



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
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Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Tuesday, September 3, 2019
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD

PARKERSBURG, WV 26101

Re: Permit Modification Approval for 1208 N-4H
47-033-05954-00-00

Modify surface casing to 1000' to case off coal

HG ENERGY II APPALACHIA, LLC

The Office of Oil and Gas has reviewed the attached permit modification for the above referenced permit. The attached modification has been approved and well work may begin. Please be reminded that the oil and gas inspector is to be notified twenty-four (24) hours before permitted well work is commenced.

If there are any questions, please feel free to contact me at (304) 926- 0450.

James A. Martin
Chief

Operator's Well Number: 1208 N-4H
Farm Name: LINDA & WILLIAM W. BRODWATER III
U.S. WELL NUMBER: 47-033-05954-00-00
Horizontal 6A New Drill
Date Modification Issued: September 3, 2019

Promoting a healthy environment.

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: HG Energy II Appalachia, L

<u>494519932</u>	<u>Harrison</u>	<u>Union</u>	<u>West Milford 7.5'</u>
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Operator ID County District Quadrangle

2) Operator's Well Number: Nutter 1208 N-4H Well Pad Name: Nutter 1208

3) Farm Name/Surface Owner: Nutter Public Road Access: SR 19

4) Elevation, current ground: 1162' Elevation, proposed post-construction: 1147'

5) Well Type (a) Gas Oil Underground Storage
Other
(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus at 7013'/7064' and 51' in thickness. Anticipated pressure at 4314#.

8) Proposed Total Vertical Depth: 7050'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19,223'

11) Proposed Horizontal Leg Length: 11,652'

12) Approximate Fresh Water Strata Depths: 135', 500'

13) Method to Determine Fresh Water Depths: Nearest offset well data

14) Approximate Saltwater Depths: 1299', 1675'

15) Approximate Coal Seam Depths: 810' to 815'

16) Approximate Depth to Possible Void (coal mine, karst, other): None

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes No

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

WW-6B
(04/15)

API NO. 47- 033 - 05954mod
 OPERATOR WELL NO. Nutter 1208 N-4H
 Well Pad Name: Nutter 1208

18)

CASING AND TUBING PROGRAM

<u>TYPE</u>	<u>Size (in)</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling (ft)</u>	<u>INTERVALS: Left in Well (ft)</u>	<u>CEMENT: Fill-up (Cu. Ft.)/CTS</u>
Conductor	30"	New	LS	157.5	120'	120'	Drilled In
Fresh Water/Coal	20"	NEW	J-55	94	1000'	650'	CTS
Intermediate 1	13 3/8"	NEW	J-55	68	1890'	1890'	CTS
Intermediate 2	9 5/8"	NEW	J-55	40	2700'	2700'	CTS
Production	5 1/2"	NEW	P-110	23	19,223'	19223'	CTS
Tubing							
Liners							

<u>TYPE</u>	<u>Size (in)</u>	<u>Wellbore Diameter (in)</u>	<u>Wall Thickness (in)</u>	<u>Burst Pressure (psi)</u>	<u>Anticipated Max. Internal Pressure (psi)</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	30"	30"	.500				Drilled In
Fresh Water	20"	26"	.438	2110	1200	Type 1, Class A	40 % excess yield = 1.20, CTS
Coal/Storage	13 3/8"	17 1/2"	.480	3450		Type 1/Class A	Lead 40% excess, Tail 0% excess
Intermediate	9 5/8"	12 1/4"	.395	3950		Type 1/Class A	Lead 40% excess, Tail 0% Excess
Production	5 1/2"	8 1/2"	.415	14520	12000	Type 1/Class A	20% excess yield = 1.19, tail yield 1.19
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill the vertical depth to the Marcellus at an estimated total vertical depth of approximately 7050 feet. Drill horizontal leg to estimated 11652 lateral length, 19223 TMD. Hydraulically fracture stimulate and be capable of producing from the Marcellus Formation. Should we encounter an unanticipated void in the coal, we will install a minimum of 20' of casing below the void but not more than 100' below the void, set a basket and grout to surface. We plan to run an ECP above the Gantz/Dominion Storage interval to aid in sealing off and isolating the storage interval.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

The stimulation will be completed with multiple stages divided over the lateral length of the well. Stage spacing is dependent upon engineering design. Slickwater fracturing technique will be utilized on each stage using sand, water, and chemicals. See attached list. Maximum pressure not to exceed 12,500 psi.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 22.420 acres

22) Area to be disturbed for well pad only, less access road (acres): 15.399 acres

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing.
Freshwater - centralized every 3 joints to surface.
Coal - Bow Spring on every joint, will also be running ECP for isolating storage zone
Intermediate - Bow Spring on first 2 joints then every third joint to 100' from surface.
Production - Run 1 spiral centralizer every 5 joints from the top of the curve to surface. Run 1 spiral centralizer every 3 joints from the 1st 5.5' long joint to the top of the curve.

24) Describe all cement additives associated with each cement type:

Conductor - N/A. Casing to be drilled in w/ Dual Rotary Rig.
Fresh Water - 15.6 ppg PNE-1 + 3% bwoc CaCl₂ 40% Excess Yield = 1.20, CTS
Coal - Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl₂ 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl₂ zero% Excess. CTS
Intermediate - Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl₂ 40% Excess. Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl₂ zero% Excess. CTS
Production - Lead: 14.5 ppg POZ-PNE-1 + 0.3% bwoc R3 + 1% bwoc ECP + 0.75 gal/bk FP13L + 0.5% bwoc MPA170. Tail: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/bk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA170 20% Excess. Lead Yield=1.19, Tail Yield=1.94, CTS

25) Proposed borehole conditioning procedures:

Conductor - Ensure the hole is clean at TD.
Fresh Water - Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.
Coal - Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.
Intermediate - Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.
Production - Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.

*Note: Attach additional sheets as needed.



1208 N-4H
Marcellus Shale Horizontal
Harrison County, WV

		1208 N-4H SHL				14219013.96N 1803616.94E							
Ground Elevation		1147'				1208 N-4H LP				14219577.29N 1804282.13E			
Azimuth		340.538°				1208 N-4H BHL				14230563.54N 1800400E			

WELLBORE DIAGRAM	HOLE	CASING	GEOLOGY	TOP	BASE	MUD	CEMENT	CENTRALIZERS	CONDITIONING	COMMENTS
	30"	30" 157.5# LS	Conductor	0	120	AIR	N/A, Casing to be drilled in w/ Dual Rotary Rig	N/A	Ensure the hole is clean at TD.	Conductor casing = 0.5" wall thickness
	26"	20" 94# J-55	Fresh Water	0	135	AIR	15.6 ppg PNE-1 + 3% bwoc CaCl 40% Excess Yield=1.20 / CTS	Centralized every 3 joints to surface	Once casing is at setting depth, circulate a minimum of one hole volume with Fresh Water prior to pumping cement.	Surface casing = 0.438" wall thickness Burst=2110 psi
			Kittaning Coal	810	815					
			Coal/Fresh Water	0	1000					
	17.5"	13-3/8" 68# J-55 BTC	Little/Big Lime	1276 / 1317	1301 / 1393	AIR / KCL Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on every joint <i>*will also be running ECP for isolating storage zone*</i>	Once casing is at setting depth, Circulate and condition at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.480" wall thickness Burst=3450 psi
			Injun / Gantz (Storage)	1393 / 1680	1499 / 1740					
			Intermediate 1	0	1890					
			Fifty / Thirty Foot	1800 / 1880	1847 / 1892					
	12.25"	9-5/8" 40# J-55 BTC	Gordon Stray / Gordon	1935 / 2000	2000 / 2090	AIR / KCL Salt Polymer	Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl 40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS	Bow Spring on first 2 joints then every third joint to 100' form surface	Once casing is at setting depth, Circulate and condition mud at TD. Circulate a minimum of one hole volume prior to pumping cement.	Intermediate casing = 0.395" wall thickness Burst=3950 psi
			5lh Sand	2185	2220					
			Bayard Sand	2275	2310					
			Intermediate 2	0	2700					
	8.5" Vertical	5-1/2" 23# P-110 HC CDC HTQ	Speechley	2895	2913	9.0ppg SOBM	Lead: 14.5 ppg POZ:PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.3% bwoc MPA170 Tail: 14.8 ppg PNE-1 + 0.35% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA170 20% Excess Lead Yield=1.19 Tail Yield=1.94 CTS	Run 1 spiral centralizer every 5 joints from the top of the curve to surface.	Once on bottom/TD with casing, circulate at max allowable pump rate for at least 2x bottoms up, or until returns and pump pressures indicate the hole is clean. Circulate a minimum of one hole volume prior to pumping cement.	Production casing = 0.415" wall thickness Burst=14520 psi Note:Actual centralizer schedules may be changed due to hole conditions
			Balltown	3115	3155					
			Benson	4200	4233					
West Falls			4770	6015						
8.5" Curve	Rhinestreet		6015	6290	11.5ppg-12.5ppg SOBM					
	Cashaqua		6290	6491						
	Middlesex		6491	6571						
	West River		6571	6664						
	Burkett		6664	6690						
	Tully Limestone		6690	6794						
	Hamilton		6794	7013						
	Marcellus		7013	7064						
8.5" Lateral	TMD / TVD (Production)	19223	7050	11.5ppg-12.5ppg SOBM						
	Onondaga	7064								

LP @ 7050' TVD / 7566' MD 8.5" Hole - Cemented Long String 5-1/2" 23# P-110 HC CDC HTQ +/-11657' ft Lateral TD @ +/-7050' TVD +/-19223' MD

33-05954 MD

Adkins, Laura L

From: Ward, Samuel D
Sent: Thursday, August 29, 2019 4:25 PM
To: Adkins, Laura L
Subject: HG 1208 Mods

Laura,

Per our discussion earlier today, I am okay with the fresh water casing modification to 1,000'.

Sam

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HG Energy, LLC
5260 Dupont Road
Parkersburg, WV 26101
(304) 420-1100 - Office
(304) 863-3172 - Fax

August 29, 2019

Ms. Laura Adkins
WVDEP
Division of Oil & Gas
601 57th Street
Charleston, West Virginia 25304

RE: Nutter 1208 ^{6H} N-1H ^{7H} thru ^{8H} S-10H ^{9H} Permit Modification Request - (47-033-05940, 5953, 05952, 05954, ^{5H} 05951, 05959, 05960, 05962, 05966 and 05967) ^{10H}
Union District, Harrison County
West Virginia

Dear Ms. Adkins:

Per discussions with you, enclosed are revised WW-6B's and Well Bore Schematics for all the 1208 laterals, (N-1H - N-5H & S-6H - S-10H). The drilling/engineered plans are revised to extend the fresh water casing, (20"), from the approved 650 feet to 1000 feet; to extend the FW casing beyond the coal seam due to conditions encountered while drilling the 1209 well pad which is in close proximity to the Nutter 1208 well pad.

Please let me know if you have any questions or require additional information. I can be reached at (304) 420-1119 or dwhite@hgenergyllc.com.

Very truly yours,

Diane White

Diane C. White

Enclosures

cc: Sam Ward - Inspector