

# Survey Report

<b>Company:</b>	NOBLE ENERGY INC WELD COUNTY CO	<b>Local Co-ordinate Reference:</b>	Well Leonard C 21-16
<b>Project:</b>	SEC.21-T4N-R64W	<b>TVD Reference:</b>	WELL @ 4721.5ft (Original Well Elev)
<b>Site:</b>	Pad-Leonard C 21-16	<b>MD Reference:</b>	WELL @ 4721.5ft (Original Well Elev)
<b>Well:</b>	Leonard C 21-16	<b>North Reference:</b>	True
<b>Wellbore:</b>	Wellbore #1	<b>Survey Calculation Method:</b>	Minimum Curvature
<b>Design:</b>	Wellbore #1 survey	<b>Database:</b>	Compass

<b>Project</b>	SEC.21-T4N-R64W, WELD COUNTY COLORADO		
<b>Map System:</b>	US State Plane 1983	<b>System Datum:</b>	Mean Sea Level
<b>Geo Datum:</b>	North American Datum 1983		Using Well Reference Point
<b>Map Zone:</b>	Colorado Northern Zone		Using geodetic scale factor

Site	Pad-Leonard C 21-16				
Site Position:		Northing:	1,350,769.26 ft	Latitude:	40° 17' 32.496 N
From:	Lat/Long	Easting:	3,265,170.02 ft	Longitude:	104° 32' 57.804 W
Position Uncertainty:	0.0 ft	Slot Radius:	"	Grid Convergence:	0.61 °

Well	Leonard C 21-16					
Well Position	+N/-S	0.0 ft	Northing:	1,350,769.26 ft	Latitude:	40° 17' 32.496 N
	+E/-W	0.0 ft	Easting:	3,265,170.02 ft	Longitude:	104° 32' 57.804 W
Position Uncertainty		0.0 ft	Wellhead Elevation:	ft	Ground Level:	4,705.5 ft

<b>Wellbore</b>	Wellbore #1				
<b>Magnetics</b>	<b>Model Name</b>	<b>Sample Date</b>	<b>Declination (°)</b>	<b>Dip Angle (°)</b>	<b>Field Strength (nT)</b>
	IGRF2005-10	9/24/2007	9.21	67.13	53,507

Design	Wellbore #1 survey				
Audit Notes:					
Version:	1.0	Phase:	ACTUAL	Tie On Depth:	0.0
Vertical Section:	Depth From (TVD)	+N/-S	+E/-W	Direction	
	(ft)	(ft)	(ft)	(°)	
	0.0	0.0	0.0	106.03	

<b>Survey Program</b>	<b>Date</b> 10/2/2007			
<b>From (ft)</b>	<b>To (ft)</b>	<b>Survey (Wellbore)</b>	<b>Tool Name</b>	<b>Description</b>
799.0	7,057.0	MWD Survey Loenard C21-16 (Wellbore #	MWD	MWD -

<b>Survey</b>									
<b>Measured Depth (ft)</b>	<b>Inclination (°)</b>	<b>Azimuth (°)</b>	<b>Vertical Depth (ft)</b>	<b>+N/-S (ft)</b>	<b>+E/-W (ft)</b>	<b>Vertical Section (ft)</b>	<b>Dogleg Rate (°/100ft)</b>	<b>Build Rate (°/100ft)</b>	<b>Turn Rate (°/100ft)</b>
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
799.0	0.00	0.00	799.0	0.0	0.0	0.0	0.00	0.00	0.00
852.8	0.30	12.60	852.8	0.1	0.0	0.0	0.56	0.56	0.00
1,071.1	0.30	325.50	1,071.1	1.2	-0.2	-0.5	0.11	0.00	-21.57
1,289.9	0.30	330.20	1,289.9	2.1	-0.8	-1.3	0.01	0.00	2.15
1,477.3	0.40	355.90	1,477.3	3.2	-1.1	-1.9	0.10	0.05	13.71
1,664.7	0.50	323.70	1,664.6	4.5	-1.6	-2.8	0.14	0.05	-17.18
1,851.8	0.50	321.80	1,851.8	5.8	-2.6	-4.1	0.01	0.00	-1.02
2,037.6	0.50	336.50	2,037.6	7.2	-3.4	-5.3	0.07	0.00	7.91
2,225.6	0.40	340.10	2,225.6	8.6	-4.0	-6.2	0.06	-0.05	1.92
2,412.0	0.20	264.30	2,412.0	9.2	-4.5	-6.9	0.22	-0.11	-40.66
2,600.0	0.20	248.60	2,600.0	9.0	-5.1	-7.4	0.03	0.00	-8.35
2,787.0	0.10	280.80	2,787.0	8.9	-5.6	-7.8	0.07	-0.05	17.22

## Survey Report

**Company:** NOBLE ENERGY INC WELD COUNTY CO  
**Project:** SEC.21-T4N-R64W  
**Site:** Pad-Leonard C 21-16  
**Well:** Leonard C 21-16  
**Wellbore:** Wellbore #1  
**Design:** Wellbore #1 survey

**Local Co-ordinate Reference:** Well Leonard C 21-16  
**TVD Reference:** WELL @ 4721.5ft (Original Well Elev)  
**MD Reference:** WELL @ 4721.5ft (Original Well Elev)  
**North Reference:** True  
**Survey Calculation Method:** Minimum Curvature  
**Database:** Compass

### Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)	Build Rate (°/100ft)	Turn Rate (°/100ft)
2,881.0	0.10	295.40	2,881.0	9.0	-5.8	-8.0	0.03	0.00	15.53
2,975.0	0.40	93.60	2,975.0	9.0	-5.5	-7.8	0.53	0.32	168.30
3,069.0	2.20	103.30	3,068.9	8.5	-3.4	-5.6	1.92	1.91	10.32
3,162.0	3.30	108.40	3,161.8	7.3	0.9	-1.2	1.21	1.18	5.48
3,256.0	5.30	102.70	3,255.6	5.5	7.7	5.8	2.17	2.13	-6.06
3,350.0	6.90	106.60	3,349.0	2.9	17.3	15.8	1.76	1.70	4.15
3,444.0	8.40	107.70	3,442.2	-0.8	29.3	28.3	1.60	1.60	1.17
3,538.0	8.90	107.50	3,535.1	-5.1	42.7	42.5	0.53	0.53	-0.21
3,630.0	9.10	107.50	3,626.0	-9.4	56.5	56.9	0.22	0.22	0.00
3,724.0	9.10	107.70	3,718.8	-13.9	70.6	71.7	0.03	0.00	0.21
3,818.0	9.10	108.90	3,811.6	-18.6	84.7	86.6	0.20	0.00	1.28
3,912.0	9.30	108.00	3,904.4	-23.3	99.0	101.6	0.26	0.21	-0.96
4,005.0	8.30	107.00	3,996.3	-27.6	112.6	115.8	1.09	-1.08	-1.08
4,099.0	9.20	103.10	4,089.2	-31.3	126.4	130.1	1.15	0.96	-4.15
4,193.0	8.30	104.10	4,182.2	-34.6	140.3	144.4	0.97	-0.96	1.06
4,287.0	8.90	111.70	4,275.1	-39.0	153.6	158.4	1.37	0.64	8.09
4,381.0	9.10	107.70	4,367.9	-43.9	167.5	173.1	0.70	0.21	-4.26
4,474.0	9.60	102.70	4,459.7	-47.9	182.0	188.2	1.03	0.54	-5.38
4,566.0	8.00	103.40	4,550.6	-51.0	195.7	202.2	1.74	-1.74	0.76
4,660.0	8.80	102.50	4,643.6	-54.1	209.1	215.9	0.86	0.85	-0.96
4,753.0	8.00	102.20	4,735.6	-57.0	222.4	229.5	0.86	-0.86	-0.32
4,847.0	8.30	104.80	4,828.6	-60.1	235.3	242.8	0.51	0.32	2.77
4,941.0	8.80	108.40	4,921.6	-64.1	248.7	256.8	0.78	0.53	3.83
5,035.0	7.70	104.00	5,014.6	-67.9	261.7	270.2	1.35	-1.17	-4.68
5,128.0	5.70	113.50	5,107.0	-71.3	271.9	281.0	2.45	-2.15	10.22
5,222.0	4.10	111.50	5,200.6	-74.4	279.3	289.0	1.71	-1.70	-2.13
5,316.0	2.50	115.70	5,294.5	-76.5	284.3	294.4	1.72	-1.70	4.47
5,407.0	0.40	120.40	5,385.4	-77.5	286.4	296.7	2.31	-2.31	5.16
5,502.0	0.60	237.40	5,480.4	-78.0	286.3	296.6	0.90	0.21	123.16
5,595.0	0.60	221.90	5,573.4	-78.6	285.5	296.1	0.17	0.00	-16.67
5,689.0	0.60	224.90	5,667.4	-79.3	284.8	295.7	0.03	0.00	3.19
5,783.0	0.60	61.40	5,761.4	-79.4	284.9	295.8	1.26	0.00	-173.94
5,876.0	0.50	255.90	5,854.4	-79.3	285.0	295.8	1.17	-0.11	-177.96
5,970.0	0.60	278.60	5,948.4	-79.3	284.1	294.9	0.25	0.11	24.15
6,064.0	0.90	317.20	6,042.4	-78.7	283.1	293.8	0.61	0.32	41.06
6,158.0	1.10	352.30	6,136.4	-77.2	282.5	292.8	0.67	0.21	37.34
6,252.0	1.30	27.20	6,230.4	-75.4	282.8	292.7	0.79	0.21	37.13
6,345.0	1.60	68.30	6,323.3	-74.0	284.5	293.9	1.14	0.32	44.19
6,439.0	1.70	103.20	6,417.3	-73.8	287.1	296.3	1.06	0.11	37.13
6,533.0	1.60	147.80	6,511.3	-75.2	289.2	298.7	1.34	-0.11	47.45
6,626.0	1.70	235.30	6,604.3	-77.1	288.7	298.8	2.45	0.11	94.09
6,720.0	1.30	252.30	6,698.2	-78.2	286.5	297.0	0.63	-0.43	18.09
6,813.0	1.30	247.40	6,791.2	-79.0	284.6	295.3	0.12	0.00	-5.27
6,907.0	1.10	242.30	6,885.2	-79.8	282.8	293.8	0.24	-0.21	-5.43
7,001.0	1.00	230.30	6,979.2	-80.7	281.4	292.7	0.26	-0.11	-12.77
7,057.0	1.00	230.30	7,035.2	-81.4	280.6	292.2	0.00	0.00	0.00

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

**ENSIGN**

**United States Drilling Inc.**

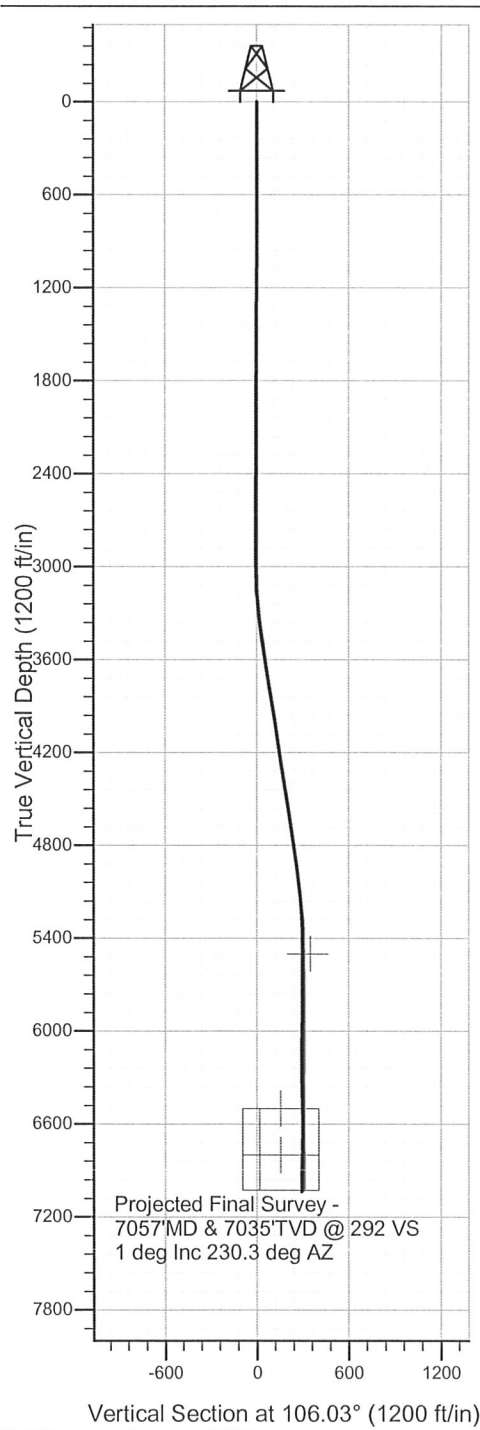
Well Name: Leonard C 21-16

Surface Location: Pad-Leonard C 21-16

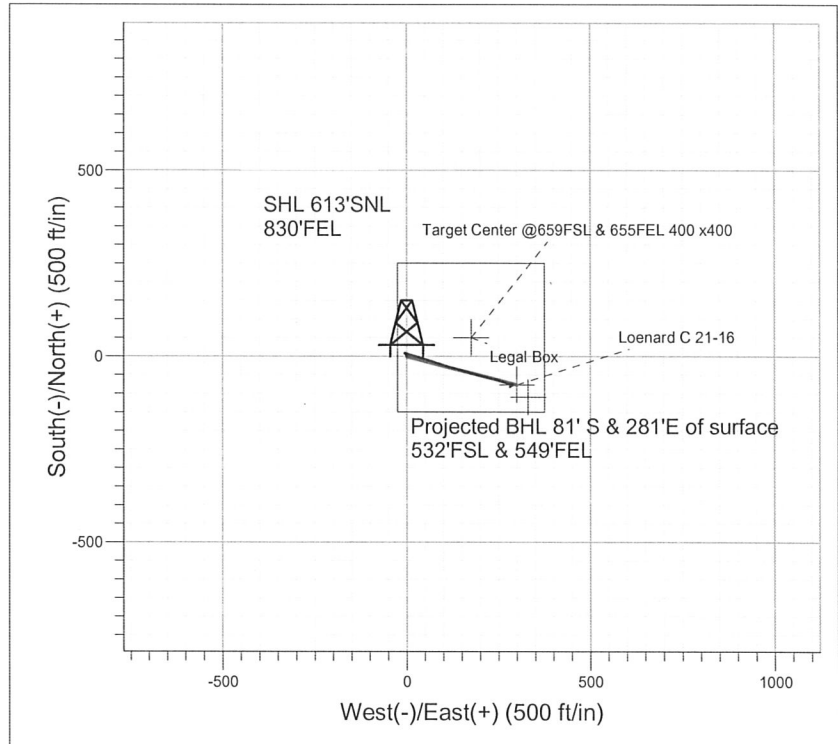
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone

Ground Elevation: 4705.5

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1350769.26	3265170.02	40° 17' 32.496 N	104° 32' 57.804 W	
Original Well Elev				WELL @ 4721.5ft (Original Well Elev)		



## NOBLE ENERGY INC WELD COUNTY CO



## Final Survey Plot

Project: SEC.21-T4N-R64W  
Site: Pad-Leonard C 21-16  
Well: Leonard C 21-16  
Plan: Wellbore #1 survey