

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

API 47 - 51 - 01698 County Marshall District Franklin  
Quad Powhatan Point 7.5' Pad Name Blake Field/Pool Name \_\_\_\_\_  
Farm name Bungard, Wilbert H. , Et Al Well Number 3H  
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 4401603.9 Easting 516704.6  
Landing Point of Curve Northing 4401323.5 Easting 516593.5  
Bottom Hole Northing 4401990.6 Easting 514982.7

Elevation (ft) 1326' 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 January 16, 2014 Date drilling commenced 7/23/2014 Date drilling ceased 11/10/2014  
Date completion activities began 3/7/2014 Date completion activities ceased 6/6/2015  
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 60' Open mine(s) (Y/N) depths \_\_\_\_\_  
Salt water depth(s) ft 1418' Void(s) encountered (Y/N) depths \_\_\_\_\_  
Coal depth(s) ft 970'-980' & 1175'-1205' Cavern(s) encountered (Y/N) depths None  
Is coal being mined in area (Y/N) No

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Reviewed by:  
JK 8/21/15

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API 47-51 - 01698 Farm name Bungard, Wilbert H. , Et Al Well number 3H

CASING STRINGS	Hole Size	Casing Size	Depth	New or Used	Grade w/ft	Basket Depth(s)	Did cement circulate (Y/ N) * Provide details below*
Conductor							
Surface	30"	20"	120'	New	PE / 54.5 #/ft		Yes
Coal	17.5"	13.375"	1278'	New	H-40 / 48 #/ft	80'	Yes
Intermediate 1	12.25"	9.625"	2621'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875" & 8.5"	5.5"	12405'	New	P-110 / 20 #/ft		No
Tubing		2.375"	6858'	New	N80/4.7#		
Packer type and depth set							

Comment Details Production Casing cement top at 1000' (1676' inside the intermediate casing).

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							
Surface	Class A	303	15.6	1.21	366	Surface	12
Coal	Class A	930	15.6	1.2	1125	Surface	8
Intermediate 1	Class A	856	15.6	1.19	1019	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2873	14.5	1.21	3476	Surface	8
Tubing							

Drillers TD (ft) 12,873' Loggers TD (ft) N/A  
 Deepest formation penetrated Marcellus Plug back to (ft) N/A  
 Plug back procedure N/A

Kick off depth (ft) 6184'

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 - 201 Centralizers total - 1 centralizer every joint in the lateral and curve and 1 centralizer every third 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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Blake #3H 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	3/8/2015	12594	12392	48	Marcellus
2	4/20/2015	12342	12190	48	Marcellus
3	4/20/2015	12142	11990	48	Marcellus
4	4/21/2015	11942	11790	48	Marcellus
5	4/21/2015	11742	11590	48	Marcellus
6	4/21/2015	11542	11390	48	Marcellus
7	4/22/2015	11342	11190	48	Marcellus
8	4/22/2015	11142	10990	48	Marcellus
9	4/22/2015	10942	10790	48	Marcellus
10	4/22/2015	10742	10590	48	Marcellus
11	4/23/2015	10542	10390	48	Marcellus
12	4/23/2015	10342	10190	48	Marcellus
13	4/23/2015	10142	9990	48	Marcellus
14	4/23/2015	9942	9790	48	Marcellus
15	4/24/2015	9742	9590	48	Marcellus
16	4/24/2015	9542	9390	48	Marcellus
17	4/24/2015	9342	9190	48	Marcellus
18	4/24/2015	9142	8990	48	Marcellus
19	4/25/2015	8942	8790	48	Marcellus
20	4/25/2015	8742	8590	48	Marcellus
21	4/25/2015	8542	8390	48	Marcellus
22	4/25/2015	8342	8190	48	Marcellus
23	4/25/2015	8142	7990	48	Marcellus
24	4/26/2015	7942	7790	48	Marcellus
25	4/26/2015	7742	7590	48	Marcellus
26	4/26/2015	7542	7390	48	Marcellus
27	4/26/2015	7342	7190	48	Marcellus
28	4/26/2015	7142	6990	48	Marcellus

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Fluid & Sand Volume Summary - Blake #3H

<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	4/20/2015	77	6,139	16	3,312	196,527	4898
2	4/20/2015	72	6,206	5,608	6,222	283,168	7452
3	4/20/2015	79	6,415	4,701	3,224	345,219	8786
4	4/21/2015	80	6,315	4,872	3,702	367,289	8072
5	4/21/2015	76	6,844	5,423	3,861	359,056	10226
6	4/21/2015	79	6,789	5,285	3,856	360,283	8283
7	4/22/2015	80	6,691	5,579	3,445	357,746	8192
8	4/22/2015	76	6,817	5,453	4,879	329,258	8120
9	4/22/2015	73	7,181	5,678	3,569	355,970	8732
10	4/22/2015	79	6,667	5,190	3,569	353,538	8000
11	4/23/2015	79	6,800	5,138	4,059	355,779	7951
12	4/23/2015	79	7,044	5,581	3,966	362,310	8343
13	4/23/2015	79	6,930	5,554	3,915	361,077	8216
14	4/23/2015	81	6,729	5,185	3,980	358,327	8179
15	4/24/2015	80	6,856	5,695	3,824	358,118	8110
16	4/24/2015	79	7,070	5,608	3,945	358,690	8053
17	4/24/2015	80	7,040	5,170	3,763	358,465	8100
18	4/24/2015	80	6,686	5,286	3,745	357,465	7964
19	4/25/2015	80	6,552	5,738	4,392	357,542	7996
20	4/25/2015	81	6,617	5,373	3,850	357,955	8628
21	4/25/2015	79	6,509	5,943	3,886	357,735	8001
22	4/25/2015	82	6,419	5,187	4,118	355,410	8043
23	4/25/2015	81	6,705	5,796	4,196	357,996	8026
24	4/26/2015	81	6,801	5,760	2,657	351,469	8658
25	4/26/2015	80	6,590	5,774	4,046	356,732	7939
26	4/26/2015	81	6,357	5,247	3,861	361,980	7891
27	4/26/2015	80	6,444	5,489	3,823	356,130	7872
28	4/26/2015	79	6,557	5,658	3,588	359,650	7795

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Formations	BLAKE TOP TVD	BLAKE BASE TVD	Top MD	Base MD
SHALE AND SANDSTONE	0	970	0	970
SEWICKLEY COAL	970	980	970	980
SHALE	980	1175	980	1175
PITTSBURGE COAL	1175	1205	1175	1205
SHALE AND SANDSTONE	1205	1418	1205	1418
3RD SALT SAND	1418	1473	1418	1473
SHALE	1473	1560	1473	1560
MAXTON	1560	1902	1560	1902
SHALE	1902	1982	1902	1982
BIG LIME	1982	2060	1982	2060
BIG INJUN	2060	2260	2060	2260
WEIR SILTSTONE	2260	2520	2260	2520
BEREA SILTSTONE	2520	2720	2520	2720
SAND AND SHALE	2720	2820	2720	2820
GORDON	2820	2850	2820	2850
SILTSTONE AND SANDSTONE	2850	3463	2850	3468
BRAILER	3463	5337	3468	5562
PIPE CREEK SHALE	5337	5537	5562	5787
SHALE	5537	5962	5787	6219
RHINESTREET	5962	6242	6219	6549
CASHAQUA	6242	6370	6549	6746
MIDDLESEX	6370	6395	6746	6789
WEST RIVER	6395	6448	6789	6887
GENESEO	6448	6474	6887	6939
TULLY LIMESTONE	6474	6500	6939	7006
HAMILTON	6500	6533	7006	7124
MARCELLUS	6533	na	7124	na
ONONDOGA	na	na	na	na

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**Hydraulic Fracturing Data**

[Edit](#)

<b>Job Start Date</b> 4/20/2015	<b>Job End Date</b> 4/27/2015	<b>API Number</b> 47-051-01698-00-00	<b>State &amp; County</b> West Virginia --- Marshall
<b>Well Name</b> BLAKE 3H			
<b>Longitude</b> -80.82522	<b>Latitude</b> 39.76768	<b>Datum</b> NAD27	<b>Federal/Tribal Well?</b>
<b>True Vertical Depth (ft)</b> 6563	<b>Total Water Vol (gal)</b> 9163266	<b>Total Non Water Vol</b> 0	<b>Total Mass (lbs)</b> 86543738.2762



**MSDS Chemical Ingredients**

[New Additive](#) [Select Additive](#) [Add Additive](#)

Trade Name	Supplier	Purpose	Ingredients	CAS #	% High Additive	% HF Job	Comments	Ingredient Mass
<a href="#">Edit</a> Water	Operator	Carrier	Water	7732-18-5	100%	88.1387333%		76401479.2548
<a href="#">Edit</a> Sand, White, 40/70	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	7.69707%		6661334
<a href="#">Edit</a> Sand, White, 30/50	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.81885%		2439542
<a href="#">Edit</a> HCl, 10.1 - 15%	Baker Hughes	Acidizing	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.505822%	SmartCare Product	437757.46
<a href="#">Edit</a> Sand, White, 100 mesh	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.293285%		253820
<a href="#">Edit</a> TerraProp Plus, 30/50 mesh (bulk)	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.706752%		170277

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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%	.0952092%	SmartCare Product	82397.64
<input type="button" value="Edit"/>	GW-3LDF	Baker Hughes	Gelling Agent	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0818291%	SmartCare Product	70818
<input type="button" value="Edit"/>	Enzyme G-NE	Baker Hughes	Breaker	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0149908%	SmartCare Product	12973.6168
<input type="button" value="Edit"/>	ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0066186%	SmartCare Product	5728
<input type="button" value="Edit"/>	GW-3	Baker Hughes	Gelling Agent	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0038697%		3349
<input type="button" value="Edit"/>	Ferrotrol 300L	Baker Hughes	Iron Control	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0034596%	SmartCare Product	2994.10455
<input type="button" value="Edit"/>	CI-39	Baker Hughes	Corrosion Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0010205%		883.2
<input type="button" value="Edit"/>	Alpha 1427	Baker Hughes	Biocide	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0004449%	SmartCare Product	385

**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%	10.7918867%		9354753.28
				Water	7732-18-5	95%	.483573%		419176.541235
				Aluminum Oxide	1344-28-1	100%	.196436%		170277
				Hydrochloric Acid	7647-01-0	15%	.0757513%		65663.619
				Mineral Oil	8042-47-5	70%	.0571882%		49572.6
				Guar Gum	9000-30-0	100%	.052882%		45839.8
				Amorphous Silica	7631-86-9	20%	.0392872%		34055.4
				Hydrotreated Light Distillate	64742-47-8	30%	.0285168%		24719.292
				Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30%	.0285168%		24719.292
				Paraffinic Petroleum Distillate	64742-55-8	30%	.045092%		21245.4
				Petroleum Distillates	64742-47-8	30%	.045092%		21245.4
				Titanium Dioxide	13463-67-7	5%	.009131%		8513.85

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Iron Oxide	1309-37-1	5%	.0098218%	8513.85
Diatomaceous Earth, Calcined	91053-39-3	100%	.006608%	5728
Sodium Chloride	7647-14-5	5%	.0047528%	4119.882
Crystalline Silica: Quartz	14808-60-7	5%	.0040849%	3540.9
1-butoxy-2-propanol	5131-66-8	5%	.0040849%	3540.9
Isotridecanol, ethoxylated	9043-30-5	5%	.0040849%	3540.9
Ammonium Chloride	12125-02-9	3%	.0028517%	2471.9292
Citric Acid	77-92-9	60%	.0020724%	1796.46273
Oleamide DEA	93-83-4	2%	.0019011%	1647.9528
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.0019011%	1647.9528
Sodium chloride	7647-14-5	15%	.0009912%	859.2
Sodium Carboxymethyl inulin	430439-54-6	15%	.0009912%	859.2
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.0007483%	648.68084
Polyoxyethylene Sorbitan Monooleate	9005-65-6	.5%	.0004753%	411.9882
Sorbitan Monooleate	1338-43-8	.5%	.0004753%	411.9882
Oxyalkylated Fatty Acid	61791-002	40%	.0004076%	353.28
Sodium diglycolate	35249-69-5	5%	.0003304%	286.4
Sodium glycolate	2836-32-0	5%	.0003304%	286.4
Tar Bases, Quinoline Derivs., Benzyl Chloride-Quaternized	72480-70-7	30%	.0003057%	264.96
Aldehyde	104-55-2	30%	.0003057%	264.96
Formic Acid	64-18-6	30%	.0003057%	264.96
Glutaraldehyde	111-30-8	30%	.0001332%	115.5
2-butoxy-1-propanol	15821-83-7	.1%	.0000817%	70.818
Quaternary Ammonium Compound	68424-85-1	5%	.0000732%	63.41
Crystalline Silica (Cristobalite)	14464-46-1	1%	.0000661%	57.28
Sulfurized polyolefin	68037-13-8	5%	.0000509%	44.16
Isopropanol	67-63-0	5%	.0000509%	44.16
Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.0000444%	38.5
Ethanol	64-17-5	5%	.0000222%	19.25
Potassium Iodide	7681-11-0	2%	.0000204%	17.664
Polyaklylene	7756-94-7	1%	.0000102%	8.832
Potassium Acetate	127-08-2	.5%	.0000051%	4.416

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Blake 3H Cement and additives

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

Coal: Class A + 3% CaCl + 1/4 # per sack flake

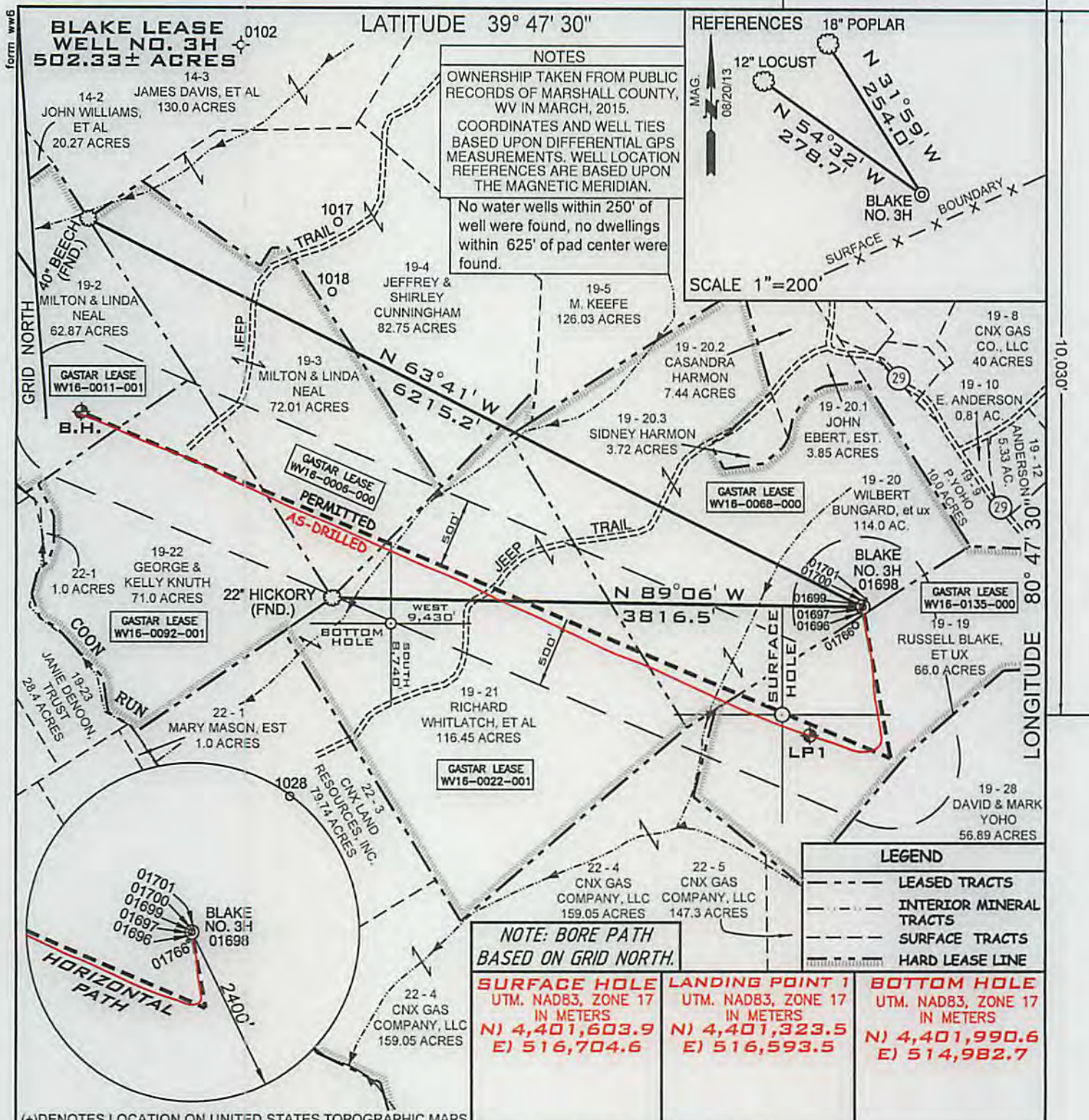
Intermediate: Class A + 1% EC-1 + .5% SMS + .55% BA-10A

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

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FILE NUMBER W0120321 (WB1-70)

DRAWING NUMBER BLAKE\_WP\_3H-REV-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. Jonathan N. White  
2122



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



DATE: JULY 23, 2015

OPERATORS WELL NO. BLAKE NO. 3H AS-DRILLED  
API WELL NO. 47-051-01698  
STATE COUNTY PERMIT

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

LOCATION ELEVATION 1326' WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER (UNDEFINED)

DISTRICT FRANKLIN COUNTY MARSHALL  
QUADRANGLE POWHATAN POINT 7.5' LEASE NUMBER WV16-0022-001, WV16-0092-001, WV16-0011-001, WV16-0135-000, WV16-0068-000, WV16-0016-000

SURFACE OWNER WIBERT H. BUNGARD, ET UX ACREAGE 114.0

OIL & GAS ROYALTY OWNER RUSSELL BLAKE, ET AL LEASE ACREAGE 502.33

PROPOSED WORK: DRILL X CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION \_\_\_  
PERFORATE NEW FORMATION \_\_\_ OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_

TARGET FORMATION MARCELLUS ESTIMATED DEPTH TVD:6,562' TMD:12,673'

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

10/30/2015

COUNTY NAME PERMIT