

# Noble Energy

Weld County, CO (McCaffrey State Pad)

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

McCaffrey State LD12-74-1AHN

05-123-39672

Original Wellbore

Design: Original Wellbore

## Sperry Drilling Services

### Final Survey Report

08 December, 2014

Surface UWI : 05-123-39672

Well Coordinates: 1,529,236.50 N, 3,468,023.59 E (40° 46' 26.03" N, 103° 48' 36.45" W)

Ground Level: 4,633.00 usft

Local Coordinate Origin:

Centered on Well McCaffrey State LD12-74-1AHN

Viewing Datum:

KB = 24' @ 4657.00usft (HP 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 LD12-74-1AHN  
Wellbore: Original Wellbore  
Design: Original Wellbore

# Noble Energy



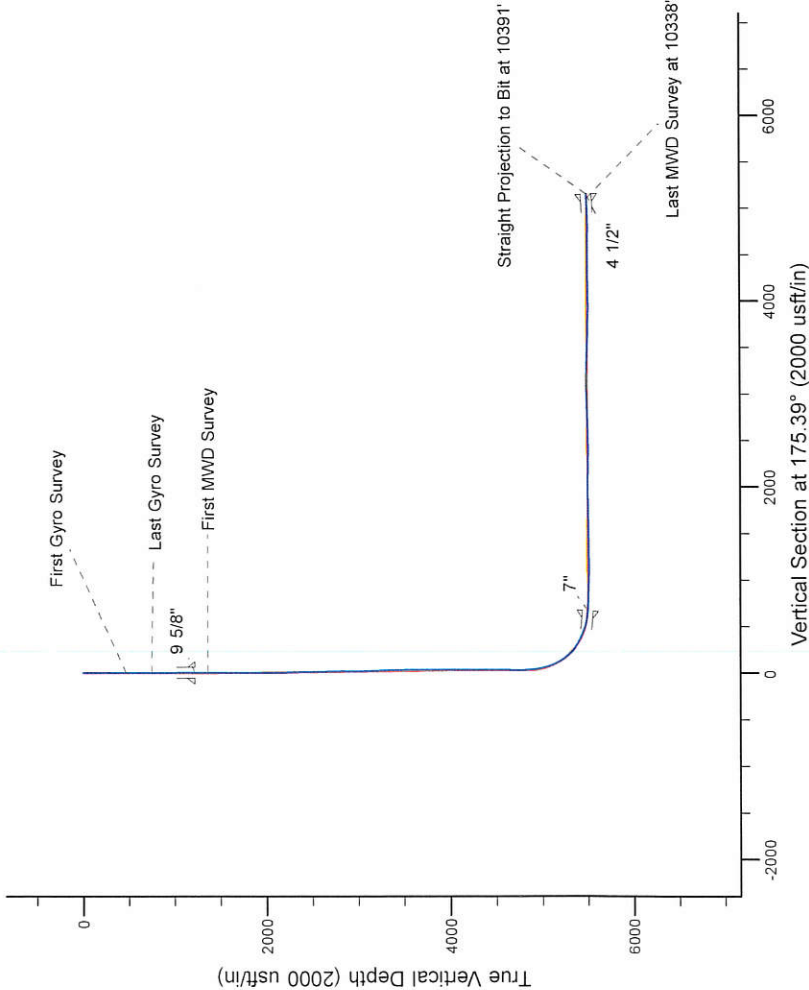
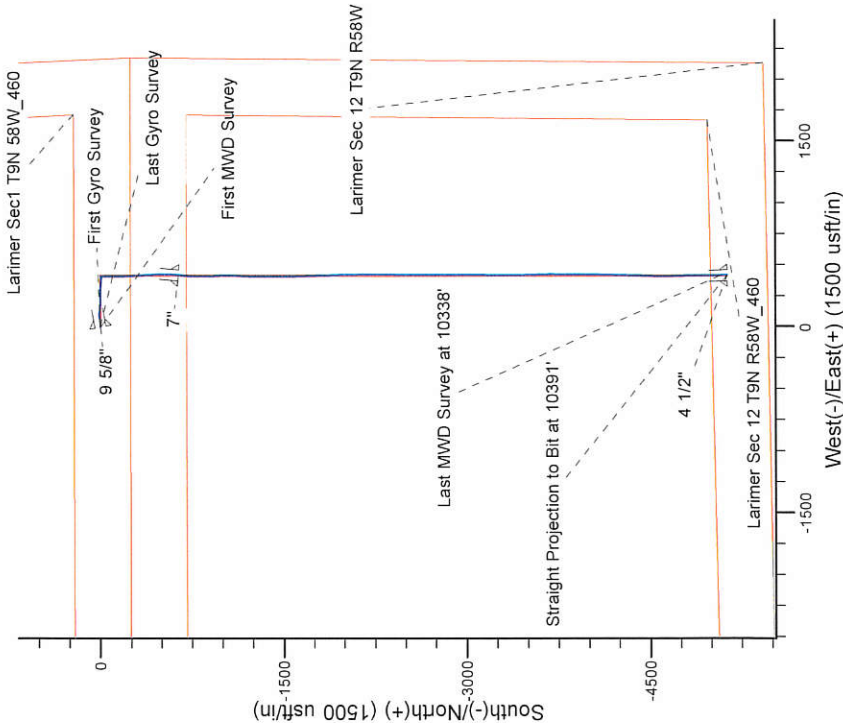
Platted SHL: 250' FSL, 2201' FEL  
Platted Lat/Long: 40.77398 N, 103.810125 W  
Location: Sec. 1-T9N-R58W

~7" Casing: 388' FNL, 1762' FEL  
Lat/Long: 40.772130 N, 103.808679 W  
State Planes - CO Northern: 1528600.22 N, 3468436.19 E  
Location: Sec. 12-T9N-R58W

Platted BHL: 330' FSL, 2163' FEL  
Lat/Long: 40.759788 N, 103.808985 W  
State Planes - CO Northern: 1524102.72 N, 3468437.30 E  
Location: Sec. 12-T9N-R58W

## LEGEND

- McCaffrey State LD12-74-1AHN, Original Wellbore, Rev B0 V0
- Original Wellbore



WELL DETAILS: McCaffrey State LD12-74-1AHN

Ground Level: 4633.00  
KB = 24' @ 4657.00usft (HP 343)

Created By: Amanda Marchand  
Created On: 12/08/2014

## Design Report for McCaffrey State LD12-74-1AHN - 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
471.00	0.20	344.50	471.00	0.79	-0.22	-0.81	0.04
First Gyro Survey							
749.00	0.50	212.90	749.00	0.24	-1.01	-0.32	0.23
Last Gyro Survey							
1,027.00	0.50	212.90	1,026.99	-1.80	-2.33	1.60	0.00
1,360.00	0.54	288.02	1,359.97	-2.53	-4.61	2.15	0.19
First MWD Survey							
1,452.00	2.70	74.58	1,451.95	-1.82	-2.93	1.58	3.44
1,547.00	4.43	86.06	1,546.76	-0.97	2.89	1.20	1.96
1,642.00	7.47	86.90	1,641.24	-0.39	12.72	1.41	3.20
1,738.00	11.42	85.92	1,735.92	0.63	28.43	1.66	4.12
1,833.00	10.15	78.64	1,829.24	2.95	46.02	0.76	1.96
1,928.00	12.39	89.59	1,922.41	4.67	64.43	0.52	3.25
2,023.00	12.25	85.59	2,015.23	5.52	84.67	1.30	0.91
2,118.00	11.42	83.95	2,108.21	7.28	104.07	1.10	0.94
2,213.00	12.32	102.46	2,201.21	6.09	123.32	3.84	4.10
2,308.00	12.15	95.97	2,294.06	2.86	143.16	8.65	1.46
2,403.00	11.73	94.63	2,387.00	1.04	162.73	12.03	0.53
2,498.00	11.55	93.62	2,480.05	-0.34	181.85	14.95	0.29
2,594.00	11.39	90.42	2,574.13	-1.02	200.92	17.15	0.68
2,689.00	11.03	89.98	2,667.32	-1.08	219.39	18.70	0.39
2,784.00	10.66	88.61	2,760.62	-0.87	237.26	19.92	0.47
2,879.00	9.41	85.40	2,854.17	-0.03	253.79	20.41	1.44
2,974.00	8.73	82.00	2,947.98	1.60	268.67	19.99	0.91
3,069.00	10.73	98.15	3,041.62	1.35	284.57	21.52	3.54
3,164.00	10.97	96.26	3,134.93	-0.89	302.31	25.17	0.45
3,259.00	11.25	94.46	3,228.15	-2.60	320.53	28.34	0.47
3,354.00	10.43	94.15	3,321.45	-3.94	338.35	31.11	0.87
3,449.00	10.12	93.55	3,414.93	-5.08	355.25	33.60	0.35
3,545.00	7.67	97.68	3,509.77	-6.46	370.02	36.16	2.64
3,640.00	6.15	101.75	3,604.07	-8.34	381.29	38.94	1.68
3,735.00	2.26	65.07	3,698.81	-8.59	387.97	39.73	4.78
3,830.00	1.65	55.86	3,793.76	-7.03	390.80	38.40	0.72
3,925.00	1.47	52.37	3,888.72	-5.52	392.90	37.06	0.21
4,020.00	1.36	58.64	3,983.69	-4.19	394.83	35.89	0.20
4,115.00	1.03	66.68	4,078.67	-3.27	396.57	35.11	0.39
4,210.00	0.97	86.61	4,173.66	-2.88	398.16	34.85	0.37
4,305.00	0.86	68.94	4,268.65	-2.58	399.63	34.67	0.32
4,400.00	0.49	49.38	4,363.64	-2.06	400.60	34.23	0.45
4,495.00	0.41	12.49	4,458.64	-1.46	400.98	33.66	0.31
4,590.00	0.57	345.07	4,553.63	-0.67	400.94	32.87	0.29
4,685.00	0.47	328.72	4,648.63	0.12	400.61	32.06	0.19
4,780.00	0.37	310.27	4,743.63	0.65	400.18	31.50	0.18
4,875.00	3.09	174.23	4,838.58	-1.70	400.20	33.84	3.54
4,971.00	9.30	173.62	4,933.98	-11.99	401.32	44.19	6.47
5,066.00	12.40	179.27	5,027.27	-29.83	402.31	62.05	3.45
5,114.00	17.30	179.58	5,073.65	-42.12	402.42	74.31	10.21
5,161.00	22.01	180.86	5,117.90	-57.93	402.34	90.06	10.06
5,209.00	25.88	180.36	5,161.76	-77.40	402.14	109.46	8.07



## Design Report for McCaffrey State LD12-74-1AHN - Original Wellbore

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,256.00	30.94	178.46	5,203.09	-99.75	402.40	131.75	10.94
5,351.00	41.21	178.21	5,279.77	-155.59	404.04	187.55	10.81
5,447.00	51.48	178.41	5,345.95	-224.93	406.08	256.82	10.70
5,542.00	62.79	177.92	5,397.42	-304.55	408.65	336.39	11.91
5,637.00	66.51	176.06	5,438.09	-390.27	413.18	422.19	4.30
5,732.00	72.90	176.84	5,471.03	-479.15	418.68	511.23	6.77
5,827.00	82.53	183.83	5,491.24	-571.80	418.03	603.53	12.42
5,844.00	84.48	185.26	5,493.16	-588.64	416.69	620.21	14.19
6,002.00	88.12	182.93	5,503.36	-745.87	405.44	776.03	2.73
6,095.00	89.48	178.63	5,505.31	-838.82	404.18	868.57	4.85
6,187.00	88.24	177.78	5,507.14	-930.75	407.06	960.44	1.63
6,280.00	89.20	178.86	5,509.21	-1,023.68	409.79	1,053.29	1.55
6,372.00	90.59	181.56	5,509.38	-1,115.67	409.45	1,144.96	3.30
6,465.00	89.35	182.27	5,509.43	-1,208.62	406.34	1,237.35	1.54
6,557.00	89.85	180.75	5,510.07	-1,300.58	403.92	1,328.82	1.74
6,650.00	91.48	180.50	5,509.00	-1,393.57	402.90	1,421.43	1.77
6,743.00	91.20	179.97	5,506.82	-1,486.54	402.52	1,514.07	0.64
6,835.00	91.11	179.11	5,504.97	-1,578.52	403.26	1,605.81	0.94
6,930.00	90.18	177.28	5,503.90	-1,673.46	406.25	1,700.68	2.16
7,025.00	91.51	178.98	5,502.50	-1,768.39	409.35	1,795.56	2.27
7,120.00	91.05	177.92	5,500.37	-1,863.33	411.92	1,890.40	1.22
7,215.00	90.68	179.41	5,498.94	-1,958.29	414.13	1,985.23	1.62
7,311.00	89.66	179.39	5,498.65	-2,054.29	415.14	2,080.99	1.06
7,406.00	88.64	178.06	5,500.06	-2,149.25	417.25	2,175.82	1.76
7,501.00	89.11	180.25	5,501.93	-2,244.21	418.65	2,270.59	2.36
7,596.00	87.78	180.21	5,504.51	-2,339.18	418.27	2,365.22	1.40
7,691.00	89.57	180.68	5,506.70	-2,434.14	417.53	2,459.82	1.95
7,786.00	92.59	181.26	5,504.91	-2,529.10	415.93	2,554.34	3.24
7,881.00	92.34	180.12	5,500.83	-2,624.01	414.78	2,648.84	1.23
7,976.00	92.71	179.78	5,496.64	-2,718.91	414.87	2,743.45	0.53
8,071.00	91.32	180.06	5,493.30	-2,813.85	415.00	2,838.09	1.49
8,166.00	92.15	178.91	5,490.42	-2,908.80	415.85	2,932.81	1.49
8,261.00	91.20	180.29	5,487.65	-3,003.76	416.51	3,027.51	1.76
8,356.00	90.06	180.80	5,486.60	-3,098.74	415.61	3,122.11	1.31
8,452.00	89.11	180.89	5,487.30	-3,194.73	414.20	3,217.68	0.99
8,547.00	90.25	180.15	5,487.83	-3,289.72	413.33	3,312.29	1.43
8,642.00	86.86	179.25	5,490.22	-3,384.68	413.83	3,406.98	3.69
8,737.00	86.39	179.01	5,495.82	-3,479.50	415.27	3,501.61	0.56
8,832.00	88.00	178.95	5,500.47	-3,574.37	416.96	3,596.31	1.70
8,927.00	88.46	178.78	5,503.40	-3,669.30	418.84	3,691.09	0.52
9,022.00	88.86	180.23	5,505.62	-3,764.27	419.66	3,785.82	1.58
9,117.00	88.89	179.22	5,507.49	-3,859.25	420.12	3,880.53	1.06
9,213.00	89.85	180.60	5,508.54	-3,955.24	420.27	3,976.22	1.75
9,318.00	90.59	181.53	5,508.14	-4,060.22	418.31	4,080.70	1.13
9,403.00	90.96	181.26	5,506.99	-4,145.19	416.25	4,165.23	0.54
9,593.00	92.10	182.07	5,501.92	-4,335.03	410.73	4,354.02	0.74
9,687.00	89.38	180.64	5,500.70	-4,428.99	408.51	4,447.49	3.27
9,783.00	88.55	181.34	5,502.44	-4,524.96	406.85	4,543.02	1.13
9,878.00	89.08	180.62	5,504.40	-4,619.92	405.22	4,637.54	0.94
9,972.00	90.12	177.21	5,505.06	-4,713.89	407.00	4,731.35	3.79
10,067.00	90.65	178.47	5,504.42	-4,808.82	410.58	4,826.26	1.44

## Design Report for McCaffrey State LD12-74-1AHN - Original Wellbore

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
10,162.00	92.10	180.74	5,502.14	-4,903.78	411.24	4,920.96	2.83
10,257.00	92.47	180.27	5,498.35	-4,998.70	410.40	5,015.51	0.63
10,338.00	92.96	178.85	5,494.52	-5,079.60	411.02	5,096.20	1.85
Last MWD Survey at 10338'							
10,391.00	92.96	178.85	5,491.78	-5,132.52	412.09	5,149.04	0.00
Straight Projection to Bit at 10391'							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
471.00	471.00	0.79	-0.22	First Gyro Survey
749.00	749.00	0.24	-1.01	Last Gyro Survey
1,360.00	1,359.97	-2.53	-4.61	First MWD Survey
10,338.00	5,494.52	-5,079.60	411.02	Last MWD Survey at 10338'
10,391.00	5,491.78	-5,132.52	412.09	Straight Projection to Bit at 10391'

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	McCaffrey St LD12-74-1AHN_BHL	175.39	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
471.00	1,027.00	Surface Surveys	Flexi-Shot
1,360.00	5,844.00	Intermediate Surveys	MWD
6,002.00	10,391.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,219.00	1,218.98	9 5/8"	9-5/8	13-3/4
5,892.00	5,497.32	7"	7	8-3/4
10,391.00	5,491.78	4 1/2"	4-1/2	6-1/8

## Design Report for McCaffrey State LD12-74-1AHN - Original Wellbore

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (usft)	+N/-S (usft)	+E/-W (usft)	Northing (usft)	Easting (usft)	Latitude	Longitude
McCaffrey St - THL - actual wellpath misses target center by 988.38usft at 8268.47usft MD (5487.50 TVD, -3011.22 N, 416.47 E) - Point	0.00	0.00	4,500.00	-2,999.98	376.21	1,526,236.52	3,468,399.80	40.765646	-103.808973
McCaffrey St LD 12-74 - actual wellpath misses target center by 438.52usft at 4536.60usft MD (4500.23 TVD, -1.15 N, 401.01 E) - Point	0.00	0.00	4,500.00	0.02	-37.50	1,529,236.52	3,467,986.09	40.773900	-103.810260
McCaffrey St LD12-74 - actual wellpath misses target center by 2.45usft at 10391.00usft MD (5491.78 TVD, -5132.52 N, 412.09 E) - Point	0.00	0.00	5,493.10	-5,133.79	413.71	1,524,102.72	3,468,437.30	40.759788	-103.808985

Directional Difficulty Index

Average Dogleg over Survey:	2.05 °/100usft	Maximum Dogleg over Survey:	14.19 °/100usft at 5,844.00 usft
Net Tortousity applicable to Plans:	0.99 °/100usft	Directional Difficulty Index:	6.348

Audit Info