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

September 11, 2014

STATOIL USA ONSHORE PROPERTIES, INC.
2103 CITYWEST BOULEVARD - SUITE 800
HOUSTON, TX 77042

Re: Permit Modification Approval for API Number 10302930, Well #: JOE JOLLIFFE UNIT 1 4H
modify fresh water casing depth

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,

Gene Smith
Assistant Chief of Permitting
Office of Oil and Gas



09/12/2014

Mail

Statoil

August 6, 2014

West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street, SE
Charleston, WV 23504-2345

Attention: Ashley LeMasters

Reference: Joe Jolliffe Unit 1 4H (API No. 47-103-02930)
Casing Revision

Ms. LeMasters:

Attached please find revised WW-6B and Wellbore Schematic for the Joe Jolliffe Unit 1 4H (API No. 47-103-02930) revising the freshwater casing setting depth (signed by the inspector). Statoil is preparing to commence drilling operations on the Jolliffe wells on or about September 29, 2014 after drilling the Michael Kuhn 2H.

Currently the freshwater casing is permitted to 500'; however, there was a study done by the state of WV (1980 Fresh & Saline Groundwater of WV by James B. Foster) that indicates the freshwater depth is actually deeper, at 587' in lieu of 320'. Though there is no evidence other than the study that the freshwater is deeper, as a prudent operator Statoil would like approval to set the casing deeper than originally permitted. Since a revision to the freshwater casing was required, Statoil took the opportunity to also revise the intermediate casing depth to set through the Big Injun.

If you have any questions or require additional information, please contact the undersigned at 713-485-2640 or at BEKW@statoil.com.

Sincerely,

Bekki Winfree
Sr. Regulatoy Advisor – Marcellus
Attachment

Received

AUG 7 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

09/12/2014

WW - 6B
(1/12)

Mod 1

# STATE OF WEST VIRGINIA
# DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
# W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: Statoil USA Onshore Properties Inc. | 494505083 (Operator ID) | Wetzel (County) | Center (District) | Littleton 7.5' (Quadrangle)

2) Operator's Well Number: Joe Jolliffe Unit I 4H Well Pad Name: Jolliffe Unit I

3 Elevation, current ground: 1336' Elevation, proposed post-construction: 1336' **already built**

4) Well Type: (a) Gas ■ Oil _____
Other _____
(b) If Gas: Shallow ■ Deep _____
Horizontal ■

DMH 8-5-14

5) Existing Pad? Yes or No: Yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale; Formation Top - 7304' TVD, 50' Thick, 0.67 psi/ft

7) Proposed Total Vertical Depth: 7480'
8) Formation at Total Vertical Depth: Marcellus Shale
9) Proposed Total Measured Depth: 13,486'
10) Approximate Fresh Water Strata Depths: 130' - 320', 587'
11) Method to Determine Fresh Water Depth: Local water well data & 1980 study "Freshwater & Saline Groundwater of WV" by James Foster
12) Approximate Saltwater Depths: 2150'
13) Approximate Coal Seam Depths: 755'
14) Approximate Depth to Possible Void (coal mine, karst, other): N/A
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill and stimulate a horizontal well in the Marcellus Shale.

17) Describe fracturing/stimulating methods in detail:
The well will be stimulated by multi-stage fracturing using a slickwater fluid.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 4.79 ac **pad already built**

19) Area to be disturbed for well pad only, less access road (acres): 1.94 ac **pad already built**

Received

AUG 7 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

09/12/2014

WW - 6B
(1/12)

Mod 1

20) **CASING AND TUBING PROGRAM**

| TYPE | Size | New or Used | Grade | Weight per ft. | FOOTAGE: For Drilling | INTERVALS: Left in Well | CEMENT: Fill -up (Cu. Ft.) |
|---|---|---|---|---|---|---|---|
| Conductor | 20" | New | H-40 | 94# | 100' | 100' | Grouted to surface 120 cu. ft. |
| Fresh Water | 13-3/8" | New | J-55 | 54.5# | 650' | 650' | Cement to surface 644 cu. ft. |
| Coal | N/A | N/A | N/A | N/A | N/A | N/A | N/A |
| Intermediate | 9-5/8" | New | J-55 | 36# | 2700' | 2700' | Cement to surface 1120 cu. ft. |
| Production | 5-1/2" | New | P-110 | 20# | 13,486' | 13,486' | Cement to 1685 ft, 3011 cu. ft. |
| Tubing | | | | | | | |
| Liners | | | | | | | |

DMH 8-5-14

| TYPE | Size | Wellbore Diameter | Wall Thickness | Burst Pressure | Cement Type | Cement Yield |
|---|---|---|---|---|---|---|
| Conductor | 20" | 26" | .438" | 1530 psi | Class "A" | 1.3 cuft/sk |
| Fresh Water | 13-3/8" | 17-1/2" | .380" | 2730 psi | Class "A" | 2.31 cuft/sk |
| Coal | N/A | N/A | N/A | N/A | N/A | N/A |
| Intermediate | 9-5/8" | 12-1/4" | .352" | 3520 psi | Class "A" | 2.31cuft/sk |
| Production | 5-1/2" | 8-1/2" | .361" | 12,640 psi | Class "A" | 1.37 cuft/sk |
| Tubing | 2-3/8" | | .19 | 7700 psi | | |
| Liners | | | | | | |

**PACKERS**

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

WW - 6B
(1/12)

Mod 1

21) Describe centralizer placement for each casing string.

Conductor - None

Fresh Water - 1 bow spring centralizer 10' from shoe, 1 bow spring centralizer every 4 joints to surface

Intermediate - 1 bow spring centralizer 10' from shoe, 1 bow spring centralizer every 3 joints to surface

Production - 1 spiroglide centralizer 10' from shoe, 1 spiroglide centralizer mid joint on second joint

1 spiroglide centralizer every joint to 45 deg, 1 bowspring centralizer every other joint to KOP, double bow spring centralizers every fourth joint to 2000'.

22) Describe all cement additives associated with each cement type.

DMH 8-5-14

Conductor - None

Fresh Water - Class A Cement with 3% Calcium Chloride

Intermediate - Accelerator (CaCl2), Expansion / Thixotropic (W-60), Retarder (HR-7)

Production (lead) - Gel / Extender (Bentonite), Fluid Loss / Gas Migration (CFL-117), Retarder (HR-7), Defoamer

Production (tail) - Gel / Extender (Bentonite), Fluid Loss / Gas Migration (CFL-117), Retarder (HR-7), solubility enhancer (for acid solubility)

**Note** Names and types of additives may vary depending on vendor availability

23) Proposed borehole conditioning procedures.

Conductor - Circulate clean

Fresh Water - Circ. hole clean at TD, Fill casing with water, Pump 20 bbl water, 25 bbl gel spacer, and 5 bbl water.

Fresh Water - Circ. hole clean at TD, Fill casing with water, Pump 20 bbl water, 25 bbl gel spacer, and 5 bbl water.

Production - Circ. hole clean at TD, Pump 50 bbl tuned spacer, 5 bbl water

**Note** tuned spacer is a combination gelled / weighted mud flush spacer, can be substituted with alternating gelled spacers and weighted mud flushes. Borehole conditioning will be dictated by hole conditions.

*Note: Attach additional sheets as needed.

Mod 1

# Statoil — Marcellus - Drilling Well Schematic

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Well Name: | Joe Jolliffe 4H | | | GLE (ft): | 1,358 | TVD(ft): | 7,482 |
| Field Name: | Marcellus | | | DF(ft): | 22 | TMD(ft): | 13,486 |
| County: | Wetzel Co., WV | BHL: | X = 4387452.4 | Y= | 539474.8 | Profile: | Horizontal |
| API #: | 47-10302930 | SHL: | X = 4388679.1 | Y= | 538102.0 | AFE No.: | 0 |

| Formations & Csg Points | Depth, ft MD | Depth, ft TVD | Depth, ft SS | Form. Temp. (F) | Pore Press. (EMW) | Frac Gradient (EMW) | Planned MW | Measure Depth (ft) | Program | Details |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | **20" Conductor** |
| *Conductor* | *100* | *100* | *1,280* | - | - | - | - | 100 | | |
| | | | | | | | *Fresh Water* | | | **17-1/2" Surface** |
| Pittsburgh Coal | | 0 | | | | | 9.1 | | Profile: | Vertical |
| | | | | | | | | | Bit Type: | 17-1/2" Tri-Cone |
| | | | | | | | | | BHA: | Rotary Assembly |
| | | | | | | | | | Mud: | 9.1 ppg Fresh Water |
| | | | | | | | | | Surveys: | n/a |
| | | | | | | | | | Logging: | n/a |
| | | | | | | | | | Casing: | 13.375 54.5 J-55 BTC at 650' MD/650' TVD |
| | | | | | | | | | Centralizers: | 1 centralizer w/ stop collar 10 ft above float shoe. One Single Bow every joint to 100ft below surface. |
| | | | | | | | | | Cement: | 15.8 ppg Tail slurry w/ TOC @ Surface |
| | | | | | | | | | Potential Drilling Problems: | Stuck Pipe, Floating, Collision, |
| Approximate Fresh Water Strata –587' | | | | | | | | | | |
| *Casing Point* | *650* | *650* | *730* | *65* | - | - | | 650 | | |
| | | | | | | | | | | **12-1/4" Intermediate** |
| | | | | | | | *5% KCl* | | FIT/LOT: 14.0 ppg EMW | |
| Red Clay | | 0 | | | | | 9.1 | | Profile: | Nudge and hold for anticollission |
| | | | | | | | | | Bit Type: | 12-1/4" Kymera 533 0 |
| 1st Salt Sand | | 0 | | | | | 9.1 | | BHA: | 8in 6.7 Lobe 4.0 Stg 1.5 ABH (0.17 rpg/620 Diff) 0 |
| 2nd Salt Sand | | 0 | | | | | 9.1 | | Mud: | 9.1 ppg 5% KCl |
| 3rd Salt Sand | | 0 | - | - | - | | 9.1 | | Surveys: | Gyro SS, MWD - EM Pulse |
| | | | | | | | | | Logging: | n/a |
| | | | | | | | | | Casing/Liner: | 9.625 36 J-55 BTC at 2700' MD/2700' TVD |
| | | | | | | | | | Csg Hanger: | Fluted Mandrel Hanger |
| Maxton Sand | | 2,243 | | | | | 9.1 | | Centralizers: | 1 centek centralizer w/ stop collar 10 ft above float shoe. 1 centek centralizer w/ stop collar 10 ft above float collar. 1 centralizer every joint for the first 15 joints. One centralizer every 3 jnts to 100ft below surface. |
| Keener Sand | | 0 | | | | | 9.1 | TOC @ 1700 | Cement: | 15.8 ppg Tail slurry w/ TOC @ Surface |
| Big Lime | | 0 | | | | | 9.1 | | | |
| Base Big Injun | | 2,556 | | | | | 9.1 | | Potential Drilling Problems: | Hole Cleaning , Poor ROP, Buckling, |
| *Casing Point* | *2,700* | *2,700* | *-1,320* | *82* | - | *>18.0* | | 2,700 | | |
| | | | | | | | | | | **8-1/2" Production** |
| | | | | | | | *SBM* | | LOT: 16.6 ppg EMW | |
| Berea Sand | | 2,903 | | | | | 9.1 | | Profile: | HZ - KOP @ 5848' md @ 13.95 deg Inc. w/ 10 DLS |
| Gordon Sand | | 3,132 | | | | | 9.1 | | Bit Type: | 8-1/2" PDC 5-blade 13mm 0 |
| Java | | 5,237 | | | | | 9.1 | | BHA: | 6.75in 6/7 lobe 5.0 stg 1.95 FBH (0.29 rpg /715 Diff) 0 |
| Angola | | 0 | | | | | 9.1 | | Mud: | 8.6 - 13 ppg SBM |
| Rhinestreet | | 0 | | | | | 9.1 | | Surveys: | MWD - EM Pulse w/ 30ft surveys in curve, 100ft surveys in lateral |
| Cashaqua | | 0 | | | | | 9.1 | | Logging: | GR |
| | | | | | | | | | Casing/Liner: | 5.5 20 P110EC VAM TOP HT at 13486 ft MD/7482 ft TVD |
| Middlesex | | 0 | | | | | 9.1 | | Csg Hanger: | Fluted Mandrel Hanger |
| | | | | | | | | | Centralizers: | 1 centek centralizer w/ stop collar 10ft above shoe. 1 centek centralizer 10ft above float collar. 1 centek centralizer every joint (floating) until KOP. 1 centek centralizer every 3 joints (floating) until 200ft inside intermediate shoe. 1 centek centralizer 50ft below mandrel hanger. |
| **KOP** | **6,905** | **6,890** | | | | | 13.0 | | Cement: | 15 ppg Tail slurry w/ TOC @ 1700' |
| West River | | 0 | | | | | 13.0 | | Potential Drilling Problems: | Bit Preservation, Hole Cleaning , , |
| Genesco | | 7,184 | | | - | - | 13.0 | | Notes / Comments: | |
| Marcellus | | 7,439 | | | | | 13.0 | | | |
| Cherry Valley | | 7,470 | | | - | - | 13.0 | | | |
| **Landing point** | **7,803** | **7,463** | | | | | 13.0 | | | TMD: 13,486 TVD: 7,482 |
| Onondaga | | 7,490 | | | - | - | 13.0 | | | |
| | | | | | | | | | | |

Received
AUG 7 2014

Last Revision Date: 7/28/2014
Revised by: George Manthos

Note: Depths are referenced to RKB
Note: Not Drawn to Scale

Cement Outside Casing

Office of Oil and Gas
WV Dept. of Environmental Protection

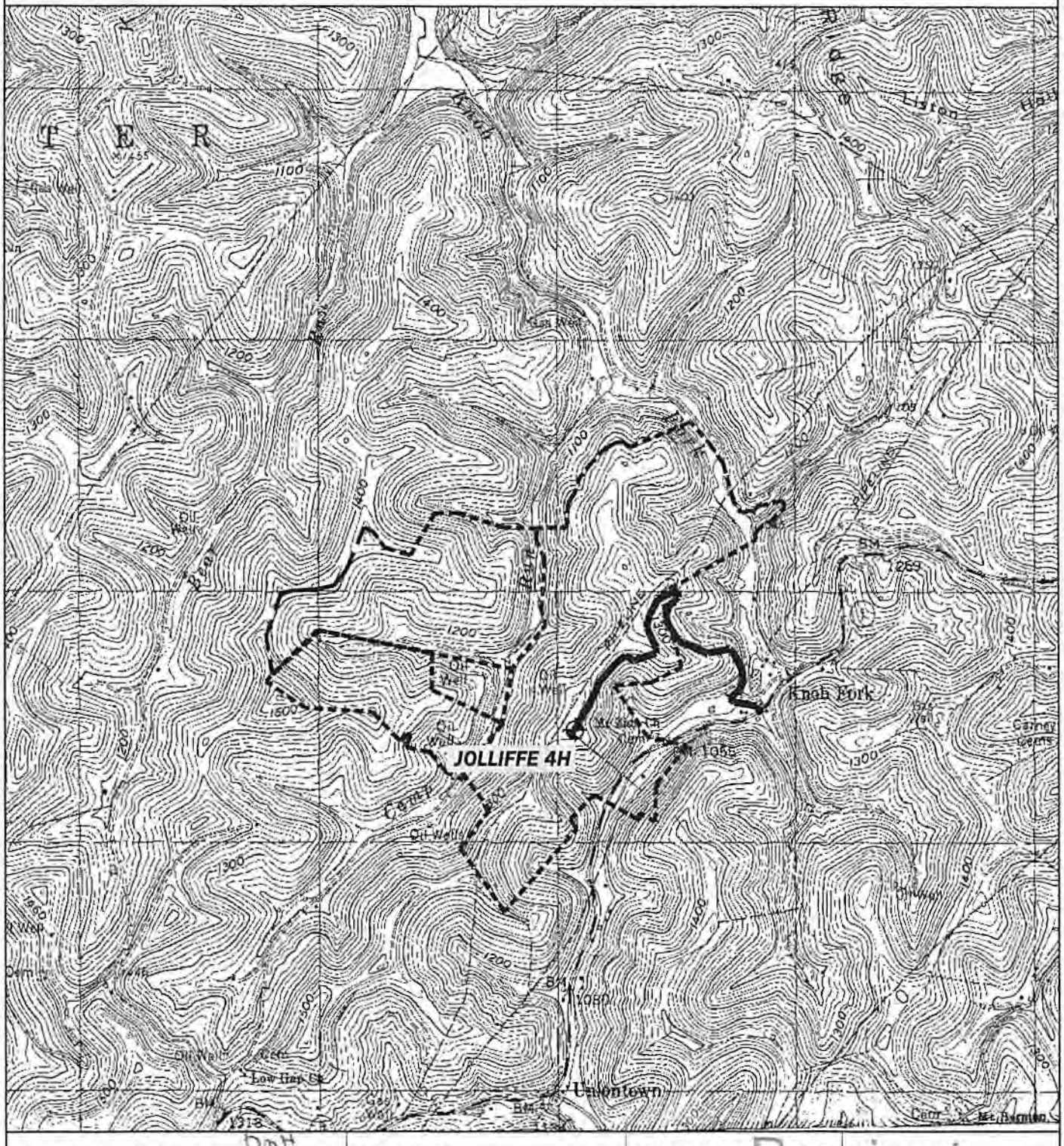
09/12/2014

WW9

# JOLLIFFE 4H

PAGE OF

103 02930



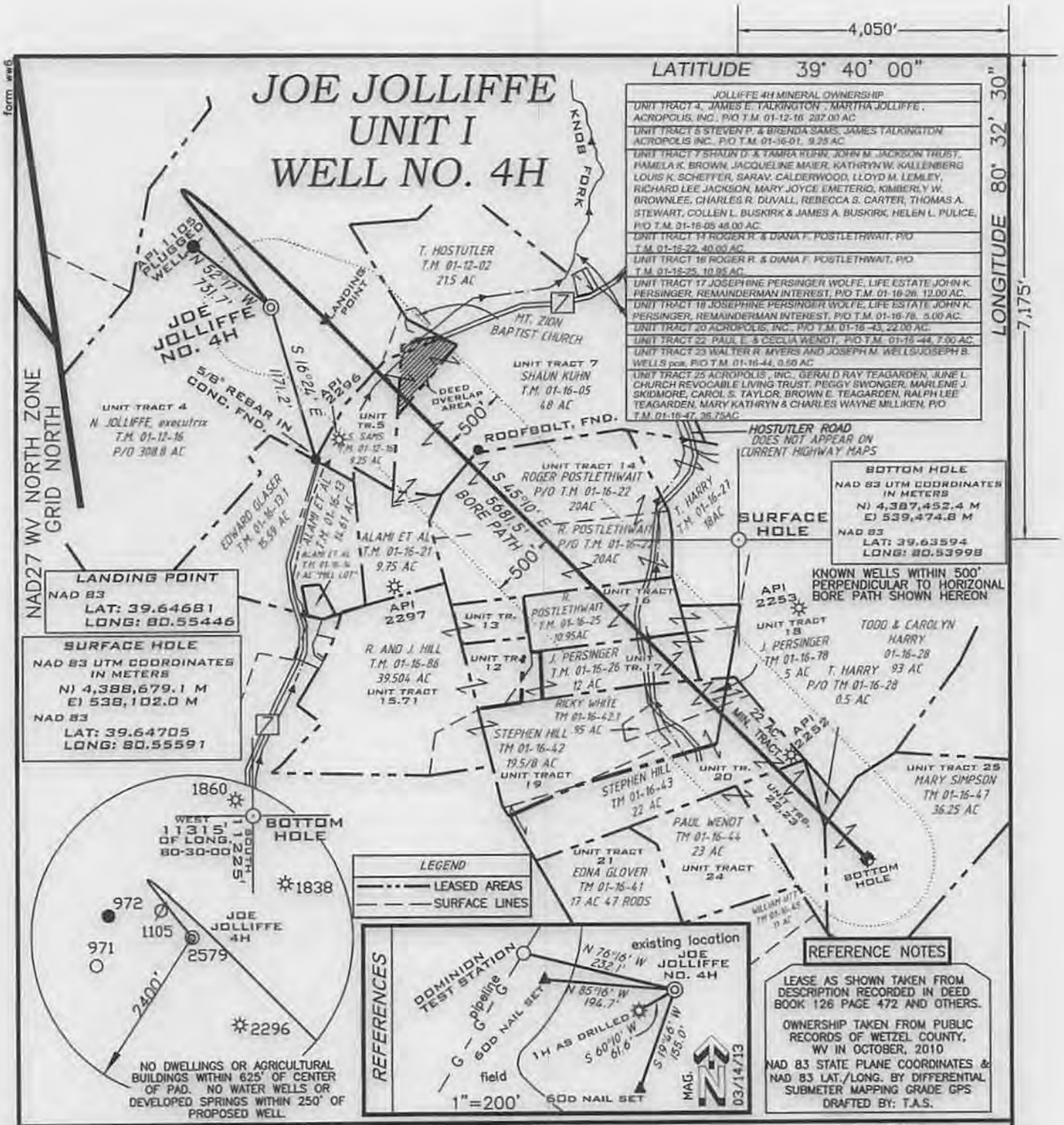

| PREPARED BY: | OPERATOR | TOPO SECTION | WELL NAME |
|---|---|---|---|
| ANGLE RIGHT LAND SURVEYING, LLC<br>PO BOX 681<br>GRANTSVILLE, WV 26147<br>(304) 354-0065<br>G100479 | STATOIL USA ONSHORE PROPERTIES INC.<br>2103 CITYWEST BLVD., STE. 800<br>HOUSTON, TX 77042 | LITTLETON 7.5' | JOLLIFFE 4H |
| | | SCALE: 1"=2000' | DATE: 04/30/2013 |

DmH 7-17

Received

09/12/2014

Office of Oil and Gas
WV Dept. of Environmental Protection




FILE NUMBER G100479(WB9-74)
DRAWING NUMBER G100479WP4H.dwg
SCALE 1" = 1000'
MINIMUM DEGREE OF ACCURACY 1/2500
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. 1006

TERRY A. SHREVE LICENSED No. 1006 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

SINGLE RIGHT LAND SURVEYING, LLC. GRANTSVILLE, WV 26147 (304) 354-0065

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

REVISED DATE: NOVEMBER 6, 2013
DATE: JULY 8, 2013
OPERATORS WELL NO. JOE JOLLIFFE UNIT 1 WELL #4H REV
API WELL NO. 47 – 103 – 02930 H6A
STATE COUNTY PERMIT

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

LOCATION ELEVATION 1336' WATERSHED TRIBUTARY OF KNOB FORK
DISTRICT CENTER COUNTY WETZEL
QUADRANGLE LITTLETON 7.5' LEASE NUMBER
SURFACE OWNER Nancy E. Jolliffe, Executrix of the estate of Joe Jolliffe ACREAGE P/O 308.8±
OIL & GAS ROYALTY OWNER MARTHA JOLLIFFE, et al LEASE ACREAGE SEE MINERAL OWNERSHIP TABLE

PROPOSED WORK: DRILL X CONVERT ___ DRILL DEEPER ___ REDRILL ___ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ___
PERFORATE NEW FORMATION ___ OTHER PHYSICAL CHANGE (SPECIFY) ___
PLUG & ABANDON ___ CLEAN OUT & REPLUG ___

TARGET FORMATION MARCELLUS ESTIMATED DEPTH 7330' + Horizontal Leg
WELL OPERATOR STATOIL USA ONSHORE PROPERTIES INC. DESIGNATED AGENT WILLIAM T. FAHEY II
ADDRESS 2103 CITYWEST BLVD., STE. 800 HOUSTON, TX 77042 ADDRESS FAHEY LAW OFFICE 2116 PENNSYLVANIA AVE., WEIRTON, WV 26062

09/12/2014

COUNTY NAME
PERMIT
A.R.L.S
form ww6