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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

August 29, 2014

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-9101298, issued to PDC MOUNTAINEER LLC, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto.

Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.



James Martin  
Chief

Operator's Well No: OES R3HM  
Farm Name: ORTHODOX EDUCATIONAL SOC  
**API Well Number: 47-9101298**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 08/29/2014

**Promoting a healthy environment.**

**08/29/2014**

## PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

### CONDITIONS

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1. This existing OES Pad must have the following erosion and sediment control improvements before well work on this permit may begin: Reinstall the mountable berm coming onto the site; Re-seed and mulch the non-vegetated areas within the LOD, especially outside the fence around the pit.
2. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
3. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
4. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
5. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
6. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
7. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
8. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
9. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
10. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling. **08/29/2014**



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

91 3 368

1) Well Operator: PDC Mountaineer, LLC. 494494839 Taylor Fetterman Gladesville 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: R3HM Well Pad Name: OES

3) Farm Name/Surface Owner: Orthodox Educational Society Public Road Access: White Day Road off of SR 119

4) Elevation, current ground: 1948' Elevation, proposed post-construction: 1950'

5) Well Type (a) Gas  Oil  Underground Storage   
Other

(b) If Gas Shallow  Deep   
Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus Shale / TVD to Landing Zone is 7864' / Thickness = 100' / Pressure: (7802' x 0.42 psi/ft = 3280 psi)

8) Proposed Total Vertical Depth: 7875'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 16,075'

11) Proposed Horizontal Leg Length: 7,193'

12) Approximate Fresh Water Strata Depths: 245'

13) Method to Determine Fresh Water Depths: Offset wells: 47-091-00576, 00312, 00694.

14) Approximate Saltwater Depths: 910'

15) Approximate Coal Seam Depths: 273', 328', 414', 468'

16) Approximate Depth to Possible Void (coal mine, karst, other): Not Known ✓

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: \_\_\_\_\_  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

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WW-6B  
(9/13)

18)

**CASING AND TUBING PROGRAM**

<u>TYPE</u>	<u>Size</u>	<u>New or Used</u>	<u>Grade</u>	<u>Weight per ft. (lb/ft)</u>	<u>FOOTAGE: For Drilling</u>	<u>INTERVALS: Left in Well</u>	<u>CEMENT: Fill-up (Cu. Ft.)</u>
Conductor	20"	N	H-40	94 lb.	70'	70'	Cement to Surface
Fresh Water	13 3/8"	N	H-40	48 lb.	540'	540'	Cement to Surface
Coal							
Intermediate	9 5/8"	N	J-55	40 lb.	2,500'	2,500'	Cement to Surface
Production	5 1/2"	N	P-110	20 lb	16,075'	16,075'	Minimum 3,480
Tubing							
Liners							

*Kenneth Bryant 5-21-14*

<u>TYPE</u>	<u>Size</u>	<u>Wellbore Diameter</u>	<u>Wall Thickness</u>	<u>Burst Pressure</u>	<u>Cement Type</u>	<u>Cement Yield (cu. ft./k)</u>
Conductor	20"	24"	.756	1,500	1	1.06
Fresh Water	13 3/8"	17 1/2"	.66	1,730	1	1.36
Coal						
Intermediate	9 5/8"	12 1/4"	.790	3,950	1	1.38
Production	5 1/2"	8 1/2" / 8 3/4"	.722	12,640	H	1.18
Tubing						
Liners						

**PACKERS**

Kind:				
Sizes:				
Depths Set:				

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WW-6B  
(9/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and Complete a horizontal Marcellus Shale well following all State and Federal guidelines. All casing will be new and the production casing will be cemented a minimum of 100' into the intermediate casing if it is not cemented to the surface.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

Slickwater frac, pumping 85 BBL/min. maximum. Each stage to be comprised of approximately 10,000 BBL of water and 400,000 lbs of sand. Maximum pressure of 9000 psi

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): Pad extension within existing LOD.

22) Area to be disturbed for well pad only, less access road (acres): Pad extension within existing LOD.

23) Describe centralizer placement for each casing string:

Conductor: None  
Surface: 1 every 90' of pipe and a basket  
Intermediate: 1 every 7 joints and a basket  
Production: 1 every 12 Joints in the vertical section, then 1 every 2 joints in the horizontal section

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

See attached sheet.

25) Proposed borehole conditioning procedures:

Surface and intermediate holes are cleaned with air. Production hole is circulated with weighted drilling mud for at least 4 hours with high viscosity sweeps ran intermittently.

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\*Note: Attach additional sheets as needed.

08/29/2014



**PDC MOUNTAINEER**

PDC Mountaineer, LLC  
120 Genesis Boulevard, PO Box 26  
Bridgeport, WV 26330

304-842-3597  
304-808-0913 (fax)

**CEMENT ADDITIVES ASSOCIATED WITH EACH CEMENT TYPE:**

**SURFACE:** Type 1 cement + 2% CaCl + 0.25 pps Cello Flake

**INTERMEDIATE:** Pre-Flush Mud Clean I  
Type 1 cement + 2% CaCl + 0.25 pps Cello Flake

**PRODUCTION:** Pre-Flush Mud Clean I  
**LEAD** Class H cement + 0.1% bwoc R-3 + 0.25% bwoc CD-32 + 1.2% bwoc FL-62  
+ 0.1% bwoc ASA-301 + 0.4% bwoc Sodium Metasilicate + 50.5% fresh water  
**TAIL** Type 1 cement + 0.4% bwoc R-3 + 0.3% bwoc CD-32 + 1% bwoc FL-62  
+ 0.15% bwoc ASA-301 + 50.5% fresh water

**ADDITIVES:**

CaCl (Calcium Chloride)= Accelerator

Cello Flake= Lost circulation control agent

R-3= Retarder

CD-32= Dispersant

FL-62= Fluid loss control agent

ASA-301 Sodium Metasilicate= Free water control & Solid suspension

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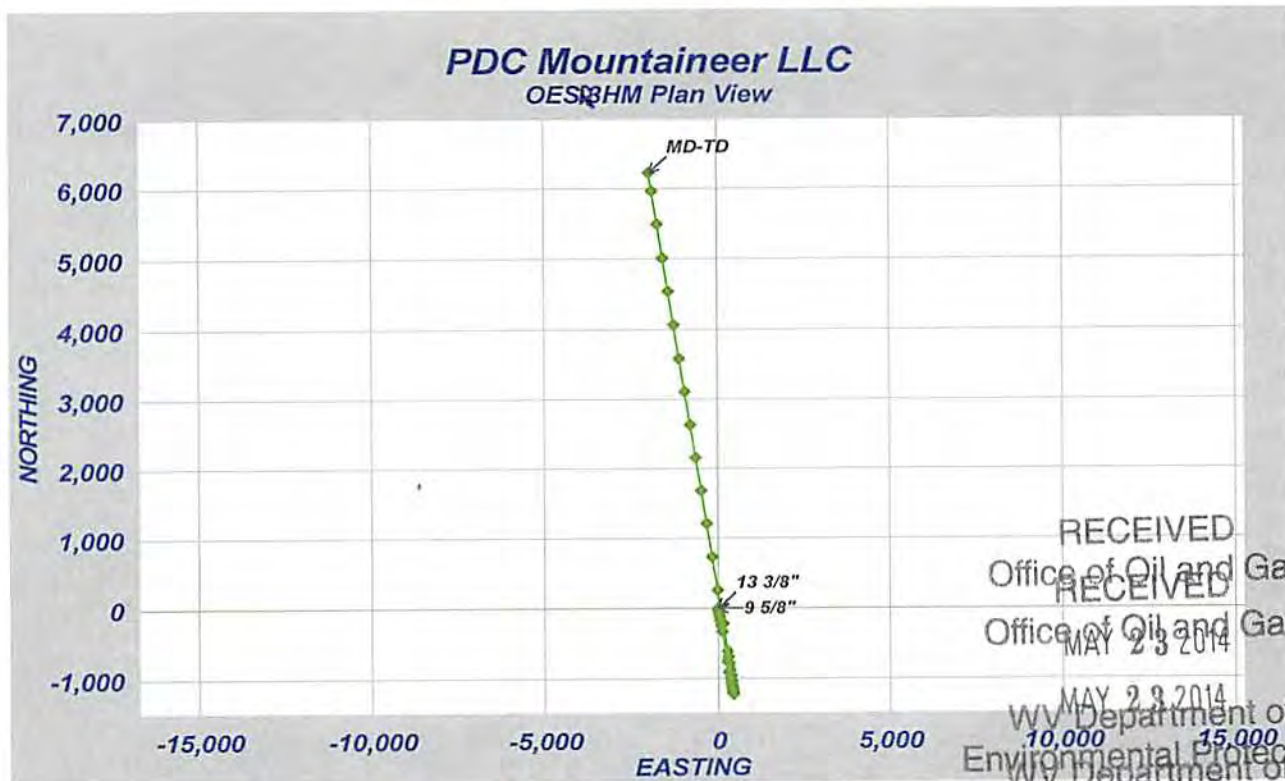
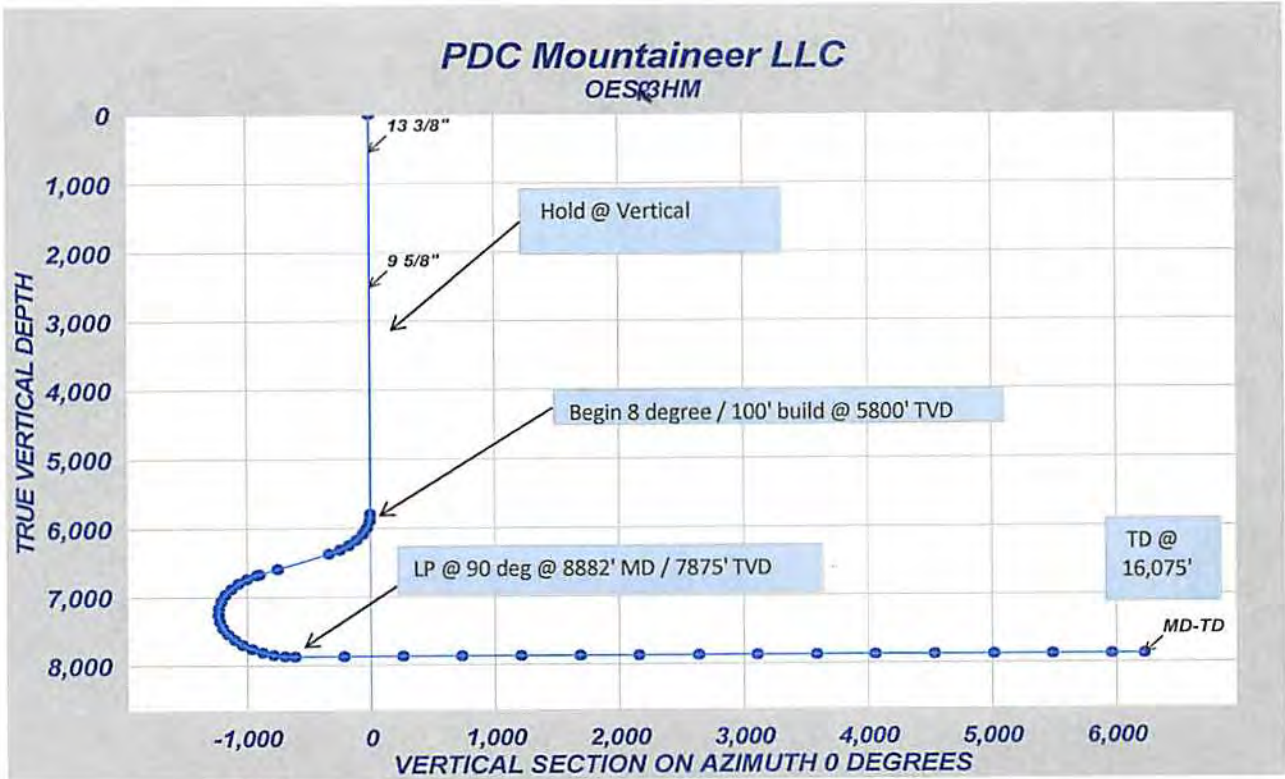
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**PDC Mountaineer LLC**  
OES R3HM Well Plan  
Taylor County, WV



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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name PDC Mountaineer, LLC OP Code 494494839

Watershed (HUC 10) White Day Creek Quadrangle Gladesville 7.5'

Elevation 1,951.0' County Taylor District Fetterman

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes  No

Will a pit be used? Yes  No

If so, please describe anticipated pit waste: Flowback Water

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? 40

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number 2459, 4037, 8462, K&H Well (Ohio) 34-9-2-3821 )
- Reuse (at API Number To Be Determined )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_)

Will closed loop system be used? If so, describe: Yes, cuttings go into a half round where they will be solidified and hauled to Meadowfill.

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Vertical-air, Horizontal-mud

-If oil based, what type? Synthetic, petroleum, etc. synthetic

Additives to be used in drilling medium? Lime, perma-lose, xan-plex, super sweep, caustic soda, bar, x-cide

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) N/A

-Landfill or offsite name/permit number? Meadowfill Landfill 100678WV

I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature Steven P. Johnson

Company Official (Typed Name) Steven P. Johnson

Company Official Title Agent

Subscribed and sworn before me this 11th day of May 2014, 20

Rachel Wyckoff Notary Public

My commission expires March 14, 2022



08/29/2014



Form WW-9

Operator's Well No. OES R3HM

PDC Mountaineer, LLC

Proposed Revegetation Treatment: Acres Disturbed 9 Prevegetation pH 7.2

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount at least 500 lbs/acre

Mulch 2 - 3 Tons/acre

Seed Mixtures

**Temporary**

**Permanent**

Seed Type	lbs/acre
Timothy Grass	40
Orchard Grass	12
Redtop Clover	5

Seed Type	lbs/acre
Timothy Grass	40
Orchard Grass	12
Redtop Clover	5

Attach:

Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: SEED RELOCATED TOPSOIL STOCKPILE ASAP

Title: OIL & GAS INSPECTION

Date: 5-27-14

Field Reviewed? (  ) Yes (  ) No

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**PDC MOUNTAINEER**

**SITE SAFETY PLAN**

**PDC Mountaineer, LLC**

**OES #3HM<sup>R</sup>**

**911 Address  
1170 White Day Road  
Grafton, WV 26354**

**Gladesville Quad, Fetterman District - Taylor County, West Virginia.**

The Following Site Safety Plan Approved By:

By: *Andy E. Cochran*

Date: 5-2-14

Title: EHS Manager, PDCM

By: *Kenneth Stewart*

Date: 5-21-14

Title: INSPECTOR, WVOOG

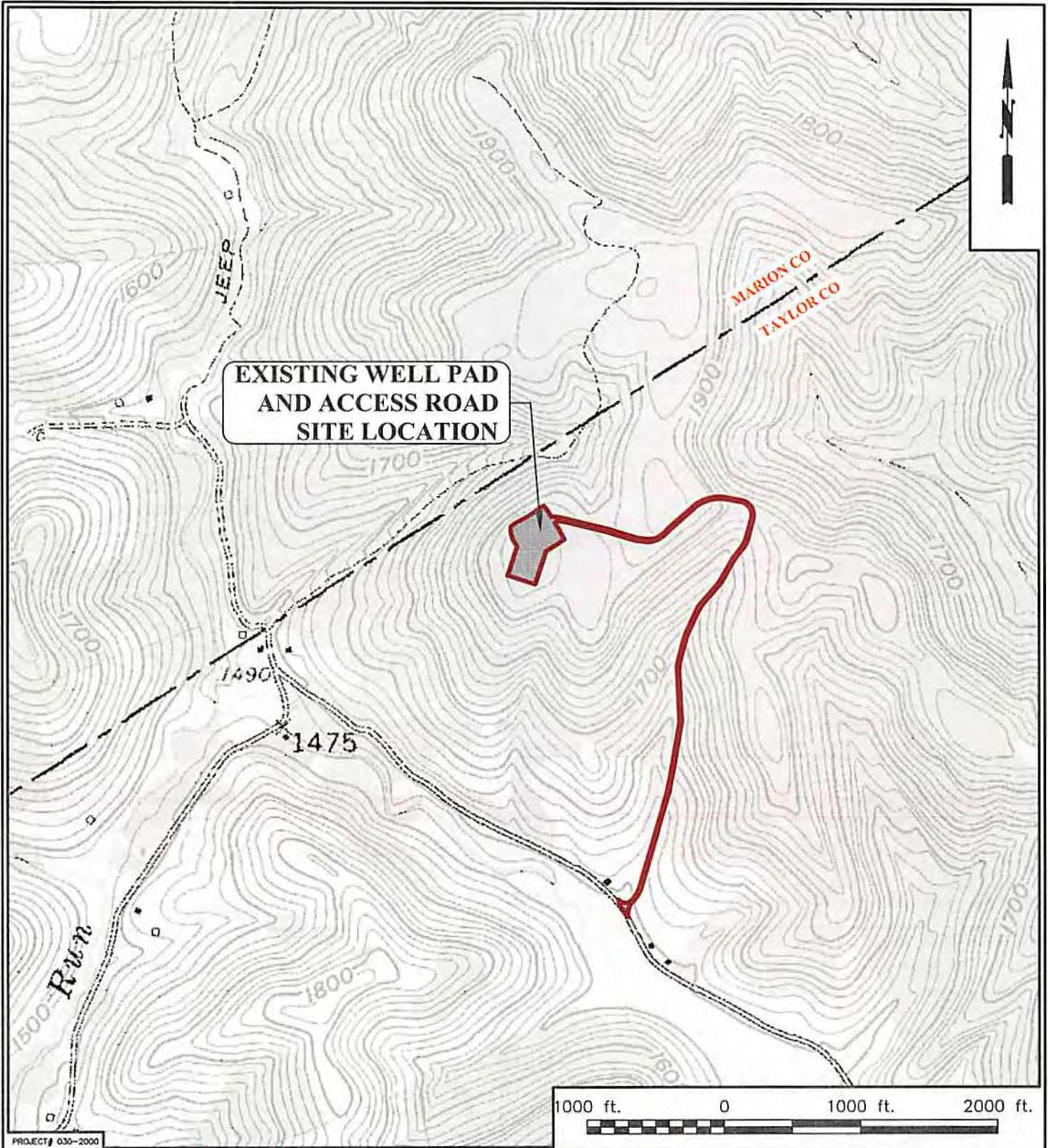
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CAD FILE: R:\030-2000 PDC Completion\Drawings\WELL PAD EXPANSION\1-2000-Topo-Site Map.dwg PLOT DATE/TIME: 4/10/2014 2:54 PM

PROJECT# 030-2000

**THRASHER**  
 THE THRASHER GROUP INC.  
 CIVIL • ENVIRONMENTAL • CONSULTING • FIELD SERVICES  
 600 WHITE OAKS BOULEVARD, BRIDGEPORT, WV 26330  
 PHONE (304) 624-4108 • FAX (304) 624-7831

 PDC MOUNTAINEER, LLC  
**PDC MOUNTAINEER**

OES WELL PAD EXPANSION  
SITE TOPOGRAPHIC LOCATION MAP

SHEET No.  
**1**

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04/10/2014

FETTERMEN DISTRICT, TAYLOR CO, WV

08/29/2014

KLC 5-21-10



PARCEL ID #	OWNER NAME	MAILING ADDRESS
2-7-0-0	RUTH E. HAUGHT	166 GRISTMILL ROAD, FAIRMONT, WV 26554

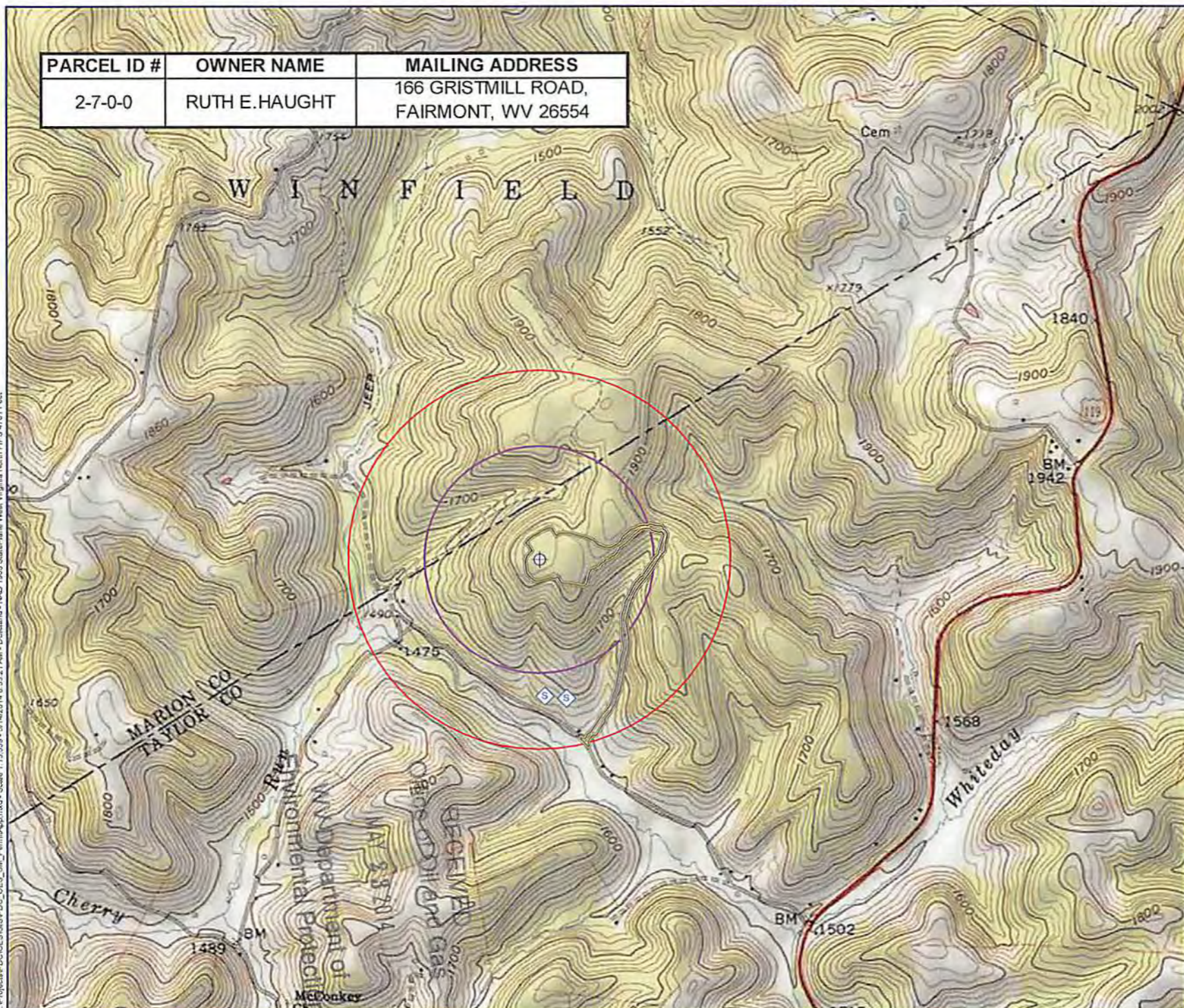
**Legend**

- Spring
- Well
- Oil/Gas Well
- Access Road
- 1,500 ft Buffer
- 2,500 ft Buffer

Notes:  
1) No sources located within the 1,500' radius.

DRAFTED BY:	SITE MAP		
DMC	OES R1HM, R3HM, R5HM		
CHECKED BY:	PDC MOUNTAINEER, LLC		
REVIEWED BY:	TAYLOR COUNTY, WV		
NORTH	Groundwater & Environmental Services, Inc. 827 FAIRMONT ROAD, SUITE 201, MORGANTOWN, WV 26501		
	SCALE IN FEET	DATE	FIGURE
	0 1,000	5-14-14	

L:\Projects\PDC\OES\GIS\PDC\_OES\_SML\TermApp.mxd - Scale: 1:15,939 - 5/14/2014 8:53:21 AM - D:\chiland - NAD 1983 StatePlane West Virginia North FIPS 4701 Feet



91-01298



**PDC MOUNTAINEER, LLC**  
**WELL OES NO. R3HM**

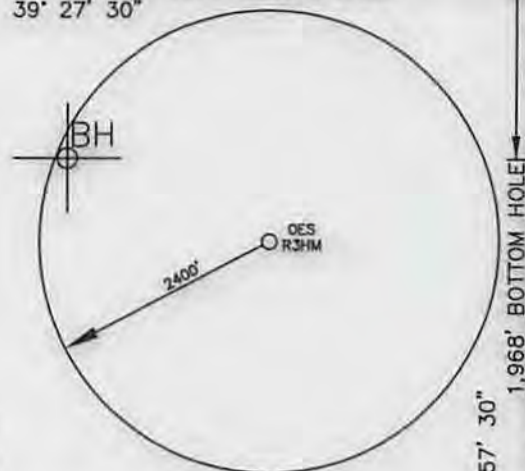
**NOTES:**  
-PLAT BEARINGS AND DISTANCES ARE BASED ON NAD2011 (GORS) WV STATE PLANES NORTH. GRID NORTH ELEVATIONS BASED ON GEOID2012A US SURVEY FEET UNLESS SHOWN OTHERWISE.  
-THERE ARE NO (0) WATER WELL(S) LOCATED WITHIN 250' OF WELL OES R3HM.  
-THERE ARE NO (0) DWELLINGS OR AGRICULTURAL STRUCTURES WITHIN 625' OF WELL OES R3HM.

MONUMENT FOUND IRON REBAR UNLESS NOTED OTHERWISE.

UT= UNNAMED TRIBUTARY

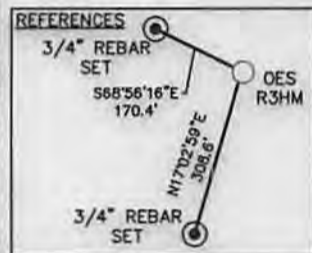
**WELL OES NO. R3HM**  
**TOP HOLE**  
**STATE PLANE COORDINATES**  
(NORTH ZONE-NAD 83)  
N: 341274.1  
E: 1836240.6  
GEO: LAT: 39°26'09.7"  
LON: 79°58'05.8"  
**UTM COORDINATES-ZONE17**  
(NAD 83-METER)  
N: 4365673.4  
E: 588788.6

2,875' TOP HOLE |  
4,855' BOTTOM HOLE  
LATITUDE 39° 27' 30"



LONGITUDE 79° 57' 30"  
1,968' BOTTOM HOLE  
8,157' TOP HOLE

USER: kpoth  
LAYOUT: 3HM  
PLOT DATE/TIME: 4/24/2014 - 10:16am  
CAD FILE: R:\030-2000\Survey\WELLS 1.3.5 (4-24-14).dwg



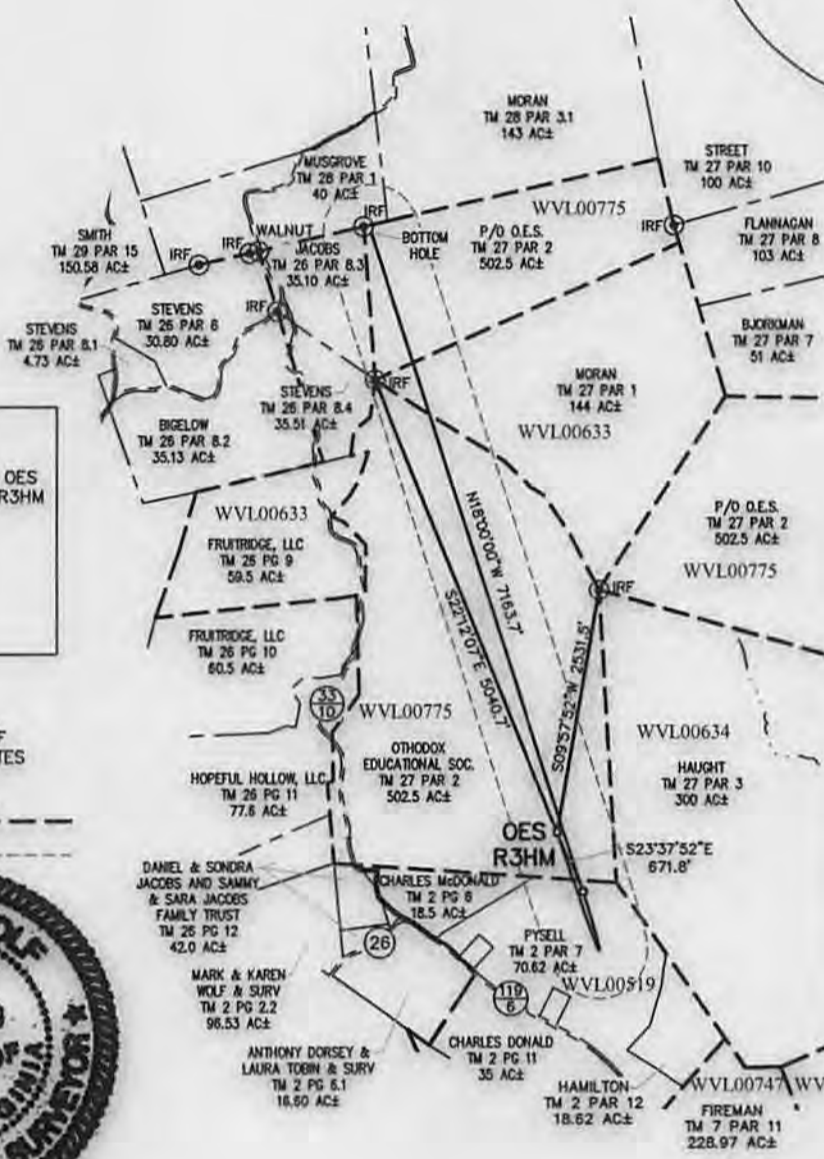
TH BH  
DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAP

LEASE BOUNDARY  
500' BUFFER



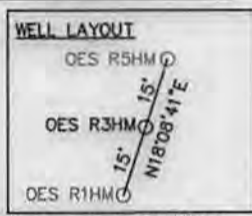
Michael S. Wolf, P.S. 2270

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 RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.



**WELL OES NO. R3HM**  
**LAUNCH POINT**  
**STATE PLANE COORDINATES**  
(NORTH ZONE-NAD 83)  
N: 340658.6  
E: 1836509.9  
GEO: LAT: 39°26'03.7"  
LON: 79°58'02.3"  
**UTM COORDINATES-ZONE17**  
(NAD 83-METER)  
N: 4365487.2  
E: 588873.8

**WELL OES NO. R3HM**  
**BOTTOM HOLE**  
**STATE PLANE COORDINATES**  
(NORTH ZONE-NAD 83)  
N: 347471.7  
E: 1834296.2  
GEO: LAT: 39°27'10.9"  
LON: 79°58'31.0"  
**UTM COORDINATES-ZONE17**  
(NAD 83-METER)  
N: 4367551.8  
E: 588164.7



FILE NO. 030-2000  
SCALE: 1"=2000'  
MINIMUM DEGREE OF ACCURACY: 1 in 2500  
PROVEN SOURCE OF ELEVATION: SURVEY GRADE GPS



DATE APRIL 24, 2014  
OPERATOR'S WELL NO. OES NO. R3HM  
API WELL NO. 47 - 091 - 01298464  
STATE COUNTY PERMIT

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

LOCATION: ELEVATION: 1951.00' WATER SHED: WHITE DAY CREEK  
DISTRICT: FETTERMAN COUNTY: TAYLOR  
QUADRANGLE: GLADESVILLE 7.5' ACREAGE: 502.5 AC±  
SURFACE OWNER: ORTHODOX EDUCATIONAL SOCIETY LEASE ACREAGE: 717.12 AC±  
OIL & GAS ROYALTY OWNER: ORTHODOX EDUCATIONAL SOCIETY/UNION NATIONAL BANK, TRUSTEE TRUMAN GORE & C.BURKE MORRIS/CHARLES & LEVERNE MACDONALD LEASE NO. WVL00775/WVL00519/WVL00633



PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
PERFORATE NEW FORMATION  PLUG OFF OLD FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_

PLUG AND ABANDON \_\_\_\_\_ CLEAN OUT AND REPLUG \_\_\_\_\_  
TARGET FORMATION: MARCELLUS SHALE ESTIMATED DEPTH: 7,875' TVD / 16,075' MD

WELL OPERATOR: PDC MOUNTAINEER, LLC. DESIGNATED AGENT: STEVEN P. JOHNSON  
ADDRESS: 120 GENESIS BOULEVARD BRIDGEPORT, WV 26330 ADDRESS: 120 GENESIS BOULEVARD BRIDGEPORT, WV 26330