



west virginia department of environmental protection

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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, March 19, 2020
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

CNX GAS COMPANY LLC
1000 CONSOL ENERGY DR

CANONSBURG, PA 15370

Re: Permit Modification Approval for SHR 37 DHSM
47-095-02667-00-00

Modified 9 5/8" casing to 5250' for stabilization through intermediate string

CNX GAS COMPANY 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: SHR 37 DHSM
Farm Name: CNX GAS COMPANY
U.S. WELL NUMBER: 47-095-02667-00-00
Horizontal 6A New Drill
Date Modification Issued: March 20, 2020

Promoting a healthy environment.

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

1) Well Operator: CNX Gas Company, LLC 494458046 Tyler Centerville West Union
Operator ID County District Quadrangle

2) Operator's Well Number: SHR37DHSM Well Pad Name: SHR37

3) Farm Name/Surface Owner: CNX Gas Company, LLC Public Road Access: Duckworth Ridge Road

4) Elevation, current ground: 828' Elevation, proposed post-construction: 828'

5) Well Type (a) Gas X Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow X Deep _____

Horizontal X

JCB 3/19/2020

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Target formation is Marcellus Shale @ 6290'-6337' TVD, 47' thick, expected formation pressure ~4000 psi

8) Proposed Total Vertical Depth: 6302'

9) Formation at Total Vertical Depth: Marcellus Shale (will not penetrate Onondaga)

10) Proposed Total Measured Depth: 18,439'

11) Proposed Horizontal Leg Length: 11,376'

12) Approximate Fresh Water Strata Depths: 92', 126', 144', 148', 150', 176', 220'

13) Method to Determine Fresh Water Depths: Offset water well information

14) Approximate Saltwater Depths: 1748', 2458'

15) Approximate Coal Seam Depths: No mineable coal seams; trace @ 154', 526', 618', 955', 992', 1044'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No X

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

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	L/S	<94.0	100	100	96 / CTS
Fresh Water	13.375	New	J-55	54.5	400	400	278 / CTS
Coal	13.375	New	J-55	54.5	400	400	278 / CTS
Intermediate	9.625	New	J-55	36.0	5250	5250 *	1664 / CTS
Production	5.5	New	P-110	20.0	18,439	18,439	3136 / TOC @ 2100'
Tubing	2.375	New	J-55	4.7		TBD	N/A
Liners	N/A						

Appendix

JCB 3/19/2020

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	24	0.375	N/A	N/A	Type 1	1.18
Fresh Water	13.375	17.5	0.380	2730	<500	Class A	1.19
Coal	13.375	17.5	0.380	2730	<500	Class A	1.19
Intermediate	9.625	12.25	0.352	3520	<2815	Class A	1.19
Production	5.5	8.75 x 8.5	0.361	14340	~11000 during frac	Class A or H	1.10
Tubing	2.375	N/A	0.190	7700	N/A	N/A	N/A
Liners	N/A						

PACKERS

Kind:	Inflatable external casing packer	To be utilized for 2-stage cement job on 9.625		
Sizes:	9.625 casing x 12.25 open hole			
Depths Set:	2600			

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

Utilize conductor rig to set 20" conductor into solid rock and cement back to surface. MIRU drilling rig. Air drill 17-1/2" hole. Run and cement 13-3/8" fresh water casing. Note that there are no known mineable coal seams in this area. Air drill 12-1/4" hole. Run and cement 9-5/8" intermediate casing. Utilize DV-Tool and external casing packer (ECP) to perform 2-stage cement job on 9-5/8". Displace cement with 12.0-12.8 ppg SOBMs. Fluid drill 8-1/2" production hole to curve KOP. Drill 8-1/2" curve from KOP to landing point. Continue drilling 8-1/2" lateral to TD (geosteer this section to remain in Marcellus target window). Perform clean-up cycle to condition well. Run and cement 5-1/2" production casing. Suspend well and skid to next well or RDMO drilling rig.

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

Run CBL to ~60 degrees in the curve and back to surface to determine production casing TOC. Test production casing and toe prep well. MIRU stimulation/hydraulic fracturing equipment. Fracture well by pumping required number of stages utilizing plug-and-perf method. Max anticipated treating pressure is ~11,000 psi and max anticipated treating pump rate is ~100 bpm. Number of stages and stage spacing to be finalized after drilling. After last stimulation stage, drill out frac plugs and clean-out well to PBTD. Flow back and clean-up well. Tie well into production. Run tubing when required.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 8.5

22) Area to be disturbed for well pad only, less access road (acres): 8

23) Describe centralizer placement for each casing string:

Fresh water string: centralize shoe joint and every other joint to surface - utilize bow spring centralizers. Intermediate string: centralize shoe joint and every 3rd joint to surface - utilize bow spring centralizers. Production string: centralize every joint from shoe to TOC - utilize single piece/rigid bow centralizers. Actual centralizer placement may be changed based on hole conditions.

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

Fresh water string: Class A cement with 1%-3% CaCl₂ and 1/4 pps cello-flake/LCM. Intermediate string: Class A cement with 0%-2% CaCl₂ and 1/4 pps cello-flake/LCM. Production string: Class A or Class H with dry blend and/or liquid additives including retarder, suspension agent, gas block, defoamer, fluid loss control, extender, dispersant, anti-settling agent. Actual cement blends may vary slightly depending upon cementing service company utilized.

25) Proposed borehole conditioning procedures:

Air sections are typically vertical holes - will ensure the hole is clean at section TD prior to TOOH to run casing (may require mist and/or soap to clean the hole). For the production hole - once at TD, circulate at max flowrate with max rotation until the shakers clean-up (typically requires multiple bottoms-up). For the production casing - once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.

4709502667 mod



DRILLING WELL PLAN
SHR-37D-HSM (Marcellus HZ)
Marcellus Shale Horizontal
Tyler County, WV

Ground Elevation	828 GL Elevation	SHR-37D-HSM SHL	SHR-37D-HSM LP	SHR-37D-HSM BHL	SHR-37D-HSM SHL	SHR-37D-HSM LP	SHR-37D-HSM BHL			
Azimuth	341°	N 313593.43, E 1619463.85 (NAD27)	N 314153.03, E 1617490.25 (NAD27)	N 324909.76, E 1613787.02 (NAD27)	N 313593.43, E 1619463.85 (NAD27)	N 314153.03, E 1617490.25 (NAD27)	N 324909.76, E 1613787.02 (NAD27)			
WELLSBORE DIAGRAM	HOLE	CASING	GEOLOGY	MD	TVD	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
	24"	20" L/S	Conductor	100	100	AIR	To Surface	N/A	N/A	Stabilize surface fill/soil
	17-1/2"	13-3/8" 54.5# J-55 BTC	Shallowest Fresh Water Deepest Fresh Water Fresh Water Casing	400	400	AIR / FW/Mist	15.6 ppg Class A + 1% to 3% CaCl2 + 1/4 pps Flake 20% OH Excess Yield = 1.19 TOC @ surface	Centralize every other joint from shoe to surface Bow spring centralizers	Ensure the hole is clean at section TD	Set through fresh water zones Cemented to surface No known mineable coal seams
	12-1/4"	9-5/8" 36.0# J-55 LTC	No mineable coal zones Big Lime Big Injun Price Weir Berea Gordon Warren Benson Alexander Intermediate Casing	N/A 1683 1748 1888 2018 2238 2458 3153 4733 4978 5250	N/A 1683 1748 1888 2018 2238 2458 3153 4733 4978 5037	AIR / Soap	15.6 ppg Class A + 0% to 2% CaCl2 + 1/4 pps Flake 20% OH Excess Yield = 1.19 TOC @ surface	Centralize every 3rd joint from shoe to surface Bow spring centralizers	Soap the hole as needed and ensure the hole is clean at section TD	Set through potential salt water zones Cemented to surface Casing to be set below the Benson due to lost returns experienced on the last well drilled on the pad Utilize DV Tool and external casing packer (set @ 2600' MD) to perform 2-stage cement job to ensure cement to surface
	8-1/2" Tangent and Curve & Lateral	5-1/2" 20.0# P-110 VAR	Cashaqua Middlesex West River Burkett Tilly Hamilton Marcellus Production Casing	5978 6083 6123 6193 6223 6243 6261 18439	5978 6083 6123 6193 6223 6243 6261 6302	12.0-12.8 ppg SOBMs	15.0 ppg Class A or H with additives (retarder, suspension agent, gas block, defoamer, fluid loss, extender, etc.) 10% OH Excess Yield = 1.10 TOC @ >= 500' above 9-5/8" shoe	Centralize every joint from shoe to TOC Single-piece/rigid bow centralizers	Once at TD, circulate at max flowrate with max rotation until shakers clean-up (typically requires multiple bottoms-up) Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement	Note: Actual centralizer placement may be changed due to hole conditions Note: Actual cement blends may vary slightly depending upon service company utilized

LP @ +/- 6302' TVD

8-1/2" Hole - Cemented Long String
 5-1/2" 20.0# VA-EP-P110-NV VAR (115-125 MYS, 95% RBW, API Modified BTC)

+/- 11376' Lateral

TD @ +/- 6302' TVD

JCS
3/19/2020

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
VOLUNTARY STATEMENT OF NO OBJECTION

Instructions to Persons Named on Page WW-6A

The well operator named on page WW-6A is applying for a permit from the State of West Virginia to conduct oil or gas well work. Well work permits are valid for twenty-four (24) months. Please contact the listed well operator and the Office of Oil and Gas if you do not own any interest in the listed surface tract.

Comment and Waiver Provisions

Pursuant to West Virginia Code § 22-6A-11(a), all persons described in subsection (b), section ten of this article may file written comments with the secretary as to the location or construction of the applicant's proposed well work within thirty days after the application is filed with the secretary.

Pursuant to West Virginia Code § 22-6A-8(b) No permit may be issued less than thirty days after the filing date of the application for any well work except plugging or replugging; and no permit for plugging or replugging may be issued less than five days after the filing date of the application except a permit for plugging or replugging a dry hole. *Provided*, That if the applicant certifies that all persons entitled to notice of the application under the provisions of subsection (b), section ten of this article have been served in person or by certified mail, return receipt requested, with a copy of the well work application, including the erosion and sediment control plan, if required, and the well plat, and further files written statements of no objection by all such persons, the secretary may issue the well work permit at any time.

VOLUNTARY STATEMENT OF NO OBJECTION

I, PETER J. BUNTO, hereby state that I have read the Instructions to Persons Named on Page WW-6A and the associated provisions listed above, and that I have received copies of a Notice of Application, an Application for a Well Work Permit on Form WW-6A and attachments consisting of pages one (1) through ⁴ _____, including the erosion and sediment control plan, if required, and the well plat, all for proposed well work on the tract of land as follows:

State: <u>West Virginia</u>	UTM NAD 83 Easting: <u>455990 26</u>
County: <u>Tyler</u>	UTM NAD 83 Northing: <u>513306 08</u>
District: <u>Centerville</u>	Public Road Access: <u>Duckworth Doad</u>
Quadrangle: <u>West Union</u>	Generally used farm name: <u>CNX Land</u>
Watershed: <u>Headwaters of Middle Island Creek</u>	

I further state that I have no objection to the planned work described in these materials, and I have no objection to a permit being issued on those materials.

<p>*Please check the box that applies</p> <p><input checked="" type="checkbox"/> SURFACE OWNER</p> <p><input checked="" type="checkbox"/> SURFACE OWNER (Road and/or Other Disturbance)</p> <p><input type="checkbox"/> SURFACE OWNER (Impoundments/Pits)</p> <p><input checked="" type="checkbox"/> COAL OWNER OR LESSEE <i>ja</i></p> <p><input type="checkbox"/> COAL OPERATOR</p> <p><input type="checkbox"/> WATER PURVEYOR</p> <p><input type="checkbox"/> OPERATOR OF ANY NATURAL GAS STORAGE FIELD</p>	<p>FOR EXECUTION BY A NATURAL PERSON</p> <p>Signature: _____</p> <p>Print Name: _____</p> <p>Date: _____</p> <p>FOR EXECUTION BY A CORPORATION, ETC.</p> <p>Company: <u>CNX Land</u></p> <p>By: <u>PETER J. BUNTO</u></p> <p>Its: <u>ASSISTANT VICE PRESIDENT</u></p> <p>Signature: _____</p> <p>Date: <u>3/19/2020</u></p>
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Oil and Gas Privacy Notice:

The Office of Oil and Gas processes your personal information, such as name, address and telephone number, as part of our regulatory duties. Your personal information may be disclosed to other State agencies or third parties in the normal course of business or as needed to comply with statutory or regulatory requirements, including Freedom of Information Act requests. Our office will appropriately secure your personal information. If you have any questions about our use or your personal information, please contact DEP's Chief Privacy Officer at depprivacyofficer@wv.gov.

Adkins, Laura L

From: Brewer, Charles T
Sent: Thursday, March 19, 2020 2:16 PM
To: Adkins, Laura L
Subject: SHR 37 MOD CNX

Laura,

After discussing with Cragin and Doug, I believe the best option for SHRL37DHSM (4709502667) is to extend the intermediate casing via the requested mod. Hopefully this will alleviate hole stability issues that they had on the previous well.

Thanks,

Taylor Brewer, B.S., M.S.
Assistant Chief - Permitting
WVDEP Office of Oil and Gas
601 57th Street, SE
Charleston, WV 25304
304-926-0499 ext. 41108

Adkins, Laura L

From: Hoon, Raymond <RaymondHoon@cnx.com>
Sent: Thursday, March 19, 2020 11:13 AM
To: Adkins, Laura L
Cc: Bitz, Daniel; Weigand, Sarah
Subject: [External] SHR37D modification
Attachments: SHR37D WW-6B Form - Modified 3-19-2020.pdf; SHR-37D Permit WBDs - Modified 3-19-2020.pdf; SHR-37D Approved Permit 47-095-02667.pdf; FW: SHR-37D-HSM 9-5/8" Casing Depth (47-095-02667)

CAUTION: External email. Do not click links or open attachments unless you verify sender.

Laura,

I called your office and got your voicemail saying that guys are working on reduced staffing. We got a request from the inspector in Tyler county to get a modification on our casing plan due to loss of return on one of the previous wells we drilled on the pad.

Proposal:

- Drill the 12-1/4" hole deeper and set the 9-5/8" casing shoe @ ~5000' MD (permit shows shoe @ 2600' MD)
- Run a DV-Tool (stage tool) and external casing packer (ECP) in the 9-5/8" casing
- Place DV-Tool and ECP @ ~2600' MD (originally permitted 9-5/8" shoe depth)
- DV-Tool and ECP will allow for a 2-stage cement job in the event returns are lost – thereby, ensuring cement to surface
- Stage 1 cement will be placed to cover from ~5000' MD (9-5/8" shoe) up to ~2600' MD (DV-tool and ECP)
- Stage 2 cement will be placed to cover from ~2600' MD to surface

Reason/Justification for Proposed Change:

- Due to lost returns on the previous SHR-37E production casing cement job, this change is proposed to mitigate the same event on SHR-37D
- Setting the 9-5/8" casing deeper will isolate the potential loss zone (most likely the Benson) during production hole drilling and production casing cementing
- Utilizing DV-Tool and ECP will allow cement to be circulated to surface, even if cement is lost to the potential loss zone

Attached is the updated ww-6B and WBD for the modification along with the originally approved permit.

Also attached is the email to Cragin Blevins the Tyler county inspector, documenting and summarizing the changes per a previous phone conversation.

If your office requires hard copies to be submitted let me know and I will get them out. Also, if you could update me on how you guys are currently operating through this shutdown it would be helpful. As of now we don't have applications in with your department. But may be submitting some in the coming weeks/months.

Thanks again Laura,

-Ray

Ray Hoon, PE

CNX | Senior Project Manager
CNX Center | 1000 CONSOL Energy Drive | Canonsburg, PA 15317
(724) 485-3540 *Office*
(330) 921-1979 *Cell*

4709502667MOD



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