Project: Weld County, CO (NAD 83)
Site: Sec. 24-T9N-R59W (Timbro 24 PAD)
Well: Timbro LC13-74-1HN

Noble Energy

HALLIBURTON
Sperry Drilling

G
T M

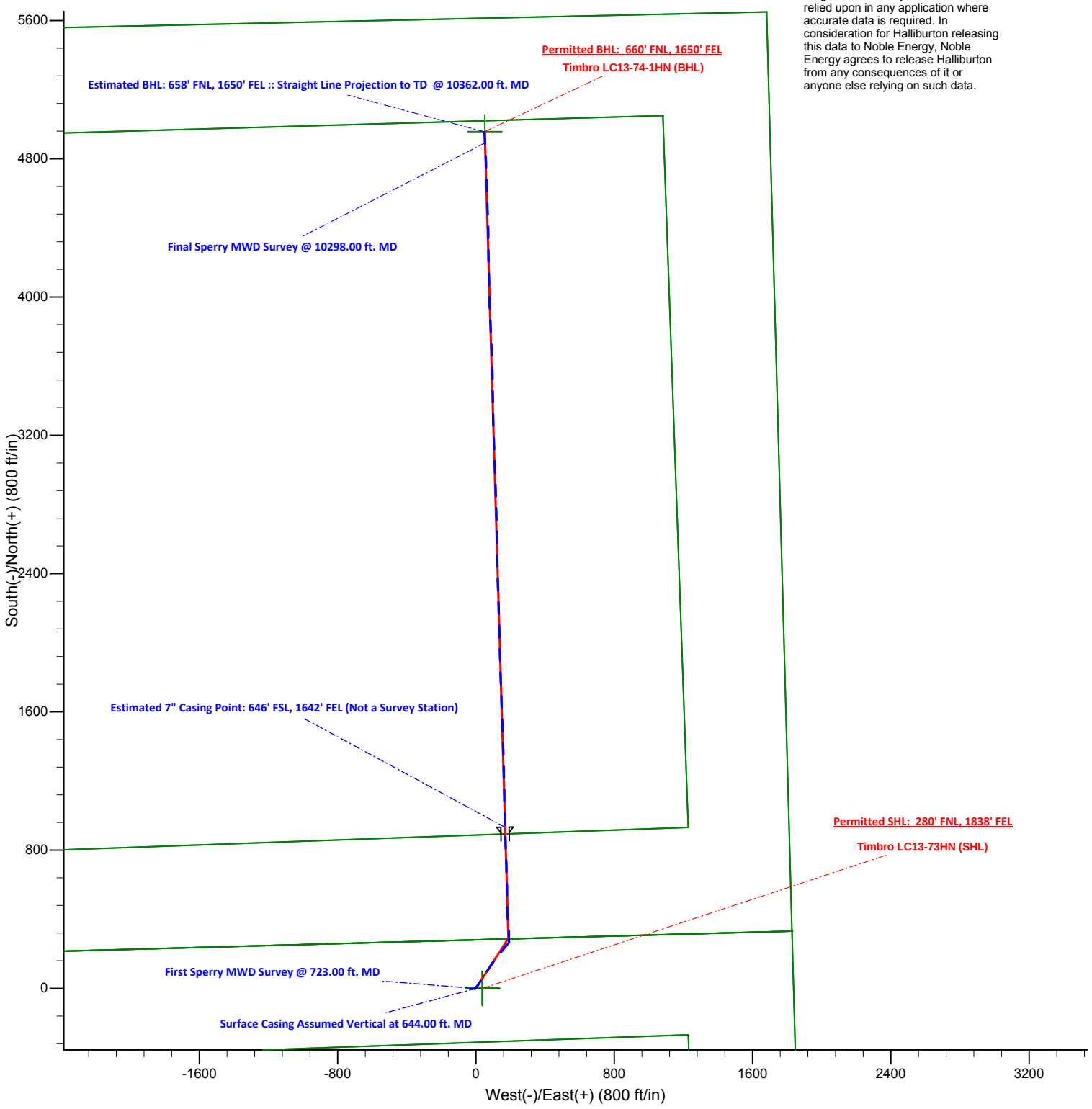
Azimuths to Grid North
True North: -1.02°
Magnetic North: 7.23°

Magnetic Field
Strength: 53109.3snT
Dip Angle: 67.37°
Date: 4/2/2013
Model: BGGM2012

LEGEND

Timbro LC13-74-1HN, Plan A Proposal
MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the Timbro LC13-74-1HN well located at Weld County, CO. At the conclusion of the job Halliburton performed a final survey on the well. Noble Energy has requested that Halliburton provide them the distances from BHL to section lines from that final survey to allow Noble Energy to meet its requirements under Colorado law. These distances are generated by a mathematical algorithm based on rough data collected after the well is drilled. Halliburton considers it to be a rough estimate only and it is not to be relied upon in any application where accurate data is required. In consideration for Halliburton releasing this data to Noble Energy, Noble Energy agrees to release Halliburton from any consequences of it or anyone else relying on such data.



Project: Weld County, CO (NAD 83)
Site: Sec. 24-T9N-R59W (Timbro 24 PAD)
Well: Timbro LC13-74-1HN

Noble Energy

HALLIBURTON
Sperry Drilling

Azimuths to Grid North
True North: -1.02°
Magnetic North: 7.23°

Magnetic Field
Strength: 53109.3snT
Dip Angle: 67.37°
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LEGEND

Timbro LC13-74-1HN, Plan A Proposal
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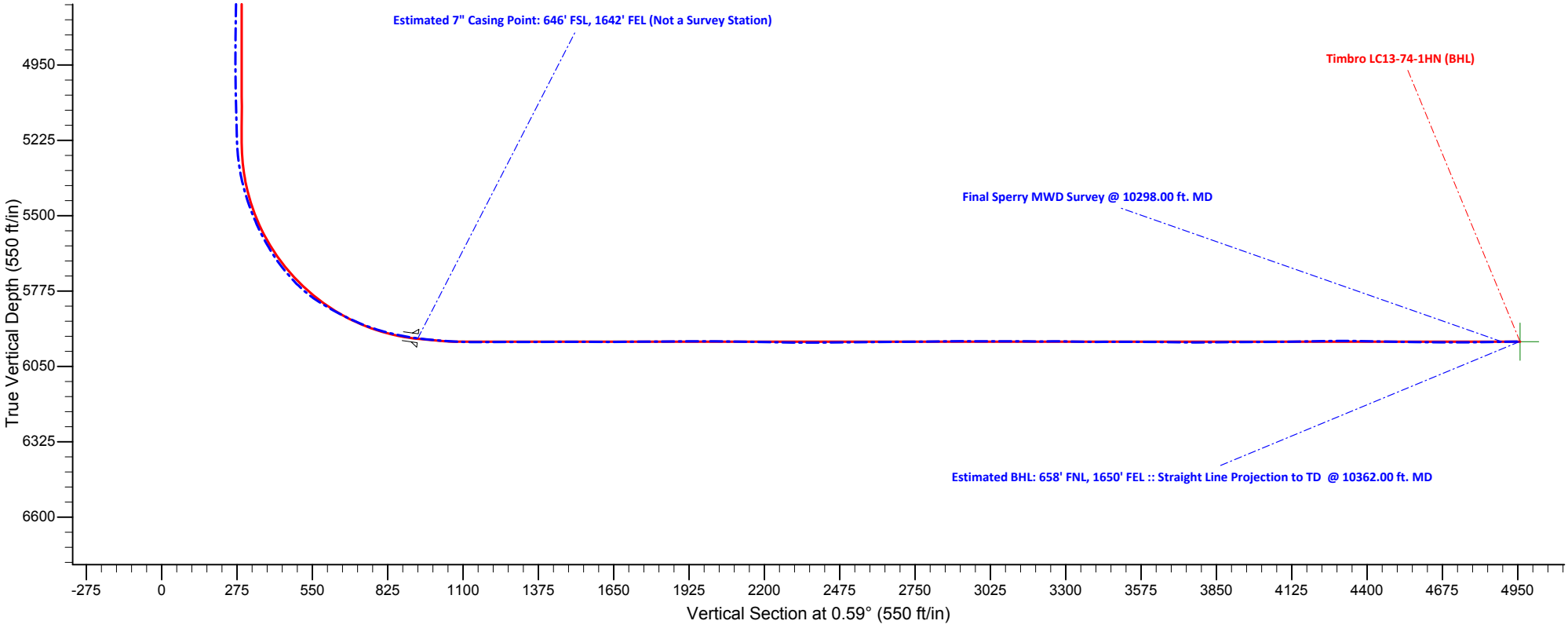

Noble Energy

Weld County, CO (NAD 83)
Sec. 24-T9N-R59W (Timbro 24 PAD)
Timbro LC13-74-1HN

Design: MWD Survey

Sperry Drilling Services

Final Survey Report

07 June, 2013

Well Coordinates: 1,517,366.89 N, 3,436,856.17 E (40° 44' 34.44" N, 103° 55' 24.23" W)
Ground Level: 4,856.00 ft

Local Coordinate Origin:	Centered on Well Timbro LC13-74-1HN - Slot A2
Viewing Datum:	KB=24' @ 4880.00ft (H&P 322)
TVDs to System:	N
North Reference:	Grid
Unit System:	API - US Survey Feet - Custom

Geodetic Scale Factor Applied
Version: 2003.16 Build: 43I

HALLIBURTON

Design Report for Timbro LC13-74-1HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
644.00	0.00	0.00	644.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 644.00 ft. MD							
723.00	0.31	251.11	723.00	-0.07	-0.20	-0.07	0.39
First Sperry MWD Survey @ 723.00 ft. MD							
816.00	0.39	278.56	816.00	-0.10	-0.75	-0.11	0.20
909.00	0.29	263.88	909.00	-0.08	-1.30	-0.09	0.14
1,002.00	0.33	263.38	1,001.99	-0.14	-1.80	-0.16	0.04
1,095.00	0.30	264.18	1,094.99	-0.19	-2.31	-0.22	0.03
1,188.00	0.44	291.45	1,187.99	-0.09	-2.88	-0.12	0.24
1,281.00	0.44	275.18	1,280.99	0.08	-3.57	0.04	0.13
1,374.00	0.68	270.50	1,373.98	0.11	-4.48	0.07	0.26
1,467.00	0.71	238.09	1,466.98	-0.19	-5.52	-0.24	0.42
1,562.00	0.61	226.59	1,561.97	-0.85	-6.39	-0.91	0.17
1,657.00	0.52	237.81	1,656.97	-1.42	-7.12	-1.50	0.15
1,752.00	0.34	315.18	1,751.97	-1.45	-7.68	-1.53	0.58
1,846.00	0.22	231.49	1,845.96	-1.37	-8.02	-1.45	0.41
1,941.00	0.52	234.94	1,940.96	-1.73	-8.52	-1.82	0.32
2,036.00	1.48	49.60	2,035.95	-1.18	-7.93	-1.26	2.10
2,131.00	4.30	51.41	2,130.82	1.84	-4.22	1.79	2.97
2,225.00	7.41	44.06	2,224.32	8.39	2.76	8.42	3.40
2,320.00	9.61	34.47	2,318.28	19.33	11.51	19.45	2.75
2,415.00	8.99	30.43	2,412.03	32.27	19.75	32.47	0.95
2,510.00	9.93	36.72	2,505.74	45.24	28.41	45.53	1.47
2,605.00	11.29	31.29	2,599.11	59.75	38.14	60.14	1.78
2,700.00	13.75	34.20	2,691.85	77.04	49.32	77.54	2.67
2,795.00	13.32	34.32	2,784.21	95.41	61.83	96.05	0.45
2,890.00	12.73	33.49	2,876.76	113.18	73.78	113.94	0.65
2,985.00	12.98	32.87	2,969.38	130.87	85.34	131.75	0.30
3,080.00	13.10	36.45	3,061.94	148.49	97.53	149.49	0.86
3,176.00	12.66	33.91	3,155.52	165.98	109.86	167.10	0.75
3,271.00	13.62	40.22	3,248.04	183.16	122.90	184.42	1.82
3,366.00	13.89	40.02	3,340.31	200.43	137.45	201.84	0.29
3,461.00	14.00	38.73	3,432.51	218.13	151.97	219.69	0.35
3,555.00	13.74	39.59	3,523.77	235.60	166.20	237.30	0.35
3,650.00	11.03	39.42	3,616.55	251.32	179.16	253.16	2.85
3,746.00	9.98	44.45	3,710.94	264.35	190.82	266.31	1.45
3,840.00	7.28	38.48	3,803.87	274.83	200.23	276.88	3.02
3,935.00	3.04	1.51	3,898.49	282.07	204.05	284.16	5.46
4,030.00	2.53	315.62	3,993.39	286.08	202.65	288.16	2.34
4,125.00	1.59	323.71	4,088.32	288.64	200.40	290.70	1.03
4,220.00	1.26	102.99	4,183.31	289.47	200.64	291.53	2.82
4,316.00	1.96	170.69	4,279.28	287.61	201.93	289.68	1.96
4,411.00	3.73	184.48	4,374.16	282.93	201.95	285.00	1.98
4,505.00	3.05	167.55	4,468.00	277.44	202.25	279.51	1.28
4,600.00	2.61	197.96	4,562.89	272.91	202.13	274.99	1.62
4,695.00	1.94	225.76	4,657.81	269.73	200.31	271.79	1.34
4,790.00	1.82	259.28	4,752.77	268.33	197.68	270.36	1.15
4,885.00	1.42	222.91	4,847.73	267.19	195.40	269.19	1.14
4,980.00	1.37	281.15	4,942.71	266.55	193.48	268.53	1.43

Design Report for Timbro LC13-74-1HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,075.00	1.53	345.42	5,037.68	267.99	192.05	269.96	1.63
5,169.00	1.26	352.16	5,131.65	270.23	191.59	272.20	0.34
5,259.00	1.55	359.41	5,221.63	272.43	191.44	274.39	0.38
5,306.00	4.70	356.41	5,268.55	274.99	191.31	276.95	6.71
5,354.00	8.27	356.81	5,316.24	280.40	191.00	282.36	7.44
5,401.00	12.04	0.51	5,362.49	288.68	190.85	290.63	8.14
5,449.00	15.63	0.98	5,409.09	300.15	191.01	302.11	7.48
5,496.00	18.82	0.23	5,453.98	314.07	191.15	316.03	6.80
5,544.00	21.78	357.43	5,498.99	330.71	190.78	332.66	6.49
5,591.00	24.97	353.06	5,542.13	349.28	189.19	351.21	7.72
5,638.00	28.57	353.15	5,584.09	370.29	186.65	372.20	7.66
5,685.00	31.47	355.64	5,624.78	393.69	184.38	395.57	6.71
5,733.00	35.20	356.85	5,664.88	420.00	182.66	421.87	7.89
5,780.00	39.35	357.37	5,702.27	448.42	181.23	450.27	8.86
5,828.00	43.35	359.66	5,738.30	480.11	180.44	481.95	8.91
5,875.00	48.65	359.68	5,770.93	513.91	180.24	515.75	11.28
5,923.00	54.67	359.04	5,800.70	551.54	179.81	553.37	12.59
5,970.00	58.92	359.31	5,826.43	590.85	179.25	592.67	9.06
6,018.00	61.54	358.02	5,850.26	632.50	178.27	634.31	5.94
6,065.00	64.08	359.08	5,871.74	674.29	177.22	676.08	5.76
6,113.00	67.15	358.75	5,891.55	717.99	176.39	719.78	6.43
6,160.00	70.69	358.14	5,908.45	761.83	175.20	763.59	7.63
6,207.00	74.41	357.13	5,922.55	806.62	173.34	808.36	8.18
6,254.00	77.77	357.33	5,933.84	852.18	171.14	853.90	7.16
6,290.00	79.89	358.05	5,940.82	887.46	169.72	889.17	6.21
6,336.00	82.52	358.42	5,947.85	932.90	168.32	934.59	5.78
Estimated 7" Casing Point: 646' FSL, 1642' FEL (Not a Survey Station)							
6,381.00	85.10	358.77	5,952.70	977.62	167.22	979.29	5.78
6,473.00	86.51	358.86	5,959.43	1,069.35	165.32	1,071.00	1.54
6,568.00	90.83	358.83	5,961.63	1,164.28	163.41	1,165.91	4.55
6,663.00	90.25	358.63	5,960.74	1,259.25	161.30	1,260.85	0.65
6,758.00	89.75	358.24	5,960.74	1,354.22	158.71	1,355.79	0.67
6,853.00	90.37	358.32	5,960.64	1,449.18	155.86	1,450.71	0.66
6,948.00	89.63	357.82	5,960.64	1,544.12	152.66	1,545.62	0.94
7,043.00	90.19	358.05	5,960.79	1,639.06	149.23	1,640.51	0.64
7,137.00	90.71	357.81	5,960.05	1,732.99	145.84	1,734.41	0.61
7,232.00	90.34	357.86	5,959.18	1,827.92	142.25	1,829.29	0.39
7,327.00	90.12	358.55	5,958.80	1,922.87	139.27	1,924.21	0.76
7,422.00	89.72	358.26	5,958.93	2,017.84	136.63	2,019.14	0.52
7,517.00	89.20	358.57	5,959.82	2,112.80	134.00	2,114.07	0.64
7,612.00	88.95	358.11	5,961.36	2,207.74	131.25	2,208.98	0.55
7,706.00	89.08	358.06	5,962.97	2,301.68	128.11	2,302.88	0.15
7,801.00	90.74	358.68	5,963.12	2,396.63	125.41	2,397.80	1.87
7,896.00	90.34	359.38	5,962.23	2,491.62	123.80	2,492.76	0.85
7,991.00	90.56	358.94	5,961.48	2,586.60	122.41	2,587.73	0.52
8,086.00	90.71	358.68	5,960.43	2,681.58	120.43	2,682.68	0.32
8,181.00	90.15	358.31	5,959.72	2,776.54	117.94	2,777.61	0.71
8,276.00	90.86	358.22	5,958.88	2,871.49	115.06	2,872.53	0.75
8,371.00	89.47	357.94	5,958.61	2,966.44	111.88	2,967.43	1.49
8,466.00	90.28	357.70	5,958.81	3,061.37	108.27	3,062.32	0.89
8,560.00	89.51	358.07	5,958.98	3,155.30	104.80	3,156.22	0.91

Design Report for Timbro LC13-74-1HN - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
8,655.00	90.59	358.08	5,958.90	3,250.25	101.61	3,251.12	1.14
8,750.00	88.24	359.48	5,959.87	3,345.21	99.58	3,346.06	2.88
8,845.00	90.77	358.86	5,960.69	3,440.19	98.21	3,441.02	2.74
8,940.00	89.72	358.86	5,960.29	3,535.17	96.32	3,535.97	1.11
9,035.00	89.41	358.03	5,961.01	3,630.13	93.74	3,630.90	0.93
9,130.00	89.32	357.89	5,962.06	3,725.06	90.36	3,725.80	0.18
9,225.00	90.49	357.09	5,962.22	3,819.97	86.20	3,820.66	1.49
9,319.00	90.52	356.87	5,961.39	3,913.84	81.25	3,914.47	0.24
9,414.00	90.18	358.96	5,960.81	4,008.77	77.79	4,009.35	2.23
9,509.00	90.56	358.81	5,960.20	4,103.74	75.94	4,104.31	0.43
9,604.00	91.36	358.54	5,958.60	4,198.71	73.74	4,199.24	0.89
9,699.00	90.31	359.89	5,957.22	4,293.68	72.44	4,294.20	1.80
9,794.00	88.61	358.90	5,958.11	4,388.67	71.44	4,389.17	2.07
9,889.00	89.01	357.75	5,960.09	4,483.61	68.66	4,484.08	1.28
9,983.00	89.41	358.20	5,961.38	4,577.54	65.34	4,577.97	0.64
10,078.00	89.66	357.91	5,962.15	4,672.48	62.12	4,672.87	0.40
10,173.00	90.46	357.96	5,962.06	4,767.42	58.70	4,767.77	0.84
10,268.00	90.96	357.50	5,960.88	4,862.33	54.93	4,862.64	0.72
10,298.00	91.02	356.69	5,960.36	4,892.29	53.41	4,892.58	2.71
Final Sperry MWD Survey @ 10298.00 ft. MD							
10,362.00	91.02	356.69	5,959.22	4,956.17	49.72	4,956.42	0.00
Estimated BHL: 658' FNL, 1650' FEL :: Straight Line Projection to TD @ 10362.00 ft. MD							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
644.00	644.00	0.00	0.00	Surface Casing Assumed Vertical at 644.00 ft. MD
723.00	723.00	-0.07	-0.20	First Sperry MWD Survey @ 723.00 ft. MD
6,336.00	5,947.85	932.90	168.32	Estimated 7" Casing Point: 646' FSL, 1642' FEL (Not a Survey Station)
10,298.00	5,960.36	4,892.29	53.41	Final Sperry MWD Survey @ 10298.00 ft. MD
10,362.00	5,959.22	4,956.17	49.72	Estimated BHL: 658' FNL, 1650' FEL :: Straight Line Projection to TD @ 10362.00 ft. MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Timbro LC13-74-1HN_PlanA - Rev0_B	0.59	Slot	0.00	0.00	0.00

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
644.00	6,336.00	MWD Field Surveys	MWD
6,336.00	10,362.00	MWD Field Surveys	MWD

Design Report for Timbro LC13-74-1HN - MWD Survey

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
6,336.00	5,947.85	7" Casing PT	7	8-3/4

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
Timbro	0.00	0.00	1.00	0.67	37.68	1,517,367.56	3,436,893.85	40.742900	-103.923261
- actual wellpath misses target center by 37.68ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,228.68	931.67	1,518,298.56	3,438,084.84		
Point 2				-2,847.32	786.67	1,518,153.56	3,434,008.87		
Point 3				-2,952.32	4,933.67	1,522,300.53	3,433,903.87		
Point 4				1,081.68	5,050.67	1,522,417.53	3,437,937.84		
Point 5				1,228.68	931.67	1,518,298.56	3,438,084.84		
Timbro LC13-73HN	0.00	0.00	0.00	0.67	37.68	1,517,367.56	3,436,893.85	40.742900	-103.923261
- actual wellpath misses target center by 37.68ft at 0.00ft MD (0.00 TVD, 0.00 N, 0.00 E)									
- Point									
Timbro	0.00	0.00	1.00	0.67	37.68	1,517,367.56	3,436,893.85	40.742900	-103.923261
- actual wellpath misses target center by 37.68ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,828.68	331.67	1,517,698.56	3,438,684.84		
Point 2				-3,447.32	186.67	1,517,553.56	3,433,408.87		
Point 3				-3,552.32	5,533.67	1,522,900.53	3,433,303.87		
Point 4				1,681.68	5,650.67	1,523,017.53	3,438,537.84		
Point 5				1,828.68	331.67	1,517,698.56	3,438,684.84		
Timbro	0.00	0.00	5,960.00	4,957.73	51.22	1,522,324.59	3,436,907.39	40.756503	-103.922894
- actual wellpath misses target center by 2.30ft at 10362.00ft MD (5959.22 TVD, 4956.17 N, 49.72 E)									
- Point									
Timbro	0.00	0.00	1.00	0.67	37.68	1,517,367.56	3,436,893.85	40.742900	-103.923261
- actual wellpath misses target center by 37.68ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,228.68	-268.33	1,517,098.57	3,438,084.84		
Point 2				1,376.68	-4,386.33	1,512,980.59	3,438,232.84		
Point 3				-2,699.32	-4,530.33	1,512,836.59	3,434,156.87		
Point 4				-2,847.32	-413.33	1,516,953.57	3,434,008.87		
Point 5				1,228.68	-268.33	1,517,098.57	3,438,084.84		
Timbro	0.00	0.00	1.00	0.67	37.68	1,517,367.56	3,436,893.85	40.742900	-103.923261
- actual wellpath misses target center by 37.68ft at 1.00ft MD (1.00 TVD, 0.00 N, 0.00 E)									
- Polygon									
Point 1				1,976.68	-4,986.33	1,512,380.60	3,438,832.84		
Point 2				-3,299.32	-5,130.33	1,512,236.60	3,433,556.87		
Point 3				-3,447.32	186.67	1,517,553.56	3,433,408.87		
Point 4				1,828.68	331.67	1,517,698.56	3,438,684.84		
Point 5				1,976.68	-4,986.33	1,512,380.60	3,438,832.84		

North Reference Sheet for Sec. 24-T9N-R59W (Timbro 24 PAD) - Timbro LC13-74-1HN

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' @ 4880.00ft (H&P 322). Northing and Easting are relative to Timbro LC13-74-1HN - 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 -105.500000°, Longitude Origin:0.000000°, Latitude Origin:40.783333°

False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99999369

Grid Coordinates of Well: 1,517,366.89 ft N, 3,436,856.17 ft E

Geographical Coordinates of Well: 40° 44' 34.44" N, 103° 55' 24.23" W

Grid Convergence at Surface is: 1.02°

Based upon Minimum Curvature type calculations, at a Measured Depth of 10,362.00ft

the Bottom Hole Displacement is 4,956.42ft in the Direction of 0.57° (Grid).

Magnetic Convergence at surface is: -7.23° (2 April 2013, , BGGM2012)