

Noble Energy

Weld County, CO (NAD 83)

Sec. 2-T9N-R58W (Sharpe State 2 /Davis State (PAD)

Gradishar State LD11-73-1AHN

05-123-39809

Original Wellbore

Design: Actual Surveys

Sperry Drilling Services

Final Survey Report

08 January, 2015

Surface UWI : 05-123-39809

Well Coordinates: 1,529,270.21 N, 3,464,386.91 E (40° 46' 27.05" N, 103° 49' 23.70" W)

Ground Level: 4,661.00 usft

Local Coordinate Origin:

Centered on Well Gradishar State LD11-73-1AHN

Viewing Datum:

KB @ 4685.00usft (HP 343)

TVDs to System:

N

North Reference:

Grid

Unit System:

Dec-Deg - API - US Survey Feet - Custom

Geodetic Scale Factor Applied

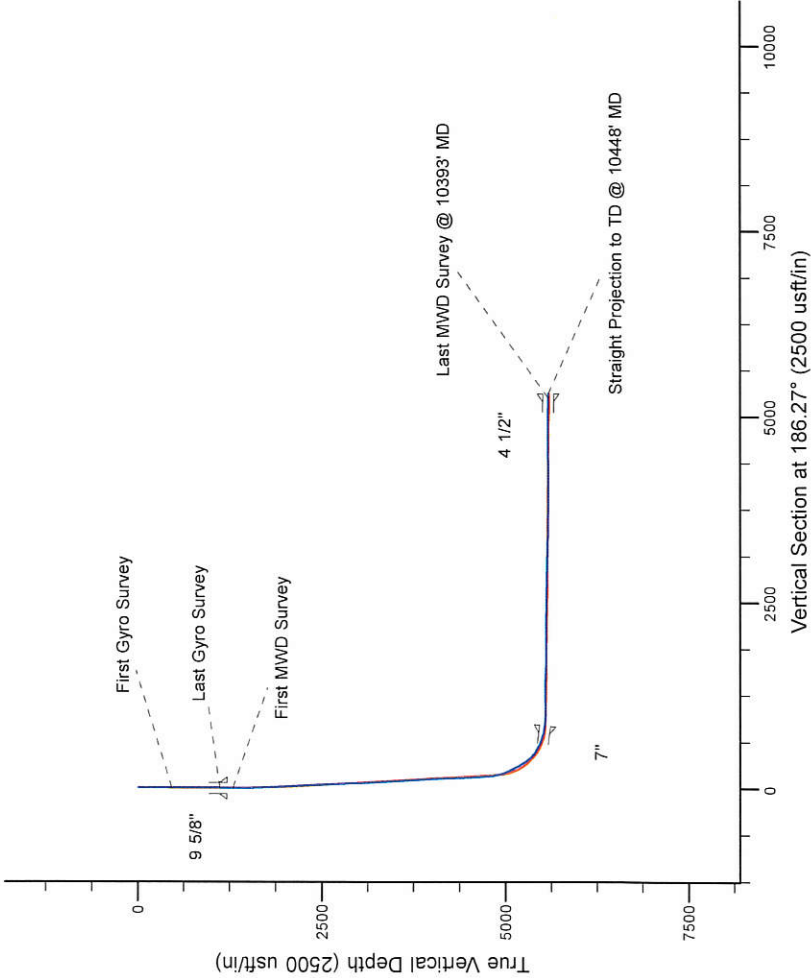
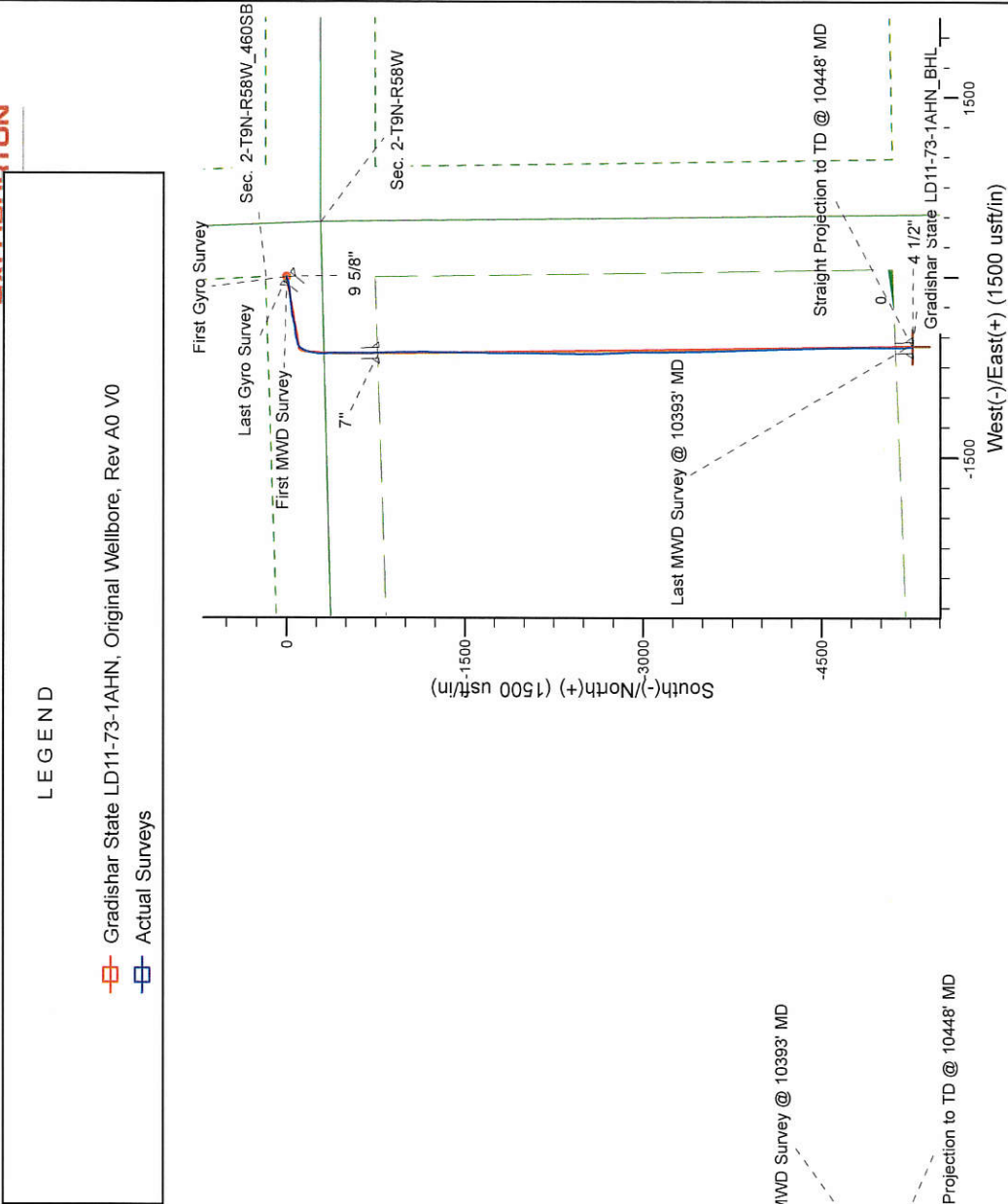
Version: 5000.1 Build: 70

HALLIBURTON

Platted SHL: 300' FSL, 446' FEL
Platted Lat/Long: 40.77418 N, 103.82325 W
Location: Sec. 2-T9N-R58W

~7" Casing: 401' FNL, 1103' FEL
Lat/Long: 40.772082 N, 103.825591 W
State Planes - CO Northern: 1528493.58 N, 3463752.97 E
Location: Sec. 11-T9N-R58W

Platted BHL: 330' FSL, 1100' FEL
Lat/Long: 40.75975 N, 103.82570 W
State Planes - CO Northern: 1524001.01 N, 3463807.71 E
Location: Sec. 11-T9N-R58W



WELL DETAILS: Gradishar State LD11-73-1AHN
Ground Level: 4661.00
KB @ 4685.00usft (HP 343)
Created By: Amanda Marchand
Created On: 1/8/2015

Design Report for Gradishar State LD11-73-1AHN - Actual Surveys

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
467.00	0.00	209.11	467.00	0.00	0.00	0.00	0.00
First Gyro Survey							
742.00	0.10	314.71	742.00	0.17	-0.17	-0.15	0.04
1,121.00	0.20	182.91	1,121.00	-0.26	-0.44	0.31	0.07
Last Gyro Survey							
1,298.00	0.30	20.99	1,298.00	-0.14	-0.29	0.17	0.28
First MWD Survey							
1,390.00	0.29	47.76	1,390.00	0.25	-0.03	-0.24	0.15
1,483.00	0.35	63.73	1,483.00	0.53	0.40	-0.57	0.11
1,575.00	2.54	245.20	1,574.97	-0.20	-1.20	0.33	3.14
1,669.00	4.10	255.12	1,668.81	-1.94	-6.34	2.62	1.76
1,762.00	5.99	256.94	1,761.44	-3.89	-14.28	5.42	2.04
1,854.00	7.89	242.04	1,852.77	-7.93	-24.54	10.57	2.83
1,946.00	9.08	252.82	1,943.77	-13.04	-37.05	17.01	2.15
2,039.00	11.56	263.06	2,035.27	-16.33	-53.31	22.06	3.31
2,131.00	10.94	262.09	2,125.50	-18.65	-71.11	26.31	0.70
2,224.00	10.34	260.74	2,216.90	-21.21	-88.09	30.70	0.70
2,316.00	10.23	258.68	2,307.42	-24.14	-104.25	35.38	0.42
2,408.00	10.49	257.34	2,397.92	-27.58	-120.43	40.57	0.39
2,504.00	11.34	265.09	2,492.19	-30.30	-138.36	45.24	1.76
2,599.00	11.37	265.18	2,585.33	-31.89	-157.00	48.85	0.04
2,694.00	11.18	265.21	2,678.50	-33.44	-175.51	52.42	0.20
2,788.00	10.85	265.26	2,770.76	-34.93	-193.41	55.86	0.35
2,884.00	9.63	264.49	2,865.23	-36.45	-210.41	59.22	1.28
2,979.00	10.36	264.28	2,958.79	-38.07	-226.81	62.62	0.77
3,074.00	10.54	263.85	3,052.22	-39.85	-243.95	66.27	0.21
3,169.00	10.71	263.56	3,145.59	-41.77	-261.36	70.08	0.19
3,264.00	11.23	263.48	3,238.85	-43.81	-279.33	74.07	0.55
3,359.00	11.78	263.62	3,331.94	-45.94	-298.15	78.24	0.58
3,454.00	12.32	263.57	3,424.85	-48.15	-317.86	82.59	0.57
3,549.00	11.85	257.47	3,517.75	-51.40	-337.46	87.97	1.43
3,645.00	10.97	254.28	3,611.85	-56.02	-355.87	94.56	1.13
3,740.00	10.10	255.64	3,705.25	-60.53	-372.64	100.89	0.95
3,835.00	9.73	257.45	3,798.83	-64.34	-388.55	106.41	0.51
3,930.00	11.19	261.82	3,892.25	-67.40	-405.51	111.30	1.75
4,025.00	10.63	260.32	3,985.53	-70.18	-423.27	116.01	0.66
4,120.00	9.85	259.72	4,079.02	-73.11	-439.90	120.73	0.83
4,215.00	10.12	266.99	4,172.58	-74.99	-456.24	124.40	1.36
4,310.00	8.62	267.88	4,266.31	-75.70	-471.69	126.78	1.59
4,405.00	9.25	261.39	4,360.16	-77.10	-486.35	129.78	1.25
4,500.00	10.61	261.49	4,453.74	-79.54	-502.55	133.97	1.43
4,595.00	9.96	254.05	4,547.21	-83.09	-519.10	139.31	1.56
4,691.00	11.64	257.65	4,641.51	-87.45	-536.54	145.55	1.88
4,786.00	12.47	251.40	4,734.42	-92.77	-555.63	152.92	1.63
4,881.00	11.53	247.90	4,827.34	-99.61	-574.15	161.75	1.25
4,976.00	15.37	218.14	4,919.83	-113.11	-590.74	176.98	8.20
5,071.00	26.43	209.05	5,008.46	-141.59	-608.85	207.26	12.10
5,166.00	28.61	195.22	5,092.79	-182.06	-625.10	249.27	7.09
5,261.00	27.54	187.32	5,176.64	-225.81	-633.87	293.72	4.07

Design Report for Gradishar State LD11-73-1AHN - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,357.00	32.95	184.05	5,259.55	-273.90	-638.55	342.03	5.89
5,405.00	37.09	179.36	5,298.86	-301.41	-639.31	369.46	10.28
5,451.00	40.90	175.85	5,334.61	-330.32	-638.07	398.06	9.57
5,546.00	52.80	179.69	5,399.48	-399.43	-635.60	466.49	12.86
5,594.00	60.50	180.86	5,425.84	-439.50	-635.81	506.34	16.17
5,642.00	61.30	180.91	5,449.19	-481.43	-636.46	548.09	1.67
5,736.00	66.60	180.59	5,490.45	-565.85	-637.56	632.12	5.65
5,832.00	78.30	178.83	5,519.35	-657.21	-637.05	722.89	12.31
5,907.00	81.74	178.40	5,532.35	-731.05	-635.26	796.08	4.62
5,999.00	84.57	178.14	5,543.31	-822.34	-632.51	886.53	3.09
6,092.00	88.98	179.01	5,548.54	-915.14	-630.20	978.52	4.83
6,185.00	90.15	180.21	5,549.25	-1,008.13	-629.57	1,070.88	1.80
6,278.00	90.18	179.47	5,548.98	-1,101.13	-629.31	1,163.30	0.80
6,370.00	89.51	178.45	5,549.23	-1,193.11	-627.64	1,254.55	1.33
6,463.00	90.92	181.29	5,548.88	-1,286.10	-627.43	1,346.95	3.41
6,555.00	88.77	181.53	5,549.13	-1,378.07	-629.69	1,438.62	2.35
6,648.00	88.80	180.90	5,551.10	-1,471.02	-631.66	1,531.23	0.68
6,740.00	88.64	180.85	5,553.16	-1,562.99	-633.07	1,622.80	0.18
6,833.00	88.67	180.27	5,555.34	-1,655.96	-633.97	1,715.32	0.62
6,925.00	88.86	179.88	5,557.32	-1,747.94	-634.09	1,806.76	0.47
7,020.00	88.95	180.07	5,559.14	-1,842.92	-634.05	1,901.17	0.22
7,114.00	89.85	180.63	5,560.12	-1,936.91	-634.63	1,994.66	1.13
7,209.00	90.56	180.73	5,559.78	-2,031.90	-635.75	2,089.20	0.75
7,304.00	90.74	180.74	5,558.71	-2,126.89	-636.97	2,183.75	0.19
7,399.00	89.26	180.49	5,558.71	-2,221.88	-637.99	2,278.29	1.58
7,494.00	89.88	180.64	5,559.42	-2,316.87	-638.93	2,372.81	0.67
7,589.00	89.91	181.79	5,559.59	-2,411.85	-640.94	2,467.44	1.21
7,684.00	89.08	179.09	5,560.43	-2,506.84	-641.67	2,561.94	2.97
7,779.00	88.77	178.26	5,562.21	-2,601.79	-639.48	2,656.09	0.93
7,874.00	88.18	177.50	5,564.74	-2,696.69	-635.96	2,750.03	1.01
7,969.00	87.56	176.87	5,568.27	-2,791.51	-631.30	2,843.78	0.93
8,064.00	89.41	179.18	5,570.78	-2,886.41	-628.03	2,937.75	3.11
8,160.00	89.32	179.79	5,571.85	-2,982.40	-627.17	3,033.07	0.64
8,255.00	88.74	179.54	5,573.46	-3,077.38	-626.61	3,127.43	0.66
8,350.00	88.34	179.16	5,575.88	-3,172.35	-625.54	3,221.70	0.58
8,445.00	88.12	179.58	5,578.81	-3,267.30	-624.49	3,315.97	0.50
8,540.00	89.17	178.79	5,581.06	-3,362.26	-623.14	3,410.21	1.38
8,635.00	89.08	178.77	5,582.51	-3,457.23	-621.12	3,504.39	0.10
8,730.00	89.20	178.56	5,583.93	-3,552.19	-618.90	3,598.55	0.25
8,825.00	88.83	178.32	5,585.57	-3,647.14	-616.32	3,692.64	0.46
8,920.00	88.40	178.00	5,587.86	-3,742.06	-613.27	3,786.67	0.56
9,015.00	89.82	178.94	5,589.34	-3,837.01	-610.73	3,880.77	1.79
9,110.00	89.97	178.97	5,589.51	-3,932.00	-609.00	3,975.00	0.16
9,205.00	89.78	178.35	5,589.72	-4,026.97	-606.78	4,069.16	0.68
9,300.00	89.97	178.24	5,589.93	-4,121.93	-603.95	4,163.24	0.23
9,395.00	90.55	177.96	5,589.50	-4,216.87	-600.80	4,257.27	0.68
9,490.00	90.09	176.70	5,588.97	-4,311.77	-596.38	4,351.12	1.41
9,585.00	91.51	178.82	5,587.64	-4,406.68	-592.66	4,445.05	2.69
9,680.00	91.73	179.37	5,584.95	-4,501.63	-591.16	4,539.27	0.62
9,775.00	90.15	180.26	5,583.40	-4,596.61	-590.86	4,633.65	1.91
9,870.00	89.97	180.24	5,583.30	-4,691.61	-591.27	4,728.12	0.19

Design Report for Gradishar State LD11-73-1AHN - Actual Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,965.00	89.54	179.97	5,583.70	-4,786.61	-591.45	4,822.57	0.53
10,060.00	89.45	179.27	5,584.54	-4,881.60	-590.82	4,916.93	0.74
10,154.00	89.85	179.62	5,585.11	-4,975.60	-589.91	5,010.26	0.57
10,249.00	89.85	179.54	5,585.36	-5,070.59	-589.21	5,104.61	0.08
10,344.00	89.81	179.18	5,585.64	-5,165.59	-588.15	5,198.92	0.38
10,393.00	89.75	178.52	5,585.83	-5,214.58	-587.17	5,247.51	1.35
Last MWD Survey @ 10393' MD							
10,448.00	89.75	178.52	5,586.07	-5,269.56	-585.75	5,302.01	0.00
Straight Projection to TD @ 10448' MD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
467.00	467.00	0.00	0.00	First Gyro Survey
1,121.00	1,121.00	-0.26	-0.44	Last Gyro Survey
1,298.00	1,298.00	-0.14	-0.29	First MWD Survey
10,393.00	5,585.83	-5,214.58	-587.17	Last MWD Survey @ 10393' MD
10,448.00	5,586.07	-5,269.56	-585.75	Straight Projection to TD @ 10448' MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/-S (usft)	+E/-W (usft)	
Target	Gradishar State LD11-73-1AHN_BHL	186.27	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
467.00	1,121.00	Surface Surveys	Flexi-Shot
1,298.00	5,907.00	Intermediate Surveys	MWD
5,999.00	10,448.00	Production Surveys	MWD

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
1,221.00	1,221.00	9 5/8"	9-5/8	13-3/4
5,953.00	5,538.40	7"	7	8-3/4
10,448.00	5,586.07	4 1/2"	4-1/2	6-1/8

Design Report for Gradishar State LD11-73-1AHN - Actual Surveys

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
Gradishar State LD11- - actual wellpath misses target center by 8.49usft at 5896.99usft MD (5530.87 TVD, -721.15 N, -635.54 E) - Point	0.00	0.00	5,538.00	-720.00	-640.00	1,528,550.21	3,463,746.91	40.772237	-103.825609
Gradishar State LD11- - actual wellpath misses target center by 11.49usft at 10447.86usft MD (5586.07 TVD, -5269.42 N, -585.75 E) - Point	0.00	0.00	5,595.51	-5,269.21	-579.20	1,524,001.01	3,463,807.71	40.759750	-103.825700

Directional Difficulty Index

Average Dogleg over Survey:	1.70 °/100usft	Maximum Dogleg over Survey:	16.17 °/100usft at 5,594.00 usft
Net Tortousity applicable to Plans:	0.74 °/100usft	Directional Difficulty Index:	6.283

Audit Info

**North Reference Sheet for Sec. 2-T9N-R58W (Sharpe State 2 /Davis State (PAD) -
Gradishar State LD11-73-1AHN - 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 @ 4685.00usft (HP 343). Northing and Easting are relative to Gradishar State LD 11-73-1AHN

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: 0.99999853

Grid Coordinates of Well: 1,529,270.21 usft N, 3,464,386.91 usft E

Geographical Coordinates of Well: 40° 46' 27.05" N, 103° 49' 23.70" W

Grid Convergence at Surface is: 1.08°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,448.00usft
the Bottom Hole Displacement is 5,302.01usft in the Direction of 186.34° (Grid).

Magnetic Convergence at surface is: -6.92° (10 December 2014, , BGGM2014)

