

HALLIBURTON

Sperry Drilling

END OF WELL REPORT

For

Anadarko Petroleum Corp.

Grenemyer 35N-3HZ

Sec. 34-T1N-R67W

Weld County, CO

Job #900930435

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SPERRY-SUN DRILLING SERVICES







CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarko Petroleum Corp.
WELL:	Grenemyer 35N-3HZ
FIELD:	Grenemyer
RIG:	Xtreme 22
LEGALS:	Sec. 34-T1N-R67W
COUNTY:	Weld
STATE:	CO
CAL. METHOD:	Min Curvature
MAG. DECL. APPLIED:	8.5841
VERTICAL SEC. DIR. :	179.680

SSDS Job Number :	900930435
Start Date of Job :	12/27/2013
End Date of Job :	2/9/2014
Lead Directional Driller:	Jacob Suitter
Other SSDS DD's :	Christopher Hopwood
SSDS MWD Engineers :	Levi George
	Caleb Jones
	Clay Wass
	Markos Daus

	Main Hole	1st Side Track	2nd Side Track	3rd Side Track	4th Side Track	
	983.00	Tie On	Tie On	Tie On	Tie On	Tie On
First Survey Depth	1105.00					
Last Survey Depth	16838.00					
KOP Depth/Sidetrack MD	7000.00	KOP	KOP-ST1	KOP-ST2	KOP-ST3	KOP-ST4
First Survey Depth	1105.00	MWD	MWD	MWD	MWD	MWD
Last Survey Depth	16838.00	MWD	MWD	MWD	MWD	MWD
Bit Extrapolation to TD	16886.00	T.D.	T.D.	T.D.	T.D.	T.D.

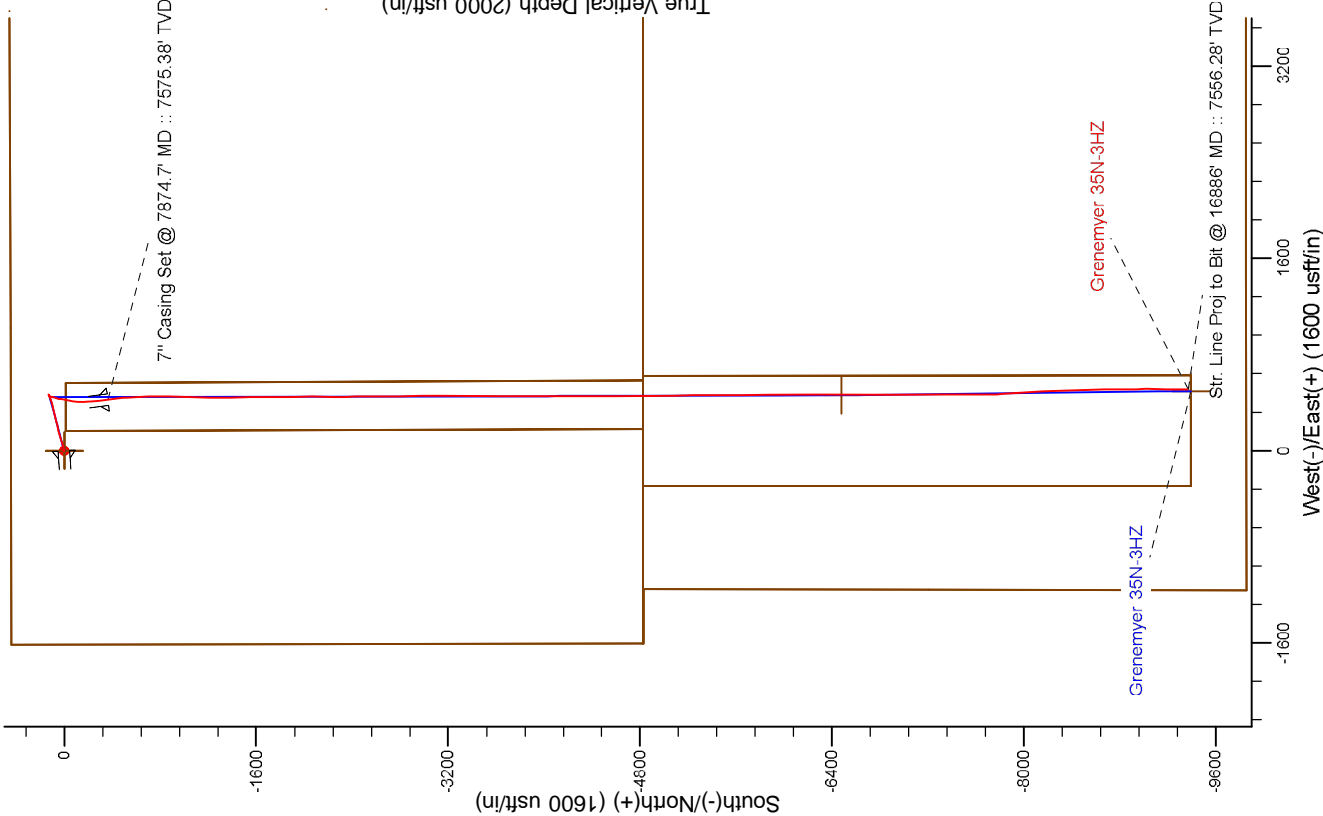
The following Sperry Sun Drilling Services personnel listed below, do certify the above survey information to be accurate :

Print Name :	Jacob Suitter	Print Name :	Caleb Jones	Print Name :	Levi George
Sign Name :		Sign Name :		Sign Name :	
Print Name :	Christopher Hopwood	Print Name :	Clay Wass	Print Name :	Markos Daus
Sign Name :		Sign Name :		Sign Name :	

Examples of Survey Types:	Tie On
	MWD
	ESS
	Gyro
	SS

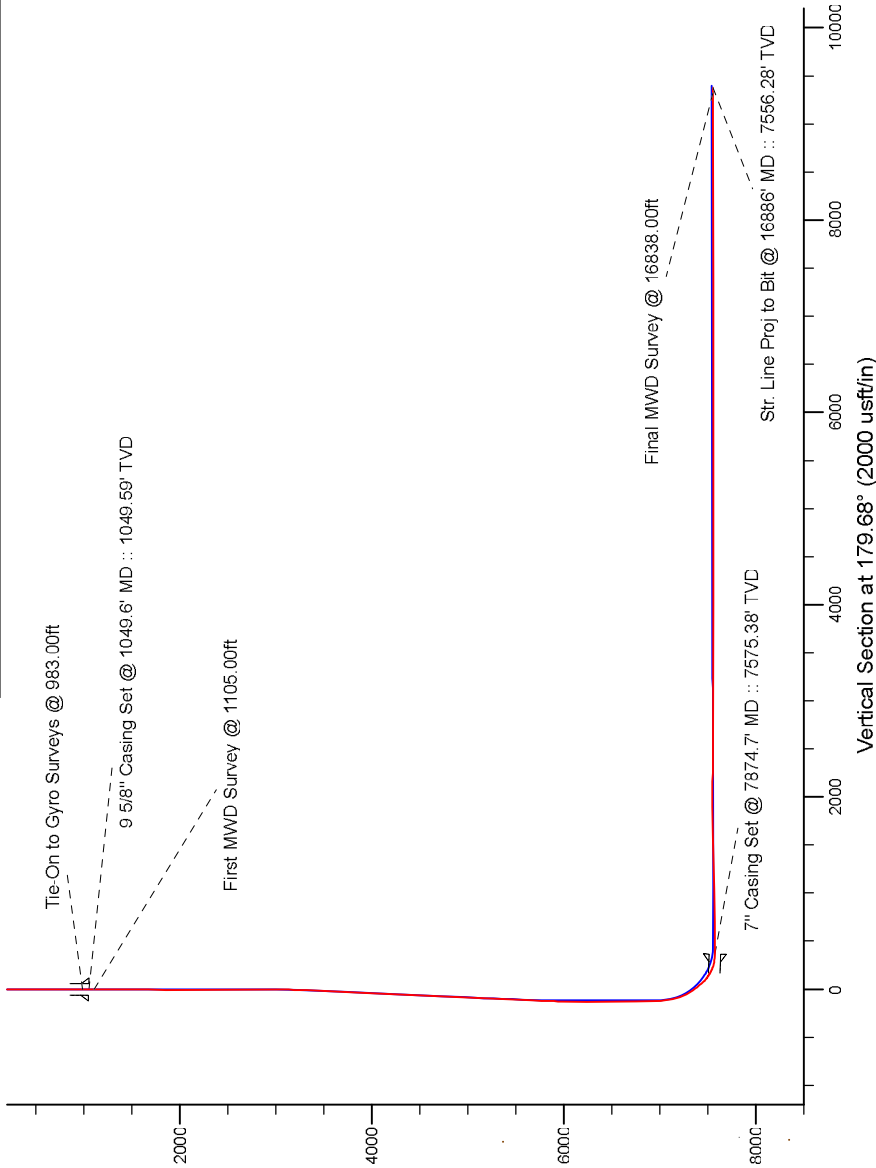
Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
 Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's
 Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's
 Gyro Survey's ; Provided by third party vendor, or by Sperry Sun Drilling Services (SSDS)
 Single Shot (SS) Survey's ; Provided by Sperry Sun Drilling Services (SSDS) or third party vendor.

Project: Weld County, CO (NAD 83)
Site: Sec. 34-T1N-R67W
Well: Grenemyer 35N-3HZ
Wellbore: Plan B
Design: Actual Field Surveys



LEGEND

- Grenemyer 35N-3HZ, Plan B, Rev B0 VC
- Actual Field Surveys



7" Casing: ~810.80' FNL ~2037.75' FWL
Lat/Long: 40.012615 N, -104.878766 E
State Planes - CO Northern: 1,248,051.50' N, 3,174,010.21' E
Location: Sec. 34-T1N-R67W

BHL: ~481.25' FSL ~1670.53' FWL
Lat/Long: 39.987886 N, -104.878449 E
State Planes - CO Northern: 1,239,044.18' N, 3,174,159.40' E
Location: Sec. 3-T1S-R67W

WELL DETAILS: Grenemyer 35N-3HZ
Ground Level: 5047.00
RKB = 16' @ 5063.00usft (Xtreme 22)

Design: Actual Field Surveys (Grenemyer 35N-3HZ/Plan B)
Created By: Clint Eshelman Date: 2/10/2013
Reviewed: Date:

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 34-T1N-R67W

Grenemyer 35N-3HZ

Plan B

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

10 February, 2014

Well Coordinates: 1,248,412.97 N, 3,173,583.51 E (40° 00' 49.01" N, 104° 52' 48.97" 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 35N-3HZ

RKB = 16' @ 5063.00usft (Xtreme 22)

N

True

API - US Survey Feet - Custom

HALLIBURTON

Design Report for Grenemyer 35N-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	0.05	149.21	116.00	-0.04	0.02	0.04	0.05
216.00	0.21	166.72	216.00	-0.25	0.09	0.25	0.16
316.00	0.09	169.99	316.00	-0.51	0.14	0.51	0.12
416.00	0.33	88.71	416.00	-0.58	0.44	0.58	0.33
516.00	0.36	24.13	516.00	-0.29	0.86	0.29	0.37
616.00	0.32	47.35	616.00	0.19	1.19	-0.18	0.14
716.00	0.55	340.34	715.99	0.83	1.24	-0.82	0.52
816.00	0.41	282.22	815.99	1.36	0.73	-1.35	0.48
916.00	0.19	202.84	915.99	1.28	0.31	-1.28	0.42
983.00	0.32	143.69	982.99	1.03	0.38	-1.03	0.41
Tie-On to Gyro Surveys @ 983.00ft							
1,049.60	0.15	85.70	1,049.59	0.88	0.58	-0.88	0.41
9 5/8" Casing Set @ 1049.6' MD :: 1049.59' TVD							
1,105.00	0.26	25.45	1,104.99	1.00	0.70	-1.00	0.41
First MWD Survey @ 1105.00ft							
1,295.00	0.38	21.43	1,294.98	1.98	1.12	-1.97	0.06
1,484.00	0.68	19.93	1,483.98	3.62	1.73	-3.61	0.16
1,673.00	0.75	11.08	1,672.96	5.89	2.35	-5.87	0.07
1,856.00	0.13	270.33	1,855.96	7.06	2.37	-7.05	0.43
2,039.00	0.22	264.75	2,038.96	7.03	1.81	-7.02	0.05
2,222.00	0.76	110.08	2,221.95	6.58	2.60	-6.57	0.53
2,406.00	0.42	214.69	2,405.94	5.61	3.37	-5.59	0.52
2,587.00	0.30	160.45	2,586.94	4.62	3.15	-4.60	0.19
2,769.00	0.69	255.83	2,768.94	3.90	2.24	-3.89	0.43
2,952.00	2.63	88.92	2,951.88	3.71	5.37	-3.68	1.81
3,134.00	3.79	75.18	3,133.60	5.33	15.36	-5.24	0.76
3,318.00	6.75	73.61	3,316.80	9.93	31.62	-9.76	1.61
3,495.00	9.37	74.91	3,492.04	16.62	55.52	-16.31	1.48
3,667.00	10.63	73.49	3,661.42	24.77	84.25	-24.30	0.75
3,838.00	10.40	76.40	3,829.55	32.89	114.37	-32.25	0.34
4,009.00	10.76	73.37	3,997.64	41.08	144.67	-40.28	0.39
4,181.00	11.28	72.90	4,166.47	50.63	176.13	-49.64	0.31
4,352.00	11.59	76.80	4,334.08	59.47	208.84	-58.30	0.49
4,523.00	10.67	75.68	4,501.86	67.30	240.90	-65.96	0.55
4,694.00	10.28	78.14	4,670.01	74.36	271.17	-72.84	0.35
4,866.00	10.26	76.61	4,839.26	81.06	301.09	-79.37	0.16
5,037.00	11.05	77.62	5,007.31	88.10	331.92	-86.24	0.47
5,208.00	10.69	80.18	5,175.24	94.32	363.55	-92.28	0.35
5,379.00	10.52	72.16	5,343.33	101.80	394.04	-99.60	0.87
5,551.00	8.78	70.06	5,512.89	111.09	421.33	-108.74	1.03
5,722.00	6.59	65.75	5,682.34	119.57	442.55	-117.10	1.32
5,893.00	4.70	65.35	5,852.51	126.53	457.86	-123.97	1.11
6,065.00	1.65	71.21	6,024.22	130.26	466.61	-127.65	1.78
6,236.00	0.79	262.61	6,195.21	130.90	467.77	-128.29	1.42
6,407.00	0.54	241.22	6,366.19	130.36	465.90	-127.76	0.20
6,578.00	0.59	251.93	6,537.19	129.70	464.35	-127.11	0.07
6,750.00	1.26	237.31	6,709.16	128.41	461.92	-125.83	0.41
6,921.00	1.72	241.61	6,880.10	126.17	458.08	-123.61	0.28

Design Report for Grenemyer 35N-3HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
7,006.00	1.76	243.15	6,965.07	124.98	455.79	-122.43	0.07
7,050.00	5.62	215.30	7,008.97	122.91	453.95	-120.37	9.42
7,092.00	6.21	216.27	7,050.74	119.40	451.41	-116.88	1.42
7,136.00	10.17	202.17	7,094.29	113.88	448.54	-111.38	10.03
7,178.00	13.12	196.94	7,135.42	105.89	445.75	-103.40	7.45
7,220.00	17.82	193.84	7,175.89	95.08	442.82	-92.61	11.36
7,263.00	22.89	191.77	7,216.19	80.50	439.54	-78.04	11.91
7,306.00	24.50	194.42	7,255.57	63.67	435.61	-61.24	4.49
7,349.00	28.04	192.73	7,294.12	45.17	431.16	-42.76	8.41
7,392.00	32.84	191.11	7,331.18	23.86	426.69	-21.48	11.32
7,435.00	37.41	188.15	7,366.35	-0.52	422.59	2.88	11.34
7,478.00	39.81	189.75	7,399.95	-27.03	418.40	29.36	6.04
7,521.00	41.12	190.77	7,432.66	-54.48	413.43	56.79	3.41
7,565.00	46.75	187.02	7,464.34	-84.63	408.76	86.91	14.09
7,608.00	52.80	183.88	7,492.10	-117.29	405.69	119.56	15.13
7,651.00	58.53	179.79	7,516.35	-152.76	404.59	155.01	15.46
7,692.00	64.18	176.74	7,536.00	-188.70	405.71	190.96	15.25
7,736.00	70.55	175.65	7,552.92	-229.20	408.41	231.48	14.66
7,779.00	76.95	174.42	7,564.95	-270.30	411.99	272.60	15.13
7,822.00	83.57	172.58	7,572.22	-312.39	416.79	314.71	15.96
7,841.00	86.15	171.47	7,573.92	-331.12	419.42	333.46	14.77
7,874.70	88.91	172.28	7,575.38	-364.45	424.18	366.82	8.52
7" Casing Set @ 7874.7' MD :: 7575.38' TVD							
7,902.00	91.14	172.93	7,575.37	-391.52	427.69	393.91	8.52
8,038.00	90.80	176.40	7,573.06	-526.89	440.33	529.34	2.56
8,210.00	90.15	178.25	7,571.64	-698.69	448.36	701.19	1.14
8,381.00	91.57	181.10	7,569.07	-869.65	449.33	872.14	1.86
8,553.00	91.66	181.64	7,564.22	-1,041.53	445.22	1,044.00	0.32
8,724.00	90.89	180.33	7,560.42	-1,212.46	442.28	1,214.91	0.89
8,896.00	90.77	179.72	7,557.93	-1,384.44	442.20	1,386.89	0.36
9,066.00	91.54	179.18	7,554.50	-1,554.39	443.83	1,556.85	0.55
9,237.00	90.37	179.59	7,551.65	-1,725.36	445.67	1,727.82	0.72
9,408.00	89.85	179.51	7,551.32	-1,896.35	447.01	1,898.82	0.31
9,580.00	90.31	180.06	7,551.08	-2,068.35	447.66	2,070.82	0.42
9,757.00	88.83	180.33	7,552.41	-2,245.34	447.06	2,247.80	0.85
9,940.00	89.94	179.28	7,554.37	-2,428.32	447.68	2,430.78	0.83
10,122.00	89.88	179.86	7,554.66	-2,610.31	449.04	2,612.78	0.32
10,305.00	89.94	178.90	7,554.95	-2,793.30	451.03	2,795.78	0.53
10,487.00	90.03	178.95	7,554.99	-2,975.27	454.44	2,977.76	0.06
10,670.00	89.69	180.22	7,555.44	-3,158.26	455.77	3,160.76	0.72
10,852.00	89.85	180.67	7,556.17	-3,340.25	454.35	3,342.74	0.26
11,035.00	90.25	180.01	7,556.01	-3,523.25	453.27	3,525.72	0.42
11,219.00	90.55	180.57	7,554.73	-3,707.24	452.33	3,709.71	0.35
11,390.00	89.75	179.26	7,554.28	-3,878.23	452.59	3,880.70	0.90
11,562.00	89.41	179.53	7,555.54	-4,050.22	454.40	4,052.69	0.25
11,733.00	90.12	179.98	7,556.24	-4,221.21	455.14	4,223.69	0.49
11,905.00	90.15	180.78	7,555.84	-4,393.21	453.99	4,395.68	0.47
12,076.00	89.97	180.34	7,555.66	-4,564.20	452.32	4,566.66	0.28
12,248.00	90.62	179.52	7,554.77	-4,736.20	452.53	4,738.65	0.61
12,419.00	89.32	179.71	7,554.86	-4,907.19	453.68	4,909.65	0.77
12,590.00	90.03	178.30	7,555.83	-5,078.15	456.65	5,080.62	0.92

Design Report for Grenemyer 35N-3HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
12,762.00	89.48	179.03	7,556.57	-5,250.10	460.66	5,252.59	0.53
12,933.00	89.72	179.86	7,557.76	-5,421.09	462.32	5,423.59	0.51
13,105.00	90.31	180.08	7,557.72	-5,593.09	462.41	5,595.58	0.37
13,276.00	89.17	178.20	7,558.49	-5,764.06	464.97	5,766.56	1.29
13,447.00	90.74	180.54	7,558.63	-5,935.03	466.85	5,937.54	1.65
13,619.00	89.97	180.14	7,557.56	-6,107.02	465.83	6,109.53	0.50
13,790.00	90.52	179.88	7,556.83	-6,278.02	465.80	6,280.52	0.36
13,962.00	89.91	180.21	7,556.18	-6,450.02	465.67	6,452.52	0.40
14,133.00	90.31	180.26	7,555.86	-6,621.02	464.96	6,623.51	0.24
14,305.00	90.00	180.01	7,555.39	-6,793.01	464.56	6,795.50	0.23
14,476.00	89.72	179.52	7,555.81	-6,964.01	465.26	6,966.50	0.33
14,647.00	89.69	180.29	7,556.69	-7,135.01	465.54	7,137.50	0.45
14,818.00	90.06	180.25	7,557.06	-7,306.00	464.74	7,308.49	0.22
14,989.00	90.34	180.11	7,556.47	-7,477.00	464.20	7,479.48	0.18
15,160.00	90.65	179.24	7,554.99	-7,647.99	465.17	7,650.47	0.54
15,331.00	88.74	176.49	7,555.90	-7,818.85	471.54	7,821.36	1.96
15,502.00	89.57	176.04	7,558.42	-7,989.46	482.68	7,992.03	0.55
15,674.00	89.94	177.75	7,559.16	-8,161.20	491.99	8,163.82	1.02
15,845.00	91.26	178.16	7,557.37	-8,332.08	498.10	8,334.73	0.81
16,017.00	90.25	178.68	7,555.10	-8,504.00	502.84	8,506.67	0.66
16,188.00	89.66	178.91	7,555.23	-8,674.96	506.43	8,677.65	0.37
16,360.00	90.12	178.86	7,555.56	-8,846.92	509.78	8,849.63	0.27
16,531.00	89.82	180.12	7,555.65	-9,017.91	511.30	9,020.63	0.76
16,703.00	89.82	180.49	7,556.19	-9,189.91	510.39	9,192.62	0.22
16,838.00	90.06	179.70	7,556.33	-9,324.91	510.16	9,327.61	0.61
Final MWD Survey @ 16838.00ft							
16,886.00	90.06	179.70	7,556.28	-9,372.91	510.41	9,375.61	0.00
Str. Line Proj to Bit @ 16886' MD :: 7556.28' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
983.00	982.99	1.03	0.38	Tie-On to Gyro Surveys @ 983.00ft
1,105.00	1,104.99	1.00	0.70	First MWD Survey @ 1105.00ft
16,838.00	7,556.33	-9,324.91	510.16	Final MWD Survey @ 16838.00ft
16,886.00	7,556.28	-9,372.91	510.41	Str. Line Proj to Bit @ 16886' MD :: 7556.28' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	179.68	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
16.00	983.00	MS Energy Gyro Surveys	NS-GYRO-MS
1,105.00	7,841.00	MWD Vertical/Build Surveys	MWD+IFR1+SC
7,902.00	16,838.00	MWD Lateral Surveys	MWD+IFR1+SC

Design Report for Grenemyer 35N-3HZ - Actual Field Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,049.60	1,049.59	9 5/8" Casing Set @ 1049.6' MD :: 1049.59' TVD	9-5/8	13-1/2
7,874.70	7,575.38	7" Casing Set @ 7874.7' MD :: 7575.38' 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 35N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.97	3,173,583.51	40° 0' 49.014 N	104° 52' 48.972 W
- actual wellpath hits target center									
- Point									
Grenemyer 35N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.97	3,173,583.51	40° 0' 49.014 N	104° 52' 48.972 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	439.82	-1,615.88	1,248,841.47	3,171,964.65	
Point 2				0.00	448.29	1,019.36	1,248,868.36	3,174,599.68	
Point 3				0.00	456.10	3,654.57	1,248,894.58	3,177,234.68	
Point 4				0.00	-2,183.72	3,672.97	1,246,255.05	3,177,271.52	
Point 5				0.00	-4,822.86	3,690.36	1,243,616.18	3,177,307.36	
Point 6				0.00	-4,824.67	1,043.53	1,243,595.88	3,174,660.70	
Point 7				0.00	-4,826.87	-1,602.75	1,243,575.18	3,172,014.59	
Point 8				0.00	-4,824.67	1,043.53	1,243,595.88	3,174,660.70	
Point 9				0.00	-4,822.51	4,110.93	1,243,619.47	3,177,727.90	
Point 10				0.00	-7,209.61	4,124.72	1,241,232.61	3,177,758.37	
Point 11				0.00	-9,848.93	4,139.84	1,238,593.55	3,177,791.94	
Point 12				0.00	-9,852.92	1,489.14	1,238,571.04	3,175,141.42	
Point 13				0.00	-9,856.32	-1,160.83	1,238,549.12	3,172,491.63	
Point 14				0.00	-7,204.04	-1,157.19	1,241,201.27	3,172,476.73	
Point 15				0.00	-4,826.50	-1,154.06	1,243,578.69	3,172,463.25	
Point 16				0.00	-4,826.87	-1,602.75	1,243,575.18	3,172,014.59	
Point 17				0.00	-2,187.57	-1,608.59	1,246,214.29	3,171,990.30	
Grenemyer 35N-3HZ_	0.00	0.00	0.00	0.00	0.00	1,248,412.97	3,173,583.51	40° 0' 49.014 N	104° 52' 48.972 W
- actual wellpath hits target center									
- Polygon									
Point 1				0.00	-14.48	163.45	1,248,399.63	3,173,747.05	
Point 2				0.00	-13.19	561.45	1,248,403.70	3,174,145.02	
Point 3				0.00	-4,825.05	583.51	1,243,592.28	3,174,200.71	
Point 4				0.00	-4,825.06	622.15	1,243,592.54	3,174,239.34	
Point 5				0.00	-9,394.01	623.70	1,239,023.87	3,174,272.82	
Point 6				0.00	-9,395.19	-296.34	1,239,016.26	3,173,352.85	
Point 7				0.00	-4,825.81	-297.89	1,243,585.36	3,173,319.36	
Point 8				0.00	-4,825.39	180.41	1,243,589.13	3,173,797.63	
Grenemyer 35N-3HZ_	0.00	0.00	7,538.00	-9,394.19	494.77	1,239,022.79	3,174,143.90	39° 59' 16.177 N	104° 52' 42.616 W
- actual wellpath misses target center by 32.13usft at 16886.00usft MD (7556.28 TVD, -9372.91 N, 510.41 E)									
- Point									
Grenemyer 35N-3HZ_	0.00	0.00	7,544.66	-6,481.00	460.00	1,241,935.57	3,174,088.78	39° 59' 44.966 N	104° 52' 43.062 W
- actual wellpath misses target center by 12.82usft at 13993.03usft MD (7556.21 TVD, -6481.04 N, 465.55 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.13 °/100usft	Maximum Dogleg over Survey:	15.96 °/100usft at 7,822.00 usft
Net Tortousity applicable to Plans:	0.46 °/100usft	Directional Difficulty Index:	6.630

Design Report for Grenemyer 35N-3HZ - Actual Field Surveys

Audit Info

North Reference Sheet for Sec. 34-T1N-R67W - Grenemyer 35N-3HZ - 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 = 16' @ 5063.00usft (Xtreme 22). Northing and Easting are relative to Grenemyer 35N-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: 1,248,412.97 usft N, 3,173,583.51 usft E
 Geographical Coordinates of Well: 40° 00' 49.01" N, 104° 52' 48.97" W
 Grid Convergence at Surface is: 0.40°

Based upon Minimum Curvature type calculations, at a Measured Depth of 16,886.00usft
 the Bottom Hole Displacement is 9,386.80usft in the Direction of 176.88° (True).
 Magnetic Convergence at surface is: -8.20° (11 December 2013, , BGGM2013)

