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

November 05, 2013

PDC MOUNTAINEER LLC
POST OFFICE BOX 26
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 3305742 , Well #: MAXWELL4HM
Changed bottom hole

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
Regulatory/Compliance Manager
Office of Oil and Gas

WW - 6B
(1/12)

33-05742 MOD

# 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: PDC Mountaineer LLC | 494494839 (Operator ID) | Harrison (County) | Union (District) | Mount Clare 7.5' (Quadrangle)

2) Operator's Well Number: 4 HM Well Pad Name: Maxwell

3 Elevation, current ground: 1462' Elevation, proposed post-construction: 1459'

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

5) Existing Pad? Yes or No: No

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Marcellus Shale, 7600' TVD, Approximately 100 feet thick, 7600' x 0.594 psi/ft = 4514 psi calculated reservoir pressure.

SDW 9/5/13

7) Proposed Total Vertical Depth: 7600'
8) Formation at Total Vertical Depth: Marcellus Shale
9) Proposed Total Measured Depth: 15,540'
10) Approximate Fresh Water Strata Depths: 302', 369', 396', & 429'
11) Method to Determine Fresh Water Depth: Reported wells: 47-033-04775, 04559, 04575, & 05556
12) Approximate Saltwater Depths: 628', 1261'
13) Approximate Coal Seam Depths: 361', 540'
14) Approximate Depth to Possible Void (coal mine, karst, other): Not Known.
15) Does land contain coal seams tributary or adjacent to, active mine? No
16) Describe proposed well work: Drill & stimulate a new horizontal Marcellus well following all State & Federal guidelines.
All casing used in the wellbore will be new casing. Centralizers will be used contingent upon final log of well. Production string cement will be at least 100 feet into the intermediate string. Cement will be API grade.

17) Describe fracturing/stimulating methods in detail:
Slick water frac, pumping 80 bbls minimum. Each stage to contain approximately 10,000 bbl of water and 40,000 pounds of sand.
Frac additives, chemical names, and CAS #'s are provided on the next page.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): _____

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

Received
SEP - 6 2013
WV Dept. of Environmental Protection
Office of Oil and Gas

WW - 6B
(1/12)

33-05742 MOD

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# | 65' | 65' | Cement to Surface |
| Fresh Water | 13 3/8" | New | J-55 | 54.5# | 500' | 500' | Cement to Surface |
| Coal | | | | | | | |
| Intermediate | 9 5/8" | New | J-55 | 40# | 2850' | 2850' | Cement to Surface |
| Production | 5 1/2" | New | P-110 | 20# | 15,540' | 15,540' | 2820 minimum |
| Tubing | | | | | | | |
| Liners | | | | | | | |

| TYPE | Size | Wellbore Diameter | Wall Thickness | Burst Pressure | Cement Type | Cement Yield |
|---|---|---|---|---|---|---|
| Conductor | 20" | 24" | 0.756 | 1500 | 1 | 1.06 |
| Fresh Water | 13 3/8" | 17 1/2" | 0.66 | 1730 | 1 | 1.18 |
| Coal | | | | | | |
| Intermediate | 9 5/8" | 12 1/4" | 0.704 | 3520 | 1 | 1.18 |
| Production | 5 1/2" | 8.5"/8.75" | 0.722 | 12,460 | H | 1.18 |
| Tubing | | | | | | |
| Liners | | | | | | |

SDW
9/5/13

**PACKERS**

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

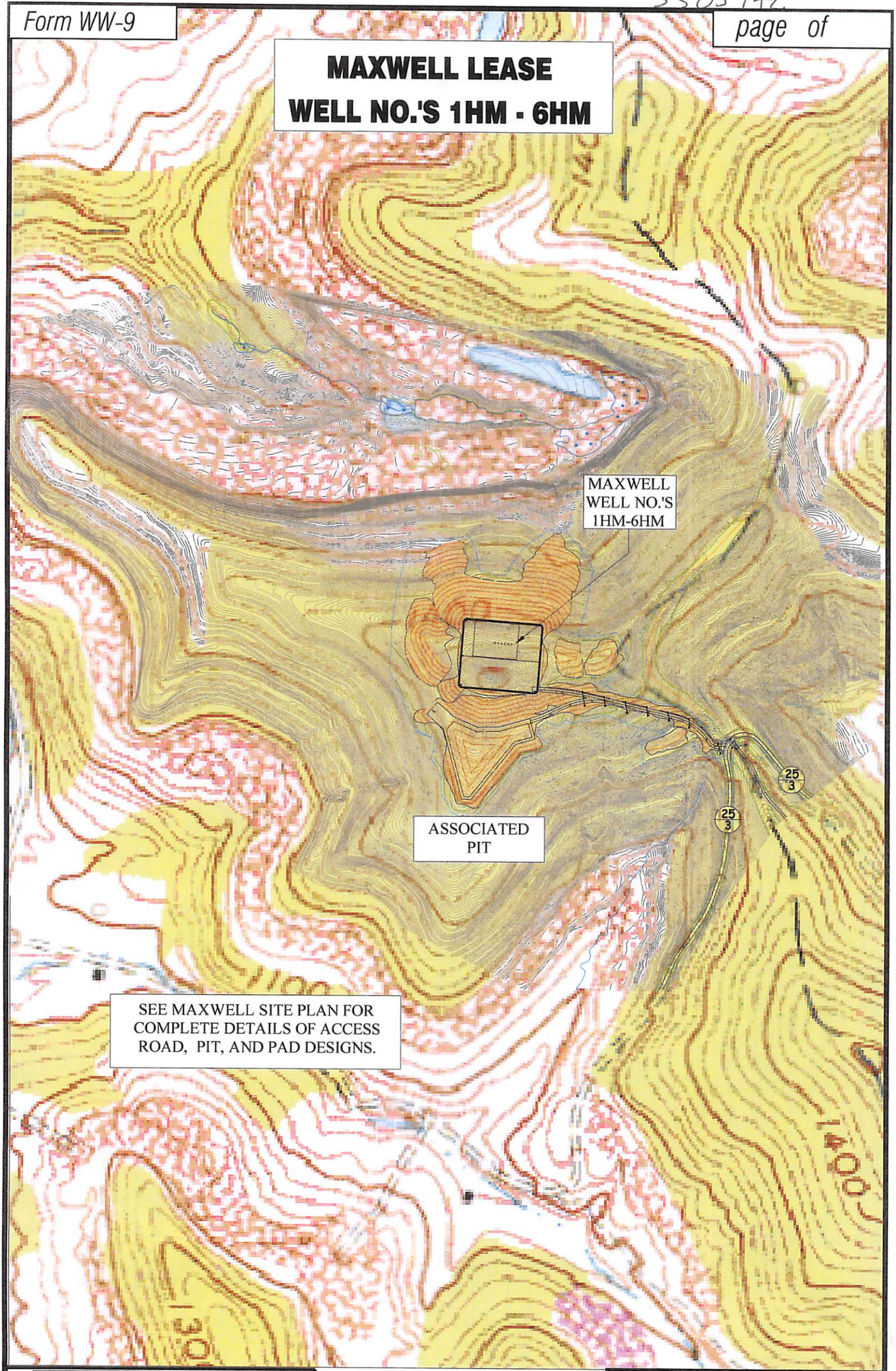
RECEIVED
Office of Oil and Gas
Environmental Protection

Form WW-9

3305742

page of

# MAXWELL LEASE
# WELL NO.'S 1HM - 6HM





Professional Energy Consultants
A DIVISION OF SMITH LAND SURVEYING
SURVEYORS
PROJECT MGMT.
SLS
ENGINEERS
ENVIRONMENTAL
220 West Main St
P.O. Box 150
Glenville, WV 26351
(304) 462-5634
56065 Dilles Bottom Road
Shadyside, OH 43947
(740) 671-0911
HONESTY, INTEGRITY, QUALITY


TOPO SECTION OF USGS
MOUNT CLARE 7.5' QUADRANGLE

**SCALE: 1"=500'**

0' 500' 1000'

| DRAWN BY | FILE NO. | DATE | CADD FILE: |
|---|---|---|---|
| C.P.M. | 7995 | 03-28-13 | 7995REC.DWG |

FORM WW 6

9,530'

LATITUDE 39°15'00"

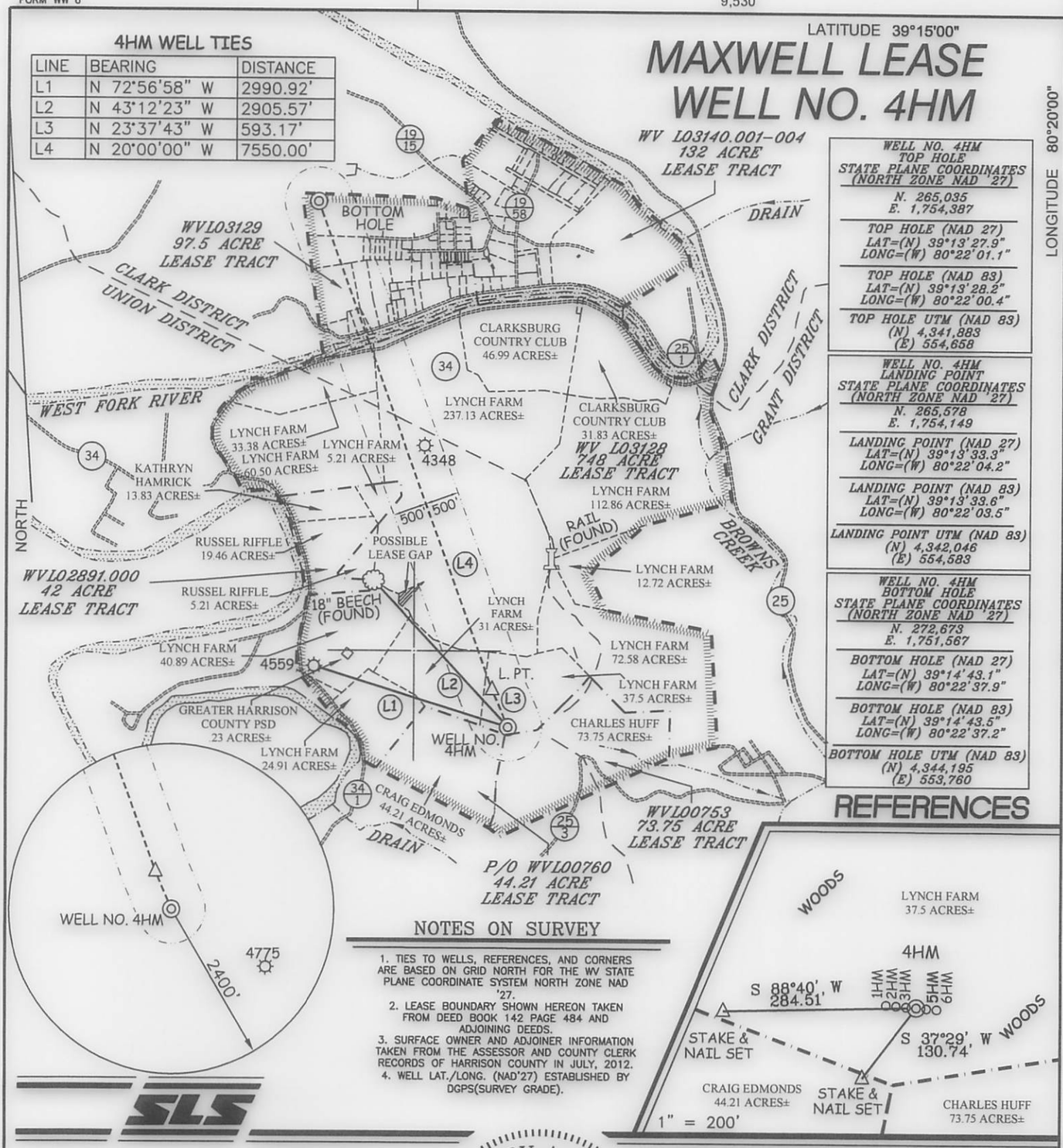
# MAXWELL LEASE
# WELL NO. 4HM

LONGITUDE 80°20'00"

9,316'

## 4HM WELL TIES

| LINE | BEARING | DISTANCE |
|---|---|---|
| L1 | N 72°56'58" W | 2990.92' |
| L2 | N 43°12'23" W | 2905.57' |
| L3 | N 23°37'43" W | 593.17' |
| L4 | N 20°00'00" W | 7550.00' |




| WELL NO. 4HM TOP HOLE STATE PLANE COORDINATES (NORTH ZONE NAD 27) |
|---|
| N. 265,035 E. 1,754,387 |
| TOP HOLE (NAD 27) LAT=(N) 39°13'27.9" LONG=(W) 80°22'01.1" |
| TOP HOLE (NAD 83) LAT=(N) 39°13'28.2" LONG=(W) 80°22'00.4" |
| TOP HOLE UTM (NAD 83) (N) 4,341,883 (E) 554,658 |

| WELL NO. 4HM LANDING POINT STATE PLANE COORDINATES (NORTH ZONE NAD 27) |
|---|
| N. 265,578 E. 1,754,149 |
| LANDING POINT (NAD 27) LAT=(N) 39°13'33.3" LONG=(W) 80°22'04.2" |
| LANDING POINT (NAD 83) LAT=(N) 39°13'33.6" LONG=(W) 80°22'03.5" |
| LANDING POINT UTM (NAD 83) (N) 4,342,046 (E) 554,583 |

| WELL NO. 4HM BOTTOM HOLE STATE PLANE COORDINATES (NORTH ZONE NAD 27) |
|---|
| N. 272,673 E. 1,751,567 |
| BOTTOM HOLE (NAD 27) LAT=(N) 39°14'43.1" LONG=(W) 80°22'37.9" |
| BOTTOM HOLE (NAD 83) LAT=(N) 39°14'43.5" LONG=(W) 80°22'37.2" |
| BOTTOM HOLE UTM (NAD 83) (N) 4,344,195 (E) 553,760 |

## REFERENCES




## NOTES ON SURVEY

1. TIES TO WELLS, REFERENCES, AND CORNERS ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 142 PAGE 484 AND ADJOINING DEEDS.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF HARRISON COUNTY IN JULY, 2012.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS(SURVEY GRADE).

SLS

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 DIVISION OF ENVIRONMENTAL PROTECTION.

P.S. 677 Gregory A. Smith

GREGORY A. SMITH LICENSED No. 677 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE APRIL 3 , 20 13

REVISED DATE SEPTEMBER 3 , 20 13

OPERATORS WELL NO. MAXWELL 4HM

API WELL NO. 47 — 33 — 05742.H6A MOD

STATE — COUNTY — PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200

PROVEN SOURCE OF ELEVATION DGPS (SUBMETER MAPPING GRADE)

FILE NO. 7995P4HMR3(448-13)

SCALE 1" = 2,000'

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

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

LOCATION :

ELEVATION 1,462' WATERSHED WEST FORK RIVER

DISTRICT UNION COUNTY HARRISON QUADRANGLE MOUNT CLARE 7.5'

SURFACE OWNER LYNCH FARM, LLC ACREAGE 37.5±

ROYALTY OWNER WBM HEIRS PROPERTIES LLC, ETAL ACREAGE 748, 42, 44.21, 73.75, 97.5, & 132±

PROPOSED WORK : LEASE NO. ____

DRILL X CONVERT ____ DRILL DEEPER ____ REDRILL ____ FRACTURE OR STIMULATE X PLUG OFF OLD FORMATION ____ PERFORATE NEW FORMATION ____ PLUG AND ABANDON ____ CLEAN OUT AND REPLUG ____ OTHER ____

PHYSICAL CHANGE IN WELL (SPECIFY) ____ TARGET FORMATION MARCELLUS

ESTIMATED DEPTH 7,590' TVD / TMD 15,538'

COUNTY NAME

PERMIT

WELL OPERATOR PDC MOUNTAINEER, LLC DESIGNATED AGENT JAMIE HAGA

ADDRESS 120 GENESIS BOULEVARD ADDRESS 120 GENESIS BOULEVARD

BRIDGEPORT, WV 26330 BRIDGEPORT, WV 26330

SIS

124668