

Project: Weld County, CO (NAD 83)  
 Site: Sec. 24-T6N-R63W  
 Well: Wells Ranch USX AA23-68-1HN  
 Wellbore: PAR0  
 Design: Vaughn ESS and Sperry MWD Survey

# Noble Energy

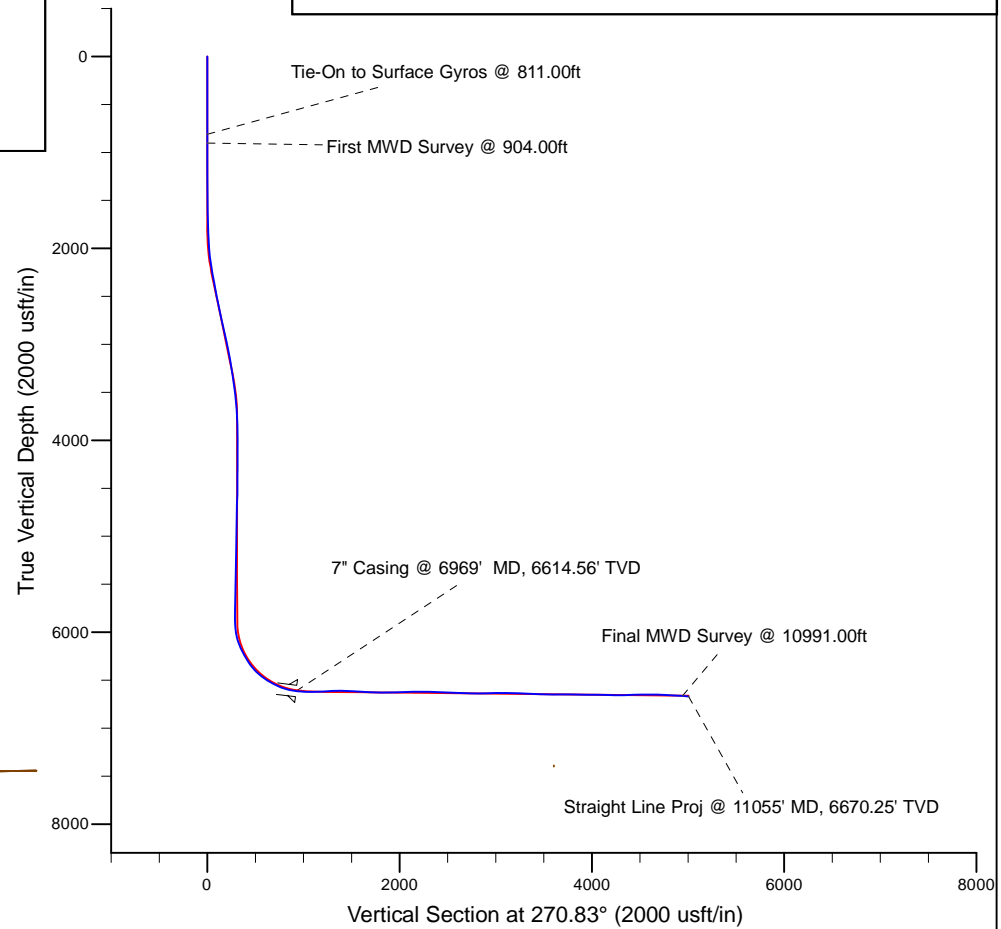
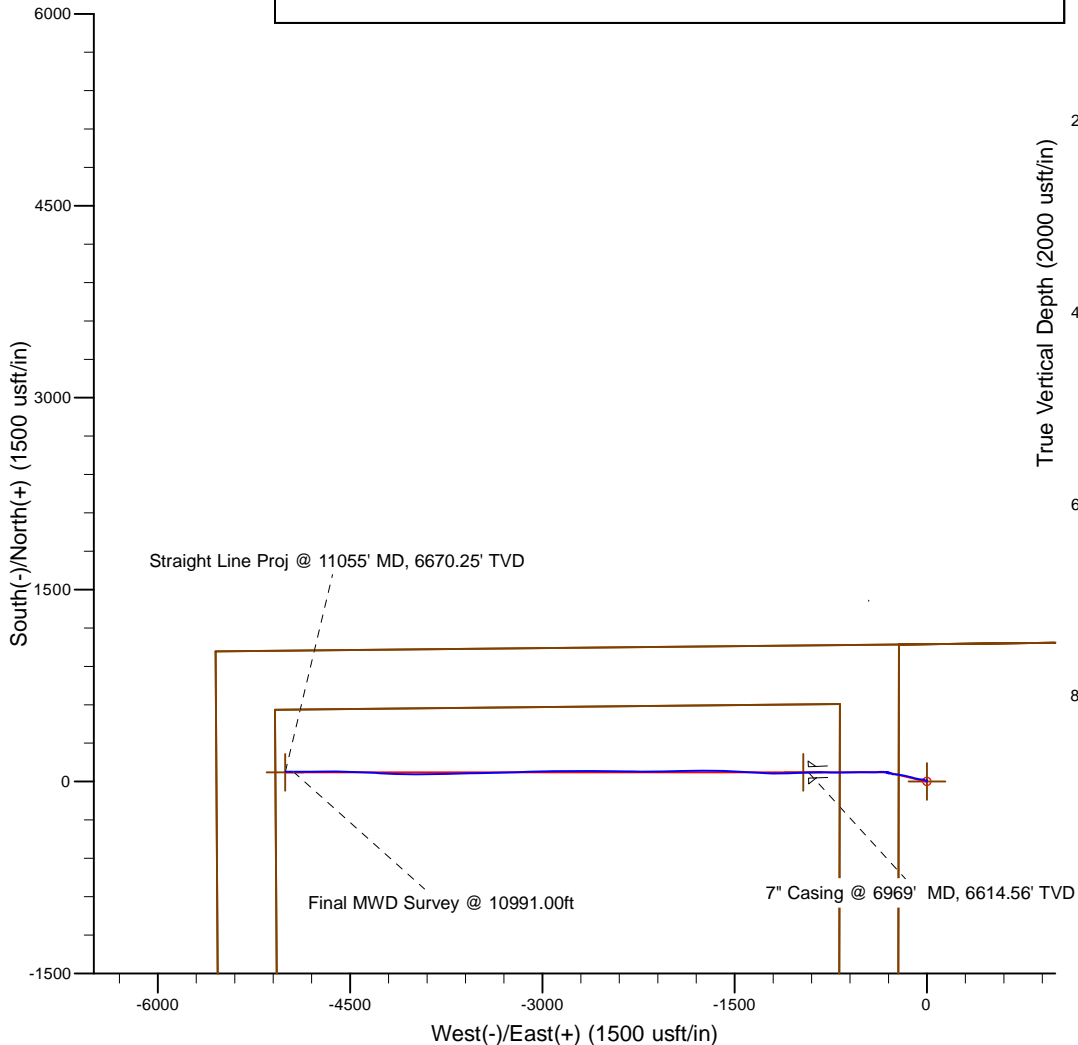


7" Casing: ~992.81' FNL, ~703.63' FEL  
 Lat/Long: 40° 28' 35.648" N, -104° 23' 48.905" E  
 State Planes - CO Northern: 1,418,363.14' N, 3,306,864.82' E  
 Location: Sec. 23-T6N-R63W

BHL: ~945.65' FNL, ~537.35' FWL  
 Lat/Long: 40° 28' 36.197" N, -104° 24' 41.717" E  
 State Planes - CO Northern: 1,418,368.23' N, 3,302,783.31' E  
 Location: Sec. 23-T6N-R63W

**LEGEND**

- + Wells Ranch USX AA23-68-1HN, PAR0, (PAR0) Proposal V0
- + Vaughn ESS and Sperry MWD Survey



WELL DETAILS: Wells Ranch USX AA23-68-1HN	
Ground Level: 4793.00 RKB 24 ft. @ 4817.00usft (H&P 343)	
Design: Vaughn ESS and Sperry MWD Survey (Wells Ranch USX AA23-68-1HN/PAR0)	
Created By: Fred Hartmann	Date: 10/10/2013

# Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R63W

Wells Ranch USX AA23-68-1HN - A2

PAR0

Design: Vaughn ESS and Sperry MWD Survey

## Sperry Drilling Services

### Standard Report

10 October, 2013

Well Coordinates: 1,418,291.23 N, 3,307,788.88 E (40° 28' 34.82" N, 104° 23' 36.96" W)

Ground Level: 4,793.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch USX AA23-68-1HN - Slot A2

Viewing Datum:

RKB 24 ft. @ 4817.00usft (H&P 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

**HALLIBURTON**



Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
663.00	0.00	0.00	663.00	0.00	0.00	0.00	0.00
811.00	0.79	344.28	811.00	0.98	-0.28	0.29	0.53
<b>Tie-On to Surface Gyros @ 811.00ft</b>							
904.00	0.82	341.70	903.99	2.23	-0.66	0.69	0.05
<b>First MWD Survey @ 904.00ft</b>							
996.00	1.40	356.55	995.97	3.98	-0.93	0.99	0.70
1,089.00	0.80	11.49	1,088.95	5.75	-0.87	0.96	0.71
1,182.00	1.20	9.29	1,181.94	7.35	-0.59	0.69	0.43
1,274.00	1.20	19.07	1,273.92	9.21	-0.12	0.25	0.22
1,368.00	1.14	238.11	1,367.91	9.64	-0.59	0.73	2.35
1,461.00	1.33	244.77	1,460.89	8.69	-2.35	2.48	0.26
1,556.00	1.46	277.58	1,555.86	8.38	-4.55	4.67	0.84
1,841.00	1.23	256.42	1,840.78	8.14	-11.12	11.24	0.19
1,935.00	3.68	306.51	1,934.70	9.70	-14.53	14.67	3.23
2,030.00	5.78	292.84	2,029.37	13.37	-21.39	21.58	2.49
2,125.00	7.82	270.41	2,123.72	15.28	-32.26	32.48	3.49
2,220.00	9.23	279.36	2,217.67	16.56	-46.24	46.48	2.03
2,315.00	11.53	281.01	2,311.11	19.62	-63.08	63.36	2.44
2,410.00	9.74	279.42	2,404.47	22.74	-80.33	80.65	1.91
2,505.00	11.13	285.38	2,497.90	26.49	-97.10	97.47	1.85
2,600.00	12.35	288.52	2,590.91	32.15	-115.57	116.03	1.45
2,695.00	12.29	283.47	2,683.73	37.73	-135.04	135.58	1.14
2,791.00	12.93	281.22	2,777.41	42.20	-155.51	156.11	0.84
2,885.00	11.87	279.24	2,869.22	45.80	-175.37	176.02	1.21
2,980.00	12.78	280.16	2,962.03	49.22	-195.36	196.05	0.98
3,075.00	12.25	280.24	3,054.77	52.87	-215.62	216.36	0.56
3,170.00	10.63	276.86	3,147.88	55.71	-234.24	235.02	1.84
3,265.00	9.03	272.66	3,241.48	57.10	-250.38	251.19	1.84
3,360.00	8.65	278.12	3,335.36	58.46	-264.90	265.73	0.97
3,455.00	7.88	290.97	3,429.38	61.80	-278.06	278.93	2.10
3,550.00	7.04	288.54	3,523.57	65.98	-289.66	290.59	0.94
3,644.00	5.96	290.90	3,616.97	69.55	-299.68	300.66	1.18
3,739.00	4.05	293.96	3,711.60	72.67	-307.35	308.38	2.03
3,834.00	1.33	304.71	3,806.49	74.66	-311.33	312.38	2.90
3,929.00	0.53	292.36	3,901.47	75.46	-312.64	313.71	0.86
4,024.00	0.71	282.56	3,996.47	75.75	-313.62	314.69	0.22
4,120.00	0.27	179.83	4,092.47	75.66	-314.20	315.27	0.85
4,214.00	0.74	111.15	4,186.46	75.22	-313.63	314.70	0.73
4,309.00	2.25	179.23	4,281.43	73.13	-313.04	314.07	2.20
4,404.00	1.88	156.72	4,376.37	69.83	-312.40	313.38	0.93
4,499.00	1.39	217.31	4,471.34	67.49	-312.48	313.43	1.79
4,594.00	2.21	69.21	4,566.32	67.22	-311.46	312.41	3.65
4,690.00	2.47	94.96	4,662.24	67.70	-307.67	308.63	1.12
4,785.00	2.54	117.42	4,757.15	66.55	-303.76	304.70	1.03
4,880.00	0.03	346.38	4,852.12	65.61	-301.90	302.82	2.69
4,975.00	0.37	123.71	4,947.12	65.46	-301.65	302.57	0.41
5,070.00	0.27	117.51	5,042.12	65.19	-301.20	302.12	0.11
5,165.00	0.73	142.51	5,137.12	64.60	-300.63	301.54	0.52
5,260.00	1.21	120.65	5,232.10	63.61	-299.40	300.29	0.63

**Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,355.00	1.07	57.12	5,327.09	63.58	-297.79	298.69	1.27
5,450.00	1.71	79.28	5,422.06	64.33	-295.66	296.56	0.87
5,545.00	2.30	81.82	5,517.00	64.86	-292.38	293.29	0.63
5,640.00	1.09	18.29	5,611.97	65.99	-290.20	291.13	2.17
5,735.00	0.50	99.94	5,706.96	66.78	-289.51	290.45	1.19
5,810.00	0.47	85.27	5,781.96	66.75	-288.88	289.82	0.17
5,921.00	0.82	325.06	5,892.95	67.43	-288.89	289.84	1.02
6,016.00	7.81	283.53	5,987.63	69.50	-295.56	296.54	7.60
6,111.00	16.11	278.66	6,080.49	73.01	-314.90	315.93	8.79
6,159.00	20.40	274.06	6,126.07	74.60	-329.84	330.89	9.42
6,206.00	24.66	271.50	6,169.47	75.44	-347.82	348.88	9.30
6,254.00	28.14	268.64	6,212.46	75.43	-369.15	370.21	7.72
6,301.00	28.88	268.41	6,253.76	74.85	-391.58	392.62	1.59
6,396.00	35.42	270.51	6,334.15	74.46	-442.09	443.13	6.98
6,491.00	44.09	270.31	6,407.12	74.89	-502.79	503.82	9.13
6,586.00	53.93	268.40	6,469.36	73.99	-574.40	575.41	10.47
6,634.00	57.53	267.20	6,496.38	72.46	-614.02	615.01	7.78
6,681.00	60.20	269.15	6,520.68	71.19	-654.23	655.19	6.70
6,729.00	62.20	270.03	6,543.80	70.89	-696.29	697.24	4.47
6,776.00	65.90	271.15	6,564.37	71.33	-738.54	739.50	8.16
6,824.00	70.39	271.04	6,582.23	72.18	-783.07	784.04	9.36
6,871.00	75.02	271.20	6,596.20	73.06	-827.92	828.90	9.86
6,924.00	79.79	268.87	6,607.76	73.08	-879.63	880.60	9.97
6,969.00	82.82	268.13	6,614.56	71.92	-924.09	925.04	6.92
<b>7" Casing @ 6969' MD, 6614.56' TVD</b>							
7,028.00	86.79	267.17	6,619.90	69.50	-982.79	983.69	6.92
7,095.00	88.61	267.06	6,622.59	66.14	-1,049.64	1,050.49	2.72
7,155.00	89.78	268.19	6,623.43	63.65	-1,109.58	1,110.39	2.71
7,250.00	94.48	271.69	6,619.90	63.55	-1,204.48	1,205.27	6.17
7,344.00	93.02	273.58	6,613.75	67.86	-1,298.17	1,299.02	2.54
7,439.00	89.51	273.33	6,611.66	73.58	-1,392.96	1,393.88	3.70
7,534.00	86.33	273.15	6,615.10	78.95	-1,487.73	1,488.72	3.35
7,629.00	86.02	271.43	6,621.44	82.73	-1,582.44	1,583.48	1.84
7,724.00	88.52	270.52	6,625.97	84.35	-1,677.31	1,678.36	2.80
7,819.00	88.83	270.28	6,628.16	85.01	-1,772.28	1,773.33	0.41
7,914.00	90.52	268.71	6,628.70	84.17	-1,867.27	1,868.30	2.43
8,009.00	91.73	268.81	6,626.84	82.12	-1,962.23	1,963.22	1.28
8,103.00	91.57	268.86	6,624.13	80.21	-2,056.17	2,057.12	0.18
8,198.00	89.44	269.86	6,623.29	79.15	-2,151.15	2,152.08	2.48
8,293.00	91.33	270.07	6,622.65	79.09	-2,246.15	2,247.06	2.00
8,387.00	88.92	271.16	6,622.45	80.10	-2,340.13	2,341.05	2.81
8,482.00	86.86	270.63	6,625.95	81.58	-2,435.05	2,435.98	2.24
8,577.00	86.36	270.42	6,631.56	82.45	-2,529.88	2,530.81	0.57
8,672.00	88.46	270.02	6,635.86	82.81	-2,624.78	2,625.71	2.25
8,767.00	89.38	269.88	6,637.65	82.73	-2,719.76	2,720.68	0.98
8,862.00	90.03	269.79	6,638.14	82.46	-2,814.76	2,815.66	0.69
8,957.00	90.89	270.08	6,637.37	82.35	-2,909.75	2,910.65	0.96
9,052.00	90.99	268.33	6,635.82	81.03	-3,004.73	3,005.59	1.84
9,147.00	89.26	267.83	6,635.61	77.85	-3,099.67	3,100.48	1.90
9,242.00	90.25	267.97	6,636.02	74.37	-3,194.61	3,195.35	1.05
9,337.00	86.85	268.35	6,638.42	71.32	-3,289.51	3,290.20	3.60

**Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,432.00	86.76	268.63	6,643.71	68.82	-3,384.33	3,384.97	0.31
9,527.00	88.58	269.35	6,647.58	67.15	-3,479.23	3,479.84	2.06
9,622.00	90.25	268.81	6,648.55	65.62	-3,574.21	3,574.79	1.85
9,717.00	90.00	269.02	6,648.34	63.82	-3,669.20	3,669.74	0.34
9,812.00	89.17	266.45	6,649.03	60.07	-3,764.11	3,764.59	2.84
9,906.00	88.86	268.26	6,650.64	55.73	-3,857.99	3,858.39	1.95
10,001.00	89.38	271.57	6,652.10	55.59	-3,952.97	3,953.36	3.53
10,096.00	89.01	271.79	6,653.44	58.38	-4,047.92	4,048.34	0.45
10,191.00	88.74	271.37	6,655.30	60.99	-4,142.86	4,143.31	0.53
10,286.00	89.38	272.59	6,656.86	64.28	-4,237.79	4,238.28	1.45
10,381.00	91.20	274.00	6,656.38	69.74	-4,332.63	4,333.18	2.42
10,476.00	92.53	271.68	6,653.29	74.44	-4,427.45	4,428.06	2.81
10,571.00	90.56	271.95	6,650.73	77.45	-4,522.36	4,523.01	2.09
10,666.00	89.85	270.47	6,650.39	79.45	-4,617.34	4,618.01	1.73
10,761.00	87.69	269.12	6,652.43	79.12	-4,712.31	4,712.96	2.68
10,856.00	86.67	269.46	6,657.10	77.94	-4,807.18	4,807.81	1.13
10,950.00	86.02	269.93	6,663.09	77.44	-4,900.99	4,901.60	0.85
10,991.00	86.11	269.72	6,665.91	77.31	-4,941.89	4,942.50	0.56
<b>Final MWD Survey @ 10991.00ft</b>							
11,055.00	86.11	269.72	6,670.25	77.00	-5,005.75	5,006.34	0.00
<b>Straight Line Proj @ 11055' MD, 6670.25' TVD</b>							

**Design Annotations**

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
811.00	811.00	0.98	-0.28	Tie-On to Surface Gyros @ 811.00ft
904.00	903.99	2.23	-0.66	First MWD Survey @ 904.00ft
10,991.00	6,665.91	77.31	-4,941.89	Final MWD Survey @ 10991.00ft
11,055.00	6,670.25	77.00	-5,005.75	Straight Line Proj @ 11055' MD, 6670.25' TVD

**Vertical Section Information**

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Wells Ranch USX AA23-68-1HN (PAR0) BHL	270.83	Slot	0.00	0.00	0.00

**Survey tool program**

From (usft)	To (usft)	Survey/Plan	Survey Tool
663.00	811.00	Vaughn ESS Surveys	Flexi-Shot
904.00	6,924.00	MWD Surveys - Vert/Build	MWD
7,028.00	10,991.00	MWD Surveys - Lateral	MWD

**Casing Details**

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,969.00	6,614.56	7" Casing @ 6969' MD, 6614.56' TVD	7	8-3/4



Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey

Wellbore Targets

Table with columns: Target Name, Dip Angle, Dip Dir., TVD (usft), +N/-S (usft), +E/-W (usft), Northing (usft), Easting (usft), Latitude, Longitude. Rows include target details for Wells Ranch USX AA2 and (S24/23)T6NR63W(SE) and (S24/23)T6NR63W(SL).

Directional Difficulty Index

Summary table for Directional Difficulty Index with columns: Metric (Average Dogleg over Survey, Net Tortosity applicable to Plans, Maximum Dogleg over Survey, Directional Difficulty Index) and Value.

Audit Info

**North Reference Sheet for Sec. 24-T6N-R63W - Wells Ranch USX AA23-68-1HN - PAR0**

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

Vertical Depths are relative to RKB 24 ft. @ 4817.00usft (H&P 343). Northing and Easting are relative to Wells Ranch USX AA23-68-1HN - Slot A2

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° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996458

Grid Coordinates of Well: 1,418,291.23 usft N, 3,307,788.88 usft E

Geographical Coordinates of Well: 40° 28' 34.82" N, 104° 23' 36.96" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,055.00usft the Bottom Hole Displacement is 5,006.34usft in the Direction of 270.88° (Grid).

Magnetic Convergence at surface is: -7.71° ( 4 June 2013, , BGGM2013)

Magnetic Model: BGGM2013  
 Date: 04-Jun-13  
 Declination: 8.43°  
 Inclination/Dip: 67.09°  
 Field Strength: 52937

Grid North is 0.71° East of True North (Grid Convergence)  
 Magnetic North is 8.43° East of True North (Magnetic Declination)  
 Magnetic North is 7.71° East of Grid North (Magnetic Convergence)

To convert a True Direction to a Grid Direction, Subtract 0.71°  
 To convert a Magnetic Direction to a True Direction, Add 8.43° East  
 To convert a Magnetic Direction to a Grid Direction, Add 7.71°

# Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R63W

Wells Ranch USX AA23-68-1HN - A2

PAR0

Design: Vaughn ESS and Sperry MWD Survey

## Sperry Drilling Services

### Geodetic Report

10 October, 2013

Well Coordinates: 1,418,291.23 N, 3,307,788.88 E (40° 28' 34.82" N, 104° 23' 36.96" W)

Ground Level: 4,793.00 usft

Local Coordinate Origin:

Centered on Well Wells Ranch USX AA23-68-1HN - Slot A2

Viewing Datum:

RKB 24 ft. @ 4817.00usft (H&P 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

**HALLIBURTON**





Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey

Measured			Vertical	Local Coordinates		Geographic Coordinates		UTM Coordinates	
Depth (usft)	Inclination (°)	Azimuth (°)	Depth (usft)	+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
0.00	0.00	0.00	0.00	0.00	0.00	40° 28' 34.824 N	104° 23' 36.960 W	1,418,291.23	3,307,788.88
663.00	0.00	0.00	663.00	0.00	0.00	40° 28' 34.824 N	104° 23' 36.960 W	1,418,291.23	3,307,788.88
811.00	0.79	344.28	811.00	0.98	-0.28	40° 28' 34.834 N	104° 23' 36.963 W	1,418,292.21	3,307,788.60
904.00	0.82	341.70	903.99	2.23	-0.66	40° 28' 34.846 N	104° 23' 36.968 W	1,418,293.46	3,307,788.22
996.00	1.40	356.55	995.97	3.98	-0.93	40° 28' 34.863 N	104° 23' 36.971 W	1,418,295.21	3,307,787.95
1,089.00	0.80	11.49	1,088.95	5.75	-0.87	40° 28' 34.881 N	104° 23' 36.970 W	1,418,296.98	3,307,788.01
1,182.00	1.20	9.29	1,181.94	7.35	-0.59	40° 28' 34.897 N	104° 23' 36.966 W	1,418,298.58	3,307,788.29
1,274.00	1.20	19.07	1,273.92	9.21	-0.12	40° 28' 34.915 N	104° 23' 36.960 W	1,418,300.44	3,307,788.76
1,368.00	1.14	238.11	1,367.91	9.64	-0.59	40° 28' 34.919 N	104° 23' 36.966 W	1,418,300.87	3,307,788.29
1,461.00	1.33	244.77	1,460.89	8.69	-2.35	40° 28' 34.910 N	104° 23' 36.989 W	1,418,299.92	3,307,786.53
1,556.00	1.46	277.58	1,555.86	8.38	-4.55	40° 28' 34.907 N	104° 23' 37.017 W	1,418,299.61	3,307,784.33
1,841.00	1.23	256.42	1,840.78	8.14	-11.12	40° 28' 34.906 N	104° 23' 37.103 W	1,418,299.38	3,307,777.76
1,935.00	3.68	306.51	1,934.70	9.70	-14.53	40° 28' 34.922 N	104° 23' 37.146 W	1,418,300.93	3,307,774.35
2,030.00	5.78	292.84	2,029.37	13.37	-21.39	40° 28' 34.959 N	104° 23' 37.235 W	1,418,304.60	3,307,767.50
2,125.00	7.82	270.41	2,123.72	15.28	-32.26	40° 28' 34.979 N	104° 23' 37.375 W	1,418,306.51	3,307,756.62
2,220.00	9.23	279.36	2,217.67	16.56	-46.24	40° 28' 34.993 N	104° 23' 37.556 W	1,418,307.79	3,307,742.64
2,315.00	11.53	281.01	2,311.11	19.62	-63.08	40° 28' 35.026 N	104° 23' 37.773 W	1,418,310.85	3,307,725.80
2,410.00	9.74	279.42	2,404.47	22.74	-80.33	40° 28' 35.059 N	104° 23' 37.996 W	1,418,313.97	3,307,708.55
2,505.00	11.13	285.38	2,497.90	26.49	-97.10	40° 28' 35.098 N	104° 23' 38.212 W	1,418,317.72	3,307,691.78
2,600.00	12.35	288.52	2,590.91	32.15	-115.57	40° 28' 35.156 N	104° 23' 38.450 W	1,418,323.38	3,307,673.31
2,695.00	12.29	283.47	2,683.73	37.73	-135.04	40° 28' 35.213 N	104° 23' 38.701 W	1,418,328.96	3,307,653.84
2,791.00	12.93	281.22	2,777.41	42.20	-155.51	40° 28' 35.260 N	104° 23' 38.965 W	1,418,333.43	3,307,633.37
2,885.00	11.87	279.24	2,869.22	45.80	-175.37	40° 28' 35.298 N	104° 23' 39.222 W	1,418,337.03	3,307,613.52
2,980.00	12.78	280.16	2,962.03	49.22	-195.36	40° 28' 35.334 N	104° 23' 39.480 W	1,418,340.45	3,307,593.53
3,075.00	12.25	280.24	3,054.77	52.87	-215.62	40° 28' 35.373 N	104° 23' 39.741 W	1,418,344.10	3,307,573.27
3,170.00	10.63	276.86	3,147.88	55.71	-234.24	40° 28' 35.403 N	104° 23' 39.982 W	1,418,346.94	3,307,554.65
3,265.00	9.03	272.66	3,241.48	57.10	-250.38	40° 28' 35.419 N	104° 23' 40.190 W	1,418,348.33	3,307,538.50
3,360.00	8.65	278.12	3,335.36	58.46	-264.90	40° 28' 35.434 N	104° 23' 40.378 W	1,418,349.68	3,307,523.98
3,455.00	7.88	290.97	3,429.38	61.80	-278.06	40° 28' 35.469 N	104° 23' 40.548 W	1,418,353.02	3,307,510.83
3,550.00	7.04	288.54	3,523.57	65.98	-289.66	40° 28' 35.512 N	104° 23' 40.697 W	1,418,357.21	3,307,499.23
3,644.00	5.96	290.90	3,616.97	69.55	-299.68	40° 28' 35.548 N	104° 23' 40.826 W	1,418,360.78	3,307,489.21
3,739.00	4.05	293.96	3,711.60	72.67	-307.35	40° 28' 35.580 N	104° 23' 40.925 W	1,418,363.90	3,307,481.54
3,834.00	1.33	304.71	3,806.49	74.66	-311.33	40° 28' 35.600 N	104° 23' 40.976 W	1,418,365.89	3,307,477.56
3,929.00	0.53	292.36	3,901.47	75.46	-312.64	40° 28' 35.608 N	104° 23' 40.993 W	1,418,366.69	3,307,476.25
4,024.00	0.71	282.56	3,996.47	75.75	-313.62	40° 28' 35.611 N	104° 23' 41.006 W	1,418,366.98	3,307,475.27
4,120.00	0.27	179.83	4,092.47	75.66	-314.20	40° 28' 35.610 N	104° 23' 41.013 W	1,418,366.88	3,307,474.69
4,214.00	0.74	111.15	4,186.46	75.22	-313.63	40° 28' 35.606 N	104° 23' 41.006 W	1,418,366.44	3,307,475.26
4,309.00	2.25	179.23	4,281.43	73.13	-313.04	40° 28' 35.585 N	104° 23' 40.999 W	1,418,364.36	3,307,475.85
4,404.00	1.88	156.72	4,376.37	69.83	-312.40	40° 28' 35.552 N	104° 23' 40.991 W	1,418,361.06	3,307,476.50
4,499.00	1.39	217.31	4,471.34	67.49	-312.48	40° 28' 35.529 N	104° 23' 40.992 W	1,418,358.71	3,307,476.41
4,594.00	2.21	69.21	4,566.32	67.22	-311.46	40° 28' 35.527 N	104° 23' 40.979 W	1,418,358.45	3,307,477.43
4,690.00	2.47	94.96	4,662.24	67.70	-307.67	40° 28' 35.531 N	104° 23' 40.930 W	1,418,358.93	3,307,481.22

**Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey**

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
4,785.00	2.54	117.42	4,757.15	66.55	-303.76	40° 28' 35.519 N	104° 23' 40.880 W	1,418,357.78	3,307,485.13
4,880.00	0.03	346.38	4,852.12	65.61	-301.90	40° 28' 35.509 N	104° 23' 40.856 W	1,418,356.83	3,307,486.99
4,975.00	0.37	123.71	4,947.12	65.46	-301.65	40° 28' 35.508 N	104° 23' 40.852 W	1,418,356.69	3,307,487.24
5,070.00	0.27	117.51	5,042.12	65.19	-301.20	40° 28' 35.505 N	104° 23' 40.847 W	1,418,356.41	3,307,487.69
5,165.00	0.73	142.51	5,137.12	64.60	-300.63	40° 28' 35.499 N	104° 23' 40.839 W	1,418,355.83	3,307,488.26
5,260.00	1.21	120.65	5,232.10	63.61	-299.40	40° 28' 35.489 N	104° 23' 40.824 W	1,418,354.84	3,307,489.49
5,355.00	1.07	57.12	5,327.09	63.58	-297.79	40° 28' 35.489 N	104° 23' 40.803 W	1,418,354.81	3,307,491.10
5,450.00	1.71	79.28	5,422.06	64.33	-295.66	40° 28' 35.496 N	104° 23' 40.775 W	1,418,355.55	3,307,493.24
5,545.00	2.30	81.82	5,517.00	64.86	-292.38	40° 28' 35.501 N	104° 23' 40.733 W	1,418,356.09	3,307,496.51
5,640.00	1.09	18.29	5,611.97	65.99	-290.20	40° 28' 35.512 N	104° 23' 40.704 W	1,418,357.22	3,307,498.69
5,735.00	0.50	99.94	5,706.96	66.78	-289.51	40° 28' 35.519 N	104° 23' 40.695 W	1,418,358.01	3,307,499.38
5,810.00	0.47	85.27	5,781.96	66.75	-288.88	40° 28' 35.519 N	104° 23' 40.687 W	1,418,357.97	3,307,500.01
5,921.00	0.82	325.06	5,892.95	67.43	-288.89	40° 28' 35.526 N	104° 23' 40.687 W	1,418,358.66	3,307,500.01
6,016.00	7.81	283.53	5,987.63	69.50	-295.56	40° 28' 35.547 N	104° 23' 40.773 W	1,418,360.73	3,307,493.33
6,111.00	16.11	278.66	6,080.49	73.01	-314.90	40° 28' 35.584 N	104° 23' 41.023 W	1,418,364.23	3,307,473.99
6,159.00	20.40	274.06	6,126.07	74.60	-329.84	40° 28' 35.602 N	104° 23' 41.216 W	1,418,365.83	3,307,459.06
6,206.00	24.66	271.50	6,169.47	75.44	-347.82	40° 28' 35.612 N	104° 23' 41.448 W	1,418,366.67	3,307,441.08
6,254.00	28.14	268.64	6,212.46	75.43	-369.15	40° 28' 35.615 N	104° 23' 41.724 W	1,418,366.66	3,307,419.74
6,301.00	28.88	268.41	6,253.76	74.85	-391.58	40° 28' 35.612 N	104° 23' 42.015 W	1,418,366.08	3,307,397.32
6,396.00	35.42	270.51	6,334.15	74.46	-442.09	40° 28' 35.614 N	104° 23' 42.668 W	1,418,365.69	3,307,346.80
6,491.00	44.09	270.31	6,407.12	74.89	-502.79	40° 28' 35.626 N	104° 23' 43.453 W	1,418,366.11	3,307,286.11
6,586.00	53.93	268.40	6,469.36	73.99	-574.40	40° 28' 35.626 N	104° 23' 44.380 W	1,418,365.22	3,307,214.51
6,634.00	57.53	267.20	6,496.38	72.46	-614.02	40° 28' 35.616 N	104° 23' 44.893 W	1,418,363.69	3,307,174.88
6,681.00	60.20	269.15	6,520.68	71.19	-654.23	40° 28' 35.608 N	104° 23' 45.414 W	1,418,362.42	3,307,134.68
6,729.00	62.20	270.03	6,543.80	70.89	-696.29	40° 28' 35.610 N	104° 23' 45.958 W	1,418,362.12	3,307,092.62
6,776.00	65.90	271.15	6,564.37	71.33	-738.54	40° 28' 35.620 N	104° 23' 46.504 W	1,418,362.56	3,307,050.37
6,824.00	70.39	271.04	6,582.23	72.18	-783.07	40° 28' 35.634 N	104° 23' 47.080 W	1,418,363.41	3,307,005.84
6,871.00	75.02	271.20	6,596.20	73.06	-827.92	40° 28' 35.648 N	104° 23' 47.661 W	1,418,364.29	3,306,960.99
6,924.00	79.79	268.87	6,607.76	73.08	-879.63	40° 28' 35.654 N	104° 23' 48.330 W	1,418,364.31	3,306,909.28
6,969.00	82.82	268.13	6,614.56	71.92	-924.09	40° 28' 35.648 N	104° 23' 48.905 W	1,418,363.14	3,306,864.82
7,028.00	86.79	267.17	6,619.90	69.50	-982.79	40° 28' 35.632 N	104° 23' 49.665 W	1,418,360.73	3,306,806.13
7,095.00	88.61	267.06	6,622.59	66.14	-1,049.64	40° 28' 35.607 N	104° 23' 50.531 W	1,418,357.36	3,306,739.27
7,155.00	89.78	268.19	6,623.43	63.65	-1,109.58	40° 28' 35.589 N	104° 23' 51.307 W	1,418,354.88	3,306,679.34
7,250.00	94.48	271.69	6,619.90	63.55	-1,204.48	40° 28' 35.600 N	104° 23' 52.535 W	1,418,354.77	3,306,584.45
7,344.00	93.02	273.58	6,613.75	67.86	-1,298.17	40° 28' 35.654 N	104° 23' 53.746 W	1,418,359.09	3,306,490.76
7,439.00	89.51	273.33	6,611.66	73.58	-1,392.96	40° 28' 35.722 N	104° 23' 54.972 W	1,418,364.81	3,306,395.97
7,534.00	86.33	273.15	6,615.10	78.95	-1,487.73	40° 28' 35.787 N	104° 23' 56.197 W	1,418,370.17	3,306,301.20
7,629.00	86.02	271.43	6,621.44	82.73	-1,582.44	40° 28' 35.836 N	104° 23' 57.422 W	1,418,373.96	3,306,206.49
7,724.00	88.52	270.52	6,625.97	84.35	-1,677.31	40° 28' 35.864 N	104° 23' 58.649 W	1,418,375.58	3,306,111.63
7,819.00	88.83	270.28	6,628.16	85.01	-1,772.28	40° 28' 35.882 N	104° 23' 59.878 W	1,418,376.24	3,306,016.66
7,914.00	90.52	268.71	6,628.70	84.17	-1,867.27	40° 28' 35.885 N	104° 24' 1.107 W	1,418,375.40	3,305,921.67
8,009.00	91.73	268.81	6,626.84	82.12	-1,962.23	40° 28' 35.877 N	104° 24' 2.336 W	1,418,373.35	3,305,826.72



Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	Local Coordinates		Geographic Coordinates		UTM Coordinates	
				+N/-S (usft)	+E/-W (usft)	Latitude (usft)	Longitude (usft)	Northing (usft)	Easting (usft)
8,103.00	91.57	268.86	6,624.13	80.21	-2,056.17	40° 28' 35.869 N	104° 24' 3.552 W	1,418,371.44	3,305,732.78
8,198.00	89.44	269.86	6,623.29	79.15	-2,151.15	40° 28' 35.870 N	104° 24' 4.781 W	1,418,370.37	3,305,637.80
8,293.00	91.33	270.07	6,622.65	79.09	-2,246.15	40° 28' 35.881 N	104° 24' 6.010 W	1,418,370.32	3,305,542.81
8,387.00	88.92	271.16	6,622.45	80.10	-2,340.13	40° 28' 35.903 N	104° 24' 7.226 W	1,418,371.33	3,305,448.83
8,482.00	86.86	270.63	6,625.95	81.58	-2,435.05	40° 28' 35.929 N	104° 24' 8.454 W	1,418,372.81	3,305,353.91
8,577.00	86.36	270.42	6,631.56	82.45	-2,529.88	40° 28' 35.949 N	104° 24' 9.681 W	1,418,373.68	3,305,259.09
8,672.00	88.46	270.02	6,635.86	82.81	-2,624.78	40° 28' 35.964 N	104° 24' 10.909 W	1,418,374.04	3,305,164.19
8,767.00	89.38	269.88	6,637.65	82.73	-2,719.76	40° 28' 35.975 N	104° 24' 12.138 W	1,418,373.96	3,305,069.22
8,862.00	90.03	269.79	6,638.14	82.46	-2,814.76	40° 28' 35.984 N	104° 24' 13.367 W	1,418,373.69	3,304,974.22
8,957.00	90.89	270.08	6,637.37	82.35	-2,909.75	40° 28' 35.995 N	104° 24' 14.596 W	1,418,373.58	3,304,879.23
9,052.00	90.99	268.33	6,635.82	81.03	-3,004.73	40° 28' 35.993 N	104° 24' 15.825 W	1,418,372.26	3,304,784.26
9,147.00	89.26	267.83	6,635.61	77.85	-3,099.67	40° 28' 35.973 N	104° 24' 17.054 W	1,418,369.08	3,304,689.32
9,242.00	90.25	267.97	6,636.02	74.37	-3,194.61	40° 28' 35.951 N	104° 24' 18.283 W	1,418,365.60	3,304,594.39
9,337.00	86.85	268.35	6,638.42	71.32	-3,289.51	40° 28' 35.932 N	104° 24' 19.512 W	1,418,362.55	3,304,499.48
9,432.00	86.76	268.63	6,643.71	68.82	-3,384.33	40° 28' 35.919 N	104° 24' 20.739 W	1,418,360.05	3,304,404.67
9,527.00	88.58	269.35	6,647.58	67.15	-3,479.23	40° 28' 35.914 N	104° 24' 21.967 W	1,418,358.38	3,304,309.77
9,622.00	90.25	268.81	6,648.55	65.62	-3,574.21	40° 28' 35.910 N	104° 24' 23.196 W	1,418,356.85	3,304,214.79
9,717.00	90.00	269.02	6,648.34	63.82	-3,669.20	40° 28' 35.904 N	104° 24' 24.426 W	1,418,355.05	3,304,119.81
9,812.00	89.17	266.45	6,649.03	60.07	-3,764.11	40° 28' 35.879 N	104° 24' 25.654 W	1,418,351.30	3,304,024.90
9,906.00	88.86	268.26	6,650.64	55.73	-3,857.99	40° 28' 35.847 N	104° 24' 26.870 W	1,418,346.96	3,303,931.02
10,001.00	89.38	271.57	6,652.10	55.59	-3,952.97	40° 28' 35.857 N	104° 24' 28.099 W	1,418,346.82	3,303,836.05
10,096.00	89.01	271.79	6,653.44	58.38	-4,047.92	40° 28' 35.897 N	104° 24' 29.327 W	1,418,349.60	3,303,741.11
10,191.00	88.74	271.37	6,655.30	60.99	-4,142.86	40° 28' 35.934 N	104° 24' 30.555 W	1,418,352.22	3,303,646.16
10,286.00	89.38	272.59	6,656.86	64.28	-4,237.79	40° 28' 35.978 N	104° 24' 31.783 W	1,418,355.50	3,303,551.24
10,381.00	91.20	274.00	6,656.38	69.74	-4,332.63	40° 28' 36.043 N	104° 24' 33.009 W	1,418,360.96	3,303,456.41
10,476.00	92.53	271.68	6,653.29	74.44	-4,427.45	40° 28' 36.101 N	104° 24' 34.235 W	1,418,365.67	3,303,361.59
10,571.00	90.56	271.95	6,650.73	77.45	-4,522.36	40° 28' 36.143 N	104° 24' 35.463 W	1,418,368.68	3,303,266.68
10,666.00	89.85	270.47	6,650.39	79.45	-4,617.34	40° 28' 36.174 N	104° 24' 36.691 W	1,418,370.68	3,303,171.71
10,761.00	87.69	269.12	6,652.43	79.12	-4,712.31	40° 28' 36.182 N	104° 24' 37.920 W	1,418,370.34	3,303,076.74
10,856.00	86.67	269.46	6,657.10	77.94	-4,807.18	40° 28' 36.182 N	104° 24' 39.148 W	1,418,369.17	3,302,981.87
10,950.00	86.02	269.93	6,663.09	77.44	-4,900.99	40° 28' 36.189 N	104° 24' 40.362 W	1,418,368.67	3,302,888.06
10,991.00	86.11	269.72	6,665.91	77.31	-4,941.89	40° 28' 36.192 N	104° 24' 40.891 W	1,418,368.54	3,302,847.16
11,055.00	86.11	269.72	6,670.25	77.00	-5,005.75	40° 28' 36.197 N	104° 24' 41.717 W	1,418,368.23	3,302,783.31

## Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey

### Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
811.00	811.00	0.98	-0.28	Tie-On to Surface Gyros @ 811.00ft
904.00	903.99	2.23	-0.66	First MWD Survey @ 904.00ft
10,991.00	6,665.91	77.31	-4,941.89	Final MWD Survey @ 10991.00ft
11,055.00	6,670.25	77.00	-5,005.75	Straight Line Proj @ 11055' MD, 6670.25' TVD

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	Wells Ranch USX AA23-68-1HN (PAR0) BHL	270.83	Slot	0.00	0.00	0.00

### Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
663.00	811.00	Vaughn ESS Surveys	Flexi-Shot
904.00	6,924.00	MWD Surveys - Vert/Build	MWD
7,028.00	10,991.00	MWD Surveys - Lateral	MWD

### Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
6,969.00	6,614.56	7" Casing @ 6969' MD, 6614.56' TVD	7	8-3/4

**Design Report for Wells Ranch USX AA23-68-1HN - Vaughn ESS and Sperry MWD Survey**

***Design Targets***

Shape	Target Name	TVD (usft)	Northing (usft)	Easting (usft)	+N/-S usft	+E/-W usft	Created	Updated
Point	Wells Ranch USX AA23-68	0.00	1,418,291.23	3,307,788.88	0.00	0.00	6/4/2013	6/4/2013
Polygon	(S24/23)T6NR63W(SB)	0.00	1,414,955.93	3,307,655.19	-3,335.42	-133.69	6/4/2013	6/4/2013
Polygon	(S24/23)T6NR63W(SL)	0.00	1,414,955.93	3,307,655.19	-3,335.42	-133.69	6/4/2013	6/4/2013
Point	Wells Ranch USX AA23-68	6,609.93	1,418,364.08	3,306,824.21	72.85	-964.70	6/4/2013	6/5/2013
Point	Wells Ranch USX AA23-68	6,662.43	1,418,364.08	3,302,782.85	72.85	-5,006.21	6/4/2013	6/4/2013

**Directional Difficulty Index**

Average Dogleg over Survey:	2.09 °/100usft	Maximum Dogleg over Survey:	10.47 °/100usft at 6,586.00 usft
Net Tortosity applicable to Plans:	1.07 °/100usft	Directional Difficulty Index:	6.291

**Audit Info**

## North Reference Sheet for Sec. 24-T6N-R63W - Wells Ranch USX AA23-68-1HN - PARO

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

Vertical Depths are relative to RKB 24 ft. @ 4817.00usft (H&P 343). Northing and Easting are relative to Wells Ranch USX AA23-68-1HN - Slot A2

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° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99996458

Grid Coordinates of Well: 1,418,291.23 usft N, 3,307,788.88 usft E

Geographical Coordinates of Well: 40° 28' 34.82" N, 104° 23' 36.96" W

Grid Convergence at Surface is: 0.71°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,055.00usft

the Bottom Hole Displacement is 5,006.34usft in the Direction of 270.88° (Grid).

Magnetic Convergence at surface is: -7.71° ( 4 June 2013, , BGGM2013)

