

## **Noble Energy Inc.**

Weld County, CO

Sec 14, T6N, R64W 6th PM

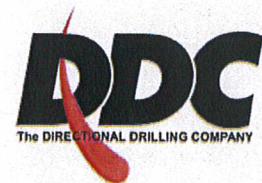
Rayglo A15-67-1HN

Wellbore #1

Survey: MWD Final

## **DDC Survey Report**

24 April, 2012





Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rayglo A15-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4768.0usft (H&P #323)
Site:	Sec 14, T6N, R64W 6th PM	MD Reference:	WELL @ 4768.0usft (H&P #323)
Well:	Rayglo A15-67-1HN	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 14, T6N, R64W 6th PM		
Site Position:		Northing:	1,422,457.54 usft
From:	Lat/Long	Easting:	3,271,010.58 usft
Position Uncertainty:	0.0 usft	Slot Radius:	13-3/16 "
		Latitude:	40° 29' 20.256 N
		Longitude:	104° 31' 32.268 W
		Grid Convergence:	0.63 °

Well	Rayglo A15-67-1HN		
Well Position	+N/-S	0.0 usft	Northing:
	+E/-W	0.0 usft	Easting:
Position Uncertainty	0.0 usft	Wellhead Elevation:	usft
		Latitude:	40° 29' 20.148 N
		Longitude:	104° 31' 33.240 W
		Ground Level:	4,744.0 usf

Wellbore	Wellbore #1		
----------	-------------	--	--

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF2010	3/21/2012	8.64	67.14	53,123

Design	Wellbore #1		
--------	-------------	--	--

Audit Notes:				
Version:	1.0	Phase:	ACTUAL	Tie On Depth:
Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	269.13

Survey Program	Date 4/24/2012		
From (usft)	To (usft)	Survey (Wellbore)	Tool Name
880.0	11,352.0	MWD (Wellbore #1)	MWD default
			Description
			MWD - Standard

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)
Tie In @ 880' MD / 880' TVD									
880.0	0.00	0.00	880.0	0.0	0.0	0.0	0.00	0.00	0.00
909.0	1.90	272.60	909.0	0.0	-0.5	0.5	6.55	6.55	0.00
970.0	2.00	258.90	970.0	-0.1	-2.5	2.5	0.78	0.16	-22.46
1,062.0	2.10	258.10	1,061.9	-0.8	-5.8	5.8	0.11	0.11	-0.87
1,344.0	2.30	263.80	1,343.7	-2.5	-16.4	16.5	0.11	0.07	2.02
1,630.0	2.20	266.20	1,629.5	-3.5	-27.6	27.7	0.05	-0.03	0.84
1,915.0	1.90	269.20	1,914.3	-3.9	-37.8	37.9	0.11	-0.11	1.05
2,010.0	2.30	264.80	2,009.2	-4.1	-41.3	41.3	0.45	0.42	-4.63
2,104.0	4.30	279.60	2,103.1	-3.7	-46.6	46.7	2.30	2.13	15.74



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rayglo A15-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4768.0usft (H&P #323)
Site:	Sec 14, T6N, R64W 6th PM	MD Reference:	WELL @ 4768.0usft (H&P #323)
Well:	Rayglo A15-67-1HN	North Reference:	Grid
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)
2,199.0	6.00	280.80	2,197.7	-2.1	-55.0	55.0	1.79	1.79	1.26
2,294.0	7.10	275.20	2,292.1	-0.7	-65.7	65.7	1.34	1.16	-5.89
2,389.0	8.60	277.30	2,386.2	0.8	-78.6	78.6	1.61	1.58	2.21
2,484.0	8.40	271.50	2,480.1	1.8	-92.6	92.6	0.93	-0.21	-6.11
2,579.0	7.40	271.50	2,574.2	2.2	-105.7	105.6	1.05	-1.05	0.00
2,674.0	5.50	263.40	2,668.6	1.8	-116.3	116.3	2.21	-2.00	-8.53
2,769.0	4.20	268.90	2,763.3	1.2	-124.3	124.3	1.45	-1.37	5.79
2,864.0	2.10	245.70	2,858.1	0.5	-129.4	129.4	2.54	-2.21	-24.42
3,054.0	0.60	239.30	3,048.1	-1.5	-133.4	133.4	0.79	-0.79	-3.37
3,339.0	0.40	317.40	3,333.1	-1.5	-135.4	135.4	0.23	-0.07	27.40
3,624.0	1.20	359.60	3,618.0	2.2	-136.1	136.0	0.33	0.28	14.81
3,909.0	1.50	6.80	3,903.0	8.9	-135.6	135.5	0.12	0.11	2.53
4,195.0	1.70	32.40	4,188.8	16.2	-132.9	132.7	0.26	0.07	8.95
4,480.0	0.60	3.10	4,473.8	21.2	-130.6	130.2	0.43	-0.39	-10.28
4,575.0	1.10	251.50	4,568.8	21.5	-131.4	131.1	1.51	0.53	-117.47
4,765.0	1.20	108.40	4,758.8	20.2	-131.3	130.9	1.15	0.05	-75.32
4,860.0	0.90	76.90	4,853.8	20.1	-129.6	129.3	0.67	-0.32	-33.16
4,955.0	1.80	159.90	4,948.7	18.9	-128.3	128.0	2.01	0.95	87.37
5,050.0	1.80	158.30	5,043.7	16.1	-127.3	127.0	0.05	0.00	-1.68
5,145.0	1.10	154.60	5,138.7	13.9	-126.3	126.1	0.74	-0.74	-3.89
5,430.0	0.40	84.70	5,423.6	11.5	-124.2	124.0	0.36	-0.25	-24.53
5,715.0	1.70	206.60	5,708.6	7.8	-125.1	124.9	0.68	0.46	42.77
5,954.0	0.80	165.90	5,947.5	3.0	-126.3	126.2	0.51	-0.38	-17.03
6,026.0	0.90	188.90	6,019.5	2.0	-126.2	126.2	0.49	0.14	31.94
6,074.0	4.10	246.90	6,067.5	0.9	-127.9	127.8	7.71	6.67	120.83
6,122.0	7.30	254.60	6,115.2	-0.6	-132.4	132.4	6.84	6.67	16.04
6,169.0	9.90	255.70	6,161.7	-2.4	-139.2	139.2	5.54	5.53	2.34
6,217.0	11.90	258.50	6,208.8	-4.4	-148.0	148.1	4.31	4.17	5.83
6,263.0	15.10	258.30	6,253.6	-6.5	-158.5	158.6	6.96	6.96	-0.43
6,312.0	17.30	255.50	6,300.6	-9.6	-171.8	172.0	4.76	4.49	-5.71
6,359.0	19.80	255.50	6,345.2	-13.4	-186.3	186.5	5.32	5.32	0.00
6,407.0	22.20	256.70	6,390.0	-17.5	-203.0	203.3	5.08	5.00	2.50
6,439.0	24.80	258.50	6,419.3	-20.2	-215.5	215.8	8.43	8.13	5.63
6,471.0	28.10	262.20	6,448.0	-22.6	-229.5	229.8	11.52	10.31	11.56
Crossed Hard Line @ 6502' MD / 6475' TVD									
6,502.0	31.10	267.10	6,474.9	-24.0	-244.8	245.1	12.43	9.68	15.81
6,566.0	36.50	276.60	6,528.1	-22.6	-280.2	280.5	11.78	8.44	14.84
6,597.0	38.90	280.80	6,552.7	-19.8	-299.0	299.2	11.34	7.74	13.55
6,629.0	40.80	280.50	6,577.2	-16.0	-319.1	319.3	5.97	5.94	-0.94
6,661.0	44.00	277.30	6,600.9	-12.6	-340.4	340.6	12.06	10.00	-10.00
6,692.0	47.80	274.90	6,622.4	-10.3	-362.6	362.7	13.46	12.26	-7.74
6,724.0	50.70	272.90	6,643.3	-8.7	-386.7	386.8	10.22	9.06	-6.25
6,756.0	54.30	270.50	6,662.8	-7.9	-412.1	412.2	12.73	11.25	-7.50
6,787.0	58.70	269.80	6,679.9	-7.9	-437.9	438.0	14.32	14.19	-2.26



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rayglo A15-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4768.0usft (H&P #323)
Site:	Sec 14, T6N, R64W 6th PM	MD Reference:	WELL @ 4768.0usft (H&P #323)
Well:	Rayglo A15-67-1HN	North Reference:	Grid
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)
6,819.0	62.10	272.00	6,695.7	-7.4	-465.8	465.8	12.19	10.63	6.88
6,850.0	65.90	272.40	6,709.3	-6.3	-493.6	493.6	12.31	12.26	1.29
6,882.0	70.40	273.40	6,721.2	-4.8	-523.3	523.3	14.36	14.06	3.13
6,914.0	74.00	274.00	6,731.0	-2.9	-553.6	553.6	11.39	11.25	1.88
6,945.0	76.60	274.50	6,738.8	-0.6	-583.5	583.5	8.53	8.39	1.61
6,977.0	79.10	272.20	6,745.6	1.2	-614.8	614.7	10.51	7.81	-7.19
7,009.0	82.90	268.70	6,750.6	1.4	-646.4	646.3	16.05	11.88	-10.94
7,040.0	86.30	268.00	6,753.5	0.5	-677.2	677.1	11.20	10.97	-2.26
<b>Crossed Hard Line @ 7070' MD / 6755' TVD</b>									
7,070.0	86.68	268.19	6,755.3	-0.5	-707.1	707.1	1.40	1.25	0.63
7,072.0	86.70	268.20	6,755.5	-0.5	-709.1	709.1	1.40	1.25	0.62
7,101.0	86.50	268.30	6,757.2	-1.4	-738.1	738.0	0.77	-0.69	0.34
7,176.0	87.30	268.70	6,761.2	-3.4	-812.9	812.9	1.19	1.07	0.53
7,208.0	89.30	269.40	6,762.2	-3.9	-844.9	844.9	6.62	6.25	2.19
7,271.0	90.20	269.40	6,762.5	-4.6	-907.9	907.9	1.43	1.43	0.00
7,366.0	90.40	269.40	6,762.0	-5.5	-1,002.9	1,002.9	0.21	0.21	0.00
7,461.0	91.40	269.00	6,760.5	-6.9	-1,097.9	1,097.9	1.13	1.05	-0.42
7,556.0	90.10	269.20	6,759.2	-8.4	-1,192.9	1,192.8	1.38	-1.37	0.21
7,651.0	91.40	269.90	6,758.0	-9.1	-1,287.8	1,287.8	1.55	1.37	0.74
7,746.0	90.10	267.60	6,756.7	-11.2	-1,382.8	1,382.8	2.78	-1.37	-2.42
7,841.0	90.20	268.90	6,756.5	-14.1	-1,477.8	1,477.8	1.37	0.11	1.37
7,935.0	88.90	269.40	6,757.2	-15.5	-1,571.7	1,571.8	1.48	-1.38	0.53
8,030.0	89.50	269.00	6,758.5	-16.8	-1,666.7	1,666.8	0.76	0.63	-0.42
8,125.0	89.90	268.70	6,759.0	-18.7	-1,761.7	1,761.8	0.53	0.42	-0.32
8,220.0	90.30	268.30	6,758.9	-21.2	-1,856.7	1,856.8	0.60	0.42	-0.42
8,315.0	88.70	268.50	6,759.7	-23.9	-1,951.6	1,951.8	1.70	-1.68	0.21
8,410.0	88.70	268.00	6,761.9	-26.8	-2,046.6	2,046.7	0.53	0.00	-0.53
8,505.0	90.10	268.20	6,762.9	-29.9	-2,141.5	2,141.7	1.49	1.47	0.21
8,600.0	90.60	267.80	6,762.3	-33.2	-2,236.4	2,236.7	0.67	0.53	-0.42
8,695.0	91.40	268.00	6,760.6	-36.7	-2,331.4	2,331.6	0.87	0.84	0.21
8,790.0	88.90	267.80	6,760.4	-40.2	-2,426.3	2,426.6	2.64	-2.63	-0.21
8,885.0	88.30	267.50	6,762.7	-44.1	-2,521.2	2,521.6	0.71	-0.63	-0.32
8,980.0	89.10	267.60	6,764.8	-48.1	-2,616.1	2,616.5	0.85	0.84	0.11
9,075.0	89.70	269.80	6,765.8	-50.3	-2,711.0	2,711.5	2.40	0.63	2.32
9,170.0	90.00	269.20	6,766.1	-51.1	-2,806.0	2,806.5	0.71	0.32	-0.63
9,265.0	90.80	269.20	6,765.4	-52.4	-2,901.0	2,901.5	0.84	0.84	0.00
9,360.0	90.50	269.20	6,764.4	-53.8	-2,996.0	2,996.5	0.32	-0.32	0.00
9,455.0	88.80	270.80	6,764.9	-53.8	-3,091.0	3,091.5	2.46	-1.79	1.68
9,550.0	89.40	271.00	6,766.4	-52.3	-3,186.0	3,186.4	0.67	0.63	0.21
9,645.0	89.30	271.10	6,767.5	-50.5	-3,280.9	3,281.3	0.15	-0.11	0.11
9,740.0	88.90	270.80	6,769.0	-49.0	-3,375.9	3,376.3	0.53	-0.42	-0.32
9,835.0	90.30	269.90	6,769.7	-48.4	-3,470.9	3,471.2	1.75	1.47	-0.95
9,930.0	90.40	270.30	6,769.1	-48.2	-3,565.9	3,566.2	0.43	0.11	0.42



Company:	Noble Energy Inc.	Local Co-ordinate Reference:	Well Rayglo A15-67-1HN
Project:	Weld County, CO	TVD Reference:	WELL @ 4768.0usft (H&P #323)
Site:	Sec 14, T6N, R64W 6th PM	MD Reference:	WELL @ 4768.0usft (H&P #323)
Well:	Rayglo A15-67-1HN	North Reference:	Grid
Wellbore:	Wellbore #1	Survey Calculation Method:	Minimum Curvature
Design:	Wellbore #1	Database:	EDM 5000.1 Single User Db

#### Survey

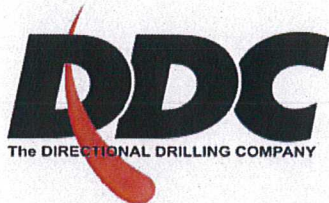
Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)	Build Rate (°/100usft)	Turn Rate (°/100usft)
10,025.0	90.10	270.10	6,768.7	-47.9	-3,660.9	3,661.2	0.38	-0.32	-0.21
10,120.0	90.30	270.50	6,768.3	-47.4	-3,755.9	3,756.2	0.47	0.21	0.42
10,215.0	90.50	270.10	6,767.7	-46.9	-3,850.9	3,851.2	0.47	0.21	-0.42
10,310.0	91.00	270.10	6,766.4	-46.7	-3,945.9	3,946.1	0.53	0.53	0.00
10,405.0	89.70	268.00	6,765.8	-48.3	-4,040.9	4,041.1	2.60	-1.37	-2.21
10,500.0	89.50	268.00	6,766.5	-51.6	-4,135.8	4,136.1	0.21	-0.21	0.00
10,595.0	89.20	267.80	6,767.6	-55.1	-4,230.7	4,231.1	0.38	-0.32	-0.21
10,690.0	89.10	268.00	6,769.0	-58.6	-4,325.7	4,326.1	0.24	-0.11	0.21
10,785.0	89.30	267.60	6,770.3	-62.2	-4,420.6	4,421.0	0.47	0.21	-0.42
10,880.0	90.30	267.60	6,770.7	-66.2	-4,515.5	4,516.0	1.05	1.05	0.00
10,975.0	90.00	267.10	6,770.4	-70.6	-4,610.4	4,610.9	0.61	-0.32	-0.53
11,070.0	90.70	266.40	6,769.8	-76.0	-4,705.2	4,705.9	1.04	0.74	-0.74
11,165.0	91.30	266.10	6,768.2	-82.2	-4,800.0	4,800.7	0.71	0.63	-0.32
11,260.0	92.20	265.70	6,765.3	-89.0	-4,894.7	4,895.5	1.04	0.95	-0.42
11,301.0	92.90	265.90	6,763.4	-92.0	-4,935.6	4,936.4	1.78	1.71	0.49
TD @ 11352' MD / 6761' TVD									
11,352.0	92.90	265.90	6,760.9	-95.6	-4,986.4	4,987.3	0.00	0.00	0.00

#### Survey Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
880.0	880.0	0.0	0.0	Tie In @ 880' MD / 880' TVD
6,502.0	6,474.9	-24.0	-244.8	Crossed Hard Line @ 6502' MD / 6475' TVD
7,070.0	6,755.3	-0.5	-707.1	Crossed Hard Line @ 7070' MD / 6755' TVD
11,352.0	6,760.9	-95.6	-4,986.4	TD @ 11352' MD / 6761' TVD

Checked By: \_\_\_\_\_ Approved By: \_\_\_\_\_ Date: \_\_\_\_\_





---

---

## Survey Certification Sheet

Noble Energy  
Company

RM-12226  
Job Number

4/24/12  
Date

Sec 14, T6N, R64W, 6<sup>th</sup> PM  
Lease

Rayglo A15-67-1HN  
Well Name

Weld, CO  
County & State

Surveyed from a depth of:

880 feet to 11352 feet MD

Type of Survey:

MWD

Directional Supervisor/Surveyor:

Boyd Wolff

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.

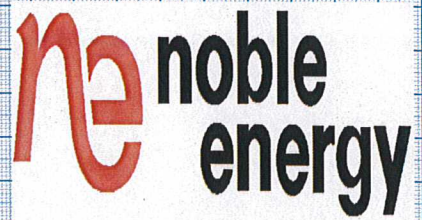
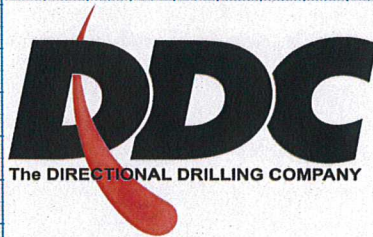
Digitally signed by Larry  
Wright  
DN: cn=Larry Wright, o=The  
Directional Drilling Company,  
ou=GM of Guidance Services,  
email=larryw@directionaldrill  
ers.com, c=US  
Date: 2012.04.25 15:46:38  
-05'00'

Larry Wright  
MWD General Manager



Company Name: Noble Energy Inc.  
Rayglo A15-67-1HN  
Weld County, CO  
Rig: H&P #323  
Created By: Dina Chance  
Date: 4/24/2012

Rayglo A15-67-1HN  
Weld County, CO  
**Q120236 & RM-12226**



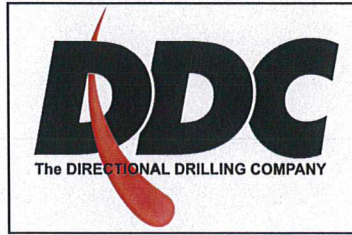
Crossed Hard Line @ 6502' MD / 8475' TVD


Crossed Hard Line @ 7070' MD / 8755' TVD

Vertical Section at 269.13° (25 usf/in)



Company Name: Noble Energy Inc.  
 Rayglo A15-67-1HN  
 Weld County, CO  
 Rig: H&P #323  
 Created By: Dina Chance  
 Date: 4/24/2012




 Azimuths to Grid North  
 Magnetic North: 8.01°  
 Magnetic Field  
 Strength: 53123.1snT  
 Dip Angle: 67.14°  
 Date: 3/21/2012  
 Model: IGRF2010

Rayglo A15-67-1HN  
 Weld County, CO  
 Q120236 & RM-12226

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

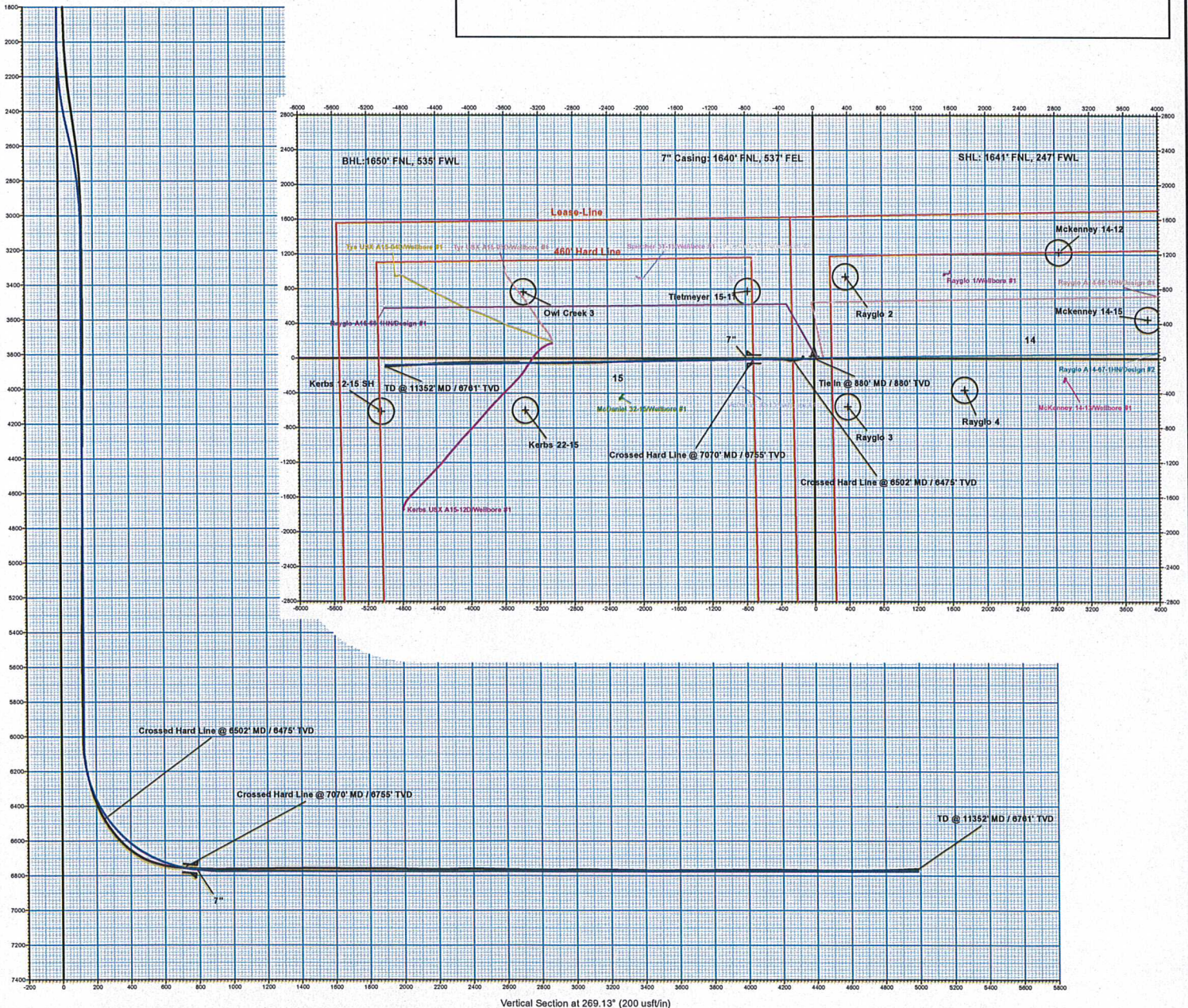
DESIGN TARGET DETAILS						
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude
VP Rayglo A15-67-1HN	3084.0	0.0	-130.0	1422445.77	3270805.60	40° 29' 20.162 N 104° 31' 34.922 W
PBHL Rayglo A15-67-1HN	6773.0	-76.1	-4866.6	1422369.65	3265948.99	40° 29' 19.932 N 104° 32' 37.788 W
- plan hits target center						

WELL DETAILS: Rayglo A15-67-1HN

Ground Level: 4744.0  
 +N/-S: 0.0 +E/-W: 0.0  
 Northing: 1422445.77 Easting: 3270935.60  
 Latitude: 40° 29' 20.148 N Longitude: 104° 31' 33.240 W

ANNOTATIONS

MD	Inc	Azi	TVD	+N/-S	+E/-W	Vsect	Departure	Annotation
880.0	0.00	0.00	880.0	0.0	0.0	0.0	0.0	Tie In @ 880' MD / 880' TVD
8502.0	31.10	267.10	8474.9	-24.0	-244.8	245.1	313.4	Crossed Hard Line @ 8502' MD / 8475' TVD
7070.0	86.87	288.19	6755.3	-0.5	-707.1	707.1	777.2	Crossed Hard Line @ 7070' MD / 6755' TVD
11352.0	92.90	265.90	6760.9	-95.6	-4968.4	4967.3	5058.8	TD @ 11352' MD / 6761' TVD



Vertical Section at 269.13° (200 usft/in)