



Noble Energy, Inc

Weld County, CO (NAD 83)

Sec 21 - T6N - R63W (Wells Ranch AA21)

Wells Ranch AA21-67-1HN

Wellbore #1

Design: OH

Final Survey Report

24 January, 2014





IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4751.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4751.0usft (HP 277)
Well:	Wells Ranch AA21-67-1HN	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 AA21-67-1HN					
Well Position	+N-S	0.0 usft	Northing:	1,417,610.72 usft	Latitude:	40° 28' 29.460 N
	+E-W	0.0 usft	Easting:	3,296,551.53 usft	Longitude:	104° 26' 2.472 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	0.0 usft	Ground Level:	4,727.0 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	269.56	

Survey Program	Date	1/24/2014			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description	
185.0	920.0	Survey #1 (Wellbore #1)	EMS	EMS - Standard	
1,023.0	10,675.0	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	
185.0	0.20	257.18	185.0	-0.1	-0.3	0.3	0.11	
467.0	0.30	275.78	467.0	-0.1	-1.5	1.5	0.05	
749.0	0.30	257.68	749.0	-0.2	-3.0	3.0	0.03	
920.0	0.30	300.68	920.0	-0.1	-3.8	3.8	0.13	
1,023.0	0.60	310.90	1,023.0	0.4	-4.4	4.4	0.30	
First MWD								
1,117.0	0.70	315.10	1,117.0	1.2	-5.2	5.2	0.12	
1,211.0	0.80	320.80	1,211.0	2.1	-6.0	6.0	0.13	
1,306.0	0.90	329.40	1,306.0	3.2	-6.8	6.8	0.17	
1,401.0	1.00	340.00	1,401.0	4.7	-7.5	7.5	0.21	

Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4751.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4751.0usft (HP 277)
Well:	Wells Ranch AA21-67-1HN	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)	
1,495.0	1.00	330.60	1,494.9	6.1	-8.2	8.1	0.17	
1,589.0	1.10	336.90	1,588.9	7.7	-8.9	8.9	0.16	
1,684.0	0.90	313.80	1,683.9	9.0	-9.8	9.8	0.47	
1,779.0	0.40	218.40	1,778.9	9.3	-10.6	10.5	1.07	
1,873.0	0.50	240.40	1,872.9	8.8	-11.1	11.1	0.21	
1,968.0	0.40	225.80	1,967.9	8.4	-11.7	11.7	0.16	
2,063.0	0.30	222.00	2,062.9	8.0	-12.2	12.1	0.11	
2,157.0	0.00	266.50	2,156.9	7.8	-12.3	12.3	0.32	
2,252.0	0.20	338.00	2,251.9	8.0	-12.4	12.3	0.21	
2,347.0	0.20	7.50	2,346.9	8.3	-12.4	12.4	0.11	
2,441.0	0.40	271.10	2,440.9	8.4	-12.7	12.7	0.50	
2,536.0	0.80	129.50	2,535.9	8.0	-12.5	12.5	1.20	
2,631.0	0.60	124.40	2,630.9	7.3	-11.6	11.6	0.22	
2,725.0	0.70	93.50	2,724.9	7.0	-10.6	10.6	0.38	
2,820.0	0.90	103.70	2,819.9	6.8	-9.3	9.3	0.26	
2,914.0	0.90	98.60	2,913.9	6.5	-7.9	7.8	0.09	
3,009.0	0.80	109.50	3,008.8	6.2	-6.5	6.5	0.20	
3,104.0	0.40	135.60	3,103.8	5.7	-5.7	5.6	0.50	
3,199.0	0.40	120.90	3,198.8	5.3	-5.2	5.1	0.11	
3,293.0	0.90	66.60	3,292.8	5.4	-4.2	4.2	0.79	
3,388.0	1.50	73.20	3,387.8	6.1	-2.3	2.3	0.65	
3,483.0	1.00	64.40	3,482.8	6.8	-0.4	0.3	0.56	
3,578.0	1.10	36.90	3,577.8	7.9	0.9	-1.0	0.54	
3,673.0	0.90	46.50	3,672.8	9.1	2.0	-2.1	0.27	
3,767.0	1.00	55.40	3,766.7	10.1	3.2	-3.3	0.19	
3,862.0	0.70	134.80	3,861.7	10.2	4.3	-4.4	1.17	
3,957.0	0.60	133.10	3,956.7	9.4	5.1	-5.2	0.11	
4,052.0	0.80	130.60	4,051.7	8.7	5.9	-6.0	0.21	
4,147.0	0.50	91.40	4,146.7	8.2	6.9	-6.9	0.55	
4,241.0	0.60	83.30	4,240.7	8.3	7.8	-7.8	0.13	
4,336.0	0.60	53.90	4,335.7	8.6	8.7	-8.7	0.32	
4,431.0	0.90	42.40	4,430.7	9.5	9.6	-9.6	0.35	
4,525.0	0.40	21.60	4,524.7	10.3	10.2	-10.3	0.58	
4,620.0	0.70	81.40	4,619.7	10.7	10.9	-11.0	0.64	
4,715.0	0.40	131.00	4,714.7	10.6	11.7	-11.8	0.56	
4,810.0	0.80	213.70	4,809.7	9.8	11.6	-11.7	0.89	
4,904.0	1.10	227.80	4,903.7	8.7	10.6	-10.6	0.40	
4,999.0	0.90	243.10	4,998.7	7.7	9.2	-9.3	0.35	
5,094.0	0.60	263.00	5,093.6	7.3	8.1	-8.1	0.41	
5,189.0	0.70	277.10	5,188.6	7.3	7.0	-7.0	0.20	
5,284.0	0.60	282.80	5,283.6	7.5	5.9	-6.0	0.13	
5,378.0	1.10	325.80	5,377.6	8.4	4.9	-5.0	0.83	
5,473.0	1.10	313.40	5,472.6	9.7	3.8	-3.8	0.25	
5,568.0	1.10	322.80	5,567.6	11.1	2.5	-2.6	0.19	
5,663.0	1.20	334.50	5,662.6	12.7	1.6	-1.7	0.27	

Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4751.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4751.0usft (HP 277)
Well:	Wells Ranch AA21-67-1HN	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)
5,757.0	1.80	347.40	5,756.5	15.0	0.8	-0.9	0.73
5,852.0	1.80	357.60	5,851.5	18.0	0.4	-0.6	0.34
5,947.0	1.70	357.40	5,946.4	20.9	0.3	-0.5	0.11
5,993.0	1.70	343.70	5,992.4	22.2	0.1	-0.3	0.88
6,040.0	4.20	292.60	6,039.4	23.6	-1.7	1.5	7.23
6,087.0	8.20	281.50	6,086.1	24.9	-6.6	6.4	8.85
6,135.0	11.50	281.60	6,133.4	26.5	-14.6	14.4	6.88
6,229.0	17.00	275.00	6,224.5	29.6	-37.5	37.3	6.09
6,324.0	22.60	268.30	6,313.8	30.3	-69.6	69.4	6.35
6,419.0	30.10	268.30	6,398.9	29.0	-111.7	111.5	7.89
6,514.0	38.90	268.90	6,477.1	27.8	-165.5	165.3	9.27
6,561.0	42.70	269.80	6,512.7	27.4	-196.2	196.0	8.18
6,608.0	47.90	268.80	6,545.7	27.0	-229.6	229.4	11.17
6,655.0	55.80	263.80	6,574.7	24.5	-266.4	266.2	18.77
6,703.0	64.40	260.10	6,598.6	18.6	-307.5	307.4	19.12
6,750.0	72.10	259.50	6,616.1	10.9	-350.5	350.4	16.43
6,797.0	76.70	259.50	6,628.7	2.7	-395.0	394.9	9.79
6,859.0	81.57	262.66	6,640.4	-6.8	-455.1	455.1	9.32
Actual 7" Csg @ 6859' MD / 6640' TVD 865' FEL & 1638' FNL Sec 21							
6,910.0	85.60	265.20	6,646.1	-12.1	-505.5	505.6	9.32
7,005.0	88.50	266.90	6,651.0	-18.6	-600.1	600.2	3.54
7,099.0	90.40	267.40	6,651.9	-23.3	-694.0	694.1	2.09
7,194.0	88.60	267.60	6,652.7	-27.5	-788.9	789.1	1.91
7,288.0	87.80	270.50	6,655.6	-29.0	-882.8	883.0	3.20
7,383.0	87.40	270.30	6,659.6	-28.4	-977.7	977.9	0.47
7,477.0	89.40	271.20	6,662.2	-27.1	-1,071.7	1,071.9	2.33
7,571.0	89.70	271.30	6,663.0	-25.1	-1,165.7	1,165.8	0.34
7,666.0	90.60	271.60	6,662.7	-22.7	-1,260.6	1,260.8	1.00
7,761.0	91.40	271.40	6,661.1	-20.2	-1,355.6	1,355.7	0.87
7,855.0	90.00	269.90	6,659.9	-19.1	-1,449.6	1,449.7	2.18
7,950.0	89.10	268.90	6,660.7	-20.1	-1,544.6	1,544.7	1.42
8,045.0	89.60	268.80	6,661.8	-22.0	-1,639.5	1,639.6	0.54
8,139.0	89.80	267.00	6,662.2	-25.5	-1,733.5	1,733.6	1.93
8,234.0	88.80	271.30	6,663.4	-26.9	-1,828.4	1,828.6	4.65
8,329.0	88.80	272.50	6,665.4	-23.7	-1,923.3	1,923.5	1.26
8,423.0	88.70	271.60	6,667.4	-20.4	-2,017.3	2,017.4	0.96
8,517.0	92.80	272.40	6,666.2	-17.1	-2,111.2	2,111.2	4.44
8,612.0	92.40	270.10	6,661.9	-15.0	-2,206.0	2,206.1	2.45
8,706.0	90.20	269.10	6,659.8	-15.7	-2,300.0	2,300.1	2.57
8,800.0	90.60	268.50	6,659.1	-17.6	-2,394.0	2,394.1	0.77
8,894.0	92.00	268.40	6,657.0	-20.2	-2,487.9	2,488.0	1.49
8,988.0	89.80	268.40	6,655.5	-22.8	-2,581.9	2,582.0	2.34
9,082.0	90.20	268.60	6,655.5	-25.3	-2,675.8	2,676.0	0.48
9,179.0	90.70	267.90	6,654.7	-28.2	-2,772.8	2,772.9	0.89



IDS Final Survey Report



Company:	Noble Energy, Inc	Local Co-ordinate Reference:	Well Wells Ranch AA21-67-1HN
Project:	Weld County, CO (NAD 83)	TVD Reference:	Well @ 4751.0usft (HP 277)
Site:	Sec 21 - T6N - R63W (Wells Ranch AA21)	MD Reference:	Well @ 4751.0usft (HP 277)
Well:	Wells Ranch AA21-67-1HN	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)
9,273.0	90.10	268.80	6,654.1	-30.9	-2,866.8	2,866.9	1.15
9,368.0	88.50	270.60	6,655.2	-31.4	-2,961.7	2,961.9	2.53
9,462.0	89.10	270.20	6,657.2	-30.8	-3,055.7	3,055.9	0.77
9,556.0	89.00	270.60	6,658.8	-30.1	-3,149.7	3,149.8	0.44
9,651.0	89.70	271.40	6,659.9	-28.5	-3,244.7	3,244.8	1.12
9,745.0	90.40	271.40	6,659.8	-26.2	-3,338.6	3,338.7	0.74
9,839.0	91.70	271.40	6,658.0	-23.9	-3,432.6	3,432.7	1.38
9,933.0	88.90	271.80	6,657.6	-21.2	-3,526.6	3,526.6	3.01
10,028.0	89.80	272.70	6,658.6	-17.5	-3,621.5	3,621.5	1.34
10,123.0	86.80	269.60	6,661.5	-15.6	-3,716.4	3,716.4	4.54
10,218.0	86.40	268.30	6,667.1	-17.3	-3,811.2	3,811.2	1.43
10,313.0	89.20	267.50	6,670.7	-20.8	-3,906.1	3,906.1	3.07
10,407.0	89.60	268.00	6,671.7	-24.5	-4,000.0	4,000.1	0.68
10,502.0	90.60	267.70	6,671.6	-28.1	-4,094.9	4,095.0	1.10
10,597.0	90.20	267.60	6,670.9	-32.0	-4,189.8	4,190.0	0.43
Last MWD @ 10597' MD / 6671' TVD							
10,675.0	90.20	267.60	6,670.6	-35.2	-4,267.8	4,267.9	0.00
PTD @ 10675' MD / 6671' TVD 575' FWL & 1651' FNL Sec 21							

Design Annotations				
Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
1,023.0	1,023.0	0.4	-4.4	First MWD
6,859.0	6,640.4	-6.8	-455.1	Actual 7" Csg @ 6859' MD / 6640' TVD 865' FEL & 1638' FNL Sec 21
10,597.0	6,670.9	-32.0	-4,189.8	Last MWD @ 10597' MD / 6671' TVD
10,675.0	6,670.6	-35.2	-4,267.8	PTD @ 10675' MD / 6671' TVD 575' FWL & 1651' FNL Sec 21

Checked By: _____ Approved By: _____ Date: _____



Weld County, CO (NAD 83) Sec 21 - T6N - R63W (Wells Ranch AA21) Wells Ranch AA21-67-1HN



HP 277 Plan #2

CASING DETAILS

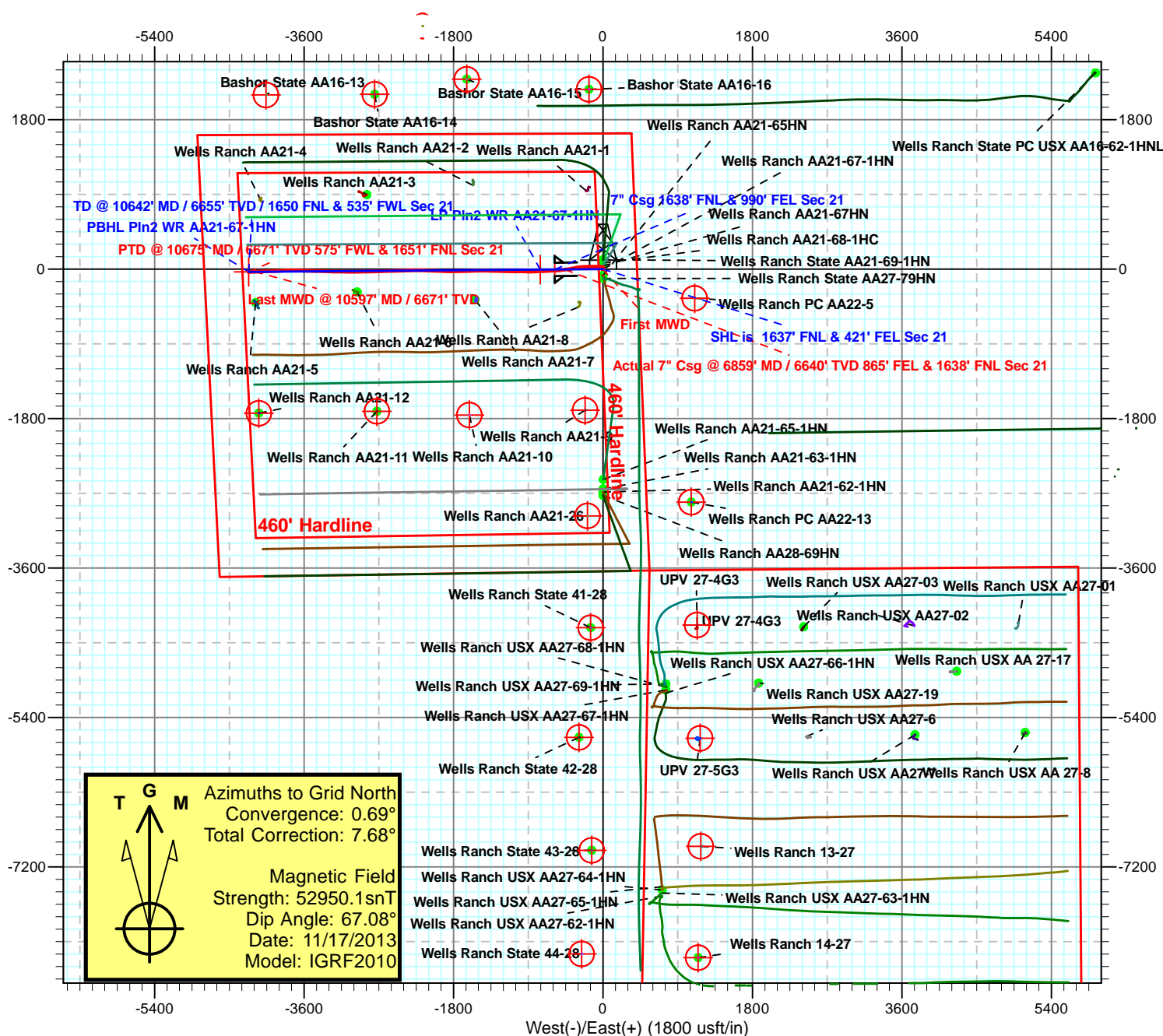
TVD	MD	Name	Size
6645.2	6955.4	7"	7"

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	VSec	Target
0.0	0.00	0.00	0.0	0.0	0.0	0.00	0.00	0.0	
6011.0	0.00	0.00	6011.0	0.0	0.0	0.00	0.00	0.0	
6955.4	85.00	269.56	6645.2	-4.5	-581.1	9.00	269.56	581.1	
7005.4	85.00	269.56	6649.6	-4.8	-630.9	0.00	0.00	630.9	
7130.4	90.00	269.56	6655.0	-5.8	-755.8	4.00	0.01	755.8	
10642.3	90.00	269.56	6655.0	-32.7	-4267.5	0.00	0.00	4267.7	PBHL Pin2 WR AA21-67-1HN





Weld County, CO (NAD 83) Sec 21 - T6N - R63W (Wells Ranch AA21) Wells Ranch AA21-67-1HN



HP 277 Plan #2

CASING DETAILS

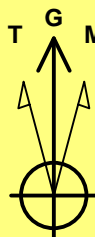
TVD	MD	Name	Size
6645.2	6955.4	7"	7"

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	
6011.0	0.00	0.00	6011.0	0.0	0.0	0.00	0.00	0.0	
6955.4	85.00	269.56	6645.2	-4.5	-581.1	9.00	269.56	581.1	
7005.4	85.00	269.56	6649.6	-4.8	-630.9	0.00	0.00	630.9	
7130.4	90.00	269.56	6655.0	-5.8	-755.8	4.00	0.01	755.8	
10642.3	90.00	269.56	6655.0	-32.7	-4267.5	0.00	0.00	4267.7	PBHL Pln2 WR AA21-67-1HN



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

