

# Noble Energy

Weld County, CO (NAD 83)

Sec. 10-T8N-R61W

Sievers LE10-78HN

## Pilot Hole

Plan: Pilot Hole - Rev 0 Proposal

# Sperry Drilling Services

## Proposal Report

23 April, 2013

Well Coordinates: 1,494,180.66 N, 3,360,627.97 E (40° 40' 57.58" N, 104° 11' 58.87" W)

Ground Level: 4,946.00 ft

Local Coordinate Origin:

Centered on Well Sievers LE10-78HN

Viewing Datum:

KB=16' @ 4962.00ft (Precision 829)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

**HALLIBURTON**

## Plan Report for Sievers LE10-78HN - Pilot Hole - Rev 0 Proposal

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)	Toolface Azimuth (°)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
100.00	0.00	0.00	100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
200.00	0.00	0.00	200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
300.00	0.00	0.00	300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
400.00	0.00	0.00	400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
500.00	0.00	0.00	500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
600.00	0.00	0.00	600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
700.00	0.00	0.00	700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
800.00	0.00	0.00	800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
900.00	0.00	0.00	900.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,000.00	0.00	0.00	1,000.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,100.00	0.00	0.00	1,100.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,200.00	0.00	0.00	1,200.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,300.00	0.00	0.00	1,300.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,400.00	0.00	0.00	1,400.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,500.00	0.00	0.00	1,500.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,600.00	0.00	0.00	1,600.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,700.00	0.00	0.00	1,700.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
1,800.00	0.00	0.00	1,800.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Begin 2.5°/100ft Nudge to 12.0° Inclination at 1800.00ft										
1,900.00	2.50	52.84	1,899.97	1.32	1.74	2.18	2.50	2.50	0.00	52.84
2,000.00	5.00	52.84	1,999.75	5.27	6.95	8.72	2.50	2.50	0.00	0.00
2,100.00	7.50	52.84	2,099.14	11.84	15.63	19.61	2.50	2.50	0.00	0.00
2,200.00	10.00	52.84	2,197.97	21.03	27.75	34.82	2.50	2.50	0.00	0.00
2,280.00	12.00	52.84	2,276.50	30.25	39.91	50.08	2.50	2.50	0.00	0.00
Begin 1811.55ft Tangent at 2280.00ft										
2,300.00	12.00	52.84	2,296.06	32.76	43.23	54.24	0.00	0.00	0.00	0.00
2,400.00	12.00	52.84	2,393.88	45.32	59.80	75.03	0.00	0.00	0.00	0.00
2,500.00	12.00	52.84	2,491.69	57.88	76.37	95.82	0.00	0.00	0.00	0.00
2,600.00	12.00	52.84	2,589.51	70.44	92.94	116.61	0.00	0.00	0.00	0.00
2,627.09	12.00	52.84	2,616.00	73.84	97.43	122.25	0.00	0.00	0.00	0.00
Pierre										
2,700.00	12.00	52.84	2,687.32	83.00	109.51	137.40	0.00	0.00	0.00	0.00
2,800.00	12.00	52.84	2,785.14	95.55	126.08	158.20	0.00	0.00	0.00	0.00
2,900.00	12.00	52.84	2,882.95	108.11	142.65	178.99	0.00	0.00	0.00	0.00
3,000.00	12.00	52.84	2,980.76	120.67	159.22	199.78	0.00	0.00	0.00	0.00
3,100.00	12.00	52.84	3,078.58	133.23	175.79	220.57	0.00	0.00	0.00	0.00
3,200.00	12.00	52.84	3,176.39	145.79	192.36	241.36	0.00	0.00	0.00	0.00
3,300.00	12.00	52.84	3,274.21	158.34	208.93	262.15	0.00	0.00	0.00	0.00
3,400.00	12.00	52.84	3,372.02	170.90	225.50	282.94	0.00	0.00	0.00	0.00
3,500.00	12.00	52.84	3,469.84	183.46	242.07	303.73	0.00	0.00	0.00	0.00
3,600.00	12.00	52.84	3,567.65	196.02	258.64	324.53	0.00	0.00	0.00	0.00
3,604.44	12.00	52.84	3,572.00	196.58	259.37	325.45	0.00	0.00	0.00	0.00
Parkman										
3,700.00	12.00	52.84	3,665.47	208.58	275.21	345.32	0.00	0.00	0.00	0.00
3,800.00	12.00	52.84	3,763.28	221.14	291.78	366.11	0.00	0.00	0.00	0.00
3,900.00	12.00	52.84	3,861.10	233.69	308.35	386.90	0.00	0.00	0.00	0.00
4,000.00	12.00	52.84	3,958.91	246.25	324.92	407.69	0.00	0.00	0.00	0.00
4,091.55	12.00	52.84	4,048.46	257.75	340.09	426.72	0.00	0.00	0.00	0.00
Begin 2.5°/100ft Drop to Vertical at 4091.55ft										
4,100.00	11.79	52.84	4,056.73	258.80	341.47	428.47	2.50	-2.50	0.00	180.00
4,200.00	9.29	52.84	4,155.04	269.85	356.05	446.75	2.50	-2.50	0.00	180.00
4,300.00	6.79	52.84	4,254.05	278.29	367.19	460.74	2.50	-2.50	0.00	180.00
4,400.00	4.29	52.84	4,353.57	284.12	374.89	470.39	2.50	-2.50	0.00	180.00
4,409.45	4.05	52.84	4,363.00	284.54	375.43	471.08	2.50	-2.50	0.00	-180.00
Sussex										
4,500.00	1.79	52.84	4,453.42	287.33	379.11	475.69	2.50	-2.50	0.00	180.00
4,571.55	0.00	0.00	4,524.96	288.00	380.00	476.81	2.50	-2.50	0.00	-180.00

## Plan Report for Sievers LE10-78HN - Pilot Hole - Rev 0 Proposal

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)	Toolface Azimuth (°)
<b>End of Drop at 4571.55ft</b>										
4,600.00	0.00	0.00	4,553.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
4,700.00	0.00	0.00	4,653.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
4,800.00	0.00	0.00	4,753.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
4,900.00	0.00	0.00	4,853.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
4,936.59	0.00	0.00	4,890.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Shannon</b>										
5,000.00	0.00	0.00	4,953.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,100.00	0.00	0.00	5,053.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,200.00	0.00	0.00	5,153.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,300.00	0.00	0.00	5,253.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,400.00	0.00	0.00	5,353.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,500.00	0.00	0.00	5,453.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,600.00	0.00	0.00	5,553.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,700.00	0.00	0.00	5,653.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,800.00	0.00	0.00	5,753.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
5,816.59	0.00	0.00	5,770.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Teepee Buttes</b>										
5,900.00	0.00	0.00	5,853.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,000.00	0.00	0.00	5,953.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,100.00	0.00	0.00	6,053.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,200.00	0.00	0.00	6,153.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,300.00	0.00	0.00	6,253.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,400.00	0.00	0.00	6,353.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,403.59	0.00	0.00	6,357.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Sharon Springs</b>										
6,436.59	0.00	0.00	6,390.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top Niobrara - Top A Chalk</b>										
6,463.59	0.00	0.00	6,417.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top A Marl</b>										
6,500.00	0.00	0.00	6,453.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,527.59	0.00	0.00	6,481.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top B Chalk</b>										
6,557.59	0.00	0.00	6,511.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top B Marl</b>										
6,570.59	0.00	0.00	6,524.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top C Chalk</b>										
6,600.00	0.00	0.00	6,553.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,626.59	0.00	0.00	6,580.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top C Marl</b>										
6,678.59	0.00	0.00	6,632.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Top Ft. Hayes</b>										
6,700.00	0.00	0.00	6,653.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,700.59	0.00	0.00	6,654.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Codell</b>										
6,709.59	0.00	0.00	6,663.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Carlile</b>										
6,800.00	0.00	0.00	6,753.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
6,900.00	0.00	0.00	6,853.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,000.00	0.00	0.00	6,953.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,100.00	0.00	0.00	7,053.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,200.00	0.00	0.00	7,153.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,300.00	0.00	0.00	7,253.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,400.00	0.00	0.00	7,353.41	288.00	380.00	476.81	0.00	0.00	0.00	0.00
7,406.59	0.00	0.00	7,360.00	288.00	380.00	476.81	0.00	0.00	0.00	0.00
<b>Total Depth at 7406.59ft</b>										

## Plan Report for Sievers LE10-78HN - Pilot Hole - Rev 0 Proposal

Plan Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
1,800.00	1,800.00	0.00	0.00	Begin 2.5°/100ft Nudge to 12.0° Inclination at 1800.00ft
2,280.00	2,276.50	30.25	39.91	Begin 1811.55ft Tangent at 2280.00ft
4,091.55	4,048.46	257.75	340.09	Begin 2.5°/100ft Drop to Vertical at 4091.55ft
4,571.55	4,524.96	288.00	380.00	End of Drop at 4571.55ft
7,406.59	7,360.00	288.00	380.00	Total Depth at 7406.59ft

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
TD	No Target (Freehand)	52.84	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
0.00	7,406.59	Pilot Hole - Rev 0 Proposal	MWD

Formation Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Lithology	Dip (°)	Dip Direction (°)
2,627.09	2,616.00	Pierre		0.00	
3,604.44	3,572.00	Parkman		0.00	
4,409.45	4,363.00	Sussex		0.00	
4,936.59	4,890.00	Shannon		0.00	
5,816.59	5,770.00	Teepee Buttes		0.00	
6,403.59	6,357.00	Sharon Springs		0.00	
6,436.59	6,390.00	Top Niobrara		0.00	
6,436.59	6,390.00	Top A Chalk		0.00	
6,463.59	6,417.00	Top A Marl		0.00	
6,527.59	6,481.00	Top B Chalk		0.00	
6,557.59	6,511.00	Top B Marl		0.00	
6,570.59	6,524.00	Top C Chalk		0.00	
6,626.59	6,580.00	Top C Marl		0.00	
6,678.59	6,632.00	Top Ft. Hayes		0.00	
6,700.59	6,654.00	Codell		0.00	
6,709.59	6,663.00	Carlile		0.00	

## North Reference Sheet for Sec. 10-T8N-R61W - Sievers LE10-78HN - Pilot Hole

All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.

Vertical Depths are relative to KB=16' @ 4962.00ft (Precision 829). Northing and Easting are relative to Sievers LE10-78HN

Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980

Projection method is Lambert Conformal Conic (2 parallel)

Central Meridian is -105.50°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99998521

Grid Coordinates of Well: 1,494,180.66 ft N, 3,360,627.97 ft E

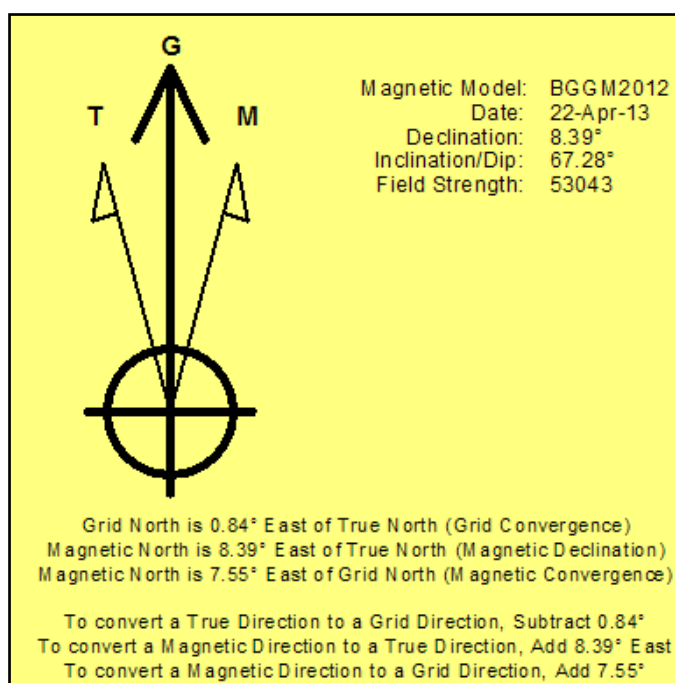
Geographical Coordinates of Well: 40° 40' 57.58" N, 104° 11' 58.87" W

Grid Convergence at Surface is: 0.84°

Based upon Minimum Curvature type calculations, at a Measured Depth of 7,406.59ft

the Bottom Hole Displacement is 476.81ft in the Direction of 52.84° (Grid).

Magnetic Convergence at surface is: -7.55° (22 April 2013, , BGGM2012)



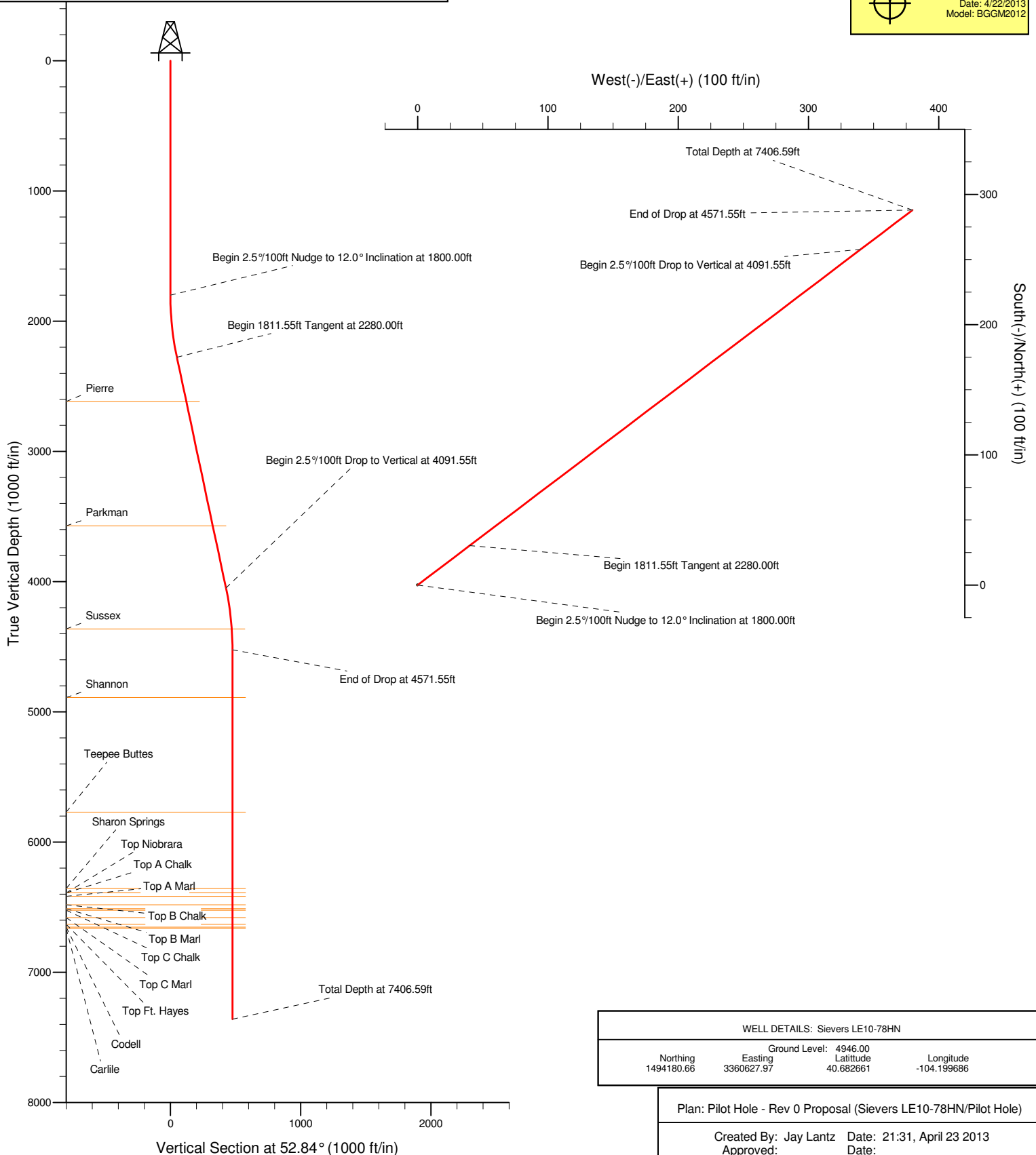
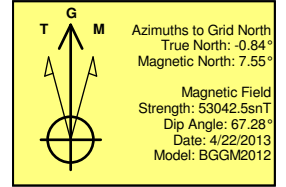
Project: Weld County, CO (NAD 83)  
 Site: Sec. 10-T8N-R61W  
 Well: Sievers LE10-78HN  
 Wellbore: Pilot Hole  
 Plan: Pilot Hole - Rev 0 Proposal

# Noble Energy

**HALLIBURTON**  
 Sperry Drilling

## SECTION DETAILS

Sec	MD	Inc	Azi	TVD	+N/-S	+E/-W	DLeg	TFace	VSec
1	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
2	1800.00	0.00	0.00	1800.00	0.00	0.00	0.00	0.00	0.00
3	2280.00	12.00	52.84	2276.50	30.25	39.91	2.50	52.84	50.08
4	4091.55	12.00	52.84	4048.46	257.75	340.09	0.00	0.00	426.72
5	4571.55	0.00	0.00	4524.96	288.00	380.00	2.50	180.00	476.81
6	7406.59	0.00	0.00	7360.00	288.00	380.00	0.00	0.00	476.81



WELL DETAILS: Sievers LE10-78HN

Northing: 1494180.66  
 Easting: 3360627.97  
 Ground Level: 4946.00  
 Latitude: 40.682661  
 Longitude: -104.199686

Plan: Pilot Hole - Rev 0 Proposal (Sievers LE10-78HN/Pilot Hole)

Created By: Jay Lantz  
 Approved:  
 Date: 21:31, April 23 2013  
 Date: