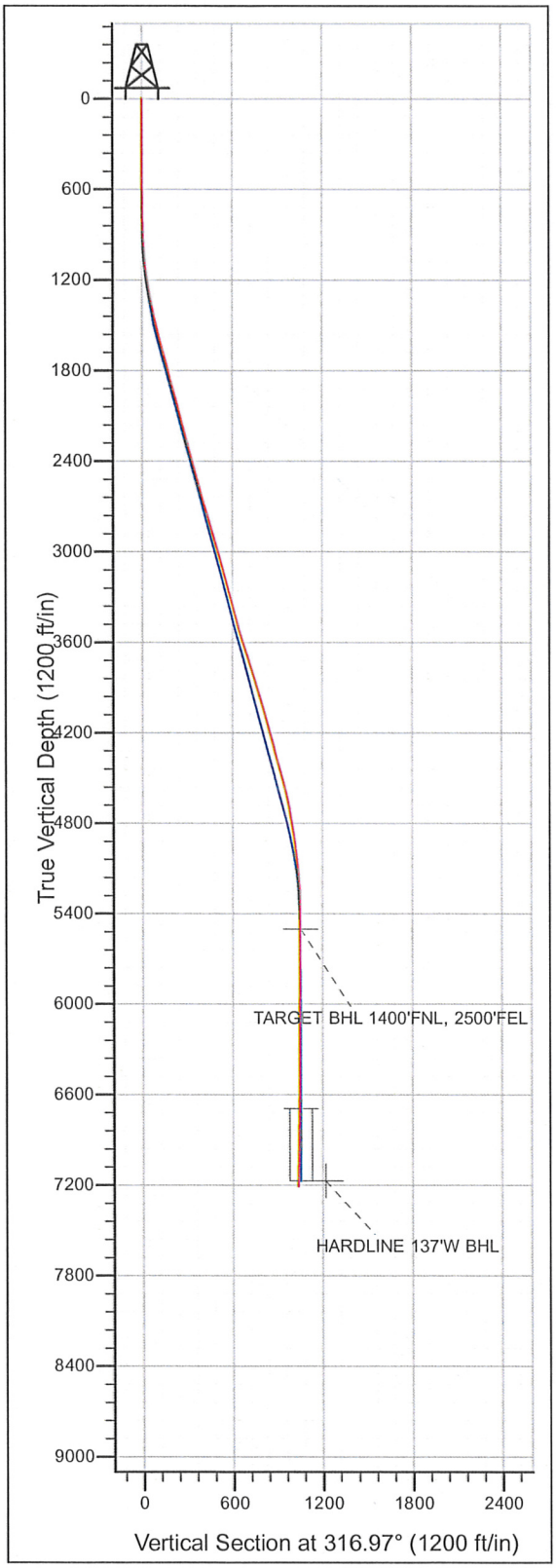
ENSIGN Directional

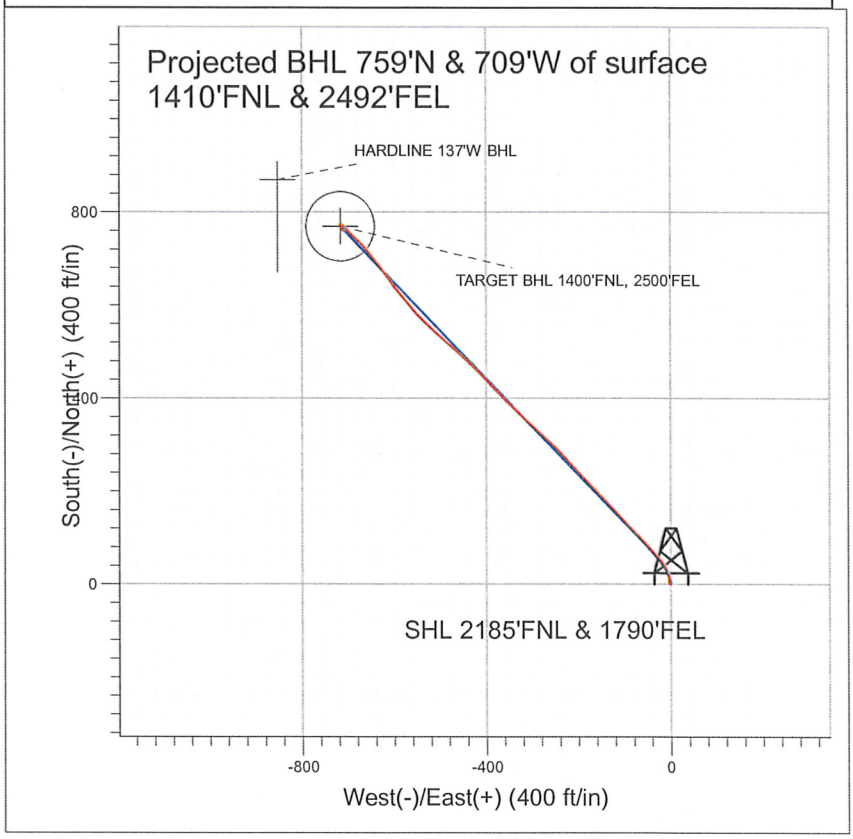
Well Name: **Emma F15-18D**
Surface Location: Emma F15-18D Pad Sec.15-T5N-R65W
North American Datum 1983 , US State Plane 1983 , Colorado Northern Zone
Ground Elevation: 4623.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	1389904.97	3237730.84	40° 24' 1.980 N	104° 38' 47.040 W	

Original Well Elev WELL @ 4636.0ft (Original Well Elev)

NOBLE ENERGY INC WELD COUNTY CO





LEGEND

- Emma F15-18D, Wellbore #1, Noble Emma F15-18D Plan #2 (03-17-10) V0
- Wellbore #1
- Survey #1

Final Survey Plot

Projected Final Survey -
7345'MD & 7210'TVD @ 1039' VS
1.4 deg Inc 107.8 deg AZ

Project: SEC.15-T5N-R65W
Site: Emma F15-18D Pad Sec.15-T5N-R65W
Well: Emma F15-18D
Plan: Wellbore #1

Company:	NOBLE ENERGY INC WELD COUNTY CO	**Local Co-ordinate Reference:**	Well Emma F15-18D
Project:	SEC.15-T5N-R65W	**TVD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Site:	Emma F15-18D Pad Sec.15-T5N-R65W	**MD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Well:	Emma F15-18D	**North Reference:**	True
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Wellbore #1	**Database:**	EDM den0-adp01 Server Data

Project	SEC.15-T5N-R65W, Weld County, Colorado		
Map System:	US State Plane 1983	**System Datum:**	Mean Sea Level
Geo Datum:	North American Datum 1983		Using Well Reference Point
Map Zone:	Colorado Northern Zone		Using geodetic scale factor

Site	Emma F15-18D Pad Sec.15-T5N-R65W				
Site Position:		**Northing:**	1,389,883.13 ft	**Latitude:**	40° 24' 1.764 N
From:	Lat/Long	**Easting:**	3,237,731.05 ft	**Longitude:**	104° 38' 47.040 W
Position Uncertainty:	0.0 ft	**Slot Radius:**	"	**Grid Convergence:**	0.55 °

Well	Emma F15-18D					
Well Position	**+N/-S**	0.0 ft	**Northing:**	1,389,904.97 ft	**Latitude:**	40° 24' 1.980 N
	+E/-W	0.0 ft	**Easting:**	3,237,730.84 ft	**Longitude:**	104° 38' 47.040 W
Position Uncertainty		0.0 ft	**Wellhead Elevation:**	ft	**Ground Level:**	4,623.0 ft

Wellbore Wellbore #1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	IGRF200510	5/21/2008	9.18	67.18	53,486
	IGRF200510	12/31/2009	8.96	67.13	53,319

Design Wellbore #1

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (ft)	+N/-S (ft)	+E/-W (ft)	Direction (°)
	0.0	0.0	0.0	316.97

Survey Program **Date** 4/26/2010

From (ft)	To (ft)	Survey (Wellbore)	Tool Name	Description
601.0	7,345.0	Survey #1 (Wellbore #1)	MWD	MWD - Standard

Survey

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)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00	0.00	0.00
601.0	0.30	291.80	601.0	0.6	-1.5	1.4	0.05	0.05	0.00
686.0	0.50	271.40	686.0	0.7	-2.0	1.9	0.29	0.24	-24.00
772.0	0.60	331.50	772.0	1.1	-2.6	2.6	0.65	0.12	69.88
857.0	2.10	3.20	857.0	3.0	-2.8	4.1	1.91	1.76	37.29
943.0	4.20	358.90	942.8	7.7	-2.7	7.5	2.46	2.44	-5.00
1,029.0	5.10	354.70	1,028.5	14.7	-3.1	12.9	1.12	1.05	-4.88
1,114.0	7.40	342.30	1,113.0	23.7	-5.2	20.8	3.12	2.71	-14.59
1,200.0	9.50	332.40	1,198.1	35.2	-10.1	32.7	2.96	2.44	-11.51
1,286.0	10.50	323.00	1,282.8	47.8	-18.1	47.3	2.22	1.16	-10.93
1,371.0	11.50	317.70	1,366.2	60.3	-28.5	63.5	1.67	1.18	-6.24
1,457.0	12.50	318.20	1,450.4	73.5	-40.5	81.4	1.17	1.16	0.58

Company:	NOBLE ENERGY INC WELD COUNTY CO	**Local Co-ordinate Reference:**	Well Emma F15-18D
Project:	SEC.15-T5N-R65W	**TVD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Site:	Emma F15-18D Pad Sec.15-T5N-R65W	**MD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Well:	Emma F15-18D	**North Reference:**	True
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Wellbore #1	**Database:**	EDM den0-adp01 Server Data

Survey

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)
1,542.0	13.80	316.80	1,533.1	87.8	-53.5	100.7	1.57	1.53	-1.65
1,628.0	14.80	316.10	1,616.5	103.2	-68.2	121.9	1.18	1.16	-0.81
1,713.0	15.30	315.30	1,698.6	119.0	-83.6	144.0	0.64	0.59	-0.94
1,799.0	15.20	316.50	1,781.5	135.2	-99.3	166.6	0.38	-0.12	1.40
1,885.0	15.30	317.40	1,864.5	151.7	-114.8	189.2	0.30	0.12	1.05
1,970.0	14.80	317.10	1,946.6	167.9	-129.8	211.3	0.60	-0.59	-0.35
2,056.0	15.30	315.60	2,029.6	184.1	-145.2	233.6	0.74	0.58	-1.74
2,141.0	14.70	315.30	2,111.7	199.8	-160.6	255.6	0.71	-0.71	-0.35
2,227.0	14.80	317.10	2,194.9	215.6	-175.8	277.5	0.55	0.12	2.09
2,313.0	15.10	316.80	2,278.0	231.8	-190.9	299.7	0.36	0.35	-0.35
2,398.0	14.90	316.90	2,360.1	247.8	-205.9	321.7	0.24	-0.24	0.12
2,484.0	15.10	318.00	2,443.2	264.2	-221.0	344.0	0.40	0.23	1.28
2,569.0	15.00	315.60	2,525.2	280.3	-236.1	366.0	0.74	-0.12	-2.82
2,655.0	15.60	314.40	2,608.2	296.4	-252.2	388.7	0.79	0.70	-1.40
2,740.0	16.90	312.70	2,689.8	312.7	-269.4	412.4	1.63	1.53	-2.00
2,826.0	17.40	312.30	2,772.0	329.9	-288.1	437.7	0.60	0.58	-0.47
2,912.0	16.40	311.80	2,854.3	346.6	-306.7	462.6	1.18	-1.16	-0.58
2,997.0	15.60	313.00	2,936.0	362.4	-324.0	486.0	1.02	-0.94	1.41
3,083.0	16.10	316.60	3,018.7	379.0	-340.6	509.5	1.28	0.58	4.19
3,168.0	16.00	314.90	3,100.4	395.8	-357.0	532.9	0.57	-0.12	-2.00
3,254.0	15.20	316.10	3,183.2	412.3	-373.2	556.1	1.00	-0.93	1.40
3,340.0	14.70	315.70	3,266.3	428.2	-388.7	578.2	0.59	-0.58	-0.47
3,425.0	15.20	314.30	3,348.4	443.7	-404.2	600.2	0.73	0.59	-1.65
3,511.0	15.30	315.20	3,431.4	459.6	-420.2	622.8	0.30	0.12	1.05
3,597.0	15.80	314.40	3,514.3	475.9	-436.6	645.8	0.63	0.58	-0.93
3,682.0	17.10	312.40	3,595.8	492.4	-454.1	669.8	1.67	1.53	-2.35
3,768.0	17.80	312.00	3,677.8	509.7	-473.2	695.5	0.83	0.81	-0.47
3,853.0	18.20	310.70	3,758.7	527.1	-492.9	721.7	0.67	0.47	-1.53
3,939.0	18.30	310.90	3,840.3	544.7	-513.3	748.4	0.14	0.12	0.23
4,025.0	17.30	315.80	3,922.2	562.7	-532.4	774.6	2.09	-1.16	5.70
4,110.0	16.00	317.50	4,003.7	580.4	-549.2	799.0	1.63	-1.53	2.00
4,196.0	15.40	319.40	4,086.4	597.8	-564.6	822.3	0.92	-0.70	2.21
4,282.0	15.80	320.20	4,169.3	615.5	-579.5	845.4	0.53	0.47	0.93
4,367.0	14.10	319.00	4,251.4	632.2	-593.7	867.3	2.03	-2.00	-1.41
4,453.0	15.40	327.80	4,334.6	649.7	-606.7	888.9	3.01	1.51	10.23
4,538.0	16.80	324.00	4,416.2	669.2	-619.9	912.2	2.06	1.65	-4.47
4,624.0	15.10	321.00	4,498.9	688.0	-634.3	935.7	2.20	-1.98	-3.49
4,709.0	13.50	320.50	4,581.3	704.3	-647.5	956.7	1.89	-1.88	-0.59
4,795.0	11.60	322.10	4,665.2	718.8	-659.2	975.3	2.25	-2.21	1.86
4,881.0	9.00	316.00	4,749.8	730.5	-669.2	990.7	3.27	-3.02	-7.09
4,966.0	9.10	312.00	4,833.8	739.8	-678.8	1,004.0	0.75	0.12	-4.71
5,052.0	8.70	312.60	4,918.7	748.7	-688.7	1,017.3	0.48	-0.47	0.70
5,137.0	7.30	317.70	5,002.9	757.1	-697.1	1,029.1	1.85	-1.65	6.00
5,223.0	5.20	321.50	5,088.4	764.2	-703.2	1,038.4	2.49	-2.44	4.42
5,309.0	4.70	309.20	5,174.1	769.4	-708.3	1,045.8	1.36	-0.58	-14.30
5,394.0	2.50	283.30	5,258.9	772.1	-712.8	1,050.8	3.16	-2.59	-30.47
5,480.0	1.30	243.80	5,344.9	772.1	-715.5	1,052.6	1.99	-1.40	-45.93
5,565.0	1.00	210.00	5,429.9	771.0	-716.8	1,052.7	0.86	-0.35	-39.76
5,635.2	0.56	202.39	5,500.0	770.1	-717.2	1,052.4	0.64	-0.62	-10.84
TARGET BHL 1400'FNL, 2500'FEL									
5,737.0	0.20	96.30	5,601.8	769.7	-717.2	1,052.0	0.64	-0.36	-104.17
5,908.0	0.20	83.50	5,772.8	769.7	-716.6	1,051.6	0.03	0.00	-7.49
6,079.0	0.20	95.80	5,943.8	769.7	-716.0	1,051.2	0.03	0.00	7.19
6,250.0	0.10	147.90	6,114.8	769.5	-715.6	1,050.9	0.09	-0.06	30.47

ENSIGN Directional

ENSIGN DIRECTIONAL
Survey Report

noble energy

Company:	NOBLE ENERGY INC WELD COUNTY CO	**Local Co-ordinate Reference:**	Well Emma F15-18D
Project:	SEC.15-T5N-R65W	**TVD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Site:	Emma F15-18D Pad Sec.15-T5N-R65W	**MD Reference:**	WELL @ 4636.0ft (Original Well Elev)
Well:	Emma F15-18D	**North Reference:**	True
Wellbore:	Wellbore #1	**Survey Calculation Method:**	Minimum Curvature
Design:	Wellbore #1	**Database:**	EDM den0-adp01 Server Data

Survey

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)
6,422.0	0.40	176.80	6,286.8	768.8	-715.5	1,050.2	0.18	0.17	16.80
6,593.0	0.40	184.90	6,457.8	767.6	-715.5	1,049.4	0.03	0.00	4.74
6,764.0	0.70	172.40	6,628.8	766.0	-715.5	1,048.1	0.19	0.18	-7.31
6,828.1	0.77	165.27	6,692.9	765.2	-715.3	1,047.4	0.18	0.10	-11.13
TARGET CIRCLE 1400'FNL, 2500'FEL									
6,935.0	0.90	156.00	6,799.8	763.7	-714.8	1,046.0	0.18	0.12	-8.67
7,106.0	0.90	134.30	6,970.8	761.5	-713.3	1,043.4	0.20	0.00	-12.69
7,299.0	1.40	107.80	7,163.8	759.8	-709.9	1,039.8	0.37	0.26	-13.73
HARDLINE 137'W BHL									
7,345.0	1.40	107.80	7,209.7	759.4	-708.9	1,038.8	0.00	0.00	0.00

Wellbore Targets

Target Name - hit/miss target - Shape	Dip Angle (°)	Dip Dir. (°)	TVD (ft)	+N/-S (ft)	+E/-W (ft)	Northing (ft)	Easting (ft)	Latitude	Longitude
TARGET BHL 1400'F	0.00	0.00	5,500.0	769.6	-716.7	1,390,667.64	3,237,006.81	40° 24' 9.585 N	104° 38' 56.304 W
- survey misses target center by 0.7ft at 5635.2ft MD (5500.0 TVD, 770.1 N, -717.2 E)									
- Point									
TARGET CIRCLE 14(	0.00	0.00	6,693.0	769.6	-716.7	1,390,667.60	3,237,006.80	40° 24' 9.585 N	104° 38' 56.304 W
- survey misses target center by 4.7ft at 6828.1ft MD (6692.9 TVD, 765.2 N, -715.3 E)									
- Circle (radius 75.0)									
HARDLINE 137'W BH	0.00	0.00	7,171.0	869.6	-853.7	1,390,766.28	3,236,868.84	40° 24' 10.573 N	104° 38' 58.075 W
- survey misses target center by 181.1ft at 7299.0ft MD (7163.8 TVD, 759.8 N, -709.9 E)									
- Polygon									
Point 1			7,171.0	0.0	0.0	1,390,766.28	3,236,868.84		
Point 2			7,171.0	-200.0	0.0	1,390,566.30	3,236,870.77		

Checked By: _____ Approved By: _____ Date: _____