

51-01676



Noble Energy MND9DHS1 ST01 MWD 3821ft to 15882ft MD Survey Report

(Def Survey)

Report Date: October 15, 2013 - 10:35 AM
Client: Noble Energy
Field: WV Marshall County (NAD 27)
Structure / Slot: Noble Energy MND9 Pad / MND9DHS1
Well: MND9DHS1
Borehole: ST01
UWI / API: Unknown / Unknown
Survey Name: Noble Energy MND9DHS1 ST01 MWD 3821ft to 15882ft MD
Survey Date: September 28, 2013
Tort / AHD / DDI / ERD Ratio: 299.088 / 10794.438 ft / 6.907 / 1.699
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 49' 53.84506", W 80° 47' 14.01676"
Location Grid NE Y/X: N 487600.316 RUS, E 1639504.443 RUS
CRS Grid Convergence Angle: -0.8210"
Grid Scale Factor: 0.99994717
Version / Patch: 2.7.998.0

Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 335.9111 (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KB
TVD Reference Elevation: 1245.560 ft above MSL
Seabed / Ground Elevation: 1219.620 ft above MSL
-7.558 \*
Total Gravity Field Strength: 999.4377mg/s (9.80665 Beaud)
Gravity Model: DOX
Total Magnetic Field Strength: 52859.932 nT
Magnetic Dip Angle: 67.362 \*
Magnetic Declination: HD0M 2013
Declination Date: September 28, 2013
Magnetic Declination Model: Grid North
North Reference: Grid North
Grid Convergence Used: -0.8210"
Total Corr Mag North-Grid North: -6.7670 \*
Local Coord Referenced To: Well Head

Table with columns: Comments, MD (ft), Incl (°), Azim Grid (°), TVD (ft), TVDSS (ft), VSEC (ft), NS (ft), EW (ft), DLS (ft/100ft), BR (ft/100ft), TR (ft/100ft), Northing (ft), Easting (ft), Latitude (N/S °'"), Longitude (E/W °'"), Directional Difficulty Index. The table contains multiple rows of survey data points.

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Table with columns: Comments, MD, Incl, Azim, Grid, TVD, TVDSS, YSEC, NS, EW, DLB, BR, TR, Northing, Easting, Latitude, Longitude, Directional Index. Rows contain survey data points from 6514.00 to 15821.00.

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| Comments                               | MD (ft)  | Incl (°)     | Adm Grid (°) | TVD (ft)      | TVDBS (ft)     | VSEC (ft)            | NS (ft)                     | EW (ft) | DLS (°/100ft)  | BR (°/100ft) | TR (°/100ft) | Northing (ftUS) | Easting (ftUS) | Latitude (N/S ° ° °) | Longitude (E/W ° ° °) | Directional Difficulty Index |
|--|--|--------------|--------------|---------------|----------------|----------------------|-----------------------------|---------|--|--------------|--------------|-----------------|----------------|----------------------|-----------------------|------------------------------|
| Survey Error Model:<br>Survey Program: | ISOWSA Rev 0 3-D 95.000% Confidence 2.7955 sigma |              |              |               |                |                      |                             |         |  |              |              |                 |                |                      |                       |                              |
| Description                            | Part   | MD From (ft) | MD To (ft)   | EOU Freq (ft) | Hole Size (in) | Casing Diameter (in) | Survey Tool Type            |         | Borehole / Survey  |              |              |                 |                |                      |                       |                              |
|  | 1  | 0.000        | 25.970       | Act Strs      | 30.000         | 30.000               | SLB_MWD-INC_ONLY-Depth Only |         | Original Borehole / Noble Energy MND9DHS1 MWD DR to 6240ft |              |              |                 |                |                      |                       |                              |
|  | 1  | 25.970       | 2432.000     | Act Strs      | 30.000         | 30.000               | SLB_MWD-INC_ONLY            |         | Original Borehole / Noble Energy MND9DHS1 MWD DR to 6240ft |              |              |                 |                |                      |                       |                              |
|  | 1  | 2432.000     | 3821.000     | Act Strs      | 30.000         | 30.000               | SLB_MWD-STD                 |         | Original Borehole / Noble Energy MND9DHS1 MWD DR to 6240ft |              |              |                 |                |                      |                       |                              |
|  | 1  | 3821.000     | 15821.000    | Act Strs      | 30.000         | 30.000               | SLB_MWD-STD                 |         | ST01 / Noble Energy MND9DHS1 ST01 MWD 3821ft to 15882ft MD |              |              |                 |                |                      |                       |                              |
|  | 1  | 15821.000    | 15882.000    | Act Strs      | 30.000         | 30.000               | SLB_BLIND-TREND             |         | ST01 / Noble Energy MND9DHS1 ST01 MWD 3821ft to 15882ft MD |              |              |                 |                |                      |                       |                              |



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## Noble Energy MND9DHS1 ST01 MWD 3821ft to update Survey Report

(Non-Def Survey)

|                               |   |                                   |                              |
|-------------------------------|---|-----------------------------------|------------------------------|
| Report Date:                  | October 14, 2013 - 09:39 PM                             | Survey / DLS Computation:         | Minimum Curvature / Lubinski |
| Client:                       | Noble Energy  | Vertical Section Azimuth:         | 335.911 ° (Grid North)       |
| Field:                        | WV Marshall County (NAD 27)                             | Vertical Section Origin:          | 0.000 ft, 0.000 ft           |
| Structure / Slot:             | Noble Energy MND9 Pad / MND9DHS1                        | TVD Reference Datum:              | KB                           |
| Well:                         | MND9DHS1  | TVD Reference Elevation:          | 1245.590 ft above MSL        |
| Borehole:                     | ST01  | Seabed / Ground Elevation:        | 1219.620 ft above MSL        |
| UWI / API#:                   | Unknown / Unknown                                       | Magnetic Declination:             | -7.588 °                     |
| Survey Name:                  | Noble Energy MND9DHS1 ST01 MWD 3821ft to update         | Total Gravity Field Strength:     | 999.4377mgn (9.80665 Based)  |
| Survey Date:                  | September 28, 2013                                      | Gravity Model:                    | DOX                          |
| Tort / AHD / DDI / ERD Ratio: | 299.088 ° / 10794.438 ft / 6.907 / 1.699                | Total Magnetic Field Strength:    | 52859.932 nT                 |
| Coordinate Reference System:  | NAD27 West Virginia State Plane, Northern Zone, US Feet | Magnetic Dip Angle:               | 67.362 °                     |
| Location Lat / Long:          | N 39° 49' 53.84506", W 80° 47' 14.01676"                | Declination Date:                 | September 28, 2013           |
| Location Grid N/E Y/X:        | N 487600.316 ftUS, E 1638504.443 ftUS                   | Magnetic Declination Model:       | HDGM 2013                    |
| CRS Grid Convergence Angle:   | -0.8210 °   | North Reference:                  | Grid North                   |
| Grid Scale Factor:            | 0.99994717  | Total Corr Mag North->Grid North: | -0.8210 °                    |
| Version / Patch:              | 2.7.998.0   | Total Corr Mag ->Grid North:      | -6.7670 °                    |
|                               |   | Local Coord Referenced To:        | Well Head                    |

| Comments | MD<br>(ft) | Incl<br>(°) | Azim Grid<br>(°) | TVD<br>(ft) | VSEC<br>(ft) | NS<br>(ft) | EW<br>(ft) | Closure<br>(ft) | Closure<br>Azimuth<br>(°) | DLS<br>(°/100ft) | TF<br>(°) |
|----------|------------|-------------|------------------|-------------|--------------|------------|------------|-----------------|---------------------------|------------------|-----------|
| SHL      | 0.00       | 0.00        | 0.00             | 0.00        | 0.00         | 0.00       | 0.00       | 0.00            | 0.00                      | N/A              | 312.8M    |
|          | 65.00      | 0.60        | 312.80           | 65.00       | 0.31         | 0.23       | -0.25      | 0.34            | 312.80                    | 0.92             | 307.7M    |
|          | 103.00     | 0.66        | 307.70           | 103.00      | 0.69         | 0.50       | -0.57      | 0.76            | 311.33                    | 0.22             | 311.37M   |
|          | 150.00     | 1.09        | 311.37           | 149.99      | 1.33         | 0.96       | -1.12      | 1.47            | 310.68                    | 0.92             | 315.46M   |
|          | 196.00     | 1.03        | 315.46           | 195.98      | 2.12         | 1.55       | -1.74      | 2.32            | 311.66                    | 0.21             | 304.04M   |
|          | 245.00     | 1.27        | 304.04           | 244.97      | 2.99         | 2.16       | -2.50      | 3.30            | 310.91                    | 0.67             | 299.69M   |
|          | 293.00     | 1.12        | 299.69           | 292.96      | 3.82         | 2.69       | -3.34      | 4.29            | 308.85                    | 0.36             | 309.93M   |
|          | 341.00     | 0.87        | 309.93           | 340.96      | 4.53         | 3.16       | -4.03      | 5.12            | 308.09                    | 0.64             | 305.91M   |
|          | 368.00     | 0.98        | 305.91           | 367.95      | 4.91         | 3.43       | -4.38      | 5.56            | 308.07                    | 0.47             | 126.98M   |
|          | 426.00     | 1.78        | 126.98           | 425.94      | 4.55         | 3.18       | -4.06      | 5.15            | 308.05                    | 4.76             | 117.7M    |
|          | 489.00     | 4.47        | 117.70           | 488.85      | 1.77         | 1.45       | -1.10      | 1.82            | 322.69                    | 4.33             | 119.84M   |
|          | 551.00     | 3.13        | 119.84           | 550.71      | -1.50        | -0.52      | 2.51       | 2.56            | 101.73                    | 2.17             | 135.92M   |
|          | 613.00     | 1.41        | 135.92           | 612.66      | -3.58        | -1.91      | 4.51       | 4.89            | 112.98                    | 2.93             | 166.51M   |
|          | 634.00     | 0.91        | 166.51           | 633.65      | -3.99        | -2.26      | 4.72       | 5.24            | 115.55                    | 3.71             | 209.87M   |
|          | 675.00     | 1.03        | 209.87           | 674.65      | -4.53        | -2.89      | 4.62       | 5.45            | 122.09                    | 1.77             | 233.76M   |
|          | 725.00     | 1.11        | 233.76           | 724.64      | -4.89        | -3.57      | 4.00       | 5.36            | 131.74                    | 0.90             | 271.05M   |
|          | 772.00     | 1.38        | 271.05           | 771.63      | -4.75        | -3.83      | 3.07       | 4.91            | 141.29                    | 1.78             | 283.7M    |
|          | 820.00     | 1.73        | 283.70           | 819.61      | -4.06        | -3.65      | 1.79       | 4.06            | 153.90                    | 1.02             | 278.2M    |
|          | 866.00     | 1.67        | 278.20           | 865.59      | -3.28        | -3.39      | 0.45       | 3.42            | 172.45                    | 0.38             | 286.43M   |
|          | 913.00     | 1.80        | 286.43           | 912.57      | -2.43        | -3.08      | -0.94      | 3.22            | 196.92                    | 0.60             | 311.3M    |
|          | 960.00     | 2.00        | 311.30           | 959.54      | -1.20        | -2.32      | 3.25       | 3.25            | 224.14                    | 1.79             | 318.74M   |
|          | 1007.00    | 2.04        | 318.74           | 1008.52     | 0.34         | -1.16      | -3.43      | 3.62            | 251.31                    | 0.56             | 325.73M   |
|          | 1055.00    | 2.19        | 325.73           | 1054.48     | 2.06         | 0.24       | -4.51      | 4.52            | 273.05                    | 0.62             | 28.98M    |
|          | 1140.00    | 1.57        | 28.98            | 1139.45     | 4.36         | 2.60       | -4.86      | 5.51            | 298.16                    | 2.40             | 47.1M     |
|          | 1269.00    | 1.53        | 47.10            | 1268.40     | 5.97         | 5.32       | -2.74      | 5.98            | 332.73                    | 0.38             | 56.03M    |
|          | 1364.00    | 1.38        | 56.03            | 1363.37     | 6.58         | 6.82       | -0.86      | 6.88            | 352.78                    | 0.29             | 336.65M   |
|          | 1459.00    | 0.30        | 336.65           | 1458.36     | 7.03         | 7.69       | -0.01      | 7.69            | 359.90                    | 1.43             | 307.13M   |
|          | 1553.00    | 1.00        | 307.13           | 1552.35     | 7.99         | 8.41       | -0.76      | 8.45            | 354.80                    | 0.80             | 150.73M   |
|          | 1648.00    | 0.45        | 150.73           | 1647.35     | 8.35         | 8.59       | -1.24      | 8.67            | 351.76                    | 1.50             | 162.58M   |
|          | 1743.00    | 0.90        | 162.58           | 1742.34     | 7.23         | 7.55       | -0.84      | 7.59            | 353.67                    | 0.49             | 180.48M   |
|          | 1838.00    | 0.64        | 180.48           | 1837.33     | 6.01         | 6.31       | -0.62      | 6.34            | 354.39                    | 0.37             | 245.65M   |
|          | 1932.00    | 0.54        | 245.65           | 1931.33     | 5.53         | 5.60       | -1.03      | 5.69            | 349.61                    | 0.68             | 209.18M   |
|          | 2026.00    | 0.41        | 209.18           | 2025.33     | 5.33         | 5.12       | -1.59      | 5.36            | 342.71                    | 0.34             | 237.08M   |
|          | 2121.00    | 0.61        | 237.08           | 2120.32     | 5.05         | 4.55       | -2.18      | 5.05            | 334.35                    | 0.33             | 201.93M   |
|          | 2214.00    | 0.40        | 201.93           | 2213.32     | 4.74         | 3.98       | -2.72      | 4.82            | 325.64                    | 0.39             | 347.16M   |
|          | 2308.00    | 0.75        | 347.16           | 2307.32     | 5.12         | 4.28       | -2.98      | 5.21            | 325.12                    | 1.17             | 337.15M   |
|          | 2402.00    | 1.19        | 337.15           | 2401.30     | 6.70         | 5.77       | -3.50      | 6.75            | 328.81                    | 0.50             | 0.29M     |
|          | 2432.00    | 1.39        | 0.29             | 2431.30     | 7.34         | 6.43       | -3.62      | 7.37            | 330.63                    | 1.84             | 329.19M   |
|          | 2496.00    | 1.23        | 329.19           | 2495.28     | 8.73         | 7.79       | -3.96      | 8.74            | 333.04                    | 1.12             | 329.44M   |
|          | 2590.00    | 0.88        | 329.44           | 2589.26     | 10.45        | 9.28       | -4.85      | 10.47           | 332.42                    | 0.37             | 315.81M   |
|          | 2684.00    | 0.79        | 315.81           | 2683.25     | 11.78        | 10.37      | -5.67      | 11.81           | 331.34                    | 0.23             | 116.32M   |
|          | 2779.00    | 0.53        | 116.32           | 2778.25     | 12.05        | 10.64      | -5.73      | 12.08           | 331.70                    | 1.37             | 109.17M   |
|          | 2873.00    | 0.44        | 109.17           | 2872.25     | 11.47        | 10.33      | -5.00      | 11.48           | 334.18                    | 0.12             | 46.28M    |
|          | 2968.00    | 0.18        | 46.28            | 2967.25     | 11.27        | 10.31      | -4.55      | 11.27           | 336.21                    | 0.41             | 353.55M   |
|          | 3063.00    | 0.35        | 353.55           | 3062.25     | 11.60        | 10.70      | -4.47      | 11.60           | 337.33                    | 0.30             | 199.8M    |
|          | 3157.00    | 0.97        | 199.80           | 3156.24     | 11.30        | 10.24      | -4.77      | 11.30           | 335.02                    | 1.38             | 212.68M   |
|          | 3252.00    | 0.70        | 212.68           | 3251.23     | 10.40        | 9.00       | -5.36      | 10.47           | 329.22                    | 0.34             | 235.11M   |
|          | 3347.00    | 0.35        | 235.11           | 3346.23     | 10.03        | 8.34       | -5.91      | 10.22           | 324.69                    | 0.42             | 301.25M   |
|          | 3443.00    | 0.26        | 301.25           | 3442.23     | 10.15        | 8.29       | -6.34      | 10.43           | 322.60                    | 0.36             | 307.67M   |
|          | 3536.00    | 0.44        | 307.67           | 3535.22     | 10.64        | 8.61       | -6.80      | 10.97           | 321.72                    | 0.20             | 68.73M    |
|          | 3631.00    | 0.44        | 68.73            | 3630.22     | 10.94        | 8.97       | -6.75      | 11.22           | 323.05                    | 0.81             | 62.09M    |
|          | 3726.00    | 0.53        | 62.09            | 3725.22     | 10.95        | 9.31       | -6.02      | 11.08           | 327.11                    | 0.11             | 205.09M   |
| Tie-In   | 3821.00    | 0.70        | 205.09           | 3820.22     | 10.60        | 8.99       | -5.88      | 10.74           | 326.82                    | 1.23             | 73.36M    |
|          | 3874.00    | 0.34        | 73.36            | 3873.22     | 10.37        | 8.74       | -5.86      | 10.52           | 326.14                    | 1.81             | 49.17M    |
|          | 3923.00    | 6.13        | 49.17            | 3922.12     | 11.11        | 10.49      | -3.74      | 11.14           | 340.37                    | 11.88            | 44.21M    |
|          | 3970.00    | 9.18        | 44.21            | 3968.69     | 13.22        | 14.82      | 0.77       | 14.84           | 2.98                      | 6.63             | 39.85R    |
|          | 4017.00    | 10.82       | 51.17            | 4014.98     | 15.73        | 20.28      | 6.82       | 21.39           | 18.60                     | 4.33             | 52.55R    |
|          | 4064.00    | 12.20       | 59.03            | 4061.04     | 17.44        | 25.60      | 14.52      | 29.43           | 29.56                     | 4.44             | 3.91R     |
|          | 4112.00    | 12.99       | 59.27            | 4107.88     | 18.68        | 30.97      | 23.50      | 38.88           | 37.20                     | 1.65             | 6.37L     |
|          | 4159.00    | 15.09       | 58.37            | 4153.47     | 20.09        | 36.87      | 33.25      | 49.65           | 42.05                     | 4.49             | 14.45R    |
|          | 4206.00    | 17.56       | 60.47            | 4198.58     | 21.56        | 43.58      | 44.63      | 62.38           | 45.69                     | 5.40             | 3.17R     |
|          | 4253.00    | 20.04       | 60.87            | 4243.07     | 22.94        | 50.99      | 57.84      | 77.11           | 48.60                     | 5.28             | 0.33R     |
|          | 4301.00    | 20.66       | 60.88            | 4288.07     | 24.41        | 59.12      | 72.42      | 93.49           | 50.78                     | 1.29             | 6.77L     |
|          | 4348.00    | 23.75       | 59.97            | 4331.58     | 26.12        | 67.89      | 87.86      | 111.04          | 52.31                     | 6.61             | 23.65L    |
|          | 4395.00    | 27.36       | 56.57            | 4373.98     | 28.85        | 78.58      | 105.08     | 131.21          | 53.21                     | 8.29             | 93.08R    |
|          | 4442.00    | 27.32       | 59.14            | 4415.73     | 31.88        | 90.06      | 123.35     | 152.73          | 53.86                     | 2.51             | 32.63R    |
|          | 4490.00    | 30.65       | 63.24            | 4457.71     | 33.75        | 101.23     | 143.74     | 175.81          | 54.84                     | 8.07             | 12.55L    |

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| Comments | MD<br>(ft) | Incl<br>(°) | Azim<br>Grid<br>(°) | TVD<br>(ft) | VSEC<br>(ft) | NS<br>(ft) | EW<br>(ft) | Closure<br>(ft) | Closure<br>Azimuth<br>(°) | DLS<br>(*/100ft) | TF<br>(°) |
|----------|------------|-------------|---------------------|-------------|--------------|------------|------------|-----------------|---------------------------|------------------|-----------|
|          | 4541.00    | 34.85       | 61.61               | 4500.60     | 35.44        | 114.02     | 168.18     | 203.18          | 55.86                     | 8.41             | 16.53L    |
|          | 4573.00    | 36.94       | 60.58               | 4526.52     | 37.02        | 123.09     | 184.60     | 221.87          | 56.31                     | 6.80             | 7.43L     |
|          | 4620.00    | 39.17       | 60.12               | 4563.53     | 39.83        | 137.42     | 209.77     | 250.78          | 56.77                     | 4.78             | 118.38L   |
|          | 4714.00    | 38.38       | 57.69               | 4636.81     | 47.00        | 167.81     | 260.18     | 309.60          | 57.18                     | 1.82             | 29.38L    |
|          | 4809.00    | 39.11       | 57.04               | 4710.91     | 55.84        | 199.88     | 310.25     | 369.06          | 57.21                     | 0.88             | 133.14R   |
|          | 4904.00    | 37.80       | 59.36               | 4785.30     | 63.78        | 231.02     | 360.44     | 428.12          | 57.34                     | 2.05             | 124R      |
|          | 4999.00    | 36.47       | 62.80               | 4861.05     | 68.64        | 258.76     | 410.61     | 485.34          | 57.78                     | 2.60             | 90.71L    |
|          | 5094.00    | 36.48       | 60.14               | 4937.44     | 73.01        | 285.73     | 460.21     | 541.70          | 58.17                     | 1.66             | 65.47R    |
|          | 5189.00    | 37.33       | 63.08               | 5013.41     | 77.27        | 312.84     | 510.39     | 598.64          | 58.49                     | 2.06             | 39.12L    |
|          | 5283.00    | 38.40       | 61.69               | 5087.62     | 80.83        | 339.59     | 561.51     | 656.21          | 58.84                     | 1.46             | 62R       |
|          | 5378.00    | 38.55       | 62.14               | 5162.00     | 84.95        | 367.41     | 613.66     | 715.24          | 59.09                     | 0.33             | 38.86L    |
|          | 5473.00    | 38.87       | 61.73               | 5236.13     | 89.07        | 395.36     | 666.08     | 774.58          | 59.31                     | 0.43             | 13.15L    |
|          | 5567.00    | 44.74       | 59.79               | 5306.17     | 94.75        | 426.01     | 720.70     | 837.19          | 59.41                     | 6.39             | 164.19L   |
|          | 5662.00    | 43.98       | 59.48               | 5374.09     | 102.01       | 459.58     | 778.01     | 903.61          | 59.43                     | 0.83             | 49.46L    |
|          | 5757.00    | 45.34       | 57.28               | 5441.66     | 110.78       | 494.60     | 834.85     | 970.37          | 59.36                     | 2.17             | 160.33R   |
|          | 5852.00    | 42.30       | 58.90               | 5510.20     | 119.75       | 529.38     | 890.67     | 1036.12         | 59.27                     | 3.41             | 167.38R   |
|          | 5946.00    | 40.53       | 59.51               | 5580.69     | 127.02       | 561.22     | 944.08     | 1098.29         | 59.27                     | 1.93             | 145.99L   |
|          | 6041.00    | 38.79       | 57.62               | 5653.83     | 134.75       | 592.82     | 995.81     | 1158.91         | 59.23                     | 2.23             | 162.76L   |
|          | 6136.00    | 35.96       | 56.12               | 5729.32     | 143.79       | 624.32     | 1044.11    | 1216.53         | 59.12                     | 3.13             | 51.85L    |
|          | 6230.00    | 37.88       | 52.27               | 5804.47     | 155.29       | 657.37     | 1089.86    | 1272.76         | 58.90                     | 3.20             | 47.84R    |
|          | 6278.00    | 39.25       | 54.62               | 5842.01     | 161.74       | 675.18     | 1113.90    | 1302.55         | 58.78                     | 4.18             | 26.56L    |
|          | 6324.00    | 40.34       | 53.78               | 5877.35     | 167.72       | 692.40     | 1137.77    | 1331.90         | 58.68                     | 2.64             | 20.37L    |
|          | 6373.00    | 44.81       | 51.44               | 5913.43     | 175.37       | 712.55     | 1164.08    | 1364.85         | 58.53                     | 9.68             | 104.91L   |
|          | 6418.00    | 43.49       | 42.23               | 5945.75     | 185.56       | 733.92     | 1186.92    | 1395.50         | 58.27                     | 14.55            | 94.8L     |
|          | 6465.00    | 43.33       | 33.01               | 5979.93     | 200.83       | 759.45     | 1206.59    | 1425.70         | 57.81                     | 13.48            | 93.02L    |
|          | 6514.00    | 43.34       | 24.44               | 6015.60     | 221.12       | 788.88     | 1222.72    | 1455.12         | 57.17                     | 12.00            | 75.09L    |
|          | 6561.00    | 44.66       | 18.28               | 6049.42     | 244.01       | 819.26     | 1234.58    | 1481.68         | 56.43                     | 9.52             | 35.8L     |
|          | 6609.00    | 46.76       | 16.22               | 6082.94     | 269.82       | 852.07     | 1244.76    | 1508.46         | 55.61                     | 5.35             | 32.37L    |
|          | 6655.00    | 50.32       | 13.32               | 6113.39     | 296.66       | 885.40     | 1253.52    | 1534.68         | 54.77                     | 9.07             | 58.74L    |
|          | 6703.00    | 52.48       | 9.04                | 6143.35     | 327.29       | 922.19     | 1260.77    | 1562.04         | 53.82                     | 8.27             | 64.06L    |
|          | 6750.00    | 54.93       | 3.20                | 6171.20     | 360.01       | 959.82     | 1264.77    | 1587.74         | 52.81                     | 11.31            | 68.47L    |
|          | 6798.00    | 56.64       | 358.31              | 6198.20     | 396.01       | 999.49     | 1265.28    | 1612.42         | 51.69                     | 9.15             | 49.12L    |
|          | 6845.00    | 59.39       | 354.69              | 6223.10     | 433.33       | 1039.26    | 1262.83    | 1635.48         | 50.55                     | 8.77             | 46.42L    |
|          | 6892.00    | 61.98       | 351.65              | 6246.11     | 472.46       | 1079.94    | 1257.94    | 1657.92         | 49.35                     | 7.88             | 50.39L    |
|          | 6939.00    | 64.39       | 348.47              | 6267.31     | 513.12       | 1121.24    | 1250.69    | 1679.71         | 48.12                     | 7.92             | 54.33L    |
|          | 6987.00    | 67.30       | 344.17              | 6286.96     | 556.18       | 1163.78    | 1240.32    | 1700.81         | 46.82                     | 10.18            | 39.65L    |
|          | 7034.00    | 71.52       | 340.52              | 6303.49     | 599.89       | 1205.68    | 1226.96    | 1720.20         | 45.50                     | 11.55            | 38.81L    |
|          | 7082.00    | 75.15       | 337.52              | 6317.26     | 645.79       | 1248.60    | 1210.49    | 1739.05         | 44.11                     | 9.64             | 61.96L    |
|          | 7129.00    | 76.96       | 334.08              | 6328.59     | 691.40       | 1290.19    | 1191.79    | 1756.41         | 42.73                     | 8.08             | 52.44L    |
|          | 7176.00    | 79.53       | 330.71              | 6338.16     | 737.31       | 1330.95    | 1170.47    | 1772.41         | 41.33                     | 8.90             | 26.2L     |
|          | 7223.00    | 84.46       | 328.28              | 6344.71     | 783.54       | 1371.04    | 1146.85    | 1787.46         | 39.91                     | 11.67            | 21.27L    |
|          | 7271.00    | 87.98       | 326.91              | 6347.87     | 830.93       | 1411.47    | 1121.19    | 1802.58         | 38.46                     | 7.87             | 16.34R    |
|          | 7362.00    | 89.14       | 327.25              | 6350.16     | 890.82       | 1487.83    | 1071.75    | 1833.65         | 35.77                     | 1.33             | 75.13L    |
|          | 7455.00    | 89.31       | 326.61              | 6351.42     | 1012.67      | 1565.78    | 1021.00    | 1869.24         | 33.11                     | 0.71             | 19.54L    |
|          | 7550.00    | 89.62       | 326.50              | 6352.30     | 1106.40      | 1645.02    | 968.65     | 1909.02         | 30.49                     | 0.35             | 79.29L    |
|          | 7644.00    | 89.90       | 325.02              | 6352.70     | 1198.93      | 1722.73    | 915.76     | 1951.00         | 27.99                     | 1.60             | 78.89L    |
|          | 7739.00    | 90.10       | 324.02              | 6352.70     | 1292.05      | 1800.09    | 860.62     | 1995.24         | 25.55                     | 1.07             | 75.96L    |
|          | 7833.00    | 90.34       | 323.06              | 6352.34     | 1383.87      | 1875.69    | 804.76     | 2041.04         | 23.22                     | 1.05             | 39.64R    |
|          | 7928.00    | 90.69       | 323.35              | 6351.48     | 1476.54      | 1951.76    | 747.86     | 2090.13         | 20.97                     | 0.48             | 77.19R    |
|          | 8023.00    | 90.89       | 324.23              | 6350.17     | 1569.41      | 2028.40    | 691.75     | 2143.11         | 18.83                     | 0.95             | 88.04R    |
|          | 8117.00    | 90.96       | 326.29              | 6348.66     | 1661.77      | 2105.63    | 638.19     | 2200.22         | 16.86                     | 2.19             | 31.18R    |
|          | 8212.00    | 91.34       | 326.52              | 6346.75     | 1755.45      | 2184.75    | 585.84     | 2261.88         | 15.01                     | 0.47             | 96.11L    |
|          | 8307.00    | 91.31       | 326.24              | 6344.55     | 1849.11      | 2263.83    | 533.05     | 2325.75         | 13.25                     | 0.30             | 124.56L   |
|          | 8401.00    | 90.69       | 325.34              | 6342.91     | 1941.84      | 2341.56    | 480.21     | 2390.29         | 11.59                     | 1.16             | 75.71R    |
|          | 8496.00    | 90.83       | 325.89              | 6341.65     | 2035.10      | 2419.95    | 426.57     | 2457.26         | 10.00                     | 0.60             | 80.04R    |
|          | 8591.00    | 91.03       | 327.03              | 6340.11     | 2128.79      | 2499.12    | 374.08     | 2526.96         | 8.51                      | 1.22             | 90R       |
|          | 8685.00    | 91.03       | 327.69              | 6338.42     | 2221.73      | 2578.26    | 323.39     | 2598.47         | 7.15                      | 0.70             | 75.79R    |
|          | 8780.00    | 91.24       | 328.52              | 6336.54     | 2315.83      | 2658.90    | 273.21     | 2672.90         | 5.87                      | 0.90             | 109.65L   |
|          | 8875.00    | 90.89       | 327.54              | 6334.77     | 2409.92      | 2739.48    | 222.92     | 2748.53         | 4.65                      | 1.10             | 88.8L     |
|          | 8969.00    | 90.96       | 324.11              | 6333.25     | 2502.44      | 2817.23    | 170.13     | 2822.36         | 3.46                      | 3.65             | 26.56R    |
|          | 9064.00    | 91.48       | 324.37              | 6331.23     | 2595.46      | 2894.30    | 114.63     | 2896.57         | 2.27                      | 0.61             | 111.03L   |
|          | 9159.00    | 91.13       | 323.46              | 6329.07     | 2688.38      | 2971.05    | 58.69      | 2971.63         | 1.13                      | 1.03             | 115.2L    |
|          | 9253.00    | 90.89       | 322.95              | 6327.41     | 2780.04      | 3046.31    | 2.40       | 3046.31         | 0.05                      | 0.60             | 97.43R    |
|          | 9348.00    | 90.86       | 323.18              | 6325.96     | 2872.65      | 3122.24    | -54.68     | 3122.72         | 359.00                    | 0.24             | 72.71L    |
|          | 9443.00    | 91.00       | 322.73              | 6324.42     | 2965.22      | 3198.05    | -111.91    | 3200.01         | 358.00                    | 0.50             | 72.43R    |
|          | 9537.00    | 91.31       | 323.71              | 6322.52     | 3056.90      | 3273.33    | -168.18    | 3277.64         | 357.00                    | 1.09             | 104.25L   |
|          | 9632.00    | 91.00       | 322.49              | 6320.61     | 3149.52      | 3349.28    | -225.21    | 3356.84         | 356.15                    | 1.32             | 126.87R   |
|          | 9726.00    | 90.82       | 322.73              | 6319.12     | 3240.98      | 3423.95    | -282.28    | 3435.57         | 355.29                    | 0.32             | 118.74R   |
|          | 9821.00    | 90.65       | 323.04              | 6317.90     | 3333.53      | 3499.70    | -339.60    | 3516.14         | 354.46                    | 0.37             | 120.46R   |
|          | 9916.00    | 90.45       | 323.38              | 6316.99     | 3426.20      | 3575.78    | -396.49    | 3597.69         | 353.67                    | 0.42             | 86.34R    |
|          | 10010.00   | 90.65       | 326.52              | 6316.08     | 3518.47      | 3652.72    | -450.46    | 3680.39         | 352.97                    | 3.35             | 92.41R    |
|          | 10105.00   | 90.58       | 328.18              | 6315.06     | 3612.41      | 3732.70    | -501.71    | 3766.27         | 352.34                    | 1.75             | 155.32R   |
|          | 10200.00   | 90.21       | 328.35              | 6314.41     | 3706.56      | 3813.49    | -551.68    | 3853.19         | 351.77                    | 0.43             | 96.6L     |
|          | 10294.00   | 90.07       | 327.14              | 6314.18     | 3799.60      | 3892.99    | -601.85    | 3939.23         | 351.21                    | 1.30             | 71.56R    |
|          | 10389.00   | 90.17       | 327.44              | 6313.98     | 3893.53      | 3972.92    | -653.18    | 4026.26         | 350.66                    | 0.33             | 90R       |
|          | 10484.00   | 90.17       | 328.12              | 6313.70     | 3987.57      | 4053.29    | -703.83    | 4113.85         | 350.15                    | 0.72             | 112.04L   |
|          | 10579.00   | 90.00       | 327.70              | 6313.56     | 4081.65      | 4133.78    | -754.30    | 4202.03         | 349.66                    | 0.48             | 50.62R    |
|          | 10673.00   | 90.55       | 328.37              | 6313.11     | 4174.76      | 4213.52    | -804.06    | 4289.56         | 349.20                    | 0.92             | 74.17R    |
|          | 10768.00   | 91.34       | 331.16              | 6311.54     | 4269.19      | 4295.58    | -851.89    | 4379.24         | 348.78                    | 3.05             | 107.87L   |
|          | 10863.00   | 90.62       | 328.93              | 6309.91     | 4363.67      | 4377.87    | -899.32    | 4469.29         | 348.39                    | 2.47             | 90.66L    |
|          | 10958.00   | 90.58       | 325.56              | 6308.92     | 4457.57      | 4457.75    | -950.70    | 4558.00         | 347.96                    | 3.55             | 80.73L    |
|          | 11052.00   | 91.07       | 322.55              | 6307.56     | 4549.54      | 4533.83    | -1005.87   | 4644.07         | 347.49                    | 3.24             | 93.56L    |
|          | 11147.00   | 90.93       | 320.31              | 6305.91     | 4641.51      | 4608.09    | -1065.09   | 4729.58         | 346.99                    | 2.36             | 95.54R    |
|          | 11242.00   | 90.76       | 322.06              | 6304.50     | 4733.37      | 4682.10    | -1124.63   | 4815.27         | 346.49                    | 1.85             | 160.02L   |
|          | 11337.00   | 90.65       | 322.02              | 6303.34     | 4825.59      | 4757.00    | -1183.06   | 4901.90         | 346.03                    | 1.02             | 46.33R    |
|          | 11431.00   | 90.86       | 322.24              | 6302.10     | 4916.88      | 4831.20    | -1240.76   | 4987.98         | 345.60                    | 0.32             | 77.89R    |
|          | 11526.00   | 91.13       | 323.50              | 6300.45     | 5009.41      | 4906.92    | -1298.09   | 5075.72         | 345.18                    | 1.36             | 151.7L    |
|          | 11621.00   | 91.00       | 323.43              | 6298.68     | 5102.17      | 4983.24    | -1354.64   | 5164.08         | 344.79                    | 0.16             | 8.74R     |
|          | 11715.00   | 91.13       | 323.45              | 6296.93     | 5193.93      | 5058.73    | -1410.62   | 5251.73         | 344.42                    | 0.14             | 95.41L    |
|          | 11810.00   | 91.00       | 322.08              | 6295.17     | 5286.42      | 5134.35    | -1468.09   | 5340.12         | 344.04                    | 1.45             | 85.91R    |
|          | 11905.00   | 91.03       | 322.50              | 6293.49     | 5378.74      | 5209.50    | -1526.19   | 5428.45         | 343.67                    | 0.44             | 91.82R    |
|          | 12000.00   | 91.00       | 323.44              | 6291.80     | 5471.31      | 5285.33    | -1583.39   | 5517.41         | 343.32                    | 0.99             | 92.09R    |
|          | 12094.00   | 90.93       | 325.34              | 6290.22     | 5563.40      | 5361.73    | -1638.11   | 5606.39         | 343.01                    | 2.02             | 100.17R   |
|          | 12189.0    |             |                     |             |              |            |            |                 |                           |                  |           |

51-01676

| Comments     | MD (ft)  | Incl (°) | Azim Grid (°) | TVD (ft) | VSEC (ft) | NS (ft) | EW (ft)  | Closure (ft) | Closure Azimuth (°) | DLS (*/100ft) | TF (°)  |
|--------------|----------|----------|---------------|----------|-----------|---------|----------|--------------|---------------------|---------------|---------|
|              | 12662.00 | 90.27    | 326.75        | 6282.75  | 6123.77   | 5835.70 | -1950.93 | 6153.17      | 341.51              | 0.79          | 93.5R   |
|              | 12757.00 | 90.21    | 327.73        | 6282.35  | 6217.68   | 5915.59 | -2002.34 | 6245.28      | 341.30              | 1.03          | 126.25L |
|              | 12852.00 | 90.10    | 327.58        | 6282.09  | 6311.69   | 5995.85 | -2053.17 | 6337.64      | 341.10              | 0.20          | 107.97L |
|              | 12947.00 | 89.86    | 326.84        | 6282.12  | 6405.60   | 6075.71 | -2104.61 | 6429.90      | 340.89              | 0.82          | 28.3R   |
|              | 13042.00 | 90.38    | 327.12        | 6281.93  | 6499.45   | 6155.36 | -2156.38 | 6522.15      | 340.69              | 0.62          | 79.15R  |
|              | 13137.00 | 90.65    | 328.53        | 6281.07  | 6593.50   | 6235.77 | -2206.97 | 6614.80      | 340.51              | 1.51          | 90R     |
|              | 13232.00 | 90.65    | 328.66        | 6279.99  | 6687.72   | 6316.85 | -2256.47 | 6707.77      | 340.34              | 0.14          | 67.68L  |
|              | 13326.00 | 91.13    | 327.49        | 6278.53  | 6780.83   | 6396.62 | -2306.17 | 6799.64      | 340.17              | 1.35          | 86.06L  |
|              | 13421.00 | 91.41    | 323.38        | 6276.43  | 6874.20   | 6474.81 | -2360.04 | 6891.52      | 339.97              | 4.34          | 99.76L  |
|              | 13516.00 | 90.96    | 320.77        | 6274.46  | 6966.42   | 6549.73 | -2418.11 | 6981.95      | 339.73              | 2.79          | 118.07R |
|              | 13611.00 | 90.72    | 321.22        | 6273.07  | 7058.20   | 6623.54 | -2478.20 | 7071.97      | 339.49              | 0.54          | 87.48R  |
|              | 13705.00 | 90.76    | 322.13        | 6271.86  | 7149.31   | 6697.28 | -2536.48 | 7161.52      | 339.26              | 0.97          | 74.9R   |
|              | 13800.00 | 91.00    | 323.02        | 6270.40  | 7241.74   | 6772.71 | -2594.21 | 7252.56      | 339.04              | 0.97          | 90L     |
|              | 13895.00 | 91.00    | 322.42        | 6268.74  | 7334.21   | 6848.29 | -2651.74 | 7343.76      | 338.83              | 0.63          | 90R     |
|              | 13989.00 | 91.00    | 323.03        | 6267.10  | 7425.72   | 6923.08 | -2708.66 | 7434.10      | 338.63              | 0.65          | 98.19L  |
|              | 14084.00 | 90.83    | 321.85        | 6265.58  | 7518.10   | 6998.38 | -2766.57 | 7525.37      | 338.43              | 1.25          | 64.53L  |
|              | 14179.00 | 90.93    | 321.64        | 6264.12  | 7610.20   | 7072.97 | -2825.38 | 7616.41      | 338.23              | 0.24          | 76.43R  |
|              | 14274.00 | 91.00    | 321.93        | 6262.52  | 7702.31   | 7147.60 | -2884.14 | 7707.56      | 338.03              | 0.31          | 90R     |
|              | 14369.00 | 91.00    | 322.02        | 6260.86  | 7794.50   | 7222.42 | -2942.65 | 7798.88      | 337.83              | 0.09          | 133.83R |
|              | 14464.00 | 90.76    | 322.27        | 6259.40  | 7886.76   | 7297.42 | -3000.94 | 7890.38      | 337.65              | 0.36          | 83.77R  |
|              | 14559.00 | 90.82    | 322.82        | 6258.09  | 7979.18   | 7372.83 | -3058.71 | 7982.12      | 337.47              | 0.58          | 78.48L  |
|              | 14654.00 | 90.93    | 322.28        | 6256.64  | 8071.59   | 7448.24 | -3116.47 | 8073.95      | 337.29              | 0.58          | 80.19R  |
|              | 14752.00 | 91.07    | 323.09        | 6254.93  | 8166.98   | 7526.17 | -3175.87 | 8168.80      | 337.12              | 0.84          | 77.92R  |
|              | 14844.00 | 91.48    | 325.01        | 6252.89  | 8256.99   | 7600.62 | -3229.86 | 8258.42      | 336.98              | 2.13          | 76.9R   |
|              | 14939.00 | 91.58    | 325.44        | 6250.35  | 8350.31   | 7678.63 | -3284.03 | 8351.42      | 336.84              | 0.46          | 42.42L  |
|              | 15034.00 | 91.93    | 325.12        | 6247.44  | 8443.63   | 7756.67 | -3338.11 | 8444.46      | 336.72              | 0.50          | 148.25R |
|              | 15129.00 | 91.51    | 325.38        | 6244.59  | 8536.95   | 7834.70 | -3392.24 | 8537.55      | 336.59              | 0.52          | 104.49R |
|              | 15223.00 | 91.07    | 327.08        | 6242.47  | 8629.59   | 7912.81 | -3444.47 | 8630.01      | 336.48              | 1.87          | 113.96R |
|              | 15318.00 | 90.79    | 327.71        | 6240.93  | 8723.52   | 7992.83 | -3495.66 | 8723.81      | 336.38              | 0.73          | 90R     |
|              | 15413.00 | 90.79    | 327.86        | 6239.62  | 8817.56   | 8073.20 | -3546.29 | 8817.75      | 336.29              | 0.16          | 86.68L  |
|              | 15508.00 | 90.83    | 327.17        | 6238.28  | 8911.53   | 8153.32 | -3597.31 | 8911.64      | 336.19              | 0.73          | 62.52R  |
|              | 15602.00 | 90.96    | 327.42        | 6236.81  | 9004.46   | 8232.41 | -3648.09 | 9004.51      | 336.10              | 0.30          | 86.18R  |
|              | 15697.00 | 91.00    | 328.02        | 6235.18  | 9098.48   | 8312.72 | -3698.82 | 9098.49      | 336.01              | 0.63          | 88.73R  |
|              | 15792.00 | 91.03    | 329.39        | 6233.50  | 9192.71   | 8393.88 | -3748.16 | 9192.71      | 335.94              | 1.44          | 90R     |
|              | 15821.00 | 91.03    | 329.84        | 6232.98  | 9221.53   | 8418.89 | -3762.83 | 9221.53      | 335.92              | 1.55          | HS      |
| Proj. to bit | 15882.00 | 91.03    | 329.84        | 6231.88  | 9282.18   | 8471.63 | -3793.47 | 9282.18      | 335.88              | 0.00          |         |

Survey Type: Non-Def Survey

Survey Error Model: ISCWSA Rev 0 \*\*\* 3-D 95.000% Confidence 2.7955 sigma  
 Survey Program:

| Description | Part | MD From (ft) | MD To (ft) | EOU Freq (ft) | Hole Size (in) | Casing Diameter (in) | Survey Tool Type            | Borehole / Survey   |
|-------------|------|--------------|------------|---------------|----------------|----------------------|-----------------------------|---|
|             | 1    | 0.000        | 25.970     | Act Sins      | 30.000         | 30.000               | SLB_MWD-INC_ONLY-Depth Only | Original Borehole / Noble Energy MND9DHS1 MWD 0ft to 6240ft |
|             | 1    | 25.970       | 2432.000   | Act Sins      | 30.000         | 30.000               | SLB_MWD-INC_ONLY            | Original Borehole / Noble Energy MND9DHS1 MWD 0ft to 6240ft |
|             | 1    | 2432.000     | 3821.000   | Act Sins      | 30.000         | 30.000               | SLB_MWD-STD                 | Original Borehole / Noble Energy MND9DHS1 MWD 0ft to 6240ft |
|             | 1    | 3821.000     | 15882.000  | Act Sins      | 30.000         | 30.000               | SLB_MWD-STD                 | ST01 / Noble Energy MND9DHS1 ST01 MWD 3821ft to update      |

12/12/2014

51-01676

Schlumberger Survey Report

Monday October 1, 2013 9:5: Report by MaxWell

-----General Information-----

Client : Noble Energy Well name : MND9DHS1 STO1  
Field :

-----Survey Calculation Methods-----

Method for positions : Minimum Curvature Method

-----Job Location & Elevation-----

Latitude : 39.8316 degrees Longitude : -80.7872 degrees  
Permanent Datum : MSL Log Measured From : DF  
Elevation of LMF from MSL : 1245.59 ft Elevation of TIP from MSL: 1245.59 ft  
Depth Source :

-----Vertical Section Origin-----

Latitude (+N/S-) : 0.00 ft Departure (+E/W-) : 0.00 ft  
Target Azimuth : 335.9100 degrees

-----MWD Survey Reference Criteria-----

----Run2----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : BGGM 2012   | Calculation Date: | : 30-Sep-2013  |
| Location G (Override):   | 999.44 mgn    | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

----Run4----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : BGGM 2012   | Calculation Date: | : 03-Oct-2013  |
| Location G (Override):   | 999.44 mgn    | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

----Run5----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : BGGM 2012   | Calculation Date: | : 05-Oct-2013  |
| Location G (Override):   | 999.44 mgn    | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

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-----Run7-----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : HDGM 2012   | Calculation Date: | : 08-Oct-2013  |
| Location G               | : 999.49 mgn  | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

-----Run8-----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : BGGM 2012   | Calculation Date: | : 12-Oct-2013  |
| Location G (Override):   | 999.44 mgn    | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

-----Run9-----

|                          |               |                   |                |
|--------------------------|---------------|-------------------|----------------|
| Geomag Model:            | : BGGM 2012   | Calculation Date: | : 13-Oct-2013  |
| Location G (Override):   | 999.44 mgn    | Tolerance G       | : 2.50 mgn     |
| Location B (Override):   | 52860.29 nT   | Tolerance B       | : 300.00 nT    |
| Magnetic Dip (Override): | 67.36 degrees | Tolerance Dip     | : 0.45 degrees |

-----MWD Survey Azimuth Correction-----

-----Run2-----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees

-----Run4-----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees

-----Run5-----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees

-----Run7-----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees



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----Run8----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees

----Run9----

Magnetic dec (+E/W-) : -7.5880 degrees(Override)  
Grid convergence (+E/W-) : -0.8210 degrees  
GTotal az corr (+E/W-) : -6.7670 degrees

-----Survey Quality Index Description-----  
0 : Long Survey passed all criteria 1 : Short  
2 : Long Survey failed mag criteria 9 : Manual  
28 : Tie-In Point

-----Survey Correction Index Description-----  
0 : No Correction

-----Survey Description Index Description-----  
0 : Not Flagged Survey 7 : Projection to Bit

===== Survey List =====

| MD<br>(ft) | Incl<br>(deg) | Azim<br>(deg) | TVD<br>(ft)<br>/100ft) | V Sec<br>(ft) | N/-S<br>(ft) | E/-W<br>(ft) | DLS<br>(deg) | Run |
|------------|---------------|---------------|------------------------|---------------|--------------|--------------|--------------|-----|
| 0          | 0             | 0             | 0                      | 0             | 0            | 0            | 0            | 0 - |
| 65         | 0.6           | 312.8         | 65                     | 0.31          | 0.23         | -0.25        | 0.92         | 2   |
| 103        | 0.66          | 307.7         | 103                    | 0.69          | 0.5          | -0.57        | 0.22         | 2   |
| 150        | 1.09          | 311.37        | 149.99                 | 1.33          | 0.96         | -1.12        | 0.92         | 2   |
| 196        | 1.03          | 315.46        | 195.98                 | 2.12          | 1.55         | -1.74        | 0.21         | 2   |
| 245        | 1.27          | 304.04        | 244.97                 | 2.99          | 2.16         | -2.5         | 0.67         | 2   |
| 293        | 1.12          | 299.69        | 292.96                 | 3.82          | 2.69         | -3.34        | 0.36         | 2   |
| 341        | 0.87          | 309.93        | 340.96                 | 4.53          | 3.16         | -4.03        | 0.64         | 2   |
| 368        | 0.98          | 305.91        | 367.95                 | 4.91          | 3.43         | -4.38        | 0.47         | 2   |
| 426        | 1.78          | 126.98        | 425.94                 | 4.55          | 3.18         | -4.06        | 4.76         | 2   |
| 489        | 4.47          | 117.7         | 488.85                 | 1.77          | 1.45         | -1.1         | 4.33         | 2   |
| 551        | 3.13          | 119.84        | 550.71                 | -1.5          | -0.52        | 2.51         | 2.17         | 2   |
| 613        | 1.41          | 135.92        | 612.66                 | -3.58         | -1.91        | 4.51         | 2.93         | 2   |
| 634        | 0.91          | 166.51        | 633.65                 | -3.99         | -2.26        | 4.72         | 3.71         | 2   |
| 675        | 1.03          | 209.87        | 674.65                 | -4.53         | -2.89        | 4.62         | 1.77         | 2   |
| 725        | 1.11          | 233.76        | 724.64                 | -4.89         | -3.57        | 4            | 0.9          | 2   |
| 772        | 1.38          | 271.05        | 771.63                 | -4.75         | -3.83        | 3.07         | 1.78         | 2   |

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|      |       |        |         |       |       |        |       |   |
|------|-------|--------|---------|-------|-------|--------|-------|---|
| 820  | 1.73  | 283.7  | 819.61  | -4.06 | -3.65 | 1.79   | 1.02  | 2 |
| 866  | 1.67  | 278.2  | 865.59  | -3.28 | -3.39 | 0.45   | 0.38  | 2 |
| 913  | 1.8   | 286.43 | 912.57  | -2.43 | -3.08 | -0.94  | 0.6   | 2 |
| 960  | 2     | 311.3  | 959.54  | -1.2  | -2.33 | -2.26  | 1.79  | 2 |
| 1007 | 2.04  | 318.74 | 1006.52 | 0.34  | -1.16 | -3.43  | 0.56  | 2 |
| 1055 | 2.19  | 325.73 | 1054.48 | 2.06  | 0.24  | -4.51  | 0.62  | 2 |
| 1140 | 1.57  | 28.98  | 1139.45 | 4.36  | 2.6   | -4.86  | 2.4   | 2 |
| 1269 | 1.53  | 47.1   | 1268.4  | 5.97  | 5.32  | -2.74  | 0.38  | 2 |
| 1364 | 1.38  | 56.03  | 1363.37 | 6.58  | 6.82  | -0.86  | 0.29  | 2 |
| 1459 | 0.3   | 336.65 | 1458.36 | 7.03  | 7.69  | -0.01  | 1.43  | 2 |
| 1553 | 1     | 307.13 | 1552.35 | 7.99  | 8.41  | -0.76  | 0.8   | 2 |
| 1648 | 0.45  | 150.73 | 1647.35 | 8.35  | 8.59  | -1.24  | 1.5   | 2 |
| 1743 | 0.9   | 162.58 | 1742.34 | 7.23  | 7.55  | -0.84  | 0.49  | 2 |
| 1838 | 0.64  | 180.48 | 1837.33 | 6.01  | 6.31  | -0.62  | 0.37  | 2 |
| 1932 | 0.54  | 245.65 | 1931.33 | 5.53  | 5.6   | -1.03  | 0.68  | 2 |
| 2026 | 0.41  | 209.18 | 2025.33 | 5.33  | 5.12  | -1.59  | 0.34  | 2 |
| 2121 | 0.61  | 237.08 | 2120.32 | 5.05  | 4.55  | -2.18  | 0.33  | 2 |
| 2214 | 0.4   | 201.93 | 2213.32 | 4.74  | 3.98  | -2.72  | 0.39  | 2 |
| 2308 | 0.75  | 347.16 | 2307.32 | 5.12  | 4.28  | -2.98  | 1.17  | 2 |
| 2402 | 1.19  | 337.15 | 2401.3  | 6.7   | 5.77  | -3.5   | 0.5   | 2 |
| 2432 | 1.39  | 0.29   | 2431.3  | 7.34  | 6.43  | -3.62  | 1.84  | 2 |
| 2496 | 1.23  | 329.19 | 2495.28 | 8.73  | 7.79  | -3.96  | 1.12  | 2 |
| 2590 | 0.88  | 329.44 | 2589.26 | 10.45 | 9.28  | -4.85  | 0.37  | 2 |
| 2684 | 0.79  | 315.81 | 2683.25 | 11.78 | 10.37 | -5.67  | 0.23  | 2 |
| 2779 | 0.53  | 116.32 | 2778.25 | 12.05 | 10.64 | -5.73  | 1.37  | 2 |
| 2873 | 0.44  | 109.17 | 2872.25 | 11.47 | 10.33 | -5     | 0.12  | 2 |
| 2968 | 0.18  | 46.28  | 2967.25 | 11.27 | 10.31 | -4.55  | 0.41  | 2 |
| 3063 | 0.35  | 353.55 | 3062.25 | 11.6  | 10.7  | -4.47  | 0.3   | 2 |
| 3157 | 0.97  | 199.8  | 3156.24 | 11.3  | 10.24 | -4.77  | 1.38  | 2 |
| 3252 | 0.7   | 212.68 | 3251.23 | 10.4  | 9     | -5.36  | 0.34  | 2 |
| 3347 | 0.35  | 235.11 | 3346.23 | 10.03 | 8.34  | -5.91  | 0.42  | 2 |
| 3443 | 0.26  | 301.25 | 3442.23 | 10.15 | 8.29  | -6.34  | 0.36  | 2 |
| 3536 | 0.44  | 307.67 | 3535.22 | 10.64 | 8.61  | -6.8   | 0.2   | 2 |
| 3631 | 0.44  | 68.73  | 3630.22 | 10.94 | 8.97  | -6.75  | 0.81  | 2 |
| 3726 | 0.53  | 62.09  | 3725.22 | 10.95 | 9.31  | -6.02  | 0.11  | 2 |
| 3821 | 0.7   | 205.09 | 3820.22 | 10.6  | 8.99  | -5.88  | 1.23  | 2 |
| 3874 | 0.34  | 73.36  | 3873.22 | 10.37 | 8.74  | -5.86  | 1.82  | 2 |
| 3923 | 6.13  | 49.17  | 3922.12 | 11.11 | 10.49 | -3.74  | 11.87 | 2 |
| 3970 | 9.18  | 44.21  | 3968.69 | 13.22 | 14.82 | 0.77   | 6.64  | 2 |
| 4017 | 10.82 | 51.17  | 4014.98 | 15.73 | 20.28 | 6.82   | 4.32  | 2 |
| 4064 | 12.2  | 59.03  | 4061.04 | 17.44 | 25.6  | 14.52  | 4.45  | 2 |
| 4112 | 12.99 | 59.27  | 4107.88 | 18.67 | 30.97 | 23.51  | 1.65  | 2 |
| 4159 | 15.09 | 58.37  | 4153.47 | 20.09 | 36.88 | 33.26  | 4.48  | 2 |
| 4206 | 17.56 | 60.47  | 4198.58 | 21.56 | 43.58 | 44.64  | 5.4   | 2 |
| 4253 | 20.04 | 60.87  | 4243.07 | 22.94 | 50.99 | 57.84  | 5.29  | 2 |
| 4301 | 20.66 | 60.88  | 4288.07 | 24.41 | 59.12 | 72.42  | 1.28  | 2 |
| 4348 | 23.75 | 59.97  | 4331.58 | 26.12 | 67.89 | 87.86  | 6.63  | 2 |
| 4395 | 27.36 | 56.57  | 4373.98 | 28.85 | 78.58 | 105.08 | 8.27  | 2 |
| 4442 | 27.32 | 59.14  | 4415.73 | 31.87 | 90.06 | 123.35 | 2.51  | 2 |

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|------|-------|--------|---------|---------|---------|---------|-------|---|
| 4490 | 30.65 | 63.24  | 4457.72 | 33.74   | 101.22  | 143.74  | 8.07  | 2 |
| 4541 | 34.85 | 61.61  | 4500.6  | 35.44   | 114.01  | 168.18  | 8.43  | 4 |
| 4573 | 36.94 | 60.58  | 4526.52 | 37.02   | 123.08  | 184.6   | 6.8   | 4 |
| 4620 | 39.17 | 60.12  | 4563.53 | 39.82   | 137.42  | 209.77  | 4.77  | 4 |
| 4714 | 38.38 | 57.69  | 4636.81 | 46.99   | 167.81  | 260.18  | 1.82  | 4 |
| 4809 | 39.11 | 57.04  | 4710.91 | 55.83   | 199.87  | 310.24  | 0.87  | 4 |
| 4904 | 37.8  | 59.36  | 4785.31 | 63.77   | 231.01  | 360.44  | 2.05  | 4 |
| 4999 | 36.47 | 62.8   | 4861.05 | 68.63   | 258.76  | 410.61  | 2.59  | 4 |
| 5094 | 36.48 | 60.14  | 4937.44 | 73      | 285.73  | 460.22  | 1.66  | 4 |
| 5189 | 37.33 | 63.08  | 5013.41 | 77.26   | 312.83  | 510.39  | 2.06  | 4 |
| 5283 | 38.4  | 61.69  | 5087.62 | 80.81   | 339.58  | 561.51  | 1.45  | 4 |
| 5378 | 38.55 | 62.14  | 5162    | 84.93   | 367.41  | 613.66  | 0.33  | 4 |
| 5473 | 38.87 | 61.73  | 5236.12 | 89.05   | 395.36  | 666.09  | 0.43  | 4 |
| 5567 | 44.74 | 59.79  | 5306.17 | 94.73   | 426     | 720.71  | 6.39  | 4 |
| 5662 | 43.98 | 59.48  | 5374.09 | 101.99  | 459.58  | 778.02  | 0.83  | 4 |
| 5757 | 45.34 | 57.28  | 5441.66 | 110.76  | 494.6   | 834.86  | 2.17  | 4 |
| 5852 | 42.3  | 58.9   | 5510.19 | 119.73  | 529.39  | 890.68  | 3.42  | 4 |
| 5946 | 40.53 | 59.51  | 5580.68 | 127     | 561.22  | 944.09  | 1.93  | 4 |
| 6041 | 38.79 | 57.62  | 5653.82 | 134.72  | 592.82  | 995.83  | 2.23  | 4 |
| 6136 | 35.96 | 56.12  | 5729.3  | 143.76  | 624.32  | 1044.13 | 3.13  | 4 |
| 6230 | 37.88 | 52.27  | 5804.46 | 155.26  | 657.37  | 1089.88 | 3.19  | 4 |
| 6278 | 39.25 | 54.62  | 5841.99 | 161.71  | 675.18  | 1113.92 | 4.18  | 5 |
| 6324 | 40.34 | 53.78  | 5877.33 | 167.69  | 692.41  | 1137.79 | 2.63  | 5 |
| 6373 | 44.81 | 51.44  | 5913.41 | 175.34  | 712.55  | 1164.1  | 9.69  | 5 |
| 6418 | 43.49 | 42.23  | 5945.73 | 185.53  | 733.93  | 1186.94 | 14.54 | 5 |
| 6465 | 43.33 | 33.01  | 5979.91 | 200.8   | 759.45  | 1206.61 | 13.47 | 5 |
| 6514 | 43.34 | 24.44  | 6015.59 | 221.08  | 788.88  | 1222.74 | 12    | 5 |
| 6561 | 44.66 | 18.28  | 6049.41 | 243.98  | 819.26  | 1234.6  | 9.52  | 5 |
| 6609 | 46.76 | 16.22  | 6082.93 | 269.78  | 852.07  | 1244.78 | 5.35  | 5 |
| 6655 | 50.32 | 13.32  | 6113.38 | 296.63  | 885.41  | 1253.54 | 9.07  | 5 |
| 6703 | 52.46 | 9.04   | 6143.34 | 327.25  | 922.19  | 1260.79 | 8.26  | 5 |
| 6750 | 54.93 | 3.2    | 6171.18 | 359.97  | 959.82  | 1264.8  | 11.31 | 5 |
| 6798 | 56.64 | 358.31 | 6198.18 | 395.98  | 999.49  | 1265.3  | 9.15  | 5 |
| 6845 | 59.39 | 354.69 | 6223.08 | 433.29  | 1039.27 | 1262.85 | 8.76  | 5 |
| 6892 | 61.98 | 351.65 | 6246.09 | 472.42  | 1079.94 | 1257.96 | 7.9   | 5 |
| 6939 | 64.39 | 348.47 | 6267.29 | 513.09  | 1121.25 | 1250.71 | 7.91  | 5 |
| 6987 | 67.3  | 344.17 | 6286.94 | 556.15  | 1163.78 | 1240.34 | 10.17 | 5 |
| 7034 | 71.52 | 340.52 | 6303.47 | 599.85  | 1205.68 | 1226.98 | 11.57 | 5 |
| 7082 | 75.15 | 337.52 | 6317.24 | 645.76  | 1248.6  | 1210.51 | 9.64  | 5 |
| 7129 | 76.96 | 334.08 | 6328.57 | 691.36  | 1290.19 | 1191.81 | 8.07  | 5 |
| 7176 | 79.53 | 330.71 | 6338.14 | 737.28  | 1330.96 | 1170.49 | 8.9   | 5 |
| 7223 | 84.46 | 328.28 | 6344.69 | 783.51  | 1371.04 | 1146.87 | 11.67 | 5 |
| 7271 | 87.98 | 326.91 | 6347.85 | 830.9   | 1411.47 | 1121.21 | 7.87  | 5 |
| 7362 | 89.14 | 327.25 | 6350.14 | 920.79  | 1487.83 | 1071.77 | 1.33  | 7 |
| 7455 | 89.31 | 326.61 | 6351.39 | 1012.64 | 1565.76 | 1021.03 | 0.71  | 7 |
| 7550 | 89.62 | 326.5  | 6352.28 | 1106.37 | 1645.03 | 968.67  | 0.35  | 7 |
| 7644 | 89.9  | 325.02 | 6352.67 | 1198.9  | 1722.73 | 915.78  | 1.6   | 7 |
| 7739 | 90.1  | 324.02 | 6352.67 | 1292.02 | 1800.1  | 860.65  | 1.07  | 7 |
| 7833 | 90.34 | 323.06 | 6352.3  | 1383.84 | 1875.7  | 804.79  | 1.05  | 7 |

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|-------|-------|--------|---------|---------|---------|----------|------|---|
| 7928  | 90.69 | 323.35 | 6351.45 | 1476.51 | 1951.77 | 747.9    | 0.47 | 7 |
| 8023  | 90.89 | 324.23 | 6350.14 | 1569.38 | 2028.41 | 691.78   | 0.95 | 7 |
| 8117  | 90.96 | 326.29 | 6348.62 | 1661.75 | 2105.64 | 638.22   | 2.2  | 7 |
| 8212  | 91.34 | 326.52 | 6346.71 | 1755.42 | 2184.76 | 585.67   | 0.47 | 7 |
| 8307  | 91.31 | 326.24 | 6344.51 | 1849.09 | 2263.85 | 533.09   | 0.3  | 7 |
| 8401  | 90.69 | 325.34 | 6342.88 | 1941.61 | 2341.57 | 480.25   | 1.17 | 7 |
| 8496  | 90.83 | 325.89 | 6341.62 | 2035.07 | 2419.96 | 426.6    | 0.6  | 7 |
| 8591  | 91.03 | 327.03 | 6340.08 | 2128.77 | 2499.13 | 374.12   | 1.22 | 7 |
| 8685  | 91.03 | 327.69 | 6338.39 | 2221.71 | 2578.27 | 323.42   | 0.7  | 7 |
| 8780  | 91.24 | 328.52 | 6336.51 | 2315.81 | 2658.91 | 273.24   | 0.9  | 7 |
| 8875  | 90.89 | 327.54 | 6334.74 | 2409.89 | 2739.49 | 222.95   | 1.09 | 7 |
| 8969  | 90.96 | 324.11 | 6333.22 | 2502.42 | 2817.24 | 170.16   | 3.65 | 7 |
| 9064  | 91.48 | 324.37 | 6331.2  | 2595.43 | 2894.31 | 114.66   | 0.61 | 7 |
| 9159  | 91.13 | 323.46 | 6329.03 | 2688.33 | 2971.07 | 58.72    | 1.02 | 7 |
| 9253  | 90.89 | 322.95 | 6327.37 | 2780.02 | 3046.33 | 2.44     | 0.6  | 7 |
| 9348  | 90.86 | 323.18 | 6325.92 | 2872.63 | 3122.26 | -54.64   | 0.25 | 7 |
| 9443  | 91    | 322.73 | 6324.38 | 2965.2  | 3198.08 | -111.86  | 0.5  | 7 |
| 9537  | 91.31 | 323.71 | 6322.49 | 3056.89 | 3273.35 | -168.13  | 1.09 | 7 |
| 9632  | 91    | 322.49 | 6320.58 | 3149.5  | 3349.31 | -225.15  | 1.32 | 7 |
| 9726  | 90.82 | 322.73 | 6319.09 | 3240.97 | 3423.99 | -282.22  | 0.31 | 7 |
| 9821  | 90.65 | 323.04 | 6317.86 | 3333.52 | 3499.74 | -339.54  | 0.37 | 7 |
| 9916  | 90.45 | 323.38 | 6316.95 | 3426.19 | 3575.81 | -396.43  | 0.42 | 7 |
| 10010 | 90.65 | 326.52 | 6316.05 | 3518.46 | 3652.75 | -450.41  | 3.34 | 7 |
| 10105 | 90.58 | 328.18 | 6315.02 | 3612.39 | 3732.73 | -501.66  | 1.75 | 7 |
| 10200 | 90.21 | 328.35 | 6314.37 | 3706.54 | 3813.52 | -551.63  | 0.44 | 7 |
| 10294 | 90.07 | 327.14 | 6314.14 | 3799.59 | 3893.02 | -601.79  | 1.3  | 7 |
| 10389 | 90.17 | 327.44 | 6313.94 | 3893.52 | 3972.95 | -653.13  | 0.33 | 7 |
| 10484 | 90.17 | 328.12 | 6313.66 | 3987.56 | 4053.32 | -703.79  | 0.72 | 7 |
| 10579 | 90    | 327.7  | 6313.52 | 4081.63 | 4133.8  | -754.26  | 0.47 | 7 |
| 10673 | 90.55 | 328.37 | 6313.06 | 4174.75 | 4213.54 | -804.02  | 0.92 | 7 |
| 10768 | 91.34 | 331.16 | 6311.5  | 4269.18 | 4295.6  | -851.85  | 3.06 | 7 |
| 10863 | 90.62 | 328.93 | 6309.87 | 4363.66 | 4377.89 | -899.27  | 2.47 | 7 |
| 10958 | 90.58 | 325.56 | 6308.88 | 4457.56 | 4457.77 | -950.66  | 3.55 | 7 |
| 11052 | 91.07 | 322.55 | 6307.52 | 4549.53 | 4533.85 | -1005.83 | 3.25 | 7 |
| 11147 | 90.93 | 320.31 | 6305.87 | 4641.49 | 4608.11 | -1065.05 | 2.36 | 7 |
| 11242 | 90.76 | 322.06 | 6304.47 | 4733.36 | 4682.12 | -1124.58 | 1.85 | 7 |
| 11337 | 90.65 | 322.02 | 6303.3  | 4825.58 | 4757.02 | -1183.01 | 0.12 | 7 |
| 11431 | 90.86 | 322.24 | 6302.06 | 4916.87 | 4831.22 | -1240.72 | 0.32 | 7 |
| 11526 | 91.13 | 323.5  | 6300.41 | 5009.4  | 4906.94 | -1298.05 | 1.36 | 7 |
| 11621 | 91    | 323.43 | 6298.65 | 5102.15 | 4983.26 | -1354.6  | 0.16 | 7 |
| 11715 | 91.13 | 323.45 | 6296.9  | 5193.92 | 5058.75 | -1410.59 | 0.15 | 7 |
| 11810 | 91    | 322.08 | 6295.13 | 5286.41 | 5134.37 | -1468.05 | 1.45 | 7 |
| 11905 | 91.03 | 322.5  | 6293.45 | 5378.73 | 5209.52 | -1526.15 | 0.44 | 7 |
| 12000 | 91    | 323.44 | 6291.77 | 5471.3  | 5285.34 | -1583.35 | 0.98 | 7 |
| 12094 | 90.93 | 325.34 | 6290.19 | 5563.39 | 5361.75 | -1638.08 | 2.02 | 7 |
| 12189 | 90.86 | 325.73 | 6288.71 | 5656.82 | 5440.06 | -1691.84 | 0.42 | 7 |
| 12284 | 91    | 327.25 | 6287.17 | 5750.52 | 5519.25 | -1744.29 | 1.61 | 7 |
| 12379 | 91.24 | 328.01 | 6285.32 | 5844.51 | 5599.47 | -1795.14 | 0.84 | 7 |
| 12473 | 90.79 | 326.37 | 6283.66 | 5937.41 | 5678.46 | -1846.07 | 1.8  | 7 |

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|       |       |        |         |         |         |          |      |   |
|-------|-------|--------|---------|---------|---------|----------|------|---|
| 12568 | 90.03 | 326.05 | 6282.97 | 6031.05 | 5757.41 | -1898.9  | 0.86 | 7 |
| 12662 | 90.27 | 326.75 | 6282.72 | 6123.75 | 5835.7  | -1950.92 | 0.78 | 7 |
| 12757 | 90.21 | 327.73 | 6282.32 | 6217.67 | 5915.59 | -2002.33 | 1.04 | 7 |
| 12852 | 90.1  | 327.58 | 6282.06 | 6311.68 | 5995.85 | -2053.16 | 0.19 | 7 |
| 12947 | 89.86 | 326.84 | 6282.09 | 6405.59 | 6075.71 | -2104.61 | 0.82 | 7 |
| 13042 | 90.38 | 327.12 | 6281.89 | 6499.43 | 6155.36 | -2156.38 | 0.62 | 7 |
| 13137 | 90.65 | 328.53 | 6281.04 | 6593.48 | 6235.76 | -2206.97 | 1.52 | 7 |
| 13232 | 90.65 | 328.66 | 6279.96 | 6687.7  | 6316.84 | -2256.47 | 0.14 | 7 |
| 13326 | 91.13 | 327.49 | 6278.49 | 6780.81 | 6396.61 | -2306.17 | 1.35 | 7 |
| 13421 | 91.41 | 323.38 | 6276.38 | 6874.19 | 6474.8  | -2360.05 | 4.33 | 7 |
| 13516 | 90.96 | 320.77 | 6274.42 | 6966.4  | 6549.72 | -2418.42 | 2.79 | 7 |
| 13611 | 90.72 | 321.22 | 6273.02 | 7058.19 | 6623.53 | -2478.2  | 0.54 | 7 |
| 13705 | 90.76 | 322.13 | 6271.81 | 7149.3  | 6697.27 | -2536.49 | 0.96 | 7 |
| 13800 | 91    | 323.02 | 6270.35 | 7241.72 | 6772.7  | -2594.22 | 0.98 | 7 |
| 13895 | 91    | 322.42 | 6268.7  | 7334.2  | 6848.28 | -2651.75 | 0.63 | 7 |
| 13989 | 91    | 323.03 | 6267.06 | 7425.71 | 6923.07 | -2708.68 | 0.65 | 7 |
| 14084 | 90.83 | 321.85 | 6265.55 | 7518.08 | 6998.36 | -2766.58 | 1.26 | 7 |
| 14179 | 90.93 | 321.64 | 6264.1  | 7610.18 | 7072.95 | -2825.4  | 0.24 | 7 |
| 14274 | 91    | 321.93 | 6262.5  | 7702.29 | 7147.58 | -2884.16 | 0.32 | 7 |
| 14369 | 91    | 322.02 | 6260.85 | 7794.49 | 7222.4  | -2942.67 | 0.09 | 7 |
| 14464 | 90.76 | 322.27 | 6259.4  | 7886.75 | 7297.41 | -3000.96 | 0.37 | 7 |
| 14559 | 90.82 | 322.82 | 6258.09 | 7979.17 | 7372.82 | -3058.72 | 0.58 | 7 |
| 14654 | 90.93 | 322.28 | 6256.63 | 8071.59 | 7448.23 | -3116.48 | 0.58 | 7 |
| 14752 | 91.07 | 323.09 | 6254.93 | 8166.97 | 7526.16 | -3175.87 | 0.84 | 8 |
| 14844 | 91.48 | 325.01 | 6252.89 | 8256.98 | 7600.62 | -3229.86 | 2.13 | 9 |
| 14939 | 91.58 | 325.44 | 6250.35 | 8350.3  | 7678.63 | -3284.02 | 0.47 | 9 |
| 15034 | 91.93 | 325.12 | 6247.44 | 8443.63 | 7756.68 | -3338.1  | 0.5  | 9 |
| 15129 | 91.51 | 325.38 | 6244.6  | 8536.95 | 7834.7  | -3392.22 | 0.52 | 9 |
| 15223 | 91.07 | 327.08 | 6242.48 | 8629.58 | 7912.82 | -3444.46 | 1.87 | 9 |
| 15318 | 90.79 | 327.71 | 6240.94 | 8723.52 | 7992.84 | -3495.64 | 0.72 | 9 |
| 15413 | 90.79 | 327.86 | 6239.63 | 8817.56 | 8073.2  | -3546.28 | 0.16 | 9 |
| 15508 | 90.83 | 327.17 | 6238.29 | 8911.53 | 8153.33 | -3597.3  | 0.73 | 9 |
| 15602 | 90.96 | 327.42 | 6236.83 | 9004.46 | 8232.42 | -3648.08 | 0.3  | 9 |
| 15697 | 91    | 328.02 | 6235.2  | 9098.48 | 8312.73 | -3698.8  | 0.64 | 9 |
| 15792 | 91.03 | 329.39 | 6233.52 | 9192.71 | 8393.9  | -3748.13 | 1.44 | 9 |
| 15821 | 91.03 | 329.84 | 6233    | 9221.53 | 8418.91 | -3762.8  | 1.53 | 9 |
| 15882 | 91.03 | 329.84 | 6231.9  | 9282.18 | 8471.64 | -3793.44 | 0    | 9 |

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# Noble Energy



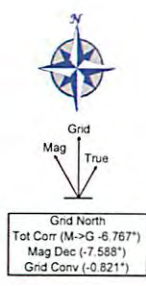
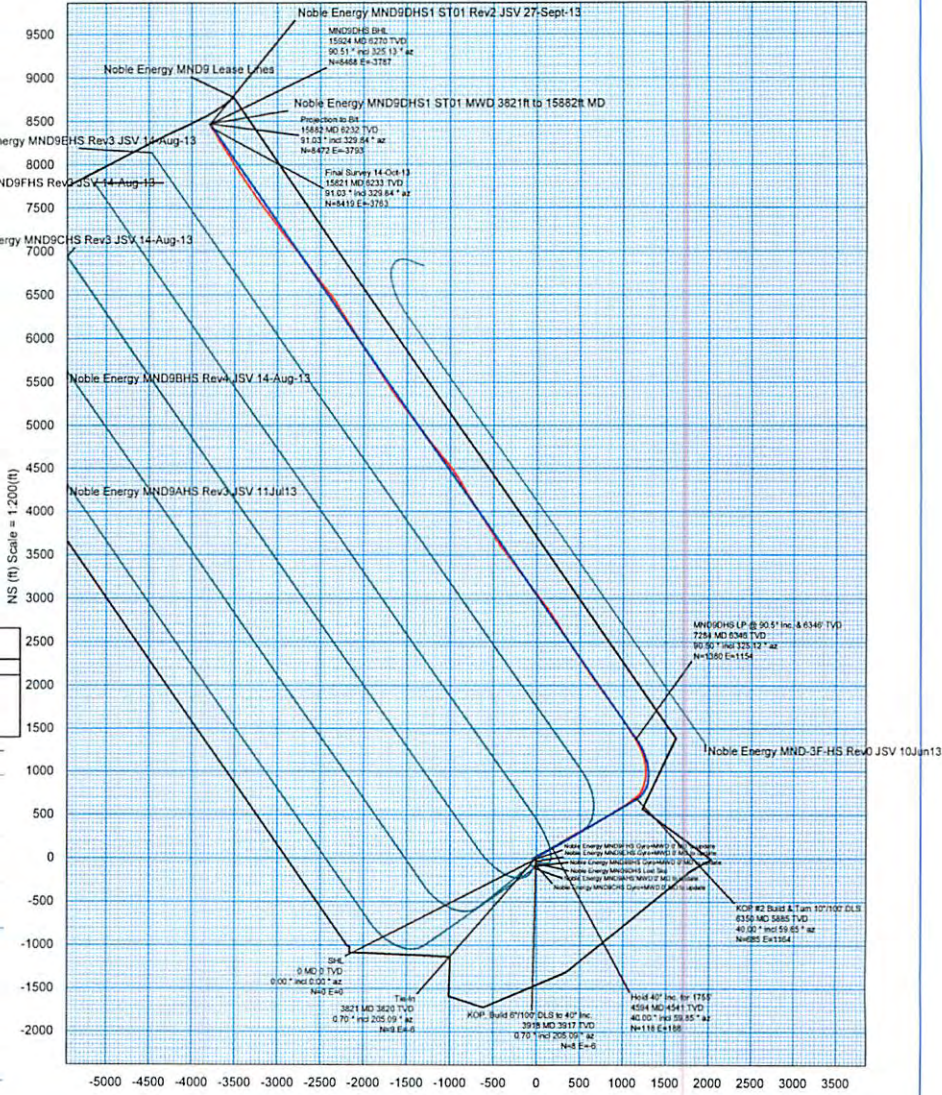
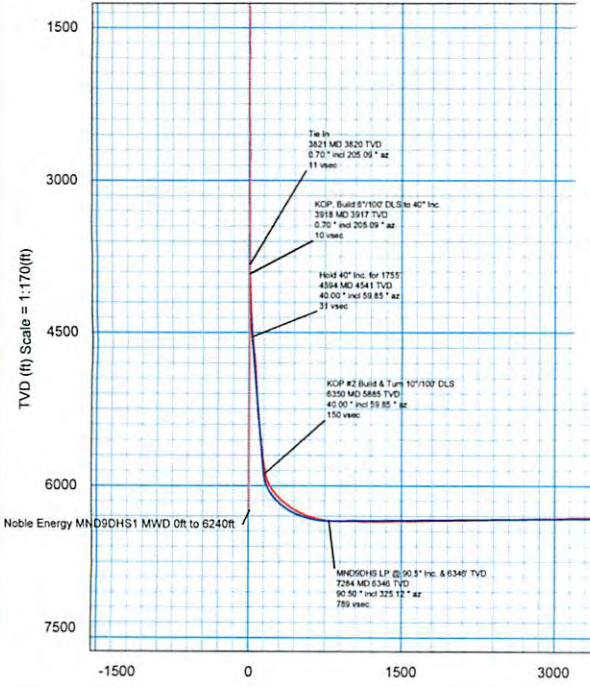
|  |             |                         |                 |  |   |                      |   |
|--|-------------|-------------------------|-----------------|--|---|----------------------|---|
| <b>Borehole:</b>                         | <b>ST01</b> | <b>Well:</b>            | <b>MND9DHS1</b> | <b>Field:</b>  | <b>WV Marshall County (NAD 27)</b>            | <b>Structure:</b>    | <b>Nomac 79</b>                                     |
| <b>Gravity &amp; Magnetic Parameters</b> |             | <b>Surface Location</b> |                 | <b>NAD27 West Virginia State Plane, Northern Zone, US Feet</b> |   | <b>Miscellaneous</b> |   |
| Model:                                   | HDM 2013    | Dip:                    | 67.362°         | Date:  | 9/28/2013                                     | Lat:                 | N 39 49 53.85                                       |
| MagDec:                                  | -7.588°     | FS:                     | 52559.932NT     | Gravity FS:  | 999.438mgal<br>(9.80665 ft/sec <sup>2</sup> ) | Northing:            | 487600.3161RUS                                      |
|  |             |                         |                 |  |   | Grid Conv:           | -0.821°   |
|  |             |                         |                 |  |   | Scale Fact:          | 1   |
|  |             |                         |                 |  |   | Slot:                | MND9DHS1  |
|  |             |                         |                 |  |   | TYD Ref:             | KB(1245.59ft above MSL)                             |
|  |             |                         |                 |  |   | Plan:                | Noble Energy MND9DHS1 ST01 MWD 3821ft to 15882ft MD |



| WELL | Seq | Survey Line                  | Interval From | Interval To | MD From (ft) | MD To (ft) | Survey | WV State | WV State | Comments |
|------|-----|------------------------------|---------------|-------------|--------------|------------|--------|----------|----------|----------|
| 1    | 1   | SLB_MND9DHS1-ONLY-Depth Only | 30            | 30          | 25.97        | 25.97      | Auto   | 1.26     | 1.25     |          |
| 1    | 2   | SLB_MND9DHS1-ONLY            | 30            | 30          | 25.97        | 2432       | Auto   | 32.81    | 6.94     |          |
| 1    | 3   | SLB_MND9DHS1-ONLY            | 30            | 30          | 2432         | 3821       | Auto   | 35.75    | 7.91     |          |
| 1    | 4   | SLB_MND9DHS1-ONLY            | 30            | 30          | 3821         | 15821      | Auto   | 253.77   | 49.76    |          |
| 1    | 5   | SLB_MND9DHS1-ONLY            | 30            | 30          | 15821        | 15882      | Auto   | 263.47   | 47.96    |          |

| Critical Points        |       |        |         |         |          |          |      |
|------------------------|-------|--------|---------|---------|----------|----------|------|
| MD                     | INCL  | AZIM   | TYD     | VSEC    | WV State | WV State | DLS  |
| 3821.00                | 0.70  | 205.09 | 3820.22 | 10.60   | 6.96     | -8.86    |      |
| Final Survey 14-Oct-13 | 91.03 | 329.84 | 9222.98 | 9221.53 | 347.89   | -3762.83 | 1.55 |
| Projection to B4       | 91.03 | 329.84 | 9222.98 | 9222.18 | 347.73   | -3763.47 | 0.20 |

| Surface Location |             |               |               |         |        |        |        |
|------------------|-------------|---------------|---------------|---------|--------|--------|--------|
| Northing         | Easting     | Latitude      | Longitude     | WGS 84  | WGS 84 | WGS 84 | WGS 84 |
| 487600.316       | 1638504.443 | N 39 49 53.85 | W 80 47 14.02 | 338.911 |        |        |        |



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