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west virginia department of environmental protection

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Office of Oil and Gas  
601 57<sup>th</sup> Street, S.E.  
Charleston, WV 25304  
(304) 926-0450  
fax: (304) 926-0452

Jim Justice, Governor  
Austin Caperton, Cabinet Secretary  
[www.dep.wv.gov](http://www.dep.wv.gov)

PERMIT MODIFICATION APPROVAL  
Horizontal 6A / Horizontal 6A Well - 1

CHEVRON APPALACHIA, LLC  
POST OFFICE BOX 611

MOON TOWNSHIP, PA 15108

Re: Permit Modification Approval for TAYLOR B 3H  
47-051-01794-00-00

Modified production casing cement type to A, G, or H

CHEVRON APPALACHIA, LLC

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.

If there are any questions, please feel free to contact me at (304) 926-0450.

James A. Martin  
Chief

Operator's Well Number: TAYLOR B 3H  
Farm Name: WILLIAMS OHIO VALLEY MIDSTREAM LLC  
U.S. WELL NUMBER: 47-051-01794-00-00  
Horizontal 6A / Horizontal 6A Well - 1  
Date Issued: 4/19/2017

Promoting a healthy environment.

04/28/2017

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

1) Well Operator: Chevron Appalachia, LLC 49449935 51 Clay Glen Easton, WV  
Operator ID County District Quadrangle

2) Operator's Well Number: 3H Well Pad Name: Taylor B

3) Farm Name/Surface Owner: Williams Ohio Valley Midstream LLC Public Road Access: CR 17 Fork Ridge Road

4) Elevation, current ground: 1222' Elevation, proposed post-construction: 1222'

5) Well Type (a) Gas  Oil  Underground Storage

Other

(b) If Gas Shallow  Deep

Horizontal

*JW 3/19/17*

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):  
Marcellus, 6525', 49' - 0.64 psi/ft

8) Proposed Total Vertical Depth: 6,533'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 15,964'

11) Proposed Horizontal Leg Length: 8,094'

12) Approximate Fresh Water Strata Depths: 463' GL

13) Method to Determine Fresh Water Depths: 1 mi radius offset wells, freshwater wells, and freshwater base level

14) Approximate Saltwater Depths: 1855', 2345'-1820' KB: Francis 1V offset well

15) Approximate Coal Seam Depths: 765' GL

16) Approximate Depth to Possible Void (coal mine, karst, other): NA - Solid coal anticipated

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes

(a) If Yes, provide Mine Info: Name: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

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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	20"	New			40'	40'	141.8
Fresh Water	13-3/8"	New	J-55	54.5#	513'	513'	691.0
Intermediate	9-5/8"	New	J-55	40#	2,240'	2,240'	905.0
Production	5-1/2"	New	P-110	20#	15,964'	15,964'	3876.0
Tubing							
Liners							

*JN 3/19/17*

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	20"	26"					
Fresh Water	13-3/8"	17-1/2"	0.380"	2,730 psi	1,911 psi	Class A	1.18
Intermediate	9-5/8"	12-1/4"	0.395"	3,950 psi	2,768 psi	Class A	1.29
Production	5-1/2"	8-1/2"	0.361"	14,360 psi	9,975 psi	Class A, G, or H	1.25
Tubing							
Liners							

**PACKERS**

Kind:			
Sizes:			
Depths Set:			

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WW-6B  
(10/14)

API NO. 47- 051 - 01794 *MOD*  
OPERATOR WELL NO. 3H  
Well Pad Name: Taylor B

*JN 3/19/17*

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

Drill 17-1/2" hole to 513' then run and cement 13-3/8" casing to surface covering the fresh water. Drill 12.25" hole to 2,240' then run and cement to surface 9 5/8" casing, covering the Big Injun. Drill 8 1/2" hole to KOP at 5,688. Drill 8 1/2" curve and lateral to 15,964' MD and 6,533 TVD. Run 5 1/2" production casing and cement to a minimum TOC of 500' above top perms'.

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

Chevron will utilizing plug and perf method with 40 stages using 8,572 bbl of fluid and 315,000 lbm of sand per stage

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 18.3

22) Area to be disturbed for well pad only, less access road (acres): 4.3

23) 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 jt from KOP to surface.

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

For the Water String the blend will contain class A cement, 3% CaCl<sub>2</sub>, and flake. The intermediate will contain class A cement, 10% CaCl<sub>2</sub>, Salt, and flake. The Production cement will have a lead and tail cement. The lead will contain class A, G, or H cement, KCl, dispersant, suspension agent, and retarder. The tail will contain class A, G, or H 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.

# Taylor B Pad - 3H

Clay Twp, Marshall Co, WV						Ground Level Elev. (ft above SL):		1270		
DRILLING FLUID / BIT TYPE / TFA	CENTRALIZER PROGRAM	CASING SIZE / FORMATION	DEPTH		WELLHEAD DESIGN		HOLE SIZE (IN)	HOLE DEPTH (FT)	CASING SPECS	CEMENT PROGRAM
			MD (FT)	TVD (FT)	INC	AZM				
Core Barrel / Auger	2 Bowspring per Jt	20" Conductor	160	160			26	160	<b>Conductor</b> 20" API 5L Minimum 40 ft from GL or at least 10 ft into bedrock	Grout to Surface
	Bow Spring: (1) on shoe track w/ stop collar & (1) per jt over coupling to surface	13-3/8" Casing	580	580			17.5	595	<b>Surface Casing</b> 13-3/8" 54.5# J-55 BTC 0.380" Wall Coupling OD (in) 14.375 ID (in) 12.615 Drift ID (in) 12.459 Burst (psi) 2.730 Collapse (psi) 1.130 Yield (Jt Strength 1,000 lbs) 853	<b>Surface Blend (Class A)</b> Cement to Surface
	Bow Spring: (1) on shoe track w/ stop collar & (1) per 3 jts over coupling	9-5/8" Casing	2,230	2,230			12.375 - 12.25	2,245	<b>Intermediate Casing</b> 9-5/8" 40# J-55 BTC 0.395" Wall Coupling OD (in) 10.625 ID (in) 8.825 Drift ID (in) 8.690 Burst (psi) 3950 Collapse (psi) 2570 Yield (Jt Strength 1,000 lbs) 630	<b>Intermediate II Blend (Class A)</b> Cement to Surface
	Bow Spring: (1) per every other jt over coupling  SpiralSlider or Centek: (1) per jt of csg to KOP	5-1/2" Casing	13,661 - 16,004				8.75 - 8.5		<b>Production Casing</b> 5-1/2" 20# P-110, DW/C-15-Plus 0.361" Wall Coupling OD (in) 6.300 ID (in) 4.778 Drift ID (in) 4.653 Burst (psi) 14.360 Collapse (psi) 12.090 Yield (Jt Strength 1,000 lbs) 729	<b>Production Lead Slurry</b> Cement to Surface
Non-Conservation	Float Equip. (2) Jts of Csg  Float Equip.	5-1/2" Casing	13,661 - 16,004				8.75 - 8.5			Production Well Slurry TOC minimum 200' above Marcolius

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**Kristen Brooks**  
Permitting Coordinator

March 28, 2017

West Virginia DEP – Office of Oil and Gas  
601 57<sup>th</sup> Street, SE  
Charleston, WV 25304

RE: Taylor B 3H, 4H, 6H, 7H, 8H, 9H modification

Dear Sir/Madam,

Please consider this our formal request for modifications to the casing program on the Taylor B 3H, 4H, 6H, 7H, 8H, and 9H permits. The API numbers are below.

Taylor B 3H	47-051-01794
Taylor B 4H	47-051-01795
Taylor B 6H	47-051-01796
Taylor B 7H	47-051-01797
Taylor B 8H	47-051-01798
Taylor B 9H	47-051-01799

Should you have any questions or concerns, please contact me at (724) 564-3781 or kristenbrooks@chevron.com.

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Sincerely,

Kristen Brooks

Enclosure