January 08, 2014

WELL WORK PERMIT
Rework/Horizontal 6A Well

This permit, API Well Number: 47-5101328, issued to CHESAPEAKE APPALACHIA, L.L.C., 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: RAY BAKER #6H 831605
Farm Name: BAKER, DONALD RAY
API Well Number: 47-5101328
Permit Type: Rework/Horizontal 6A Well
Date Issued: 01/08/2014

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. 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.

2. 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.

3. 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.
STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS  
WELL WORK PERMIT APPLICATION

1) Well Operator: Chesapeake Appalachia, LLC 49447757  
Operator ID: 51-Marshall Liberty Glen Easton  
Operator’s Well Number: Ray Baker MSH 6H  
Well Pad Name: Ray Baker Pad

2) Operator’s Well Number: Ray Baker MSH 6H  
Well Pad Name: Ray Baker Pad

3) Farm Name/Surface Owner: Ray Baker  
Public Road Access: Greenfield Ridge Road

4) Elevation, current ground: 1298’  
Elevation, proposed post-construction: 1298’

5) Well Type  
(a) Gas  
(b) Oil  
Underground Storage

Other:  
Shallow  
Deep  
Horizontal

6) Existing Pad: Yes or No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Target formation- Marcellus  
Target top TVD- 7055’  
Target base TVD- 7107’  
Anticipated thickness- 52’  
Associated Pressure- 4727

8) Proposed Total Vertical Depth: 7,141’

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 12,000’

11) Proposed Horizontal Leg Length: 1423’

12) Approximate Fresh Water Strata Depths: 395’

13) Method to Determine Fresh Water Depths: From analysis of nearby water wells, streams, and ponds.

14) Approximate Saltwater Depths: 1180’

15) Approximate Coal Seam Depths: 375’

16) Approximate Depth to Possible Void (coal mine, karst, other): None that we are aware of.

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine?  
Yes [ ]  
No [✓]

(a) If Yes, provide Mine Info:  
Name:  
Depth:  
Seam:  
Owner:
# CASING AND TUBING PROGRAM

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Size</th>
<th>New or Used</th>
<th>Grade</th>
<th>Weight per ft. (lb/ft)</th>
<th>FOOTAGE: For Drilling</th>
<th>INTERVARS Left in Well</th>
<th>CEMENT Fill-Up (Drill Ft.)</th>
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<tbody>
<tr>
<td>Conductor</td>
<td>20&quot;</td>
<td>New</td>
<td>J-55</td>
<td>94#</td>
<td>100'</td>
<td>100</td>
<td>CTS</td>
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<td>New</td>
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<td>9 5/8&quot;</td>
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<td>Intermediate</td>
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<td>New</td>
<td>P-110</td>
<td>20#</td>
<td>If Needed</td>
<td>If Needed</td>
<td>If Needed/As Needed</td>
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<tr>
<td>Production</td>
<td>5 1/2&quot;</td>
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<td>P-110</td>
<td>20#</td>
<td>13,550'</td>
<td>13,550'</td>
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<tr>
<td>Tubing</td>
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<td>New</td>
<td>N-80</td>
<td>4.7#</td>
<td>Approx. 7457'</td>
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**AEK for GIC**

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<th>TYPE</th>
<th>Size</th>
<th>Wellbore Diameter</th>
<th>Wall Thickness</th>
<th>Burst Pressure</th>
<th>Cement Type</th>
<th>Cement Yield (cu. ft./k)</th>
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<td>3950</td>
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<td>1.19/50% Excess</td>
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<td>4360</td>
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<td>1.20/15% Excess</td>
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<td>Production</td>
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<td>8 3/4&quot;</td>
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<td>12360</td>
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<td>1.20/15% Excess</td>
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<td>Liners</td>
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<td></td>
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</tr>
</tbody>
</table>

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### PACKERS

**Kind:** 10K Arrowset AS1-X

**Sizes:** 5 1/2"

**Depths Set:** Approx. 6,197'
19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

We are re-permitting this well in order to frac it.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Well will be perforated within the target formation and stimulated with a slurry of water, sand, and chemical additives at a high rate. This will be performed in stages with the plug and perf method along the wellbore until the entire lateral has been stimulated within the target formation. All stage plugs are then drilled out and the well is flowed back to surface. The well is produced through surface facilities consisting of high pressure production units, vertical separation units, water and oil storage tanks. Max press and anticipated max rate-9000 lbs @ 80 barrels a minute.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): ________________

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

23) Describe centralizer placement for each casing string:

All casing strings will be ran with a centralizer at a minimum of 1 per every 3 joints of casing.

24) Describe all cement additives associated with each cement type:

**Please see attached sheets for Chemical Listing of Cement & Additives for Chesapeake Energy wells.

25) Proposed borehole conditioning procedures:

All boreholes will be conditioned with circulation and rotation for a minimum of one bottoms up and continuing until operator is satisfied with borehole conditions.

*Note: Attach additional sheets as needed.*
### SLB Cement Additives

<table>
<thead>
<tr>
<th>Product Name</th>
<th>Product Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>D046</td>
<td>antifoam</td>
</tr>
<tr>
<td>D130</td>
<td>polyester flake - lcm</td>
</tr>
<tr>
<td>S001</td>
<td>calcium chloride</td>
</tr>
<tr>
<td>SPACER</td>
<td></td>
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<tr>
<td>D130</td>
<td>polyester flake - lcm</td>
</tr>
<tr>
<td>D020</td>
<td>bentonite extender</td>
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</table>

#### Intermediate

<table>
<thead>
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<th>Product Use</th>
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<tbody>
<tr>
<td>D046</td>
<td>antifoam</td>
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<tr>
<td>D130</td>
<td>polyester flake - lcm</td>
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<tr>
<td>D044</td>
<td>granulated salt</td>
</tr>
<tr>
<td>D153</td>
<td>Anti-Settling Agent</td>
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<td>SPACER</td>
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<tr>
<td>D020</td>
<td>bentonite extender</td>
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<tr>
<td>D130</td>
<td>polyester flake - lcm</td>
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#### Kick Off Plug

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<th>Product Use</th>
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<tbody>
<tr>
<td>B220</td>
<td>surfactant</td>
</tr>
<tr>
<td>B389</td>
<td>MUDPUSH* Express</td>
</tr>
<tr>
<td>D206</td>
<td>Antifoaming Agent</td>
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<tr>
<td>D031</td>
<td>barite</td>
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</table>

#### Production - Lead

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<th>Product Name</th>
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<tr>
<td>D167</td>
<td>UNIFLAC* S</td>
</tr>
<tr>
<td>D154</td>
<td>low-temperature extender</td>
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<tr>
<td>D400</td>
<td>EasyBLOK</td>
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<tr>
<td>D046</td>
<td>antifoam</td>
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<tr>
<td>D201</td>
<td>basic cements enabler</td>
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<tr>
<td>D202</td>
<td>low-temperature solid dispersant</td>
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<tr>
<td>D046</td>
<td>antifoam</td>
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<tr>
<td>D167</td>
<td>UNIFLAC* S</td>
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<tr>
<td>D065</td>
<td>TIC* Dispersant</td>
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<td>Code</td>
<td>Description</td>
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<td>-------</td>
<td>----------------------</td>
</tr>
<tr>
<td>D201</td>
<td>basic cements enabler</td>
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<tr>
<td>D153</td>
<td>Anti-Settling Agent</td>
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<td>SPACER</td>
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<td>B389</td>
<td>MUDPUSH* Express</td>
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<tr>
<td>D206</td>
<td>Antifoaming Agent</td>
</tr>
<tr>
<td>D031</td>
<td>barite</td>
</tr>
<tr>
<td>B220</td>
<td>surfactant</td>
</tr>
</tbody>
</table>

*Note: MUDPUSH* Express is a trade name for a product.
STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Chesapeake Appalachia, LLC
OP Code 49447757

Watershed (HUC 10) Fish Creek
Quadrangle Glen Easton

Elevation 1298' County Marshall
District Liberty

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

Will a pit be used? Yes [ ] No [ ]

If so, please describe anticipated pit waste: Closed loop system in place at this time- cuttings will be taken to a permitted landfill.

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 2D0672539/2D0413175/2D0610306/2D0610317)
- Reuse (at API Number at next anticipated well, API# will be included with the WIR-34/DDMR &/or permit addendum.
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain) Flow back fluids will be put in steel tanks and reused or taken to a permitted disposal facility.

Will closed loop system be used? If so, describe:yes

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air and salt saturate mud

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

Additives to be used in drilling medium? See attached sheets

Drill cuttings disposal method? Leave in pit, landfill, removed off site, etc. Landfill

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

- Landfill or off site name/permit number

Arden Landfill #2, American OZ-12954, Country Wide 38390/CID 38390, Pine Grove 13588

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2008, 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) Danielle Southall
Company Official Title Regulatory Analyst

Subscribed and sworn before me this 25th day of September

Brittany Woody
Notary Public, State of West Virginia
My commission expires 11/21/92

07/10/2014

OFFICIAL SEAL
Notary Public, State of West Virginia
BRITTANY W WOODY
3302 Old Elkins Road
Buckhannon, WV 26201
My commission expires 09-30-2020
Chesapeake Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 10+/- Prevegetation pH

Lime Tons/acre or to correct to pH 6.5
Fertilizer type 10-20-20
Fertilizer amount 600 lbs/acre
Mulch Hay/Straw 2.5 Tons/acre

Seed Mixtures

<table>
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<tr>
<th>Seed Type</th>
<th>Temporary</th>
<th>lbs/acre</th>
<th>Permanent</th>
<th>Seed Type</th>
<th>lbs/acre</th>
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</thead>
<tbody>
<tr>
<td>White Clover</td>
<td>15</td>
<td></td>
<td>White Clover</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Red Top</td>
<td>15</td>
<td></td>
<td>Red Top</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>Orchard Grass</td>
<td>20</td>
<td></td>
<td>Orchard Grass</td>
<td>20</td>
<td></td>
</tr>
</tbody>
</table>

Attach:
Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5’ topographic sheet.

Plan Approved by: [Signature]

Comments:
Verify casing depths, Freshwater casing and salt water elevations

Title: Oil and Gas Inspector
Date: 10/21/2013

Field Reviewed? ( X ) Yes ( ) No
Important:
For each proposed primary water source (including source intakes for purchased water sources) identified in your water management plan, and summarized herein, DEP has made an evaluation concerning water availability over the specified date range. DEP’s assessment is based on the following considerations:

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

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

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

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

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

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

<table>
<thead>
<tr>
<th>WMP: 01654</th>
<th>API Number:</th>
<th>047-051-01328</th>
<th>Operator:</th>
<th>Chesapeake Energy</th>
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</thead>
</table>

Ray Baker #6H - 831605

## Stream/River

### Ohio River WP 1 (Beech Bottom Staging Area)
- **Owner:** Brownlee Land Ventures
- **Start Date:** 10/15/2013  
- **End Date:** 10/15/2014  
- **Total Volume (gal):** 6,000,000  
- **Max. daily purchase (gal):**  
- **Intake Latitude:** 40.226889  
- **Intake Longitude:** -80.658972
- **Regulated Stream:** Yes  
- **Ohio River Min. Flow:**  
- **Ref. Gauge ID:** 9999999  
- **Ohio River Station:** Willow Island Lock & Dam

<table>
<thead>
<tr>
<th>Max. Pump rate (gpm):</th>
<th>6,000</th>
<th>Min. Gauge Reading (cfs):</th>
<th>6,468.00</th>
<th>Min. Passby (cfs):</th>
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</thead>
</table>

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

### Little Wheeling Creek WP 1 (Rt. 40 Staging Area)
- **Owner:** JDS Investments, LLC
- **Start Date:** 10/15/2013  
- **End Date:** 10/15/2014  
- **Total Volume (gal):** 6,000,000  
- **Max. daily purchase (gal):**  
- **Intake Latitude:** 40.078324  
- **Intake Longitude:** -80.591145
- **Regulated Stream:** No  
- **Ref. Gauge ID:** 3112000  
- **WHEELING CREEK AT ELM GROVE, WV**

| Max. Pump rate (gpm): | 2,000 | Min. Gauge Reading (cfs): | 64.80 | Min. Passby (cfs): | 2.83 |
|-----------------------|-------|---------------------------|-------|---------------------|

**DEP Comments:**

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01/10/2014
# Purchased Water

## Source: Ohio River @ J&R Excavating
- **Owner:** J&R Excavating
- **Start Date:** 10/15/2013
- **End Date:** 10/15/2014
- **Total Volume (gal):** 6,000,000
- **Max. daily purchase (gal):** 1,890,000
- **Intake Latitude:** 39.998509
- **Intake Longitude:** -80.737336
- **Regulated Stream?** Yes
- **Ohio River Min. Flow Ref. Gauge ID:** 9999999
- **Ohio River Station:** Willow Island Lock & Dam
- **Min. Gauge Reading (cfs):** 6,468.00
- **Min. Passby (cfs):**
- **DEP Comments:** Refer to the specified station on the National Weather Service's Ohio River forecast website: [http://www.erh.noaa.gov/ohrfc//flows.shtml](http://www.erh.noaa.gov/ohrfc//flows.shtml)

## Source: The Village of Valley Grove
- **Owner:** The Village of Valley Grove
- **Start Date:** 10/15/2013
- **End Date:** 10/15/2014
- **Total Volume (gal):** 6,000,000
- **Max. daily purchase (gal):** 720,000
- **Intake Latitude:**
- **Intake Longitude:**
- **Regulated Stream?** Yes
- **Ohio River Min. Flow Ref. Gauge ID:** 9999999
- **Ohio River Station:** Willow Island Lock & Dam
- **Min. Gauge Reading (cfs):** 6,468.00
- **Min. Passby (cfs):**
- **DEP Comments:** Refer to the specified station on the National Weather Service's Ohio River forecast website: [http://www.erh.noaa.gov/ohrfc//flows.shtml](http://www.erh.noaa.gov/ohrfc//flows.shtml)

## Source: Ohio County PSD
- **Owner:** Ohio County PSD
- **Start Date:** 10/15/2013
- **End Date:** 10/15/2014
- **Total Volume (gal):** 6,000,000
- **Max. daily purchase (gal):** 720,000
- **Intake Latitude:**
- **Intake Longitude:**
- **Regulated Stream?** Yes
- **Ohio River Min. Flow Ref. Gauge ID:** 9999999
- **Ohio River Station:** Willow Island Lock & Dam
- **Min. Gauge Reading (cfs):** 6,468.00
- **Min. Passby (cfs):**
- **DEP Comments:** Refer to the specified station on the National Weather Service's Ohio River forecast website: [http://www.erh.noaa.gov/ohrfc//flows.shtml](http://www.erh.noaa.gov/ohrfc//flows.shtml)
**Source Detail**

**Source ID:** 30571  |  **Source Name:** Ohio River @ J&R Excavating
**HUC-8 Code:** 5030106  |  **County:** Marshall
**Drainage Area (sq. mi.):** 25000  |  **Anticipated withdrawal start date:** 10/15/2013
**Source Latitude:** 39.998509  |  **Anticipated withdrawal end date:** 10/15/2014
**Source Longitude:** -80.737336  |  **Total Volume from Source (gal):** 6,000,000

- Endangered Species?
- Trout Stream?
- Regulated Stream?
- Proximate PSD?
- Gauged Stream?

**Reference Gaug:** 9999999  |  **Ohio River Station:** Willow Island Lock & Dam
**Gauge Threshold (cfs):** 6468

<table>
<thead>
<tr>
<th>Month</th>
<th>Median monthly flow (cfs)</th>
<th>Threshold (+ pump)</th>
<th>Estimated Available water (cfs)</th>
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<tbody>
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<td>-</td>
</tr>
<tr>
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<td>49,200.00</td>
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<td>-</td>
</tr>
<tr>
<td>3</td>
<td>65,700.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>56,100.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>38,700.00</td>
<td>-</td>
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<tr>
<td>6</td>
<td>24,300.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>16,000.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>13,400.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>12,800.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>15,500.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>11</td>
<td>26,300.00</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>12</td>
<td>41,300.00</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>

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

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

- **WMP:** 01654
- **API/ID Number:** 047-051-01328
- **Operator:** Chesapeake Energy

- **Source ID:** 30572
- **Source Name:** The Village of Valley Grove
- **Source Latitude:** -
- **Source Longitude:** -

- **HUC-8 Code:** 5030106
- **Drainage Area (sq. mi.):** 25000
- **County:** Ohio
- **Anticipated withdrawal start date:** 10/15/2013
- **Anticipated withdrawal end date:** 10/15/2014
- **Total Volume from Source (gal):** 6,000,000
- **Max. Pump rate (gpm):**
  - Max. Simultaneous Trucks:
  - Max. Truck pump rate (gpm):

**Reference Gaug:** 9999999

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

**Water Availability Profile**

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

**Threshold (+ pump):**
- Month 1: -
- Month 2: -
- Month 3: -
- Month 4: -
- Month 5: -
- Month 6: -
- Month 7: -
- Month 8: -
- Month 9: -
- Month 10: -
- Month 11: -
- Month 12: -

**Estimated Available water (cfs):**
- Month 1: -
- Month 2: -
- Month 3: -
- Month 4: -
- Month 5: -
- Month 6: -
- Month 7: -
- Month 8: -
- Month 9: -
- Month 10: -
- Month 11: -
- Month 12: -

"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 Availability Assessment of Location**

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

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

"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.
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.
Source Detail

WMP: 01654 API/ID Number: 047-051-01328 Operator: Chesapeake Energy

Ray Baker #6H - 831605

Source ID: 30570 Source Name: Little Wheeling Creek WP 1 (Rt. 40 Staging Area) JDS Investments, LLC

HUC-8 Code: 5030106 Drainage Area (sq. mi.): 13.94 County: Ohio

Source Latitude: 40.078324 Source Longitude: -80.591145

Anticipated withdrawal start date: 10/15/2013 Anticipated withdrawal end date: 10/15/2014

Total Volume from Source (gal): 6,000,000

Max. Pump rate (gpm): 2,000

Reference Gaug: 3112000 Gauge Threshold (cfs): 38

Drainage Area (sq. mi.): 281.00

WHEELING CREEK AT ELM GROVE, WV


<table>
<thead>
<tr>
<th>Month</th>
<th>Median monthly flow (+ pump)</th>
<th>Estimated Available water (cfs)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>13.81 10.62</td>
<td>3.55</td>
</tr>
<tr>
<td>2</td>
<td>17.62 10.62</td>
<td>7.36</td>
</tr>
<tr>
<td>3</td>
<td>24.44 10.62</td>
<td>14.18</td>
</tr>
<tr>
<td>4</td>
<td>18.14 10.62</td>
<td>7.88</td>
</tr>
<tr>
<td>5</td>
<td>11.05 10.62</td>
<td>0.80</td>
</tr>
<tr>
<td>6</td>
<td>5.03 10.62</td>
<td>5.23</td>
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<td>7</td>
<td>2.22 10.62</td>
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<td>8</td>
<td>1.30 10.62</td>
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<td>9</td>
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<td>10</td>
<td>1.37 10.62</td>
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<td>11</td>
<td>4.31 10.62</td>
<td>-5.95</td>
</tr>
<tr>
<td>12</td>
<td>9.77 10.62</td>
<td>-0.49</td>
</tr>
</tbody>
</table>

Water Availability Profile

"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 Availability Assessment of Location

Base Threshold (cfs): 1.89
Upstream Demand (cfs): 3.34
Downstream Demand (cfs): 0.00
Pump rate (cfs): 4.46
Headwater Safety (cfs): 0.47
Ungauged Stream Safety (cfs): 0.47

Min. Gauge Reading (cfs): 64.80
Passby at Location (cfs): 2.83
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: | 30576 | Source Name | Schostag Freshwater Impoundment (Chesapeake En Industrial Facility) | Source start date: | 10/15/2013 |
| Source start date: | 10/15/2013 | Source end date: | 10/15/2014 |
| Source Lat: | 39.72385 | Source Long: | -80.664395 |
| County | Marshall |
| Max. Daily Purchase (gal) | 864,000 | Total Volume from Source (gal): | 6,000,000 |

DEP Comments:

The intake identified above has been defined in a previous water management plan. The thresholds established in that plan govern this water management plan unless otherwise noted. Reference: WMP-77
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.

### Purchased Water

<table>
<thead>
<tr>
<th>Source ID: 30574</th>
<th>Source Name</th>
<th>Pennsylvania American Water Public Water Provider</th>
<th>Source start date: 10/15/2013</th>
<th>Source end date: 10/15/2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Source Lat:</td>
<td>Source Long:</td>
<td>County</td>
</tr>
<tr>
<td>Max. Daily Purchase (gal)</td>
<td>720,000</td>
<td>Total Volume from Source (gal): 6,000,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DEP Comments:** Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.

<table>
<thead>
<tr>
<th>Source ID: 30575</th>
<th>Source Name</th>
<th>Elite Gasfield Services, Midland Borough Commercial Supplier</th>
<th>Source start date: 10/15/2013</th>
<th>Source end date: 10/15/2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Source Lat: 40.644598</td>
<td>Source Long: -80.469382</td>
<td>County</td>
</tr>
<tr>
<td>Max. Daily Purchase (gal)</td>
<td>8,640,000</td>
<td>Total Volume from Source (gal): 6,000,000</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**DEP Comments:** Please ensure that the sourcing of this water confirms to all rules and guidance provided by PA DEP.
Important:

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

• For groundwater supply wells, DEP recommends that the operator contact the local health department prior to drilling any new well; and reminds the operator that all drinking water wells within 1,500 feet of a water supply well shall be flow- and quality-tested by the operator at the request of the drinking well owner prior to operation of the water supply well.

• For each proposed multi-site impoundment water source identified in your water management plan (if applicable), DEP will review the withdrawal limits established in the referenced Water Management Plan for current suitability and provide to the operator these limits for each identified intake. Note that withdrawal limits may be modified as necessary based on changing demands upon that water supply.

Recycled Frac Water

Source ID: 30577  Source Name: Various

Source start date: 10/15/2013  Source end date: 10/15/2014

Source Lat:  Source Long:  County

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

DEP Comments: Sources include, but are not limited to, Robert Baxter WTZ 6H
Marcellus Well Drilling Procedures
And Site Safety Plan

Chesapeake Appalachia, LLC

47 - 51 -
Well name: Ray Baker, 6H
Glen Easton, Quad
Liberty, District
Marshall County, West Virginia

Submitted by: Danielle Southall
Date: 9/25/2013
Title: Regulatory Analyst
Chesapeake Appalachia, LLC

Approved by:

Title:
Date:

Title:

Approved by:

Title:

Chesapeake Appalachia, L.L.C. – Confidential
FILE #: CHE 039  
DRAWING #: 1284  
SCALE: 1"=1000'  
MINIMUM DEGREE OF ACCURACY: 1/200  
PROVEN SOURCE OF ELEVATION: Submeter Mapping  
GRADE GPS  

L.L.S. #2124: Ernest J. Benchek III  

DATE: SEPTEMBER 25, 2013  
OPERATOR’S WELL #: RAY BAKER 66H  
API WELL #: 47-51-01328-16A  
STATE: WEST VIRGINIA  
COUNTY: MARshall/LIBERTY  
SURFACE OWNER: DONALD RAY BAKER  
OIL & GAS ROYALTY OWNER: DONALD RAY BAKER  
LEASE NUMBERS:  

DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  
PLUG OFF FORMATION  PERFORATE NEW FORMATION  PLUG & ABANDON  
CLEAN OUT & REPLUG  OTHER CHANGE (SPECIFY):  
TARGET FORMATION: MARCELUS  
WELL OPERATOR: CHESAPEAKE APPALACHIA, LLC.  
ADDRESS: PO BOX 18946  
CITY: OKLAHOMA CITY  STATE: OK  ZIP CODE: 73154-0496  

01/10/2014