

51-01626



Noble Energy MND9BHS Gyro+MWD 0ft to 16580ft MD Survey Report

(Def Survey)

Report Date: December 09, 2013 - 09:13 AM
Client: Noble Energy
Field: WV Marshall County (NAD 27)
Structure / Slot: Noble Energy MND9 Pad / MND9BHS
Well: MND9BHS
Borehole: Original Borehole
UWI / API#: Unknown / Unknown
Survey Name: Noble Energy MND9BHS Gyro+MWD 0ft to 16580ft MD
Survey Date: November 22, 2013
Tort / AHD / DDI / ERD Ratio: 276.892' / 1125.245 ft / 6.905 / 1.751
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 49' 52.92700", W 80° 47' 14.29800"
Location Grid NE YX: N 483507.751 ftUS, E 1638481.174 ftUS
CRS Grid Convergence Angle: -0.8210"
Grid Scale Factor: 0.99994715
Version / Patch: 2.7.998.0

Vertical / DLS Computation: Minimum Curvature / Lubinski
Vertical Section Azimuth: 318.366 ° (Grid North)
Vertical Section Origin: 0.000 ft, 0.000 ft
TVD Reference Datum: KSI
TVD Reference Elevation: 1245.560 ft above MSL
Seabed / Ground Elevation: 1219.020 ft above MSL
Magnetic Declination: -7.592 °
Total Gravity Field Strength: 999.3452mgm (9.80665 Barweid)
Gravity Model: GAIM
Total Magnetic Field Strength: 52939.642 nT
Magnetic Dip Angle: 67.347 °
Declination Date: November 22, 2013
Magnetic Declination Model: HDGM 2013
North Reference: Grid North
Grid Convergence Used: -0.8210"
Total Corr Mag North->Grid North: -6.7714"
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), DR (ft/100ft), TR (ft/100ft), Northing (ftUS), Easting (ftUS), Latitude (N/S/E/W), Longitude (E/W/N/S), Directional Difficulty Index

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Table with columns: Comments, MD, Incl, Azim Grid, TVD, TVDBS, VSEC, NS, EW, DLS, BR, TR, Northing, Easting, Latitude, Longitude, Directional Index. The table contains multiple rows of numerical data representing well parameters.

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Comments	MD (ft)	Incl (°)	Azim Grid (°)	TVD (ft)	TVDSS (ft)	VSEC (ft)	NS (ft)	EW (ft)	DLB (°/100ft)	BR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ° ' °)	Longitude (E/W ° ° ' °)	Directional Difficulty Index
	15798.00	90.98	325.08	6224.65	4979.09	9376.47	6959.86	-6286.03	0.18	0.07	-0.17	494487.23	1632194.89	N 39 51 0.80 W	80 48 36.17	6.85
	15803.00	90.93	325.22	6223.08	4977.52	9472.80	7037.81	-6340.91	0.15	-0.03	0.15	494545.17	1632140.61	N 39 51 1.57 W	80 48 36.88	6.86
	15807.00	90.96	324.89	6221.53	4975.97	9566.14	7114.85	-6394.75	0.35	0.03	-0.35	494622.21	1632086.78	N 39 51 2.32 W	80 48 37.59	6.86
	16082.00	90.70	325.62	6220.08	4974.52	9680.45	7192.90	-6448.88	0.79	-0.18	0.77	494700.26	1632032.65	N 39 51 3.08 W	80 48 38.29	6.87
	16178.00	90.70	325.16	6218.78	4973.22	9753.73	7270.26	-6502.27	0.49	0.00	-0.49	494777.61	1631979.26	N 39 51 3.84 W	80 48 38.99	6.88
	16271.00	90.80	324.77	6217.39	4971.83	9848.09	7348.04	-6556.80	0.42	0.11	-0.41	494855.39	1631924.74	N 39 51 4.60 W	80 48 39.71	6.88
	16368.00	91.03	324.72	6215.80	4970.24	9942.49	7425.60	-6611.63	0.16	0.15	-0.05	494932.95	1631869.91	N 39 51 5.36 W	80 48 40.42	6.89
	16461.00	91.10	324.89	6214.03	4968.47	10036.87	7503.22	-6666.37	0.19	0.07	0.18	495010.56	1631815.17	N 39 51 6.12 W	80 48 41.14	6.90
Final Survey 07- Dec-13 PTB	16530.00	90.93	324.91	6212.81	4967.25	10105.42	7559.67	-6708.04	0.25	-0.25	0.03	495087.00	1631775.50	N 39 51 6.87 W	80 48 41.86	6.90
	16580.00	90.93	324.91	6212.00	4966.44	10155.08	7600.57	-6734.78	0.00	0.00	0.00	495107.91	1631746.78	N 39 51 7.07 W	80 48 42.04	6.91

Survey Type: Def Survey

Survey Error Model: ISCHWSA Rev 0 *** 3-D 95.000% Confidence 2.7956 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	25.940	Act Strs	30.000	30.000	SLB_NSG+MSHOT-Depth Only	Original Borehole / Noble Energy MND9BHS Gyro+MWD Off to 16580ft MD
	1	25.940	2378.000	Act Strs	30.000	30.000	SLB_NSG+MSHOT	Original Borehole / Noble Energy MND9BHS Gyro+MWD Off to
	1	2378.000	16530.000	Act Strs	30.000	30.000	SLB_MWD-STD	Original Borehole / Noble Energy MND9BHS Gyro+MWD Off to
	1	16530.000	16580.000	Act Strs	30.000	30.000	SLB_BLIND+TREND	Original Borehole / Noble Energy MND9BHS Gyro+MWD Off to

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