

State of West Virginia  
Department of Environmental Protection - Office of Oil and Gas  
Well Operator's Report of Well Work

API 47-051-01616 County MARSHALL District FRANKLIN  
Quad POWHATAN POINT 7.5' Pad Name ARMSTRONG Field/Pool Name \_\_\_\_\_  
Farm name CNX GAS COMPANY, LLC Well Number ARMSTRONG NO. 4H  
Operator (as registered with the OOG) GASTAR EXPLORATION USA, INC.  
Address 229 W MAIN STREET - STE 301 City CLARKSBURG State WV Zip 26301

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey  
Top hole Northing 4,400,452.55 Easting 516,412.52  
Landing Point of Curve Northing \_\_\_\_\_ Easting \_\_\_\_\_  
Bottom Hole Northing 4,400,391.40 Easting 516,449.24

Elevation (ft) 1279' GL Type of Well  New  Existing Type of Report  Interim  Final  
Permit Type  Deviated  Horizontal  Horizontal 6A  Vertical Depth Type  Deep  Shallow  
Type of Operation  Convert  Deepen  Drill  Plug Back  Redrilling  Rework  Stimulate  
Well Type  Brine Disposal  CBM  Gas  Oil  Secondary Recovery  Solution Mining  Storage  Other \_\_\_\_\_  
Type of Completion  Single  Multiple Fluids Produced  Brine  Gas  NGL  Oil  Other N/A  
Drilled with  Cable  Rotary

Drilling Media Surface hole  Air  Mud  Fresh Water Intermediate hole  Air  Mud  Fresh Water  Brine  
Production hole  Air  Mud  Fresh Water  Brine  
Mud Type(s) and Additive(s) \_\_\_\_\_

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Date permit issued 4/15/2013 Date drilling commenced 08/28/2013 Date drilling ceased 11/26/2013  
Date completion activities began N/A Date completion activities ceased N/A  
Verbal plugging (Y/N) N Date permission granted \_\_\_\_\_ Granted by \_\_\_\_\_

Please note: Operator is required to submit a plugging application within 5 days of verbal permission to plug

Freshwater depth(s) ft 55' Open mine(s) (Y/N) depths N  
Salt water depth(s) ft 1,664' Void(s) encountered (Y/N) depths N  
Coal depth(s) ft 815'-825' & 1,160'-1,190' Cavern(s) encountered (Y/N) depths N  
Is coal being mined in area (Y/N) N

Approved by: Jim Teboke Reviewed by: \_\_\_\_\_  
9/20/17

API 47-051 - 01616 Farm name CNX GAS COMPANY, LLC Well number ARMSTRONG NO. 4H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade wt/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor	30"	20"	118'	New	PE / 54.5 #/ft		YES
Surface	17-1/2"	13-3/8"	1,230'	New	H-40 / 48 #/ft	83'	YES
Coal	17-1/2"	13-3/8"	1,230'	New	H-40 / 48 #/ft	83'	YES
Intermediate 1	12-1/4"	9-5/8"	2,664'	New	J-55 / 36 #/ft	80'	YES
Intermediate 2							
Intermediate 3							
Production	8-7/8" & 8-3/4"	N/A	5,721'	N/A	N/A	N/A	N/A
Tubing							
Packer type and depth set		N/A					

Comment Details \*SEE ATTACHED SUMMARY

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft <sup>3</sup> /sks)	Volume (ft <sup>3</sup> )	Cement Top (MD)	WOC (hrs)
Conductor	CLASS "A"	292	15.6	1.21	353	SURFACE	12
Surface	CLASS "A"	934	15.6	1.21	1130	SURFACE	8
Coal	CLASS "A"	934	15.6	1.21	1130	SURFACE	8
Intermediate 1	CLASS "A"	852	15.6	1.19	1014	SURFACE	8
Intermediate 2							
Intermediate 3							
Production							
Tubing							

Drillers TD (ft) 5,703' Loggers TD (ft) N/A  
 Deepest formation penetrated Alexander Formation Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) N/A

Check all wireline logs run  caliper  density  deviated/directional  induction  
 neutron  resistivity  gamma ray  temperature  sonic

Well cored  Yes  No Conventional Sidewall Were cuttings collected  Yes  No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING \_\_\_\_\_

SURFACE / COAL CASING - 3 CENTRALIZERS AT 300' SPACING  
 INTERMEDIATE CASING - 7 CENTRALIZERS AT 300' SPACING

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WAS WELL COMPLETED AS SHOT HOLE  Yes  No DETAILS N/A WV Department of Environmental Protection

WAS WELL COMPLETED OPEN HOLE?  Yes  No DETAILS N/A

WERE TRACERS USED  Yes  No TYPE OF TRACER(S) USED N/A

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PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
	N/A				

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbbls)	Amount of Nitrogen/other (units)
	N/A							

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Please insert additional pages as applicable.

API 47- 051 - 01616 Farm name CNX GAS COMPANY, LLC Well number ARMSTRONG NO. 4H

PRODUCING FORMATION(S)	DEPTHS	
	TVD	MD
N/A		

Please insert additional pages as applicable.

GAS TEST  Build up  Drawdown  Open Flow OIL TEST  Flow  Pump

SHUT-IN PRESSURE Surface \_\_\_\_\_ psi Bottom Hole \_\_\_\_\_ psi DURATION OF TEST \_\_\_\_\_ hrs

OPEN FLOW Gas \_\_\_\_\_ mcfpd Oil \_\_\_\_\_ bpd NGL \_\_\_\_\_ bpd Water \_\_\_\_\_ bpd GAS MEASURED BY  Estimated  Orifice  Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H <sub>2</sub> S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
**SEE ATTACHED	0		0		

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Please insert additional pages as applicable.

Drilling Contractor CODY DRILLING  
Address 704 BLAND ST. STE. 114 City BLUEFIELD State WV Zip 24701

Logging Company N/A  
Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Cementing Company BAKER HUGHES  
Address 837 PHILIPPI PIKE City CLARKSBURG State WV Zip 26301

Stimulating Company N/A  
Address \_\_\_\_\_ City \_\_\_\_\_ State \_\_\_\_\_ Zip \_\_\_\_\_

Please insert additional pages as applicable.

Completed by Jonathan White Telephone 724-749-8388  
Signature *Jonathan White* Title Regulatory Analyst Date 8/20/2017

## **Armstrong 4H Cement Additives**

Surface: Class A + 3% CaCl + ¼ #per sack flake

Coal: Class A + 3% CaCl + ¼ #per sack flake

Intermediate: Class A + 1% EC-1 + ¼ per sack flake + .5% SMS + .55% BA-10A

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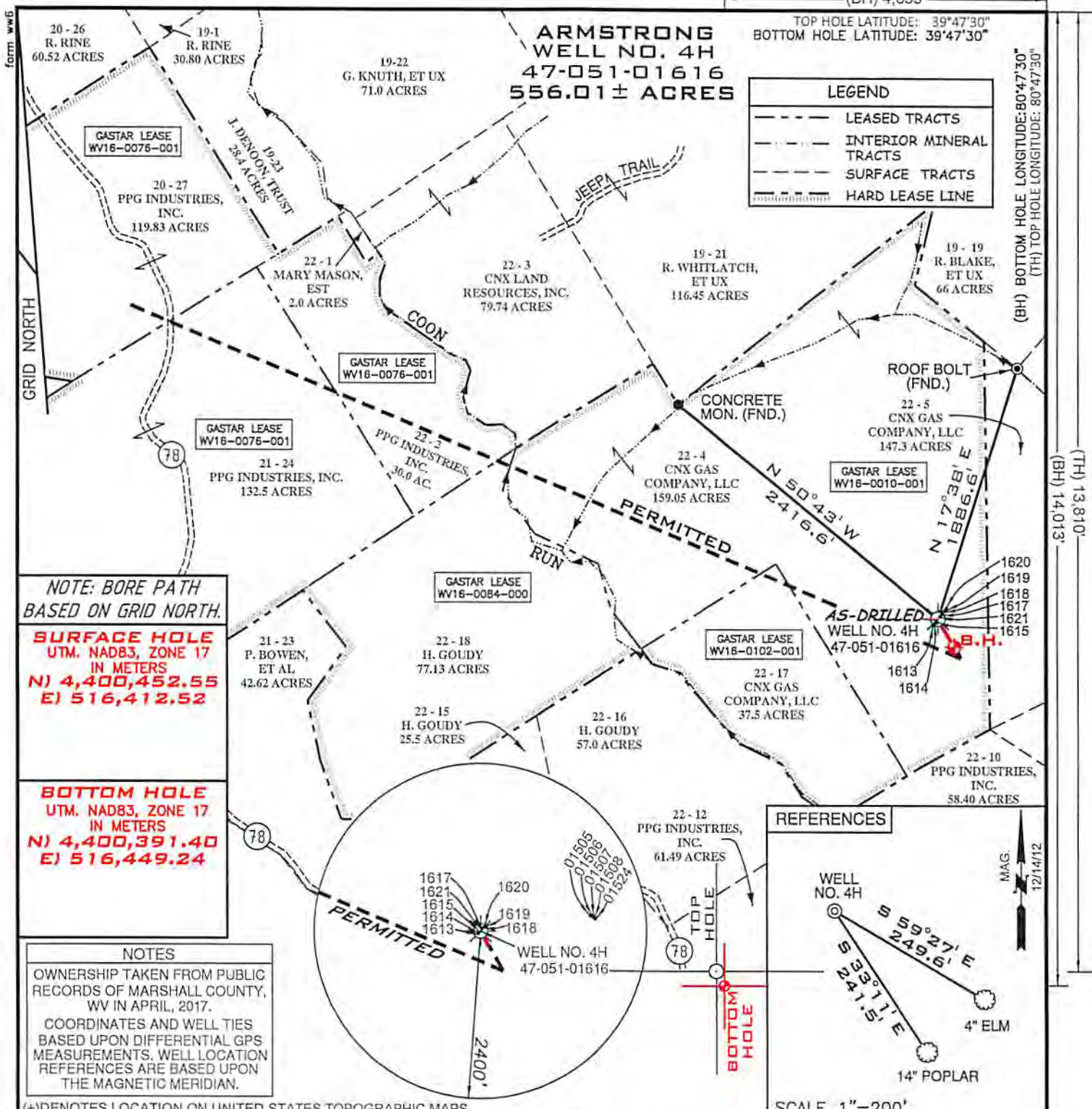
## **Armstrong 4H Drilling & Casing Summary**

The Armstrong 4H well was initially drilled to a depth of 118 feet utilizing a 30 inch bit. 20 inch conductor pipe was installed and cemented to surface. The well was then drilled to 1274' MD utilizing a 17 ½" bit. 13 3/8" casing was installed to 1230' MD and cemented to surface. The well was then drilled to 2694' MD utilizing a 12 ¼" bit. 9 5/8" casing was then installed to 2664' MD and cemented to surface. The well was then drilled to a total depth of 5721' MD utilizing a 8 7/8" bit. The well was subsequently filled with 9.4 lb/gal brine water and capped to await additional drilling.

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LITHOLOGY/FORMATION	TOP DEPTH IN FT TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL , GAS, H <sub>2</sub> S, ETC)
Undifferentiated Fm	0	810	0	812	Interbedded sandstone, siltstone, limestone and shale
Sewickley Coal	810	814	812	816	Coal
Undifferentiated Fm	814	908	816	910	Interbedded sandstone, siltstone, limestone and shale
Pittsburgh Coal	908	913	910	915	Coal
Undifferentiated Fm	913	1456	915	1461	Interbedded sandstone, siltstone, limestone and shale
Salt Sand	1456	1486	1461	1491	Sandstone
Undifferentiated Fm	1486	1990	1491	1996	Interbedded sandstone, siltstone and shale
Maxton Sandstone	1990	2025	1996	2031	Sandstone
Undifferentiated Fm	2025	2087	2031	2093	Interbedded sandstone, siltstone and shale
Big Lime	2087	2154	2093	2160	Limestone
Big Injun	2154	2238	2160	2244	Sandstone
Undifferentiated Fm	2238	2441	2244	2447	Interbedded sandstone, siltstone and shale
Weir Sandstone	2441	2486	2447	2492	Sandstone
Undifferentiated Fm	2486	2629	2492	2635	Interbedded sandstone, siltstone and shale
Berea Sandstone	2629	2634	2635	2640	Sandstone
Undifferentiated Fm	2634	2969	2640	2975	Interbedded sandstone, siltstone and shale
Gordon Sandstone	2969	2979	2975	2985	Sandstone
Undifferentiated Fm	2979	3025	2985	3031	Interbedded sandstone, siltstone and shale
Fifty Foot Sandstone	3025	3045	3031	3051	Sandstone
Undifferentiated Fm	3045	3580	3051	3586	Interbedded sandstone, siltstone and shale
Speechley Sandstone	3580	3630	3586	3636	Sandstone
Undifferentiated Fm	3630	4964	3636	4972	Interbedded sandstone, siltstone and shale
Benson Sandstone	4964	4994	4972	5002	Sandstone
Undifferentiated Fm	4994	5324	5002	5337	Interbedded sandstone, siltstone and shale
Alexander Fm	5324	5702	5337	5721	Siltstone

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FILE NUMBER W0120316 (WB1-56)  
 DRAWING NUMBER ARMSTRONG\_WP\_4H-AD  
 SCALE 1" = 1000'  
 MINIMUM DEGREE OF ACCURACY 1/200  
 PROVEN SOURCE OF ELEVATION SUBMETER MAPPING  
GRADE GPS

I, THE UNDERSIGNED, HEREBY CERTIFY THAT THIS PLAT IS CORRECT TO THE BEST OF MY KNOWLEDGE AND BELIEF AND SHOWS ALL THE INFORMATION REQUIRED BY LAW AND THE REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION

P.S. 2122 *Jonathan N. White*



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WVDEP  
 OFFICE OF OIL & GAS  
 801 57TH STREET  
 CHARLESTON, WV 25304

DATE: APRIL 18, 2017  
 OPERATORS WELL NO. ARMSTRONG NO. 4H AS-DRILLED

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION ELEVATION 1279' WATERSHED TRIBUTARY OF COON RUN  
 DISTRICT FRANKLIN COUNTY MARSHALL  
 QUADRANGLE POWHATAN POINT 7.5' LEASE NUMBER WV16-0102-001  
WV16-0010-001, WV16-0076-001, WV16-0084-000

SURFACE OWNER CNX GAS COMPANY, LLC ACREAGE 159.05  
 OIL & GAS ROYALTY OWNER CNX GAS COMPANY, LLC LEASE ACREAGE 556.01  
 PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION   
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_\_\_

TARGET FORMATION ALEXANDER ESTIMATED DEPTH TVD: 5,703' TMD: 5,721'

WELL OPERATOR GASTAR EXPLORATION USA, INC. DESIGNATED AGENT MICHAEL McCOWN  
 ADDRESS 229 W MAIN STREET, SUITE 301 ADDRESS 229 W MAIN STREET, SUITE 301  
CLARKSBURG WV, 26301 CLARKSBURG WV, 26301

COUNTY NAME  
 PERMIT