



Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD Survey Report

(Def Survey)

Report Date: March 14, 2014 - 08:58 AM
Client: Noble Energy
Field: WV Ritchie County (NAD27)
Structure / Slot: Noble Energy PEN2 Pad/PEN2FHS
Well: PEN2FHS
Borehole: Original Borehole
UWI / API: Unknown / Unknown
Survey Name: Noble Energy PEN2FHS INC ONLY+MWD 0ft to14664ft MD
Survey Date: February 22, 2014
Tort / AHD / DDI / ERD Ratio: 303.218 " / 9255.503 ft / 0.816 / 1.471
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 20' 11.81000" W 81° 0' 45.38000"
Location Grid N/E Y/X: N 308313 361 MUS, E 1572180 669 MUS
CRS Grid Convergence Angle: -0.9647 "
Grid Scale Factor: 0.99995343
Version / Patch: 2.7.1043.0
Survey / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 326.368 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: N8
TVD Reference Elevation: 1099.100 ft above MSL
Seabed / Ground Elevation: 1073.100 ft above MSL
Magnetic Declination: -7.855
Total Gravity Field Strength: 999.308mgn (9.80665 Based)
Gravity Model: GARM
Total Magnetic Field Strength: 52254.600 nT
Magnetic Dip Angle: 66.856 °
Declination Date: February 22, 2014
Magnetic Declination Model: HDOM 2013
North Reference: Grid North
Grid Convergence Used: -0.9647 "
Total Corr Mag North-Grid: -6.8904 "
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 (ftUS), Easting (ftUS), Latitude (N/S ° ' ''), Longitude (E/W ° ' ''), Directional Difficulty Index. Rows include data points for various depths and coordinates.

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06/12/2015

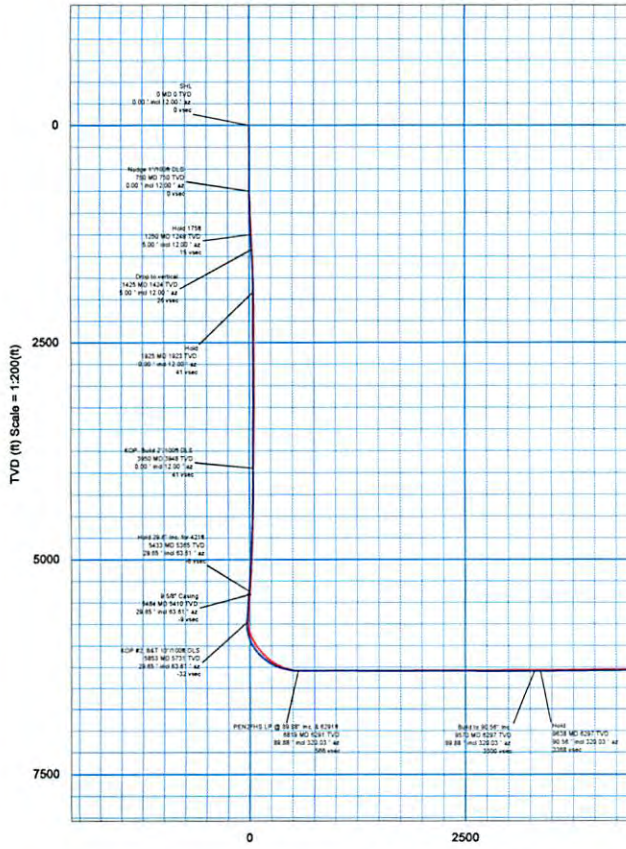
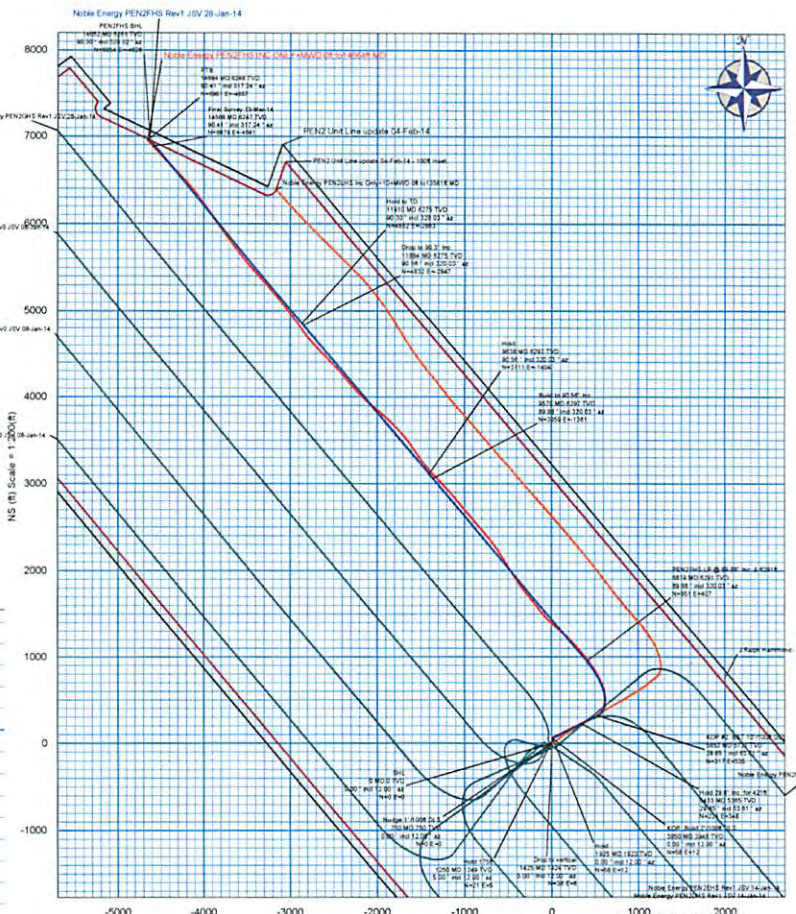
| | | | |
|-------------------|--------------|---------------------------|-------------------|
| Borehole: | Well: | Field: | Structure: |
| Original Borehole | PEN2FH5 | WV Ritchie County (NAD27) | Nomac 78 |

| | | | | | |
|--|----------------|--|---|--|--|
| Gravity & Magnetic Parameters | | Surface Location | | Miscellaneous | |
| Model: HDGM 2013 | Dip: 68.856° | Date: 22-Feb-2014 | NAD27 West Virginia State Plane, Northern Zone, US Feet | Slot: PEN2FH5 | TVD Ref: KB(1099.1ft above MSL) |
| MagDec: -7.855° | FS: 52254.66nT | Gravity FS: 998.309mgm (9.80665 Based) | Lat: N 39 20 11.81 Lon: W 81 0 45.38 | Northing: 308313.361FUS Easting: 1572180.669FUS | Scale Fact: 0.99995343 Plan: Noble Energy PEN2FH5 INC ONLY+MWD ON to 14664ft MD |

| Crustal Point | MD | INCL | AZIM | VSEC | N49514 | Ely(W) | DLB |
|------------------------|----------|-------|--------|---------|---------|---------|----------|
| SHL | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| Final Survey 13 Mar 14 | 14588.00 | 90.41 | 317.24 | 8248.83 | 8270.37 | 8879.13 | -4360.95 |
| PTB | 14684.00 | 90.41 | 317.24 | 8248.23 | 8267.13 | 8861.08 | -4857.48 |

| PART | Seq | Survey Tool | Vendor/Tool | Hole Size (in) | CWV Size (in) | MD From (ft) | MD To (ft) | Survey Frequency | EQI Size (Bore Major) (in) | EQI Size (Bore Minor) (in) | Comments/Contingency |
|------|-----|---------------------------|-------------|----------------|---------------|--------------|------------|------------------|----------------------------|----------------------------|----------------------|
| 1 | 1 | SLB_NC_ONLY+10 Depth Only | | 30 | 30 | 0 | 28 | Act Stn | 1.25 | 1.25 | |
| 1 | 2 | SLB_NC_ONLY+10 | | 30 | 30 | 28 | 718 | 1.68 4.25 | 9.22 | 8.22 | |
| 1 | 3 | SLB_NC_ONLY+10 | | 30 | 30 | 718 | 809 | Act Stn | 9.46 | 9.46 | |
| 1 | 4 | SLB_MWD-STD | | 30 | 30 | 809 | 14568 | Act Stn | 235.27 | 23.7 | |
| 1 | 5 | SLB_BLD+TRND | | 30 | 30 | 14568 | 14664 | Act Stn | 260.28 | 27.81 | |

| Surface Location | | Grid Coord | | Local Coord | | | | | |
|----------------------------|-----------|---------------|--------------|-------------|------------|---------|---------|--------|----------|
| Target Description | Shape | Latitude | Longitude | Northing | Easting | TVD | VSec | N49514 | Ely(W) |
| Target Name | Dimension | | | | | | | | |
| PEN2 Line Update 04-Feb-14 | Point | N 39 20 11.34 | W 81 0 45.23 | 308268.84 | 1572113.26 | 1098.10 | -1.22 | -48.42 | 47.58 |
| PEN2 Line Update 04-Feb-14 | Point | N 39 20 11.34 | W 81 0 45.23 | 308268.84 | 1572113.26 | 1098.10 | -1.22 | -48.42 | 47.58 |
| PEN2FH5 LP | Point | N 39 20 21.27 | W 81 0 42.41 | 308263.89 | 1572587.42 | 8314.00 | 588.28 | 802.88 | 408.75 |
| PEN2FH5 SHL | Point | N 39 21 18.75 | W 81 1 45.75 | 315268.83 | 1587553.28 | 8314.00 | 8351.58 | 863.81 | -4825.81 |



Grid
Mag True

Grid North
Tot Cor (M->G -6.890°)
Mag Dec (-7.855°)
Grid Conv (-0.965°)

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