



**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

September 26, 2014

**WELL WORK PERMIT**

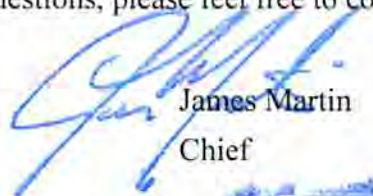
**Horizontal 6A Well**

This permit, API Well Number: 47-3305820, 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: GOFF 18HM  
Farm Name: CATHER, H. DOTSON, TRUSTEE  
**API Well Number: 47-3305820**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 09/26/2014

# 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. The operator will exercise extreme caution when excavating above any dwellings.
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](mailto:DEPOOGNotify@wv.gov) within 30 days of **09/26/2014**

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

1) Well Operator: PDC Mountaineer, LLC. 494494839 Harrison Clark Wolf Summit 7.5  
Operator ID County District Quadrangle

692

2) Operator's Well Number: Goff 18HM Well Pad Name: Goff 18,19,20,21HM

3) Farm Name/Surface Owner: H. Dotson Calther, Trustee Public Road Access: WV Route 98

4) Elevation, current ground: 1127.0' Elevation, proposed post-construction: 1126.3'

5) Well Type (a) Gas  Oil  Underground Storage

Other

(b) If Gas Shallow  Deep

Horizontal

6) Existing Pad: Yes or No No

SDW  
5/1/2014

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):  
Marcellus Shale / Depth Approx. 7039' / Thickness approx. 70', / 7039 x 0.42 = 2960 psi

8) Proposed Total Vertical Depth: 7089'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14,038'

11) Proposed Horizontal Leg Length: 5,369'

12) Approximate Fresh Water Strata Depths: 25'

13) Method to Determine Fresh Water Depths: Drilling Reports, API permit #s: 4703302434, 2435, 3483, 3539, 4160

14) Approximate Saltwater Depths: 749'

15) Approximate Coal Seam Depths: 500'

16) Approximate Depth to Possible Void (coal mine, karst, other): \_\_\_\_\_

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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MAY - 7 2014

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	20"	N	H-40	94 lb.	100'	100'	Cement to Surface
Fresh Water	13 3/8"	N	H-40	48 lb.	600'	600'	Cement to Surface
Coal							
Intermediate	9 5/8"	N	J-55	40 lb.	2,600'	2,600'	Cement to Surface
Production	5 1/2"	N	P-110	20 lb	14,038'	14,038'	2,940
Tubing							
Liners							

*SOW  
5/1/2014*

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
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:				

MAY - 7 2014

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): 9.76

22) Area to be disturbed for well pad only, less access road (acres): 7.66

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 to be cleaned with air. Production hole to be circulated with mud for a minimum of 4 hours with high viscosity sweeps ran occasionally.

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Office of Oil and Gas  
WV Dept. of Environmental Protection

\*Note: Attach additional sheets as needed.

4703305820



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

**PRODUCTION:** Pre-Flush Mud Clean 1

**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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MAY - 7 2014

Office of Oil and Gas  
WV Dept. of Environmental Protection

09/26/2014

## Open Mine Contingency Plan

The Goff 18HM, 19HM, 20HM and 21HM wells are being drilled at ground elevation of 1127', which is at or just below the existing strip bench elevation just to the west of the pad. We do not anticipate a mine void in this area, but will plan for the possibility of an open mine with the following plan.

**Conductor:** diameter will be changed to accommodate possible mine string, the new diameter will be 24", H-40 grade, 94#, cemented to surface.

**Mine String:** if an open mine is encountered, PDCM will run 20" (H-40, 48#) as a mine string. The mine string will be set between 30 to 50 feet below the base of the open mine encountered. The mine string will have a cement balance job on the bottom (below the open mine), and the top will be surface-grouted to ground level.

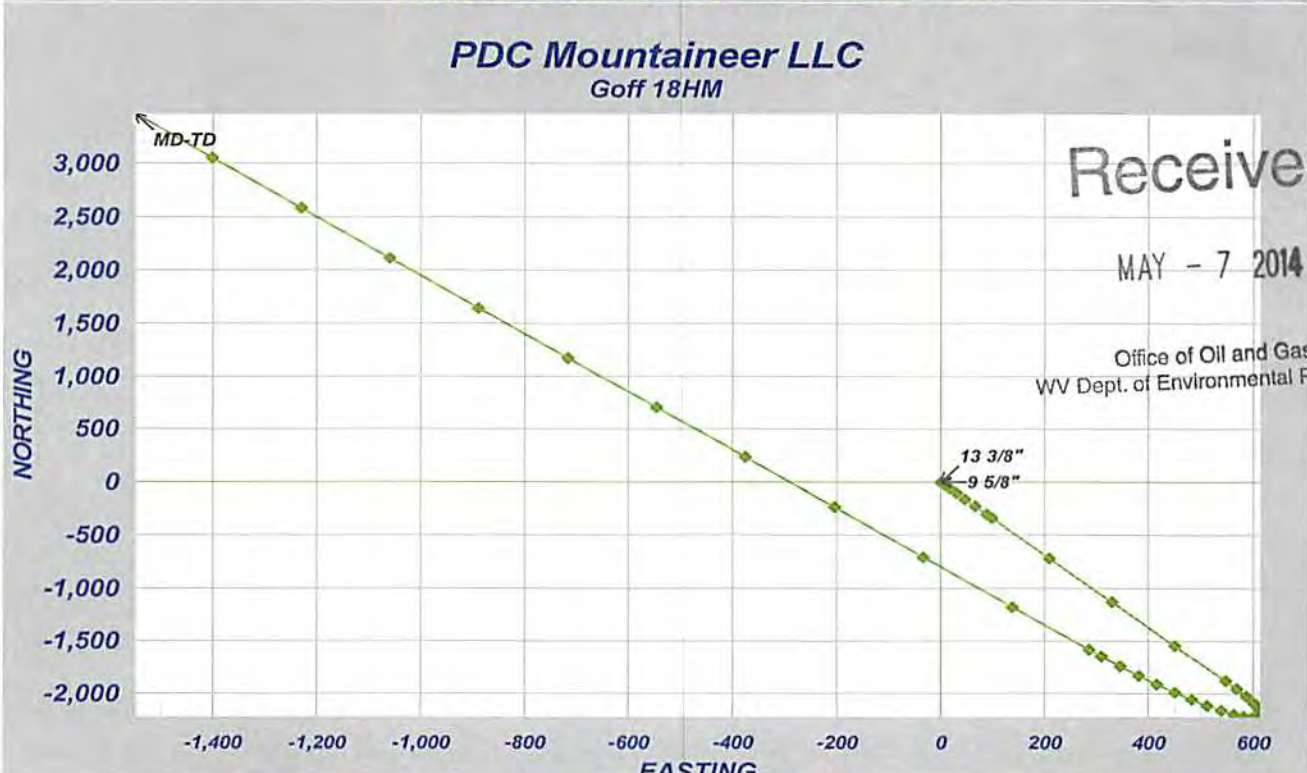
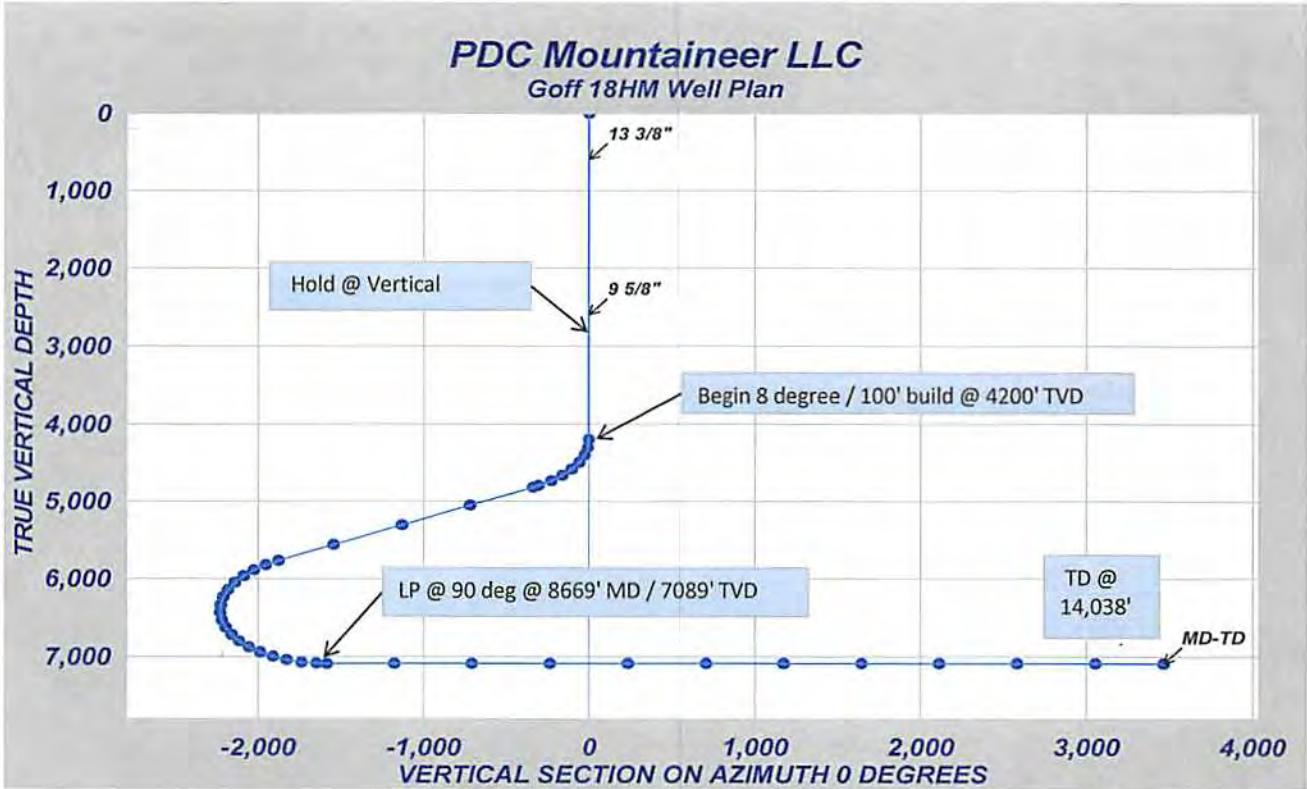
Regardless of whether an open mine is encountered, PDCM will drill to 600' (per the Casing and Tubing Program in the Permit package) and set a 13 3/8" fresh water string through all potential zones and cement to surface.

PDC Mountaineer LLC  
Goff 18HM Well Plan  
Harrison County, WV

4703305820



PDC MOUNTAINEER



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MAY - 7 2014

Office of Oil and Gas  
WV Dept. of Environmental Protection

09/26/2014



WW-9  
(9/13)

API Number 47 - \_\_\_\_\_ - \_\_\_\_\_  
Operator's Well No. Goff 18 HM

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

4703305820

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name PDC Mountaineer, LLC OP Code 494494839

Watershed (HUC 10) West Fork River Quadrangle Wolf Summit

Elevation 1125.5' County Harrison District Clark

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

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 \_\_\_\_\_)

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5/1/2014*

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.

**Received**

Company Official Signature Steven P. Johnson

Company Official (Typed Name) Steven P. Johnson

Company Official Title Agent

MAY - 7 2014

Office of Oil and Gas  
WV Dept. of Environmental Protection

Subscribed and sworn before me this 1st day of May, 2014

Rachel Wyckoff Notary Public

My commission expires March 14, 2022



09/26/2014

PDC Mountaineer, LLC

Proposed Revegetation Treatment: Acres Disturbed 7.66 Prevegetation pH 7.2

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 Minimum lbs/acre

Mulch 2 - 3 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Timothy Grass	40	Timothy Grass	40
Orchard Grass	12	Orchard Grass	12
Redtop Clover	5	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: S J D Warratt

Comments: Pre-Seed + mulch as soon as reasonably possible all disturbed areas - Upgrade EIS as necessary per WV DEP EIS Manual.

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Title: O.U + Gas

Date: 5/1/2014 Office of Oil and Gas WV Dept. of Environmental Protection

Field Reviewed? (X) Yes ( ) No

4703305820



**PDC MOUNTAINEER**

**SITE SAFETY PLAN**

**PDC Mountaineer, LLC**

**Goff #18HM**

**911 Address**

**2499 Davisson Run Road  
Clarksburg, WV 26301**

**Wolf Summit, Clark District - Harrison County, West Virginiaol.**

The Following Site Safety Plan Approved By:

By: *Ray E. Cook*

Date: 4-23-14

Title: EHS Manager, PDCM

**Received**

**MAY - 7 2014**

By: \_\_\_\_\_

Date: \_\_\_\_\_  
Office of Oil and Gas  
WV Dept. of Environmental Protection

Title: \_\_\_\_\_, WVOOG

*SDW*  
*5/1/2014*

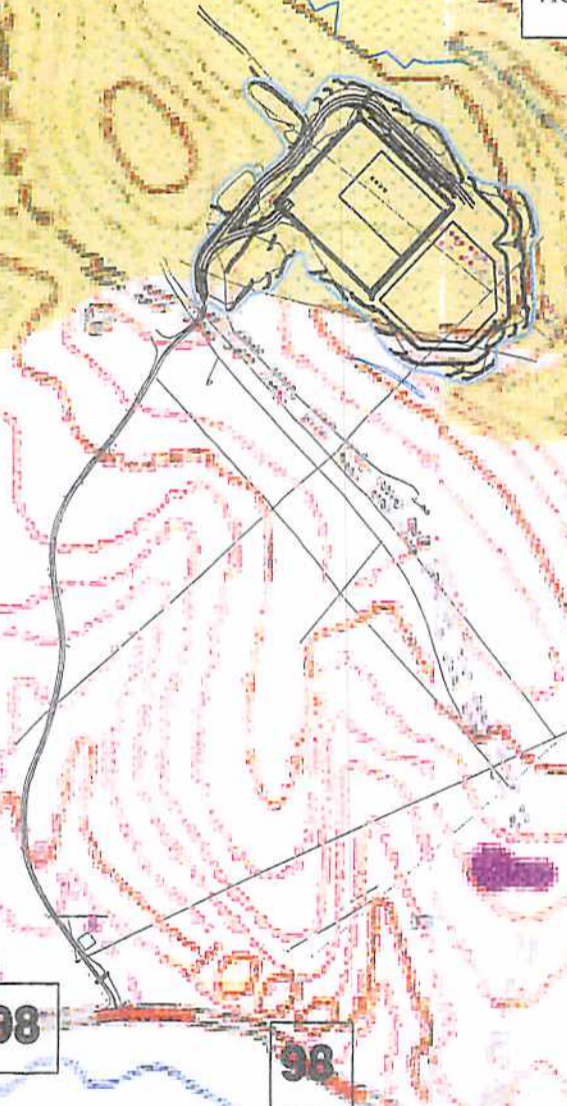
09/26/2014

# GOFF LEASE WELL #'S 18HM-21HM

47-03305820



SEE GOFF A (WELLS 18HM-21HM) SITE  
PLAN FOR COMPLETE DETAILS OF  
ACCESS ROAD, PIT, AND PAD DESIGNS.



98

98

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MAY - 7 2010

Office of Oil and Gas  
WV Dept. of Environmental Protection

WOLF SUMMIT 7.5'

CLARKSBURG 7.5'

09/26/2014



Professional Energy Consultants  
A DIVISION OF EARTH LAND SURVEYING

SURVEYORS  
Project Mgmt.



ENGINEERS  
ENVIRONMENTAL

P.O. Box 150  
Martinsburg, WV 26151  
(304) 462-2834

50065 Dilles Bottom Road  
Shelbyville, OH 45047  
(740) 671-9811

HONESTY. INTEGRITY. QUALITY.

TOPO SECTION OF USGS  
WOLF SUMMIT & CLARKSBURG  
7.5' QUADRANGLES

SCALE: 1"=500'

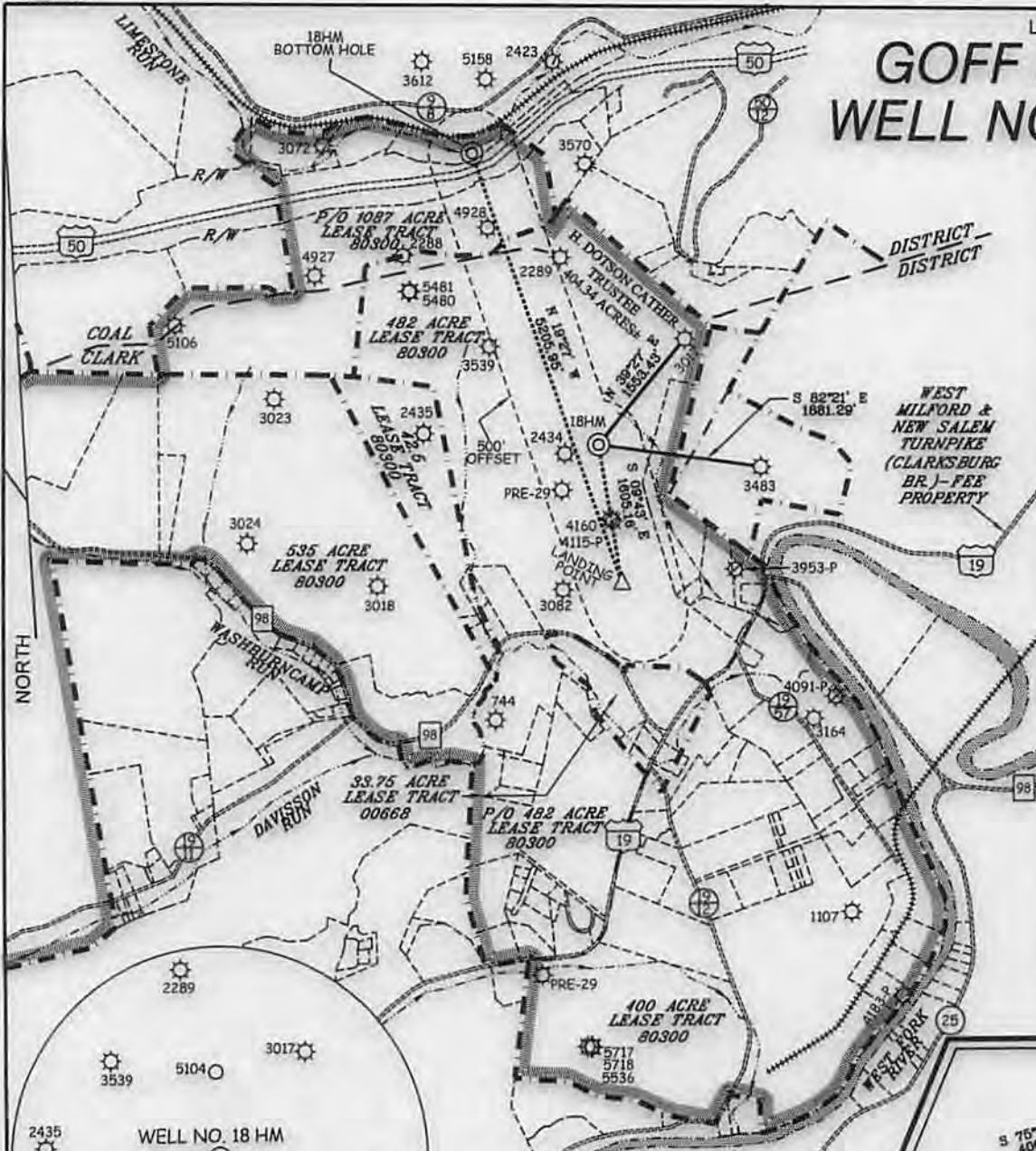


DRAWN BY C.P.M.	FILE NO. 8099	DATE 01-10-14	CADD FILE: 8099REC.DWG
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# GOFF LEASE WELL NO. 18 HM

LATITUDE 39°17'30"

LONGITUDE 80°22'30"



<b>WELL NO. 18 HM TOP HOLE</b> STATE PLANE COORDINATES (NORTH ZONE NAD 27) N. 284,475 E. 1,752,114 <hr/> TOP HOLE (NAD 27) LAT=(N) 39°16'39.8" LONG=(W) 80°22'32.4" <hr/> TOP HOLE (NAD 83) LAT=(N) 39°16'40.2" LONG=(W) 80°22'31.7" <hr/> TOP HOLE UTM (NAD 83) (N) 4,347,794 (E) 553,867
<b>WELL NO. 18 HM LANDING POINT</b> STATE PLANE COORDINATES (NORTH ZONE NAD 27) N. 282,993 E. 1,752,386 <hr/> LANDING POINT (NAD 27) LAT=(N) 39°16'24.2" LONG=(W) 80°22'28.7" <hr/> LANDING POINT (NAD 83) LAT=(N) 39°16'24.6" LONG=(W) 80°22'28.1" <hr/> LANDING POINT UTM (NAD 83) (N) 4,347,313 (E) 553,957
<b>WELL NO. 18 HM BOTTOM HOLE</b> STATE PLANE COORDINATES (NORTH ZONE NAD 27) N. 287,902 E. 1,750,652 <hr/> BOTTOM HOLE (NAD 27) LAT=(N) 39°17'12.6" LONG=(W) 80°22'51.4" <hr/> BOTTOM HOLE (NAD 83) LAT=(N) 39°17'12.9" LONG=(W) 80°22'50.7" <hr/> BOTTOM HOLE UTM (NAD 83) (N) 4,348,800 (E) 553,404

## 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 70 PAGE 152 AND ADJOINING DEEDS.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF HARRISON COUNTY IN JULY, 2013
4. WELL COORDINATES 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 MARCH 6, 20 13  
 OPERATORS WELL NO. GOFF 18HM  
 API WELL NO. 47 - 033 - 0582046A  
 STATE            COUNTY            PERMIT           

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 8099P18R2(475-70)  
 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  INJECTION  WASTE DISPOSAL  IF "GAS" PRODUCTION  STORAGE  DEEP  SHALLOW

LOCATION: GROUND  PROPOSED   
 ELEVATION 1,129' 1,126' WATERSHED WEST FORK RIVER  
 DISTRICT CLARK COUNTY HARRISON QUADRANGLE WOLF SUMMIT 7.5'  
 SURFACE OWNER H. DOTSON CATHER TRUSTEE ACREAGE 404.34±  
 ROYALTY OWNER H. DOTSON CATHER TRUSTEE ETAL ACREAGE 1087± 09/26/2014  
 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 7,089' TVD / TMD 14,038'

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

COUNTY NAME PERMIT