WR-35
Rev. 8/23/13

Page ___ of ___

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

API 47 - 51 - 01645 County Marshall District Franklin
Quad New Martinsville 7.5' Pad Name Hansen Field/Pool Name
Farm name Bayer Material Sciences, 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 4397423.9	Easting 515913.9
Landing Point of Curve	Northing 4396910.2	Easting 516214.5
Bottom Hole	Northing 4395450.2	Easting 516806.6

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 2/26/2014 Date drilling ceased 10/11/2014
Date completion activities began 10/31/2014 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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WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 51 - 01645 Farm name Bayer Material Sciences, 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	26"	20"	110'	New	PE / 54.5 #/ft		Yes
Coal	17.5"	13.375"	1252'	New	H-40 / 48 #/ft	83'	Yes
Intermediate 1	12.25"	9.625"	2641'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875"	5.5"	12,280'	New	P-110 / 20 #/ft		Yes
Tubing		2.375"	6840'	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	324	15.6	1.21	392	Surface	12
Coal	Class A	915	15.6	1.21	1107	Surface	8
Intermediate 1	Class A	864	15	1.29	1115	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2792	14.5	1.21	3378	Surface	
Tubing							

Drillers TD (ft) 12,308' Loggers TD (ft) N/A
Deepest formation penetrated Marcellus Plug back to (ft) N/A
Plug back procedure N/A

Kick off depth (ft) 6464'

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 - 166 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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WR-35
Rev. 8/23/13

API 47- 51 - 01645 Farm name Bayer Material Sciences, 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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WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 51 - 01645 Farm name Bayer Material Sciences, LLC Well number 1H

PRODUCING FORMATION(S)	DEPTHS	
Marcellus	6,447' - 6,522' TVD	7,128' - 12,308' MD

Please insert additional pages as applicable.

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

SHUT-IN PRESSURE Surface 1150 psi Bottom Hole 3978 psi DURATION OF TEST 192 hrs

OPEN FLOW Gas 4378.5 mcfpd Oil 636 bpd NGL ___ bpd Water 693 bpd GAS MEASURED BY ☐ Estimated ☒ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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_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.

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Completed by Thomas Rowan Telephone 304-622-4796
Signature [signature] Title Drilling and Completions Engineer Date 7-31-15

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

51-01645

Hansen #1H Perforation Information

Stage	Date	Perforated interval From ft	Perforated interval To ft	Number of Perfs	Formation
1	11/1/2014	12226	12128	60	Marcellus
2	11/19/2014	12092	11910	60	Marcellus
3	11/19/2014	11826	11635	60	Marcellus
4	11/20/2014	11586	11446	48	Marcellus
5	11/20/2014	11372	11242	48	Marcellus
6	11/21/2014	11172	11045	48	Marcellus
7	11/21/2014	10996	10858	48	Marcellus
8	11/22/2014	10800	10636	48	Marcellus
9	11/22/2014	10580	10462	48	Marcellus
10	11/22/2014	10412	10226	60	Marcellus
11	11/23/2014	10177	10009	60	Marcellus
12	11/23/2014	9956	9777	60	Marcellus
13	11/23/2014	9726	9515	60	Marcellus
14	11/24/2014	9462	9240	60	Marcellus
15	11/24/2014	9187	9002	60	Marcellus
16	11/25/2014	8952	8761	60	Marcellus
17	12/2/2014	8712	8578	48	Marcellus
18	12/2/2014	8517	8393	48	Marcellus
19	12/2/2014	8332	8212	36	Marcellus
20	12/2/2014	8164	8001	60	Marcellus
21	12/3/2014	7962	7852	36	Marcellus
22	12/4/2014	7786	7640	48	Marcellus
23	12/4/2014	7585	7460	48	Marcellus
24	12/4/2014	7396	7229	48	Marcellus
25	12/4/2014	7180	7035	48	Marcellus

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Fluid & Sand Volume Summary - Hansen 1H

Stage	Stimulation Date	Avg Pump Rate (BPM)	Avg Pressure (PSI)	Max Break Pres. (PSI)	ISIP (PSI)	Sand Total (lbs)	Total Water (bbls)
1	11/19/2015	80	7145	7725	4613	181,764	4,501
2	11/19/2015	80	7196	5923	4699	322,438	7,818
3	11/20/2015	80	6927	7078	4629	342,405	7,778
4	11/20/2015	79	6969	6097	4763	352,701	7,910
5	11/21/2015	80	7019	5879	4708	352,179	7,847
6	11/21/2015	80	6800	5602	4360	358,641	8,161
7	11/22/2015	81	6600	5835	4509	359,003	8,064
8	11/22/2015	80	6779	5807	4509	359,628	8,102
9	11/22/2015	80	6637	5264	4512	360,024	8,115
10	11/23/2015	80	6350	5033	4570	359,957	8,141
11	11/23/2015	80	6282	5345	4577	359,059	7,977
12	11/23/2015	80	6451	6180	4416	361,287	8,008
13	11/24/2015	81	6585	5745	4479	358,436	7,943
14	11/24/2015	80	6449	5925	4262	359,062	7,942
15	11/25/2015	80	6455	6357	4297	359,317	8,012
16	12/2/2015	80	6628	5588	4065	358,231	8,078
17	12/2/2015	80	6983	7679	3972	354,008	7,798
18	12/2/2015	79	6930	7968	3658	354,013	7,928
19	12/2/2015	77	6675	8706	4304	615,310	8,649
20	12/3/2015	80	6400	7525	3873	353,572	7,838
21	12/3/2015	78	6886	7674	4800	357,969	7,757
22	12/3/2015	80	6205	6589	4219	355,631	7,823
23	12/3/2015	80	6355	6205	4524	357,095	7,858
24	12/3/2015	80	5997	7881	4469	355,693	7,802
25	12/4/2015	80	5998	5454	4710	356,229	7,788

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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 SANDSTC	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
GENESEO	6361	6388	6722	6762
TULLY LIMESTONE	6388	6423	6762	6824
HAMILTON	6423	6447	6824	6875
MARCELLUS	6447	na	6875	na
ONONDOGA	na	na	na	na

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

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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
11/19/2014	12/4/2014	47-051-01645-00-00	West Virginia --- Marshall

Well Name
HANSEN 1H

Longitude	Latitude	Datum	Federal/Tribal Well?
-80.81453	39.7265	NAD27	

True Vertical Depth (ft)	Total Water Vol (gal)	Total Non Water Vol	Total Mass (lbs)
6490	8259258	0	78009625.4915

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%	88.1690945%		68864041.3524
Edit	Sand, White, 40/70	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	7.82006%		6100400
Edit	Sand, White, 30/50	Baker Hughes	Proppant	MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.98283%		2326900

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Edit	FRW-18	Baker Hughes	Friction Reducer						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0904741%	SmartCare Product	70578.56
Edit	Alpha 1427	Baker Hughes	Biocide						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0227135%	SmartCare Product	17718.75
Edit	Enzyme G-NE	Baker Hughes	Breaker						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0158933%	SmartCare Product	12398.3086
Edit	ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0064095%	SmartCare Product	5000
Edit	Ferrotrol 300L (Totes)	Baker Hughes	Iron Control						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0016565%	SmartCare Product	1292.19249
Edit	Ferrotrol 300L	Baker Hughes	Iron Control						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0014544%	SmartCare Product	1134.60804
Edit	CI-14	Baker Hughes	Corrosion Inhibitor						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0014312%	SmartCare Product	1116.5

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%	11.0190176%		8606350
				Water	7732-18-5	95%	.4506191%		351953.882435
				Mineral Oil	8042-47-5	70%	.0690103%		53900.154
				Hydrochloric Acid	7647-01-0	15%	.0678167%		52967.915
				Guar Gum	9000-30-0	60%	.0591517%		46200.132
				Petroleum Distillates	64742-47-8	30%	.0295758%		23100.066
				Paraffinic Petroleum Distillate	64742-55-8	30%	.0295758%		23100.066

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Sodium chloride	7647-14-5	3%	[illegible]	[illegible]
Ammonium Chloride	12125-02-9	3%	.0027109%	2117.3568
Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.0022686%	1771.875
Citric Acid	77-92-9	60%	.0018643%	1456.080318
Oleamide DEA	93-83-4	2%	.0018073%	1411.5712
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.0018073%	1411.5712
Methanol	67-56-1	100%	.0014295%	1116.5
Quaternary Ammonium Compound	68424-85-1	5%	.0011343%	885.9375
Ethanol	64-17-5	5%	.0011343%	885.9375
Sodium Carboxymethyl inulin	430439-54-6	15%	.0009603%	750
Sodium chloride	7647-14-5	15%	.0009603%	750
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.0007937%	619.91543
Sorbitan Monooleate	1338-43-8	.5%	.0004518%	352.8928
Polyoxythylene Sorbitan Monooleate	9005-65-6	.5%	.0004518%	352.8928
Polyoxyalkylenes	68951-67-7	30%	.0004288%	334.95
Sodium glycolate	2836-32-0	5%	.0003201%	250
Sodium diglycolate	35249-69-5	5%	.0003201%	250
Fatty Acids	61790-12-3	10%	.0001429%	111.65
Modified Thiourea Polymer	68527-49-1	7%	.0001001%	78.155
2-butoxy-1-propanol	15821-83-7	.1%	.0000986%	77.00022
Olefin	64743-02-8	5%	.0000715%	55.825
Propargyl Alcohol	107-19-7	5%	.0000715%	55.825
Crystalline Silica (Cristobaloite)	14464-46-1	1%	.000064%	50
Formaldehyde	50-00-0	1%	.0000143%	11.165

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Hansen 1H 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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GASTAR EXPLORATION USA, INC.

Location: Marshall County, WV
Field: Marshall
Facility: Hansen Unit

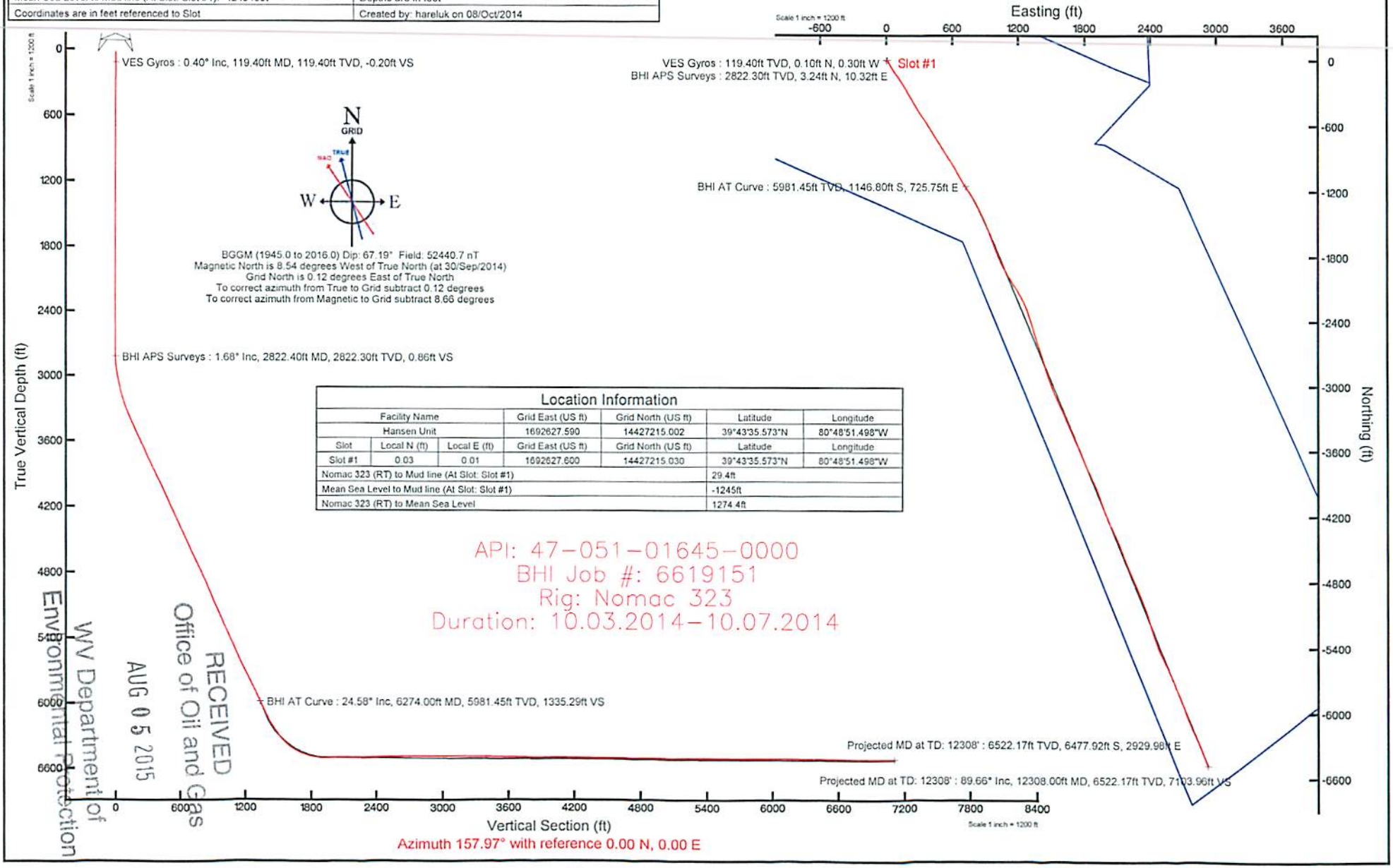
Slot: Slot #1
Well: Hansen Unit 1H
Wellbore: Hansen Unit 1H (PWB)

51-01645

Plot reference wellpath is Hansen Unit 1H (PWP) Rev-B.0	
True vertical depths are referenced to Nomac 323 (RT)	Grid System: NAD83 / UTM Zone 17 North, US feet
Measured depths are referenced to Nomac 323 (RT)	North Reference: Grid north
Nomac 323 (RT) to Mean Sea Level: 1274.4 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot #1): -1245 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: hareluk on 08/Oct/2014

Well Data

Slot	Well	Wellbore	Wellpath
Slot #1	Hansen Unit 1H	Hansen Unit 1H (AWB)	Hansen Unit 1H AWP Proj: 12308'
Slot #1	Hansen Unit 1H	Hansen Unit 1H (PWB)	Hansen Unit 1H (PWP) Rev-B.0



BGGM (1945.0 to 2016.0) Dip: 67.19° Field: 52440.7 nT
Magnetic North is 8.54 degrees West of True North (at 30/Sep/2014)
Grid North is 0.12 degrees East of True North
To correct azimuth from True to Grid subtract 0.12 degrees
To correct azimuth from Magnetic to Grid subtract 8.66 degrees

Location Information

Facility Name			Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Hansen Unit			1692627.590	14427215.002	39°43'35.573"N	80°48'51.498"W
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot #1	0.03	0.01	1692627.600	14427215.030	39°43'35.573"N	80°48'51.498"W
Nomac 323 (RT) to Mud line (At Slot: Slot #1)					29.4ft	
Mean Sea Level to Mud line (At Slot: Slot #1)					-1245ft	
Nomac 323 (RT) to Mean Sea Level					1274.4ft	

API: 47-051-01645-0000
BHI Job #: 6619151
Rig: Nomac 323
Duration: 10.03.2014-10.07.2014

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51-01645

REFERENCE WELLPATH IDENTIFICATION			
Operator	GASTAR EXPLORATION INC.	Slot	Slot #1
Area	Marshall County, WV	Well	Hansen 1H
Field	Marshall	Wellbore	Hansen 1H (AWB)
Facility	Hansen Unit	Wellpath	Hansen 1H (AWP) Proj: 12,308'
		Sidetrack	(none)

WELLPATH DATA † = interpolated/extrapolated station

	MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
†	0.00	0.00	288.27	0.00	0.00	0.00	0.00	515913.9	4397423.9	39°43'35.573"N	80°48'51.498"W	0.00	0.00	0.00
	29.40	0.00	288.27	29.40	0.00	0.00	0.00	515913.9	4397423.9	39°43'35.573"N	80°48'51.498"W	0.00	0.00	0.00
	119.40	0.40	288.27	119.40	-0.20	0.10	-0.30	515913.8	4397424.0	39°43'35.574"N	80°48'51.502"W	0.31	288.27	0.44
	219.40	0.38	255.18	219.40	-0.47	0.12	-0.95	515913.6	4397424.0	39°43'35.575"N	80°48'51.510"W	0.96	277.38	0.22
	319.40	0.27	260.86	319.40	-0.56	0.00	-1.50	515913.5	4397423.9	39°43'35.573"N	80°48'51.517"W	1.50	270.03	0.11
	419.40	0.53	293.31	419.39	-0.95	0.15	-2.16	515913.3	4397424.0	39°43'35.575"N	80°48'51.526"W	2.17	273.88	0.34
	519.40	0.27	280.04	519.39	-1.40	0.37	-2.82	515913.1	4397424.0	39°43'35.577"N	80°48'51.534"W	2.84	277.49	0.27
	619.40	0.30	245.70	619.39	-1.52	0.30	-3.29	515912.9	4397424.0	39°43'35.576"N	80°48'51.540"W	3.30	275.28	0.17
	719.40	0.07	204.23	719.39	-1.46	0.14	-3.55	515912.8	4397424.0	39°43'35.575"N	80°48'51.543"W	3.55	272.26	0.25
	819.40	0.17	201.12	819.39	-1.31	-0.05	-3.63	515912.8	4397423.9	39°43'35.573"N	80°48'51.544"W	3.63	269.15	0.10
	919.40	0.17	199.66	919.39	-1.09	-0.33	-3.73	515912.8	4397423.8	39°43'35.570"N	80°48'51.546"W	3.75	264.92	0.00
	1019.40	0.11	226.48	1019.39	-0.95	-0.54	-3.85	515912.8	4397423.8	39°43'35.568"N	80°48'51.547"W	3.89	262.06	0.09
	1119.40	0.11	221.94	1119.39	-0.87	-0.68	-3.99	515912.7	4397423.7	39°43'35.567"N	80°48'51.549"W	4.04	260.39	0.01
	1219.40	0.10	178.28	1219.39	-0.75	-0.83	-4.05	515912.7	4397423.7	39°43'35.565"N	80°48'51.550"W	4.13	258.37	0.08
	1319.40	0.43	65.79	1319.39	-0.68	-0.77	-3.70	515912.8	4397423.7	39°43'35.566"N	80°48'51.545"W	3.78	258.30	0.48
	1419.40	0.27	49.92	1419.38	-0.77	-0.46	-3.18	515913.0	4397423.8	39°43'35.569"N	80°48'51.539"W	3.21	261.75	0.19
	1519.40	0.45	35.32	1519.38	-1.05	0.01	-2.77	515913.1	4397423.9	39°43'35.573"N	80°48'51.533"W	2.77	270.22	0.20
	1619.40	0.43	23.37	1619.38	-1.53	0.68	-2.40	515913.2	4397424.1	39°43'35.580"N	80°48'51.529"W	2.49	285.73	0.09
	1719.40	0.41	60.10	1719.38	-1.84	1.20	-1.94	515913.3	4397424.3	39°43'35.585"N	80°48'51.523"W	2.28	301.72	0.27
	1819.40	0.54	73.24	1819.37	-1.85	1.52	-1.18	515913.6	4397424.4	39°43'35.588"N	80°48'51.513"W	1.92	322.18	0.16
	1919.40	0.53	71.09	1919.37	-1.79	1.81	-0.29	515913.8	4397424.5	39°43'35.591"N	80°48'51.502"W	1.84	350.80	0.01
	2019.40	0.65	76.29	2019.36	-1.68	2.10	0.69	515914.1	4397424.6	39°43'35.594"N	80°48'51.489"W	2.21	18.32	0.13
	2119.40	0.68	79.40	2119.36	-1.48	2.34	1.83	515914.5	4397424.6	39°43'35.596"N	80°48'51.474"W	2.97	37.99	0.05
	2219.40	0.69	74.10	2219.35	-1.30	2.62	2.99	515914.8	4397424.7	39°43'35.599"N	80°48'51.460"W	3.97	48.83	0.06
	2319.40	0.91	83.05	2319.34	-1.03	2.88	4.36	515915.3	4397424.8	39°43'35.602"N	80°48'51.442"W	5.22	56.57	0.25

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2419.40	0.74	77.45	2419.33	-0.72	3.11	5.78	515915.7	4397424.9	39°43'35.604"N	80°48'51.424"W	6.56	61.68	0.19
2519.40	0.70	77.18	2519.32	-0.52	3.39	7.00	515916.1	4397425.0	39°43'35.607"N	80°48'51.408"W	7.78	64.17	0.04
2619.40	0.68	109.36	2619.32	-0.02	3.33	8.16	515916.4	4397425.0	39°43'35.606"N	80°48'51.393"W	8.81	67.81	0.38
2719.40	0.67	64.00	2719.31	0.33	3.39	9.24	515916.7	4397425.0	39°43'35.607"N	80°48'51.379"W	9.85	69.87	0.52
2781.40	0.50	65.04	2781.31	0.29	3.66	9.82	515916.9	4397425.1	39°43'35.609"N	80°48'51.372"W	10.48	69.55	0.27
2822.40	1.68	144.91	2822.30	0.86	3.24	10.32	515917.1	4397424.9	39°43'35.605"N	80°48'51.366"W	10.82	72.55	4.06
2854.40	3.36	158.18	2854.27	2.26	1.99	10.94	515917.3	4397424.5	39°43'35.593"N	80°48'51.358"W	11.12	79.69	5.52
2885.40	4.49	158.42	2885.19	4.38	0.02	11.73	515917.5	4397423.9	39°43'35.573"N	80°48'51.348"W	11.73	89.91	3.65
2917.40	6.14	156.48	2917.06	7.34	-2.72	12.87	515917.8	4397423.1	39°43'35.546"N	80°48'51.333"W	13.15	101.92	5.19
2949.40	7.43	154.25	2948.83	11.12	-6.15	14.45	515918.3	4397422.1	39°43'35.512"N	80°48'51.313"W	15.70	113.05	4.11
2980.40	8.78	154.94	2979.52	15.48	-10.10	16.32	515918.9	4397420.9	39°43'35.473"N	80°48'51.289"W	19.19	121.74	4.37
3012.40	9.95	152.88	3011.09	20.68	-14.77	18.62	515919.6	4397419.4	39°43'35.427"N	80°48'51.260"W	23.77	128.43	3.80
3043.40	11.20	152.35	3041.57	26.34	-19.82	21.24	515920.4	4397417.9	39°43'35.377"N	80°48'51.227"W	29.05	133.03	4.04
3075.40	12.28	152.76	3072.90	32.82	-25.60	24.24	515921.3	4397416.1	39°43'35.320"N	80°48'51.188"W	35.25	136.57	3.39
3106.40	13.19	152.73	3103.13	39.63	-31.67	27.37	515922.3	4397414.3	39°43'35.260"N	80°48'51.148"W	41.86	139.17	2.94
3138.40	14.08	151.76	3134.23	47.13	-38.35	30.88	515923.3	4397412.3	39°43'35.194"N	80°48'51.104"W	49.24	141.16	2.87
3169.40	15.17	149.91	3164.23	54.90	-45.18	34.70	515924.5	4397410.2	39°43'35.126"N	80°48'51.055"W	56.97	142.48	3.82
3201.40	16.44	149.33	3195.02	63.52	-52.70	39.11	515925.8	4397407.9	39°43'35.052"N	80°48'50.999"W	65.62	143.42	4.00
3232.40	17.83	149.36	3224.64	72.55	-60.56	43.76	515927.3	4397405.5	39°43'34.974"N	80°48'50.939"W	74.71	144.14	4.48
3264.40	18.85	150.11	3255.01	82.52	-69.25	48.84	515928.8	4397402.8	39°43'34.888"N	80°48'50.875"W	84.74	144.81	3.27
3295.40	20.53	148.83	3284.20	92.84	-78.25	54.15	515930.4	4397400.1	39°43'34.799"N	80°48'50.807"W	95.15	145.32	5.59
3327.40	22.45	147.58	3313.97	104.39	-88.21	60.33	515932.3	4397397.1	39°43'34.700"N	80°48'50.728"W	106.86	145.63	6.17
3390.40	23.90	145.22	3371.89	128.68	-108.84	74.06	515936.5	4397390.8	39°43'34.496"N	80°48'50.553"W	131.65	145.77	2.73
3452.40	23.81	142.62	3428.60	152.99	-129.10	88.82	515941.0	4397384.6	39°43'34.296"N	80°48'50.365"W	156.71	145.47	1.70
3514.40	24.56	144.00	3485.15	177.57	-149.47	103.99	515945.6	4397378.4	39°43'34.094"N	80°48'50.171"W	182.09	145.17	1.51
3576.40	25.44	146.54	3541.35	203.12	-171.01	118.91	515950.2	4397371.8	39°43'33.881"N	80°48'49.981"W	208.29	145.19	2.24
3638.40	26.34	147.08	3597.12	229.68	-193.67	133.73	515954.7	4397364.9	39°43'33.657"N	80°48'49.792"W	235.35	145.38	1.50
3701.40	25.22	146.61	3653.85	256.57	-216.60	148.71	515959.2	4397357.9	39°43'33.430"N	80°48'49.600"W	262.74	145.53	1.81
3764.40	23.93	149.48	3711.15	282.37	-238.82	162.58	515963.5	4397351.2	39°43'33.210"N	80°48'49.423"W	288.91	145.75	2.79
3828.40	25.36	151.07	3769.32	308.81	-262.00	175.81	515967.5	4397344.1	39°43'32.980"N	80°48'49.255"W	315.52	146.14	2.46
3892.40	26.17	151.30	3826.95	336.44	-286.37	189.22	515971.6	4397336.7	39°43'32.739"N	80°48'49.084"W	343.24	146.55	1.28

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Department of Environmental Protection

51-01645

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3955.40	26.11	149.91	3883.51	363.96	-310.55	202.84	515975.7	4397329.3	39°43'32.500"N	80°48'48.910"W	370.93	146.85	0.98
4018.40	26.53	149.13	3939.98	391.59	-334.63	217.01	515980.0	4397322.0	39°43'32.262"N	80°48'48.729"W	398.83	147.04	0.86
4081.40	25.86	149.81	3996.51	419.10	-358.58	231.14	515984.3	4397314.7	39°43'32.025"N	80°48'48.549"W	426.62	147.20	1.17
4143.40	24.79	149.47	4052.55	445.34	-381.46	244.54	515988.4	4397307.7	39°43'31.798"N	80°48'48.378"W	453.11	147.34	1.74
4206.40	24.82	148.46	4109.74	471.44	-404.11	258.16	515992.6	4397300.8	39°43'31.574"N	80°48'48.204"W	479.53	147.43	0.67
4269.40	24.93	149.38	4166.89	497.61	-426.81	271.84	515996.8	4397293.9	39°43'31.350"N	80°48'48.030"W	506.03	147.51	0.64
4332.40	25.14	148.70	4223.97	523.95	-449.67	285.56	516000.9	4397286.9	39°43'31.123"N	80°48'47.855"W	532.68	147.58	0.57
4394.40	24.67	146.59	4280.21	549.63	-471.72	299.53	516005.2	4397280.2	39°43'30.905"N	80°48'47.677"W	558.78	147.59	1.62
4457.40	25.30	146.21	4337.31	575.70	-493.88	314.25	516009.7	4397273.5	39°43'30.686"N	80°48'47.489"W	585.39	147.53	1.03
4521.40	25.92	144.28	4395.03	602.68	-516.61	330.02	516014.5	4397266.5	39°43'30.461"N	80°48'47.288"W	613.02	147.43	1.62
4584.40	25.72	144.24	4451.74	629.33	-538.88	346.05	516019.4	4397259.8	39°43'30.241"N	80°48'47.083"W	640.42	147.29	0.32
4647.40	24.61	146.44	4508.76	655.47	-560.90	361.29	516024.0	4397253.0	39°43'30.023"N	80°48'46.889"W	667.19	147.21	2.30
4710.40	24.55	148.28	4566.05	681.22	-582.97	375.43	516028.3	4397246.3	39°43'29.804"N	80°48'46.708"W	693.40	147.22	1.22
4773.40	25.26	148.00	4623.19	707.36	-605.50	389.43	516032.6	4397239.5	39°43'29.581"N	80°48'46.530"W	719.92	147.25	1.14
4836.40	26.20	148.50	4679.94	734.32	-628.76	403.82	516037.0	4397232.4	39°43'29.351"N	80°48'46.346"W	747.27	147.29	1.53
4900.40	25.72	148.70	4737.49	761.96	-652.67	418.42	516041.4	4397225.1	39°43'29.114"N	80°48'46.160"W	775.28	147.34	0.76
4963.40	25.32	147.85	4794.34	788.72	-675.76	432.69	516045.8	4397218.0	39°43'28.886"N	80°48'45.978"W	802.41	147.37	0.86
5026.40	24.95	147.43	4851.37	815.04	-698.36	447.01	516050.1	4397211.2	39°43'28.662"N	80°48'45.795"W	829.17	147.38	0.65
5089.40	24.13	148.56	4908.68	840.81	-720.55	460.88	516054.3	4397204.4	39°43'28.443"N	80°48'45.618"W	855.34	147.40	1.50
5153.40	23.61	145.84	4967.21	866.25	-742.31	474.90	516058.6	4397197.8	39°43'28.227"N	80°48'45.440"W	881.23	147.39	1.90
5216.40	23.30	145.76	5025.00	890.76	-763.05	489.00	516062.9	4397191.4	39°43'28.022"N	80°48'45.260"W	906.29	147.35	0.49
5280.40	24.48	148.91	5083.52	916.23	-784.87	502.97	516067.2	4397184.8	39°43'27.806"N	80°48'45.082"W	932.20	147.35	2.71
5342.40	24.01	148.29	5140.05	941.35	-806.61	516.23	516071.2	4397178.2	39°43'27.591"N	80°48'44.912"W	957.66	147.38	0.86
5406.40	24.57	147.47	5198.39	967.27	-828.90	530.23	516075.5	4397171.4	39°43'27.371"N	80°48'44.734"W	983.98	147.39	1.02
5469.40	25.13	147.08	5255.55	993.28	-851.17	544.54	516079.8	4397164.6	39°43'27.150"N	80°48'44.551"W	1010.46	147.39	0.93
5532.40	25.76	147.30	5312.44	1019.87	-873.92	559.21	516084.3	4397157.7	39°43'26.925"N	80°48'44.364"W	1037.52	147.39	1.01
5595.40	25.93	146.49	5369.14	1046.82	-896.93	574.21	516088.9	4397150.7	39°43'26.697"N	80°48'44.173"W	1064.99	147.37	0.62
5658.40	25.17	144.47	5425.98	1073.35	-919.32	589.60	516093.6	4397143.8	39°43'26.476"N	80°48'43.976"W	1092.14	147.33	1.83
5721.40	24.72	146.84	5483.11	1099.30	-941.25	604.59	516098.1	4397137.2	39°43'26.259"N	80°48'43.785"W	1118.69	147.29	1.74
5784.40	24.41	150.04	5540.41	1125.12	-963.55	618.30	516102.3	4397130.4	39°43'26.038"N	80°48'43.610"W	1144.87	147.31	2.17
5847.40	24.65	150.78	5597.72	1151.05	-986.30	631.21	516106.2	4397123.4	39°43'25.813"N	80°48'43.446"W	1170.99	147.38	0.62

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5910.40	26.19	150.52	5654.62	1177.87	-1009.87	644.47	516110.3	4397116.2	39°43'25.580"N	80°48'43.277"W	1197.99	147.46	2.45
5973.40	26.80	150.71	5711.00	1205.74	-1034.36	658.26	516114.5	4397108.8	39°43'25.337"N	80°48'43.101"W	1226.05	147.53	0.98
6036.40	26.34	150.06	5767.35	1233.68	-1058.86	672.18	516118.7	4397101.3	39°43'25.095"N	80°48'42.923"W	1254.20	147.59	0.86
6099.40	26.43	149.63	5823.79	1261.39	-1083.06	686.25	516123.0	4397094.0	39°43'24.855"N	80°48'42.744"W	1282.17	147.64	0.34
6161.40	26.04	148.64	5879.40	1288.47	-1106.59	700.30	516127.3	4397086.8	39°43'24.623"N	80°48'42.565"W	1309.57	147.67	0.95
6225.40	24.62	147.46	5937.25	1315.45	-1129.83	714.79	516131.7	4397079.7	39°43'24.393"N	80°48'42.380"W	1336.95	147.68	2.35
6256.40	24.53	147.04	5965.44	1328.11	-1140.67	721.76	516133.8	4397076.4	39°43'24.285"N	80°48'42.291"W	1349.84	147.68	0.63
6274.00	24.58	146.91	5981.45	1335.29	-1146.80	725.75	516135.0	4397074.5	39°43'24.225"N	80°48'42.240"W	1357.15	147.67	0.42
6369.00	24.44	147.53	6067.89	1374.01	-1179.94	747.09	516141.5	4397064.4	39°43'23.897"N	80°48'41.968"W	1396.56	147.66	0.31
6464.00	27.67	145.82	6153.22	1414.91	-1214.77	770.03	516148.5	4397053.8	39°43'23.552"N	80°48'41.675"W	1438.27	147.63	3.49
6557.00	34.50	147.80	6232.82	1462.01	-1254.97	796.23	516156.5	4397041.6	39°43'23.154"N	80°48'41.341"W	1486.25	147.61	7.42
6652.00	37.09	154.01	6309.90	1517.09	-1303.51	823.14	516164.7	4397026.8	39°43'22.674"N	80°48'40.998"W	1541.65	147.73	4.69
6748.00	49.06	153.79	6379.89	1582.37	-1362.28	851.94	516173.5	4397008.9	39°43'22.093"N	80°48'40.631"W	1606.74	147.98	12.47
6843.00	61.28	153.65	6434.05	1659.99	-1432.06	886.41	516184.0	4396987.6	39°43'21.402"N	80°48'40.192"W	1684.20	148.24	12.86
6938.00	71.04	158.72	6472.42	1746.70	-1511.49	921.30	516194.6	4396963.4	39°43'20.617"N	80°48'39.747"W	1770.14	148.64	11.37
7032.00	80.04	159.96	6495.87	1837.60	-1596.57	953.37	516204.4	4396937.5	39°43'19.775"N	80°48'39.339"W	1859.56	149.16	9.66
7128.00	89.17	159.46	6504.89	1933.03	-1686.12	986.48	516214.5	4396910.2	39°43'18.889"N	80°48'38.918"W	1953.49	149.67	9.52
7222.00	92.25	159.10	6503.72	2026.99	-1774.02	1019.73	516224.6	4396883.4	39°43'18.020"N	80°48'38.495"W	2046.22	150.11	3.30
7316.00	89.66	153.73	6502.15	2120.90	-1860.12	1057.32	516236.1	4396857.2	39°43'17.168"N	80°48'38.016"W	2139.62	150.39	6.34
7411.00	90.03	150.93	6502.41	2215.43	-1944.25	1101.43	516249.5	4396831.6	39°43'16.336"N	80°48'37.454"W	2234.56	150.47	2.97
7506.00	90.09	147.81	6502.31	2309.35	-2025.98	1149.82	516264.3	4396806.7	39°43'15.527"N	80°48'36.837"W	2329.53	150.42	3.28
7601.00	92.53	149.42	6500.14	2403.05	-2107.05	1199.28	516279.3	4396782.0	39°43'14.725"N	80°48'36.206"W	2424.45	150.35	3.08
7695.00	91.75	153.28	6496.63	2496.34	-2189.47	1244.31	516293.0	4396756.8	39°43'13.909"N	80°48'35.632"W	2518.35	150.39	4.19
7791.00	91.57	159.80	6493.84	2592.22	-2277.45	1282.49	516304.7	4396730.0	39°43'13.039"N	80°48'35.146"W	2613.72	150.62	6.79
7886.00	90.77	163.03	6491.90	2687.01	-2367.46	1312.76	516313.9	4396702.6	39°43'12.149"N	80°48'34.761"W	2707.07	150.99	3.50
7981.00	90.55	164.17	6490.81	2781.55	-2458.59	1339.58	516322.1	4396674.9	39°43'11.248"N	80°48'34.420"W	2799.85	151.42	1.22
8076.00	90.12	162.41	6490.25	2876.13	-2549.57	1366.89	516330.4	4396647.1	39°43'10.348"N	80°48'34.073"W	2892.87	151.80	1.91
8172.00	90.03	161.83	6490.13	2971.88	-2640.94	1396.36	516339.4	4396619.3	39°43'09.445"N	80°48'33.698"W	2987.37	152.13	0.61
8265.00	89.78	162.81	6490.28	3064.61	-2729.54	1424.61	516348.0	4396592.3	39°43'08.568"N	80°48'33.339"W	3078.95	152.44	1.09
8359.00	89.51	164.24	6490.86	3158.17	-2819.68	1451.27	516356.1	4396564.8	39°43'07.677"N	80°48'33.000"W	3171.24	152.77	1.55
8452.00	89.51	162.40	6491.66	3250.75	-2908.76	1477.96	516364.2	4396537.7	39°43'06.796"N	80°48'32.661"W	3262.70	153.07	1.98

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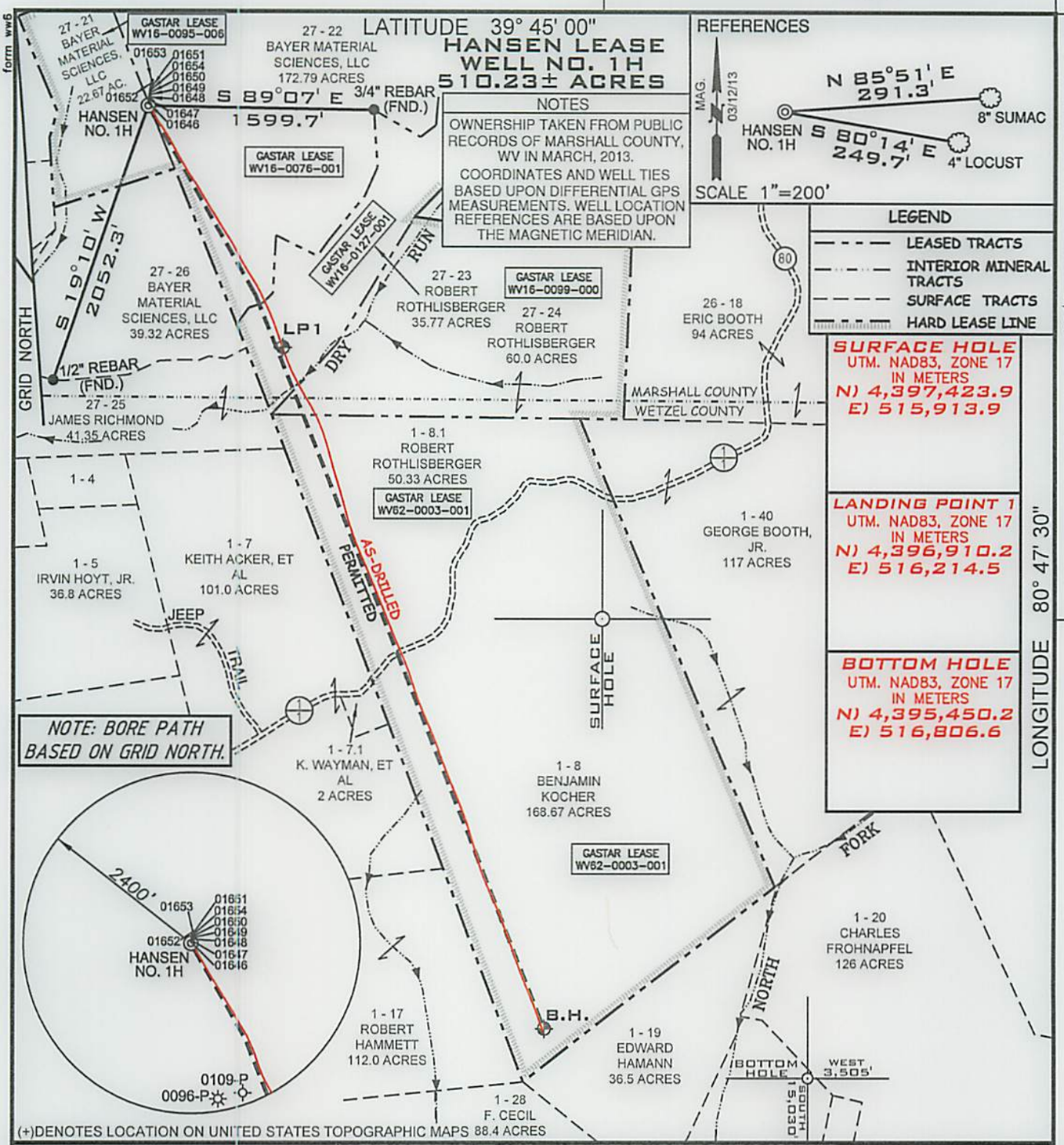
WELLPATH DATA † = interpolated/extrapolated station													
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
8547.00	89.51	158.82	6492.47	3345.63	-2998.35	1509.49	516373.8	4396510.4	39°43'05.910"N	80°48'32.260"W	3356.89	153.28	3.77
8642.00	89.23	156.96	6493.52	3440.62	-3086.36	1545.24	516384.7	4396483.6	39°43'05.039"N	80°48'31.805"W	3451.58	153.40	1.98
8737.00	88.92	154.65	6495.05	3535.54	-3173.00	1584.17	516396.6	4396457.2	39°43'04.182"N	80°48'31.309"W	3546.48	153.47	2.45
8832.00	88.89	156.92	6496.87	3630.44	-3259.62	1623.13	516408.5	4396430.8	39°43'03.326"N	80°48'30.813"W	3641.38	153.53	2.39
8927.00	88.86	157.58	6498.73	3725.42	-3347.21	1659.86	516419.6	4396404.1	39°43'02.459"N	80°48'30.345"W	3736.16	153.62	0.70
9021.00	88.86	156.76	6500.60	3819.39	-3433.83	1696.32	516430.8	4396377.7	39°43'01.602"N	80°48'29.881"W	3829.97	153.71	0.87
9116.00	89.54	156.30	6501.93	3914.35	-3520.96	1734.15	516442.3	4396351.2	39°43'00.740"N	80°48'29.399"W	3924.85	153.78	0.86
9210.00	89.54	158.87	6502.68	4008.34	-3607.84	1769.99	516453.2	4396324.7	39°42'59.881"N	80°48'28.943"W	4018.63	153.87	2.73
9303.00	89.60	156.19	6503.38	4101.32	-3693.77	1805.53	516464.0	4396298.5	39°42'59.031"N	80°48'28.491"W	4111.44	153.95	2.88
9398.00	89.38	154.59	6504.23	4196.22	-3780.14	1845.09	516476.1	4396272.2	39°42'58.177"N	80°48'27.987"W	4206.40	153.98	1.70
9493.00	89.54	155.89	6505.12	4291.11	-3866.40	1884.88	516488.2	4396245.9	39°42'57.323"N	80°48'27.480"W	4301.37	154.01	1.38
9588.00	89.63	159.74	6505.81	4386.08	-3954.35	1920.74	516499.1	4396219.1	39°42'56.453"N	80°48'27.024"W	4396.15	154.09	4.05
9683.00	90.15	161.25	6505.99	4480.99	-4043.89	1952.46	516508.8	4396191.8	39°42'55.568"N	80°48'26.620"W	4490.56	154.23	1.68
9778.00	90.12	158.54	6505.77	4575.93	-4133.09	1985.11	516518.7	4396164.7	39°42'54.685"N	80°48'26.205"W	4585.10	154.35	2.85
9872.00	89.85	157.38	6505.79	4669.92	-4220.22	2020.38	516529.5	4396138.1	39°42'53.824"N	80°48'25.756"W	4678.91	154.42	1.27
9967.00	89.85	154.43	6506.04	4764.85	-4306.94	2059.16	516541.3	4396111.7	39°42'52.966"N	80°48'25.262"W	4773.87	154.45	3.11
10062.00	89.91	156.22	6506.24	4859.75	-4393.26	2098.82	516553.4	4396085.4	39°42'52.112"N	80°48'24.757"W	4868.86	154.46	1.89
10157.00	89.38	159.38	6506.83	4954.73	-4481.20	2134.71	516564.3	4396058.6	39°42'51.242"N	80°48'24.300"W	4963.68	154.53	3.37
10252.00	89.42	159.09	6507.83	5049.70	-4570.03	2168.39	516574.6	4396031.5	39°42'50.363"N	80°48'23.871"W	5058.37	154.62	0.31
10347.00	90.09	157.36	6508.23	5144.70	-4658.24	2203.63	516585.3	4396004.7	39°42'49.491"N	80°48'23.423"W	5153.18	154.68	1.95
10442.00	90.00	155.82	6508.16	5239.67	-4745.42	2241.37	516596.8	4395978.1	39°42'48.628"N	80°48'22.942"W	5248.12	154.72	1.62
10537.00	89.94	156.40	6508.21	5334.62	-4832.28	2279.85	516608.5	4395951.6	39°42'47.769"N	80°48'22.452"W	5343.09	154.74	0.61
10632.00	90.06	158.37	6508.21	5429.61	-4919.97	2316.37	516619.7	4395924.9	39°42'46.902"N	80°48'21.987"W	5437.99	154.79	2.08
10728.00	89.42	159.02	6508.64	5525.60	-5009.41	2351.25	516630.3	4395897.7	39°42'46.017"N	80°48'21.544"W	5533.77	154.86	0.95
10822.00	89.35	162.63	6509.65	5619.46	-5098.18	2382.12	516639.7	4395870.6	39°42'45.139"N	80°48'21.151"W	5627.25	154.96	3.84
10918.00	89.45	162.29	6510.66	5715.16	-5189.71	2411.05	516648.5	4395842.7	39°42'44.234"N	80°48'20.783"W	5722.43	155.08	0.37
11012.00	90.03	162.78	6511.08	5808.86	-5279.37	2439.26	516657.1	4395815.4	39°42'43.347"N	80°48'20.425"W	5815.65	155.20	0.81
11107.00	90.00	159.34	6511.06	5903.71	-5369.21	2470.09	516666.5	4395788.1	39°42'42.459"N	80°48'20.033"W	5910.15	155.30	3.62
11202.00	90.12	153.63	6510.96	5998.64	-5456.29	2507.98	516678.1	4395761.5	39°42'41.597"N	80°48'19.551"W	6005.09	155.31	6.01
11297.00	90.03	154.79	6510.84	6093.43	-5541.83	2549.31	516690.6	4395735.5	39°42'40.751"N	80°48'19.024"W	6100.07	155.30	1.22
11389.00	89.60	155.47	6511.13	6185.32	-5625.29	2588.00	516702.4	4395710.0	39°42'39.925"N	80°48'18.531"W	6192.07	155.29	0.87

51-01645

WELLPATH DATA † = interpolated/extrapolated station													
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
11484.00	89.51	159.18	6511.87	6280.29	-5712.93	2624.62	516713.6	4395683.3	39°42'39.059"N	80°48'18.065"W	6286.99	155.33	3.91
11579.00	89.54	157.40	6512.66	6375.28	-5801.19	2659.76	516724.3	4395656.4	39°42'38.186"N	80°48'17.618"W	6381.86	155.37	1.87
11674.00	89.14	159.00	6513.75	6470.27	-5889.38	2695.03	516735.0	4395629.6	39°42'37.313"N	80°48'17.169"W	6476.73	155.41	1.74
11769.00	89.14	160.48	6515.18	6565.21	-5978.49	2727.93	516745.1	4395602.4	39°42'36.432"N	80°48'16.751"W	6571.45	155.47	1.56
11864.00	89.08	158.56	6516.65	6660.16	-6067.47	2761.16	516755.2	4395575.3	39°42'35.552"N	80°48'16.328"W	6666.20	155.53	2.02
11958.00	89.29	155.39	6517.99	6754.13	-6153.97	2797.92	516766.4	4395549.0	39°42'34.696"N	80°48'15.860"W	6760.15	155.55	3.38
12053.00	89.08	155.89	6519.34	6849.04	-6240.50	2837.10	516778.3	4395522.6	39°42'33.840"N	80°48'15.361"W	6855.14	155.55	0.57
12148.00	89.20	159.44	6520.77	6944.01	-6328.35	2873.19	516789.3	4395495.8	39°42'32.971"N	80°48'14.902"W	6950.05	155.58	3.74
12243.00	89.60	159.57	6521.76	7038.97	-6417.33	2906.45	516799.5	4395468.7	39°42'32.091"N	80°48'14.479"W	7044.83	155.63	0.44
12282.00	89.66	158.44	6522.02	7077.96	-6453.74	2920.42	516803.7	4395457.6	39°42'31.731"N	80°48'14.301"W	7083.76	155.65	2.90
12308.00	89.66	158.44	6522.17	7103.96	-6477.92	2929.98	516806.6	4395450.2	39°42'31.492"N	80°48'14.179"W	7109.73	155.66	0.00



FILE NUMBER W0120318 (WB1-62)

DRAWING NUMBER HANSEN_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 28, 2015

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

API WELL NO. 47 - 051 - 01645
STATE COUNTY PERMIT

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

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, WV16-0095-006, WV16-0127-001

SURFACE OWNER BAYER MATERIAL SCIENCES, LLC ACREAGE 22.67

OIL & GAS ROYALTY OWNER BAYER MATERIAL SCIENCES, LLC, et al LEASE ACREAGE 510.23

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: 6522' TMD: 12,308'

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

WR-35
Rev. 8/23/13

Page ___ of ___

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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Page ___ of ___

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

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	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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Rev. 8/23/13

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

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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WR-35
Rev. 8/23/13

Page ___ of ___

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

PRODUCING FORMATION(S)	DEPTHS	
Marcellus	6,517' - 6,532' TVD	7,316' - 12,203' MD

Please insert additional pages as applicable.

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

SHUT-IN PRESSURE Surface 1400 psi Bottom Hole 4232 psi DURATION OF TEST 192 hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	3066 mcfpd	445 bpd	___ bpd	684 bpd	☐ Estimated ☒ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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_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.

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Completed by Thomas Rowan Telephone 304-622-4796
Signature [signature] Title Drilling and Completions Engineer Date 7-31-15

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

51-01649

Hansen #5H Perforation Information

Stage	Date	Perforated interval From ft	Perforated interval To ft	Number of Perfs	Formation
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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51-01649

Fluid & Sand Volume Summary - Hansen 5H

Stage	Stimulation Date	Avg Pump Rate (BPM)	Avg Pressure (PSI)	Max Break Pres. (PSI)	ISIP (PSI)	Sand Total (lbs)	Total Water (bbls)
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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51-01649

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 SANDSTO	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
GENESEO	6361	6388	6722	6762
TULLY LIMESTONE	6388	6423	6762	6824
HAMILTON	6423	6447	6824	6875
MARCELLUS	6447	na	6875	na
ONONDOGA	na	na	na	na

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51-01649

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

Hydraulic Fracturing DISCLOSURE

FracFocus Chemical Disclosure Registry

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.

Preview Disclosure PDF | Validate Disclosure | Submit To FracFocus

Hydraulic Fracturing Data

Edit

Job Start Date	Job End Date	API Number	State & County
11/26/2014	12/11/2014	47-051-01649-00-00	West Virginia --- Marshall

Well Name
HANSEN 5H

Longitude	Latitude	Datum	Federal/Tribal Well?
-80.80181	39.71017	NAD27	

True Vertical Depth (ft)	Total Water Vol (gal)	Total Non Water Vol	Total Mass (lbs)
6517	20178312	0	176105226.4558

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%	95.4948478%		168242729.7936
Edit Sand, White, 40/70	Baker Hughes	Proppant						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.94573%		5187600
Edit Sand, White, 30/50	Baker Hughes	Proppant						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	1.14511%		2016600
Edit HCl, 10.1 - 15%	Baker Hughes	Acidizing						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.174438%	SmartCare Product	307195
Edit Sand, White, 100 mesh	Baker Hughes	Proppant						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.108912%		191800
Edit FRW-18	Baker Hughes	Friction Reducer						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0339634%	SmartCare Product	59811.44

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Edit GW-3LDF	Baker Hughes	Gelling Agent						
51-01649			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0335564%	SmartCare Product	59094.75
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%		9100
			Glutaraldehyde	111-30-8	30%	.0024689%		4349.625
			Diatomaceous Earth, Calcined	91053-39-3	100%	.0022136%		3900
			Sodium Chloride	7647-14-5	5%	.0019557%		3445.572
			1-butoxy-2-propanol	5131-66-8	5%	.0016771%		2954.7375
			Isotridecanol, ethoxylated	9043-30-5	5%	.0016771%		2954.7375

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51-01649

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
Polyoxythylene 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 (Cristobaloite)	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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GASTAR EXPLORATION USA, INC.

Location: Marshall County, WV
Field: Marshall
Facility: Hansen Unit

Slot: Slot #5
Well: Hansen Unit 5H
Wellbore: Hansen Unit 5H (PWB)

BAKER HUGHES

51-01649

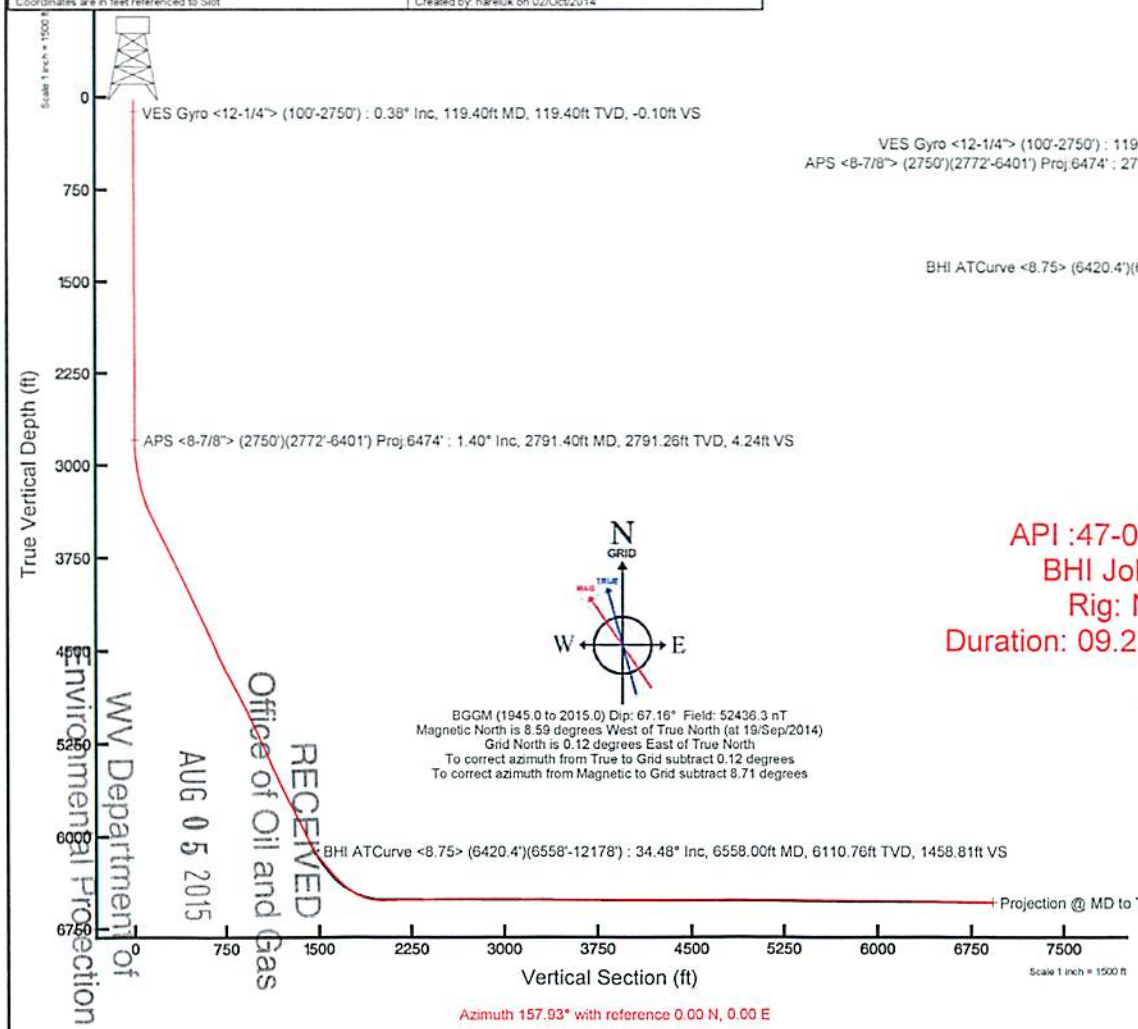
Location Information

Facility Name			Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Hansen Unit			1692627.590	14427215.002	39°43'35.573"N	80°48'51.498"W
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot #5	79.28	10.90	1692638.490	14427294.250	39°43'36.356"N	80°48'51.356"W
Nomac 323 (RT) to Mud line (At Slot: Slot #5)					29.4ft	
Mean Sea Level to Mud line (At Slot: Slot #5)					-1245ft	
Nomac 323 (RT) to Mean Sea Level					1274.4ft	

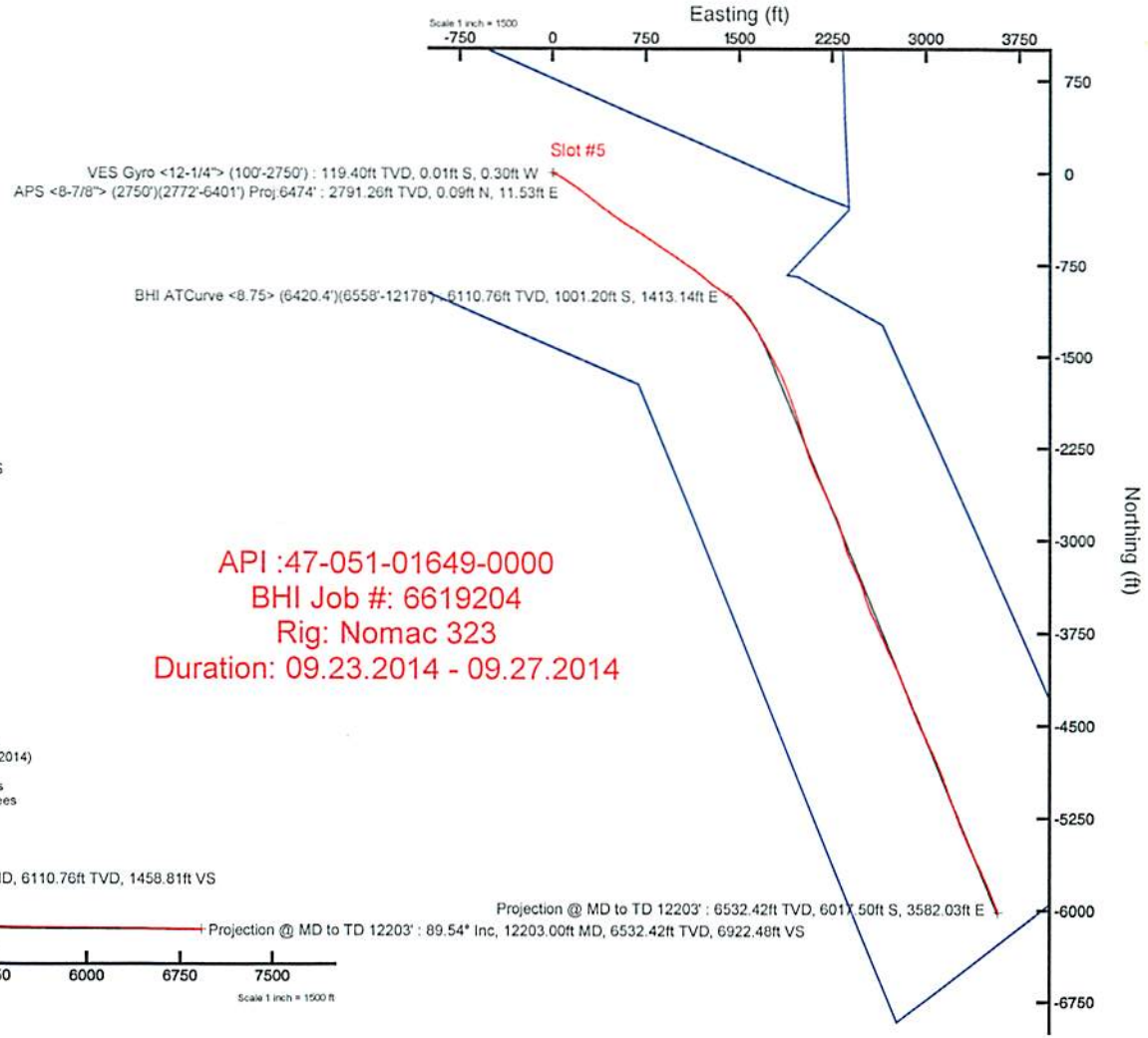
Well Data

Slot	Well	Wellbore	Wellpath
Slot #5	Hansen Unit 5H	Hansen Unit 5H (PWB)	Hansen Unit 5H Rev-B.0
Slot #5	Hansen Unit 5H	Hansen Unit 5H AWB	Hansen Unit 5H AWP Proj: 12203'

Plot reference wellpath is Hansen Unit 5H Rev-B.0	
True vertical depths are referenced to Nomac 323 (RT)	Grid System: NAD83 / UTM Zone 17 North, US feet
Measured depths are referenced to Nomac 323 (RT)	North Reference: Grid north
Nomac 323 (RT) to Mean Sea Level: 1274.4 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot #5): -1245 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: hareluk on 02/Oct/2014



BGGM (1945.0 to 2015.0) Dip: 67.16° Field: 52436.3 nT
Magnetic North is 8.59 degrees West of True North (at 19/Sep/2014)
Grid North is 0.12 degrees East of True North
To correct azimuth from True to Grid subtract 0.12 degrees
To correct azimuth from Magnetic to Grid subtract 8.71 degrees



API :47-051-01649-0000
BHI Job #: 6619204
Rig: Nomac 323
Duration: 09.23.2014 - 09.27.2014

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51-01649

REFERENCE WELLPATH IDENTIFICATION			
Operator	GASTAR EXPLORATION INC.	Slot	Slot #5
Area	Marshall County, WV	Well	Hansen 5H
Field	Marshall	Wellbore	Hansen 5H (AWB)
Facility	Hansen Unit	Wellpath	Hansen 5H (AWP) Proj: 12,203'
		Sidetrack	(none)

WELLPATH DATA † = interpolated/extrapolated station

	MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
†	0.00	0.00	267.12	0.00	0.00	0.00	0.00	515917.3	4397448.1	39°43'36.356"N	80°48'51.356"W	0.00	0.00	0.00
	29.40	0.00	267.12	29.40	0.00	0.00	0.00	515917.3	4397448.1	39°43'36.356"N	80°48'51.356"W	0.00	0.00	0.00
	119.40	0.38	267.12	119.40	-0.10	-0.01	-0.30	515917.3	4397448.1	39°43'36.356"N	80°48'51.360"W	0.30	267.12	0.42
	219.40	0.43	250.60	219.40	-0.22	-0.16	-0.98	515916.9	4397448.0	39°43'36.355"N	80°48'51.369"W	1.00	260.97	0.13
	319.40	0.49	252.48	319.39	-0.28	-0.41	-1.74	515916.7	4397448.0	39°43'36.352"N	80°48'51.379"W	1.79	256.79	0.06
	419.40	0.27	253.59	419.39	-0.33	-0.60	-2.38	515916.5	4397447.9	39°43'36.350"N	80°48'51.387"W	2.45	255.73	0.22
	519.40	0.33	221.90	519.39	-0.23	-0.89	-2.80	515916.4	4397447.8	39°43'36.348"N	80°48'51.392"W	2.93	252.43	0.17
	619.40	0.39	193.33	619.39	0.17	-1.43	-3.07	515916.3	4397447.6	39°43'36.342"N	80°48'51.396"W	3.39	244.99	0.19
	719.40	0.47	193.50	719.39	0.78	-2.16	-3.24	515916.3	4397447.4	39°43'36.335"N	80°48'51.398"W	3.90	236.31	0.08
	819.40	0.43	201.53	819.38	1.39	-2.91	-3.48	515916.2	4397447.2	39°43'36.328"N	80°48'51.401"W	4.53	230.07	0.07
	919.40	0.46	202.23	919.38	1.95	-3.63	-3.77	515916.1	4397447.0	39°43'36.320"N	80°48'51.405"W	5.23	226.05	0.03
	1019.40	0.22	201.91	1019.38	2.37	-4.18	-3.99	515916.0	4397446.8	39°43'36.315"N	80°48'51.407"W	5.78	223.66	0.24
	1119.40	0.06	202.87	1119.38	2.55	-4.41	-4.08	515916.0	4397446.7	39°43'36.313"N	80°48'51.409"W	6.01	222.80	0.16
	1219.40	0.13	213.25	1219.38	2.65	-4.55	-4.16	515916.0	4397446.7	39°43'36.311"N	80°48'51.410"W	6.17	222.46	0.07
	1319.40	0.17	112.46	1319.38	2.82	-4.70	-4.09	515916.0	4397446.7	39°43'36.310"N	80°48'51.409"W	6.23	221.01	0.23
	1419.40	0.33	108.34	1419.38	3.11	-4.85	-3.68	515916.1	4397446.6	39°43'36.308"N	80°48'51.404"W	6.09	217.19	0.16
	1519.40	0.26	110.25	1519.37	3.45	-5.02	-3.19	515916.3	4397446.6	39°43'36.307"N	80°48'51.397"W	5.95	212.46	0.07
	1619.40	0.30	90.08	1619.37	3.70	-5.10	-2.72	515916.4	4397446.5	39°43'36.306"N	80°48'51.391"W	5.77	208.06	0.11
	1719.40	0.51	90.05	1719.37	3.97	-5.10	-2.01	515916.6	4397446.5	39°43'36.306"N	80°48'51.382"W	5.48	201.52	0.21
	1819.40	0.91	92.21	1819.36	4.46	-5.13	-0.77	515917.0	4397446.5	39°43'36.306"N	80°48'51.366"W	5.19	188.56	0.40
	1919.40	1.05	98.32	1919.35	5.25	-5.29	0.93	515917.5	4397446.5	39°43'36.304"N	80°48'51.345"W	5.37	170.05	0.17
	2019.40	0.87	89.80	2019.33	6.00	-5.42	2.59	515918.0	4397446.4	39°43'36.303"N	80°48'51.323"W	6.01	154.42	0.23
	2119.40	0.77	72.80	2119.32	6.34	-5.22	4.00	515918.5	4397446.5	39°43'36.305"N	80°48'51.305"W	6.57	142.57	0.26
	2219.40	0.76	70.53	2219.32	6.43	-4.80	5.26	515918.8	4397446.6	39°43'36.309"N	80°48'51.289"W	7.12	132.37	0.03
	2319.40	0.86	61.59	2319.31	6.37	-4.22	6.55	515919.2	4397446.8	39°43'36.314"N	80°48'51.273"W	7.79	122.81	0.16

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51-01649

WELLPATH DATA † = interpolated/extrapolated station													
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
2419.40	0.92	50.65	2419.29	6.05	-3.36	7.83	515919.6	4397447.1	39°43'36.323"N	80°48'51.256"W	8.52	113.20	0.18
2519.40	0.78	44.57	2519.28	5.54	-2.36	8.93	515920.0	4397447.4	39°43'36.333"N	80°48'51.242"W	9.23	104.82	0.17
2619.40	0.74	45.47	2619.27	5.03	-1.42	9.87	515920.2	4397447.6	39°43'36.342"N	80°48'51.230"W	9.97	98.21	0.04
2719.40	0.74	42.41	2719.27	4.50	-0.49	10.76	515920.5	4397447.9	39°43'36.351"N	80°48'51.219"W	10.77	92.63	0.04
2769.40	0.70	39.29	2769.26	4.22	-0.02	11.17	515920.6	4397448.1	39°43'36.356"N	80°48'51.213"W	11.17	90.10	0.11
2791.40	1.40	88.19	2791.26	4.24	0.09	11.53	515920.8	4397448.1	39°43'36.357"N	80°48'51.209"W	11.53	89.54	4.90
2823.40	2.47	114.99	2823.24	4.88	-0.19	12.54	515921.1	4397448.0	39°43'36.354"N	80°48'51.196"W	12.54	90.85	4.29
2855.40	3.80	123.04	2855.19	6.26	-1.06	14.06	515921.5	4397447.8	39°43'36.346"N	80°48'51.176"W	14.10	94.29	4.37
2887.40	5.08	123.58	2887.09	8.30	-2.42	16.13	515922.2	4397447.3	39°43'36.332"N	80°48'51.150"W	16.31	98.53	4.00
2918.40	6.70	126.53	2917.93	10.98	-4.25	18.72	515922.9	4397446.8	39°43'36.314"N	80°48'51.117"W	19.20	102.80	5.31
2950.40	8.21	127.13	2949.66	14.53	-6.74	22.04	515924.0	4397446.0	39°43'36.289"N	80°48'51.074"W	23.05	107.01	4.72
2981.40	9.48	127.93	2980.29	18.64	-9.65	25.82	515925.1	4397445.1	39°43'36.260"N	80°48'51.026"W	27.57	110.49	4.12
3013.40	10.77	123.64	3011.79	23.40	-12.93	30.39	515926.5	4397444.1	39°43'36.228"N	80°48'50.968"W	33.02	113.04	4.67
3043.40	11.90	120.62	3041.21	28.17	-16.05	35.39	515928.0	4397443.2	39°43'36.197"N	80°48'50.904"W	38.86	114.40	4.25
3075.40	12.48	118.66	3072.48	33.47	-19.39	41.26	515929.8	4397442.2	39°43'36.164"N	80°48'50.829"W	45.59	115.17	2.23
3107.40	13.77	117.50	3103.65	39.05	-22.81	47.67	515931.8	4397441.1	39°43'36.130"N	80°48'50.747"W	52.85	115.57	4.11
3139.40	15.19	118.12	3134.63	45.17	-26.54	54.75	515933.9	4397440.0	39°43'36.093"N	80°48'50.656"W	60.84	115.87	4.46
3170.40	16.45	119.42	3164.46	51.72	-30.61	62.15	515936.2	4397438.8	39°43'36.052"N	80°48'50.562"W	69.28	116.22	4.22
3202.40	17.76	119.01	3195.04	59.07	-35.21	70.37	515938.7	4397437.4	39°43'36.007"N	80°48'50.457"W	78.68	116.58	4.11
3233.40	19.48	119.83	3224.42	66.81	-40.07	78.99	515941.3	4397435.9	39°43'35.959"N	80°48'50.346"W	88.57	116.90	5.61
3265.40	21.00	121.91	3254.44	75.65	-45.76	88.48	515944.2	4397434.1	39°43'35.902"N	80°48'50.225"W	99.61	117.34	5.25
3296.40	22.34	124.12	3283.25	85.04	-52.00	98.08	515947.1	4397432.2	39°43'35.840"N	80°48'50.102"W	111.01	117.93	5.06
3328.40	24.39	125.40	3312.62	95.66	-59.24	108.50	515950.3	4397430.0	39°43'35.769"N	80°48'49.969"W	123.62	118.63	6.60
3359.40	26.29	125.30	3340.64	106.84	-66.91	119.32	515953.6	4397427.7	39°43'35.693"N	80°48'49.831"W	136.80	119.28	6.13
3391.40	27.76	125.69	3369.14	119.12	-75.36	131.16	515957.2	4397425.1	39°43'35.609"N	80°48'49.680"W	151.26	119.88	4.63
3422.40	29.74	124.56	3396.32	131.64	-83.93	143.35	515960.9	4397422.5	39°43'35.524"N	80°48'49.524"W	166.12	120.35	6.62
3454.40	31.36	124.76	3423.88	145.24	-93.18	156.73	515965.0	4397419.7	39°43'35.432"N	80°48'49.353"W	182.34	120.73	5.07
3486.40	32.11	123.87	3451.09	159.26	-102.67	170.63	515969.2	4397416.8	39°43'35.338"N	80°48'49.175"W	199.14	121.04	2.76
3517.40	31.70	124.08	3477.41	172.85	-111.82	184.22	515973.4	4397414.0	39°43'35.247"N	80°48'49.002"W	215.50	121.26	1.37
3549.40	31.47	124.26	3504.67	186.78	-121.24	198.09	515977.6	4397411.1	39°43'35.154"N	80°48'48.824"W	232.25	121.47	0.78
3611.40	30.36	126.75	3557.86	213.66	-139.72	224.02	515985.5	4397405.5	39°43'34.971"N	80°48'48.493"W	264.02	121.95	2.73

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3674.40	29.76	129.09	3612.39	240.98	-159.11	248.91	515993.1	4397399.6	39°43'34.779"N	80°48'48.175"W	295.42	122.59	2.09
3737.40	29.81	128.23	3667.07	268.28	-178.66	273.35	516000.5	4397393.6	39°43'34.585"N	80°48'47.863"W	326.56	123.17	0.68
3800.40	30.28	128.32	3721.60	295.69	-198.20	298.11	516008.1	4397387.7	39°43'34.391"N	80°48'47.546"W	357.99	123.62	0.75
3863.40	29.99	128.48	3776.09	323.21	-217.84	322.90	516015.6	4397381.7	39°43'34.197"N	80°48'47.229"W	389.51	124.01	0.48
3927.40	29.12	129.10	3831.76	350.78	-237.62	347.51	516023.1	4397375.7	39°43'34.001"N	80°48'46.915"W	420.98	124.36	1.44
3990.40	29.92	128.27	3886.58	377.86	-257.02	371.74	516030.5	4397369.8	39°43'33.809"N	80°48'46.605"W	451.94	124.66	1.43
4053.40	29.90	126.75	3941.19	404.95	-276.14	396.66	516038.1	4397363.9	39°43'33.619"N	80°48'46.287"W	483.31	124.85	1.20
4116.40	29.26	125.92	3995.98	431.44	-294.57	421.71	516045.7	4397358.3	39°43'33.436"N	80°48'45.967"W	514.40	124.94	1.21
4179.40	29.09	126.82	4050.99	457.61	-312.78	446.44	516053.3	4397352.8	39°43'33.256"N	80°48'45.651"W	545.10	125.02	0.75
4242.40	29.86	127.33	4105.83	484.22	-331.47	471.17	516060.8	4397347.1	39°43'33.071"N	80°48'45.335"W	576.08	125.13	1.29
4306.40	30.10	125.92	4161.27	511.54	-350.55	496.83	516068.6	4397341.3	39°43'32.882"N	80°48'45.007"W	608.05	125.21	1.16
4368.40	29.41	125.13	4215.10	537.52	-368.43	521.87	516076.2	4397335.8	39°43'32.704"N	80°48'44.687"W	638.82	125.22	1.28
4431.40	30.03	124.93	4269.81	563.74	-386.36	547.45	516084.0	4397330.4	39°43'32.527"N	80°48'44.360"W	670.05	125.21	1.00
4494.40	30.57	124.75	4324.20	590.37	-404.51	573.54	516092.0	4397324.8	39°43'32.347"N	80°48'44.027"W	701.84	125.20	0.87
4558.40	29.82	123.13	4379.52	617.06	-422.49	600.24	516100.1	4397319.4	39°43'32.169"N	80°48'43.685"W	734.02	125.14	1.73
4620.40	28.94	121.79	4433.55	641.84	-438.82	625.90	516107.9	4397314.4	39°43'32.007"N	80°48'43.357"W	764.40	125.03	1.77
4684.40	28.36	120.25	4489.71	666.37	-454.63	652.19	516116.0	4397309.6	39°43'31.850"N	80°48'43.021"W	795.01	124.88	1.47
4747.40	29.21	122.85	4544.93	690.80	-470.51	678.03	516123.8	4397304.7	39°43'31.692"N	80°48'42.691"W	825.29	124.76	2.40
4811.40	29.58	124.28	4600.69	716.73	-487.88	704.20	516131.8	4397299.4	39°43'31.520"N	80°48'42.357"W	856.69	124.72	1.24
4874.40	32.96	126.35	4654.53	744.28	-506.80	730.86	516139.9	4397293.7	39°43'31.333"N	80°48'42.016"W	889.39	124.74	5.63
4937.40	33.26	124.07	4707.30	773.22	-526.64	758.98	516148.5	4397287.6	39°43'31.136"N	80°48'41.657"W	923.79	124.76	2.03
5000.40	32.71	124.61	4760.15	801.80	-545.98	787.30	516157.1	4397281.7	39°43'30.944"N	80°48'41.295"W	958.09	124.74	0.99
5062.40	32.66	123.78	4812.33	829.64	-564.80	814.99	516165.6	4397276.0	39°43'30.758"N	80°48'40.941"W	991.57	124.72	0.73
5124.40	32.35	124.89	4864.62	857.39	-583.59	842.50	516173.9	4397270.3	39°43'30.571"N	80°48'40.589"W	1024.88	124.71	1.08
5188.40	30.81	125.91	4919.14	885.64	-603.00	869.82	516182.3	4397264.4	39°43'30.379"N	80°48'40.240"W	1058.40	124.73	2.55
5251.40	30.24	123.86	4973.41	912.46	-621.30	896.07	516190.3	4397258.8	39°43'30.198"N	80°48'39.905"W	1090.39	124.74	1.88
5315.40	29.70	123.60	5028.85	938.91	-639.05	922.65	516198.4	4397253.4	39°43'30.022"N	80°48'39.565"W	1122.36	124.71	0.87
5378.40	29.32	126.00	5083.68	964.89	-656.76	948.13	516206.1	4397248.0	39°43'29.846"N	80°48'39.239"W	1153.38	124.71	1.97
5441.40	29.45	124.42	5138.58	990.89	-674.58	973.39	516213.8	4397242.6	39°43'29.669"N	80°48'38.916"W	1184.29	124.72	1.25
5504.40	29.06	123.44	5193.54	1016.42	-691.77	998.93	516221.6	4397237.3	39°43'29.499"N	80°48'38.590"W	1215.07	124.70	0.98
5567.40	27.78	127.19	5248.95	1041.65	-709.07	1023.40	516229.1	4397232.0	39°43'29.328"N	80°48'38.277"W	1245.04	124.72	3.49

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5630.40	27.56	127.39	5304.75	1066.82	-726.80	1046.67	516236.1	4397226.6	39°43'29.152"N	80°48'37.980"W	1274.27	124.78	0.38
5693.40	27.84	125.43	5360.53	1091.78	-744.18	1070.24	516243.3	4397221.3	39°43'28.980"N	80°48'37.679"W	1303.54	124.81	1.51
5757.40	28.02	124.10	5417.07	1116.87	-761.27	1094.87	516250.8	4397216.1	39°43'28.810"N	80°48'37.364"W	1333.51	124.81	1.01
5820.40	28.84	123.19	5472.48	1141.65	-777.88	1119.84	516258.4	4397211.1	39°43'28.645"N	80°48'37.045"W	1363.50	124.79	1.47
5883.40	28.08	126.94	5527.87	1166.85	-795.11	1144.41	516265.9	4397205.8	39°43'28.475"N	80°48'36.731"W	1393.51	124.79	3.08
5946.40	28.72	129.62	5583.29	1192.89	-813.68	1167.92	516273.1	4397200.2	39°43'28.291"N	80°48'36.431"W	1423.41	124.87	2.26
6010.40	28.71	130.73	5639.42	1220.10	-833.51	1191.41	516280.2	4397194.1	39°43'28.094"N	80°48'36.130"W	1454.03	124.98	0.83
6073.40	29.07	131.94	5694.58	1247.31	-853.62	1214.26	516287.2	4397188.0	39°43'27.895"N	80°48'35.838"W	1484.28	125.11	1.09
6136.40	29.32	131.14	5749.57	1274.84	-873.99	1237.26	516294.2	4397181.8	39°43'27.693"N	80°48'35.545"W	1514.82	125.24	0.74
6199.40	30.46	129.74	5804.19	1302.69	-894.35	1261.16	516301.5	4397175.6	39°43'27.491"N	80°48'35.239"W	1546.09	125.34	2.12
6262.40	31.27	127.09	5858.27	1330.80	-914.42	1286.48	516309.2	4397169.5	39°43'27.293"N	80°48'34.916"W	1578.36	125.41	2.51
6325.40	31.00	123.77	5912.20	1358.27	-933.30	1313.02	516317.3	4397163.7	39°43'27.105"N	80°48'34.577"W	1610.92	125.41	2.76
6388.40	30.33	122.16	5966.39	1384.60	-950.79	1339.97	516325.5	4397158.4	39°43'26.932"N	80°48'34.232"W	1643.02	125.36	1.68
6420.40	29.57	122.59	5994.12	1397.59	-959.34	1353.46	516329.6	4397155.8	39°43'26.847"N	80°48'34.060"W	1658.97	125.33	2.47
6558.00	34.48	127.19	6110.76	1458.81	-1001.20	1413.14	516347.8	4397143.0	39°43'26.432"N	80°48'33.297"W	1731.87	125.32	3.98
6653.00	42.60	136.43	6185.07	1511.97	-1040.85	1456.83	516361.1	4397131.0	39°43'26.040"N	80°48'32.739"W	1790.46	125.54	10.46
6748.00	41.19	140.51	6255.79	1571.75	-1088.30	1498.90	516373.9	4397116.5	39°43'25.570"N	80°48'32.202"W	1852.32	125.98	3.23
6843.00	44.23	143.75	6325.60	1633.74	-1139.18	1538.40	516386.0	4397101.0	39°43'25.066"N	80°48'31.698"W	1914.26	126.52	3.95
6938.00	49.24	143.93	6390.69	1700.82	-1195.02	1579.20	516398.4	4397084.0	39°43'24.513"N	80°48'31.177"W	1980.39	127.12	5.28
7032.00	58.21	146.49	6446.25	1774.68	-1257.24	1622.31	516411.5	4397065.0	39°43'23.898"N	80°48'30.627"W	2052.44	127.78	9.79
7128.00	68.61	149.89	6489.18	1859.17	-1330.13	1667.39	516425.3	4397042.8	39°43'23.176"N	80°48'30.052"W	2132.94	128.58	11.28
7222.00	82.44	150.78	6512.61	1949.17	-1409.04	1712.30	516438.9	4397018.8	39°43'22.395"N	80°48'29.480"W	2217.51	129.45	14.74
7316.00	92.09	152.56	6517.10	2042.39	-1491.59	1756.80	516452.5	4396993.6	39°43'21.579"N	80°48'28.912"W	2304.60	130.33	10.44
7411.00	91.05	152.60	6514.49	2136.94	-1575.88	1800.53	516465.8	4396967.9	39°43'20.745"N	80°48'28.355"W	2392.76	131.19	1.10
7506.00	89.85	155.29	6513.75	2231.70	-1661.22	1842.25	516478.5	4396941.9	39°43'19.900"N	80°48'27.823"W	2480.63	132.04	3.10
7601.00	91.35	159.56	6512.75	2326.66	-1748.91	1878.71	516489.6	4396915.2	39°43'19.033"N	80°48'27.359"W	2566.76	132.95	4.76
7696.00	92.16	159.37	6509.84	2421.58	-1837.83	1912.02	516499.8	4396888.1	39°43'18.154"N	80°48'26.935"W	2652.06	133.87	0.88
7791.00	91.14	161.42	6507.11	2516.45	-1927.28	1943.88	516509.5	4396860.9	39°43'17.269"N	80°48'26.530"W	2737.35	134.75	2.41
7886.00	89.97	161.89	6506.19	2611.24	-2017.45	1973.78	516518.6	4396833.4	39°43'16.377"N	80°48'26.150"W	2822.39	135.63	1.33
7981.00	89.85	163.91	6506.33	2705.88	-2108.24	2001.71	516527.1	4396805.7	39°43'15.479"N	80°48'25.795"W	2907.15	136.49	2.13
8076.00	89.38	163.52	6506.97	2800.39	-2199.43	2028.35	516535.2	4396778.0	39°43'14.578"N	80°48'25.457"W	2991.94	137.32	0.64

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8172.00	89.66	163.27	6507.78	2895.95	-2291.42	2055.78	516543.6	4396749.9	39°43'13.668"N	80°48'25.108"W	3078.45	138.10	0.39
8265.00	89.60	158.32	6508.38	2988.81	-2379.22	2086.36	516552.9	4396723.2	39°43'12.799"N	80°48'24.719"W	3164.42	138.75	5.32
8359.00	89.51	156.04	6509.11	3082.79	-2465.85	2122.82	516564.0	4396696.8	39°43'11.943"N	80°48'24.255"W	3253.73	139.28	2.43
8452.00	89.51	152.72	6509.90	3175.60	-2549.69	2163.02	516576.3	4396671.2	39°43'11.113"N	80°48'23.743"W	3343.59	139.69	3.57
8547.00	89.48	156.71	6510.74	3270.42	-2635.57	2203.59	516588.6	4396645.1	39°43'10.263"N	80°48'23.226"W	3435.41	140.10	4.20
8642.00	89.38	155.22	6511.69	3365.36	-2722.33	2242.28	516600.4	4396618.6	39°43'09.405"N	80°48'22.733"W	3526.88	140.52	1.57
8737.00	89.66	156.82	6512.48	3460.30	-2809.12	2280.89	516612.2	4396592.2	39°43'08.547"N	80°48'22.242"W	3618.51	140.93	1.71
8833.00	89.82	162.82	6512.92	3556.20	-2899.18	2313.99	516622.3	4396564.8	39°43'07.656"N	80°48'21.820"W	3709.42	141.41	6.25
8927.00	89.94	164.84	6513.12	3649.70	-2989.46	2340.17	516630.2	4396537.3	39°43'06.763"N	80°48'21.488"W	3796.48	141.95	2.15
9021.00	89.60	162.13	6513.49	3743.25	-3079.57	2366.88	516638.4	4396509.8	39°43'05.872"N	80°48'21.149"W	3884.06	142.46	2.91
9116.00	89.69	155.52	6514.08	3838.18	-3168.11	2401.18	516648.8	4396482.8	39°43'04.996"N	80°48'20.712"W	3975.25	142.84	6.96
9210.00	89.48	153.73	6514.76	3932.02	-3253.03	2441.46	516661.1	4396457.0	39°43'04.156"N	80°48'20.199"W	4067.30	143.11	1.92
9303.00	89.57	159.11	6515.53	4024.95	-3338.23	2478.65	516672.4	4396431.0	39°43'03.313"N	80°48'19.725"W	4157.82	143.41	5.79
9398.00	90.12	164.48	6515.79	4119.70	-3428.45	2508.32	516681.5	4396403.5	39°43'02.421"N	80°48'19.348"W	4248.04	143.81	5.68
9493.00	89.94	161.75	6515.74	4214.30	-3519.34	2535.91	516689.9	4396375.8	39°43'01.522"N	80°48'18.998"W	4337.81	144.23	2.88
9588.00	89.94	153.63	6515.84	4309.22	-3607.16	2571.94	516700.9	4396349.1	39°43'00.654"N	80°48'18.539"W	4430.17	144.51	8.55
9683.00	89.94	157.04	6515.94	4404.11	-3693.48	2611.58	516712.9	4396322.8	39°42'59.800"N	80°48'18.034"W	4523.51	144.74	3.59
9778.00	90.06	154.91	6515.94	4499.05	-3780.24	2650.25	516724.7	4396296.3	39°42'58.941"N	80°48'17.542"W	4616.72	144.97	2.25
9873.00	89.97	156.49	6515.92	4593.97	-3866.82	2689.35	516736.6	4396269.9	39°42'58.085"N	80°48'17.044"W	4710.08	145.18	1.67
9967.00	90.06	153.18	6515.89	4687.82	-3951.89	2729.31	516748.8	4396244.0	39°42'57.243"N	80°48'16.535"W	4802.77	145.37	3.52
10062.00	90.06	156.32	6515.79	4782.67	-4037.80	2769.83	516761.2	4396217.8	39°42'56.393"N	80°48'16.019"W	4896.51	145.55	3.31
10157.00	90.06	157.59	6515.69	4877.65	-4125.22	2807.02	516772.5	4396191.2	39°42'55.529"N	80°48'15.545"W	4989.67	145.77	1.34
10252.00	89.94	159.85	6515.69	4972.64	-4213.73	2841.49	516783.0	4396164.2	39°42'54.653"N	80°48'15.107"W	5082.29	146.01	2.38
10347.00	89.91	159.28	6515.82	5067.60	-4302.76	2874.66	516793.1	4396137.1	39°42'53.773"N	80°48'14.685"W	5174.69	146.25	0.60
10442.00	89.82	157.91	6516.04	5162.59	-4391.20	2909.33	516803.7	4396110.2	39°42'52.898"N	80°48'14.243"W	5267.53	146.47	1.45
10537.00	89.85	155.39	6516.31	5257.56	-4478.41	2946.98	516815.1	4396083.6	39°42'52.035"N	80°48'13.764"W	5361.05	146.65	2.65
10632.00	89.88	155.27	6516.54	5352.46	-4564.74	2986.63	516827.2	4396057.3	39°42'51.181"N	80°48'13.259"W	5454.98	146.80	0.13
10728.00	89.88	155.75	6516.74	5448.37	-4652.10	3026.43	516839.3	4396030.7	39°42'50.317"N	80°48'12.752"W	5549.90	146.95	0.50
10823.00	89.72	156.03	6517.07	5543.31	-4738.82	3065.24	516851.2	4396004.3	39°42'49.459"N	80°48'12.258"W	5643.76	147.10	0.34
10918.00	89.66	156.31	6517.59	5638.26	-4825.72	3103.62	516862.9	4395977.8	39°42'48.599"N	80°48'11.769"W	5737.59	147.25	0.30
11013.00	89.29	160.07	6518.46	5733.24	-4913.90	3138.91	516873.6	4395950.9	39°42'47.727"N	80°48'11.320"W	5830.87	147.43	3.98

Oil & Gas Conservation Commission
Well Record Review
Date 10/22/2013

51-01649

WELLPATH DATA † = interpolated/extrapolated station													
MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
11107.00	89.26	162.12	6519.65	5827.09	-5002.81	3169.36	516882.9	4395923.8	39°42'46.848"N	80°48'10.933"W	5922.24	147.65	2.18
11202.00	89.26	159.06	6520.87	5921.96	-5092.40	3200.92	516892.5	4395896.5	39°42'45.962"N	80°48'10.532"W	6014.85	147.85	3.22
11297.00	89.35	159.66	6522.03	6016.93	-5181.29	3234.41	516902.7	4395869.5	39°42'45.082"N	80°48'10.106"W	6107.96	148.03	0.64
11390.00	89.45	159.73	6523.00	6109.88	-5268.51	3266.68	516912.5	4395842.9	39°42'44.220"N	80°48'09.695"W	6199.06	148.20	0.13
11484.00	89.48	156.83	6523.88	6203.86	-5355.82	3301.46	516923.1	4395816.3	39°42'43.356"N	80°48'09.253"W	6291.62	148.35	3.09
11579.00	89.26	157.39	6524.92	6298.85	-5443.33	3338.41	516934.4	4395789.6	39°42'42.491"N	80°48'08.782"W	6385.52	148.48	0.63
11674.00	89.35	156.19	6526.07	6393.82	-5530.64	3375.84	516945.8	4395763.0	39°42'41.627"N	80°48'08.306"W	6479.53	148.60	1.27
11769.00	89.42	154.38	6527.09	6488.71	-5616.93	3415.56	516957.9	4395736.7	39°42'40.773"N	80°48'07.800"W	6573.88	148.70	1.91
11864.00	89.23	155.92	6528.21	6583.59	-5703.12	3455.48	516970.1	4395710.5	39°42'39.921"N	80°48'07.292"W	6668.28	148.79	1.63
11959.00	89.20	157.09	6529.51	6678.55	-5790.24	3493.35	516981.6	4395683.9	39°42'39.059"N	80°48'06.810"W	6762.42	148.90	1.23
12053.00	89.26	158.42	6530.78	6772.54	-5877.23	3528.93	516992.4	4395657.4	39°42'38.198"N	80°48'06.357"W	6855.30	149.02	1.42
12148.00	89.35	159.81	6531.93	6867.51	-5965.98	3562.79	517002.8	4395630.4	39°42'37.320"N	80°48'05.926"W	6948.84	149.16	1.47
12178.00	89.54	159.42	6532.22	6897.49	-5994.10	3573.24	517005.9	4395621.8	39°42'37.042"N	80°48'05.793"W	6978.34	149.20	1.45
12203.00	89.54	159.42	6532.42	6922.48	-6017.50	3582.03	517008.6	4395614.7	39°42'36.811"N	80°48'05.681"W	7002.95	149.24	0.00

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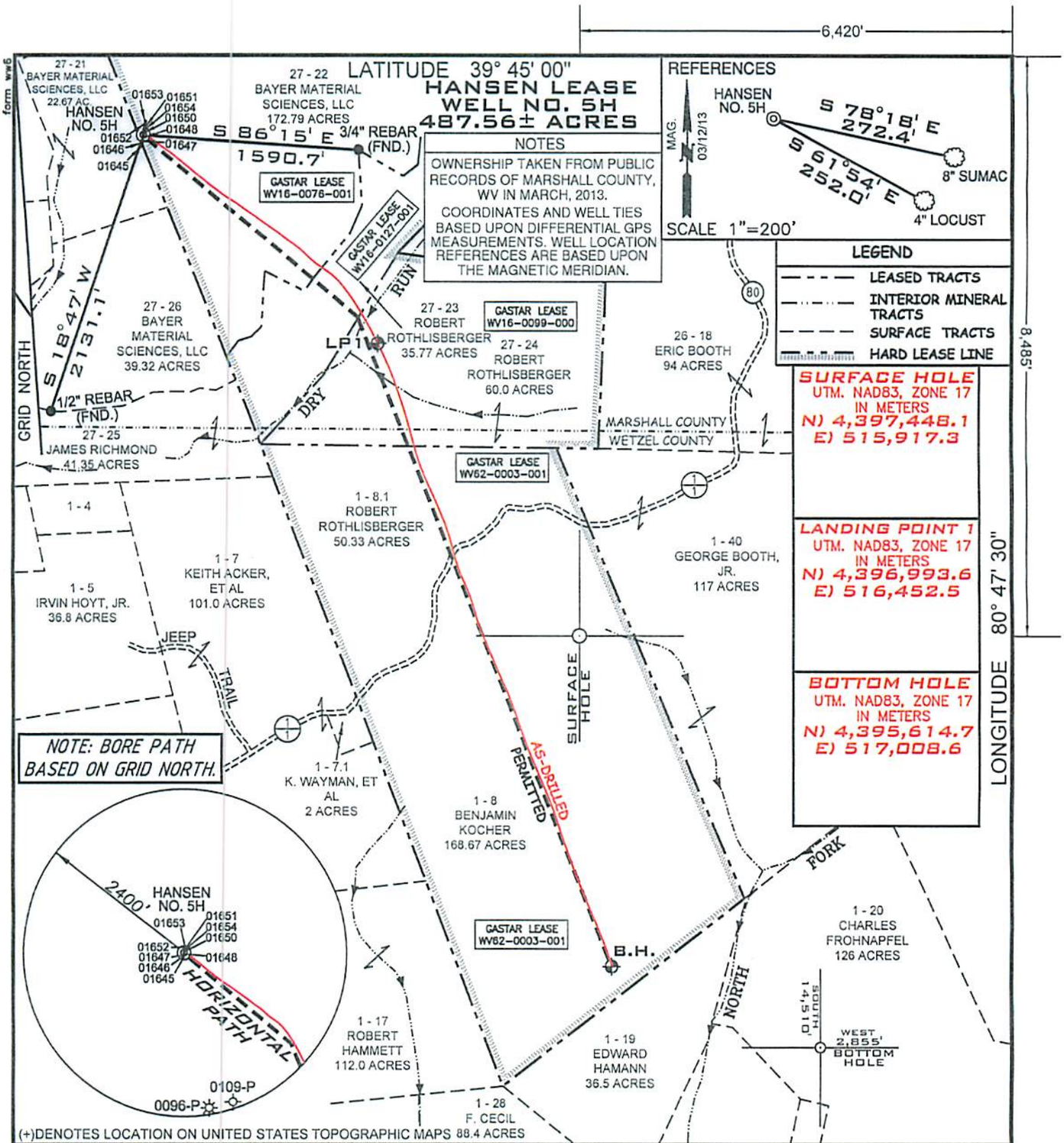

(+)DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

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. 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 28, 2015

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

API WELL NO. 47 — 051 — 01649
STATE COUNTY PERMIT

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

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

COUNTY NAME PERMIT

WR-35
Rev. 8/23/13

Page ___ of ___

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

API 47 - 51 - 01652 County Marshall District Franklin
Quad New Martinsville 7.5' Pad Name Hansen Field/Pool Name
Farm name Bayer Material Sciences, LLC Well Number 9H
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 4397472.2	Easting 515920.6
Landing Point of Curve	Northing 4396926.8	Easting 516739.5
Bottom Hole	Northing 4395770.3	Easting 517201.9

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 29, 2013 Date drilling commenced 5/3/2014 Date drilling ceased 9/17/2014
Date completion activities began 11/2/2014 Date completion activities ceased 4/16/2015
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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WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 51 - 01652 Farm name Bayer Material Sciences, LLC Well number 9H

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	26"	20"	110'	New	PE / 54.5 #/ft		Yes
Coal	17.5"	13.375"	1203'	New	H-40 / 48 #/ft	83'	Yes
Intermediate 1	12.25"	9.625"	2619'	New	J-55 / 36 #/ft	80'	Yes
Intermediate 2							
Intermediate 3							
Production	8.875"	5.5"	11,971'	New	P-110 / 20 #/ft		Yes
Tubing		2.375"	7395'	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	932	15.6	1.2	1118	Surface	8
Intermediate 1	Class A	859	15.2	1.27	1091	Surface	8
Intermediate 2							
Intermediate 3							
Production	50:50 Class A	2466	14.5	1.21	2984	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) 7224'

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 - 199 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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WR-35
Rev. 8/23/13

API 47- 51 - 01652 Farm name Bayer Material Sciences, LLC Well number 9H

PERFORATION RECORD

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

WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 51 - 01652 Farm name Bayer Material Sciences, LLC Well number 9H

PRODUCING FORMATION(S)	DEPTHS	
Marcellus	6,503' - 6,535' TVD	7,888' - 11,983' MD

Please insert additional pages as applicable.

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

SHUT-IN PRESSURE Surface 1300 psi Bottom Hole 4134 psi DURATION OF TEST 192 hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	3055.5 mcfpd	444 bpd	___ bpd	709 bpd	☐ Estimated ☒ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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_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.

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Completed by Thomas Rowan Telephone 304-622-4796
Signature [signature] Title Drilling and Completions Engineer Date 7/31/15

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

51-01652

Hansen #9H Perforation Information

Stage	Date	Perforated interval From ft	Perforated interval To ft	Number of Perfs	Formation
1	11/3/2014	11875	11777	60	Marcellus
2	11/27/2014	11735	11562	60	Marcellus
3	11/27/2014	11497	11301.5	60	Marcellus
4	11/28/2014	11265	11032	60	Marcellus
5	11/29/2014	10974	10761	60	Marcellus
6	11/29/2014	10700	10554	48	Marcellus
7	12/4/2014	10493	10249	60	Marcellus
8	12/5/2014	10207	10016	60	Marcellus
9	12/5/2014	9969	9805	60	Marcellus
10	12/5/2014	9746	9580	60	Marcellus
11	12/6/2014	9532	9390	48	Marcellus
12	12/6/2014	9342	9157	48	Marcellus
13	12/7/2014	9099	8978	48	Marcellus
14	12/8/2014	8921	8732	60	Marcellus
15	12/8/2014	8577	8413	48	Marcellus
16	12/9/2014	8351	8128	60	Marcellus
17	12/9/2014	8073	7911	48	Marcellus

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Fluid & Sand Volume Summary - Hansen 9H

Stage	Stimulation Date	Avg Pump Rate (BPM)	Avg Pressure (PSI)	Max Break Pres. (PSI)	ISIP (PSI)	Sand Total (lbs)	Total Water (bbls)
1	11/27/2014	80	6891	6181	4452	185069	4750
2	11/27/2014	79	6734	5358	4692	356005	8277
3	11/28/2014	80	6721	6020	4372	187159	6415
4	11/29/2014	79	6634	5654	4512	357158	8381
5	11/29/2014	79	6487	5490	4830	359191	8190
6	12/4/2014	79	6531	5531	4735	356502	7943
7	12/5/2014	80	6549	6097	4828	360489	8322
8	12/5/2014	79	6637	7054	4836	357948	8057
9	12/6/2014	80	6657	6140	4508	357119	8630
10	12/6/2014	80	6603	6123	4563	358180	7957
11	12/7/2014	80	6768	7216	4359	358681	8186
12	12/7/2014	0	0	6805	0	0	1991
13	12/7/2014	80	6299	N/A	4291	357777	7753
14	12/8/2014	80	6227	6305	4581	357800	7873
15	12/9/2014	80	6170	6111	4414	359280	7957
16	12/9/2014	79	5908	5869	4490	353721	7767
17	12/9/2014	80	6417	6277	4216	359576	7527

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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 SANDSTO	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
GENESEO	6361	6388	6722	6762
TULLY LIMESTONE	6388	6423	6762	6824
HAMILTON	6423	6447	6824	6875
MARCELLUS	6447	na	6875	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
11/27/2014	12/9/2014	47-051-01652-00-00	West Virginia --- Marshall

Well Name
HANSEN 9H

Longitude	Latitude	Datum	Federal/Tribal Well?
-80.7995	39.71157	NAD27	☐

True Vertical Depth (ft)	Total Water Vol (gal)	Total Non Water Vol	Total Mass (lbs)
6518	5203380	0	49044791.1098

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%	88.3602395%		43384741.764
Edit	Sand, White, 40/70	Baker Hughes	Proppant						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	7.77289%		3812200
Edit	Sand, White, 30/50	Baker Hughes	Proppant						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	2.75238%		1349900
Edit	HCl, 10.1 - 15%	Baker Hughes	Acidizing						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.495475%	SmartCare Product	243005
Edit	Sand, White, 100 mesh	Baker Hughes	Proppant						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.293609%		144000
Edit	GW-3LDF	Baker Hughes	Gelling Agent						
				MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0900514%	SmartCare Product	44165.55

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Edit FRW-18	Baker Hughes	Friction Reducer						
51-01652			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0871476%	SmartCare Product	42741.4
Edit Alpha 1427	Baker Hughes	Biocide						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0226043%	SmartCare Product	11086.25
Edit Enzyme G-NE	Baker Hughes	Breaker						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0149093%	SmartCare Product	7312.2506
Edit ScaleSorb 4, (50# bag)	Baker Hughes	Scale Inhibitor						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0065246%	SmartCare Product	3200
Edit Ferrotrol 300L	Baker Hughes	Iron Control						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0034059%	SmartCare Product	1670.39517
Edit CI-14	Baker Hughes	Corrosion Inhibitor						
			MSDS and Non-MSDS Ingredients Listed Below	N/A	0%	.0015669%	SmartCare Product	768.5

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%	10.80682%		5306132
			Water	7732-18-5	95%	.4849141%		238092.080655
			Hydrochloric Acid	7647-01-0	15%	.0742537%		36458.435
			Mineral Oil	8042-47-5	70%	.0629653%		30915.885
			Guar Gum	9000-30-0	60%	.0539703%		26499.33
			Paraffinic Petroleum Distillate	64742-55-8	30%	.0269851%		13249.665
			Petroleum Distillates	64742-47-8	30%	.0269851%		13249.665
			Poly (acrylamide-co-acrylic acid) partial sodium salt	62649-23-4	30%	.026115%		12822.42
			Hydrotreated Light Distillate	64742-47-8	30%	.026115%		12822.42
			Glutaraldehyde	111-30-8	30%	.0067737%		3325.875
			Diatomaceous Earth, Calcined	91053-39-3	100%	.0065173%		3200
			Isotridecanol, ethoxylated	9043-30-5	5%	.0044975%		2208.2775
			1-butoxy-2-propanol	5131-66-8	5%	.0044975%		2208.2775
			Crystalline Silica: Quartz	14808-60-7	5%	.0044975%		2208.2775
			Sodium Chloride	7647-14-5	5%	.0043525%		2137.07
			Ammonium Chloride	12125-02-9	3%	.0026115%		1282.242
			Didecyl Dimethyl Ammonium Chloride	7173-51-5	10%	.0022579%		1108.625

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Citric Acid	77-92-9	60%	.0020412%	1002.237102
Oleamide DEA	93-83-4	2%	.001741%	854.828
Alcohols, C12-16, ethoxylated	68551-12-2	2%	.001741%	854.828
Methanol	67-56-1	100%	.0015652%	768.5
Quaternary Ammonium Compound	68424-85-1	5%	.0011289%	554.3125
Ethanol	64-17-5	5%	.0011289%	554.3125
Sodium chloride	7647-14-5	15%	.0009776%	480
Sodium Carboxymethyl inulin	430439-54-6	15%	.0009776%	480
Hemicellulase Enzyme Concentrate	9025-56-3	5%	.0007446%	365.61253
Polyoxyalkylenes	68951-67-7	30%	.0004696%	230.55
Polyoxythylene Sorbitan Monooleate	9005-65-6	.5%	.0004352%	213.707
Sorbitan Monooleate	1338-43-8	.5%	.0004352%	213.707
Sodium diglycolate	35249-69-5	5%	.0003259%	160
Sodium glycolate	2836-32-0	5%	.0003259%	160
Fatty Acids	61790-12-3	10%	.0001565%	76.85
Modified Thiourea Polymer	68527-49-1	7%	.0001096%	53.795
2-butoxy-1-propanol	15821-83-7	.1%	.00009%	44.16555
Propargyl Alcohol	107-19-7	5%	.0000783%	38.425
Olefin	64743-02-8	5%	.0000783%	38.425
Crystalline Silica (Cristobaloite)	14464-46-1	1%	.0000652%	32
Formaldehyde	50-00-0	1%	.0000157%	7.685

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51-01652

Hansen 9H 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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GASTAR EXPLORATION USA, INC.

Location: Marshall County, WV
Field: Marshall
Facility: Hansen Unit

Slot: Slot #9
Well: Hansen Unit 9H
Wellbore: Hansen Unit 9H (PWB)

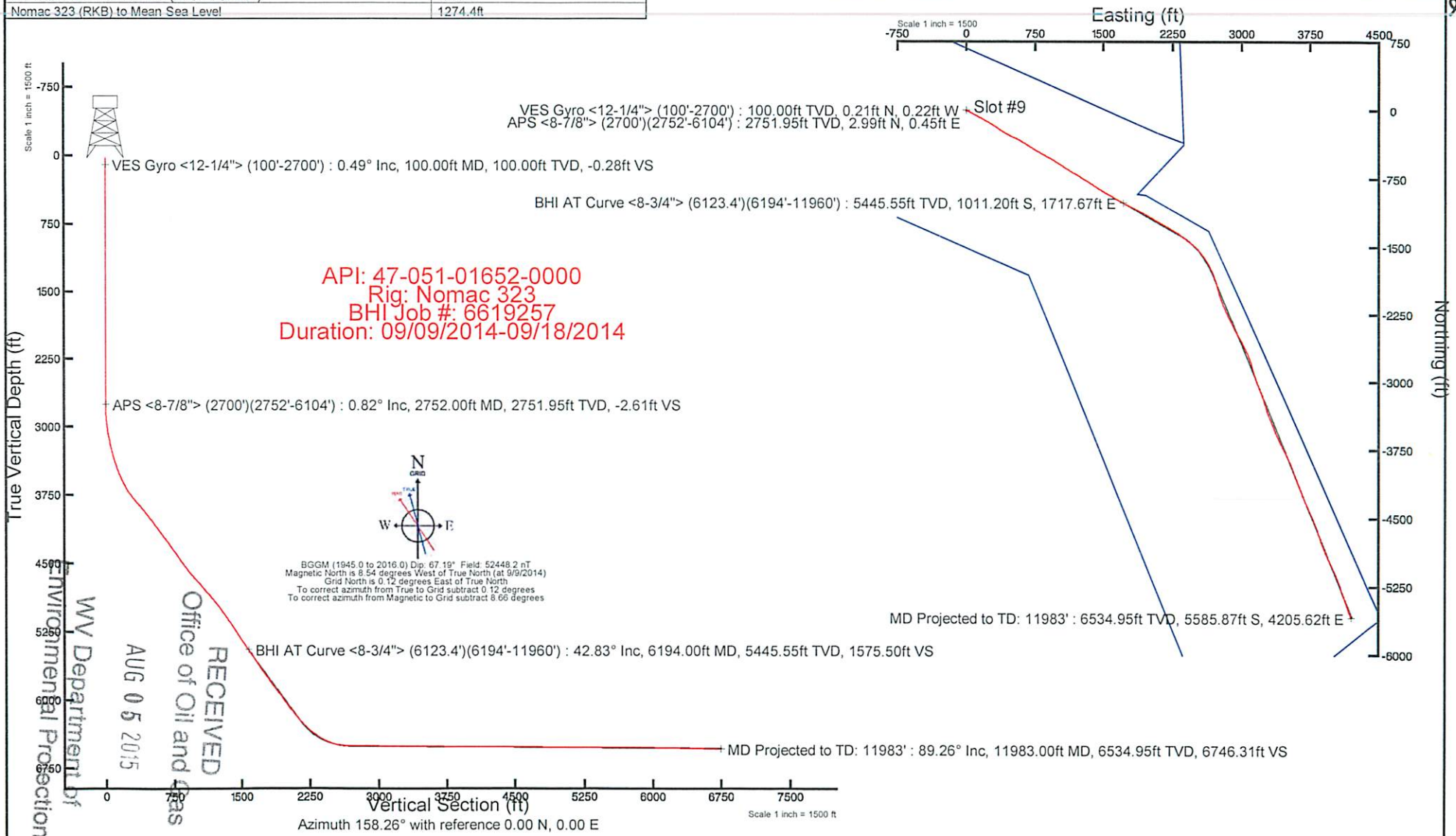
BAKER HUGHES

51-01652

Location Information

Facility Name			Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Hansen Unit			1692627.590	14427215.002	39°43'35.573"N	80°48'51.498"W
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot #9	158.54	21.81	1692649.390	14427373.480	39°43'37.139"N	80°48'51.215"W
Nomac 323 (RKB) to Mud line (At Slot: Slot #9)					29.4ft	
Mean Sea Level to Mud line (At Slot: Slot #9)					-1245ft	
Nomac 323 (RKB) to Mean Sea Level					1274.4ft	

Plot reference wellpath is Hansen Unit 9H Rev-B.0	
True vertical depths are referenced to Nomac 323 (RKB)	Grid System: NAD83 / UTM Zone 17 North, US feet
Measured depths are referenced to Nomac 323 (RKB)	North Reference: Grid north
Nomac 323 (RKB) to Mean Sea Level: 1274.4 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot #9): -1245 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: kroschr on 9/17/2014



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51-01653

REFERENCE WELLPATH IDENTIFICATION			
Operator	GASTAR EXPLORATION INC.	Slot	Slot #9
Area	Marshall County, WV	Well	Hansen 9H
Field	Marshall	Wellbore	Hansen 9H (AWB)
Facility	Hansen Unit	Wellpath	Hansen 9H (AWP) Proj: 11,983'
		Sidetrack	(none)

WELLPATH DATA † = interpolated/extrapolated station

	MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
†	0.00	0.00	313.71	0.00	0.00	0.00	0.00	515920.6	4397472.2	39°43'37.139"N	80°48'51.215"W	0.00	0.00	0.00
	29.40	0.00	313.71	29.40	0.00	0.00	0.00	515920.6	4397472.2	39°43'37.139"N	80°48'51.215"W	0.00	0.00	0.00
	119.40	0.63	313.71	119.40	-0.45	0.34	-0.36	515920.5	4397472.3	39°43'37.143"N	80°48'51.219"W	0.49	313.71	0.70
	219.40	0.52	298.45	219.39	-1.30	0.94	-1.15	515920.2	4397472.5	39°43'37.149"N	80°48'51.229"W	1.49	309.10	0.19
	319.40	0.60	288.81	319.39	-1.99	1.32	-2.05	515919.9	4397472.6	39°43'37.153"N	80°48'51.241"W	2.44	302.85	0.12
	419.40	0.31	269.59	419.39	-2.43	1.49	-2.81	515919.7	4397472.7	39°43'37.154"N	80°48'51.251"W	3.18	297.89	0.32
	519.40	0.22	257.60	519.38	-2.56	1.45	-3.27	515919.6	4397472.7	39°43'37.154"N	80°48'51.257"W	3.58	293.85	0.11
	619.40	0.20	232.68	619.38	-2.54	1.30	-3.60	515919.5	4397472.6	39°43'37.152"N	80°48'51.261"W	3.83	289.86	0.09
	719.40	0.45	215.02	719.38	-2.28	0.87	-3.96	515919.4	4397472.5	39°43'37.148"N	80°48'51.265"W	4.06	282.41	0.27
	819.40	0.19	205.54	819.38	-1.95	0.40	-4.26	515919.3	4397472.4	39°43'37.143"N	80°48'51.269"W	4.28	275.38	0.26
	919.40	0.55	186.94	919.38	-1.42	-0.23	-4.39	515919.2	4397472.2	39°43'37.137"N	80°48'51.271"W	4.40	267.07	0.37
	1019.40	0.33	161.41	1019.38	-0.71	-0.97	-4.36	515919.2	4397471.9	39°43'37.130"N	80°48'51.270"W	4.46	257.39	0.29
	1119.40	0.12	148.52	1119.37	-0.32	-1.34	-4.21	515919.3	4397471.8	39°43'37.126"N	80°48'51.269"W	4.42	252.38	0.21
	1219.40	0.18	125.77	1219.37	-0.08	-1.52	-4.03	515919.3	4397471.8	39°43'37.124"N	80°48'51.266"W	4.30	249.35	0.08
	1319.40	0.26	115.44	1319.37	0.22	-1.71	-3.69	515919.4	4397471.7	39°43'37.123"N	80°48'51.262"W	4.07	245.20	0.09
	1419.40	0.36	106.75	1419.37	0.58	-1.90	-3.19	515919.6	4397471.7	39°43'37.121"N	80°48'51.256"W	3.71	239.28	0.11
	1519.40	0.32	100.60	1519.37	0.92	-2.04	-2.61	515919.8	4397471.6	39°43'37.119"N	80°48'51.248"W	3.31	232.07	0.05
	1619.40	0.25	81.43	1619.37	1.12	-2.06	-2.12	515919.9	4397471.6	39°43'37.119"N	80°48'51.242"W	2.96	225.93	0.12
	1719.40	0.22	65.82	1719.37	1.16	-1.94	-1.73	515920.0	4397471.6	39°43'37.120"N	80°48'51.237"W	2.60	221.70	0.07
	1819.40	0.54	51.38	1819.37	1.02	-1.57	-1.19	515920.2	4397471.8	39°43'37.124"N	80°48'51.230"W	1.97	217.11	0.33
	1919.40	0.30	46.16	1919.36	0.78	-1.10	-0.63	515920.4	4397471.9	39°43'37.129"N	80°48'51.223"W	1.27	209.97	0.24
	2019.40	0.26	25.14	2019.36	0.53	-0.71	-0.35	515920.5	4397472.0	39°43'37.132"N	80°48'51.219"W	0.79	206.06	0.11
	2119.40	0.36	16.86	2119.36	0.13	-0.20	-0.16	515920.5	4397472.2	39°43'37.137"N	80°48'51.217"W	0.26	218.09	0.11
	2219.40	0.22	9.21	2219.36	-0.28	0.29	-0.04	515920.6	4397472.3	39°43'37.142"N	80°48'51.215"W	0.29	352.48	0.14
	2319.40	0.24	5.61	2319.36	-0.63	0.68	0.01	515920.6	4397472.4	39°43'37.146"N	80°48'51.214"W	0.68	1.12	0.02

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MD [ft]	Inclination [°]	Azimuth [°]	TVD [ft]	Vert Sect [ft]	North [ft]	East [ft]	Grid East [M]	Grid North [M]	Latitude	Longitude	Closure Dist [ft]	Closure Dir [°]	DLS [°/100ft]
2419.40	0.09	7.35	2419.36	-0.89	0.97	0.04	515920.6	4397472.5	39°43'37.149"N	80°48'51.214"W	0.97	2.59	0.15
2519.40	0.16	4.96	2519.36	-1.08	1.19	0.07	515920.6	4397472.6	39°43'37.151"N	80°48'51.214"W	1.19	3.18	0.07
2619.40	0.47	7.35	2619.36	-1.56	1.73	0.13	515920.6	4397472.8	39°43'37.157"N	80°48'51.213"W	1.74	4.31	0.31
2719.40	0.75	2.62	2719.35	-2.52	2.79	0.21	515920.6	4397473.1	39°43'37.167"N	80°48'51.212"W	2.80	4.36	0.28
2771.40	1.39	112.90	2771.34	-2.38	2.89	0.81	515920.8	4397473.1	39°43'37.168"N	80°48'51.204"W	3.00	15.66	3.45
2803.40	2.28	119.54	2803.33	-1.61	2.42	1.72	515921.1	4397473.0	39°43'37.163"N	80°48'51.193"W	2.97	35.37	2.85
2834.40	3.49	119.16	2834.29	-0.40	1.66	3.08	515921.5	4397472.7	39°43'37.156"N	80°48'51.175"W	3.50	61.69	3.90
2866.40	4.58	121.13	2866.21	1.37	0.52	5.03	515922.1	4397472.4	39°43'37.144"N	80°48'51.150"W	5.05	84.04	3.43
2897.40	5.72	122.40	2897.08	3.61	-0.94	7.39	515922.8	4397471.9	39°43'37.130"N	80°48'51.120"W	7.45	97.27	3.70
2929.40	6.91	122.57	2928.89	6.47	-2.83	10.36	515923.7	4397471.4	39°43'37.111"N	80°48'51.082"W	10.74	105.30	3.72
2960.40	8.20	121.41	2959.62	9.75	-4.99	13.82	515924.8	4397470.7	39°43'37.090"N	80°48'51.038"W	14.69	109.86	4.19
2992.40	9.44	119.42	2991.24	13.62	-7.47	18.05	515926.1	4397470.0	39°43'37.065"N	80°48'50.984"W	19.53	112.48	3.99
3023.40	10.47	119.65	3021.77	17.80	-10.11	22.71	515927.5	4397469.2	39°43'37.039"N	80°48'50.924"W	24.86	114.00	3.33
3054.40	11.32	118.03	3052.21	22.33	-12.93	27.85	515929.1	4397468.3	39°43'37.011"N	80°48'50.859"W	30.70	114.91	2.91
3086.40	12.44	117.37	3083.53	27.33	-15.99	33.68	515930.8	4397467.4	39°43'36.981"N	80°48'50.784"W	37.28	115.40	3.53
3117.40	13.56	117.88	3113.73	32.62	-19.23	39.86	515932.7	4397466.4	39°43'36.949"N	80°48'50.705"W	44.25	115.75	3.63
3149.40	14.78	118.56	3144.76	38.62	-22.93	46.76	515934.8	4397465.2	39°43'36.912"N	80°48'50.617"W	52.08	116.13	3.85
3181.40	15.77	119.38	3175.63	45.15	-27.02	54.13	515937.1	4397464.0	39°43'36.871"N	80°48'50.523"W	60.50	116.53	3.17
3212.40	16.29	119.61	3205.42	51.82	-31.23	61.58	515939.3	4397462.7	39°43'36.829"N	80°48'50.427"W	69.05	116.89	1.69
3244.40	16.96	119.30	3236.08	58.96	-35.74	69.56	515941.8	4397461.3	39°43'36.785"N	80°48'50.325"W	78.20	117.19	2.11
3275.40	17.77	119.36	3265.67	66.15	-40.27	77.62	515944.2	4397460.0	39°43'36.740"N	80°48'50.222"W	87.45	117.42	2.61
3307.40	18.84	118.72	3296.05	73.94	-45.15	86.41	515946.9	4397458.5	39°43'36.691"N	80°48'50.110"W	97.49	117.59	3.40
3339.40	20.08	118.67	3326.22	82.16	-50.26	95.76	515949.7	4397456.9	39°43'36.641"N	80°48'49.990"W	108.15	117.69	3.88
3370.40	21.03	118.61	3355.25	90.54	-55.48	105.31	515952.7	4397455.3	39°43'36.589"N	80°48'49.868"W	119.03	117.78	3.07
3402.40	22.06	116.66	3385.01	99.46	-60.93	115.72	515955.8	4397453.7	39°43'36.535"N	80°48'49.735"W	130.78	117.77	3.92
3434.40	23.45	116.97	3414.52	108.73	-66.51	126.77	515959.2	4397452.0	39°43'36.479"N	80°48'49.594"W	143.16	117.68	4.36
3466.40	24.97	116.84	3443.71	118.58	-72.45	138.47	515962.8	4397450.2	39°43'36.421"N	80°48'49.444"W	156.28	117.62	4.75
3497.40	26.02	117.57	3471.69	128.65	-78.55	150.34	515966.4	4397448.3	39°43'36.360"N	80°48'49.293"W	169.62	117.59	3.54
3529.40	27.46	117.46	3500.26	139.56	-85.20	163.11	515970.3	4397446.3	39°43'36.294"N	80°48'49.129"W	184.02	117.58	4.50
3560.40	28.48	118.65	3527.64	150.66	-92.04	175.94	515974.2	4397444.2	39°43'36.226"N	80°48'48.965"W	198.56	117.62	3.75
3591.40	30.22	118.32	3554.66	162.34	-99.29	189.29	515978.2	4397442.0	39°43'36.154"N	80°48'48.795"W	213.75	117.68	5.64

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3623.40	31.41	118.99	3582.14	174.97	-107.15	203.68	515982.6	4397439.6	39°43'36.076"N	80°48'48.611"W	230.14	117.75	3.87
3653.40	32.99	119.39	3607.53	187.38	-114.95	217.63	515986.9	4397437.2	39°43'35.999"N	80°48'48.432"W	246.12	117.84	5.31
3685.40	34.30	120.50	3634.17	201.29	-123.80	232.99	515991.6	4397434.5	39°43'35.911"N	80°48'48.236"W	263.84	117.98	4.52
3716.40	35.94	120.64	3659.52	215.40	-132.87	248.35	515996.2	4397431.8	39°43'35.821"N	80°48'48.040"W	281.65	118.15	5.30
3766.40	38.09	121.91	3699.45	239.45	-148.50	274.07	516004.1	4397427.0	39°43'35.666"N	80°48'47.711"W	311.71	118.45	4.56
3797.40	39.66	123.41	3723.58	255.27	-159.00	290.44	516009.1	4397423.8	39°43'35.562"N	80°48'47.502"W	331.12	118.70	5.90
3829.40	41.23	124.13	3747.93	272.38	-170.54	307.70	516014.3	4397420.3	39°43'35.448"N	80°48'47.281"W	351.80	119.00	5.12
3861.40	42.19	125.06	3771.82	290.10	-182.63	325.22	516019.7	4397416.6	39°43'35.328"N	80°48'47.057"W	372.99	119.32	3.57
3893.40	44.32	124.23	3795.13	308.36	-195.09	343.26	516025.1	4397412.8	39°43'35.204"N	80°48'46.827"W	394.83	119.61	6.89
3924.40	46.05	123.88	3816.97	326.55	-207.41	361.48	516030.7	4397409.0	39°43'35.082"N	80°48'46.594"W	416.76	119.85	5.64
3987.40	47.84	121.11	3859.99	363.88	-232.12	400.31	516042.5	4397401.5	39°43'34.837"N	80°48'46.097"W	462.74	120.11	4.29
4049.40	47.59	118.98	3901.70	399.92	-255.08	440.01	516054.6	4397394.5	39°43'34.609"N	80°48'45.590"W	508.60	120.10	2.57
4113.40	46.72	116.87	3945.23	435.69	-277.06	481.46	516067.3	4397387.8	39°43'34.391"N	80°48'45.060"W	555.49	119.92	2.77
4175.40	46.02	114.43	3988.01	468.71	-296.49	521.91	516079.6	4397381.9	39°43'34.199"N	80°48'44.543"W	600.24	119.60	3.06
4238.40	44.54	117.38	4032.34	501.78	-316.03	562.17	516091.8	4397375.9	39°43'34.005"N	80°48'44.028"W	644.91	119.34	4.07
4300.40	43.58	120.62	4076.90	535.14	-336.92	599.87	516103.3	4397369.6	39°43'33.797"N	80°48'43.546"W	688.01	119.32	3.95
4362.40	42.25	122.79	4122.31	569.04	-359.09	635.79	516114.3	4397362.8	39°43'33.577"N	80°48'43.087"W	730.19	119.46	3.21
4426.40	42.69	123.04	4169.52	604.29	-382.57	672.07	516125.3	4397355.7	39°43'33.345"N	80°48'42.623"W	773.33	119.65	0.74
4489.40	41.73	122.62	4216.18	638.78	-405.52	707.63	516136.2	4397348.7	39°43'33.117"N	80°48'42.169"W	815.59	119.82	1.59
4551.40	41.70	122.13	4262.46	672.21	-427.61	742.47	516146.8	4397341.9	39°43'32.898"N	80°48'41.723"W	856.81	119.94	0.53
4614.40	42.52	120.85	4309.20	706.04	-449.67	778.50	516157.8	4397335.2	39°43'32.679"N	80°48'41.263"W	899.04	120.01	1.88
4676.40	42.98	119.65	4354.73	739.20	-470.87	814.85	516168.8	4397328.8	39°43'32.469"N	80°48'40.798"W	941.12	120.02	1.51
4739.40	43.60	118.41	4400.59	772.66	-491.83	852.62	516180.3	4397322.4	39°43'32.261"N	80°48'40.315"W	984.31	119.98	1.67
4802.40	42.56	116.81	4446.60	805.31	-511.78	890.75	516192.0	4397316.3	39°43'32.063"N	80°48'39.828"W	1027.30	119.88	2.39
4865.40	42.05	118.84	4493.20	837.58	-531.57	928.25	516203.4	4397310.3	39°43'31.867"N	80°48'39.349"W	1069.67	119.80	2.31
4927.40	41.35	121.62	4539.49	870.05	-552.32	963.88	516214.2	4397304.0	39°43'31.661"N	80°48'38.893"W	1110.91	119.81	3.19
4988.40	43.86	123.42	4584.39	903.57	-574.53	998.68	516224.8	4397297.2	39°43'31.441"N	80°48'38.448"W	1152.15	119.91	4.57
5050.40	47.10	123.29	4627.86	939.82	-598.83	1035.60	516236.1	4397289.8	39°43'31.200"N	80°48'37.976"W	1196.27	120.04	5.23
5113.40	48.70	123.00	4670.09	978.06	-624.39	1074.74	516248.0	4397282.0	39°43'30.946"N	80°48'37.476"W	1242.95	120.16	2.56
5176.40	47.98	122.10	4711.97	1016.27	-649.71	1114.41	516260.1	4397274.3	39°43'30.695"N	80°48'36.969"W	1289.98	120.24	1.56
5239.40	47.61	119.35	4754.30	1053.28	-673.55	1154.52	516272.3	4397267.0	39°43'30.459"N	80°48'36.456"W	1336.63	120.26	3.29

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5303.40	48.70	118.60	4796.99	1090.17	-696.65	1196.23	516285.0	4397260.0	39°43'30.230"N	80°48'35.923"W	1384.30	120.22	1.91
5366.40	47.70	123.37	4839.00	1127.52	-720.80	1236.48	516297.3	4397252.6	39°43'29.990"N	80°48'35.409"W	1431.23	120.24	5.86
5429.40	46.89	122.25	4881.72	1165.23	-745.89	1275.38	516309.2	4397245.0	39°43'29.742"N	80°48'34.912"W	1477.48	120.32	1.83
5492.40	45.74	121.45	4925.24	1201.90	-769.93	1314.08	516320.9	4397237.7	39°43'29.503"N	80°48'34.417"W	1523.02	120.37	2.04
5555.40	44.25	122.21	4969.79	1237.73	-793.42	1351.93	516332.5	4397230.5	39°43'29.270"N	80°48'33.933"W	1567.55	120.41	2.51
5619.40	42.33	123.46	5016.37	1273.48	-817.20	1388.80	516343.7	4397223.2	39°43'29.034"N	80°48'33.462"W	1611.39	120.47	3.29
5683.40	41.42	123.46	5064.03	1308.56	-840.76	1424.44	516354.6	4397216.1	39°43'28.801"N	80°48'33.006"W	1654.06	120.55	1.42
5746.40	42.00	121.60	5111.06	1342.59	-863.29	1459.78	516365.3	4397209.2	39°43'28.577"N	80°48'32.555"W	1695.95	120.60	2.17
5809.40	40.76	121.00	5158.33	1375.86	-884.93	1495.36	516376.2	4397202.6	39°43'28.363"N	80°48'32.100"W	1737.59	120.62	2.07
5871.40	40.70	120.13	5205.31	1407.87	-905.50	1530.20	516386.8	4397196.3	39°43'28.159"N	80°48'31.655"W	1778.04	120.62	0.92
5935.40	40.67	119.47	5253.84	1440.54	-926.23	1566.40	516397.8	4397190.0	39°43'27.953"N	80°48'31.192"W	1819.76	120.60	0.67
5998.40	41.22	119.71	5301.43	1472.78	-946.62	1602.30	516408.8	4397183.8	39°43'27.751"N	80°48'30.733"W	1861.04	120.57	0.91
6061.40	41.94	119.54	5348.56	1505.44	-967.29	1638.65	516419.8	4397177.5	39°43'27.546"N	80°48'30.268"W	1902.84	120.55	1.16
6123.40	43.56	118.74	5394.08	1538.08	-987.78	1675.41	516431.0	4397171.3	39°43'27.343"N	80°48'29.799"W	1944.91	120.52	2.76
6194.00	42.83	119.25	5445.55	1575.50	-1011.20	1717.67	516443.9	4397164.1	39°43'27.110"N	80°48'29.258"W	1993.22	120.49	1.15
6276.00	42.52	117.04	5505.84	1618.00	-1037.42	1766.68	516458.8	4397156.2	39°43'26.850"N	80°48'28.632"W	2048.75	120.42	1.87
6371.00	42.83	116.06	5575.69	1666.07	-1066.20	1824.28	516476.4	4397147.4	39°43'26.564"N	80°48'27.895"W	2113.00	120.30	0.77
6466.00	42.80	117.51	5645.38	1714.44	-1095.29	1881.91	516493.9	4397138.5	39°43'26.276"N	80°48'27.159"W	2177.45	120.20	1.04
6560.00	42.84	119.36	5714.33	1763.51	-1125.71	1938.09	516511.1	4397129.2	39°43'25.974"N	80°48'26.440"W	2241.30	120.15	1.34
6655.00	42.82	120.45	5784.00	1814.15	-1157.91	1994.07	516528.1	4397119.4	39°43'25.654"N	80°48'25.725"W	2305.88	120.14	0.78
6750.00	42.78	122.38	5853.71	1865.80	-1191.55	2049.16	516544.9	4397109.2	39°43'25.321"N	80°48'25.021"W	2370.41	120.18	1.38
6845.00	42.75	120.75	5923.45	1917.52	-1225.32	2104.11	516561.6	4397098.9	39°43'24.986"N	80°48'24.318"W	2434.89	120.21	1.17
6940.00	43.02	119.33	5993.06	1968.31	-1257.68	2160.08	516578.7	4397089.0	39°43'24.665"N	80°48'23.603"W	2499.54	120.21	1.06
7034.00	43.11	121.28	6061.74	2018.91	-1290.06	2215.48	516595.6	4397079.2	39°43'24.344"N	80°48'22.895"W	2563.71	120.21	1.42
7130.00	43.06	122.80	6131.86	2071.81	-1324.85	2271.07	516612.5	4397068.6	39°43'23.999"N	80°48'22.184"W	2629.25	120.26	1.08
7224.00	43.82	125.15	6200.11	2125.21	-1360.97	2324.66	516628.8	4397057.6	39°43'23.641"N	80°48'21.500"W	2693.75	120.35	1.90
7318.00	46.90	126.65	6266.16	2181.71	-1400.20	2378.81	516645.3	4397045.6	39°43'23.252"N	80°48'20.808"W	2760.31	120.48	3.47
7413.00	52.63	129.05	6327.50	2244.26	-1444.73	2436.01	516662.8	4397032.1	39°43'22.810"N	80°48'20.077"W	2832.20	120.67	6.33
7508.00	58.29	133.50	6381.36	2313.98	-1496.39	2494.70	516680.7	4397016.3	39°43'22.299"N	80°48'19.327"W	2909.07	120.96	7.10
7603.00	59.82	142.51	6430.28	2390.31	-1556.88	2549.09	516697.2	4396997.9	39°43'21.700"N	80°48'18.633"W	2986.93	121.42	8.29
7698.00	70.42	145.73	6470.20	2473.78	-1626.66	2599.44	516712.6	4396976.6	39°43'21.009"N	80°48'17.990"W	3066.44	122.04	11.57

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7793.00	80.44	151.32	6494.09	2564.26	-1704.99	2647.27	516727.1	4396952.8	39°43'20.234"N	80°48'17.380"W	3148.82	122.78	11.98
7888.00	87.88	157.90	6503.76	2658.46	-1790.28	2687.71	516739.5	4396926.8	39°43'19.390"N	80°48'16.865"W	3229.38	123.67	10.43
7983.00	89.69	163.72	6505.77	2753.30	-1879.94	2718.92	516749.0	4396899.5	39°43'18.503"N	80°48'16.468"W	3305.55	124.66	6.41
8078.00	89.63	165.99	6506.34	2847.66	-1971.63	2743.73	516756.5	4396871.5	39°43'17.597"N	80°48'16.153"W	3378.67	125.70	2.39
8174.00	89.66	160.98	6506.93	2943.23	-2063.64	2771.01	516764.8	4396843.5	39°43'16.687"N	80°48'15.807"W	3455.01	126.68	5.22
8267.00	89.63	158.28	6507.51	3036.19	-2150.81	2803.38	516774.7	4396816.9	39°43'15.824"N	80°48'15.395"W	3533.40	127.50	2.90
8361.00	89.14	154.90	6508.52	3130.13	-2237.06	2840.72	516786.1	4396790.6	39°43'14.971"N	80°48'14.919"W	3615.81	128.22	3.63
8454.00	89.11	154.06	6509.94	3222.92	-2320.97	2880.78	516798.3	4396765.1	39°43'14.141"N	80°48'14.409"W	3699.44	128.86	0.90
8549.00	90.06	152.76	6510.63	3317.57	-2405.92	2923.30	516811.2	4396739.2	39°43'13.301"N	80°48'13.867"W	3786.05	129.46	1.69
8644.00	90.00	151.04	6510.58	3411.99	-2489.72	2968.05	516824.9	4396713.7	39°43'12.472"N	80°48'13.297"W	3874.02	129.99	1.81
8739.00	90.00	152.52	6510.58	3506.38	-2573.42	3012.97	516838.6	4396688.2	39°43'11.643"N	80°48'12.725"W	3962.38	130.50	1.56
8835.00	89.54	155.81	6510.96	3602.12	-2659.82	3054.80	516851.3	4396661.8	39°43'10.789"N	80°48'12.192"W	4050.48	131.05	3.46
8929.00	89.23	159.60	6511.97	3696.09	-2746.77	3090.45	516862.2	4396635.4	39°43'09.929"N	80°48'11.738"W	4134.68	131.63	4.05
9023.00	89.26	164.41	6513.21	3789.85	-2836.14	3119.48	516871.0	4396608.1	39°43'09.045"N	80°48'11.369"W	4216.02	132.28	5.12
9118.00	89.23	163.64	6514.46	3884.36	-2927.46	3145.62	516879.0	4396580.3	39°43'08.142"N	80°48'11.037"W	4297.09	132.94	0.81
9212.00	89.42	159.58	6515.57	3978.18	-3016.63	3175.27	516888.0	4396553.1	39°43'07.260"N	80°48'10.660"W	4379.77	133.53	4.32
9305.00	89.54	157.54	6516.41	4071.17	-3103.19	3209.26	516898.4	4396526.8	39°43'06.404"N	80°48'10.227"W	4464.21	134.04	2.20
9400.00	89.91	161.14	6516.87	4166.13	-3192.06	3242.77	516908.6	4396499.7	39°43'05.524"N	80°48'09.801"W	4550.26	134.55	3.81
9495.00	89.88	164.21	6517.04	4260.84	-3282.74	3271.06	516917.2	4396472.1	39°43'04.628"N	80°48'09.442"W	4634.24	135.10	3.23
9590.00	90.12	158.65	6517.04	4355.66	-3372.76	3301.30	516926.4	4396444.6	39°43'03.737"N	80°48'09.057"W	4719.54	135.61	5.86
9685.00	90.15	157.30	6516.82	4450.65	-3460.83	3336.92	516937.3	4396417.8	39°43'02.866"N	80°48'08.604"W	4807.53	136.04	1.42
9780.00	90.09	158.18	6516.62	4545.65	-3548.75	3372.91	516948.2	4396391.0	39°43'01.997"N	80°48'08.146"W	4895.93	136.46	0.93
9875.00	90.18	154.57	6516.40	4640.58	-3635.77	3410.98	516959.8	4396364.5	39°43'01.136"N	80°48'07.661"W	4985.34	136.83	3.80
9969.00	89.48	152.98	6516.68	4734.29	-3720.09	3452.51	516972.5	4396338.8	39°43'00.302"N	80°48'07.132"W	5075.32	137.14	1.85
10064.00	89.41	153.86	6517.60	4828.95	-3805.04	3495.02	516985.4	4396312.9	39°42'59.461"N	80°48'06.590"W	5166.58	137.43	0.93
10159.00	89.32	157.53	6518.65	4923.83	-3891.60	3534.11	516997.3	4396286.5	39°42'58.605"N	80°48'06.093"W	5256.85	137.76	3.86
10254.00	90.15	158.95	6519.09	5018.82	-3979.83	3569.33	517008.1	4396259.7	39°42'57.732"N	80°48'05.644"W	5345.95	138.11	1.73
10349.00	90.12	159.40	6518.87	5113.81	-4068.62	3603.10	517018.4	4396232.6	39°42'56.854"N	80°48'05.215"W	5434.71	138.47	0.47
10444.00	90.15	159.37	6518.64	5208.79	-4157.54	3636.55	517028.5	4396205.5	39°42'55.974"N	80°48'04.789"W	5523.55	138.82	0.04
10539.00	90.15	157.58	6518.39	5303.79	-4245.91	3671.40	517039.2	4396178.6	39°42'55.100"N	80°48'04.346"W	5613.11	139.15	1.88
10634.00	90.09	155.87	6518.19	5398.75	-4333.18	3708.94	517050.6	4396152.0	39°42'54.237"N	80°48'03.868"W	5703.74	139.44	1.80

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10730.00	89.60	154.71	6518.45	5494.62	-4420.38	3749.07	517062.8	4396125.4	39°42'53.374"N	80°48'03.357"W	5796.15	139.70	1.31
10825.00	89.63	157.30	6519.09	5589.54	-4507.17	3787.70	517074.6	4396099.0	39°42'52.516"N	80°48'02.865"W	5887.38	139.96	2.73
10920.00	89.66	159.45	6519.68	5684.53	-4595.47	3822.71	517085.3	4396072.1	39°42'51.642"N	80°48'02.419"W	5977.58	140.25	2.26
11015.00	89.66	162.63	6520.24	5779.40	-4685.30	3853.57	517094.7	4396044.7	39°42'50.754"N	80°48'02.027"W	6066.47	140.56	3.35
11109.00	89.60	160.25	6520.85	5873.25	-4774.41	3883.48	517103.8	4396017.6	39°42'49.873"N	80°48'01.647"W	6154.38	140.88	2.53
11204.00	89.32	155.89	6521.75	5968.22	-4862.51	3918.95	517114.6	4395990.7	39°42'49.001"N	80°48'01.195"W	6245.17	141.13	4.60
11299.00	89.08	154.71	6523.07	6063.08	-4948.81	3958.65	517126.7	4395964.4	39°42'48.147"N	80°48'00.690"W	6337.32	141.34	1.27
11392.00	89.14	154.87	6524.52	6155.90	-5032.94	3998.25	517138.8	4395938.8	39°42'47.315"N	80°48'00.186"W	6427.79	141.54	0.18
11487.00	88.86	156.23	6526.18	6250.78	-5119.40	4037.57	517150.7	4395912.5	39°42'46.460"N	80°47'59.685"W	6519.99	141.74	1.46
11582.00	88.89	159.94	6528.04	6345.74	-5207.51	4073.01	517161.5	4395885.6	39°42'45.588"N	80°47'59.234"W	6611.17	141.97	3.90
11676.00	88.83	161.85	6529.91	6439.62	-5296.31	4103.77	517170.9	4395858.6	39°42'44.710"N	80°47'58.843"W	6700.13	142.23	2.03
11771.00	88.83	160.09	6531.85	6534.49	-5386.09	4134.74	517180.3	4395831.2	39°42'43.822"N	80°47'58.449"W	6790.14	142.49	1.85
11866.00	89.26	160.39	6533.44	6629.42	-5475.49	4166.85	517190.1	4395804.0	39°42'42.938"N	80°47'58.041"W	6880.67	142.73	0.55
11960.00	89.26	160.82	6534.65	6723.33	-5564.14	4198.06	517199.6	4395777.0	39°42'42.061"N	80°47'57.644"W	6970.18	142.97	0.46
11983.00	89.26	160.82	6534.95	6746.31	-5585.87	4205.62	517201.9	4395770.3	39°42'41.846"N	80°47'57.548"W	6992.08	143.02	0.00

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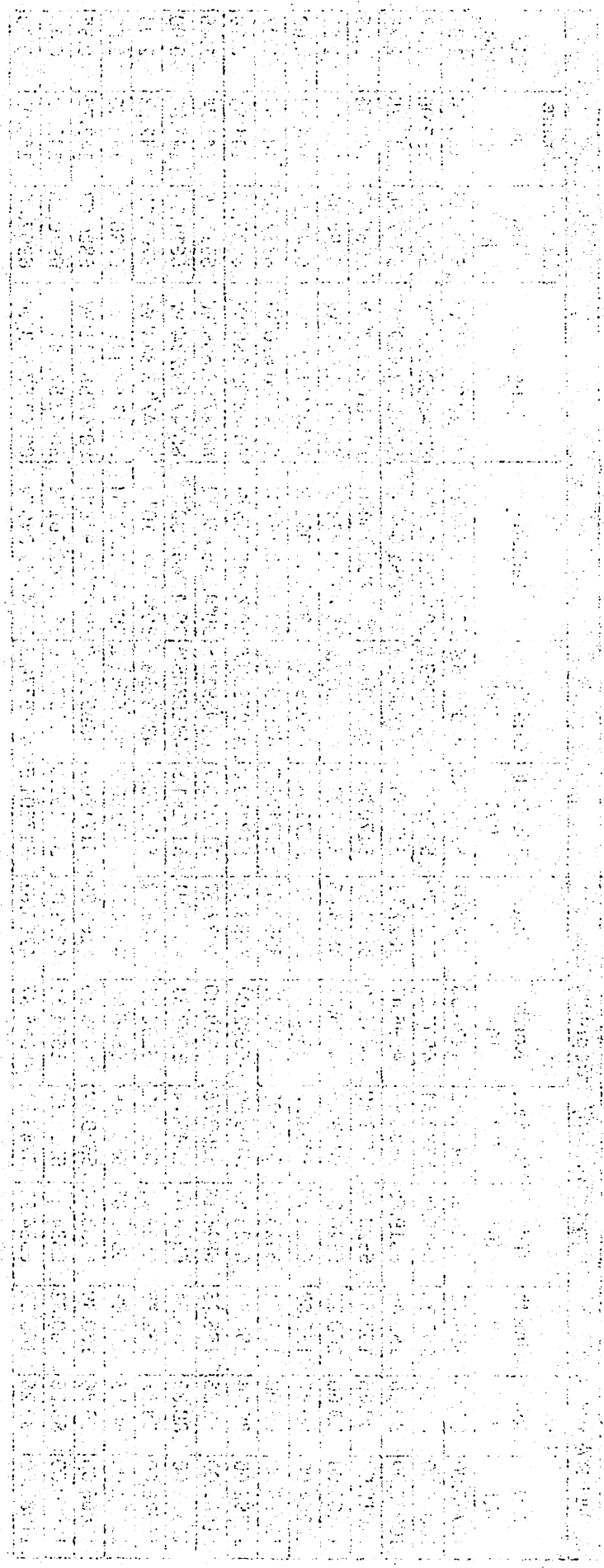

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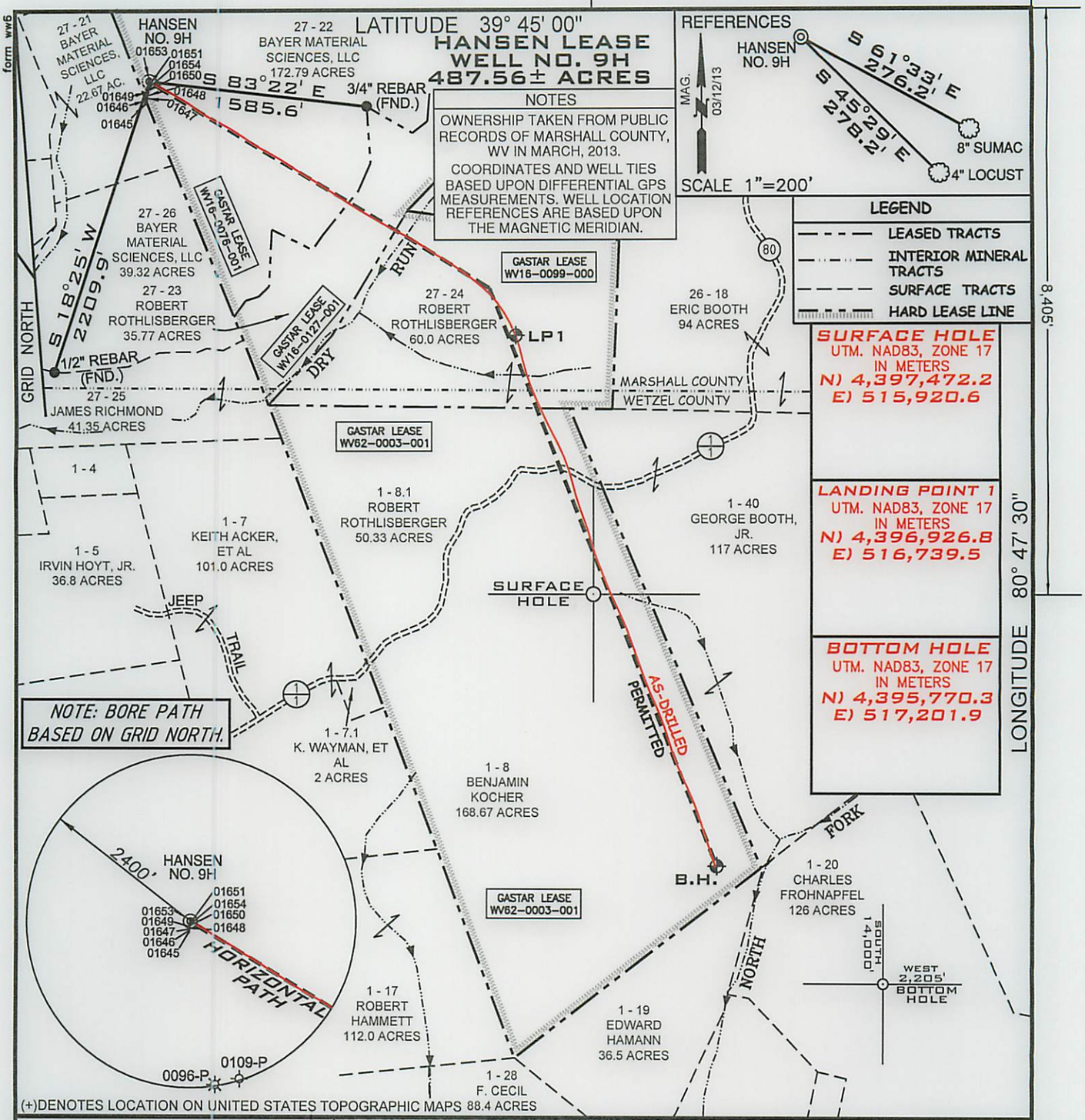

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SCALE 1" = 1000'

MINIMUM DEGREE OF ACCURACY 1/200

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601 57TH STREET
CHARLESTON, WV 25304

DATE: JULY 28, 2015

OPERATORS WELL NO. HANSEN NO. 9H AS-DRILLED

API WELL NO. 47 — 051 — 01652
STATE COUNTY PERMIT

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

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: 6535' TMD: 11,983'

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

WR-35
Rev. 8/23/13

Page ___ o

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

API 47 - 085 - 09962 County Ritchie District Clay
Quad Pennsboro 7.5' Pad Name Eddy Pad Field/Pool Name ----
Farm name Annie B. Haymond, et al Well Number Cairo-Anna Unit 1H
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4,353,850m Easting 506,896m
Landing Point of Curve Northing 4,353,534.95m Easting 506,990.65m
Bottom Hole Northing 4,351,487m Easting 507,812m

Elevation (ft) 971' 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)
Air - Foam & 4% KCL
Mud - Polymer

Date permit issued 8/13/2012 & 6/25/2014 Date drilling commenced 1/12/2013 Date drilling ceased 9/10/2014
Date completion activities began 1/14/2015 Date completion activities ceased 4/29/2015
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 126', 307' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 653', 2099' Void(s) encountered (Y/N) depths N
Coal depth(s) ft 1056' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

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Office of Oil & Gas
SEP 21 2015

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WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 085 - 09962 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 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	24"	20"	40'	New	94#/J-55	N/A	Y
Surface	17-1/2"	13-3/8"	650'	New	48#/H-40	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2665'	New	36#/J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	13,975'	New	20#/P-110	N/A	Y
Tubing		2-3/8"	6508'		4.7#/N-80		
Packer type and depth set		N/A					

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	Class A	75 sx	15.6	1.18	38 Cu. Ft.	0'	8 Hrs.
Surface	Class A	765 sx	15.6	1.18	451 Cu. Ft.	0'	8 Hrs.
Coal							
Intermediate 1	Class A	979 sx	15.6	1.18	835 Cu. Ft.	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	869 sx (Lead), 1175 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.44 (Lead), 1.80 (Tail)	2706 Cu. Ft.	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 13,975' MD, 6328' TVD (BHL) Loggers TD (ft) 13,927' MD

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

Plug back procedure N/A

Kick off depth (ft) 6081'

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Anna Unit 2H API# 47-085-09963). Please reference the wireline logs submitted with Form WR-35 for the Anna Unit 2H. A Cement Bond Log has been included with this submittal.

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

Well cored ☐ Yes ■ No Conventional Sidewall Were cuttings collected ☐ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

Conductor - 0

Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface

Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface

Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

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 N/A

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SEP 21 2015

WR-35
Rev. 8/23/13

API 47- 085 - 09962 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 1H

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
			SEE ATTACHED EXHIBIT 1		

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 EXHIBIT 2				

Received
Office of Oil & Gas
SEP 21 2015

Please insert additional pages as applicable.

WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 085 - 09962 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 1H

PRODUCING FORMATION(S)	DEPTHS			
Marcellus	6262' (Top)	TVD	6500' (Top)	MD

Please insert additional pages as applicable.

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

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole ---- psi DURATION OF TEST ---- hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	1863 mcfpd	---- bpd	--- bpd	49 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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 QUANTITYAND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		

SEE ATTACHED EXHIBIT 3

Please insert additional pages as applicable.

Drilling Contractor Frontier Drilling LLC
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

Logging Company STRC
Address 1560 Good Hope Pike City Clarksburg State WV Zip 26301

Cementing Company Allied Oil & Gas Services, LLC
Address 1036 East Main Street City Bridgeport State WV Zip 26330

Stimulating Company US Well Services
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

Completed by Natalie Komp Telephone 303-357-6820
Signature Natalie Title Permitting Agent Date 9/14/2015

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

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SEP 21 2015

API 47-085-09962 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 1H					
EXHIBIT 1					
Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	14-Jan-15	13,715	13,883	60	Marcellus
2	15-Feb-15	13,516	13,684	60	Marcellus
3	16-Feb-15	13,317	13,485	60	Marcellus
4	17-Feb-15	13,118	13,286	60	Marcellus
5	17-Feb-15	12,919	13,087	60	Marcellus
6	18-Feb-15	12,720	12,888	60	Marcellus
7	18-Feb-15	12,521	12,699	60	Marcellus
8	19-Feb-15	12,322	12,490	60	Marcellus
9	19-Feb-15	12,123	12,291	60	Marcellus
10	19-Feb-15	11,924	12,092	60	Marcellus
11	20-Feb-15	11,725	11,893	60	Marcellus
12	20-Feb-15	11,526	11,694	60	Marcellus
13	20-Feb-15	11,327	11,495	60	Marcellus
14	21-Feb-15	11,128	11,296	60	Marcellus
15	21-Feb-15	10,929	11,097	60	Marcellus
16	22-Feb-15	10,730	10,898	60	Marcellus
17	22-Feb-15	10,531	10,699	60	Marcellus
18	22-Feb-15	10,332	10,500	60	Marcellus
19	22-Feb-15	10,133	10,301	60	Marcellus
20	23-Feb-15	9,934	10,102	60	Marcellus
21	23-Feb-15	9,735	9,903	60	Marcellus
22	23-Feb-15	9,536	9,704	60	Marcellus
23	24-Feb-15	9,337	9,505	60	Marcellus
24	24-Feb-15	9,138	9,306	60	Marcellus
25	24-Feb-15	8,939	9,107	60	Marcellus
26	24-Feb-15	8,740	8,908	60	Marcellus
27	25-Feb-15	8,541	8,709	60	Marcellus
28	25-Feb-15	8,342	8,510	60	Marcellus
29	25-Feb-15	8,143	8,311	60	Marcellus
30	25-Feb-15	7,944	8,112	60	Marcellus
31	26-Feb-15	7,745	7,913	60	Marcellus
32	26-Feb-15	7,546	7,714	60	Marcellus
33	26-Feb-15	7,347	7,515	60	Marcellus
34	27-Feb-15	7,148	7,316	60	Marcellus
35	27-Feb-15	6,949	7,117	60	Marcellus
36	27-Feb-15	6,750	6,918	60	Marcellus
37	27-Feb-15	6,551	6,719	60	Marcellus

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Office of Oil & Gas
SEP 21 2015

API 47-085-09962 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 1H

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	15-Feb-15	50.3	8,111	N/A	4,820	800	6,558	N/A
2	16-Feb-15	58.5	7,167	5,540	4,776	174,500	7,163	N/A
3	17-Feb-15	61.5	6,901	5,503	3,988	242,080	6,850	N/A
4	17-Feb-15	54.7	6,648	5,430	4,614	62,400	5,863	N/A
5	17-Feb-15	60.4	7,059	5,405	4,692	225,000	6,562	N/A
6	18-Feb-15	52.6	6,873	5,336	5,270	113,160	8,362	N/A
7	18-Feb-15	61.0	7,148	6,246	3,854	203,800	6,955	N/A
8	19-Feb-15	57.0	6,821	5,279	4,460	242,420	6,590	N/A
9	19-Feb-15	64.0	7,269	5,667	3,951	242,660	6,491	N/A
10	19-Feb-15	62.7	7,303	5,618	4,437	243,200	6,492	N/A
11	20-Feb-15	62.4	7,017	5,300	4,859	241,640	6,427	N/A
12	20-Feb-15	62.9	7,039	5,495	4,783	239,580	6,990	N/A
13	20-Feb-15	62.1	6,986	5,199	4,712	242,800	6,358	N/A
14	21-Feb-15	64.4	7,060	5,194	4,716	242,400	6,334	N/A
15	21-Feb-15	64.6	6,775	5,307	4,263	243,500	6,353	N/A
16	22-Feb-15	64.8	6,848	5,442	4,362	242,400	6,337	N/A
17	22-Feb-15	63.0	6,708	5,359	4,874	242,560	6,689	N/A
18	22-Feb-15	64.0	6,774	5,412	4,882	231,560	6,114	N/A
19	22-Feb-15	65.1	6,854	5,392	3,609	242,000	6,271	N/A
20	23-Feb-15	64.3	6,729	5,579	4,626	239,040	6,231	N/A
21	23-Feb-15	64.7	6,831	5,290	4,107	242,000	6,206	N/A
22	23-Feb-15	65.6	6,896	5,441	4,693	243,400	6,245	N/A
23	24-Feb-15	65.7	6,823	5,243	4,534	235,400	6,254	N/A
24	24-Feb-15	64.5	6,651	5,003	3,580	242,700	6,493	N/A
25	24-Feb-15	65.2	6,598	5,112	4,052	242,700	6,154	N/A
26	24-Feb-15	64.7	6,725	5,336	4,840	213,300	6,160	N/A
27	25-Feb-15	65.6	6,619	5,058	3,698	242,700	6,100	N/A
28	25-Feb-15	63.9	6,570	4,985	4,259	242,900	6,076	N/A
29	25-Feb-15	65.3	6,570	5,115	4,979	242,700	6,055	N/A
30	25-Feb-15	65.7	6,495	5,148	4,978	242,700	6,068	N/A
31	26-Feb-15	61.7	6,320	5,280	4,669	142,900	6,348	N/A
32	26-Feb-15	64.0	6,461	5,252	4,711	241,900	6,003	N/A
33	26-Feb-15	65.7	6,510	5,755	4,755	241,700	6,025	N/A
34	27-Feb-15	65.6	6,476	5,419	4,920	214,800	6,541	N/A
35	27-Feb-15	64.4	6,413	5,059	3,220	241,400	5,976	N/A
36	27-Feb-15	65.8	6,480	4,896	4,120	242,100	5,943	N/A
37	27-Feb-15	65.5	6,419	5,236	4,108	241,000	6,085	N/A
	AVG=	62.8	6,809	5,343	4,453	8,113,800	236,722	TOTAL

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SEP 21 2015

API 47-085-09962 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 1H

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD) From Surface	BOTTOM DEPTH (TVD) From Surface	TOP DEPTH (MD) From Surface	BOTTOM DEPTH (MD) From Surface
Freshwater	126	NA	126	NA
Freshwater	307	NA	307	NA
Sandstone	0	256	0	256
Sandstone/Trace Coal	est. 256	316	est. 256	316
Sandstone/Siltstone	est. 316	596	est. 316	596
Limestone	est. 596	636	est. 596	636
Siltstone/Sandstone	est. 636	736	est. 636	736
Limestone/Siltstone	est. 736	796	est. 736	796
Siltstone	est. 796	896	est. 796	896
Limestone/Sandstone	est. 896	1,056	est. 896	1,056
Coal	est. 1056	1,076	est. 1056	1,076
Sandstone	est. 1076	1,136	est. 1076	1,136
Siltstone	est. 1136	1,196	est. 1136	1,196
Shale	est. 1196	1,256	est. 1196	1,256
Sandstone	est. 1256	1,316	est. 1256	1,316
Sandstone/Trace Coal	est. 1316	1,336	est. 1316	1,336
Sandstone	est. 1336	1,376	est. 1336	1,376
Siltstone	est. 1376	1,396	est. 1376	1,396
Sandstone/Trace Coal	est. 1396	1,696	est. 1396	1,696
Siltstone	est. 1696	1,809	est. 1696	1,809
Big Lime	1,809	1,983	1,809	1,983
Big Injun	1,983	2,361	1,983	2,361
Gantz Sand	2,361	2,760	2,361	2,760
Fifty Foot Sandstone	2,760	2,832	2,760	2,832
Gordon	2,832	3,192	2,832	3,192
Fifth Sandstone	3,192	3,247	3,192	3,247
Bayard	3,247	3,395	3,247	3,395
Warren	3,395	3,748	3,395	3,748
Speechley	3,748	3,980	3,748	3,980
Baltown	3,980	4,445	3,980	4,454
Bradford	4,445	4,819	4,454	4,843
Benson	4,819	5,062	4,843	5,098
Alexander	5,062	5,358	5,098	5,414
Elk	5,358	5,661	5,414	5,735
Rhinestreet	5,661	5,995	5,735	6,089
Sycamore	5,995	6,101	6,089	6,218
Middlesex	6,101	6,208	6,218	6,383
Burkett	6,208	6,237	6,383	6,441
Tully	6,237	6,262	6,441	6,500
Marcellus	6,262	NA	6,500	NA

*Please note Antero determines formation tops based on mud logs that are only run on one well on a multi-well pad. The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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85-09962

Antero Resources

Antero Resources
Cairo-Anna Unit 1H
Ritchie County WV
Northing: 14283541.61
Easting: 1662993.14
ST 1 As Drilled

Frontier 25: GL 968' + KB 28 @ 996.0usft
Gr: 968.0

WELL DETAILS: Cairo-Anna Unit 1H

Ground Level: 968.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	14283541.61	1662993.14	39° 20' 2.265 N	80° 55' 12.564 W	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Cairo-Anna Unit 1H, Grid North
Vertical (TVD) Reference: Frontier 25: GL 968' + KB 28 @ 996.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: Frontier 25: GL 968' + KB 28 @ 996.0usft
Calculation Method: Minimum Curvature

PROJECT DETAILS: Ritchie County WV

Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level

Scientific Drilling

Genie Lightfoot
11:16, September 12 2014

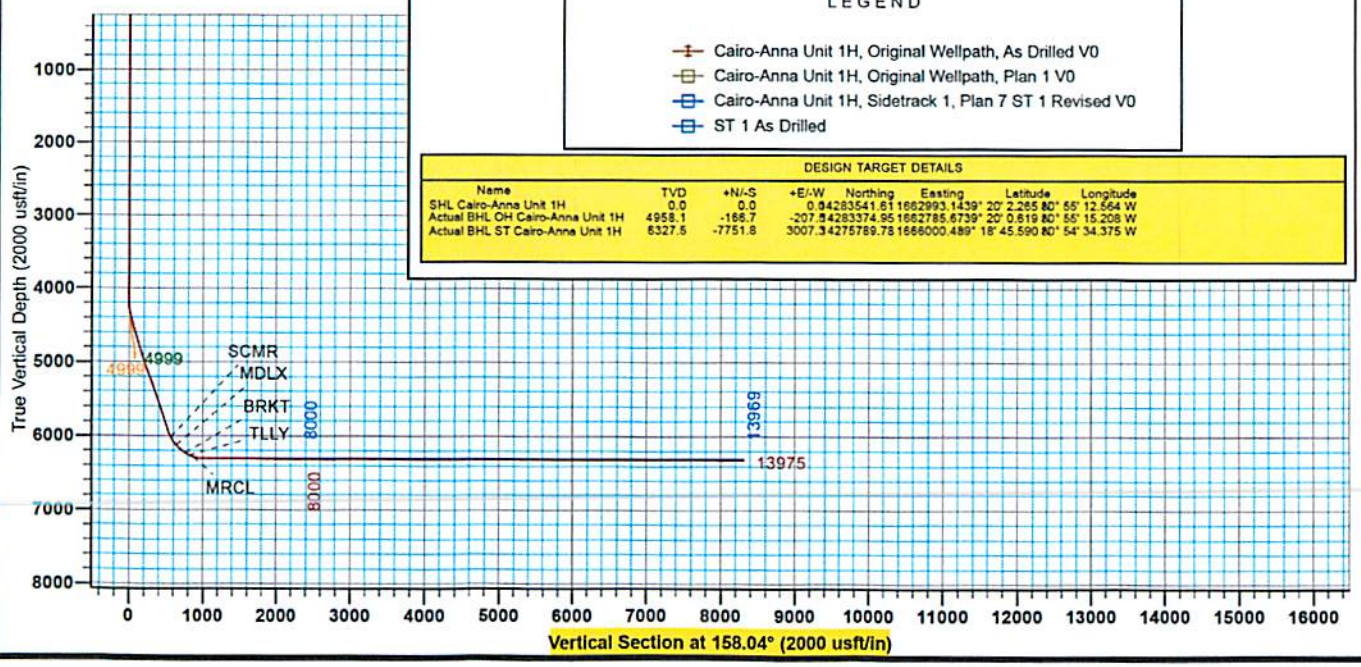
Scientific Drilling
421 South Eagle Lane
Oklahoma City, OK 73128

LEGEND

- Cairo-Anna Unit 1H, Original Wellpath, As Drilled V0
- Cairo-Anna Unit 1H, Original Wellpath, Plan 1 V0
- Cairo-Anna Unit 1H, Sidetrack 1, Plan 7 ST 1 Revised V0
- ST 1 As Drilled

DESIGN TARGET DETAILS

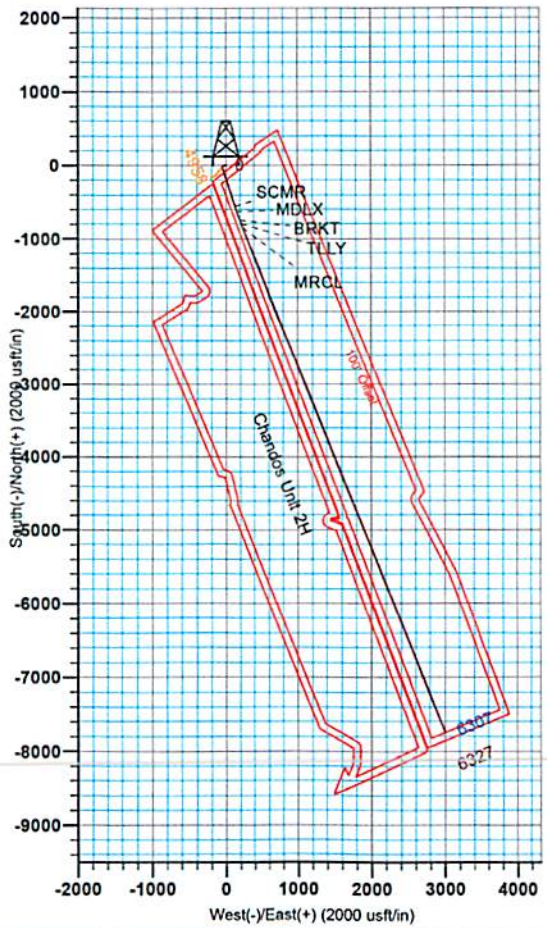
Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Cairo-Anna Unit 1H	0.0	0.0	0.0	14283541.61	1662993.14	39° 20' 2.265 N	80° 55' 12.564 W
Actual BHL OH Cairo-Anna Unit 1H	4958.1	-166.7	-207.5	14283374.95	1662785.67	39° 20' 0.619 N	80° 55' 15.208 W
Actual BHL ST Cairo-Anna Unit 1H	6327.5	-7751.8	3007.3	14275789.78	1666000.48	39° 18' 45.590 N	80° 54' 34.375 W



To convert Magnetic North to Grid, Subtract 8.44°
To convert True North to Grid, Subtract 0.05°

Azimuths to Grid North
True North: -0.05°
Magnetic North: -8.44°

Magnetic Field
Strength: 52279.7snT
Dip Angle: 66.91°
Date: 8/8/2014
Model: BGGM2014



85.09962

Antero Resources

Ritchie County WV
Anna Pad
Cairo-Anna Unit 1H
Sidetrack 1

Design: ST 1 As Drilled

EOW Completion Report

12 September, 2014

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SEP 21 2015

Scientific Drilling

85.09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Project Ritchie County WV, Ritchie County WV, WV North

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site Anna Pad

Site Position:		**Northing:**	14,283,550.70 usft	**Latitude:**	39° 20' 2.355 N
From:	Map	**Easting:**	1,662,998.99 usft	**Longitude:**	80° 55' 12.490 W
Position Uncertainty:	2.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.05 °

Well Cairo-Anna Unit 1H, Marcellus

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,283,541.61 usft	**Latitude:**	39° 20' 2.265 N
	+E/-W	0.0 usft	**Easting:**	1,662,993.14 usft	**Longitude:**	80° 55' 12.564 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	996.0 usft	**Ground Level:**	968.0 usft

Wellbore Sidetrack 1

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	8/8/2014	-8.39	66.91	52,280

Design ST 1 As Drilled

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	4,197.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	158.04

Survey Program Date 9/12/2014

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
115.0	3,705.0	Survey #2 Def Gyro to Int (Original Wellpa	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
3,718.0	4,197.0	Survey #3 Stab/Steer (Original Wellpath)	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
4,197.0	13,975.0	Survey #1 ST1 (Sidetrack 1)	MWD SDI	MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
115.0	0.13	234.91	115.0	-0.1	-0.1	0.0	0.11
140.0	0.17	248.71	140.0	-0.1	-0.2	0.0	0.21
165.0	0.21	255.95	165.0	-0.1	-0.2	0.0	0.19
190.0	0.18	238.84	190.0	-0.2	-0.3	0.0	0.26
215.0	0.12	254.61	215.0	-0.2	-0.4	0.0	0.29
240.0	0.14	241.12	240.0	-0.2	-0.4	0.0	0.15
265.0	0.15	254.55	265.0	-0.2	-0.5	0.0	0.14
290.0	0.17	245.17	290.0	-0.3	-0.6	0.0	0.13
315.0	0.27	232.76	315.0	-0.3	-0.6	0.0	0.44

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85.09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	Local Co-ordinate Reference:	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	TVD Reference:	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	MD Reference:	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	North Reference:	Grid
Wellbore:	Sidetrack 1	Survey Calculation Method:	Minimum Curvature
Design:	ST 1 As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
340.0	0.12	255.22	340.0	-0.4	-0.7	0.1	0.66
365.0	0.23	238.00	365.0	-0.4	-0.8	0.1	0.48
390.0	0.21	239.88	390.0	-0.4	-0.9	0.1	0.09
415.0	0.20	226.74	415.0	-0.5	-0.9	0.1	0.19
440.0	0.17	241.14	440.0	-0.5	-1.0	0.1	0.22
465.0	0.17	244.74	465.0	-0.6	-1.1	0.1	0.04
490.0	0.06	215.08	490.0	-0.6	-1.1	0.1	0.49
515.0	0.01	144.24	515.0	-0.6	-1.1	0.1	0.23
540.0	0.04	213.00	540.0	-0.6	-1.1	0.2	0.15
565.0	0.06	287.35	565.0	-0.6	-1.1	0.2	0.25
590.0	0.09	228.30	590.0	-0.6	-1.2	0.2	0.31
615.0	0.04	214.82	615.0	-0.6	-1.2	0.2	0.21
640.0	0.03	244.35	640.0	-0.7	-1.2	0.2	0.08
665.0	0.10	292.60	665.0	-0.7	-1.2	0.2	0.33
690.0	0.05	343.17	690.0	-0.6	-1.2	0.1	0.31
715.0	0.10	293.49	715.0	-0.6	-1.3	0.1	0.31
740.0	0.11	311.03	740.0	-0.6	-1.3	0.1	0.13
765.0	0.15	288.27	765.0	-0.6	-1.3	0.0	0.26
790.0	0.12	317.90	790.0	-0.5	-1.4	0.0	0.30
815.0	0.16	312.24	815.0	-0.5	-1.4	-0.1	0.17
840.0	0.10	339.84	840.0	-0.4	-1.5	-0.1	0.34
865.0	0.06	310.42	865.0	-0.4	-1.5	-0.2	0.22
890.0	0.07	356.66	890.0	-0.4	-1.5	-0.2	0.21
915.0	0.09	324.74	915.0	-0.4	-1.5	-0.2	0.19
940.0	0.06	327.56	940.0	-0.3	-1.5	-0.3	0.12
965.0	0.12	280.64	965.0	-0.3	-1.6	-0.3	0.36
990.0	0.13	292.13	990.0	-0.3	-1.6	-0.3	0.11
1,015.0	0.09	316.70	1,015.0	-0.3	-1.7	-0.4	0.24
1,040.0	0.12	292.04	1,040.0	-0.3	-1.7	-0.4	0.21
1,065.0	0.13	270.96	1,065.0	-0.2	-1.7	-0.4	0.19
1,090.0	0.11	316.78	1,090.0	-0.2	-1.8	-0.5	0.38
1,115.0	0.10	305.51	1,115.0	-0.2	-1.8	-0.5	0.09
1,140.0	0.16	300.82	1,140.0	-0.2	-1.9	-0.5	0.24
1,165.0	0.04	293.86	1,165.0	-0.1	-1.9	-0.6	0.48
1,190.0	0.10	296.56	1,190.0	-0.1	-1.9	-0.6	0.24
1,215.0	0.06	300.61	1,215.0	-0.1	-2.0	-0.6	0.16
1,240.0	0.12	261.54	1,240.0	-0.1	-2.0	-0.6	0.33
1,265.0	0.12	298.48	1,265.0	-0.1	-2.1	-0.7	0.30
1,290.0	0.16	280.43	1,290.0	-0.1	-2.1	-0.7	0.24
1,315.0	0.11	305.71	1,315.0	-0.1	-2.2	-0.7	0.31
1,340.0	0.15	286.36	1,340.0	0.0	-2.2	-0.8	0.24
1,365.0	0.08	274.51	1,365.0	0.0	-2.3	-0.8	0.29
1,390.0	0.21	284.77	1,390.0	0.0	-2.3	-0.9	0.53
1,415.0	0.11	332.49	1,415.0	0.0	-2.4	-0.9	0.63
1,440.0	0.11	326.77	1,440.0	0.1	-2.4	-1.0	0.04

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SEP 21 2015

85-09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,465.0	0.10	263.58	1,465.0	0.1	-2.4	-1.0	0.44
1,490.0	0.15	312.37	1,490.0	0.1	-2.5	-1.0	0.45
1,515.0	0.09	251.73	1,515.0	0.1	-2.5	-1.0	0.53
1,540.0	0.02	3.05	1,540.0	0.1	-2.5	-1.1	0.40
1,565.0	0.06	284.01	1,565.0	0.1	-2.6	-1.1	0.24
1,590.0	0.06	277.84	1,590.0	0.1	-2.6	-1.1	0.03
1,615.0	0.06	354.42	1,615.0	0.1	-2.6	-1.1	0.30
1,640.0	0.10	57.97	1,640.0	0.2	-2.6	-1.1	0.36
1,665.0	0.05	79.26	1,665.0	0.2	-2.6	-1.1	0.23
1,690.0	0.02	90.32	1,690.0	0.2	-2.5	-1.1	0.12
1,715.0	0.01	98.16	1,715.0	0.2	-2.5	-1.1	0.04
1,740.0	0.02	205.36	1,740.0	0.2	-2.5	-1.1	0.10
1,765.0	0.06	96.82	1,765.0	0.2	-2.5	-1.1	0.28
1,790.0	0.02	255.71	1,790.0	0.2	-2.5	-1.1	0.32
1,815.0	0.05	216.32	1,815.0	0.2	-2.5	-1.1	0.15
1,840.0	0.03	317.73	1,840.0	0.1	-2.5	-1.1	0.25
1,865.0	0.08	10.31	1,865.0	0.2	-2.5	-1.1	0.26
1,890.0	0.05	36.79	1,890.0	0.2	-2.5	-1.1	0.17
1,915.0	0.03	348.28	1,915.0	0.2	-2.5	-1.1	0.15
1,940.0	0.04	312.66	1,940.0	0.2	-2.5	-1.2	0.09
1,965.0	0.06	282.02	1,965.0	0.2	-2.5	-1.2	0.13
1,990.0	0.02	10.47	1,990.0	0.2	-2.6	-1.2	0.25
2,015.0	0.09	82.39	2,015.0	0.2	-2.5	-1.2	0.34
2,040.0	0.08	320.19	2,040.0	0.3	-2.5	-1.2	0.60
2,065.0	0.07	161.16	2,065.0	0.3	-2.5	-1.2	0.59
2,090.0	0.09	267.01	2,090.0	0.2	-2.6	-1.2	0.51
2,115.0	0.02	346.92	2,115.0	0.2	-2.6	-1.2	0.35
2,140.0	0.06	37.17	2,140.0	0.3	-2.6	-1.2	0.20
2,165.0	0.07	63.36	2,165.0	0.3	-2.5	-1.2	0.12
2,190.0	0.05	50.95	2,190.0	0.3	-2.5	-1.2	0.09
2,215.0	0.03	19.75	2,215.0	0.3	-2.5	-1.2	0.12
2,240.0	0.07	268.98	2,240.0	0.3	-2.5	-1.2	0.34
2,265.0	0.01	162.49	2,265.0	0.3	-2.5	-1.2	0.29
2,290.0	0.07	171.66	2,290.0	0.3	-2.5	-1.2	0.24
2,315.0	0.06	211.66	2,315.0	0.3	-2.5	-1.2	0.18
2,340.0	0.08	297.96	2,340.0	0.3	-2.6	-1.2	0.39
2,365.0	0.17	281.63	2,365.0	0.3	-2.6	-1.2	0.38
2,390.0	0.04	210.10	2,390.0	0.3	-2.7	-1.3	0.65
2,415.0	0.13	264.03	2,415.0	0.3	-2.7	-1.3	0.49
2,440.0	0.07	281.52	2,440.0	0.3	-2.7	-1.3	0.27
2,465.0	0.09	310.16	2,465.0	0.3	-2.8	-1.3	0.18
2,490.0	0.05	349.79	2,490.0	0.3	-2.8	-1.3	0.24
2,515.0	0.05	260.66	2,515.0	0.3	-2.8	-1.3	0.28
2,540.0	0.08	303.06	2,540.0	0.3	-2.8	-1.4	0.22

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SEP 21 2015

85.09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
2,565.0	0.14	299.77	2,565.0	0.3	-2.9	-1.4	0.24
2,590.0	0.06	237.68	2,590.0	0.4	-2.9	-1.4	0.50
2,615.0	0.28	236.29	2,615.0	0.3	-3.0	-1.4	0.88
2,630.6	0.08	241.27	2,630.5	0.3	-3.0	-1.4	1.29
2,784.0	0.21	244.15	2,784.0	0.1	-3.3	-1.4	0.08
2,987.0	0.18	250.10	2,987.0	-0.2	-4.0	-1.3	0.02
3,189.0	0.11	213.06	3,189.0	-0.4	-4.4	-1.2	0.06
3,395.0	0.09	160.77	3,395.0	-0.7	-4.4	-1.0	0.04
3,585.0	0.19	108.93	3,585.0	-1.0	-4.1	-0.6	0.08
3,705.0	0.24	116.54	3,705.0	-1.2	-3.7	-0.3	0.05
3,718.0	0.24	100.64	3,718.0	-1.2	-3.6	-0.3	0.51
3,835.0	2.79	287.48	3,834.9	-0.4	-6.1	-1.9	2.59
3,951.0	4.85	268.41	3,950.7	0.3	-13.7	-5.4	2.06
4,072.0	6.47	249.57	4,071.1	-2.2	-25.2	-7.4	2.02
4,197.0	9.57	230.16	4,194.9	-11.3	-39.8	-4.4	3.26
4,240.0	8.18	217.63	4,237.4	-16.0	-44.4	-1.8	5.52
4,272.0	9.67	190.03	4,269.0	-20.5	-46.3	1.7	14.01
4,304.0	10.90	178.69	4,300.5	-26.1	-46.7	6.8	7.39
4,336.0	12.49	168.94	4,331.8	-32.6	-45.9	13.0	7.91
4,368.0	13.81	159.97	4,363.0	-39.5	-44.0	20.2	7.58
4,399.0	14.42	156.19	4,393.1	-46.6	-41.1	27.8	3.56
4,431.0	14.95	157.86	4,424.0	-54.0	-38.0	35.9	2.12
4,463.0	15.21	160.15	4,454.9	-61.8	-35.0	44.2	2.03
4,558.0	14.68	165.24	4,546.7	-85.2	-27.7	68.6	1.49
4,654.0	16.00	165.60	4,639.3	-109.7	-21.3	93.8	1.38
4,750.0	17.32	166.30	4,731.2	-136.4	-14.6	121.1	1.39
4,845.0	17.32	156.54	4,822.0	-163.1	-5.6	149.2	3.06
4,941.0	17.67	156.10	4,913.5	-189.6	6.0	178.1	0.39
5,036.0	17.59	158.30	5,004.1	-216.1	17.1	206.8	0.71
5,131.0	19.26	163.84	5,094.2	-244.5	26.8	236.8	2.55
5,225.0	20.31	165.51	5,182.6	-275.2	35.2	268.4	1.27
5,320.0	21.72	162.87	5,271.3	-307.9	44.5	302.2	1.79
5,416.0	19.96	161.64	5,361.0	-340.5	54.9	336.3	1.89
5,511.0	18.20	159.36	5,450.8	-369.7	65.2	367.3	2.01
5,606.0	18.29	164.45	5,541.0	-398.0	74.4	396.9	1.68
5,701.0	19.52	161.90	5,630.9	-427.4	83.4	427.6	1.56
5,796.0	18.29	161.20	5,720.8	-456.6	93.1	458.3	1.32
5,890.0	19.79	161.38	5,809.7	-485.7	102.9	488.9	1.60
5,986.0	18.11	159.44	5,900.4	-515.1	113.4	520.1	1.87
6,017.0	17.67	159.27	5,929.9	-524.0	116.7	529.6	1.43
6,049.0	19.61	160.23	5,960.3	-533.6	120.3	539.8	6.14
6,081.0	23.13	161.55	5,990.1	-544.6	124.1	551.5	11.10
6,112.0	27.02	162.73	6,018.1	-557.1	128.1	564.6	12.65

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SEP 21 2015

85.09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,113.0	27.15	162.76	6,019.0	-557.5	128.2	565.0	13.34
SCMR							
6,143.0	31.13	163.66	6,045.2	-571.5	132.4	579.6	13.34
6,174.0	34.91	162.43	6,071.2	-587.7	137.4	596.4	12.38
6,206.0	38.53	160.68	6,096.9	-605.8	143.4	615.5	11.77
6,238.0	41.68	160.81	6,121.3	-625.3	150.2	636.1	9.85
6,242.0	42.04	160.77	6,124.3	-627.8	151.1	638.7	9.09
MDLX							
6,270.0	44.58	160.50	6,144.7	-645.9	157.5	657.9	9.09
6,303.0	47.29	160.87	6,167.6	-668.3	165.3	681.6	8.25
6,335.0	50.12	158.30	6,188.7	-690.8	173.7	705.6	10.70
6,367.0	53.20	156.19	6,208.6	-713.9	183.4	730.7	10.93
6,398.0	56.45	155.58	6,226.5	-737.1	193.8	756.0	10.61
6,407.0	57.14	155.93	6,231.4	-743.9	196.9	763.6	8.37
BRKT							
6,430.0	58.92	156.81	6,243.6	-761.8	204.7	783.1	8.37
6,461.0	60.76	157.86	6,259.1	-786.5	215.0	809.9	6.62
6,465.0	61.25	158.00	6,261.1	-789.8	216.3	813.4	12.72
TLLY							
6,493.0	64.72	158.92	6,273.8	-813.0	225.5	838.3	12.72
6,525.0	69.53	159.95	6,286.2	-840.6	235.8	867.8	15.32
6,531.0	70.54	159.95	6,288.3	-845.9	237.8	873.4	16.84
MRCL							
6,557.0	74.92	159.97	6,296.0	-869.2	246.3	898.2	16.84
6,607.0	85.03	159.36	6,304.7	-915.3	263.4	947.4	20.26
6,626.0	88.05	158.22	6,305.8	-933.0	270.2	966.3	16.99
6,734.0	90.57	157.16	6,307.1	-1,032.9	311.2	1,074.3	2.53
6,829.0	90.22	156.37	6,306.5	-1,120.2	348.7	1,169.3	0.91
6,924.0	88.55	156.45	6,307.5	-1,207.2	386.7	1,264.2	1.76
7,019.0	88.90	155.84	6,309.6	-1,294.1	425.1	1,359.2	0.74
7,113.0	89.60	160.15	6,310.8	-1,381.2	460.3	1,453.1	4.64
7,208.0	89.96	159.54	6,311.2	-1,470.4	493.1	1,548.1	0.75
7,303.0	89.43	160.50	6,311.7	-1,559.7	525.5	1,643.0	1.15
7,398.0	89.87	159.60	6,312.3	-1,649.0	557.9	1,738.0	1.05
7,493.0	88.81	159.18	6,313.4	-1,737.9	591.4	1,832.9	1.20
7,588.0	88.90	159.27	6,315.3	-1,826.7	625.1	1,927.9	0.13
7,683.0	90.40	159.44	6,315.9	-1,915.6	658.5	2,022.9	1.59
7,777.0	90.84	158.56	6,314.8	-2,003.3	692.2	2,116.8	1.05
7,872.0	89.34	156.89	6,314.7	-2,091.2	728.2	2,211.8	2.36
7,968.0	89.43	156.02	6,315.7	-2,179.2	766.6	2,307.8	0.91
8,064.0	89.60	156.81	6,316.5	-2,267.2	805.0	2,403.7	0.84
8,159.0	90.57	157.69	6,316.4	-2,354.8	841.7	2,498.7	1.38
8,248.0	89.96	157.51	6,316.0	-2,437.1	875.6	2,587.7	0.71
8,338.0	89.69	156.45	6,316.3	-2,519.9	910.8	2,677.7	1.22
8,429.0	90.23	157.08	6,316.3	-2,603.5	946.7	2,768.7	0.91

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Office of Oil & Gas
SEP 21 2015

85-09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
8,520.0	90.57	158.56	6,315.7	-2,687.8	981.1	2,859.7	1.67
8,611.0	90.40	158.21	6,314.9	-2,772.4	1,014.6	2,950.7	0.43
8,791.0	90.13	158.04	6,314.1	-2,939.4	1,081.7	3,130.7	0.18
8,883.0	89.52	158.04	6,314.4	-3,024.8	1,116.1	3,222.7	0.66
8,973.0	89.43	157.69	6,315.2	-3,108.1	1,150.0	3,312.7	0.40
9,063.0	89.87	157.95	6,315.7	-3,191.5	1,184.0	3,402.7	0.57
9,153.0	90.57	157.60	6,315.4	-3,274.8	1,218.0	3,492.7	0.87
9,243.0	88.90	158.65	6,315.8	-3,358.3	1,251.5	3,582.7	2.19
9,338.0	88.81	158.21	6,317.7	-3,446.6	1,286.5	3,677.6	0.47
9,432.0	88.99	158.65	6,319.5	-3,534.0	1,321.0	3,771.6	0.51
9,527.0	89.16	158.21	6,321.1	-3,622.4	1,355.9	3,866.6	0.50
9,621.0	89.69	158.56	6,322.0	-3,709.7	1,390.6	3,960.6	0.68
9,715.0	90.22	160.15	6,322.1	-3,797.7	1,423.7	4,054.6	1.78
9,809.0	90.92	160.15	6,321.1	-3,886.1	1,455.6	4,148.5	0.74
9,903.0	91.01	159.44	6,319.5	-3,974.3	1,488.1	4,242.4	0.76
9,998.0	90.04	158.92	6,318.7	-4,063.1	1,521.8	4,337.4	1.16
10,092.0	90.13	158.30	6,318.5	-4,150.6	1,556.1	4,431.4	0.67
10,187.0	90.04	158.04	6,318.4	-4,238.8	1,591.4	4,526.4	0.29
10,281.0	89.96	158.12	6,318.4	-4,326.0	1,626.5	4,620.4	0.12
10,375.0	89.69	158.04	6,318.7	-4,413.2	1,661.6	4,714.4	0.30
10,469.0	89.96	157.86	6,319.0	-4,500.4	1,696.9	4,808.4	0.35
10,563.0	90.22	157.77	6,318.8	-4,587.4	1,732.4	4,902.4	0.29
10,657.0	90.40	157.51	6,318.3	-4,674.3	1,768.2	4,996.4	0.34
10,751.0	90.66	156.98	6,317.4	-4,761.0	1,804.5	5,090.4	0.63
10,847.0	88.55	156.98	6,318.1	-4,849.4	1,842.1	5,186.4	2.20
10,941.0	89.52	157.16	6,319.7	-4,935.9	1,878.7	5,280.3	1.05
11,035.0	89.78	158.39	6,320.3	-5,022.9	1,914.2	5,374.3	1.34
11,129.0	89.69	158.83	6,320.7	-5,110.5	1,948.5	5,468.3	0.48
11,223.0	89.87	159.00	6,321.1	-5,198.2	1,982.3	5,562.3	0.26
11,318.0	89.98	158.65	6,321.2	-5,286.7	2,016.6	5,657.3	0.39
11,412.0	89.69	158.92	6,321.5	-5,374.4	2,050.7	5,751.3	0.42
11,506.0	89.96	158.21	6,321.7	-5,461.9	2,085.0	5,845.3	0.81
11,601.0	89.43	158.48	6,322.2	-5,550.2	2,120.1	5,940.3	0.63
11,696.0	89.60	158.04	6,323.1	-5,638.4	2,155.3	6,035.3	0.50
11,884.0	89.52	157.86	6,324.5	-5,812.6	2,225.8	6,223.3	0.10
11,979.0	89.78	157.60	6,325.1	-5,900.6	2,261.8	6,318.3	0.39
12,073.0	90.48	157.33	6,324.9	-5,987.4	2,297.9	6,412.3	0.80
12,166.0	90.84	156.81	6,323.8	-6,073.0	2,334.1	6,505.3	0.68
12,261.0	91.45	156.98	6,321.9	-6,160.4	2,371.4	6,600.2	0.67
12,355.0	90.04	158.39	6,320.7	-6,247.3	2,407.1	6,694.2	2.12
12,449.0	89.52	158.65	6,321.0	-6,334.8	2,441.5	6,788.2	0.62
12,543.0	89.78	158.74	6,321.6	-6,422.4	2,475.6	6,882.2	0.29
12,637.0	89.87	158.74	6,321.9	-6,510.0	2,509.7	6,976.2	0.10
12,732.0	89.60	159.00	6,322.3	-6,598.6	2,544.0	7,071.2	0.39

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85-09962

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 1H
Project:	Ritchie County WV	**TVD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Site:	Anna Pad	**MD Reference:**	Frontier 25: GL 968' + KB 28 @ 996.0usft
Well:	Cairo-Anna Unit 1H	**North Reference:**	Grid
Wellbore:	Sidetrack 1	**Survey Calculation Method:**	Minimum Curvature
Design:	ST 1 As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
12,826.0	90.13	158.21	6,322.6	-6,686.1	2,578.2	7,165.2	1.01
12,921.0	90.40	158.48	6,322.1	-6,774.4	2,613.3	7,260.2	0.40
13,016.0	90.57	158.39	6,321.3	-6,862.8	2,648.2	7,355.2	0.20
13,111.0	90.31	159.09	6,320.6	-6,951.3	2,682.7	7,450.1	0.79
13,205.0	90.75	159.00	6,319.7	-7,039.1	2,716.3	7,544.1	0.48
13,299.0	89.43	158.83	6,319.6	-7,126.8	2,750.1	7,638.1	1.42
13,393.0	89.43	158.12	6,320.5	-7,214.2	2,784.6	7,732.1	0.76
13,582.0	88.99	157.60	6,323.1	-7,389.3	2,855.8	7,921.1	0.36
13,676.0	89.16	156.76	6,324.6	-7,475.9	2,892.3	8,015.1	0.91
13,770.0	89.25	157.07	6,325.9	-7,562.4	2,929.1	8,109.0	0.34
13,864.0	89.52	157.25	6,326.9	-7,649.0	2,965.6	8,203.0	0.35
13,918.0	89.78	158.12	6,327.3	-7,698.9	2,986.1	8,257.0	1.68
13,975.0	89.78	158.12	6,327.5	-7,751.8	3,007.3	8,314.0	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
6,113.0	6,019.0	-557.5	128.2	SCMR
6,242.0	6,124.3	-627.8	151.1	MDLX
6,407.0	6,231.4	-743.9	196.9	BRKT
6,465.0	6,261.1	-789.8	216.3	TLLY
6,531.0	6,288.3	-845.9	237.8	MRCL

Checked By: _____ Approved By: _____ Date: _____

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SEP 21 2015

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	2/15/2015
Job End Date:	2/27/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-09962-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Cairo-Anna Unit 1H
Longitude:	-80.91998300
Latitude:	39.33404400
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,328
Total Base Water Volume (gal):	9,942,324
Total Base Non Water Volume:	430,888

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Interstate Oil & Gas Compact Commission

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Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Antero Resources	Base Fluid					
			Water	7732-18-5	100.00000	90.61906	
Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	8.86727	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.17528	
			Hydrogen Chloride	7641-01-1	18.00000	0.04187	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.08087	
			Petroleum Distillates	64742-47-8	60.00000	0.07659	
			Suspending agent (solid)	14808-60-7	3.00000	0.01237	
			Surfactant	68439-51-0	3.00000	0.00485	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.02847	
			Anionic Polyacrylamide	Proprietary		0.02847	
			Petroleum Distillates	64742-47-8	22.00000	0.02292	
			Crystalline Salt	12125-02-9	5.00000	0.00356	

085-09962

			Ethoxylated alcohol blend	Proprietary	5.00000	0.00356	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01054	
			Ethylene Glycol	107-21-1	40.00000	0.00595	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00178	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00170	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00165	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00155	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00151	
			Acrylic polymer	52255-49-9	5.00000	0.00066	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00449	
			Deionized Water	7732-18-5	28.00000	0.00256	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00215	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00013	
			Methenamine	100-97-0	20.00000	0.00011	
			Hydrogen Chloride	7647-01-0	10.00000	0.00005	
			Polyethylene polyamine	68603-67-8	10.00000	0.00004	
			Coco amine	61791-14-8	5.00000	0.00002	

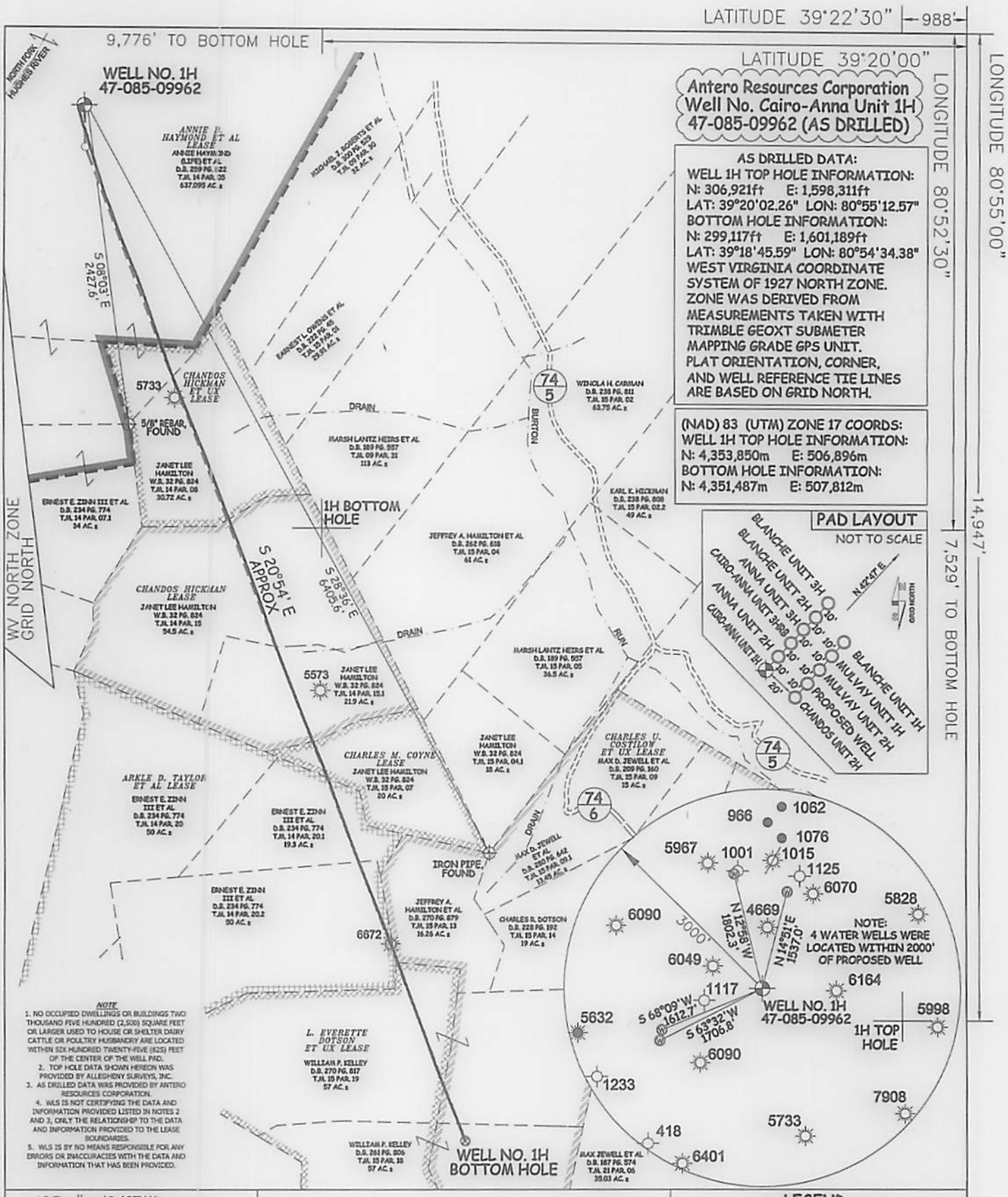
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

* Total Water Volume sources may include fresh water, produced water, and/or recycled water
** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.
Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

Received
Office of Oil & Gas
SEP 21 2015

85-09962



NOTE

1. NO OCCUPIED DWELLINGS OR BUILDINGS TWO THOUSAND FIVE HUNDRED (2,500) SQUARE FEET OR LARGER USED TO HOUSE OR SHELTER DAIRY CATTLE OR POULTRY HUSBANDRY ARE LOCATED WITHIN SIX HUNDRED TWENTY-FIVE (625) FEET OF THE CENTER OF THE WELL PAD.
2. TOP HOLE DATA SHOWN HEREON WAS PROVIDED BY ALLEGHENY SURVEYS, INC.
3. AS DRILLED DATA WAS PROVIDED BY ANTERO RESOURCES CORPORATION.
4. WLS IS NOT CERTIFYING THE DATA AND INFORMATION PROVIDED LISTED IN NOTES 2 AND 3, ONLY THE RELATIONSHIP TO THE DATA AND INFORMATION PROVIDED TO THE LEASE BOUNDARIES.
5. WLS IS BY NO MEANS RESPONSIBLE FOR ANY ERRORS OR INACCURACIES WITH THE DATA AND INFORMATION THAT HAS BEEN PROVIDED.

JOB # 12-127WA
DRAWING # CAIRO-ANNA1HAD
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY SUBMETER
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS

STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

WILLOW LAND SURVEYING PLLC
266 HUSHERS RUN RD PENNSBORO
WEST VIRGINIA 26415

LEGEND
- Surface Owner Boundary Lines +/-
- Interior Surface Tracts +/-
- Existing Fence
- Found monument, as noted
- Proposed Well Path
- As Drilled Well Path

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

DATE 07/27/15
OPERATOR'S WELL# CAIRO-ANNA UNIT #1H

API WELL # 47 – 085 – 09962
STATE COUNTY PERMIT

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

LOCATION: ELEVATION 992' ORIGINAL - 971' AS DRILLED WATERSHED NORTH FORK HUGHES RIVER
QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE
SURFACE OWNER ANNIE B. HAYMOND, ET AL ACREAGE 637.095 ACRES +/-
OIL & GAS ROYALTY OWNER ANNIE B. HAYMOND, ET AL; CHANDOS HICKMAN ET UX; CHANDOS HICKMAN; CHARLES M. COYNE; ARKLE D. TAYLOR ET AL; CHARLES U. COSTILOW ET UX; L. EVERETTE DOTSON ET UX LEASE ACREAGE 700 ACRES±; 35 ACRES±; 75.5 ACRES±; 18.5 ACRES±; 120 ACRES±; 200 ACRES±; 75 ACRES±
PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL (SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,327' TVD 13,975' MD

COUNTY NAME
PERMIT

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD
CHARLESTON, WV 25313

FORM WW-6

WR-35
Rev. 8/23/13

Page ___ of ___

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

API 47 - 085 - 10015 County Ritchie District Clay
Quad Pennsboro 7.5' Pad Name Eddy Pad Field/Pool Name ---
Farm name Annie B. Haymond, et al Well Number Cairo-Anna Unit 3HRB
Operator (as registered with the OOG) Antero Resources Corporation
Address 1615 Wynkoop Street City Denver State CO Zip 80202

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey

Top hole	Northing	4,353,854m	Easting	506,900m
Landing Point of Curve	Northing	4,353,762.41m	Easting	507,117.28m
Bottom Hole	Northing	4,351,567m	Easting	508,003m

Elevation (ft) 971' 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)
Air - Foam & 4% KCL
Mud - Polymer

Date permit issued 1/31/2013 Date drilling commenced 3/1/2013 Date drilling ceased 9/23/2014
Date completion activities began 3/1/2015 Date completion activities ceased 5/4/2015
Verbal plugging (Y/N) N/A Date permission granted N/A Granted by N/A

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

Freshwater depth(s) ft 126', 307' Open mine(s) (Y/N) depths N
Salt water depth(s) ft 653', 2099' Void(s) encountered (Y/N) depths N
Coal depth(s) ft 1056' Cavern(s) encountered (Y/N) depths N
Is coal being mined in area (Y/N) N

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Office of Oil & Gas
SEP 21 2015

Reviewed by:

WR-35
Rev. 8/23/13

API 47- 085 - 10015 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 3HRB

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	24"	20"	40'	New	94#/H-40	N/A	Y
Surface	17-1/2"	13-3/8"	377'	New	48#/AT-50	N/A	Y
Coal							
Intermediate 1	12-1/4"	9-5/8"	2501'	New	36#/J-55	N/A	Y
Intermediate 2							
Intermediate 3							
Production	8-3/4"/8-1/2"	5-1/2"	14,692'	New	23#/P-110	N/A	Y
Tubing		2-3/8"	6516'		4.7#/N-80		
Packer type and depth set		N/A					

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	Class A	70 sx	15.6	1.88	38 Cu. Ft.	0'	8 Hrs.
Surface	Class A	467 sx	15.6	1.18	262 Cu. Ft.	0'	8 Hrs.
Coal							
Intermediate 1	Class A	982 sx	15.6	1.18	783 Cu. Ft.	0'	8 Hrs.
Intermediate 2							
Intermediate 3							
Production	Class H	783 sx (Lead), 1378 sx (Tail)	13.5 (Lead), 15.2 (Tail)	1.44 (Lead), 1.80 (Tail)	2908 Cu. Ft.	~500' into Intermediate Casing	8 Hrs.
Tubing							

Drillers TD (ft) 14,692' MD, 6323' TVD (BHL); 6337' TVD (Deepest Point Drilled) Loggers TD (ft) 14,637' MD

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

Plug back procedure N/A

Kick off depth (ft) 5543'

** This is a subsequent well. Antero only runs wireline logs on one well on a multi-well pad (Anna Unit 2H API# 47-085-09963). Please reference the wireline logs submitted with Form WR-35 for the Anna Unit 2H. A Cement Bond Log has been included with this submittal.

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

Well cored ☐ Yes ■ No Conventional Sidewall Were cuttings collected ☐ Yes ■ No

DESCRIBE THE CENTRALIZER PLACEMENT USED FOR EACH CASING STRING

Conductor - 0

Surface - 1 above guide shoe, 1 above insert float, 1 every 4th joint to surface

Intermediate - 1 above float joint, 1 above float collar, 1 every 4th joint to surface

Production - 1 above float joint, 1 below float collar, 1 every 3rd joint to top of cement

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 N/A

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Office of Oil & Gas
SEP 21 2015

WR-35
Rev. 8/23/13

API 47- 085 - 10015 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 3HRB

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
			SEE ATTACHED EXHIBIT 1		

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 EXHIBIT 2				

Received
Office of Oil & Gas
SEP 21 2015

Please insert additional pages as applicable.

WR-35
Rev. 8/23/13

Page ___ of ___

API 47- 085 - 10015 Farm name Annie B. Haymond, et al Well number Cairo-Anna Unit 3HRB

PRODUCING FORMATION(S)	DEPTHS			
Marcellus	6270' (Top)	TVD	6662' (Top)	MD

Please insert additional pages as applicable.

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

SHUT-IN PRESSURE Surface 3000 psi Bottom Hole ---- psi DURATION OF TEST ---- hrs

OPEN FLOW	Gas	Oil	NGL	Water	GAS MEASURED BY
	11,951 mcfpd	67 bpd	---- bpd	494 bpd	☐ Estimated ■ Orifice ☐ Pilot

LITHOLOGY/ FORMATION NAME	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 QUANTITYAND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H_2S, ETC)
	0		0		

SEE ATTACHED EXHIBIT 3

Please insert additional pages as applicable.

Drilling Contractor Frontier Drilling LLC
Address 562 Spring Run Road City Pennsboro State WV Zip 26415

Logging Company STRC
Address 1560 Good Hope Pike City Clarksburg State WV Zip 26301

Cementing Company Allied Oil & Gas Services, LLC
Address 1036 East Main Street City Bridgeport State WV Zip 26330

Stimulating Company US Well Services
Address 533 Industrial Park Drive City Jane Lew State WV Zip 26378

Please insert additional pages as applicable.

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Completed by Natalie Komp Telephone 303-357-6820
Signature Natalie Komp Title Permitting Agent Date 9/14/2015

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

API 47-085-10015 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 3HRB

EXHIBIT 1

Stage No.	Perforation Date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formations
1	1-Mar-15	14,427	14,594	60	Marcellus
2	2-Mar-15	14,229	14,396	60	Marcellus
3	2-Mar-15	14,031	14,198	60	Marcellus
4	3-Mar-15	13,833	14,000	60	Marcellus
5	3-Mar-15	13,635	13,802	60	Marcellus
6	4-Mar-15	13,437	13,604	60	Marcellus
7	4-Mar-15	13,239	13,406	60	Marcellus
8	5-Mar-15	13,041	13,208	60	Marcellus
9	5-Mar-15	12,843	13,010	60	Marcellus
10	5-Mar-15	12,645	12,812	60	Marcellus
11	6-Mar-15	12,447	12,614	60	Marcellus
12	6-Mar-15	12,249	12,416	60	Marcellus
13	7-Mar-15	12,051	12,218	60	Marcellus
14	7-Mar-15	11,854	12,020	60	Marcellus
15	8-Mar-15	11,656	11,823	60	Marcellus
16	8-Mar-15	11,458	11,625	60	Marcellus
17	8-Mar-15	11,260	11,427	60	Marcellus
18	8-Mar-15	11,062	11,229	60	Marcellus
19	9-Mar-15	10,864	11,031	60	Marcellus
20	9-Mar-15	10,666	10,833	60	Marcellus
21	9-Mar-15	10,468	10,635	60	Marcellus
22	10-Mar-15	10,270	10,437	60	Marcellus
23	10-Mar-15	10,072	10,239	60	Marcellus
24	10-Mar-15	9,874	10,041	60	Marcellus
25	10-Mar-15	9,676	9,843	60	Marcellus
26	11-Mar-15	9,478	9,645	60	Marcellus
27	11-Mar-15	9,280	9,447	60	Marcellus
28	11-Mar-15	9,082	9,249	60	Marcellus
29	11-Mar-15	8,884	9,051	60	Marcellus
30	12-Mar-15	8,686	8,853	60	Marcellus
31	12-Mar-15	8,488	8,655	60	Marcellus
32	12-Mar-15	8,290	8,457	60	Marcellus
33	12-Mar-15	8,092	8,259	60	Marcellus
34	13-Mar-15	7,894	8,061	60	Marcellus
35	13-Mar-15	7,696	7,863	60	Marcellus
36	13-Mar-15	7,498	7,665	60	Marcellus
37	13-Mar-15	7,300	7,467	60	Marcellus
38	14-Mar-15	7,102	7,269	60	Marcellus
39	14-Mar-15	6,904	7,071	60	Marcellus
40	14-Mar-15	6,706	6,873	60	Marcellus

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API 47-085-10015 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 3HRB

EXHIBIT 2

Stage No.	Stimulations Date	Avg Pump Rate	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/ other (units)
1	1-Mar-15	57.4	7,430	N/A	4,391	113,500	6,581	N/A
2	2-Mar-15	61.3	7,608	5,736	4,745	242,160	6,620	N/A
3	2-Mar-15	61.1	7,724	5,380	4,529	236,760	6,467	N/A
4	3-Mar-15	63.4	7,468	5,737	4,021	233,100	6,395	N/A
5	3-Mar-15	63.4	7,635	6,001	4,507	242,440	6,492	N/A
6	4-Mar-15	63.7	7,380	5,718	3,437	242,460	6,562	N/A
7	4-Mar-15	63.8	7,357	5,578	5,513	220,100	5,708	N/A
8	5-Mar-15	64.2	7,337	5,318	4,642	241,880	6,622	N/A
9	5-Mar-15	64.6	7,336	5,354	3,616	241,200	6,478	N/A
10	5-Mar-15	62.7	7,320	5,293	4,221	241,660	6,398	N/A
11	6-Mar-15	64.7	7,328	5,052	4,516	243,800	6,421	N/A
12	6-Mar-15	63.3	7,254	5,270	3,398	242,600	6,368	N/A
13	7-Mar-15	64.5	7,291	5,447	3,431	242,200	6,368	N/A
14	7-Mar-15	64.1	7,374	5,255	3,561	242,520	6,332	N/A
15	8-Mar-15	63.1	7,297	5,089	3,680	230,120	6,160	N/A
16	8-Mar-15	63.5	7,293	5,300	4,297	203,290	6,882	N/A
17	8-Mar-15	62.6	7,384	5,248	3,815	241,790	6,278	N/A
18	8-Mar-15	63.3	7,315	5,226	3,585	232,930	6,861	N/A
19	9-Mar-15	64.4	6,819	5,319	3,905	241,100	6,289	N/A
20	9-Mar-15	63.8	6,889	5,394	4,498	196,000	6,463	N/A
21	9-Mar-15	64.2	7,053	5,239	3,549	239,480	6,216	N/A
22	10-Mar-15	62.9	6,778	5,418	4,010	243,320	6,203	N/A
23	10-Mar-15	64.7	6,646	5,586	4,911	242,500	6,173	N/A
24	10-Mar-15	64.5	6,752	5,131	3,746	242,100	6,466	N/A
25	10-Mar-15	63.0	6,690	5,280	3,639	241,400	6,138	N/A
26	11-Mar-15	63.3	6,543	5,147	3,567	240,450	6,098	N/A
27	11-Mar-15	64.9	6,713	5,374	4,593	241,500	8,638	N/A
28	11-Mar-15	64.5	6,630	5,339	4,317	205,640	5,605	N/A
29	11-Mar-15	64.2	6,866	5,093	3,511	241,160	6,065	N/A
30	12-Mar-15	64.1	6,497	5,196	4,557	240,030	6,061	N/A
31	12-Mar-15	65.3	6,446	5,229	3,904	244,400	6,158	N/A
32	12-Mar-15	61.2	7,250	5,518	4,855	106,500	6,303	N/A
33	12-Mar-15	64.1	6,920	5,261	4,592	244,400	6,150	N/A
34	13-Mar-15	64.7	6,901	5,362	4,926	223,180	5,730	N/A
35	13-Mar-15	63.2	7,101	5,478	3,487	226,700	5,912	N/A
36	13-Mar-15	66.1	6,573	5,533	3,389	243,340	5,972	N/A
37	13-Mar-15	65.1	6,481	5,358	3,163	242,600	5,937	N/A
38	14-Mar-15	65.3	6,687	5,587	4,093	241,400	6,019	N/A
39	14-Mar-15	65.4	6,565	5,653	3,539	242,500	5,931	N/A
40	14-Mar-15	66.8	6,289	5,711	3,535	241,300	6,014	N/A
	AVG=	63.8	7,031	5,390	4,055	9,205,510	252,534	TOTAL

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API 47-085-10015 Farm Name Annie B. Haymond, et al Well Number Cairo-Anna Unit 3HRB

EXHIBIT 3

LITHOLOGY/ FORMATION	TOP DEPTH (TVD) From Surface	BOTTOM DEPTH (TVD) From Surface	TOP DEPTH (MD) From Surface	BOTTOM DEPTH (MD) From Surface
Fresh Water	126	N/A	126	N/A
Fresh Water	307	N/A	307	N/A
Sandstone	0	256	0	256
Sandstone/Trace Coal	est. 256	316	est. 256	316
Sandstone/Siltstone	est. 316	596	est. 316	596
Limestone	est. 596	636	est. 596	636
Siltstone/Sandstone	est. 636	736	est. 636	736
Limestone/Siltstone	est. 736	796	est. 736	796
Siltstone	est. 796	896	est. 796	896
Limestone/Sandstone	est. 896	1,056	est. 896	1,056
Coal	est. 1056	1,076	est. 1056	1,076
Sandstone	est. 1076	1,136	est. 1076	1,136
Siltstone	est. 1136	1,196	est. 1136	1,196
Shale	est. 1196	1,256	est. 1196	1,256
Sandstone	est. 1256	1,316	est. 1256	1,316
Sandstone/Trace Coal	est. 1316	1,336	est. 1316	1,336
Sandstone	est. 1336	1,376	est. 1336	1,376
Siltstone	est. 1376	1,396	est. 1376	1,396
Sandstone/Trace Coal	est. 1396	1,696	est. 1396	1,696
Siltstone	est. 1696	1,824	est. 1696	1,824
Big Lime	1,824	1,987	1,824	1,987
Big Injun	1,987	2,369	1,987	2,369
Gantz Sand	2,369	2,761	2,369	2,761
Fifty Foot Sandstone	2,761	2,840	2,761	2,840
Gordon	2,840	3,197	2,840	3,197
Fifth Sandstone	3,197	3,261	3,197	3,261
Bayard	3,261	3,412	3,261	3,412
Warren	3,412	3,746	3,412	3,746
Speechley	3,746	3,992	3,746	3,992
Baltown	3,992	4,481	3,992	4,481
Bradford	4,481	4,855	4,481	4,855
Benson	4,855	5,086	4,855	5,086
Alexander	5,086	5,379	5,086	5,379
Elk	5,379	5,645	5,379	5,649
Rhinestreet	5,645	6,001	5,649	6,131
Sycamore	6,001	6,105	6,131	6,300
Middlesex	6,105	6,211	6,300	6,490
Burkett	6,211	6,245	6,490	6,578
Tully	6,245	6,270	6,578	6,662
Marcellus	6,270	NA	6,662	NA

*Please note Antero determines shallow formation tops based on mud logs that are only run on one well on a multi-well pad. The measured depth (MD) data on subsequent wells may be slightly different due to the well's unique departure.

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Antero Resources

Antero Resources
Cairo-Anna Unit 3HRB
Ritchie County WV
Northing: 14283557.82
Easting: 1663005.87
As Drilled

WELL DETAILS: Cairo-Anna Unit 3HRB
Ground Level: 970.0

+N/-S	+E/-W	Northing	Easting	Latitude	Longitude	Slot
0.0	0.0	14283557.82	1663005.87	39° 20' 2.425 N	80° 55' 12.402 W	

REFERENCE INFORMATION

Co-ordinate (N/E) Reference: Well Cairo-Anna Unit 3HRB, Grid North
Vertical (TVD) Reference: Hall: 970' + 13' @ 983.0usft
Section (VS) Reference: Slot - (0.0N, 0.0E)
Measured Depth Reference: Hall: 970' + 13' @ 983.0usft
Calculation Method: Minimum Curvature

Scientific Drilling

PROJECT DETAILS: Ritchie County WV

Geodetic System: Universal Transverse Mercator (US Survey Feet)
Datum: NAD 1927 (NADCON CONUS)
Ellipsoid: Clarke 1866
Zone: Zone 17N (84 W to 78 W)

System Datum: Mean Sea Level

Genie Lightfoot
16:16, September 24 2014

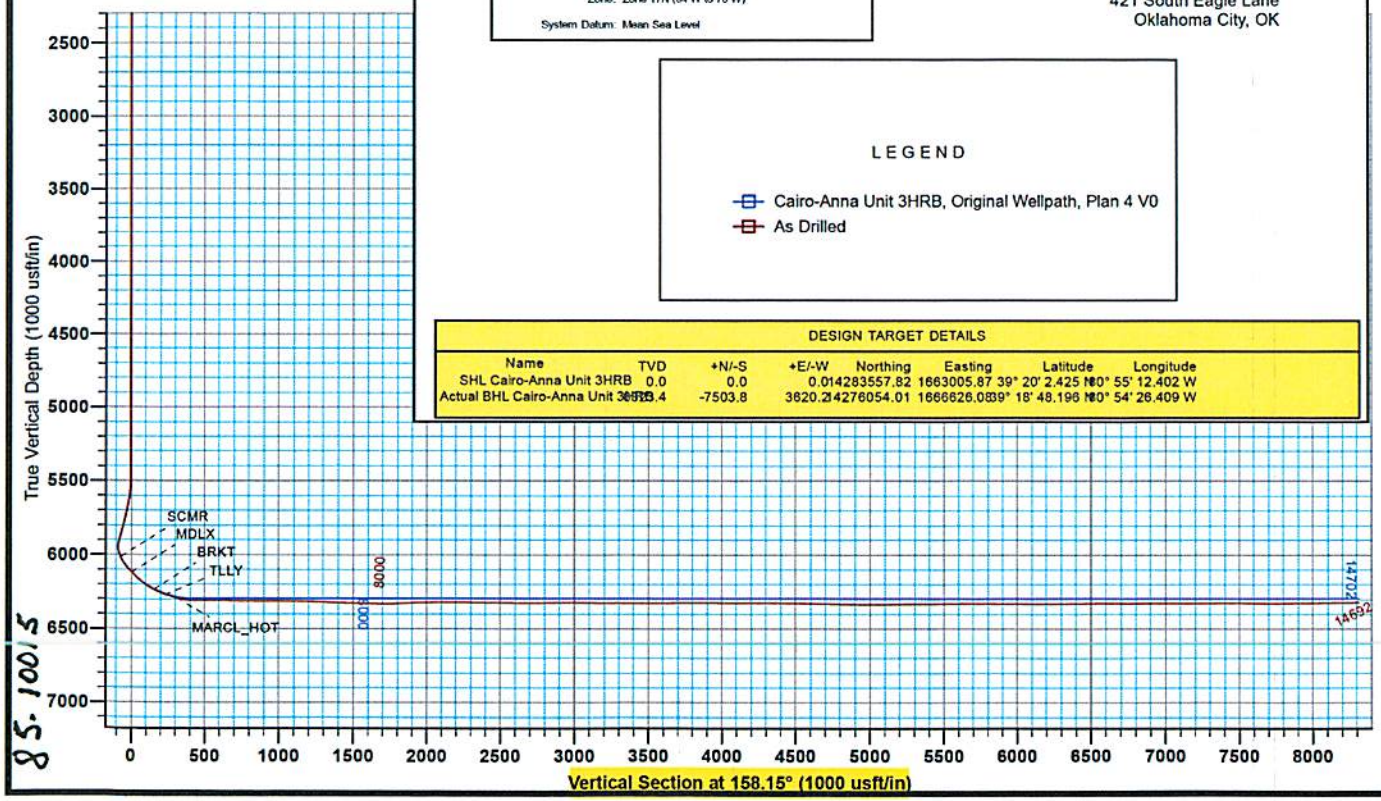
Scientific Drilling
421 South Eagle Lane
Oklahoma City, OK

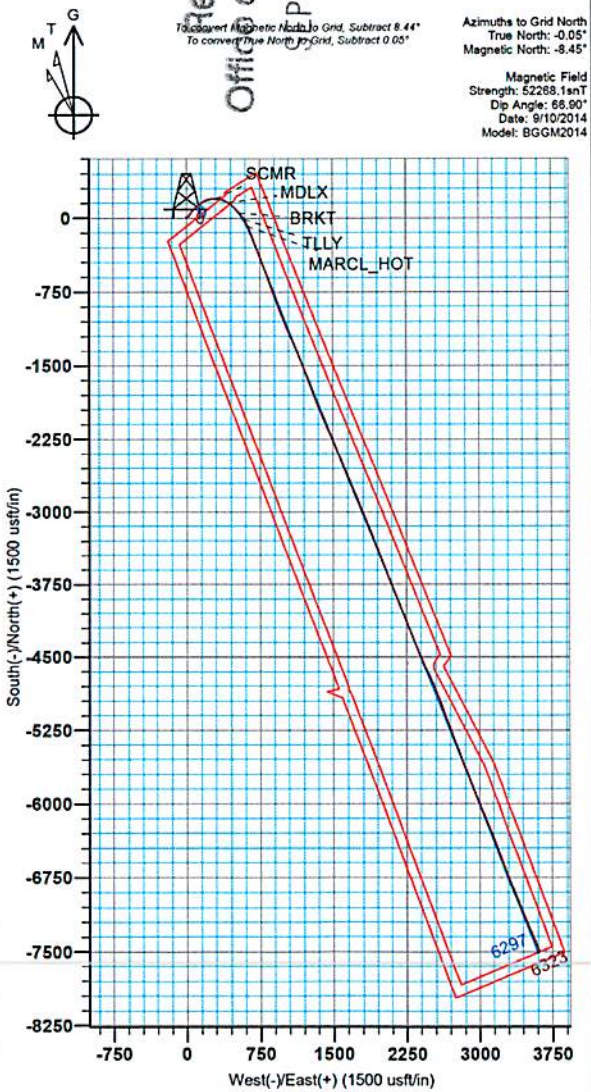
LEGEND

Cairo-Anna Unit 3HRB, Original Wellpath, Plan 4 V0
As Drilled

DESIGN TARGET DETAILS

Name	TVD	+N/-S	+E/-W	Northing	Easting	Latitude	Longitude
SHL Cairo-Anna Unit 3HRB	0.0	0.0	0.0	14283557.82	1663005.87	39° 20' 2.425 N	80° 55' 12.402 W
Actual BHL Cairo-Anna Unit 3HRB	6523.4	-7503.8	3620.2	14276054.01	1666626.08	39° 18' 48.196 N	80° 54' 26.409 W





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Antero Resources

Ritchie County WV
Anna Pad
Cairo-Anna Unit 3HRB
Original Wellpath

Design: As Drilled

EOW Completion Report

24 September, 2014

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SEP 21 2015

Scientific Drilling

85-10015

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	**TVD Reference:**	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	**MD Reference:**	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Project Ritchie County WV, Ritchie County WV, WV North

Map System:	Universal Transverse Mercator (US Survey Fee	**System Datum:**	Mean Sea Level
Geo Datum:	NAD 1927 (NADCON CONUS)		
Map Zone:	Zone 17N (84 W to 78 W)		

Site Anna Pad

Site Position:		**Northing:**	14,283,550.70 usft	**Latitude:**	39° 20' 2.355 N
From:	Map	**Easting:**	1,662,998.99 usft	**Longitude:**	80° 55' 12.490 W
Position Uncertainty:	2.0 usft	**Slot Radius:**	13-3/16"	**Grid Convergence:**	0.05 °

Well Cairo-Anna Unit 3HRB

Well Position	**+N/-S**	0.0 usft	**Northing:**	14,283,557.82 usft	**Latitude:**	39° 20' 2.425 N
	+E/-W	0.0 usft	**Easting:**	1,663,005.87 usft	**Longitude:**	80° 55' 12.402 W
Position Uncertainty		2.0 usft	**Wellhead Elevation:**	983.0 usft	**Ground Level:**	970.0 usft

Wellbore Original Wellpath

Magnetics	Model Name	Sample Date	Declination (°)	Dip Angle (°)	Field Strength (nT)
	BGGM2014	9/10/2014	-8.39	66.90	52,268

Design As Drilled

Audit Notes:

Version:	1.0	**Phase:**	ACTUAL	**Tie On Depth:**	0.0

Vertical Section:	Depth From (TVD) (usft)	+N/-S (usft)	+E/-W (usft)	Direction (°)
	0.0	0.0	0.0	158.15

Survey Program **Date** 9/24/2014

From (usft)	To (usft)	Survey (Wellbore)	Tool Name	Description
100.0	5,437.7	Survey #1 Def Gyro to KOP (Original Well	SDI Standard Keeper	Scientific Drilling Intl. Standard Wireline Keeper
5,480.0	14,692.0	Survey #2 MWD (Original Wellpath)	SDI MWD	Scientific Drilling Intl. MWD - Standard ver 1.0.1

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
0.0	0.00	0.00	0.0	0.0	0.0	0.0	0.00
100.0	0.14	335.77	100.0	0.1	-0.1	-0.1	0.14
200.0	0.20	273.02	200.0	0.2	-0.3	-0.3	0.18
300.0	0.19	246.09	300.0	0.2	-0.6	-0.4	0.09
400.0	0.13	251.87	400.0	0.1	-0.9	-0.4	0.06
500.0	0.13	271.22	500.0	0.0	-1.1	-0.4	0.04
600.0	0.20	313.73	600.0	0.2	-1.3	-0.6	0.14
700.0	0.09	340.21	700.0	0.4	-1.5	-0.9	0.13
800.0	0.18	323.36	800.0	0.6	-1.6	-1.1	0.10
900.0	0.05	328.35	900.0	0.7	-1.7	-1.3	0.13
1,000.0	0.11	299.40	1,000.0	0.8	-1.8	-1.4	0.07

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85-10015

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	**TVD Reference:**	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	**MD Reference:**	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
1,100.0	0.10	35.80	1,100.0	0.9	-1.8	-1.5	0.16
1,200.0	0.10	319.40	1,200.0	1.1	-1.9	-1.7	0.12
1,300.0	0.15	3.87	1,300.0	1.3	-1.9	-1.9	0.11
1,400.0	0.06	47.10	1,400.0	1.4	-1.9	-2.0	0.11
1,500.0	0.08	304.18	1,500.0	1.5	-1.9	-2.1	0.11
1,600.0	0.23	354.46	1,600.0	1.7	-2.0	-2.3	0.19
1,700.0	0.10	5.86	1,700.0	2.0	-2.0	-2.6	0.13
1,800.0	0.32	354.41	1,800.0	2.4	-2.0	-3.0	0.22
1,900.0	0.06	90.03	1,900.0	2.7	-2.0	-3.2	0.33
2,000.0	0.13	349.59	2,000.0	2.8	-1.9	-3.3	0.15
2,100.0	0.13	92.68	2,100.0	2.9	-1.8	-3.4	0.20
2,200.0	0.04	323.80	2,200.0	2.9	-1.7	-3.3	0.16
2,300.0	0.09	324.04	2,300.0	3.0	-1.8	-3.5	0.05
2,400.0	0.08	342.72	2,400.0	3.1	-1.9	-3.6	0.03
2,500.0	0.04	287.83	2,500.0	3.2	-1.9	-3.7	0.07
2,600.0	0.11	291.53	2,600.0	3.3	-2.0	-3.8	0.07
2,700.0	0.12	308.80	2,700.0	3.4	-2.2	-3.9	0.04
2,800.0	0.03	212.70	2,800.0	3.4	-2.3	-4.0	0.13
2,900.0	0.05	231.40	2,900.0	3.3	-2.4	-4.0	0.02
3,000.0	0.13	246.46	3,000.0	3.3	-2.5	-4.0	0.08
3,100.0	0.18	292.95	3,100.0	3.3	-2.8	-4.1	0.13
3,200.0	0.03	180.05	3,200.0	3.3	-2.9	-4.2	0.19
3,300.0	0.10	202.52	3,300.0	3.2	-2.9	-4.1	0.07
3,400.0	0.02	160.95	3,400.0	3.1	-3.0	-4.0	0.09
3,500.0	0.17	78.70	3,500.0	3.1	-2.8	-4.0	0.17
3,600.0	0.19	98.16	3,600.0	3.1	-2.5	-3.8	0.06
3,700.0	0.16	47.70	3,700.0	3.2	-2.2	-3.8	0.15
3,800.0	0.21	83.76	3,800.0	3.3	-1.9	-3.8	0.12
3,900.0	0.28	56.28	3,900.0	3.5	-1.6	-3.8	0.13
4,000.0	0.38	39.54	4,000.0	3.9	-1.1	-4.0	0.14
4,100.0	0.50	41.67	4,100.0	4.5	-0.6	-4.4	0.12
4,200.0	0.64	51.85	4,200.0	5.1	0.1	-4.7	0.17
4,300.0	0.73	69.63	4,300.0	5.7	1.1	-4.9	0.23
4,400.0	0.68	76.02	4,400.0	6.1	2.3	-4.8	0.09
4,500.0	0.80	63.93	4,500.0	6.5	3.5	-4.7	0.20
4,600.0	0.98	66.27	4,599.9	7.2	4.9	-4.8	0.18
4,700.0	1.11	70.10	4,699.9	7.8	6.6	-4.8	0.15
4,800.0	0.98	71.87	4,799.9	8.4	8.3	-4.7	0.13
4,900.0	1.20	69.17	4,899.9	9.1	10.1	-4.6	0.23
5,000.0	1.12	70.51	4,999.9	9.8	12.0	-4.6	0.08
5,100.0	1.34	70.25	5,099.9	10.5	14.0	-4.5	0.22
5,200.0	1.06	73.93	5,199.8	11.1	16.0	-4.4	0.29
5,300.0	1.15	77.26	5,299.8	11.6	17.9	-4.1	0.11
5,400.0	1.18	66.84	5,399.8	12.2	19.8	-4.0	0.21

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85-10015

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	**TVD Reference:**	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	**MD Reference:**	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
5,437.7	1.17	74.45	5,437.5	12.5	20.6	-3.9	0.41
5,480.0	1.23	73.40	5,479.8	12.7	21.4	-3.9	0.15
5,512.0	3.25	42.49	5,511.7	13.5	22.3	-4.2	7.14
5,543.0	7.03	27.78	5,542.6	15.8	23.8	-5.8	12.82
5,575.0	9.85	23.83	5,574.3	20.1	25.8	-9.0	8.99
5,607.0	12.40	29.19	5,605.7	25.6	28.6	-13.1	8.59
5,639.0	15.74	31.39	5,636.7	32.3	32.6	-17.8	10.57
5,671.0	18.55	35.25	5,667.3	40.1	37.8	-23.2	9.47
5,702.0	21.98	37.54	5,696.4	48.8	44.1	-28.8	11.35
5,734.0	25.24	39.37	5,725.7	58.8	52.1	-35.2	10.44
5,766.0	28.58	41.85	5,754.2	69.8	61.6	-41.9	11.01
5,798.0	32.18	43.34	5,781.8	81.7	72.5	-48.8	11.49
5,830.0	35.61	46.77	5,808.4	94.3	85.2	-55.8	12.27
5,862.0	38.87	49.84	5,833.8	107.1	99.6	-62.4	11.72
5,894.0	42.82	51.51	5,858.0	120.4	115.8	-68.6	12.81
5,925.0	47.22	52.30	5,880.0	133.9	133.1	-74.8	14.31
5,957.0	50.39	54.33	5,901.0	148.3	152.4	-80.9	11.00
5,989.0	51.09	59.78	5,921.3	161.7	173.2	-85.7	13.36
6,021.0	51.27	65.93	5,941.4	173.1	195.3	-88.0	14.98
6,052.0	51.18	71.99	5,960.8	181.8	217.9	-87.6	15.24
6,084.0	51.35	77.62	5,980.8	188.3	241.9	-84.7	13.73
6,116.0	51.62	83.86	6,000.8	192.3	266.6	-79.3	15.28
6,147.0	52.23	89.39	6,019.9	193.8	291.0	-71.5	14.18
6,155.0	52.27	90.76	6,024.8	193.7	297.3	-69.2	13.51
SCMR							
6,179.0	52.50	94.84	6,039.4	192.8	316.3	-61.3	13.51
6,211.0	52.50	101.08	6,058.9	189.3	341.4	-48.6	15.47
6,243.0	51.88	107.41	6,078.6	183.1	365.9	-33.8	15.74
6,275.0	51.27	113.12	6,098.5	174.4	389.4	-17.0	14.11
6,306.0	50.91	119.19	6,117.9	163.8	411.0	0.9	15.28
6,324.0	51.08	122.46	6,129.3	156.6	423.0	12.1	14.15
MDLX							
6,338.0	51.27	124.99	6,138.0	150.6	432.1	21.1	14.15
6,369.0	51.97	128.42	6,157.3	136.1	451.6	41.8	8.96
6,401.0	54.08	130.79	6,176.5	119.8	471.3	64.2	8.86
6,432.0	56.89	133.34	6,194.1	102.6	490.2	87.2	11.32
6,464.0	59.62	135.80	6,210.9	83.5	509.6	112.1	10.75
6,496.0	61.82	137.21	6,226.6	63.3	528.8	138.1	7.88
6,514.0	63.19	138.80	6,234.9	51.4	539.5	153.1	10.93
BRKT							
6,527.0	64.19	139.93	6,240.7	42.6	547.1	164.1	10.93
6,559.0	67.36	142.74	6,253.8	19.8	565.3	192.0	12.74
6,591.0	70.17	145.29	6,265.4	-4.3	582.8	220.9	11.50
6,602.0	71.07	146.68	6,269.0	-12.9	588.6	231.1	14.41
TLLY							

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SEP 21 2015

85-10015

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	Local Co-ordinate Reference:	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	TVD Reference:	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	MD Reference:	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	North Reference:	Grid
Wellbore:	Original Wellpath	Survey Calculation Method:	Minimum Curvature
Design:	As Drilled	Database:	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
6,622.0	72.72	149.16	6,275.3	-29.0	598.7	249.8	14.41
6,654.0	72.98	153.03	6,284.7	-55.8	613.5	280.1	11.58
6,686.0	73.25	156.72	6,294.0	-83.5	626.5	310.7	11.07
MARCL_HOT							
6,718.0	76.94	157.77	6,302.2	-112.0	638.4	341.6	11.96
6,750.0	81.43	157.95	6,308.2	-141.1	650.3	373.0	14.04
6,797.0	88.55	158.56	6,312.3	-184.6	667.6	419.8	15.20
6,829.0	89.78	158.56	6,312.8	-214.4	679.3	451.8	3.84
6,924.0	90.22	158.65	6,312.8	-302.8	714.0	546.8	0.47
7,018.0	89.16	159.36	6,313.3	-390.6	747.6	640.8	1.36
7,113.0	89.43	159.71	6,314.5	-479.6	780.9	735.8	0.47
7,208.0	90.13	160.06	6,314.8	-568.8	813.5	830.7	0.82
7,303.0	90.48	158.74	6,314.3	-657.7	847.0	925.7	1.44
7,399.0	88.99	159.97	6,314.8	-747.5	880.8	1,021.7	2.01
7,493.0	89.52	159.00	6,316.0	-835.6	913.7	1,115.6	1.18
7,589.0	88.11	158.30	6,318.0	-925.0	948.7	1,211.6	1.64
7,684.0	87.41	157.42	6,321.7	-1,012.9	984.5	1,306.5	1.18
7,780.0	87.93	157.72	6,325.6	-1,101.6	1,021.1	1,402.4	0.63
7,876.0	88.81	156.81	6,328.3	-1,190.1	1,058.1	1,498.4	1.32
7,972.0	88.29	155.22	6,330.8	-1,277.7	1,097.1	1,594.3	1.74
8,066.0	88.64	154.78	6,333.3	-1,362.9	1,136.9	1,688.1	0.60
8,163.0	92.59	160.76	6,332.2	-1,452.6	1,173.5	1,785.0	7.39
8,258.0	92.68	159.79	6,327.9	-1,542.0	1,205.6	1,879.9	1.02
8,352.0	91.19	159.27	6,324.7	-1,630.0	1,238.4	1,973.8	1.68
8,448.0	91.28	158.83	6,322.6	-1,719.6	1,272.7	2,069.7	0.47
8,543.0	89.25	158.83	6,322.2	-1,808.2	1,307.0	2,164.7	2.14
8,638.0	89.16	159.00	6,323.5	-1,896.8	1,341.2	2,259.7	0.20
8,734.0	89.16	158.21	6,324.9	-1,986.2	1,376.2	2,355.7	0.82
8,829.0	88.90	156.72	6,326.5	-2,073.9	1,412.6	2,450.7	1.59
8,923.0	90.40	156.63	6,327.1	-2,160.2	1,449.8	2,544.6	1.60
9,014.0	90.13	155.75	6,326.7	-2,243.5	1,486.6	2,635.6	1.01
9,104.0	90.40	156.81	6,326.3	-2,325.9	1,522.8	2,725.5	1.22
9,196.0	90.31	157.42	6,325.7	-2,410.6	1,558.6	2,817.5	0.67
9,286.0	90.57	157.25	6,325.0	-2,493.7	1,593.2	2,907.5	0.35
9,377.0	89.08	156.19	6,325.3	-2,577.3	1,629.2	2,998.5	2.01
9,468.0	89.52	157.25	6,326.4	-2,660.9	1,665.2	3,089.4	1.26
9,558.0	89.60	157.33	6,327.1	-2,743.9	1,699.9	3,179.4	0.13
9,648.0	89.78	158.12	6,327.6	-2,827.2	1,734.0	3,269.4	0.90
9,738.0	90.48	159.00	6,327.4	-2,910.9	1,766.9	3,359.4	1.25
9,829.0	89.96	158.74	6,327.0	-2,995.8	1,799.7	3,450.4	0.64
9,919.0	89.69	158.48	6,327.3	-3,079.6	1,832.6	3,540.4	0.42
10,010.0	89.60	157.86	6,327.8	-3,164.1	1,866.4	3,631.4	0.69
10,104.0	90.75	159.18	6,327.6	-3,251.5	1,900.8	3,725.4	1.86
10,199.0	91.10	159.36	6,326.0	-3,340.4	1,934.4	3,820.4	0.41
10,294.0	88.37	156.98	6,326.5	-3,428.6	1,969.8	3,915.4	3.81

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85.10015

Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	**TVD Reference:**	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	**MD Reference:**	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
10,389.0	90.04	159.00	6,327.8	-3,516.6	2,005.3	4,010.3	2.76
10,485.0	90.04	159.09	6,327.7	-3,606.3	2,039.7	4,106.3	0.09
10,580.0	90.04	158.21	6,327.6	-3,694.7	2,074.3	4,201.3	0.93
10,675.0	90.31	158.65	6,327.4	-3,783.1	2,109.2	4,296.3	0.54
10,769.0	88.90	157.77	6,328.0	-3,870.4	2,144.1	4,390.3	1.77
10,863.0	88.64	157.33	6,330.0	-3,957.2	2,180.0	4,484.3	0.54
10,959.0	89.25	158.92	6,331.8	-4,046.3	2,215.7	4,580.3	1.77
11,052.0	88.90	158.30	6,333.3	-4,132.9	2,249.6	4,673.2	0.77
11,146.0	88.86	158.29	6,335.1	-4,220.2	2,284.4	4,767.2	0.04
11,240.0	89.16	158.56	6,336.8	-4,307.6	2,319.0	4,861.2	0.43
11,334.0	90.23	158.34	6,337.3	-4,395.0	2,353.5	4,955.2	1.16
11,429.0	90.10	156.91	6,337.0	-4,482.9	2,389.7	5,050.2	1.51
11,523.0	90.66	155.40	6,336.4	-4,568.8	2,427.6	5,144.1	1.71
11,617.0	90.13	153.82	6,335.7	-4,653.8	2,468.0	5,238.0	1.77
11,711.0	90.48	155.66	6,335.2	-4,738.8	2,508.1	5,331.8	1.99
11,806.0	90.48	158.04	6,334.4	-4,826.1	2,545.4	5,426.8	2.51
11,900.0	90.84	157.95	6,333.3	-4,913.3	2,580.6	5,520.7	0.39
11,995.0	90.40	159.79	6,332.3	-5,001.9	2,614.9	5,615.7	1.99
12,089.0	90.48	160.06	6,331.6	-5,090.1	2,647.1	5,709.7	0.30
12,183.0	89.87	159.62	6,331.3	-5,178.4	2,679.5	5,803.6	0.80
12,278.0	88.99	159.53	6,332.2	-5,267.4	2,712.7	5,898.6	0.93
12,372.0	89.16	159.11	6,333.8	-5,355.3	2,745.9	5,992.6	0.48
12,466.0	90.27	159.11	6,334.2	-5,443.2	2,779.4	6,086.6	1.18
12,560.0	90.13	158.83	6,333.9	-5,530.9	2,813.1	6,180.5	0.33
12,656.0	89.78	159.09	6,334.0	-5,620.5	2,847.6	6,276.5	0.45
12,750.0	90.92	158.39	6,333.4	-5,708.1	2,881.7	6,370.5	1.42
12,844.0	91.19	157.16	6,331.7	-5,795.1	2,917.2	6,464.5	1.34
12,939.0	90.13	158.04	6,330.6	-5,882.9	2,953.4	6,559.5	1.45
13,034.0	89.78	158.12	6,330.6	-5,971.0	2,988.9	6,654.5	0.38
13,128.0	89.69	157.16	6,331.1	-6,058.0	3,024.6	6,748.5	1.03
13,222.0	90.57	157.16	6,330.9	-6,144.6	3,061.1	6,842.5	0.94
13,316.0	90.57	156.72	6,329.9	-6,231.1	3,097.9	6,936.4	0.47
13,411.0	89.78	158.48	6,329.6	-6,318.9	3,134.1	7,031.4	2.03
13,505.0	90.40	158.56	6,329.5	-6,406.4	3,168.6	7,125.4	0.67
13,599.0	90.13	157.42	6,329.1	-6,493.5	3,203.8	7,219.4	1.25
13,694.0	90.57	159.71	6,328.5	-6,582.0	3,238.5	7,314.4	2.45
13,787.0	90.75	158.38	6,327.4	-6,668.8	3,271.8	7,407.4	1.44
13,882.0	88.99	158.39	6,327.6	-6,757.1	3,306.8	7,502.4	1.85
13,976.0	88.55	157.69	6,329.6	-6,844.3	3,341.9	7,596.4	0.88
14,070.0	89.34	158.04	6,331.4	-6,931.3	3,377.3	7,690.4	0.92
14,164.0	90.84	158.39	6,331.2	-7,018.6	3,412.2	7,784.4	1.64
14,258.0	90.75	157.42	6,329.9	-7,105.7	3,447.5	7,878.3	1.04
14,352.0	91.01	156.98	6,328.5	-7,192.3	3,484.0	7,972.3	0.54
14,447.0	90.84	156.81	6,326.9	-7,279.7	3,521.2	8,067.3	0.25

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Antero Resources

EOW Completion Report

Scientific Drilling

Company:	Antero Resources	**Local Co-ordinate Reference:**	Well Cairo-Anna Unit 3HRB
Project:	Ritchie County WV	**TVD Reference:**	Hall: 970' + 13' @ 983.0usft
Site:	Anna Pad	**MD Reference:**	Hall: 970' + 13' @ 983.0usft
Well:	Cairo-Anna Unit 3HRB	**North Reference:**	Grid
Wellbore:	Original Wellpath	**Survey Calculation Method:**	Minimum Curvature
Design:	As Drilled	**Database:**	Oklahoma District

Survey

MD (usft)	Inc (°)	Azi (azimuth) (°)	TVD (usft)	N/S (usft)	E/W (usft)	V. Sec (usft)	DLeg (°/100usft)
14,541.0	90.84	156.02	6,325.6	-7,365.9	3,558.9	8,161.2	0.84
14,629.0	90.84	156.02	6,324.3	-7,446.3	3,594.6	8,249.2	0.00
14,692.0	90.84	156.02	6,323.4	-7,503.8	3,620.2	8,312.1	0.00

Design Annotations

Measured Depth (usft)	Vertical Depth (usft)	Local Coordinates +N/-S (usft)	Local Coordinates +E/-W (usft)	Comment
6,155.0	6,024.8	193.7	297.3	SCMR
6,324.0	6,129.3	156.6	423.0	MDLX
6,514.0	6,234.9	51.4	539.5	BRKT
6,602.0	6,269.0	-12.9	588.6	TLLY
6,686.0	6,294.0	-83.5	626.5	MARCL_HOT

Checked By: _____ Approved By: _____ Date: _____

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Office of Oil & Gas
SEP 21 2015

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	3/2/2015
Job End Date:	3/14/2015
State:	West Virginia
County:	Ritchie
API Number:	47-085-10015-00-00
Operator Name:	Antero Resources Corporation
Well Name and Number:	Cairo-Anna Unit 3HRB
Longitude:	-80.91993900
Latitude:	39.33408100
Datum:	NAD83
Federal/Tribal Well:	NO
True Vertical Depth:	6,337
Total Base Water Volume (gal):	10,606,428
Total Base Non Water Volume:	477,898

FracFocus Chemical Disclosure Registry

GROUNDWATER PROTECTION COUNCIL

Oil & Gas

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SEP 21 2015

85-10015

Hydraulic Fracturing Fluid Composition:

Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Water	Antero Resources	Base Fluid					
			Water	7732-18-5	100.00000	90.16349	
Sand	U.S. Well Services, LLC	Proppant					
			Crystalline Silica, quartz	14808-60-7	100.00000	9.38304	
HCL Acid (12.6%-18.0%)	U.S. Well Services, LLC	Bulk Acid					
			Water	7732-18-5	87.50000	0.17462	
			Hydrogen Chloride	7641-01-1	18.00000	0.04171	
LGC-15	U.S. Well Services, LLC	Gelling Agents					
			Guar Gum	9000-30-0	50.00000	0.05282	
			Petroleum Distillates	64742-47-8	60.00000	0.05003	
			Suspending agent (solid)	14808-60-7	3.00000	0.00808	
			Surfactant	68439-51-0	3.00000	0.00317	
WFRA-405	U.S. Well Services, LLC	Friction Reducer					
			Water	7732-18-5	40.00000	0.02888	
			Anionic Polyacrylamide	Proprietary		0.02888	
			Petroleum Distillates	64742-47-8	22.00000	0.02325	
			Crystalline Salt	12125-02-9	5.00000	0.00361	

			Ethoxylated alcohol blend	Proprietary	5.00000	0.00361	
SI-1100	U.S. Well Services	Scale Inhibitor					
			Di Water	7732-18-5	80.00000	0.01065	
			Ethylene Glycol	107-21-1	40.00000	0.00602	
			Potassium salt of diethylene triamine penta (methylene phosphonic acid)	15827-60-8	10.00000	0.00180	
			2-Phosphonobutane 1,2,4 tricarboxylic salt	37971-36-1	10.00000	0.00172	
			hexamethylenediamine tetra (methylene phosphonic acid)	38820-59-6	10.00000	0.00166	
			Copolymer of Maleic and Acrylic acid	26677-99-6	10.00000	0.00157	
			bis (hexamethylene) tramine penta (methylene phosphonic acid) - phosphate acid	40623-75-4	10.00000	0.00153	
			Acrylic polymer	52255-49-9	5.00000	0.00067	
K-BAC 1020	U.S. Well Services, LLC	Anti-Bacterial Agent					
			2,2-dibromo-3-nitrilopropionamide	10222-01-2	20.00000	0.00449	
			Deionized Water	7732-18-5	28.00000	0.00256	
AP One	U.S. Well Services, LLC	Gel Breakers					
			Ammonium Persulfate	7727-54-0	100.00000	0.00180	
AI-301	U.S. Well Services, LLC	Acid Corrosion Inhibitors					
			Diethylene Glycol	111-46-6	30.00000	0.00013	
			Methenamine	100-97-0	20.00000	0.00011	
			Hydrogen Chloride	7647-01-0	10.00000	0.00005	
			Polyethylene polyamine	68603-67-8	10.00000	0.00004	
			Coco amine	61791-14-8	5.00000	0.00002	

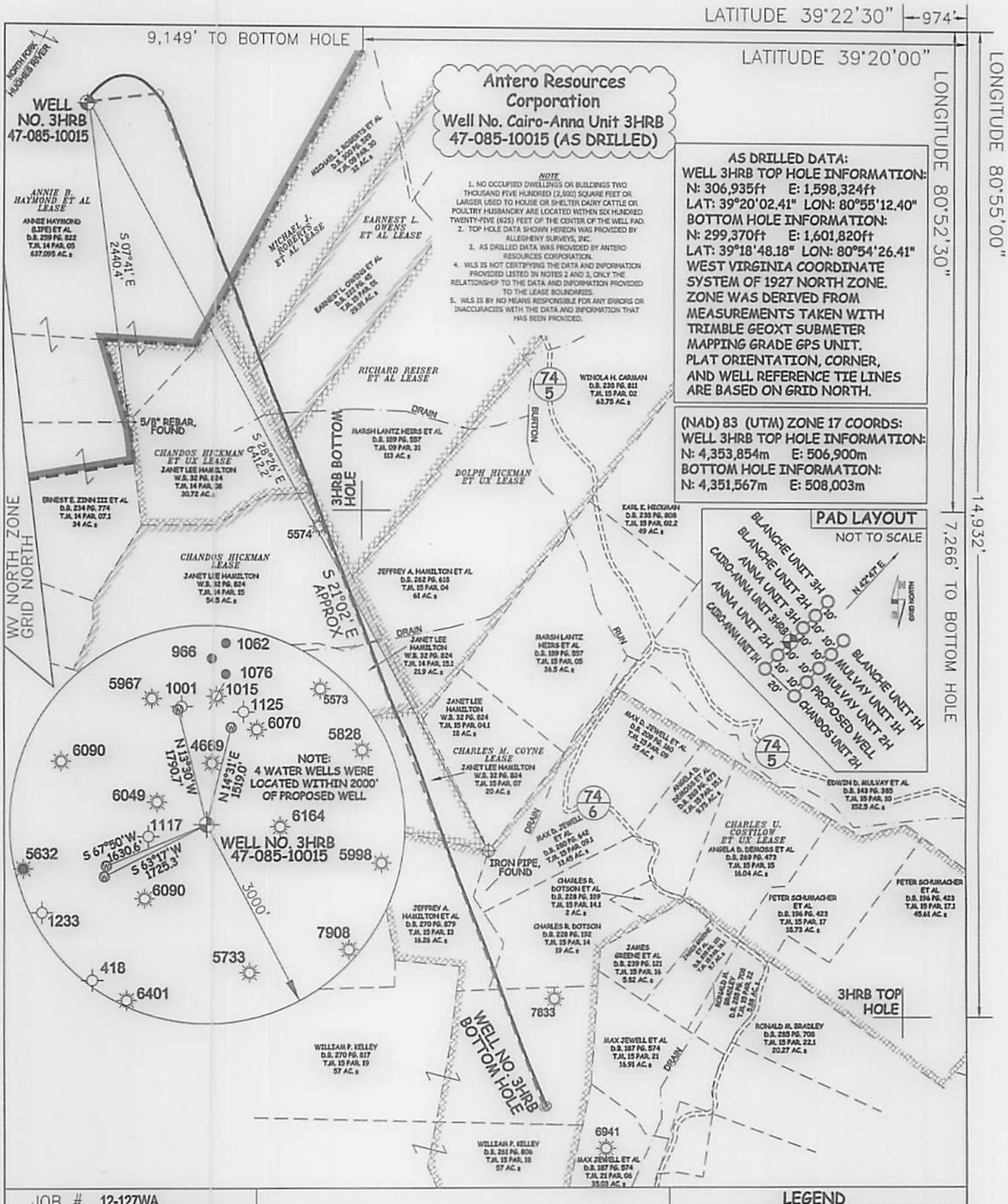
Ingredients shown above are subject to 29 CFR 1910.1200(i) and appear on Material Safety Data Sheets (MSDS). Ingredients shown below are Non-MSDS.

* Total Water Volume sources may include fresh water, produced water, and/or recycled water
** Information is based on the maximum potential for concentration and thus the total may be over 100%

Note: For Field Development Products (products that begin with FDP), MSDS level only information has been provided.
Ingredient information for chemicals subject to 29 CFR 1910.1200(i) and Appendix D are obtained from suppliers Material Safety Data Sheets (MSDS)

Received
Office of Oil & Gas
SEP 2 2015

85-10015



JOB # 12-127WA	STATE OF WEST VIRGINIA, DIVISION OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS		LEGEND
DRAWING # CAIRO-ANNA3HRBAD			Surface Owner Boundary Lines +/-
SCALE 1" = 1000'			Interior Surface Tracts +/-
MINIMUM DEGREE OF ACCURACY SUBMETER			Existing Fence
PROVEN SOURCE OF ELEV. SUBMETER MAPPING GRADE GPS	WILLOW LAND SURVEYING PLLC 266 HUSHERS RUN RD PENNSBORO WEST VIRGINIA 26415		Found monument, as noted
			Proposed Well Path
			As Drilled Well Path

STATE OF WEST VIRGINIA
DEPARTMENT OF ENERGY
DIVISION OF OIL AND GAS

DATE 07/27/15

OPERATOR'S WELL# CAIRO-ANNA UNIT #3HRB

API WELL # 47 – 085 – 10015
STATE COUNTY PERMIT

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

LOCATION: ELEVATION 992' ORIGINAL - 971' AS DRILLED WATERSHED NORTH FORK HUGHES RIVER
QUADRANGLE PENNSBORO 7.5' DISTRICT CLAY COUNTY RITCHIE
SURFACE OWNER ANNIE B. HAYMOND, ET AL ACREAGE 637.095 ACRES +/-
OIL & GAS ROYALTY OWNER ANNIE B. HAYMOND, ET AL; MICHAEL J. ROBERTS ET AL; EARNEST L. OWENS ET AL; RICHARD REISER ET AL; CHANDOS HICKMAN ET UX; CHANDOS HICKMAN; CHARLES M. COYNE; CHARLES U. COSTILOW ET UX LEASE ACREAGE 700 ACRES±; 34.638 ACRES±; 34.638 ACRES±; 113 ACRES±; 35 ACRES±; 75.5 ACRES±; 18.5 ACRES±; 200 ACRES±
PROPOSED WORK: DRILL ___ CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE ___
PLUG OFF OLD FORMATION ___ PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE IN WELL
(SPECIFY) (X) AS DRILLED PLUG & ABANDON CLEAN OUT & REPLUG
TARGET FORMATION MARCELLUS ESTIMATED DEPTH 6,323' TVD 14,692' MD

WELL OPERATOR ANTERO RESOURCES CORP. DESIGNATED AGENT DIANNA STAMPER
ADDRESS 1615 WYNKOOP STREET ADDRESS CT CORPORATION SYSTEM
DENVER, CO 80202 5400 D BIG TYLER ROAD CHARLESTON, WV 25313

COUNTY NAME
PERMIT

FORM WW-6