west virginia department of environmental protection

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 03, 2013

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-1706259, issued to ANTERO RESOURCES APPALACHIAN CORPORATION, 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: MISHKA UNIT 1H
Farm Name: SMITH, ROBERT J.
API Well Number: 47-1706259
Permit Type: Horizontal 6A Well
Date Issued: 07/03/2013

Promoting a healthy environment.

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. 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.

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(3/13)

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

03 Cell

1) Well Operator:	Antero Resources Appalachian Corporation	494488557	017- Doddridge	Grant	Smithburg 7.5'
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Mishka Unit 1H Well Pad Name: RJ Smith Pad

3 Elevation, current ground: ~1002' Elevation, proposed post-construction: 996'

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):

Marcellus Shale: 7200' TVD, Anticipated Thickness- 55 Feet, Associated Pressure- 2950#

7) Proposed Total Vertical Depth: 7200' TVD

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 19000' MD

10) Approximate Fresh Water Strata Depths: 73', 370'

11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.

12) Approximate Saltwater Depths: 1,300', 2,185'

13) Approximate Coal Seam Depths: 185', 1,003'

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

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine: No

16) Describe proposed well work: Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale

*Antero will be air drilling the fresh water string which makes it difficult to determine when freshwater is encountered, therefore we have built in a buffer for the casing setting depth which helps to ensure that all fresh water zones are covered.

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17) Describe fracturing/stimulating methods in detail:

Antero plans to pump Slickwater into the Marcellus Shale formation in order to ready the well for production. The fluid will be comprised of approximately 99 percent water and sand, with less than 1 percent special-purpose additives as shown in the attached "List of Anticipated Additives Used for Fracturing or Stimulating Well."

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 13.39 acres

19) Area to be disturbed for well pad only, less access road (acres): 2.70 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"	New	H-40	94#	40'	40'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55/H-40	54.5#/ 48#	430'	430' *See above	CTS, 597 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2565'	2565'	CTS, 1044 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	19000'	19000'	4794 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7000'	
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	24"	0.438"	1530	Class A	1.18
Fresh Water	13-3/8"	17-1/2"	0.38"/0.33"	2730/1730	Class A	1.18
Coal	9-5/8"	12-1/4"	0.352"	3520	Class A	1.18
Intermediate						
Production	5-1/2"	8-3/4" & 8-1/2"	0.361"	12630	Lead-H/POZ & Tail - H	H/POZ-1.44 & H-1.8
Tubing	2-3/8"	4.778"	0.19"	11200		
Liners						

PACKERS

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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21) Describe centralizer placement for each casing string. Conductor: no centralizers

Surface Casing: one centralizer 10' above the float shoe, one on the insert float collar and one every 4th joint spaced up the hole to surface.

Intermediate Casing: one centralizer above float joint, one centralizer 5' above float collar and one every 4th collar to surface.

Production Casing: one centralizer at shoe joint and one every 3 joints to top of cement in intermediate casing.

22) Describe all cement additives associated with each cement type.

Conductor: no additives, Class A cement.

✓ Surface: Class A cement with 2% calcium and 1/4 lb flake, 5 gallons of clay treat

Intermediate: Class A cement with 1/4 lb of flake, 5 gallons of clay treat

Production: Lead cement- 50/50 Class H/Poz + 1.5% salt + 1% C-45 + 0.5% C-16a + 0.2% C-12 + 0.45% C-20 + 0.05% C-51

Production: Tail cement- Class H + 45 PPS Calcium Carbonate + 1.0% FL-160 + 0.2% ACGB-47 + 0.05% ACSA-51 + 0.2% ACR-20

23) Proposed borehole conditioning procedures. Conductor: blowhole clean with air, run casing, 10 bbls fresh water.

Surface: blowhole clean with air, trip to conductor shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate pipe capacity + 40 bbls fresh water followed by 25 bbls bentonite mud, 10 bbls fresh water spacer.

Intermediate: blowhole clean with air, trip to surface casing shoe, trip to bottom, blowhole clean with air, trip out, run casing, circulate 40 bbls brine water followed by 10 bbls fresh water and 25 bbls bentonite mud, pump 10 bbls fresh water.

Production: circulate with 14 lb/gal NaCl mud, trip to middle of lateral, circulate, pump high viscosity sweep, trip to base of curve, pump high viscosity sweep, trip to top of curve, trip to bottom, circulate, pump high viscosity sweep, trip out, run casing, circulate 10 bbls fresh water, pump 48 bbls barite pill, pump 10 bbls fresh water followed by 48 bbls mud flush and 10 bbls water.

*Note: Attach additional sheets as needed.

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API Number 47 - 017 - 6259

Operator's Well No. Mishka Unit 1H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Antero Resources Appalachian Corporation OP Code 494488557

Watershed (HUC 10) Little Flint Run Quadrangle Smithburg 7.5'

Elevation 996' County Doddridge District Grant

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

Will a pit be used for drill cuttings? Yes _____ No X

If so, please describe anticipated pit waste: No pit will be used at this site (Drilling and Flowback Fluids will be stored in tanks. Cuttings will be tanked and hauled off site.

Will a synthetic liner be used in the pit? Yes _____ No X If so, what ml.? N/A

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
_____ Underground Injection (UIC Permit Number _____)
■ Reuse (at API Number Future permitted well locations when applicable. API# will be provided on Form WR-34)
■ Off Site Disposal (Meadowfill Landfill Permit #SWF-1032-98)
_____ Other (Explain _____

Will closed loop system be used? Yes

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Surface - Air/Freshwater, Intermediate - Dust/Stiff Foam, Production - Water Based Mud

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

Additives to be used in drilling medium? Please See Attachment

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Stored in tanks, removed offsite and taken to landfill.

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Meadowfill Landfill (Permit #SWF-1032-98)

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 _____

Company Official (Typed Name) Gerard G. Alberts

Company Official Title Environmental & Regulatory Manager

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Subscribed and sworn before me this 2 day of April, 20 13

_____ Notary Public

My commission expires 11/9/16

LISA BOTTINELLI
Notary Public
State of Colorado
Notary ID 20124072365
My Commission Expires Nov 9, 2016

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Form WW-9

Operator's Well No. Mishka Unit 1H

Antero Resources Appalachian Corporation

Proposed Revegetation Treatment: Acres Disturbed 13.39 Prevegetation pH _____

Lime 2-3 Tons/acre or to correct to pH 6.5

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

Mulch 2-3 Tons/acre

Access Road (5.09) + Drill Pad (2.70) +Auxiliary Pad (1.68) + Spoil Pads (3.92) = 13.39 Acres

Seed Mixtures

Area I (Temporary)		Area II (Permanent)	
Seed Type	lbs/acre	Seed Type	lbs/acre
Tall Fescue	45	Tall Fescue	45
Perennial Rye Grass	20	Perennial Rye Grass	20
*or type of grass seed requested by surface owner		*or type of grass seed requested by surface owner	

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Douglas Newlon

Comments: Preseed & mulch install E+S to Dep regulations

Title: Oil & Gas inspector Date: 4-18-2013

Field Reviewed? (✓) Yes ( ) No

V4/5

Water Management Plan:
Primary Water Sources

WMP- 01191	API/ID Number:	047-017-06259	Operator:	Antero Resources
		Mishka Unit 1H		

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 mutiple wells and well sites. In these cases, the thresholds set by the Water Management Plan are to be interepreted 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 MAY 2 8 2013

Source Summary

WMP-01191 | API Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Stream/River

- Source: **Ohio River @ Ben's Run Withdrawal Site** | Owner: **Ben's Run Land Company Limited Partnership**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.46593	-81.110781

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

Max. Pump rate (gpm): 3,360 | **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

- Source: **West Fork River @ JCP Withdrawal** | Owner: **James & Brenda Raines**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.320913	-80.337572

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

Max. Pump rate (gpm): 2,000 | **Min. Gauge Reading (cfs): 175.00** | **Min. Passby (cfs) 146.25**

DEP Comments:

- Source: **West Fork River @ McDonald Withdrawal** | Owner: **David Shrieves**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.16761	-80.45069

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

Max. Pump rate (gpm): 3,000 | **Min. Gauge Reading (cfs): 175.00** | **Min. Passby (cfs) 106.30**

DEP Comments:

Source **West Fork River @ GAL Withdrawal** Owner: **David Shrieves**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.16422	-80.45173

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

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 175.00** **Min. Passby (cfs) 106.30**

DEP Comments:

Source **Middle Island Creek @ Dawson Withdrawal** Owner: **Gary D. and Rella A. Dawson**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.379292	-80.867803

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

Max. Pump rate (gpm): 3,000 **Min. Gauge Reading (cfs): 76.03** **Min. Passby (cfs) 28.83**

DEP Comments:

Source **McElroy Creek @ Forest Withdrawal** Owner: **Forest C. & Brenda L. Moore**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.39675	-80.738197

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 74.77** **Min. Passby (cfs) 13.10**

DEP Comments:

- Source **McElroy Creek @ Sweeney Withdrawal** Owner: **Bill Sweeney**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.398123	-80.656808

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 6.66**

DEP Comments:

- Source **Meathouse Fork @ Gagnon Withdrawal** Owner: **George L. Gagnon and Susan C. Gagnon**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.26054	-80.720998

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 71.96** **Min. Passby (cfs) 11.74**

DEP Comments:

- Source **Meathouse Fork @ Whitehair Withdrawal** Owner: **Elton Whitehair**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.211317	-80.679592

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 7.28**

DEP Comments:

- Source **Tom's Fork @ Erwin Withdrawal** Owner: **John F. Erwin and Sandra E. Erwin**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.174306	-80.702992

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 0.59**

DEP Comments:

- Source **Arnold Creek @ Davis Withdrawal** Owner: **Jonathon Davis**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.302006	-80.824561

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 3.08**

DEP Comments:

- Source **Buckeye Creek @ Powell Withdrawal** Owner: **Dennis Powell**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.277142	-80.690386

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

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 69.73** **Min. Passby (cfs) 4.59**

DEP Comments:

- Source **South Fork of Hughes River @ Knight Withdrawal** Owner: **Tracy C. Knight & Stephanie C. Knight**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.198369	-80.870969

☐ Regulated Stream? Ref. Gauge ID: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Max. Pump rate (gpm): 3,000 **Min. Gauge Reading (cfs): 39.80** **Min. Passby (cfs) 1.95**

DEP Comments:

- Source **North Fork of Hughes River @ Davis Withdrawal** Owner: **Lewis P. Davis and Norma J. Davis**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000		39.322363	-80.936771

☐ Regulated Stream? Ref. Gauge ID: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 35.23** **Min. Passby (cfs) 2.19**

DEP Comments:

Source Summary

WMP- 01191	API Number:	047-017-06259	Operator:	Antero Resources
		Mishka Unit 1H		

Purchased Water

- Source **Middle Island Creek @ Solo Construction** Owner: **Solo Construction, LLC**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000	1,000,000	39.399094	-81.185548

☑ 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: **Elevation analysis indicates that this location has the same elevation as Middle Island Creek's pour point into the Ohio River. As such, it is deemed that water flow at this location is heavily influenced by the Ohio River.**

- Source **Sun Valley Public Service District** Owner: **Sun Valley PSD**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
1/13/2014	1/13/2015	11,560,000	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):** **171.48** **Min. Passby (cfs)**

DEP Comments:

Source Detail

WMP-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16890 | Source Name: Middle Island Creek @ Solo Construction

Solo Construction, LLC

Source Latitude: 39.399094

Source Longitude: -81.185548

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 25000 | County: Pleasants

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

Max. Truck pump rate (gpm): 0

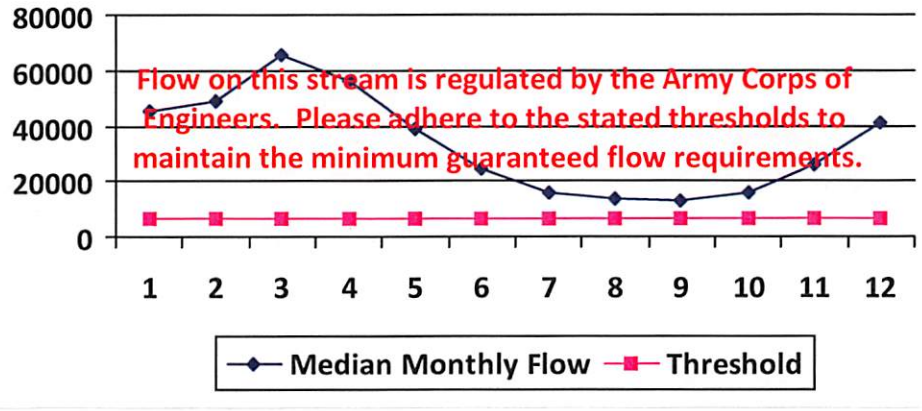
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Ohio River Min. Flow
- [x] Proximate PSD? — City of St. Marys
- [x] Gauged Stream?

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):	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.

Source Detail

WMP-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16891 | Source Name: Sun Valley Public Service District / Sun Valley PSD

Source Latitude: - | Source Longitude: -

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 391.85 | County: Harrison

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm):

Max. Simultaneous Trucks:

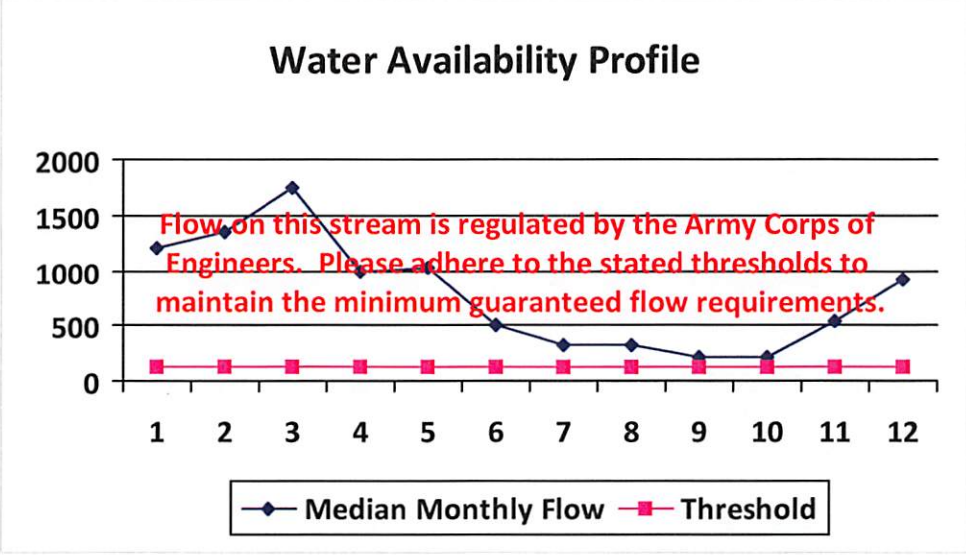
Max. Truck pump rate (gpm)

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Stonewall Jackson Dam
- [ ] Proximate PSD?
- [x] 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	1,200.75	-	-
2	1,351.92	-	-
3	1,741.33	-	-
4	995.89	-	-
5	1,022.23	-	-
6	512.21	-	-
7	331.86	-	-
8	316.87	-	-
9	220.48	-	-
10	216.17	-	-
11	542.45	-	-
12	926.12	-	-



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.

Source Detail

WMP-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16876 | Source Name: Ohio River @ Ben's Run Withdrawal Site
Ben's Run Land Company Limited Partnership

Source Latitude: 39.46593
Source Longitude: -81.110781

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 25000 | County: Tyler

Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 3,360
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

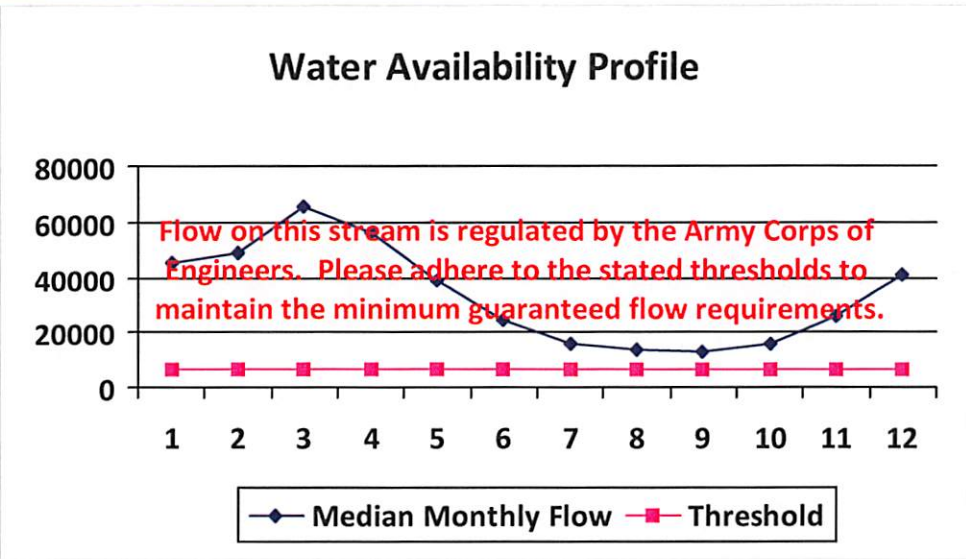
Ohio River Min. Flow

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 Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	7.49
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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16877 | Source Name: West Fork River @ JCP Withdrawal
James & Brenda Raines

Source Latitude: 39.320913
Source Longitude: -80.337572

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 532.2 | County: Harrison

Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

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

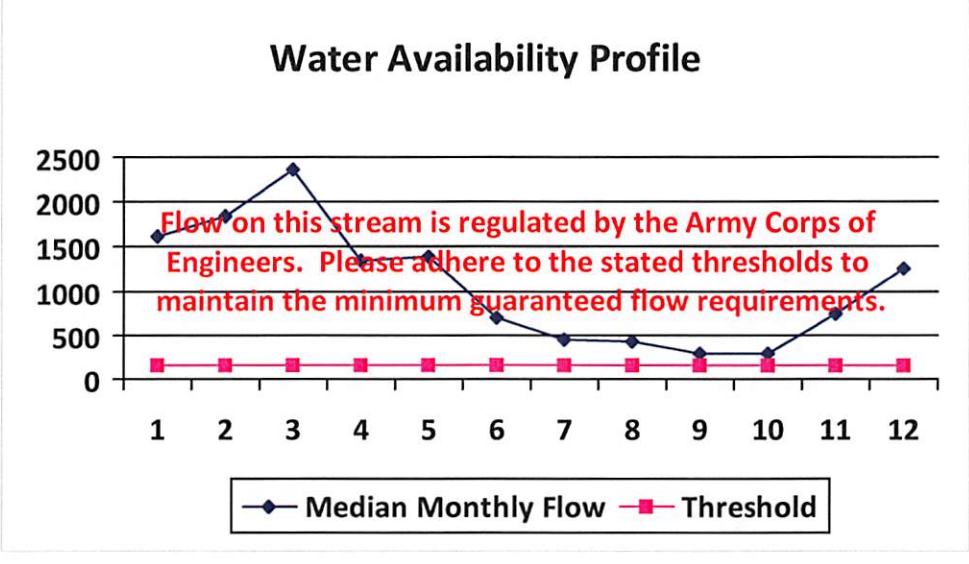
Stonewall Jackson Dam

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	1,630.82	-	-
2	1,836.14	-	-
3	2,365.03	-	-
4	1,352.59	-	-
5	1,388.37	-	-
6	695.67	-	-
7	450.73	-	-
8	430.37	-	-
9	299.45	-	-
10	293.59	-	-
11	736.74	-	-
12	1,257.84	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16878 | Source Name: West Fork River @ McDonald Withdrawal

David Shrieves

Source Latitude: 39.16761

Source Longitude: -80.45069

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 314.91 | County: Harrison

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 3,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

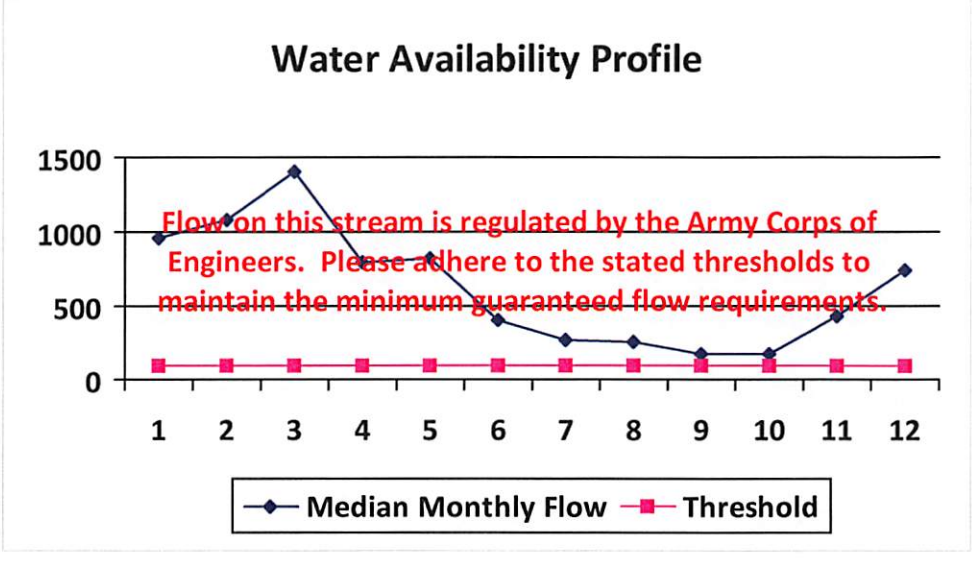
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Stonewall Jackson Dam
- [ ] Proximate PSD?
- [x] Gauged Stream?

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	964.98	-	-
2	1,086.47	-	-
3	1,399.42	-	-
4	800.34	-	-
5	821.52	-	-
6	411.64	-	-
7	266.70	-	-
8	254.66	-	-
9	177.19	-	-
10	173.72	-	-
11	435.94	-	-
12	744.28	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	6.68
Headwater Safety (cfs):	24.27
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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16879 | Source Name: West Fork River @ GAL Withdrawal
David Shrieves

Source Latitude: 39.16422
Source Longitude: -80.45173

HUC-8 Code: 5020002

Drainage Area (sq. mi.): 313.67 | County: Harrison

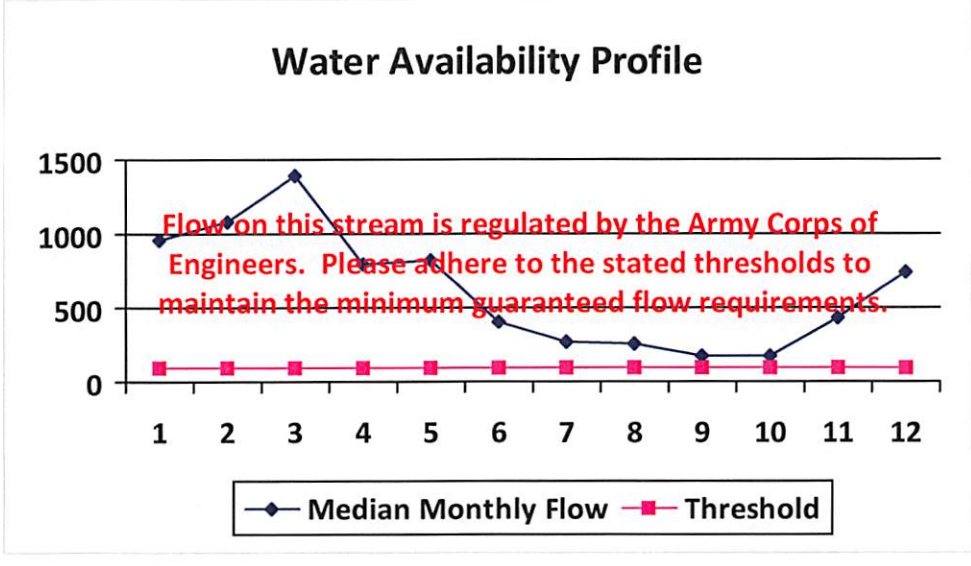
Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 2,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Stonewall Jackson Dam
- [ ] Proximate PSD?
- [x] 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	961.18	-	-
2	1,082.19	-	-
3	1,393.91	-	-
4	797.19	-	-
5	818.28	-	-
6	410.02	-	-
7	265.65	-	-
8	253.65	-	-
9	176.49	-	-
10	173.04	-	-
11	434.22	-	-
12	741.35	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	24.29
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	24.18
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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16880 | Source Name: Middle Island Creek @ Dawson Withdrawal

Gary D. and Rella A. Dawson

Source Latitude: 39.379292

Source Longitude: -80.867803

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 181.34 | County: Tyler

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 3,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

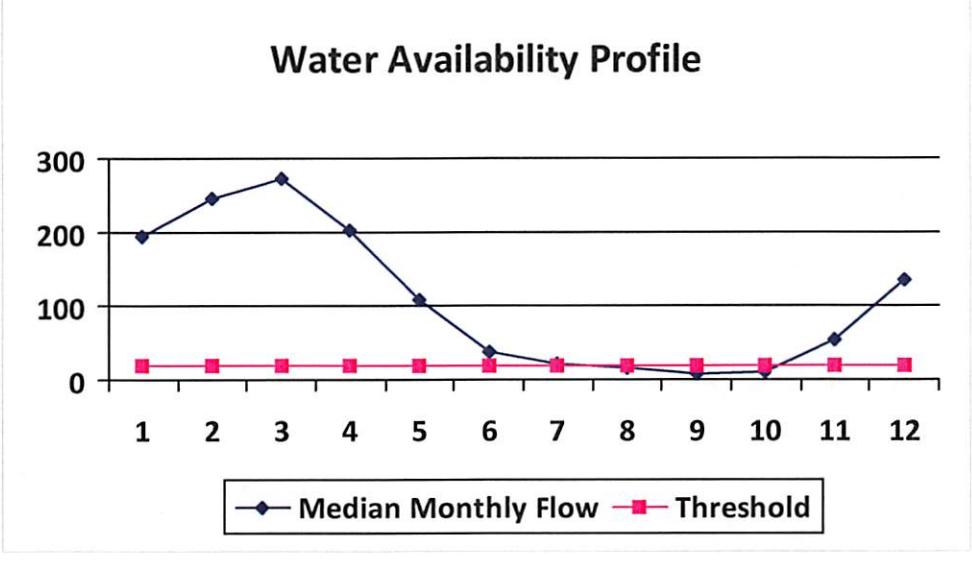
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [x] Gauged Stream?

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	194.47	42.06	152.68
2	244.62	42.06	202.83
3	273.72	42.06	231.93
4	203.26	42.06	161.47
5	107.22	42.06	65.43
6	37.44	42.06	-4.35
7	21.19	42.06	-20.60
8	17.45	42.06	-24.34
9	8.94	42.06	-32.85
10	11.23	42.06	-30.56
11	54.82	42.06	13.04
12	133.96	42.06	92.17



Water Availability Assessment of Location

Base Threshold (cfs):	17.82
Upstream Demand (cfs):	13.10
Downstream Demand (cfs):	6.55
Pump rate (cfs):	6.68
Headwater Safety (cfs):	4.45
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	**76.03**
Passby at Location (cfs):	**28.82**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16881 | Source Name: McElroy Creek @ Forest Withdrawal

Forest C. & Brenda L. Moore

Source Latitude: 39.39675

Source Longitude: -80.738197

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 88.85 | County: Tyler

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

☐ Endangered Species? ☐ Mussel Stream?

☐ Trout Stream? ☐ Tier 3?

☐ Regulated Stream?

☐ Proximate PSD?

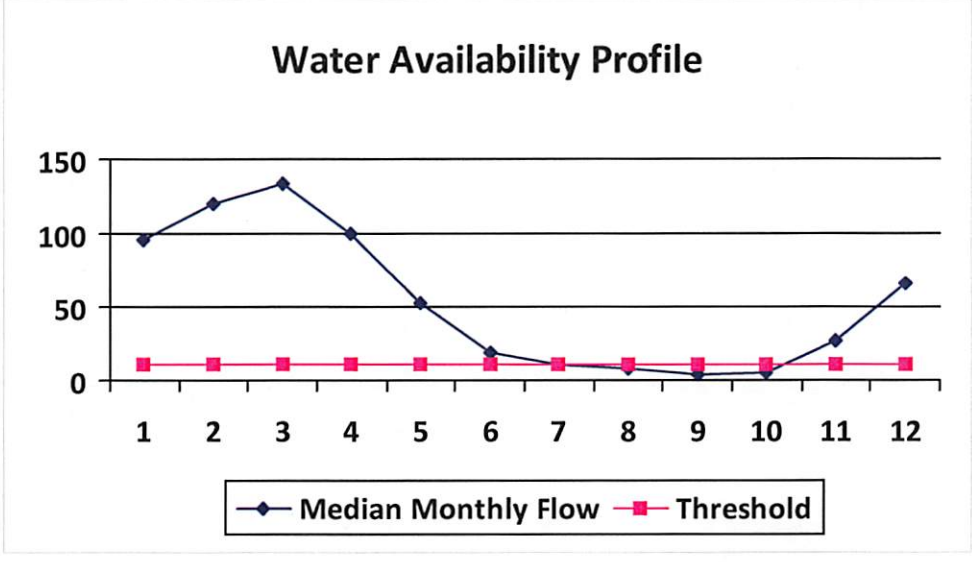
☐ Gauged Stream?

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	95.28	19.78	75.68
2	119.86	19.78	100.25
3	134.11	19.78	114.51
4	99.59	19.78	79.99
5	52.54	19.78	32.93
6	18.35	19.78	-1.26
7	10.38	19.78	-9.22
8	8.55	19.78	-11.05
9	4.38	19.78	-15.23
10	5.50	19.78	-14.10
11	26.86	19.78	7.26
12	65.63	19.78	46.03



Water Availability Assessment of Location

Base Threshold (cfs):	8.73
Upstream Demand (cfs):	4.46
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	2.18
Ungauged Stream Safety (cfs):	2.18
Min. Gauge Reading (cfs):	**74.19**
Passby at Location (cfs):	**13.09**

"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- 01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16882 | Source Name: McElroy Creek @ Sweeney Withdrawal / Bill Sweeney

Source Latitude: 39.398123

Source Longitude: -80.656808

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 45.16 | County: Doddridge

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

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

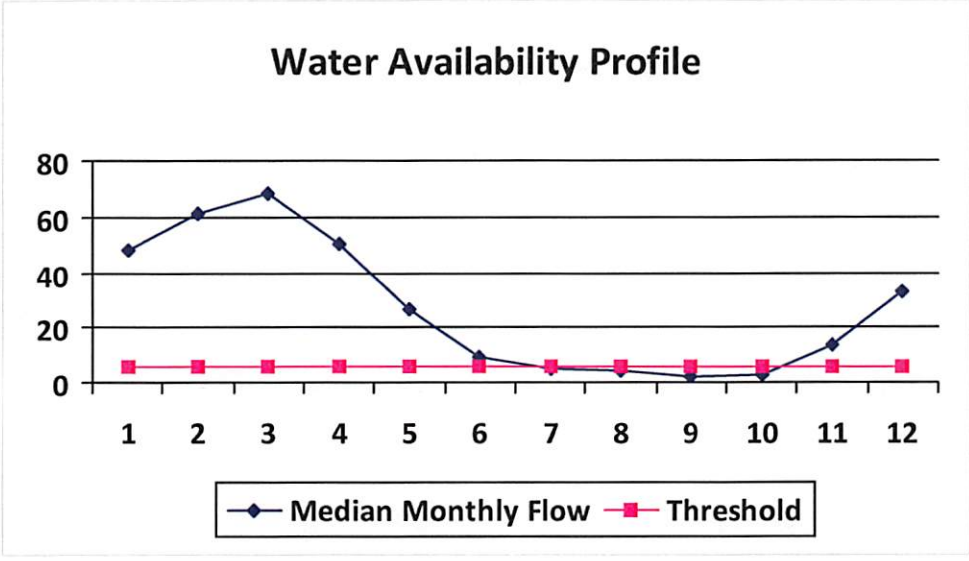
Max. Truck pump rate (gpm) 0

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	48.43	8.88	39.93
2	60.92	8.88	52.42
3	68.17	8.88	59.67
4	50.62	8.88	42.12
5	26.70	8.88	18.21
6	9.32	8.88	0.83
7	5.28	8.88	-3.22
8	4.34	8.88	-4.15
9	2.23	8.88	-6.27
10	2.80	8.88	-5.70
11	13.65	8.88	5.16
12	33.36	8.88	24.86



Water Availability Assessment of Location

Base Threshold (cfs):	4.44
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.11
Ungauged Stream Safety (cfs):	1.11
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**6.66**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16883 | Source Name: Meathouse Fork @ Gagnon Withdrawal
George L. Gagnon and Susan C. Gagnon

Source Latitude: 39.26054
Source Longitude: -80.720998

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 60.6 | County: Doddridge

Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

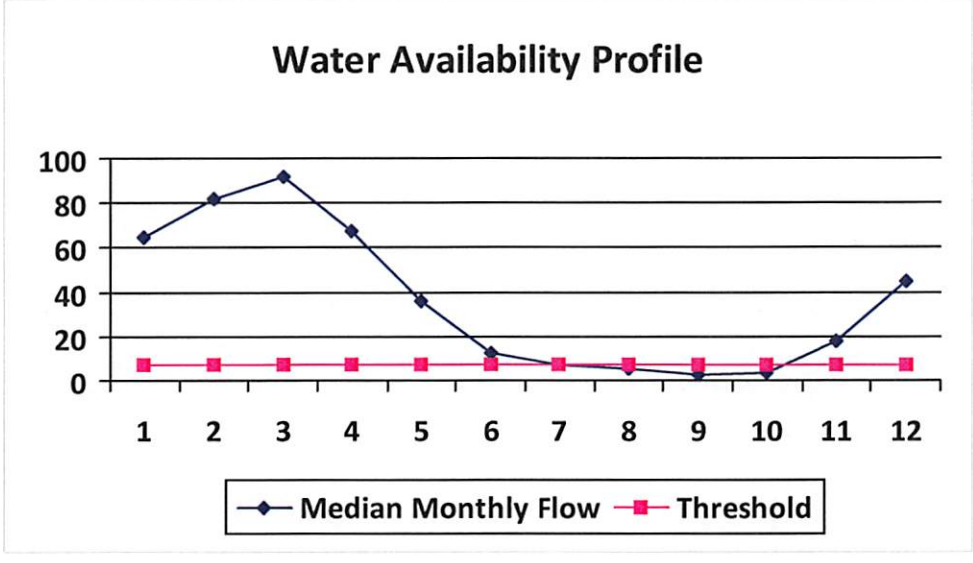
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

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	64.99	13.39	51.70
2	81.75	13.39	68.46
3	91.47	13.39	78.19
4	67.93	13.39	54.64
5	35.83	13.39	22.55
6	12.51	13.39	-0.77
7	7.08	13.39	-6.20
8	5.83	13.39	-7.45
9	2.99	13.39	-10.30
10	3.75	13.39	-9.53
11	18.32	13.39	5.04
12	44.76	13.39	31.48



Water Availability Assessment of Location

Base Threshold (cfs):	5.95
Upstream Demand (cfs):	2.23
Downstream Demand (cfs):	2.81
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.49
Ungauged Stream Safety (cfs):	1.49
Min. Gauge Reading (cfs):	**71.96**
Passby at Location (cfs):	**11.74**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16884 | Source Name: Meathouse Fork @ Whitehair Withdrawal
Elton Whitehair

Source Latitude: 39.211317
Source Longitude: -80.679592

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 30.37 | County: Doddridge

Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

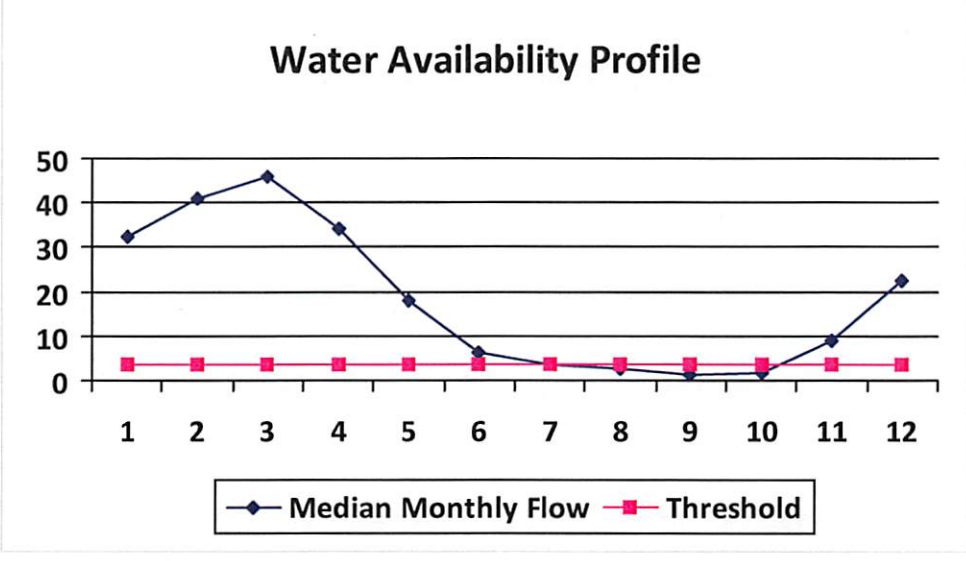
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

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	32.57	6.70	26.15
2	40.97	6.70	34.55
3	45.84	6.70	39.42
4	34.04	6.70	27.62
5	17.96	6.70	11.54
6	6.27	6.70	-0.15
7	3.55	6.70	-2.87
8	2.92	6.70	-3.50
9	1.50	6.70	-4.92
10	1.88	6.70	-4.54
11	9.18	6.70	2.76
12	22.43	6.70	16.01



Water Availability Assessment of Location

Base Threshold (cfs):	2.98
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	2.81
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.75
Ungauged Stream Safety (cfs):	0.75
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**7.29**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16885 | Source Name: Tom's Fork @ Erwin Withdrawal
John F. Erwin and Sandra E. Erwin

Source Latitude: 39.174306
Source Longitude: -80.702992

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 4.01 | County: Doddridge

Anticipated withdrawal start date: 1/13/2014
Anticipated withdrawal end date: 1/13/2015
Total Volume from Source (gal): 11,560,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm) 0

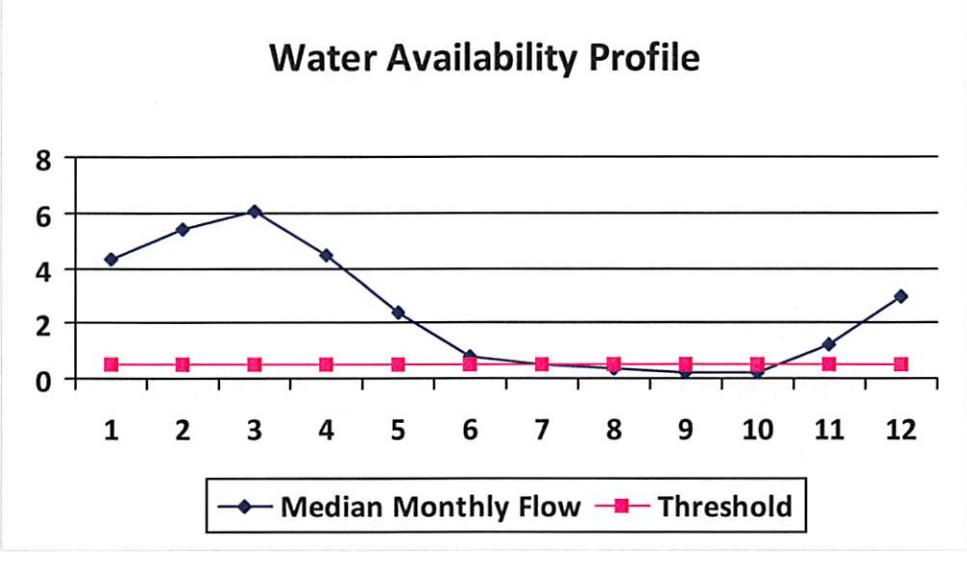
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

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	4.30	2.82	1.88
2	5.41	2.82	2.98
3	6.05	2.82	3.63
4	4.49	2.82	2.07
5	2.37	2.82	-0.05
6	0.83	2.82	-1.60
7	0.47	2.82	-1.96
8	0.39	2.82	-2.04
9	0.20	2.82	-2.23
10	0.25	2.82	-2.18
11	1.21	2.82	-1.21
12	2.96	2.82	0.54



Water Availability Assessment of Location

Base Threshold (cfs):	0.39
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.10
Ungauged Stream Safety (cfs):	0.10
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**0.59**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16886 | Source Name: Arnold Creek @ Davis Withdrawal | Jonathon Davis

Source Latitude: 39.302006

Source Longitude: -80.824561

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 20.83 | County: Doddridge

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

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

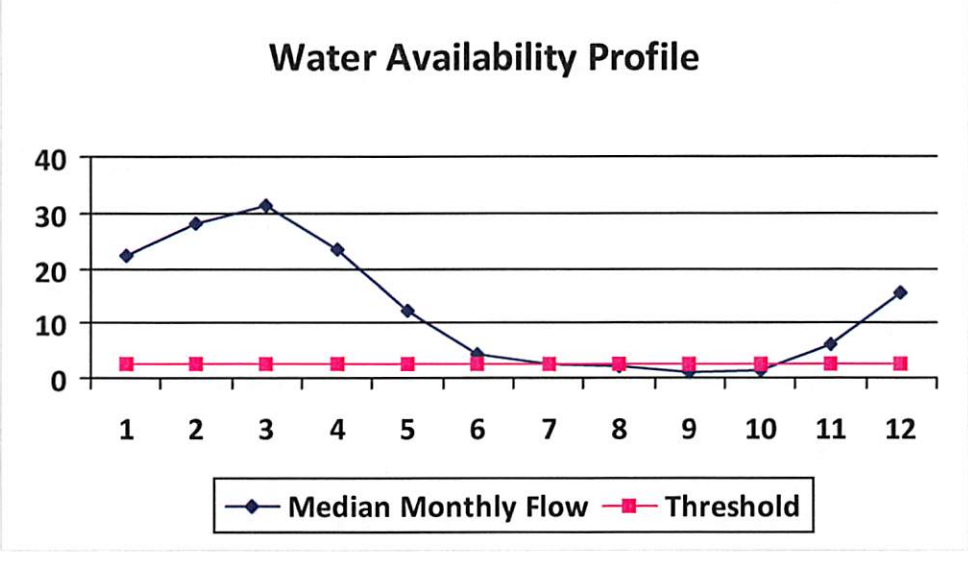
Max. Truck pump rate (gpm) 0

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	22.34	5.30	17.29
2	28.10	5.30	23.05
3	31.44	5.30	26.39
4	23.35	5.30	18.30
5	12.32	5.30	7.26
6	4.30	5.30	-0.75
7	2.43	5.30	-2.62
8	2.00	5.30	-3.05
9	1.03	5.30	-4.03
10	1.29	5.30	-3.76
11	6.30	5.30	1.25
12	15.39	5.30	10.34



Water Availability Assessment of Location

Base Threshold (cfs):	2.05
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.51
Ungauged Stream Safety (cfs):	0.51
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**3.07**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16887 | Source Name: Buckeye Creek @ Powell Withdrawal / Dennis Powell

Source Latitude: 39.277142

Source Longitude: -80.690386

HUC-8 Code: 5030201

Drainage Area (sq. mi.): 31.15 | County: Doddridge

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

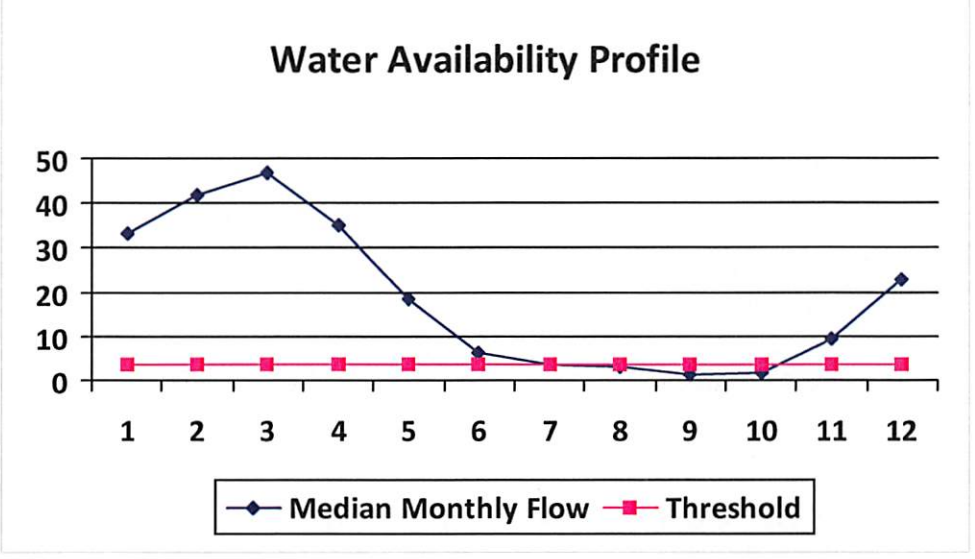
- ☐ Endangered Species?
- ☑ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☐ Regulated Stream?
- ☐ Proximate PSD?
- ☐ Gauged Stream?

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	33.41	6.82	26.95
2	42.02	6.82	35.56
3	47.02	6.82	40.56
4	34.92	6.82	28.46
5	18.42	6.82	11.96
6	6.43	6.82	-0.03
7	3.64	6.82	-2.82
8	3.00	6.82	-3.46
9	1.53	6.82	-4.92
10	1.93	6.82	-4.53
11	9.42	6.82	2.96
12	23.01	6.82	16.55



Water Availability Assessment of Location

Base Threshold (cfs):	3.06
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.77
Ungauged Stream Safety (cfs):	0.77
Min. Gauge Reading (cfs):	**69.73**
Passby at Location (cfs):	**4.59**

"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-01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16888 | Source Name: South Fork of Hughes River @ Knight Withdrawal

Tracy C. Knight & Stephanie C. Knight

Source Latitude: 39.198369

Source Longitude: -80.870969

HUC-8 Code: 5030203

Drainage Area (sq. mi.): 16.26 | County: Ritchie

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 3,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

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

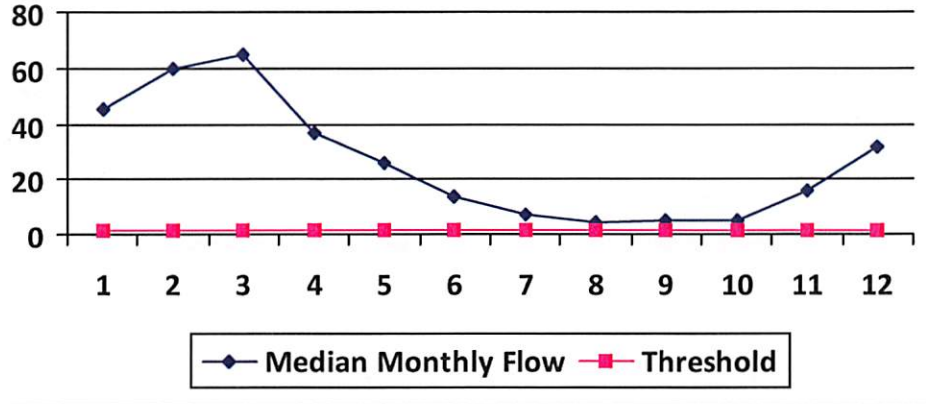
Reference Gaug: 3155220 | SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.) 229.00

Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	45.67	14.26	31.44
2	59.55	14.26	45.31
3	65.21	14.26	50.97
4	36.87	14.26	22.63
5	25.86	14.26	11.63
6	13.90	14.26	-0.33
7	6.89	14.26	-7.34
8	3.98	14.26	-10.25
9	4.79	14.26	-9.45
10	5.20	14.26	-9.04
11	15.54	14.26	1.30
12	32.06	14.26	17.82

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	1.56
Upstream Demand (cfs):	5.62
Downstream Demand (cfs):	0.00
Pump rate (cfs):	6.68
Headwater Safety (cfs):	0.39
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	**39.80**
Passby at Location (cfs):	**1.95**

"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- 01191 | API/ID Number: 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

Source ID: 16889 | Source Name: North Fork of Hughes River @ Davis Withdrawal

Lewis P. Davis and Norma J. Davis

Source Latitude: 39.322363

Source Longitude: -80.936771

HUC-8 Code: 5030203

Drainage Area (sq. mi.): 15.18 | County: Ritchie

Anticipated withdrawal start date: 1/13/2014

Anticipated withdrawal end date: 1/13/2015

Total Volume from Source (gal): 11,560,000

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

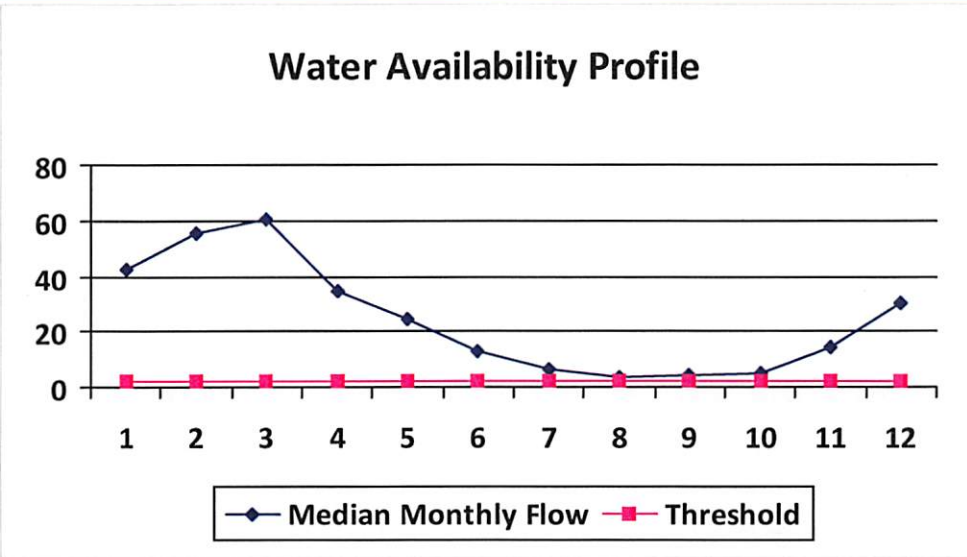
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

Reference Gaug: 3155220 | SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.) 229.00

Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	42.64	4.42	38.36
2	55.59	4.42	51.32
3	60.88	4.42	56.60
4	34.42	4.42	30.14
5	24.15	4.42	19.87
6	12.98	4.42	8.70
7	6.44	4.42	2.16
8	3.72	4.42	-0.56
9	4.47	4.42	0.19
10	4.85	4.42	0.57
11	14.50	4.42	10.23
12	29.93	4.42	25.65



Water Availability Assessment of Location

Base Threshold (cfs):	1.46
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.36
Ungauged Stream Safety (cfs):	0.36
Min. Gauge Reading (cfs):	**35.23**
Passby at Location (cfs):	**2.19**

"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- 01191 | API/ID Number 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

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.

Lake/Reservior

Source ID: 16892 Source Name: City of Salem Reservior (Lower Dog Run)
Public Water Provider

Source start date: 1/13/2014
Source end date: 1/13/2015

Source Lat: 39.28834 Source Long: -80.54966 County: Harrison

Max. Daily Purchase (gal): 1,000,000 Total Volume from Source (gal): 11,560,000

DEP Comments:

WMP-01191	API/ID Number	047-017-06259	Operator:	Antero Resources
	Mishka Unit 1H			

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:	16893	Source Name	Pennsboro Lake	Source start date:	1/13/2014
				Source end date:	1/13/2015

Source Lat:	39.281689	Source Long:	-80.925526	County	Ritchie

Max. Daily Purchase (gal) | Total Volume from Source (gal): 11,560,000

DEP Comments:

Source ID:	16894	Source Name	Powers Lake (Wilderness Water Park Dam) Private Owner	Source start date:	1/13/2014
				Source end date:	1/13/2015

Source Lat:	39.255752	Source Long:	-80.463262	County	Harrison

Max. Daily Purchase (gal) | Total Volume from Source (gal): 11,560,000

DEP Comments:

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:	16895	Source Name	Powers Lake Two			Source start date:	1/13/2014
						Source end date:	1/13/2015
	Source Lat:	39.247604	Source Long:	-80.466642	County	Harrison	
	Max. Daily Purchase (gal)				Total Volume from Source (gal):	11,560,000	

DEP Comments:

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.

Other

Source ID: 16896 Source Name: Poth Lake (Landowner Pond)
Private Owner
Source start date: 1/13/2014
Source end date: 1/13/2015

Source Lat: 39.221306 Source Long: -80.463028 County: Harrison

Max. Daily Purchase (gal): Total Volume from Source (gal): 11,560,000

DEP Comments:

Source ID: 16897 Source Name: Williamson Pond (Landowner Pond)
Source start date: 1/13/2014
Source end date: 1/13/2015

Source Lat: 39.19924 Source Long: -80.886161 County: Ritchie

Max. Daily Purchase (gal): Total Volume from Source (gal): 11,560,000

DEP Comments:

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: 16898 Source Name Eddy Pond (Landowner Pond)
Source start date: 1/13/2014
Source end date: 1/13/2015

Source Lat: 39.19924 Source Long: -80.886161 County Ritchie

Max. Daily Purchase (gal) Total Volume from Source (gal): 11,560,000

DEP Comments:

Source ID: 16899 Source Name Hog Lick Quarry
Industrial Facility
Source start date: 1/13/2014
Source end date: 1/13/2015

Source Lat: 39.419272 Source Long: -80.217941 County Marion

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal): 11,560,000

DEP Comments:

WMP-01191 | API/ID Number 047-017-06259 | Operator: Antero Resources

Mishka Unit 1H

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: 16900 Source Name: Glade Fork Mine Industrial Facility

Source start date: 1/13/2014

Source end date: 1/13/2015

Source Lat: 38.965767 Source Long: -80.299313 County: Upshur

Max. Daily Purchase (gal): 1,000,000 Total Volume from Source (gal): 11,560,000

DEP Comments:

Recycled Frac Water

Source ID: 16901 Source Name: Duff Unit 2H

Source start date: 1/13/2014

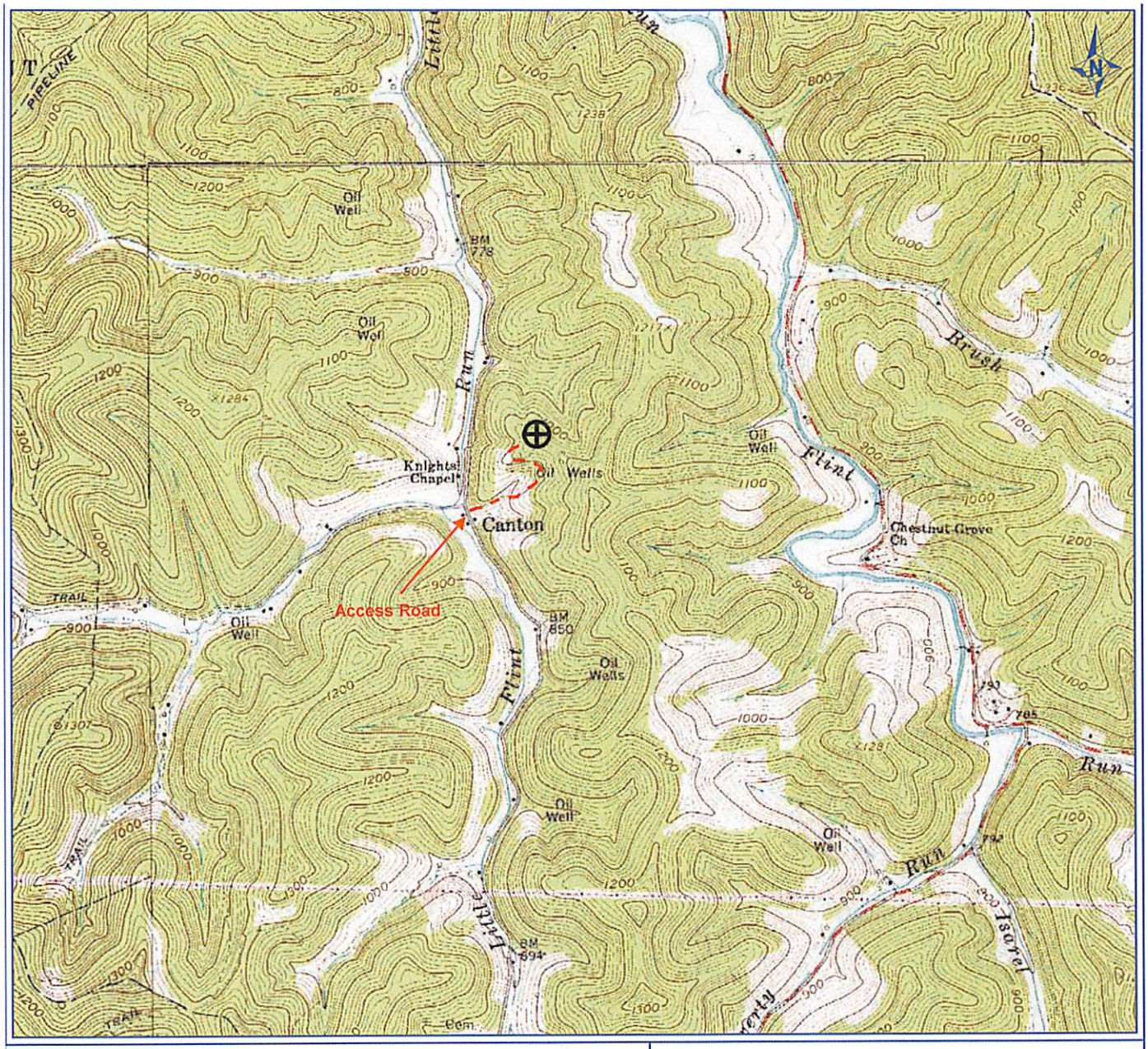
Source end date: 1/13/2015

Source Lat: Source Long: County:

Max. Daily Purchase (gal): Total Volume from Source (gal): 11,560,000

DEP Comments:

17-06259 ✓ CP



PETRA 2/6/2013 3:22:34 PM

Antero Resources Corporation

Appalachian Basin

Mishka Unit 1H

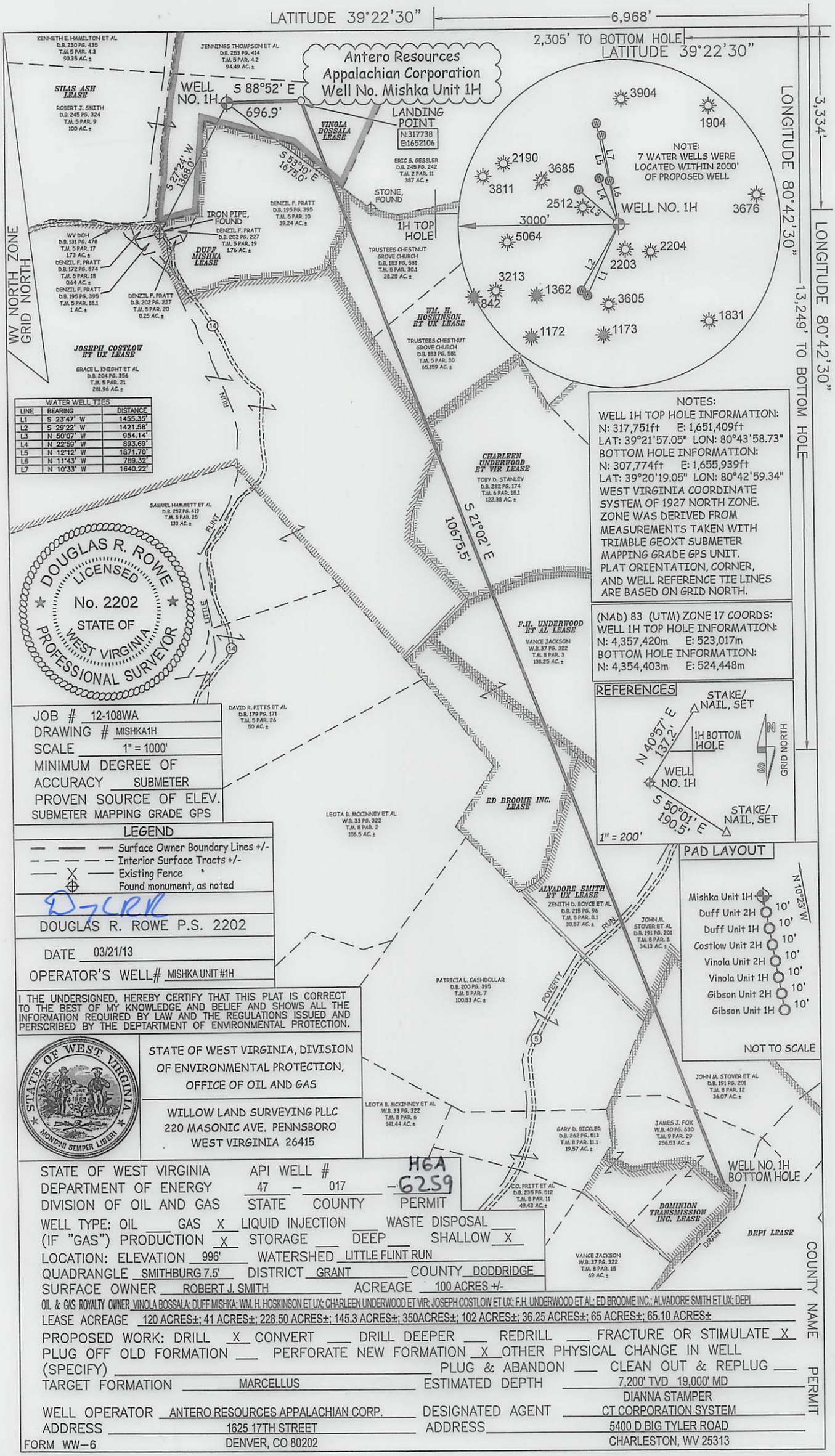
Doddridge County

0 2,000 4,000
FEET

REMARKS
QUADRANGLE: SMITHBURG
WATERSHED: LITTLE FLINT RUN
DISTRICT: GRANT

February 6, 2013

Received
Office of Oil & Gas
APR - 5 2013


LATITUDE 39°22'30"
6,968'
2,305' TO BOTTOM HOLE
LATITUDE 39°22'30"
LONGITUDE 80°42'30"
3,334'
LONGITUDE 80°42'30"
13,249' TO BOTTOM HOLE
WV NORTH ZONE GRID NORTH
Antero Resources Appalachian Corporation Well No. Mishka Unit 1H
WELL NO. 1H
S 88°52' E
696.9'
LANDING POINT
N:317738
E:1652106
S 27°24' W 1368.0'
S 33°10' E 1675.0'
1H TOP HOLE
S 21°02' E 10675.5'
NOTE: 7 WATER WELLS WERE LOCATED WITHIN 2000' OF PROPOSED WELL
3000'
WELL NO. 1H
3904
1904
2190
3685
3811
2512
3676
5064
2204
2203
3213
1362
842
3605
1831
1172
1173
KENNETH E. HAMILTON ET AL D.B. 230 PG. 435 T.M. 5 PAR. 4.3 90.35 AC. ±
SILAS ASH LEASE
ROBERT J. SMITH D.B. 245 PG. 324 T.M. 5 PAR. 9 100 AC. ±
JENNINGS THOMPSON ET AL D.B. 253 PG. 414 T.M. 5 PAR. 4.2 94.49 AC. ±
VINOLA BOSSALA LEASE
ERIC S. GESSLER D.B. 245 PG. 242 T.M. 2 PAR. 11 387 AC. ±
STONE, FOUND
IRON PIPE, FOUND
DENZIL F. PRATT D.B. 195 PG. 395 T.M. 5 PAR. 10 39.24 AC. ±
DENZIL F. PRATT D.B. 202 PG. 227 T.M. 5 PAR. 19 176 AC. ±
DUFF MISHKA LEASE
WV DOH D.B. 131 PG. 478 T.M. 5 PAR. 17 173 AC. ±
DENZIL F. PRATT D.B. 172 PG. 874 T.M. 5 PAR. 18 0.64 AC. ±
DENZIL F. PRATT D.B. 195 PG. 395 T.M. 5 PAR. 18.1 1 AC. ±
DENZIL F. PRATT D.B. 202 PG. 227 T.M. 5 PAR. 20 0.25 AC. ±
TRUSTEES CHESTNUT GROVE CHURCH D.B. 183 PG. 581 T.M. 5 PAR. 30.1 28.25 AC. ±
WM. H. HOSKINSON ET UX LEASE
TRUSTEES CHESTNUT GROVE CHURCH D.B. 183 PG. 581 T.M. 5 PAR. 30 65.159 AC. ±
JOSEPH COSTLOW ET UX LEASE
GRACE L. KNIGHT ET AL D.B. 204 PG. 356 T.M. 5 PAR. 21 281.96 AC. ±
CHARLEEN UNDERWOOD ET VIR LEASE
TOBY D. STANLEY D.B. 282 PG. 174 T.M. 6 PAR. 18.1 122.38 AC. ±
SAMUEL HAMMETT ET AL D.B. 257 PG. 419 T.M. 5 PAR. 25 133 AC. ±
F.H. UNDERWOOD ET AL LEASE
VANCE JACKSON W.B. 37 PG. 322 T.M. 8 PAR. 3 138.25 AC. ±
DAVID R. PITTS ET AL D.B. 179 PG. 171 T.M. 5 PAR. 26 50 AC. ±
LEOTA B. MCKINNEY ET AL W.B. 33 PG. 322 T.M. 8 PAR. 2 106.5 AC. ±
ED BROOME INC. LEASE
ALVADORE SMITH ET UX LEASE
ZENITH D. BOYCE ET AL D.B. 215 PG. 96 T.M. 8 PAR. 8.1 30.87 AC. ±
JOHN M. STOVER ET AL D.B. 191 PG. 201 T.M. 8 PAR. 8 34.13 AC. ±
PATRICIA L. CASHDOLLAR D.B. 200 PG. 395 T.M. 8 PAR. 7 100.83 AC. ±
LEOTA B. MCKINNEY ET AL W.B. 33 PG. 322 T.M. 8 PAR. 6 141.44 AC. ±
GARY D. BICKLER D.B. 262 PG. 513 T.M. 8 PAR. 11.1 19.57 AC. ±
JAMES J. FOX W.B. 40 PG. 630 T.M. 9 PAR. 29 256.53 AC. ±
J.C.O. PRITT ET AL D.B. 235 PG. 512 T.M. 8 PAR. 11 49.43 AC. ±
DOMINION TRANSMISSION INC. LEASE
DEPI LEASE
VANCE JACKSON W.B. 37 PG. 322 T.M. 8 PAR. 15 69 AC. ±
JOHN M. STOVER ET AL D.B. 191 PG. 201 T.M. 8 PAR. 12 36.07 AC. ±
WELL NO. 1H BOTTOM HOLE
LITTLE FLINT RUN
POVERTY RUN
DRAIN
WATER WELL TIES
LINE | BEARING | DISTANCE
L1 | S 23°47' W | 1455.35'
L2 | S 29°22' W | 1421.58'
L3 | N 50°07' W | 954.14'
L4 | N 22°59' W | 893.69'
L5 | N 12°12' W | 1871.70'
L6 | N 11°43' W | 789.32'
L7 | N 10°33' W | 1640.22'
NOTES:
WELL 1H TOP HOLE INFORMATION:
N: 317,751ft E: 1,651,409ft
LAT: 39°21'57.05" LON: 80°43'58.73"
BOTTOM HOLE INFORMATION:
N: 307,774ft E: 1,655,939ft
LAT: 39°20'19.05" LON: 80°42'59.34"
WEST VIRGINIA COORDINATE SYSTEM OF 1927 NORTH ZONE.
ZONE WAS DERIVED FROM MEASUREMENTS TAKEN WITH TRIMBLE GEOXT SUBMETER MAPPING GRADE GPS UNIT.
PLAT ORIENTATION, CORNER, AND WELL REFERENCE TIE LINES ARE BASED ON GRID NORTH.
(NAD) 83 (UTM) ZONE 17 COORDS:
WELL 1H TOP HOLE INFORMATION:
N: 4,357,420m E: 523,017m
BOTTOM HOLE INFORMATION:
N: 4,354,403m E: 524,448m
REFERENCES
STAKE/ NAIL, SET
N 40°57' E 137.2'
1H BOTTOM HOLE
WELL NO. 1H
S 50°01' E 190.5'
STAKE/ NAIL, SET
GRID NORTH
1" = 200'
PAD LAYOUT
Mishka Unit 1H
Duff Unit 2H
Duff Unit 1H
Costlow Unit 2H
Vinola Unit 2H
Vinola Unit 1H
Gibson Unit 2H
Gibson Unit 1H
10'
N 10°23' W
NOT TO SCALE
DOUGLAS R. ROWE LICENSED No. 2202 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR
JOB # 12-108WA
DRAWING # MISHKA1H
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS
LEGEND
Surface Owner Boundary Lines +/-
Interior Surface Tracts +/-
Existing Fence
Found monument, as noted
DRR
DOUGLAS R. ROWE P.S. 2202
DATE 03/21/13
OPERATOR'S WELL# MISHKA UNIT #1H
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 PERSCRIBED BY THE DEPTARTMENT OF ENVIRONMENTAL PROTECTION.
STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415
STATE OF WEST VIRGINIA DEPARTMENT OF ENERGY DIVISION OF OIL AND GAS
API WELL # 47 - 017 - H6A-6259
STATE COUNTY PERMIT
WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
LOCATION: ELEVATION 996' WATERSHED LITTLE FLINT RUN
QUADRANGLE SMITHBURG 7.5' DISTRICT GRANT COUNTY DODDRIDGE
SURFACE OWNER ROBERT J. SMITH ACREAGE 100 ACRES +/-
OIL & GAS ROYALTY OWNER VINOLA BOSSALA; DUFF MISHKA; WM. H. HOSKINSON ET UX; CHARLEEN UNDERWOOD ET VIR; JOSEPH COSTLOW ET UX; F.H. UNDERWOOD ET AL; ED BROOME INC.; ALVADORE SMITH ET UX; DEPI
LEASE ACREAGE 120 ACRES±; 41 ACRES±; 228.50 ACRES±; 145.3 ACRES±; 350ACRES±; 102 ACRES±; 36.25 ACRES±; 65 ACRES±; 65.10 ACRES±
PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION X OTHER PHYSICAL CHANGE IN WELL (SPECIFY) ___ PLUG & ABANDON ___ CLEAN OUT & REPLUG ___
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7,200' TVD 19,000' MD
WELL OPERATOR ANTERO RESOURCES APPALACHIAN CORP. DESIGNATED AGENT DIANNA STAMPER / CT CORPORATION SYSTEM
ADDRESS 1625 17TH STREET DENVER, CO 80202 ADDRESS 5400 D BIG TYLER ROAD CHARLESTON, WV 25313
FORM WW-6
COUNTY NAME PERMIT