

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

API 47 - 51 - 01649 County Marshall District Franklin
Quad New Martinsville 7.5' Pad Name Hansen Field/Pool Name _____
Farm name Bayer Material Sciences, LLC Well Number 5H
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 4397448.1 Easting 515917.3
Landing Point of Curve Northing 4396993.6 Easting 516452.5
Bottom Hole Northing 4395614.7 Easting 517008.6

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 July 24, 2013 Date drilling commenced 3/21/2014 Date drilling ceased 9/30/2014
Date completion activities began 11/1/2014 Date completion activities ceased 4/15/2015
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 1590' Void(s) encountered (Y/N) depths None
Coal depth(s) ft 820'-830' & 1130'-1160' Cavern(s) encountered (Y/N) depths None
Is coal being mined in area (Y/N) No

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API 47-51 - 01649 Farm name Bayer Material Sciences, LLC Well number 5H

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	26"	20"	110'	New	PE / 54.5 #/ft		Yes
Coal	17.5"	13.375"	1213'	New	H-40 / 48 #/ft	83'	Yes
Intermediate 1	12.25"	9.625"	2644'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875"	5.5"	12,171'	New	P-110 / 20 #/ft		Yes
Tubing		2.375"	7060'	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	297	15.6	1.19	353	Surface	12
Coal	Class A	893	15.6	1.21	1080	Surface	8
Intermediate 1	Class A	861	15.2	1.27	1093	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2768	14.5	1.21	3349	Surface	
Tubing							

Drillers TD (ft) 12,178' Loggers TD (ft) N/A
 Deepest formation penetrated Marcellus Plug back to (ft) N/A
 Plug back procedure N/A

Kick off depth (ft) 6420'

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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Hansen #5H 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	11/2/2014	12117	12019	60	Marcellus
2	11/26/2014	11975.5	11842	48	Marcellus
3	12/1/2014	11796	11669	48	Marcellus
4	12/4/2014	11632	11460	48	Marcellus
5	12/5/2014	11422	11244	60	Marcellus
6	12/5/2014	11185	10961	60	Marcellus
7	12/6/2014	10914	10706	60	Marcellus
8	12/6/2014	10640	10425	60	Marcellus
9	12/7/2014	10376	10178	60	Marcellus
10	12/7/2014	10128	9972	48	Marcellus
11	12/7/2014	9933	9744	48	Marcellus
12	12/8/2014	9561	9559	48	Marcellus
13	12/8/2014	9520	9365	48	Marcellus
14	12/8/2014	9328	9180	48	Marcellus
15	12/9/2014	9122	8974	48	Marcellus
16	12/9/2014	8911	8683	60	Marcellus
17	12/10/2014	8621	8436	48	Marcellus
18	12/10/2014	8379	8175	60	Marcellus
19	12/10/2014	8128	7922	60	Marcellus
20	12/10/2014	7874	7675	60	Marcellus
21	12/10/2014	7608	7455	48	Marcellus
22	12/11/2014	7349	7127	48	Marcellus

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Fluid & Sand Volume Summary - Hansen 5H

<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	11/26/2014	80	6902	6472	4621	181685	4755
2	11/26/2014	80	7072	5533	4822	353096	8377
3	12/4/2014	60	6063	6537	4712	87450	3662
4	12/5/2014	80	6711	6497	4560	359010	8407
5	12/5/2014	80	7040	6051	4509	361107	8163
6	12/5/2014	78	6675	5792	4570	358593	8335
7	12/6/2014	80	6570	5330	4581	355337	8131
8	12/6/2014	80	6635	6250	4492	359052	8331
9	12/7/2014	80	6908	5765	4454	331980	7735
10	12/7/2014	82	7199	6724	4649	359889	8145
11	12/8/2014	80	6840	6683	4663	357471	7867
12	12/8/2014	81	6899	6731	4136	358369	7852
13	12/9/2014	80	6664	6867	4406	359262	7691
14	12/9/2014	80	6966	6793	4054	356510	7860
15	12/9/2014	79	6813	5946	4207	358695	8040
16	12/10/2014	75	6453	6871	3977	357823	7739
17	12/10/2014	80	6514	6762	4014	358024	7755
18	12/10/2014	80	6102	6935	4014	360498	7728
19	12/10/2014	80	6467	6479	4017	357362	7738
20	12/11/2014	80	6100	6061	4733	362943	8001
21	12/11/2014	80	6071	6263	4651	362752	7897
22	12/11/2014	80	6161	7316	4686	369085	7927

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Formations	Hansen TOP TVD	Hansen BASE TVD	Top MD	Base MD
SHALE AND SANDSTONE	0	820	0	820
SEWICKLEY COAL	820	830	820	830
SHALE	830	1130	830	1130
PITTSBURGE COAL	1130	1160	1130	1160
SHALE AND SANDSTONE	1160	1590	1160	1590
3RD SALT SAND	1590	1650	1590	1650
SHALE	1650	1780	1650	1780
MAXTON	1780	1840	1780	1840
SHALE	1840	1860	1840	1860
BIG LIME	1860	1992	1860	1992
BIG INJUN	1992	2240	1992	2240
WEIR SILTSTONE	2240	2490	2240	2490
BEREA SILTSTONE	2490	2550	2490	2550
SAND AND SHALE	2550	2870	2550	2870
GORDON	2870	2960	2870	2960
SILTSTONE AND SANDSTONE	2960	3440	2960	3465
BRAILLER	3440	5051	3465	5244
PIPE CREEK SHALE	5051	5454	5244	5686
SHALE	5454	5879	5686	6129
RHINESTREET	5879	6168	6129	6482
CASHAQUA	6168	6282	6482	6618
MIDDLESEX	6282	6308	6618	6649
WEST RIVER	6308	6361	6649	6722
GENESE0	6361	6388	6722	6762
TULLY LIMESTONE	6388	6423	6762	6824
HAMILTON	6423	6447	6824	6875
MARCELLUS	6447	na	6875	na
ONONDAGA	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.

[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.

Hydraulic Fracturing Data

Job Start Date 11/26/2014	Job End Date 12/11/2014	API Number 47-051-01649-00-00	State & County West Virginia --- Marshall
Well Name HANSEN 5H			
Longitude -80.80181	Latitude 39.71017	Datum NAD27	Federal/Tribal Well? <input type="checkbox"/>
True Vertical Depth (ft) 6517	Total Water Vol (gal) 20178312	Total Non Water Vol 0	Total Mass (lbs) 176105226.4558



MSDS Chemical Ingredients

Trade Name	Supplier	Purpose	Ingredients	CAS #	% High Additive	% HF Job	Comments	Ingredient Mass
<input type="button" value="Edit"/> Water	Operator	Carrier	Water	7732-18-5	100%	95.4948478%		168242729.7936
<input type="button" value="Edit"/> Sand, White, 40/70	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.94573%		5187600
<input type="button" value="Edit"/> Sand, White, 30/50	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	1.14511%		2016600
<input type="button" value="Edit"/> HCl, 10.1 - 15%	Baker Hughes	Acidizing	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.174438%	SmartCare Product	307195
<input type="button" value="Edit"/> Sand, White, 100 mesh	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.108912%		191800
<input type="button" value="Edit"/> FRW-18	Baker Hughes	Friction Reducer	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0339634%	SmartCare Product	5981144

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Edit	GW-3LDF	Baker Hughes	Gelling Agent	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0335564%	SmartCare Product	59094.75
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Edit	Alpha 1427	Baker Hughes	Biocide	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.008233%	SmartCare Product	14498.75
Edit	Enzyme G-NE	Baker Hughes	Breaker	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0055726%	SmartCare Product	9813.5906
Edit	Calcium Chloride	Baker Hughes	Salts	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0051674%		9100
Edit	ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0022146%	SmartCare Product	3900
Edit	Ferrotrol 300L	Baker Hughes	Iron Control	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0011991%	SmartCare Product	2111.63163
Edit	CI-14	Baker Hughes	Corrosion Inhibitor	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0005517%	SmartCare Product	971.5

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%	4.1980038%		7396039
				Water	7732-18-5	95%	.1726236%		304128.017885
				Hydrochloric Acid	7647-01-0	15%	.0261602%		46088.965
				Mineral Oil	8042-47-5	70%	.0234796%		41366.325
				Guar Gum	9000-30-0	60%	.0201254%		35456.85
				Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30%	.0101847%		17943.432
				Hydrotreated Light Distillate	64742-47-8	30%	.0101847%		17943.432
				Petroleum Distillates	64742-47-8	30%	.0100627%		17728.425
				Paraffinic Petroleum Distillate	64742-55-8	30%	.0100627%		17728.425
				Calcium Chloride	10043-52-4	100%	.0051652%		7100
				Glutaraldehyde	111-30-8	30%	.0024689%		4349.625
				Diatomaceous Earth, Calcined	91053-39-3	100%	.0022136%		3900
				Sodium Chloride	7647-14-5	5%	.0019557%		2140.572
				1-butoxy-2-propanol	5131-66-8	5%	.0016771%		2954.7375
				Isotridecanol, ethoxylated	9043-30-5	5%	.0016771%		2954.7375

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Crystalline Silica: Quartz	14808-60-7	5%	.0016771%	2954.7375
Ammonium Chloride	12125-02-9	3%	.0010185%	1794.3432
Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.000823%	1449.875
Citric Acid	77-92-9	60%	.0007191%	1266.978978
Oleamide DEA	93-83-4	2%	.000679%	1196.2288
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.000679%	1196.2288
Methanol	67-56-1	100%	.0005514%	971.5
Ethanol	64-17-5	5%	.0004115%	724.9375
Quaternary Ammonium Compound	68424-85-1	5%	.0004115%	724.9375
Sodium Carboxymethyl inulin	430439-54-6	15%	.000332%	585
Sodium chloride	7647-14-5	15%	.000332%	585
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.0002785%	490.67953
Potassium Chloride	7447-40-7	5%	.0002583%	455
Sorbitan Monooleate	1338-43-8	.5%	.0001697%	299.0572
Polyoxyethylene Sorbitan Monooleate	9005-65-6	.5%	.0001697%	299.0572
Polyoxyalkylenes	68951-67-7	30%	.0001654%	291.45
Sodium glycolate	2836-32-0	5%	.0001107%	195
Sodium diglycolate	35249-69-5	5%	.0001107%	195
Fatty Acids	61790-12-3	10%	.0000551%	97.15
Modified Thiourea Polymer	68527-49-1	7%	.0000386%	68.005
2-butoxy-1-propanol	15821-83-7	.1%	.0000335%	59.09475
Olefin	64743-02-8	5%	.0000276%	48.575
Propargyl Alcohol	107-19-7	5%	.0000276%	48.575
Crystalline Silica (Cristobalite)	14464-46-1	1%	.0000221%	39
Formaldehyde	50-00-0	1%	.0000055%	9.715

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Hansen 5H Cement and additives

Surface: Class A + 3% CaCl + .25 #/sk Flake

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

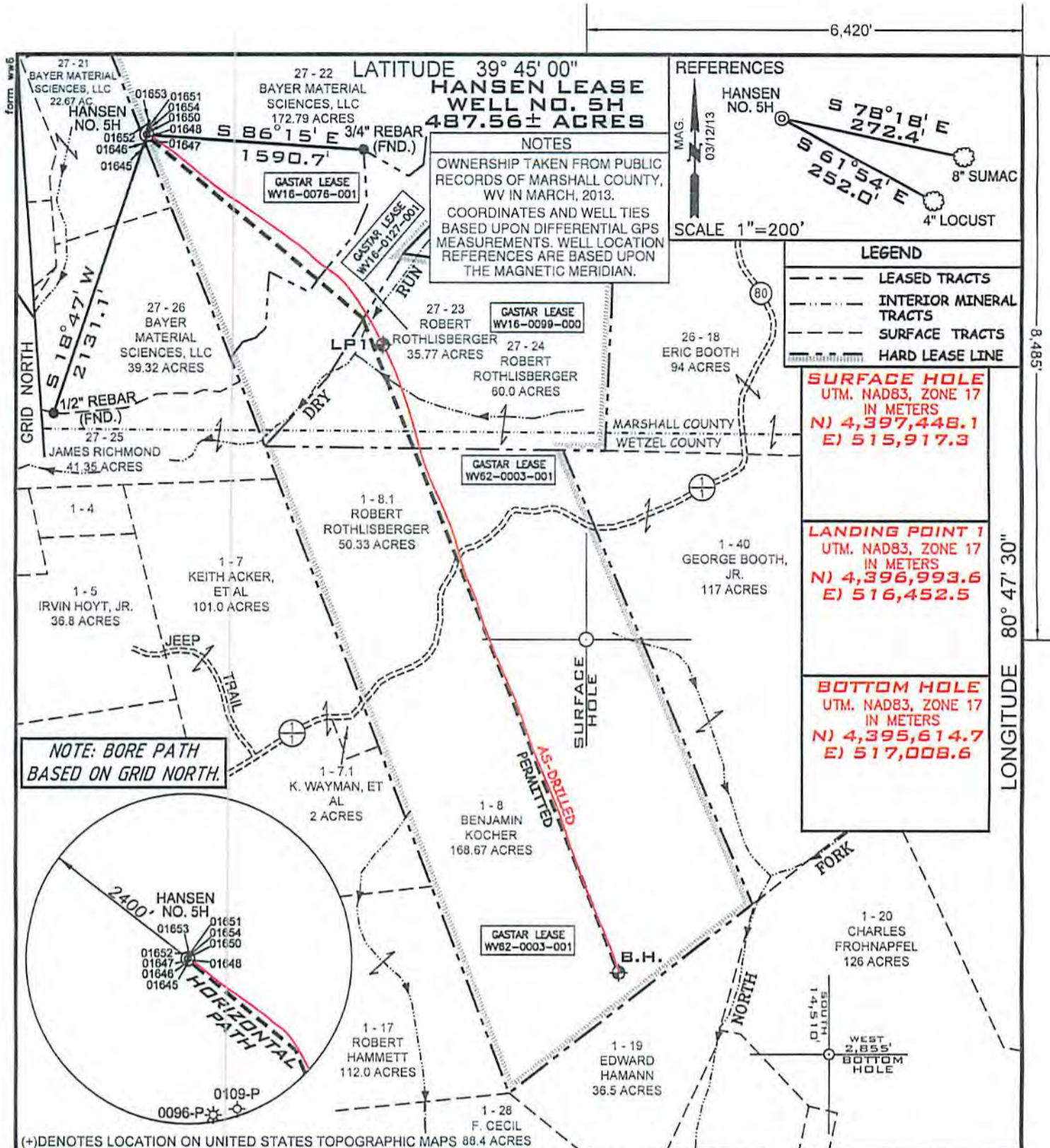
Production: 50:50 Class A + 3 lbs/sk BA-90 + .25% R-3 + .3% MPA-170

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FILE NUMBER W0120318 (WB1-62)
 DRAWING NUMBER HANSEN_WP_5H-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 28, 2015

OPERATORS WELL NO. HANSEN NO. 5H AS-DRILLED
 API WELL NO.

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
 (IF "GAS") PRODUCTION STORAGE DEEP SHALLOW
 LOCATION ELEVATION 1245' WATERSHED (HUC 10) FRENCH CREEK - OHIO RIVER (0503020110)

DISTRICT FRANKLIN COUNTY MARSHALL
 QUADRANGLE NEW MARTINSVILLE 7.5' LEASE NUMBER WV16-0099-000, WV62-0003-001
WV16-0076-001, WV16-0127-001

SURFACE OWNER BAYER MATERIAL SCIENCES, LLC ACREAGE 172.79
 OIL & GAS ROYALTY OWNER PPG INDUSTRIES, INC., et al LEASE ACREAGE 487.56
 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: 6532' TMD: 12,203'
 WELL OPERATOR GASTAR EXPLORATION 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

10/16/2015

COUNTY NAME
 PERMIT