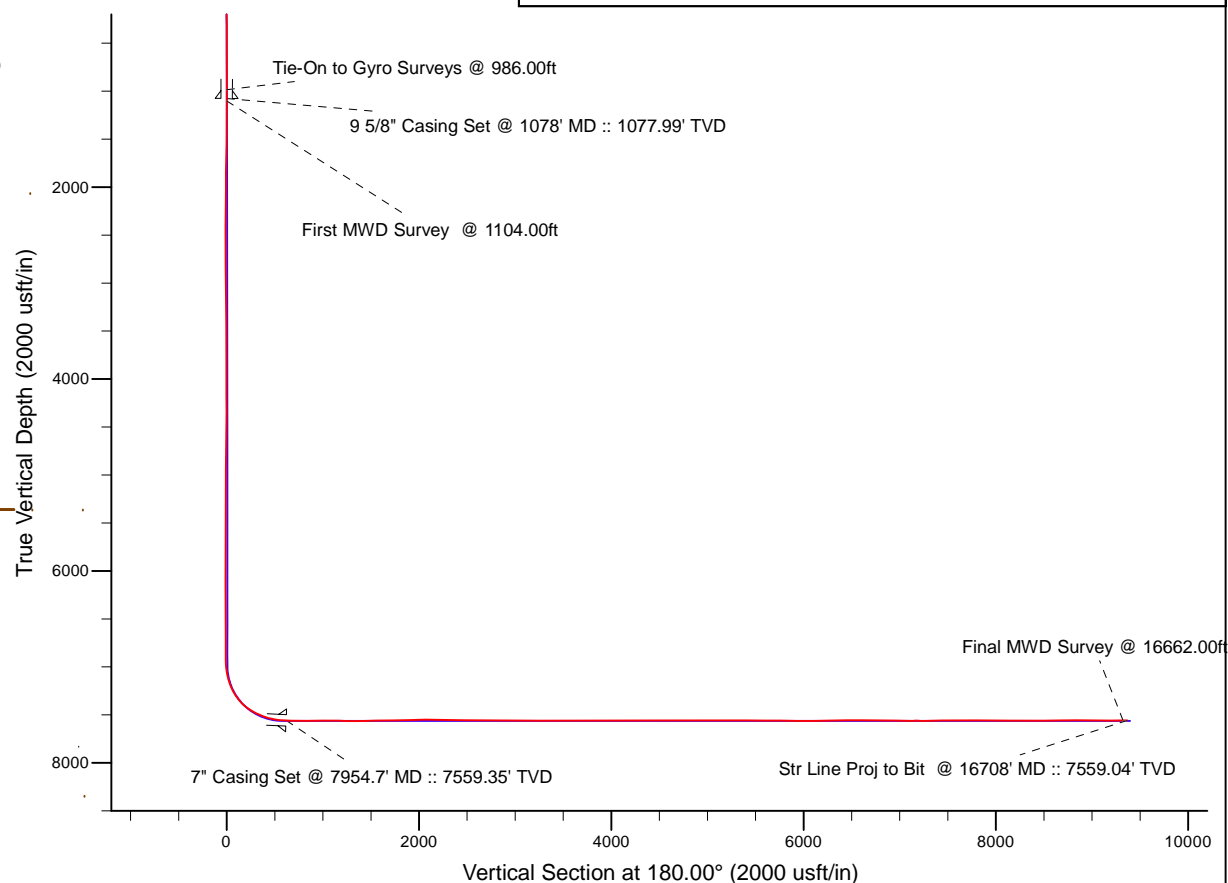
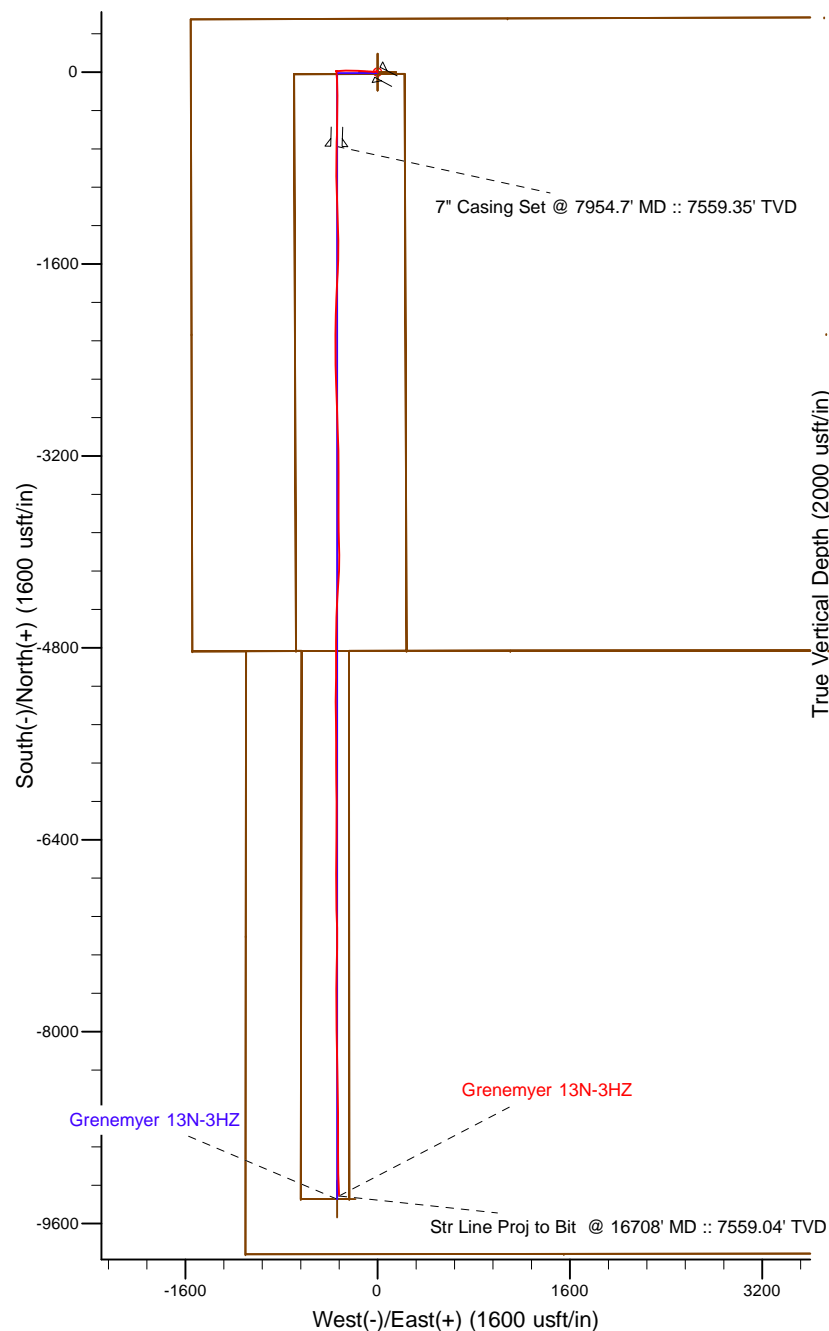


Project: Weld County, CO (NAD 83)  
 Site: Sec. 34-T1N-R67W  
 Well: Grenemyer 13N-3HZ  
 Wellbore: Plan A  
 Design: Actual Field Surveys



**HALLIBURTON**  
 Sperry Drilling



- LEGEND
- Grenemyer 13N-3HZ, Plan A, Rev A1 V0
  - Actual Field Surveys

7" Casing: ~1063.15' FNL, ~1211.29' FWL  
 Lat/Long: 40.011915 N, -104.881704 E  
 State Planes - CO Northern: 1,247,790.73' N, 3,173,186.26' E  
 Location: Sec. 34-T1N-R67W

BHL: ~485.79' FSL, ~778.58' FWL  
 Lat/Long: 39.987895 N, -104.881632 E  
 State Planes - CO Northern: 1,239,041.34' N, 3,173,267.46' E  
 Location: Sec. 3-T1S-R67W

WELL DETAILS: Grenemyer 13N-3HZ	
Ground Level:	5047.00
RKB = 16' @ 5063.00usft (Xtreme 22)	
Design: Actual Field Surveys (Grenemyer 13N-3HZ/Plan A)	
Created By: Clint Eshelman	Date: 2/11/2013
Reviewed: _____	Date: _____

# Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 34-T1N-R67W

Grenemyer 13N-3HZ

Plan A

Design: Actual Field Surveys

## Sperry Drilling Services

### Standard Report

20 January, 2014

Well Coordinates: 1,248,412.56 N, 3,173,523.57 E (40° 00' 49.01" N, 104° 52' 49.74" W)

Ground Level: 5,047.00 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 Grenemyer 13N-3HZ

RKB = 16' @ 5063.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

**HALLIBURTON**

**Design Report for Grenemyer 13N-3HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
16.00	0.00	0.00	16.00	0.00	0.00	0.00	0.00
116.00	0.12	321.46	116.00	0.08	-0.07	-0.08	0.12
216.00	0.20	227.24	216.00	0.05	-0.26	-0.05	0.24
316.00	0.26	221.78	316.00	-0.24	-0.54	0.24	0.06
416.00	0.37	178.15	416.00	-0.73	-0.68	0.73	0.26
516.00	0.56	146.89	515.99	-1.47	-0.40	1.47	0.31
616.00	0.20	339.33	615.99	-1.71	-0.20	1.71	0.76
716.00	0.33	236.16	715.99	-1.71	-0.50	1.71	0.42
816.00	0.22	148.77	815.99	-2.03	-0.64	2.03	0.39
916.00	0.35	317.39	915.99	-1.97	-0.74	1.97	0.57
986.00	0.33	255.06	985.99	-1.87	-1.08	1.87	0.50
<b>Tie-On to Gyro Surveys @ 986.00ft</b>							
1,078.00	0.37	297.13	1,077.99	-1.80	-1.60	1.80	0.28
<b>9 5/8" Casing Set @ 1078' MD :: 1077.99' TVD</b>							
1,104.00	0.41	305.90	1,103.99	-1.71	-1.75	1.71	0.28
<b>First MWD Survey @ 1104.00ft</b>							
1,294.00	0.42	345.48	1,293.98	-0.64	-2.48	0.64	0.15
1,484.00	0.57	0.35	1,483.98	0.98	-2.65	-0.98	0.10
1,673.00	1.07	357.68	1,672.96	3.69	-2.71	-3.69	0.27
1,855.00	1.27	295.34	1,854.92	6.25	-4.61	-6.25	0.67
2,039.00	0.62	41.14	2,038.91	7.87	-5.79	-7.87	0.85
2,222.00	0.53	22.33	2,221.90	9.40	-4.82	-9.40	0.11
2,406.00	0.61	39.31	2,405.89	10.94	-3.88	-10.94	0.10
2,587.00	0.34	240.82	2,586.89	11.43	-3.73	-11.43	0.52
2,769.00	1.13	251.40	2,768.87	10.59	-5.91	-10.59	0.44
2,952.00	1.38	238.78	2,951.83	8.87	-9.50	-8.87	0.20
3,135.00	2.04	248.02	3,134.75	6.51	-14.41	-6.51	0.39
3,318.00	0.60	265.40	3,317.69	5.22	-18.38	-5.22	0.81
3,495.00	1.01	252.40	3,494.67	4.67	-20.79	-4.67	0.25
3,666.00	1.58	256.51	3,665.63	3.67	-24.52	-3.67	0.34
3,837.00	0.48	238.57	3,836.60	2.74	-27.43	-2.74	0.66
4,008.00	0.19	316.97	4,007.60	2.58	-28.23	-2.58	0.28
4,179.00	0.64	236.75	4,178.59	2.26	-29.22	-2.26	0.37
4,350.00	1.59	268.31	4,349.56	1.67	-32.39	-1.67	0.64
4,521.00	5.05	279.44	4,520.25	2.83	-42.19	-2.83	2.05
4,692.00	6.90	272.86	4,690.31	4.58	-59.88	-4.58	1.15
4,863.00	9.31	275.25	4,859.59	6.36	-83.91	-6.36	1.42
5,034.00	12.08	272.31	5,027.61	8.34	-115.57	-8.34	1.65
5,206.00	11.13	273.08	5,196.09	9.96	-150.13	-9.96	0.56
5,377.00	10.51	272.60	5,364.05	11.56	-182.19	-11.56	0.37
5,548.00	10.26	270.57	5,532.25	12.41	-213.00	-12.41	0.26
5,720.00	9.76	268.16	5,701.63	12.10	-242.89	-12.10	0.38
5,891.00	10.54	268.18	5,869.95	11.14	-273.01	-11.14	0.46
6,062.00	9.01	268.83	6,038.47	10.37	-302.03	-10.37	0.90
6,234.00	5.98	268.53	6,208.98	9.86	-324.46	-9.86	1.76
6,405.00	3.45	270.46	6,379.38	9.67	-338.51	-9.67	1.48
6,576.00	0.98	269.08	6,550.24	9.69	-345.12	-9.69	1.44
6,747.00	0.68	104.05	6,721.24	9.42	-345.60	-9.42	0.96
6,919.00	0.40	89.45	6,893.23	9.18	-344.00	-9.18	0.18

**Design Report for Grenemyer 13N-3HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
6,961.00	1.05	149.99	6,935.23	8.85	-343.67	-8.85	2.19
7,004.00	3.30	167.73	6,978.19	7.30	-343.21	-7.30	5.40
7,047.00	6.20	175.81	7,021.04	3.77	-342.77	-3.77	6.90
7,090.00	9.70	177.24	7,063.62	-2.16	-342.43	2.16	8.15
7,133.00	13.72	174.42	7,105.72	-10.86	-341.76	10.86	9.44
7,176.00	17.26	174.77	7,147.15	-22.29	-340.68	22.29	8.24
7,218.00	21.22	174.69	7,186.80	-36.07	-339.41	36.07	9.43
7,261.00	24.82	176.85	7,226.37	-52.84	-338.19	52.84	8.60
7,303.00	29.31	178.82	7,263.76	-71.93	-337.50	71.93	10.90
7,346.00	33.33	178.86	7,300.48	-94.27	-337.04	94.27	9.35
7,389.00	38.32	179.90	7,335.34	-119.43	-336.79	119.43	11.69
7,432.00	42.69	179.90	7,368.03	-147.35	-336.74	147.35	10.16
7,475.00	48.21	179.73	7,398.18	-177.98	-336.64	177.98	12.84
7,518.00	52.77	179.75	7,425.53	-211.15	-336.48	211.15	10.60
7,561.00	57.53	179.64	7,450.09	-246.43	-336.30	246.43	11.07
7,604.00	61.61	179.83	7,471.87	-283.49	-336.13	283.49	9.50
7,647.00	64.51	179.93	7,491.35	-321.82	-336.05	321.82	6.75
7,690.00	68.64	180.47	7,508.44	-361.27	-336.19	361.27	9.67
7,732.00	71.76	181.23	7,522.66	-400.78	-336.78	400.78	7.62
7,775.00	75.10	181.52	7,534.93	-441.97	-337.77	441.97	7.79
7,818.00	77.99	181.14	7,544.93	-483.78	-338.73	483.78	6.78
7,861.00	81.96	181.25	7,552.41	-526.10	-339.62	526.10	9.24
7,916.00	87.19	181.29	7,557.61	-580.83	-340.83	580.83	9.51
7,954.70	87.65	181.15	7,559.35	-619.48	-341.66	619.48	1.24
<b>7" Casing Set @ 7954.7' MD :: 7559.35' TVD</b>							
8,035.00	88.61	180.87	7,561.97	-699.72	-343.07	699.72	1.24
8,206.00	90.62	179.42	7,563.12	-870.70	-343.50	870.70	1.45
8,377.00	90.59	177.92	7,561.32	-1,041.64	-339.54	1,041.64	0.88
8,549.00	88.03	177.16	7,563.39	-1,213.46	-332.16	1,213.46	1.55
8,720.00	90.95	179.36	7,564.91	-1,384.34	-326.96	1,384.34	2.14
8,891.00	91.41	182.22	7,561.39	-1,555.27	-329.32	1,555.27	1.69
9,062.00	89.91	182.34	7,559.42	-1,726.12	-336.12	1,726.12	0.88
9,233.00	93.08	182.78	7,554.96	-1,896.87	-343.76	1,896.87	1.87
9,405.00	89.57	180.98	7,550.98	-2,068.70	-349.40	2,068.70	2.29
9,575.00	88.67	179.91	7,553.59	-2,238.67	-350.72	2,238.67	0.82
9,758.00	89.60	179.62	7,556.35	-2,421.64	-349.97	2,421.64	0.53
9,941.00	88.49	177.58	7,559.40	-2,604.55	-345.50	2,604.55	1.27
10,125.00	90.12	178.98	7,561.63	-2,788.44	-339.97	2,788.44	1.17
10,308.00	90.25	176.57	7,561.04	-2,971.29	-332.87	2,971.29	1.32
10,491.00	90.25	179.34	7,560.25	-3,154.15	-326.34	3,154.15	1.51
10,673.00	90.00	180.12	7,559.85	-3,336.15	-325.48	3,336.15	0.45
10,855.00	89.72	179.75	7,560.29	-3,518.15	-325.28	3,518.15	0.25
11,038.00	89.85	180.41	7,560.98	-3,701.15	-325.53	3,701.15	0.37
11,215.00	90.12	178.27	7,561.03	-3,878.12	-323.49	3,878.12	1.22
11,386.00	90.62	179.55	7,559.92	-4,049.09	-320.24	4,049.09	0.80
11,557.00	89.29	183.80	7,560.06	-4,219.97	-325.24	4,219.97	2.60
11,729.00	90.06	183.71	7,561.03	-4,391.60	-336.50	4,391.60	0.45
11,900.00	90.46	180.81	7,560.26	-4,562.44	-343.24	4,562.44	1.71
12,071.00	89.57	180.13	7,560.21	-4,733.43	-344.65	4,733.43	0.65
12,243.00	89.51	181.09	7,561.59	-4,905.42	-346.48	4,905.42	0.56
12,414.00	90.62	179.84	7,561.40	-5,076.40	-347.87	5,076.40	0.98

**Design Report for Grenemyer 13N-3HZ - Actual Field Surveys**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,585.00	90.43	180.54	7,559.83	-5,247.40	-348.43	5,247.40	0.42
12,757.00	89.85	178.98	7,559.41	-5,419.39	-347.71	5,419.39	0.97
12,928.00	89.23	179.99	7,560.78	-5,590.37	-346.17	5,590.37	0.69
13,099.00	89.97	179.80	7,561.98	-5,761.37	-345.86	5,761.37	0.45
13,271.00	89.26	179.13	7,563.13	-5,933.35	-344.26	5,933.35	0.57
13,442.00	90.59	179.51	7,563.36	-6,104.34	-342.23	6,104.34	0.81
13,613.00	91.42	180.50	7,560.36	-6,275.31	-342.24	6,275.31	0.76
13,785.00	91.11	179.89	7,556.56	-6,447.26	-342.83	6,447.26	0.40
13,956.00	89.13	180.75	7,556.20	-6,618.25	-343.78	6,618.25	1.26
14,127.00	88.80	180.39	7,559.29	-6,789.21	-345.48	6,789.21	0.29
14,299.00	89.57	178.25	7,561.74	-6,961.17	-343.44	6,961.17	1.32
14,470.00	90.25	178.08	7,562.01	-7,132.08	-337.97	7,132.08	0.41
14,642.00	89.20	181.22	7,562.83	-7,304.05	-336.91	7,304.05	1.92
14,813.00	91.76	181.50	7,561.40	-7,474.99	-340.97	7,474.99	1.51
14,984.00	90.46	180.67	7,558.09	-7,645.92	-344.21	7,645.92	0.90
15,155.00	89.57	179.12	7,558.04	-7,816.91	-343.90	7,816.91	1.05
15,326.00	90.31	178.36	7,558.22	-7,987.87	-340.14	7,987.87	0.62
15,498.00	89.45	179.64	7,558.58	-8,159.83	-337.13	8,159.83	0.90
15,669.00	88.61	179.67	7,561.48	-8,330.81	-336.10	8,330.81	0.49
15,840.00	90.65	178.51	7,562.58	-8,501.77	-333.39	8,501.77	1.37
16,012.00	91.82	179.31	7,558.87	-8,673.69	-330.12	8,673.69	0.82
16,183.00	89.32	180.50	7,557.17	-8,844.67	-329.83	8,844.67	1.62
16,354.00	89.20	179.53	7,559.38	-9,015.65	-329.88	9,015.65	0.57
16,526.00	90.19	178.77	7,560.30	-9,187.63	-327.33	9,187.63	0.73
16,662.00	90.52	177.85	7,559.45	-9,323.56	-323.32	9,323.56	0.72
<b>Final MWD Survey @ 16662.00ft</b>							
16,708.00	90.52	177.85	7,559.04	-9,369.53	-321.59	9,369.53	0.00
<b>Str Line Proj to Bit @ 16078' MD :: 7559.04' TVD</b>							

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Comment
986.00	985.99	-1.87	-1.08	Tie-On to Gyro Surveys @ 986.00ft
1,104.00	1,103.99	-1.71	-1.75	First MWD Survey @ 1104.00ft
16,662.00	7,559.45	-9,323.56	-323.32	Final MWD Survey @ 16662.00ft
16,708.00	7,559.04	-9,369.53	-321.59	Str Line Proj to Bit @ 16078' MD :: 7559.04' TVD

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	+N/_S (usft)	+E/-W (usft)	Start TVD (usft)
User	No Target (Freehand)	180.00	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	986.00	MS Energy Gyro Surveys	NS-GYRO-MS
1,104.00	7,916.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
8,035.00	16,662.00	MWD Lateral Surveys	MWD+IFR1+SC

**Design Report for Grenemyer 13N-3HZ - Actual Field Surveys****Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,078.00	1,077.99	9 5/8" Casing Set @ 1078' MD :: 1077.99' TVD	9-5/8	13-1/2
7,954.70	7,559.35	7" Casing Set @ 7954.7' MD :: 7559.35' TVD	7	8-3/4

**Wellbore Targets**

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
Grenemyer 13N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.56	3,173,523.57	40° 0' 49.014 N	104° 52' 49.742 W
- actual wellpath hits target center									
- Point									
Grenemyer 13N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.56	3,173,523.57	40° 0' 49.014 N	104° 52' 49.742 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	439.81	-1,555.94	1,248,841.47	3,171,964.65	
Point 2				0.00	448.29	1,079.30	1,248,868.36	3,174,599.68	
Point 3				0.00	456.10	3,714.51	1,248,894.58	3,177,234.68	
Point 4				0.00	-2,183.72	3,732.91	1,246,255.05	3,177,271.52	
Point 5				0.00	-4,822.86	3,750.32	1,243,616.18	3,177,307.36	
Point 6				0.00	-4,824.67	1,103.49	1,243,595.88	3,174,660.70	
Point 7				0.00	-4,826.89	-1,542.79	1,243,575.18	3,172,014.59	
Point 8				0.00	-4,824.67	1,103.49	1,243,595.88	3,174,660.70	
Point 9				0.00	-4,822.51	4,170.88	1,243,619.47	3,177,727.90	
Point 10				0.00	-7,209.61	4,184.68	1,241,232.61	3,177,758.37	
Point 11				0.00	-9,848.93	4,199.81	1,238,593.55	3,177,791.94	
Point 12				0.00	-9,852.92	1,549.11	1,238,571.04	3,175,141.42	
Point 13				0.00	-9,856.33	-1,100.86	1,238,549.12	3,172,491.63	
Point 14				0.00	-7,204.05	-1,097.23	1,241,201.27	3,172,476.73	
Point 15				0.00	-4,826.51	-1,094.10	1,243,578.69	3,172,463.25	
Point 16				0.00	-4,826.89	-1,542.79	1,243,575.18	3,172,014.59	
Point 17				0.00	-2,187.58	-1,548.65	1,246,214.29	3,171,990.30	
Grenemyer 13N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.56	3,173,523.57	40° 0' 49.014 N	104° 52' 49.742 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	-17.45	-696.63	1,248,390.24	3,172,827.10	
Point 2				0.00	-14.49	223.39	1,248,399.63	3,173,747.05	
Point 3				0.00	-4,825.39	240.36	1,243,589.13	3,173,797.63	
Point 4				0.00	-4,825.82	-237.94	1,243,585.36	3,173,319.36	
Point 5				0.00	-9,395.22	-236.37	1,239,016.24	3,173,352.85	
Point 6				0.00	-9,395.65	-640.22	1,239,012.99	3,172,949.03	
Point 7				0.00	-4,826.14	-634.08	1,243,582.27	3,172,923.24	
Point 8				0.00	-4,826.17	-679.67	1,243,581.93	3,172,877.66	
Grenemyer 13N-3HZ_	0.00	0.00	7,563.00	-9,395.29	-337.10	1,239,015.46	3,173,252.13	39° 59' 16.166 N	104° 52' 54.073 W
- actual wellpath misses target center by 30.33usft at 16708.00usft MD (7559.04 TVD, -9369.53 N, -321.59 E)									
- Point									

**Directional Difficulty Index**

Average Dogleg over Survey:	1.31 °/100usft	Maximum Dogleg over Survey:	12.84 °/100usft at 7,475.00 usft
Net Tortousity applicable to Plans:	0.52 °/100usft	Directional Difficulty Index:	6.675

**Audit Info**

**North Reference Sheet for Sec. 34-T1N-R67W - Grenemyer 13N-3HZ - Plan A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to True North Reference.  
 Vertical Depths are relative to RKB = 16' @ 5063.00usft (Xtreme 22). Northing and Easting are relative to Grenemyer 13N-3HZ  
 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: 0.99996536

Grid Coordinates of Well: 1,248,412.56 usft N, 3,173,523.57 usft E  
 Geographical Coordinates of Well: 40° 00' 49.01" N, 104° 52' 49.74" W  
 Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,708.00usft  
 the Bottom Hole Displacement is 9,375.05usft in the Direction of 181.97° ( True).  
 Magnetic Convergence at surface is: -8.20° ( 11 December 2013, , BGGM2013)

