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

PERMIT MODIFICATION APPROVAL

May 20, 2015

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

Re: Permit Modification Approval for API Number 5101781, Well #: CURRY 4H

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,

for Gene Smith

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas

4705101781 MD

Chevron

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 57th 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

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 - 01781
OPERATOR WELL NO. 4H
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: 4H 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 X Oil ____ Underground Storage ____
Other ____
(b)If Gas Shallow X Deep ____
Horizontal X

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: 7,078'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 13,333'

11) Proposed Horizontal Leg Length: 6,255'

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 X

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(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

WW-6B
(04/15)

API NO. 47- 051 - 01781 MOD
OPERATOR WELL NO. 4H
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#	13,301'	13,301'	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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4705101781 mod

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 ½" 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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