



HALLIBURTON

Sperry Drilling

End of Well Report

Eisenach 32N-8HZ

SEC. 8-T3N-R66W

Weld County, CO

Job# 900582951

SPERRY-SUN DRILLING SERVICES




CERTIFIED SURVEY WORK SHEET

OPERATOR:	Anadarco
WELL:	Eisenach 32N-8HZ
FIELD:	DJ Basin
RIG:	H & P 308
LEGALS:	Sec . 8-T3N-R66W
COUNTY:	Weld
STATE:	CO
CAL. METHOD:	True North
MAG. DECL. APPLIED:	8.61
VERTICAL SEC. DIR. :	270.350

SSDS Job Number :	900582951
Start Date of Job :	8/31/2013
End Date of Job :	9/9/2013
Lead Directional Driller:	Jesse Kysar
Other SSDS DD's :	Brian Suanders John Rizzuti
SSDS MWD Engineers :	Jonathan Parrish Ryan White Patrick Lane

	Main Hole	1st Side Track	2nd Side Track	3rd Side Track	4th Side Track
	Tie On	Tie On	Tie On	Tie On	Tie On
Surface Casing	698.00				
First Survey Depth	25.00				
Last Survey Depth	618.00				
KOP Depth/Sidetrack MD	6542.00	KOP	KOP-ST1	KOP-ST2	KOP-ST3
MWD Tie-on	618.00				
First Survey Depth	731.00	MWD	MWD	MWD	MWD
Last Survey Depth	12038.00	MWD	MWD	MWD	MWD
Bit Extrapolation to TD	12107.00	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 :	Jesse Kysar	Print Name :	Jolanta Obrochta	Print Name :	John Rizzuti
Sign Name :		Sign Name :		Sign Name :	
Print Name :	Jonathan Parrish	Print Name :	Patrick Lane	Print Name :	
Sign Name :		Sign Name :		Sign Name :	

Examples of Survey Types:	Tie On
	MWD
	ESS
	Gyro
	SS

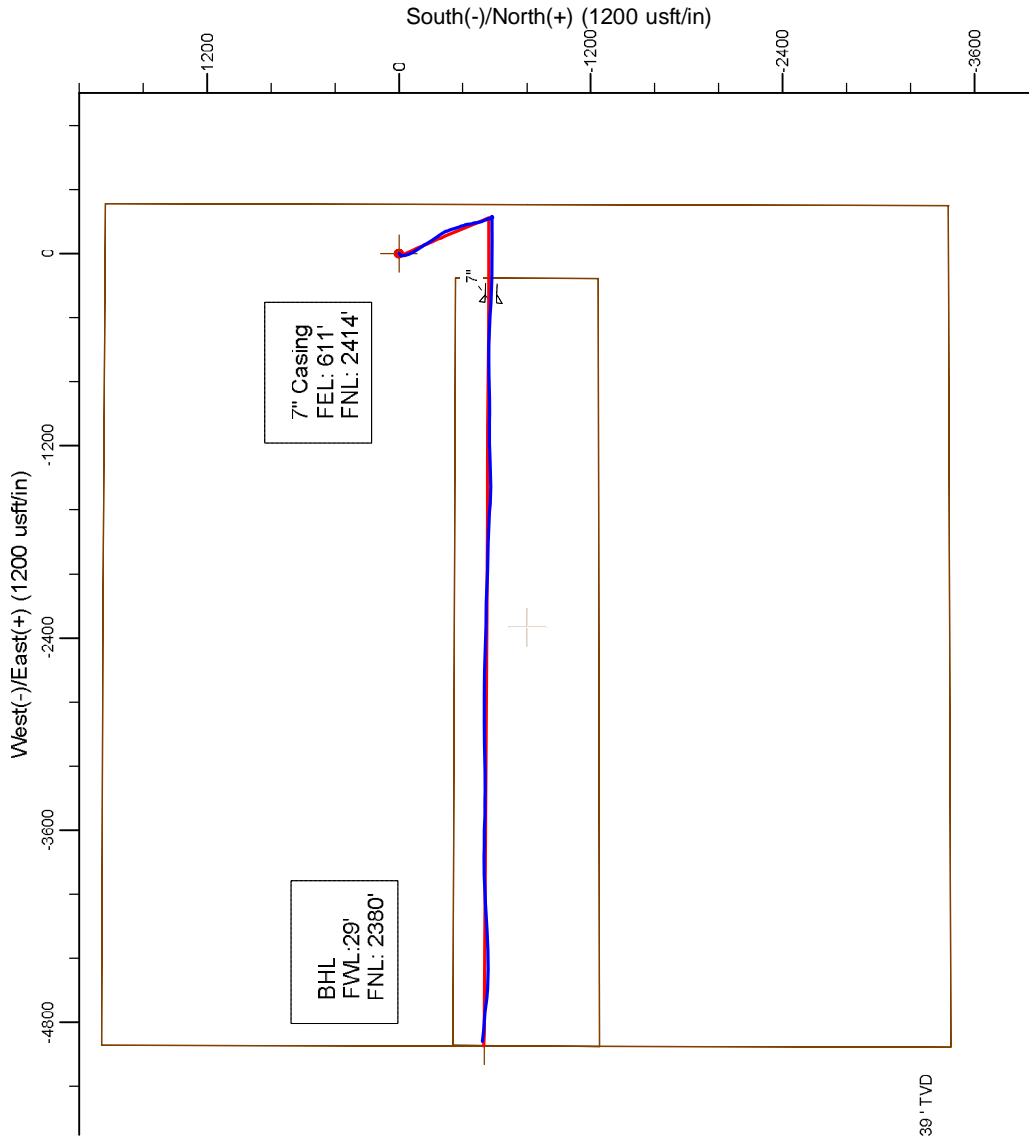
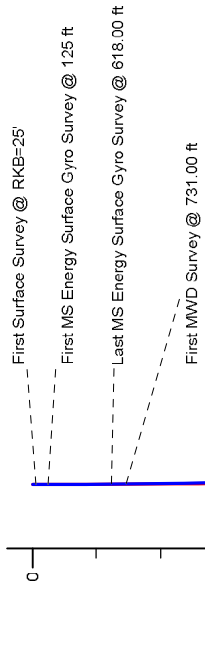
Tie On to Surface Casing (Assumed Vertical), Tie On to existing MWD Survey (prior drilled hole)
 Sperry Sun Drilling Services (SSDS) Measurement While Drilling (MWD) Survey's
 Sperry Sun Drilling Services (SSDS) Electronic Survey System (ESS) Survey's
 Gyro Survey's ; Provided by third party vendor, 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. 8-T3N-R66W
 Well: Eisenach 32N-8HZ
 Wellbore: Plan A
 Design: Actual Field Surveys



LEGEND

- ▲ Eisenach 32N-8HZ, Plan A, Plan A0 V0
- Actual Field Surveys



Latitude	Longitude	Northing	Easting
7" Casing: 40° 14' 23.690 N	104° 47' 38.768 W	1,331,026.86	3,197,061.98
BHL: 40° 14' 24.202 N	104° 48' 38.235 W	1,331,042.39	3,192,450.28

WELL DETAILS Eisenach 32N-8HZ	
RKB = 25' @ 4852.00usft (H&P 308)	Ground Level: 4827.00
Design: Actual Field Surveys (Eisenach 32N-8HZ/Plan A)	
Created By: Parit Amanlou	Date: 09/26/2013

Anadarko Petroleum Corp.

Weld County, CO (NAD 83)

Sec. 8-T3N-R66W

Eisenach 32N-8HZ

API # 05-123-37572 Job # 900582951

Plan A

Design: Actual Field Surveys

Sperry Drilling Services

Standard Report

04 October, 2013

Surface UWI : API # 05-123-37572 Job # 900582951

Well Coordinates: 1,331,603.01 N, 3,197,363.17 E (40° 14' 29.36" N, 104° 47' 34.83" W)

Ground Level: 4,827.00 usft

Local Coordinate Origin:

Centered on Well Eisenach 32N-8HZ

Viewing Datum:

RKB = 25' @ 4852.00usft (H&P 308)

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 Eisenach 32N-8HZ - 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
25.00	0.00	0.00	25.00	0.00	0.00	0.00	0.00
First Surface Survey @ RKB=25'							
125.00	0.53	157.23	125.00	-0.43	0.18	-0.18	0.53
First MS Energy Surface Gyro Survey @ 125 ft							
225.00	0.34	122.54	225.00	-1.01	0.61	-0.61	0.32
325.00	0.19	277.82	325.00	-1.15	0.69	-0.70	0.52
425.00	0.73	233.93	424.99	-1.50	0.01	-0.02	0.61
525.00	0.36	216.47	524.99	-2.13	-0.69	0.67	0.40
618.00	0.71	219.01	617.98	-2.81	-1.22	1.21	0.38
Last MS Energy Surface Gyro Survey @ 618.00 ft							
731.00	0.68	225.98	730.97	-3.82	-2.15	2.12	0.08
First MWD Survey @ 731.00 ft							
828.00	0.82	240.99	827.97	-4.56	-3.17	3.14	0.25
919.00	0.80	220.35	918.96	-5.36	-4.15	4.11	0.32
1,011.00	1.02	236.03	1,010.95	-6.31	-5.24	5.20	0.36
1,347.00	1.11	264.34	1,346.89	-8.30	-10.96	10.91	0.16
1,439.00	0.95	252.74	1,438.88	-8.61	-12.58	12.52	0.28
1,531.00	1.61	213.76	1,530.85	-9.91	-14.02	13.96	1.15
1,623.00	2.05	179.67	1,622.81	-12.63	-14.73	14.65	1.25
1,715.00	3.68	182.77	1,714.69	-17.23	-14.87	14.76	1.78
1,806.00	5.03	169.97	1,805.43	-24.07	-14.31	14.16	1.82
1,898.00	6.92	171.83	1,896.92	-33.53	-12.82	12.62	2.06
1,989.00	8.36	163.41	1,987.12	-45.30	-10.15	9.88	2.00
2,081.00	9.46	153.72	2,078.01	-58.49	-4.90	4.54	2.02
2,173.00	11.16	153.30	2,168.52	-73.22	2.45	-2.90	1.85
2,264.00	9.87	153.90	2,257.99	-88.10	9.84	-10.38	1.42
2,386.00	10.39	146.72	2,378.09	-106.68	20.48	-21.13	1.12
2,481.00	11.92	147.94	2,471.30	-122.16	30.39	-31.13	1.63
2,575.00	10.11	144.93	2,563.56	-137.14	40.28	-41.12	2.02
2,669.00	11.98	148.41	2,655.82	-152.21	50.13	-51.06	2.11
2,764.00	11.41	150.18	2,748.85	-168.76	59.97	-61.00	0.71
2,858.00	11.35	150.03	2,841.00	-184.84	69.22	-70.34	0.07
2,952.00	11.05	149.15	2,933.21	-200.58	78.46	-79.68	0.37
3,047.00	9.63	146.77	3,026.66	-215.05	87.48	-88.79	1.56
3,141.00	10.56	146.41	3,119.21	-228.80	96.55	-97.95	0.99
3,236.00	9.51	146.00	3,212.75	-242.56	105.76	-107.24	1.11
3,331.00	8.28	143.58	3,306.61	-254.57	114.21	-115.76	1.35
3,425.00	7.40	145.67	3,399.73	-265.01	121.64	-123.26	0.98
3,520.00	8.05	153.54	3,493.87	-276.02	128.05	-129.74	1.31
3,614.00	8.68	153.11	3,586.87	-288.24	134.20	-135.95	0.67
3,709.00	9.18	160.28	3,680.72	-301.77	140.00	-141.84	1.28
3,804.00	10.39	158.11	3,774.34	-316.85	145.75	-147.68	1.33
3,898.00	12.35	164.90	3,866.49	-334.42	151.53	-153.57	2.52
3,993.00	12.45	163.44	3,959.27	-354.05	157.09	-159.25	0.35
4,087.00	12.31	162.41	4,051.09	-373.31	163.01	-165.28	0.28
4,182.00	10.54	158.75	4,144.20	-391.07	169.22	-171.60	2.01
4,277.00	11.36	158.40	4,237.47	-407.86	175.81	-178.30	0.87
4,371.00	12.36	169.67	4,329.48	-426.37	181.02	-183.63	2.68
4,466.00	11.47	170.26	4,422.43	-445.68	184.45	-187.16	0.95

Design Report for Eisenach 32N-8HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
4,560.00	10.04	165.77	4,514.78	-462.84	188.04	-190.86	1.76
4,655.00	11.62	168.09	4,608.08	-480.23	192.05	-194.98	1.72
4,750.00	11.64	166.11	4,701.13	-498.89	196.33	-199.37	0.42
4,844.00	11.42	164.04	4,793.24	-517.05	201.16	-204.32	0.50
4,939.00	9.44	160.61	4,886.66	-533.44	206.33	-209.59	2.18
5,033.00	9.19	161.08	4,979.42	-547.81	211.33	-214.67	0.28
5,128.00	7.59	163.14	5,073.41	-560.99	215.61	-219.03	1.71
5,222.00	4.90	161.92	5,166.84	-570.75	218.65	-222.14	2.87
5,317.00	2.85	169.89	5,261.62	-576.93	220.33	-223.85	2.23
5,411.00	2.87	164.17	5,355.50	-581.50	221.38	-224.93	0.30
5,506.00	1.16	183.12	5,450.44	-584.75	221.98	-225.54	1.91
5,600.00	1.20	179.37	5,544.42	-586.68	221.94	-225.52	0.09
5,695.00	0.85	11.62	5,639.41	-586.99	222.09	-225.67	2.15
5,790.00	0.58	53.63	5,734.41	-586.01	222.62	-226.19	0.60
5,885.00	0.35	55.17	5,829.40	-585.56	223.24	-226.82	0.24
5,980.00	0.56	74.42	5,924.40	-585.27	223.93	-227.50	0.27
6,075.00	0.70	82.95	6,019.39	-585.07	224.95	-228.52	0.18
6,169.00	0.93	72.04	6,113.39	-584.77	226.25	-229.82	0.29
6,264.00	0.77	57.71	6,208.37	-584.19	227.52	-231.08	0.28
6,359.00	1.02	54.82	6,303.36	-583.36	228.75	-232.31	0.27
6,454.00	0.97	52.55	6,398.35	-582.39	230.08	-233.63	0.07
6,549.00	0.37	297.78	6,493.34	-581.75	230.45	-234.00	1.24
6,596.00	3.72	264.21	6,540.31	-581.84	228.80	-232.35	7.27
6,643.00	6.72	263.75	6,587.11	-582.29	224.54	-228.10	6.38
6,690.00	9.23	263.52	6,633.65	-583.02	218.06	-221.62	5.34
6,738.00	11.98	266.20	6,680.83	-583.78	209.27	-212.83	5.82
6,785.00	14.10	272.93	6,726.61	-583.81	198.68	-202.24	5.54
6,833.00	16.91	272.38	6,772.86	-583.22	185.86	-189.42	5.86
6,880.00	19.35	272.76	6,817.53	-582.56	171.26	-174.81	5.20
6,928.00	24.10	270.93	6,862.10	-582.02	153.50	-157.06	9.99
6,975.00	29.36	269.25	6,904.07	-582.02	132.37	-135.93	11.31
7,023.00	35.61	269.74	6,944.54	-582.23	106.61	-110.16	13.03
7,070.00	42.03	269.82	6,981.14	-582.34	77.16	-80.72	13.66
7,117.00	48.76	270.24	7,014.12	-582.32	43.72	-47.27	14.33
7,164.00	55.48	270.55	7,042.96	-582.06	6.64	-10.20	14.31
7,212.00	63.35	270.81	7,067.37	-581.57	-34.65	31.09	16.40
7,259.00	70.10	271.51	7,085.93	-580.69	-77.79	74.24	14.43
7,307.00	76.06	270.87	7,099.89	-579.74	-123.68	120.13	12.48
7,354.00	81.08	271.14	7,109.20	-578.93	-169.72	166.18	10.70
7,402.00	84.63	271.93	7,115.17	-577.65	-217.33	213.79	7.57
7,450.00	87.38	272.60	7,118.52	-575.76	-265.17	261.64	5.90
7,490.70	88.00	273.03	7,120.16	-573.76	-305.78	302.27	1.86
7"							
7,569.00	89.20	273.85	7,122.07	-569.07	-383.92	380.43	1.86
7,663.00	88.46	272.29	7,123.99	-564.03	-477.76	474.31	1.84
7,758.00	89.01	270.58	7,126.08	-561.66	-572.70	569.26	1.89
7,853.00	89.44	269.70	7,127.37	-561.42	-667.69	664.25	1.03
7,948.00	88.89	268.39	7,128.75	-563.01	-762.67	759.21	1.50
8,043.00	89.01	269.82	7,130.49	-564.49	-857.64	854.17	1.51
8,138.00	88.76	270.14	7,132.34	-564.52	-952.62	949.15	0.43
8,232.00	88.39	269.80	7,134.68	-564.57	-1,046.59	1,043.12	0.53

Design Report for Eisenach 32N-8HZ - Actual Field Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
8,327.00	90.56	269.91	7,135.55	-564.81	-1,141.58	1,138.11	2.29
8,422.00	89.51	268.52	7,135.49	-566.11	-1,236.57	1,233.09	1.83
8,517.00	89.44	267.48	7,136.36	-569.43	-1,331.50	1,328.00	1.10
8,612.00	89.51	269.24	7,137.23	-572.15	-1,426.46	1,422.94	1.85
8,707.00	89.51	271.92	7,138.05	-571.19	-1,521.44	1,517.92	2.82
8,801.00	89.75	274.20	7,138.65	-566.17	-1,615.30	1,611.81	2.44
8,896.00	88.39	272.43	7,140.20	-560.68	-1,710.12	1,706.66	2.35
8,991.00	87.47	271.55	7,143.63	-557.38	-1,805.00	1,801.56	1.34
9,085.00	87.40	271.53	7,147.83	-554.86	-1,898.87	1,895.45	0.08
9,180.00	87.22	271.54	7,152.29	-552.31	-1,993.73	1,990.32	0.19
9,274.00	87.59	271.59	7,156.55	-549.75	-2,087.60	2,084.20	0.40
9,369.00	89.07	271.25	7,159.32	-547.40	-2,182.53	2,179.14	1.60
9,463.00	90.06	271.36	7,160.03	-545.26	-2,276.50	2,273.13	1.06
9,558.00	89.26	271.21	7,160.59	-543.12	-2,371.47	2,368.11	0.86
9,652.00	90.86	271.82	7,160.50	-540.64	-2,465.44	2,462.09	1.82
9,747.00	90.80	271.66	7,159.12	-537.76	-2,560.38	2,557.05	0.18
9,842.00	90.37	270.68	7,158.15	-535.82	-2,655.36	2,652.03	1.13
9,937.00	91.61	270.63	7,156.51	-534.73	-2,750.34	2,747.02	1.31
10,031.00	90.12	270.08	7,155.09	-534.15	-2,844.32	2,841.00	1.69
10,126.00	90.19	269.86	7,154.83	-534.20	-2,939.32	2,936.00	0.24
10,221.00	91.61	269.89	7,153.34	-534.40	-3,034.30	3,030.98	1.50
10,316.00	89.57	268.43	7,152.36	-535.80	-3,129.28	3,125.95	2.64
10,410.00	88.39	269.04	7,154.04	-537.87	-3,223.24	3,219.90	1.41
10,505.00	87.90	269.07	7,157.11	-539.44	-3,318.18	3,314.82	0.52
10,600.00	90.49	271.39	7,158.45	-539.06	-3,413.15	3,409.80	3.66
10,695.00	90.25	271.17	7,157.83	-536.93	-3,508.13	3,504.78	0.34
10,790.00	89.44	270.85	7,158.09	-535.26	-3,603.11	3,599.78	0.92
10,885.00	90.74	271.15	7,157.94	-533.60	-3,698.10	3,694.77	1.40
10,980.00	90.56	270.25	7,156.86	-532.44	-3,793.08	3,789.76	0.97
11,075.00	91.67	268.71	7,155.01	-533.30	-3,888.06	3,884.72	2.00
11,170.00	91.48	267.54	7,152.40	-536.41	-3,982.97	3,979.62	1.25
11,264.00	91.24	267.18	7,150.17	-540.74	-4,076.84	4,073.46	0.46
11,359.00	91.17	265.91	7,148.17	-546.46	-4,171.64	4,168.23	1.34
11,454.00	93.77	267.42	7,144.08	-551.98	-4,266.38	4,262.93	3.16
11,549.00	93.03	268.42	7,138.44	-555.43	-4,361.15	4,357.68	1.31
11,644.00	90.68	270.22	7,135.37	-556.55	-4,456.09	4,452.60	3.12
11,739.00	90.99	272.84	7,133.99	-554.02	-4,551.03	4,547.56	2.78
11,834.00	91.11	274.89	7,132.24	-547.61	-4,645.80	4,642.36	2.16
11,928.00	88.45	275.66	7,132.60	-538.97	-4,739.39	4,736.01	2.95
12,038.00	87.71	275.60	7,136.29	-528.19	-4,848.80	4,845.48	0.67
Last MWD Survey @ 12038.00 ft							
12,107.00	87.71	275.60	7,139.05	-521.46	-4,917.41	4,914.13	0.00
St. Line Projection to Bit @ 12107MD::7139' TVD							

Design Report for Eisenach 32N-8HZ - Actual Field Surveys**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
25.00	25.00	0.00	0.00	First Surface Survey @ RKB=25'
125.00	125.00	-0.43	0.18	First MS Energy Surface Gyro Survey @ 125 ft
618.00	617.98	-2.81	-1.22	Last MS Energy Surface Gyro Survey @ 618.00 ft
731.00	730.97	-3.82	-2.15	First MWD Survey @ 731.00 ft
12,038.00	7,136.29	-528.19	-4,848.80	Last MWD Survey @ 12038.00 ft
12,107.00	7,139.05	-521.46	-4,917.41	St. Line Projection to Bit @ 12107'MD::7139 ' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
User	No Target (Freehand)	270.35	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
25.00	618.00	MS Gyros	NS-GYRO-MS
731.00	7,450.00	MWD Vertical/Build	MWD+IFR1
7,569.00	12,038.00	MWD Lateral	MWD+IFR1

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,490.70	7,120.16	7"	7	8-3/4

Design Report for Eisenach 32N-8HZ - 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
Eisenach 32N-8HZ_LL	0.00	0.00	0.00	-801.65	-2,333.15	1,330,782.82	3,195,036.58	40° 14' 21.437 N	104° 48' 4.911 W
- actual wellpath misses target center by 2467.03usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	465.99	-2,608.97	1,331,227.98	3,192,424.09	
Point 2				0.00	-453.42	-2,616.30	1,330,308.58	3,192,424.09	
Point 3				0.00	-442.87	2,177.06	1,330,357.34	3,197,217.01	
Point 4				0.00	446.71	2,179.15	1,331,246.87	3,197,212.01	
Point 5				0.00	465.99	-2,608.97	1,331,227.98	3,192,424.09	
Eisenach 32N-8HZ_SE	0.00	0.00	0.00	-801.65	-2,333.15	1,330,782.82	3,195,036.58	40° 14' 21.437 N	104° 48' 4.911 W
- actual wellpath misses target center by 2467.03usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				0.00	2,660.14	-2,607.12	1,333,421.98	3,192,408.45	
Point 2				0.00	2,653.52	-13.36	1,333,436.04	3,195,002.07	
Point 3				0.00	2,649.73	650.46	1,333,437.54	3,195,665.87	
Point 4				0.00	2,645.96	1,314.16	1,333,439.06	3,196,329.55	
Point 5				0.00	2,638.19	2,641.61	1,333,441.87	3,197,656.96	
Point 6				0.00	1.32	2,637.64	1,330,805.17	3,197,674.01	
Point 7				0.00	-2,634.68	2,633.58	1,328,169.34	3,197,690.97	
Point 8				0.00	-2,641.52	6.00	1,328,141.55	3,195,063.64	
Point 9				0.00	-2,647.56	-2,619.52	1,328,114.58	3,192,438.36	
Point 10				0.00	6.41	-2,613.63	1,330,768.39	3,192,423.09	
Point 11				0.00	2,660.14	-2,607.12	1,333,421.98	3,192,408.45	
Eisenach 32N-8HZ_SF	0.00	0.00	0.00	0.00	0.00	1,331,603.01	3,197,363.17	40° 14' 29.360 N	104° 47' 34.825 W
- actual wellpath hits target center									
- Point									
Eisenach 32N-8HZ_BF	0.00	0.00	7,122.00	-531.73	-4,945.11	1,331,031.90	3,192,422.67	40° 14' 24.101 N	104° 48' 38.592 W
- actual wellpath misses target center by 34.11usft at 12107.00usft MD (7139.05 TVD, -521.46 N, -4917.41 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.84 °/100usft	Maximum Dogleg over Survey:	16.40 °/100usft at 7,212.00 usft
Net Tortosity applicable to Plans:	0.91 °/100usft	Directional Difficulty Index:	6.340

Audit Info

North Reference Sheet for Sec. 8-T3N-R66W - Eisenach 32N-8HZ - 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 = 25' @ 4852.00usft (H&P 308). Northing and Easting are relative to Eisenach 32N-8HZ

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: 0.99995686

Grid Coordinates of Well: 1,331,603.01 usft N, 3,197,363.17 usft E

Geographical Coordinates of Well: 40° 14' 29.36" N, 104° 47' 34.83" W

Grid Convergence at Surface is: 0.46°

Based upon Minimum Curvature type calculations, at a Measured Depth of 12,107.00usft
the Bottom Hole Displacement is 4,944.98usft in the Direction of 263.95° (True).

Magnetic Convergence at surface is: -8.15° (22 July 2013, , BGGM2013)

