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**west virginia** department of environmental protection

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Office of Oil and Gas  
601 57th Street SE  
Charleston, WV 25304  
(304) 926-0450  
(304) 926-0452 fax

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
www.dep.wv.gov

July 25, 2013

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-9502112, issued to NOBLE ENERGY, INC., is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.

James Martin  
Chief

Operator's Well No: SHR 1 DHS  
Farm Name: NOBLE ENERGY, INC.  
**API Well Number: 47-9502112**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 07/25/2013

**Promoting a healthy environment.**

**INSPECTORS PERMIT SUMMARY FORM**

**GPS YES [ ] NO [ ]**

DATE STARTED/LOCATION: \_\_\_\_\_ OPERATOR: NOBLE ENERGY, INC.  
 DRILLING COMMENCED: \_\_\_\_\_ FARM: NOBLE ENERGY, INC.  
 TO DATE: \_\_\_\_\_ DEPTHS: \_\_\_\_\_ Well No: SHR 1 DHS  
 WATER DEPTHS: \_\_\_\_\_ COAL DEPTHS \_\_\_\_\_

QUESTIONS FOR THIS REPORT ARE IN ACCORDANCE OF WV CODE 22-6-30 AND REGULATIONS 35CSR 4-12.1 AND 35CSR 4-16 AND THE GENERAL WATER POLLUTION CONTROL PERMIT.

**POINTS ARE TO BE GIVEN UP TO MAXIMUM AS SHOWN BASED ON PERFORMANCE.**

1. DID OPERATOR GIVE PROPER NOTICE TO INSPECTOR BEFORE THE FOLLOWING:
  - A. CONSTRUCTION YES [ ] NO [ ] (2\_PTS) (4\_PTS) \_\_\_\_\_
  - B. DRILLING YES [ ] NO [ ] (2\_PTS)
2. WAS THE TIMBER CUT, STACKED, AND BRUSH USED FOR SEDIMENT BARRIERS BEFORE DIRT WORK STARTED? YES [ ] NO [ ] (2\_PTS) (4\_PTS) \_\_\_\_\_
3. ARE ALL LOCATION AND/OR ROAD BANKS BEING SLOPED? YES [ ] NO [ ] (4\_PTS) (4\_PTS) \_\_\_\_\_
4. CONSTRUCTIONS:  
WERE THE FOLLOWING SEDIMENT CONTROL STRUCTURES PROPERLY INSTALLED/MAINTAINED?
  - A. ROAD DITCHES (1)\_ (2)\_ (3)\_ (4)\_ (PTS) B. CROSS DRAINS (1)\_ (2)\_ (3)\_ (4)\_ (5)\_ (PTS)
  - C. CULVERTS (1)\_ (2)\_ (3)\_ (4)\_ (5)\_ (PTS) D. CREEK CROSSINGS (1)\_ (2)\_ (3)\_ (PTS)
  - E. DIVERSION DITCHES (1)\_ (2)\_ (3)\_ (PTS) F. BARRIERS (1)\_ (2)\_ (3)\_ (PTS)
  - G. TEMPORARY SEEDING YES [ ] NO [ ] (10\_PTS)

**POINTS AVAILABLE FOR QUESTION 4: (33\_PTS) \_\_\_\_\_**

5. HAS TOP SOIL (IF ANY) BEEN STOCKED PILED? YES [ ] NO [ ] (2\_PTS) (2\_PTS) \_\_\_\_\_
6. IS THE PIT PROPERLY INSTALLED AND MAINTAINED? YES [ ] NO [ ] (9\_PTS) (9\_PTS) \_\_\_\_\_
7. RECLAMATION:
  - A. ROADWAY (1)\_ (2)\_ (3)\_ (PTS) B. LOCATION (1)\_ (2)\_ (3)\_ (PTS)
  - C. PITS (1)\_ (2)\_ (3)\_ (PTS) D. PIPELINES (1)\_ (2)\_ (3)\_ (PTS)
  - E. TANK DIKES (1)\_ (2)\_ (3)\_ (PTS) F. API INSTALLED YES [ ] NO [ ] (3\_PTS)
  - G. ADEQUATE SEEDING MATERIALS (1)\_ (2)\_ (3)\_ (PTS)
  - H. WAS SEED BED ADEQUATE (1)\_ (2)\_ (3)\_ (PTS)

**POINTS AVAILABLE FOR QUESTION 7: (24\_PTS) \_\_\_\_\_**

8. WAS RECLAMATION COMPLETED WITHIN:  
6 MTHS OF TD 6\_PTS ONLY; 4 MTHS OF TD 12\_PTS ONLY; 2 MTHS OF TD 19\_PTS ONLY;

**POINTS AVAILABLE FOR QUESTION 8: (19\_PTS) \_\_\_\_\_**

**TOTAL MAXIMUM POSSIBLE SCORE OF 99.**

**TOTAL RECLAMATION SCORE: \_\_\_\_\_**

\_\_\_\_\_  
DATE RELEASED

\_\_\_\_\_  
INSPECTOR'S SIGNATURE



# PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

## CONDITIONS

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1. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
2. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the fill material shall be within plus or minus 2% (unless soil test results show a greater range of moisture content is appropriate and 95% compaction can still be achieved) of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
3. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
4. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
5. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
6. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
7. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

**STATE OF WEST VIRGINIA**  
**DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS**  
**W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION**

95 01 607

1) Well Operator: Noble Energy, Inc.	494501907	Tyler	Centerville	Shirley
	Operator ID	County	District	Quadrangle

2) Operator's Well Number: SHR 1 DHS Well Pad Name: SHR 1

3 Elevation, current ground: 1016.30 Elevation, proposed post-construction: 994.5'

4) Well Type: (a) Gas  Oil   
 Other \_\_\_\_\_  
 (b) If Gas: Shallow  Deep   
 Horizontal

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):  
Target - Marcellus, Depth - 6570', Thickness - 61', Pressure - 4376#

7) Proposed Total Vertical Depth: 6621'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 16347'

10) Approximate Fresh Water Strata Depths: 321, 351, 599'

11) Method to Determine Fresh Water Depth: Offset well data - Seneca Technology data base

12) Approximate Saltwater Depths: 1501'

13) Approximate Coal Seam Depths: No Coal

14) Approximate Depth to Possible Void (coal mine, karst, other): None

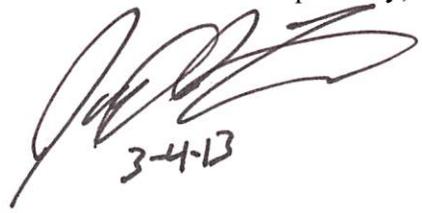
15) Does land contain coal seams tributary or adjacent to, active mine? No

16) Describe proposed well work: Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6,621 feet.  
Drill Horizontal leg - stimulate and produce the Marcellus Formation.  
 \*\*If we should encounter an unanticipated void we will install casing at a minimum of 20' below the void but not more than 50' below the void, set a basket and grout to surface.

17) Describe fracturing/stimulating methods in detail:  
The stimulation will be multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 14.36 acres

19) Area to be disturbed for well pad only, less access road (acres): 3.89 acres

  
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20)

CASING AND TUBING PROGRAM

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	N	LS	94	40'	40'	CTS
Fresh Water	13 3/8"	N	J55	54.5	699'	699'	CTS / 15.6 ppg Yield 1.18
Coal							
Intermediate	9 5/8"	N	J55	36.0	3627'	3627'	CTS / 15.6 ppg Yield 1.19
Production	5 1/2"	N	P110	20.0	16,347'	16,347'	TOC 200' above 9,625 shoe
Tubing							
Liners							

\*\*We would like to drill through all the freshwater zones into a more stable rock before setting casing. Once we set the casing string will be circulated with cement to the surface.

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	26"	.25		Type 1	cts
Fresh Water	13 3/8"	17 1/2"	.380	2730	Type 1	1.18
Coal						
Intermediate	9 5/8"	12 3/8"	.352	3520	Class A	1.19
Production	5 1/2"	8 3/4" & 8 1/2"	.361	12,640	Class A	1.27
Tubing						
Liners						

PACKERS

Kind:				
Sizes:				
Depths Set:				

*[Handwritten Signature]*  
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21) Describe centralizer placement for each casing string. Conductor - No centralizers used. Fresh Water & Coal -

Bow spring centralizers on first 2 joints then every third joint to 100 feet from surface.

Intermediate - Bow spring centralizers every third joint to 100' from surface.

Production - Rigid bow spring every third joint from KOP to TOC. Rigid bow spring every joint to KOP.

22) Describe all cement additives associated with each cement type. Conductor - 1.15% CaCl2.

Fresh Water - "15.6 ppg Type 1 + 2% CaCl, 0.25# Lost Circ 20% Excess Yield = 1.18

Intermediate - "15.6ppg Class A +0.4% Ret, 0.15% Disp, 0.2% AntiFoam, 0.125#/sk Lost Circ 30% Excess Yield=1.19 To Surface

Production: "14.8ppg Class A 25:75:0 System +2.6% Cement extender, 0.7% Fluid Loss additive, 0.45% high temp retarder, 0.2% friction reducer

15% Excess Yield=1.27 TOC >= 200' above 9.625" shoe.

23) Proposed borehole conditioning procedures. Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring

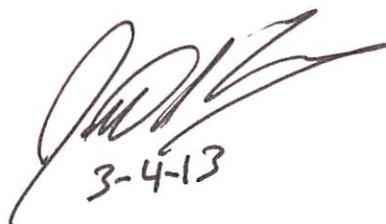
the hole is clean via air circulation at TD, there are no other conditioning procedures. Fresh Water -The hole is drilled w/air and casing is run in air. Fill with KCl water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.

Coal -The hole is drilled w/air and casing is run in air. Once casing is at setting depth, the hole is filled w/ KCl water and a minimum of one hole volume is circulated prior to pumping cement. Intermediate - Once surface casing is set and cemented Intermediate hole is drilled either on air or SOBMs and filled w/ KCl water once

drilled to TD. The well is conditioned with KCl circulation prior to running casing. Once casing is at setting depth, the well is circulated a minimum of one hole volume prior to pumping cement. Production - The hole is drilled with synthetic oil base mud and

Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

\*Note: Attach additional sheets as needed.

  
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95-02112



**DRILLING WELL PLAN**  
**SHRL-1D-HS**  
**Macellus Shale Horizontal**  
**Tyler County, WV**

Ground Elevation			SHRL-1D SHL (Lat/Long)			(336047.15N, 1619685.15E) (NAD27)			
Azm			SHRL-1D LP (Lat/Long)			(335720.05N, 1621116.43E) (NAD27)			
WELLBORE DIAGRAM			SHRL-1D BHL (Lat/Long)			(327280.73N, 1624188.09E) (NAD27)			
HOLE	CASING	GEOLOGY	MD	TVD	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
26	20" 94#	Conductor	40	40	AIR	To Surface	Conductor Rig	n/a	Stabilize surface fill/soil Conductor casing = 0.25" wall thickness
17 1/2	13-3/8" 54.5# J-55 BTC				AIR	15.6 ppg Type 1 + 2% CaCl, 0.25# Lost Circ 20% Excess Yield = 1.18	Bow Spring on first 2 joints then every third joint to 100' form surface	Fill with KCl water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Surface casing = 0.380" wall thickness Burst=2730 psi
		Surf. Casing	699	699					
12 3/8	9-5/8" 36# J-55 LTC				AIR	15.6ppg Class A +0.4% Ret, 0.15% Disp, 0.2% AntiFoam, 0.125#/sk Lost Circ 30% Excess Yield=1.19 To Surface	Bow spring centralizers every third joint to 100' feet from surface.	Fill with KCl water once drilled to TD. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.352" wall thickness Burst=3520 psi
		Price	2212	2212					
		Berea	2567	2567					
		Venango	2755	2755					
		Gordon Top	2996	2996					
	Int. Casing	3627	3627						
8.75" Vertical					8.0ppg - 9.0ppg SOB M	14.8ppg Class A 25:75:0 System +2.6% Cement extender, 0.7% Fluid Loss additive, 0.45% high temp retarder, 0.2% friction reducer	Rigid Bow Spring every third joint from KOP to TOC		
8.75" Curve	5-1/2" 20# HCP-110 TXP BTC	Benson		5048	12.0ppg-12.5ppg SOB M	15% Excess Yield=1.27  TOC >= 200' above 9.625" shoe	Rigid Bow Spring every joint to KOP	Once at TD, circulate at max allowable pump rate for at least 6x bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.361" wall thickness Burst=12640 psi Note:Actual centralizer schedules may be changed due to hole conditions
		Alexander		5296					
		Tully Limestone		6547					
		Hamilton		6551					
		Marcellus		6570					
		Cherry Valley		6612					
8.75" - 8.5" Lateral		TD	16347	6621	12.0ppg-12.5ppg SOB M				
		Onondaga		6631					

LP @ 6621' TVD / 7366' MD

8.75 / 8.5 Hole - Cemented Long String  
5-1/2" 20# HCP-110 TXP BTC

+/-8981 ft Lateral

TD @ +/-6621 TVD +/-16347 MD

X=centralizers

*[Signature]*  
3-4-13

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STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

CONSTRUCTION AND RECLAMATION PLAN AND SITE REGISTRATION APPLICATION FORM  
GENERAL PERMIT FOR OIL AND GAS PIT WASTE DISCHARGE

Operator Name Noble Energy, Inc. OP Code 494501907

Watershed Middle Island Creek Quadrangle Shirley

Elevation 1016.30 County Tyler District Centerville

Description of anticipated Pit Waste: None - Closed loop system

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a synthetic liner be used in the pit? n/a. If so, what mil.? \_\_\_\_\_

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number \_\_\_\_\_ )
- Reuse (at API Number next anticipated well )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_)

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Top Hole Air, Freshwater/Bottom Hole Synthetic Oil Based Mud.

-If oil based, what type? Synthetic, petroleum, etc. Synthetic

Additives to be used? Bactericide, polymers, and weighting agents

Will closed loop system be used? Yes

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All cuttings will be taken off site to an approved facility

-If left in pit and plan to solidify what medium will be used? Cement, lime,

-Landfill or offsite name/permit number? See attachment - Site Water/Cuttings Disposal

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Dee Swiger

Company Official (Typed Name) Dee Swiger

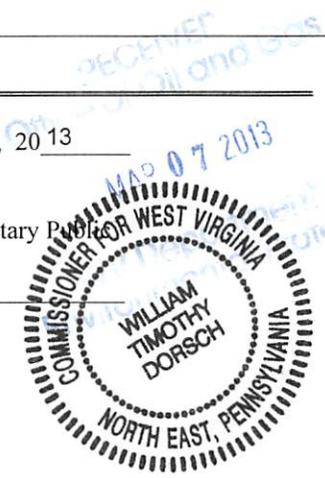
Company Official Title Regulatory Analyst

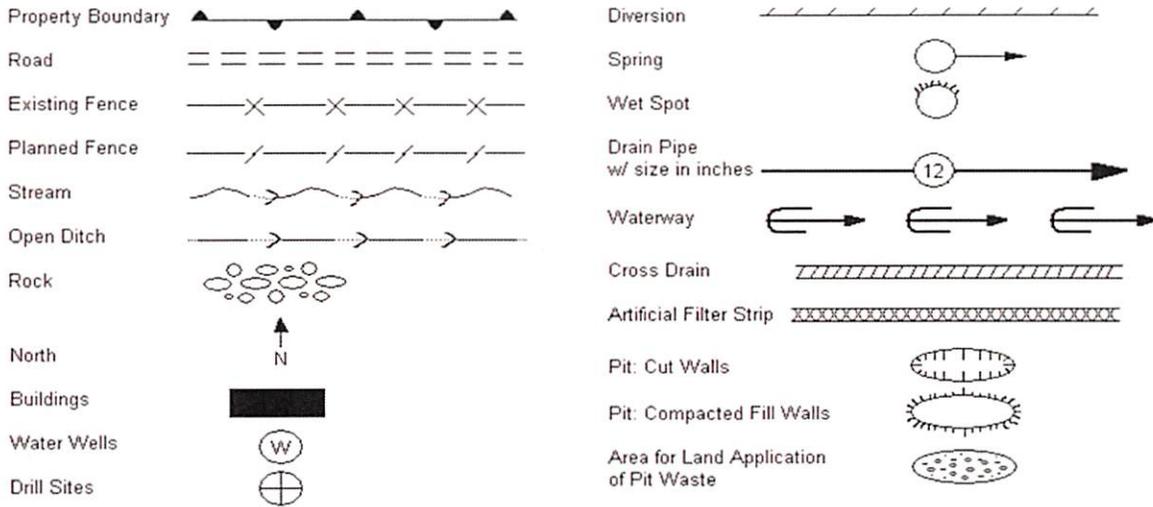
Subscribed and sworn before me this 5<sup>th</sup> day of March, 2013

William T. Dorsch

Notary Public

My commission expires 14 July 2020





Proposed Revegetation Treatment: Acres Disturbed 14.36 acres Prevegetation pH \_\_\_\_\_

Lime 2 to 3 tons Tons/acre or to correct to pH \_\_\_\_\_

Fertilizer (10-20-20 or equivalent) 500 lbs/acre (500 lbs minimum)

Mulch hay or straw at 2 tons Tons/acre

Seed Mixtures

Seed Type	Area I lbs/acre	Seed Type	Area II lbs/acre
Tall Fescue	40	Tall Fescue	40
Ladino Clover	5	Ladino Clover	5

Attach:  
Drawing(s) of road, location, pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: \_\_\_\_\_

Title: Oil and Gas Inspector Date: 3-4-13

Field Reviewed?  Yes  No

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## Water Management Plan: Primary Water Sources



WMP- 01140

API/ID Number:

047-095-02112

Operator:

Noble Energy, Inc

Shirley 1 DHS

### Important:

For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP's assessment is based on the following considerations:

- Statistical analysis of historical USGS stream gauge data (transferred to un-gauged locations as necessary);
- Identification of sensitive aquatic life (endangered species, mussels, etc.);
- Quantification of known existing demands on the water supply (Large Quantity Users);
- Minimum flows required by the Army Corps of Engineers; and
- Designated stream uses.

Based on these factors, DEP has provided, for each intake location (and origination point for purchased water), a reference gauge location and discharge flow reading which must be surpassed prior to withdrawals. Additionally, DEP has established a minimum passby flow at the withdrawal location which must also be surpassed prior to withdrawals. These thresholds are considered terms of the permit and are enforceable as such.

**DEP is aware that some intake points will be used for multiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interpreted as total withdrawal limits for each location over the specified date range regardless of how many wells are supported by that intake.**

For all purchased water intakes, determinations of water availability are made at the original source intake location. It is the responsibility of the Oil and Gas Operator, not the seller, to cease withdrawal of water from the seller when flows are less than the minimum gauge reading at the stream gauge referenced by the Water Management Plan in order to protect stream uses.

Note that the determinations made herein are based on the best available data, but it is impossible to predict water availability in the future. While the DEP has carefully established these minimum withdrawal thresholds, it remains the operator's responsibility to protect aquatic life at all times. Approval to withdrawal is contingent upon permission from the land owner. It is the responsibility of the operator to secure and maintain permission prior to any withdrawals.

The operator is reminded that 24-48 hours prior to withdrawing (or purchasing) water, DEP must be notified by email at [DEP.water.use@wv.gov](mailto:DEP.water.use@wv.gov).

APPROVED MAY 13 2013

## Source Summary

WMP- 01140

API Number:

047-095-02112

Operator:

Noble Energy, Inc

Shirley 1 DHS

### Stream/River

● Source **Ohio River @ Select Energy** Owner: **Select Energy**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/1/2013	10/1/2014	14,600,000		39.346473	-81.338727

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999998 Ohio River Station: Racine Dam

Max. Pump rate (gpm): **1,500** Min. Gauge Reading (cfs): **7,216.00** Min. Passby (cfs)

DEP Comments: Refer to the specified station on the National Weather Service's Ohio River forecast website: <http://www.erh.noaa.gov/ohrfc//flows.shtml>

● Source **Middle Island Creek @ Nelson Withdrawal Site** Owner: **Helen J. Nelson**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/1/2013	10/1/2014	14,600,000		39.414418	-80.829423

Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): **2,000** Min. Gauge Reading (cfs): **87.04** Min. Passby (cfs) **23.45**

DEP Comments:

● Source **McElroy Creek @ WVDOH Withdrawal Site** Owner: **WV Department of Highways**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/1/2013	10/1/2014	14,600,000		39.429741	-80.828309

Regulated Stream? Ref. Gauge ID: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Max. Pump rate (gpm): **500** Min. Gauge Reading (cfs): **75.88** Min. Passby (cfs) **15.63**

DEP Comments:

## Source Summary

WMP-01140

API Number:

047-095-02112

Operator:

Noble Energy, Inc

Shirley 1 DHS

## Purchased Water

● Source **West Virginia American Water - Weston Water Treatment Plant** Owner: **West Virginia American Water**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
10/1/2013	10/1/2014	14,600,000	200,000	-	-

Regulated Stream? Stonewall Jackson Dam Ref. Gauge ID: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Max. Pump rate (gpm):                      Min. Gauge Reading (cfs):      **170.57**                      Min. Passby (cfs)

DEP Comments:

## Source Detail

WMP- 01140

API/ID Number: 047-095-02112

Operator: Noble Energy, Inc

Shirley 1 DHS

Source ID: 16128 Source Name: West Virginia American Water - Weston Water Treat  
West Virginia American Water

Source Latitude: -  
Source Longitude: -

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 104.83 County: Lewis

Anticipated withdrawal start date: 10/1/2013

Anticipated withdrawal end date: 10/1/2014

Total Volume from Source (gal): 14,600,000

- Endangered Species?  Mussel Stream?
- Trout Stream?  Tier 3?
- Regulated Stream?  Stonewall Jackson Dam
- Proximate PSD?  Weston WTP
- Gauged Stream?

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm):

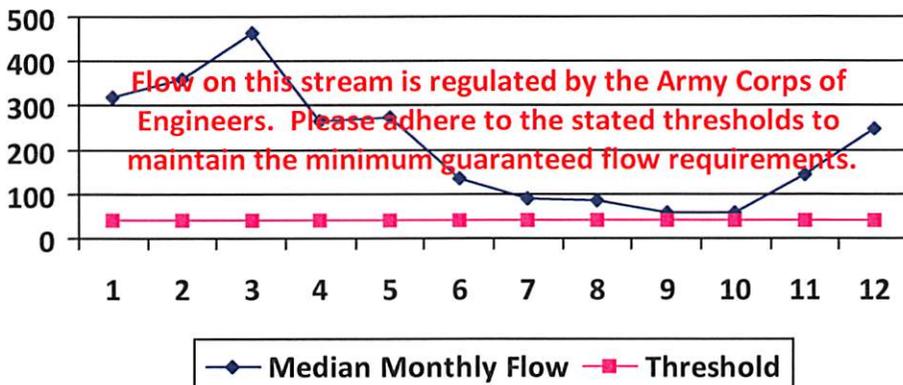
Reference Gaug: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.): 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	321.23	-	-
2	361.67	-	-
3	465.85	-	-
4	266.43	-	-
5	273.47	-	-
6	137.03	-	-
7	88.78	-	-
8	84.77	-	-
9	58.98	-	-
10	57.83	-	-
11	145.12	-	-
12	247.76	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs): 24.32

Downstream Demand (cfs): 0.00

Pump rate (cfs):

Headwater Safety (cfs): 8.08

Ungauged Stream Safety (cfs): 8.08

Min. Gauge Reading (cfs): -

Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

## Source Detail

WMP-01140      API/ID Number: 047-095-02112      Operator: Noble Energy, Inc  
 Shirley 1 DHS

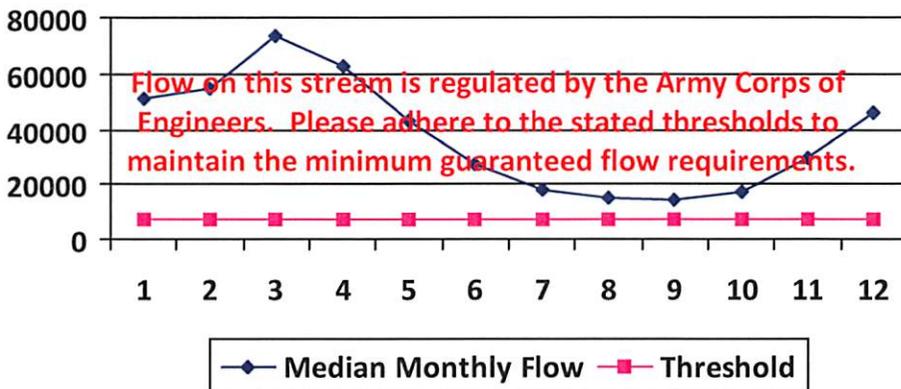
Source ID: 16125      Source Name: Ohio River @ Select Energy      Source Latitude: 39.346473  
 Select Energy      Source Longitude: -81.338727

HUC-8 Code: 5030201      Anticipated withdrawal start date: 10/1/2013  
 Drainage Area (sq. mi.): 25000      County: Pleasants      Anticipated withdrawal end date: 10/1/2014  
 Endangered Species?       Mussel Stream?      Total Volume from Source (gal): 14,600,000  
 Trout Stream?       Tier 3?      Max. Pump rate (gpm): 1,500  
 Regulated Stream?      Ohio River Min. Flow      Max. Simultaneous Trucks: 0  
 Proximate PSD?      Max. Truck pump rate (gpm): 0  
 Gauged Stream?

Reference Gaug: 9999998      Ohio River Station: Racine Dam  
 Drainage Area (sq. mi.): 25,000.00      Gauge Threshold (cfs): 7216

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	50,956.00	-	-
2	54,858.00	-	-
3	73,256.00	-	-
4	62,552.00	-	-
5	43,151.00	-	-
6	27,095.00	-	-
7	17,840.00	-	-
8	14,941.00	-	-
9	14,272.00	-	-
10	17,283.00	-	-
11	29,325.00	-	-
12	46,050.00	-	-

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): -  
 Upstream Demand (cfs): 0.00  
 Downstream Demand (cfs): 0.00  
 Pump rate (cfs): 3.34  
 Headwater Safety (cfs): 0.00  
 Ungauged Stream Safety (cfs): 0.00

Min. Gauge Reading (cfs): -  
 Passby at Location (cfs): -

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

## Source Detail

WMP-01140

API/ID Number: 047-095-02112

Operator: Noble Energy, Inc

Shirley 1 DHS

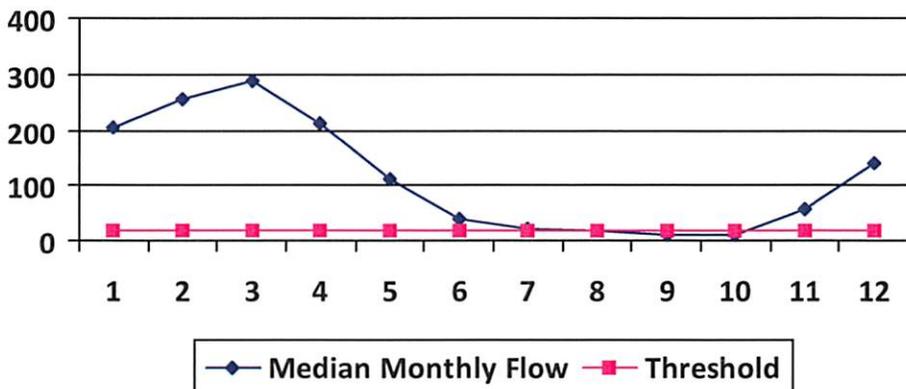
Source ID: 16126	Source Name: Middle Island Creek @ Nelson Withdrawal Site Helen J. Nelson	Source Latitude: 39.414418	Source Longitude: -80.829423
HUC-8 Code: 5030201	Drainage Area (sq. mi.): 190.91	County: Tyler	Anticipated withdrawal start date: 10/1/2013
<input checked="" type="checkbox"/> Endangered Species?	<input checked="" type="checkbox"/> Mussel Stream?	Anticipated withdrawal end date: 10/1/2014	
<input type="checkbox"/> Trout Stream?	<input type="checkbox"/> Tier 3?	Total Volume from Source (gal): 14,600,000	
<input type="checkbox"/> Regulated Stream?		Max. Pump rate (gpm): 2,000	
<input type="checkbox"/> Proximate PSD?		Max. Simultaneous Trucks: 0	
<input checked="" type="checkbox"/> Gauged Stream?		Max. Truck pump rate (gpm): 0	

Reference Gaug: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00 Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	204.73	54.23	150.81
2	257.53	54.23	203.61
3	288.17	54.23	234.24
4	213.99	54.23	160.06
5	112.88	54.23	58.96
6	39.42	54.23	-14.51
7	22.31	54.23	-31.62
8	18.37	54.23	-35.56
9	9.41	54.23	-44.52
10	11.82	54.23	-42.11
11	57.72	54.23	3.79
12	141.02	54.23	87.10

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs):	18.76
Upstream Demand (cfs):	26.33
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	4.69
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	87.04
Passby at Location (cfs):	23.45

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.

## Source Detail

WMP-01140

API/ID Number: 047-095-02112

Operator:

Noble Energy, Inc

Shirley 1 DHS

Source ID: 16127 Source Name: McElroy Creek @ WVDOH Withdrawal Site  
WV Department of Highways

Source Latitude: 39.429741  
Source Longitude: -80.828309

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 106.08 County: Tyler

Anticipated withdrawal start date: 10/1/2013

Anticipated withdrawal end date: 10/1/2014

- Endangered Species?  Mussel Stream?
- Trout Stream?  Tier 3?
- Regulated Stream?
- Proximate PSD?
- Gauged Stream?

Total Volume from Source (gal): 14,600,000

Max. Pump rate (gpm): 500

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm): 0

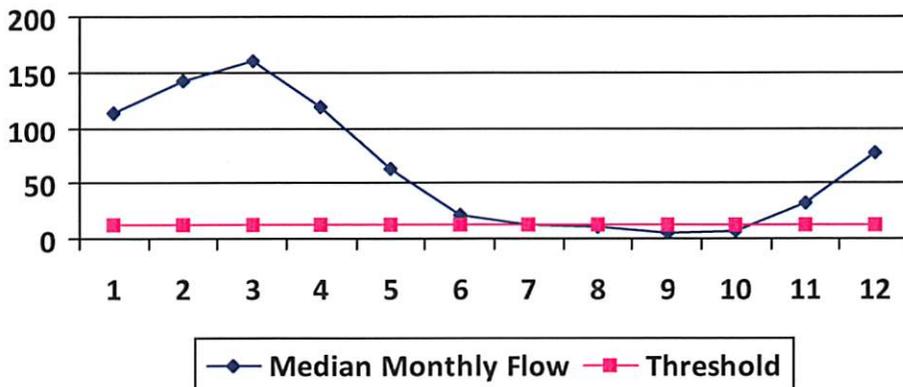
Reference Gaug: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	113.76	24.02	89.82
2	143.10	24.02	119.15
3	160.12	24.02	136.18
4	118.90	24.02	94.96
5	62.72	24.02	38.78
6	21.90	24.02	-2.04
7	12.40	24.02	-11.55
8	10.21	24.02	-13.74
9	5.23	24.02	-18.72
10	6.57	24.02	-17.38
11	32.07	24.02	8.13
12	78.36	24.02	54.42

### Water Availability Profile



### Water Availability Assessment of Location

Base Threshold (cfs): 10.42

Upstream Demand (cfs): 7.27

Downstream Demand (cfs): 0.00

Pump rate (cfs): 1.11

Headwater Safety (cfs): 2.61

Ungauged Stream Safety (cfs): 2.61

Min. Gauge Reading (cfs): 75.88

Passby at Location (cfs): 15.63

"Threshold", as depicted in the chart above is meant only to indicate the calculated base threshold at the proposed withdrawal location. This value does not include the proposed pump rate or existing demand on the stream. Refer to the monthly breakdown above for a more complete estimation of water availability by month.



## Water Management Plan: Secondary Water Sources



WMP-01140

API/ID Number

047-095-02112

Operator:

Noble Energy, Inc

Shirley 1 DHS

**Important:**

For each proposed secondary water source identified in your water management plan (i.e., groundwater well, lake/reservoir, recycled frac water, multi-site impoundment, out-of-state source), DEP makes no estimation of the availability of water. These sources may prove to be unsuitable water supplies. Please review the following notes:

- For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.
- For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

### Multi-site impoundment

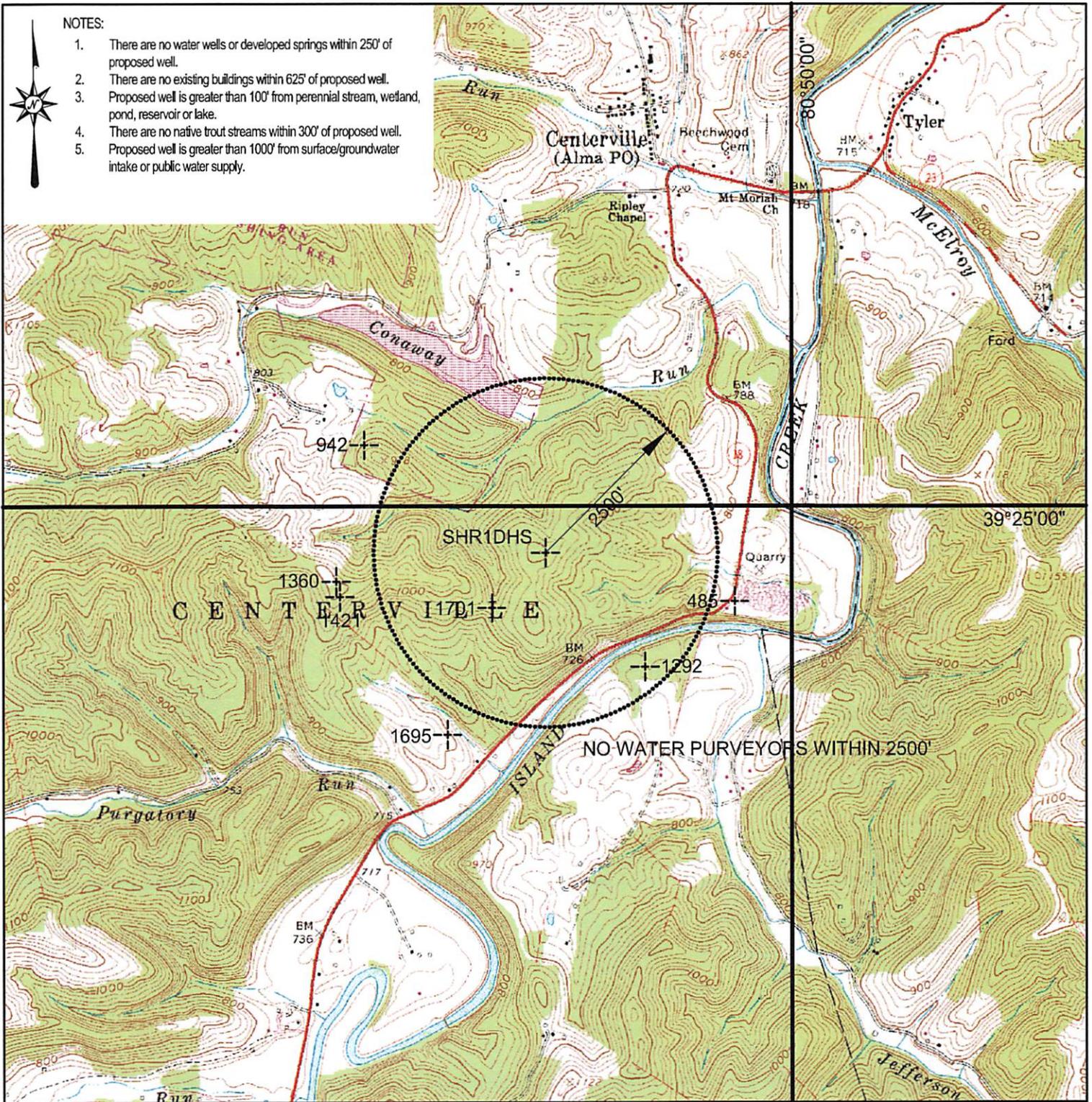
Source ID:	16129	Source Name	SHR3 Centralized Freshwater Impoundment		Source start date:	10/1/2013
					Source end date:	10/1/2014
Source Lat:	39.414781	Source Long:	-80.836665	County	Tyler	
Max. Daily Purchase (gal)		Total Volume from Source (gal):	14,600,000			
DEP Comments:						

The intake identified above has been defined in a previous water management plan. The thresholds established in that plan govern this water management plan unless otherwise noted.

Reference: WMP-1177

NOTES:

1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.



**Blue Mountain Engineering**  
 11023 MASON DIXON HIGHWAY  
 BURTON, WV 26562  
 PHONE: (304) 662-6486

PREPARED FOR:

NOBEL ENERGY, INC.  
 333 TECHNOLOGY DRIVE  
 SUITE 110  
 CANNONBURG, PA 15317

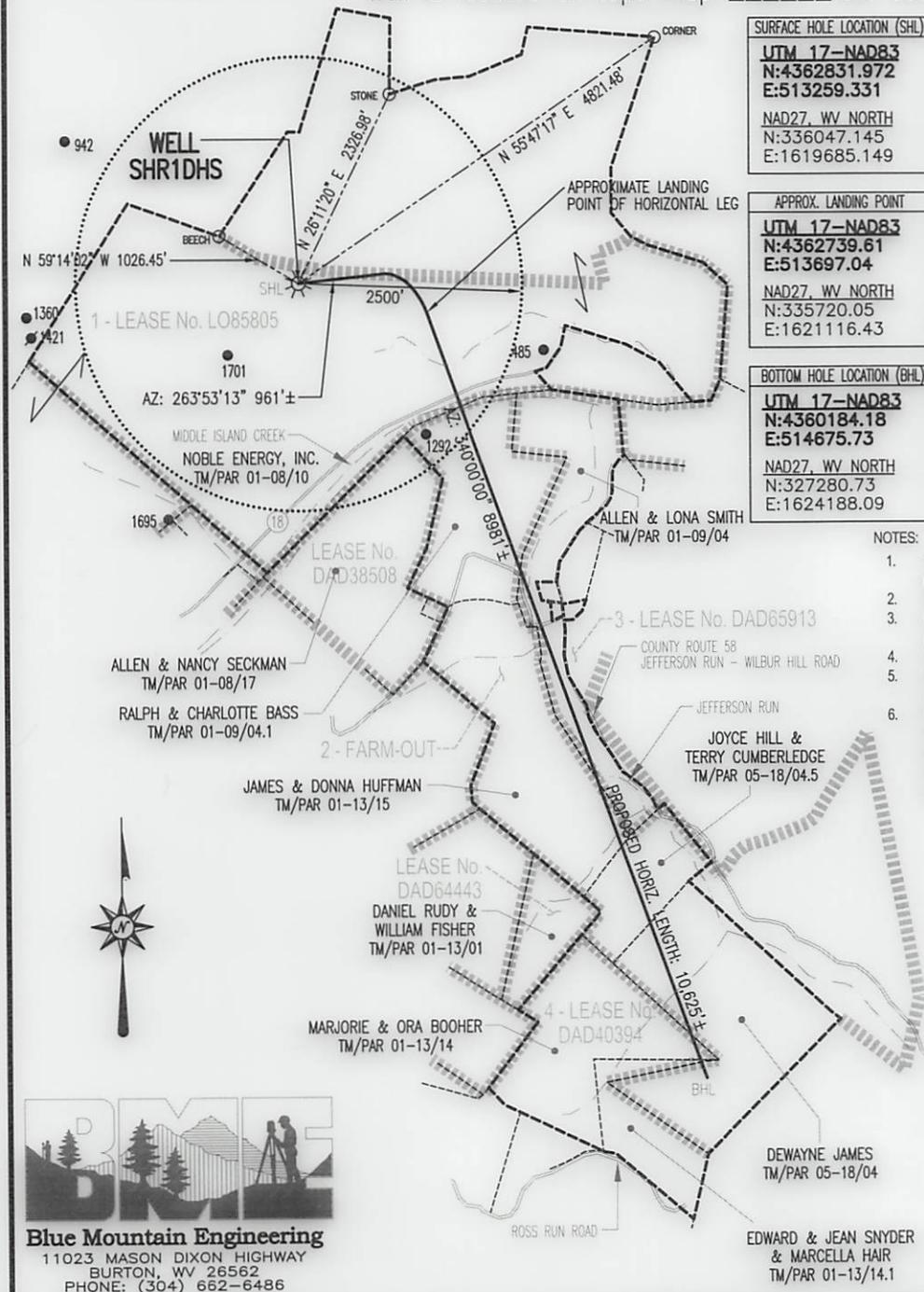
LEGEND

- ⊕ - WATER PURVEYOR
- ⊕ - EXISTING WELLS

**SHR1DHS**  
 LOCATION MAP  
 TYLER COUNTY  
 CENTERVILLE DISTRICT  
 WEST VIRGINIA

TOPO QUAD: SHIRLEY, WV  
 SCALE: 1" = 2000'  
 DATE: SEPTEMBER 26, 2012

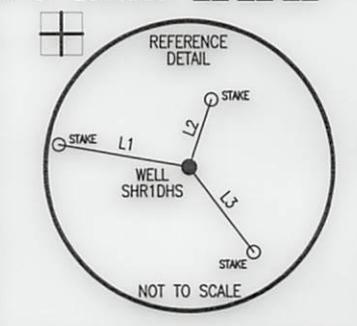
Well is located on topo map 674' feet south of Latitude: 39° 25' 00"



**SURFACE HOLE LOCATION (SHL)**  
**UTM 17-NAD83**  
**N:4362831.972**  
**E:513259.331**  
 NAD27, WV NORTH  
 N:336047.145  
 E:1619685.149

**APPROX. LANDING POINT**  
**UTM 17-NAD83**  
**N:4362739.61**  
**E:513697.04**  
 NAD27, WV NORTH  
 N:335720.05  
 E:1621116.43

**BOTTOM HOLE LOCATION (BHL)**  
**UTM 17-NAD83**  
**N:4360184.18**  
**E:514675.73**  
 NAD27, WV NORTH  
 N:327280.73  
 E:1624188.09



LINE	BEARING	DISTANCE
L1	S 80°13'12" E	274.98'
L2	S 18°47'50" W	146.48'
L3	N 37°05'47" W	221.59'

- NOTES:
1. There are no water wells or developed springs within 250' of proposed well.
  2. There are no existing buildings within 625' of proposed well.
  3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
  4. There are no native trout streams within 300' of proposed well.
  5. Proposed well is greater than 1000' from surface/groundwater intake or public water supply.
  6. It is not the purpose or intention of this plat to represent surveyed locations of the surface or mineral parcels depicted hereon. The location of the boundary lines, as shown, are based on record deed descriptions, field evidence found and/or tax map position, unless otherwise noted.

**LEGEND**

- TOPO MAP POINT
- PROPOSED GAS WELL
- ALL ARE POINTS UNLESS OTHERWISE NOTED.
- WATER SOURCE
- SURFACE BOUNDARY
- LEASE BOUNDARY
- PARCEL LINES
- WELL REFERENCE
- PROPOSED HORIZONTAL WELL
- ROAD
- STREAM CENTER LINE
- WELLS WITHIN 3000'**
- EXISTING WELLS
- PLUGGED WELLS

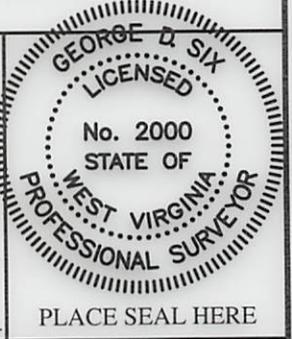
**Blue Mountain Engineering**  
 11023 MASON DIXON HIGHWAY  
 BURTON, WV 26562  
 PHONE: (304) 662-6486

Well is located on topo map 3574' feet west of Longitude: 80° 50' 00"

FILE #: SHR1DHS  
 DRAWING #: SHR1DHS  
 SCALE: 1" = 2000'  
 MINIMUM DEGREE OF ACCURACY: 1/2500  
 PROVEN SOURCE OF ELEVATION: U.S.G.S. MONUMENT THOMAS 1498.81'

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: *George D. Six*  
 R.P.E.: \_\_\_\_\_ L.L.S.: P.S. No. 2000



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS WVDEP  
 OFFICE OF OIL & GAS  
 601 57TH STREET  
 CHARLESTON, WV 25304



DATE: FEBRUARY 21, 2013  
 OPERATOR'S WELL #: SHR1DHS  
 API WELL #: 47 95 02112 H6A  
 STATE COUNTY PERMIT

Well Type:  Oil  Waste Disposal  Production  Deep  
 Gas  Liquid Injection  Storage  Shallow

WATERSHED: MIDDLE ISLAND CREEK ELEVATION: 1016.30'  
 COUNTY/DISTRICT: TYLER COUNTY / CENTERVILLE DISTRICT QUADRANGLE: SHIRLEY, WV 7.5'  
 SURFACE OWNER: NOBLE ENERGY, INC. ACREAGE: 580.207±  
 OIL & GAS ROYALTY OWNER: SEE ATTACHED WW-6A1 ACREAGE: 949.321±

DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
 PLUG OFF OLD FORMATION  PERFORATE NEW FORMATION  PLUG & ABANDON   
 CLEAN OUT & REPLUG  OTHER CHANGE  (SPECIFY): \_\_\_\_\_

TARGET FORMATION: MARCELLUS ESTIMATED DEPTH: TVD: 6,621'± TMD: 16,347'±  
 WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN  
 Address 333 TECHNOLOGY DRIVE, SUITE 110 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590  
 City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301