June 16, 2014

WELL WORK PERMIT
Horizontal 6A Well

This permit, API Well Number: 47-5101748, issued to CHEVRON APPALACHIA, 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: HART 2H
Farm Name: HART, JOHN J. & RENEE
API Well Number: 47-5101748
Permit Type: Horizontal 6A Well
Date Issued: 06/16/2014

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

9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGN@wv.gov within 30 days of commencement of drilling.
STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

   Operator ID County District Quadrangle

2) Operator’s Well Number: 2H Well Pad Name: Hart

3) Farm Name/Surface Owner: John Hart Public Road Access: Campbells Run Rd- 38

4) Elevation, current ground: 1329' Elevation, proposed post-construction: 1322'

5) Well Type (a) Gas Oil Underground Storage
   Other
   (b) If Gas Shallow Deep
   Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
   Proposed Target: Marcellus; TVD: 6534'; anticipated thickness: 47'; associated pressure: 4,247 psi

8) Proposed Total Vertical Depth: 6585'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15168'

11) Proposed Horizontal Leg Length: 7782'

12) Approximate Fresh Water Strata Depths: 247' below final pad grade elevation

13) Method to Determine Fresh Water Depths: Offset well data, Hart #1H (P&A) driller’s log, USGS local stream base level

14) Approximate Saltwater Depths: 1994' based on offset well data

15) Approximate Coal Seam Depths: 829' from proposed pad elevation

16) Approximate Depth to Possible Void (coal mine, karst, other): 829' mine void possible in Pittsburgh Coal Seam

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: Alexander Mine- Closed & Abandoned

   Depth: 829' from proposed pad elevation

   Seam: Pittsburgh No. 8 Coal Seam

   Owner: Reserve Coal Properties, LLC

RECEIVED
Office of Oil and Gas

MAY 28 2014

WWW Department of Environmental Protection
### 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>INTERVALS: Left in Well</th>
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**JN 5/28/14**

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<th>Wall Thickness</th>
<th>Burst Pressure</th>
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</tr>
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</table>

### PACKERS

| Kind:       | None | |
|-------------|------||
| Sizes:      |      | |
| Depths Set: |      | |

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Office of Oil and Gas

**MAY 28 2014**

WW Department of Environmental Protection
19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill 26" hole to 354' MD then set and cement 20" casing to surface covering the fresh water. Drill 17.5" hole to 941' MD then set and cement to surface 13-3/8" casing covering Pittsburgh coal. Drilling of the 17.5" hole will stop and 13 3/8" casing will be set no more than 100' past the void. A basket will be run with the 13 3/8" casing to place 20' above the mine void. Cement will be backfilled to surface using volume necessary to get cement to surface. Drill 12.25" hole to 2,166' MD then set and cement to surface 9-5/8" casing, covering the Burgoon (50' below Big Injun). Drill 8-1/2" hole to KOP. Drill 8-1/2" hole curve and lateral to 15,166' MD/ 6,585' TVD. Set 5-1/2" production casing and cement back to surface.

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

Complete each stage of the well with #50,000's of 100 mesh and #300,000's of 40/70 along with 300,000 gallons of fresh water. The stages in these wells will be fractured at 90 bpm at an anticipated psi of 8,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 11.1 acres

22) Area to be disturbed for well pad only, less access road (acres): 2.27 acres

23) Describe centralizer placement for each casing string:

There will be a bow spring centralizer every two jts on the Water string, Coal string and intermediate. The production string will have two centralizer every jt in the lateral and curve, then one every two jts from KOP to surface.

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

For the Water String and Coal String the blend will contain class A cement, 3% CaCl2, and flake. The intermediate will contain class A cement, 10% CaCl2, Salt, and flake. The Production cement will have a lead and tail cement. The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder. The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer, suspension agent, and friction reducer.

25) Proposed borehole conditioning procedures:

Well will be circulated a minimum of 3 bottoms up once casing point has been reached on all hole sections and until uniform mud properties are achieved.

*Note: Attach additional sheets as needed.
Cement Additives: Hart Unit 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H

For the Water String and Coal String the blend will contain class A cement, 3% CaCl2, and flake.

The intermediate will contain class A cement, 10% CaCl2, Salt, and flake.

The Production cement will have a lead and tail cement.

The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder.

The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer, suspension agent, and friction reducer.
# Hart 2H

**Marshall Co., WV**  
March 26, 2014

## Casing & Cementing Details

<table>
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<tr>
<th>AZM</th>
<th>Casing Formation</th>
<th>DEPTH</th>
<th>Inclination</th>
<th>HOLE SIZE</th>
<th>CASING SPECS</th>
<th>CEMENT INFO</th>
<th>GENERAL INFO</th>
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<td></td>
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<td>MID</td>
<td>TUB</td>
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<tr>
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</table>

**Deepest Aquifer: 264'**

1. Bow Spring: 1-shoe, 1-every 2nd jt  
   1 on ea 2-3 jts across previous shoe.  
   Rigid: 2 within 100 ft of surface

2. **Casing: 13-3/8" 5-5/8 L-55 BTC**  
   **0.468" wall**

   **Fresh Water Casing:**  
   **20" 2-45.5 B 2-55 BTC**  
   **0.435" wall**

   **Capacity:** 0.055 bbl/ft  
   **Annul. 4-210 bbll**  
   **Burst: 2,600 psi**

   **Min. 40 ft from OIL or at least 10 ft below bottom of water:**

**72,600 lbs air set with water**

3. **Coal Casing:**  
   **12-3/4" 5-5/8 L-55 BTC**  
   **0.468" wall**

   **Capacity:** 0.055 bbl/ft  
   **Annul. 4-210 bbll**  
   **Burst: 2,600 psi**

   **Min. 40 ft from OIL or at least 10 ft below bottom of water:**

**38,342 lbs air set with water**

4. **Burroon (Bia Injun): 1,891'**

**Centralization:**  
- 2 Tung glider per jt from shoe to KOP  
- 1 single bow per 2 jts from KOP to surface

**Maximum Landing Point: 7,906'**

**51h (Basal Marcellus): 6,595'**

**Onondaga: 6,595'**

**Ground Level Elevation: 1250**  
**Depths are measured from KOP 10 ft above OS.**

## Cement to surface

**Class A or 3% CaCO3, Salt & Flake**  
**Yield:** 1.05 cubic ft  
**Weight:** 15.6 lbs  
**Min. 33 ft, Optimum 50 ft, Maximum 70 ft below the bottom of void**

**Class B:**  
**Yield:** 1.05 cubic ft  
**Weight:** 15.6 lbs  
**Min. 33 ft, Optimum 50 ft, Maximum 70 ft below the bottom of void**

**Class C:**  
**Yield:** 1.05 cubic ft  
**Weight:** 15.6 lbs  
**Min. 33 ft, Optimum 50 ft, Maximum 70 ft below the bottom of void**

## Load Calculations

**Class A:**  
1. **LEAD SLURRY:**  
   - 301.5 lbs  
   - 120.5 shots  
   - 0.2 lbs  
   - 0.5 lbs  
   - **Total Load:** 302.5 lbs

2. **TAR SLURRY:**  
   - 360.6 lbs  
   - 133.7 shots  
   - 5.2 lbs  
   - 1.5 lbs  
   - **Total Load:** 374.3 lbs

**Displacement:**  
- 233.4 lbs

## Other Details

- **Cement Type:**  
  - **Class A:**  
  - **Class B:**  
  - **Class C:**

- **06/20/2014**
STATE OF WEST VIRGINIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
OFFICE OF OIL AND GAS  

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name  Chevron Appalachia, LLC  
OP Code  4944935

Watershed (HUC 10)  Middle Grave Creek- Grave Creek  
County  Marshall  
Elevation  1329.31'  
District  Washington

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:  N/A

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  )
- Reuse ( at API Number  )
- Off-Site Disposal ( Supply form WW-9 for disposal location)
- Other (Explain)

Will closed loop system be used?  If so, describe:  Collect and treat drill cuttings at rigsite, then transport in boxes to approved disposal/ land fill location

Drilling medium anticipated for this well (vertical and horizontal)?  Air, freshwater, oil based, etc.  Vertical, horizontal, others.

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

Additives to be used in drilling medium?  Fluid loss control, emulsifier, shale stabilizer

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

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

- Landfill or offsite name/permit number?  Drill cuttings will be disposed offsite at Waste Management's Aidsen Landfill located in Washington, PA. Permit # PADEP 1009172

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) Branden Weimer  
Company Official Title  Construction Permitting Team Lead

Subscribed and sworn before me this  25  day of  February  2014

My commission expires  9/31/2017

Notary Public  
COMMONWEALTH OF PENNSYLVANIA

RECEIVED
Office of Oil and Gas

NOTARIAL SEAL
THOMAS BASINGER
Notary Public  
CONNELLSVILLE DPT, FAYETTE COUNTY, PA.  My Commission Expires September 24, 2017
Form WW-9

Operator's Well No.: Hart 2H

Chevron Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 13.6

Prevegetation pH 7

Lime 2 Tons/acre or to correct to pH 5.5-7

Fertilizer type

Fertilizer amount 1000 lbs/acre

Mulch 2 Tons/acre

Seed Mixtures

Temporary

Seed Type lbs/acre
Annual Ryegrass See Pg ES104
Barley or Oats See Pg ES104
Millet See Pg ES104

Permanent

Seed Type lbs/acre
Kentucky 31 Fescue See Pg ES104
Red Fescue See Pg ES104
Crownvetch See Pg ES104

Cereal Rye or Cereal Wheat See Pg ES104, Hard Fescue See Pg ES 104, Annual Ryegrass See Pg ES104

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: DEP waiver and permit conditions required for the following well restrictions: Distance to nearest occupied dwelling ≤ 625' from center of pad, and ≤ 1/100 from LOD to wetlands. "Pre-6A pad, already built - LKE restriction does not apply."

[signature]

Title: OIL and GAS INSPECTOR

Field Reviewed? [ ] Yes [ ] No

Date: 3/4/14

06/20/2014
Wetland Waiver Request

API Number 510174R  Well Number 2H
Operator Chevron Appalachia, LLC  Pad Name Hart Wells 2H-10H

Submit a conclusive demonstration to justify the proposed activity by addressing the following:

1. Demonstrate that there is not a practical alternative to impact the Waters of the U.S. by including other alternatives that were considered but eliminated.
   a. Include a No-Action Alternative as to show “the future without the project”
   b. Location Alternatives must be shown
   c. Must demonstrate why a 100’ buffer cannot be maintained

   The Hart Well Pad is an existing well pad that has been purchased by Chevron and has been previously constructed by another well operator. In order to add more wells to the existing pad, Chevron is expanding the well pad surface. The Wetland Waiver Request is for a field identified wetland located approximately 46-ft north of the existing well pad. As the well pad is an existing feature, the No-Action Alternative and the proposed project involve an equal amount of disturbance to the wetland. The proposed expansion implements efforts to minimize impact to Waters of the U.S. on site to the greatest extent practicable – the well pad expansion will not be directed in a manner that further encroaches on Waters of the U.S. on site. Additionally, adding wells to the existing pad not only reduces surface area disturbances by reducing the number of well sites, but also results in fewer access driveways being constructed. The 100-ft buffer cannot be maintained due to the pre-existing conditions on site. Please refer to the attached Environmental Exhibit (EX-1).

2. Show that treatment facilities (Erosion and Sediment Control Features) will be located as close as practical to the source(s) with which it is associated.

   The edge of the proposed limit of disturbance is shown as close to the E&S control features (access road cross culvert with rip rap apron & rock filter and super silt fence) and the edge of the well pad/cut slope as possible. Runoff from the access road is collected and routed away from the wetland. Please refer to the Erosion and Sediment Control Plan.

3. Demonstrate that all proposed activity will not impact Waters of the U.S. more than is necessary to accommodate the proper construction and operation of the facility.
   a. Specify and identify wetlands using unique identification and/or perennial streams located within 100’ of the pad’s limit of disturbance (including erosion and sediment controls).
Wetland Waiver Request

API Number 5101748 Well Number 2H
Operator Chevron Appalachia, LLC Pad Name Hart Wells 2H-10H

b. Is the proposed project the least environmentally damaging practicable alternative to the waters of the United States, so long as the alternative does not have other environmental consequences.

Multiple Unnamed Tributaries to North Fork Middle Grave Creek are located east and south of the existing well pad. No perennial streams are located within 100-ft of the well pad’s limit of disturbance. Five (5) field located wetlands (Wetlands 1-6), all Palustrine Emergent (PEM), are located on site. Wetland #6 is located 46-ft north of the well pad. The limit of disturbance has been adjusted to the greatest extent practicable in order to achieve the 100-ft buffer requirement for five out of six (5/6) field located wetlands on site. As the well pad has already been constructed within 100-ft to Wetland #4 by another operator, Chevron is minimizing any further disturbance to the wetlands on site by expanding the well pad in other directions. The proposed well pad expansion will not further encroach on wetland #6. Please refer to the attached Environmental Exhibit (EX-1).

<table>
<thead>
<tr>
<th>Wetland ID</th>
<th>USACE Water Type</th>
<th>NWI Classification</th>
<th>Approximate Size (Acres)</th>
<th>Distance from LOD (feet)</th>
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4. Provide mapping, plans, specifications and design analysis for the preferred alternative to the project.
   a. Specify in writing what additional controls, measures, devices, monitoring, etc will be utilized to protect these wetlands and/or perennial streams.

The following controls will be utilized to protect the wetland:
1) The upstream grading operations are entirely in cut, no sediment laced runoff will discharge directly to the wetland.
2) Super silt fence will act as a sediment barrier.
3) An endwall with rip rap and rock filter outlet will divert access road flow away from the wetland.

Received
MAR 31 2014

Page 2 of 2
Office of Oil and Gas
WV Dept. of Environmental Protection

06/20/2014
<table>
<thead>
<tr>
<th>SURFACE OWNER</th>
<th>DIST-TM/PAR</th>
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<td>WILLIAM H. III &amp; LINDA BARDALL</td>
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<tr>
<td>MARSHALL COUNTY 4-H LEADERS</td>
<td>14-7/40</td>
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<tr>
<td>JOHN R. REGAN &amp; CONNIE L. THOMAS</td>
<td>14-0/1</td>
</tr>
<tr>
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MARCH 13, 2014

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