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

API 47 - 51 - 01613 County Marshall District Franklin
Quad Powhatan Point 7.5' Pad Name Armstrong Field/Pool Name
Farm name CNX Gas Company, LLC Well Number 1H
Operator (as registered with the OOG) Gastar Exploration Inc.
Address 229 West Main Street Suite 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 4400437.8 Easting 516401.6
Landing Point of Curve Northing 4400119.8 Easting 516076.5
Bottom Hole Northing 4400761.8 Easting 514488.7

Elevation (ft) 1278' 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 ___
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)
Synthetic Oil Base Mud

Date permit issued April 15, 2013 Date drilling commenced 8/26/2013 Date drilling ceased 8/22/2014
Date completion activities began 9/17/2014 Date completion activities ceased 4/21/2015
Verbal plugging (Y/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 None
Salt water depth(s) ft 1664' Void(s) encountered (Y/N) depths None
Coal depth(s) ft 815'-825' & 1160'-1190' Cavern(s) encountered (Y/N) depths None
Is coal being mined in area (Y/N) No

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API 47- 51 - 01613 Farm name CNX Gas Company, LLC Well number 1H

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							
Surface	30"	20"	118'	New	PE / 54.5 #/ft		Yes
Coal	17.5"	13.375"	1201'	New	H-40 / 48 #/ft	83'	Yes
Intermediate 1	12.25"	9.625"	2572'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875" & 8.5"	5.5"	12555	New	P-110 / 20 #/ft		Yes
Tubing		2.375"	6780'	New	N80/4.7#		
Packer type and depth set							

Comment Details

CEMENT DATA	Class/Type of Cement	Number of Sacks	Slurry wt (ppg)	Yield (ft ^{3}/sks)	Volume (ft^3)	Cement Top (MD)	WOC (hrs)
Conductor							
Surface	Class A	292	15.6	1.21	353	Surface	12
Coal	Class A	938	15.6	1.21	1135	Surface	8
Intermediate 1	Class A	839	15.6	1.21	1015	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2841	14.5	1.21	3437	Surface	8
Tubing							

Drillers TD (ft) 12,572' Loggers TD (ft) N/A

Deepest formation penetrated Marcellus Plug back to (ft) N/A

Plug back procedure N/A

Kick off depth (ft) 6279'

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

Production Casing - 229 Centralizers total - 1 centralizer every joint in the lateral and curve and 1 centralizer every other joint in the vertical section

WAS WELL COMPLETED AS SHOT HOLE ☐ Yes ■ No DETAILS

WAS WELL COMPLETED OPEN HOLE? ☐ Yes ■ No DETAILS

WERE TRACERS USED ☐ Yes ■ No TYPE OF TRACER(S) USED

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API 47- 51 - 01613 Farm name CNX Gas Company, LLC Well number 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
					SEE ATTACHED PERF INFO SHEET

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 (bbls)	Amount of Nitrogen/other (units)
			See Attached					

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6,470' - 6,513'	TVD	6,942' - 12,572' MD

Please insert additional pages as applicable.

GAS TEST ☐ Build up ☐ Drawdown ☒ Open Flow OIL TEST ☒ Flow ☐ Pump

SHUT-IN PRESSURE Surface 1700 psi Bottom Hole 4524 psi DURATION OF TEST 126 hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	2611 mcfpd	194 bpd	____ bpd	812 bpd	☐ Estimated ☒ Orifice ☐ Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME 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_2S, ETC)
	0		0		SEE ATTACHED

Please insert additional pages as applicable.

Drilling Contractor Nomac Drilling
Address 171 Locust Ave. City Mt. Morris State PA Zip 15349

Logging Company Baker Hughes
Address 370 Westec Drive City Mt. Pleasant State PA Zip 15666

Cementing Company Baker Hughes
Address 837 Philippi Pike City Clarksburg State WV Zip 26301

Stimulating Company Baker Hughes
Address 837 Philippi Pike City Clarksburg State WV Zip 26301

Please insert additional pages as applicable.

Completed by Thomas Rowan Telephone 304-622-4796
Signature _____ Title Drilling and Completions Engineer Date 7-31-AUG 05 2015

Submittal of Hydraulic Fracturing Chemical Disclosure Information Attach copy of FRACFOCUS Registry

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Armstrong #1H Perforation Information

Stage	Date	Perforated interval From ft	Perforated interval To ft	Number of Perfs	Formation
1	9/20/2014	12359	12419	48	Marcellus
2	10/1/2014	12137	12304	48	Marcellus
3	10/2/2014	11917	12084	48	Marcellus
4	10/3/2014	11697	11864	48	Marcellus
5	10/8/2014	11477	11644	48	Marcellus
6	10/11/2014	11257	11424	48	Marcellus
7	10/12/2014	11037	11204	48	Marcellus
8	10/13/2014	10817	10984	48	Marcellus
9	10/14/2014	10589	10771	60	Marcellus
10	10/15/2014	10377	10544	60	Marcellus
11	10/16/2014	10149	10331	60	Marcellus
12	1017/2014	9929	10111	60	Marcellus
13	10/18/2014	9717	9884	60	Marcellus
14	10/19/2014	9497	9664	60	Marcellus
15	10/20/2014	9277	9444	60	Marcellus
16	10/21/2014	9057	9224	60	Marcellus
17	10/22/2014	8837	9004	60	Marcellus
18	10/22/2014	8617	8784	60	Marcellus
19	10/23/2014	8397	8564	60	Marcellus
20	10/23/2014	8177	8344	60	Marcellus
21	10/24/2014	7957	8124	60	Marcellus
22	**10/24/2014**	7737	7904	60	Marcellus
23	10/25/2014	7517	7684	60	Marcellus
24	10/26/2014	7289	7471	60	Marcellus
25	10/27/2014	7069	7251	60	Marcellus

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Fluid & Sand Volume Summary - Armstrong #1H

Stage	Stimulation Date	Avg Pump Rate (BPM)	Avg Pressure (PSI)	Max Break Pres. (PSI)	ISIP (PSI)	Sand Total (lbs)	Total Water (bbls)
1	9/27/2014	67	6023	4850	2140	127,688	4411
2	10/2/2014	77	5696	4650	2140	312,172	7035
3	10/3/2014	77	6036	5111	3923	185,251	6016
4	10/4/2014	78	6545	5673	6621	334,656	7993
5	10/11/2014	79	6413	5020	3705	182,346	6684
6	10/12/2014	77	6221	5293	3466	186,756	7126
7	10/13/2014	80	6338	5325	4020	174,436	7866
8	10/14/2014	81	6345	4970	4195	214,876	9024
9	10/15/2014	82	6163	4853	4567	217,399	8898
10	10/16/2014	82	6090	5030	4316	216,547	8731
11	10/17/2014	81	6175	4693	4430	218,687	8877
12	10/18/2014	80	6062	4556	3947	264,315	8915
13	10/19/2014	81	5818	4895	3826	218,037	8946
14	10/20/2014	80	5818	4995	3335	214,990	8801
15	10/21/2014	82	5768	4750	3685	212,503	8670
16	10/22/2014	81	5629	4593	3564	277,845	8141
17	10/22/2014	82	5650	5043	3560	143,711	8141
18	10/23/20014	82	5630	5103	3605	284,300	8268
19	10/23/2014	82	5740	5508	3930	280,886	8154
20	10/24/2014	82	5810	4971	3995	317,834	6205
21	10/24/2014	82	5871	4934	4210	323,512	6810
22	10/25/2014	82	5554	4677	4138	323,512	6992
23	10/26/2014	82	5581	4910	3960	334,118	7175
24	10/27/2014	80	5927	7766	4607	340,117	7213
25	10/27/2014	82	5890	5062	4370	315,352	6746

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Formations	Armstrong TOP TVD	Armstrong BASE TVD	Top MD	Base MD
SHALE AND SANDSTONE	0	815	0	815
SEWICKLEY COAL	815	825	815	825
SHALE	825	1160	825	1160
PITTSBURGE COAL	1160	1190	1160	1190
SHALE AND SANDSTONE	1190	1664	1190	1664
3RD SALT SAND	1664	1720	1664	1720
SHALE	1720	1820	1720	1820
MAXTON	1820	1894	1820	1894
SHALE	1894	1914	1894	1914
BIG LIME	1914	2001	1914	2001
BIG INJUN	2001	2251	2001	2251
WEIR SILTSTONE	2251	2524	2251	2524
BEREA SILTSTONE	2524	2724	2524	2724
SAND AND SHALE	2724	2730	2724	2730
GORDON	2730	2787	2730	2787
SILTSTONE AND SANDSTC	2787	3400	2787	3400
BRAILLER	3400	5280	3400	5325
PIPE CREEK SHALE	5280	5480	5325	5526
SHALE	5480	5905	5526	5958
RHINESTREET	5905	6175	5958	6243
CASHAQUA	6175	6311	6243	6414
MIDDLESEX	6311	6330	6414	6442
WEST RIVER	6330	6389	6442	6538
GENESEO	6389	6416	6538	6588
TULLY LIMESTONE	6416	6452	6588	6666
HAMILTON	6452	6470	6666	6721
MARCELLUS	6470	na	6721	na
ONONDOGA	na	na	na	na

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Welcome Tracy H., Operator - OpNo. G1410907 [Log Out]

Hydraulic Fracturing DISCLOSURE

FracFocus Chemical Disclosure Registry

Please use the FracFocus XML submission process or create disclosures online.

FIND A WELL BY STATE | ABOUT PROJECT PARTNERS

(Note: Clicking the FracFocus, FIND A WELL links will open a new window.)

Prepare Disclosure for FracFocus Submission

Disclosure Lists | Dashboard

Note: This window expires with 10 minutes of inactivity. After that you will be taken back to the dashboard.

Preview Disclosure PDF | Validate Disclosure | Submit To FracFocus

Hydraulic Fracturing Data

Edit

Job Start Date	Job End Date	API Number	State & County
9/27/2014	10/27/2014	47-051-01613-00-00	West Virginia --- Marshall

Well Name
ARMSTRONG 1H

Longitude	Latitude	Datum	Federal/Tribal Well?
-80.831	39.7566	NAD27	

True Vertical Depth (ft)	Total Water Vol (gal)	Total Non Water Vol	Total Mass (lbs)
6490	19934964	0	172653604.7726

MSDS Chemical Ingredients

New Additive | Select Additive | Add Additive

	Trade Name	Supplier	Purpose	Ingredients	CAS #	% High Additive	% HF Job	Comments	Ingredient Mass
Edit	Water	Operator	Carrier	Water	7732-18-5	100%	96.2280421%		166213742.8392
Edit	Sand, White, 40/70	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.66109%		4594477
Edit	Sand, White, 30/50	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.78308%		1352032
Edit	HCl, 10.1 - 15%	Baker Hughes	Acidizing	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.193859%	SmartCare Product	334705
Edit	FRW-18	Baker Hughes	Friction Reducer	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0353234%	SmartCare Product	60987.16
Edit	GW-3LDF	Baker Hughes	Gelling Agent	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0347982%	SmartCare Product	60080.46

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Edit	Alpha 1427	Baker Hughes	Biocide						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0086813%	SmartCare Product	14988.75
Edit	Enzyme G-NE	Baker Hughes	Breaker						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0061234%	SmartCare Product	10572.3304
Edit	ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0026006%	SmartCare Product	4490
Edit	FlexSand MSE, 20/40 mesh	Baker Hughes	Proppant						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0023168%		4000
Edit	Ferrotrol 300L	Baker Hughes	Iron Control						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0013326%	SmartCare Product	2300.73297
Edit	CI-14	Baker Hughes	Corrosion Inhibitor						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0006131%	SmartCare Product	1058.5
Edit	ScaleSorb 7 (50 lb)	Baker Hughes	Scale Inhibitor						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0000985%		170

Non-MSDS Chemical Ingredients

New Ingredients

	Trade Name	Supplier	Purpose	Ingredients	CAS #	% High Additive	% HF Job	Comments	Ingredient Mass
Edit	Ingredients in Additive(s) (MSDS and non-MSDS)	Baker Hughes	See Trade Name(s) List						
				Crystalline Silica (Quartz)	14808-60-7	100%	3.4427081%		5946555.6
				Water	7732-18-5	95%	.19053%		329100.529365
				Hydrochloric Acid	7647-01-0	15%	.0290723%		50216.335
				Mineral Oil	8042-47-5	70%	.0243482%		42056.322
				Guar Gum	9000-30-0	60%	.0208698%		36048.276
				Hydrotreated Light Distillate	64742-47-8	30%	.0105924%		18296.148
				Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30%	.0105924%		18296.148
				Petroleum Distillates	64742-47-8	30%	.0104349%		18024.138
				Paraffinic Petroleum Distillate	64742-55-8	30%	.0104349%		18024.138
				Diatomaceous Earth, Calcined	91053-39-3	100%	.0026979%		4660
				Glutaraldehyde	111-30-8	30%	.0026033%		4496.625
				Walnut Shells	84012-43-1	90%	.0020842%		3600
				Sodium Chloride	7647-14-5	10%	.0017752%		3066.358
				1-butoxy-2-propanol	5131-66-8	5%	.0017392%		3004.023

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Crystalline Silica: Quartz	14808-60-7	5%	.0017392%	3004.023
Isotridecanol, ethoxylated	9043-30-5	5%	.0017392%	3004.023
Ammonium Chloride	12125-02-9	3%	.0010592%	1829.6148
Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.0008678%	1498.875
Citric Acid	77-92-9	60%	.0007992%	1380.439782
Oleamide DEA	93-83-4	2%	.0007062%	1219.7432
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.0007062%	1219.7432
Methanol	67-56-1	100%	.0006128%	1058.5
Quaternary Ammonium Compound	68424-85-1	5%	.0004339%	749.4375
Ethanol	64-17-5	5%	.0004339%	749.4375
Sodium chloride	7647-14-5	15%	.0003899%	673.5
Sodium Carboxymethyl inulin	430439-54-6	15%	.0003899%	673.5
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.000306%	528.61652
Cured Resin	25085-99-8	10%	.0002316%	400
Polyoxyalkylenes	68951-67-7	30%	.0001838%	317.55
Sorbitan Monooleate	1338-43-8	.5%	.0001765%	304.9358
Polyoxythylene Sorbitan Monooleate	9005-65-6	.5%	.0001765%	304.9358
Sodium diglycolate	35249-69-5	5%	.00013%	224.5
Sodium glycolate	2836-32-0	5%	.00013%	224.5
Fatty Acids	61790-12-3	10%	.0000613%	105.85
Modified Thiourea Polymer	68527-49-1	7%	.0000429%	74.095
2-butoxy-1-propanol	15821-83-7	.1%	.0000348%	60.08046
Propargyl Alcohol	107-19-7	5%	.0000306%	52.925
Olefin	64743-02-8	5%	.0000306%	52.925
Organo Phosphorus Salt	Trade Secret , disc.	30%	.0000295%	51
Crystalline Silica (Cristobaloite)	14464-46-1	1%	.000026%	44.9
Formaldehyde	50-00-0	1%	.0000061%	10.585
Sodium Bisulfate	7631-90-5	1%	.000001%	1.7
Sodium Sulfonate	870-72-4	.5%	.0000005%	0.85

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Armstrong 1H Cement and additives

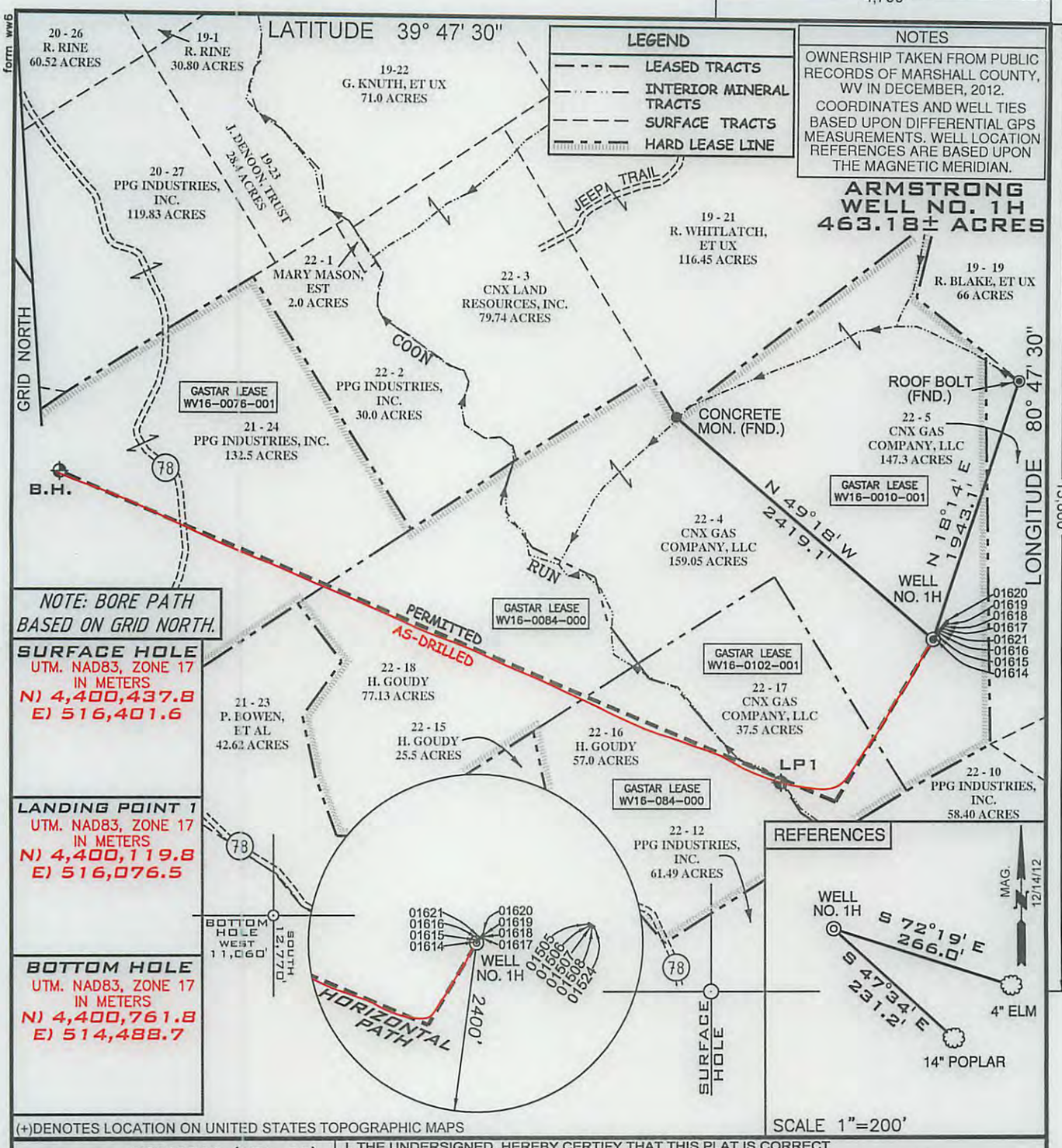
Surface: Class A + 3% CaCl + 1/4 #per sack Flake

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

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

Production: 50:50 Class A + 3 lbs/sk BA-90 + .35% R-3 + .3% MPA-170

form ww6



FILE NUMBER W0120316 (WB1-56)

DRAWING NUMBER ARMSTRONG_WP_1H-WR35

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

Jonathan N. White LICENSED NO. 2122 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

SEAL

STATE OF WEST VIRGINIA MONTANI SEMPER LIBERI

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: JULY 27, 2015

OPERATORS WELL NO. ARMSTRONG NO. 1H AS-DRILLED

API WELL NO. 47 - 051 - 01613
STATE COUNTY PERMIT

WELL TYPE: OIL ___ GAS X LIQUID INJECTION ___ WASTE DISPOSAL ___
(IF "GAS") PRODUCTION X STORAGE ___ DEEP ___ SHALLOW X

LOCATION ELEVATION 1278' 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

10/16/2015

SURFACE OWNER CNX GAS COMPANY, LLC ACREAGE 159.05

OIL & GAS ROYALTY OWNER CNX GAS COMPANY, LLC LEASE ACREAGE 463.18

PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___ PLUG OFF OLD FORMATION ___
PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) ___
PLUG & ABANDON ___ CLEAN OUT & REPLUG ___

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD:6,513' TMD:12,572'

WELL OPERATOR GASTAR EXPLORATION INC. DESIGNATED AGENT MICHAEL McCOWN

ADDRESS 229 W MAIN STREET, SUITE 301 CLARKSBURG WV, 26301 ADDRESS 229 W MAIN STREET, SUITE 301 CLARKSBURG WV, 26301

COUNTY NAME PERMIT