

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

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APR 03 2020

WV Department of
Environmental Protection

API 47 - 033 - 05816 County Harrison District Union
Quad West Milford, WV 7.5' Pad Name KST5 Field/Pool Name _____
Farm name James Ivan McDonald Well Number KST5 CHS
Operator (as registered with the OOG) HG Energy II Appalachia, LLC
Address 5260 Dupont Road City Parkersburg State WV Zip 26101

As Drilled location NAD 83/UTM Attach an as-drilled plat, profile view, and deviation survey
Top hole Northing 4335838.53 Easting 545518.12
Landing Point of Curve Northing 4335471.15 Easting 544956.94
Bottom Hole Northing 4332648.65 Easting 545949.26

Elevation (ft) 1134 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, Additives - Lime, Calcium Chloride, Gilsonite, Asphalt, Barite, Emulsifier, Base Oil

Date permit issued 03/06/2018 Date drilling commenced 3/09/2018 Date drilling ceased 6/02/18
Date completion activities began 7/29/18 Date completion activities ceased 11/29/18
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 521' Open mine(s) (Y/N) depths No
Salt water depth(s) ft Not observed Void(s) encountered (Y/N) depths No
Coal depth(s) ft 620, 692 Cavern(s) encountered (Y/N) depths No
Is coal being mined in area (Y/N) _____

Reviewed by:
SPW5/20/2020

API 47-033 - 05816 Farm name James Ivan McDonald Well number KST5 CHS

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"	114'	N	J-55 94#		N - Drilled In
Surface	17 1/2"	13 3/8"	512'		J-55 54#	None	Y
Coal							
Intermediate 1	12 3/8"	9 5/8"	2624'	N	J-55 40#	None	Y
Intermediate 2							
Intermediate 3							
Production	8 1/2"	5 1/2"	17342'	N	P-110 20#	None	Y
Tubing							
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	Drilled In					Drilled In	
Surface	Class A	484	15.6	1.20		Surface	8
Coal							
Intermediate 1	Class A	920	Lead 15.4, Tail 15.9	Lead 1.24, Tail 1.17		Surface	8
Intermediate 2							
Intermediate 3							
Production	Class A	4060	14.5	1.17		Surface	8
Tubing							

Drillers TD (ft) 18133' Loggers TD (ft) 18133'
 Deepest formation penetrated Marcellus Plug back to (ft) _____
 Plug back procedure _____

Kick off depth (ft) 6274'

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 _____
Fresh Water - Bow spring centralizers on first joint then every fourth joint to 100 feet from surface
Coal - Bow spring centralizers on first joint then every fourth joint to 100 feet from surface
Intermediate - Bow spring centralizers on the first two joints and every fourth joint inside surface casing
Production - Run 1 spiral centralizer every 3 joints from the 1st 5.5" long joint to the top of the curve

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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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6852' - 6715'	TVD	7520' - 17282' MD
_____	_____	_____	_____
_____	_____	_____	_____
_____	_____	_____	_____

Please insert additional pages as applicable.

GAS TEST Build up Drawdown Open Flow OIL TEST Flow Pump

SHUT-IN PRESSURE Surface 3780 psi Bottom Hole _____ psi DURATION OF TEST 502 hrs

OPEN FLOW Gas Oil NGL Water GAS MEASURED BY
 19126 mcfpd _____ bpd _____ bpd 792 bpd Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP	BOTTOM	TOP	BOTTOM	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	DEPTH IN FT NAME TVD	DEPTH IN FT TVD	DEPTH IN FT MD	DEPTH IN FT MD	
	0		0		** See Attached **

Please insert additional pages as applicable.

Drilling Contractor Patterson Drilling
 Address 2198 University Drive City Lemont Furnace State PA Zip 15456

Logging Company Schlumberger
 Address 100 Gillingham Lane City Sugar Land State TX Zip 77478

Cementing Company C&J Energy Services
 Address 3990 Rogerdale City Houston State TX Zip 77042

Stimulating Company Stingray
 Address 14201 Caliber Drive City Oklahoma City State OK Zip 73134

Please insert additional pages as applicable.

Completed by Diane White Telephone 304-420-1119
 Signature Diane White Title _____ Date 3/23/2020

API 47-033 - 05816 Farm name James Ivan McDonald Well number KST5 CHS

PERFORATION RECORD

Stage No.	Perforation date	Perforated from MD ft.	Perforated to MD ft.	Number of Perforations	Formation(s)
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					APR 03 2020
		See Attached			WV Department of Environmental Protection

Please insert additional pages as applicable.

STIMULATION INFORMATION PER STAGE

Complete a separate record for each stimulation stage.

Stage No.	Stimulations Date	Ave Pump Rate (BPM)	Ave Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (bbls)	Amount of Nitrogen/other (units)
			See Attached					

Please insert additional pages as applicable.

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PRODUCING FORMATION(S)	DEPTHS		
Marcellus	6852' - 6715'	TVD	7520' - 17282' MD

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SHUT-IN PRESSURE Surface 3780 psi Bottom Hole _____ psi DURATION OF TEST 502 hrs

OPEN FLOW Gas 19126 mcfpd Oil _____ bpd NGL _____ bpd Water 792 bpd GAS MEASURED BY Estimated Orifice Pilot

LITHOLOGY/ FORMATION	TOP DEPTH IN FT NAME TVD	BOTTOM DEPTH IN FT TVD	TOP DEPTH IN FT MD	BOTTOM DEPTH IN FT MD	DESCRIBE ROCK TYPE AND RECORD QUANTITY AND TYPE OF FLUID (FRESHWATER, BRINE, OIL, GAS, H ₂ S, ETC)
	0		0		
Pittsburg Coal	692	700	692	700	Coal
Big Lime	1730	1820	1730	1820	Limestone
Big Injun	1820	1910	1820	1910	Sandstone
Pocono Big Injun	1910	2150	1910	2150	Sandstone
5th Sand	2150	2165	2150	2165	Sandstone
Rhinestreet	5720	6006	6034	6270	Grey Shale
Cashaqua	6006	6078	6270	6405	Silty Shale
Middlesex	6078	6101	6405	6454	Grey Shale
West River	6101	6170	6454	6612	Grey Shale
Burket	6170	6186	6612	6652	Dark Grey Shale
Tully	6186	6219	6652	6744	Limestone
Hamilton	6219	6260	6744	6880	Shale
Marcellus	6260	6439	6880	16446	Black Shale

Please insert additional pages as applicable.

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Address 2198 University Drive City Lemont Furnace State PA Zip 15456

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Signature Diane White Title _____ Date 3/23/2020

KST5 CHS
Perforation Record

1 8

Stage No.	Perforation Date	Perforated from MD ft	Perforated to MD ft	# of Perforations	Formation
1	10/21/2018	17,230		2	
2	10/25/2018	17,145	16,971	49	
3	10/25/2018	16,943	16,769	49	
4	10/26/2018	16,741	16,567	49	
5	10/26/2018	16,539	16,371	49	
6	10/27/2018	16,343	16,175	49	
7	10/27/2018	16,074		42	
8	10/27/2018	15,878	15,710	49	
9	10/28/2018	15,682	15,514	49	
10	10/28/2018	15,486	15,318	49	
11	10/28/2018	15,290	15,122	49	
12	10/28/2018	15,094	14,926	49	
13	10/29/2018	14,898	14,730	49	
14	10/29/2018	14,702	14,534	49	
15	10/30/2018	14,506	14,338	49	
16	10/30/2018	14,310	14,142	49	
17	10/31/2018	14,114	13,946	49	
18	10/31/2018	13,918	13,750	49	
19	11/1/2018	13,722	13,554	49	
20	11/1/2018	13,526	13,358	49	
21	11/1/2018	13,330	13,162	49	
22	11/2/2018	13,134	12,966	49	
23	11/2/2018	12,938	12,770	49	
24	11/2/2018	12,742	12,574	49	
25	11/3/2018	12,546	12,378	49	
26	11/3/2018	12,350	12,182	49	
27	11/3/2018	12,154	11,986	49	
28	11/4/2018	11,958	11,790	49	
29	11/4/2018	11,762	11,594	49	
30	11/5/2018	11,566	11,398	49	
31	11/5/2018	11,370	11,202	49	
32	11/5/2018	11,174	11,006	49	
33	11/6/2018	10,978	10,810	49	
34	11/6/2018	10,782	10,614	49	
35	11/6/2018	10,586	10,418	49	
36	11/7/2018	10,390	10,222	49	
37	11/7/2018	10,194	10,026	49	
38	11/8/2018	9,998	9,830	49	
39	11/8/2018	9,802	9,634	49	
40	11/8/2018	9,606	9,438	49	
41	11/8/2018	9,410	9,242	49	
42	11/9/2018	9,214	9,046	49	
43	11/9/2018	9,018	8,850	49	
44	11/9/2018	8,822	8,660	49	
45	11/10/2018	8,632	8,470	49	
46	11/10/2018	8,442	8,280	49	
47	11/10/2018	8,252	8,090	49	
48	11/11/2018	8,062	7,900	49	
49	11/11/2018	7,872	7,710	49	
50	11/11/2018	7,682	7,520	49	

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KHS 5 CHS
Stimulation Information Per Stage

Stage No.	Perforation Date	Avg Pump Rate (BPM)	Avg Treatment Pressure (PSI)	Max Breakdown Pressure (PSI)	ISIP (PSI)	Amount of Proppant (lbs)	Amount of Water (BBLs)	Amount of Nitrogen/Other (units)
1	10/21/2018	80.7	8,626	7,354	-	2,369.0	6,464	2,071
2	10/25/2018	81.8	9,028	6,746	4,755	5,615.0	11,441	2,075
3	10/25/2018	83.1	9,257	6,447	5,025	5,229.0	10,824	2,053
4	10/26/2018	82.6	9,088	5,999	5,075	7,174.0	12,694	2,043
5	10/26/2018	85.8	9,261	6,056	4,865	7,215.8	13,059	2,024
6	10/27/2018	84.5	9,254	6,070	5,600	7,159.0	13,561	1,019
7	10/27/2018	85.3	9,266	6,143	-	6,875.4	13,378	1,034
8	10/27/2018	88.1	8,867	-	5,283	7,182.0	13,252	1,047
9	10/28/2018	85.6	8,995	6,255	6,225	7,083.0	13,057	1,015
10	10/28/2018	87.1	9,117	6,516	5,281	4,629.2	11,403	1,040
11	10/28/2018	93.6	9,077	5,943	5,012	7,210.0	14,555	1,013
12	10/28/2018	90.9	8,031	5,794	5,435	7,177.0	11,905	1,037
13	10/29/2018	93.6	8,679	5,962	6,161	7,123.4	13,183	1,026
14	10/29/2018	95.2	9,047	6,577	5,850	7,234.0	13,498	1,004
15	10/30/2018	90.7	8,851	6,608	5,406	7,335.0	14,490	1,007
16	10/30/2018	94.1	8,996	6,435	5,861	7,141.8	12,721	1,030
17	10/31/2018	95.0	8,551	6,452	5,450	7,343.8	13,033	1,012
18	10/31/2018	90.6	8,002	6,024	5,902	7,279.0	12,691	988
19	11/1/2018	95.1	8,395	6,166	5,480	7,225.0	12,604	980
20	11/1/2018	94.0	8,688	5,796	6,320	7,250.0	14,293	1,040
21	11/1/2018	87.9	8,724	6,651	6,433	7,015.0	12,336	999
22	11/2/2018	90.8	8,977	6,355	5,450	6,048.2	11,884	1,000
23	11/2/2018	89.4	8,461	6,603	5,707	7,264.0	12,799	1,021
24	11/2/2018	96.6	9,156	6,378	5,190	7,216.0	12,583	1,012
25	11/3/2018	88.8	8,767	6,544	5,580	6,835.4	12,387	988
26	11/3/2018	91.6	8,414	6,565	5,912	7,262.0	12,555	1,010
27	11/3/2018	94.4	8,617	6,641	5,480	7,226.6	12,622	1,043
28	11/4/2018	90.8	8,150	6,120	6,462	7,653.0	14,576	1,003
29	11/4/2018	95.5	8,372	6,261	5,690	6,400.0	11,798	1,032
30	11/5/2018	94.8	8,389	5,889	5,025	7,221.6	13,539	990
31	11/5/2018	96.3	8,001	6,124	6,071	7,240.0	12,465	990
32	11/5/2018	95.2	7,972	6,292	5,400	7,107.4	12,562	1,049
33	11/6/2018	96.2	7,860	5,776	5,647	7,277.0	11,952	1,031
34	11/6/2018	95.7	7,798	6,097	5,299	7,210.0	12,557	972
35	11/6/2018	99.6	7,979	5,930	4,800	7,026.0	12,637	935
36	11/7/2018	100.6	8,084	6,221	5,725	7,111.0	12,541	1,036
37	11/7/2018	98.8	7,716	6,107	5,425	7,353.0	12,612	1,055
38	11/8/2018	98.1	7,772	5,980	5,390	6,876.2	12,766	1,063
39	11/8/2018	100.4	7,942	5,863	4,950	7,251.0	12,709	956
40	11/8/2018	100.4	7,918	6,110	5,450	7,116.0	12,403	944
41	11/8/2018	95.5	7,708	6,597	5,000	7,099.0	12,380	1,000
42	11/9/2018	100.1	7,931	6,609	5,200	7,187.8	12,490	990
43	11/9/2018	101.2	7,632	6,424	5,354	7,153.0	12,314	980
44	11/9/2018	94.6	7,740	6,592	5,190	7,246.2	12,477	956
45	11/10/2018	98.8	8,004	6,092	5,410	7,118.4	12,488	1,057
46	11/10/2018	98.4	7,943	6,380	5,080	7,035.0	12,413	1,051
47	11/10/2018	95.6	7,710	5,714	5,100	7,266.6	12,778	1,028
48	11/11/2018	96.6	7,472	6,079	4,950	7,224.0	12,600	1,077
49	11/11/2018	100.7	7,451	6,000	5,475	7,322.0	12,372	999
50	11/11/2018	100.5	7,397	9,468	4,975	7,351.0	12,336	1,021

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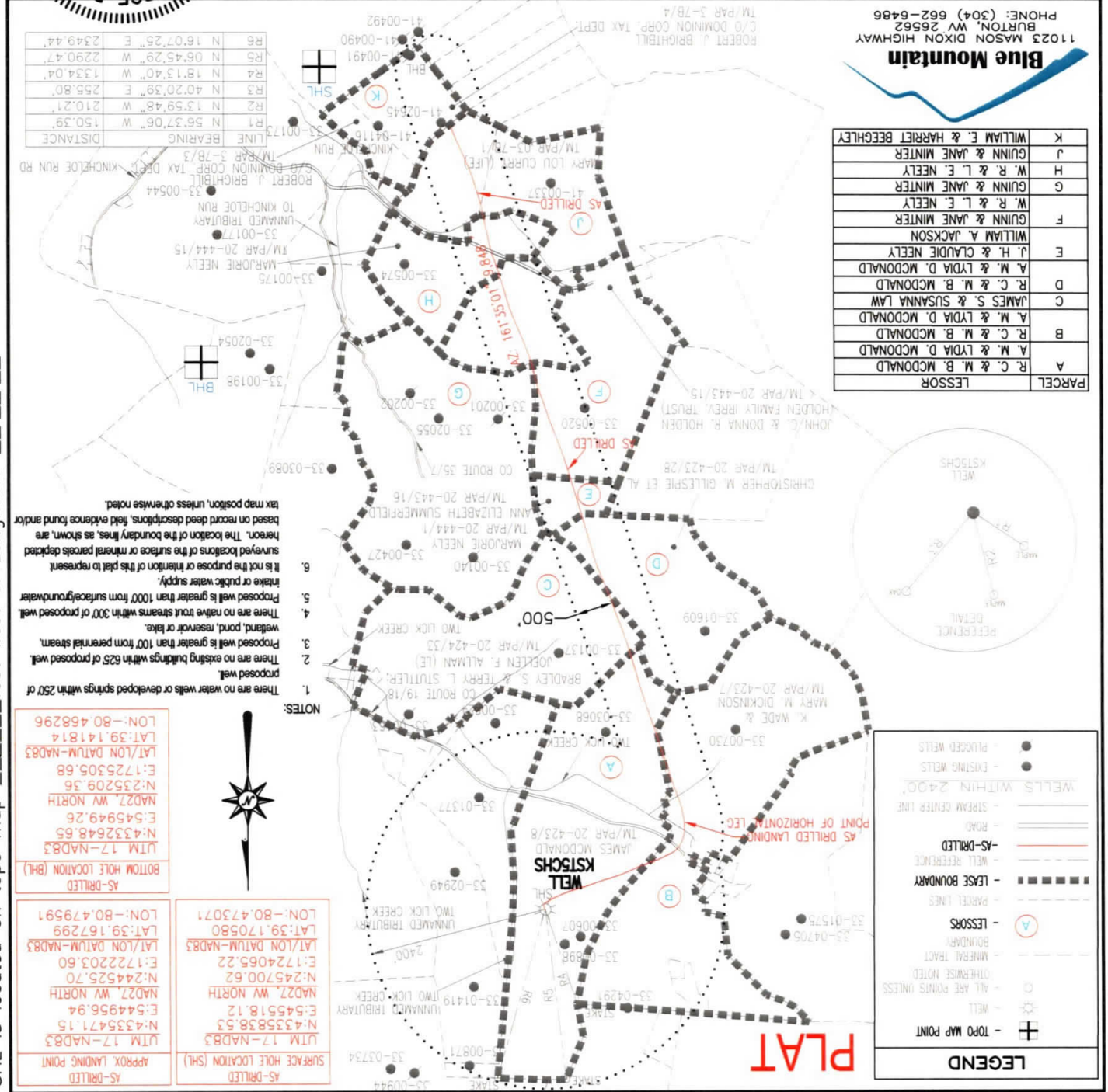
KST5 CHS tops for Completion report
Lithology/Formation Information

Lithology/formation	Top Depth in FT name TVD	Bottom Depth TVD	Top Depth MD	Bottom Depth MD	Rock type, type of fluid, gas, oil
Pittsburg Coal	692	700	692	700	Coal
Big Lime	1730	1820	1730	1820	Limestone
Big Injun	1820	1910	1820	1910	Sandstone
Pocono Big Injun	1910	2150	1910	2150	Sandstone
5th Sand	2150	2165	2150	2165	Sandstone
Rhinestreet	5720	6006	6034	6270	Grey Shale
Cashaqua	6006	6078	6270	6405	Silty Shale
Middlesex	6078	6101	6405	6454	Grey Shale
West River	6101	6170	6454	6612	Grey Shale
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FILE #: KST5CHS-AS DRILLED
DRAWING #: KST5CHS-AS DRILLED
SCALE: 1" = 200'
MINIMUM DEGREE OF ACCURACY: 1/2500
PROVEN SOURCE: U.S.G.S. MONUMENT THOMAS 1498.81'
OF ELEVATION:
R.P.E.:
Signed: *George D. S.*
L.L.S.: P.S. No. 2000
DATE: JANUARY 25, 2019
OPERATOR'S WELL #: KST5CHS-AS DRILLED
API WELL #: 47
STATE: 33
COUNTY: PERMIT 05816
WV Department of Environmental Protection
Well Type: Gas Oil Waste Disposal Production Deep Shallow
WATERSHED: MIDDLE WEST FORK CREEK
ELEVATION: 1,134'
COUNTY/DISTRICT: HARRISON / UNION
SURFACE OWNER: JAMES VAN MCDONALD
OIL & GAS ROYALTY OWNER: R. C. MCDONALD & M. B. MCDONALD, A. M. MCDONALD & LYDIA D. MCDONALD ACREAGE: 176.000±
ACREAGE: 1328.95±
DESIGNATED AGENT: DIANE C. WHITE
Address: 5260 DUPONT ROAD
City: PARKERSBURG State WV Zip Code 26101
WELL OPERATOR: HG ENERGY II APPALACHIA, LLC
Address: 5260 DUPONT ROAD
City: PARKERSBURG State WV Zip Code 26101
TARGET FORMATION: MARCELLUS
ESTIMATED DEPTH: AS-DRILLED TWD: 6,712'± TMD: 17,368'±
CLEAN OUT & REPLUG OTHER CHANGE (SPECIFY): AS-DRILLED PLAT
PLUG OFF OLD FORMATION PERFORATE NEW FORMATION PLUG & ABANDON
DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS
WVDEP RECEIVED Office of Oil and Gas
APR 03 2020
STATE OF WEST VIRGINIA
601 57TH STREET
CHARLESTON, WV 25304
WV Department of Environmental Protection



BHL is located on top map 9,784 feet south of Latitude: 39° 10' 00"
SHL is located on top map 13,751 feet south of Latitude: 39° 12' 30"
BHL is located on top map 2,582 feet west of Longitude: 80° 27' 30"
SHL is located on top map 4,178 feet west of Longitude: 80° 27' 30"

AS DRILLED PLAT