



Noble Energy



WELL				FIELD				STRUCTURE			
SHL17AHS				VV Marshall County (NAD 27)				Precision 543			
Magnetic Parameters		Datum		Datum		Datum		Datum		Datum	
Magnetic Decl.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.	Mag. Dec.
88.02° W	3.8° E	47.87°	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N
Magnetic Parameters			Datum			Datum			Datum		
Magnetic Decl.	Mag. Dec.	Mag. Dec.	Magnetic Decl.	Mag. Dec.	Mag. Dec.	Magnetic Decl.	Mag. Dec.	Mag. Dec.	Magnetic Decl.	Mag. Dec.	Mag. Dec.
88.02° W	3.8° E	47.87°	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N	18.7° N

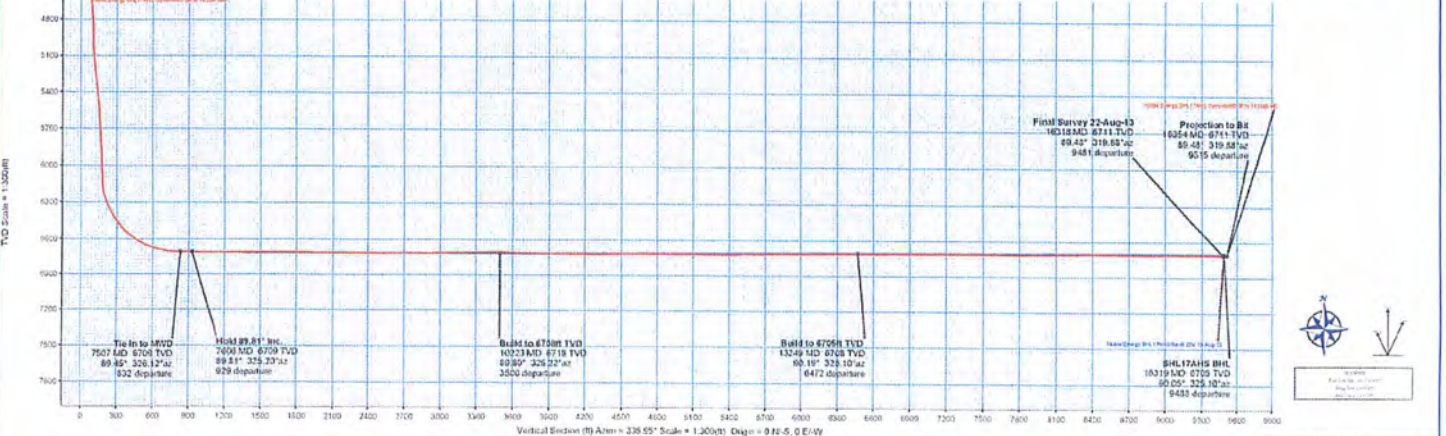
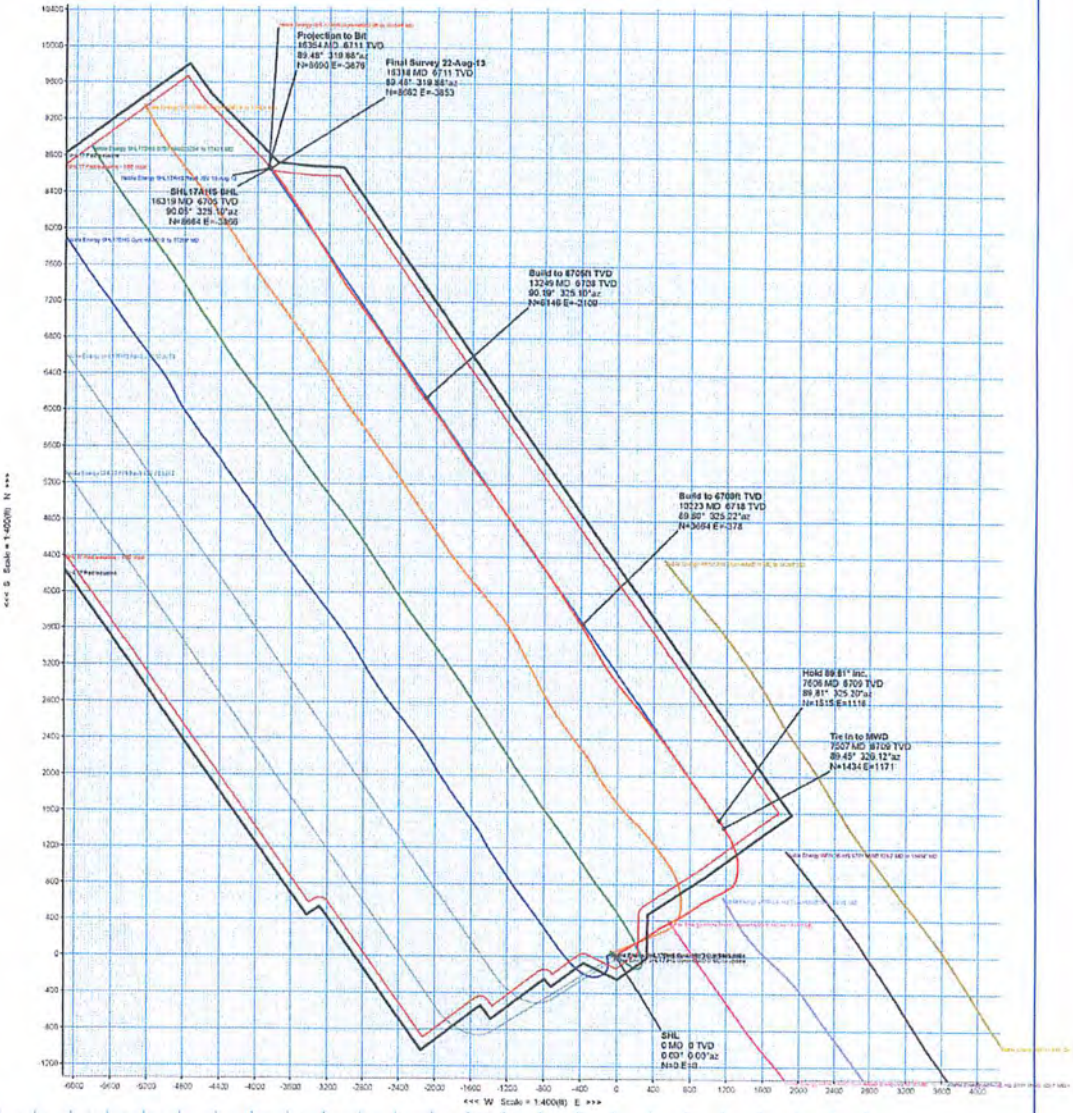
Legend

- 1000' Contour
- 2000' Contour
- 3000' Contour
- 4000' Contour
- 5000' Contour
- 6000' Contour
- 7000' Contour
- 8000' Contour
- 9000' Contour
- 10000' Contour
- 11000' Contour
- 12000' Contour
- 13000' Contour
- 14000' Contour
- 15000' Contour
- 16000' Contour
- 17000' Contour
- 18000' Contour
- 19000' Contour
- 20000' Contour
- 21000' Contour
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- 28000' Contour
- 29000' Contour
- 30000' Contour
- 31000' Contour
- 32000' Contour
- 33000' Contour
- 34000' Contour
- 35000' Contour
- 36000' Contour
- 37000' Contour
- 38000' Contour
- 39000' Contour
- 40000' Contour

Well Name	Depth (ft)	Interval	Interval	Interval	Interval	Interval	Interval
SHL17AHS	100	100-200	200-300	300-400	400-500	500-600	600-700
SHL17AHS	700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300
SHL17AHS	1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900
SHL17AHS	1900	1900-2000	2000-2100	2100-2200	2200-2300	2300-2400	2400-2500
SHL17AHS	2500	2500-2600	2600-2700	2700-2800	2800-2900	2900-3000	3000-3100
SHL17AHS	3100	3100-3200	3200-3300	3300-3400	3400-3500	3500-3600	3600-3700
SHL17AHS	3700	3700-3800	3800-3900	3900-4000	4000-4100	4100-4200	4200-4300
SHL17AHS	4300	4300-4400	4400-4500	4500-4600	4600-4700	4700-4800	4800-4900
SHL17AHS	4900	4900-5000	5000-5100	5100-5200	5200-5300	5300-5400	5400-5500
SHL17AHS	5500	5500-5600	5600-5700	5700-5800	5800-5900	5900-6000	6000-6100
SHL17AHS	6100	6100-6200	6200-6300	6300-6400	6400-6500	6500-6600	6600-6700
SHL17AHS	6700	6700-6800	6800-6900	6900-7000	7000-7100	7100-7200	7200-7300
SHL17AHS	7300	7300-7400	7400-7500	7500-7600	7600-7700	7700-7800	7800-7900
SHL17AHS	7900	7900-8000	8000-8100	8100-8200	8200-8300	8300-8400	8400-8500
SHL17AHS	8500	8500-8600	8600-8700	8700-8800	8800-8900	8900-9000	9000-9100
SHL17AHS	9100	9100-9200	9200-9300	9300-9400	9400-9500	9500-9600	9600-9700
SHL17AHS	9700	9700-9800	9800-9900	9900-10000			

Well Name	Depth (ft)	Interval	Interval	Interval	Interval	Interval	Interval
SHL17AHS	100	100-200	200-300	300-400	400-500	500-600	600-700
SHL17AHS	700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300
SHL17AHS	1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900
SHL17AHS	1900	1900-2000	2000-2100	2100-2200	2200-2300	2300-2400	2400-2500
SHL17AHS	2500	2500-2600	2600-2700	2700-2800	2800-2900	2900-3000	3000-3100
SHL17AHS	3100	3100-3200	3200-3300	3300-3400	3400-3500	3500-3600	3600-3700
SHL17AHS	3700	3700-3800	3800-3900	3900-4000	4000-4100	4100-4200	4200-4300
SHL17AHS	4300	4300-4400	4400-4500	4500-4600	4600-4700	4700-4800	4800-4900
SHL17AHS	4900	4900-5000	5000-5100	5100-5200	5200-5300	5300-5400	5400-5500
SHL17AHS	5500	5500-5600	5600-5700	5700-5800	5800-5900	5900-6000	6000-6100
SHL17AHS	6100	6100-6200	6200-6300	6300-6400	6400-6500	6500-6600	6600-6700
SHL17AHS	6700	6700-6800	6800-6900	6900-7000	7000-7100	7100-7200	7200-7300
SHL17AHS	7300	7300-7400	7400-7500	7500-7600	7600-7700	7700-7800	7800-7900
SHL17AHS	7900	7900-8000	8000-8100	8100-8200	8200-8300	8300-8400	8400-8500
SHL17AHS	8500	8500-8600	8600-8700	8700-8800	8800-8900	8900-9000	9000-9100
SHL17AHS	9100	9100-9200	9200-9300	9300-9400	9400-9500	9500-9600	9600-9700
SHL17AHS	9700	9700-9800	9800-9900	9900-10000			

Well Name	Depth (ft)	Interval	Interval	Interval	Interval	Interval	Interval
SHL17AHS	100	100-200	200-300	300-400	400-500	500-600	600-700
SHL17AHS	700	700-800	800-900	900-1000	1000-1100	1100-1200	1200-1300
SHL17AHS	1300	1300-1400	1400-1500	1500-1600	1600-1700	1700-1800	1800-1900
SHL17AHS	1900	1900-2000	2000-2100	2100-2200	2200-2300	2300-2400	2400-2500
SHL17AHS	2500	2500-2600	2600-2700	2700-2800	2800-2900	2900-3000	3000-3100
SHL17AHS	3100	3100-3200	3200-3300	3300-3400	3400-3500	3500-3600	3600-3700
SHL17AHS	3700	3700-3800	3800-3900	3900-4000	4000-4100	4100-4200	4200-4300
SHL17AHS	4300	4300-4400	4400-4500	4500-4600	4600-4700	4700-4800	4800-4900
SHL17AHS	4900	4900-5000	5000-5100	5100-5200	5200-5300	5300-5400	5400-5500
SHL17AHS	5500	5500-5600	5600-5700	5700-5800	5800-5900	5900-6000	6000-6100
SHL17AHS	6100	6100-6200	6200-6300	6300-6400	6400-6500	6500-6600	6600-6700
SHL17AHS	6700	6700-6800	6800-6900	6900-7000	7000-7100	7100-7200	7200-7300
SHL17AHS	7300	7300-7400	7400-7500	7500-7600	7600-7700	7700-7800	7800-7900
SHL17AHS	7900	7900-8000	8000-8100	8100-8200	8200-8300	8300-8400	8400-8500
SHL17AHS	8500	8500-8600	8600-8700	8700-8800	8800-8900	8900-9000	9000-9100
SHL17AHS	9100	9100-9200	9200-9300	9300-9400	9400-9500	9500-9600	9600-9700
SHL17AHS	9700	9700-9800	9800-9900	9900-10000			



Drawn By: J. W. ...
 Date Checked: August 16, 2013 11:50:43 AM
 Created By: ...
 Checked/Date: ...
 Approved By: ...
 Approved Date: ...

51-01635



Noble Energy SHL17AHS Gyro+MWD 0ft to 16354ft MD Survey Report



(Dof Survey)

Report Date: August 22, 2013 - 08:49 AM
Client: Noble Energy
Field: WV Marshall County (NAO 27)
Structure / Plot: Noble Energy SHL17 Pad/SHL17AHS
Well: SHL17AHS
Borehole: Gagne Borehole
DST/APR: Unknown / Unknown
Survey Name: Noble Energy SHL17AHS Gyro+MWD 0ft to 16354ft MD
Survey Date: August 15, 2013
Tort / AHD / DOI / ERD Ratio: 203.685 / 11071.890 N / 6.692 / 1.647
Coordinate Reference System: NAD27 West Virginia State Plane, Northern Zone, US Feet
Location Lat / Long: N 39° 56' 35.55058", W 107° 31' 45.85824"
Location Grid NE YK: N 390754 209 NUS, E 1711514 051 NUS
CRS Grid Convergence Angle: -0.9566°
Grid Scale Factor: 0.99999551

Survey / DLS Computation: Minimum Gravity / Local
Vertical Scales Assumed: 395.923 / 0.34 (Heavy)
Vertical Scales Origin: 0.000 R 0.000 H
TVD Reference Datum: KG
TVR Reference Elevation: 1290.500 N above MSL
Seasid / Ground Elevation: 1272.000 N above MSL
Magnetic Declination: -6.471°
Total Gravity Field Strength: 969.328 (mg (D 86065 (Loaded)
Total Magnetic Field Strength: 53176.102 nT
Magnetic Dip Angle: 67.53°
Declination Date: August 15, 2013
Magnetic Declination Model: IIGM 2013
North Reference: Grid North
Grid Convergence Used: -0.9566°
Total Corr Mag North->Grid North: -7.8189°
Local Coord Referenced To: Well Head

Table with columns: Comemarks, 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

03/21/2014

Comments	MD (ft)	Incl (°)	Azlm Grid (°)	TVD (ft)	TVD99 (ft)	VSEC (ft)	N8 (ft)	EW (ft)	DLG (°/100ft)	GR (°/100ft)	TR (°/100ft)	Northing (ftUS)	Easting (ftUS)	Latitude (N/S ° ° ' '')	Longitude (E/W ° ° ' '')	Directional Difficulty Index
	14772.00	80.96	325.50	8714.30	8423.80	7956.34	7372.22	-3003.85	2.84	1.18	2.82	647126.11	17086516.62	N 30 50 51.03 W	80 32 25.53	6.75
	14862.00	80.53	328.16	8713.12	8422.82	8045.20	7447.88	-3052.83	2.89	-0.48	2.89	647201.47	17084611.35	N 30 50 51.80 W	80 32 26.18	6.78
	14951.00	81.34	327.81	8711.85	8421.18	8133.33	7523.03	-3100.00	0.97	0.89	-0.29	647270.92	1708414.18	N 30 50 52.54 W	80 32 26.70	6.77
	15041.00	82.76	328.10	8710.00	8419.50	8272.44	7569.35	-3147.60	0.77	-0.84	-0.42	647352.22	1708358.50	N 30 50 53.29 W	80 32 27.42	6.78
	15130.00	80.41	328.22	8709.09	8418.99	8310.83	7674.08	-3194.66	0.30	-0.39	0.03	647428.88	1708319.61	N 30 50 54.03 W	80 32 28.03	6.79
	15220.00	80.02	328.80	8708.28	8417.78	8399.85	7751.08	-3241.96	0.87	0.73	0.52	647505.55	1708272.53	N 30 50 54.78 W	80 32 28.65	6.79
	15310.00	80.35	328.11	8708.21	8417.81	8489.17	7828.75	-3288.15	1.40	-1.41	0.47	647582.81	1708229.04	N 30 50 55.54 W	80 32 29.28	6.80
	15399.00	80.55	320.35	8708.16	8418.08	8577.66	7906.21	-3333.98	0.55	0.22	-0.27	647659.08	1708180.52	N 30 50 56.29 W	80 32 29.85	6.81
	15489.00	80.35	328.28	8710.02	8419.62	8666.85	7982.20	-3380.28	1.21	-0.22	-1.19	647734.00	1708133.02	N 30 50 57.04 W	80 32 30.48	6.82
	15578.00	80.26	327.07	8711.03	8420.83	8754.02	8067.41	-3427.86	1.36	0.00	-1.36	647811.26	1708086.23	N 30 50 57.78 W	80 32 31.08	6.82
	15668.00	80.31	326.87	8712.09	8421.60	8843.81	8132.85	-3476.92	0.73	-0.04	-0.22	647886.71	1708039.28	N 30 50 58.52 W	80 32 31.73	6.83
	15758.00	81.17	326.64	8711.71	8421.21	8932.65	8208.12	-3526.26	2.08	2.07	-0.20	647961.07	1707992.05	N 30 50 59.26 W	80 32 32.37	6.84
	15847.00	80.79	320.72	8710.19	8419.88	9020.47	8282.48	-3575.14	0.44	-0.43	0.09	648036.33	1707945.07	N 30 50 60.00 W	80 32 33.01	6.85
	15930.00	80.38	326.85	8709.28	8418.78	9108.30	8356.85	-3624.02	0.47	-0.40	-0.08	648110.69	1707898.10	N 40 0 0.72 W	80 32 33.65	6.85
	16020.00	80.24	328.80	8708.70	8418.29	9196.98	8431.58	-3674.20	1.22	-0.16	-1.21	648185.39	1707850.00	N 40 0 1.45 W	80 32 34.31	6.86
	16115.00	80.53	322.80	8708.95	8418.45	9284.10	8503.71	-3726.20	3.20	-0.78	-3.10	648264.56	1707781.62	N 40 0 2.18 W	80 32 34.99	6.87
	16205.00	80.24	321.53	8709.90	8419.40	9371.60	8574.70	-3781.48	1.45	-0.24	-1.41	648328.62	1707732.73	N 40 0 2.85 W	80 32 35.71	6.88
	16294.00	80.48	320.51	8710.00	8420.40	9457.48	8643.97	-3837.47	1.18	0.27	-1.15	648397.80	1707678.76	N 40 0 3.53 W	80 32 36.44	6.89
Final Survey 22-Aug 13	16318.00	80.48	319.88	8711.17	8420.02	9480.58	8692.40	-3892.83	2.02	0.00	-2.03	648461.24	1707618.138	N 40 0 3.71 W	80 32 36.64	6.90
Projection to Bt	16354.00	80.48	319.88	8711.44	8420.04	9516.17	8889.03	-3870.03	0.00	0.00	0.00	648443.78	1707638.19	N 40 0 3.98 W	80 32 36.84	6.90

Survey Type: Def Survey

Survey Error Model: ISCWSA Rev 0 *** 3-D 95.000% Confidence 2 7955 sigma

Survey Program:

Description	MD From (ft)	MD To (ft)	EQI Freq (ft)	Hole Size (in)	Casing Diameter (in)	Survey Tool Type	Borehole / Survey
	0.000	18.000		Act Sins	30.000	SLB_NSQ+MSHOT-Depth Only	Original Borehole / Noble Energy SHL17AHS Gyro+MWD Off to 1835ft MD
	18.000	3095.000		Act Sins	30.000	SI_R_N8G+MSHOT	Original Borehole / Noble Energy SHL17AHS Gyro+MWD Off to
	3095.000	16318.000		Act Sins	30.000	SI_R_MWD-BTD	Original Borehole / Noble Energy SHL17AHS Gyro+MWD Off to
	16318.000	16354.000		Act Sins	30.000	SI_R_BLIND+TREND	Original Borehole / Noble Energy SHL17AHS Gyro+MWD Off to