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west virginia department of environmental protection

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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

## PERMIT MODIFICATION APPROVAL

May 20, 2015

CHEVRON APPALACHIA, LLC  
POST OFFICE BOX 611  
MOON TOWN, PA 15108

Re: Permit Modification Approval for API Number 5101783, Well #: CURRY 7H

**Modify freshwater, coal and intermediate casing**

Oil and Gas Operator:

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas

Promoting a healthy environment.



**Kristen Brooks**  
Permit Coordinator

Appalachian/Michigan  
Strategic Business Unit  
Chevron North America  
Exploration and Production  
A Division of Chevron U.S.A. Inc.  
800 Mountain View Drive  
Smithfield, PA 15478  
Tel 724-564-3700  
Fax 724-564-2365  
kristenbrooks@chevron.com

March 25, 2015

West Virginia D.E.P.  
Office of Oil & Gas  
601 57<sup>th</sup> Street SE  
Charleston, WV 25304-2345

RE: Curry 2H, 3H, 4H, 5H, 7H, 9H, 10H, and 11H  
Casing Modification Change

Dear Mr. Smith,

Please accept this as our formal request for a modification to the Intermediate Casing of the Curry 2H, 3H, 4H, 5H, 7H, 9H, 10H, and 11H drill permits. An updated Page 2 of the WW-6B and an updated contingency plan are attached. If you have any questions, please contact me at (724) 564-3781 or kristenbrooks@chevron.com.

Sincerely,

Kristen Brooks  
Permit Coordinator  
Chevron Appalachia, LLC

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Office of Oil and Gas  
MAR 27 2015  
WV Department of  
Environmental Protection

Enclosure

WW-6B  
(04/15)

API NO. 47-051 - 01783 MOD  
OPERATOR WELL NO. 7H  
Well Pad Name: Curry

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

- 1) Well Operator: Chevron Appalachia, LLC 49449935 Marshall Washington Moundsville, WV  
Operator ID County District Quadrangle
- 2) Operator's Well Number: 7H Well Pad Name: Curry
- 3) Farm Name/Surface Owner: Curry Public Road Access: Wayman's Ridge Rd/County Rt 38
- 4) Elevation, current ground: 1317' Elevation, proposed post-construction: 1317'
- 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 Expected Pressure(s):  
Marcellus, 6,504' GL, Thickness: 56' - Pressure 0.58 psi/ft
- 8) Proposed Total Vertical Depth: 7,018'
- 9) Formation at Total Vertical Depth: Marcellus
- 10) Proposed Total Measured Depth: 13,401'
- 11) Proposed Horizontal Leg Length: 6,383'
- 12) Approximate Fresh Water Strata Depths: 355' GL
- 13) Method to Determine Fresh Water Depths: Curry 2H
- 14) Approximate Saltwater Depths: 1,890'-3,080'
- 15) Approximate Coal Seam Depths: 825' GL
- 16) Approximate Depth to Possible Void (coal mine, karst, other): 825' GL
- 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 (abandoned)  
Depth: 825'-833' GL  
Seam: Pittsburgh No. 8 Coal Seam  
Owner: Reserve Coal Properties Company

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**APR 28 2015**  
Office of Oil and Gas  
WV Dept. of Environmental Protection

WW-6B  
(04/15)

API NO. 47-051 - 01783 100  
 OPERATOR WELL NO. 7H  
 Well Pad Name: Curry

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft./CTS)
Conductor	30"	New			40'	40'	CTS
Fresh Water	20"	New	J-55	94#	405'	405'	CTS
Coal	13-3/8"	New	J-55	54.5#	880'	880'	CTS
Intermediate	9-5/8"	New	J-55	40#	2,292'	2,292'	CTS
Production	5.5"	New	P-110	20#	13,369'	13,369'	CTS
Tubing							
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	36"					
Fresh Water	20"	26"	0.438"	2,100 psi	300 psi	Class A	1.21
Coal	13-3/8"	17.5"	0.380"	2,730 psi	600 psi	Class A	1.04
Intermediate	9-5/8"	12.25"	0.395"	3,950 psi	2,500 psi	Class A	1.29
Production	5.5"	8.5"	0.361"	12,640 psi	9,000 psi	Class A	2.2
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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## WW-6B Attachment Curry Unit 2H, 3H, 4H, 5H, 6H, 7H, 8H, 9H, 10H, 11H

**Scenario-1: Marcellus well drilled first as Pilot well:**

- a. **If a void is encountered, we will drill ahead to min 30' or max 50' below mine void and stop drilling.**
- Notify DEP Inspector and obtain permit/ approval to plug back hole. The plugback procedure will be as follows:
    - Trip in hole with 2-7/8" tubing cement stinger to 20' above top of void.
    - Mix and pump cement to fill rat hole below void. Trip out of hole and lay down tubing
    - Trip in hole with Open Hole Packer and set at 20' above top of void. Test packer.
    - Trip out of hole and lay down packer running tool
    - TIH w/ 2-7/8" tubing to 5'+/- from top of packer
    - Mix and pump 15.6pgg cement on top of packer and fill hole to within 10' from surface.
    - Trip out of hole and lay down tubing.
    - Nipple down BOPE and related equipment
    - Cut casing, lay wellhead and casing cut piece
    - Weld on steel plate to cover casing
    - Rig down and skid rig to next well. Note: Cellar ring removal, cellar filling and installation of land mark will be done later

The rest wells original plan will be revised to incorporate a coal casing string as follows:

b. **Marcellus Wells Contingency Casing Plan:**

- Drill 26" hole to 700' (min 50' or max 150' beyond freshwater zone)
- Run 20" 94.5# J-55 BTC casing
- Cement casing to surface using displacement method with 30% excess
- Drill 17-1/2" hole to 925' (min 30' or max 50 beyond mine void)
- Run 13-3/8" 54.5# J-55 BTC casing with cement basket 20' above mine void
- Cement casing using displacement method to bottom of mine void using 100% excess
- Grout from surface to cement basket using whatever volume of cement necessary to get cement to surface
- Drill 12-1/4" hole to 2,292' 100' below the Berea Sand
- Run 9-5/8" 40# J-55 BTC casing to isolate the Berea, shallow gas sand and salt water zones
- Cement casing to surface using displacement method with 30% excess
- Drill 8-1/2" production hole to TD
- Run 5 1/2" 20# P-110 VA Superior production casing to TD
- Cement casing to surface using displacement method with 10% excess

c. **Utica/ Point Pleasant well Contingency Casing Plan:** In a situation where there is also Utica/ Point Pleasant well(s) to be drilled on same pad, the Point Pleasant/Utica well contingency casing design based on the outcome of the Marcellus pilot well drilled will be as follows:

- Drill 26" hole to 405' (min 50' or max 150' beyond freshwater zone)
- Run 20" 94# J55 BTC casing
- Cement casing to surface using displacement method with 30% excess
- Drill 18 7/8" hole to 925' (min 30' or max 50 beyond mine void)
- Run 16" 75# J-55 BTC casing with cement basket 20' above mine void
- Cement casing using displacement method to bottom of mine void using 100% excess
- Grout from surface to cement basket using whatever volume of cement necessary to get cement to surface
- Drill 14 3/4" hole to 2,292' 100' below the Berea Sand
- Run 13-3/8" 72# L-80 SF II casing to isolate the Berea, shallow gas sand and salt water zones
- Cement casing to surface using displacement method with 30% excess
- Drill 12-1/4" hole to 8,852' 100' below the Lockport

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**Scenario-2: Drilling String/ Bottom Hole Assembly Stuck during drilling:**

- If the drill string/BHA gets stuck during drilling operation:
  - Make all necessary effort and attempt to free the drill string/BHA.
  - If all effort and attempts proves unsuccessful, will notify WV DEP Inspector of situation and obtain verbal and/or email approval to plug hole back with cement plug(s) and sidetrack well
  - Cement plug(s) will be set as needed to the desired depth adequate for successful sidetrack of well without compromising anti-collision with the original hole and ghost well(s)/adjacent wells on the same pad
  - Cement plug(s) additives will contain Class H cement, KCl, Dispersant, Anti-Foam, and Retarder.
  - Trip in hole with Drilling Bottom Hole Assembly
  - Dress/drill cement to proposed kick off point
  - Kick off and sidetrack well and directionally drill sidetrack well to original casing point

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