



Noble Energy, Inc

Weld County, CO (NAD 83)

Sec 21 - T6N - R63W (Wells Ranch AA21)

Wells Ranch AA21-67HN

Wellbore #1

Design: OH

Final Survey Report

13 February, 2014





IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4749.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4749.0usft (HP 277)
Well:	Wells Ranch AA21-67HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	EDM 5000.1 Single User Db

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

Site		Sec 21 - T6N - R63W (Wells Ranch AA21)			
Site Position:		Northing:	1,417,534.22 usft	Latitude:	40° 28' 28.704 N
From:	Lat/Long	Easting:	3,296,552.45 usft	Longitude:	104° 26' 2.472 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16"	Grid Convergence:	0.69 °

Well	Wells Ranch AA21-67HN					
Well Position	+N/-S	0.0 usft	Northing:	1,417,647.15 usft	Latitude:	40° 28' 29.820 N
	+E/-W	0.0 usft	Easting:	3,296,551.10 usft	Longitude:	104° 26' 2.472 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,725.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	11/17/2013	8.36	67.08	52,950

Design	OH				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)	
	0.0	0.0	0.0	273.41	

Survey Program	Date 2/13/2014				
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
290.0	620.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
961.0	10,904.0	Survey #2 (Wellbore #1)	MWD	MWD - Standard	

Survey								
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	0.00	
290.0	0.10	223.08	290.0	-0.2	-0.2	0.2	0.03	
620.0	1.00	189.28	620.0	-3.2	-0.8	0.6	0.28	
961.0	0.40	184.68	961.0	-7.4	-1.4	1.0	0.18	
1,022.0	0.80	186.10	1,022.0	-8.0	-1.5	1.0	0.66	
1,116.0	1.00	184.40	1,115.9	-9.5	-1.6	1.0	0.21	
1,210.0	0.80	12.70	1,209.9	-9.6	-1.5	0.9	1.91	
1,305.0	1.00	12.60	1,304.9	-8.2	-1.2	0.7	0.21	
1,400.0	1.10	16.50	1,399.9	-6.5	-0.8	0.4	0.13	
1,494.0	1.00	20.20	1,493.9	-4.9	-0.2	-0.1	0.13	
1,589.0	0.90	16.70	1,588.9	-3.4	0.3	-0.5	0.12	



IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4749.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4749.0usft (HP 277)
Well:	Wells Ranch AA21-67HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	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)	
1,683.0	0.70	357.00	1,682.9	-2.1	0.5	-0.6	0.36	
1,778.0	0.80	347.00	1,777.9	-0.9	0.3	-0.3	0.17	
1,872.0	3.10	26.60	1,871.8	2.0	1.3	-1.2	2.70	
1,967.0	5.50	29.30	1,966.5	8.3	4.7	-4.2	2.53	
2,062.0	7.30	32.10	2,060.9	17.4	10.1	-9.0	1.92	
2,156.0	9.10	32.60	2,154.0	28.7	17.3	-15.5	1.92	
2,251.0	11.10	34.30	2,247.5	42.6	26.5	-23.9	2.13	
2,346.0	11.90	36.70	2,340.6	58.0	37.5	-34.0	0.98	
2,440.0	11.30	35.30	2,432.7	73.3	48.6	-44.1	0.71	
2,535.0	11.00	36.80	2,525.9	88.1	59.4	-54.1	0.44	
2,630.0	10.60	33.40	2,619.2	102.7	69.6	-63.4	0.79	
2,724.0	9.80	30.00	2,711.7	116.8	78.4	-71.3	1.06	
2,819.0	11.20	29.20	2,805.1	131.9	86.9	-78.9	1.48	
2,913.0	10.90	28.70	2,897.4	147.7	95.7	-86.7	0.34	
3,008.0	10.80	29.00	2,990.7	163.3	104.3	-94.4	0.12	
3,103.0	10.40	28.00	3,084.0	178.7	112.6	-101.8	0.46	
3,198.0	9.90	29.60	3,177.6	193.4	120.7	-109.0	0.60	
3,293.0	9.00	29.60	3,271.3	206.9	128.4	-115.9	0.95	
3,387.0	7.60	27.10	3,364.3	218.8	134.9	-121.6	1.54	
3,482.0	7.90	24.00	3,458.4	230.4	140.4	-126.4	0.54	
3,577.0	8.10	25.30	3,552.5	242.4	145.9	-131.2	0.28	
3,672.0	8.50	26.90	3,646.5	254.7	151.9	-136.5	0.49	
3,766.0	7.70	29.70	3,739.6	266.4	158.2	-142.1	0.95	
3,861.0	7.40	39.50	3,833.7	276.6	165.2	-148.5	1.39	
3,956.0	5.40	40.00	3,928.1	284.8	172.0	-154.8	2.11	
4,051.0	3.30	41.60	4,022.9	290.3	176.7	-159.1	2.21	
4,146.0	0.40	93.90	4,117.8	292.3	178.8	-161.1	3.23	
4,240.0	0.40	125.50	4,211.8	292.1	179.4	-161.7	0.23	
4,335.0	0.90	127.90	4,306.8	291.4	180.3	-162.6	0.53	
4,430.0	1.10	119.00	4,401.8	290.5	181.7	-164.1	0.27	
4,524.0	1.20	72.20	4,495.8	290.4	183.4	-165.8	0.98	
4,619.0	0.80	81.60	4,590.8	290.8	185.0	-167.4	0.45	
4,714.0	1.20	102.80	4,685.7	290.7	186.6	-169.0	0.57	
4,809.0	1.70	101.10	4,780.7	290.2	189.0	-171.4	0.53	
4,903.0	1.30	129.00	4,874.7	289.2	191.2	-173.6	0.87	
4,998.0	0.30	228.70	4,969.7	288.4	191.8	-174.3	1.46	
5,093.0	0.50	355.50	5,064.7	288.6	191.6	-174.1	0.76	
5,188.0	0.40	16.60	5,159.7	289.4	191.7	-174.1	0.20	
5,283.0	1.00	268.00	5,254.7	289.7	190.9	-173.4	1.25	
5,377.0	1.20	280.00	5,348.6	289.8	189.2	-171.6	0.32	
5,472.0	1.30	237.30	5,443.6	289.4	187.3	-169.7	0.96	
5,567.0	0.80	232.90	5,538.6	288.4	185.8	-168.3	0.53	
5,662.0	0.40	253.30	5,633.6	287.9	185.0	-167.5	0.47	
5,756.0	0.30	249.40	5,727.6	287.7	184.4	-167.0	0.11	



IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4749.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4749.0usft (HP 277)
Well:	Wells Ranch AA21-67HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	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)
5,851.0	0.30	353.90	5,822.6	287.9	184.2	-166.7	0.50
5,946.0	0.50	359.50	5,917.6	288.6	184.2	-166.7	0.21
6,039.0	0.80	317.30	6,010.6	289.4	183.7	-166.2	0.59
6,086.0	4.00	281.70	6,057.5	290.0	181.9	-164.3	7.20
6,133.0	7.30	278.60	6,104.3	290.8	177.3	-159.7	7.05
6,228.0	14.70	271.50	6,197.5	292.0	159.3	-141.6	7.90
6,323.0	22.60	269.70	6,287.4	292.2	128.9	-111.3	8.34
6,418.0	30.30	267.00	6,372.4	290.9	86.7	-69.2	8.20
6,512.0	40.20	264.70	6,449.1	286.8	32.7	-15.5	10.62
6,607.0	51.20	269.10	6,515.4	283.4	-35.1	51.9	12.04
6,702.0	57.40	268.60	6,570.8	281.8	-112.2	128.8	6.54
6,796.0	63.10	269.20	6,617.4	280.3	-193.8	210.1	6.09
6,891.0	69.60	269.90	6,655.5	279.6	-280.7	296.9	6.88
6,986.0	76.50	270.90	6,683.2	280.3	-371.6	387.6	7.33
7,034.0	79.40	271.50	6,693.2	281.2	-418.5	434.5	6.16
7,086.0	83.36	271.03	6,701.0	282.4	-469.9	485.8	7.66
Actual 7" Csg @ 7086' MD / 6701' TVD 1313' FNL & 869' FEL Sec 21							
7,101.0	84.50	270.90	6,702.6	282.6	-484.8	500.7	7.66
7,196.0	87.20	271.60	6,709.5	284.7	-579.5	595.4	2.94
7,290.0	90.90	269.30	6,711.0	285.4	-673.5	689.3	4.63
7,384.0	92.40	270.50	6,708.3	285.3	-767.4	783.0	2.04
7,479.0	89.70	269.10	6,706.6	284.9	-862.4	877.8	3.20
7,573.0	89.20	268.00	6,707.5	282.6	-956.4	971.5	1.29
7,668.0	89.80	267.70	6,708.3	279.0	-1,051.3	1,066.0	0.71
7,725.0	88.30	268.10	6,709.2	276.9	-1,108.2	1,122.8	2.72
7,857.0	89.10	269.20	6,712.2	273.8	-1,240.2	1,254.3	1.03
7,952.0	89.80	270.00	6,713.1	273.1	-1,335.2	1,349.0	1.12
8,047.0	89.60	269.40	6,713.6	272.6	-1,430.2	1,443.8	0.67
8,141.0	88.10	269.90	6,715.5	272.1	-1,524.1	1,537.6	1.68
8,236.0	87.50	268.80	6,719.2	271.0	-1,619.1	1,632.3	1.32
8,330.0	90.30	267.70	6,721.0	268.1	-1,713.0	1,725.9	3.20
8,425.0	88.40	269.60	6,722.1	265.9	-1,807.9	1,820.6	2.83
8,519.0	89.70	271.40	6,723.6	266.7	-1,901.9	1,914.4	2.36
8,613.0	89.50	271.50	6,724.3	269.1	-1,995.9	2,008.4	0.24
8,707.0	90.50	270.90	6,724.3	271.1	-2,089.9	2,102.3	1.24
8,801.0	91.60	269.50	6,722.6	271.4	-2,183.8	2,196.1	1.89
8,896.0	90.50	271.20	6,720.8	272.0	-2,278.8	2,291.0	2.13
8,990.0	88.90	269.10	6,721.3	272.2	-2,372.8	2,384.8	2.81
9,084.0	89.40	270.30	6,722.7	271.7	-2,466.8	2,478.6	1.38
9,179.0	89.50	272.30	6,723.6	273.9	-2,561.8	2,573.5	2.11
9,273.0	89.50	274.10	6,724.4	279.1	-2,655.6	2,667.5	1.91
9,367.0	90.00	274.00	6,724.8	285.8	-2,749.4	2,761.5	0.54
9,462.0	91.50	270.60	6,723.6	289.6	-2,844.3	2,856.5	3.91
9,556.0	92.50	268.40	6,720.3	288.7	-2,938.2	2,950.2	2.57
9,650.0	91.10	267.00	6,717.4	285.0	-3,032.1	3,043.7	2.11



IDS Final Survey Report

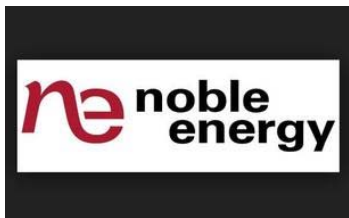


Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4749.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4749.0usft (HP 277)
Well:	Wells Ranch AA21-67HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	OH	Database:	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)
9,744.0	88.00	260.80	6,718.1	275.0	-3,125.5	3,136.3	7.37
9,839.0	91.80	262.20	6,718.3	261.0	-3,219.4	3,229.2	4.26
9,933.0	90.70	263.40	6,716.2	249.2	-3,312.7	3,321.6	1.73
10,028.0	91.80	265.10	6,714.1	239.7	-3,407.2	3,415.4	2.13
10,123.0	90.70	266.10	6,712.1	232.4	-3,501.8	3,509.5	1.56
10,217.0	90.40	269.60	6,711.2	228.9	-3,595.8	3,603.0	3.74
10,312.0	88.50	269.90	6,712.1	228.4	-3,690.8	3,697.8	2.02
10,407.0	89.20	271.50	6,714.0	229.6	-3,785.7	3,792.7	1.84
10,502.0	90.00	271.50	6,714.7	232.1	-3,880.7	3,887.6	0.84
10,597.0	90.80	271.30	6,714.0	234.4	-3,975.7	3,982.6	0.87
10,691.0	90.90	273.50	6,712.6	238.3	-4,069.6	4,076.5	2.34
10,786.0	89.30	274.70	6,712.4	245.1	-4,164.3	4,171.5	2.11
10,840.0	88.70	275.10	6,713.4	249.7	-4,218.1	4,225.5	1.34
Last MWD @ 10840' MD / 6713' TVD							
10,904.0	88.70	275.10	6,714.8	255.4	-4,281.8	4,289.4	0.00
PTD @ 10904' MD / 6715' TVD 1328' FNL & 551' FWL Sec 21							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
7,086.0	6,701.0	282.4	-469.9	Actual 7" Csg @ 7086' MD / 6701' TVD 1313' FNL & 869' FEL Sec 21
10,840.0	6,713.4	249.7	-4,218.1	Last MWD @ 10840' MD / 6713' TVD
10,904.0	6,714.8	255.4	-4,281.8	PTD @ 10904' MD / 6715' TVD 1328' FNL & 551' FWL Sec 21

Checked By: _____ Approved By: _____ Date: _____



Weld County, CO (NAD 83)
Sec 21 - T6N - R63W (Wells Ranch AA21)
Wells Ranch AA21-67HN
HP 277
Plan #2



CASING DETAILS

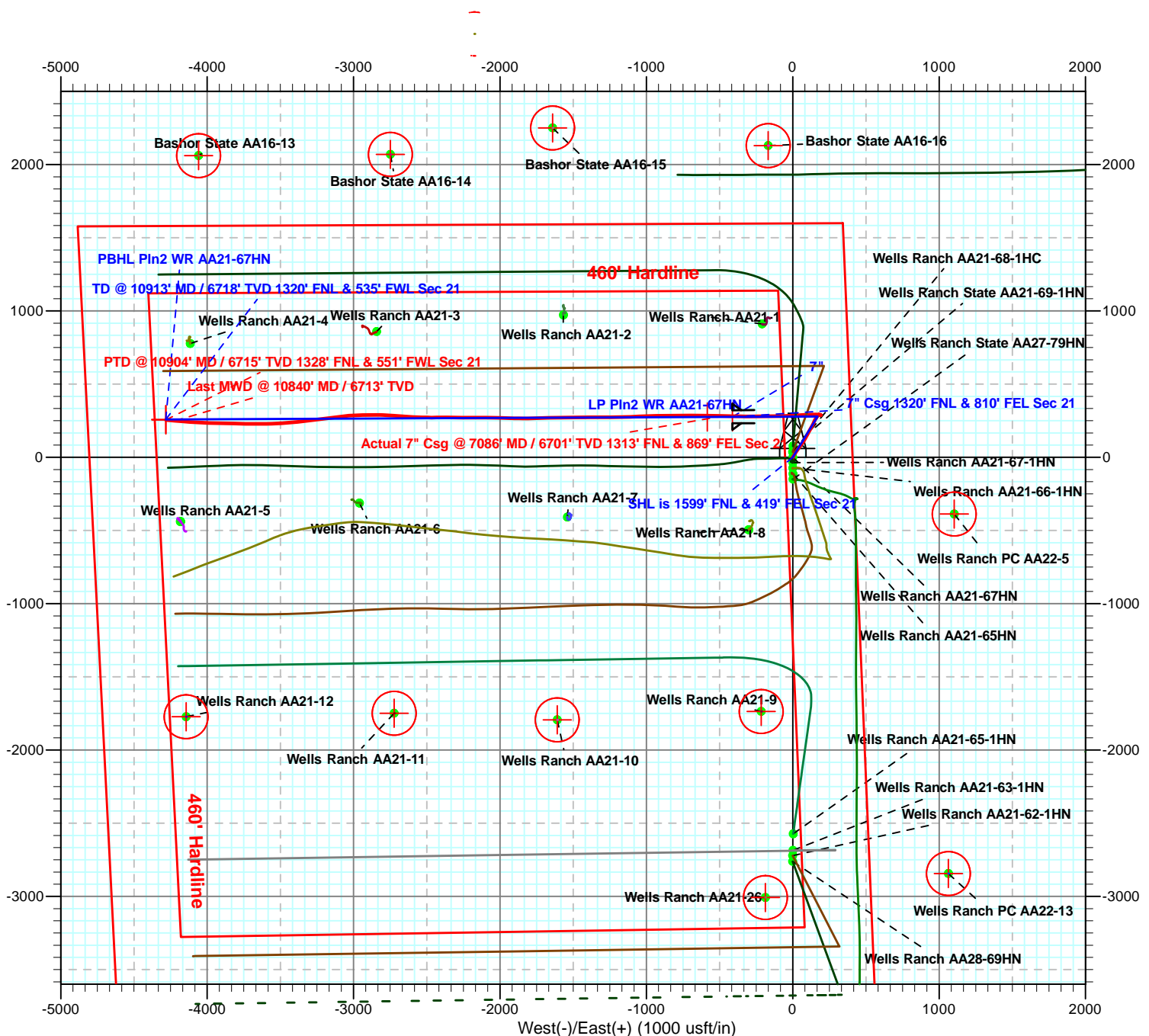
TVD	MD	Name	Size
6701.1	7041.3	7"	7"

SITE DETAILS: Sec 21 - T6N - R63W (Wells Ranch AA21)

Site Centre Northing: 1417534.22
Easting: 3296552.45
Positional Uncertainty: 0.0
Convergence: 0.69
Local North: Grid

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	Vsect	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
1800.0	0.00	0.00	1800.0	0.0	0.0	0.00	0.00	0.0	
2402.5	12.05	31.35	2398.1	53.9	32.8	2.00	31.35	-29.6	
3362.4	12.05	31.35	3336.8	225.0	137.1	0.00	0.00	-123.5	
3964.9	0.00	0.00	3934.9	279.0	169.9	2.00	180.00	-153.0	
6096.9	0.00	0.00	6066.9	279.0	169.9	0.00	0.00	-153.0	
7041.3	85.00	269.74	6701.1	276.3	-411.2	9.00	269.74	426.9	
7091.3	85.00	269.74	6705.4	276.1	-461.0	0.00	0.00	476.6	
7213.8	89.90	269.74	6710.9	275.5	-583.3	4.00	-0.03	598.6	
10912.7	89.90	269.74	6717.5	258.6	-4282.1	0.00	0.00	4289.9	PBHL Pln2 WR AA21-67HN





Weld County, CO (NAD 83) Sec 21 - T6N - R63W (Wells Ranch AA21) Wells Ranch AA21-67HN HP 277 Plan #2



CASING DETAILS

TVD	MD	Name	Size
6701.1	7041.3	7"	7"

SITE DETAILS: Sec 21 - T6N - R63W (Wells Ranch AA21)

Site Centre Northing: 1417534.22
Easting: 3296552.45
Positional Uncertainty: 0.0
Convergence: 0.69
Local North: Grid

SECTION DETAILS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Dleg	TFace	VFace	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
1800.0	0.00	0.00	1800.0	0.0	0.0	0.00	0.00	0.0	
2402.5	12.05	31.35	2398.1	53.9	32.8	2.00	31.35	-29.6	
3362.4	12.05	31.35	3336.8	225.0	137.1	0.00	0.00	-123.5	
3964.9	0.00	0.00	3934.9	279.0	169.9	2.00	180.00	-153.0	
6096.9	0.00	0.00	6066.9	279.0	169.9	0.00	0.00	-153.0	
7041.3	85.00	269.74	6701.1	276.3	-411.2	9.00	269.74	426.9	
7091.3	85.00	269.74	6705.4	276.1	-461.0	0.00	0.00	476.6	
7213.8	89.90	269.74	6710.9	275.5	-583.3	4.00	-0.03	598.6	
10912.7	89.90	269.74	6717.5	258.6	-4282.1	0.00	0.00	4289.9	PBHL Pln2 WR AA21-67HN



Azimuths to Grid North
Convergence: 0.69°
Total Correction: 7.68°

Magnetic Field
Strength: 52950.1snT
Dip Angle: 67.08°
Date: 11/17/2013
Model: IGRF2010

