



Noble Energy Inc.

**Weld County, CO
Sec 12, T5N,R64W
SLW Ranch B12-79HN**

Wellbore #1

Design: Wellbore #1 FINAL

DDC Survey Report

23 April, 2013



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well SLW Ranch B12-79HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4625.0usft (H&P #326)
Site:	Sec 12, T5N,R64W	MD Reference:	WELL @ 4625.0usft (H&P #326)
Well:	SLW Ranch B12-79HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

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

Site	Sec 12, T5N,R64W				
Site Position:		Northing:	1,393,120.64 usft	Latitude:	40° 24' 29.772 N
From:	Lat/Long	Easting:	3,276,451.66 usft	Longitude:	104° 30' 26.100 W
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "	Grid Convergence:	0.64 °

Well	SLW Ranch B12-79HN					
Well Position	+N-S	0.0 usft	Northing:	1,393,076.92 usft	Latitude:	40° 24' 29.340 N
	+E-W	0.0 usft	Easting:	3,276,452.15 usft	Longitude:	104° 30' 26.100 W
Position Uncertainty		0.0 usft	Wellhead Elevation:	usft	Ground Level:	4,595.0 usft

Wellbore	Wellbore #1				
Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/27/2013	8.49	67.04	52,977

Design	Wellbore #1				
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	355.77	

Survey Program	Date 4/23/2013			
From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
287.0	634.0	GYRO (Wellbore #1)	Good_gyro	Good Gyro
739.0	11,733.0	DDC MWD (Wellbore #1)	MWD default	MWD - Standard

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N-S (usft)	+E-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00	
287.0	0.80	181.10	287.0	-2.0	0.0	-2.0	0.28	0.28	0.00	
TIE IN @ 634' MD / 634' TVD										
634.0	0.10	277.80	634.0	-4.4	-0.4	-4.3	0.24	-0.20	27.87	
739.0	0.30	47.90	739.0	-4.2	-0.3	-4.2	0.35	0.19	123.90	
833.0	0.30	354.00	833.0	-3.8	-0.1	-3.8	0.29	0.00	-57.34	
928.0	0.30	307.20	928.0	-3.4	-0.3	-3.3	0.25	0.00	-49.26	
1,022.0	0.30	109.80	1,022.0	-3.3	-0.3	-3.3	0.63	0.00	172.98	
1,117.0	0.20	204.70	1,117.0	-3.5	-0.1	-3.5	0.39	-0.11	99.89	
1,211.0	3.60	234.40	1,210.9	-5.4	-2.6	-5.2	3.65	3.62	31.60	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey										
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)	
1,309.0	6.50	232.50	1,308.5	-10.6	-9.5	-9.9	2.96	2.96	-1.94	
1,403.0	9.10	222.10	1,401.6	-19.3	-18.7	-17.9	3.14	2.77	-11.06	
1,497.0	11.30	214.40	1,494.2	-32.5	-28.9	-30.2	2.75	2.34	-8.19	
1,591.0	13.30	202.60	1,586.0	-50.0	-38.3	-47.1	3.41	2.13	-12.55	
1,683.0	13.20	200.70	1,675.6	-69.6	-46.0	-66.1	0.49	-0.11	-2.07	
1,777.0	15.70	208.10	1,766.6	-90.9	-55.8	-86.5	3.30	2.66	7.87	
1,870.0	15.60	205.80	1,856.1	-113.3	-67.2	-108.0	0.68	-0.11	-2.47	
1,962.0	14.90	203.00	1,944.9	-135.3	-77.2	-129.2	1.10	-0.76	-3.04	
2,055.0	14.80	205.40	2,034.8	-157.0	-87.0	-150.2	0.67	-0.11	2.58	
2,147.0	14.40	211.40	2,123.8	-177.4	-98.0	-169.7	1.70	-0.43	6.52	
2,239.0	14.90	210.00	2,212.8	-197.4	-109.9	-188.8	0.67	0.54	-1.52	
2,332.0	13.70	211.40	2,303.0	-217.2	-121.6	-207.6	1.34	-1.29	1.51	
2,423.0	17.60	217.20	2,390.6	-237.3	-135.5	-226.7	4.61	4.29	6.37	
2,517.0	17.10	216.70	2,480.3	-259.7	-152.4	-247.8	0.56	-0.53	-0.53	
2,610.0	16.40	217.00	2,569.4	-281.2	-168.4	-268.0	0.76	-0.75	0.32	
2,703.0	18.20	214.40	2,658.1	-303.7	-184.5	-289.2	2.11	1.94	-2.80	
2,795.0	18.70	212.60	2,745.4	-327.9	-200.6	-312.2	0.82	0.54	-1.96	
2,889.0	17.80	212.10	2,834.7	-352.8	-216.4	-335.9	0.97	-0.96	-0.53	
2,983.0	17.60	213.10	2,924.2	-376.9	-231.8	-358.8	0.39	-0.21	1.06	
CROSSED HARD LINE @ 3057' MD / 2995' TVD										
3,056.9	16.65	207.74	2,994.9	-395.6	-242.8	-376.6	2.50	-1.29	-7.26	
3,078.0	16.40	206.10	3,015.1	-401.0	-245.5	-381.8	2.50	-1.16	-7.76	
3,173.0	14.10	202.40	3,106.7	-423.7	-255.8	-403.7	2.63	-2.42	-3.89	
3,268.0	13.50	207.20	3,199.0	-444.3	-265.3	-423.5	1.36	-0.63	5.05	
3,362.0	14.70	213.50	3,290.2	-464.0	-276.9	-442.3	2.07	1.28	6.70	
3,457.0	12.30	209.30	3,382.5	-482.8	-288.5	-460.3	2.73	-2.53	-4.42	
3,552.0	10.90	211.40	3,475.6	-499.3	-298.1	-476.0	1.54	-1.47	2.21	
3,646.0	11.10	210.00	3,567.9	-514.8	-307.3	-490.7	0.35	0.21	-1.49	
3,741.0	10.00	205.60	3,661.3	-530.1	-315.4	-505.4	1.43	-1.16	-4.63	
3,836.0	7.60	193.50	3,755.2	-543.7	-320.4	-518.6	3.18	-2.53	-12.74	
3,930.0	5.10	187.30	3,848.6	-553.9	-322.4	-528.6	2.75	-2.66	-6.60	
4,025.0	2.60	184.90	3,943.3	-560.2	-323.2	-534.8	2.64	-2.63	-2.53	
4,120.0	1.40	53.40	4,038.3	-561.7	-322.4	-536.3	3.87	-1.26	-138.42	
4,215.0	1.30	40.40	4,133.3	-560.1	-320.8	-535.0	0.34	-0.11	-13.68	
4,309.0	1.60	342.70	4,227.3	-558.1	-320.5	-532.9	1.51	0.32	-61.38	
4,404.0	1.10	320.50	4,322.2	-556.1	-321.4	-530.9	0.75	-0.53	-23.37	
4,499.0	1.10	314.80	4,417.2	-554.8	-322.7	-529.4	0.12	0.00	-6.00	
4,593.0	1.10	286.80	4,511.2	-553.9	-324.2	-528.4	0.57	0.00	-29.79	
4,688.0	0.20	184.30	4,606.2	-553.8	-325.1	-528.3	1.22	-0.95	-107.89	
4,783.0	0.60	87.10	4,701.2	-553.9	-324.6	-528.5	0.69	0.42	-102.32	
4,877.0	0.80	99.90	4,795.2	-554.0	-323.4	-528.6	0.27	0.21	13.62	
4,972.0	1.30	162.40	4,890.2	-555.1	-322.5	-529.8	1.23	0.53	65.79	
5,067.0	0.90	164.10	4,985.2	-556.9	-321.9	-531.6	0.42	-0.42	1.79	

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Survey										
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5,161.0	1.00	203.10	5,079.1	-558.3	-322.1	-533.1	0.68	0.11	41.49	
5,256.0	0.30	236.90	5,174.1	-559.2	-322.6	-533.9	0.81	-0.74	35.58	
5,351.0	0.50	288.00	5,269.1	-559.2	-323.2	-533.9	0.41	0.21	53.79	
5,445.0	0.40	269.20	5,363.1	-559.1	-323.9	-533.7	0.19	-0.11	-20.00	
5,540.0	0.40	271.00	5,458.1	-559.1	-324.6	-533.7	0.01	0.00	1.89	
5,768.0	0.20	220.20	5,686.1	-559.4	-325.6	-533.9	0.14	-0.09	-22.28	
5,825.0	0.20	222.80	5,743.1	-559.6	-325.8	-534.0	0.02	0.00	4.56	
5,920.0	1.30	350.80	5,838.1	-558.6	-326.0	-533.1	1.51	1.16	134.74	
6,015.0	11.20	13.30	5,932.4	-548.6	-324.1	-523.2	10.54	10.42	23.68	
6,109.0	18.50	9.10	6,023.2	-524.9	-319.6	-499.9	7.84	7.77	-4.47	
6,204.0	25.00	14.50	6,111.4	-490.6	-312.2	-466.2	7.15	6.84	5.68	
6,299.0	33.80	14.90	6,194.1	-445.5	-300.4	-422.1	9.27	9.26	0.42	
6,394.0	43.00	9.90	6,268.5	-387.9	-288.0	-365.6	10.21	9.68	-5.26	
6,489.0	50.10	3.10	6,333.9	-319.5	-280.4	-297.9	9.09	7.47	-7.16	
6,584.0	58.90	2.00	6,389.0	-242.3	-277.0	-221.2	9.31	9.26	-1.16	
6,678.0	64.70	358.40	6,433.4	-159.5	-276.8	-138.7	7.03	6.17	-3.83	
6,773.0	65.60	356.90	6,473.3	-73.4	-280.3	-52.5	1.72	0.95	-1.58	
6,868.0	70.60	357.50	6,508.7	14.6	-284.6	35.6	5.30	5.26	0.63	
6,963.0	84.00	356.80	6,529.6	107.0	-289.2	128.0	14.12	14.11	-0.74	
7,017.0	84.90	357.30	6,534.8	160.7	-292.0	181.8	1.90	1.67	0.93	
7,123.0	85.40	355.90	6,543.7	266.1	-298.3	287.4	1.40	0.47	-1.32	
7,215.0	84.90	355.40	6,551.5	357.5	-305.2	379.0	0.77	-0.54	-0.54	
7,308.0	88.20	354.80	6,557.1	450.0	-313.2	471.8	3.61	3.55	-0.65	
7,403.0	89.60	356.20	6,558.9	544.7	-320.6	566.8	2.08	1.47	1.47	
7,498.0	89.80	358.00	6,559.4	639.5	-325.4	661.8	1.91	0.21	1.89	
7,593.0	89.70	357.30	6,559.9	734.5	-329.3	756.7	0.74	-0.11	-0.74	
7,688.0	89.90	356.60	6,560.2	829.3	-334.4	851.7	0.77	0.21	-0.74	
7,782.0	89.70	354.80	6,560.5	923.0	-341.4	945.7	1.93	-0.21	-1.91	
7,877.0	90.90	359.40	6,560.0	1,017.9	-346.2	1,040.7	5.00	1.26	4.84	
7,972.0	89.70	358.40	6,559.5	1,112.9	-348.0	1,135.5	1.64	-1.26	-1.05	
8,066.0	88.60	0.50	6,560.9	1,206.9	-348.9	1,229.3	2.52	-1.17	2.23	
8,161.0	89.30	1.00	6,562.7	1,301.8	-347.7	1,323.9	0.91	0.74	0.53	
8,256.0	88.90	359.40	6,564.1	1,396.8	-347.4	1,418.6	1.74	-0.42	-1.68	
8,351.0	88.80	358.90	6,566.1	1,491.8	-348.8	1,513.4	0.54	-0.11	-0.53	
8,446.0	90.00	1.70	6,567.1	1,586.8	-348.3	1,608.1	3.21	1.26	2.95	
8,541.0	90.00	1.20	6,567.1	1,681.7	-345.9	1,702.7	0.53	0.00	-0.53	
8,636.0	90.00	2.20	6,567.1	1,776.7	-343.1	1,797.2	1.05	0.00	1.05	
8,731.0	89.90	0.80	6,567.1	1,871.7	-340.6	1,891.7	1.48	-0.11	-1.47	
8,825.0	90.80	0.80	6,566.6	1,965.6	-339.3	1,985.3	0.96	0.96	0.00	
8,920.0	90.90	359.60	6,565.2	2,060.6	-338.9	2,080.0	1.27	0.11	-1.26	
9,015.0	91.20	0.60	6,563.4	2,155.6	-338.8	2,174.7	1.10	0.32	1.05	
9,110.0	90.80	359.80	6,561.8	2,250.6	-338.4	2,269.4	0.94	-0.42	-0.84	
9,205.0	89.80	1.00	6,561.3	2,345.6	-337.8	2,364.1	1.64	-1.05	1.26	
9,300.0	89.80	1.50	6,561.6	2,440.6	-335.7	2,458.7	0.53	0.00	0.53	

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Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
9,395.0	87.10	359.20	6,564.2	2,535.5	-335.1	2,553.3	3.73	-2.84	-2.42
9,490.0	87.20	0.10	6,568.9	2,630.4	-335.7	2,648.0	0.95	0.11	0.95
9,585.0	89.00	356.40	6,572.0	2,725.3	-338.6	2,742.8	4.33	1.89	-3.89
9,680.0	89.50	357.80	6,573.3	2,820.1	-343.4	2,837.8	1.56	0.53	1.47
9,775.0	89.80	0.10	6,573.9	2,915.1	-345.1	2,932.6	2.44	0.32	2.42
9,870.0	89.50	358.50	6,574.4	3,010.1	-346.3	3,027.5	1.71	-0.32	-1.68
9,965.0	89.30	357.10	6,575.4	3,105.0	-349.9	3,122.4	1.49	-0.21	-1.47
10,059.0	91.90	358.40	6,574.4	3,198.9	-353.6	3,216.3	3.09	2.77	1.38
10,154.0	91.90	358.20	6,571.3	3,293.9	-356.4	3,311.2	0.21	0.00	-0.21
10,249.0	90.60	358.90	6,569.2	3,388.8	-358.9	3,406.0	1.55	-1.37	0.74
10,343.0	88.90	358.70	6,569.6	3,482.8	-360.8	3,499.9	1.82	-1.81	-0.21
10,438.0	91.00	1.70	6,569.7	3,577.8	-360.5	3,594.6	3.85	2.21	3.16
10,533.0	89.80	2.20	6,569.1	3,672.7	-357.3	3,689.0	1.37	-1.26	0.53
10,628.0	90.50	1.70	6,568.8	3,767.6	-354.0	3,783.5	0.91	0.74	-0.53
10,722.0	90.60	0.80	6,567.9	3,861.6	-352.0	3,877.1	0.96	0.11	-0.96
10,817.0	89.50	2.40	6,567.8	3,956.6	-349.3	3,971.6	2.04	-1.16	1.68
10,912.0	89.40	2.20	6,568.7	4,051.5	-345.5	4,065.9	0.24	-0.11	-0.21
11,007.0	89.00	0.30	6,570.1	4,146.5	-343.4	4,160.5	2.04	-0.42	-2.00
11,101.0	88.80	359.60	6,571.9	4,240.4	-343.5	4,254.2	0.77	-0.21	-0.74
11,196.0	88.60	359.80	6,574.0	4,335.4	-344.0	4,349.0	0.30	-0.21	0.21
11,291.0	90.10	358.70	6,575.1	4,430.4	-345.3	4,443.8	1.96	1.58	-1.16
11,386.0	90.20	359.00	6,574.8	4,525.4	-347.2	4,538.6	0.33	0.11	0.32
11,480.0	90.40	358.00	6,574.4	4,619.3	-349.6	4,632.5	1.08	0.21	-1.06
11,575.0	90.80	357.50	6,573.4	4,714.3	-353.4	4,727.5	0.67	0.42	-0.53
CROSSED HARD LINE @ 11597' MD / 6573' TVD									
11,596.7	90.87	357.57	6,573.0	4,735.9	-354.3	4,749.2	0.45	0.32	0.32
11,670.0	91.10	357.80	6,571.8	4,809.2	-357.2	4,822.4	0.45	0.32	0.32
11,683.0	91.10	356.90	6,571.5	4,822.1	-357.9	4,835.4	6.92	0.00	-6.92
TD @ 11733' MD / 6571' TVD									
11,733.0	91.10	356.90	6,570.6	4,872.1	-360.6	4,885.4	0.00	0.00	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
634.0	634.0	-4.4	-0.4	TIE IN @ 634' MD / 634' TVD
3,056.9	2,994.9	-395.6	-242.8	CROSSED HARD LINE @ 3057' MD / 2995' TVD
11,596.7	6,573.0	4,735.9	-354.3	CROSSED HARD LINE @ 11597' MD / 6573' TVD
11,733.0	6,570.6	4,872.1	-360.6	TD @ 11733' MD / 6571' TVD

Checked By: _____ Approved By: _____ Date: _____



Survey Certification Sheet

Noble Energy Inc
Company

RM-13306
Job Number

4/23/13
Date

Sec12,T5N,R64W
Lease

SLW Ranch B12-79HN
Well Name

Weld, CO
County & State

API: 05-123-36505

Surveyed from a depth of: 634 feet to 11733 feet MD

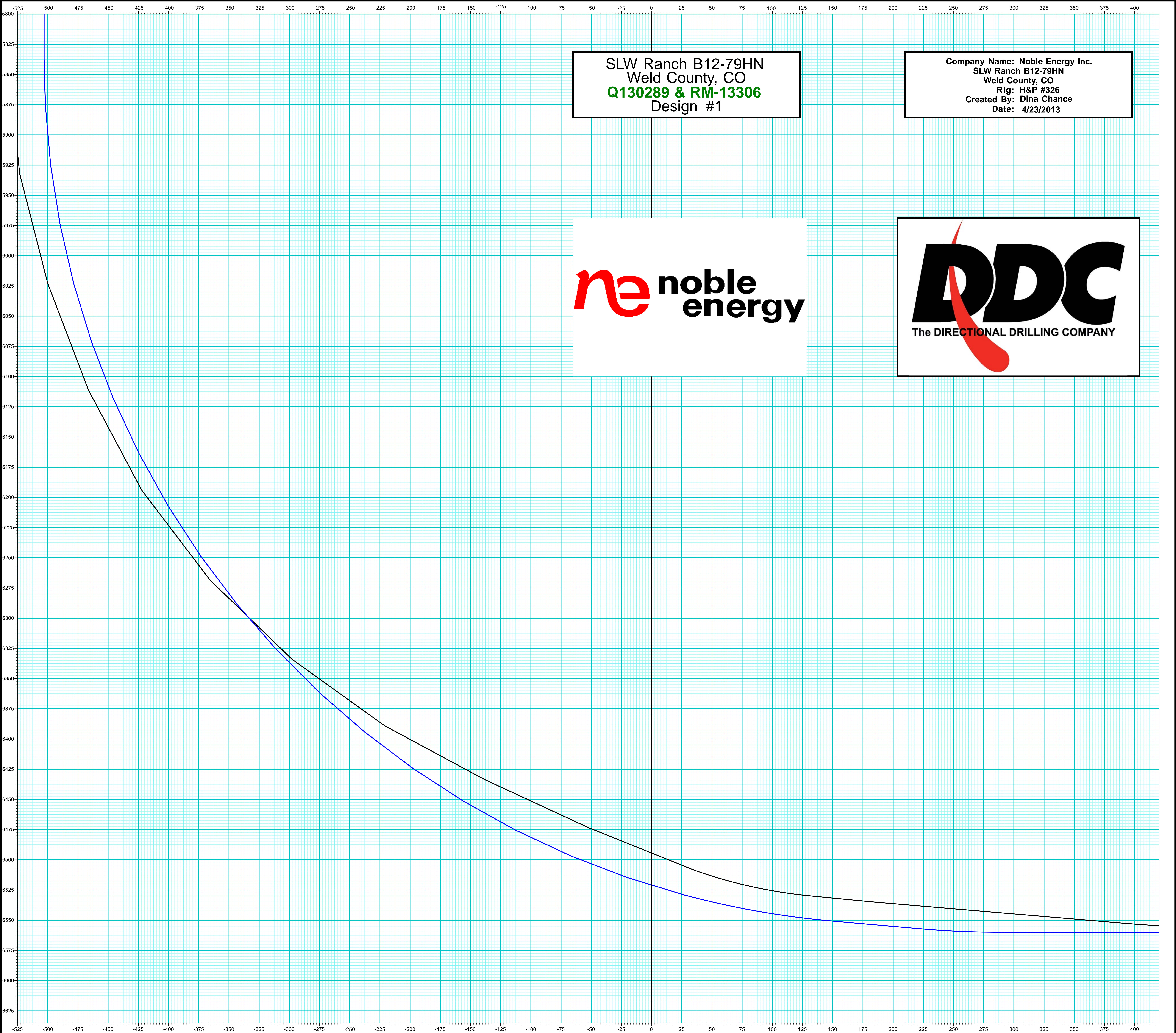
Type of Survey: MWD

Directional Supervisor/Surveyor: Bob Kubistek

The data and calculations for this survey have been checked by me and conform to the standards and procedures set forth by **The Directional Drilling Company (DDC)**. This report represents a true and correct Directional survey of this well based on the original data obtained at the well site. Wellbore Coordinates are calculated using minimum curvature.

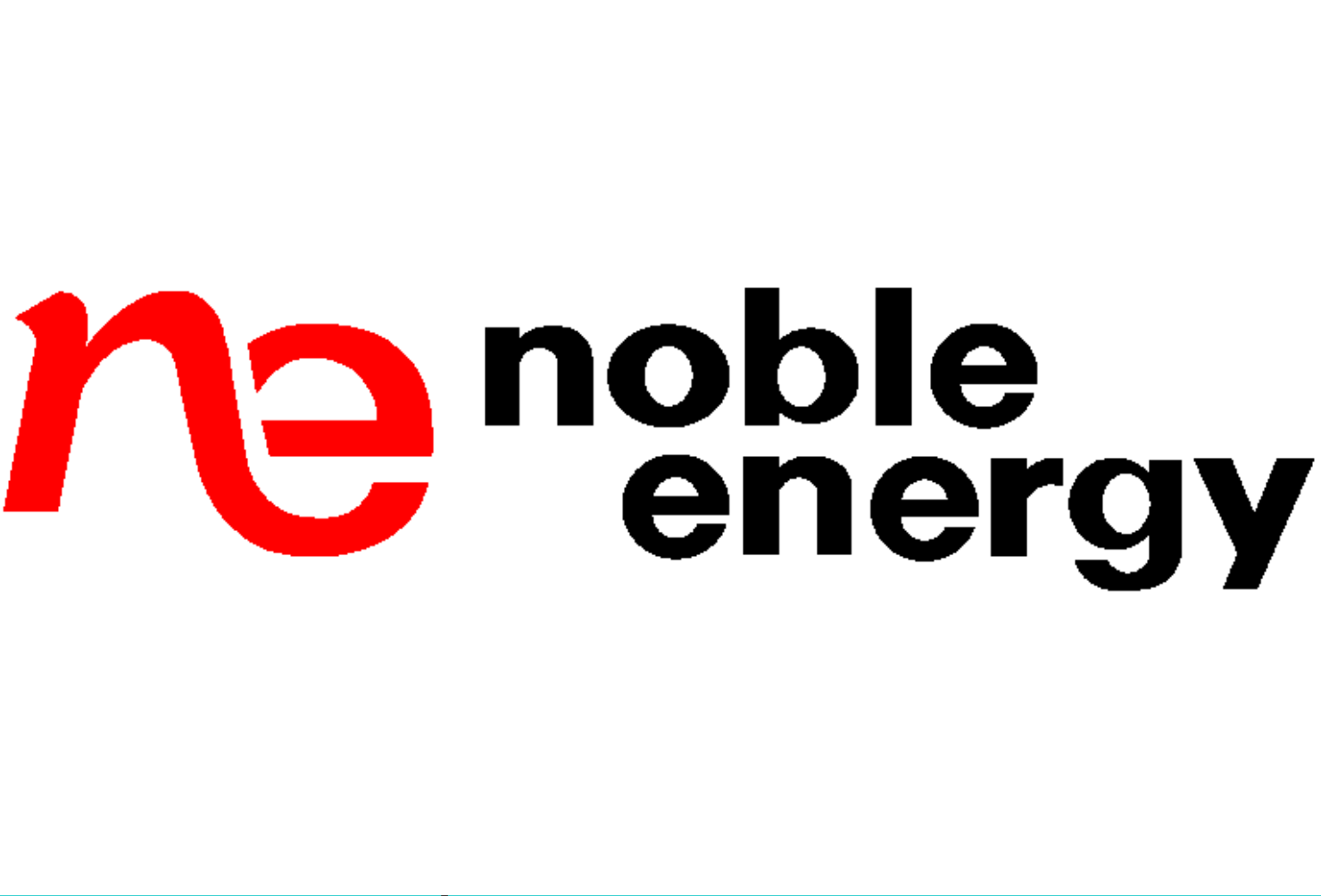
Digitally signed by Larry Wright
DN: cn=Larry Wright, o=The
Directional Drilling Company,
ou=GM of Guidance Services,
email=larryw@directionaldrillers
.com, c=US
Date: 2013.04.24 10:58:59 -05'00'

Larry Wright
MWD General Manager



SLW Ranch B12-79HN
 Weld County, CO
Q130289 & RM-13306
 Design #1

Company Name: Noble Energy Inc.
 SLW Ranch B12-79HN
 Weld County, CO
 Rig: H&P #326
 Created By: Dina Chance
 Date: 4/23/2013



Vertical Section at 355.77° (25 usft/in)

Company Name: Noble Energy Inc.
 SLW Ranch B12-79HN
 Weld County, CO
 Rig: H&P #326
 Created By: Dina Chance
 Date: 4/23/2013

SLW Ranch B12-79HN
 Weld County, CO
Q130289 & RM-13306
 Design #1

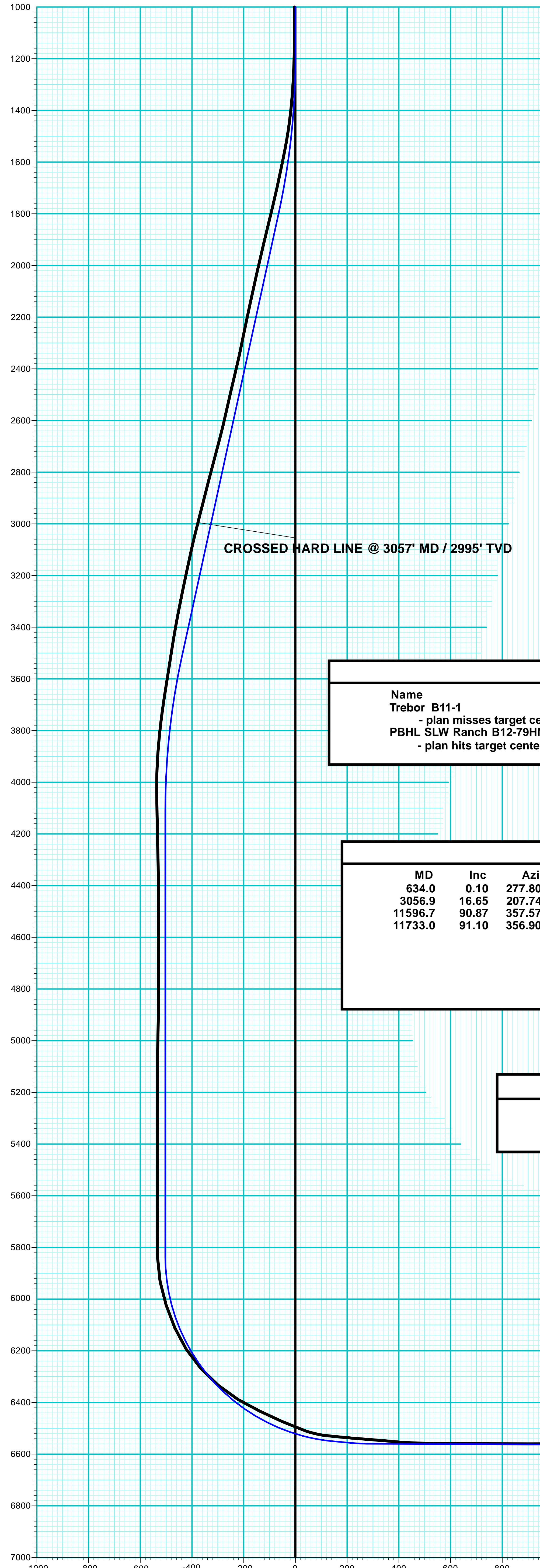
PROJECT DETAILS: Weld County, CO

Geodetic System: US State Plane 1983
 Datum: North American Datum 1983
 Ellipsoid: GRS 1980
 Zone: Colorado Northern Zone
 System Datum: Mean Sea Level



T G M Azimuths to Grid North
 Magnetic North: 7.85°

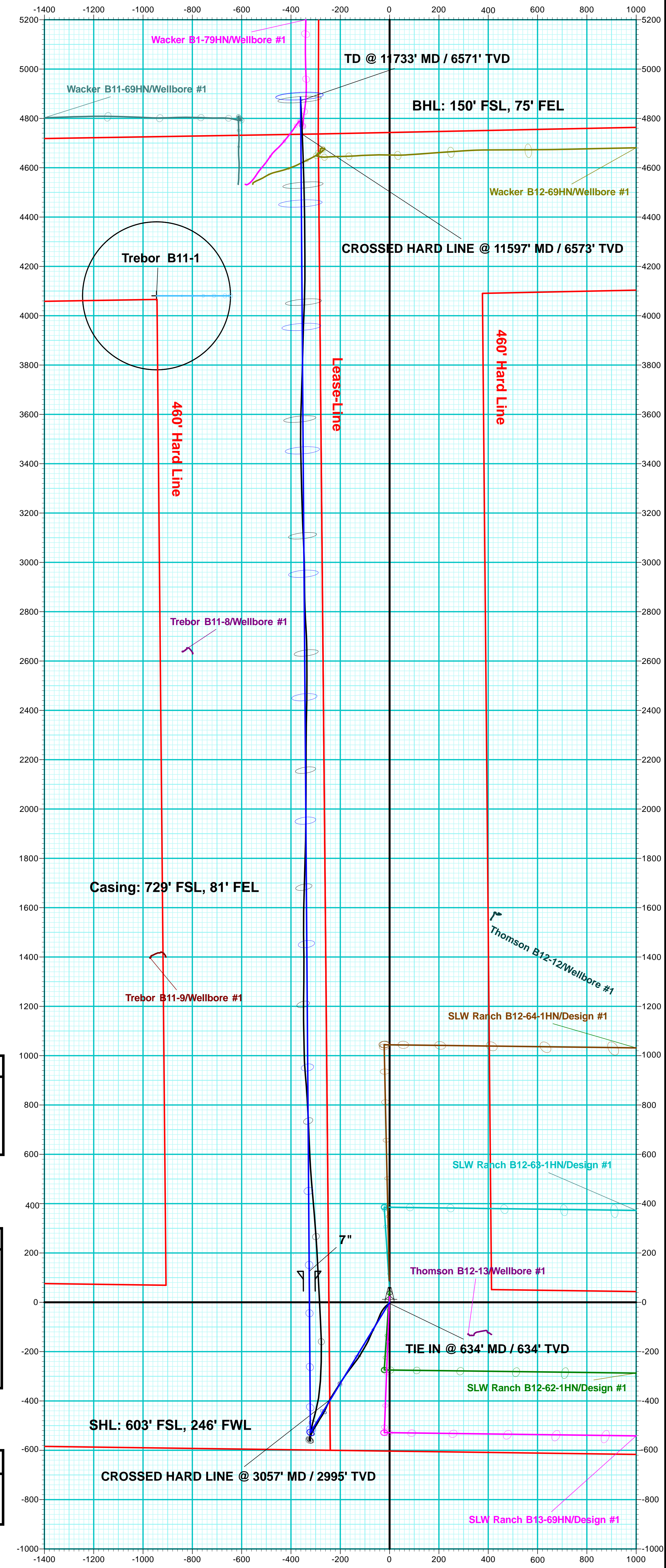
Magnetic Field
 Strength: 52976.8snT
 Dip Angle: 67.04°
 Date: 3/27/2013
 Model: IGRF2010



DESIGN TARGET DETAILS							
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
Trebor B11-1	0.0	4080.8	-945.1	1397157.68	3275507.07	40° 25' 9.768 N	104° 30' 37.728 W
- plan misses target center by 4188.8usft at 0.0usft MD (0.0 TVD, 0.0 N, 0.0 E)							
PBHL SLW Ranch B12-79HN	6576.0	4885.3	-361.0	1397962.22	3276091.14	40° 25' 17.653 N	104° 30' 30.060 W
- plan hits target center							

ANNOTATIONS									
MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation	
634.0	0.10	277.80	634.0	-4.4	-0.4	-4.3	4.7	TIE IN @ 634' MD / 634' TVD	
3056.9	16.65	207.74	2994.9	-395.6	-242.8	-376.6	471.0	CROSSED HARD LINE @ 3057' MD / 2995' TVD	
11596.7	90.87	357.57	6573.0	4735.9	-354.3	4749.2	5986.1	CROSSED HARD LINE @ 11597' MD / 6573' TVD	
11733.0	91.10	356.90	6570.6	4872.1	-360.6	4885.4	6122.4	TD @ 11733' MD / 6571' TVD	

WELL DETAILS: SLW Ranch B12-79HN						
+N/-S	+E/-W	Ground Level:	Latitude	Longitude		
0.0	0.0	Northing	4595.0			
		Easting	3276452.14	40° 24' 29.340 N	104° 30' 26.100 W	



TD @ 11733' MD / 6571' TVD
 CROSSED HARD LINE @ 11597' MD / 6573' TVD

Vertical Section at 355.77° (200 usft/in)