

# Bill Barrett Corp

Weld County, CO (NAD 1983)

Sec. 22-T6N-R62W

Dutch Lake 24-22H

Plan A

Design: MWD Survey

## Sperry Drilling Services

# Final Survey Report

01 November, 2012

Well Coordinates: 1,419,599.32 N, 3,329,787.89 E (40° 28' 44.94" N, 104° 18' 52.08" W)

Ground Level: 4,791.00 ft

Local Coordinate Origin:

Centered on Well Dutch Lake 24-22H

Viewing Datum:

KB=22' @ 4813.00ft (H&P 278)

TVDs to System:

N

North Reference:

Grid

Unit System:

API - US Survey Feet - Custom

Geodetic Scale Factor Applied

Version: 2003.16 Build: 431

**HALLIBURTON**

## Design Report for Dutch Lake 24-22H - 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
872.00	0.00	0.00	872.00	0.00	0.00	0.00	0.00
Surface Casing Assumed Vertical at 872.00ft							
900.00	0.74	329.81	900.00	0.16	-0.09	-0.15	2.64
First MWD Survey							
991.00	0.65	1.99	990.99	1.18	-0.37	-1.15	0.43
1,090.00	0.59	347.51	1,089.99	2.24	-0.46	-2.20	0.17
1,185.00	0.49	337.86	1,184.98	3.09	-0.72	-3.03	0.14
1,281.00	0.88	11.61	1,280.98	4.20	-0.72	-4.12	0.57
1,374.00	0.83	10.02	1,373.97	5.56	-0.46	-5.50	0.06
1,468.00	0.94	0.06	1,467.95	7.00	-0.34	-6.95	0.20
1,562.00	0.88	355.66	1,561.94	8.49	-0.40	-8.43	0.10
1,658.00	1.34	344.38	1,657.92	10.31	-0.76	-10.21	0.53
1,754.00	1.91	358.95	1,753.89	12.99	-1.09	-12.86	0.73
1,849.00	1.45	25.89	1,848.85	15.65	-0.59	-15.56	0.95
1,945.00	1.24	11.83	1,944.82	17.76	0.15	-17.72	0.41
2,041.00	1.39	358.75	2,040.80	19.94	0.34	-19.91	0.35
2,136.00	0.93	48.01	2,135.78	21.61	0.89	-21.61	1.11
2,232.00	1.03	48.79	2,231.76	22.70	2.12	-22.80	0.11
2,327.00	0.44	74.80	2,326.76	23.36	3.11	-23.53	0.70
2,423.00	0.40	119.25	2,422.75	23.29	3.76	-23.51	0.33
2,517.00	0.37	178.63	2,516.75	22.83	4.05	-23.08	0.41
2,613.00	0.25	154.07	2,612.75	22.33	4.15	-22.59	0.18
2,708.00	0.59	212.09	2,707.75	21.73	3.98	-21.97	0.53
2,804.00	0.42	193.34	2,803.74	20.97	3.64	-21.19	0.24
2,900.00	0.52	166.78	2,899.74	20.20	3.66	-20.43	0.25
2,995.00	0.44	176.57	2,994.74	19.42	3.78	-19.65	0.12
3,091.00	0.58	242.55	3,090.73	18.82	3.37	-19.03	0.59
3,186.00	0.73	238.58	3,185.73	18.29	2.42	-18.42	0.16
3,281.00	0.65	295.60	3,280.72	18.20	1.42	-18.26	0.70
3,376.00	1.32	316.16	3,375.71	19.23	0.18	-19.18	0.79
3,471.00	1.68	315.31	3,470.68	21.01	-1.56	-20.82	0.38
3,567.00	1.57	307.15	3,566.64	22.80	-3.60	-22.44	0.27
3,662.00	2.09	303.19	3,661.59	24.53	-6.08	-23.98	0.56
3,757.00	0.18	215.38	3,756.57	25.36	-7.62	-24.68	2.20
3,852.00	0.22	192.86	3,851.57	25.06	-7.75	-24.37	0.09
3,947.00	0.26	127.74	3,946.57	24.75	-7.62	-24.07	0.27
4,043.00	0.50	116.25	4,042.56	24.43	-7.07	-23.80	0.26
4,138.00	0.66	126.99	4,137.56	23.92	-6.26	-23.35	0.20
4,234.00	0.99	99.00	4,233.55	23.46	-5.00	-22.99	0.53
4,329.00	0.73	102.74	4,328.54	23.20	-3.60	-22.84	0.28
4,424.00	0.56	67.03	4,423.53	23.24	-2.58	-22.97	0.45
4,519.00	0.38	46.52	4,518.53	23.64	-1.93	-23.42	0.26
4,614.00	0.88	343.27	4,613.52	24.56	-1.91	-24.33	0.83
4,710.00	0.98	341.39	4,709.51	26.04	-2.38	-25.77	0.11
4,805.00	1.36	20.99	4,804.49	27.86	-2.24	-27.60	0.92
4,901.00	1.85	15.99	4,900.45	30.42	-1.40	-30.21	0.53
4,996.00	2.15	29.11	4,995.40	33.45	-0.11	-33.33	0.57
5,091.00	0.50	328.56	5,090.37	35.36	0.54	-35.29	2.06
5,187.00	0.66	340.82	5,186.37	36.24	0.14	-36.14	0.21

**Design Report for Dutch Lake 24-22H - MWD Survey**

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
5,283.00	0.29	10.25	5,282.36	37.00	0.00	-36.88	0.45
5,568.00	0.79	52.73	5,567.35	38.90	1.69	-38.91	0.21
5,662.00	0.56	30.44	5,661.34	39.69	2.44	-39.76	0.37
5,757.00	0.48	51.44	5,756.34	40.34	2.99	-40.45	0.22
5,852.00	0.18	172.47	5,851.34	40.44	3.32	-40.57	0.62
5,899.00	4.51	192.89	5,898.29	38.56	2.91	-38.67	9.24
5,947.00	9.28	185.37	5,945.93	32.86	2.13	-32.93	10.09
5,994.00	13.79	187.87	5,991.97	23.54	1.01	-23.54	9.65
6,043.00	16.32	190.74	6,039.28	10.99	-1.07	-10.87	5.38
6,091.00	19.38	189.54	6,084.97	-3.50	-3.65	3.77	6.42
6,137.00	24.20	187.79	6,127.67	-20.37	-6.20	20.80	10.57
6,184.00	30.85	187.39	6,169.32	-41.89	-9.06	42.48	14.15
6,232.00	36.79	191.32	6,209.19	-68.22	-13.46	69.07	13.18
6,279.00	40.78	192.66	6,245.82	-97.01	-19.59	98.25	8.67
6,327.00	46.10	185.62	6,280.68	-129.55	-24.73	131.10	14.97
6,374.00	51.06	182.82	6,311.77	-164.69	-27.29	166.33	11.46
6,423.00	57.96	183.63	6,340.20	-204.50	-29.54	206.19	14.15
6,470.00	60.17	184.63	6,364.36	-244.70	-32.45	246.50	5.04
6,518.00	62.12	185.18	6,387.52	-286.59	-36.05	288.54	4.18
6,565.00	66.81	184.93	6,407.78	-328.82	-39.78	330.93	9.99
6,613.00	73.97	183.77	6,423.88	-373.87	-43.20	376.12	15.09
6,660.00	77.13	183.73	6,435.60	-419.28	-46.17	421.62	6.72
6,708.00	79.11	183.35	6,445.48	-466.16	-49.07	468.58	4.20
6,755.00	80.91	183.04	6,453.64	-512.38	-51.65	514.86	3.88
6,803.00	81.83	183.25	6,460.84	-559.76	-54.26	562.30	1.96
6,850.00	83.50	182.82	6,466.84	-606.31	-56.72	608.90	3.67
6,920.00	92.38	184.83	6,469.35	-676.04	-61.39	678.77	13.01
6,997.00	93.89	184.27	6,465.14	-752.68	-67.49	755.66	2.09
7,091.00	90.28	185.00	6,461.72	-846.29	-75.08	849.58	3.92
7,186.00	90.37	186.48	6,461.18	-940.81	-84.58	944.55	1.56
7,283.00	90.52	183.34	6,460.43	-1,037.44	-92.88	1,041.53	3.24
7,378.00	90.77	182.61	6,459.36	-1,132.30	-97.81	1,136.49	0.81
7,472.00	90.83	182.60	6,458.05	-1,226.20	-102.08	1,230.43	0.06
7,568.00	88.03	183.82	6,459.00	-1,322.03	-107.46	1,326.39	3.18
7,663.00	88.18	183.16	6,462.15	-1,416.80	-113.24	1,421.32	0.71
7,759.00	89.14	183.01	6,464.39	-1,512.64	-118.40	1,517.26	1.01
7,854.00	90.22	184.39	6,464.92	-1,607.43	-124.53	1,612.25	1.84
7,949.00	90.52	186.28	6,464.31	-1,702.01	-133.37	1,707.23	2.01
8,044.00	90.34	185.36	6,463.59	-1,796.52	-143.00	1,802.20	0.99
8,139.00	90.19	184.74	6,463.15	-1,891.15	-151.36	1,897.20	0.67
8,235.00	90.22	185.03	6,462.81	-1,986.80	-159.54	1,993.20	0.30
8,330.00	86.95	181.56	6,465.16	-2,081.59	-164.99	2,088.12	5.02
8,425.00	89.72	178.85	6,467.92	-2,176.53	-165.33	2,182.79	4.08
8,521.00	90.77	179.14	6,467.51	-2,272.51	-163.65	2,278.34	1.13
8,617.00	91.14	178.96	6,465.91	-2,368.49	-162.06	2,373.88	0.43
8,711.00	89.51	179.39	6,465.37	-2,462.47	-160.70	2,467.47	1.79
8,807.00	89.51	182.14	6,466.20	-2,558.45	-161.99	2,563.25	2.86
8,902.00	89.20	181.61	6,467.27	-2,653.39	-165.09	2,658.14	0.65
8,998.00	88.77	181.10	6,468.97	-2,749.35	-167.36	2,753.98	0.69
9,093.00	86.29	178.15	6,473.06	-2,844.24	-166.74	2,848.52	4.05
9,188.00	88.15	179.17	6,477.67	-2,939.10	-164.53	2,942.91	2.23

## Design Report for Dutch Lake 24-22H - MWD Survey

Measured Depth (ft)	Inclination (°)	Azimuth (°)	Vertical Depth (ft)	+N/-S (ft)	+E/-W (ft)	Vertical Section (ft)	Dogleg Rate (°/100ft)
9,283.00	89.29	179.69	6,479.79	-3,034.07	-163.58	3,037.51	1.32
9,377.00	90.71	179.80	6,479.79	-3,128.06	-163.16	3,131.18	1.52
9,472.00	91.57	180.10	6,477.90	-3,223.04	-163.08	3,225.85	0.96
9,567.00	89.14	178.34	6,477.31	-3,318.02	-161.79	3,320.43	3.16
9,662.00	90.31	178.90	6,477.77	-3,412.99	-159.50	3,414.92	1.37
9,758.00	89.85	180.31	6,477.63	-3,508.99	-158.84	3,510.56	1.54
9,853.00	90.00	181.66	6,477.76	-3,603.97	-160.47	3,605.38	1.43
9,948.00	90.37	184.00	6,477.45	-3,698.85	-165.16	3,700.33	2.49
10,043.00	90.49	185.25	6,476.74	-3,793.53	-172.82	3,795.33	1.32
10,137.00	90.62	186.87	6,475.83	-3,887.00	-182.74	3,889.29	1.73
10,232.00	90.43	188.52	6,474.96	-3,981.14	-195.46	3,984.13	1.75
10,327.00	90.15	190.21	6,474.48	-4,074.87	-210.92	4,078.79	1.80
10,422.00	90.12	191.07	6,474.25	-4,168.23	-228.46	4,173.25	0.91
10,517.00	90.12	192.77	6,474.05	-4,261.18	-248.08	4,267.46	1.79
10,546.00	90.22	193.29	6,473.97	-4,289.43	-254.62	4,296.14	1.83
<b>Final MWD Survey</b>							
10,600.00	90.22	193.29	6,473.76	-4,341.99	-267.03	4,349.51	0.00
<b>Survey Projection to TD</b>							

### Design Annotations

Measured Depth (ft)	Vertical Depth (ft)	Local Coordinates		Comment
		+N/-S (ft)	+E/-W (ft)	
872.00	872.00	0.00	0.00	Surface Casing Assumed Vertical at 872.00ft
900.00	900.00	0.16	-0.09	First MWD Survey
10,546.00	6,473.97	-4,289.43	-254.62	Final MWD Survey
10,600.00	6,473.76	-4,341.99	-267.03	Survey Projection to TD

### Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (ft)
				+N/-S (ft)	+E/-W (ft)	
Target	Dutch Lake 24-22H_PlanA - Rev0_BHL	184.53	Slot	0.00	0.00	0.00

### Survey tool program

From (ft)	To (ft)	Survey/Plan	Survey Tool
872.00	10,600.00	Sperry MWD Surveys	MWD

## Design Report for Dutch Lake 24-22H - MWD Survey

**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
Dutch Lake	0.00	0.00	0.00	0.00	0.00	1,419,599.32	3,329,787.89	40° 28' 44.940 N	104° 18' 52.081 W
- actual wellpath hits target center									
- Polygon									
Point 1				-955.00	294.00	1,419,893.31	3,328,832.93		
Point 2				1,740.00	368.00	1,419,967.31	3,331,527.83		
Point 3				3,075.00	409.00	1,420,008.31	3,332,862.79		
Point 4				4,410.00	449.00	1,420,048.31	3,334,197.74		
Point 5				4,472.00	-4,826.00	1,414,773.49	3,334,259.74		
Point 6				1,765.00	-4,908.00	1,414,691.49	3,331,552.83		
Point 7				-947.00	-4,987.00	1,414,612.50	3,328,840.93		
Point 8				-942.00	-2,347.00	1,417,252.40	3,328,845.93		
Point 9				-955.00	294.00	1,419,893.31	3,328,832.93		
Dutch Lake	0.00	0.00	0.00	0.00	0.00	1,419,599.32	3,329,787.89	40° 28' 44.940 N	104° 18' 52.081 W
- actual wellpath hits target center									
- Polygon									
Point 1				-355.00	-306.00	1,419,293.33	3,329,432.91		
Point 2				1,740.00	-232.00	1,419,367.33	3,331,527.83		
Point 3				3,075.00	-191.00	1,419,408.33	3,332,862.79		
Point 4				3,810.00	-151.00	1,419,448.33	3,333,597.76		
Point 5				3,872.00	-4,226.00	1,415,373.47	3,333,659.76		
Point 6				1,765.00	-4,308.00	1,415,291.47	3,331,552.83		
Point 7				-347.00	-4,387.00	1,415,212.48	3,329,440.91		
Point 8				-342.00	-2,347.00	1,417,252.40	3,329,445.91		
Point 9				-355.00	-306.00	1,419,293.33	3,329,432.91		
Dutch Lake	0.00	0.00	6,473.00	-4,369.89	-346.46	1,415,229.59	3,329,441.45	40° 28' 1.808 N	104° 18' 57.319 W
- actual wellpath misses target center by 84.18ft at 10600.00ft MD (6473.76 TVD, -4341.99 N, -267.03 E)									
- Point									

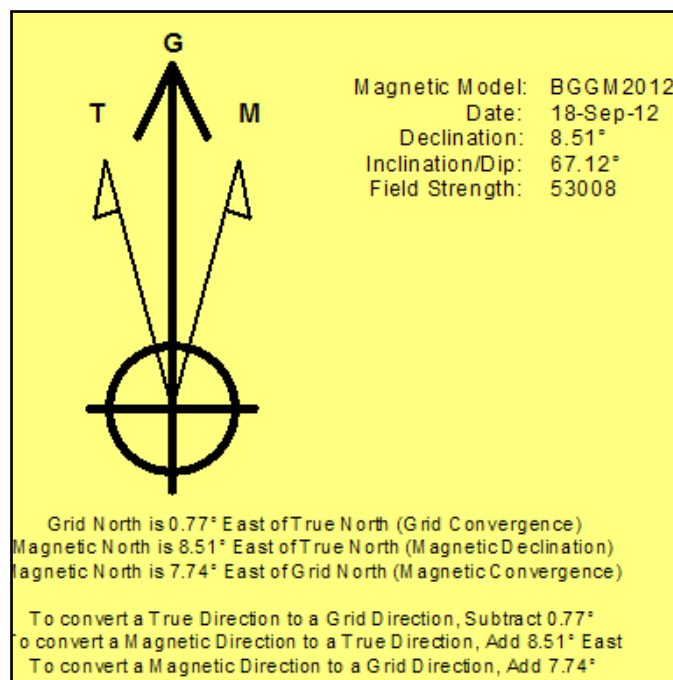
# North Reference Sheet for Sec. 22-T6N-R62W - Dutch Lake 24-22H - Plan A

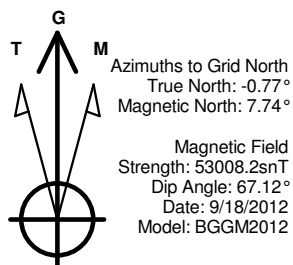
All data is in US Feet unless otherwise stated. Directions and Coordinates are relative to Grid North Reference.  
Vertical Depths are relative to KB=22' @ 4813.00ft (H&P 278). Northing and Easting are relative to Dutch Lake 24-22H  
Coordinate System is US State Plane 1983, Colorado Northern Zone using datum North American Datum 1983, ellipsoid GRS 1980  
Projection method is Lambert Conformal Conic (2 parallel)  
Central Meridian is 105° 30' 0.000 W°, Longitude Origin:0° 0' 0.000 E°, Latitude Origin:40° 47' 0.000 N°  
False Easting: 3,000,000.00ft, False Northing: 1,000,000.00ft, Scale Reduction: 0.99996477

Grid Coordinates of Well: 1,419,599.32 ft N, 3,329,787.89 ft E  
Geographical Coordinates of Well: 40° 28' 44.94" N, 104° 18' 52.08" W  
Grid Convergence at Surface is: 0.77°

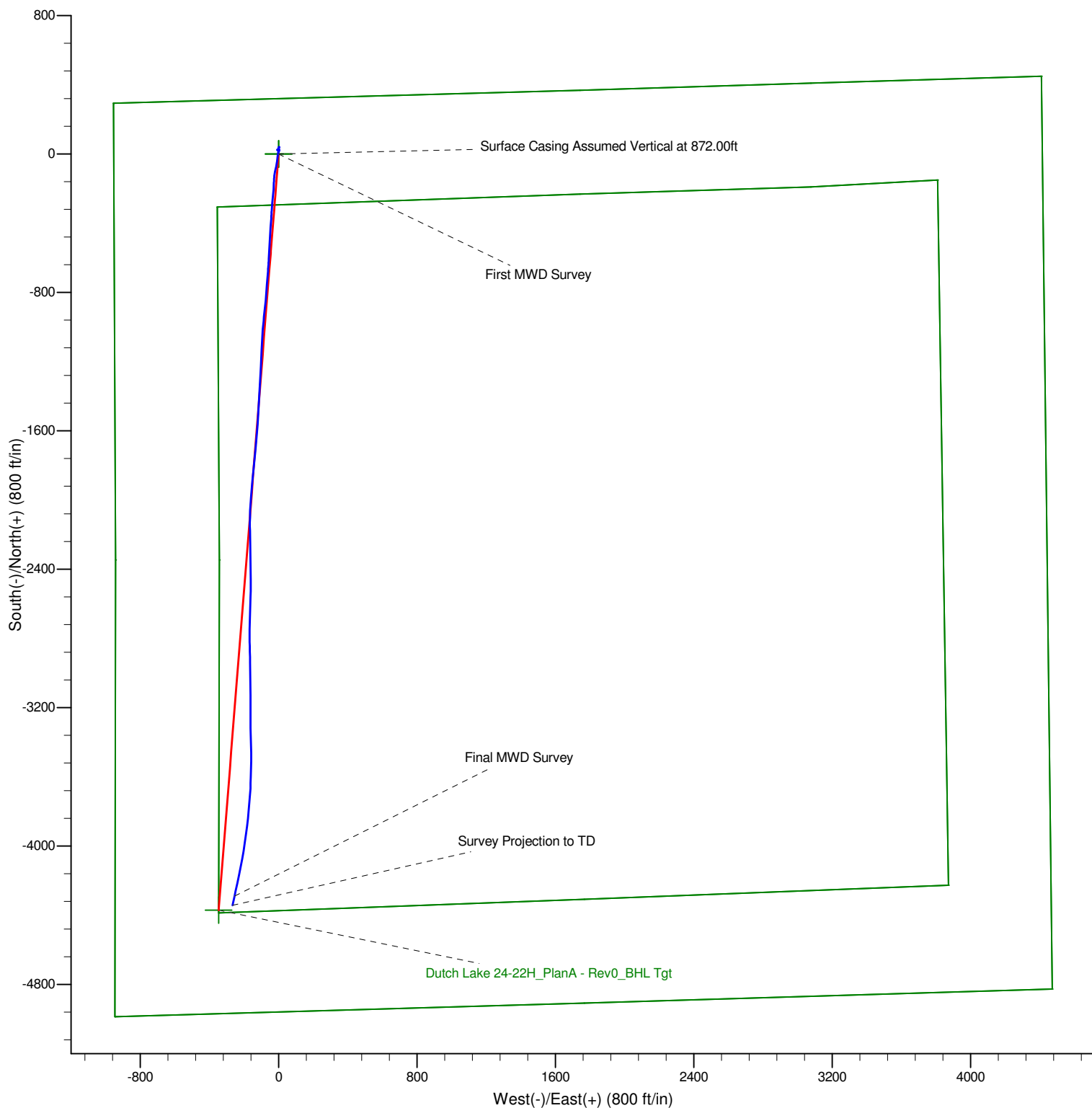
Based upon Minimum Curvature type calculations, at a Measured Depth of 10,600.00ft  
the Bottom Hole Displacement is 4,350.19ft in the Direction of 183.52° (Grid).

Magnetic Convergence at surface is: -7.74° (18 September 2012, , BGGM2012)



**LEGEND**

- Dutch Lake 24-22H, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

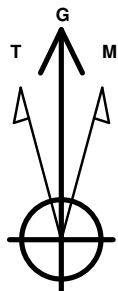


Project: Weld County, CO (NAD 1983)  
Site: Sec. 22-T6N-R62W  
Well: Dutch Lake 24-22H

# Bill Barrett Corp

**HALLIBURTON**

Sperry Drilling



Azimuths to Grid North  
True North:  $-0.77^\circ$   
Magnetic North:  $7.74^\circ$

Magnetic Field  
Strength: 53008.2snT  
Dip Angle:  $67.12^\circ$   
Date: 9/18/2012  
Model: BGGM2012

## LEGEND

- Dutch Lake 24-22H, Plan A, Plan A - Rev 0 Proposal V0
- MWD Survey

