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 09, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-103324, issued to MOUNTAINEER KEYSTONE, LLC, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

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

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

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

James Martin
Chief

Operator's Well No: HOWDERSHELT 210
Farm Name: HOWDERSHELT, MELVIN & REN
API Well Number: 47-103324
Permit Type: Horizontal 6A Well
Date Issued: 01/09/2014

Promoting a healthy environment.

API Number: 001 03324

PERMIT CONDITIONS

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

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations,* 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

WW - 6B
(3/13)

001 03324

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

1) Well Operator: Mountaineer Keystone, LLC | 494501227 (Operator ID) | Barbour (County) | Cove (District) | Nestorville (Quadrangle)

2) Operator's Well Number: Howdershelt 210 Well Pad Name: Howdershelt

3 Elevation, current ground: 1564' Elevation, proposed post-construction: 1558'

4) Well Type: (a) Gas ■ Oil ____ Underground Storage ____
Other ____
(b) If Gas: Shallow ■ Deep ____
Horizontal ■

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5) Existing Pad? Yes or No: no

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale, ~7750'TVD, 110' thick, .50 psi/ft pressure gradient

7) Proposed Total Vertical Depth: 7845" (Heel)

8) Formation at Total Vertical Depth: Huntersville Chert (Pilot), Marcellus Shale (Lateral)

9) Proposed Total Measured Depth: 15306'

10) Approximate Fresh Water Strata Depths: Potential for fresh water from surface to ~800' (50', 275', 620', 750')

11) Method to Determine Fresh Water Depth: Offsetting wells reported water depths (001-01784, 001-03057, 001-03058, 001-03136)

12) Approximate Saltwater Depths: 900' - 1730'

13) Approximate Coal Seam Depths: Upper Freeport - 100', Lower Freeport - 160', Upper Kittanning - 230', Middle Kittanning - 300', Lower Kittaning - 320'

14) Approximate Depth to Possible Void (coal mine, karst, other): None, no mapped mines in the area of the surface location.

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

16) Describe proposed well work: Hydraulic Stimulation

17) Describe fracturing/stimulating methods in detail:
Perform a multi-stage plug and perf slickwater hydraulic stimulation utilizing approximately 7,500 bbls of water and 400,000 lbs of sand per stage.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 11.0 acres

19) Area to be disturbed for well pad only, less access road (acres): 10.0 acres

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(3/13)

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20) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill -up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40	40	Drive Pipe
Fresh Water	13.375"	New	J-55	54.5#	850	850	CTS
Coal						Bryan Harris	1-4-14
Intermediate	9.625"	New	J-55	36#	1930	1930	CTS
Production	5.5"	New	P-110	20#	15,894	15,894	3,886
Tubing							
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield
Conductor	20"	20"	0.417"	1530	None	None
Fresh Water	13.375"	17.5"	0.38"	2730	Type 1	1.18
Coal						
Intermediate	9.625"	12.25"	0.352"	3520	Type 1 1.5% CaCl	1.28
Production	5.5	7.875"	0.361"	14360	Type 1	1.18
Tubing						
Liners						

PACKERS

Kind:	n/a			
Sizes:	n/a			
Depths Set:	n/a			

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21) Describe centralizer placement for each casing string. 20" - No centralizers

13 3/8" - one bow spring centralizer on every other joint

9 5/8" - one bow spring centralizer every third joint from TD to surface

5 1/2" - one semi-rigid centralizer on every other joint from TD of casing to end of curve. Then every other joint to KOP

Every third joint from KOP to 1,400 TOC will be 1,400'; there will be no centralizers from 1,400' to surface

22) Describe all cement additives associated with each cement type. *See attached sheet

23) Proposed borehole conditioning procedures. *See attached sheet

*Note: Attach additional sheets as needed.

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Mountaineer Keystone LLC

WW-6B – Howdershelt #210

Cement Additives

- 20" is drive pipe.
- The 13-3/8" casing will be cemented to surface with Type 1 cement with 1.18 yield. Will pump 10% excess.
- The 9-5/8" casing will be cemented to surface with Type 1 cement, a cement retarder (to extend pumpability), calcium chloride an accelerator, salt (NaCl) to aid in expansion, cellophane flakes for fluid loss and gypsum as a gas blocking additive to aid in blocking/gas migration (in combination with other additives mentioned here, helps cement achieve a "right-angle set" during the plastic phase of the cement set-up.
- The 5-1/2" production string will be cemented back to 1400' (+/- 500' above the casing shoe for the 9-5/8") with Type 1 cement retarder (to extend pumpability) cellophane flakes for fluid loss, Bentonite gel as an extender (increased pumpability and fluid loss), a defoaming agent to decrease cement foaming during mixing to insure the cement is of proper weight to placement and gypsum as a gas blocking additive to aid in blocking / gas migration (in combination with other additives mentioned here, helps cement achieve a "right-angle" set) during the plastic phase of the cement set-up.

Proposed Borehole Conditioning Procedures:

- Top holes will be drilled with air to KOP. At KOP, the wellbore will be loaded with salt-water based, barite-weighted mud system with such properties as to build a filter-cake on the face to the bore-hole. This will provide lubricity as well as stabilizing the well bore. We will begin rotating the drill string and mud will be circuated upon reaching TD until no furhter cuttings are observed coming across the shaker screens. Once clean mud is circulated back to surface, we will put three strands of drill pipe, load the hole, pull three strands and load the hole. The weight indicator on the rig will be monitored for any occurences of drag and if any are noticed, we will re-run the previous strand of pipe pulled across and circulate 2X bottoms up while watching the shakers for signs of cuttings. Once at the base of the curve, the string will be continuously rotoated wihile pumping 2X bottoms up. We will pull three strands and fill the hole until we reach the vertical sotion of the well

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Mountaineer Keystone LLC

Mountaineer Keystone
Howdershelt #210
Casing Design
Directional Plan #1 (Phoenix)

001 03324

Other Names:	Howdershelt 210	County:	Barbour
Surface Location:	LAT 39-11-50.171 N x Long -79-52-30.551 W	State:	West Virginia
Bottom Hole Location:	LAT 39-10-36.996 N x Long -79-51-57.749 W	AFE #:	API #:
		RKB:	24
Total Depth:	15,306' MD / 7,726' TVD	Ground Level:	1,550

Logs	Significant Formations (TVD)	Depth (ft) MD	Depth (ft) TVD	Hole Size	Casing and Cement	Mud	Directional & Surveys Drlg /Csg Point
None	Section 1	40'	Drive Pipe 40'		20" 94# H-40 STC		Vertical
None	Section 2	Possible CBL after cement job 850'	Floc 850'	17 1/2" (PDC)	Cement:Class A 671 Sacks w/ 30% Excess TOC: Surface (top off if needed)	Floc Water	13 3/8" 54.5# J-55 BTC — Vertical
None	Section 3	Possible CBL after cement job 1930'	Floc 1930'	12 1/4" (PDC)	Cement:Type 1 600 Sacks w/ 30% Excess TOC: Surface (top off if needed)	Floc Water	9 5/8" 36# J-55 LTC — Vertical
	Section 4		Floc	8- 3/4" (PDC)		12.0- 12.5 ppg WBM	5 1/2" 20# P-110 EC DWC

Wireline: None
Mudloggers:6,500' - TD
KOP @ 6,500' MD

Mud Data	From	To
Floc Water	40'	1930'
Floc Water	1930'	6,500
12.0- 12.5 ppg WBM	1930'	15,306' MD

Bit Data	From	To
17-1/2" & 12 1/4" PDC	60' ft	1930'
8- 3/4" (PDC)	1930'	15,306' MD

Directional Data	
KOP	6,500
Build #1	6°/100 ft - angle 43° - Az 205°
EOB	7,216' /7,151'
Hold	0°/100 ft - angle 43° - Az 205°
BOH	7,216' /7,151'
EOH	7,774' / 7,558'
Build 2	9°/100 ft - angle 91° - Az 155°
KOP	7,774' / 7,558'
EOB	8,489' / 7,845'
TD	15,306' MD / 7,726' TVD
Lateral	6,817

WBM	
Wier Sandstone	1,536
1st Elk Siltstone	4,910
Burkett Shale	7,446
Tully (Limestone)	7,478
Marcellus	7,750

Cement: Type 1
Tail 1.18 ft3/sack +10% Exs in OH = 2987 sacks
Tail TOC : 1,800 ft

15,306' MD
7,726' TVD
91° inclination 155° Azmuth

Revision 1

Note: Not drawn to scale

Cement Outside Casing
Seal Assembly in Annulus

Date Last Revised: 4-Sep-13
Ross Schweitzer

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SEP 16 2013
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WW-9
(5/13)

Page 001 of 03324

API Number 47 - _____ - _____
Operator's Well No. Howdershelt 201-212

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Mountaineer Keystone, LLC OP Code 494501227

Watershed (HUC 10) Teter Creek Quadrangle Nestorville

Elevation 1569" (ground) 1558' (proposed) County Barbour District Cove

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

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

If so, please describe anticipated pit waste: _____

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

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
_____ Underground Injection (UIC Permit Number _____)
x Reuse (at API Number Cove Run)
_____ Off Site Disposal (Supply form WW-9 for disposal location)
■ Other (Explain Cuttings hauled off-site to Meadofill Landfill

Will closed loop system be used? yes

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. air-vertical, oil-horizontal

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

Additives to be used in drilling medium? soap in intermediate and production sections only. No soap will be used in freshwater section.

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. landfill

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

-Landfill or offsite name/permit number? Meadowfill Landfill

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) Nathan Skeen

Company Official Title Designated Agent

Subscribed and sworn before me this 30th day of August, 2013

[signature] Notary Public

Official Seal
Notary Public, State Of West Virginia
Amy L Miller
1111 Van Voorhis Road Suite G
Morgantown WV 26505
My commission expires March 15, 2022

My commission expires 3-15-2022

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001 03324

Form WW-9

Operator's Well No. Howdershelt 201 - 212

Mountaineer Keystone, LLC

Proposed Revegetation Treatment: Acres Disturbed 10.0 Prevegetation pH 6.5

Lime 2 Tons/acre or to correct to pH 7.0

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

Mulch hay or straw at 2 Tons/acre

Seed Mixtures

Area I		Area II	
Seed Type	lbs/acre	Seed Type	lbs/acre
*see attached sheet		*see attached sheet	

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

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Bryan O'Hara

Comments:

Title: Date: 9-18-13

Field Reviewed? (*X) Yes ( ) No

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Howdershelt 201 - 212
Seed Mixtures

Area I

Seed Type	lbs/acre
Annual Ryegrass	40
Spring Oats	96
Rye Grain	140
Annual Ryegrass	26
Spring Oats	64

Area II

Seed Type	lbs/acre
Tall Fescue	40
Ladino Clover	5
Tall Fescue	30
Birdsfoot Trefoil	10
Tall Fescue	30
Crownvetch	10
Orchardgrass	12
Birdsfoot Trefoil	10
Orchardgrass	12
Ladino	3
Kentucky Bluegrass	20
Redtop	5
White Clover	2
Kentucky Bluegrass	20
Redshirt	5
Birdsfoot Trefoil	10

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103324

001 03324

Mountaineer Keystone LLC

Duryea Hare
11-18-13

Site Specific Safety Program

Howdershelt 201-212

The following Safety, Health, and Environmental Program is a living document and changes may be made at any time by Mountaineer Keystone, LLC Operations.

Water Management Plan:
Primary Water Sources

WMP-01557	API/ID Number:	047-001-03324	Operator:	Mountaineer Keystone
		Howdershelt 210		

Important:

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

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

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

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

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

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

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

APPROVED DEC 0 3 2013

WMP-01557 API Number: 047-001-03324 Operator: Mountaineer Keystone

Howdershelt 210

Stream/River

Source **Tygart Valley River @ McDaniel Withdrawal Site** Taylor Owner: **Phyllis J. Hall McDaniel**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			39.3598	-80.063

☑ Regulated Stream? Tygart Valley Dam Ref. Gauge ID: 3057000 TYGART VALLEY RIVER AT COLFAX, WV

Max. Pump rate (gpm): 1,000 Min. Gauge Reading (cfs): 400.53 Min. Passby (cfs) 381.03

DEP Comments:

Source **Tygart Valley River @ Kuhnes Withdrawal Site B** Taylor Owner: **Charles & Peggy Kuhnes**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			39.3534	-80.0553

☑ Regulated Stream? Tygart Valley Dam Ref. Gauge ID: 3057000 TYGART VALLEY RIVER AT COLFAX, WV

Max. Pump rate (gpm): 1,000 Min. Gauge Reading (cfs): 400.33 Min. Passby (cfs) 393.20

DEP Comments:

Source **Tygart Valley River @ McCue Withdrawal Site** Taylor Owner: **Robert B. McCue II**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			39.3202	-80.0237

☑ Regulated Stream? Tygart Valley Dam Ref. Gauge ID: 3057000 TYGART VALLEY RIVER AT COLFAX, WV

Max. Pump rate (gpm): 1,200 Min. Gauge Reading (cfs): 400.33 Min. Passby (cfs) 393.20

DEP Comments:

- Source **Tygart Valley River @ Bennet Withdrawal Site** Barbo 001 Owner 03324 **Betty A. Bennett**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			39.2096	-79.9542

☐ Regulated Stream? Ref. Gauge ID: 3054500 TYGART VALLEY RIVER AT PHILIPPI, WV

Max. Pump rate (gpm): 2,000 **Min. Gauge Reading (cfs): 348.74** **Min. Passby (cfs) 371.21**

DEP Comments:

- Source **Sandy Creek @ Wolfe Withdrawal Site** Preston Owner: **Darwin & Karen Wolfe**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			39.2948	-79.8726

☐ Regulated Stream? Ref. Gauge ID: 3056250 THREE FORK CREEK NR GRAFTON, WV

Max. Pump rate (gpm): 1,000 **Min. Gauge Reading (cfs): 38.23** **Min. Passby (cfs) 10.67**

DEP Comments:

Source Summary

WMP- 01557 API Number: 047-001-03324 Operator: Mountaineer Keystone

Howdershelt 210

Purchased Water

- Source **Chestnut Ridge Public Service District** Barbour Owner: **Chestnut Ridge Public Service**

Start Date	End Date	Total Volume (gal)	Max. daily purchase (gal)	Intake Latitude:	Intake Longitude:
8/1/2013	8/1/2014			-	-

☐ Regulated Stream? Ref. Gauge ID: 3054500 TYGART VALLEY RIVER AT PHILIPPI, WV

Max. Pump rate (gpm): 1,526 **Min. Gauge Reading (cfs): 344.40** **Min. Passby (cfs)**

DEP Comments: Water originates from City of Philippi.

Source Detail

WMP- 01557	API/ID Number: 047-001-03324	Operator:	Mountaineer Keystone

Howdershelt 210

Source ID: 28542 Source Name: Chestnut Ridge Public Service District
Chestnut Ridge Public Service

Source Latitude: -
Source Longitude: -

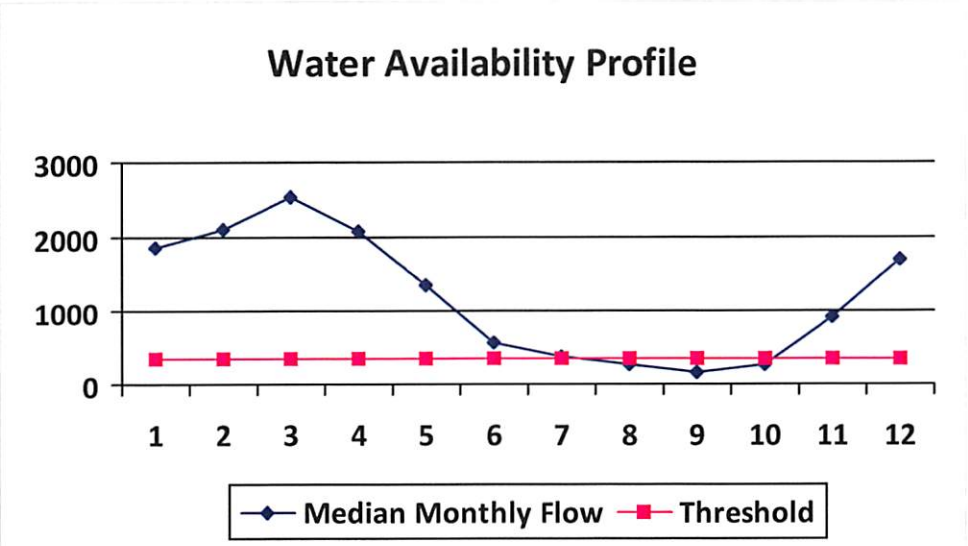
HUC-8 Code: 5020001
Drainage Area (sq. mi.): 907.99 County: Barbour

Anticipated withdrawal start date: 8/1/2013
Anticipated withdrawal end date: 8/1/2014
Total Volume from Source (gal):
Max. Pump rate (gpm): 1,526
Max. Simultaneous Trucks:
Max. Truck pump rate (gpm)

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

Reference Gaug: 3054500 TYGART VALLEY RIVER AT PHILIPPI, WV
Drainage Area (sq. mi.): 914.00
Gauge Threshold (cfs): 341

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	1,853.22	342.16	1,512.23
2	2,101.26	342.16	1,760.27
3	2,535.48	342.16	2,194.49
4	2,078.58	342.16	1,737.59
5	1,340.87	342.16	999.88
6	571.35	342.16	230.36
7	391.89	342.16	50.90
8	273.51	342.16	-67.48
9	172.96	342.16	-168.03
10	279.54	342.16	-61.45
11	926.96	342.16	585.97
12	1,694.59	342.16	1,353.60



Water Availability Assessment of Location

Base Threshold (cfs):	338.76
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	3.40
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	344.40
Passby at Location (cfs):	-

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

Source Detail

001 03324

WMP- 01557 | API/ID Number: 047-001-03324 | Operator: Mountaineer Keystone

Howdershelt 210

Source ID: 28537 | Source Name: Tygart Valley River @ McDaniel Withdrawal Site

Phyllis J. Hall McDaniel

Source Latitude: 39.3598

Source Longitude: -80.063

HUC-8 Code: 5020001

Drainage Area (sq. mi.): 1302.35 | County: Taylor

Anticipated withdrawal start date: 8/1/2013

Anticipated withdrawal end date: 8/1/2014

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

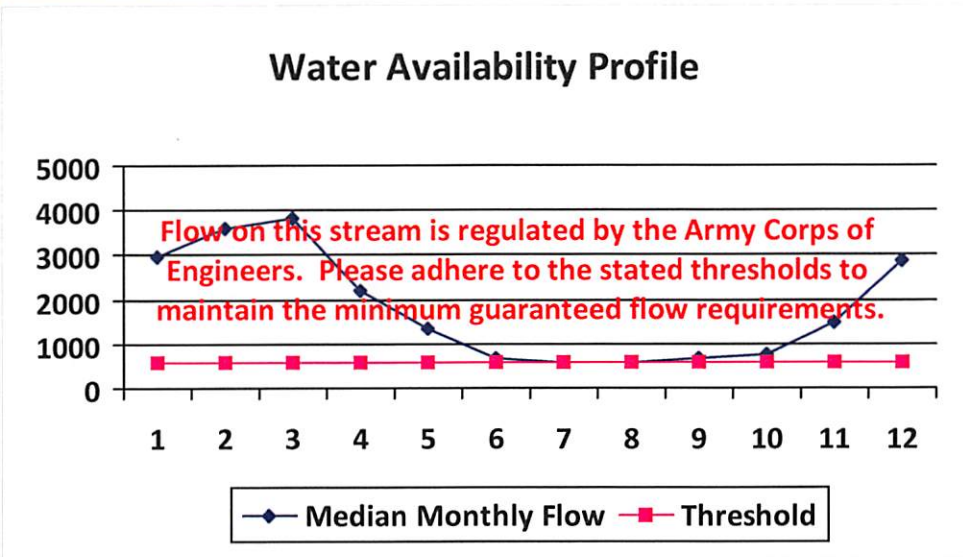
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Tygart Valley Dam
- [ ] Proximate PSD?
- [x] Gauged Stream?

Reference Gaug: 3057000 | TYGART VALLEY RIVER AT COLFAX, WV

Drainage Area (sq. mi.): 1,363.00

Gauge Threshold (cfs): 624

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	2,968.84	-	-
2	3,584.45	-	-
3	3,830.33	-	-
4	2,189.06	-	-
5	1,373.70	-	-
6	695.32	-	-
7	584.71	-	-
8	593.52	-	-
9	661.97	-	-
10	755.83	-	-
11	1,477.62	-	-
12	2,905.34	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	17.07
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

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

Source Detail

WMP- 01557 | API/ID Number: 047-001-03324 | Operator: Mountaineer Keystone

Howdershelt 210

Source ID: 28538 | Source Name: Tygart Valley River @ Kuhnes Withdrawal Site B

Charles & Peggy Kuhnes

Source Latitude: 39.3534

Source Longitude: -80.0553

HUC-8 Code: 5020001

Drainage Area (sq. mi.): 1302.05 | County: Taylor

Anticipated withdrawal start date: 8/1/2013

Anticipated withdrawal end date: 8/1/2014

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

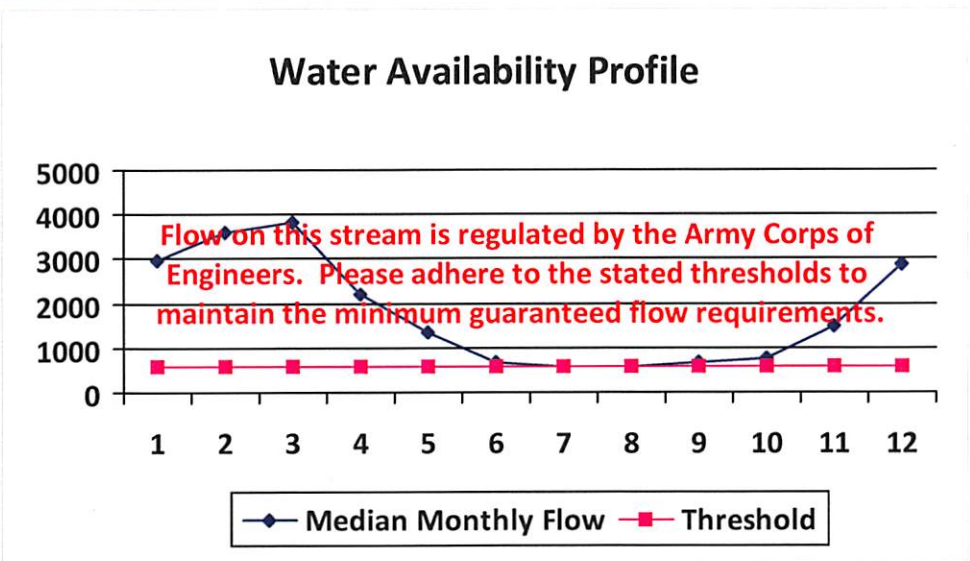
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? — Tygart Valley Dam
- [ ] Proximate PSD?
- [x] Gauged Stream?

Reference Gaug: 3057000 | TYGART VALLEY RIVER AT COLFAX, WV

Drainage Area (sq. mi.) 1,363.00

Gauge Threshold (cfs): 624

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	2,968.16	-	-
2	3,583.63	-	-
3	3,829.45	-	-
4	2,188.55	-	-
5	1,373.39	-	-
6	695.16	-	-
7	584.57	-	-
8	593.38	-	-
9	661.82	-	-
10	755.66	-	-
11	1,477.28	-	-
12	2,904.68	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	17.07
Downstream Demand (cfs):	12.17
Pump rate (cfs):	2.23
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

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

Source Detail

001 03324

WMP-01557 API/ID Number: 047-001-03324 Operator: Mountaineer Keystone

Howdershelt 210

Source ID: 28539 Source Name: Tygart Valley River @ McCue Withdrawal Site

Robert B. McCue II

Source Latitude: 39.3202

Source Longitude: -80.0237

HUC-8 Code: 5020001

Drainage Area (sq. mi.): 1178.11 County: Taylor

Anticipated withdrawal start date: 8/1/2013

Anticipated withdrawal end date: 8/1/2014

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,200

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

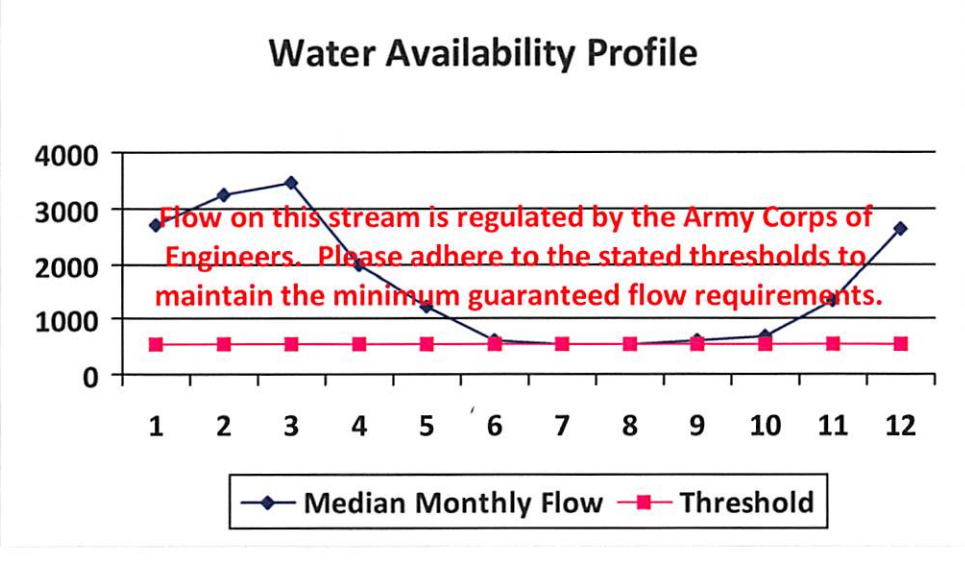
- [ ] Endangered Species?
- [x] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [x] Regulated Stream? Tygart Valley Dam
- [ ] Proximate PSD?
- [x] Gauged Stream?

Reference Gaug 3057000 TYGART VALLEY RIVER AT COLFAX, WV

Drainage Area (sq. mi.) 1,363.00

Gauge Threshold (cfs): 624

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	2,685.62	-	-
2	3,242.51	-	-
3	3,464.93	-	-
4	1,980.23	-	-
5	1,242.66	-	-
6	628.99	-	-
7	528.93	-	-
8	536.90	-	-
9	598.82	-	-
10	683.73	-	-
11	1,336.66	-	-
12	2,628.18	-	-



Water Availability Assessment of Location

Base Threshold (cfs):	-
Upstream Demand (cfs):	16.63
Downstream Demand (cfs):	12.17
Pump rate (cfs):	2.67
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	-
Passby at Location (cfs):	-

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

Source Detail

001 03324

WMP-01557 API/ID Number: 047-001-03324 Operator: Mountaineer Keystone

Howdershelt 210

Source ID: 28540 Source Name Tygart Valley River @ Bennet Withdrawal Site

Betty A. Bennett

Source Latitude: 39.2096

Source Longitude: -79.9542

HUC-8 Code: 5020001

Drainage Area (sq. mi.): 994.98 County: Barbour

Anticipated withdrawal start date: 8/1/2013

Anticipated withdrawal end date: 8/1/2014

Total Volume from Source (gal):

Max. Pump rate (gpm): 2,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

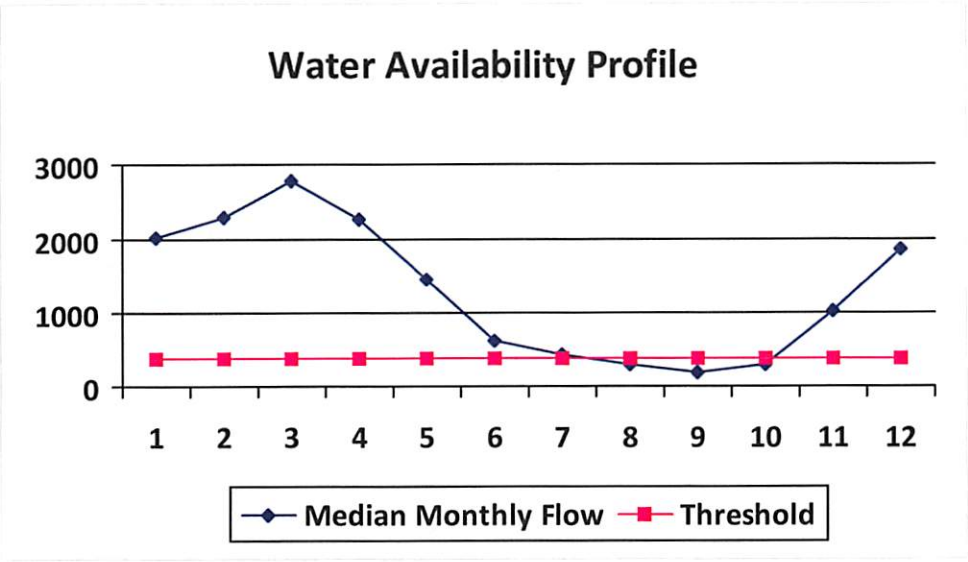
- [ ] Endangered Species?
- [ ] Mussel Stream?
- [ ] Trout Stream?
- [ ] Tier 3?
- [ ] Regulated Stream?
- [ ] Proximate PSD?
- [x] Gauged Stream?

Reference Gaug 3054500 TYGART VALLEY RIVER AT PHILIPPI, WV

Drainage Area (sq. mi.) 914.00

Gauge Threshold (cfs): 341

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	2,030.76	378.95	1,654.75
2	2,302.58	378.95	1,926.56
3	2,778.39	378.95	2,402.37
4	2,277.71	378.95	1,901.70
5	1,469.33	378.95	1,093.31
6	626.09	378.95	250.07
7	429.43	378.95	53.42
8	299.72	378.95	-76.30
9	189.53	378.95	-186.49
10	306.32	378.95	-69.70
11	1,015.77	378.95	639.76
12	1,856.94	378.95	1,480.92



Water Availability Assessment of Location

Base Threshold (cfs):	371.21
Upstream Demand (cfs):	3.28
Downstream Demand (cfs):	0.00
Pump rate (cfs):	4.46
Headwater Safety (cfs):	0.00
Ungauged Stream Safety (cfs):	0.00
Min. Gauge Reading (cfs):	**348.74**
Passby at Location (cfs):	**371.21**

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

Source Detail

WMP-01557 API/ID Number: 047-001-03324 Operator: Mountaineer Keystone

Howdershelt 210

Source ID: 28541 Source Name: Sandy Creek @ Wolfe Withdrawal Site

Darwin & Karen Wolfe

Source Latitude: 39.2948

Source Longitude: -79.8726

HUC-8 Code: 5020001

Drainage Area (sq. mi.): 28.66 County: Preston

Anticipated withdrawal start date: 8/1/2013

Anticipated withdrawal end date: 8/1/2014

Total Volume from Source (gal):

Max. Pump rate (gpm): 1,000

Max. Simultaneous Trucks: 0

Max. Truck pump rate (gpm) 0

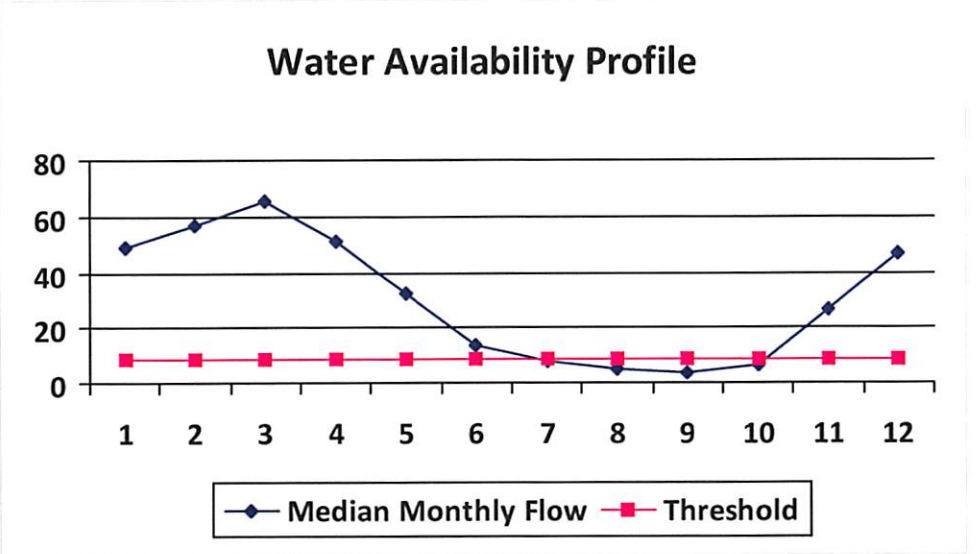
- ☐ Endangered Species?
- ☐ Mussel Stream?
- ☐ Trout Stream?
- ☐ Tier 3?
- ☐ Regulated Stream?
- ☐ Proximate PSD?
- ☐ Gauged Stream?

Reference Gaug 3056250 THREE FORK CREEK NR GRAFTON, WV

Drainage Area (sq. mi.) 96.80

Gauge Threshold (cfs): 24

Month	Median monthly flow (cfs)	Threshold (+ pump	Estimated Available water (cfs)
1	49.16	12.89	36.42
2	57.30	12.89	44.55
3	65.85	12.89	53.11
4	51.07	12.89	38.33
5	32.27	12.89	19.53
6	14.05	12.89	1.31
7	7.58	12.89	-5.16
8	5.24	12.89	-7.50
9	3.92	12.89	-8.82
10	6.48	12.89	-6.27
11	26.37	12.89	13.63
12	47.10	12.89	34.36



Water Availability Assessment of Location

Base Threshold (cfs):	7.11
Upstream Demand (cfs):	0.00
Downstream Demand (cfs):	0.00
Pump rate (cfs):	2.23
Headwater Safety (cfs):	1.78
Ungauged Stream Safety (cfs):	1.78
Min. Gauge Reading (cfs):	**38.23**
Passby at Location (cfs):	**10.66**

"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.

Water Management Plan:
Secondary Water Sources

WMP- 01557	API/ID Number	047-001-03324	Operator:	Mountaineer Keystone
	Howdershelt 210			

Important:

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

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

Multi-site impoundment

Source ID:	28543	Source Name	Cove Run Centralized Freshwater Impoundment	Source start date:	8/1/2013
				Source end date:	8/1/2014
Source Lat:	39.24131	Source Long:	-79.89231	County	Barbour
Max. Daily Purchase (gal)				Total Volume from Source (gal):	11,025,000
DEP Comments:	001-FWC-00001; 001-WPC-00002				

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

Reference: WMP-689

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: 28544 Source Name Cove Run Centralized Waste Pit

Source start date: 8/1/2013
Source end date: 8/1/2014

Source Lat: 39.24131 Source Long: -79.89231 County Barbour

Max. Daily Purchase (gal) Total Volume from Source (gal):

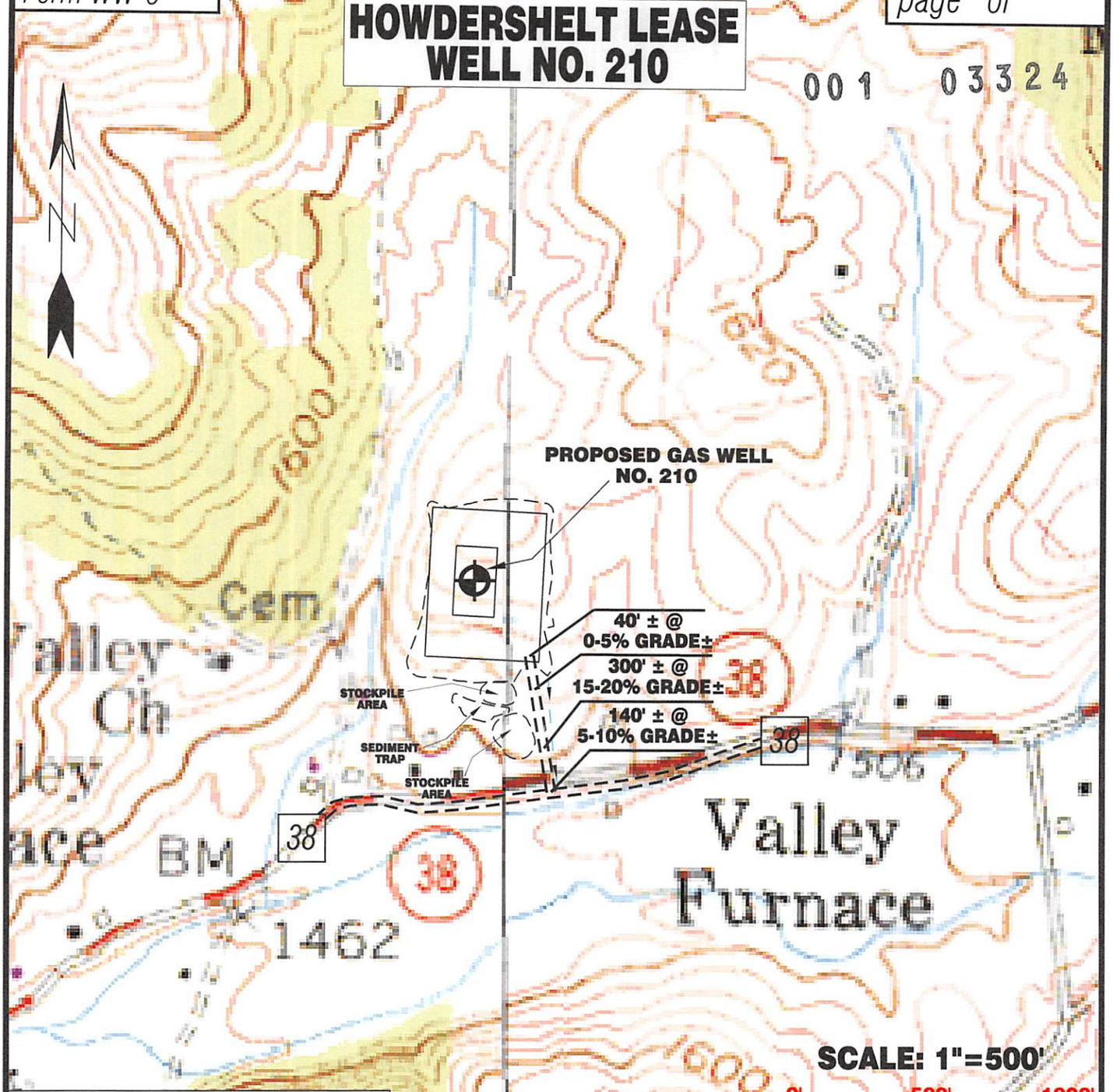
DEP Comments: 001-WPC-00001

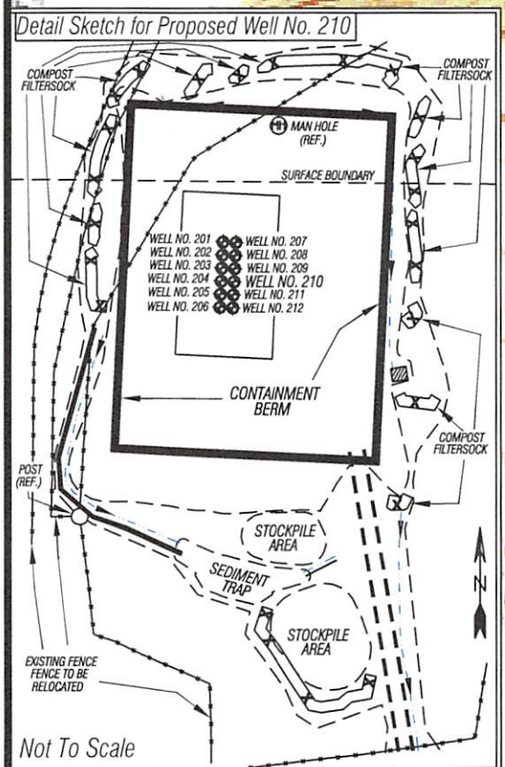
Form WW-9

page of

HOWDERSHELT LEASE
WELL NO. 210

001 03324





NESTORVILLE 7.5' QUAD

COLEBANK 7.5' QUAD

ALL ROADS SHOWN HEREON ARE EXISTING UNLESS OTHERWISE NOTED AND SHALL BE MAINTAINED IN ACCORDANCE WITH WV D.E.P. OIL AND GAS BMP MANUAL ENTRANCES AT COUNTY/STATE ROADS SHALL BE MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATION. SEPARATE PERMITS MAY BE REQUIRED BY THE D.O.T.

SEDIMENT BASINS (TRAPS) AND APPROPRIATE EROSION CONTROL BARRIERS ARE TO BE CONSTRUCTED AT ALL CULVERT AND CROSS DRAIN INLETS AND OUTLETS AS REQUIRED IN THE WV D.E.P. OIL AND GAS BMP MANUAL. FIELD CONDITIONS (ROCK OUTCROPS AND BEDROCK) MAY PROHIBIT INLET TRAPS BEING INSTALLED. WHEN THESE CONDITIONS EXIST ADDITIONAL EROSION CONTROL MEASURES SHALL BE EVALUATED AND UTILIZED AS NEEDED.

EARTHWORK CONTRACTORS ARE RESPONSIBLE FOR NOTIFICATION TO THE OPERATOR AND INSPECTOR PRIOR TO ANY DEVIATION FROM THIS PLAN.

TEMPORARY SEED & MULCH ALL SLOPES AFTER CONSTRUCTION OF LOCATION.

CUT & STACK ALL MARKETABLE TIMBER.

STACKED BRUSH MAY BE USED FOR SEDIMENT CONTROL.

APPLICATIONS FOR SEPARATE PLC PERMITS ON THE ACCESS ROAD STREAM CROSSINGS HAVE BEEN PREPARED (IF APPLIES).

Received

= EXISTING CULVERT

Ⓒ = PROPOSED CULVERT 12" MIN. UNLESS OTHERWISE NOTED

Ⓧ = PROPOSED STREAM CROSSING

APPROXIMATE LIMITS OF DISTURBANCE

Office of Oil and Gas
WV Dept. of Environmental Protection

Professional Energy Consultants
A DIVISION OF SMITH LAND SURVEYING
SURVEYORS PROJECT MGMT. SLS ENGINEERS ENVIRONMENTAL
220 West Main St. P.O. Box 150 Glenville, WV 26351 (304) 462-5634
56065 Dilles Bottom Road Shadyside, OH 43947 (740) 671-9911
HONESTY, INTEGRITY, QUALITY

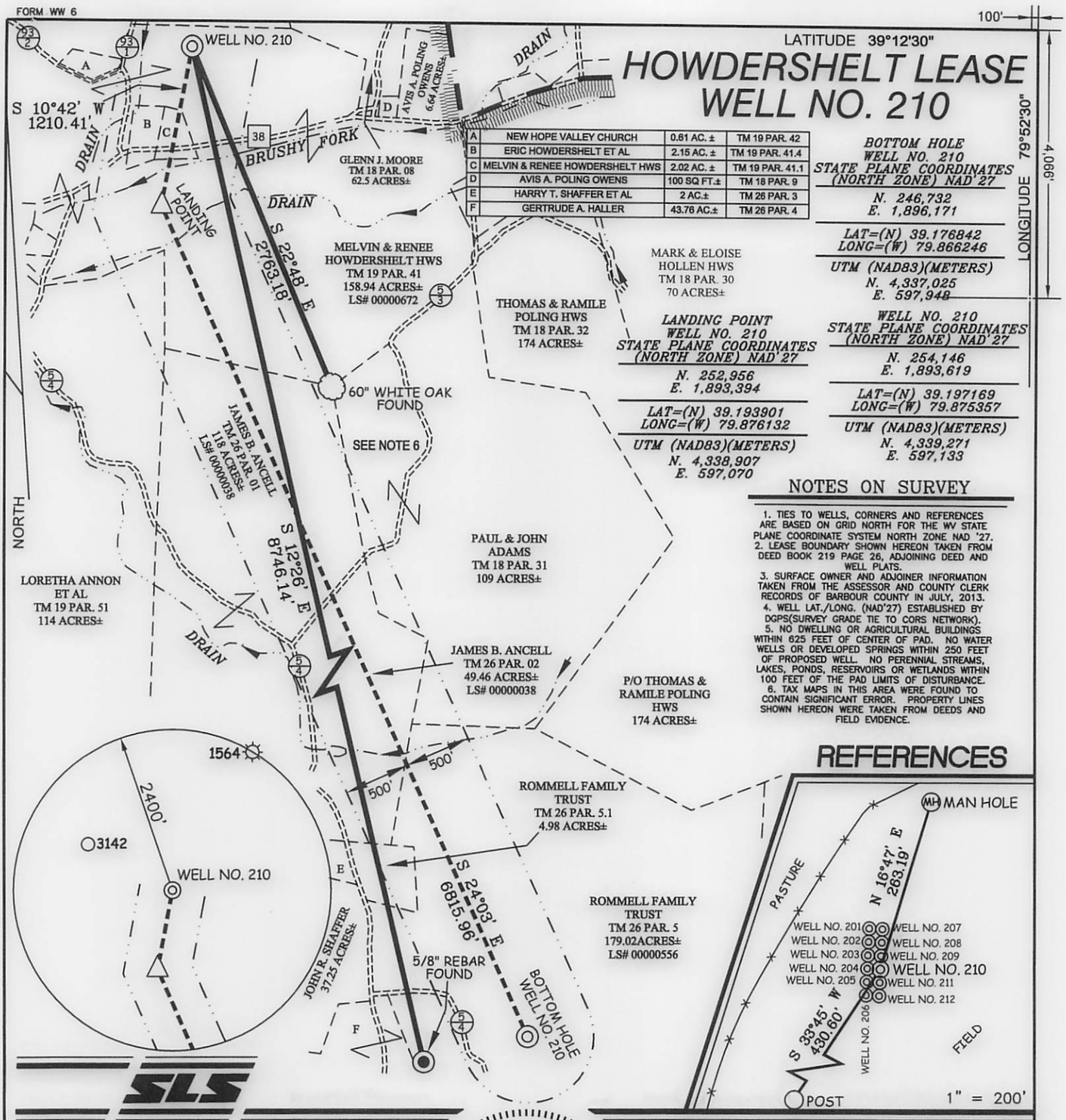
DRAWN BY	FILE NO.	DATE	CADD FILE:
K.D.W.	7962	08/22/13	7962REC210.dwg

TOPO SECTION OF NESTORVILLE 7.5' & COLEBANK 7.5' USGS TOPO QUADRANGLES

FORM WW 6

LATITUDE 39°12'30"

HOWDERSHELT LEASE
WELL NO. 210



A	NEW HOPE VALLEY CHURCH	0.61 AC. ±	TM 19 PAR. 42
B	ERIC HOWDERSHELT ET AL	2.15 AC. ±	TM 19 PAR. 41.4
C	MELVIN & RENEE HOWDERSHELT HWS	2.02 AC. ±	TM 19 PAR. 41.1
D	AVIS A. POLING OWENS	100 SQ FT.±	TM 18 PAR. 9
E	HARRY T. SHAFFER ET AL	2 AC.±	TM 26 PAR. 3
F	GERTRUDE A. HALLER	43.76 AC.±	TM 26 PAR. 4

BOTTOM HOLE
WELL NO. 210
STATE PLANE COORDINATES
(NORTH ZONE) NAD'27

N. 246,732
E. 1,896,171

LAT=(N) 39.176842
LONG=(W) 79.866246

UTM (NAD83)(METERS)
N. 4,337,025
E. 597,948

LANDING POINT
WELL NO. 210
STATE PLANE COORDINATES
(NORTH ZONE) NAD'27

N. 252,956
E. 1,893,394

LAT=(N) 39.193901
LONG=(W) 79.876132

UTM (NAD83)(METERS)
N. 4,338,907
E. 597,070

WELL NO. 210
STATE PLANE COORDINATES
(NORTH ZONE) NAD'27

N. 254,146
E. 1,893,619

LAT=(N) 39.197169
LONG=(W) 79.875357

UTM (NAD83)(METERS)
N. 4,339,271
E. 597,133

NOTES ON SURVEY

1. TIES TO WELLS, CORNERS AND REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 219 PAGE 26, ADJOINING DEED AND WELL PLATS.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF BARBOUR COUNTY IN JULY, 2013.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS(SURVEY GRADE TIE TO CORS NETWORK).
5. NO DWELLING OR AGRICULTURAL BUILDINGS WITHIN 625 FEET OF CENTER OF PAD. NO WATER WELLS OR DEVELOPED SPRINGS WITHIN 250 FEET OF PROPOSED WELL. NO PERENNIAL STREAMS, LAKES, PONDS, RESERVOIRS OR WETLANDS WITHIN 100 FEET OF THE PAD LIMITS OF DISTURBANCE.
6. TAX MAPS IN THIS AREA WERE FOUND TO CONTAIN SIGNIFICANT ERROR. PROPERTY LINES SHOWN HEREON WERE TAKEN FROM DEEDS AND FIELD EVIDENCE.

REFERENCES

SLS

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 DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 849 C. Victor Moyers

C. VICTOR MOYERS LICENSED No. 849 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE NOVEMBER 21, 20 13

OPERATORS WELL NO. 210

API WELL NO. 47 — 001 — 03324 HGA
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7962P210R2

SCALE 1" = 1000'

PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK)

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

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

LOCATION:

ELEVATION 1,564'(GROUND) 1,558'(PROPOSED) WATERSHED BRUSHY FORK OF TETER CREEK

DISTRICT COVE COUNTY BARBOUR QUADRANGLE NESTORVILLE 7.5'

SURFACE OWNER MELVIN AND RENEE HOWDERSHELT ACREAGE 158.94±

ROYALTY OWNER MELVIN & RENEE HOWDERSHELT (158.94 AC.±), JAMES ANCELL (49.46 AC.±)(118 AC.±), ROMMEL FAMILY TRUST (179.02 AC.±)

PROPOSED WORK: LEASE NO. ____

DRILL X CONVERT ____ DRILL DEEPER ____ REDRILL ____ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ____ PERFORATE NEW FORMATION ____ PLUG AND ABANDON ____ CLEAN OUT AND REPLUG ____ OTHER ____

PHYSICAL CHANGE IN WELL (SPECIFY) ____ TARGET FORMATION MARCELLUS

ESTIMATED DEPTH TVD 7,845' / TMD 15,306'

WELL OPERATOR MOUNTAINEER KEYSTONE LLC DESIGNATED AGENT NATHAN SKEEN

ADDRESS 1111 VAN VOORHIS ROAD, SUITE G ADDRESS 1111 VAN VOORHIS ROAD, SUITE G

MORGANTOWN, WV 26505 MORGANTOWN, WV 26505

COUNTY NAME

PERMIT

SLS

124568