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west virginia department of environmental protection

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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](http://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

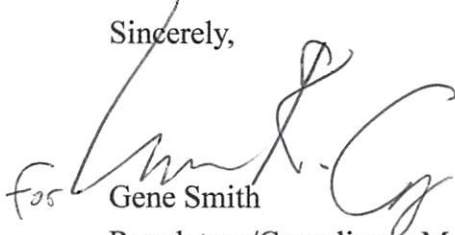
Changed bottom hole

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

**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 Harrison Union Mount Clare 7.5'  
Operator ID County District 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.

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  
Office of Oil and Gas  
Department of Environmental Protection

20)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<b>Size</b>	<b>New or Used</b>	<b>Grade</b>	<b>Weight per ft.</b>	<b>FOOTAGE: For Drilling</b>	<b>INTERVALS: Left in Well</b>	<b>CEMENT: Fill -up (Cu. Ft.)</b>
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							

<b>TYPE</b>	<b>Size</b>	<b>Wellbore Diameter</b>	<b>Wall Thickness</b>	<b>Burst Pressure</b>	<b>Cement Type</b>	<b>Cement Yield</b>
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**

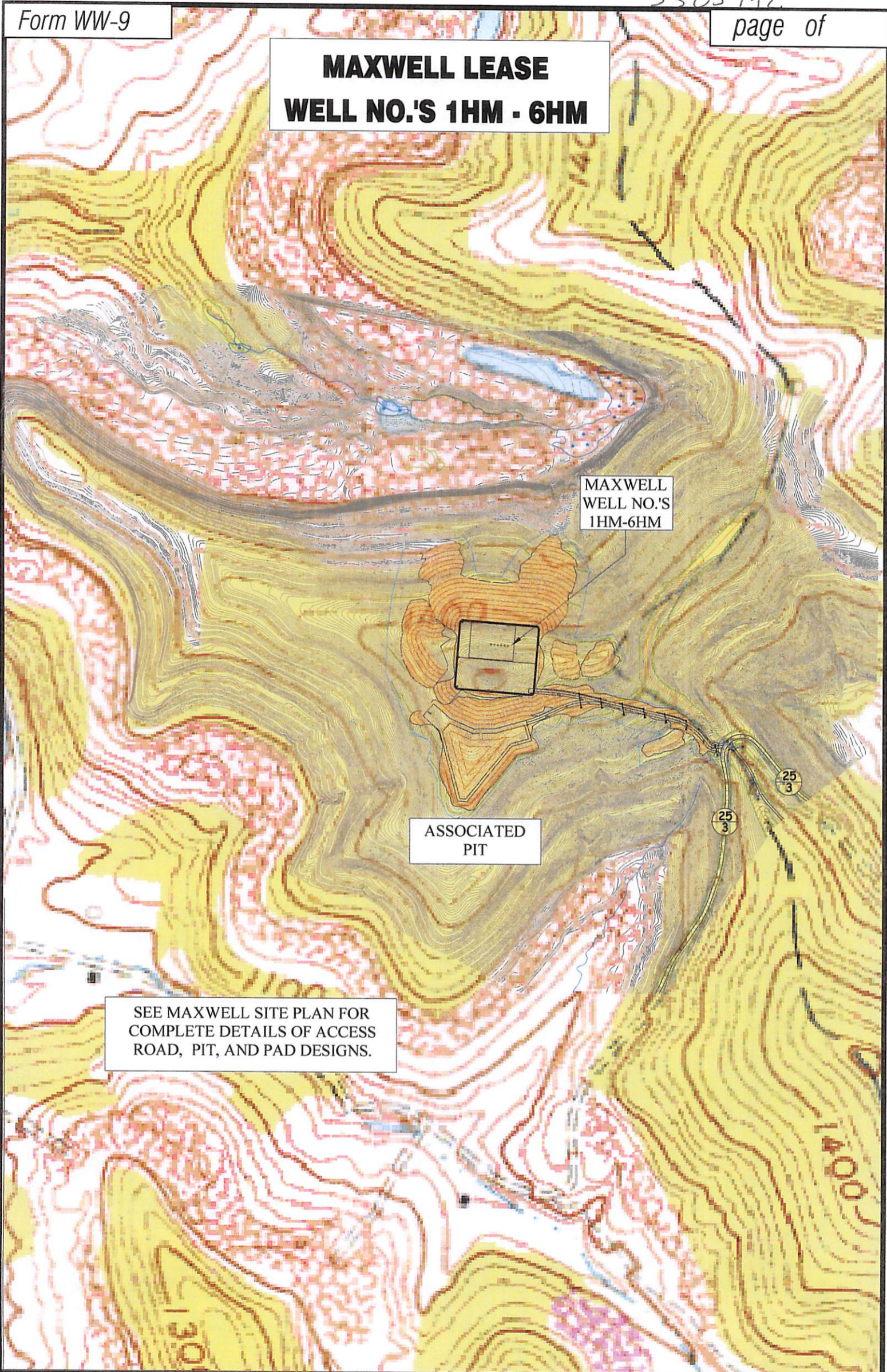
Kind:				
Sizes:				
Depths Set:				

Received

W...  
2013  
Office of Oil and Gas  
Environmental Protection



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



MAXWELL  
WELL NO.'S  
1HM-6HM

ASSOCIATED  
PIT

SEE MAXWELL SITE PLAN FOR  
COMPLETE DETAILS OF ACCESS  
ROAD, PIT, AND PAD DESIGNS.

**Professional Energy Consultants**  
A DIVISION OF SMITH LAND SURVEYING

SURVEYORS PROJECT MGMT. **SLS** ENGINEERS ENVIRONMENTAL

228 West Main St.  
P.O. Box 150  
Glenville, WV 26031  
(304) 452-5634  
HONESTY, INTEGRITY, QUALITY

56065 Dikes Bottom Road  
Shadeside, OH 43087  
(740) 671-9911

TOPO SECTION OF USGS  
MOUNT CLARE 7.5' QUADRANGLE



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

**MAXWELL LEASE  
WELL NO. 4HM**

WV L03140.001-004  
132 ACRE  
LEASE TRACT

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) 554,658

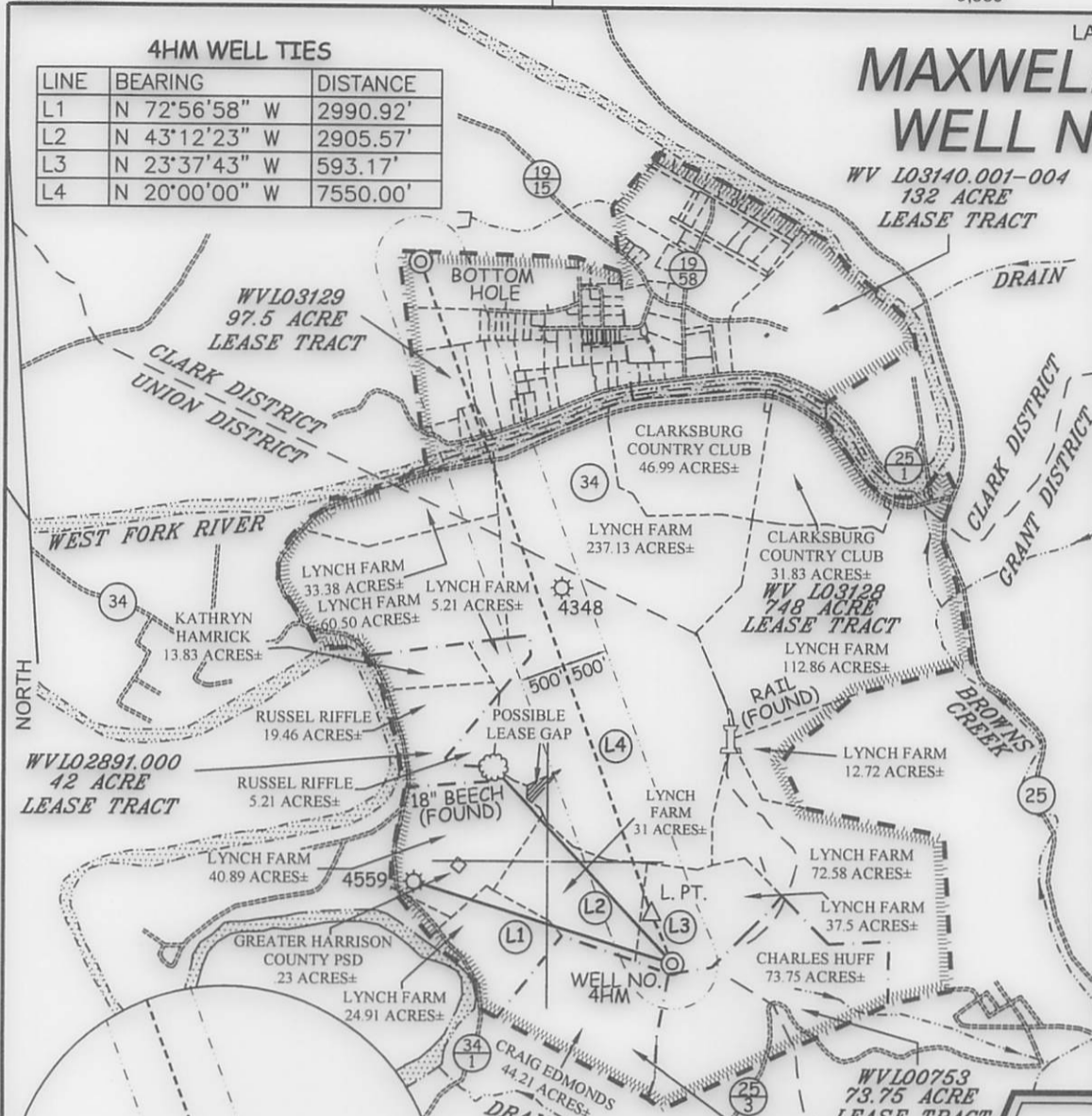
WELL NO. 4HM  
BOTTOM HOLE  
STATE PLANE COORDINATES  
(NORTH ZONE NAD 27)  
N. 272,673  
E. 1,751,567

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).



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*



(+) 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 - MOD  
STATE COUNTY PERMIT 05742.H6A

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7995P4HMR3(448-13)  
PROVEN SOURCE OF ELEVATION DGPS (SUBMETER MAPPING GRADE) SCALE 1" = 2,000'

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



WELL TYPE: OIL \_\_\_ GAS  LIQUID WASTE IF "GAS" PRODUCTION  STORAGE \_\_\_ DEEP \_\_\_ SHALLOW   
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  CONVERT \_\_\_ DRILL DEEPER \_\_\_ REDRILL \_\_\_ FRACTURE OR STIMULATE  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'

WELL OPERATOR PDC MOUNTAINEER, LLC DESIGNATED AGENT JAMIE HAGA  
ADDRESS 120 GENESIS BOULEVARD BRIDGEPORT, WV 26330 ADDRESS 120 GENESIS BOULEVARD BRIDGEPORT, WV 26330