



# Noble Energy, Inc

Weld County, CO (NAD 83)  
Sec 36, T6N R63W (Wells Ranch AA35)  
Wells Ranch AA35-63-1BHNA  
Wellbore #1

Design: OH

## Final Survey Report

09 April, 2014





# IDS

## Final Survey Report



<b>Company:</b> Noble Energy, Inc	<b>Local Co-ordinate Reference:</b> Well Wells Ranch AA35-63-1BHNA
<b>Project:</b> Weld County, CO (NAD 83)	<b>TVD Reference:</b> Well @ 4765.0usft (HP 277)
<b>Site:</b> Sec 36, T6N R63W (Wells Ranch AA35)	<b>MD Reference:</b> Well @ 4765.0usft (HP 277)
<b>Well:</b> Wells Ranch AA35-63-1BHNA	<b>North Reference:</b> Grid
<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> OH	<b>Database:</b> EDM 5000.1 Single User Db

<b>Project</b> Weld County, CO (NAD 83)			
<b>Map System:</b> US State Plane 1983	<b>System Datum:</b>	Mean Sea Level	
<b>Geo Datum:</b> North American Datum 1983			
<b>Map Zone:</b> Colorado Northern Zone			

<b>Site</b> Sec 36, T6N R63W (Wells Ranch AA35)			
<b>Site Position:</b>	<b>Northing:</b> 1,404,137.44 usft	<b>Latitude:</b>	40° 26' 14.964 N
<b>From:</b> Lat/Long	<b>Easting:</b> 3,307,823.51 usft	<b>Longitude:</b>	104° 23' 38.796 W
<b>Position Uncertainty:</b> 0.0 usft	<b>Slot Radius:</b> 13-3/16"	<b>Grid Convergence:</b>	0.71 °

<b>Well</b> Wells Ranch AA35-63-1BHNA			
<b>Well Position</b>	<b>+N-S</b> 0.0 usft	<b>Northing:</b> 1,404,173.89 usft	<b>Latitude:</b> 40° 26' 15.324 N
	<b>+E-W</b> 0.0 usft	<b>Easting:</b> 3,307,825.84 usft	<b>Longitude:</b> 104° 23' 38.760 W
<b>Position Uncertainty</b>	0.0 usft	<b>Wellhead Elevation:</b> 0.0 usft	<b>Ground Level:</b> 4,741.0 usft

<b>Wellbore</b> Wellbore #1					
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/25/2014	8.29	67.04	52,898

<b>Design</b> OH					
<b>Audit Notes:</b>					
<b>Version:</b> 1.0	<b>Phase:</b> ACTUAL	<b>Tie On Depth:</b> 0.0			
Vertical Section:	Depth From (TVD) (usft)	+N-S (usft)	+E-W (usft)	Direction (°)	
	0.0	0.0	0.0	270.97	

<b>Survey Program</b>		<b>Date</b> 4/9/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
277.0	558.0	ESS Surface Surveys (Wellbore #1)	EMS	EMS - Standard	
649.0	6,823.0	MWD Intermediate Surveys (Wellbore #1)	MWD	MWD - Standard	
6,901.0	11,078.0	MWD + IFR1 + MS Rockies Lateral Surveys	Sperry - MWD+IFR1+MS_	Fixed:v2:Rockies, crustal dec + 3-axis correction	

<b>Survey</b>									
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)		
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.0	0.0	0.00
277.0	0.20	138.62	277.0	-0.4	0.3	-0.3	0.07		
558.0	0.80	153.32	558.0	-2.5	1.5	-1.6	0.22		
649.0	1.14	162.90	649.0	-3.9	2.1	-2.1	0.41		
<b>First MWD</b>									
743.0	1.23	173.56	743.0	-5.8	2.5	-2.6	0.25		
837.0	1.41	170.04	836.9	-8.0	2.8	-2.9	0.21		
931.0	2.37	231.57	930.9	-10.3	1.5	-1.6	2.24		
1,024.0	2.64	231.83	1,023.8	-12.8	-1.7	1.5	0.29		
1,119.0	3.87	250.55	1,118.6	-15.2	-6.5	6.2	1.69		



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<b>Site:</b>	Sec 36, T6N R63W (Wells Ranch AA35	<b>MD Reference:</b>	Well @ 4765.0usft (HP 277)
<b>Well:</b>	Wells Ranch AA35-63-1BHNA	<b>North Reference:</b>	Grid
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	OH	<b>Database:</b>	EDM 5000.1 Single User Db

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
1,214.0	3.87	270.76	1,213.4	-16.3	-12.7	12.4	1.43	
1,307.0	2.99	301.88	1,306.3	-14.9	-17.9	17.7	2.18	
1,402.0	3.78	329.83	1,401.1	-10.9	-21.6	21.4	1.90	
1,496.0	3.69	331.67	1,494.9	-5.6	-24.6	24.5	0.16	
1,591.0	3.52	331.58	1,589.7	-0.3	-27.4	27.4	0.18	
1,686.0	4.75	321.13	1,684.5	5.3	-31.3	31.4	1.51	
1,780.0	6.24	315.06	1,778.0	11.9	-37.3	37.5	1.70	
1,874.0	7.39	311.81	1,871.4	19.6	-45.4	45.8	1.29	
1,969.0	8.09	311.02	1,965.5	28.1	-55.0	55.5	0.75	
2,064.0	10.02	309.52	2,059.3	37.7	-66.5	67.1	2.05	
2,159.0	10.82	315.06	2,152.8	49.3	-79.1	80.0	1.35	
2,253.0	10.20	314.27	2,245.2	61.3	-91.3	92.3	0.68	
2,348.0	9.40	316.56	2,338.8	72.8	-102.7	103.9	0.94	
2,443.0	8.35	316.47	2,432.7	83.5	-112.8	114.2	1.11	
2,538.0	7.83	315.76	2,526.7	93.1	-122.0	123.6	0.56	
2,632.0	7.30	315.33	2,619.9	101.9	-130.7	132.4	0.57	
2,727.0	7.56	331.15	2,714.1	111.7	-138.0	139.8	2.16	
2,822.0	4.75	338.26	2,808.5	120.8	-142.4	144.5	3.06	
2,916.0	3.25	350.57	2,902.3	127.1	-144.3	146.4	1.83	
3,011.0	0.88	349.51	2,997.2	130.5	-144.9	147.1	2.49	
3,106.0	0.09	154.40	3,092.2	131.1	-145.0	147.2	1.02	
3,201.0	1.14	105.18	3,187.2	130.8	-144.0	146.2	1.14	
3,295.0	1.23	106.94	3,281.2	130.2	-142.2	144.4	0.10	
3,390.0	1.85	108.87	3,376.2	129.5	-139.7	141.9	0.65	
3,485.0	2.20	102.54	3,471.1	128.6	-136.5	138.7	0.44	
3,580.0	3.17	131.28	3,566.0	126.4	-132.8	134.9	1.72	
3,675.0	3.52	145.26	3,660.9	122.3	-129.1	131.2	0.93	
3,770.0	3.17	158.88	3,755.7	117.5	-126.5	128.5	0.91	
3,864.0	2.99	182.35	3,849.6	112.6	-125.7	127.6	1.35	
3,959.0	2.20	190.08	3,944.5	108.3	-126.1	127.9	0.91	
4,054.0	0.79	219.00	4,039.4	106.0	-126.8	128.6	1.64	
4,148.0	0.79	224.71	4,133.4	105.0	-127.7	129.5	0.08	
4,243.0	0.53	261.10	4,228.4	104.5	-128.6	130.3	0.51	
4,338.0	1.14	240.27	4,323.4	104.0	-129.8	131.6	0.71	
4,433.0	1.67	229.37	4,418.4	102.6	-131.7	133.4	0.62	
4,528.0	0.97	211.44	4,513.4	101.0	-133.2	134.9	0.85	
4,623.0	0.79	196.32	4,608.3	99.7	-133.8	135.5	0.31	
4,718.0	0.09	351.36	4,703.3	99.1	-134.0	135.6	0.92	
4,812.0	0.35	11.93	4,797.3	99.5	-133.9	135.6	0.28	
4,907.0	0.53	29.07	4,892.3	100.2	-133.7	135.3	0.23	
5,002.0	0.53	7.27	4,987.3	101.0	-133.4	135.1	0.21	
5,097.0	0.70	23.00	5,082.3	102.0	-133.1	134.8	0.25	
5,192.0	0.79	46.12	5,177.3	102.9	-132.4	134.1	0.33	
5,287.0	1.32	31.35	5,272.3	104.3	-131.4	133.1	0.62	



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<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
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Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
5,381.0	1.14	42.25	5,366.3	106.0	-130.2	132.0	0.31	
5,476.0	1.14	51.39	5,461.3	107.2	-128.8	130.6	0.19	
5,571.0	0.88	47.08	5,556.3	108.3	-127.5	129.3	0.28	
5,666.0	1.14	51.65	5,651.2	109.4	-126.3	128.1	0.29	
5,760.0	1.23	53.76	5,745.2	110.6	-124.7	126.6	0.11	
5,850.0	1.49	51.92	5,835.2	111.9	-123.0	124.9	0.29	
5,944.0	5.01	256.17	5,929.1	111.7	-126.0	127.9	6.81	
6,042.0	8.88	247.56	6,026.4	107.7	-137.2	139.0	4.08	
6,136.0	15.83	246.33	6,118.1	99.8	-155.7	157.3	7.40	
6,231.0	24.62	244.84	6,207.2	86.2	-185.5	186.9	9.27	
6,326.0	36.58	240.71	6,288.8	63.8	-228.3	229.3	12.78	
6,421.0	53.55	243.61	6,355.7	32.8	-287.6	288.1	17.99	
6,515.0	70.35	252.48	6,399.8	2.4	-364.4	364.3	19.69	
6,610.0	82.39	262.06	6,422.2	-17.7	-454.2	453.8	16.01	
6,657.0	87.14	268.22	6,426.5	-21.7	-500.8	500.3	16.50	
6,705.0	91.63	275.16	6,427.0	-20.3	-548.7	548.3	17.22	
6,752.0	91.36	278.15	6,425.8	-14.8	-595.4	595.0	6.39	
6,800.0	89.69	278.15	6,425.3	-8.0	-642.9	642.7	3.48	
6,823.0	88.60	279.00	6,425.7	-4.6	-665.6	665.4	6.01	
<b>Last MWD</b>								
6,882.0	87.29	280.41	6,427.8	5.4	-723.7	723.7	3.26	
<b>Actual 7' @ 6882' MD/ 6427' TVD / 730' &amp; 545' FEL - Actual 7"</b>								
6,901.0	86.87	280.87	6,428.7	8.9	-742.4	742.4	3.26	
<b>First MWD+IFR1+MS Rockies</b>								
7,030.0	83.53	277.90	6,439.5	29.8	-869.2	869.6	3.46	
7,124.0	86.19	277.14	6,448.0	42.1	-962.0	962.6	2.94	
7,219.0	88.83	278.87	6,452.1	55.3	-1,056.0	1,056.7	3.32	
7,314.0	91.03	278.72	6,452.2	69.8	-1,149.8	1,150.9	2.32	
7,408.0	91.06	275.34	6,450.5	81.3	-1,243.1	1,244.3	3.60	
7,503.0	89.37	272.73	6,450.1	88.0	-1,337.9	1,339.1	3.27	
7,598.0	89.79	269.62	6,450.8	90.0	-1,432.8	1,434.1	3.30	
7,693.0	90.45	266.78	6,450.6	87.0	-1,527.8	1,529.0	3.07	
7,788.0	91.13	266.29	6,449.3	81.2	-1,622.6	1,623.7	0.88	
7,882.0	88.47	265.58	6,449.7	74.6	-1,716.3	1,717.3	2.93	
7,977.0	88.76	265.25	6,451.9	67.0	-1,811.0	1,811.9	0.46	
8,071.0	89.46	266.50	6,453.4	60.2	-1,904.7	1,905.5	1.52	
8,166.0	90.44	269.06	6,453.5	56.5	-1,999.7	2,000.3	2.89	
8,261.0	88.64	267.82	6,454.3	54.0	-2,094.6	2,095.2	2.30	
8,355.0	90.96	268.24	6,454.6	50.7	-2,188.6	2,189.1	2.51	
8,450.0	90.23	267.30	6,453.6	47.0	-2,283.5	2,283.9	1.25	
8,545.0	89.48	268.42	6,453.8	43.5	-2,378.4	2,378.8	1.42	
8,640.0	89.66	272.82	6,454.6	44.5	-2,473.4	2,473.8	4.64	
8,735.0	89.47	272.58	6,455.3	49.0	-2,568.3	2,568.7	0.32	
8,829.0	89.63	274.90	6,456.0	55.1	-2,662.1	2,662.6	2.47	
8,924.0	89.65	271.68	6,456.6	60.6	-2,756.9	2,757.5	3.39	



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<b>Wellbore:</b> Wellbore #1	<b>Survey Calculation Method:</b> Minimum Curvature
<b>Design:</b> OH	<b>Database:</b> EDM 5000.1 Single User Db

Survey								
MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)	
9,019.0	89.09	268.32	6,457.7	60.6	-2,851.9	2,852.5	3.59	
9,114.0	89.53	267.29	6,458.8	56.9	-2,946.8	2,947.3	1.18	
9,209.0	90.02	267.56	6,459.2	52.7	-3,041.7	3,042.1	0.59	
9,304.0	88.92	269.88	6,460.0	50.5	-3,136.7	3,137.1	2.70	
9,399.0	90.47	270.35	6,460.6	50.7	-3,231.6	3,232.0	1.70	
9,493.0	88.99	270.29	6,461.0	51.3	-3,325.6	3,326.0	1.58	
9,588.0	90.39	270.14	6,461.5	51.6	-3,420.6	3,421.0	1.48	
9,683.0	89.61	270.47	6,461.5	52.1	-3,515.6	3,516.0	0.89	
9,778.0	88.01	271.24	6,463.5	53.5	-3,610.6	3,611.0	1.87	
9,873.0	87.43	271.65	6,467.3	55.9	-3,705.5	3,705.9	0.75	
9,968.0	88.38	271.41	6,470.7	58.5	-3,800.4	3,800.8	1.03	
10,062.0	89.76	271.66	6,472.3	61.0	-3,894.4	3,894.8	1.49	
10,157.0	89.94	270.86	6,472.5	63.1	-3,989.3	3,989.8	0.86	
10,252.0	88.63	269.71	6,473.7	63.5	-4,084.3	4,084.8	1.83	
10,347.0	91.03	269.43	6,474.0	62.8	-4,179.3	4,179.8	2.54	
10,442.0	91.32	271.57	6,472.0	63.7	-4,274.3	4,274.7	2.27	
10,537.0	90.83	272.46	6,470.2	67.0	-4,369.2	4,369.7	1.07	
10,631.0	87.32	272.42	6,471.8	71.0	-4,463.1	4,463.6	3.73	
10,726.0	87.57	271.88	6,476.0	74.6	-4,557.9	4,558.5	0.63	
10,821.0	88.46	271.29	6,479.3	77.2	-4,652.8	4,653.5	1.12	
10,915.0	89.49	270.29	6,481.0	78.5	-4,746.8	4,747.5	1.53	
11,014.0	91.47	271.07	6,480.1	79.6	-4,845.8	4,846.4	2.15	
<b>Last MWD+IFR1+MS Rockies</b>								
11,078.0	91.47	271.07	6,478.5	80.8	-4,909.8	4,910.4	0.00	
<b>PTD @ 11078' MD / 6478' TVD / 854' &amp; 533' FWL</b>								

Casing Points							
Measured Depth (usft)	Vertical Depth (usft)	Name			Casing Diameter (")	Hole Diameter (")	
6,882.0	6,427.8	Actual 7"			7	8-3/4	

Design Annotations					
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment	
		+N-S (usft)	+E-W (usft)		
649.0	649.0	-3.9	2.1	First MWD	
6,823.0	6,425.7	-4.6	-665.6	Last MWD	
6,882.0	6,427.8	5.4	-723.7	Actual 7' @ 6882' MD/ 6427' TVD / 730' & 545' FEL	
6,901.0	6,428.7	8.9	-742.4	First MWD+IFR1+MS Rockies	
11,014.0	6,480.1	79.6	-4,845.8	Last MWD+IFR1+MS Rockies	
11,078.0	6,478.5	80.8	-4,909.8	PTD @ 11078' MD / 6478' TVD / 854' & 533' FWL	

Checked By: _____	Approved By: _____	Date: _____
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# Weld County, CO (NAD 83) Sec 36, T6N R63W (Wells Ranch AA35) Wells Ranch AA35-63-1BHNA HP 277 Plan #4

**T G M**  
 Azimuths to Grid North  
 Convergence: 0.71°  
 Magnetic North: 7.58°

Magnetic Field  
 Strength: 52897.5snT  
 Dip Angle: 67.04°  
 Date: 3/25/2014  
 Model: IGRF2010

SECTION DETAILS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	Target	
6823.0	88.60	279.00	6425.7	-4.6	-665.6	0.00	0.00	665.4		
6885.0	86.00	279.00	6428.6	5.1	-726.8	4.19	180.00	726.8		
6945.0	86.00	279.00	6432.8	14.5	-785.9	0.00	0.00	786.0		
7020.0	83.00	279.00	6440.0	26.2	-859.6	4.00	180.00	859.9		
7190.0	89.80	279.00	6450.6	52.7	-1027.1	4.00	0.00	1027.8		
7500.9	89.80	269.67	6451.7	76.2	-1336.7	3.00	-90.02	1337.8		
11075.5	89.80	269.67	6464.2	55.8	-4911.3	0.00	0.00	4911.5	PBHL Pln #4 WR AA35-63-1BHNA	

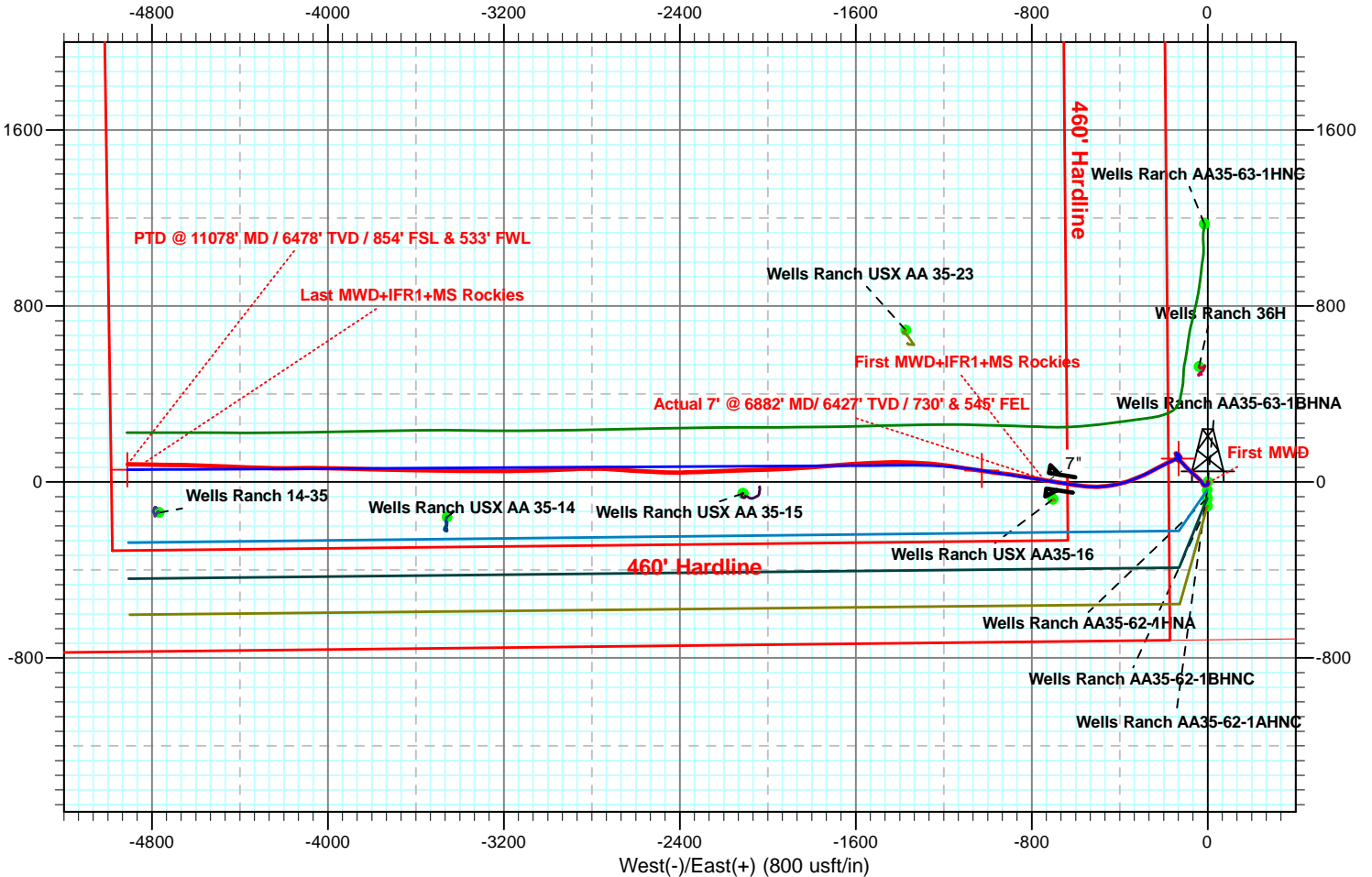
CASING DETAILS			
MD	TVD	Name	Size
6882	6427		7" 7

WELL DETAILS: Wells Ranch AA35-63-1BHNA					
+N/-S	+E/-W	Ground Level:	4741.0		
0.0	0.0	Northing	Easting	Latitude	Longitude
		1404173.89	3307825.84	40° 26' 15.324 N	104° 23' 38.760 W

**SITE DETAILS: Sec 36, T6N R63W (Wells Ranch AA35)**

Site Centre Northing: 1404137.44  
 Easting: 3307823.51

Positional Uncertainty: 0.0  
 Convergence: 0.71  
 Local North: Grid



**SHL @ 718' FSL & 178' FWL Sec 36**  
**Actual 7" Csg @ 6882' MD / 730' FSL & 545' FEL Sec 35**  
**Actual BHL @ 11078' MD / 854' FSL & 533' FWL Sec 35**





**Weld County, CO (NAD 83)**  
**Sec 36, T6N R63W (Wells Ranch AA35)**  
**Wells Ranch AA35-63-1BHNA**  
**HP 277**  
**Plan #4**

**T G M**  
 Azimuths to Grid North  
 Convergence: 0.71°  
 Magnetic North: 7.58°

Magnetic Field  
 Strength: 52897.5snT  
 Dip Angle: 67.04°  
 Date: 3/25/2014  
 Model: IGRF2010

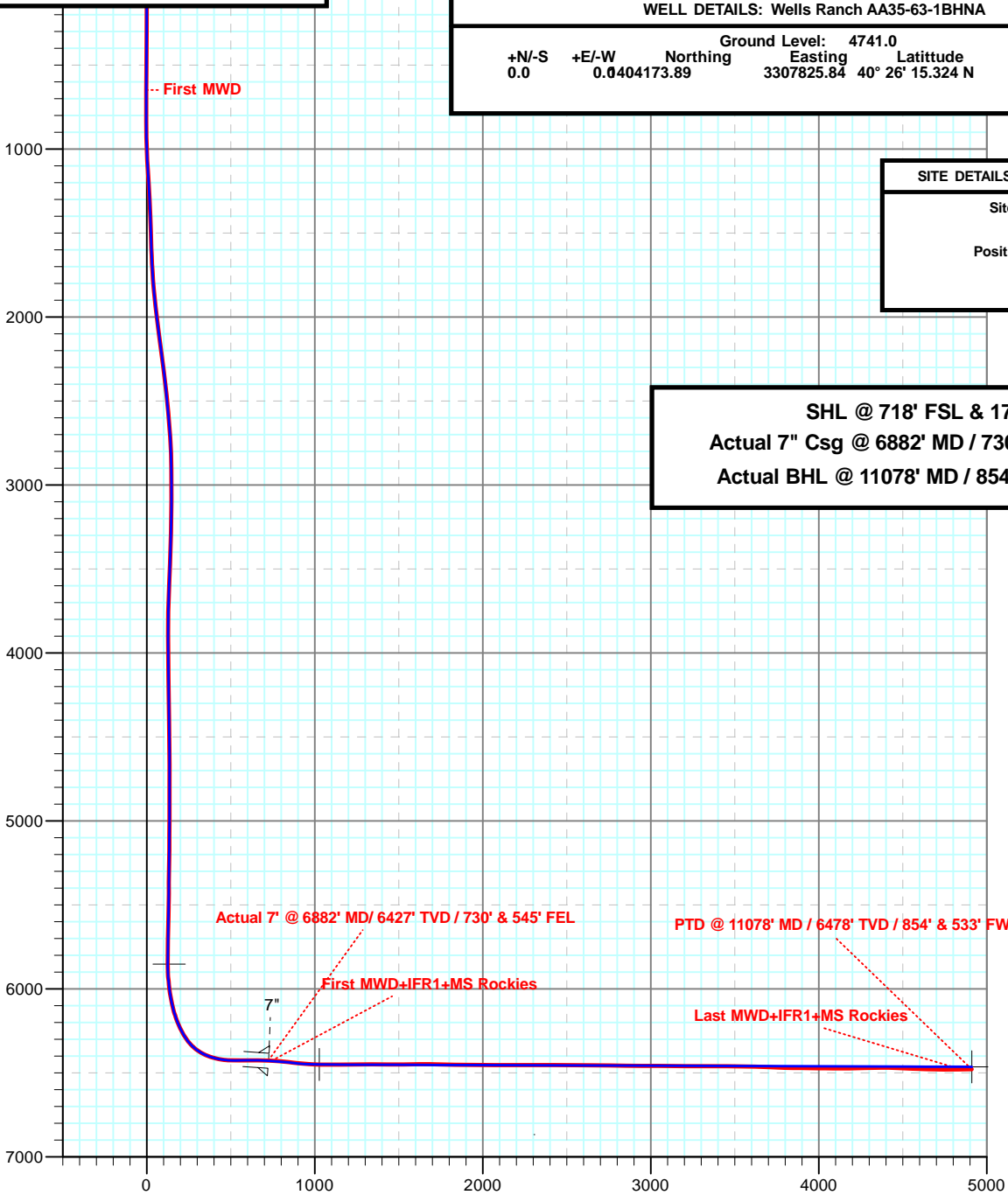
SECTION DETAILS										
MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VSect	Target	
6823.0	88.60	279.00	6425.7	-4.6	-665.6	0.00	0.00	665.4		
6885.0	86.00	279.00	6428.6	5.1	-726.8	4.19	180.00	726.8		
6945.0	86.00	279.00	6432.8	14.5	-785.9	0.00	0.00	786.0		
7020.0	83.00	279.00	6440.0	26.2	-859.6	4.00	180.00	859.9		
7190.0	89.80	279.00	6450.6	52.7	-1027.1	4.00	0.00	1027.8		
7500.9	89.80	269.67	6451.7	76.2	-1336.7	3.00	-90.02	1337.8		
11075.5	89.80	269.67	6464.2	55.8	-4911.3	0.00	0.00	4911.5		PBHL Pln #4 WR AA35-63-1BHNA

ACTUAL CASING DETAILS			
MWD	TVD	Name	Size
6882	6427	7"	7"

WELL DETAILS: Wells Ranch AA35-63-1BHNA					
+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
0.0	0.0	404173.89	3307825.84	40° 26' 15.324 N	104° 23' 38.760 W

Ground Level: 4741.0

SITE DETAILS: Sec 36, T6N R63W (Wells Ranch AA35)	
Site Centre Northing:	1404137.44
Easting:	3307823.51
Positional Uncertainty:	0.0
Convergence:	0.71
Local North:	Grid



**SHL @ 718' FSL & 178' FWL Sec 36**  
**Actual 7" Csg @ 6882' MD / 730' FSL & 545' FEL Sec 35**  
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Vertical Section at 270.97° (1000 usft/in)