

Noble Energy

Weld County, CO (NAD 83)

Sec. 27-T3N-R65W (Moser Pad)

Moser H22-715

05-123-40754

Plan A

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

02 December, 2015

Surface UWI : 05-123-40754

Well Coordinates: 1,317,805.05 N, 3,239,620.46 E (40° 12' 09.32" N, 104° 38' 31.63" W)

Ground Level: 4,812.00 usft

Local Coordinate Origin:

Centered on Well Moser H22-715

Viewing Datum:

KB = 24' @ 4836.00usft (H&P 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 73

HALLIBURTON

Project: Weld County, CO (NAD 83)
Site: Sec. 27-T3N-R65W (Moser Pad)
Well: Moser H22-715
Wellbore: Plan A
Design: Actual Surveys



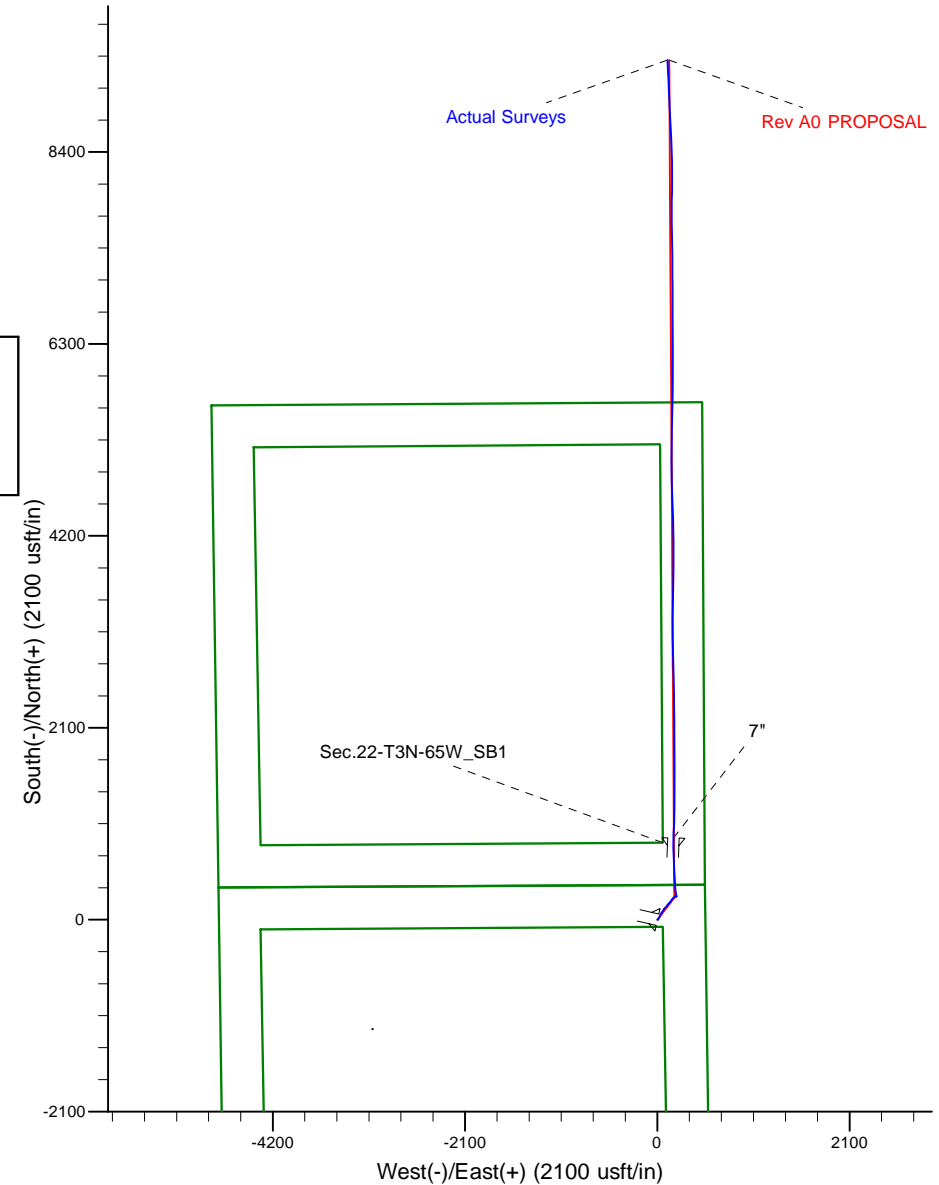
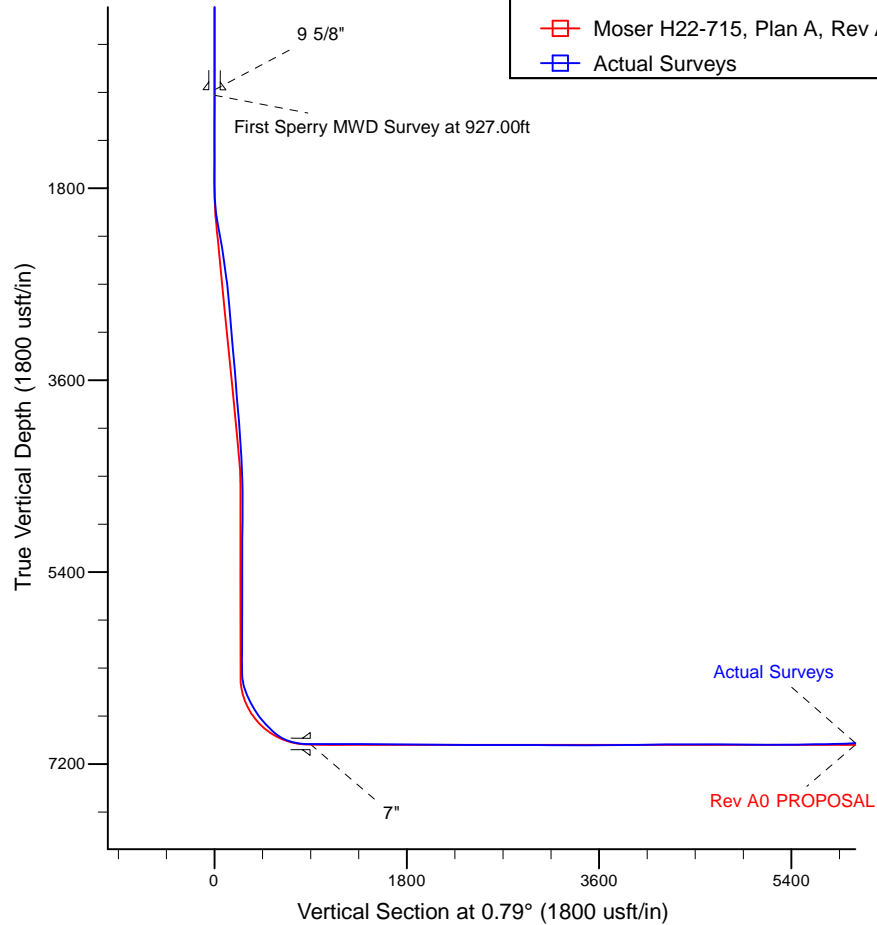
Platted SHL: 380' FNL, 524' FEL
Platted Lat/Long: 40.20259, -104.64212
Location: Sec. 27-T3N-R65W

~7" Casing: 527' FSL, 346' FEL
Lat/Long: 40.205041 N, -104.641452 W
State Planes - CO Northern: 1,318,699.51 N, 3,239,798.53 E
Sec. 27-T3N-R65W

Platted BHL: 1530' FNL, 330' FEL
Platted Lat/Long: 40.228238 N, -104.641389 W
State Planes - CO Northern: 1,327,149.74 N, 3,239,734.15 E
Location: Sec. 15-T3N-R65W

LEGEND

- Moser H22-715, Plan A, Rev A0 PROPOSAL V0
- Actual Surveys



WELL DETAILS: Moser H22-715

Ground Level: 4812.00

KB = 24' @ 4836.00usft (H&P 343)

Created By: Tatiana Gomez
Created On: 12-2-15

Design Report for Moser H22-715 - Actual 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
877.00	0.38	103.36	876.99	-0.67	2.82	-0.63	0.04
9 5/8"							
927.00	0.40	103.36	926.99	-0.75	3.15	-0.70	0.04
First Sperry MWD Survey at 927.00ft							
1,022.00	0.25	117.52	1,021.99	-0.92	3.65	-0.87	0.18
1,203.00	0.12	185.24	1,202.99	-1.29	3.99	-1.24	0.13
1,294.00	0.12	193.73	1,293.99	-1.48	3.96	-1.42	0.02
1,386.00	0.04	173.61	1,385.99	-1.60	3.94	-1.55	0.09
1,476.00	0.06	200.50	1,475.99	-1.68	3.92	-1.63	0.03
1,568.00	0.13	76.46	1,567.99	-1.70	4.01	-1.64	0.19
1,659.00	0.09	25.72	1,658.99	-1.61	4.14	-1.55	0.11
1,841.00	1.88	45.56	1,840.96	0.61	6.33	0.69	0.99
1,933.00	4.91	35.48	1,932.78	4.87	9.70	5.00	3.34
2,024.00	7.13	33.08	2,023.28	12.78	15.04	12.98	2.45
2,115.00	11.93	24.27	2,113.00	26.09	21.99	26.39	5.50
2,205.00	11.07	20.72	2,201.19	42.65	28.87	43.05	1.24
2,297.00	10.33	28.17	2,291.60	58.19	35.89	58.68	1.70
2,388.00	10.34	35.45	2,381.12	72.03	44.48	72.64	1.43
2,480.00	9.60	33.73	2,471.73	85.14	53.53	85.87	0.87
2,571.00	9.47	30.11	2,561.48	97.93	61.50	98.76	0.67
2,663.00	9.69	29.83	2,652.19	111.19	69.15	112.13	0.24
2,755.00	7.13	44.44	2,743.21	121.99	77.00	123.03	3.60
2,849.00	6.92	44.21	2,836.50	130.21	85.03	131.37	0.23
2,944.00	6.64	42.40	2,930.84	138.37	92.73	139.63	0.37
3,038.00	6.33	39.70	3,024.24	146.37	99.70	147.73	0.46
3,133.00	6.15	34.59	3,118.67	154.59	105.94	156.03	0.61
3,227.00	5.92	31.43	3,212.15	162.87	111.32	164.39	0.43
3,322.00	6.83	47.17	3,306.57	170.89	118.02	172.50	2.06
3,417.00	6.52	41.44	3,400.93	178.77	125.73	180.49	0.77
3,511.00	6.14	41.36	3,494.36	186.55	132.59	188.36	0.40
3,606.00	5.82	39.00	3,588.84	194.10	138.98	196.00	0.42
3,795.00	5.65	33.70	3,776.89	209.29	150.17	211.34	0.29
3,890.00	5.71	35.31	3,871.43	217.04	155.49	219.16	0.18
3,984.00	5.63	42.53	3,964.97	224.25	161.31	226.45	0.76
4,079.00	5.45	38.78	4,059.53	231.20	167.29	233.49	0.43
4,174.00	4.94	38.62	4,154.14	237.92	172.67	240.27	0.54
4,268.00	5.10	49.23	4,247.78	243.81	178.36	246.24	1.00
4,363.00	5.06	60.56	4,342.41	248.62	185.21	251.15	1.06
4,457.00	4.25	54.48	4,436.10	252.68	191.65	255.30	1.01
4,646.00	2.98	54.79	4,624.72	259.59	201.36	262.33	0.67
4,740.00	0.52	144.89	4,718.67	260.65	203.61	263.43	3.22
4,835.00	1.40	95.35	4,813.66	260.19	205.01	262.98	1.19
4,929.00	0.97	168.42	4,907.64	259.30	206.31	262.12	1.55
5,024.00	0.92	162.60	5,002.63	257.78	206.70	260.61	0.11
5,118.00	0.77	143.55	5,096.62	256.55	207.30	259.39	0.34
5,213.00	0.75	109.21	5,191.61	255.84	208.27	258.68	0.47
5,307.00	0.66	252.53	5,285.61	255.47	208.33	258.32	1.42
5,402.00	0.53	287.88	5,380.61	255.44	207.39	258.27	0.40
5,591.00	0.47	320.11	5,569.60	256.31	206.07	259.12	0.15

Design Report for Moser H22-715 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,686.00	0.69	215.94	5,664.60	256.14	205.48	258.95	0.97
5,780.00	0.76	166.90	5,758.59	255.08	205.29	257.88	0.64
5,875.00	0.56	139.93	5,853.58	254.11	205.73	256.92	0.38
5,969.00	0.14	97.76	5,947.58	253.74	206.14	256.56	0.50
6,064.00	0.41	2.02	6,042.58	254.06	206.27	256.88	0.47
6,158.00	0.62	163.24	6,136.58	253.91	206.43	256.73	1.08
6,253.00	0.75	93.86	6,231.57	253.38	207.19	256.21	0.83
6,348.00	1.14	75.45	6,326.56	253.57	208.73	256.43	0.52
6,443.00	9.31	349.98	6,421.13	261.40	208.31	264.24	9.78
6,538.00	20.20	348.28	6,512.86	285.09	203.62	287.87	11.47
6,632.00	27.04	353.09	6,598.94	322.24	197.75	324.94	7.55
6,727.00	30.97	359.03	6,682.03	368.15	194.74	370.80	5.12
6,822.00	36.32	359.32	6,761.09	420.76	193.99	423.39	5.63
6,916.00	44.36	354.84	6,832.69	481.43	190.69	484.02	9.09
7,010.00	48.11	356.11	6,897.70	549.10	185.36	551.60	4.11
7,105.00	59.15	354.65	6,953.95	625.21	179.14	627.62	11.69
7,199.00	75.49	0.23	6,990.10	711.53	175.54	713.88	18.22
7,294.00	82.37	0.44	7,008.33	804.71	176.08	807.06	7.25
7,337.00	87.72	1.42	7,012.04	847.52	176.78	849.88	12.65
7,384.00	89.61	1.76	7,013.14	894.49	178.08	896.86	4.08
7"							
7,442.00	91.94	2.17	7,012.35	952.45	180.07	954.84	4.08
7,537.00	89.35	1.99	7,011.28	1,047.37	183.52	1,049.80	2.73
7,631.00	89.29	1.35	7,012.40	1,141.32	186.26	1,143.78	0.68
7,726.00	89.44	0.72	7,013.45	1,236.30	187.97	1,238.77	0.68
7,821.00	89.48	0.25	7,014.35	1,331.29	188.78	1,333.77	0.50
7,915.00	89.72	359.61	7,015.00	1,425.29	188.66	1,427.76	0.73
8,010.00	90.15	358.98	7,015.11	1,520.28	187.49	1,522.72	0.80
8,105.00	89.82	0.37	7,015.14	1,615.28	186.95	1,617.70	1.50
8,199.00	89.54	0.51	7,015.66	1,709.28	187.67	1,711.70	0.33
8,294.00	89.44	359.96	7,016.51	1,804.27	188.06	1,806.69	0.59
8,388.00	89.51	359.43	7,017.37	1,898.27	187.56	1,900.67	0.57
8,483.00	89.63	359.63	7,018.08	1,993.26	186.78	1,995.64	0.25
8,578.00	89.54	359.74	7,018.77	2,088.26	186.26	2,090.62	0.15
8,672.00	89.32	359.21	7,019.70	2,182.25	185.40	2,184.59	0.61
8,767.00	89.14	358.47	7,020.98	2,277.22	183.48	2,279.53	0.80
8,862.00	90.06	359.17	7,021.64	2,372.19	181.52	2,374.47	1.22
8,956.00	89.91	359.80	7,021.67	2,466.19	180.68	2,468.44	0.69
9,051.00	89.91	359.32	7,021.82	2,561.19	179.95	2,563.42	0.51
9,145.00	89.85	358.83	7,022.01	2,655.17	178.43	2,657.38	0.53
9,240.00	90.37	358.31	7,021.83	2,750.14	176.06	2,752.31	0.77
9,335.00	90.55	357.69	7,021.07	2,845.08	172.74	2,847.19	0.68
9,425.00	89.20	359.17	7,021.27	2,935.04	170.28	2,937.11	2.23
9,524.00	89.48	359.33	7,022.41	3,034.03	168.98	3,036.07	0.33
9,619.00	89.23	358.78	7,023.47	3,129.01	167.42	3,131.02	0.64
9,709.00	89.54	359.27	7,024.44	3,218.99	165.88	3,220.97	0.64
9,800.00	90.28	1.53	7,024.58	3,309.98	166.52	3,311.96	2.61
9,891.00	90.03	1.28	7,024.34	3,400.95	168.75	3,402.95	0.39
9,983.00	89.45	0.29	7,024.76	3,492.94	170.01	3,494.95	1.25
10,165.00	90.71	1.42	7,024.50	3,674.91	172.73	3,676.95	0.93
10,256.00	91.05	1.28	7,023.10	3,765.88	174.87	3,767.93	0.40

Design Report for Moser H22-715 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,347.00	91.08	0.60	7,021.41	3,856.85	176.36	3,858.91	0.75
10,438.00	91.36	0.14	7,019.47	3,947.83	176.95	3,949.89	0.59
10,530.00	90.15	359.98	7,018.26	4,039.82	177.05	4,041.87	1.33
10,621.00	90.34	359.35	7,017.87	4,130.81	176.51	4,132.85	0.72
10,712.00	90.31	358.87	7,017.36	4,221.80	175.10	4,223.81	0.53
10,802.00	90.15	358.88	7,017.00	4,311.78	173.33	4,313.76	0.18
10,894.00	90.00	358.49	7,016.88	4,403.76	171.22	4,405.70	0.45
11,077.00	90.06	357.45	7,016.78	4,586.64	164.74	4,588.48	0.57
11,168.00	90.25	356.78	7,016.53	4,677.53	160.16	4,679.29	0.77
11,260.00	89.75	358.66	7,016.53	4,769.45	156.50	4,771.15	2.11
11,352.00	89.54	0.12	7,017.10	4,861.44	155.52	4,863.12	1.60
11,541.00	88.80	0.05	7,019.84	5,050.42	155.80	5,052.08	0.39
11,635.00	91.91	0.82	7,019.26	5,144.40	156.52	5,146.07	3.41
11,730.00	90.03	0.27	7,017.65	5,239.38	157.42	5,241.05	2.06
11,919.00	89.97	0.81	7,017.65	5,428.37	159.20	5,430.05	0.29
12,014.00	90.96	2.08	7,016.88	5,523.33	161.60	5,525.03	1.69
12,108.00	90.93	1.53	7,015.33	5,617.27	164.56	5,619.01	0.59
12,203.00	90.74	0.89	7,013.94	5,712.24	166.56	5,713.99	0.70
12,297.00	91.85	0.66	7,011.82	5,806.21	167.83	5,807.97	1.21
12,392.00	92.04	0.20	7,008.60	5,901.15	168.55	5,902.91	0.52
12,487.00	92.68	0.19	7,004.68	5,996.07	168.87	5,997.82	0.67
12,582.00	90.68	0.45	7,001.90	6,091.02	169.40	6,092.78	2.12
12,676.00	91.26	0.32	7,000.31	6,185.00	170.03	6,186.76	0.63
12,771.00	90.43	359.27	6,998.91	6,279.99	169.69	6,281.73	1.41
12,865.00	91.29	359.19	6,997.50	6,373.97	168.43	6,375.69	0.92
12,960.00	90.15	359.69	6,996.30	6,468.96	167.50	6,470.65	1.31
13,055.00	89.51	359.95	6,996.58	6,563.96	167.20	6,565.64	0.73
13,149.00	91.02	359.81	6,996.15	6,657.95	167.00	6,659.62	1.61
13,243.00	87.62	359.95	6,997.26	6,751.93	166.81	6,753.59	3.62
13,338.00	87.04	359.55	7,001.69	6,846.83	166.39	6,848.47	0.74
13,432.00	87.13	359.49	7,006.47	6,940.70	165.61	6,942.32	0.12
13,527.00	89.26	359.77	7,009.46	7,035.65	164.99	7,037.25	2.26
13,716.00	89.23	359.10	7,011.95	7,224.62	163.13	7,226.18	0.35
13,811.00	90.46	359.41	7,012.21	7,319.61	161.89	7,321.15	1.34
13,905.00	90.22	359.48	7,011.65	7,413.60	160.98	7,415.12	0.27
14,000.00	90.49	358.91	7,011.06	7,508.59	159.65	7,510.08	0.66
14,095.00	90.83	358.53	7,009.97	7,603.56	157.53	7,605.01	0.54
14,189.00	91.08	0.08	7,008.40	7,697.54	156.39	7,698.96	1.67
14,284.00	92.19	0.57	7,005.69	7,792.50	156.93	7,793.92	1.28
14,378.00	92.87	0.77	7,001.54	7,886.40	158.02	7,887.83	0.75
14,473.00	90.68	0.98	6,998.60	7,981.34	159.47	7,982.78	2.32
14,567.00	91.60	0.42	6,996.73	8,075.31	160.62	8,076.76	1.15
14,662.00	89.75	359.80	6,995.61	8,170.30	160.80	8,171.74	2.05
14,756.00	90.62	359.36	6,995.31	8,264.29	160.12	8,265.71	1.04
14,851.00	90.34	358.91	6,994.51	8,359.28	158.68	8,360.67	0.56
14,946.00	89.48	357.77	6,994.66	8,454.24	155.93	8,455.58	1.50
15,041.00	89.69	357.44	6,995.35	8,549.15	151.96	8,550.43	0.41
15,136.00	90.89	357.05	6,994.87	8,644.04	147.39	8,645.25	1.33
15,230.00	91.66	356.96	6,992.78	8,737.89	142.48	8,739.02	0.82
15,324.00	90.68	357.68	6,990.86	8,831.76	138.09	8,832.83	1.29
15,418.00	91.33	356.83	6,989.21	8,925.64	133.59	8,926.63	1.14

Design Report for Moser H22-715 - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
15,512.00	91.97	356.60	6,986.50	9,019.44	128.20	9,020.35	0.72
15,606.00	90.31	357.83	6,984.63	9,113.31	123.64	9,114.15	2.20
15,700.00	90.18	357.78	6,984.23	9,207.24	120.04	9,208.02	0.15
15,794.00	89.63	357.31	6,984.39	9,301.15	116.01	9,301.87	0.77
15,838.00	89.75	356.66	6,984.62	9,345.09	113.70	9,345.77	1.50
Final Sperry MWD Survey at 15838.00ft							
15,900.00	89.75	356.66	6,984.89	9,406.98	110.09	9,407.61	0.00
Straight Line Projection to TD at 15900.00ft							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
927.00	926.99	-0.75	3.15	First Sperry MWD Survey at 927.00ft
15,838.00	6,984.62	9,345.09	113.70	Final Sperry MWD Survey at 15838.00ft
15,900.00	6,984.89	9,406.98	110.09	Straight Line Projection to TD at 15900.00ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Moser H22-715_Rev A0_BHL	0.79	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
927.00	7,337.00	Intermediate Sperry MWD Surveys	MWD
7,442.00	15,900.00	Production Sperry Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
877.00	876.99	9 5/8"	9-5/8	13-3/4
7,384.00	7,013.14	7"	7	8-3/4

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
- hit/miss target									
- Shape									
Moser H22-715_Rev A	0.00	0.00	0.00	0.01	0.00	1,317,805.06	3,239,620.46	40.202590	-104.642120
- actual wellpath misses target center by 0.01usft at 0.00usft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Moser H22-715_Rev A	0.00	0.00	7,020.00	9,407.92	129.58	1,327,212.57	3,239,750.03	40.228410	-104.641330
- actual wellpath misses target center by 40.17usft at 15899.95usft MD (6984.89 TVD, 9406.94 N, 110.09 E)									
- Point									

Design Report for Moser H22-715 - Actual Surveys

Directional Difficulty Index

Average Dogleg over Survey:	1.42 °/100usft	Maximum Dogleg over Survey:	18.22 °/100usft at 7,199.00 usft
Net Tortosity applicable to Plans:	0.76 °/100usft	Directional Difficulty Index:	6.687

Audit Info

North Reference Sheet for Sec. 27-T3N-R65W (Moser Pad) - Moser H22-715 - Plan**A**

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB = 24' @ 4836.00usft (H&P 343). Northing and Easting are relative to Moser H22-715

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: 0.99995720

Grid Coordinates of Well: 1,317,805.05 usft N, 3,239,620.46 usft E

Geographical Coordinates of Well: 40° 12' 09.32" N, 104° 38' 31.63" W

Grid Convergence at Surface is: 0.55°

Based upon Minimum Curvature type calculations, at a Measured Depth of 15,900.00usft
the Bottom Hole Displacement is 9,407.63usft in the Direction of 0.67° (Grid).

Magnetic Convergence at surface is: -7.88° (23 November 2015, , BGGM2015)

