Doddridge County Sheriff
Flood Plain Ordinance Fund

1021
69-217/515

DATE July 16, 2013

PAY TO THE ORDER OF ANTERO RESOURCES $ 1,000.00

One Thousand Dollars and No/100---------- DOLLARS

Security features included. Details on back.

Ralph Sandora Jr.
Beth A. Rogers

CORNERSTONE BANK
West Union, WV 26456

MEMO Reimburse Bldg Permit #13-031 (Redican)

⑈001021⑈ ⑆051502175⑆ ⑈9649⑈

BLUE TRADITIONAL

7012 1010 0001 4282 8096

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)
For delivery information visit our website at www.usps.com®
OFFICIAL USE

Postage	$ .46
Certified Fee	3.10
Return Receipt Fee (Endorsement Required)	2.55
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.11

Postmark Here
JUL 10 2013
USPS 26456
WEST UNION WV

Sent To: John & Melissa Cascarelli
Street, Apt. No.; or PO Box No.: Rt.3, Box 55 A
City, State, ZIP+4: Salem, WV 26426

PS Form 3800, August 2006 See Reverse for Instructions

7012 1010 0001 4282 8102

U.S. Postal Service™
CERTIFIED MAIL™ RECEIPT
(Domestic Mail Only; No Insurance Coverage Provided)
For delivery information visit our website at www.usps.com®
OFFICIAL USE

Postage	$ .46
Certified Fee	3.10
Return Receipt Fee (Endorsement Required)	2.55
Restricted Delivery Fee (Endorsement Required)	
Total Postage & Fees	$ 6.11

Postmark Here
JUL 10 2013
USPS 26456
WEST UNION WV

Sent To: Carolyn Lehmann Trust
Street, Apt. No.; or PO Box No.: P.O. Box 418
City, State, ZIP+4: Babb, MT 59411

PS Form 3800, August 2006 See Reverse for Instructions

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

Carolyn Lehmann Trust c/o
Kristian Loel Rexroad Bikas
P.O. Box 418
Babb, MT 59411

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X [signature] ☐ Agent ☒ Addressee

B. Received by *(Printed Name)* KRISTIN BIKAS

C. Date of Delivery 7/20/2013

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7012 1010 0001 4282 8102

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

GREAT FALLS MT 594
UNITED STATES POSTAL SERVICE

22 JUL 2013 PM 1 T

• Sender: Please print your name, address, and ZIP+4 in this box •

BETH A. ROGERS
DODDRIDGE COUNTY CLERK
118 E. COURT ST., RM 102
WEST UNION, WV 26456

SENDER: *COMPLETE THIS SECTION*

- Complete items 1, 2, and 3. Also complete item 4 if Restricted Delivery is desired.
- Print your name and address on the reverse so that we can return the card to you.
- Attach this card to the back of the mailpiece, or on the front if space permits.

1. Article Addressed to:

John & Melissa Cascarelli
Rt. 3, Box 55 A
Salem, WV 26426

COMPLETE THIS SECTION ON DELIVERY

A. Signature

X R Cascarelli ☐ Agent ☐ Addressee

B. Received by *(Printed Name)* John R. Cascarelli C. Date of Delivery 7/12/13

D. Is delivery address different from item 1? ☐ Yes
If YES, enter delivery address below: ☐ No

3. Service Type
☒ Certified Mail ☐ Express Mail
☐ Registered ☐ Return Receipt for Merchandise
☐ Insured Mail ☐ C.O.D.

4. Restricted Delivery? *(Extra Fee)* ☐ Yes

2. Article Number *(Transfer from service label)* 7012 1010 0001 4282 8096

PS Form 3811, February 2004 Domestic Return Receipt 102595-02-M-1540

UNITED STATES POSTAL SERVICE

CHARLESTON WV 253

12 JUL 2013 PM 4 L

First-Class Mail
Postage & Fees Paid
USPS
Permit No. G-10

• Sender: Please print your name, address, and ZIP+4 in this box •

BETH A. ROGERS
DODDRIDGE COUNTY CLERK
118 E. COURT ST., RM 102
WEST UNION, WV 26456

By: BH - MEH - AML
Asst. Chief Tax Deputy

W. C .Underwood Jr.
Sheriff of Doddridge County

The Person paying Money into the Treasury shall forthwith file one of these Receipts with the County Clerk

Doddridge County, West Virginia

No. 7

Date: July 9, 2013
Customer copy

Received: #13-031 Antero $1,985.75

In Payment For: 318 Building Permits (LP)

For: 12-Flood Plain Ordinance #20 Fund

By: BH - MEH - AML
Asst. Chief Tax Deputy

W. C .Underwood Jr.
Sheriff of Doddridge County

By: BH - MEH - AML
Asst. Chief Tax Deputy

Michael Headley
Sheriff of Doddridge County

The Person paying Money into the Treasury shall forthwith file one of these Receipts with the County Clerk

Doddridge County, West Virginia

No. 4859

Date: July 9, 2013
Customer copy

Received: #13-031 Antero $1,985.75

In Payment For: 318 Building Permits (LP)

For: 12-Flood Plain Ordinanc Fund #20 Fund

By: BH - MEH - AML
Asst. Chief Tax Deputy

Michael Headley
Sheriff of Doddridge County

ANTERO RESOURCES CORPORATION
1625 17th STREET, SUITE 300
DENVER, COLORADO 80202

Vendor Name	Vendor No.	Date	Check Number	Check Total
DODDRIDGE COUNTY COMMISSION	43312	Jul-02-2013	32831	$1,985.75

VOUCHER	VENDOR INV #	INV DATE	TOTAL AMOUNT	PRIOR PMTS & DISCOUNTS	NET AMOUNT
07-AP-881	XSTAGINGAREA	07/02/13	1,985.75	0.00	1,985.75
FLOOD PLAIN PERMIT APP- COX STAGING AREA					
TOTAL INVOICES PAID					1,985.75

DETACH AND RETAIN FOR TAX PURPOSES

Doddridge County Flood Plain Application Fee Calculator (if in Flood Plain)	
Cox Staging Area	
Estimated Construction Costs	$97,150.60
Amount over $100,000	-$2,849.40
Drilling Oil and Gas Well Fee	$1,000.00
Deposit for additional charges	$1,000.00
$5 per $1,000 over $100,000	-$14.25
Amount Due with application	$1,985.75

Legal Advertisement:

Doddridge County

Floodplain Permit Application

20 days from 9th is 29th July.

Please take notice that on the **09th day of July, 2013,**

ANTERO RESOURCES APPALACHIAN CORP. filed an application for a Floodplain Permit to develop land located at or about: **VICTOR & WANDA COX, Surface Owners, Greenbrier District, Deed Book /Page: 229/313 & 65/123, Tax Map: 13 Parcel 11 & TM 14 Parcel 8**

The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours.

Any interested persons who desire to comment shall present the same in writing by **July 29th , 2013.**

Delivered to the:

Clerk of the County Court

118 E. Court Street, West Union, WV 26456.

Beth A Rogers, Doddridge County Clerk

Dan Wellings, Doddridge County Flood Plain Manager

P. 01

TRANSACTION REPORT

JUL-10-2013 WED 03:58 PM

FOR: DODDRIDGE CO. CLERK 304 873 1840

SEND

DATE	START	RECEIVER	TX TIME	PAGES	TYPE	NOTE	M#	DP
JUL-10	03:58 PM	93048731600	26"	1	FAX TX	OK	501	

TOTAL : 26S PAGES: 1

Legal Advertisement:

Doddridge County

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Beth A Rogers, Doddridge County Clerk

Dan Wellings, Doddridge County Flood Plain Manager

ANTERO
RESOURCES

Antero Resources
1625 17th Street
Denver, Colorado 80202
Office 303.357.7310
Fax 303.357.7315

July 1, 2013

Doddridge County Commission
Attn: Dan Wellings, Doddridge County Floodplain Manager
118 East Court Street, Room 102
West Union, WV 26456

Mr. Wellings:

Antero Resources Appalachian Corporation (Antero) would like to submit a Doddridge County Floodplain permit application for our Cox Staging Area. Our project is located in Doddridge County, Greenbrier District. Per the enclosed HEC-RAS study prepared by The Trasher Group, Inc. on June 7, 2013, the placement of the topsoil in the floodplain will not create an increase of the flood elevation or cause significant erosion.

Attached you will find the following:

- Doddridge County Floodplain Permit Application and permit fees
- HEC-RAS Study
- FIRM Map
- Copies of other required permits

If you have any questions please feel free to contact me at (303) 357-6820.

Thank you in advance for your consideration.

Sincerely,

Shauna Redican
Permit Representative
Antero Resources Appalachian Corporation

Enclosures

2013 JUL -3 PM 4:00

PERMIT NO. 13-031

DODDRIDGE COUNTY

FLOODPLAIN DEVELOPMENT

PERMIT

PURPOSE FOR PERMIT: STAGING AREA

ISSUED TO ANTERO RESOURCES

ADDRESS: 1625 17TH STREET, DENVER CO 80202

PROJECT ADDRESS: RT. 3 BOX 46, SALEM, WV 26426
TAX MAP 13-PARCEL 11 & TAX MAP 14 PARCEL 8

ISSUED BY: Dan Williams

DATE: 07/31/2013

THIS PERMIT MUST BE POSTED ON THE PREMISES IN A CONSPICUOUS PLACE SO AS TO BE CLEARLY VISIBLE FROM THE STREET.

DODDRIDGE COUNTY
FLOODPLAIN DEVELOPMENT PERMIT APPLICATION

SECTION 1: GENERAL PROVISIONS (APPLICANT TO READ AND SIGN)

1. No work may start until a permit is issued.
2. The permit may be revoked if any false statements are made herein.
3. If revoked, all work must cease until permit is re-issued.
4. Development shall not be used or occupied until a Certificate of Compliance is issued.
5. The permit will expire if no work is commenced within six months of issuance.
6. Applicant is hereby informed that other permits may be required to fulfill local, state, and federal requirements.
7. Applicant hereby gives consent to the Floodplain Administrator/Manager or his/her representative to make inspections to verify compliance.
8. **I, THE APPLICANT CERTIFY THAT ALL STATEMENTS HEREIN AND IN ATTACHMENTS TO THIS APPLICATION ARE, TO THE BEST OF MY KNOWLEDGE, TRUE AND ACCURATE.**

APPLICANT'S SIGNATURE _____

DATE July 1, 2013

SECTION 2: PROPOSE DEVELOPMENT (TO BE COMPLETED BY APPLICANT).

IF THE APPLICANT IS NOT A NATURAL PERSON, THE NAME, ADDRESS, AND TELEPHONE NUMBER OF A NATURAL PERSON WHO SHALL BE APPOINTED BY THE APPLICANT TO RECEIVE NOTICE PURSUANT TO ANY PROVISION OF THE CURRENT DODDRIDGE COUNTY FLOODPLAIN ORDINANCE.

APPLICANT'S NAME: Antero Resources Appalachian Corporation - Kevin Kilstrom, Vice President of Production

ADDRESS: 1625 17th Street, Denver, CO 80202

TELEPHONE NUMBER: Contact Shauna Redican: 303-357-6820

2013 JUL -3 PM 4:01

BUILDER'S NAME: _____

ADDRESS: _____

TELEPHONE NUMBER: _____

ENGINEER'S NAME: The Thrasher Group - Michael Nestor

ADDRESS: 30 Columbia Boulevard, Clarksburg, WV 26301

TELEHONE NUMBER: 304-624-4108

PROJECT LOCATION:

NAME OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) 1) Victor and Wanda Cox 2) M.E. Church

ADDRESS OF SURFACE OWNER/OWNERS (IF NOT THE APPLICANT) 1) Rt. 3, Box 46 Salem, WV 26426 2) Unknown

DISTRICT: Greenbrier

DATE/FROM WHOM PROPERTY PURCHASED: _____

LAND BOOK DESCRIPTION: Tillable, Woodland

DEED BOOK REFERENCE: 1) DB 229; PG 313 2) DB 65; PG 123

TAX MAP REFERENCE: 1) TM 13; Par 11 2) TM 14; Par 8

EXISTING BUILDINGS/USES OF PROPERTY: 1) None/None 2) Abandoned Church/none

NAME OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Victor Cox

ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON THE SUBJECT PROPERTY Rt. 3, Box 46 Salem, WV 26426

To avoid delay in processing the application, please provide enough information to easily identify the project location.

DESCRIPTION OF WORK (CHECK ALL APPLICABLE BOXES)

A. STRUCTURAL DEVELOPMENT

ACTIVITY		STRUCTURAL TYPE	
[]	New Structure	[]	Residential (1 – 4 Family)
[]	Addition	[]	Residential (more than 4 Family)
[]	Alteration	[]	Non-residential (floodproofing)
[]	Relocation	[]	Combined Use (res. & com.)
[]	Demolition	[]	Replacement
[]	Manufactured/Mobil Home		

B. OTHER DEVEOPLMENT ACTIVITIES:

[X] Fill [] Mining [] Drilling [] Pipelining
[X] Grading
[] Excavation (except for STRUCTURAL DEVELOPMENT checked above)
[] Watercourse Altercation (including dredging and channel modification)
[] Drainage Improvements (including culvert work)
[] Road, Street, or Bridge Construction
[] Subdivision (including new expansion)
[] Individual Water or Sewer System
[] Other (please specify)

C. STANDARD SITE PLAN OR SKETCH

1. **SUBMIT ALL STANDARD SITE PLANS, IF ANY HAVE BEEN PREPARED.**
2. **IF STANDARD SITE PLANS HAVE NOT BEEN PREPARED:**
   SKETCH ON A SEPARATE 8 ½ X 11 INCH SHEET OF PAPER THE SHAPE AND LOCATION OF THE LOT. SHOW THE LOCATION OF THE INTENDED CONSTRUCTION OR LAND USE INDICATING BUILDING SETBACKS, SIZE & HEIGHT. IDENTIFY EXISTING BUILDINGS, STRUCTURES OR LAND USES ON THE PROPERTY.
3. **SIGN AND DATE THE SKETCH.**

ACTUAL TOTAL CONSTRUCTION COSTS OF THE COMPLETE DEVELOPMENT IRRESPECTIVE OF WHETHER ALL OR ANY PART OF THE SUBJECT PROPOSED CONSTRUCTION PROJECT IS WITHIN THE FLOODPLAIN $ 97,150.60

D. ADJACENT AND/OR AFFECTED LANDOWNERS:

Sent out Auto 7/10/13

1. **NAME AND ADDRESS OF ALL OWNERS OF SURFACE TRACTS ADJACENT TO THE AREA OF THE SURFACE TRACT (UP & DOWN STREAM) UPON WHICH THE PROPOSED ACTIVITY WILL OCCUR AND ALL OTHER SURFACE OWNERS UP & DOWN STREAM) WHO OWN PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY (IF ONE HAS BEEN COMPLETED).**

NAME: John + Melissa Cascarelli
ADDRESS: Rt. 3, Box 55A
Salem, WV 26426

NAME: Carolyn Lehmann Trust c/o Kristin Loel Rexroad Bikos
ADDRESS: P.O. Box 418
Babb, MT 59411

NAME:
ADDRESS:

NAME:
ADDRESS:

1. **NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN EACH RESIDENCE LOCATED UPON ANY ADJACENT PROPERTY AT THE TIME THE FLOODPLAIN PERMIT APPLICATION IS FILED AND THE NAME AND ADDRESS OF AT LEAST ONE ADULT RESIDING IN ANY HOME ON ANY PROPERTY THAT MAY BE AFFECTED BY FLOODING AS IS DEMONSTRATED BY A FLOODPLAIN STUDY OR SURVEY.**

NAME: John Cascarelli
ADDRESS: Rt. 3, Box 55A
Salem, WV 26426

NAME:
ADDRESS:

NAME:
ADDRESS:

NAME:
ADDRESS:

E. CONFIRMATION FORM

THE APPLICANT ACKNOWLEDGES, AGREES, AND CONFIRMS THAT HE/IT WILL PAY WITHIN 30 DAYS OF RECEIPT OF INVOICE BY THE COUNTY FOR ALL EXPENSES RELATIVE TO THE PERMIT APPLICATION PROCESS GREATER THAN THE REQUIRED DEPOSIT FOR EXPENSES INCLUDING:

(A) PERSONAL SERVICE OF PROCESS BY THE DODDRIDGE COUNTY SHERIFF AT THE RATES PERMITTED BY LAW FOR SUCH SERVICE.

(B) SERVICE BY CERTIFIED MAIL RETURN RECEIPT REQUESTED.

(C) PUBLICATION.

(D) COURT REPORTING SERVICES AT ANY HEARINGS REQUESTED BY THE APPLICANT.

(E) CONSULTANTS AND/OR HEARING EXPERTS UTILIZED BY DODDRIDGE COUNTY FLOODPLAIN ADMINISTRATOR/MANAGER OR FLOODPLAIN APPEALS BOARD FOR REVIEW OF MATERIALS AND/OR TESTIMONY REGARDING THE EFFICACY OF GRANTING OR DENYING THE APPLICANT'S FLOODPLAIN PERMIT.

NAME (PRINT): Kevin Kilstrom, Vice President of Production

SIGNATURE: _____ **DATE:** July 1, 2013

After completing SECTION 2, APPLICANT should submit form to Floodplain Administrator/Manager or his/her representative for review.

SECTION 3: FLOODPLAIN DETERMINATION (to be completed by Floodplain Administrator/Manager or his/her representative)

THE PROPOSED DEVELOPMENT:

THE PROPOSED DEVELOPMENT IS LOCATED ON:

FIRM Panel: 235

Dated: 10/04/2011

[] Is **NOT** located in a Specific Flood Hazard Area (Notify applicant that the application review is complete and **NO FLOOPLAIN DEVELOPMENT PERMIT IS REQUIRED**).

[X] Is located in Special Flood Hazard Area.

FIRM zone designation A

100-Year flood elevation is: N/A NGVD (MSL)

[] Unavailable

[] The proposed development is located in a floodway.

FBFM Panel No._____ Dated_____

[] See section 4 for additional instructions.

SIGNED Dan Wellington DATE 07/31/2013

SECTION 4: ADDITIONAL INFORMATION REQUIRED (To be completed by Floodplain Administrator/Manager or his/her representative)

The applicant must submit the documents checked below before the application can be processed.

[] A plan showing the location of all existing structures, water bodies, adjacent roads, lot dimensions and proposed development.

[] Development plans, drawn to scale, and specifications, including where applicable: details for anchoring structures, storage tanks, proposed elevation of lowest floor, (including basement or crawl space), types of water resistant materials used below the first floor, details of flood proffing of utilities located below the first floor and details of enclosures below the first floor. Also_____

_____

[] Subdivision or other development plans (If the subdivision or development exceeds 50 lots or 5 acres, whichever is the lesser, the applicant must provide 100-year flood elevations if they are not otherwise available).

[] Plans showing the extent of watercourse relocation and/or landform alterations.

[] Top of new fill elevation_____Ft. NGVD (MSL).
For floodproofing structures applicant must attach certification from registered engineer or architect.

[] Certification from a registered engineer that the proposed activity in a regulatory floodway will not result in any increase in the height of the 100-year flood. A copy of all data and calculations supporting this finding must also be submitted.

[] Manufactured homes located in a floodplain area must have a West Virginia Contractor's License and a Manufactured Home Installation License as required by the Federal Emergency Management Agency (FEMA).

[] Other:

_____

_____

_____

SECTION 5: PERMIT DETERMINATION (To be completed by Floodplain Administrator/Manager or his/her representative)

I have determined that the proposed activity **(type is or is not)** in conformance with provisions of the Floodplain Ordinance adopted by the County Commission of Doddridge County on May 21, 2013. The permit is issued subject to the conditions attached to and made part of this permit.

SIGNED_____DATE_____

If the Floodplain Administrator/Manager found that the above was not in conformance with the provisions of the Doddridge County Floodplain Ordinance and/or denied that application, the applicant may complete an appealing process below.

APPEALS: Appealed to the County Commission of Doddridge County? [] Yes {} No
Hearing Date:_____
County Commission Decision - Approved [] Yes [] No

CONDITIONS:_____

_____

_____

_____

SECTION 6: AS-BUILT ELEVATIONS (To be submitted by APPLICANT before Certificate of Compliance is issued).

The following information must be provided for project structures. This section must be completed by a registered professional engineer or a licensed land surveyor (or attach a certification to this application).

COMPLETE 1 OR 2 BELOW:

1 Actual (As-Built) Elevation of the top of the lowest floor (including basement or crawl space is_____FT. NGVD (MSL)

2 Actual (As Built) elevation of floodproofing is_____FT. NGVD (MSL)

Note: Any work performed prior to submittal of the above information is at risk of the applicant.

SECTION 7: COMPLIANCE ACTION (To be completed by the Floodplain Administrator/Manager or his/her representative).

The Floodplain Administrator/Manager or his/her representative will complete this section as applicable based on inspection of the project to ensure compliance with the Doddridge County Floodplain Ordinance.

INSPECTIONS:

DATE:_____ **BY:**_____

DEFICIENCIES ? **Y/N**

COMMENTS_____

_____

_____

_____

_____

_____

SECTION 8: CERTIFICATE OF COMPLIANCE (To be completed by Floodplain Administrator/Manager or his/her representative).

Certificate of Compliance issued: DATE: 12/06/13 BY: Dan Nottingham

CERTIFICATE OF COMPLIANCE
FOR DEVELOPMENT IN SPECIAL FLOOD HAZARD AREA
(OWNER MUST RETAIN)

PERMIT NUMBER: 13-031
PERMIT DATE: 07/31/2013

PURPOSE –

CONSTRUCTION LOCATION: Cox Staging Area

OWNER'S ADDRESS: Antero Resources
1625 17TH STREET
Denver, Co. 80202

THE FOLLOWING MUST BE COMPLETED BY THE FLOODPLAIN ADMINISTRATOR/MANAGER OR HIS/HER AGENT.

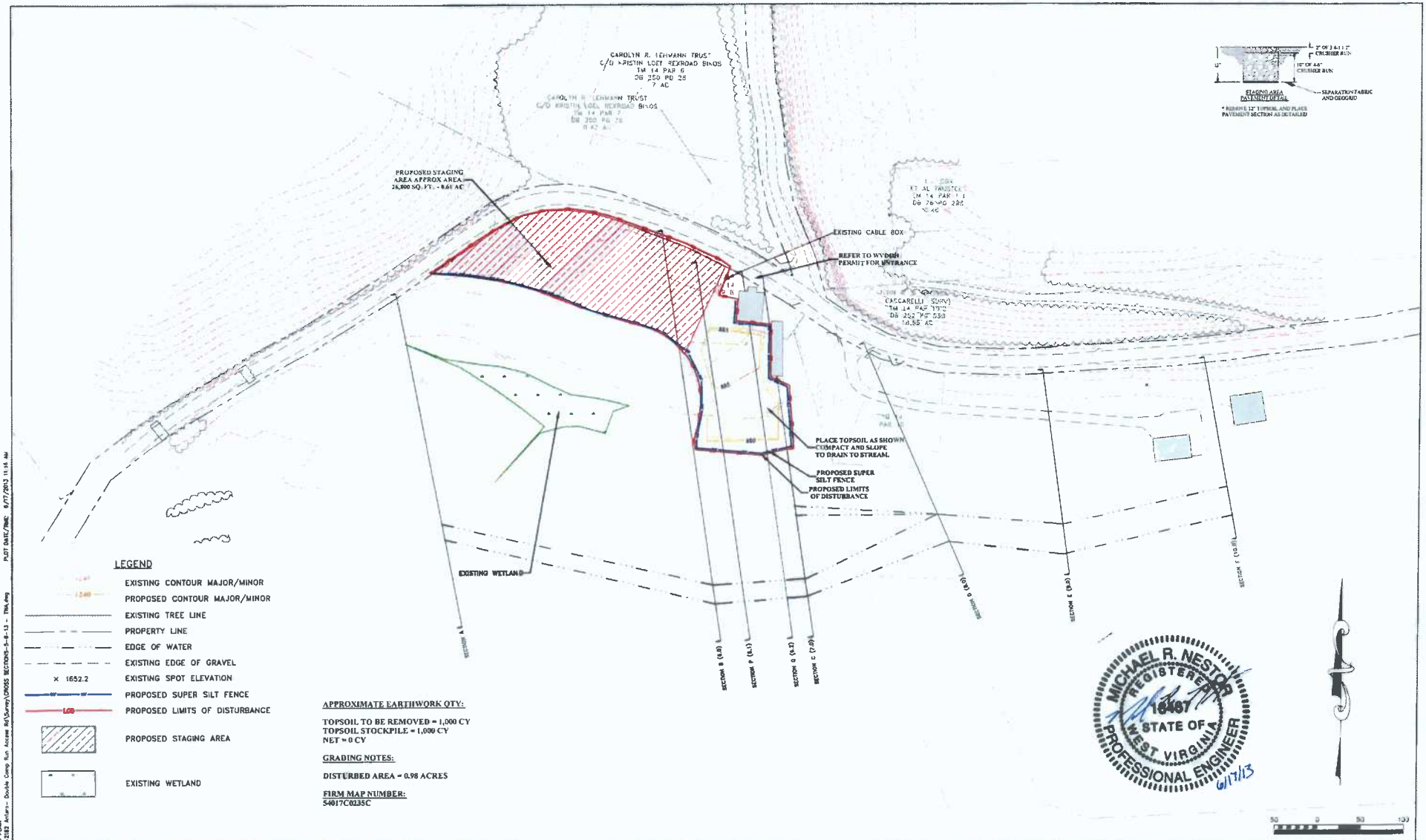
COMPLIANCE IS HEREBY CERTIFIED WITH THE REQUIREMENT OF THE FLOODPLAIN ORDINANCE ADOPTED BY THE COUNTY COMMISSION OF DODDRIDGE COUNTY ON MAY 21, 2013.

SIGNED Dan Wellman **DATE** 12/06/2013

Antero 13-031

Staging Area 12/05/2013

Meathouse Fork at mouth of Double Camp DJ 2V



LEGEND

- EXISTING CONTOUR MAJOR/MINOR
- PROPOSED CONTOUR MAJOR/MINOR
- EXISTING TREE LINE
- PROPERTY LINE
- EDGE OF WATER
- EXISTING EDGE OF GRAVEL
- × 1652.2 EXISTING SPOT ELEVATION
- PROPOSED SUPER SILT FENCE
- PROPOSED LIMITS OF DISTURBANCE
- PROPOSED STAGING AREA
- EXISTING WETLAND

APPROXIMATE EARTHWORK QTY:

TOPSOIL TO BE REMOVED = 1,000 CY
TOPSOIL STOCKPILE = 1,000 CY
NET = 0 CY

GRADING NOTES:

DISTURBED AREA = 0.98 ACRES

FIRM MAP NUMBER:
54017C0235C

MICHAEL R. NESTOR
REGISTERED
16487
STATE OF WEST VIRGINIA
PROFESSIONAL ENGINEER
6/7/13

50 0 50 100

NO	BY	DATE	DESCRIPTION

SCALE: AS SHOWN
DRAWN: DATE:
CHECKED: DATE:
APPROVED: DATE:
SURVEY DATE:
SURVEY BY:
FIELD BOOK No.:

THRASHER
THE THRASHER GROUP, INC.
PHONE (304) 624-4108 (FAX) (304) 624-7831
30 COLUMBIA BOULEVARD, CLARKSBURG, WV 26301

PHASE No.
CONTRACT No.
PROJECT No. 1-01-030-2162

COX STAGING AREA AT DOUBLE CAMP SITE DESIGN, CONSTRUCTION, AND EROSION & SEDIMENT CONTROL PLANS DODDRIDGE COUNTY, WEST VIRGINIA FLOODPLAIN EXHIBIT

SHEET No. 1

LAYOUT TAB: FLOOD PLAN
CAD FILE: R:\030-2162 Antero - Double Camp Run Access Rd\Survey\CROSS SECTIONS-5-8-13 - TRH.dwg
PLOT DATE/TIME: 6/7/2013 11:18 AM

2.0 FLOODPLAIN EXHIBIT

TRUMBULL
ENERGY SERVICES

May 9, 2013

Mike Ash
Antero Resources
175-D Elk Creek Road
Mt. Clare, WV 26408

Re: Double Camp Road – Cox Staging Area

Dear Mike,

Below please find an estimated budget to construct the Cox Staging Area. I have included E&S controls, grading, and placing a stone surface over the area. If you have any questions please feel free to give me a call at 412-980-2203.

Description	Quantity	Unit	Unit Cost	Total
Strip Topsoil	1,000	CY	$5.00	$5,000.00
Super Silt Fence	1,100	LF	$10.00	$11,000.00
Class 2A Geotextile	3,000	SY	$1.50	$4,500.00
Geogrid	3,000	SY	$6.00	$18,000.00
4"-6" Crusher Run	1,580	TN	$29.17	$46,088.60
3/4" Crusher Run	320	TN	$28.60	$9,152.00
Concrete Barrier	48	LF	$10.42	$500.00
Seed & Mulch	3,000	SY	$0.97	$2,910.00
				$97,150.60

Sincerely,

Richard C. Doyle, Jr.
General Manager

P.O. BOX 6774, PITTSBURGH, PA 15212-0774 TEL 412.807.2000 FAX 412.807.2010

EXHIBIT A

Cox Staging Area at Double Camp

New Milton, WV

Floodplain Analysis Report
For
Antero Resources

Doddridge County, West Virginia

June 2013

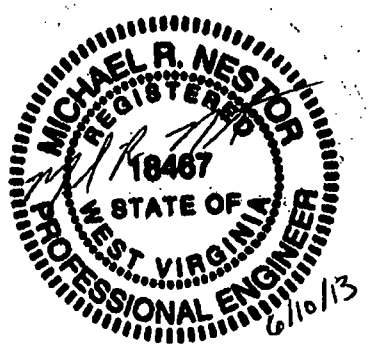


TABLE OF CONTENTS

June 10, 2013

COX STAGING AREA AT DOUBLE CAMP

FLOODPLAIN ANALYSIS SUMMARY

The project is located approximately 250 ft west of Meatfork (CR-25) and Double Camp Road (Rt. 25/11) in Doddridge County. The flood analysis is for a section of Meathouse Fork, and the site is an existing low-lying area. Antero Resources is proposing to create a staging area along CR-25. Creation of the staging area will require removing topsoil and re-establishing existing grade with imported stone. The excess topsoil will be placed adjacent to the staging area within the floodplain zone.

The flood analysis base flow was estimated using information from the Flood Insurance Study for Doddridge County issued in the October 4, 2011 revised edition. The project is located approximately half way between the tributary connections from Laurel Run/Big Isaac Creek and Brushy Fork. The peak flows at these locations are 2,230 cfs and 6,050 cfs, respectively. A peak flow of 4,140 cfs was used for the flood analysis. An estimated flow is sufficient for this analysis as the increase/decrease in flood elevation created from the modifications being proposed is of more concern than an exact flood elevation.

A HEC-RAS model was created to compare the flood elevation for both the existing condition and proposed condition. The existing condition model was set up based on field surveyed cross sections. The existing condition HEC-RAS model was then modified to include two additional cross sections to account for placement of the topsoil in the proposed condition. The results of the models show the water elevation decreases slightly (approximately 1") with the placement of the fill within the floodplain from Section C upstream to Section F. Conversely the velocity through these sections increases approximately 0.22 cfs. This is a minor increase and will not create an erosion concern. The downstream section (Section B) shows no impact due to the placement of the topsoil within the floodplain. The detailed summary for each model is attached as part of this report.

In conclusion the placement of the topsoil in the floodplain will not create an increase of the flood elevation or cause significant erosion.

1.0 NARRATIVE

3.0 EXISTING CONDITION HEC-RAS CALCULATIONS

HEC-RAS Plan: EX SITE River: STREAM 1 Reach: F TO A Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F TO A	10.0	PF 1	4140.00	871.87	881.79	879.75	882.30	0.001771	6.88	784.35	160.95	0.40
F TO A	9.0	PF 1	4140.00	869.42	881.69		881.99	0.000958	5.44	1040.45	210.19	0.30
F TO A	8.0	PF 1	4140.00	869.42	881.54		881.84	0.001067	5.54	1045.08	233.38	0.31
F TO A	7.0	PF 1	4140.00	870.81	881.34		881.64	0.001333	6.16	1076.67	292.29	0.35
F TO A	6.0	PF 1	4140.00	870.97	880.11	880.11	881.17	0.005060	10.84	639.93	253.33	0.66

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X    X    X    X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X    XXXXX
```

PROJECT DATA
Project Title: Double Camp Run
Project File : DoubleCampRun.prj
Run Date and Time: 6/7/2013 2:27:29 PM

Project in English units

Project Description:
Analysis of Adding Topsoil within Floodplain for Antero - EXISTING CONDITION

PLAN DATA

Plan Title: Double Camp Existing
Plan File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.p01

Geometry Title: Double Camp Existing
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.g01

Flow Title : Double Camp Flow
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.f01

Plan Description:
Floodplain analysis of existing conditions where Cox Staging area will be placed.

Plan Summary Information:

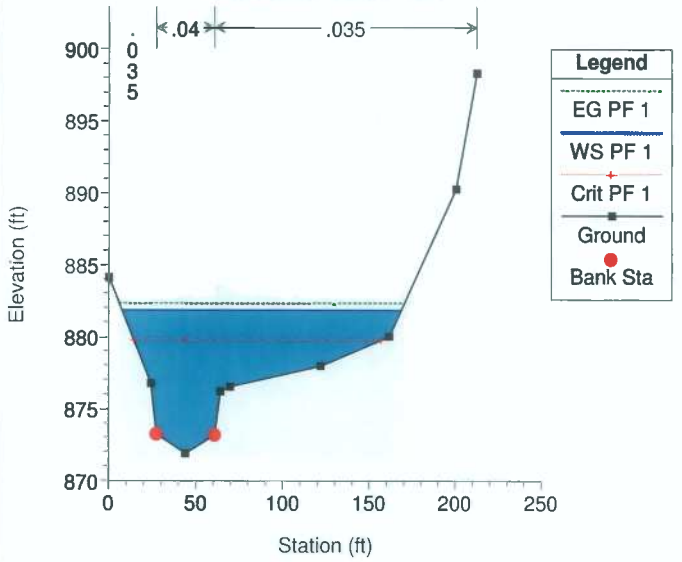
Number of: Cross Sections	=	5	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

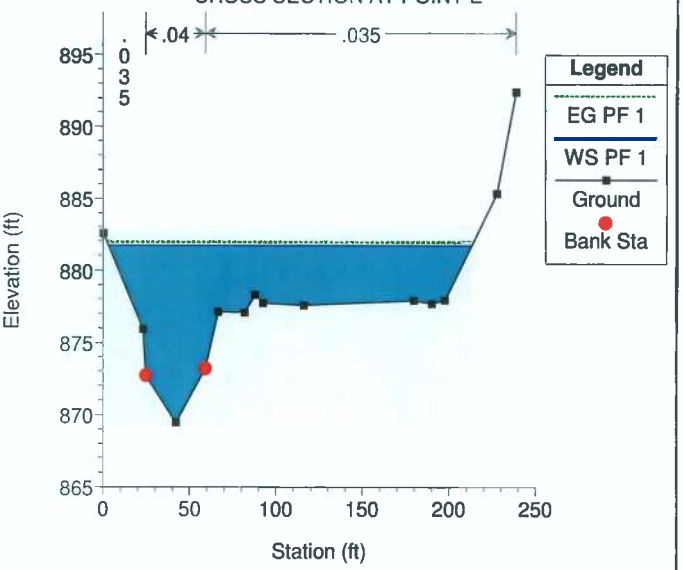
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT F



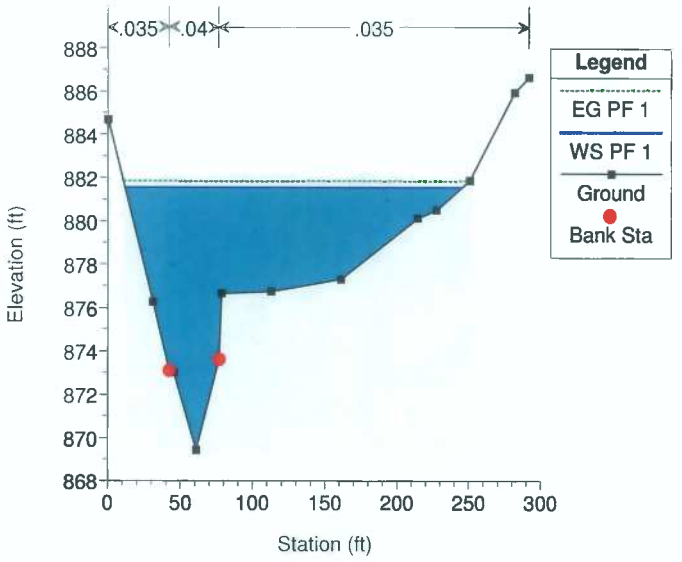
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT E



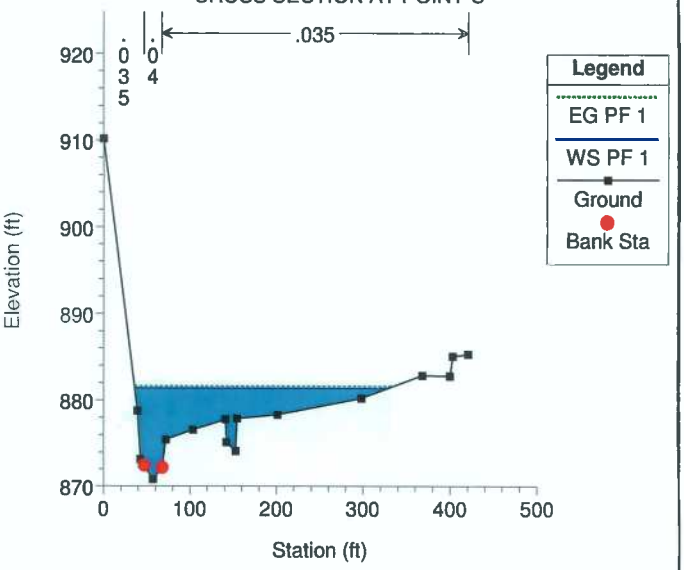
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT D



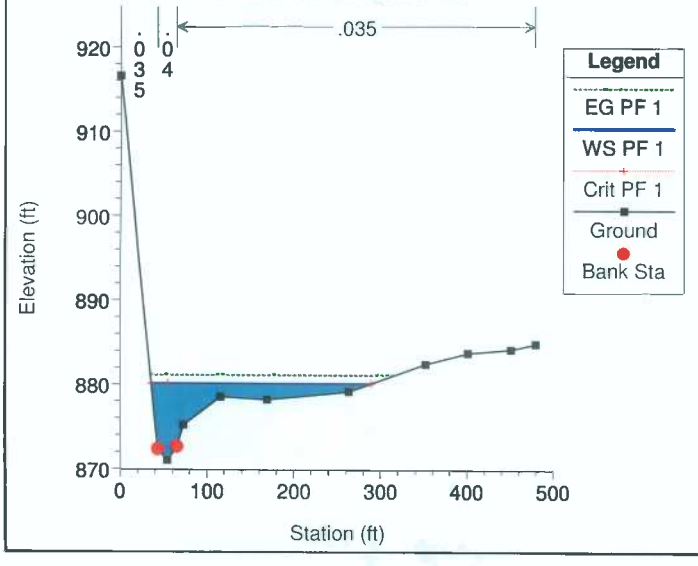
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT C



Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT B



Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Double Camp Flow
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.f01

Flow Data (cfs)

River	Reach	RS	PF 1
STREAM 1	F TO A	10.0	4140

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
STREAM 1	F TO A	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: Double Camp Existing
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.g01

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 10.0

INPUT
Description: CROSS SECTION AT POINT F
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.08	24.3	876.73	27.35	873.2	44.11	871.87	60.88	873.14
64.26	876.18	69.69	876.5	121.92	877.94	161.72	879.99	200.59	890.24
212.77	898.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	27.35	.04	60.88	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.35	60.88	200	197	194	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	882.30	Element			
Vel Head (ft)	0.52	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.79	Reach Len. (ft)	200.00	197.00	194.00
Crit W.S. (ft)	879.75	Flow Area (sq ft)	63.07	310.70	410.58
E.G. Slope (ft/ft)	0.001771	Area (sq ft)	63.07	310.70	410.58
Q Total (cfs)	4140.00	Flow (cfs)	226.53	2138.84	1774.63
Top Width (ft)	160.95	Top Width (ft)	19.77	33.53	107.65
Vel Total (ft/s)	5.28	Avg. Vel. (ft/s)	3.59	6.88	4.32
Max Chl Dpth (ft)	9.92	Hydr. Depth (ft)	3.19	9.27	3.81
Conv. Total (cfs)	98365.7	Conv. (cfs)	5382.4	50818.5	42164.8
Length Wtd. (ft)	195.79	Wetted Per. (ft)	22.13	33.63	109.13
Min Ch El (ft)	871.87	Shear (lb/sq ft)	0.32	1.02	0.42
Alpha	1.19	Stream Power (lb/ft s)	212.77	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	1.17	4.48	9.30
C & E Loss (ft)	0.06	Cum SA (acres)	0.30	0.45	2.88

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 9.0

INPUT
Description: CROSS SECTION AT POINT E
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	882.54	23.16	875.91	24.82	872.67	42.06	869.42	59.3	873.16
66.73	877.1	81.79	877.06	87.98	878.27	92.71	877.71	116.18	877.55
179.79	877.88	190.01	877.67	197.63	877.91	228.1	885.31	239.14	892.37

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	24.82	.04	59.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
24.82	59.3	133	140	145	.1

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.99	Element			
Vel Head (ft)	0.30	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.69	Reach Len. (ft)	133.00	140.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	70.55	362.67	607.23
E.G. Slope (ft/ft)	0.000958	Area (sq ft)	70.55	362.67	607.23
Q Total (cfs)	4140.00	Flow (cfs)	186.93	1974.57	1978.50
Top Width (ft)	210.19	Top Width (ft)	21.84	34.48	153.88
Vel Total (ft/s)	3.98	Avg. Vel. (ft/s)	2.65	5.44	3.26
Max Chl Dpth (ft)	12.27	Hydr. Depth (ft)	3.23	10.52	3.95
Conv. Total (cfs)	133789.0	Conv. (cfs)	6040.8	63810.6	63937.7
Length Wtd. (ft)	141.73	Wetted Per. (ft)	24.63	35.18	155.47
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.17	0.62	0.23
Alpha	1.23	Stream Power (lb/ft s)	239.14	0.00	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.87	2.96	7.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.20	0.30	2.30

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 8.0

INPUT
Description: CROSS SECTION AT POINT D
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.68	30.93	876.26	42.31	873.09	45.38	873	60.98	869.42
76.58	873.6	78.19	876.65	112.61	876.74	160.97	877.3	214.49	880.12
227.38	880.5	250.49	881.87	281.86	885.93	292	886.64		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	42.31	.04	76.58	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.31	76.58	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.84	Element			
Vel Head (ft)	0.31	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.54	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	129.32	343.69	572.08
E.G. Slope (ft/ft)	0.001067	Area (sq ft)	129.32	343.69	572.08
Q Total (cfs)	4140.00	Flow (cfs)	455.88	1904.39	1779.73
Top Width (ft)	233.38	Top Width (ft)	30.77	34.27	168.34
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)	3.53	5.54	3.11
Max Chl Dpth (ft)	12.12	Hydr. Depth (ft)	4.20	10.03	3.40
Conv. Total (cfs)	126726.1	Conv. (cfs)	13954.6	58293.8	54477.8
Length Wtd. (ft)	169.72	Wetted Per. (ft)	31.91	35.23	170.29
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.27	0.65	0.22
Alpha	1.25	Stream Power (lb/ft s)	292.00	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.56	1.82	5.07
C & E Loss (ft)	0.00	Cum SA (acres)	0.12	0.19	1.76

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 7.0

INPUT
Description: CROSS SECTION AT POINT C
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910.2	39.17	878.77	42.76	873.17	47.1	872.43	57.37	870.81
67.64	872.19	72.06	875.45	103.46	876.57	140.93	877.76	142.02	875.12
152.77	874.11	154.44	877.87	201.3	878.31	298.48	880.22	368.67	882.87
400.78	882.79	403.66	885.09	421.54	885.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	47.1	.04	67.64	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47.1	67.64	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.64	Element			
Vel Head (ft)	0.30	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.34	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	60.50	200.96	815.21

E.G. Slope (ft/ft)	0.001333	Area (sq ft)	60.50	200.96	815.21
Q Total (cfs)	4140.00	Flow (cfs)	235.89	1238.10	2666.01
Top Width (ft)	292.29	Top Width (ft)	11.14	20.54	260.61
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)	3.90	6.16	3.27
Max Chl Dpth (ft)	10.53	Hydr. Depth (ft)	5.43	9.78	3.13
Conv. Total (cfs)	113387.5	Conv. (cfs)	6460.5	33909.5	73017.5
Length Wtd. (ft)	169.51	Wetted Per. (ft)	15.17	20.76	266.02
Min Ch El (ft)	870.81	Shear (lb/sq ft)	0.33	0.81	0.26
Alpha	1.29	Stream Power (lb/ft s)	421.54	0.00	0.00
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.18	0.75	2.40
C & E Loss (ft)	0.08	Cum SA (acres)	0.04	0.08	0.93

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.0

INPUT
Description: CROSS SECTION AT POINT B
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	916.62	43.26	872.32	54.14	870.97	65.03	872.62	72.94	875.2
115.51	878.55	169.35	878.2	262.91	879.15	351.97	882.44	400.5	883.75
450.77	884.18	479.55	884.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	43.26	.04	65.03	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
43.26	65.03	314	314	315	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.17	Element			
Vel Head (ft)	1.06	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.11	Reach Len. (ft)			
Crit W.S. (ft)	880.11	Flow Area (sq ft)	29.65	182.71	427.56
E.G. Slope (ft/ft)	0.005060	Area (sq ft)	29.65	182.71	427.56
Q Total (cfs)	4140.00	Flow (cfs)	174.60	1981.48	1983.92
Top Width (ft)	253.33	Top Width (ft)	7.61	21.77	223.95
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)	5.89	10.84	4.64
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	3.90	8.39	1.91
Conv. Total (cfs)	58198.6	Conv. (cfs)	2454.4	27854.9	27889.2
Length Wtd. (ft)		Wetted Per. (ft)	10.89	21.98	224.51
Min Ch El (ft)	870.97	Shear (lb/sq ft)	0.86	2.63	0.60
Alpha	1.63	Stream Power (lb/ft s)	479.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:STREAM 1

Reach	River Sta.	n1	n2	n3
F TO A	10.0	.035	.04	.035
F TO A	9.0	.035	.04	.035
F TO A	8.0	.035	.04	.035
F TO A	7.0	.035	.04	.035
F TO A	6.0	.035	.04	.035

SUMMARY OF REACH LENGTHS

River: STREAM 1

Reach	River Sta.	Left	Channel	Right
F TO A	10.0	200	197	194
F TO A	9.0	133	140	145
F TO A	8.0	175	171	168
F TO A	7.0	175	171	168
F TO A	6.0	314	314	315

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: STREAM 1

Reach	River Sta.	Contr.	Expan.
F TO A	10.0	.1	.3
F TO A	9.0	.1	.3
F TO A	8.0	.1	.3
F TO A	7.0	.1	.3
F TO A	6.0	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : EX SITE

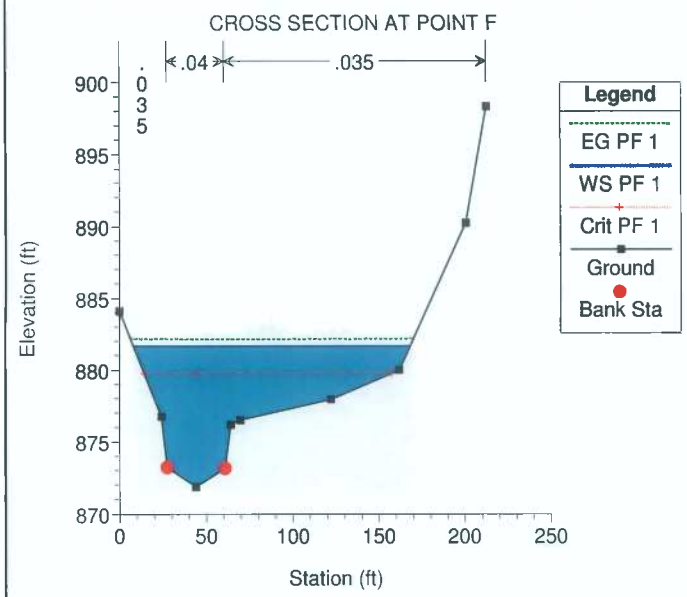
River: STREAM 1 Reach: F TO A RS: 7.0 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

4.0 PROPOSED CONDITION HEC-RAS CALCULATIONS

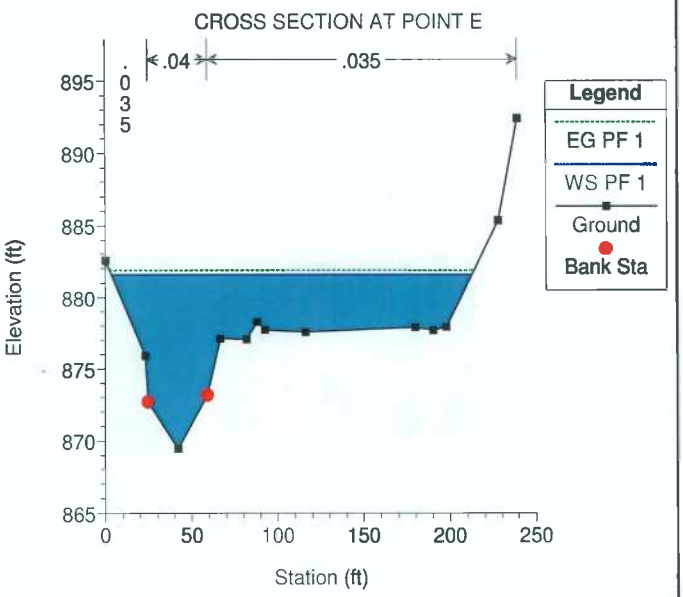
HEC-RAS Plan: Proposed Site River: STREAM 1 Reach: F TO A Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F TO A	10.0	PF 1	4140.00	871.87	881.65	879.75	882.20	0.001923	7.10	762.05	159.96	0.41
F TO A	9.0	PF 1	4140.00	869.42	881.53		881.86	0.001047	5.64	1008.29	209.03	0.31
F TO A	8.0	PF 1	4140.00	869.42	881.37		881.70	0.001183	5.77	1004.99	229.83	0.32
F TO A	7.0	PF 1	4140.00	870.81	881.13		881.47	0.001565	6.58	1014.18	286.30	0.37
F TO A	6.2	PF 1	4140.00	870.84	881.01		881.42	0.001679	6.75	867.45	196.24	0.39
F TO A	6.1	PF 1	4140.00	870.59	880.84		881.33	0.002030	7.35	815.56	197.45	0.42
F TO A	6.0	PF 1	4140.00	870.97	880.11	880.11	881.17	0.005060	10.84	639.93	253.33	0.66

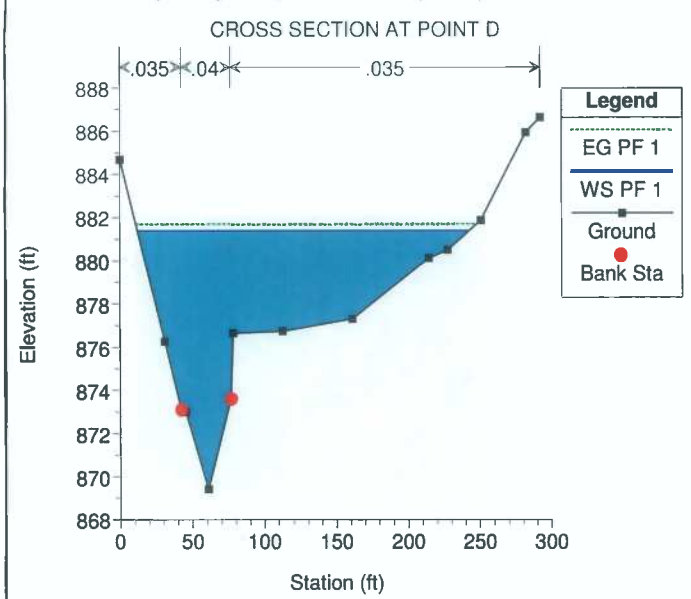
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



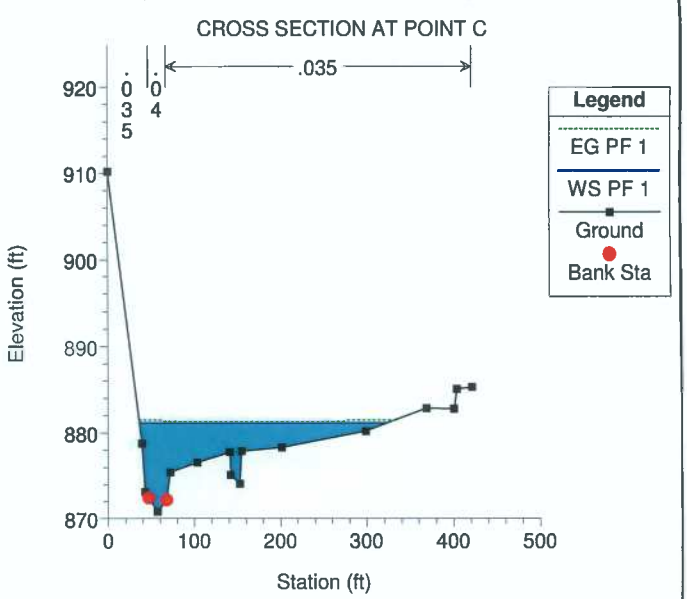
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



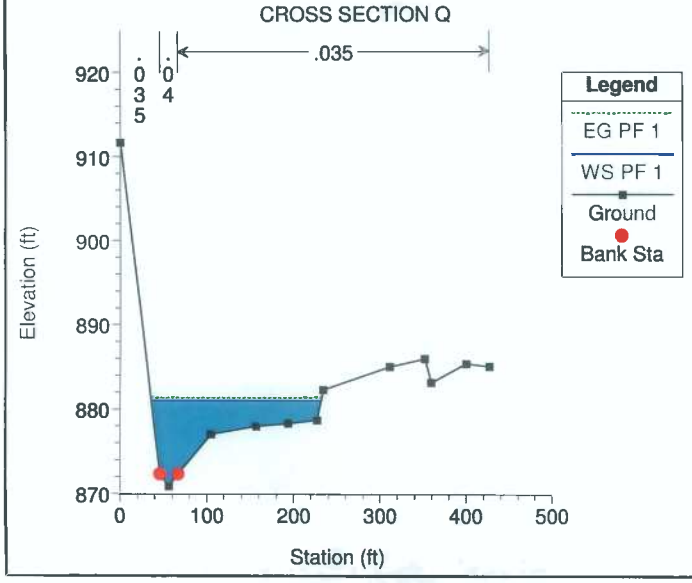
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



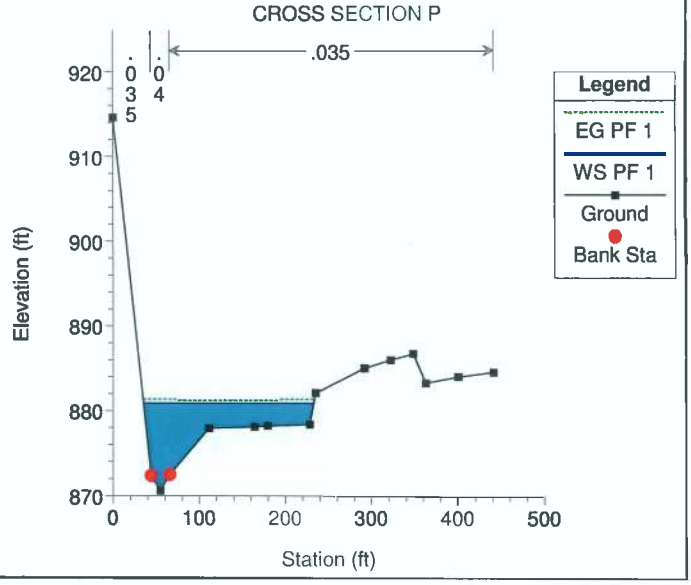
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



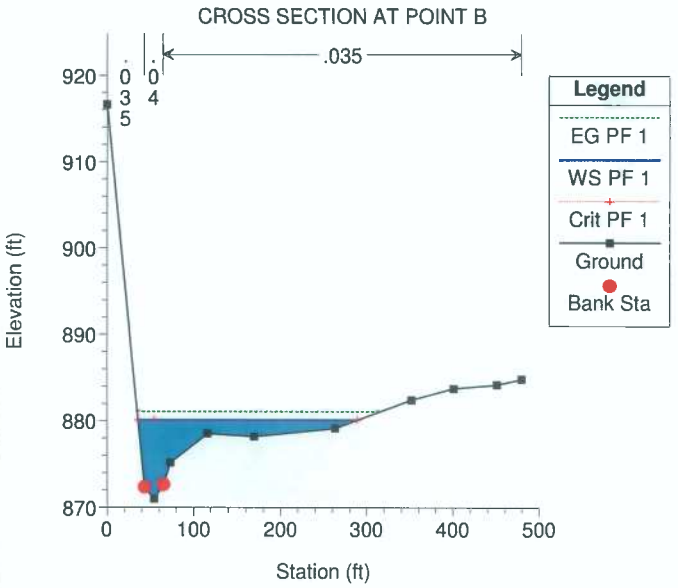
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



DoubleCampRunPro.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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PROJECT DATA
Project Title: DC Run Proposed Topsoil Area
Project File : DoubleCampRunPro.prj
Run Date and Time: 6/10/2013 7:12:01 AM

Project in English units

Project Description:
Analysis of Adding Topsoil within Floodplain for Antero - PROPOSED CONDITION

PLAN DATA

Plan Title: DC Run Proposed Topsoil Area
Plan File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.p02

Geometry Title: DC Run Proposed Topsoil Area
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.g02

Flow Title : DC Run Proposed Topsoil Area
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.f02

Plan Description:
Floodplain analysis of proposed conditions after Cox Staging area is established and topsoil stockpile is in place.

Plan Summary Information:

Number of:	Cross Sections	= 7	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: DC Run Proposed Topsoil Area
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.f02

Flow Data (cfs)

River	Reach	RS	PF 1
STREAM 1	F TO A	10.0	4140

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
STREAM 1	F TO A	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: DC Run Proposed Topsoil Area
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.g02

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 10.0

INPUT
Description: CROSS SECTION AT POINT F
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.08	24.3	876.73	27.35	873.2	44.11	871.87	60.88	873.14
64.26	876.18	69.69	876.5	121.92	877.94	161.72	879.99	200.59	890.24
212.77	898.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	27.35	.04	60.88	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.35	60.88	200	197	194	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	882.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.65	Reach Len. (ft)	200.00	197.00	194.00
Crit W.S. (ft)	879.75	Flow Area (sq ft)	60.36	306.04	395.65
E.G. Slope (ft/ft)	0.001923	Area (sq ft)	60.36	306.04	395.65
Q Total (cfs)	4140.00	Flow (cfs)	222.58	2173.17	1744.25
Top Width (ft)	159.96	Top Width (ft)	19.31	33.53	107.13
Vel Total (ft/s)	5.43	Avg. Vel. (ft/s)	3.69	7.10	4.41
Max Chl Dpth (ft)	9.78	Hydr. Depth (ft)	3.13	9.13	3.69
Conv. Total (cfs)	94403.9	Conv. (cfs)	5075.4	49554.6	39773.9
Length Wtd. (ft)	195.81	Wetted Per. (ft)	21.65	33.63	108.59
Min Ch El (ft)	871.87	Shear (lb/sq ft)	0.33	1.09	0.44
Alpha	1.20	Stream Power (lb/ft s)	212.77	0.00	0.00
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1.05	4.13	7.99
C & E Loss (ft)	0.07	Cum SA (acres)	0.28	0.42	2.37

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 9.0

INPUT
Description: CROSS SECTION AT POINT E
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	882.54	23.16	875.91	24.82	872.67	42.06	869.42	59.3	873.16
66.73	877.1	81.79	877.06	87.98	878.27	92.71	877.71	116.18	877.55
179.79	877.88	190.01	877.67	197.63	877.91	228.1	885.31	239.14	892.37

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	24.82	.04	59.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
24.82	59.3	133	140	145	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.53	Reach Len. (ft)	133.00	140.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	67.24	357.38	583.67
E.G. Slope (ft/ft)	0.001047	Area (sq ft)	67.24	357.38	583.67
Q Total (cfs)	4140.00	Flow (cfs)	183.19	2014.69	1942.12
Top Width (ft)	209.03	Top Width (ft)	21.30	34.48	153.25
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)	2.72	5.64	3.33
Max Chl Dpth (ft)	12.11	Hydr. Depth (ft)	3.16	10.36	3.81
Conv. Total (cfs)	127952.2	Conv. (cfs)	5661.7	62266.7	60023.8
Length Wtd. (ft)	141.68	Wetted Per. (ft)	24.07	35.18	154.82
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.18	0.66	0.25
Alpha	1.24	Stream Power (lb/ft s)	239.14	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.75	2.63	5.81
C & E Loss (ft)	0.00	Cum SA (acres)	0.18	0.27	1.79

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 8.0

INPUT
Description: CROSS SECTION AT POINT D
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.68	30.93	876.26	42.31	873.09	45.38	873	60.98	869.42
76.58	873.6	78.19	876.65	112.61	876.74	160.97	877.3	214.49	880.12
227.38	880.5	250.49	881.87	281.86	885.93	292	886.64		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	42.31	.04	76.58	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.31	76.58	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.37	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	124.05	337.75	543.19
E.G. Slope (ft/ft)	0.001183	Area (sq ft)	124.05	337.75	543.19
Q Total (cfs)	4140.00	Flow (cfs)	454.02	1947.45	1738.52
Top Width (ft)	229.83	Top Width (ft)	30.14	34.27	165.42
Vel Total (ft/s)	4.12	Avg. Vel. (ft/s)	3.66	5.77	3.20
Max Chl Dpth (ft)	11.95	Hydr. Depth (ft)	4.12	9.86	3.28
Conv. Total (cfs)	120379.6	Conv. (cfs)	13201.7	56626.5	50551.3
Length Wtd. (ft)	169.76	Wetted Per. (ft)	31.25	35.23	167.37
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.29	0.71	0.24
Alpha	1.26	Stream Power (lb/ft s)	292.00	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.46	1.52	3.93
C & E Loss (ft)	0.00	Cum SA (acres)	0.10	0.16	1.26

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 7.0

INPUT
Description: CROSS SECTION AT POINT C
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910.2	39.17	878.77	42.76	873.17	47.1	872.43	57.37	870.81
67.64	872.19	72.06	875.45	103.46	876.57	140.93	877.76	142.02	875.12
152.77	874.11	154.44	877.87	201.3	878.31	298.48	880.22	368.67	882.87
400.78	882.79	403.66	885.09	421.54	885.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	47.1	.04	67.64	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47.1	67.64	21	22	23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.13	Reach Len. (ft)	21.00	22.00	23.00
Crit W.S. (ft)		Flow Area (sq ft)	58.13	196.53	759.53

E.G. Slope (ft/ft)	0.001565	Area (sq ft)	58.13	196.53	759.53
Q Total (cfs)	4140.00	Flow (cfs)	242.76	1292.45	2604.79
Top Width (ft)	286.30	Top Width (ft)	10.87	20.54	254.89
Vel Total (ft/s)	4.08	Avg. Vel. (ft/s)	4.18	6.58	3.43
Max Chl Dpth (ft)	10.32	Hydr. Depth (ft)	5.35	9.57	2.98
Conv. Total (cfs)	104652.6	Conv. (cfs)	6136.6	32671.0	65845.0
Length Wtd. (ft)	22.58	Wetted Per. (ft)	14.82	20.76	260.30
Min Ch El (ft)	870.81	Shear (lb/sq ft)	0.38	0.92	0.29
Alpha	1.32	Stream Power (lb/ft s)	421.54	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.10	0.47	1.42
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	0.05	0.45

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.2

INPUT
Description: CROSS SECTION Q
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	911.63	45.87	872.32	56.27	870.84	66.69	872.28	105.55	877
157.14	877.94	193.88	878.29	227.42	878.68	234.48	882.3	311.6	885
352.31	885.94	359.61	883.13	400.14	885.38	427.17	885.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	45.87	.04	66.69	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45.87	66.69	48	48	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.01	Reach Len. (ft)	48.00	48.00	48.00
Crit W.S. (ft)		Flow Area (sq ft)	44.08	196.58	626.80
E.G. Slope (ft/ft)	0.001679	Area (sq ft)	44.08	196.58	626.80
Q Total (cfs)	4140.00	Flow (cfs)	169.93	1327.87	2642.20
Top Width (ft)	196.24	Top Width (ft)	10.14	20.82	165.28
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)	3.86	6.75	4.22
Max Chl Dpth (ft)	10.17	Hydr. Depth (ft)	4.35	9.44	3.79
Conv. Total (cfs)	101047.4	Conv. (cfs)	4147.6	32410.1	64489.7
Length Wtd. (ft)	48.00	Wetted Per. (ft)	13.36	21.02	166.14
Min Ch El (ft)	870.84	Shear (lb/sq ft)	0.35	0.98	0.40
Alpha	1.17	Stream Power (lb/ft s)	427.17	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.07	0.37	1.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	0.04	0.34

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.1

INPUT
Description: CROSS SECTION P
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

0	914.59	44.28	872.36	54.98	870.59	65.69	872.48	111.32	877.92
164.25	878.09	179.2	878.23	228.11	878.37	235.14	882.05	291.7	885
322.3	886	348.36	886.7	362.81	883.28	400.23	884	441.08	884.54

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	44.28	.04	65.69	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
44.28	65.69	34	34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.33	Element			
Vel Head (ft)	0.49	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.84	Reach Len. (ft)	34.00	34.00	34.00
Crit W.S. (ft)		Flow Area (sq ft)	37.72	199.91	577.93
E.G. Slope (ft/ft)	0.002030	Area (sq ft)	37.72	199.91	577.93
Q Total (cfs)	4140.00	Flow (cfs)	152.38	1469.38	2518.25
Top Width (ft)	197.45	Top Width (ft)	8.89	21.41	167.14
Vel Total (ft/s)	5.08	Avg. Vel. (ft/s)	4.04	7.35	4.36
Max Chl Dpth (ft)	10.25	Hydr. Depth (ft)	4.24	9.34	3.46
Conv. Total (cfs)	91893.0	Conv. (cfs)	3382.2	32614.9	55896.0
Length Wtd. (ft)	34.00	Wetted Per. (ft)	12.29	21.72	168.08
Min Ch El (ft)	870.59	Shear (lb/sq ft)	0.39	1.17	0.44
Alpha	1.22	Stream Power (lb/ft s)	441.08	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.03	0.15	0.39
C & E Loss (ft)	0.06	Cum SA (acres)	0.01	0.02	0.15

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.0

INPUT
Description: CROSS SECTION AT POINT B
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	916.62	43.26	872.32	54.14	870.97	65.03	872.62	72.94	875.2
115.51	878.55	169.35	878.2	262.91	879.15	351.97	882.44	400.5	883.75
450.77	884.18	479.55	884.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	43.26	.04	65.03	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
43.26	65.03	314	314	315	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.17	Element			
Vel Head (ft)	1.06	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.11	Reach Len. (ft)			
Crit W.S. (ft)	880.11	Flow Area (sq ft)	29.65	182.71	427.56

E.G. Slope (ft/ft)	0.005060	Area (sq ft)	29.65	182.71	427.56
Q Total (cfs)	4140.00	Flow (cfs)	174.60	1981.48	1983.92
Top Width (ft)	253.33	Top Width (ft)	7.61	21.77	223.95
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)	5.89	10.84	4.64
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	3.90	8.39	1.91
Conv. Total (cfs)	58198.6	Conv. (cfs)	2454.4	27854.9	27889.2
Length Wtd. (ft)		Wetted Per. (ft)	10.89	21.98	224.51
Min Ch El (ft)	870.97	Shear (lb/sq ft)	0.86	2.63	0.60
Alpha	1.63	Stream Power (lb/ft s)	479.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:STREAM 1

Reach	River Sta.	n1	n2	n3
F TO A	10.0	.035	.04	.035
F TO A	9.0	.035	.04	.035
F TO A	8.0	.035	.04	.035
F TO A	7.0	.035	.04	.035
F TO A	6.2	.035	.04	.035
F TO A	6.1	.035	.04	.035
F TO A	6.0	.035	.04	.035

SUMMARY OF REACH LENGTHS

River: STREAM 1

Reach	River Sta.	Left	Channel	Right
F TO A	10.0	200	197	194
F TO A	9.0	133	140	145
F TO A	8.0	175	171	168
F TO A	7.0	21	22	23
F TO A	6.2	48	48	48
F TO A	6.1	34	34	34
F TO A	6.0	314	314	315

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: STREAM 1

Reach	River Sta.	Contr.	Expan.
F TO A	10.0	.1	.3
F TO A	9.0	.1	.3
F TO A	8.0	.1	.3
F TO A	7.0	.1	.3
F TO A	6.2	.1	.3
F TO A	6.1	.1	.3
F TO A	6.0	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Proposed Site

River: STREAM 1 Reach: F TO A RS: 6.1 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

APPENDIX

Cox Staging Area at Double Camp

New Milton, WV

Floodplain Analysis Report
For
Antero Resources

Doddridge County, West Virginia

June 2013
(Revised July 2013)

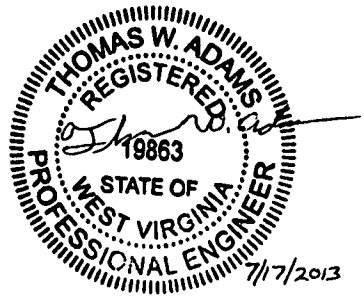


TABLE OF CONTENTS

1.0 NARRATIVE

June 10, 2013

COX STAGING AREA AT DOUBLE CAMP

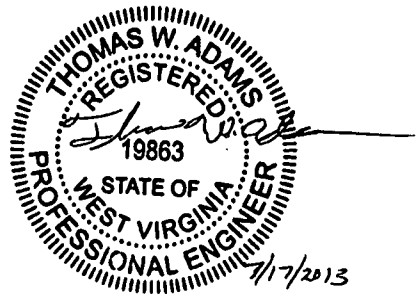
FLOODPLAIN ANALYSIS SUMMARY

The project is located approximately 250 ft west of Meatfork (CR-25) and Double Camp Road (Rt. 25/11) in Doddridge County. The flood analysis is for a section of Meathouse Fork, and the site is an existing low-lying area. Antero Resources is proposing to create a staging area along CR-25. Creation of the staging area will require removing topsoil and re-establishing existing grade with imported stone. The excess topsoil will be placed adjacent to the staging area within the floodplain zone.

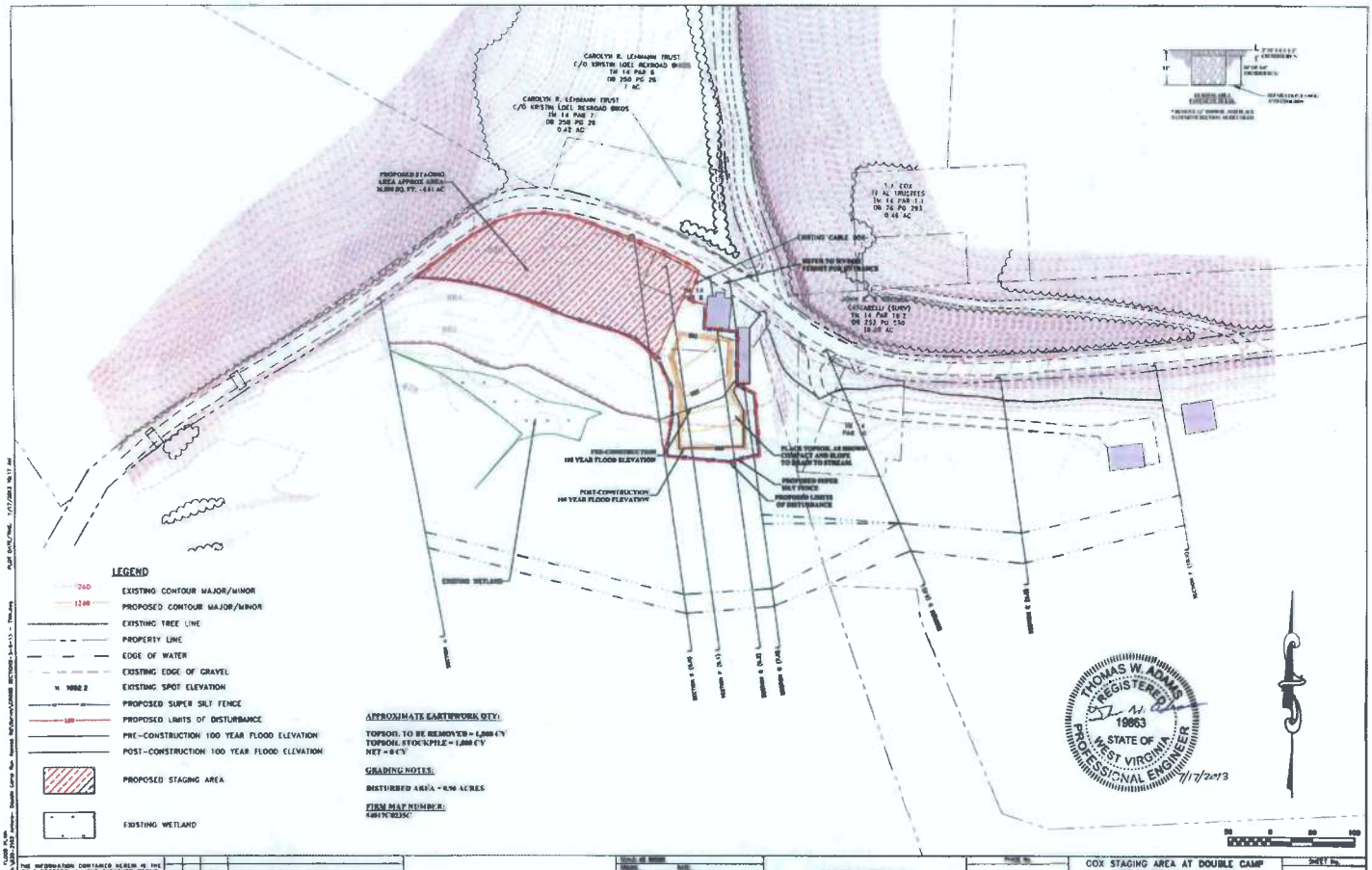
The flood analysis base flow was estimated using information from the Flood Insurance Study for Doddridge County issued in the October 4, 2011 revised edition. The project is located approximately half way between the tributary connections from Laurel Run/Big Isaac Creek and Brushy Fork. The peak flows at these locations are 2,230 cfs and 6,050 cfs, respectively. A peak flow of 4,140 cfs was used for the flood analysis. An estimated flow is sufficient for this analysis as the increase/decrease in flood elevation created from the modifications being proposed is of more concern than an exact flood elevation.

A HEC-RAS model was created to compare the flood elevation for both the existing condition and proposed condition. The existing condition model was set up based on field surveyed cross sections. The existing condition HEC-RAS model was then modified to include two additional cross sections to account for placement of the topsoil in the proposed condition. The results of the models show the water elevation decreases slightly (approximately 1") with the placement of the fill within the floodplain from Section C upstream to Section F. Conversely the velocity through these sections increases approximately 0.22 cfs. This is a minor increase and will not create an erosion concern. The downstream section (Section B) shows no impact due to the placement of the topsoil within the floodplain. The detailed summary for each model is attached as part of this report.

In conclusion the placement of the topsoil in the floodplain will not create an increase of the flood elevation or cause significant erosion.



2.0 FLOODPLAIN EXHIBIT



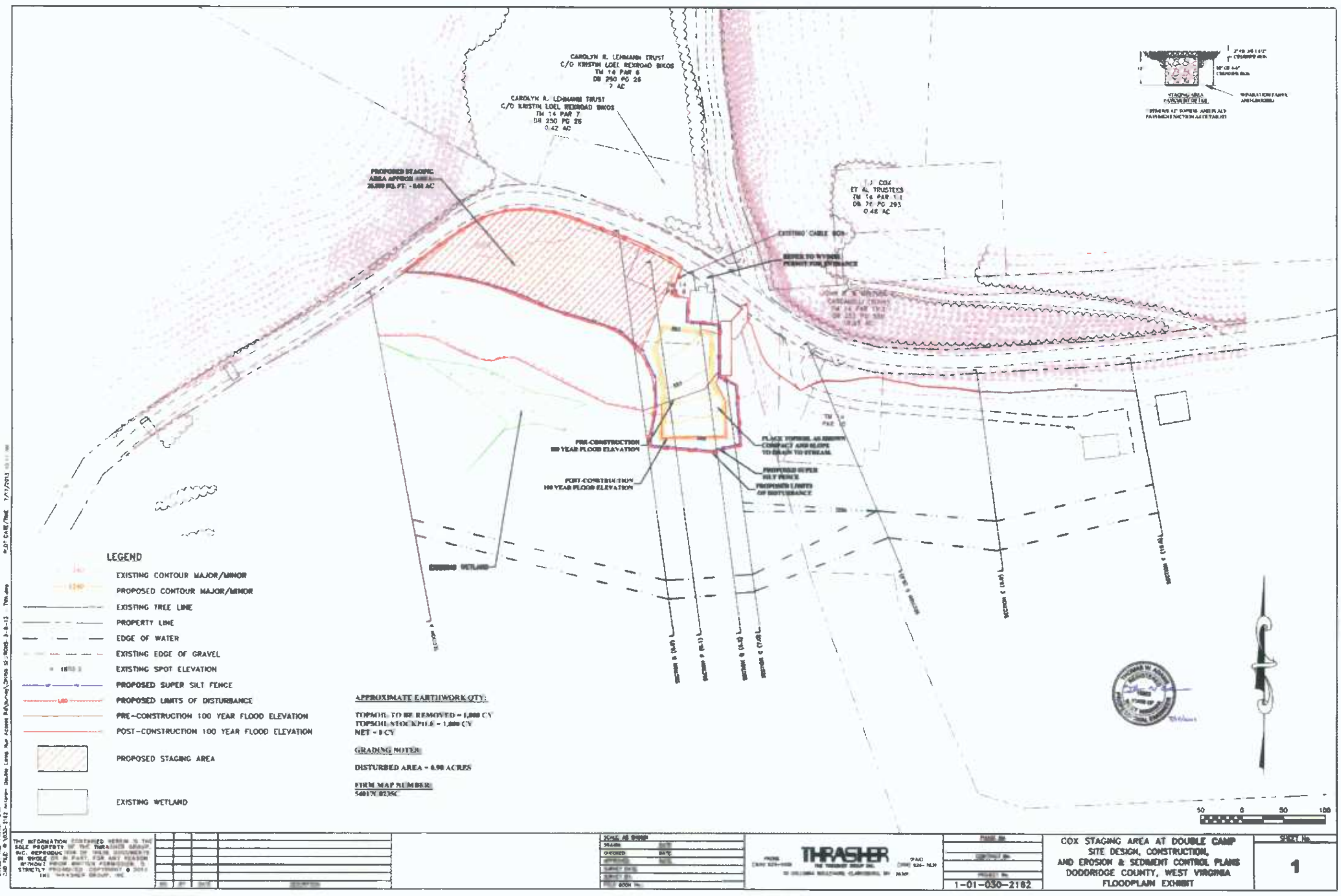
NO.	BY	DATE	DESCRIPTION

THRASHER
PHONE (304) 624-4108 (FAX) (304) 624-7831
10 COLUMBIA BOULEVARD, CLARKSBURG, WV 26301

1-01-030-2102

COX STAGING AREA AT DOUBLE CAMP
SITE DESIGN, CONSTRUCTION,
AND EROSION & SEDIMENT CONTROL PLANS
DODDRIDGE COUNTY, WEST VIRGINIA
FLOODPLAIN EXHIBIT

SHEET No. 1


CAROLYN R. LEHMANN TRUST
C/O KRISTIN LOEL REXROAD BIKOS
TM 14 PAR 6
DB 250 PG 26
7 AC
CAROLYN R. LEHMANN TRUST
C/O KRISTIN LOEL REXROAD BIKOS
TM 14 PAR 7
DB 250 PG 26
0.42 AC
EXISTING CABLE BOX
LEGEND
EXISTING CONTOUR MAJOR/MINOR
PROPOSED CONTOUR MAJOR/MINOR
EXISTING TREE LINE
PROPERTY LINE
EDGE OF WATER
EXISTING EDGE OF GRAVEL
EXISTING SPOT ELEVATION
PROPOSED SUPER SILT FENCE
PROPOSED LIMITS OF DISTURBANCE
PRE-CONSTRUCTION 100 YEAR FLOOD ELEVATION
POST-CONSTRUCTION 100 YEAR FLOOD ELEVATION
PROPOSED STAGING AREA
EXISTING WETLAND
APPROXIMATE EARTHWORK QTY:
NET = 0 CY
GRADING NOTES:
FIRM MAP NUMBER:
50 0 50 100
THRASHER
1-01-030-2182
COX STAGING AREA AT DOUBLE CAMP
SITE DESIGN, CONSTRUCTION,
AND EROSION & SEDIMENT CONTROL PLANS
DODDRIDGE COUNTY, WEST VIRGINIA
FLOODPLAIN EXHIBIT
1

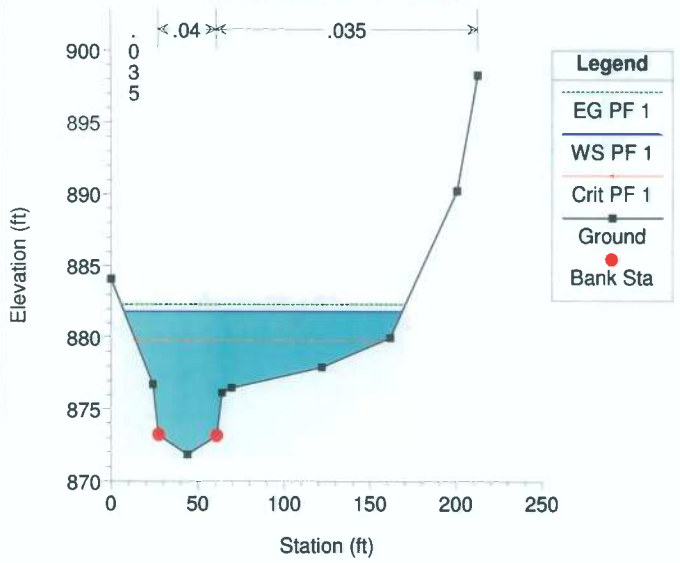
3.0 EXISTING CONDITION HEC-RAS CALCULATIONS

HEC-RAS Plan: EX SITE River: STREAM 1 Reach: F TO A Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F TO A	10.0	PF 1	4140.00	871.87	881.79	879.75	882.30	0.001771	6.88	784.35	160.95	0.40
F TO A	9.0	PF 1	4140.00	869.42	881.69		881.99	0.000958	5.44	1040.45	210.19	0.30
F TO A	8.0	PF 1	4140.00	869.42	881.54		881.84	0.001067	5.54	1045.08	233.38	0.31
F TO A	7.0	PF 1	4140.00	870.81	881.34		881.64	0.001333	6.16	1076.67	292.29	0.35
F TO A	6.0	PF 1	4140.00	870.97	880.11	880.11	881.17	0.005060	10.84	639.93	253.33	0.66

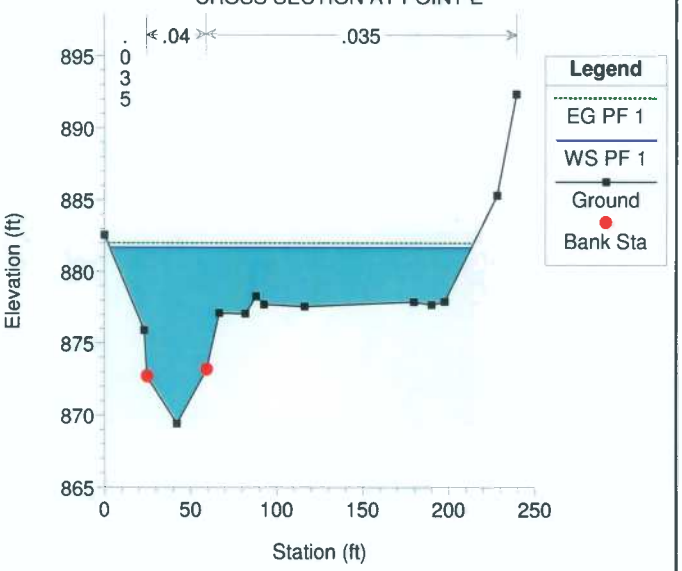
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT F



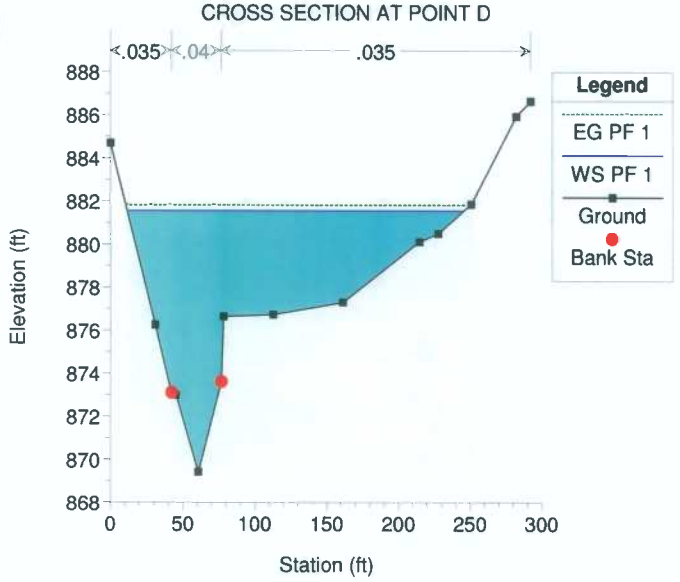
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT E



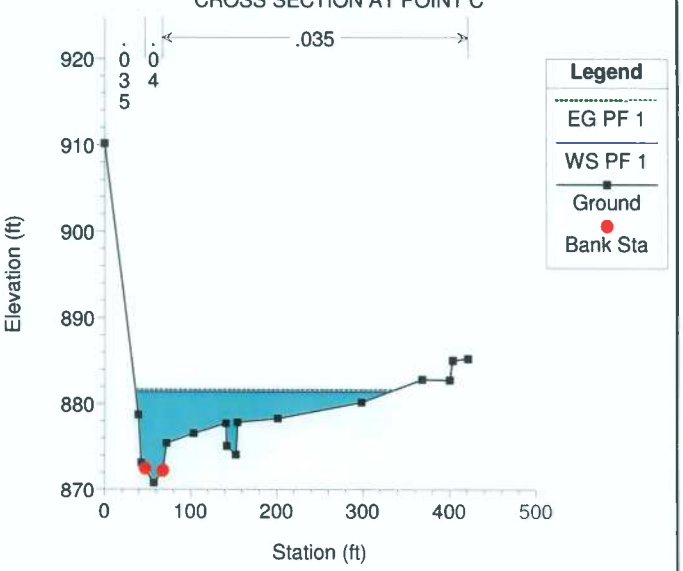
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT D



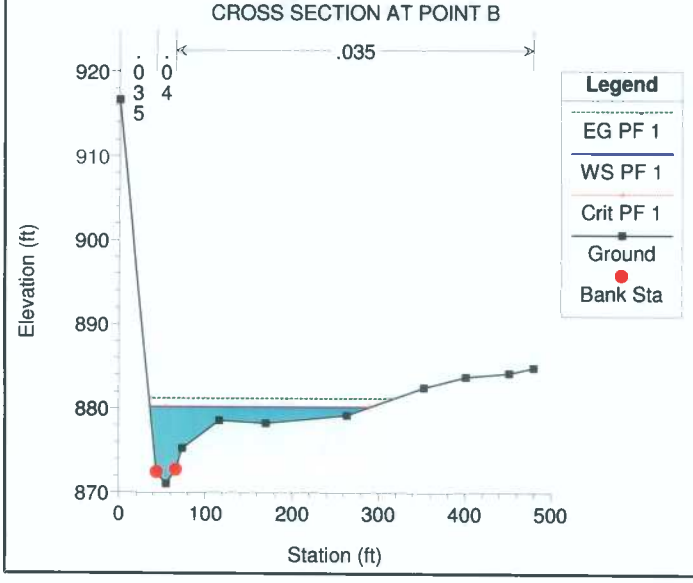
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT C



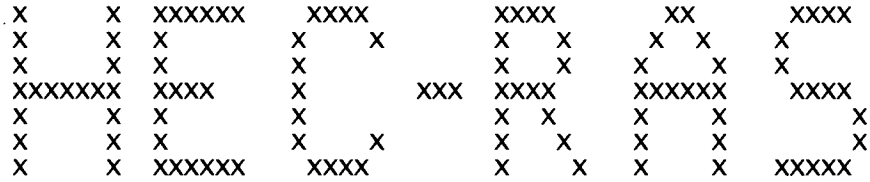
Double Camp Run Plan: Double Camp Existing 6/7/2013

CROSS SECTION AT POINT B



DoubleCampRun.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California



PROJECT DATA
Project Title: Double Camp Run
Project File : DoubleCampRun.prj
Run Date and Time: 6/7/2013 2:27:29 PM

Project in English units

Project Description:
Analysis of Adding Topsoil within Floodplain for Antero - EXISTING CONDITION

PLAN DATA

Plan Title: Double Camp Existing
Plan File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.p01

Geometry Title: Double Camp Existing
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.g01

Flow Title : Double Camp Flow
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.f01

Plan Description:
Floodplain analysis of existing conditions where Cox Staging area will be placed.

Plan Summary Information:

Number of:	Cross Sections	= 5	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: Double Camp Flow
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.f01

Flow Data (cfs)

River	Reach	RS	PF 1
STREAM 1	F TO A	10.0	4140

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
STREAM 1	F TO A	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: Double Camp Existing
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRun.g01

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 10.0

INPUT
Description: CROSS SECTION AT POINT F
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.08	24.3	876.73	27.35	873.2	44.11	871.87	60.88	873.14
64.26	876.18	69.69	876.5	121.92	877.94	161.72	879.99	200.59	890.24
212.77	898.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	27.35	.04	60.88	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.35	60.88	200	197	194	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	882.30	Element			
Vel Head (ft)	0.52	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.79	Reach Len. (ft)	200.00	197.00	194.00
Crit W.S. (ft)	879.75	Flow Area (sq ft)	63.07	310.70	410.58
E.G. Slope (ft/ft)	0.001771	Area (sq ft)	63.07	310.70	410.58
Q Total (cfs)	4140.00	Flow (cfs)	226.53	2138.84	1774.63
Top Width (ft)	160.95	Top Width (ft)	19.77	33.53	107.65
Vel Total (ft/s)	5.28	Avg. Vel. (ft/s)	3.59	6.88	4.32
Max Chl Dpth (ft)	9.92	Hydr. Depth (ft)	3.19	9.27	3.81
Conv. Total (cfs)	98365.7	Conv. (cfs)	5382.4	50818.5	42164.8
Length Wtd. (ft)	195.79	Wetted Per. (ft)	22.13	33.63	109.13
Min Ch El (ft)	871.87	Shear (lb/sq ft)	0.32	1.02	0.42
Alpha	1.19	Stream Power (lb/ft s)	212.77	0.00	0.00
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	1.17	4.48	9.30
C & E Loss (ft)	0.06	Cum SA (acres)	0.30	0.45	2.88

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 9.0

INPUT
Description: CROSS SECTION AT POINT E
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	882.54	23.16	875.91	24.82	872.67	42.06	869.42	59.3	873.16
66.73	877.1	81.79	877.06	87.98	878.27	92.71	877.71	116.18	877.55
179.79	877.88	190.01	877.67	197.63	877.91	228.1	885.31	239.14	892.37

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	24.82	.04	59.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
24.82	59.3	133	140	145	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.99	Element			
Vel Head (ft)	0.30	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.69	Reach Len. (ft)	133.00	140.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	70.55	362.67	607.23
E.G. Slope (ft/ft)	0.000958	Area (sq ft)	70.55	362.67	607.23
Q Total (cfs)	4140.00	Flow (cfs)	186.93	1974.57	1978.50
Top Width (ft)	210.19	Top Width (ft)	21.84	34.48	153.88
Vel Total (ft/s)	3.98	Avg. Vel. (ft/s)	2.65	5.44	3.26
Max Chl Dpth (ft)	12.27	Hydr. Depth (ft)	3.23	10.52	3.95
Conv. Total (cfs)	133789.0	Conv. (cfs)	6040.8	63810.6	63937.7
Length Wtd. (ft)	141.73	Wetted Per. (ft)	24.63	35.18	155.47
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.17	0.62	0.23
Alpha	1.23	Stream Power (lb/ft s)	239.14	0.00	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.87	2.96	7.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.20	0.30	2.30

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 8.0

INPUT
Description: CROSS SECTION AT POINT D
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.68	30.93	876.26	42.31	873.09	45.38	873	60.98	869.42
76.58	873.6	78.19	876.65	112.61	876.74	160.97	877.3	214.49	880.12
227.38	880.5	250.49	881.87	281.86	885.93	292	886.64		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	42.31	.04	76.58	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.31	76.58	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.84	Element			
Vel Head (ft)	0.31	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.54	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	129.32	343.69	572.08
E.G. Slope (ft/ft)	0.001067	Area (sq ft)	129.32	343.69	572.08
Q Total (cfs)	4140.00	Flow (cfs)	455.88	1904.39	1779.73
Top Width (ft)	233.38	Top Width (ft)	30.77	34.27	168.34
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)	3.53	5.54	3.11
Max Chl Dpth (ft)	12.12	Hydr. Depth (ft)	4.20	10.03	3.40
Conv. Total (cfs)	126726.1	Conv. (cfs)	13954.6	58293.8	54477.8
Length Wtd. (ft)	169.72	Wetted Per. (ft)	31.91	35.23	170.29
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.27	0.65	0.22
Alpha	1.25	Stream Power (lb/ft s)	292.00	0.00	0.00
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.56	1.82	5.07
C & E Loss (ft)	0.00	Cum SA (acres)	0.12	0.19	1.76

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 7.0

INPUT
Description: CROSS SECTION AT POINT C
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910.2	39.17	878.77	42.76	873.17	47.1	872.43	57.37	870.81
67.64	872.19	72.06	875.45	103.46	876.57	140.93	877.76	142.02	875.12
152.77	874.11	154.44	877.87	201.3	878.31	298.48	880.22	368.67	882.87
400.78	882.79	403.66	885.09	421.54	885.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	47.1	.04	67.64	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47.1	67.64	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.64	Element			
Vel Head (ft)	0.30	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.34	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	60.50	200.96	815.21

E.G. Slope (ft/ft)	0.001333	Area (sq ft)	60.50	200.96	815.21
Q Total (cfs)	4140.00	Flow (cfs)	235.89	1238.10	2666.01
Top Width (ft)	292.29	Top Width (ft)	11.14	20.54	260.61
Vel Total (ft/s)	3.85	Avg. Vel. (ft/s)	3.90	6.16	3.27
Max Chl Dpth (ft)	10.53	Hydr. Depth (ft)	5.43	9.78	3.13
Conv. Total (cfs)	113387.5	Conv. (cfs)	6460.5	33909.5	73017.5
Length Wtd. (ft)	169.51	Wetted Per. (ft)	15.17	20.76	266.02
Min Ch El (ft)	870.81	Shear (lb/sq ft)	0.33	0.81	0.26
Alpha	1.29	Stream Power (lb/ft s)	421.54	0.00	0.00
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.18	0.75	2.40
C & E Loss (ft)	0.08	Cum SA (acres)	0.04	0.08	0.93

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.0

INPUT
Description: CROSS SECTION AT POINT B
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	916.62	43.26	872.32	54.14	870.97	65.03	872.62	72.94	875.2
115.51	878.55	169.35	878.2	262.91	879.15	351.97	882.44	400.5	883.75
450.77	884.18	479.55	884.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	43.26	.04	65.03	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
43.26	65.03	314	314	315	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.11	Reach Len. (ft)			
Crit W.S. (ft)	880.11	Flow Area (sq ft)	29.65	182.71	427.56
E.G. Slope (ft/ft)	0.005060	Area (sq ft)	29.65	182.71	427.56
Q Total (cfs)	4140.00	Flow (cfs)	174.60	1981.48	1983.92
Top Width (ft)	253.33	Top Width (ft)	7.61	21.77	223.95
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)	5.89	10.84	4.64
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	3.90	8.39	1.91
Conv. Total (cfs)	58198.6	Conv. (cfs)	2454.4	27854.9	27889.2
Length Wtd. (ft)		Wetted Per. (ft)	10.89	21.98	224.51
Min Ch El (ft)	870.97	Shear (lb/sq ft)	0.86	2.63	0.60
Alpha	1.63	Stream Power (lb/ft s)	479.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:STREAM 1

Reach	River Sta.	n1	n2	n3
F TO A	10.0	.035	.04	.035
F TO A	9.0	.035	.04	.035
F TO A	8.0	.035	.04	.035
F TO A	7.0	.035	.04	.035
F TO A	6.0	.035	.04	.035

SUMMARY OF REACH LENGTHS

River: STREAM 1

Reach	River Sta.	Left	Channel	Right
F TO A	10.0	200	197	194
F TO A	9.0	133	140	145
F TO A	8.0	175	171	168
F TO A	7.0	175	171	168
F TO A	6.0	314	314	315

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: STREAM 1

Reach	River Sta.	Contr.	Expan.
F TO A	10.0	.1	.3
F TO A	9.0	.1	.3
F TO A	8.0	.1	.3
F TO A	7.0	.1	.3
F TO A	6.0	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : EX SITE

River: STREAM 1 Reach: F TO A RS: 7.0 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

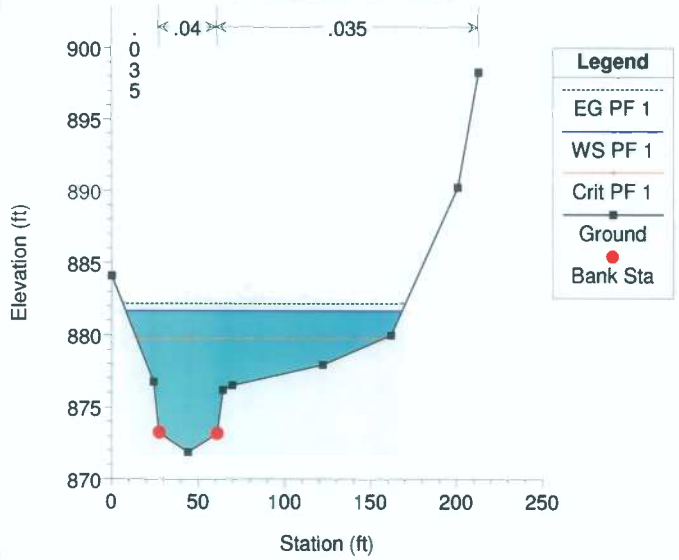
4.0 PROPOSED CONDITION HEC-RAS CALCULATIONS

HEC-RAS Plan: Proposed Site River: STREAM 1 Reach: F TO A Profile: PF 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
F TO A	10.0	PF 1	4140.00	871.87	881.65	879.75	882.20	0.001923	7.10	762.05	159.96	0.41
F TO A	9.0	PF 1	4140.00	869.42	881.53		881.86	0.001047	5.64	1008.29	209.03	0.31
F TO A	8.0	PF 1	4140.00	869.42	881.37		881.70	0.001183	5.77	1004.99	229.83	0.32
F TO A	7.0	PF 1	4140.00	870.81	881.13		881.47	0.001565	6.58	1014.18	286.30	0.37
F TO A	6.2	PF 1	4140.00	870.84	881.01		881.42	0.001679	6.75	867.45	196.24	0.39
F TO A	6.1	PF 1	4140.00	870.59	880.84		881.33	0.002030	7.35	815.56	197.45	0.42
F TO A	6.0	PF 1	4140.00	870.97	880.11	880.11	881.17	0.005060	10.84	639.93	253.33	0.66

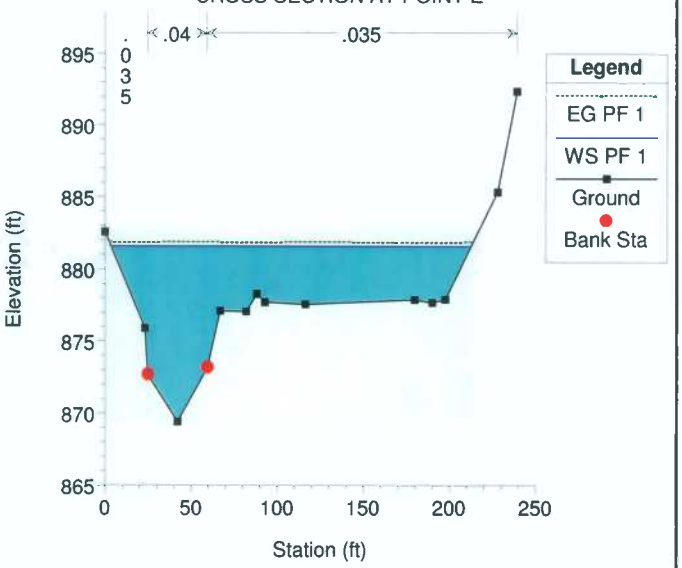
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION AT POINT F



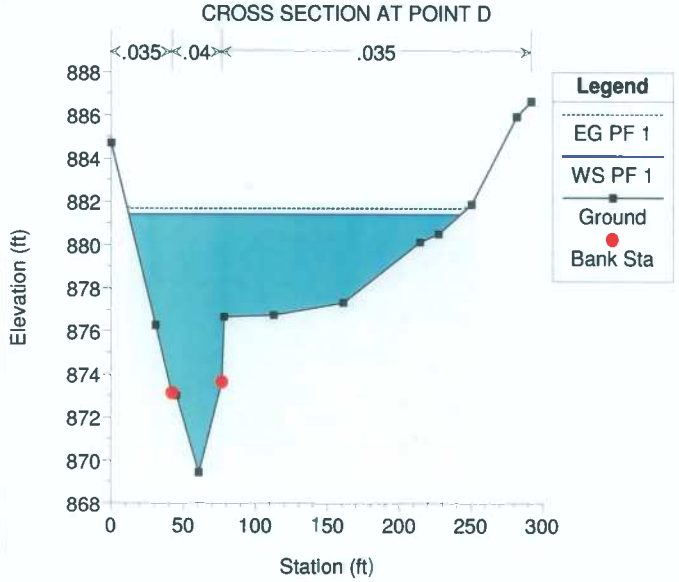
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION AT POINT E



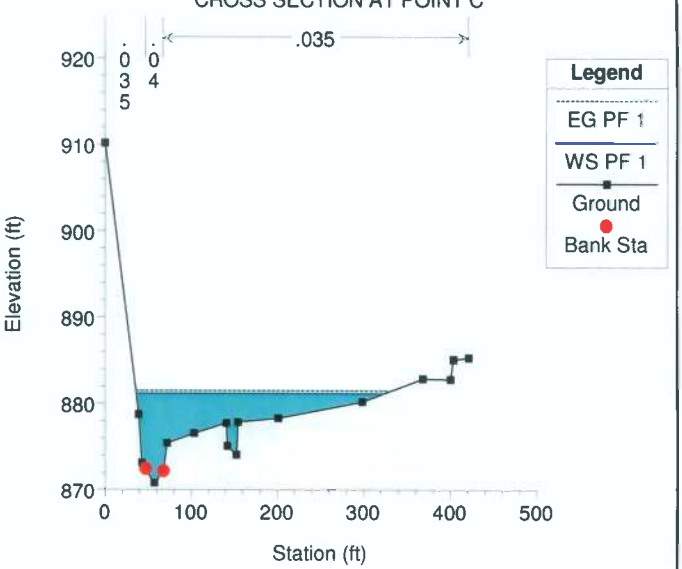
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION AT POINT D



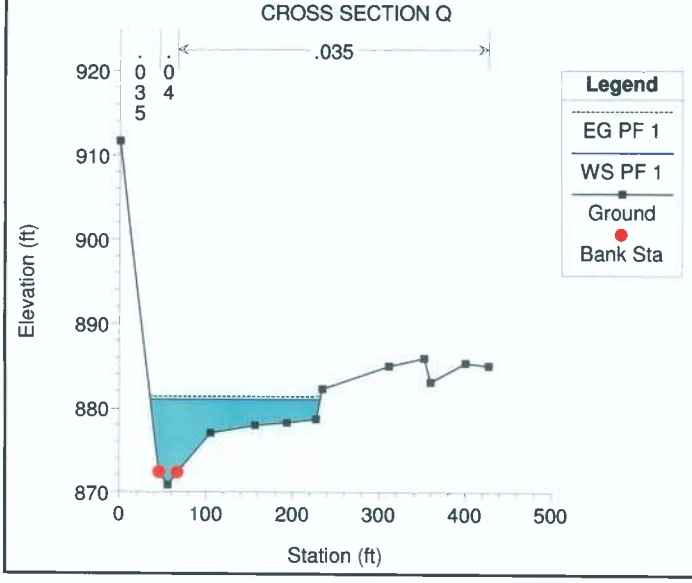
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION AT POINT C



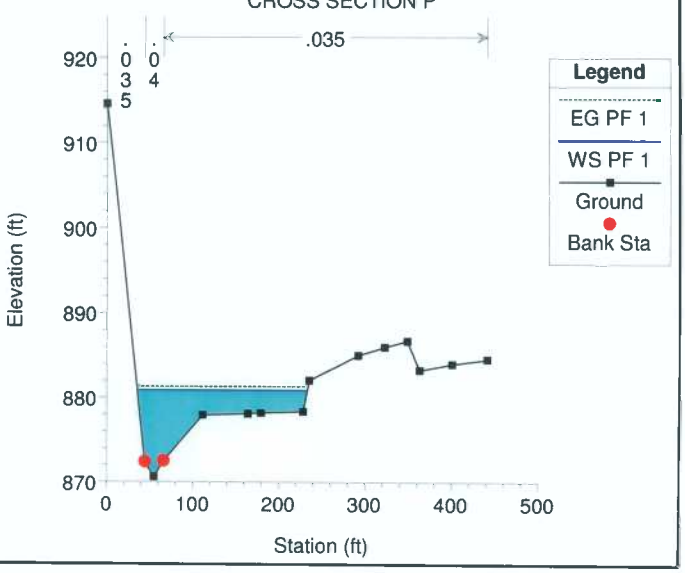
DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION Q

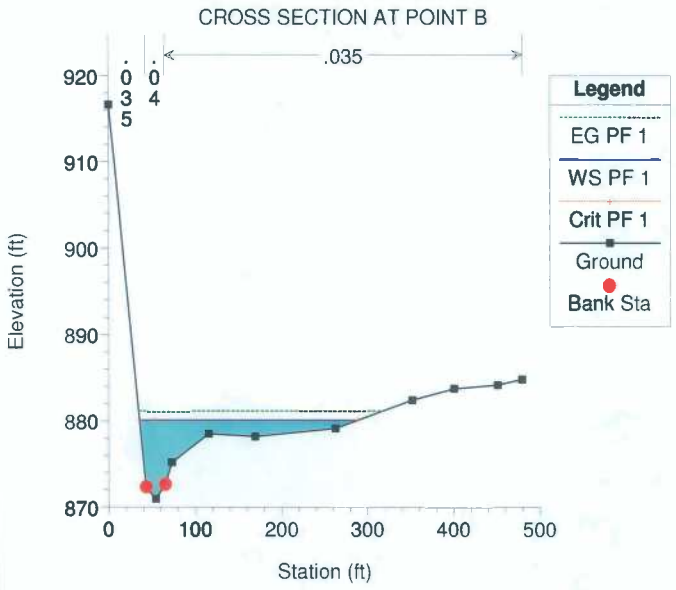


DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013

CROSS SECTION P



DC Run Proposed Topsoil Area Plan: DC Run Proposed Topsoil Area 6/7/2013



HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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PROJECT DATA
Project Title: DC Run Proposed Topsoil Area
Project File : DoubleCampRunPro.prj
Run Date and Time: 6/10/2013 7:12:01 AM

Project in English units

Project Description:
Analysis of Adding Topsoil within Floodplain for Antero - PROPOSED CONDITION

PLAN DATA

Plan Title: DC Run Proposed Topsoil Area
Plan File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.p02

Geometry Title: DC Run Proposed Topsoil Area
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.g02

Flow Title : DC Run Proposed Topsoil Area
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.f02

Plan Description:
Floodplain analysis of proposed conditions after Cox Staging area is established and topsoil stockpile is in place.

Plan Summary Information:

Number of:	Cross Sections	= 7	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	= 0.01
Critical depth calculation tolerance	= 0.01
Maximum number of iterations	= 20
Maximum difference tolerance	= 0.3
Flow tolerance factor	= 0.001

Computation Options
    Critical depth computed only where necessary
    Conveyance Calculation Method: At breaks in n values only
    Friction Slope Method: Average Conveyance
    Computational Flow Regime: Mixed Flow

FLOW DATA

Flow Title: DC Run Proposed Topsoil Area
Flow File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.f02

Flow Data (cfs)

River	Reach	RS	PF 1
STREAM 1	F TO A	10.0	4140

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
STREAM 1	F TO A	PF 1	Critical	Critical

GEOMETRY DATA

Geometry Title: DC Run Proposed Topsoil Area
Geometry File : r:\030-2162 Antero- Double Camp Run Access Rd\Documents\Design\HEC RAS\DoubleCampRunPro.g02

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 10.0

INPUT
Description: CROSS SECTION AT POINT F
Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.08	24.3	876.73	27.35	873.2	44.11	871.87	60.88	873.14
64.26	876.18	69.69	876.5	121.92	877.94	161.72	879.99	200.59	890.24
212.77	898.27								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	27.35	.04	60.88	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
27.35	60.88	200	197	194	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	882.20	Element			
Vel Head (ft)	0.55	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.65	Reach Len. (ft)	200.00	197.00	194.00
Crit W.S. (ft)	879.75	Flow Area (sq ft)	60.36	306.04	395.65
E.G. Slope (ft/ft)	0.001923	Area (sq ft)	60.36	306.04	395.65
Q Total (cfs)	4140.00	Flow (cfs)	222.58	2173.17	1744.25
Top Width (ft)	159.96	Top Width (ft)	19.31	33.53	107.13
Vel Total (ft/s)	5.43	Avg. Vel. (ft/s)	3.69	7.10	4.41
Max Chl Dpth (ft)	9.78	Hydr. Depth (ft)	3.13	9.13	3.69
Conv. Total (cfs)	94403.9	Conv. (cfs)	5075.4	49554.6	39773.9
Length Wtd. (ft)	195.81	Wetted Per. (ft)	21.65	33.63	108.59
Min Ch El (ft)	871.87	Shear (lb/sq ft)	0.33	1.09	0.44
Alpha	1.20	Stream Power (lb/ft s)	212.77	0.00	0.00
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1.05	4.13	7.99
C & E Loss (ft)	0.07	Cum SA (acres)	0.28	0.42	2.37

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 9.0

INPUT
Description: CROSS SECTION AT POINT E
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	882.54	23.16	875.91	24.82	872.67	42.06	869.42	59.3	873.16
66.73	877.1	81.79	877.06	87.98	878.27	92.71	877.71	116.18	877.55
179.79	877.88	190.01	877.67	197.63	877.91	228.1	885.31	239.14	892.37

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	24.82	.04	59.3	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
24.82	59.3	133	140	145	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.86	Element			
Vel Head (ft)	0.33	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.53	Reach Len. (ft)	133.00	140.00	145.00
Crit W.S. (ft)		Flow Area (sq ft)	67.24	357.38	583.67
E.G. Slope (ft/ft)	0.001047	Area (sq ft)	67.24	357.38	583.67
Q Total (cfs)	4140.00	Flow (cfs)	183.19	2014.69	1942.12
Top Width (ft)	209.03	Top Width (ft)	21.30	34.48	153.25
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)	2.72	5.64	3.33
Max Chl Dpth (ft)	12.11	Hydr. Depth (ft)	3.16	10.36	3.81
Conv. Total (cfs)	127952.2	Conv. (cfs)	5661.7	62266.7	60023.8
Length Wtd. (ft)	141.68	Wetted Per. (ft)	24.07	35.18	154.82
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.18	0.66	0.25
Alpha	1.24	Stream Power (lb/ft s)	239.14	0.00	0.00
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.75	2.63	5.81
C & E Loss (ft)	0.00	Cum SA (acres)	0.18	0.27	1.79

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 8.0

INPUT
Description: CROSS SECTION AT POINT D
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	884.68	30.93	876.26	42.31	873.09	45.38	873	60.98	869.42
76.58	873.6	78.19	876.65	112.61	876.74	160.97	877.3	214.49	880.12
227.38	880.5	250.49	881.87	281.86	885.93	292	886.64		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	42.31	.04	76.58	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
42.31	76.58	175	171	168	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.37	Reach Len. (ft)	175.00	171.00	168.00
Crit W.S. (ft)		Flow Area (sq ft)	124.05	337.75	543.19
E.G. Slope (ft/ft)	0.001183	Area (sq ft)	124.05	337.75	543.19
Q Total (cfs)	4140.00	Flow (cfs)	454.02	1947.45	1738.52
Top Width (ft)	229.83	Top Width (ft)	30.14	34.27	165.42
Vel Total (ft/s)	4.12	Avg. Vel. (ft/s)	3.66	5.77	3.20
Max Chl Dpth (ft)	11.95	Hydr. Depth (ft)	4.12	9.86	3.28
Conv. Total (cfs)	120379.6	Conv. (cfs)	13201.7	56626.5	50551.3
Length Wtd. (ft)	169.76	Wetted Per. (ft)	31.25	35.23	167.37
Min Ch El (ft)	869.42	Shear (lb/sq ft)	0.29	0.71	0.24
Alpha	1.26	Stream Power (lb/ft s)	292.00	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.46	1.52	3.93
C & E Loss (ft)	0.00	Cum SA (acres)	0.10	0.16	1.26

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 7.0

INPUT
Description: CROSS SECTION AT POINT C
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910.2	39.17	878.77	42.76	873.17	47.1	872.43	57.37	870.81
67.64	872.19	72.06	875.45	103.46	876.57	140.93	877.76	142.02	875.12
152.77	874.11	154.44	877.87	201.3	878.31	298.48	880.22	368.67	882.87
400.78	882.79	403.66	885.09	421.54	885.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	47.1	.04	67.64	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
47.1	67.64	21	22	23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.13	Reach Len. (ft)	21.00	22.00	23.00
Crit W.S. (ft)		Flow Area (sq ft)	58.13	196.53	759.53

0	914.59	44.28	872.36	54.98	870.59	65.69	872.48	111.32	877.92
164.25	878.09	179.2	878.23	228.11	878.37	235.14	882.05	291.7	885
322.3	886	348.36	886.7	362.81	883.28	400.23	884	441.08	884.54

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	44.28	.04	65.69	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
44.28	65.69	34	34	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.84	Reach Len. (ft)	34.00	34.00	34.00
Crit W.S. (ft)		Flow Area (sq ft)	37.72	199.91	577.93
E.G. Slope (ft/ft)	0.002030	Area (sq ft)	37.72	199.91	577.93
Q Total (cfs)	4140.00	Flow (cfs)	152.38	1469.38	2518.25
Top Width (ft)	197.45	Top Width (ft)	8.89	21.41	167.14
Vel Total (ft/s)	5.08	Avg. Vel. (ft/s)	4.04	7.35	4.36
Max Chl Dpth (ft)	10.25	Hydr. Depth (ft)	4.24	9.34	3.46
Conv. Total (cfs)	91893.0	Conv. (cfs)	3382.2	32614.9	55896.0
Length Wtd. (ft)	34.00	Wetted Per. (ft)	12.29	21.72	168.08
Min Ch El (ft)	870.59	Shear (lb/sq ft)	0.39	1.17	0.44
Alpha	1.22	Stream Power (lb/ft s)	441.08	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.03	0.15	0.39
C & E Loss (ft)	0.06	Cum SA (acres)	0.01	0.02	0.15

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.0

INPUT
Description: CROSS SECTION AT POINT B
Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	916.62	43.26	872.32	54.14	870.97	65.03	872.62	72.94	875.2
115.51	878.55	169.35	878.2	262.91	879.15	351.97	882.44	400.5	883.75
450.77	884.18	479.55	884.83						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	43.26	.04	65.03	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
43.26	65.03	314	314	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	881.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	880.11	Reach Len. (ft)			
Crit W.S. (ft)	880.11	Flow Area (sq ft)	29.65	182.71	427.56

E.G. Slope (ft/ft)	0.001565	Area (sq ft)	58.13	196.53	759.53
Q Total (cfs)	4140.00	Flow (cfs)	242.76	1292.45	2604.79
Top Width (ft)	286.30	Top Width (ft)	10.87	20.54	254.89
Vel Total (ft/s)	4.08	Avg. Vel. (ft/s)	4.18	6.58	3.43
Max Chl Dpth (ft)	10.32	Hydr. Depth (ft)	5.35	9.57	2.98
Conv. Total (cfs)	104652.6	Conv. (cfs)	6136.6	32671.0	65845.0
Length Wtd. (ft)	22.58	Wetted Per. (ft)	14.82	20.76	260.30
Min Ch El (ft)	870.81	Shear (lb/sq ft)	0.38	0.92	0.29
Alpha	1.32	Stream Power (lb/ft s)	421.54	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.10	0.47	1.42
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	0.05	0.45

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.2

INPUT
Description: CROSS SECTION Q
Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	911.63	45.87	872.32	56.27	870.84	66.69	872.28	105.55	877
157.14	877.94	193.88	878.29	227.42	878.68	234.48	882.3	311.6	885
352.31	885.94	359.61	883.13	400.14	885.38	427.17	885.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	45.87	.04	66.69	.035

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
45.87	66.69	48	48	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	881.42	Element			
Vel Head (ft)	0.41	Wt. n-Val.	0.035	0.040	0.035
W.S. Elev (ft)	881.01	Reach Len. (ft)	48.00	48.00	48.00
Crit W.S. (ft)		Flow Area (sq ft)	44.08	196.58	626.80
E.G. Slope (ft/ft)	0.001679	Area (sq ft)	44.08	196.58	626.80
Q Total (cfs)	4140.00	Flow (cfs)	169.93	1327.87	2642.20
Top Width (ft)	196.24	Top Width (ft)	10.14	20.82	165.28
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)	3.86	6.75	4.22
Max Chl Dpth (ft)	10.17	Hydr. Depth (ft)	4.35	9.44	3.79
Conv. Total (cfs)	101047.4	Conv. (cfs)	4147.6	32410.1	64489.7
Length Wtd. (ft)	48.00	Wetted Per. (ft)	13.36	21.02	166.14
Min Ch El (ft)	870.84	Shear (lb/sq ft)	0.35	0.98	0.40
Alpha	1.17	Stream Power (lb/ft s)	427.17	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.07	0.37	1.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	0.04	0.34

CROSS SECTION

RIVER: STREAM 1
REACH: F TO A RS: 6.1

INPUT
Description: CROSS SECTION P
Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

E.G. Slope (ft/ft)	0.005060	Area (sq ft)	29.65	182.71	427.56
Q Total (cfs)	4140.00	Flow (cfs)	174.60	1981.48	1983.92
Top Width (ft)	253.33	Top Width (ft)	7.61	21.77	223.95
Vel Total (ft/s)	6.47	Avg. Vel. (ft/s)	5.89	10.84	4.64
Max Chl Dpth (ft)	9.14	Hydr. Depth (ft)	3.90	8.39	1.91
Conv. Total (cfs)	58198.6	Conv. (cfs)	2454.4	27854.9	27889.2
Length Wtd. (ft)		Wetted Per. (ft)	10.89	21.98	224.51
Min Ch El (ft)	870.97	Shear (lb/sq ft)	0.86	2.63	0.60
Alpha	1.63	Stream Power (lb/ft s)	479.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:STREAM 1

Reach	River Sta.	n1	n2	n3
F TO A	10.0	.035	.04	.035
F TO A	9.0	.035	.04	.035
F TO A	8.0	.035	.04	.035
F TO A	7.0	.035	.04	.035
F TO A	6.2	.035	.04	.035
F TO A	6.1	.035	.04	.035
F TO A	6.0	.035	.04	.035

SUMMARY OF REACH LENGTHS

River: STREAM 1

Reach	River Sta.	Left	Channel	Right
F TO A	10.0	200	197	194
F TO A	9.0	133	140	145
F TO A	8.0	175	171	168
F TO A	7.0	21	22	23
F TO A	6.2	48	48	48
F TO A	6.1	34	34	34
F TO A	6.0	314	314	315

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: STREAM 1

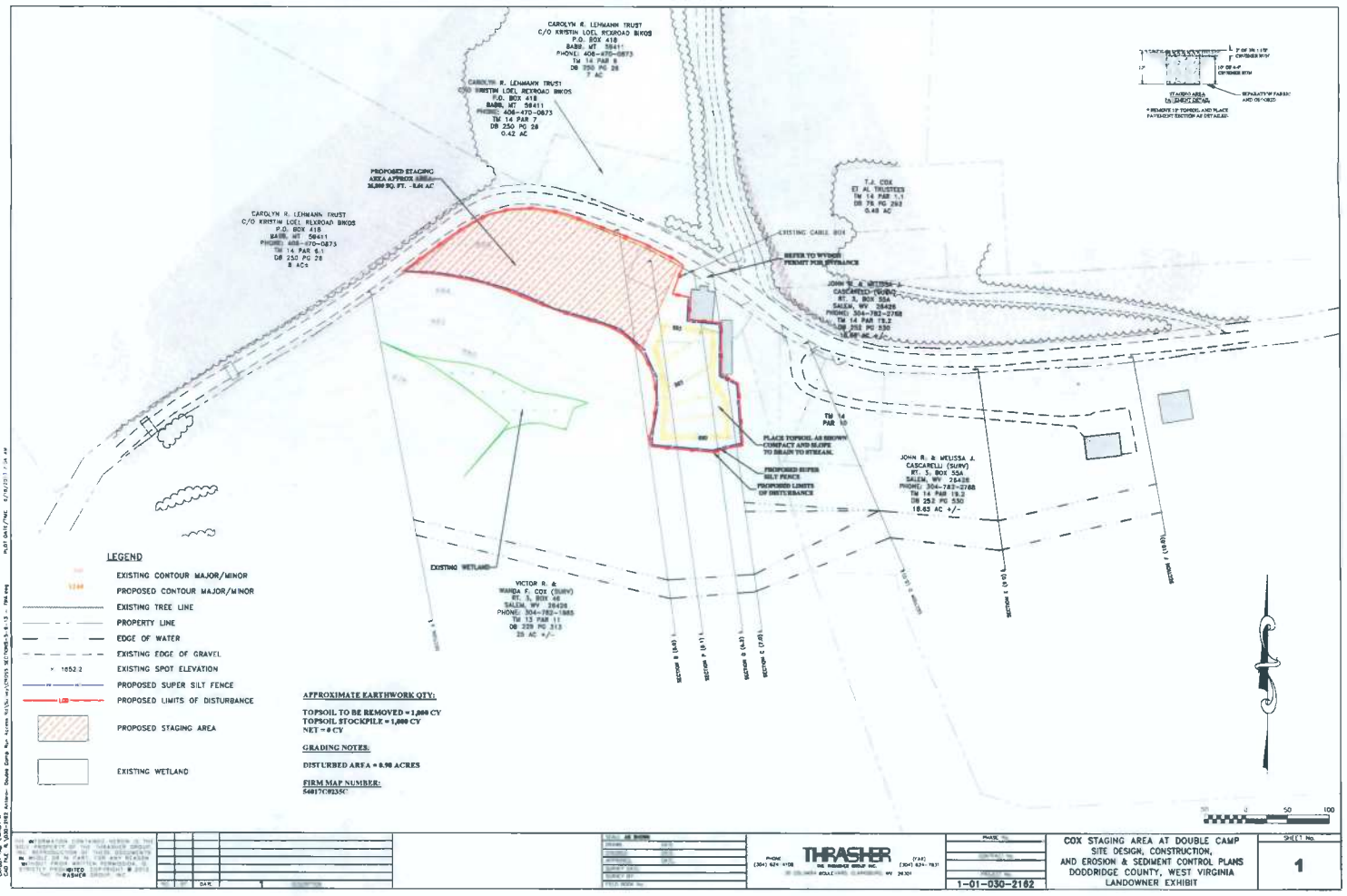
Reach	River Sta.	Contr.	Expan.
F TO A	10.0	.1	.3
F TO A	9.0	.1	.3
F TO A	8.0	.1	.3
F TO A	7.0	.1	.3
F TO A	6.2	.1	.3
F TO A	6.1	.1	.3
F TO A	6.0	.1	.3

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Proposed Site

River: STREAM 1 Reach: F TO A RS: 6.1 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
This may indicate the need for additional cross sections.

APPENDIX

EXHIBIT A



THRASHER

COX STAGING AREA AT DOUBLE CAMP
SITE DESIGN, CONSTRUCTION,
AND EROSION & SEDIMENT CONTROL PLANS
DODDRIDGE COUNTY, WEST VIRGINIA
LANDOWNER EXHIBIT

1-01-030-2162

SHEET No. 1

EXHIBIT B

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

Earl Ray Tomblin
Governor

Office of the District Engineer/Manager
District Four
PO Box 4220 (EXIT 121, I-79) * Clarksburg, WV 26302 * 304-842-1550

Paul A. Mattox, Jr., P. E.
Secretary of Transportation /
Commissioner of Highways

May 16, 2013

ANTERO RESOURCES APPALACHIAN
CORPORATION
175 D ELK CREEK ROAD
MOUNT CLARE, WV 26408

Dear Applicant:

Your approved copy of Permit Number 04-2013-0481 for a T - Temporary permit type is enclosed. A description of the work is on the permit.

Please contact the District Four office:

Denise Roncone 304-842-1575

at least 48 hours in advance of the date you plan to begin work so arrangements can be made to inspect the work authorized by the permit.

Failure to comply will result in cancellation of your permit.

A copy of this permit is to be available on the job at all times while the work is in progress for inspection by the West Virginia Division of Highways' personnel.

Sincerely,

District Engineer / District Manager

Permit Supervisor

Initials: TC
Attachments: Yes
Enclosure: No
cc:0409 Charleston Permits

Form MM-109
Rev. 05-19-05

PERMIT NO. 0420130481

PERMIT TO ENTER UPON, UNDER, OVER OR ACROSS THE STATE ROADS OF THE STATE OF WEST VIRGINIA, AS PROVIDED FOR IN SECTION 6, ARTICLE 16, CHAPTER 17; SECTION 9, ARTICLE 16, CHAPTER 17; SECTION 8, ARTICLE 4, CHAPTER 17, WEST VIRGINIA CODE, 1931, AS AMENDED.

THIS PERMIT, Made this 1 day of MAY 20 13, between the WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, a statutory corporation hereinafter called DIVISION and ANTERO RESOURCES
Address: 175-D Elk Creek Road Mt. Clare, WV. 26408 Phone No: 304-622-3842
hereinafter called APPLICANT.

WITNESSETH

In consideration of the hereinafter set out covenants and in accordance with Section 6, Article 16, Chapter 17; or Section 9, Article 16, Chapter 17; or Section 8, Article 4, Chapter 17, of the Official Code of West Virginia, 1931, as amended, and the rules and regulations promulgated thereunder, APPLICANT does hereby apply to enter

Route Type & No. CR 25 DOH Project No. SLS 25/11 NA (if applicable);
at 250 ft. west of Jct. Meathouse Fork (CR 25) & Double Camp Rd. Mile Post 7.384
in DODDRIDGE County, for the purposes hereinafter set forth and in accordance with plans and specifications which are attached hereto and made a part hereof: Remove 12" of topsoil from proposed staging area. After removal place separation fabric down. Place 10" of 4-6" crusher run on top of the separation fabric followed by 2" of ¾" – 1 ½" crusher run on top of that. Cox Staging Area

APPLICANT further agrees to accept the conditions hereinafter set forth:

1. APPLICANT shall deposit with DIVISION the sum of $ 0 in the form of an official, certified or cashier's check, or executed bond with surety satisfactory to DIVISION to cover any damage and inspection costs DIVISION may sustain by reason of the granting of this permit, including any expense incurred in restoring said highway to its original condition or the proper repair of any and all damages that may result within one (1) year from the date of the completion of said work.

2. APPLICANT agrees to reimburse DIVISION for inspection costs as follows:
   - ☐ A. For any inspection costs incurred under this permit.
   - ☐ B. At $ _____ per linear foot for _____ feet of water line installed under this permit
   - ☐ C. At $ _____ per linear foot for _____ feet of sewer line installed under this permit

3. APPLICANT shall notify DIVISION at least 48 hours in advance of the date the work will begin. Failure to comply will be cause for cancellation of this permit.

4. APPLICANT agrees to protect its employees, equipment and users of the highway at all times in accordance with the current Division of Highways manual "Traffic Control For Street and Highway Construction and Maintenance Operations".

5. APPLICANT agrees to comply with all applicable state and federal laws in the performance of work under this permit.

6. Supplementary conditions cited on the reverse side of this permit are understood and agreed to be a part hereof.

7. The work authorized under this permit shall be completed on or before (Date): 05-10-2013

RECOMMENDED:
Denise Ramone
Title PERMIT SUPERVISOR

Signature and Title of Applicant

BOND REQUIREMENT:
BOND NO. LPM9016891 /DATE 2-21-13
Attached ☐ On File ☒
INSPECTION: Owner/Consultant ☐
Full Time ☐ Part Time ☐
Periodic ☒ Reimbursable ☐ No Cost ☑

APPROVED:
Title DISTRICT MANAGER
West Virginia Division of Highways

AUTHORIZATION NO: _____ PERMIT NO: 0420130401

CHAPTER 17 WEST VIRGINIA CODE, 1931

§17-4-8. Use of roadbed by railroad, telephone company, etc.
No railroad or electric or other railway shall be constructed upon the roadbed of any state road, except to cross the same, nor shall any person, firm or corporation enter upon or construct any works in or upon such road, or lay or maintain thereon or thereunder any drainage, sewer or water pipes, gas pipes, electric conduits or other pipes, nor shall any telephone, telegraph or electric line or power pole, or any other structure whatsoever, be erected upon, in or over any portion of a state road, except under such restrictions, conditions and regulations as may be prescribed by the state road commissioner. Whenever any railroad or electric or other railway, heretofore or hereafter constructed, shall cross any state road, it shall be required to keep its own roadbed, and the bed of the road or highway at such crossing, in proper repair, or else to construct and maintain an overhead or undergrade crossing, subject to the approval of the state road commissioner; and the tracks of such railroad or railway at grade crossings shall be so constructed as to give a safe and easy approach to and across the same, and when the construction of such approaches is made necessary by a change in the railroad grade at the grade crossing, the cost shall be upon the railway company.

§17-16-6. Permit by commission or county court for openings in or structures on public roads; franchises and easements of oil, etc., transportation companies.
No opening shall be made in any state or county-district road or highway, nor shall any structure be placed therein or thereover, nor shall any structure, which has been so placed, be changed or removed, except in accordance with a permit from the state road commission or county court, as the case may be. No road or highway shall be dug up for laying or placing pipes, sewers, poles or wires, or for other purposes, and no trees shall be planted or removed or obstructions placed thereon, without the written permit of the commission or county court, or its duly authorized agent, and then only in accordance with the regulations of the commission or court. The work shall be done under the supervision and to the satisfaction of the commission or court; and the entire expense of replacing the highway in as good condition as before shall be paid by the persons to whom the permit was given, or by whom the work was done: **Provided, however,** That nothing herein contained shall be so construed as to prevent any oil or gas company or person having a proper permit or franchise from transporting oil or gasoline along any of the public highways of this State, nor to give such company a franchise without paying to the landowners through whose lands such road passes the usual and customary compensation paid or to be paid to the landowners for such right of way. Any grant or franchise when made shall be construed to give to such company or person only the right to use the easement in such public road.

A violation of any provision of this section shall be a misdemeanor, and the person or corporation violating the same shall, upon conviction thereof, be fined not less than twenty-five nor more than one hundred dollars for each offense.

§17-16-9. Private driveways or approaches to roads; obstruction of ditches.
The owner or tenant of land fronting on any state road shall construct and keep in repair all approaches or driveways to and from the same, under the direction of the state road commission, and, likewise, the owner or tenant of land fronting on any county-district road shall construct and keep in repair approaches or driveways to and from the same, under the direction of the county road engineer, and it shall be unlawful for such owner or tenant to fill up any ditch, or place any material of any kind or character in any ditch, so as in any manner to obstruct or interfere with the purposes for which it was made.

SUPPLEMENTARY CONDITIONS

1. The person, firm or corporation to whom a permit is issued agrees to hold the State of West Virginia and DIVISION harmless on account of any damages to persons or property which may arise during the process of the work authorized by this permit or by reason thereof.
2. Applications for permission to perform work within highway rights of way shall be made on DIVISION'S standard permit form and shall be signed by the authorized representative of the person, firm or corporation applying.
3. The APPLICANT shall give detailed information concerning the work to be performed and the application must include a sketch sufficient to show the nature of the work performed.
4. APPLICANT, his agents, successor, heirs or assigns, contractors or any other person, firm or corporation working under APPLICANT'S real or apparent authority, shall perform the work in a manner satisfactory to DIVISION. Damage to the road resulting at any time from work authorized under this permit shall be repaired by APPLICANT. Unsatisfactory repairs may be a corrected by DIVISION or its authorized agent and the cost thereof paid by APPLICANT.
5. DIVISION assumes no liability for damage to the proposed work by reason of construction or maintenance work on the road.
6. This permit is granted subject to removal of the authorized installation by APPLICANT at no cost to DIVISION when required for improvement of the road, and subject to all regulations now or hereafter adopted by DIVISION.
7. Utility installation shall be in accordance with the current manual, "Accommodation of Utilities on Highway Right of Way".
8. Driveways shall be in accordance with the current manual, "Rules and Regulations for Constructing Driveways on State Highway Rights-of-Way."
9. DIVISION reserves the right to cancel this permit at any time, should APPLICANT fail to comply with the terms and conditions under which it is granted.
10. This permit is granted only insofar as the DIVISION has a right to do so.

0420130481

Addendum to Permit 04-2013-0481

This addendum, made this 13th day of May 2013, between the West Virginia Department of Transportation, Division of Highways, a statutory company hereinafter called the Division and Antero Resources

Address: 1625 17th Street, Denver, CO 80202 Phone: 303 357-7310

hereinafter called APPLICANT.

The Applicant has filed with the DIVISION a written application for the following named route and location:

Doddridge County Route SLS 25, Meathouse Fork@ MP7.384 to construct a truck staging area for the Trent, Wagner and Hughs Well Pad sites.

1. All Equipment, Machinery, and Materials (including but not limited to Jersey Barriers, etc) must be stored off of the Division's right-of-way. No Parking will be permitted on the Division's Right-of-Way.
2. Equipment, Machinery, or Materials, even if placed off of the Division's Right-of-Way, must not cause sight distance problems.
3. Entrance and Exit must clearly marked in the field and follow the Division's Manual on Rules and Regulations for Constructing Driveways on State Highway Rights-of-Way.

- After completion of the project, a joint review of roads will be filmed and evaluated to assure roads have been repaired to existing condition or better.
- No travel on School Bus Routes during their traversing operational hours on above mentioned route on bi-directional roadways where the lane widths are less than 10 ft.
- Pilot Vehicle required for all Oversized Loads on covered roads.
- Ditch lines to be maintained by applicant. **FDR or equivalent required to stabilize road to uphold increased traffic and heavy and excess amount of loads.** Centerline of roadway cannot be relocated without an agreement between WV DOH and Antero Resources.
- Repairs that will include "Hot Mix Asphalt" will have the following testing requirement: The supplier will be responsible for testing at the plant; Compaction testing will be as per WV DOH specifications.
- The Division of Highways shall have the right at all times to inspect the work, and if such inspections should reveal that the work is not done according to specifications, upon being so advised by the Division, ANTERO Resources agrees to take immediate corrective actions.

Applicant shall properly repair and maintain any and all damages that may result to said bridges, highways, shoulders and ditches from hauling activities of Applicant, its agents, contractors and employees, to as good a condition prior to commencement of Applicant's operation or as when the permit was issued, as determined by the District Engineer/Manager of the DIVISON having jurisdiction over the work permitted, or pay damages therefore in the amount to sufficiently restore such bridges, roads, highways, shoulders and ditches to original condition; and shall reimburse the DIVISON for all inspection costs incurred by it in connection with said work and repairs of such damages and faithfully comply with all terms and conditions of said permits and save harmless the DIVISION and the State of West Virginia from all losses resulting from the conduct of said work and repairs; provided that all projects covered by this blanket bond have been restored to original or better condition; then this Bond shall be released; or otherwise will remain in full force and effect.

Bond Amount: $1,000,000.00

Bond Number: LPM9062891 Date: 2/21/2012

Dist. Permit Number 04201804 81

BOND Number LPM 9062891

OIL and GAS DATA INFORMATION SHEET

APPLICANT

Company Name ANTERO RESOURCES APPALCHIAN CORPORATION

Address 1625 17TH STREET

City DENVER ST CO Zip 80202

Contact Person Permit Burt Simcox Telephone (304) 282-9372

24/7 Road Maintenance Contact Aaron Kunzler Telephone _____ Cell (405) 227-8344

24/7 Backup Contact Dusty Wood Telephone _____ Cell (817) 771-1436

Drilling/Fracking will require _____ Less than 5000 Barrels of fluids X 5000/+

Site Location

Site Name Cox Staging area Road Local Name Meathouse Fork Rte.# SLS 25

Approach location WGS 83 Decimal Format GPS N39.19168 W-80.62721 County Doddridge

Location Description

On Route.# SLS 25 being 250 feet N S E W of Jct. of Rte.# SLS 25 and Rte.# SLS25/11

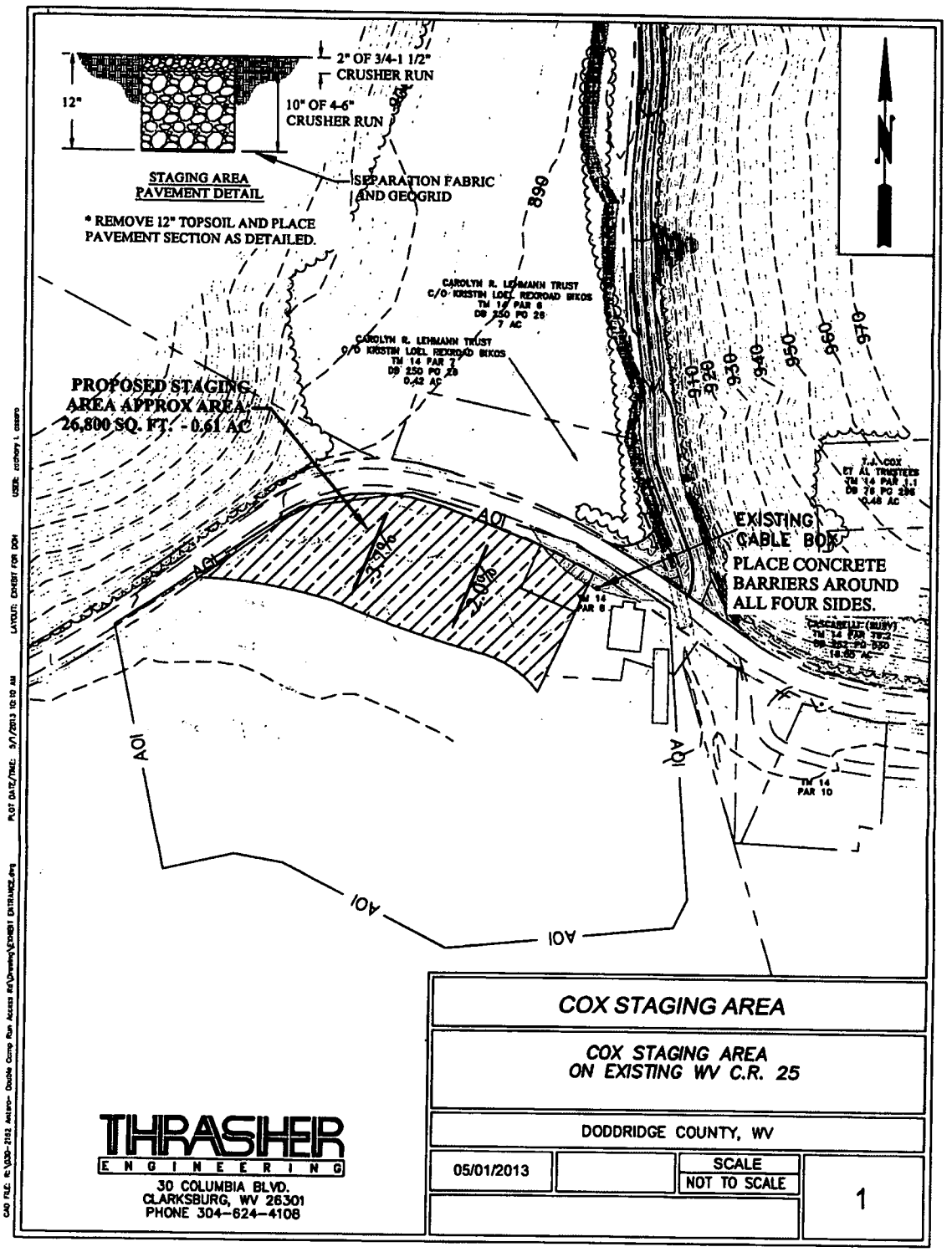
DOH USE ONLY **HAULING ROUTE From US or WV Route (Attach Map)**

Name & Rte.#	Beg MP	End MP	Surface Type	Condition
STAGING Area will				
service:				
Trent PAD 04-12-1069				
Wagner PAD				
Hughes PAD				

Well location WGS 83 Decimal Format GPS N: W:

WV DEP Permit Number 47 - _____ - _____

STATE COUNTY PERMIT NUMBER


2" OF 3/4-1 1/2" CRUSHER RUN
12"
10" OF 4-6" CRUSHER RUN
STAGING AREA PAVEMENT DETAIL
SEPARATION FABRIC AND GEOGRID
* REMOVE 12" TOPSOIL AND PLACE PAVEMENT SECTION AS DETAILED.
PROPOSED STAGING AREA APPROX AREA: 26,800 SQ. FT. - 0.61 AC
CAROLYN R. LEHMANN TRUST C/O KRISTIN LOEL REXROAD BIKOS TM 14 PAR 6 DB 250 PG 28 7 AC
CAROLYN R. LEHMANN TRUST C/O KRISTIN LOEL REXROAD BIKOS TM 14 PAR 7 DB 250 PG 28 0.42 AC
EXISTING CABLE BOX
PLACE CONCRETE BARRIERS AROUND ALL FOUR SIDES.
AOI
TM 14 PAR 10
COX STAGING AREA
COX STAGING AREA ON EXISTING WV C.R. 25
DODDRIDGE COUNTY, WV
05/01/2013
SCALE NOT TO SCALE
1
THRASHER ENGINEERING
30 COLUMBIA BLVD.
CLARKSBURG, WV 26301
PHONE 304-624-4108

0420130481

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

January 29, 2013

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-1706167, 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 of completion of drilling, 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: BOWEN UNIT 2H
Farm Name: CLARENCE TRENT JR ET AL
API Well Number: 47-1706167
Permit Type: Horizontal 6A Well
Date Issued: 01/29/2013

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.

WW - 6B
(1/12)

1-5C167

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

17 04 51

1) Well Operator: Antero Resources Appalachian Corporation | 494488557 (Operator ID) | 017- Doddridge (County) | Greenbrier (District) | New Milton 7.5' (Quadrangle)

2) Operator's Well Number: Bowen Unit 2H Well Pad Name: Trent Pad

3 Elevation, current ground: ~1422' Elevation, proposed post-construction: 1410'

4) Well Type: (a) Gas ☒ Oil ☐
Other
(b) If Gas: Shallow ☒ Deep ☐
Horizontal ☒

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale: 7,600' TVD, Anticipated Thickness: 80', Associated Pressure - 3,250#

7) Proposed Total Vertical Depth: 7,600 TVD
8) Formation at Total Vertical Depth: Marcellus Shale
9) Proposed Total Measured Depth: 14,300' MD
10) Approximate Fresh Water Strata Depths: 37, 214'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 1795' -DE LEC
13) Approximate Coal Seam Depths: 352', 1058'
14) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale

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): 13.97 acres

19) Area to be disturbed for well pad only, less access road (acres): 6.81 acres

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#	90'	90'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2490'	2490'	CTS, 1014 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	14,300'	14,300	3537 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7200'	
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			

17-CAS-107

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.

WW-9
Rev. 1/12

API No. 47 - 017 - [illegible]
Operator's Well No. Bowen Unit 2H

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

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

Operator Name Antero Resources Appalachian Corporation OP Code 494488557

Watershed Standingstone Run of Meathouse Fork Quadrangle New Milton 7.5'

Elevation 1410' County Doddridge District Greenbrier

Description of anticipated Pit Waste: Drilling and Flowback Fluids and Cuttings

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

Will a synthetic liner be used in the pit? Yes. If so, what mil.? 60 mil

Proposed Disposal Method For Treated Pit Wastes:

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

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? Please See Attachment
Will closed loop system be used ? Yes
Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Removed offsite and taken to landfill
-If left in pit and plan to solidify what medium will be used? Cement, lime, 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 [signature]

Company Official (Typed Name) Gerard G. Alberts

Company Official Title Environmental & Regulatory Manager

Subscribed and sworn before me this 18 day of October, 2012

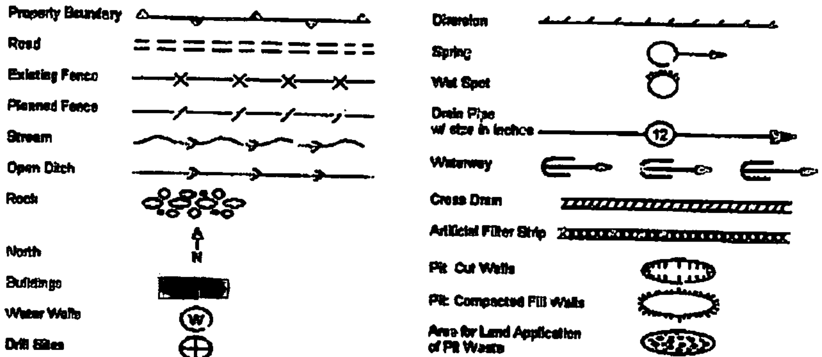
[signature] Notary Public

My commission expires 11/18/2014

C E WHITLOCK NOTARY PUBLIC STATE OF COLORADO MY COMMISSION EXPIRES 11/18/2014

WW-9
Rev. 1/12

API No. 47 - 017 - 06167
Operator's Well No. Bowen Unit 2H



New Well Pad (6.81) + New Frac Pit (3.22) + New Access Roads (2.08) + Topsoil Stockpile (0.59) + Waste Stockpile (1.03) + Timber Stockpile (0.23) = 13.97 Acres

Proposed Revegetation Treatment: Acres Disturbed 13.97 Prevegetation pH 6.0

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

preseed & mulch all cut area no less than 2 ton per acre

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

Mulch 2-3 Tons/acre

Seed Mixtures

Area I (Temporary) Seed Type	lbs/acre	Area II (Permanent) Seed Type	lbs/acre
Oats	168	Tall Fescue	50
Rye	120		

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [signature]

Comments:

Title: oil & gas inspector Date: 10-30-12

Field Reviewed? (✓) Yes ( ) No

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Water Management Plan:
Primary Water Sources

00887 | 047-017-06167 | Antero Resources

Bowen Unit 2H

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.

Stream/River

West Fork River @ JCP Withdrawal **James & Brenda Raines**

5/31/2013	5/31/2014	6,010,000	39.320913	-80.337572

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

1,900	170.54	146.25

West Fork River @ McDonald Withdrawal **David Shrieves**

5/31/2013	5/31/2014	6,010,000	39.16761	-80.45069

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

3,000	170.54	106.30

West Fork River @ GAL Withdrawal **David Shrieves**

5/31/2013	5/31/2014	6,010,000	39.16422	-80.45173

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

1,000	170.54	106.30

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McElroy Creek @ Forest Withdrawal

Forest C. & Brenda L. Moore

5/31/2013	5/31/2014	6,010,000		39.39675	-80.738197
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		71.96		13.10

McElroy Creek @ Sweeney Withdrawal

Bill Sweeney

5/31/2013	5/31/2014	6,010,000		39.398123	-80.656808
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		6.66

Meathouse Fork @ Gagnon Withdrawal

George L. Gagnon and Susan C. Gagnon

5/31/2013	5/31/2014	6,010,000		39.26054	-80.720998
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		71.96		11.74

Meathouse Fork @ Whitehair Withdrawal

Elton Whitehair

5/31/2013	5/31/2014	6,010,000		39.211317	-80.679592
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		7.28

Tom's Fork @ Erwin Withdrawal

John F. Erwin and Sandra E. Erwin

5/31/2013	5/31/2014	6,010,000		39.174306	-80.702992
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		0.59

Arnold Creek @ Davis Withdrawal

Jonathon Davis

5/31/2013	5/31/2014	6,010,000		39.302006	-80.824561
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		3.08

Buckeye Creek @ Powell Withdrawal

Dennis Powell

5/31/2013 5/31/2014 6,010,000 39.277142 -80.690386

☐ 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

1,000 69.73 4.59

South Fork of Hughes River @ Knight Withdrawal

Tracy C. Knight & Stephanie C. Knight

5/31/2013 5/31/2014 6,010,000 39.198369 -80.870969

☐ 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

3,000 39.50 1.95

North Fork of Hughes River @ Davis Withdrawal

Lewis P. Davis and Normal J. Davis

5/31/2013 5/31/2014 6,010,000 39.322363 -80.936771

☐ 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

1,000 35.23 2.19

-00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8945 Source Name: West Fork River @ JCP Withdrawal
James & Brenda Raines

Source Latitude: 39.320913
Source Longitude: -80.337572

NHD-8 Code: 5020002

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

Anticipated withdrawal start date: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Withdrawals: 0
Max. Truck Pump Rate (gpm): 0

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Stonewall Jackson Dam
☐ Proximate PSD?
☑ Gauged Stream?

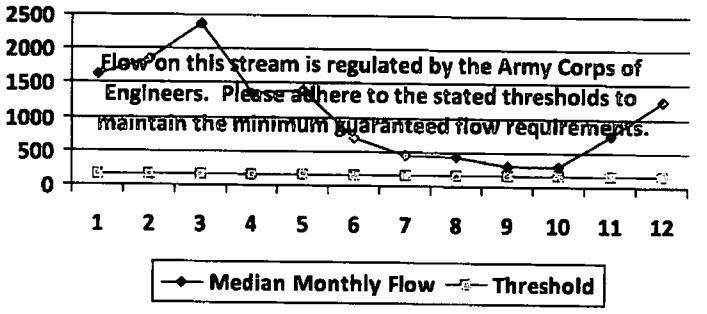
Reference Gauge: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median Monthly Flow (cfs)	Threshold	Estimated Available Volume (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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	-
Stream Demand (cfs):	17.61
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Adod Threshold (cfs	-
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.

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Bowen Unit 2H

Source ID: 8946 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 3,000

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Stonewall Jackson Dam
☐ Proximate PSD?
☑ Gauged Stream?

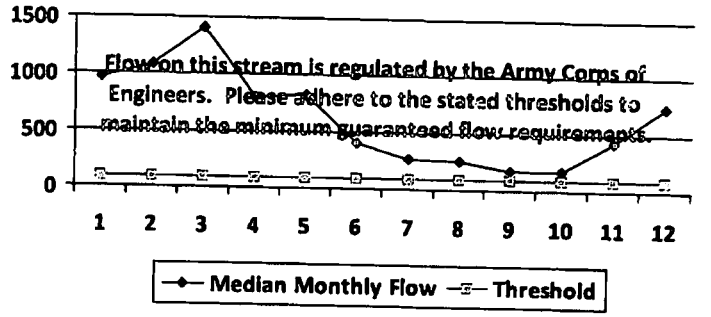
Reference Gauge: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold	Estimated Available water (cfs)
1	964.93	-	-
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 Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Stream Demand (cfs):	17.61
Pump rate (cfs):	6.68
Headwater Safety (cfs):	24.27
Ungauged Stream Safety (cfs):	0.00
Total Threshold (cfs	-
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8947 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm): 0

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

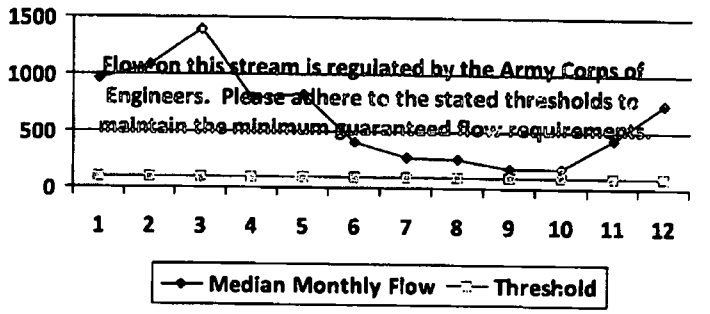
Reference Gaug 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment of Location

Base Threshold (cfs):	-
Stream Demand (cfs):	17.61
Pump rate (cfs):	2.23
Headwater Safety (cfs):	24.18
Ungauged Stream Safety (cfs):	0.00
Final Threshold (cfs	-
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.

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Bowen Unit 2H

Source ID: 8948 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

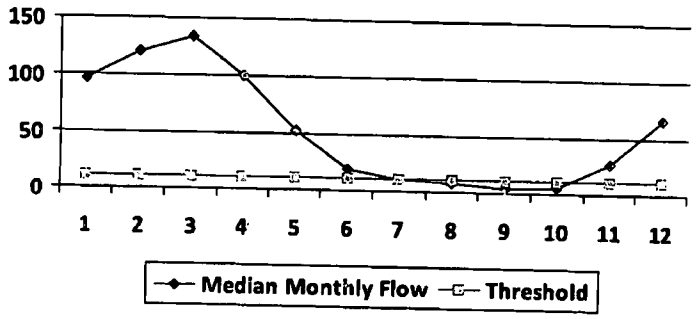
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	Estimated Available water (cfs)
1	95.28	17.55	77.91
2	119.86	17.55	102.48
3	134.11	17.55	116.74
4	99.59	17.55	82.22
5	52.54	17.55	35.16
6	18.35	17.55	0.97
7	10.38	17.55	-6.99
8	8.55	17.55	-8.82
9	4.38	17.55	-13.00
10	5.50	17.55	-11.87
11	26.86	17.55	9.49
12	65.63	17.55	48.26

Water Availability Profile



Water Availability Assessment of Location

Base Threshold (cfs):	8.73
Stream Demand (cfs):	2.23
Pump rate (cfs):	2.23
Headwater Safety (cfs):	2.18
Ungauged Stream Safety (cfs):	2.18
Final Threshold (cfs	17.55
Max. Gauge Reading (cfs):	71.96
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.

00887 | 047-017-06167 | Antero Resources

Bowen Unit 2H

Source ID: 8949 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

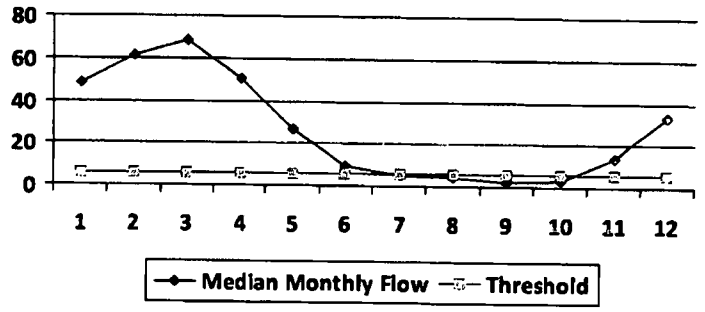
Anticipated withdrawal start date: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm): 0

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

Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV
Drainage Area (sq. mi.): 458.00
Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	4.44
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.11
Ungauged Stream Safety (cfs):	1.11
Final Threshold (cfs):	8.88
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.

00887 | 047-017-06167 | Antero Resources

Bowen Unit 2H

Source ID: 8950 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

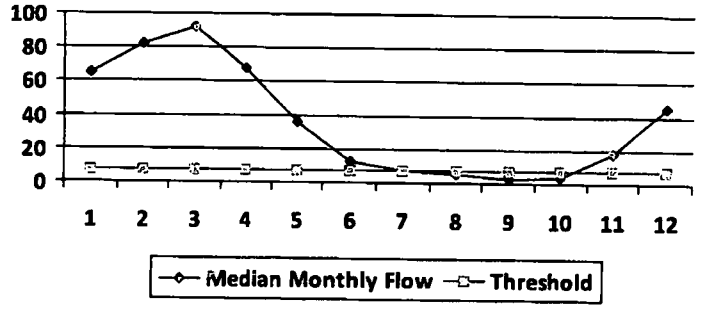
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	5.95
Stream Demand (cfs):	2.23
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.49
Ungauged Stream Safety (cfs):	1.49
Final Threshold (cfs	13.39
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.

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Bowen Unit 2H

Source ID: 8951 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

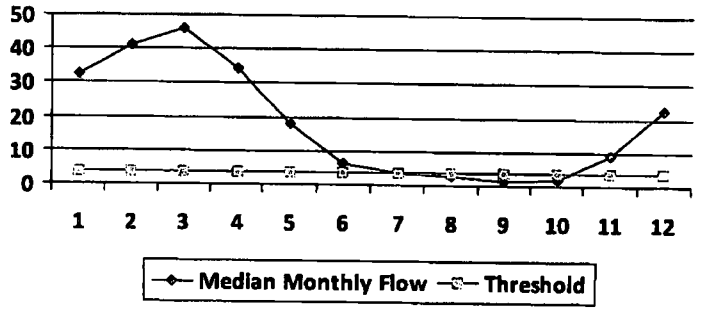
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment of Location

Base Threshold (cfs):	2.98
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.75
Ungauged Stream Safety (cfs):	0.75
Final Threshold (cfs):	6.70
Min. Gauge Reading (psi):	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.

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Bowen Unit 2H

Source ID: 8952 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

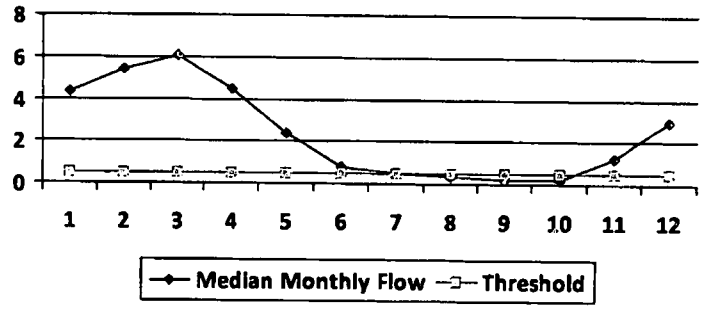
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	0.39
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.10
Ungauged Stream Safety (cfs):	0.10
Final Threshold (cfs):	2.82
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8953 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

Anticipated withdrawal start date: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

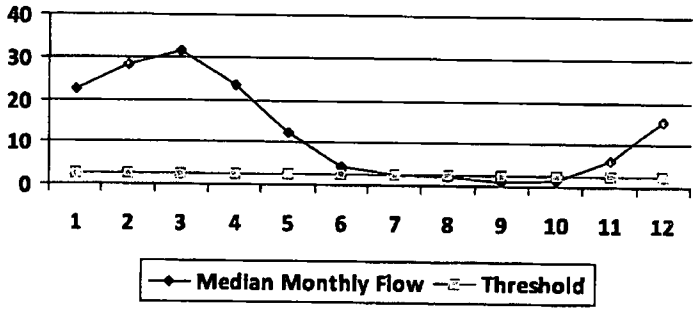
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Passby Threshold (cfs): 45

Month	Median Monthly Flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location:

Base Threshold (cfs):	2.05
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.51
Ungauged Stream Safety (cfs):	0.51
Final Threshold (cfs):	5.30
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8954 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm): 0

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

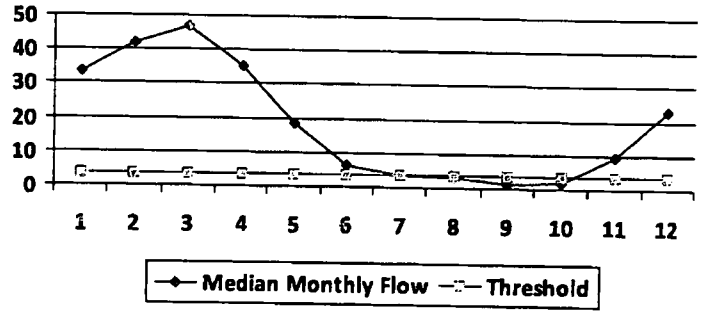
Reference Gauge 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median Monthly Flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	3.06
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.77
Ungauged Stream Safety (cfs):	0.77
Total Threshold (cfs	6.82
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8955 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

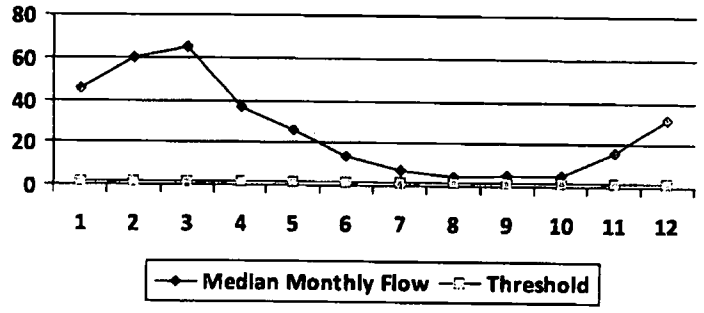
Reference Gauge: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.) 229.00

Gauge Threshold (cfs): 22

Month	Median Monthly Flow (cfs)	Threshold (cfs)	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 at Location:

Base Threshold (cfs):	1.56
Stream Demand (cfs):	5.62
Pump rate (cfs):	6.68
Headwater Safety (cfs):	0.39
Ungauged Stream Safety (cfs):	0.00
Final Threshold (cfs	14.26
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.

APPROVED DEC 2 6 2012

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8956 Source Name: North Fork of Hughes River @ Davis Withdrawal
Lewis P. Davis and Normal 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000

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

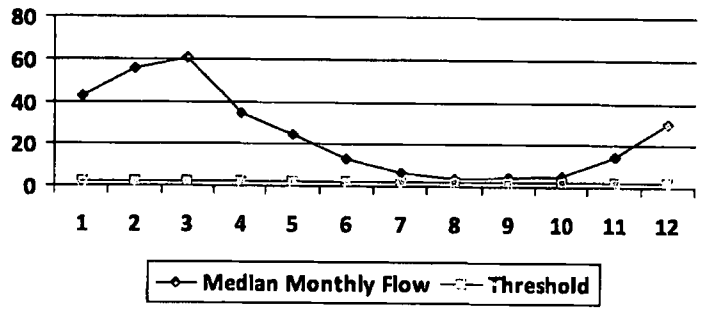
Reference Gauge: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.): 229.00

Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	1.46
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.36
Ungauged Stream Safety (cfs):	0.36
Final Threshold (cfs	4.42
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.

WMP-00887 | 047-017-06167 | Antero Resources

Bowen Unit 2H

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: 8957 Source Name City of Salem Reservior (Lower Dog Run)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal) 1,000,000
Total Volume from Source (gal): 6,010,000

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: 8958 Source Name Pennsboro Lake

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8959 Source Name Powers Lake (Wilderness Water Park Dam)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

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: 8960 Source Name Powers Lake Two

Max. Daily Purchase (gal)

Source start date: 5/31/2013
Source end date: 5/31/2014
Total Volume from Source (gal): 6,010,000

APPROVED DEC 2 6 2012

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: 8961 Source Name Poth Lake (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8962 Source Name Williamson Pond (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

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: 8963 Source Name Eddy Pond (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8964 Source Name Hog Lick Quarry

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal) 1,000,000
Total Volume from Source (gal): 6,010,000

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.

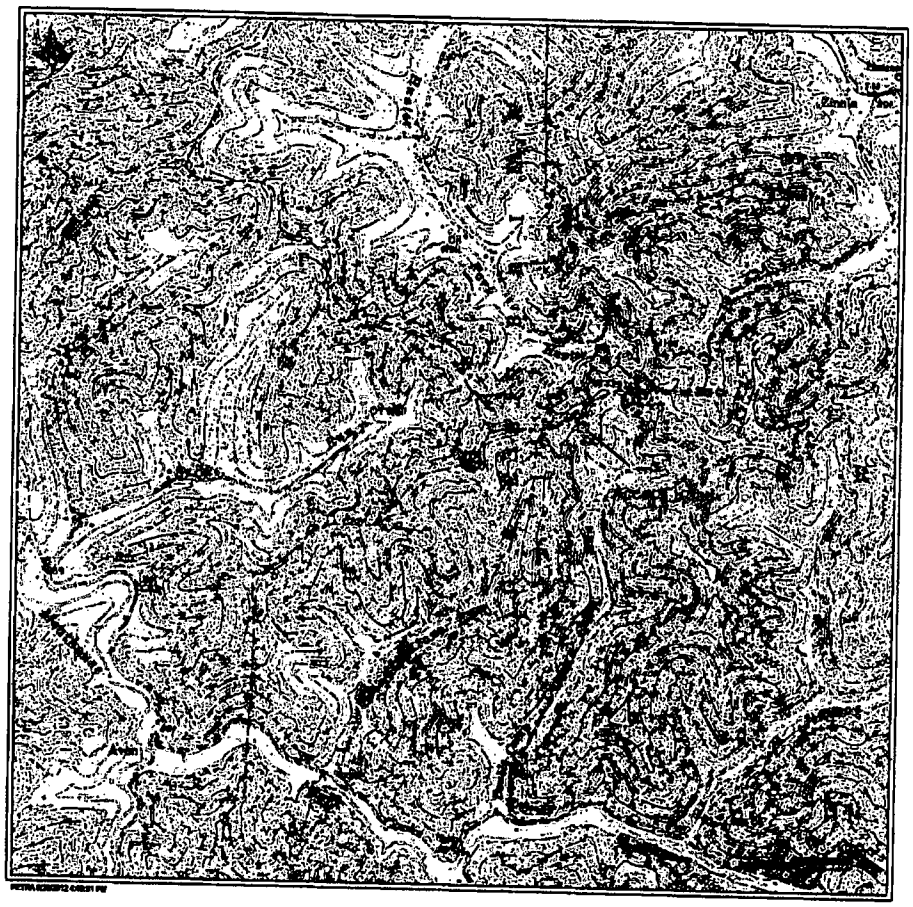
Source ID: 8965 Source Name Glade Fork Mine

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal) 1,000,000
Total Volume from Source (gal): 6,010,000

Recycled Frac Water

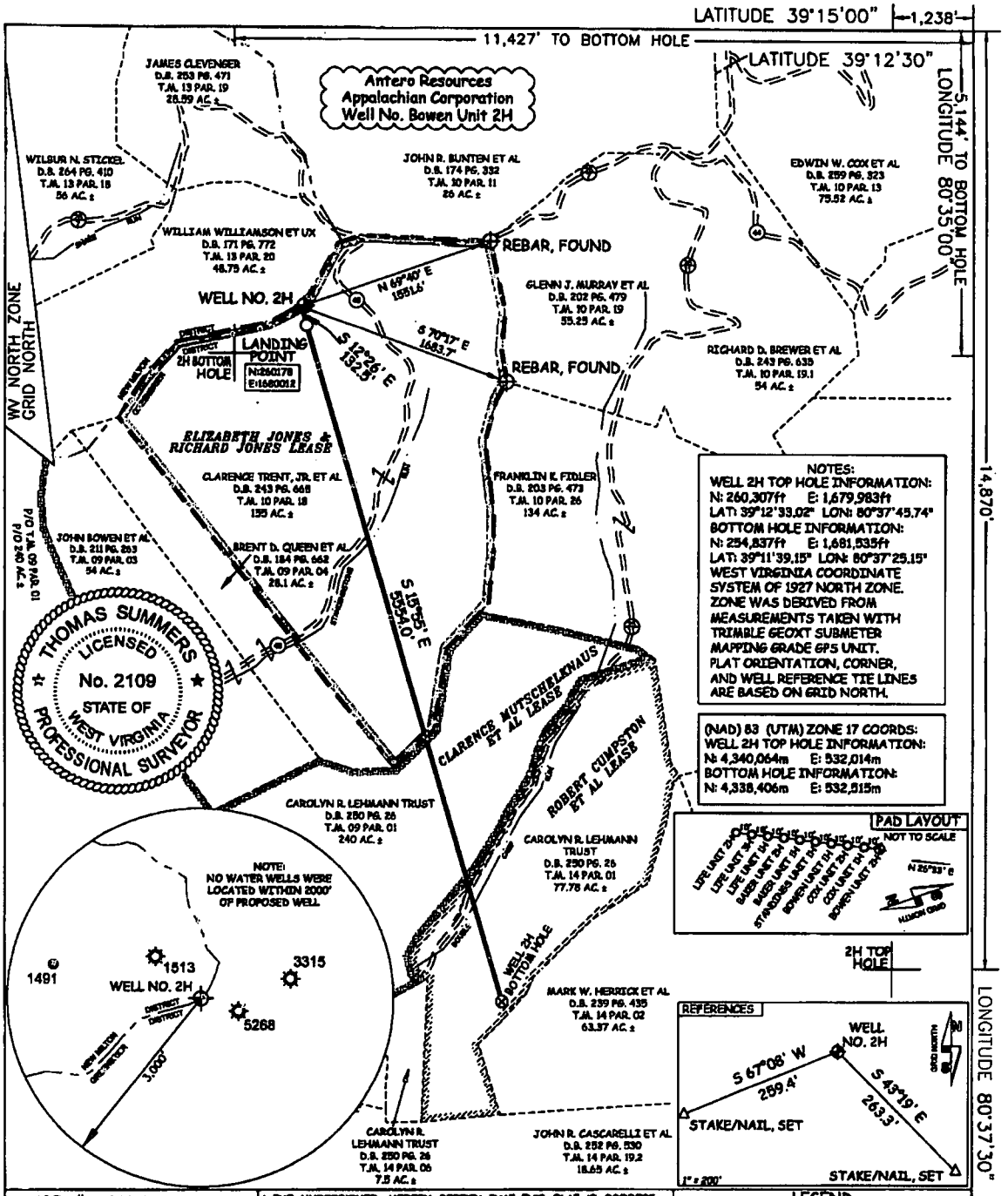
Source ID: 8966 Source Name Belton Unit 1H

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000



Antero Resources Corporation
APPALACHIAN BASIN
Bowen Unit 2H County Doddridge
0 2,000 4,000 FEET
REMARKS QUADRANGLE: NEW MILTON & BIG ISAAC WATERSHED: STANDINGS RUN DISTRICT: GREENBRIER
Date: 9/12/2012

17-06167



JOB # 12-066WA
DRAWING # BOWEN2H
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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.

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

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

THOMAS SUMMERS P.S. 2109

DATE 10/18/12
OPERATOR'S WELL# BOWEN UNIT #2H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

API WELL # 47 - 017 - 06167 HEA
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X
LOCATION: ELEVATION 1,410' WATERSHED STANDINGSTONE RUN OF MEATHOUSE FORK
QUADRANGLE NEW MILTON 7.5 (TOP HOLE); BIG ISAAC 7.5 (BOTTOM HOLE) DISTRICT GREENBRIER COUNTY DODDRIDGE
SURFACE OWNER CLARENCE TRENT, JR. ET AL ACREAGE 155 ACRES +/-
OIL & GAS ROYALTY OWNER ELIZABETH JONES & RICHARD JONES; CLARENCE MUTSCHELKNAUS ET AL; ROBERT CUMPSTON ET AL LEASE ACREAGE 155 ACRES±; 265 ACRES±; 78.375 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 7,600' TVD 14,300' MD

WELL OPERATOR ANTERO RESOURCES APPALACHIAN CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1625 17TH STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6

COUNTY NAME PERMIT

EXHIBIT C

MAP SCALE 1" = 1000'

500 0 1000 2000

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0235C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 235 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0235	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
54017C0235C

MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

EXHIBIT D

CONTACTS

Project Engineer

Michael R. Nestor, P.E., C.F.M.
The Thrasher Group
30 Columbia Boulevard
Clarksburg, WV 26301
Phone: 304-624-4108
Cell: 304-677-8981
Fax: 304-624-7831

Applicant/Developer Contact

Michael W. Ash, P.S.
Survey Coordinator
Antero Resources
175-D Elk Creek Road
Mt. Clare, WV 26408
Phone: 304-622-3842
Cell: 304-380-6181

EXHIBIT E

TRUMBULL
ENERGY SERVICES

May 9, 2013

Mike Ash
Antero Resources
175-D Elk Creek Road
Mt. Clare, WV 26408

Re: Double Camp Road – Cox Staging Area

Dear Mike,

Below please find an estimated budget to construct the Cox Staging Area. I have included E&S controls, grading, and placing a stone surface over the area. If you have any questions please feel free to give me a call at 412-980-2203.

Description	Quantity	Unit	Unit Cost	Total
Strip Topsoil	1,000	CY	$5.00	$5,000.00
Super Silt Fence	1,100	LF	$10.00	$11,000.00
Class 2A Geotextile	3,000	SY	$1.50	$4,500.00
Geogrid	3,000	SY	$6.00	$18,000.00
4"-6" Crusher Run	1,580	TN	$29.17	$46,088.60
3/4" Crusher Run	320	TN	$28.60	$9,152.00
Concrete Barrier	48	LF	$10.42	$500.00
Seed & Mulch	3,000	SY	$0.97	$2,910.00
				$97,150.60

Sincerely,

Richard C. Doyle, Jr
General Manager

P.O. BOX 6774, PITTSBURGH, PA 15212-0774 TEL 412.807.2000 FAX 412.807.2010

WEST VIRGINIA DEPARTMENT OF TRANSPORTATION

Division of Highways

Earl Ray Tomblin
Governor

Office of the District Engineer/Manager
District Four
PO Box 4220 (EXIT 121, I-79) * Clarksburg, WV 26302 * 304-842-1550

Paul A. Mattox, Jr., P. E.
Secretary of Transportation /
Commissioner of Highways

May 16, 2013

ANTERO RESOURCES APPALACHIAN
CORPORATION
175 D ELK CREEK ROAD
MOUNT CLARE, WV 26408

Dear Applicant:

Your approved copy of Permit Number **04-2013-0481** for a **T - Temporary** permit type is enclosed. A description of the work is on the permit.

Please contact the District Four office:

Denise Roncone 304-842-1575

at least 48 hours in advance of the date you plan to begin work so arrangements can be made to inspect the work authorized by the permit.

Failure to comply will result in cancellation of your permit.

A copy of this permit is to be available on the job at all times while the work is in progress for inspection by the West Virginia Division of Highways' personnel.

Sincerely,

District Engineer / District Manager

Permit Supervisor

Initials: TC
Attachments: Yes
Enclosure: No
cc:0409 Charleston Permits

E.E.O./AFFIRMATIVE ACTION EMPLOYER

Form MM-109
Rev. 05-19-05

PERMIT NO. 0420130481

PERMIT TO ENTER UPON, UNDER, OVER OR ACROSS THE STATE ROADS OF THE STATE OF WEST VIRGINIA, AS PROVIDED FOR IN SECTION 6, ARTICLE 16, CHAPTER 17; SECTION 9, ARTICLE 16, CHAPTER 17; SECTION 8, ARTICLE 4, CHAPTER 17, WEST VIRGINIA CODE, 1931, AS AMENDED.

THIS PERMIT, Made this 1 day of MAY 20 13, between the WEST VIRGINIA DEPARTMENT OF TRANSPORTATION, DIVISION OF HIGHWAYS, a statutory corporation hereinafter called DIVISION and ANTERO RESOURCES

Address: 175-D Elk Creek Road Mt. Clare, WV. 26408 Phone No: 304-622-3842

hereinafter called APPLICANT.

WITNESSETH

In consideration of the hereinafter set out covenants and in accordance with Section 6, Article 16, Chapter 17; or Section 9, Article 16, Chapter 17; or Section 8, Article 4, Chapter 17, of the Official Code of West Virginia, 1931, as amended, and the rules and regulations promulgated thereunder, APPLICANT does hereby apply to enter

Route Type & No. CR 25 DOH Project No. NA (if applicable);

at 250 ft. west of Jct. Meathouse Fork (CR 25) & Double Camp Rd. SLS 25/11 Mile Post 7.384

in DODDRIDGE County, for the purposes hereinafter set forth and in accordance with plans and specifications which are attached hereto and made a part hereof: Remove 12" of topsoil from proposed staging area. After removal place separation fabric down. Place 10" of 4-6" crusher run on top of the separation fabric followed by 2" of ¾" – 1 ½" crusher run on top of that. Cox Staging Area

APPLICANT further agrees to accept the conditions hereinafter set forth:

1. APPLICANT shall deposit with DIVISION the sum of $ 0 in the form of an official, certified or cashier's check, or executed bond with surety satisfactory to DIVISION to cover any damage and inspection costs DIVISION may sustain by reason of the granting of this permit, including any expense incurred in restoring said highway to its original condition or the proper repair of any and all damages that may result within one (1) year from the date of the completion of said work.

2. APPLICANT agrees to reimburse DIVISION for inspection costs as follows:
   - ☐ A. For any inspection costs incurred under this permit.
   - ☐ B. At $ _____ per linear foot for _____ feet of water line installed under this permit
   - ☐ C. At $ _____ per linear foot for _____ feet of sewer line installed under this permit

3. APPLICANT shall notify DIVISION at least 48 hours in advance of the date the work will begin. Failure to comply will be cause for cancellation of this permit.

4. APPLICANT agrees to protect its employees, equipment and users of the highway at all times in accordance with the current Division of Highways manual "Traffic Control For Street and Highway Construction and Maintenance Operations".

5. APPLICANT agrees to comply with all applicable state and federal laws in the performance of work under this permit.

6. Supplementary conditions cited on the reverse side of this permit are understood and agreed to be a part hereof.

7. The work authorized under this permit shall be completed on or before (Date): 05-10-2013

RECOMMENDED: Denise Ramone

Title PERMIT SUPERVISOR

Signature and Title of Applicant

BOND REQUIREMENT:
BOND NO. LPM9102891 /DATE 2-21-12
Attached ☐ On File ☑
INSPECTION: Owner/Consultant ☐
Full Time ☐ Part Time ☐
Periodic ☑ Reimbursable ☐ No Cost ☑

APPROVED: Greg Bailey

Title DISTRICT MANAGER
West Virginia Division of Highways

AUTHORIZATION NO: _____

PERMIT NO: 0420130481

CHAPTER 17 WEST VIRGINIA CODE, 1931

§17-4-8. Use of roadbed by railroad, telephone company, etc.
No railroad or electric or other railway shall be constructed upon the roadbed of any state road, except to cross the same, nor shall any person, firm or corporation enter upon or construct any works in or upon such road, or lay or maintain thereon or thereunder any drainage, sewer or water pipes, gas pipes, electric conduits or other pipes, nor shall any telephone, telegraph or electric line or power pole, or any other structure whatsoever, be erected upon, in or over any portion of a state road, except under such restrictions, conditions and regulations as may be prescribed by the state road commissioner. Whenever any railroad or electric or other railway, heretofore or hereafter constructed, shall cross any state road, it shall be required to keep its own roadbed, and the bed of the road or highway at such crossing, in proper repair, or else to construct and maintain an overhead or undergrade crossing, subject to the approval of the state road commissioner; and the tracks of such railroad or railway at grade crossings shall be so constructed as to give a safe and easy approach to and across the same, and when the construction of such approaches is made necessary by a change in the railroad grade at the grade crossing, the cost shall be upon the railway company.

§17-16-6. Permit by commission or county court for openings in or structures on public roads; franchises and easements of oil, etc., transportation companies.
No opening shall be made in any state or county-district road or highway, nor shall any structure be placed therein or thereover, nor shall any structure, which has been so placed, be changed or removed, except in accordance with a permit from the state road commission or county court, as the case may be. No road or highway shall be dug up for laying or placing pipes, sewers, poles or wires, or for other purposes, and no trees shall be planted or removed or obstructions placed thereon, without the written permit of the commission or county court, or its duly authorized agent, and then only in accordance with the regulations of the commission or court. The work shall be done under the supervision and to the satisfaction of the commission or court; and the entire expense of replacing the highway in as good condition as before shall be paid by the persons to whom the permit was given, or by whom the work was done: **Provided, however,** That nothing herein contained shall be so construed as to prevent any oil or gas company or person having a proper permit or franchise from transporting oil or gasoline along any of the public highways of this State, nor to give such company a franchise without paying to the landowners through whose lands such road passes the usual and customary compensation paid or to be paid to the landowners for such right of way. Any grant or franchise when made shall be construed to give to such company or person only the right to use the easement in such public road.

A violation of any provision of this section shall be a misdemeanor, and the person or corporation violating the same shall, upon conviction thereof, be fined not less than twenty-five nor more than one hundred dollars for each offense.

§17-16-9. Private driveways or approaches to roads; obstruction of ditches.
The owner or tenant of land fronting on any state road shall construct and keep in repair all approaches or driveways to and from the same, under the direction of the state road commission, and, likewise, the owner or tenant of land fronting on any county-district road shall construct and keep in repair approaches or driveways to and from the same, under the direction of the county road engineer, and it shall be unlawful for such owner or tenant to fill up any ditch, or place any material of any kind or character in any ditch, so as in any manner to obstruct or interfere with the purposes for which it was made.

SUPPLEMENTARY CONDITIONS

1. The person, firm or corporation to whom a permit is issued agrees to hold the State of West Virginia and DIVISION harmless on account of any damages to persons or property which may arise during the process of the work authorized by this permit or by reason thereof.
2. Applications for permission to perform work within highway rights of way shall be made on DIVISION'S standard permit form and shall be signed by the authorized representative of the person, firm or corporation applying.
3. The APPLICANT shall give detailed information concerning the work to be performed and the application must include a sketch sufficient to show the nature of the work performed.
4. APPLICANT, his agents, successor, heirs or assigns, contractors or any other person, firm or corporation working under APPLICANT'S real or apparent authority, shall perform the work in a manner satisfactory to DIVISION. Damage to the road resulting at any time from work authorized under this permit shall be repaired by APPLICANT. Unsatisfactory repairs may be a corrected by DIVISION or its authorized agent and the cost thereof paid by APPLICANT.
5. DIVISION assumes no liability for damage to the proposed work by reason of construction or maintenance work on the road.
6. This permit is granted subject to removal of the authorized installation by APPLICANT at no cost to DIVISION when required for improvement of the road, and subject to all regulations now or hereafter adopted by DIVISION.
7. Utility installation shall be in accordance with the current manual, "Accommodation of Utilities on Highway Right of Way".
8. Driveways shall be in accordance with the current manual, "Rules and Regulations for Constructing Driveways on State Highway Rights-of-Way."
9. DIVISION reserves the right to cancel this permit at any time, should APPLICANT fail to comply with the terms and conditions under which it is granted.
10. This permit is granted only insofar as the DIVISION has a right to do so.

0420130481

Addendum to Permit 04-2013-0481

This addendum, made this 13th day of May 2013, between the West Virginia Department of Transportation, Division of Highways, a statutory company hereinafter called the Division and Antero Resources

Address: 1625 17th Street, Denver, CO 80202 Phone: 303 357-7310

hereinafter called APPLICANT.

The Applicant has filed with the DIVISION a written application for the following named route and location:

Doddridge County Route SLS 25, Meathouse Fork@ MP7.384 to construct a truck staging area for the Trent, Wagner and Hughs Well Pad sites.

1. All Equipment, Machinery, and Materials (including but not limited to Jersey Barriers, etc) must be stored off of the Division's right-of-way. No Parking will be permitted on the Division's Right-of-Way.
2. Equipment, Machinery, or Materials, even if placed off of the Division's Right-of-Way, must not cause sight distance problems.
3. Entrance and Exit must clearly marked in the field and follow the Division's Manual on Rules and Regulations for Constructing Driveways on State Highway Rights-of-Way.

- After completion of the project, a joint review of roads will be filmed and evaluated to assure roads have been repaired to existing condition or better.
- No travel on School Bus Routes during their traversing operational hours on above mentioned route on bi-directional roadways where the lane widths are less than 10 ft.
- Pilot Vehicle required for all Oversized Loads on covered roads.
- Ditch lines to be maintained by applicant. FDR or equivalent required to stabilize road to uphold increased traffic and heavy and excess amount of loads. Centerline of roadway cannot be relocated without an agreement between WV DOH and Antero Resources.
- Repairs that will include "Hot Mix Asphalt" will have the following testing requirement: The supplier will be responsible for testing at the plant; Compaction testing will be as per WV DOH specifications.
- The Division of Highways shall have the right at all times to inspect the work, and if such inspections should reveal that the work is not done according to specifications, upon being so advised by the Division, ANTERO Resources agrees to take immediate corrective actions.

Applicant shall properly repair and maintain any and all damages that may result to said bridges, highways, shoulders and ditches from hauling activities of Applicant, its agents, contractors and employees, to as good a condition prior to commencement of Applicant's operation or as when the permit was issued, as determined by the District Engineer/Manager of the DIVISON having jurisdiction over the work permitted, or pay damages therefore in the amount to sufficiently restore such bridges, roads, highways, shoulders and ditches to original condition; and shall reimburse the DIVISON for all inspection costs incurred by it in connection with said work and repairs of such damages and faithfully comply with all terms and conditions of said permits and save harmless the DIVISION and the State of West Virginia from all losses resulting from the conduct of said work and repairs; provided that all projects covered by this blanket bond have been restored to original or better condition; then this Bond shall be released; or otherwise will remain in full force and effect.

Bond Amount: $1,000,000.00

Bond Number: LPM9062891 Date: 2/21/2012

Dist. Permit Number 04201304 81

BOND Number LPM 9062891

OIL and GAS DATA INFORMATION SHEET

APPLICANT

Company Name ANTERO RESOURCES APPALCHIAN CORPORATION

Address 1625 17TH STREET

City DENVER ST CO Zip 80202

Contact Person Permit Burt Simcox Telephone (304) 282-9372

24/7 Road Maintenance Contact Aaron Kunzler Telephone _____ Cell (405) 227-8344

24/7 Backup Contact Dusty Wood Telephone _____ Cell (817) 771-1436

Drilling/Fracking will require _____ Less than 5000 Barrels of fluids X 5000/+

Site Location

Site Name Cox Staging area Road Local Name Meathouse Fork Rte.# SLS 25

Approach location WGS 83 Decimal Format GPS N39.19168 W-80.62721 County Doddridge

Location Description

On Route.# SLS 25 being 250 feet N S E W of Jct. of Rte.# SLS 25 and Rte.# SLS25/11

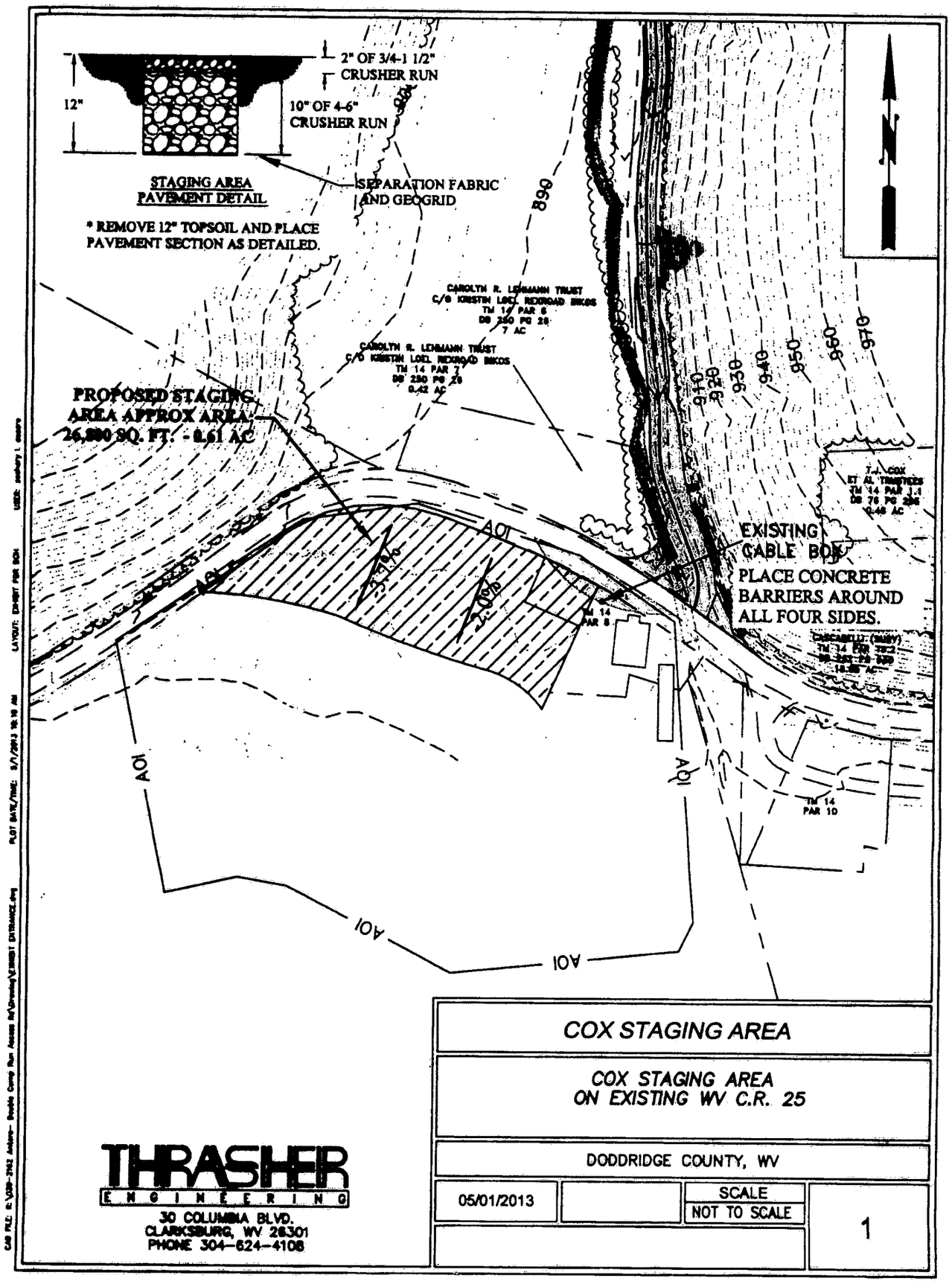
DOH USE ONLY **HAULING ROUTE From US or WV Route (Attach Map)**

Name & Rte.#	Beg MP	End MP	Surface Type	Condition
STAGING Area will service: Trent PAD 04-12-1069 Wagner PAD Hughes PAD				

Well location WGS 83 **Decimal Format GPS** N: W:

WV DEP Permit Number 47 - _____ - _____

STATE COUNTY PERMIT NUMBER



COX STAGING AREA			
COX STAGING AREA ON EXISTING WV C.R. 25			
DODDRIDGE COUNTY, WV			
05/01/2013		SCALE NOT TO SCALE	1

THRASHER
ENGINEERING
30 COLUMBIA BLVD.
CLARKSBURG, WV 26301
PHONE 304-624-4108

0420130481

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

January 29, 2013

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-1706167, 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 of completion of drilling, 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: BOWEN UNIT 2H
Farm Name: CLARENCE TRENT JR ET AL
API Well Number: 47-1706167
Permit Type: Horizontal 6A Well
Date Issued: 01/29/2013

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.

WW - 6B
(1/12)

1-06115 I

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

17 04 E11

1) Well Operator: Antero Resources Appalachian Corporation | 494488557 (Operator ID) | 017- Doddridge (County) | Greenbrier (District) | New Milton 7.5' (Quadrangle)

2) Operator's Well Number: Bowen Unit 2H Well Pad Name: Trent Pad

3 Elevation, current ground: ~1422' Elevation, proposed post-construction: 1410'

4) Well Type: (a) Gas ☒ Oil ☐
Other
(b) If Gas: Shallow ☒ Deep ☐
Horizontal ☒

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale: 7,600' TVD, Anticipated Thickness: 60', Associated Pressure - 3,250#

7) Proposed Total Vertical Depth: 7,600 TVD
8) Formation at Total Vertical Depth: Marcellus Shale
9) Proposed Total Measured Depth: 14,300' MD
10) Approximate Fresh Water Strata Depths: 37, 214'
11) Method to Determine Fresh Water Depth: Offset well records. Depths have been adjusted according to surface elevations.
12) Approximate Saltwater Depths: 1795' ~OK LEC
13) Approximate Coal Seam Depths: 352', 1058'
14) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill, perforate, fracture a new horizontal shallow well and complete Marcellus Shale

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): 13.97 acres

19) Area to be disturbed for well pad only, less access road (acres): 6.81 acres

WW - 6B
(1/12)

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#	90'	90'	CTS, 38 Cu. Ft.
Fresh Water	13-3/8"	New	J-55	54.5#	300'	300'	CTS, 417 Cu. Ft.
Coal	9-5/8"	New	J-55	36#	2490'	2490'	CTS, 1014 Cu. Ft.
Intermediate							
Production	5-1/2"	New	P-110	20#	14,300'	14,300	3537 Cu. Ft.
Tubing	2-3/8"	New	N-80	4.7#		7200'	
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.

WW-9
Rev. 1/12

API No. 47 - 017 - [illegible]
Operator's Well No. Bowen Unit 2H

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

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

Operator Name Antero Resources Appalachian Corporation OP Code 494488557

Watershed Standingstone Run of Meathouse Fork Quadrangle New Milton 7.5'

Elevation 1410' County Doddridge District Greenbrier

Description of anticipated Pit Waste: Drilling and Flowback Fluids and Cuttings

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

Will a synthetic liner be used in the pit? Yes . If so, what mil.? 60 mil

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 _____

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? Please See Attachment
Will closed loop system be used ? Yes
Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Removed offsite and taken to landfill
-If left in pit and plan to solidify what medium will be used? Cement, lime, 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

Subscribed and sworn before me this 18 day of October, 2012

_____ Notary Public

My commission expires 11/18/2014

C.E. WHITLOCK
NOTARY PUBLIC
STATE OF COLORADO
MY COMMISSION EXPIRES 11/18/2014

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Rev. 1/12

API No. 47- 017 - 06187
Operator's Well No. Brown Unit 2H

Property Boundary
Road
Existing Fence
Planned Fence
Stream
Open Ditch
Rock
North
Buildings
Water Wells
Drill Sites

Diversion
Spring
Wet Spot
Drain Pipe w/ size in inches (12)
Waterway
Cross Drain
Artificial Filter Strip
Pit: Cut Walls
Pit: Compacted Fill Walls
Area for Land Application of Pit Waste

New Well Pad (6.81) + New Frac Pit (3.22) + New Access Roads (2.08) + Topsoil Stockpile (0.59) + Waste Stockpile (1.03) + Timber Stockpile (0.23) = 13.97 Acres

Proposed Revegetation Treatment: Acres Disturbed 13.97 Prevegetation pH 6.0

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

prepad & mulch all cut areas no less than 2 ton per acre

Seed Mixtures

Area I (Temporary) Seed Type	lbs/acre	Area II (Permanent) Seed Type	lbs/acre
Oats	168	Tall Fescue	60
Rye	120		

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: David Cunn

Comments:

Title: oil & gas inspector Date: 10-30-12

Field Reviewed? (✓) Yes ( ) No

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Water Management Plan: Primary Water Source

00887 047-017-06167 Antero Resources

Bowen Unit 2H

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.

Stream/River

West Fork River @ JCP Withdrawal **James & Brenda Raines**

5/31/2013	5/31/2014	6,010,000	39.320913	-80.337572

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

1,000	170.54	146.25

West Fork River @ McDonald Withdrawal **David Shrieves**

5/31/2013	5/31/2014	6,010,000	39.16761	-80.45069

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

3,000	170.54	106.30

West Fork River @ GAL Withdrawal **David Shrieves**

5/31/2013	5/31/2014	6,010,000	39.16422	-80.45173

☑ Stonewall Jackson Dam 3061000 WEST FORK RIVER AT ENTERPRISE, WV

1,000	170.54	106.30

APPROVED DEC 26 2012

McElroy Creek @ Forest Withdrawal

Forest C. & Brenda L. Moore

5/31/2013	5/31/2014	6,010,000		39.39675	-80.738197
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		71.96		13.10

McElroy Creek @ Sweeney Withdrawal

Bill Sweeney

5/31/2013	5/31/2014	6,010,000		39.398123	-80.656808
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		6.66

Meathouse Fork @ Gagnon Withdrawal

George L. Gagnon and Susan C. Gagnon

5/31/2013	5/31/2014	6,010,000		39.26054	-80.720998
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		71.96		11.74

Meathouse Fork @ Whitehair Withdrawal

Elton Whitehair

5/31/2013	5/31/2014	6,010,000		39.211317	-80.679592
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		7.28

Tom's Fork @ Erwin Withdrawal

John F. Erwin and Sandra E. Erwin

5/31/2013	5/31/2014	6,010,000		39.174306	-80.702992
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		0.59

Arnold Creek @ Davis Withdrawal

Jonathon Davis

5/31/2013	5/31/2014	6,010,000		39.302006	-80.824561
☐			3114500	MIDDLE ISLAND CREEK AT LITTLE, WV	
	1,000		69.73		3.08

Buckeye Creek @ Powell Withdrawal

Dennis Powell

5/31/2013	5/31/2014	6,010,000		39.277142	-80.690386

☐ 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

1,000 69.73 4.59

South Fork of Hughes River @ Knight Withdrawal

Tracy C. Knight & Stephanie C. Knight

5/31/2013	5/31/2014	6,010,000		39.198369	-80.870969

☐ 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

3,000 39.80 1.95

North Fork of Hughes River @ Davis Withdrawal

Lewis P. Davis and Norma J. Davis

5/31/2013	5/31/2014	6,010,000		39.322363	-80.936771

☐ 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

1,000 35.23 2.19

-00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8945 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000

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

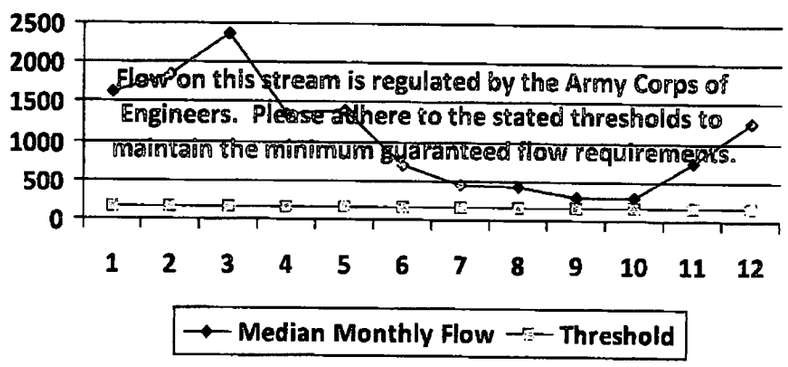
Reference Gauge: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median monthly flow (cfs)	[illegible]	Estimated Available [illegible]
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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	-
Stream Demand (cfs):	17.61
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
[illegible] (cfs	-
[illegible] 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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8946 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 3,000
Max. Simultaneous Trucks: 0
Max. Truck Pump rate (gpm): 0

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Stonewall Jackson Dam
☐ Proximate PSD?
☑ Gauged Stream?

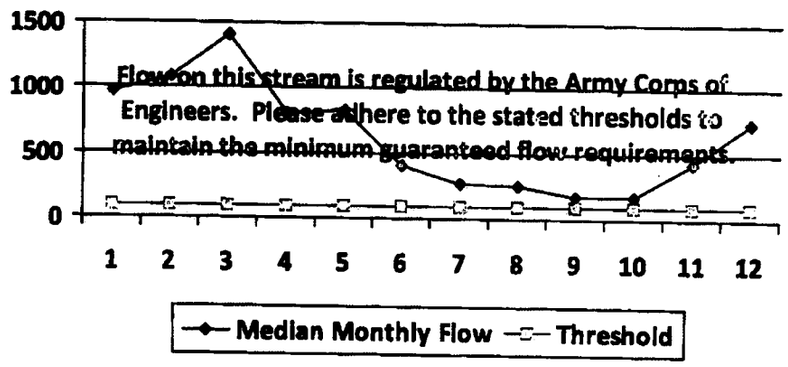
Reference Gauge 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.) 759.00

Gauge Threshold (cfs): 234

Month	Median Monthly Flow (cfs)	Threshold	Estimated Available Water (cfs)
1	964.92	-	-
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 Profile



Water Availability Assessment at Location

Base Threshold (cfs): -
Stream Demand (cfs): 17.61
Pump rate (cfs): 6.68
Headwater Safety (cfs): 24.27
Ungauged Stream Safety (cfs): 0.00
Total Threshold (cfs): -
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8947 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014

☐ Endangered Species? ☑ Mussel Stream?
☐ Trout Stream? ☐ Tier 3?
☑ Regulated Stream? Stonewall Jackson Dam
☐ Proximate PSD?
☑ Gauged Stream?

Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm): 0

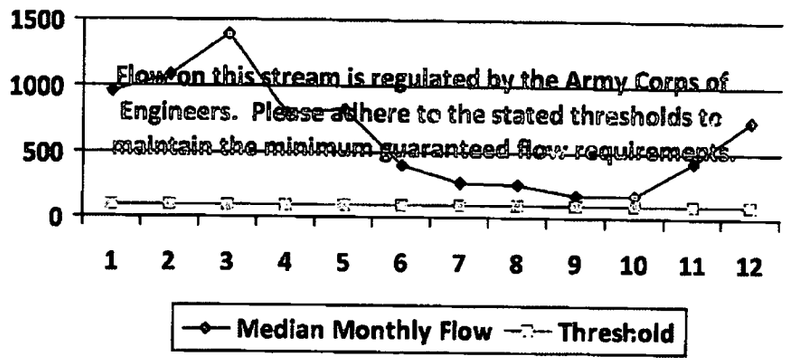
Reference Gauge: 3061000 WEST FORK RIVER AT ENTERPRISE, WV

Drainage Area (sq. mi.): 759.00

Gauge Threshold (cfs): 234

Month	Median Monthly Flow (cfs)	Threshold	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 Profile



Flow on this stream is regulated by the Army Corps of Engineers. Please adhere to the stated thresholds to maintain the minimum guaranteed flow requirements.

Water Availability Assessment of Location

Base Threshold (cfs):	-
Stream Demand (cfs):	17.61
Pump rate (cfs):	2.23
Headwater Safety (cfs):	24.18
Ungauged Stream Safety (cfs):	0.00
Total Threshold (cfs):	-
Site 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 for each month.

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Bowen Unit 2H

Source ID: 8948 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

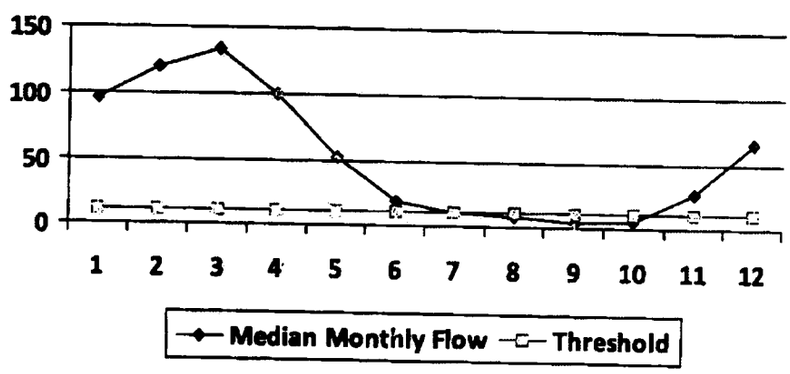
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Gauge Threshold (cfs): 45

Month	Median Monthly Flow (cfs)	Threshold	Estimated Available Water (cfs)
1	95.28	17.55	77.91
2	119.86	17.55	102.48
3	134.11	17.55	116.74
4	99.59	17.55	82.22
5	52.54	17.55	35.16
6	18.35	17.55	0.97
7	10.38	17.55	-6.99
8	8.55	17.55	-8.82
9	4.38	17.55	-13.00
10	5.50	17.55	-11.87
11	26.86	17.55	9.49
12	65.63	17.55	48.26

Water Availability Profile



Water Availability Assessment at Location

Base Threshold (cfs):	8.73
Stream Demand (cfs):	2.23
Pump rate (cfs):	2.23
Headwater Safety (cfs):	2.18
Ungauged Stream Safety (cfs):	2.18
Final Threshold (cfs):	17.55
Min. Gauge Reading (cfs):	71.96
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8949 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

Anticipated withdrawal start date: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

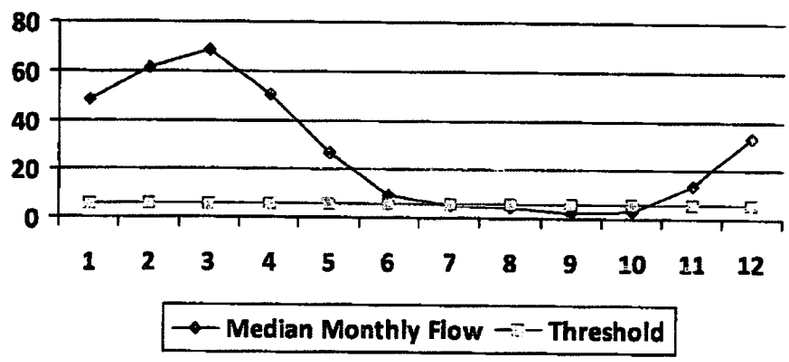
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	4.44
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.11
Ungauged Stream Safety (cfs):	1.11
Final Threshold (cfs	8.88
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8950 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

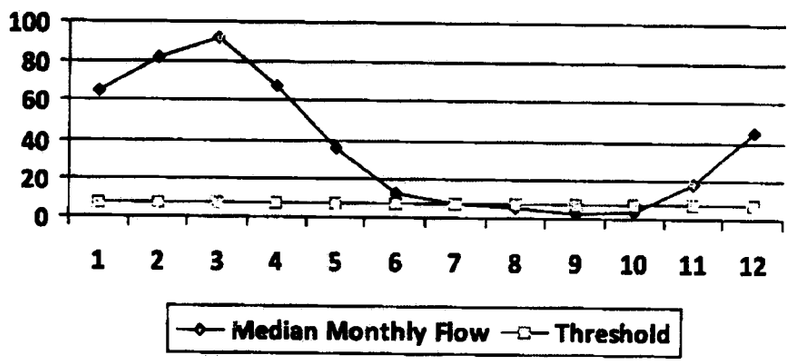
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	5.95
Stream Demand (cfs):	2.23
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.49
Ungauged Stream Safety (cfs):	1.49
Final Threshold (cfs	13.39
Adjm. 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.

Approved

00887 | 047-017-06167 | Antero Resources

Bowen Unit 2H

Source ID: 8951 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

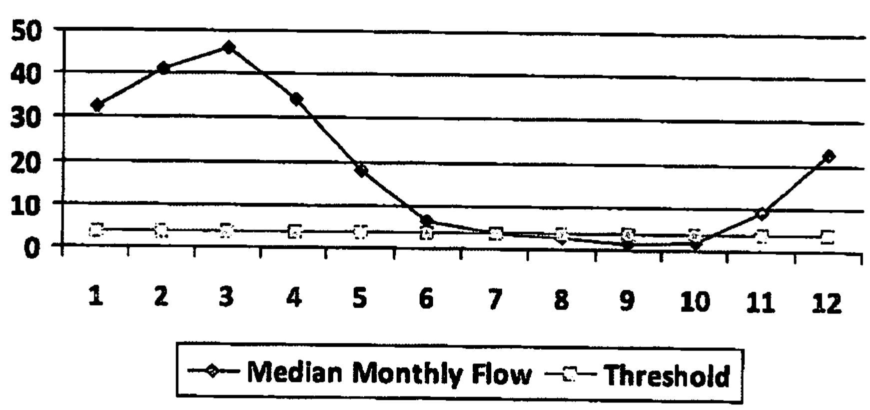
Reference Gaug 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment of Location

Base Threshold (cfs):	2.98
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.75
Ungauged Stream Safety (cfs):	0.75
Total Threshold (cfs):	6.70
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.

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Bowen Unit 2H

Source ID: 8952 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. Pump rate (gpm): 1,000
Max. Simultaneous Trucks: 0
Max. Truck pump rate (gpm): 0

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

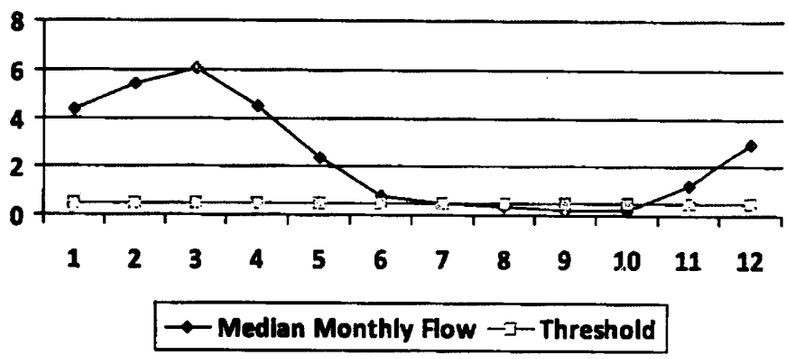
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	Estimated passby 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	-2.16
11	1.21	2.82	-1.21
12	2.96	2.82	0.54

Water Availability Profile



Water Availability Assessment at Location

Base Threshold (cfs):	0.39
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.10
Ungauged Stream Safety (cfs):	0.10
Final Threshold (cfs):	2.82
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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8953 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

Anticipated withdrawal start date: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

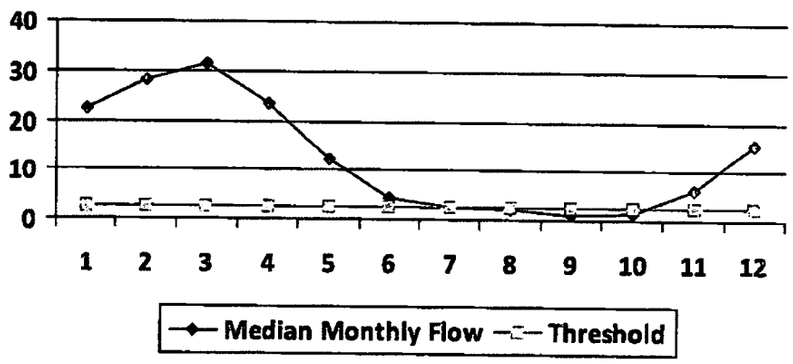
Reference Gauge: 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.): 458.00

Headwater Threshold (cfs): 45

Month	Median Monthly Flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Intake

Base Threshold (cfs): 2.05
Stream Demand (cfs): 0.00
Pump rate (cfs): 2.23
Headwater Safety (cfs): 0.51
Ungauged Stream Safety (cfs): 0.51
Total Threshold (cfs): 5.30
Min. Passby Reading (cfs): 69.73
Passby at Intake (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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8954 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: 5/31/2013
Anticipated Withdrawal End Date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

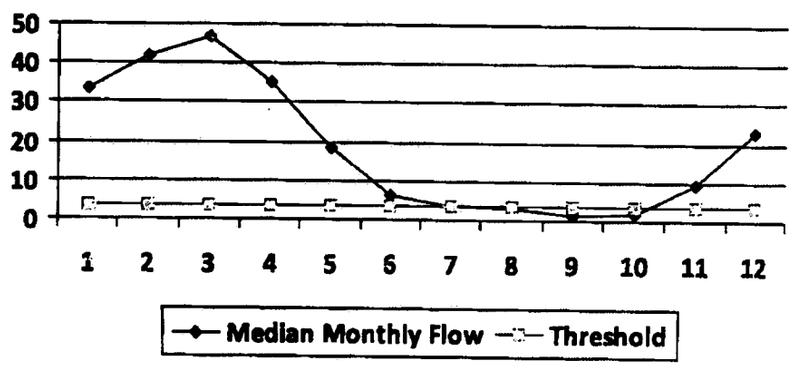
Reference Gauge 3114500 MIDDLE ISLAND CREEK AT LITTLE, WV

Drainage Area (sq. mi.) 458.00

Gauge Threshold (cfs): 45

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	3.06
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.77
Ungauged Stream Safety (cfs):	0.77
Final Threshold (cfs:	6.82
Max. 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.

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8955 Source Name: South Fork of Hughes River @ Knight Withdrawal
Tracy C. Knight & Stephanie C. Knight

Source Latitude: 39.198369
Source Longitude: -80.870969

NHD-8 Code: 5030203

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

Proposed withdrawal start date: 5/31/2013
Proposed withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
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?

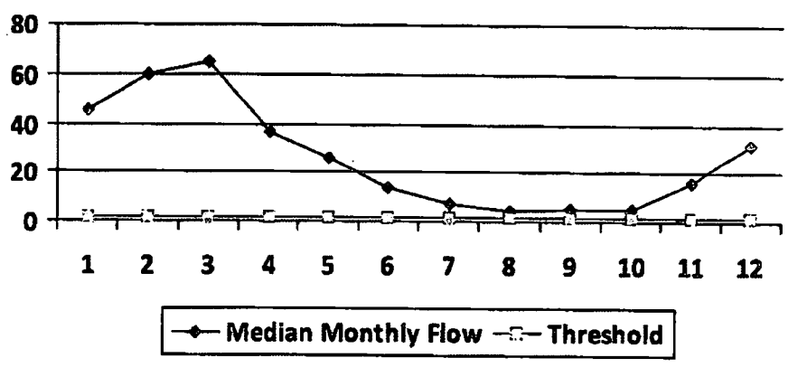
Reference Gauge: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.): 229.00

Gauge Threshold (cfs): 22

Month	Median Monthly Flow (cfs)	Threshold (cfs)	Withdrawal Available (Median - Threshold)
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	-9.06
11	15.54	14.26	1.30
12	32.06	14.26	17.82

Water Availability Profile



Water Availability Assessment at Location:

Base Threshold (cfs):	1.56
Stream Demand (cfs):	5.62
Pump rate (cfs):	6.68
Headwater Safety (cfs):	0.39
Ungauged Stream Safety (cfs):	0.00
Final Threshold (cfs):	14.26
Withdrawal Available (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.

APPROVED DEC 2 6 2012

00887 047-017-06167 Antero Resources

Bowen Unit 2H

Source ID: 8956 Source Name: North Fork of Hughes River @ Davis Withdrawal
Lewis P. Davis and Normal 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: 5/31/2013
Anticipated withdrawal end date: 5/31/2014
Total Volume from Source (gal): 6,010,000
Max. pump rate (gpm): 1,000
Max. Simultaneous Withdrawals: 0
Max. Truck Withdrawals (gpd): 0

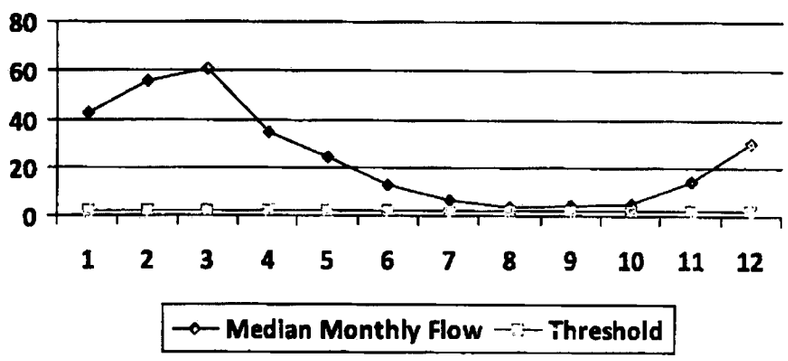
- [x] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [ ] Gauged Stream?

Reference Gauge: 3155220 SOUTH FORK HUGHES RIVER BELOW MACFARLAN, WV

Drainage Area (sq. mi.): 229.00 Gauge Threshold (cfs): 22

Month	Median monthly flow (cfs)	Threshold	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 Profile



Water Availability Assessment at Location

Base Threshold (cfs):	1.46
Stream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.36
Ungauged Stream Safety (cfs):	0.36
Total Threshold (cfs	4.42
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.

-00887 047-017-06167 Antero Resources

Bowen Unit 2H

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: 8957 Source Name City of Salem Reservior (Lower Dog Run)

Source start date: 5/31/2013

Source end date: 5/31/2014

Max. Daily Purchase (gal) 1,000,000 Total Volume from Source (gal): 6,010,000

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: 8958 Source Name Pennsboro Lake

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8959 Source Name Powers Lake (Wilderness Water Park Dam)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

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: 8960 Source Name Powers Lake Two

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

APPROVED DEC 2 6 2012

west virginia department of environmental protection

12/26/2012 12:11:11 PM

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: 8961 Source Name Poth Lake (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8962 Source Name Williamson Pond (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

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: 8963 Source Name Eddy Pond (Landowner Pond)

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

Source ID: 8964 Source Name Hog Lick Quarry

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal) 1,000,000
Total Volume from Source (gal): 6,010,000

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: 8965 Source Name Glade Fork Mine

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal) 1,000,000
Total Volume from Source (gal): 6,010,000

Recycled Frac Water

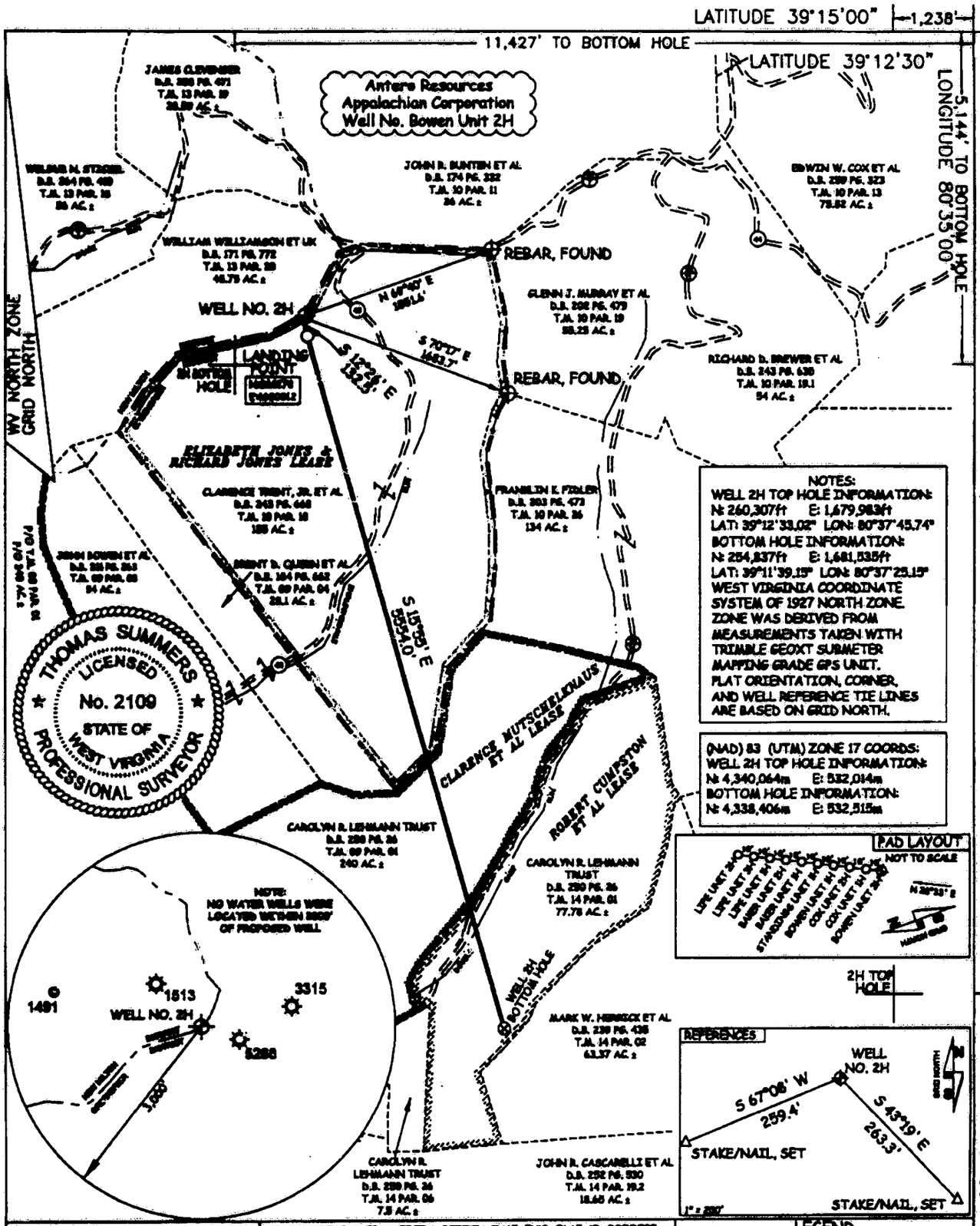
Source ID: 8966 Source Name Belton Unit 1H

Source start date: 5/31/2013
Source end date: 5/31/2014
Max. Daily Purchase (gal)
Total Volume from Source (gal): 6,010,000

APPROVED

Antero Resources Corporation
APPALACHIAN BASIN
Bowen Unit 2H County Doddridge
0 2,000 4,000 FEET
REMARKS QUADRANGLE: NEW MILTON & BIG ISAAC WATERSHED: STANDINGS RUN DISTRICT: GREENBRIER
Date: 9/12/2012

17-06167



JOB # 12-099WA
DRAWING # BOWEN2H
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

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.

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

WILLOW LAND SURVEYING PLLC
220 MASONIC AVE. PENNSBORO
WEST VIRGINIA 26415

LEGEND
Surface Owner Boundary Lines +/-
Interior Surface Tracts +/-
Existing Fence
Found monument, as noted

THOMAS SUMMERS P.S. 2109

DATE 10/18/12
OPERATOR'S WELL # BOWEN UNIT 2H

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

API WELL # 47 - 017 - 06167 H6A
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION: ELEVATION 1417' WATERSHED STANDINGSTONE RUN OF MEATHOUSE FORK
QUADRANGLE HERMILTON 7.5' (TOP HOLE); BIG ISAAC 7.5' (BOTTOM HOLE) DISTRICT GREENBRIER COUNTY DODDRIDGE

SURFACE OWNER CLARENCE TRENT, JR ET AL ACREAGE 155 ACRES +/-
OIL & GAS ROYALTY OWNER ELIZABETH JONES & RICHARD JONES; CLARENCE MUTSCHELLKNAUS ET AL; ROBERT CUMPSTON ET AL LEASE ACREAGE 155 ACRES±; 285 ACRES±; 78.375 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 7,600' TVD, 14,300' MD

WELL OPERATOR ANTERO RESOURCES APPALACHIAN CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1625 17TH STREET ADDRESS 5400 D BIG TYLER ROAD
DENVER, CO 80202 CHARLESTON, WV 25313

FORM WW-6

COUNTY NAME PERMIT

Cox — Sumary/cover page needs signed & sealed

Michael Nestor

larger copy of plans

Show project on FIRM MAP

Show BFE before & after on plans?

per HEC-RAS findings

13-631

STATE OF WEST VIRGINIA,
COUNTY OF DODDRIDGE, TO WIT

I, Virginia Nicholson, Editor of THE HERALD RECORD, a weekly newspaper published regularly, in Doddridge County, West Virginia, Do Hereby Certify Upon Oath That the Accompanying Legal Notice Entitled:

Floodplain Permit Application

was published in said paper for 2

successive weeks beginning with the issue

of July 23 2013 and

ending with the issue of

July 30 2013 and

that said notice contains 168

WORD SPACE at .115 cents a word

amounts to the sum of $ 19.32

FOR FIRST PUBLICATION, SECOND PUBLICATION IS 75% OF THE FIRST PUBLICATION

$ 14.49

and each publication thereafter

$ 33.81 TOTAL

EDITOR

W.V. Nicholson

SWORN TO AND SUBSCRIBED

BEFORE ME THIS THE 1 DAY

OF August 2013

NOTARY PUBLIC

Laura J Adams

LEGAL ADVERTISEMENT
Doddridge County
Floodplain Permit Application

Please take notice that on the 09th day of July, 2013, ANTERO RESOURCES APPALACHIAN CORP. filed an application for a Floodplain Permit to develop land located at or about: VICTOR & WANDA COX. Surface Owners, Greenbrier District; Deed Book/Page: 229/313 & 65/123, Tax Map: 13 Parcel 11 & TM 14 Parcel 8. The Application is on file with the Clerk of the County Court and may be inspected or copied during regular business hours. Any interested persons who desire to comment shall present the same in writing by July 29th, 2013.

Delivered to the:

Clerk of the County Court
115 E. Court Street, West Union, WV 26456
Beth A. Rogers, Doddridge County Clerk
Dan Wellings, Doddridge County Flood Plain Manager

7-23-2xb

OFFICIAL SEAL
Notary Public, State Of West Virginia
LAURA J ADAMS
212 Edmond Street
West Union, WV 26456
My Commission Expires June 14, 2023

MAP SCALE 1" = 1000'

500 0 1000 2000

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0235C

FIRM

FLOOD INSURANCE RATE MAP

DODDRIDGE COUNTY, WEST VIRGINIA AND INCORPORATED AREAS

PANEL 235 OF 325

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0235	C

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
54017C0235C

MAP REVISED
OCTOBER 4, 2011

Federal Emergency Management Agency

CAROLYN R. LEHMANN TRUST
C/O KRISTIN LOEL REXROAD BIKOS
P.O. BOX 418
BABB, MT 59411
TM 14 PAR 6
DB 250 PG 26
7 AC

CAROLYN R. LEHMANN TRUST
C/O KRISTIN LOEL REXROAD BIKOS
TM 14 PAR 7
DB 250 PG 26
0.42 AC

PROPOSED STAGING AREA APPROX AREA: 26,800 SQ. FT. - 0.61 AC

CAROLYN R. LEHMANN TRUST
C/O KRISTIN LOEL REXROAD BIKOS
P.O. BOX 418
BABB, MT 59411
TM 14 PAR 6.1
DB 250 PG 26
8 AC±

T.J. COX
ET AL TRUSTEES
TM 14 PAR 1.1
DB 76 PG 293
0.48 AC

EXISTING CABLE BOX

REFER TO WVDOH PERMIT FOR ENTRANCE

JOHN R. & MELISSA J. CASCARELLI (SURV)
RT. 3, BOX 55A
SALEM, WV 26426
TM 14 PAR 19.2
DB 252 PG 530
18.65 AC +/-

TM 14
PAR 10

PLACE TOPSOIL AS SHOWN COMPACT AND SLOPE TO DRAIN TO STREAM.

PROPOSED SUPER SILT FENCE

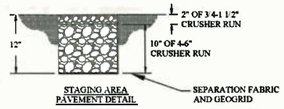
PROPOSED LIMITS OF DISTURBANCE

JOHN R. & MELISSA J. CASCARELLI (SURV)
RT. 3, BOX 55A
SALEM, WV 26426
TM 14 PAR 19.2
DB 252 PG 530
18.65 AC +/-

EXISTING WETLAND

VICTOR R. & WANDA F. COX (SURV)
RT. 3, BOX 46
SALEM, WV 26426
TM 13 PAR 11
DB 229 PG 313
25 AC +/-

SECTION A (6.0)
SECTION B (6.0)
SECTION P (6.1)
SECTION Q (6.2)
SECTION C (7.0)
SECTION D (8.0)
SECTION E (9.0)
SECTION F (10.0)



STAGING AREA PAVEMENT DETAIL

* REMOVE 12" TOPSOIL AND PLACE PAVEMENT SECTION AS DETAILED.

LEGEND

- EXISTING CONTOUR MAJOR/MINOR (1240)
- PROPOSED CONTOUR MAJOR/MINOR (1240)
- EXISTING TREE LINE
- PROPERTY LINE
- EDGE OF WATER
- EXISTING EDGE OF GRAVEL
- × 1652.2 EXISTING SPOT ELEVATION
- PROPOSED SUPER SILT FENCE (SSF)
- PROPOSED LIMITS OF DISTURBANCE (LOD)
- PROPOSED STAGING AREA
- EXISTING WETLAND

APPROXIMATE EARTHWORK QTY:

TOPSOIL TO BE REMOVED = 1,000 CY
TOPSOIL STOCKPILE = 1,000 CY
NET = 0 CY

GRADING NOTES:

DISTURBED AREA = 0.98 ACRES

FIRM MAP NUMBER:
54017C0235C

50 0 50 100

NO.	BY	DATE	DESCRIPTION

SCALE: AS SHOWN
DRAWN: DATE:
CHECKED: DATE:
APPROVED: DATE:
SURVEY DATE:
SURVEY BY:
FIELD BOOK No.:

THRASHER
THE THRASHER GROUP INC.
30 COLUMBIA BOULEVARD, CLARKSBURG, WV 26301
PHONE (304) 624-4108
(FAX) (304) 624-7831

PHASE No.
CONTRACT No.
PROJECT No. 1-01-030-2162

COX STAGING AREA AT DOUBLE CAMP SITE DESIGN, CONSTRUCTION, AND EROSION & SEDIMENT CONTROL PLANS DODDRIDGE COUNTY, WEST VIRGINIA
LANDOWNER EXHIBIT

SHEET No. 1

LAYOUT TAB: EXHIBIT A
CAD FILE: R:\030-2162 Antero- Double Camp Run Access Rd\Survey\CROSS SECTIONS-5-6-13 - TWA.dwg
PLOT DATE/TIME: 6/17/2013 2:06 PM