02/08/2019

west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Monday, February 4, 2019
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

HG ENERGY II APPALACHIA, LLC
5260 DUPONT ROAD

PARKERSBURG, WV 26101

Re: Permit Modification Approval for STICKEL 1210 S-5H
47-033-05928-00-00

Modified Casing Program

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:	STICKEL 1210 S-5H
Farm Name:	DANNY & ALICIA STICKEL
U.S. WELL NUMBER:	47-033-05928-00-00
Horizontal 6A	New Drill
Date Modification Issued:	February 4, 2019

02/08/2019

WW-6B
(04/15)

API NO. 47- 033 05928 MOD
OPERATOR WELL NO. Stickel 1210 S-5H
Well Pad Name: Stickel 1210

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	494519932	Harrison	Union	West Milford 7.5'
	Operator ID	County	District	Quadrangle

2) Operator's Well Number: Stickel 1210 S-5H Well Pad Name: Stickel 1210

3) Farm Name/Surface Owner: Danny & Alicia Stickel Public Road Access: Kincheloe Run Rd/SLS 35

4) Elevation, current ground: 989' Elevation, proposed post-construction: 994'

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

SDW 1/4/19

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus at 6863'/6914' and 51' in thickness. Anticipated pressure at 4314#.

8) Proposed Total Vertical Depth: 6900'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 17,312'

11) Proposed Horizontal Leg Length: 9,752'

12) Approximate Fresh Water Strata Depths: 82', 135', 500'

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

14) Approximate Saltwater Depths: None noted in offsets

15) Approximate Coal Seam Depths: 660' to 665'

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 X

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

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WW-6B
(04/15)

API NO. 47- 033059 28 MOD
OPERATOR WELL NO. Stickel 1210 S-5H
Well Pad Name: Stickel 1210

18) **CASING AND TUBING PROGRAM**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	30"	New	LS	157.5	75'	75'	Drilled In
Fresh Water	20"	NEW	J-55	94	600'	600'	CTS 30% excess yield =1.20,CTS
Coal	13 3/8"	NEW	J-55	68	1735'	1635'	40% excess yield = 1.20,CTS
Intermediate	9 5/8"	NEW	J-55	40	2500'	2500'	40% excess yield Lead/ 0% Excess Tail
Production	5 1/2"	NEW	P-110	23	17574'	17574'	20% excess yield = 1.19, tail yield = 1.04
Tubing							
Liners							

SDW
1/4/19

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	30"	30"	.500				CTS
Fresh Water	20"	24"	.438	2110	1200	Type 1, Class A	30 % excess yield = 1.20, CTS
Coal	13 3/8"	17 1/2"	.380	2730		Type 1/Class A	40% excess yield = 1.20, CTS
Intermediate	9 5/8"	12 1/4"	.395	3950		Type 1/Class A	40% excess yield = 0% Excess Lead
Production	5 1/2"	8 1/2"	.415	14520	12500	Type 1/ClassA	20% excess yield = 1.19, tail yield 1.04
Tubing							
Liners							

PACKERS

Kind:				
Sizes:				
Depths Set:				

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WW-6B
(10/14)

API NO. 47- 033 05928 Mod
OPERATOR WELL NO. Stickel 1210 S-5H
Well Pad Name: Stickel 1210

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 6900 feet. Drill horizontal leg to estimated 9752 TMD, 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.

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): 3.456 acres

22) Area to be disturbed for well pad only, less access road (acres): 3.0 acres

23) Describe centralizer placement for each casing string:

No centralizers will be used with conductor casing. Freshwater every 3 joints to surface. Coal - Bow Spring on first 2 joints then every third joint to 100' from surface. Intermediate - Bow Spring on first 2 joints then every third joint to 100' from surface. Production - Run 1 spiral centralizer every 3 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 CaCl, 40% Excess Yield = 1.20 / CTS".
Coal - "Lead: 15.4 ppg PNE-1 + 2.5% bwoc CaCl40% Excess / Tail: 15.9 ppg PNE-1 + 2.5% bwoc CaCl zero% Excess. CTS"
Intermediate - "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
Production - "Lead: 14.5 ppg POZ(PNE-1 + 0.3% bwoc R3 + 1% bwoc EC1 + 0.75 gal/sk FP13L + 0.5% bwoc NPA170, Tail: 14.8 ppg PNE-1 + 0.25% bwoc R3 + 0.75 gal/sk FP13L + 50% bwoc ASCA1 + 0.5% bwoc MPA170,20% ExcessLead Yield=1.19Tail Yield=1.04CTS"

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.

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*Note: Attach additional sheets as needed.