

Noble Energy

Weld County, CO (McCaffrey State Pad)

Sec. 1-T9N-R58W (McCaffrey State Pad)

McCaffrey State LD12-75-1BHN

05-123-39654

Original Wellbore

Design: Original Wellbore

Sperry Drilling Services

Final Survey Report

01 December, 2014

Surface UWI : 05-123-39654

Well Coordinates: 1,529,235.77 N, 3,467,984.82 E (40° 46' 26.03" N, 103° 48' 36.95" W)

Ground Level: 4,632.00 usft

Local Coordinate Origin:

Centered on Well McCaffrey State LD12-75-1BHN

Viewing Datum:

KB=24' @ 4656.00usft (H&P 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

HALLIBURTON

Project: Weld County, CO (McCaffrey State Pad)
Site: Sec. 1-T9N-R58W (McCaffrey State Pad)
Well: McCaffrey State LD12-75-1BHN
Wellbore: Original Wellbore
Design: Original Wellbore

Noble Energy



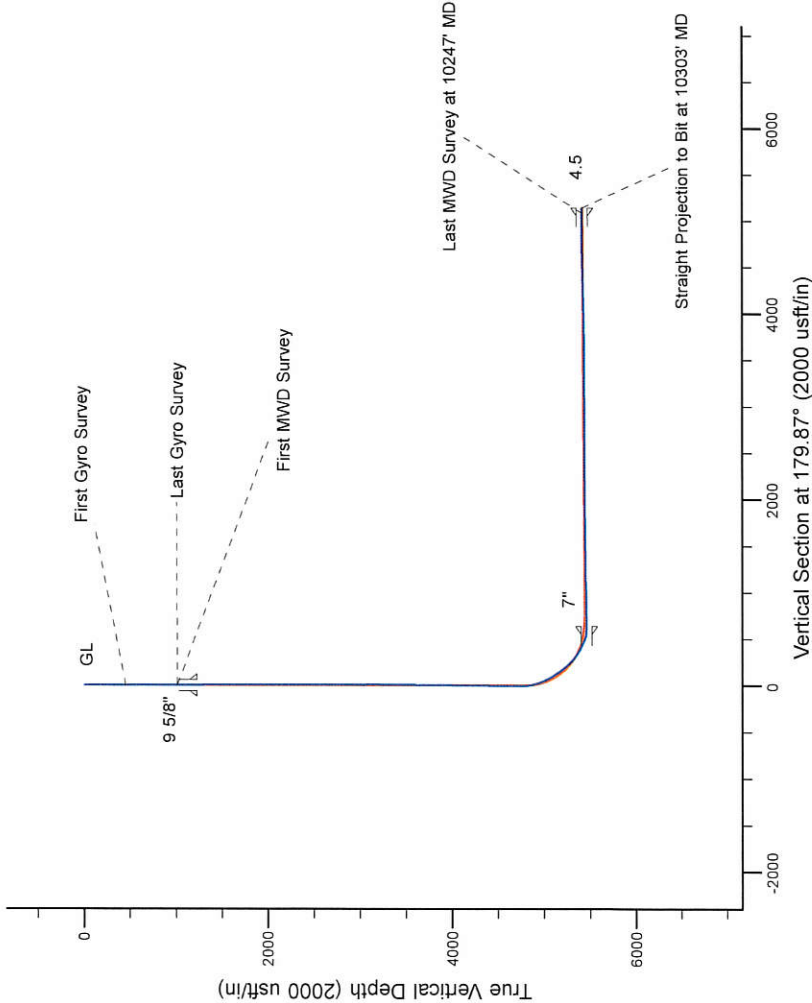
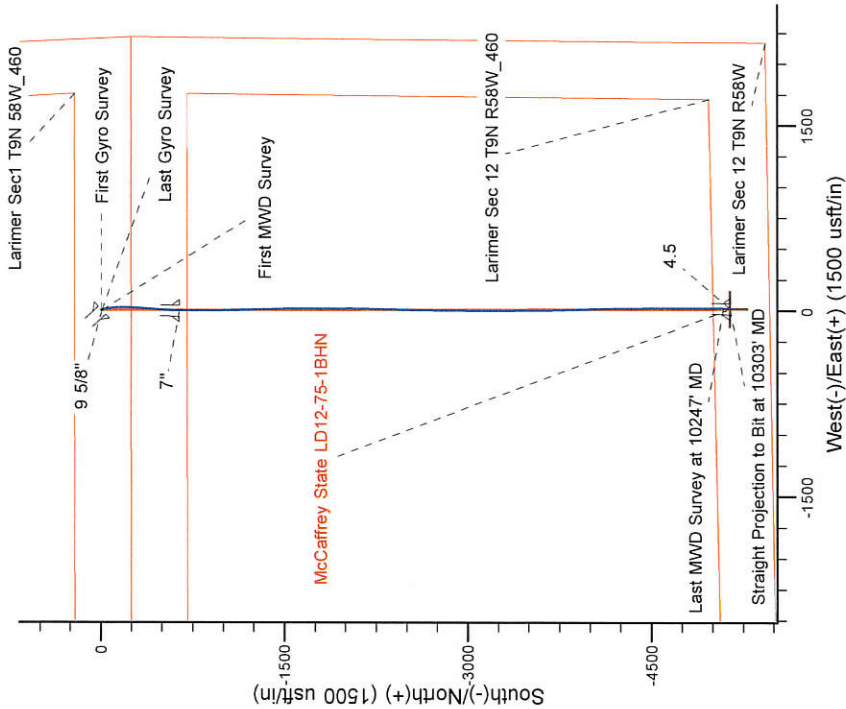
Platted SHL: 250' FSL, 2275' FEL
Platted Lat/Long: 40.77390 N, 103.81053 W
Location: Sec. 1-T9N-R58W

~7" Casing: 397' FNL, 2200' FEL
Lat/Long: 40.772151 N, 103.810320 W
State Planes - CO Northern: 1528598.93 N, 3467981.64 E
Location: Sec. 12-T9N-R58W

Platted BHL: 330' FSL, 2613' FEL
Lat/Long: 40.759788 N, 103.810575 W
State Planes - CO Northern: 1524094.33 N, 3467996.90 E
Location: Sec. 12-T9N-R58W

LEGEND

- McCaffrey State LD12-75-1BHN, Original Wellbore, Rev B0 V0
- Original Wellbore



WELL DETAILS: McCaffrey State LD12-75-1BHN

Ground Level: 4632.00
KB=24' @ 4655.00usft (H&P 343)

Created By: Amanda Marchand
Created On: 12/01/2014

Design Report for McCaffrey State LD12-75-1BHN - Original Wellbore

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
455.00	0.40	254.10	455.00	-0.44	-1.53	0.43	0.09
First Gyro Survey							
734.00	0.70	173.70	733.99	-2.40	-2.28	2.39	0.27
1,012.00	0.60	122.10	1,011.97	-4.86	-0.86	4.86	0.21
Last Gyro Survey - First MWD Survey							
1,292.00	0.33	144.07	1,291.96	-6.29	0.86	6.29	0.11
1,385.00	0.36	138.33	1,384.96	-6.72	1.21	6.73	0.05
1,477.00	0.31	128.51	1,476.96	-7.10	1.60	7.10	0.08
1,571.00	0.09	143.26	1,570.96	-7.31	1.84	7.32	0.24
1,664.00	0.19	135.60	1,663.96	-7.48	1.99	7.49	0.11
1,756.00	0.19	101.49	1,755.96	-7.62	2.25	7.63	0.12
1,848.00	0.19	62.27	1,847.96	-7.58	2.53	7.59	0.14
1,941.00	0.21	24.05	1,940.96	-7.35	2.74	7.36	0.14
2,033.00	0.22	33.60	2,032.96	-7.05	2.90	7.06	0.04
2,126.00	0.22	96.13	2,125.95	-6.92	3.18	6.93	0.25
2,219.00	0.51	70.98	2,218.95	-6.81	3.75	6.82	0.35
2,311.00	0.26	32.31	2,310.95	-6.50	4.25	6.51	0.38
2,403.00	0.32	356.49	2,402.95	-6.06	4.34	6.07	0.20
2,499.00	0.36	358.19	2,498.95	-5.49	4.32	5.50	0.04
2,594.00	0.26	48.97	2,593.95	-5.05	4.47	5.07	0.30
2,689.00	0.31	174.56	2,688.95	-5.17	4.66	5.18	0.53
2,784.00	0.32	220.48	2,783.94	-5.63	4.51	5.64	0.26
2,879.00	0.44	218.33	2,878.94	-6.11	4.11	6.12	0.13
2,974.00	1.00	227.01	2,973.93	-6.97	3.28	6.97	0.60
3,069.00	1.21	227.17	3,068.92	-8.21	1.94	8.22	0.22
3,165.00	1.28	221.99	3,164.89	-9.70	0.48	9.70	0.14
3,259.00	0.15	324.79	3,258.89	-10.38	-0.30	10.38	1.41
3,355.00	0.29	332.93	3,354.89	-10.06	-0.48	10.06	0.15
3,450.00	0.25	338.51	3,449.88	-9.65	-0.67	9.65	0.05
3,545.00	0.91	5.47	3,544.88	-8.71	-0.67	8.71	0.73
3,640.00	1.10	347.95	3,639.87	-7.07	-0.79	7.06	0.38
3,735.00	1.11	349.93	3,734.85	-5.27	-1.14	5.27	0.04
3,830.00	1.20	336.76	3,829.83	-3.45	-1.69	3.44	0.29
3,925.00	1.12	338.55	3,924.81	-1.67	-2.43	1.66	0.09
4,020.00	0.77	101.06	4,019.80	-0.93	-2.14	0.92	1.75
4,115.00	0.87	97.18	4,114.79	-1.14	-0.80	1.14	0.12
4,210.00	0.75	56.74	4,209.78	-0.89	0.44	0.89	0.60
4,305.00	0.57	35.72	4,304.78	-0.17	1.24	0.17	0.31
4,400.00	0.50	37.02	4,399.77	0.55	1.76	-0.54	0.07
4,495.00	0.49	42.26	4,494.77	1.18	2.28	-1.17	0.05
4,590.00	0.51	26.94	4,589.77	1.86	2.75	-1.85	0.14
4,685.00	0.50	9.67	4,684.76	2.64	3.01	-2.64	0.16
4,780.00	0.13	40.67	4,779.76	3.13	3.15	-3.13	0.42
4,875.00	13.87	168.56	4,873.84	-8.00	5.49	8.01	14.68
4,971.00	21.36	172.23	4,965.28	-36.64	10.14	36.67	7.88
5,066.00	27.59	172.23	5,051.70	-75.62	15.46	75.66	6.56
5,161.00	34.47	174.99	5,133.06	-124.26	20.79	124.31	7.39
5,256.00	37.69	181.15	5,209.85	-180.11	22.56	180.16	5.10
5,351.00	44.14	183.21	5,281.61	-242.24	20.12	242.29	6.94

Design Report for McCaffrey State LD12-75-1BHN - Original Wellbore

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,447.00	54.03	182.37	5,344.40	-314.61	16.63	314.65	10.32
5,542.00	61.44	184.30	5,395.09	-394.74	11.91	394.77	7.99
5,637.00	67.92	185.88	5,435.70	-480.22	4.26	480.23	6.98
5,754.00	88.18	181.13	5,459.81	-593.85	-2.52	593.85	17.76
5,909.00	92.68	179.32	5,458.65	-748.80	-3.13	748.79	3.13
6,003.00	90.74	179.48	5,455.84	-842.75	-2.15	842.74	2.07
6,096.00	90.80	179.47	5,454.59	-935.74	-1.29	935.73	0.07
6,187.00	91.14	178.39	5,453.05	-1,026.71	0.40	1,026.71	1.24
6,280.00	91.60	178.76	5,450.83	-1,119.65	2.72	1,119.66	0.63
6,373.00	90.59	178.50	5,449.05	-1,212.61	4.94	1,212.62	1.12
6,465.00	90.12	178.52	5,448.48	-1,304.57	7.33	1,304.59	0.51
6,557.00	90.03	177.67	5,448.36	-1,396.52	10.39	1,396.54	0.93
6,650.00	90.46	178.83	5,447.96	-1,489.48	13.23	1,489.50	1.33
6,743.00	90.74	180.19	5,446.99	-1,582.47	14.03	1,582.49	1.49
6,835.00	90.92	179.88	5,445.66	-1,674.46	13.97	1,674.48	0.39
6,930.00	90.96	180.28	5,444.10	-1,769.44	13.84	1,769.47	0.42
7,025.00	90.86	178.91	5,442.59	-1,864.43	14.51	1,864.46	1.45
7,120.00	90.92	178.78	5,441.11	-1,959.40	16.42	1,959.43	0.15
7,216.00	90.49	180.97	5,439.93	-2,055.38	16.63	2,055.42	2.32
7,311.00	90.18	182.40	5,439.38	-2,150.34	13.84	2,150.36	1.54
7,406.00	90.00	181.55	5,439.23	-2,245.28	10.56	2,245.30	0.91
7,501.00	89.91	180.50	5,439.30	-2,340.26	8.87	2,340.28	1.11
7,596.00	89.78	180.59	5,439.56	-2,435.26	7.96	2,435.27	0.17
7,691.00	90.06	181.64	5,439.69	-2,530.24	6.11	2,530.25	1.14
7,786.00	89.75	180.43	5,439.85	-2,625.22	4.40	2,625.22	1.31
7,881.00	89.45	180.57	5,440.51	-2,720.22	3.57	2,720.22	0.35
7,976.00	90.62	180.95	5,440.45	-2,815.21	2.31	2,815.20	1.29
8,071.00	91.05	180.27	5,439.07	-2,910.19	1.30	2,910.18	0.85
8,166.00	91.14	180.49	5,437.25	-3,005.17	0.67	3,005.16	0.25
8,261.00	90.65	180.54	5,435.77	-3,100.15	-0.19	3,100.14	0.52
8,357.00	90.40	179.66	5,434.89	-3,196.15	-0.35	3,196.14	0.95
8,452.00	90.62	179.83	5,434.05	-3,291.14	0.07	3,291.13	0.29
8,547.00	90.00	180.14	5,433.53	-3,386.14	0.09	3,386.13	0.73
8,642.00	89.38	179.98	5,434.05	-3,481.14	-0.01	3,481.13	0.67
8,737.00	88.46	179.22	5,435.84	-3,576.12	0.66	3,576.11	1.26
8,832.00	90.83	176.92	5,436.42	-3,671.05	3.86	3,671.05	3.48
8,927.00	91.39	179.11	5,434.58	-3,765.97	7.15	3,765.98	2.38
9,023.00	91.42	179.08	5,432.23	-3,861.93	8.66	3,861.94	0.04
9,118.00	91.02	178.89	5,430.21	-3,956.89	10.34	3,956.90	0.47
9,213.00	90.46	178.16	5,428.98	-4,051.85	12.79	4,051.87	0.97
9,308.00	90.71	178.23	5,428.01	-4,146.80	15.78	4,146.82	0.27
9,403.00	91.29	178.23	5,426.35	-4,241.74	18.72	4,241.77	0.61
9,498.00	91.02	180.61	5,424.44	-4,336.71	19.68	4,336.74	2.52
9,593.00	91.72	179.37	5,422.17	-4,431.68	19.69	4,431.71	1.50
9,688.00	92.25	179.85	5,418.88	-4,526.62	20.34	4,526.65	0.75
9,783.00	90.40	180.27	5,416.68	-4,621.59	20.24	4,621.62	2.00
9,878.00	90.99	179.99	5,415.53	-4,716.58	20.02	4,716.61	0.69
9,973.00	91.26	179.01	5,413.66	-4,811.56	20.85	4,811.59	1.07
10,067.00	89.60	181.45	5,412.96	-4,905.54	20.48	4,905.58	3.14
10,163.00	89.78	180.78	5,413.47	-5,001.52	18.61	5,001.55	0.72
10,247.00	90.06	181.21	5,413.59	-5,085.51	17.15	5,085.54	0.61

Design Report for McCaffrey State LD12-75-1BHN - Original Wellbore

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
Last MWD Survey at 10247' MD							
10,303.00	90.06	181.21	5,413.53	-5,141.50	15.97	5,141.52	0.00
Straight Projection to Bit at 10303' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
455.00	455.00	-0.44	-1.53	First Gyro Survey
1,012.00	1,011.97	-4.86	-0.86	Last Gyro Survey
1,012.00	1,011.97	-4.86	-0.86	First MWD Survey
10,247.00	5,413.59	-5,085.51	17.15	Last MWD Survey at 10247' MD
10,303.00	5,413.53	-5,141.50	15.97	Straight Projection to Bit at 10303' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/-S (usft)	Origin +E/-W (usft)	Start TVD (usft)
Target	McCaffrey St LD12-75-1BHN_BHL	179.87	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
455.00	1,012.00	Surface Surveys	Flexi-Shot
1,292.00	5,637.00	Intermediate Survey	MWD
5,754.00	10,303.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,229.00	1,228.96	9 5/8"	9-5/8	13-3/4
5,797.00	5,460.71	7"	7	8-3/4
10,303.00	5,413.53	4.5	4-1/2	6-1/8

Wellbore Targets

Target Name	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
McCaffrey St LD12-75-1BHN - hit/miss target	0.00	0.00	5,420.08	-5,141.45	12.08	1,524,094.33	3,467,996.90	40.759788	-103.810575
- actual wellpath misses target center by 7.61usft at 10303.00usft MD (5413.53 TVD, -5141.50 N, 15.97 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.50 °/100usft	Maximum Dogleg over Survey:	17.76 °/100usft at 5,754.00 usft
Net Tortousity applicable to Plans:	0.62 °/100usft	Directional Difficulty Index:	6.180

Design Report for McCaffrey State LD12-75-1BHN - Original Wellbore

Audit Info

North Reference Sheet for Sec. 1-T9N-R58W (McCaffrey State Pad) - McCaffrey State LD12-75-1BHN - Original Wellbore

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

Vertical Depths are relative to KB=24' @ 4656.00usft (H&P 343). Northing and Easting are relative to McCaffrey State LD 12-75-1BHN

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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00usft, False Northing: 1,000,000.00usft, Scale Reduction: 0.99999848

Grid Coordinates of Well: 1,529,235.77 usft N, 3,467,984.82 usft E

Geographical Coordinates of Well: 40° 46' 26.03" N, 103° 48' 36.95" W

Grid Convergence at Surface is: 1.09°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,303.00usft

the Bottom Hole Displacement is 5,141.52usft in the Direction of 179.82° (Grid).

Magnetic Convergence at surface is: -6.92° (7 October 2014, , BGGM2014)

