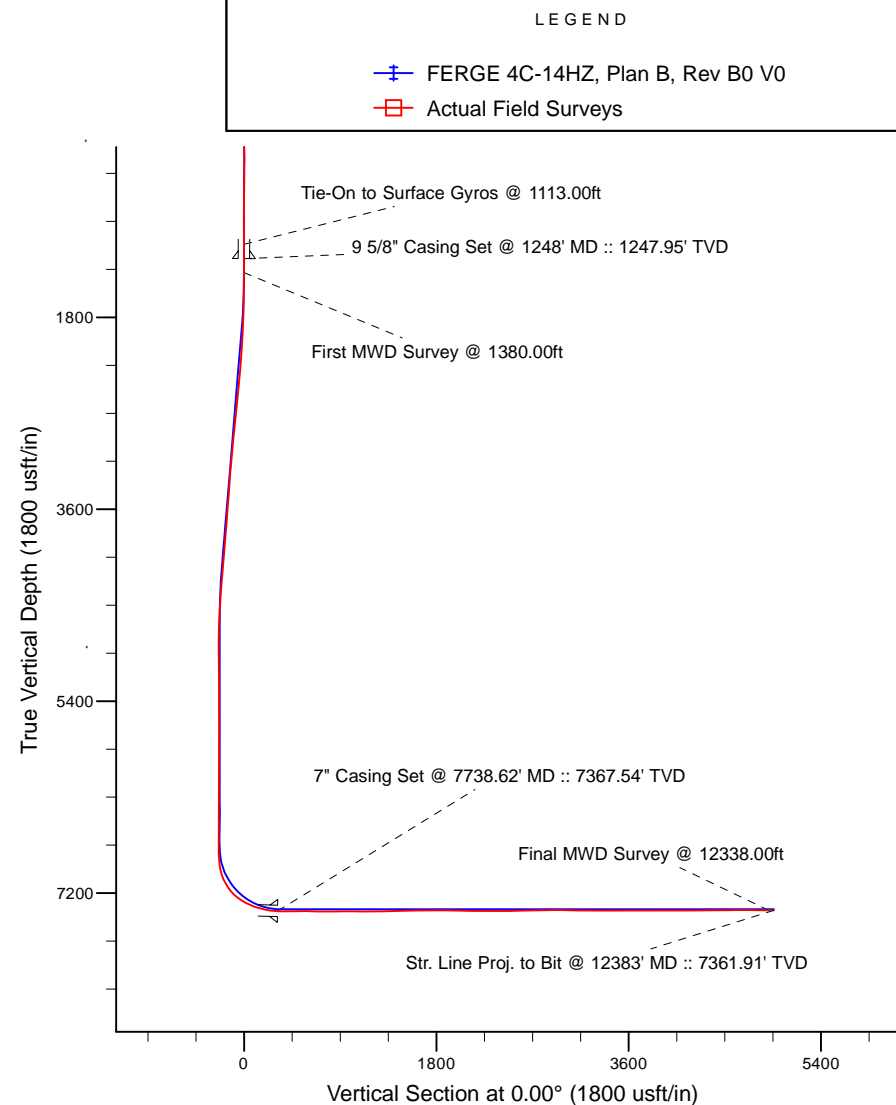
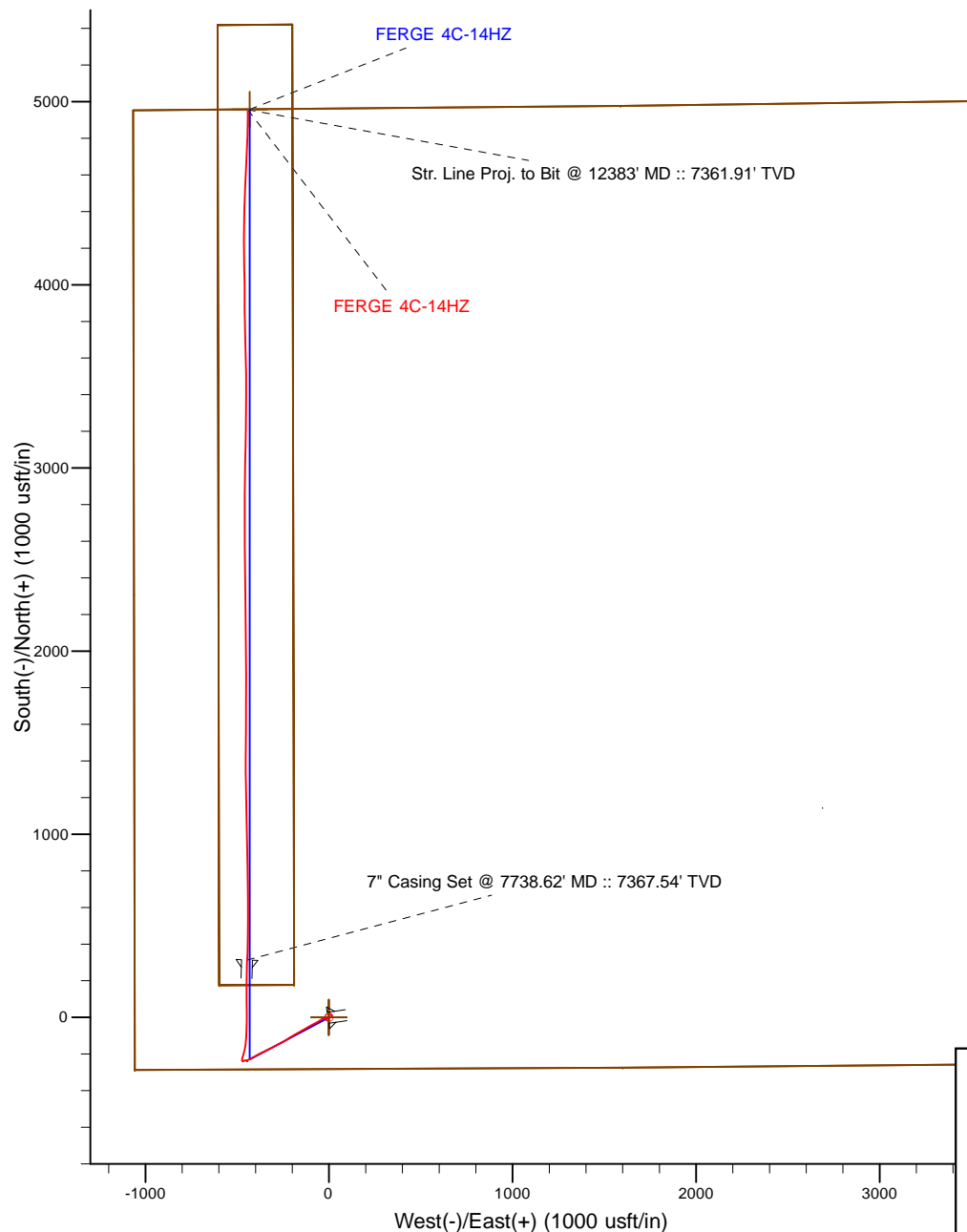


Project: Weld County, CO (NAD 83)  
 Site: Sec. 14-T3N-R66W  
 Well: FERGE 4C-14HZ  
 Wellbore: Plan B  
 Design: Actual Field Surveys



7" Casing: ~597.29' FSL, ~613.64' FWL  
 Lat/Long: 40.219452 N, -104.751611 E  
 State Planes - CO Northern: 1,323,670.49' N, 3,208,986.84' E  
 Location: Sec. 14-T3N-R66W

BHL: ~2.78' FNL, ~625.24' FWL  
 Lat/Long: 40.232197 N, -104.751597 E  
 State Planes - CO Northern: 1,328,313.16' N, 3,208,951.63' E  
 Location: Sec. 14-T3N-R66W

WELL DETAILS: FERGE 4C-14HZ	
Ground Level:	4913.00
RKB = 13' @ 4926.00usft (Ensign 132)	
Design: Actual Field Surveys (FERGE 4C-14HZ/Plan B)	
Created By: Clint Eshelman	Date: 4/9/2014
Reviewed: _____	Date: _____

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 14-T3N-R66W

FERGE 4C-14HZ

Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

### Standard Report

09 April, 2014

Well Coordinates: 1,323,360.51 N, 3,209,434.75 E (40° 13' 06.93" N, 104° 45' 00.06" W)

Ground Level: 4,913.00 usft

Local Coordinate Origin:

Centered on Well FERGE 4C-14HZ

Viewing Datum:

RKB = 13' @ 4926.00usft (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 FERGE 4C-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
13.00	0.00	0.00	13.00	0.00	0.00	0.00	0.00
113.00	0.90	274.50	113.00	0.06	-0.78	0.06	0.90
213.00	0.56	318.61	212.99	0.49	-1.89	0.49	0.63
313.00	0.39	124.20	312.99	0.67	-1.93	0.67	0.94
413.00	0.86	203.06	412.98	-0.22	-1.94	-0.22	0.87
513.00	0.76	270.73	512.97	-0.90	-2.90	-0.90	0.91
613.00	0.28	48.36	612.97	-0.73	-3.38	-0.73	0.99
713.00	0.80	196.37	712.97	-1.24	-3.39	-1.24	1.05
813.00	0.61	284.06	812.96	-1.78	-4.11	-1.78	0.99
913.00	0.50	120.82	912.96	-1.87	-4.25	-1.87	1.10
1,013.00	0.80	234.31	1,012.96	-2.50	-4.44	-2.50	1.10
1,113.00	0.37	27.79	1,112.96	-2.62	-4.86	-2.62	1.14
<b>Tie-On to Surface Gyros @ 1113.00ft</b>							
1,248.00	0.19	261.57	1,247.95	-2.27	-4.87	-2.27	0.37
<b>9 5/8" Casing Set @ 1248' MD :: 1247.95' TVD</b>							
1,380.00	0.65	234.89	1,379.95	-2.73	-5.70	-2.73	0.37
<b>First MWD Survey @ 1380.00ft</b>							
1,485.00	1.34	265.23	1,484.94	-3.18	-7.41	-3.18	0.81
1,570.00	2.77	254.70	1,569.88	-3.80	-10.38	-3.80	1.73
1,664.00	4.78	258.91	1,663.67	-5.15	-16.41	-5.15	2.16
1,759.00	5.46	267.19	1,758.29	-6.14	-24.81	-6.14	1.06
1,853.00	6.86	251.30	1,851.75	-8.16	-34.60	-8.16	2.33
1,947.00	6.44	233.23	1,945.13	-13.11	-44.14	-13.11	2.26
2,041.00	7.10	237.86	2,038.48	-19.36	-53.28	-19.36	0.91
2,135.00	8.81	243.20	2,131.57	-25.69	-64.63	-25.69	1.98
2,229.00	10.70	241.39	2,224.21	-33.12	-78.71	-33.12	2.04
2,323.00	9.79	239.29	2,316.71	-41.38	-93.25	-41.38	1.05
2,417.00	10.13	243.71	2,409.29	-49.12	-107.53	-49.12	0.89
2,512.00	10.18	236.77	2,502.81	-57.42	-122.04	-57.42	1.29
2,606.00	10.90	242.47	2,595.22	-66.08	-136.87	-66.08	1.35
2,700.00	10.00	239.95	2,687.66	-74.28	-151.82	-74.28	1.07
2,794.00	12.56	241.40	2,779.84	-83.26	-167.86	-83.26	2.74
2,889.00	12.28	239.10	2,872.62	-93.39	-185.60	-93.39	0.60
2,983.00	12.38	239.14	2,964.45	-103.69	-202.82	-103.69	0.11
3,077.00	10.89	237.22	3,056.51	-113.67	-218.94	-113.67	1.64
3,171.00	8.97	232.24	3,149.10	-122.97	-232.20	-122.97	2.24
3,265.00	8.59	243.75	3,242.01	-130.56	-244.29	-130.56	1.91
3,360.00	8.17	244.88	3,336.00	-136.56	-256.77	-136.56	0.47
3,455.00	8.38	238.57	3,430.01	-143.04	-268.78	-143.04	0.98
3,550.00	9.51	243.60	3,523.85	-150.14	-281.72	-150.14	1.45
3,645.00	9.54	243.05	3,617.54	-157.20	-295.77	-157.20	0.10
3,740.00	9.18	243.48	3,711.28	-164.15	-309.57	-164.15	0.39
3,835.00	9.68	243.90	3,804.99	-171.05	-323.52	-171.05	0.53
3,930.00	9.69	242.57	3,898.64	-178.24	-337.79	-178.24	0.24
4,025.00	11.37	243.73	3,992.04	-186.07	-353.28	-186.07	1.78
4,120.00	11.17	242.62	4,085.21	-194.45	-369.85	-194.45	0.31
4,215.00	11.29	242.45	4,178.39	-202.98	-386.27	-202.98	0.13
4,310.00	9.73	240.54	4,271.79	-211.23	-401.50	-211.23	1.68
4,405.00	8.11	242.41	4,365.64	-218.28	-414.43	-218.28	1.73

**Design Report for FERGE 4C-14HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,500.00	6.54	240.37	4,459.86	-224.06	-425.07	-224.06	1.67
4,595.00	5.26	241.50	4,554.35	-228.81	-433.60	-228.81	1.35
4,690.00	3.59	241.39	4,649.07	-232.32	-440.04	-232.32	1.76
4,786.00	2.87	223.98	4,744.92	-235.48	-444.35	-235.48	1.26
4,881.00	0.44	205.46	4,839.87	-237.53	-446.16	-237.53	2.59
4,976.00	0.70	128.51	4,934.87	-238.22	-445.86	-238.22	0.78
5,071.00	0.43	350.13	5,029.86	-238.23	-445.47	-238.23	1.12
5,166.00	0.34	330.78	5,124.86	-237.63	-445.67	-237.63	0.17
5,261.00	0.64	334.55	5,219.86	-236.90	-446.03	-236.90	0.32
5,356.00	0.95	313.16	5,314.85	-235.89	-446.84	-235.89	0.45
5,451.00	0.98	294.53	5,409.84	-235.01	-448.15	-235.01	0.33
5,546.00	0.81	271.16	5,504.83	-234.66	-449.56	-234.66	0.42
5,640.00	0.84	268.02	5,598.82	-234.67	-450.91	-234.67	0.06
5,830.00	0.29	288.91	5,788.81	-234.56	-452.76	-234.56	0.30
6,021.00	0.47	258.02	5,979.80	-234.57	-453.98	-234.57	0.14
6,116.00	1.16	252.25	6,074.79	-234.94	-455.28	-234.94	0.73
6,211.00	1.05	271.04	6,169.77	-235.22	-457.07	-235.22	0.40
6,306.00	1.15	258.88	6,264.76	-235.39	-458.87	-235.39	0.27
6,401.00	0.83	258.52	6,359.74	-235.71	-460.48	-235.71	0.34
6,496.00	1.87	239.36	6,454.72	-236.64	-462.49	-236.64	1.18
6,591.00	1.37	234.16	6,549.68	-238.09	-464.74	-238.09	0.55
6,687.00	1.38	265.39	6,645.65	-238.85	-466.83	-238.85	0.77
6,782.00	2.01	263.21	6,740.61	-239.14	-469.62	-239.14	0.67
6,830.00	2.01	292.31	6,788.58	-238.92	-471.24	-238.92	2.10
6,877.00	2.78	326.59	6,835.54	-237.66	-472.63	-237.66	3.39
6,925.00	4.37	349.70	6,883.45	-234.89	-473.59	-234.89	4.41
6,972.00	6.91	3.01	6,930.22	-230.30	-473.77	-230.30	6.04
7,025.00	12.58	17.17	6,982.44	-221.60	-471.89	-221.60	11.54
7,067.00	18.56	16.11	7,022.88	-210.79	-468.68	-210.79	14.25
7,115.00	24.49	18.18	7,067.51	-193.99	-463.46	-193.99	12.45
7,162.00	30.09	11.10	7,109.28	-173.15	-458.14	-173.15	13.75
7,210.00	35.62	6.70	7,149.59	-147.43	-454.19	-147.43	12.54
7,257.00	41.03	5.21	7,186.45	-118.46	-451.19	-118.46	11.68
7,305.00	47.48	2.35	7,220.81	-85.05	-449.03	-85.05	14.06
7,352.00	53.23	0.69	7,250.79	-48.89	-448.10	-48.89	12.53
7,400.00	58.94	0.31	7,277.56	-9.08	-447.75	-9.08	11.91
7,448.00	64.72	359.21	7,300.21	33.22	-447.94	33.22	12.21
7,496.00	69.91	359.72	7,318.72	77.49	-448.35	77.49	10.86
7,543.00	72.38	359.73	7,333.91	121.96	-448.56	121.96	5.26
7,591.00	75.64	0.01	7,347.13	168.10	-448.67	168.10	6.81
7,638.00	77.90	1.17	7,357.88	213.84	-448.19	213.84	5.38
7,686.00	84.48	1.39	7,365.23	261.24	-447.13	261.24	13.72
7,708.00	88.00	2.22	7,366.67	283.18	-446.44	283.18	16.44
7,738.62	88.76	2.10	7,367.54	313.76	-445.29	313.76	2.52
<b>7" Casing Set @ 7738.62' MD :: 7367.54' TVD</b>							
7,777.00	89.72	1.95	7,368.05	352.12	-443.93	352.12	2.52
7,872.00	89.51	0.95	7,368.68	447.08	-441.53	447.08	1.08
7,967.00	89.38	0.25	7,369.60	542.07	-440.53	542.07	0.75
8,062.00	89.01	359.78	7,370.94	637.06	-440.51	637.06	0.63
8,157.00	90.22	359.09	7,371.58	732.05	-441.45	732.05	1.47
8,252.00	90.18	359.00	7,371.25	827.04	-443.03	827.04	0.10

**Design Report for FERGE 4C-14HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,348.00	90.18	358.57	7,370.94	923.02	-445.07	923.02	0.45
8,443.00	89.97	358.99	7,370.82	1,017.99	-447.09	1,017.99	0.49
8,538.00	89.91	359.22	7,370.92	1,112.98	-448.57	1,112.98	0.25
8,633.00	89.72	358.83	7,371.23	1,207.97	-450.19	1,207.97	0.46
8,728.00	90.92	358.37	7,370.69	1,302.94	-452.51	1,302.94	1.35
8,823.00	92.07	0.68	7,368.22	1,397.89	-453.30	1,397.89	2.72
8,918.00	92.07	0.19	7,364.78	1,492.83	-452.58	1,492.83	0.52
9,013.00	90.89	0.73	7,362.33	1,587.79	-451.81	1,587.79	1.37
9,109.00	90.59	0.11	7,361.09	1,683.78	-451.11	1,683.78	0.72
9,204.00	89.75	0.14	7,360.81	1,778.78	-450.90	1,778.78	0.88
9,299.00	89.23	359.31	7,361.65	1,873.77	-451.36	1,873.77	1.03
9,394.00	88.70	0.03	7,363.37	1,968.75	-451.91	1,968.75	0.94
9,489.00	89.72	359.50	7,364.68	2,063.74	-452.30	2,063.74	1.21
9,584.00	89.60	359.43	7,365.24	2,158.74	-453.18	2,158.74	0.15
9,680.00	88.95	358.61	7,366.46	2,254.71	-454.82	2,254.71	1.09
9,775.00	89.41	359.23	7,367.82	2,349.69	-456.62	2,349.69	0.81
9,870.00	91.26	0.29	7,367.26	2,444.68	-457.01	2,444.68	2.24
9,965.00	91.17	359.68	7,365.25	2,539.66	-457.04	2,539.66	0.65
10,060.00	90.92	359.47	7,363.52	2,634.64	-457.74	2,634.64	0.34
10,155.00	90.68	359.12	7,362.19	2,729.62	-458.91	2,729.62	0.45
10,250.00	91.73	0.01	7,360.19	2,824.60	-459.63	2,824.60	1.45
10,346.00	90.46	1.04	7,358.36	2,920.57	-458.75	2,920.57	1.70
10,441.00	88.95	1.37	7,358.85	3,015.55	-456.76	3,015.55	1.63
10,536.00	88.77	1.47	7,360.74	3,110.50	-454.40	3,110.50	0.22
10,631.00	88.49	1.06	7,363.01	3,205.45	-452.30	3,205.45	0.52
10,726.00	89.94	0.41	7,364.31	3,300.43	-451.09	3,300.43	1.67
10,821.00	90.46	359.86	7,363.98	3,395.43	-450.86	3,395.43	0.80
10,917.00	90.43	359.89	7,363.23	3,491.42	-451.07	3,491.42	0.04
11,012.00	90.25	358.90	7,362.67	3,586.41	-452.08	3,586.41	1.06
11,107.00	89.94	358.35	7,362.51	3,681.39	-454.35	3,681.39	0.66
11,202.00	89.54	357.68	7,362.94	3,776.33	-457.65	3,776.33	0.82
11,297.00	90.65	0.02	7,362.78	3,871.30	-459.55	3,871.30	2.73
11,392.00	90.31	0.46	7,361.99	3,966.30	-459.15	3,966.30	0.59
11,487.00	89.32	358.74	7,362.30	4,061.29	-459.82	4,061.29	2.09
11,582.00	89.11	358.20	7,363.60	4,156.25	-462.35	4,156.25	0.61
11,677.00	90.65	0.55	7,363.80	4,251.23	-463.39	4,251.23	2.96
11,772.00	91.33	1.51	7,362.15	4,346.20	-461.68	4,346.20	1.24
11,867.00	91.02	1.31	7,360.21	4,441.15	-459.34	4,441.15	0.39
11,962.00	90.34	2.43	7,359.08	4,536.09	-456.25	4,536.09	1.38
12,057.00	90.37	2.86	7,358.49	4,630.99	-451.86	4,630.99	0.45
12,152.00	89.51	2.55	7,358.59	4,725.88	-447.38	4,725.88	0.96
12,247.00	89.20	1.57	7,359.66	4,820.81	-443.96	4,820.81	1.08
12,338.00	88.98	0.94	7,361.10	4,911.78	-441.97	4,911.78	0.73
<b>Final MWD Survey @ 12338.00ft</b>							
12,383.00	88.98	0.94	7,361.91	4,956.76	-441.23	4,956.76	0.00
<b>Str. Line Proj. to Bit @ 12383' MD :: 7361.91' TVD</b>							

## Design Report for FERGE 4C-14HZ - Actual Field Surveys

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,113.00	1,112.96	-2.62	-4.86	Tie-On to Surface Gyros @ 1113.00ft
1,380.00	1,379.95	-2.73	-5.70	First MWD Survey @ 1380.00ft
12,338.00	7,361.10	4,911.78	-441.97	Final MWD Survey @ 12338.00ft
12,383.00	7,361.91	4,956.76	-441.23	Str. Line Proj. to Bit @ 12383' MD :: 7361.91' TVD

Vertical Section Information

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

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,113.00	MS Energy Gyros	NS-GYRO-MS
1,380.00	7,777.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,872.00	8,823.00	MWD Beginning Lateral Surveys	MWD+IFR1+SC
8,918.00	12,338.00	MWD Lateral Surveys	MWD+SC

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,248.00	1,247.95	9 5/8" Casing Set @ 1248' MD :: 1247.95' TVD	9-5/8	13-1/2
7,738.62	7,367.54	7" Casing Set @ 7738.62' MD :: 7367.54' TVD	7	8-3/4

## Design Report for FERGE 4C-14HZ - 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
FERGE 4C-14HZ_SHI - actual wellpath hits target center - Point	0.00	0.00	0.00	0.00	0.00	1,323,360.51	3,209,434.75	40.218591	-104.750016
FERGE 4C-14HZ_LD - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,323,360.51	3,209,434.75	40.218591	-104.750016
Point 1				0.00	5,418.07	-606.80	1,328,773.03	3,208,782.17	
Point 2				0.00	5,421.77	-199.54	1,328,780.17	3,209,189.37	
Point 3				0.00	177.51	-189.20	1,323,536.41	3,209,244.06	
Point 4				0.00	175.69	-598.70	1,323,531.13	3,208,834.61	
FERGE 4C-14HZ_SEC - actual wellpath hits target center - Polygon	0.00	0.00	0.00	0.00	0.00	1,323,360.51	3,209,434.75	40.218591	-104.750016
Point 1				0.00	4,953.86	-1,066.49	1,328,304.96	3,208,326.44	
Point 2				0.00	4,977.97	1,588.51	1,328,351.53	3,210,981.03	
Point 3				0.00	5,012.95	4,244.10	1,328,408.96	3,213,636.12	
Point 4				0.00	2,374.53	4,249.72	1,325,770.80	3,213,664.05	
Point 5				0.00	-250.17	4,261.67	1,323,146.41	3,213,698.20	
Point 6				0.00	-274.20	1,601.36	1,323,099.88	3,211,038.30	
Point 7				0.00	-286.37	-1,057.91	1,323,065.22	3,208,379.34	
Point 8				0.00	2,309.91	-1,062.44	1,325,661.26	3,208,352.85	
FERGE 4C-14HZ_BHL - actual wellpath misses target center by 14.80usft at 12383.00usft MD (7361.91 TVD, 4956.76 N, -441.23 E) - Point	0.00	0.00	7,351.00	4,958.51	-431.38	1,328,314.99	3,208,961.46	40.232202	-104.751561

**Directional Difficulty Index**

Average Dogleg over Survey:	1.66 °/100usft	Maximum Dogleg over Survey:	16.44 °/100usft at 7,708.00 usft
Net Tortousity applicable to Plans:	0.68 °/100usft	Directional Difficulty Index:	6.297

**Audit Info**

**North Reference Sheet for Sec. 14-T3N-R66W - FERGE 4C-14HZ - Plan B**

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' @ 4926.00usft (Ensign 132). Northing and Easting are relative to FERGE 4C-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: 0.99995700

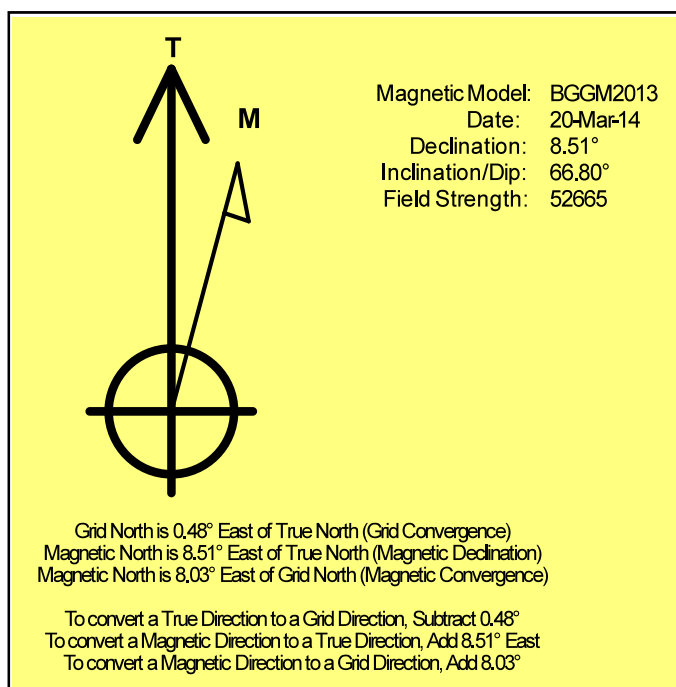
Grid Coordinates of Well: 1,323,360.51 usft N, 3,209,434.75 usft E

Geographical Coordinates of Well: 40° 13' 06.93" N, 104° 45' 00.06" W

Grid Convergence at Surface is: 0.48°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,383.00usft  
the Bottom Hole Displacement is 4,976.36usft in the Direction of 354.91° ( True).

Magnetic Convergence at surface is: -8.03° (20 March 2014, , BGGM2013)





# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 14-T3N-R66W

FERGE 4C-14HZ

Plan B

Design: Actual Field Surveys

## Sperry Drilling Services

## Geodetic Report

09 April, 2014

Well Coordinates: 1,323,360.51 N, 3,209,434.75 E (40° 13' 06.93" N, 104° 45' 00.06" W)

Ground Level: 4,913.00 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 FERGE 4C-14HZ

RKB = 13' @ 4926.00usft (Ensign 132)

N

True

Dec-Deg - API - US Survey Feet - Custom

# HALLIBURTON

## Design Report for FERGE 4C-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	40.218591	-104.750016	1,323,360.51	3,209,434.75
13.00	0.00	0.00	13.00	0.00	0.00	40.218591	-104.750016	1,323,360.51	3,209,434.75
113.00	0.90	274.50	113.00	0.06	-0.78	40.218591	-104.750019	1,323,360.57	3,209,433.96
213.00	0.56	318.61	212.99	0.49	-1.89	40.218592	-104.750023	1,323,360.99	3,209,432.85
313.00	0.39	124.20	312.99	0.67	-1.93	40.218593	-104.750023	1,323,361.16	3,209,432.81
413.00	0.86	203.06	412.98	-0.22	-1.94	40.218590	-104.750023	1,323,360.28	3,209,432.80
513.00	0.76	270.73	512.97	-0.90	-2.90	40.218589	-104.750027	1,323,359.59	3,209,431.85
613.00	0.28	48.36	612.97	-0.73	-3.38	40.218589	-104.750028	1,323,359.76	3,209,431.37
713.00	0.80	196.37	712.97	-1.24	-3.39	40.218588	-104.750028	1,323,359.25	3,209,431.36
813.00	0.61	284.06	812.96	-1.78	-4.11	40.218586	-104.750031	1,323,358.70	3,209,430.65
913.00	0.50	120.82	912.96	-1.87	-4.25	40.218586	-104.750031	1,323,358.61	3,209,430.51
1,013.00	0.80	234.31	1,012.96	-2.50	-4.44	40.218584	-104.750032	1,323,357.98	3,209,430.32
1,113.00	0.37	27.79	1,112.96	-2.62	-4.86	40.218584	-104.750034	1,323,357.85	3,209,429.91
1,248.00	0.19	261.57	1,247.95	-2.27	-4.87	40.218585	-104.750034	1,323,358.20	3,209,429.89
1,380.00	0.65	234.89	1,379.95	-2.73	-5.70	40.218584	-104.750037	1,323,357.74	3,209,429.07
1,485.00	1.34	265.23	1,484.94	-3.18	-7.41	40.218582	-104.750043	1,323,357.28	3,209,427.37
1,570.00	2.77	254.70	1,569.88	-3.80	-10.38	40.218581	-104.750053	1,323,356.63	3,209,424.40
1,664.00	4.78	258.91	1,663.67	-5.15	-16.41	40.218577	-104.750075	1,323,355.22	3,209,418.38
1,759.00	5.46	267.19	1,758.29	-6.14	-24.81	40.218574	-104.750105	1,323,354.17	3,209,409.99
1,853.00	6.86	251.30	1,851.75	-8.16	-34.60	40.218569	-104.750140	1,323,352.07	3,209,400.22
1,947.00	6.44	233.23	1,945.13	-13.11	-44.14	40.218555	-104.750174	1,323,347.03	3,209,390.72
2,041.00	7.10	237.86	2,038.48	-19.36	-53.28	40.218538	-104.750207	1,323,340.71	3,209,381.63
2,135.00	8.81	243.20	2,131.57	-25.69	-64.63	40.218521	-104.750248	1,323,334.28	3,209,370.34
2,229.00	10.70	241.39	2,224.21	-33.12	-78.71	40.218500	-104.750298	1,323,326.73	3,209,356.32
2,323.00	9.79	239.29	2,316.71	-41.38	-93.25	40.218477	-104.750350	1,323,318.35	3,209,341.86
2,417.00	10.13	243.71	2,409.29	-49.12	-107.53	40.218456	-104.750401	1,323,310.49	3,209,327.64
2,512.00	10.18	236.77	2,502.81	-57.42	-122.04	40.218433	-104.750453	1,323,302.06	3,209,313.20
2,606.00	10.90	242.47	2,595.22	-66.08	-136.87	40.218410	-104.750506	1,323,293.28	3,209,298.44
2,700.00	10.00	239.95	2,687.66	-74.28	-151.82	40.218387	-104.750560	1,323,284.96	3,209,283.57
2,794.00	12.56	241.40	2,779.84	-83.26	-167.86	40.218362	-104.750617	1,323,275.84	3,209,267.60
2,889.00	12.28	239.10	2,872.62	-93.39	-185.60	40.218335	-104.750681	1,323,265.56	3,209,249.95
2,983.00	12.38	239.14	2,964.45	-103.69	-202.82	40.218306	-104.750743	1,323,255.11	3,209,232.81
3,077.00	10.89	237.22	3,056.51	-113.67	-218.94	40.218279	-104.750800	1,323,245.00	3,209,216.78
3,171.00	8.97	232.24	3,149.10	-122.97	-232.20	40.218253	-104.750848	1,323,235.59	3,209,203.60
3,265.00	8.59	243.75	3,242.01	-130.56	-244.29	40.218233	-104.750891	1,323,227.90	3,209,191.58
3,360.00	8.17	244.88	3,336.00	-136.56	-256.77	40.218216	-104.750936	1,323,221.79	3,209,179.15
3,455.00	8.38	238.57	3,430.01	-143.04	-268.78	40.218198	-104.750979	1,323,215.21	3,209,167.19
3,550.00	9.51	243.60	3,523.85	-150.14	-281.72	40.218179	-104.751025	1,323,208.00	3,209,154.32
3,645.00	9.54	243.05	3,617.54	-157.20	-295.77	40.218160	-104.751075	1,323,200.83	3,209,140.33
3,740.00	9.18	243.48	3,711.28	-164.15	-309.57	40.218140	-104.751125	1,323,193.76	3,209,126.59
3,835.00	9.68	243.90	3,804.99	-171.05	-323.52	40.218122	-104.751175	1,323,186.75	3,209,112.70
3,930.00	9.69	242.57	3,898.64	-178.24	-337.79	40.218102	-104.751226	1,323,179.43	3,209,098.49

## Design Report for FERGE 4C-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)
4,025.00	11.37	243.73	3,992.04	-186.07	-353.28	40.218080	-104.751281	1,323,171.47	3,209,083.06
4,120.00	11.17	242.62	4,085.21	-194.45	-369.85	40.218057	-104.751341	1,323,162.95	3,209,066.57
4,215.00	11.29	242.45	4,178.39	-202.98	-386.27	40.218034	-104.751399	1,323,154.28	3,209,050.23
4,310.00	9.73	240.54	4,271.79	-211.23	-401.50	40.218011	-104.751454	1,323,145.91	3,209,035.06
4,405.00	8.11	242.41	4,365.64	-218.28	-414.43	40.217992	-104.751500	1,323,138.74	3,209,022.19
4,500.00	6.54	240.37	4,459.86	-224.06	-425.07	40.217976	-104.751538	1,323,132.88	3,209,011.60
4,595.00	5.26	241.50	4,554.35	-228.81	-433.60	40.217963	-104.751569	1,323,128.05	3,209,003.11
4,690.00	3.59	241.39	4,649.07	-232.32	-440.04	40.217953	-104.751592	1,323,124.50	3,208,996.70
4,786.00	2.87	223.98	4,744.92	-235.48	-444.35	40.217945	-104.751607	1,323,121.29	3,208,992.42
4,881.00	0.44	205.46	4,839.87	-237.53	-446.16	40.217939	-104.751614	1,323,119.23	3,208,990.63
4,976.00	0.70	128.51	4,934.87	-238.22	-445.86	40.217937	-104.751613	1,323,118.55	3,208,990.93
5,071.00	0.43	350.13	5,029.86	-238.23	-445.47	40.217937	-104.751611	1,323,118.54	3,208,991.33
5,166.00	0.34	330.78	5,124.86	-237.63	-445.67	40.217939	-104.751612	1,323,119.13	3,208,991.12
5,261.00	0.64	334.55	5,219.86	-236.90	-446.03	40.217941	-104.751613	1,323,119.86	3,208,990.75
5,356.00	0.95	313.16	5,314.85	-235.89	-446.84	40.217944	-104.751616	1,323,120.87	3,208,989.94
5,451.00	0.98	294.53	5,409.84	-235.01	-448.15	40.217946	-104.751621	1,323,121.73	3,208,988.62
5,546.00	0.81	271.16	5,504.83	-234.66	-449.56	40.217947	-104.751626	1,323,122.07	3,208,987.21
5,640.00	0.84	268.02	5,598.82	-234.67	-450.91	40.217947	-104.751631	1,323,122.05	3,208,985.85
5,830.00	0.29	288.91	5,788.81	-234.56	-452.76	40.217947	-104.751637	1,323,122.14	3,208,984.01
6,021.00	0.47	258.02	5,979.80	-234.57	-453.98	40.217947	-104.751642	1,323,122.13	3,208,982.78
6,116.00	1.16	252.25	6,074.79	-234.94	-455.28	40.217946	-104.751647	1,323,121.74	3,208,981.49
6,211.00	1.05	271.04	6,169.77	-235.22	-457.07	40.217945	-104.751653	1,323,121.45	3,208,979.70
6,306.00	1.15	258.88	6,264.76	-235.39	-458.87	40.217945	-104.751659	1,323,121.26	3,208,977.90
6,401.00	0.83	258.52	6,359.74	-235.71	-460.48	40.217944	-104.751665	1,323,120.93	3,208,976.29
6,496.00	1.87	239.36	6,454.72	-236.64	-462.49	40.217941	-104.751672	1,323,119.99	3,208,974.29
6,591.00	1.37	234.16	6,549.68	-238.09	-464.74	40.217937	-104.751680	1,323,118.51	3,208,972.05
6,687.00	1.38	265.39	6,645.65	-238.85	-466.83	40.217935	-104.751688	1,323,117.73	3,208,969.98
6,782.00	2.01	263.21	6,740.61	-239.14	-469.62	40.217935	-104.751698	1,323,117.42	3,208,967.18
6,830.00	2.01	292.31	6,788.58	-238.92	-471.24	40.217935	-104.751704	1,323,117.62	3,208,965.57
6,877.00	2.78	326.59	6,835.54	-237.66	-472.63	40.217939	-104.751709	1,323,118.88	3,208,964.17
6,925.00	4.37	349.70	6,883.45	-234.89	-473.59	40.217946	-104.751712	1,323,121.64	3,208,963.17
6,972.00	6.91	3.01	6,930.22	-230.30	-473.77	40.217959	-104.751713	1,323,126.22	3,208,962.96
7,025.00	12.58	17.17	6,982.44	-221.60	-471.89	40.217983	-104.751706	1,323,134.95	3,208,964.76
7,067.00	18.56	16.11	7,022.88	-210.79	-468.68	40.218012	-104.751695	1,323,145.77	3,208,967.88
7,115.00	24.49	18.18	7,067.51	-193.99	-463.46	40.218059	-104.751676	1,323,162.62	3,208,972.97
7,162.00	30.09	11.10	7,109.28	-173.15	-458.14	40.218116	-104.751657	1,323,183.51	3,208,978.10
7,210.00	35.62	6.70	7,149.59	-147.43	-454.19	40.218186	-104.751643	1,323,209.25	3,208,981.84
7,257.00	41.03	5.21	7,186.45	-118.46	-451.19	40.218266	-104.751632	1,323,238.25	3,208,984.59
7,305.00	47.48	2.35	7,220.81	-85.05	-449.03	40.218358	-104.751624	1,323,271.67	3,208,986.47
7,352.00	53.23	0.69	7,250.79	-48.89	-448.10	40.218457	-104.751621	1,323,307.84	3,208,987.10
7,400.00	58.94	0.31	7,277.56	-9.08	-447.75	40.218566	-104.751620	1,323,347.65	3,208,987.10
7,448.00	64.72	359.21	7,300.21	33.22	-447.94	40.218682	-104.751620	1,323,389.94	3,208,986.56

## Design Report for FERGE 4C-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)
7,496.00	69.91	359.72	7,318.72	77.49	-448.35	40.218804	-104.751622	1,323,434.20	3,208,985.77
7,543.00	72.38	359.73	7,333.91	121.96	-448.56	40.218926	-104.751622	1,323,478.67	3,208,985.19
7,591.00	75.64	0.01	7,347.13	168.10	-448.67	40.219052	-104.751623	1,323,524.80	3,208,984.69
7,638.00	77.90	1.17	7,357.88	213.84	-448.19	40.219178	-104.751621	1,323,570.55	3,208,984.78
7,686.00	84.48	1.39	7,365.23	261.24	-447.13	40.219308	-104.751617	1,323,617.95	3,208,985.44
7,708.00	88.00	2.22	7,366.67	283.18	-446.44	40.219368	-104.751615	1,323,639.89	3,208,985.94
7,738.62	88.76	2.10	7,367.54	313.76	-445.29	40.219452	-104.751611	1,323,670.49	3,208,986.84
7,777.00	89.72	1.95	7,368.05	352.12	-443.93	40.219558	-104.751606	1,323,708.85	3,208,987.87
7,872.00	89.51	0.95	7,368.68	447.08	-441.53	40.219818	-104.751597	1,323,803.83	3,208,989.47
7,967.00	89.38	0.25	7,369.60	542.07	-440.53	40.220079	-104.751594	1,323,898.82	3,208,989.66
8,062.00	89.01	359.78	7,370.94	637.06	-440.51	40.220340	-104.751594	1,323,993.80	3,208,988.88
8,157.00	90.22	359.09	7,371.58	732.05	-441.45	40.220601	-104.751597	1,324,088.78	3,208,987.14
8,252.00	90.18	359.00	7,371.25	827.04	-443.03	40.220861	-104.751603	1,324,183.74	3,208,984.76
8,348.00	90.18	358.57	7,370.94	923.02	-445.07	40.221125	-104.751610	1,324,279.69	3,208,981.91
8,443.00	89.97	358.99	7,370.82	1,017.99	-447.09	40.221385	-104.751617	1,324,374.65	3,208,979.08
8,538.00	89.91	359.22	7,370.92	1,112.98	-448.57	40.221646	-104.751623	1,324,469.62	3,208,976.80
8,633.00	89.72	358.83	7,371.23	1,207.97	-450.19	40.221907	-104.751628	1,324,564.58	3,208,974.38
8,728.00	90.92	358.37	7,370.69	1,302.94	-452.51	40.222168	-104.751637	1,324,659.52	3,208,971.25
8,823.00	92.07	0.68	7,368.22	1,397.89	-453.30	40.222428	-104.751640	1,324,754.46	3,208,969.66
8,918.00	92.07	0.19	7,364.78	1,492.83	-452.58	40.222689	-104.751637	1,324,849.40	3,208,969.58
9,013.00	90.89	0.73	7,362.33	1,587.79	-451.81	40.222950	-104.751634	1,324,944.36	3,208,969.54
9,109.00	90.59	0.11	7,361.09	1,683.78	-451.11	40.223213	-104.751632	1,325,040.35	3,208,969.43
9,204.00	89.75	0.14	7,360.81	1,778.78	-450.90	40.223474	-104.751631	1,325,135.34	3,208,968.83
9,299.00	89.23	359.31	7,361.65	1,873.77	-451.36	40.223735	-104.751633	1,325,230.32	3,208,967.57
9,394.00	88.70	0.03	7,363.37	1,968.75	-451.91	40.223995	-104.751635	1,325,325.29	3,208,966.22
9,489.00	89.72	359.50	7,364.68	2,063.74	-452.30	40.224256	-104.751636	1,325,420.27	3,208,965.03
9,584.00	89.60	359.43	7,365.24	2,158.74	-453.18	40.224517	-104.751639	1,325,515.25	3,208,963.34
9,680.00	88.95	358.61	7,366.46	2,254.71	-454.82	40.224780	-104.751645	1,325,611.20	3,208,960.89
9,775.00	89.41	359.23	7,367.82	2,349.69	-456.62	40.225041	-104.751651	1,325,706.15	3,208,958.29
9,870.00	91.26	0.29	7,367.26	2,444.68	-457.01	40.225302	-104.751653	1,325,801.14	3,208,957.09
9,965.00	91.17	359.68	7,365.25	2,539.66	-457.04	40.225562	-104.751653	1,325,896.11	3,208,956.26
10,060.00	90.92	359.47	7,363.52	2,634.64	-457.74	40.225823	-104.751656	1,325,991.07	3,208,954.76
10,155.00	90.68	359.12	7,362.19	2,729.62	-458.91	40.226084	-104.751660	1,326,086.04	3,208,952.79
10,250.00	91.73	0.01	7,360.19	2,824.60	-459.63	40.226345	-104.751662	1,326,181.00	3,208,951.26
10,346.00	90.46	1.04	7,358.36	2,920.57	-458.75	40.226608	-104.751659	1,326,276.98	3,208,951.33
10,441.00	88.95	1.37	7,358.85	3,015.55	-456.76	40.226869	-104.751652	1,326,371.96	3,208,952.52
10,536.00	88.77	1.47	7,360.74	3,110.50	-454.40	40.227129	-104.751644	1,326,466.92	3,208,954.07
10,631.00	88.49	1.06	7,363.01	3,205.45	-452.30	40.227390	-104.751636	1,326,561.88	3,208,955.37
10,726.00	89.94	0.41	7,364.31	3,300.43	-451.09	40.227651	-104.751632	1,326,656.87	3,208,955.78
10,821.00	90.46	359.86	7,363.98	3,395.43	-450.86	40.227911	-104.751631	1,326,751.86	3,208,955.20
10,917.00	90.43	359.89	7,363.23	3,491.42	-451.07	40.228175	-104.751632	1,326,847.85	3,208,954.18
11,012.00	90.25	358.90	7,362.67	3,586.41	-452.08	40.228436	-104.751635	1,326,942.82	3,208,952.37

## Design Report for FERGE 4C-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)
11,107.00	89.94	358.35	7,362.51	3,681.39	-454.35	40.228696	-104.751643	1,327,037.77	3,208,949.29
11,202.00	89.54	357.68	7,362.94	3,776.33	-457.65	40.228957	-104.751655	1,327,132.67	3,208,945.20
11,297.00	90.65	0.02	7,362.78	3,871.30	-459.55	40.229218	-104.751662	1,327,227.62	3,208,942.49
11,392.00	90.31	0.46	7,361.99	3,966.30	-459.15	40.229478	-104.751661	1,327,322.61	3,208,942.08
11,487.00	89.32	358.74	7,362.30	4,061.29	-459.82	40.229739	-104.751663	1,327,417.59	3,208,940.62
11,582.00	89.11	358.20	7,363.60	4,156.25	-462.35	40.230000	-104.751672	1,327,512.52	3,208,937.28
11,677.00	90.65	0.55	7,363.80	4,251.23	-463.39	40.230261	-104.751676	1,327,607.49	3,208,935.44
11,772.00	91.33	1.51	7,362.15	4,346.20	-461.68	40.230521	-104.751670	1,327,702.47	3,208,936.34
11,867.00	91.02	1.31	7,360.21	4,441.15	-459.34	40.230782	-104.751661	1,327,797.43	3,208,937.88
11,962.00	90.34	2.43	7,359.08	4,536.09	-456.25	40.231043	-104.751650	1,327,892.39	3,208,940.17
12,057.00	90.37	2.86	7,358.49	4,630.99	-451.86	40.231303	-104.751635	1,327,987.32	3,208,943.75
12,152.00	89.51	2.55	7,358.59	4,725.88	-447.38	40.231564	-104.751619	1,328,082.24	3,208,947.44
12,247.00	89.20	1.57	7,359.66	4,820.81	-443.96	40.231824	-104.751606	1,328,177.19	3,208,950.05
12,338.00	88.98	0.94	7,361.10	4,911.78	-441.97	40.232074	-104.751599	1,328,268.17	3,208,951.27
12,383.00	88.98	0.94	7,361.91	4,956.76	-441.23	40.232197	-104.751597	1,328,313.16	3,208,951.63

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,113.00	1,112.96	-2.62	-4.86	Tie-On to Surface Gyros @ 1113.00ft
1,380.00	1,379.95	-2.73	-5.70	First MWD Survey @ 1380.00ft
12,338.00	7,361.10	4,911.78	-441.97	Final MWD Survey @ 12338.00ft
12,383.00	7,361.91	4,956.76	-441.23	Str. Line Proj. to Bit @ 12383' MD :: 7361.91' TVD

### Vertical Section Information

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

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
13.00	1,113.00	MS Energy Gyros	NS-GYRO-MS
1,380.00	7,777.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,872.00	8,823.00	MWD Beginning Lateral Surveys	MWD+IFR1+SC

## Design Report for FERGE 4C-14HZ - Actual Field Surveys

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
8,918.00	12,338.00	MWD Lateral Surveys	MWD+SC

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,248.00	1,247.95	9 5/8" Casing Set @ 1248' MD :: 1247.95' TVD	9-5/8	13-1/2
7,738.62	7,367.54	7" Casing Set @ 7738.62' MD :: 7367.54' TVD	7	8-3/4

### Design Targets

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

Average Dogleg over Survey:	1.66 °/100usft	Maximum Dogleg over Survey:	16.44 °/100usft at 7,708.00 usft
Net Tortousity applicable to Plans:	0.68 °/100usft	Directional Difficulty Index:	6.297

### Audit Info

**North Reference Sheet for Sec. 14-T3N-R66W - FERGE 4C-14HZ - Plan B**

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' @ 4926.00usft (Ensign 132). Northing and Easting are relative to FERGE 4C-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: 0.99995700

Grid Coordinates of Well: 1,323,360.51 usft N, 3,209,434.75 usft E

Geographical Coordinates of Well: 40° 13' 06.93" N, 104° 45' 00.06" W

Grid Convergence at Surface is: 0.48°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,383.00usft

the Bottom Hole Displacement is 4,976.36usft in the Direction of 354.91° (True).

Magnetic Convergence at surface is: -8.03° (20 March 2014, , BGGM2013)

