

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

API 47-51-01617 County Marshall District Franklin
Quad Powhatan Point 7.5' Pad Name Armstrong Field/Pool Name _____
Farm name CNX Gas Company, LLC Well Number 6H
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 4400462.3 Easting 516419.7
Landing Point of Curve Northing 4400657.0 Easting 516354.4
Bottom Hole Northing 4401331.0 Easting 514718.1

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 12/12/2013 Date drilling ceased 7/30/2014
Date completion activities began 9/10/2014 Date completion activities ceased 4/20/2015
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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Reviewed by: JR
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API 47-51 - 01617 Farm name CNX Gas Company, LLC Well number 6H

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"	1240'	New	H-40 / 48 #/ft	80'	Yes
Intermediate 1	12.25"	9.625"	2665'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875" & 8.5"	5.5"	12479'	New	P-110 / 20 #/ft		Yes
Tubing		2.375"	6589'	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	295	15.6	1.21	357	Surface	12
Coal	Class A	942	15.6	1.21	1140	Surface	8
Intermediate 1	Class A	870	15.6	1.19	1035	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2663	14.5	1.21	3223	Surface	8
Tubing							

Drillers TD (ft) 12,484' Loggers TD (ft) N/A
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6190'

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 - 216 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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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					
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Please insert additional pages as applicable.

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<u>PRODUCING FORMATION(S)</u>	<u>DEPTHS</u>	
<u>Marcellus</u>	<u>6,470' - 6,514'</u> TVD	<u>6,664' - 12,485'</u> MD
_____	_____	_____
_____	_____	_____
_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 1200 psi Bottom Hole 4025 psi DURATION OF TEST 253 hrs

OPEN FLOW Gas 2911 mcfpd Oil 266 bpd NGL _____ bpd Water 398 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 ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	<u>0</u>		<u>0</u>		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 TR Title Drilling and Completions Engineer Date 7-31-15

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

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Armstrong #6H Perforation Information

<u>Stage</u>	<u>Date</u>	<u>Perforated interval</u>		<u>Number of Perfs</u>	<u>Formation</u>
		<u>From</u> ft	<u>To</u> ft		
1	9/22/2014	12373	12281	48	Marcellus
2	11/3/2014	12219	12091	36	Marcellus
3	11/4/2014	12046	11864	48	Marcellus
4	11/5/2014	11751	11606	48	Marcellus
5	11/6/2014	11558	11369	48	Marcellus
6	11/8/2014	11338	11160	48	Marcellus
7	11/9/2014	11106	10998	36	Marcellus
8	11/10/2014	10953	10782	48	Marcellus
9	11/11/2014	10742	10584	48	Marcellus
10	11/12/2014	10537	10409	48	Marcellus
11	11/13/2014	10359	10202	48	Marcellus
12	11/14/2014	10165	10027	48	Marcellus
13	11/15/2014	9986	9806	48	Marcellus
14	11/16/2014	9773	9601	48	Marcellus
15	11/17/2014	9551	9398	48	Marcellus
16	11/19/2014	9341	9201	48	Marcellus
17	11/20/2014	9140	9001	48	Marcellus
18	11/21/2014	8951	8833	36	Marcellus
19	11/22/2014	8718	8555	48	Marcellus
20	11/23/2014	8500	8342	48	Marcellus
21	11/23/2014	8239	8081	48	Marcellus
22	11/25/2014	8009	7783	60	Marcellus
23	11/25/2014	7738	7590	48	Marcellus
24	11/26/2014	7542	7386	48	Marcellus
25	11/26/2014	7317	7135	48	Marcellus
26	11/26/2014	7074	6911	48	Marcellus

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Fluid & Sand Volume Summary - Armstrong #6H

<u>Stage</u>	<u>Stimulation Date</u>	<u>Avg Pump Rate (BPM)</u>	<u>Avg Pressure (PSI)</u>	<u>Max Break Pres. (PSI)</u>	<u>ISIP (PSI)</u>	<u>Sand Total (lbs)</u>	<u>Total Water (bbls)</u>
1	11/3/2014	74	6615	n/a	4295	129,513	4138
2	11/4/2014	78	6706	5026	4290	194,567	5885
3	11/5/2014	80	6468	5068	3667	260,165	6652
4	11/6/2014	80	6520	5168	4702	257,266	6497
5	11/7/2014	80	6840	5542	4817	256,943	5727
6	11/9/2014	80	6479	5228	4976	261,730	6486
7	11/10/2014	80	6623	5655	4857	255,790	6444
8	11/11/2014	81	6550	5274	4897	251,545	6352
9	11/12/2014	81	6752	5438	4788	263,436	6382
10	11/13/2014	81	6654	5438	5095	260,710	6361
11	11/14/2014	81	6669	5515	4977	258,972	6367
12	11/15/2014	81	6602	5448	4942	241,238	6361
13	11/16/2014	80	6498	5024	4952	255,706	6306
14	11/17/2014	82	6471	5523	4653	261,000	6334
15	11/19/2014	80	6320	5345	3352	250,672	6275
16	11/20/2014	80	6122	5077	4585	259,268	6284
17	11/21/2014	82	6313	5377	4905	259,697	6208
18	11/22/2014	81	6678	5290	4899	256,101	6045
19	11/23/2014	82	5936	5981	4588	258,166	6199
20	10/23/2014	81	5647	4920	4739	257,730	6025
21	11/25/2014	81	6265	5125	4740	257,896	5919
22	11/25/2014	80	5845	4920	5260	253,832	6023
23	11/26/2014	80	5920	4907	4943	255,824	6030
24	11/26/2014	81	5994	4813	5206	254,768	6023
25	11/27/2014	80	5818	4852	4894	252,634	4937
26	11/27/2014	80	5869	5001	5012	253415	5899

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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 SANDSTONE	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



Submission to FracFocus using Excel Spreadsheets has been turned off.

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

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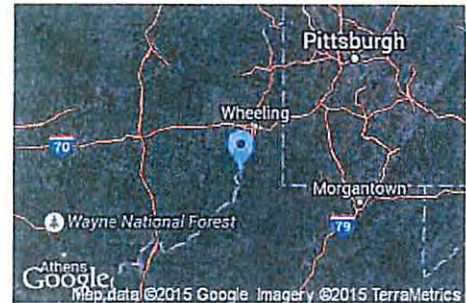
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Hydraulic Fracturing Data

[Edit](#)

Job Start Date 11/3/2014	Job End Date 11/27/2014	API Number 47-051-01617-00-00	State & County West Virginia --- Marshall
Well Name ARMSTRONG 6H			
Longitude -80.82834	Latitude 39.7617	Datum NAD27	Federal/Tribal Well? <input type="checkbox"/>
True Vertical Depth (ft) 6490	Total Water Vol (gal) 6657294	Total Non Water Vol 0	Total Mass (lbs) 62367452.6255



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%	88.8692886%		55507185.9132
Edit	Sand, White, 40/70	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	6.19476%		3863515
Edit	Sand, White, 30/50	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	3.58253%		2234333
Edit	HCl, 10.1 - 15%	Baker Hughes	Acidizing	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.595478%	SmartCare Product	371385
Edit	Sand, White, 100 mesh	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.355485%		
Edit	GW-3LDF	Baker Hughes	Gelling Agent	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.1221425%	SmartCare Product	

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<input type="button" value="Edit"/>	FRW-18	Baker Hughes	Friction Reducer	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.088687%	SmartCare Product	55311.88
<input type="button" value="Edit"/>	Alpha 1427	Baker Hughes	Biocide	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0227001%	SmartCare Product	14157.5
<input type="button" value="Edit"/>	Enzyme G-NE	Baker Hughes	Breaker	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.021243%	SmartCare Product	13248.7642
<input type="button" value="Edit"/>	ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0080427%	SmartCare Product	5016
<input type="button" value="Edit"/>	Ferrotrol 300L	Baker Hughes	Iron Control	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0040933%	SmartCare Product	2552.86809
<input type="button" value="Edit"/>	Calcium Chloride	Baker Hughes	Salts	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0027065%		1688
<input type="button" value="Edit"/>	CI-14	Baker Hughes	Corrosion Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0018832%	SmartCare Product	1174.5

Non-MSDS Chemical Ingredients

	Trade Name	Supplier	Purpose	Ingredients	CAS #	% High Additive	% HF Job	Comments	Ingredient Mass
<input type="button" value="Edit"/>	Ingredients in Additive(s) (MSDS and non-MSDS)	Baker Hughes	See Trade Name(s) List	Crystalline Silica (Quartz)	14808-60-7	100%	10.1179479%		6319605.16
				Water	7732-18-5	95%	.5766486%		360171.007035
				Hydrochloric Acid	7647-01-0	15%	.0892092%		55719.495
				Mineral Oil	8042-47-5	70%	.085374%		53324.04
				Guar Gum	9000-30-0	60%	.0731777%		45706.32
				Paraffinic Petroleum Distillate	64742-55-8	30%	.0365888%		22853.16
				Petroleum Distillates	64742-47-8	30%	.0365888%		22853.16
				Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30%	.026567%		16593.564
				Hydrotreated Light Distillate	64742-47-8	30%	.026567%		16593.564
				Diatomaceous Earth, Calcined	91053-39-3	100%	.0080308%		5016
				Glutaraldehyde	111-30-8	30%	.0068%		1247.25
				Crystalline Silica: Quartz	14808-60-7	5%	.0060981%		3808.86
				Isotridecanol, ethoxylated	9043-30-5	5%	.0060981%		3808.86
				1-butoxy-2-	5131-66-8	5%	.0060981%		3808.86

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Sodium Chloride	7647-14-5	5%	.004563%	2849.994
Calcium Chloride	10043-52-4	100%	.0027026%	1688
Ammonium Chloride	12125-02-9	3%	.0026567%	1659.3564
Citric Acid	77-92-9	60%	.0024523%	1531.720854
Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.0022667%	1415.75
Methanol	67-56-1	100%	.0018804%	1174.5
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.0017711%	1106.2376
Oleamide DEA	93-83-4	2%	.0017711%	1106.2376
Sodium Carboxymethyl inulin	430439-54-6	15%	.0012046%	752.4
Sodium chloride	7647-14-5	15%	.0012046%	752.4
Ethanol	64-17-5	5%	.0011333%	707.875
Quaternary Ammonium Compound	68424-85-1	5%	.0011333%	707.875
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.0010606%	662.43821
Polyoxyalkylenes	68951-67-7	30%	.0005641%	352.35
Sorbitan Monooleate	1338-43-8	.5%	.0004428%	276.5594
Polyoxyethylene Sorbitan Monooleate	9005-65-6	.5%	.0004428%	276.5594
Sodium diglycolate	35249-69-5	5%	.0004015%	250.8
Sodium glycolate	2836-32-0	5%	.0004015%	250.8
Fatty Acids	61790-12-3	10%	.000188%	117.45
Potassium Chloride	7447-40-7	5%	.0001351%	84.4
Modified Thiourea Polymer	68527-49-1	7%	.0001316%	82.215
2-butoxy-1-propanol	15821-83-7	.1%	.000122%	76.1772
Propargyl Alcohol	107-19-7	5%	.000094%	58.725
Olefin	64743-02-8	5%	.000094%	58.725
Crystalline Silica (Cristobalite)	14464-46-1	1%	.0000803%	50.16
Formaldehyde	50-00-0	1%	.0000188%	11.745

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Armstrong 6H 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 + .5% SMS + .55% BA-10A

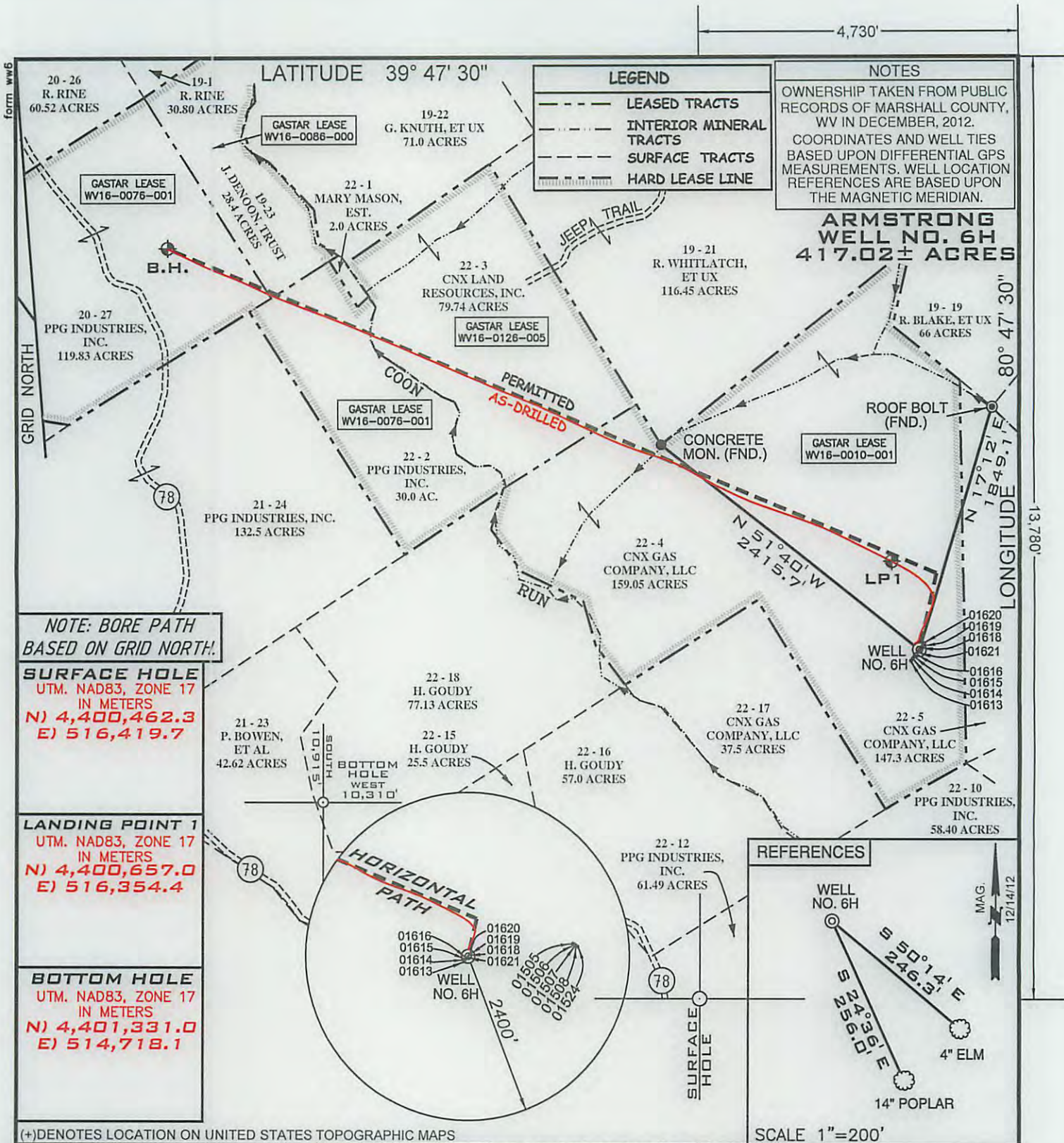
Production: 50:50 Class A + 3 lbs/sk BA-90 + .35% R-3 + .3% MPA-170

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NOTE: BORE PATH BASED ON GRID NORTH.

SURFACE HOLE
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,400,462.3
 E) 516,419.7

LANDING POINT 1
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,400,657.0
 E) 516,354.4

BOTTOM HOLE
 UTM, NAD83, ZONE 17
 IN METERS
 N) 4,401,331.0
 E) 514,718.1

(+) DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

FILE NUMBER W0120316 (WB1-56)
 DRAWING NUMBER ARMSTRONG_WP_6H-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*



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

DATE: JULY 27, 2015
 OPERATORS WELL NO. ARMSTRONG NO. 6H AS-DRILLED

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 LOCATION ELEVATION 1278' WATERSHED TRIBUTARY OF COON RUN
 DISTRICT FRANKLIN COUNTY MARSHALL
 QUADRANGLE POWHATAN POINT 7.5' LEASE NUMBER WV16-0086-000, WV16-0010-001, WV16-0076-001, WV16-0126-005

SURFACE OWNER CNX GAS COMPANY, LLC ACREAGE 159.05
 OIL & GAS ROYALTY OWNER CNX GAS COMPANY, LLC LEASE ACREAGE 417.02
 PROPOSED WORK: DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE PLUG OFF OLD FORMATION
 PERFORATE NEW FORMATION OTHER PHYSICAL CHANGE (SPECIFY) _____

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD:6514' TMD:12,485'

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

10/16/2015

COUNTY NAME
 PERMIT