west virginia department of environmental protection

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

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

# PERMIT MODIFICATION APPROVAL

January 06, 2015

NOBLE ENERGY, INC.
333 TECHNOLOGY DRIVE, SUITE 116
CANONSBURG, PA 15317

Re: Permit Modification Approval for API Number 5101767 , Well #: SHL 22 HHS
Lengthen 13 5/8" casing

Oil and Gas Operator:
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.

Please call James Martin at 304-926-0499, extension 1654 if you have any questions.

Sincerely,

for Gene Smith

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas



01/09/2015

4705101767 Mod

noble energy

Office of Oil & Gas
601 57th street, SE
Charleston, WV 25304-2345

November 17, 2014

Re: SHL 22 GHS (API 051-01789) and HHS (API 051-01767) Casing Modifications

To Office of Oil and Gas:

Enclosed please find casing modifications for the above referenced permit applications. The permits have not been issued to date, if possible can you please switch out the pages, if not, I would like to modify the permits lengthening the 13 5/8 casing due to formation conditions.

Should you have any questions or desire additional information, please do not hesitate to contact me at dswiger@nobleenergyinc.com or 724-820-3061.

Sincerely,

Dee Swiger
Regulatory Analyst III

DS/

Enclosures:

Received
Office of Oil & Gas
NOV 20 2014

01/09/2015

WW-6B
(9/13)

4705101767 MOD

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

| 1) Well Operator: | Noble Energy, Inc. | 494501907 | 051 - Marshall | Sandhill | Valley Grove |
|---|---|---|---|---|---|
| | | Operator ID | County | District | Quadrangle |

2) Operator's Well Number: SHL 22 HHS Well Pad Name: SHL 22

3) Farm Name/Surface Owner: Noble Energy, Inc. Public Road Access: Staniford Hill Road County Rte 9

4) Elevation, current ground: 1322' Elevation, proposed post-construction: 1321.50'

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

JN 11/13/2014

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus 6641' / 6690' Thick 49' / 4415 psi

8) Proposed Total Vertical Depth: 6680'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14,533'

11) Proposed Horizontal Leg Length: 7,159'

12) Approximate Fresh Water Strata Depths: 210'

13) Method to Determine Fresh Water Depths: nearest offset wells

14) Approximate Saltwater Depths: None

15) Approximate Coal Seam Depths: 770' - 780' Pittsburgh Coal Seam Existing Perimeter Barrier/ Proposed Interior Barrier

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: Shoemaker Mine
Depth: 770'-780'
Seam: Pittsburgh No. 8
Owner: Consolidation Coal Company (Murray American Energy Inc.)

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18) **CASING AND TUBING PROGRAM**

| TYPE | Size | New or Used | Grade | Weight per ft. (lb/ft) | FOOTAGE: For Drilling | INTERVALS: Left in Well | CEMENT: Fill-up (Cu. Ft.) |
|---|---|---|---|---|---|---|---|
| Conductor | 30" | New | LS | 117# | 40' | 40' | GTS |
| Fresh Water | 20" | New | J-55 | 94# | 360' | 360' | CTS 30% excess Yield =1.18 |
| Coal | 13 3/8" | New | J-55 | 54.5# | 1180' due to Red rock issues | 1180' due to Red rock issues | CTS 30% excess Yield = 1.18 |
| Intermediate | 9 5/8" | New | J-55 | 36.0# | 3139' | 3139' | CTS 20% excess Yield = 1.19 |
| Production | 5 1/2" | New | P-110 | 20.0# | 14,533' | 14,533' | 10% excess Yield = 1.27 TOC=200' above 9.625" shoe |
| Tubing | | | | | | | |
| Liners | | | | | | | |

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| TYPE | Size | Wellbore Diameter | Wall Thickness | Burst Pressure | Cement Type | Cement Yield (cu. ft./k) |
|---|---|---|---|---|---|---|
| Conductor | 30" | 36" | 0.375 | | Stabilize to surface with fill/soil | to surface |
| Fresh Water | 20" | 26" | 0.438 | 2730 | Type 1 | 30% excess Yield = 1.18 |
| Coal | 13 3/8" | 17.5 | 0.380 | 2730 | Type 1 | 30% Excess Yield = 1.18 |
| Intermediate | 9 5/8" | 12.3/8" | .352 | 3520 | Class A | 20% excess Yield = 1.19 to surface |
| Production | 5 1/2" | 8.75" - 8.5" | .361 | 12,640 | Class A | 10% excess Yield = 1.27 TOC=200' above 9.625" shoe |
| Tubing | | | | | | |
| Liners | | | | | | |

**PACKERS**

| | | | | |
|---|---|---|---|---|
| Kind: | | | | |
| Sizes: | | | | |
| Depths Set: | | | | |

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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 6,680 feet. Drill Horizontal leg - stimulate and be capable of producing from the Benson to the Marcellus Formation. Should we encounter red rock / formation issues set the 13 3/8 to next component formation. Should we encounter a unanticipated void 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 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. our maximum pressure is not to exceed 10,000 lbs. Please refer to attached list.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 21.01

22) Area to be disturbed for well pad only, less access road (acres): 10.102

23) Describe centralizer placement for each casing string:

Conductor - No centralizers used. Fresh Water/Surface - centralized every three joints to surface. Coal - Bow Spring on first two joints then every third joint to 100' from surface. Intermediate - Bow Springs centralizers every third joint to 100' from Surface. Production - Rigid bow springs every third joint from KOP to TOC, rigid bow springs every joint to KOP.

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

See attached sheets - Conductor - GTS. Fresh Water - 15.6 ppg Type 1 cement with flake and +2% CaCl, 0.25# lost circ., 30%excess yield =1.18. Coal-15.6 ppg Type 1 +2% CaCl, 0.25# Lost Circ 30% Excess Yield = 1.18 Intermediate- 15.6 ppg Class A +0.4% Ret, 0.15% Disp, 0.2% Anti Foam, 0.125# sk Lost circ. 20% Excess Yield =1.19 To Surface. Production - 14. 8 ppg Class A 25:75:0 System +2.6% cement extender, 0.7 Fluid Loss additive, 0.45% high temp retarder, 0.2% fiction reducer 10% excess Yield =1.27 TOC >= 200' above 9.625" shoe. See attached approved variance from WV DEP.

25) Proposed borehole conditioning procedures:

Conductor - The hole is drilled w/ air and casing is run in air. Apart from insuring the hole is clean via air circulation at TD, there are no other conditioning procedures. Coal and Fresh Water/Surface -The hole is drilled w/air and casing is run in air. Once casing is at setting depth, circulate a minimum of one hole volume prior to pumping cement. Intermediate - Once surface casing is set and cemented Intermediate hole is drilled either on air or SOBM and filled w/ KCl water once filled w/ KCl water once drilled to TD. The well is conditioned with KCl circulation prior to running casing. Once casing is at setting depth, the well is circulated a minimum of one hole volume prior to pumping cement. Production - The hole is drilled with synthetic oil base mud and once at TD the hole is circulated at maximum allowable drilling pump rate for at least 6X bottoms up. Once on bottom with casing, circulate a minimum of one hole volume prior to pumping cement.



*Note: Attach additional sheets as needed.



01/09/2015