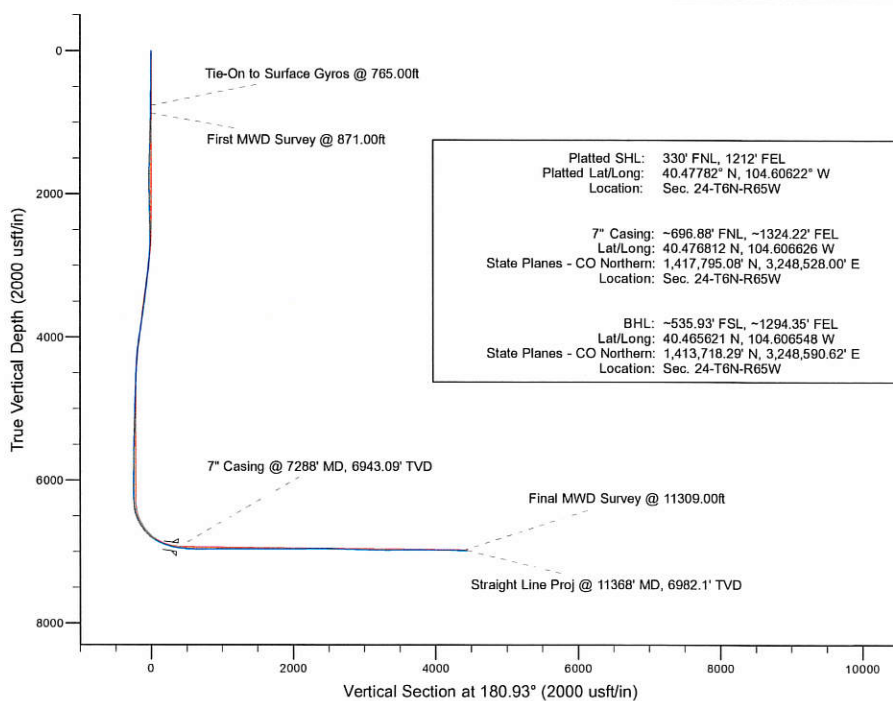
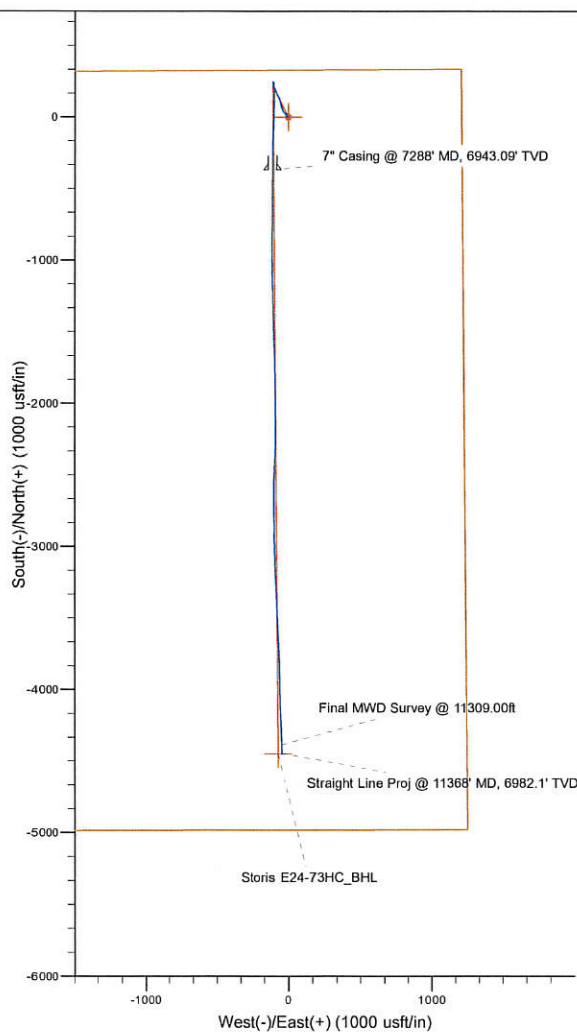


Project: Weld County, CO (NAD 83)
 Site: Sec. 24-T6N-R65W (Storis/Mackinaw Pad)
 Well: Storis E24-73HC
 Wellbore: Plan A
 Design: Final Surveys

Noble Energy

HALLIBURTON
 Space Drilling



LEGEND

- ✕ Storis E24-73HC, Plan A, Rev A0 - PROPOSAL V0
- Final Surveys

Platted SHL: 330' FNL, 1212' FEL
 Platted Lat/Long: 40.47782° N, 104.60622° W
 Location: Sec. 24-T6N-R65W

7" Casing: ~696.88' FNL, ~1324.22' FEL
 Lat/Long: 40.476812° N, 104.606626° W
 State Planes - CO Northern: 1,417,795.08' N, 3,248,528.00' E
 Location: Sec. 24-T6N-R65W

BHL: ~535.93' FSL, ~1294.35' FEL
 Lat/Long: 40.465621° N, 104.606548° W
 State Planes - CO Northern: 1,413,718.29' N, 3,248,590.62' E
 Location: Sec. 24-T6N-R65W

WELL DETAILS: Storis E24-73HC

Ground Level: 4684.00
 RKB=24ft @ 4708.00usft (H&P 315)

Created By: Fred Hartmann
 Created On: 05/30/2014

Noble Energy

Weld County, CO (NAD 83)

Sec. 24-T6N-R65W (Storis/Mackinaw Pad)

Storis E24-73HC

Design: Final Surveys

Sperry Drilling Services

Final Survey Report

30 May, 2014

Surface UWI : 901173067

Well Coordinates: 1,418,163.27 N, 3,248,637.03 E (40° 28' 40.15" N, 104° 36' 22.39" W)

Ground Level: 4,684.00 usft

Local Coordinate Origin:

Viewing Datum:

TVDs to System:

North Reference:

Unit System:

Geodetic Scale Factor Applied

Version: 5000.1 Build: 70

Centered on Well Storis E24-73HC

RKB=24ft @ 4708.00usft (H&P 315)

N

Grid

Dec-Deg - API - US Survey Feet - Custom

HALLIBURTON

Design Report for Storis E24-73HC - Final 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
235.00	0.80	289.46	234.99	0.55	-1.55	-0.52	0.34
480.00	0.60	300.06	479.97	1.76	-4.27	-1.69	0.10
765.00	1.70	269.96	764.91	2.50	-9.79	-2.34	0.43
Tie-On to Surface Gyros @ 765.00ft							
871.00	2.44	335.05	870.86	4.55	-12.31	-4.35	2.18
First MWD Survey @ 871.00ft							
993.00	1.57	10.15	992.79	8.55	-13.11	-8.34	1.20
1,086.00	1.69	9.21	1,085.75	11.16	-12.67	-10.95	0.13
1,273.00	1.64	3.10	1,272.67	16.55	-12.08	-16.35	0.10
1,457.00	2.00	13.18	1,456.58	22.31	-11.21	-22.12	0.26
1,552.00	1.97	12.40	1,551.52	25.51	-10.48	-25.34	0.04
1,647.00	1.77	12.87	1,646.47	28.54	-9.80	-28.38	0.21
1,742.00	0.68	97.88	1,741.45	29.89	-8.92	-29.74	1.94
1,837.00	0.70	152.10	1,836.45	29.30	-8.09	-29.17	0.66
1,932.00	1.02	165.89	1,931.43	27.97	-7.61	-27.84	0.40
2,027.00	1.54	178.78	2,026.41	25.87	-7.38	-25.75	0.62
2,122.00	1.23	183.71	2,121.38	23.58	-7.42	-23.46	0.35
2,217.00	1.24	174.82	2,216.36	21.54	-7.39	-21.42	0.20
2,312.00	1.42	205.83	2,311.34	19.45	-7.81	-19.33	0.77
2,407.00	1.25	179.54	2,406.31	17.36	-8.31	-17.22	0.66
2,502.00	1.00	193.68	2,501.29	15.52	-8.50	-15.38	0.39
2,596.00	1.32	269.76	2,595.28	14.72	-9.78	-14.56	1.54
2,691.00	3.23	295.06	2,690.20	15.85	-13.30	-15.63	2.22
2,786.00	3.80	307.65	2,785.02	18.90	-18.21	-18.60	1.01
2,881.00	5.59	322.44	2,879.70	24.49	-23.53	-24.11	2.26
2,976.00	7.12	320.90	2,974.12	32.73	-30.06	-32.24	1.62
3,071.00	8.03	331.80	3,068.29	43.15	-36.91	-42.54	1.79
3,166.00	7.77	338.47	3,162.39	54.97	-42.40	-54.28	1.00
3,261.00	7.83	341.46	3,256.51	67.08	-46.82	-66.31	0.43
3,356.00	7.25	347.14	3,350.69	79.06	-50.21	-78.24	0.99
3,451.00	5.89	345.35	3,445.07	89.62	-52.78	-88.75	1.45
3,546.00	7.67	354.73	3,539.40	100.65	-54.59	-99.75	2.20
3,641.00	8.27	346.61	3,633.49	113.61	-56.76	-112.68	1.34
3,736.00	9.23	335.99	3,727.39	127.22	-61.44	-126.21	1.97
3,831.00	9.58	335.58	3,821.11	141.37	-67.81	-140.26	0.38
3,926.00	9.56	337.00	3,914.79	155.83	-74.16	-154.61	0.25
4,021.00	8.99	336.50	4,008.55	169.90	-80.20	-168.58	0.61
4,115.00	7.64	335.78	4,101.56	182.34	-85.69	-180.93	1.44
4,210.00	6.33	339.09	4,195.85	192.99	-90.15	-191.50	1.44
4,305.00	5.63	336.94	4,290.33	202.17	-93.85	-200.62	0.77
4,400.00	3.95	332.59	4,385.00	209.36	-97.18	-207.76	1.81
4,495.00	3.07	329.72	4,479.82	214.46	-99.97	-212.82	0.94
4,590.00	1.07	337.86	4,574.75	217.48	-101.59	-215.81	2.12
4,685.00	1.47	6.69	4,669.73	219.51	-101.78	-217.84	0.78
4,780.00	2.14	0.91	4,764.68	222.50	-101.61	-220.82	0.73
4,875.00	3.02	15.18	4,859.58	226.69	-100.92	-225.02	1.14
4,970.00	1.28	7.58	4,954.51	230.15	-100.13	-228.50	1.85
5,064.00	0.97	10.57	5,048.50	231.98	-99.84	-230.33	0.34
5,159.00	1.25	15.73	5,143.48	233.76	-99.42	-232.12	0.31

Design Report for Storis E24-73HC - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
5,254.00	1.50	354.06	5,238.45	236.00	-99.26	-234.36	0.60
5,444.00	2.09	348.26	5,428.36	241.86	-100.23	-240.21	0.32
5,539.00	2.54	273.51	5,523.30	243.69	-102.68	-242.00	2.98
5,634.00	0.35	1.68	5,618.27	244.11	-104.77	-242.38	2.69
5,729.00	0.17	169.49	5,713.27	244.26	-104.74	-242.53	0.54
5,824.00	0.72	359.16	5,808.26	244.72	-104.72	-242.99	0.93
5,919.00	0.87	350.63	5,903.25	246.03	-104.85	-244.30	0.20
6,014.00	0.14	68.71	5,998.25	246.78	-104.86	-245.05	0.90
6,109.00	0.45	283.62	6,093.25	246.91	-105.11	-245.18	0.60
6,202.00	0.77	315.87	6,186.24	247.45	-105.90	-245.70	0.49
6,259.00	1.02	321.98	6,243.24	248.12	-106.48	-246.36	0.47
6,388.00	7.25	172.39	6,371.93	240.94	-106.11	-239.19	6.31
6,436.00	11.91	165.59	6,419.25	233.14	-104.48	-231.42	9.97
6,483.00	16.89	169.58	6,464.76	221.72	-102.03	-220.04	10.80
6,531.00	21.78	172.52	6,510.04	206.02	-99.61	-204.38	10.38
6,578.00	24.91	175.70	6,553.19	187.50	-97.73	-185.90	7.18
6,626.00	29.29	177.33	6,595.91	165.68	-96.43	-164.10	9.25
6,673.00	34.38	181.01	6,635.83	140.91	-96.12	-139.34	11.59
6,721.00	37.50	184.06	6,674.69	112.78	-97.40	-111.19	7.49
6,768.00	38.60	181.59	6,711.70	83.85	-98.82	-82.24	4.00
6,816.00	42.90	180.97	6,748.06	52.53	-99.51	-50.92	9.00
6,863.00	48.35	180.83	6,780.91	18.96	-100.04	-17.33	11.60
6,911.00	54.60	181.93	6,810.80	-18.57	-100.96	20.20	13.14
6,958.00	59.70	182.84	6,836.28	-58.00	-102.61	59.65	10.97
7,006.00	63.39	181.90	6,859.15	-100.16	-104.35	101.83	7.88
7,053.00	66.65	182.19	6,879.00	-142.73	-105.87	144.42	6.96
7,101.00	70.77	181.48	6,896.42	-187.42	-107.30	189.13	8.69
7,148.00	72.72	180.98	6,911.14	-232.04	-108.25	233.76	4.27
7,196.00	75.23	179.95	6,924.39	-278.17	-108.62	279.89	5.62
7,240.00	78.04	180.35	6,934.56	-320.98	-108.74	322.69	6.45
7,288.00	81.50	180.37	6,943.09	-368.20	-109.04	369.92	7.20
7" Casing @ 7288' MD, 6943.09' TVD							
7,319.00	83.73	180.39	6,947.07	-398.94	-109.24	400.66	7.20
7,414.00	85.47	179.84	6,956.01	-493.52	-109.43	495.23	1.92
7,509.00	87.47	180.15	6,961.86	-588.33	-109.42	590.03	2.13
7,604.00	90.25	180.98	6,963.75	-683.30	-110.36	685.00	3.05
7,699.00	90.09	179.92	6,963.47	-778.30	-111.10	779.99	1.13
7,794.00	91.79	181.06	6,961.91	-873.27	-111.92	874.97	2.15
7,889.00	90.65	180.20	6,959.89	-968.24	-112.96	969.95	1.50
7,983.00	90.56	179.62	6,958.89	-1,062.24	-112.81	1,063.93	0.62
8,078.00	89.08	178.61	6,959.19	-1,157.22	-111.35	1,158.87	1.89
8,173.00	89.38	178.31	6,960.47	-1,252.18	-108.79	1,253.78	0.45
8,268.00	89.69	178.04	6,961.24	-1,347.13	-105.77	1,348.66	0.43
8,363.00	90.99	178.52	6,960.68	-1,442.08	-102.92	1,443.56	1.46
8,457.00	90.74	178.31	6,959.26	-1,536.03	-100.32	1,537.46	0.35
8,552.00	90.77	178.51	6,958.01	-1,630.99	-97.68	1,632.36	0.21
8,647.00	89.41	178.05	6,957.86	-1,725.94	-94.83	1,727.25	1.51
8,742.00	89.75	178.70	6,958.55	-1,820.90	-92.14	1,822.16	0.77
8,837.00	90.28	179.09	6,958.53	-1,915.88	-90.30	1,917.10	0.69
8,932.00	89.32	179.98	6,958.86	-2,010.88	-89.53	2,012.06	1.38
9,026.00	89.41	179.79	6,959.90	-2,104.87	-89.34	2,106.04	0.22

Design Report for Storis E24-73HC - Final Surveys

Measured Depth (usft)	Inclination (°)	Azimuth (°)	Vertical Depth (usft)	+N/-S (usft)	+E/-W (usft)	Vertical Section (usft)	Dogleg Rate (°/100usft)
9,121.00	90.31	180.45	6,960.13	-2,199.87	-89.54	2,201.03	1.17
9,216.00	91.36	181.26	6,958.75	-2,294.85	-90.96	2,296.02	1.40
9,311.00	90.92	182.31	6,956.86	-2,389.78	-93.92	2,390.99	1.20
9,406.00	90.65	183.01	6,955.56	-2,484.67	-98.33	2,485.94	0.79
9,501.00	87.87	179.99	6,956.78	-2,579.61	-100.81	2,580.90	4.32
9,596.00	87.63	179.45	6,960.51	-2,674.53	-100.35	2,675.81	0.62
9,691.00	87.19	179.05	6,964.81	-2,769.43	-99.11	2,770.67	0.63
9,785.00	88.46	179.52	6,968.37	-2,863.35	-97.94	2,864.56	1.44
9,880.00	89.38	180.18	6,970.17	-2,958.33	-97.69	2,959.53	1.19
9,975.00	88.77	178.14	6,971.70	-3,053.30	-96.30	3,054.46	2.24
10,070.00	88.68	176.91	6,973.81	-3,148.19	-92.19	3,149.27	1.30
10,165.00	89.20	177.64	6,975.57	-3,243.07	-87.68	3,244.06	0.94
10,260.00	90.03	177.68	6,976.21	-3,337.98	-83.80	3,338.90	0.87
10,355.00	91.11	177.64	6,975.26	-3,432.90	-79.92	3,433.74	1.14
10,450.00	90.46	178.37	6,973.96	-3,527.83	-76.61	3,528.61	1.03
10,544.00	89.94	176.22	6,973.63	-3,621.72	-72.18	3,622.41	2.35
10,639.00	89.78	177.15	6,973.87	-3,716.56	-66.69	3,717.15	0.99
10,734.00	89.38	178.67	6,974.56	-3,811.49	-63.22	3,812.01	1.65
10,829.00	90.19	179.59	6,974.92	-3,906.48	-61.78	3,906.97	1.29
10,924.00	90.15	179.05	6,974.64	-4,001.47	-60.65	4,001.93	0.57
11,019.00	89.78	177.96	6,974.70	-4,096.44	-58.17	4,096.84	1.21
11,114.00	88.92	177.49	6,975.77	-4,191.35	-54.40	4,191.68	1.03
11,208.00	87.87	178.24	6,978.41	-4,285.25	-50.90	4,285.51	1.37
11,309.00	89.05	178.46	6,981.12	-4,386.17	-47.99	4,386.37	1.19
Final MWD Survey @ 11309.00ft							
11,368.00	89.05	178.46	6,982.10	-4,445.14	-46.41	4,445.31	0.00
Straight Line Proj @ 11368' MD, 6982.1' TVD							

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates		Comment
		+N/-S (usft)	+E/-W (usft)	
765.00	764.91	2.50	-9.79	Tie-On to Surface Gyros @ 765.00ft
871.00	870.86	4.55	-12.31	First MWD Survey @ 871.00ft
11,309.00	6,981.12	-4,386.17	-47.99	Final MWD Survey @ 11309.00ft
11,368.00	6,982.10	-4,445.14	-46.41	Straight Line Proj @ 11368' MD, 6982.1' TVD

Vertical Section Information

Angle Type	Target	Azimuth (°)	Origin Type	Origin		Start TVD (usft)
				+N/_S (usft)	+E/-W (usft)	
Target	Storis E24-73HC_BHL	180.93	Slot	0.00	0.00	0.00

Survey tool program

From (usft)	To (usft)	Survey/Plan	Survey Tool
235.00	765.00	Surface Gyros	Flexi-Shot
765.00	7,240.00	MWD Surveys - Intermediate	MWD+SC
7,319.00	11,309.00	MWD Surveys - Production	MWD+SC

Design Report for Storis E24-73HC - Final Surveys

Casing Details

Measured Depth (usft)	Vertical Depth (usft)	Name	Casing Diameter (")	Hole Diameter (")
7,288.00	6,943.09	7" Casing @ 7288' MD, 6943.09' TVD	7	8-3/4

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
Storis E24-73HC_460	0.00	0.00	0.00	0.00	0.00	1,418,163.27	3,248,637.03	40.477820	-104.606220
- actual wellpath hits target center									
- Polygon									
Point 1			0.00	-154.78	-3,629.98	1,418,008.50	3,245,007.18		
Point 2			0.00	-4,538.62	-3,546.79	1,413,624.81	3,245,090.37		
Point 3			0.00	-4,523.53	-1,396.78	1,413,639.90	3,247,240.30		
Point 4			0.00	-4,518.70	792.30	1,413,644.73	3,249,429.30		
Point 5			0.00	-123.53	749.60	1,418,039.75	3,249,386.60		
Point 6			0.00	-154.78	-3,629.98	1,418,008.50	3,245,007.18		
Storis E24-73HC_SHL	0.00	0.00	0.00	0.00	0.00	1,418,163.27	3,248,637.03	40.477820	-104.606220
- actual wellpath hits target center									
- Point									
Storis E24-73HC_SL	0.00	0.00	0.00	0.00	0.00	1,418,163.27	3,248,637.03	40.477820	-104.606220
- actual wellpath hits target center									
- Polygon									
Point 1			0.00	305.24	-4,089.99	1,418,468.50	3,244,547.18		
Point 2			0.00	-4,998.64	-4,006.80	1,413,164.81	3,244,630.37		
Point 3			0.00	-4,983.55	-1,396.78	1,413,179.90	3,247,240.30		
Point 4			0.00	-4,978.72	1,252.31	1,413,184.73	3,249,889.30		
Point 5			0.00	336.49	1,209.61	1,418,499.75	3,249,846.60		
Point 6			0.00	305.24	-4,089.99	1,418,468.50	3,244,547.18		
Storis E24-73HC_KOF	0.00	0.00	6,298.29	218.26	-106.81	1,418,381.52	3,248,530.23	40.478422	-104.606596
- actual wellpath misses target center by 28.96usft at 6315.68usft MD (6299.90 TVD, 247.18 N, -106.76 E)									
- Circle (radius 35.00)									
Storis E24-73HC_Late	-0.60	0.00	6,932.00	0.00	0.00	1,418,163.27	3,248,637.03	40.477820	-104.606220
- actual wellpath misses target center by 151.82usft at 6957.63usft MD (6836.10 TVD, -57.68 N, -102.59 E)									
- Polygon									
Point 1			6,936.15	-396.30	-137.24	1,417,767.01	3,248,499.80		
Point 2			6,936.15	-396.30	-67.23	1,417,767.01	3,248,569.80		
Point 3			6,978.59	-4,449.24	-37.02	1,413,714.43	3,248,600.01		
Point 4			6,978.59	-4,449.24	-107.02	1,413,714.43	3,248,530.01		
Point 5			6,936.15	-396.30	-137.24	1,417,767.01	3,248,499.80		
Storis E24-73HC_BHL	0.00	0.00	6,978.60	-4,449.24	-72.02	1,413,714.19	3,248,565.01	40.465610	-104.606640
- actual wellpath misses target center by 26.18usft at 11368.00usft MD (6982.10 TVD, -4445.14 N, -46.41 E)									
- Point									

Directional Difficulty Index

Average Dogleg over Survey:	1.71 °/100usft	Maximum Dogleg over Survey:	13.14 °/100usft at 6,911.00 usft
Net Tortousity applicable to Plans:	0.78 °/100usft	Directional Difficulty Index:	6.202

Audit Info

North Reference Sheet for Sec. 24-T6N-R65W (Storis/Mackinaw Pad) - Storis E24-73HC - 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 RKB=24ft @ 4708.00usft (H&P 315). Northing and Easting are relative to Storis E24-73HC

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: 0.99996468

Grid Coordinates of Well: 1,418,163.27 usft N, 3,248,637.03 usft E

Geographical Coordinates of Well: 40° 28' 40.15" N, 104° 36' 22.39" W

Grid Convergence at Surface is: 0.58°

Based upon Minimum Curvature type calculations, at a Measured Depth of 11,368.00usft
the Bottom Hole Displacement is 4,445.38usft in the Direction of 180.60° (Grid).

Magnetic Convergence at surface is: -7.87° (20 March 2014, , BGGM2013)

