



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304
(304) 926-0450
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Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

November 18, 2013

WELL WORK PERMIT

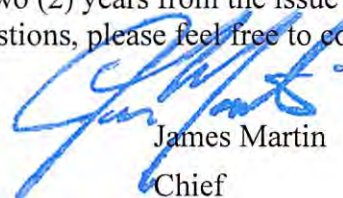
Horizontal 6A Well

This permit, API Well Number: 47-5101686, 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: SHL25DHS
Farm Name: RUTHERFORD, DAVID
API Well Number: 47-5101686
Permit Type: Horizontal 6A Well
Date Issued: 11/18/2013

Promoting a healthy environment.

11/22/2013

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

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE regarding this proposed activity.
2. 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.
3. 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% 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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
WELL WORK PERMIT APPLICATION

1) Well Operator: Noble Energy, Inc 494501907 Marshall Sandhill Valley Grove
Operator ID County District Quadrangle

2) Operator's Well Number: SHL 25 DHS Well Pad Name: SHL 25

3 Elevation, current ground: 1310' Elevation, proposed post-construction: 1326'

4) Well Type: (a) Gas Oil Underground Storage
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-6783', Thickness-50', Pressure-4510#

7) Proposed Total Vertical Depth: 6823'

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 13,904'

10) Approximate Fresh Water Strata Depths: 213', 300'

11) Method to Determine Fresh Water Depth: Offset well data

12) Approximate Saltwater Depths: None noted for offsets

13) Approximate Coal Seam Depths: 810', 866' Pittsburgh

14) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated, drilling in pillar-see mine maps

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: Yes, Shoemaker Mine with base at appx. 866'

16) Describe proposed well work: Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 6,823 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 50' below the void but not more than 100' 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. See attached list.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 34.92 acres

19) Area to be disturbed for well pad only, less access road (acres): 11.71 acres

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34.92 acres
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51 01686

20)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft.</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill -up (Cu. Ft.)</u>
Conductor	30"	N	LS	117#	40'	40'	CTS
Fresh Water	20"	N	LS	94#	400'	400'	CTS
Coal	13 3/8"	N	J-55	54.5#	1250'	1250'	CTS
Intermediate	9 5/8"	N	J-55	36#	3260'	3260'	CTS
Production	5 1/2"	N	P110	20#	13,904'	13,904'	TOC 200' above 9.625 shoe
Tubing							
Liners							

WRH
8-27-13

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield</u>
Conductor	30"	36"	0.375		Type 1/Class A	1.2
Fresh Water	20"	26"	.438	2110	Type 1/Class A	1.2
Coal	13 3/8"	17 1/2"	.380	2730	Type 1/Class A	1.2
Intermediate	9 5/8"	12 3/8"	.352	3520	Type 1/Class A	1.19
Production	5 1/2"	8 3/4" & 8 1/2"	.361	12,640	Type 1/Class A	1.27
Tubing						
Liners						

PACKERS

Kind:				RECEIVED Office of Oil and Gas SEP 16 2013
Sizes:				
Depths Set:				

WV Department of
Environmental Protection

51 01686

21) Describe centralizer placement for each casing string. No centralizers will be used with conductor casing. Surface casing will have bow spring centralizers on first 2 joints then every third joint to 100' from surface. Intermediate casing will have bow spring centralizers on first 2 joints then every third joint to 100' from surface. Production string will have a rigid bow spring every joint to KOP, rigid bow spring every third joint from KOP to top of cement.

22) Describe all cement additives associated with each cement type. Conductor-1.15% CaCl2.
*Surface-15.6 ppg Type 1 +2% XxL, 0.25# Lost Circ 20% Excess Yield=1.18
Intermediate- 15.6 ppg Class A +0.4% Ret, 0.15% Disp, 0.2% AntiFoam, 0.125#/sk Lost circ 30% Excess Yield=1.19 to surface. Production- 14.8 ppg 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 greater or equal to 200' above 9.625" shoe.
*Cement Blend for Surface Casing is a WVDEP Approved Blend.

23) Proposed borehole conditioning procedures. Conductor-The hole is drilled w/air and casing is run on air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Surface-The hole is drilled w/air and casing is run on 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 and cased w/air or on Freshwater based mud. 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 or SOBM and filled with KCl water once drilled to TD. Production-The hole is drilled with SOBM and once to TD, circulated at maximum 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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11/22/2013



Water Management Plan: Primary Water Sources



WMP- 01547

API/ID Number: 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

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.

APPROVED NOV 13 2013

11/22/2013

Source Summary

WMP-01547

API Number:

047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

Purchased Water

● Source **West Virginia American Water - Weston Water Treatme** Lewis Owner: **West Virginia American Water**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	10,817,000	500,000	-	-

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 **Bethlehem Water Department** Ohio Owner: **Bethlehem Water Department**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	10,817,000	200,000	-	-

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: Bethlehem Water Department purchases all its water from the City of Wheeling. Thresholds are set based on the location of the City of Wheeling's raw water intake.

● Source **Wellsburg Water Department** Brooke Owner: **Wellsburg Water Department**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	10,817,000	200,000	-	-

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: This alluvial groundwater well is, to some extent, under the influence of the Ohio River. Please adhere to stated minimum flow requirements on the Ohio River for withdrawals. <http://www.erh.noaa.gov/er/ohrfc/flows.shtml>

11/22/2013

Source **Moundsville Water Board** Marshall Owner: **Moundsville Water Treatment Plant**

Start Date End Date Total Volume (gal) Max. daily purchase (gal) Intake Latitude: Intake Longitude:
9/1/2013 9/1/2014 10,817,000 2,000,000 - -

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments: This alluvial groundwater well is, to some extent, under the influence of the Ohio River. Please adhere to stated minimum flow requirements on the Ohio River for withdrawals. <http://www.erh.noaa.gov/er/ohrfc/flows.shtml>

Source **Dean's Water Service** Ohio Owner: **Dean's Water Service**

Start Date End Date Total Volume (gal) Max. daily purchase (gal) Intake Latitude: Intake Longitude:
9/1/2013 9/1/2014 10,817,000 600,000 - -

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

DEP Comments:

Source **Wheeling Water Department** Ohio Owner: **Wheeling Water Department**

Start Date End Date Total Volume (gal) Max. daily purchase (gal) Intake Latitude: Intake Longitude:
9/1/2013 9/1/2014 10,817,000 17,500 - -

Regulated Stream? Ohio River Min. Flow Ref. Gauge ID: 9999999 Ohio River Station: Willow Island Lock & Dam

Max. Pump rate (gpm): Min. Gauge Reading (cfs): **6,468.00** Min. Passby (cfs)

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

11/22/2013

Source **Ohio County PSD** Ohio Owner: **Ohio county PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
9/1/2013	9/1/2014	10,817,000	720,000	-	-

Regulated Stream? **Ohio River Min. Flow** Ref. Gauge ID: **9999999** Ohio River Station: **Willow Island Lock & Dam**

Max. Pump rate (gpm): **Min. Gauge Reading (cfs): 6,468.00** **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>**

11/22/2013

Source Detail

WMP- 01547

API/ID Number: 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

Source ID: 28123 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: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Total Volume from Source (gal): 10,817,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

Endangered Species? Mussel Stream?

Trout Stream? Tier 3?

Regulated Stream? Stonewall Jackson Dam

Proximate PSD? Weston WTP

Gauged Stream?

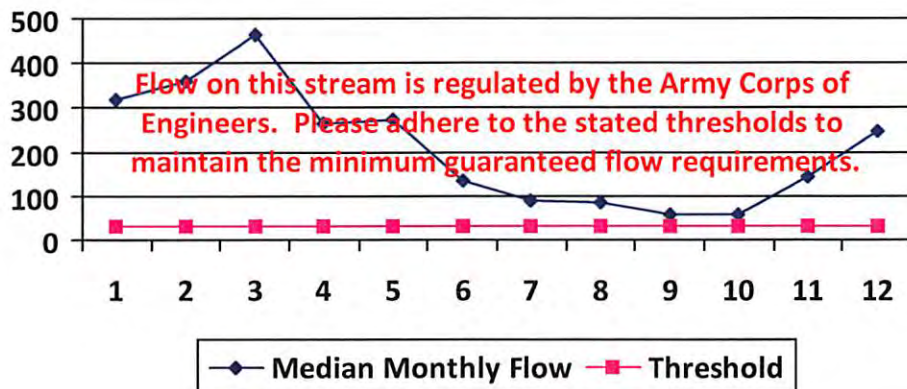
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

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):	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.

11/22/2013

Source Detail

WMP- 01547

API/ID Number: 047-051-01686

Operator: Noble Energy, Inc

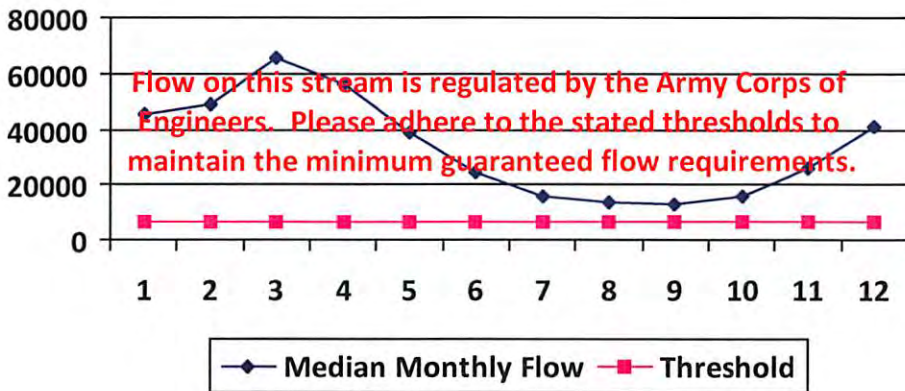
SHL25DHS

Source ID:	28124	Source Name	Bethlehem Water Department Bethlehem Water Department	Source Latitude:	-
				Source Longitude:	-
HUC-8 Code:	5030106			Anticipated withdrawal start date:	9/1/2013
Drainage Area (sq. mi.):	25000	County:	Ohio	Anticipated withdrawal end date:	9/1/2014
<input type="checkbox"/> Endangered Species?	<input checked="" type="checkbox"/> Mussel Stream?			Total Volume from Source (gal):	10,817,000
<input type="checkbox"/> Trout Stream?	<input type="checkbox"/> Tier 3?			Max. Pump rate (gpm):	
<input checked="" type="checkbox"/> Regulated Stream?	Ohio River Min. Flow			Max. Simultaneous Trucks:	
<input checked="" type="checkbox"/> Proximate PSD?	City of Wheeling			Max. Truck pump rate (gpm):	
<input checked="" type="checkbox"/> Gauged Stream?					

Reference Gaug	9999999	Ohio River Station:	Willow Island Lock & Dam
Drainage Area (sq. mi.)	25,000.00	Gauge Threshold (cfs):	6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
<hr/>	
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.

11/22/2013

Source Detail

WMP- 01547

API/ID Number: 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

Source ID: 28125 Source Name: Wellsburg Water Department
Wellsburg Water Department

Source Latitude: -

Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Brooke

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species? Mussel Stream?

Trout Stream? Tier 3?

Total Volume from Source (gal): 10,817,000

Regulated Stream? Ohio River Min. Flow

Max. Pump rate (gpm):

Proximate PSD? Wellsburg Water Department

Max. Simultaneous Trucks:

Gauged Stream?

Max. Truck pump rate (gpm)

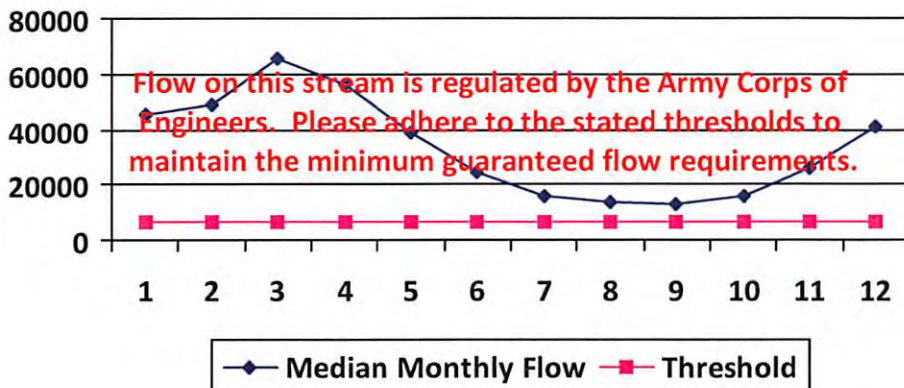
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

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.

11/22/2013

Source Detail

WMP-01547

API/ID Number: 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

Source ID: 28126 Source Name: Moundsville Water Board
Moundsville Water Treatment Plant

Source Latitude: -
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Marshall

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

- Endangered Species? Mussel Stream?
- Trout Stream? Tier 3?
- Regulated Stream? Ohio River Min. Flow
- Proximate PSD?
- Gauged Stream?

Total Volume from Source (gal): 10,817,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

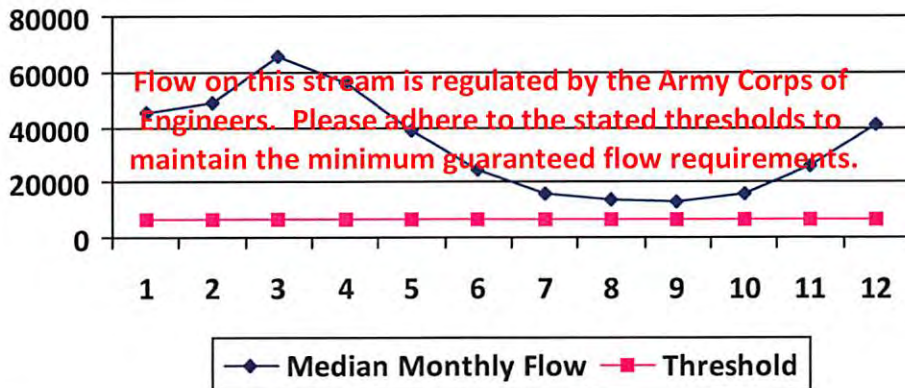
Reference Gaug 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs):

Downstream Demand (cfs):

Pump rate (cfs):

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.

11/22/2013

Source Detail

WMP- 01547

API/ID Number: 047-051-01686

Operator: Noble Energy, Inc

SHL25DHS

Source ID: 28127 Source Name: Dean's Water Service
Dean's Water Service

Source Latitude: -
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

- Endangered Species? Mussel Stream?
- Trout Stream? Tier 3?
- Regulated Stream? Ohio River Min. Flow
- Proximate PSD?
- Gauged Stream?

Total Volume from Source (gal): 10,817,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm)

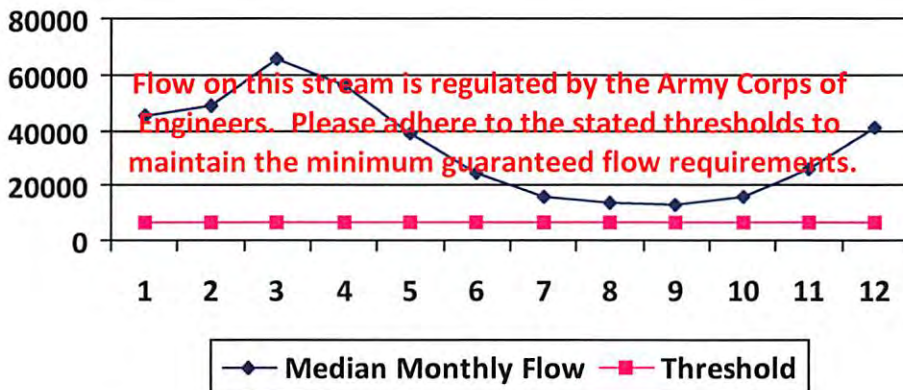
Reference Gaug: 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.) 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	
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.

11/22/2013

Source Detail

WMP- 01547

API/ID Number: 047-051-01686

Operator: Noble Energy, Inc

SHL25DHS

Source ID: 28129 Source Name: Wheeling Water Department
Wheeling Water Department

Source Latitude: -
Source Longitude: -

HUC-8 Code: 5030106

Drainage Area (sq. mi.): 25000 County: Ohio

Anticipated withdrawal start date: 9/1/2013

Anticipated withdrawal end date: 9/1/2014

Endangered Species? Mussel Stream?

Total Volume from Source (gal): 10,817,000

Trout Stream? Tier 3?

Max. Pump rate (gpm):

Regulated Stream? Ohio River Min. Flow

Max. Simultaneous Trucks:

Proximate PSD? Wheeling Water Department

Max. Truck pump rate (gpm)

Gauged Stream?

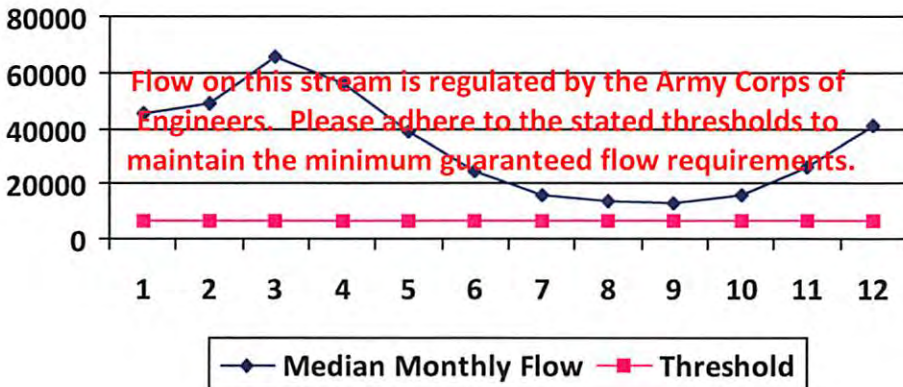
Reference Gaug: 9999999 Ohio River Station: Willow Island Lock & Dam

Drainage Area (sq. mi.): 25,000.00

Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs): -

Upstream Demand (cfs): -

Downstream Demand (cfs): -

Pump rate (cfs): -

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.

11/22/2013

Source Detail

WMP-01547

API/ID Number: 047-051-01686

Operator:

Noble Energy, Inc

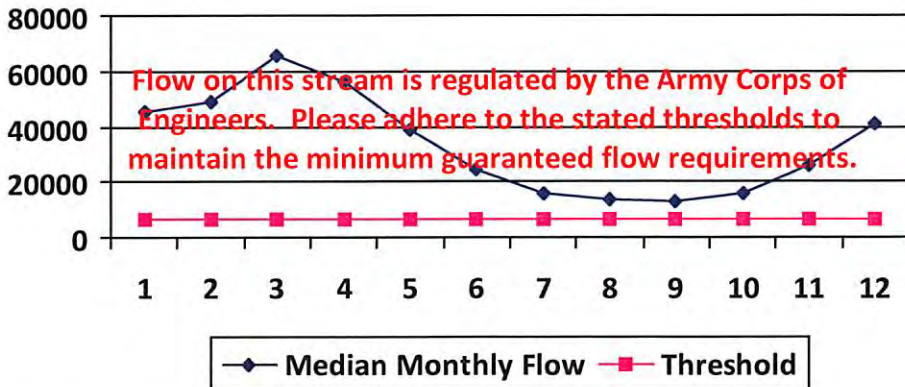
SHL25DHS

Source ID:	28130	Source Name:	Ohio County PSD Ohio county PSD	Source Latitude:	-
				Source Longitude:	-
HUC-8 Code:	5030106	Anticipated withdrawal start date:	9/1/2013		
Drainage Area (sq. mi.):	25000	County:	Ohio	Anticipated withdrawal end date:	9/1/2014
<input type="checkbox"/> Endangered Species?	<input checked="" type="checkbox"/> Mussel Stream?	Total Volume from Source (gal): 10,817,000			
<input type="checkbox"/> Trout Stream?	<input type="checkbox"/> Tier 3?	Max. Pump rate (gpm):			
<input checked="" type="checkbox"/> Regulated Stream?	Ohio River Min. Flow	Max. Simultaneous Trucks:			
<input checked="" type="checkbox"/> Proximate PSD?	Wheeling Water Department	Max. Truck pump rate (gpm):			
<input checked="" type="checkbox"/> Gauged Stream?					

Reference Gaug:	9999999	Ohio River Station: Willow Island Lock & Dam
Drainage Area (sq. mi.):	25,000.00	Gauge Threshold (cfs): 6468

Month	Median monthly flow (cfs)	Threshold (+ pump)	Estimated Available water (cfs)
1	45,700.00	-	-
2	49,200.00	-	-
3	65,700.00	-	-
4	56,100.00	-	-
5	38,700.00	-	-
6	24,300.00	-	-
7	16,000.00	-	-
8	13,400.00	-	-
9	12,800.00	-	-
10	15,500.00	-	-
11	26,300.00	-	-
12	41,300.00	-	-

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	
Downstream Demand (cfs):	
Pump rate (cfs):	
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.

11/22/2013



Water Management Plan: Secondary Water Sources



WMP-01547

API/ID Number 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

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: 28131 Source Name SHL #3 Pad Tank Farm

Source start date: 9/1/2013

Source end date: 9/1/2014

Source Lat: 39.971171

Source Long: -80.556856

County

Marshall

Max. Daily Purchase (gal)

Total Volume from Source (gal): 10,817,000

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-1435

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.

Source ID:	28132	Source Name	SHL #4 Pad Tank Farm		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	39.956739	Source Long:	-80.5515	County	Marshall
		Max. Daily Purchase (gal)		Total Volume from Source (gal):			10,817,000

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-1436

Source ID:	28133	Source Name	SHL #1 Centralized Freshwater Impoundment		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	39.979696	Source Long:	-80.579465	County	Marshall
		Max. Daily Purchase (gal)		Total Volume from Source (gal):			10,817,000

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-200

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.

Source ID:	28134	Source Name	SHL #2 Centralized Waste Pit		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	39.966973	Source Long:	-80.561377	County	Marshall
		Max. Daily Purchase (gal)		Total Volume from Source (gal):		10,817,000	
DEP Comments:	WV51-WPC-00001						

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-201

Source ID:	28135	Source Name	SHL #3 Centralized Waste Pit		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	39.974133	Source Long:	-80.55527	County	Marshall
		Max. Daily Purchase (gal)		Total Volume from Source (gal):		10,817,000	
DEP Comments:	WV51-WPC-00002						

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-202

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.

Source ID:	28136	Source Name	SHL #4 Centralized Waste Pit		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	39.963284	Source Long:	-80.562743	County	Marshall
		Max. Daily Purchase (gal)		Total Volume from Source (gal):		10,817,000	
DEP Comments:	WV51-WPC-00003						

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-204

Purchased Water

Source ID:	28128	Source Name	Bridgeport Ohio Water Department		Source start date:	9/1/2013	
					Source end date:	9/1/2014	
		Source Lat:	40.08348	Source Long:	-80.736488	County	
		Max. Daily Purchase (gal)	200,000	Total Volume from Source (gal):		10,817,000	
DEP Comments:	Please ensure that purchases from this source are approved by, and completed in accordance with, requirements set forth by the State of Ohio Department of Environmental Protection.						

WMP- 01547

API/ID Number 047-051-01686

Operator:

Noble Energy, Inc

SHL25DHS

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.

Recycled Frac Water

Source ID: 28137 Source Name SHL25 Well Pad

Source start date: 9/1/2013

Source end date: 9/1/2014

Source Lat:

Source Long:

County

Max. Daily Purchase (gal)

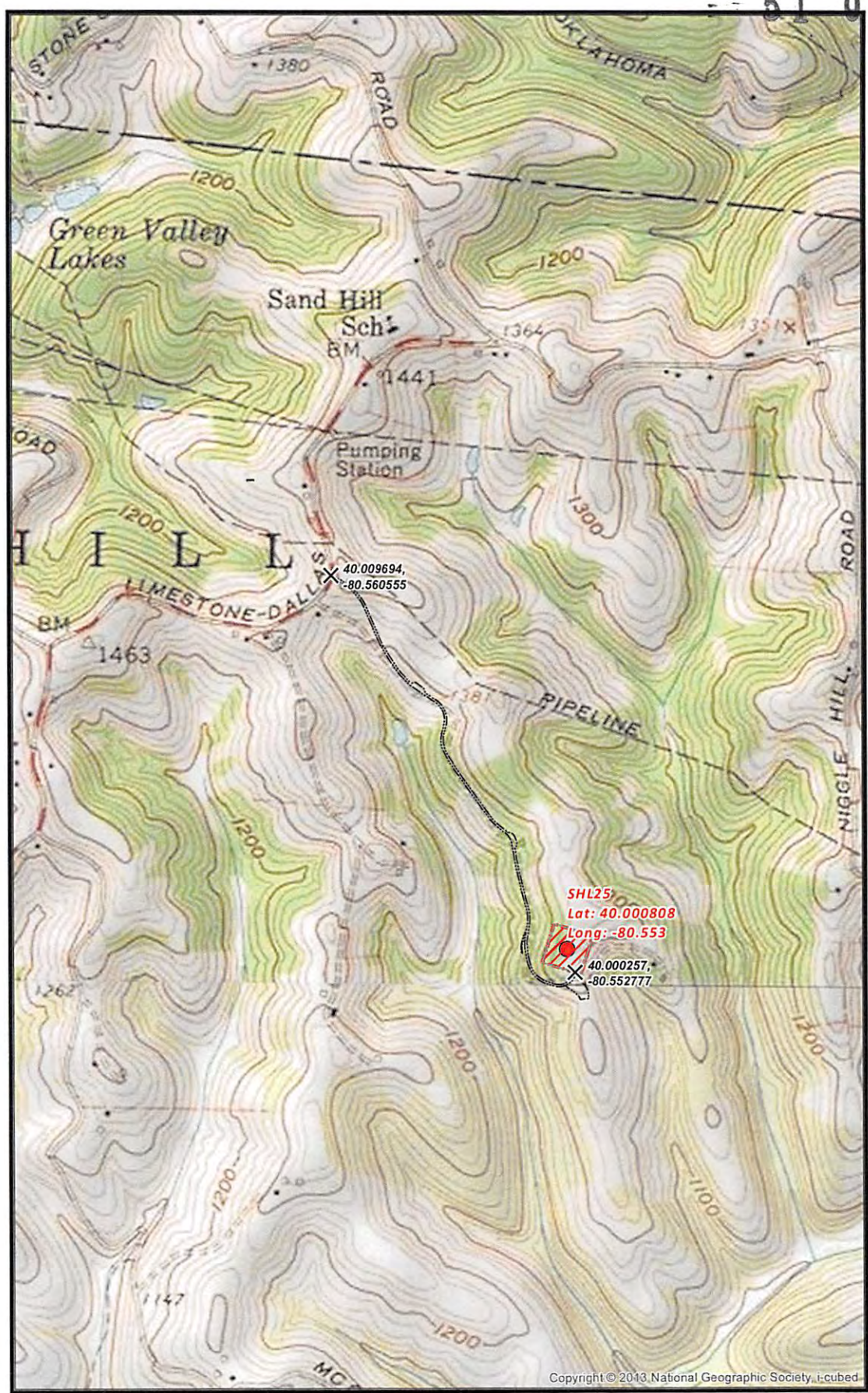
Total Volume from Source (gal): 10,817,000

DEP Comments: Sources include, but are not limited to, the SHL25 well pad.

11/22/2013

51 01686

plat spotted



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RECEIVED
Office of Oil and Gas

SEP 16 2013

WV Department of
Environment

SHL25 SITE SAFETY PLAN
- SITE WELL LOCATION -

Access Road Intersection Proposed Road
 Well Pad Boundary Well Pad Center

0 500 1,000 2,000 Feet

Scale 1" = 1,000'

Projection: NAD_1927_StatePlane_Virginia_North_FIPS_4701
Units: Feet US

noble energy

Date: 7/8/2013
Author: Christopher Glover

Disclaimer: All data is licensed for use by Noble Energy Inc. use only.

1/6

Document Path: G:\Denver\GIS-Denver\Projects\District_30\Appalachia\MXDs\EHSR\Permitting\SandHill\SHL25\D30_PA_WV_SHL25_Well_Location.mxd

11/22/2013

Well is located on topo map 14,868' feet south of Latitude: 40° 02' 30"

Well is located on topo map 3,181' feet west of Longitude: 80° 32' 30"

SURFACE HOLE LOCATION (SHL)
UTM 17-NAD83
N:4427953.50
E:538163.48
NAD27, WV NORTH
N:548375.22
E:1704971.27

APPROX. LANDING POINT
UTM 17-NAD83
N:4427949.56
E:537978.05
NAD27, WV NORTH
N:548372.17
E:1704362.53

BOTTOM HOLE LOCATION (BHL)
UTM 17-NAD83
N:4429579.72
E:536795.41
NAD27, WV NORTH
N:553786.55
E:1700571.34

NOTES:

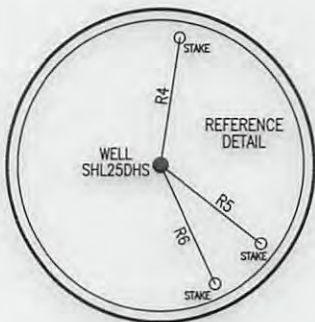
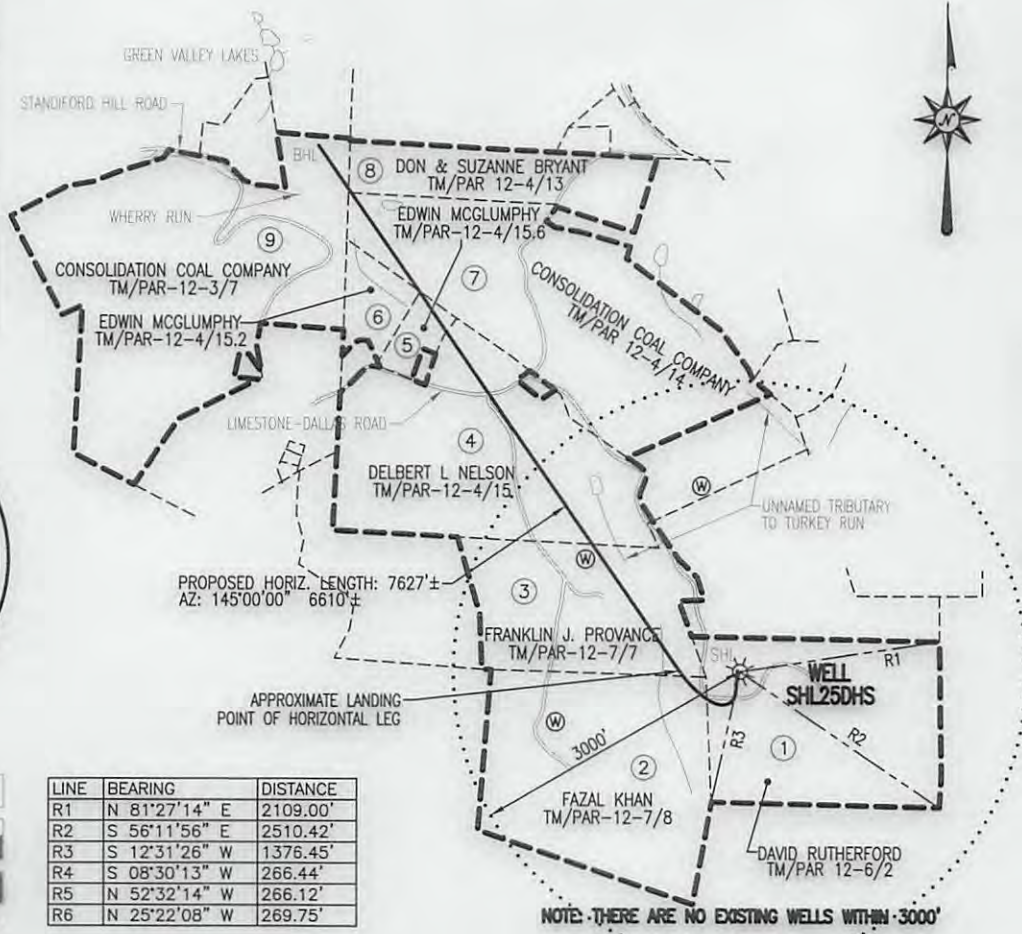
1. There are no water wells or developed springs within 250' of proposed well.
2. There are no existing buildings within 625' of proposed well.
3. Proposed well is greater than 100' from perennial stream, wetland, pond, reservoir or lake.
4. There are no native trout streams within 300' of proposed well.
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
- ☀ - WELL
- - ALL ARE POINTS UNLESS OTHERWISE NOTED.
- ⊙ - WATER SOURCE
- ⓪ - LEASE NUMBER BASED ON ATTACHED WW-6A1
- - MINERAL TRACT BOUNDARY
- - - - - PARCEL LINES
- - - - - WELL REFERENCE
- — — — — PROPOSED HORIZONTAL WELL
- — — — — ROAD
- — — — — STREAM CENTER LINE

WELLS WITHIN 3000'

- - EXISTING WELLS
- ⊙ - PLUGGED WELLS



LINE	BEARING	DISTANCE
R1	N 81°27'14" E	2109.00'
R2	S 56°11'56" E	2510.42'
R3	S 12°31'26" W	1376.45'
R4	S 08°30'13" W	266.44'
R5	N 52°32'14" W	266.12'
R6	N 25°22'08" W	269.75'

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

NOTE: THERE ARE NO EXISTING WELLS WITHIN 3000'

FILE #: SHL25DHS
 DRAWING #: SHL25DHS
 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: *[Signature]*
 R.P.E.: _____ L.L.S.: P.S. No. 2000

GEORGE D. SIX
 LICENSED
 No. 2000
 STATE OF
 WEST VIRGINIA
 PROFESSIONAL SURVEYOR

PLACE SEAL HERE

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



DATE: JULY 24, 2013
 OPERATOR'S WELL #: SHL25DHS
 API WELL #: 47 51 01686 #6A
 STATE COUNTY PERMIT

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

WATERSHED: WHEELING CREEK ELEVATION: 1344.75'
 COUNTY/DISTRICT: MARSHALL / SAND HILL QUADRANGLE: VALLEY GROVE, WV 7.5'
 SURFACE OWNER: DAVID RUTHERFORD ACREAGE: 95.912±
 OIL & GAS ROYALTY OWNER: SEE ATTACHED WW-6A1 ACREAGE: 757.697± **11/22/2013**

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: 6,823' ± TMD: 13,904' ±
 WELL OPERATOR NOBLE ENERGY, INC. DESIGNATED AGENT STEVEN M. GREEN
 Address 333 TECHNOLOGY DRIVE, SUITE 116 Address 500 VIRGINIA STREET EAST, UNITED CENTER SUITE 590
 City CANONSBURG State PA Zip Code 15317 City CHARLESTON State WV Zip Code 25301