March 20, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-5101712, 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: FRANCIS 4H
Farm Name: WILLIAMS OHIO VALLEY MIDS
API Well Number: 47-5101712
Permit Type: Horizontal 6A Well
Date Issued: 03/20/2014

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

1) Well Operator: **Chevron Appalachia, LLC**

2) Operator’s Well Number: **4H**

3) Elevation, current ground: **1283’**

4) Well Type: (a) Gas       (b) If Gas:

5) Proposed Pad? Yes or No: **YES**

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
   Marcellus 4323 psi, Upper Devonian 4134 psi, 6489'-6538', 50' anticipated thickness, overpressured

7) Proposed Total Vertical Depth: **6512’**

8) Formation at Total Vertical Depth: **MARCELLUS**

9) Proposed Total Measured Depth: **10,788’**

10) Approximate Fresh Water Strata Depths:

11) Method to Determine Fresh Water Depth:

12) Approximate Saltwater Depths:

13) Approximate Coal Seam Depths:

14) Approximate Depth to Possible Void (coal mine, karst, other):

15) Does proposed well location contain coal seams directly overlying or adjacent to an active mine? If so, indicate name and depth of mine:

16) Describe proposed well work:

17) Describe fracturing/stimulating methods in detail:

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

19) Area to be disturbed for well pad only, less access road (acres):
WW-6B Attachment Francis Unit 2H, 3H, 4H, 6H, 7H, 8H, 9H, 10H, 11H, 12H, 13H

- If a void is encountered the contingency will be the following:
  - Once unexpected void is encountered drill 12-1/4" hole to 100' below bottom of mine void.
  - Run 9-5/8", 36 lb/ft, J-55 casing with cement basket 20' above mine void.
  - Cement casing using displacement method to bottom of mine void using 100 percent excess.
  - Grout from surface to cement basket using whatever volume of cement is necessary to get cement to surface.
  - Drill 8-3/4” hole to 2580’.
  - Run 7", 23 lb/ft, N-80 casing.
  - Cement casing to surface using the displacement method with 30% excess.
  - Drill 6-1/4” hole to TD.
  - Run 4-1/2” 13.5 lb/ft, P-110 casing to TD.
  - Cement to surface using displacement method with 10% excess
## 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.</th>
<th>FOOTAGE: For Drilling</th>
<th>INTERVALS: Left in Well</th>
<th>CEMENT: Fill-up (Cu. Ft.)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conductor</td>
<td>20&quot;</td>
<td>New</td>
<td></td>
<td></td>
<td>40'</td>
<td>40'</td>
<td>CTS</td>
</tr>
<tr>
<td>Fresh Water</td>
<td>13-3/8&quot;</td>
<td>New</td>
<td>J-55</td>
<td>54.5#</td>
<td>500'</td>
<td>500'</td>
<td>CTS</td>
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<tr>
<td>Coal</td>
<td></td>
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</tr>
<tr>
<td>Intermediate</td>
<td>9-5/8&quot;</td>
<td>New</td>
<td>N-80</td>
<td>40#</td>
<td>2,580'</td>
<td>2,580'</td>
<td>CTS</td>
</tr>
<tr>
<td>Production</td>
<td>5-1/2&quot;</td>
<td>New</td>
<td>P-110</td>
<td>20#</td>
<td>10,788'</td>
<td>10,788'</td>
<td>CTS</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<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</th>
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<tbody>
<tr>
<td>Conductor</td>
<td>20&quot;</td>
<td>26&quot;</td>
<td></td>
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<td></td>
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</tr>
<tr>
<td>Fresh Water</td>
<td>13-3/8&quot;</td>
<td>17-1/2&quot;</td>
<td>0.380&quot;</td>
<td>2,730 psi</td>
<td>Class A</td>
<td>1.18</td>
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<tr>
<td>Coal</td>
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<tr>
<td>Intermediate</td>
<td>9-5/8&quot;</td>
<td>12-1/4&quot;</td>
<td>0.395&quot;</td>
<td>5,750 psi</td>
<td>Class A</td>
<td>1.29</td>
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<td>Production</td>
<td>5-1/2&quot;</td>
<td>8-1/2&quot;</td>
<td>0.361&quot;</td>
<td>12,640 psi</td>
<td>Class A</td>
<td>2.2</td>
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<tr>
<td>Tubing</td>
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<td></td>
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<tr>
<td>Liners</td>
<td></td>
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</table>

## Packers

<table>
<thead>
<tr>
<th>Kind:</th>
<th>None</th>
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<tbody>
<tr>
<td>Sizes:</td>
<td></td>
</tr>
<tr>
<td>Depths Set:</td>
<td></td>
</tr>
</tbody>
</table>
21) Describe centralizer placement for each casing string.

There will be a bow spring centralizer every two jts on the Water 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.

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

For the Water 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, middle, and tail cement.
The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder.
The middle will contain class A cement, KCl, dispersant, Aluminum Silicate, suspension agent, and retarder.
The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer, suspension agent, and friction reducer

23) 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.
# Francis 4H

<table>
<thead>
<tr>
<th>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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<tbody>
<tr>
<td>20° Conductor</td>
<td>40'</td>
<td></td>
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<tr>
<td>Deepest Aquifer</td>
<td>400'</td>
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<tr>
<td>12 3/8&quot; Casing</td>
<td>500'</td>
<td></td>
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<tr>
<td>Bow Spring: 1-shoe 1, every 2nd ft 1 on ea 2-3 jks across previous shoe. Right: 2 within 100 ft of surface</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Basket</td>
<td>780'</td>
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<td></td>
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<tr>
<td>Top Coal</td>
<td>800'</td>
<td></td>
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<tr>
<td>Deepest Coal</td>
<td>810'</td>
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<tr>
<td>Red Beds</td>
<td>1000'</td>
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<tr>
<td>Berea</td>
<td>2,480'</td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>9-5/8&quot; Casing</td>
<td>2,580'</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>Bow Spring: 1-shoe 1, every 2nd ft 1 on ea 2-3 jks across previous shoe. Double-Bow: 2 within 100 ft of surface</td>
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<tr>
<td>KOP</td>
<td>5,000'</td>
<td>0°</td>
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<tr>
<td>Burkett Sh.</td>
<td>6,354'</td>
<td>30°</td>
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<tr>
<td>Tully Lm.</td>
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<tr>
<td>Hamilton Sh.</td>
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<tr>
<td>U. Marcellus</td>
<td>6,480'</td>
<td>45°</td>
<td></td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Cherry Valley</td>
<td>6,505'</td>
<td>60°</td>
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<tr>
<td>L. Marcellus</td>
<td>6,509'</td>
<td>60°</td>
<td></td>
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<tr>
<td>Landing Point</td>
<td>7,384'</td>
<td>90°</td>
<td></td>
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<tr>
<td>Basal Marcellus</td>
<td>6,512'</td>
<td>90°</td>
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<tr>
<td>Onondaga</td>
<td>6,533'</td>
<td>90°</td>
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<tr>
<td>Landing Point</td>
<td>7,384'</td>
<td>90°</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5-1/2&quot; Casing</td>
<td>10,788'</td>
<td>90°</td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>3,424'</td>
<td>9-1/2&quot;</td>
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</tbody>
</table>

- **Surface String**
  - 13-3/8" 54.5e J-45 BTC
  - 0.38" wall
  - Capacity = 1455 bbl/hr
  - Annulus = 1227 bbl/ft
  - (+ 0 bbl for shoe track)
  - Burst = 2750 psi

- **Intermediate Casing**
  - 9-5/8" 409 N-80 BTC
  - 8.835" ID, 8.679" DD
  - Capacity = 0.75 bbl/hr
  - Annulus = 6557 bbl/ft
  - (+ 3.1 bbl for shoe track)
  - Burst = 5750 psi
  - Collapse = 3090 psi

- **Prod. Casing**
  - 5-1/2", 20...
  - P-110, VAM Top
  - Capacity = 5321 bbl/ft
  - (+1 bbl for shoe track)
  - Burst = 12,640 psi
  - Collapse = 11,000 psi
  - ID = 9.479"
  - OD = 9.653"

- **Centralization**
  - See Drilling Program
  - 1 Tubular per joint for 3 joints above and 3 joints below 9-5/8" shoe
  - 2 double Bow Spring per 3 joints from top Marcellus to KOP
  - 2 SpiralGlider per joint from shoe to top of Marcellus

- **Cement to Surface**

- **Minimum 40 ft from GL or at least 10 ft into bedrock**

- **Optimum 80 ft past deepest coal**

- **Set below the Berea**

- **45 ft Shoe Track**
STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION
OFFICE OF OIL AND GAS

FLUIDS/CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name: Chevron Appalachia, LLC
Watershed (HUC 10): Middle Grave Creek Quadrangle
Elevation: 1260.14'

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes [ ] No [x]
Will a pit be used? Yes [ ] No [x]
If so, please describe anticipated pit waste: n/a
Will a synthetic liner be used in the pit? Yes [ ] No [x] 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: N/A

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc.
- If oil based, what type? Synthetic, petroleum, etc. Highly refined mineral oil base mud

Additives to be used in drilling medium? emulsifiers, weighting agents, organophilic clays, barite, calcium chloride (for internal phase of invert) guar

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc.
- If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A
- Landfill or offsite name/permit number? Arden Landfill Permit # PA DEP 100172

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): Jeremy Hirtz
Company Official Title: Permitting Team Lead

FEB 11 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Rodney Lee Frazee, Notary Public
My Commission Expires Jun 12, 2030

My commission expires January 17, 2016
Form WW-9

Chevron Appalachia, LLC

Proposed Revegetation Treatment: Acres Disturbed 190  Prevegetation pH 7
Lime 2  Tons/acre or to correct to pH 6.5-7
Fertilizer type 10-20-10
Fertilizer amount 1000  lbs/acre
Mulch 2  Tons/acre

Seed Mixtures

<table>
<thead>
<tr>
<th>Temporary</th>
<th>Permanent</th>
</tr>
</thead>
<tbody>
<tr>
<td>Seed Type</td>
<td>Seed Type</td>
</tr>
<tr>
<td>Annual Ryegrass 40lbs/acre</td>
<td>Perennial Rye Grass 12%</td>
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<tr>
<td></td>
<td>Creeping Red Fescue 27%</td>
</tr>
<tr>
<td></td>
<td>Tall Fescue 42%, Red Top 4%,</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:

Received

Title: [Signature]
Field Reviewed? [ ] Yes [ ] No
Date: 10/2/2013

FEB 1 1 2014

Office of Oil and Gas
WV Dept. of Environmental Protection
03/21/2014
Cement Additives for Francis Unit 2, 3, 4, 6, 7, 8, 9, 10, 11, 12, 13

<table>
<thead>
<tr>
<th>For the Water String the blend will contain class A cement, 3% CaCl2, and flake.</th>
</tr>
</thead>
<tbody>
<tr>
<td>The intermediate will contain class A cement, 10% CaCl2, salt, and flake.</td>
</tr>
<tr>
<td>The Production cement will have a lead, middle, and tail cement.</td>
</tr>
<tr>
<td>The lead will contain class A cement, KCl, dispersant, suspension agent, and retarder.</td>
</tr>
<tr>
<td>The middle will contain class A cement, KCl, dispersant, Aluminum Silicate, suspension agent, and retarder.</td>
</tr>
<tr>
<td>The tail will contain class A cement, Calcium Carbonate, KCl, dispersant, de-foamer, suspension agent, and friction reducer.</td>
</tr>
</tbody>
</table>
CHEVRON
APPALACHIA, LLC

West Virginia Well Site Safety Plan

Francis Site
Well 4H
Marshall County, West Virginia

Prepared in Conformance with:

West Virginia's Code §22-6A and Legislative Rule §35-8-5.7
and
West Virginia Department of Environmental Protection's, Office of Oil and Gas
documents: "Well Site Safety Plan Standards" (issued August 25, 2011), and
"Deep Well Drilling Procedures and Site Safety Plan Requirements" (issued
October 22, 2012)

Revision 1

Original: September 2012
Revised: June 2013

RECEIVED
Office of Oil and Gas
OCT 28 2013
WV Department of
Environmental Protection