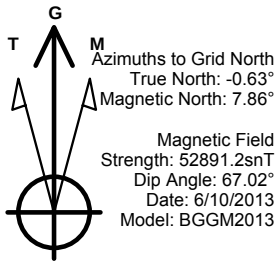
Project: Weld County, CO (NAD 83)
Site: Sec. 11-T5N-R64W
Well: Trebor B11-66-1HN

Noble Energy

HALLIBURTON
Sperry Drilling



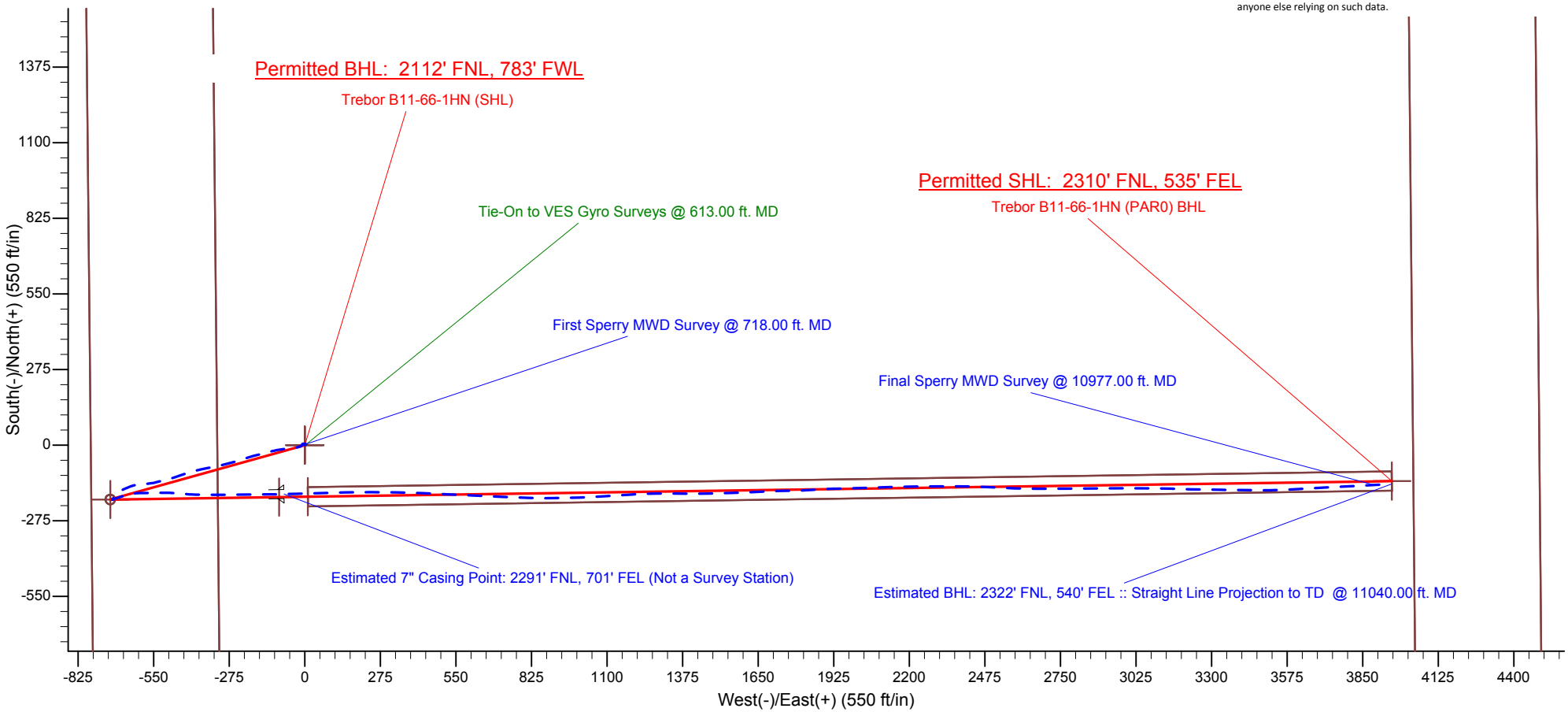
Azimuths to Grid North
True North: -0.63°
Magnetic North: 7.86°

Magnetic Field
Strength: 52891.2snT
Dip Angle: 67.02°
Date: 6/10/2013
Model: BGGM2013

LEGEND

Trebor B11-66-1HN, PAR0
Vaughn ESS and Sperry MWD Survey

Halliburton Energy Services, Inc. ("Halliburton") recently completed directional drilling and MWD operations at the "Trebor B11-66-1HN" 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. 11-T5N-R64W
Well: Trebor B11-66-1HN

Noble Energy

HALLIBURTON
Sperry Drilling

Azimuths to Grid North
True North: -0.63°
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LEGEND

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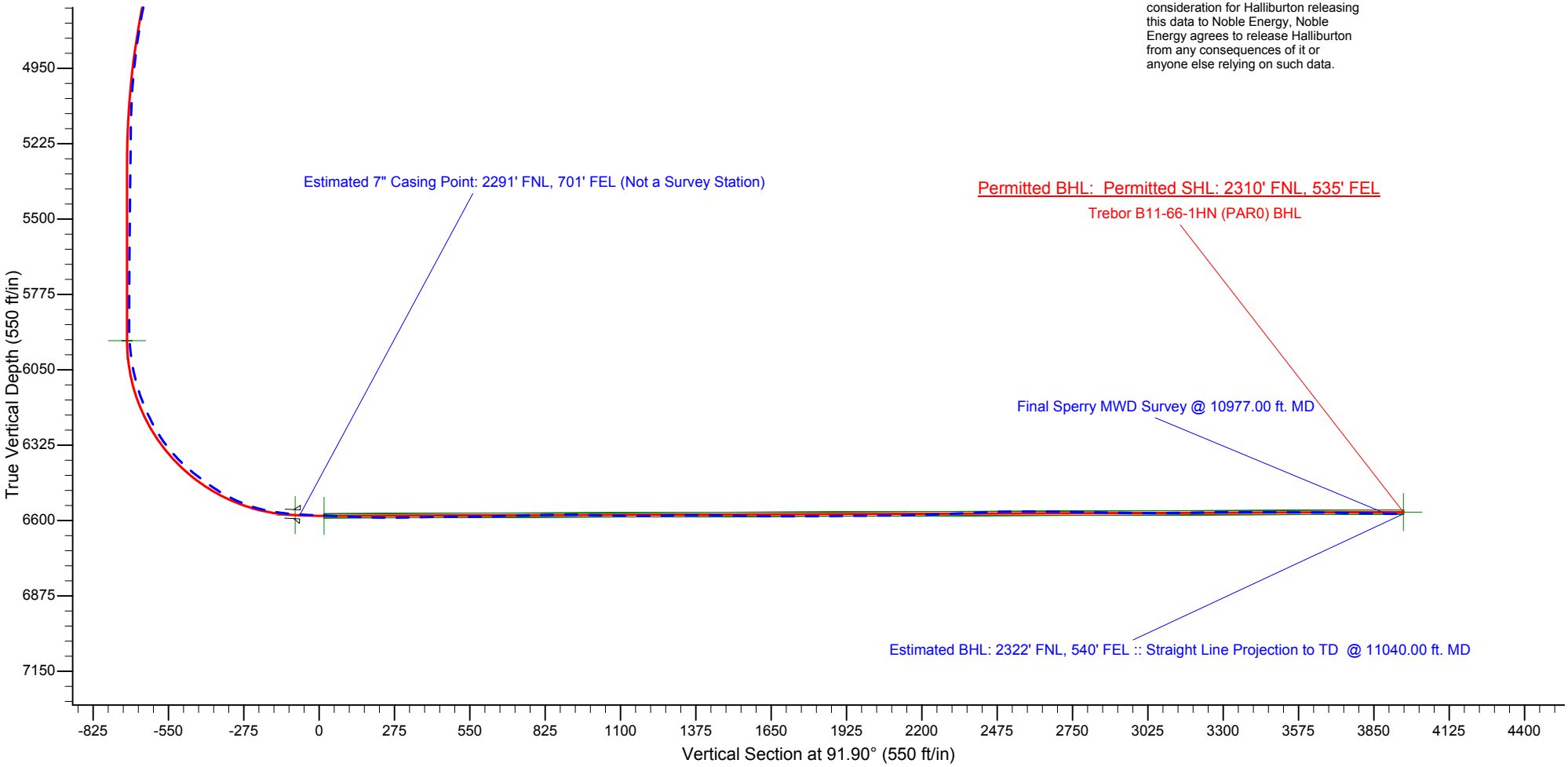

Noble Energy

Weld County, CO (NAD 83)
Sec. 11-T5N-R64W
Trebor B11-66-1HN

Design: Vaughn ESS and Sperry MWD Survey

Sperry Drilling Services

Final Survey Report

14 August, 2013

Well Coordinates: 1,395,625.34 N, 3,271,692.49 E (40° 24' 55.04" N, 104° 31' 27.26" W)
Ground Level: 4,601.00 ft

Local Coordinate Origin:	Centered on Well Trebor B11-66-1HN
Viewing Datum:	RKB 26 ft. @ 4627.00ft (H&P 315)
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 Trebor B11-66-1HN - Vaughn ESS and Sperry 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
305.00	0.70	78.56	304.99	0.37	1.83	1.81	0.23
613.00	0.60	3.56	612.98	2.35	3.77	3.69	0.26
Tie-On to VES Gyro Surveys @ 613.00 ft. MD							
718.00	0.32	353.71	717.97	3.19	3.77	3.66	0.28
First Sperry MWD Survey @ 718.00 ft. MD							
811.00	2.16	290.53	810.95	4.07	2.10	1.97	2.19
904.00	1.43	269.61	903.90	4.67	-0.70	-0.85	1.04
997.00	2.05	283.09	996.86	5.04	-3.48	-3.64	0.79
1,089.00	1.02	250.98	1,088.83	5.15	-5.86	-6.02	1.42
1,183.00	1.52	254.22	1,182.81	4.53	-7.85	-7.99	0.54
1,275.00	0.76	202.03	1,274.79	3.64	-9.25	-9.37	1.32
1,368.00	0.62	192.81	1,367.78	2.58	-9.59	-9.67	0.19
1,463.00	0.69	168.16	1,462.78	1.51	-9.59	-9.64	0.30
1,558.00	0.77	208.93	1,557.77	0.40	-9.78	-9.79	0.54
1,653.00	0.69	197.70	1,652.76	-0.71	-10.26	-10.24	0.17
1,748.00	0.54	236.03	1,747.76	-1.50	-10.81	-10.75	0.45
1,843.00	2.65	226.56	1,842.71	-3.26	-12.78	-12.66	2.23
1,938.00	2.79	262.73	1,937.61	-5.07	-16.66	-16.49	1.78
2,033.00	6.05	250.04	2,032.32	-7.07	-23.67	-23.42	3.56
2,128.00	6.69	265.06	2,126.74	-9.25	-33.88	-33.56	1.87
2,223.00	8.01	259.06	2,220.96	-10.99	-45.90	-45.51	1.61
2,318.00	9.23	265.41	2,314.89	-12.85	-59.99	-59.53	1.63
2,412.00	11.06	263.67	2,407.41	-14.45	-76.47	-75.95	1.97
2,507.00	11.70	260.69	2,500.55	-17.01	-95.03	-94.42	0.91
2,602.00	13.91	255.30	2,593.18	-21.47	-115.58	-114.81	2.64
2,697.00	15.64	256.33	2,685.04	-27.39	-139.07	-138.09	1.84
2,792.00	15.49	255.88	2,776.55	-33.52	-163.82	-162.62	0.20
2,887.00	14.77	254.60	2,868.26	-39.83	-187.80	-186.38	0.84
2,982.00	15.46	252.95	2,959.97	-46.75	-211.58	-209.91	0.86
3,077.00	13.15	251.92	3,052.02	-53.82	-233.96	-232.05	2.45
3,172.00	14.10	254.15	3,144.35	-60.34	-255.36	-253.23	1.14
3,267.00	14.56	254.86	3,236.39	-66.62	-278.02	-275.67	0.52
3,362.00	15.04	257.19	3,328.24	-72.47	-301.57	-299.01	0.80
3,457.00	14.95	258.63	3,420.00	-77.62	-325.60	-322.85	0.40
3,551.00	16.25	258.73	3,510.54	-82.58	-350.39	-347.46	1.38
3,646.00	17.19	257.67	3,601.52	-88.17	-377.14	-374.01	1.04
3,741.00	16.50	256.01	3,692.45	-94.43	-403.94	-400.60	0.89
3,836.00	14.77	250.50	3,783.93	-101.74	-428.45	-424.85	2.40
3,931.00	13.36	250.84	3,876.08	-109.38	-450.24	-446.37	1.49
4,026.00	14.41	251.68	3,968.31	-116.70	-471.83	-467.71	1.13
4,121.00	14.39	254.06	4,060.32	-123.66	-494.40	-490.04	0.62
4,216.00	15.20	257.38	4,152.17	-129.62	-517.91	-513.33	1.23
4,311.00	13.13	255.98	4,244.28	-134.96	-540.53	-535.77	2.21
4,406.00	13.91	261.21	4,336.65	-139.31	-562.28	-557.36	1.53
4,500.00	13.91	262.68	4,427.89	-142.48	-584.66	-579.62	0.38
4,595.00	11.37	268.35	4,520.59	-144.21	-605.35	-600.24	2.97
4,690.00	12.37	254.20	4,613.57	-147.25	-624.50	-619.29	3.23
4,785.00	12.37	246.57	4,706.38	-154.06	-643.63	-638.18	1.72
4,880.00	10.54	244.30	4,799.48	-161.88	-660.80	-655.08	1.98

Design Report for Trebor B11-66-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
4,975.00	8.77	238.68	4,893.13	-169.41	-674.82	-668.84	2.11
5,070.00	6.68	228.27	4,987.27	-176.86	-685.13	-678.90	2.64
5,165.00	4.60	213.93	5,081.81	-183.70	-691.38	-684.92	2.63
5,260.00	1.80	208.91	5,176.65	-188.16	-694.23	-687.62	2.96
5,354.00	1.52	197.35	5,270.61	-190.65	-695.31	-688.62	0.46
5,450.00	1.34	222.60	5,366.58	-192.69	-696.45	-689.69	0.68
5,734.00	0.62	212.27	5,650.54	-196.43	-699.52	-692.64	0.26
5,924.00	0.67	197.90	5,840.53	-198.36	-700.41	-693.46	0.09
5,978.00	0.31	194.52	5,894.53	-198.80	-700.55	-693.58	0.67
6,114.00	10.47	68.77	6,029.78	-194.67	-689.09	-682.26	7.83
6,162.00	15.06	70.13	6,076.58	-190.97	-679.15	-672.46	9.58
6,209.00	17.65	73.39	6,121.68	-186.86	-666.58	-660.03	5.84
6,257.00	22.37	73.04	6,166.77	-182.11	-650.86	-644.47	9.84
6,304.00	25.49	79.53	6,209.73	-177.66	-632.35	-626.12	8.68
6,352.00	28.48	86.10	6,252.51	-175.00	-610.77	-604.64	8.79
6,399.00	32.80	89.74	6,292.94	-174.18	-586.84	-580.76	10.00
6,447.00	38.15	89.30	6,332.02	-173.94	-559.00	-552.93	11.16
6,494.00	43.44	88.34	6,367.59	-173.30	-528.31	-522.28	11.33
6,542.00	47.64	92.34	6,401.21	-173.54	-494.07	-488.06	10.58
6,589.00	51.78	95.63	6,431.60	-176.06	-458.33	-452.25	10.30
6,637.00	54.13	93.75	6,460.51	-179.19	-420.15	-413.99	5.81
6,684.00	57.26	90.49	6,487.00	-180.60	-381.36	-375.18	8.78
6,732.00	62.00	90.51	6,511.27	-180.96	-339.96	-333.79	9.88
6,779.00	66.46	89.61	6,531.69	-181.00	-297.65	-291.49	9.64
6,827.00	71.95	89.15	6,548.73	-180.51	-252.80	-246.68	11.47
6,873.00	77.34	89.37	6,560.91	-179.94	-208.46	-202.39	11.73
6,921.00	81.57	89.17	6,569.69	-179.34	-161.28	-155.26	8.82
6,961.00	84.28	89.60	6,574.61	-178.91	-121.59	-115.60	6.86
7,007.00	86.63	88.90	6,578.26	-178.31	-75.75	-69.80	5.34
Estimated 7" Casing Point: 2291' FNL, 701' FEL (Not a Survey Station)							
7,039.00	88.27	88.41	6,579.68	-177.56	-43.79	-37.89	5.34
7,134.00	87.19	88.22	6,583.44	-174.77	51.10	56.85	1.15
7,229.00	88.02	88.79	6,587.41	-172.29	145.98	151.60	1.06
7,324.00	89.63	90.07	6,589.36	-171.35	240.95	246.49	2.16
7,419.00	91.32	91.24	6,588.57	-172.43	335.93	341.46	2.16
7,514.00	91.20	92.09	6,586.48	-175.19	430.87	436.43	0.90
7,609.00	89.60	92.70	6,585.82	-179.16	525.78	531.42	1.80
7,703.00	91.51	92.99	6,584.91	-183.83	619.66	625.40	2.06
7,798.00	91.94	92.36	6,582.05	-188.26	714.51	720.35	0.80
7,893.00	90.56	92.01	6,579.98	-191.88	809.42	815.32	1.50
7,988.00	90.37	89.15	6,579.21	-192.84	904.40	910.29	3.02
8,083.00	88.55	88.23	6,580.10	-190.67	999.36	1,005.13	2.15
8,178.00	88.98	86.36	6,582.15	-186.19	1,094.23	1,099.80	2.02
8,273.00	90.65	85.99	6,582.46	-179.85	1,189.02	1,194.32	1.80
8,368.00	91.14	89.45	6,580.97	-176.07	1,283.91	1,289.04	3.68
8,463.00	89.72	91.09	6,580.26	-176.52	1,378.90	1,383.99	2.28
8,558.00	89.26	88.39	6,581.11	-176.09	1,473.89	1,478.91	2.88
8,653.00	88.49	88.30	6,582.97	-173.35	1,568.83	1,573.71	0.82
8,748.00	89.69	86.97	6,584.48	-169.43	1,663.74	1,668.43	1.89
8,843.00	90.59	89.24	6,584.25	-166.29	1,758.68	1,763.22	2.57
8,938.00	90.15	86.10	6,583.63	-162.42	1,853.58	1,857.94	3.34

Design Report for Trebor B11-66-1HN - Vaughn ESS and Sperry MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,033.00	90.92	88.85	6,582.75	-158.24	1,948.48	1,952.65	3.01
9,128.00	89.75	87.84	6,582.19	-155.50	2,043.43	2,047.46	1.63
9,223.00	91.60	88.61	6,581.07	-152.55	2,138.38	2,142.25	2.11
9,318.00	91.82	89.28	6,578.24	-150.81	2,233.32	2,237.09	0.74
9,413.00	92.71	89.87	6,574.48	-150.10	2,328.24	2,331.93	1.12
9,507.00	92.50	90.96	6,570.21	-150.78	2,422.14	2,425.80	1.18
9,602.00	90.65	93.31	6,567.60	-154.32	2,517.03	2,520.75	3.15
9,697.00	89.69	91.37	6,567.32	-158.20	2,611.94	2,615.75	2.28
9,792.00	89.29	89.87	6,568.16	-159.23	2,706.93	2,710.72	1.63
9,887.00	88.55	89.46	6,569.95	-158.67	2,801.91	2,805.63	0.89
9,982.00	89.66	89.29	6,571.44	-157.63	2,896.89	2,900.52	1.18
10,077.00	88.98	90.00	6,572.56	-157.05	2,991.88	2,995.44	1.03
10,172.00	90.74	90.32	6,572.80	-157.31	3,086.88	3,090.39	1.88
10,267.00	90.99	92.31	6,571.36	-159.49	3,181.83	3,185.37	2.11
10,362.00	90.55	90.53	6,570.09	-161.84	3,276.79	3,280.35	1.93
10,435.00	90.03	90.83	6,569.72	-162.71	3,349.79	3,353.34	0.82
10,530.00	89.66	90.99	6,569.97	-164.22	3,444.77	3,448.32	0.42
10,625.00	89.63	88.20	6,570.56	-163.55	3,539.76	3,543.23	2.94
10,720.00	90.03	86.36	6,570.84	-159.04	3,634.65	3,637.92	1.98
10,815.00	88.67	86.79	6,571.92	-153.37	3,729.47	3,732.50	1.50
10,910.00	89.04	87.65	6,573.82	-148.76	3,824.34	3,827.17	0.99
10,977.00	88.86	86.82	6,575.05	-145.53	3,891.25	3,893.93	1.27
Final Sperry MWD Survey @ 10977.00 ft. MD							
11,040.00	88.86	86.82	6,576.30	-142.03	3,954.14	3,956.67	0.00
Estimated BHL: 2322' FNL, 540' FEL :: Straight Line Projection to TD @ 11040.00 ft. MD							

Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates +N/-S (ft)	Local Coordinates +E/-W (ft)	Comment
613.00	612.98	2.35	3.77	Tie-On to VES Gyro Surveys @ 613.00 ft. MD
718.00	717.97	3.19	3.77	First Sperry MWD Survey @ 718.00 ft. MD
7,007.00	6,578.26	-178.31	-75.75	Estimated 7" Casing Point: 2291' FNL, 701' FEL (Not a Survey Station)
10,977.00	6,575.05	-145.53	3,891.25	Final Sperry MWD Survey @ 10977.00 ft. MD
11,040.00	6,576.30	-142.03	3,954.14	Estimated BHL: 2322' FNL, 540' FEL :: Straight Line Projection to TD @ 11040.00 ft. MD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin +N/_S (ft)	Origin +E/-W (ft)	Start TVD (ft)
Target	Trebor B11-66-1HN (PAR0) BHL	91.90	Slot	0.00	0.00	0.00

Design Report for Trebor B11-66-1HN - Vaughn ESS and Sperry MWD Survey

Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
305.00	613.00	Vaughn ESS Survey	Flexi-Shot
718.00	7,007.00	Sperry MWD Surveys	MWD+IFR1+MS_WY
7,007.00	11,040.00	Sperry MWD Surveys	MWD+IFR1+MS_WY

Casing Details

Measured Depth (ft)	Vertical Depth (ft)	Name	Casing Diameter (")	Hole Diameter (")
7,007.00	6,578.26	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
Trebor B11-66-1HN	0.00	0.00	5,944.17	-198.00	-708.00	1,395,427.35	3,270,984.52	40.414768	-104.526790
- actual wellpath misses target center by 8.94ft at 6026.91ft MD (5943.40 TVD, -198.43 N, -699.10 E)									
- Circle (radius 17.50)									
Trebor B11-66-1HN	0.00	0.00	6,569.26	-131.03	3,955.82	1,395,494.31	3,275,648.15	40.414810	-104.510040
- actual wellpath misses target center by 13.17ft at 11040.00ft MD (6576.30 TVD, -142.03 N, 3954.14 E)									
- Point									
Trebor B11 (PAD)	0.00	0.00	0.00	0.00	0.00	1,395,625.34	3,271,692.49	40.415290	-104.524240
- actual wellpath hits target center									
- Polygon									
Point 1				-292.13	-2,759.28	1,392,866.17	3,271,400.37		
Point 2				4,058.47	-2,696.69	1,392,928.76	3,275,750.80		
Point 3				4,016.91	1,720.27	1,397,345.54	3,275,709.24		
Point 4				-335.00	1,648.71	1,397,273.99	3,271,357.50		
Point 5				-292.13	-2,759.28	1,392,866.17	3,271,400.37		
Trebor B11-66-1HN	0.00	0.00	0.00	0.00	0.00	1,395,625.34	3,271,692.49	40.415290	-104.524240
- actual wellpath hits target center									
- Point									
Trebor B11-66-1HN	-0.20	89.18	6,583.01	-187.70	11.29	1,395,437.65	3,271,703.78	40.414774	-104.524207
- actual wellpath misses target center by 11.80ft at 7093.85ft MD (6581.63 TVD, -175.99 N, 11.00 E)									
- Rectangle (sides W70.00 H3,944.96 D8.00)									
Trebor B11 (PAD) SL	0.00	0.00	0.00	0.00	0.00	1,395,625.34	3,271,692.49	40.415290	-104.524240
- actual wellpath hits target center									
- Polygon									
Point 1				-747.13	-3,225.28	1,392,400.19	3,270,945.39		
Point 2				4,521.47	-3,148.69	1,392,476.77	3,276,213.78		
Point 3				4,472.91	2,188.27	1,397,813.52	3,276,165.23		
Point 4				-800.00	2,100.71	1,397,725.97	3,270,892.52		
Point 5				-747.13	-3,225.28	1,392,400.19	3,270,945.39		
Trebor B11-66-1HN		0.00	6,580.40	-189.21	-93.66	1,395,436.14	3,271,598.83	40.414773	-104.524584
- actual wellpath misses target center by 11.11ft at 6989.17ft MD (6577.07 TVD, -178.61 N, -93.54 E)									
- Point									

North Reference Sheet for Sec. 11-T5N-R64W - Trebor B11-66-1HN

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

Vertical Depths are relative to RKB 26 ft. @ 4627.00ft (H&P 315). Northing and Easting are relative to Trebor B11-66-1HN

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: 0.99996096

Grid Coordinates of Well: 1,395,625.34 ft N, 3,271,692.49 ft E

Geographical Coordinates of Well: 40° 24' 55.04" N, 104° 31' 27.26" W

Grid Convergence at Surface is: 0.63°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,040.00ft
the Bottom Hole Displacement is 3,956.69ft in the Direction of 92.06° (Grid).

Magnetic Convergence at surface is: -7.86° (10 June 2013, , BGGM2013)