



**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

April 02, 2014

**WELL WORK PERMIT**

**Horizontal 6A Well**

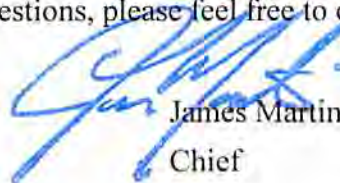
This permit, API Well Number: 47-9101287, issued to PDC MOUNTAINEER LLC, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as 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: COALTRAIN NO. 20HM  
Farm Name: PATRIOT MINING COMPANY, INC  
**API Well Number: 47-9101287**  
**Permit Type: Horizontal 6A Well**  
Date Issued: 04/02/2014

Promoting a healthy environment.

04/04/2014

## 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 proposed activity may require permit coverage from the United States Army Corps of Engineers (USACOE). Through this permit, you are hereby being advised to consult with USACOE regarding this proposed activity.
2. 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.
3. 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.
4. 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.
5. 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.
6. 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.
7. 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.
8. 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.

WW-6B  
(9/13)

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

91 02 318

1) Well Operator: PDC Mountaineer LLC 494494839 Taylor Courthouse Grafton 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: 20HM Well Pad Name: Coaltrain

3) Farm Name/Surface Owner: Patriot Mining Corp Public Road Access: Co Rt. 11 Wendall Road

4) Elevation, current ground: 1268' Elevation, proposed post-construction: 1268'

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, Depth approx 7,770', Thickness approx 100', 4615PSI

8) Proposed Total Vertical Depth: 7,770'

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 15,925'

11) Proposed Horizontal Leg Length: 7007'

12) Approximate Fresh Water Strata Depths: 163', 387'

13) Method to Determine Fresh Water Depths: Well Records

14) Approximate Saltwater Depths: None

15) Approximate Coal Seam Depths: 688', 754', 855', 1088'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated working on a old strip bench

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: N/A  
Depth: \_\_\_\_\_  
Seam: \_\_\_\_\_  
Owner: \_\_\_\_\_

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(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"	New	H-40	94#	80'	80'	CCTS
Fresh Water	13 3/8"	New	H-40	48#	450'	450"	CCTS
Coal							
Intermediate	9 5/8"	New	J-55	36#	2,800'	2,800'	CCTS
Production	5 1/2"	New	P-110	20#	15,925'	15,925'	875 SX
Tubing							
Liners							

*Debra Ann 11-22-13*

<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	1500	1	1.06
Fresh Water	13 3/8"	17 1/2"	.66	1730	1	1.36
Coal						
Intermediate	9 5/8"	12 1/4"	.704	3520	1	1.38
Production	5 1/2"	8.5"/8.75"	.722	12640	H	1.18
Tubing						
Liners						

**PACKERS**

Kind:			
Sizes:			
Depths Set:			

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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 cement will go at least 100' into the intermediate casing if we don't CCTS.

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

Slick water frac, pumping 85 BBL min maximum. Each stage to contain approx 10,000 BBL of water and 400,000 lbs of sand. Max pressure of 9000 PSI.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 5 ac. No new disturbance

22) Area to be disturbed for well pad only, less access road (acres): 2

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 circulated with mud for at least 2 hours with high viscosity sweeps ran occasionally.

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\*Note: Attach additional sheets as needed.

### **Open Mine Contingency Plan**

The Coaltrain wells are being drilled on a pre-existing well pad in which no open mines have been encountered.

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.

**Describe all cement additives associated with each cement type:**

**Conductor:** Type 1 Cement

**Surface:** Type 1 Cement +2% CaCl + 0.25pps Cello Flake

**Intermediate:** Pre-Flush – Mud Clean 1

Type 1 Cement +2% CaCl + 0.25pps 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 I 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

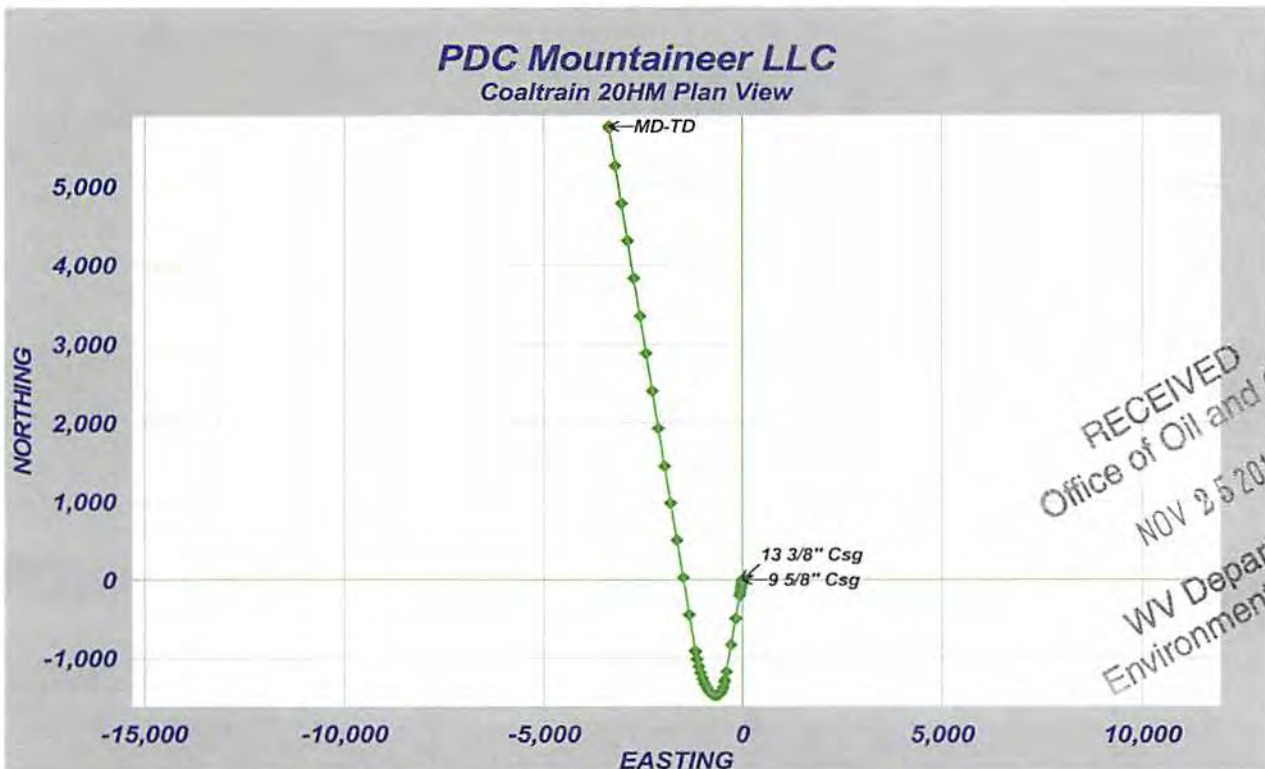
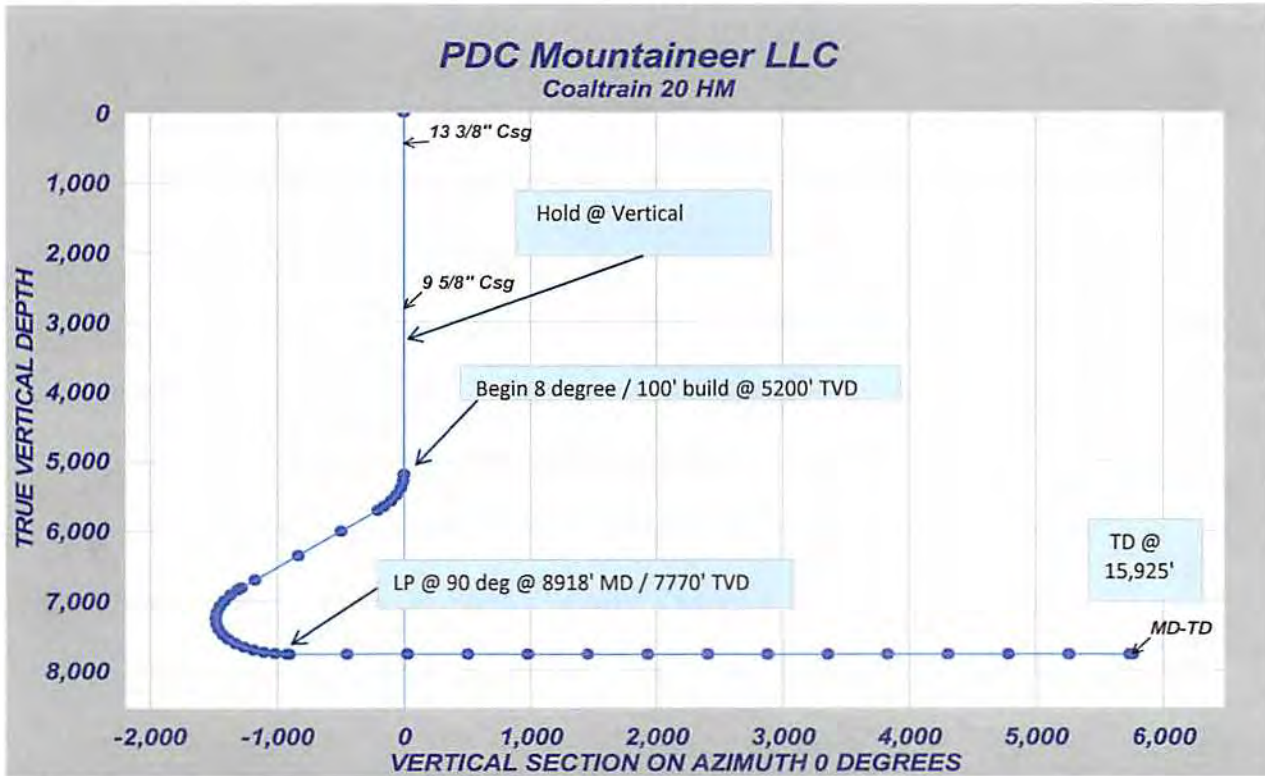
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**PDC Mountaineer LLC**  
Coaltrain 20HM Well Plan  
Taylor County, WV



PDC MOUNTAINEER



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WW-9  
(9/13)

API Number 47 - 091 01287  
Operator's Well No. 20HM

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) Sand Lick Run of Simpson Creek Quadrangle Grafton 7.5'

Elevation 1268' County Taylor District Courthouse

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 )
- Reuse (at API Number Wells to be determined )
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_)

Will closed loop system be used? If so, describe: cuttings go into a half round where they are 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

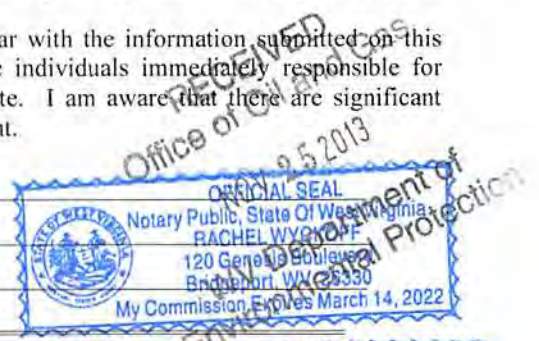
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations 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 \_\_\_\_\_

Company Official (Typed Name) Jamie Haga

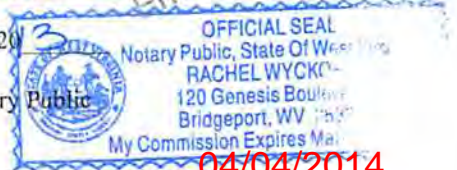
Company Official Title Agent



Subscribed and sworn before me this 19th day of November, 2013

Rachel Wyckoff Notary Public

My commission expires March 14, 2022



04/04/2014

Form WW-9

Operator's Well No. 20HM

PDC Mountaineer LLC

Proposed Revegetation Treatment: Acres Disturbed 5 Prevegetation pH 7.2

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 Min lbs/acre

Mulch 2-3 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	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: Bryan Harris

Comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

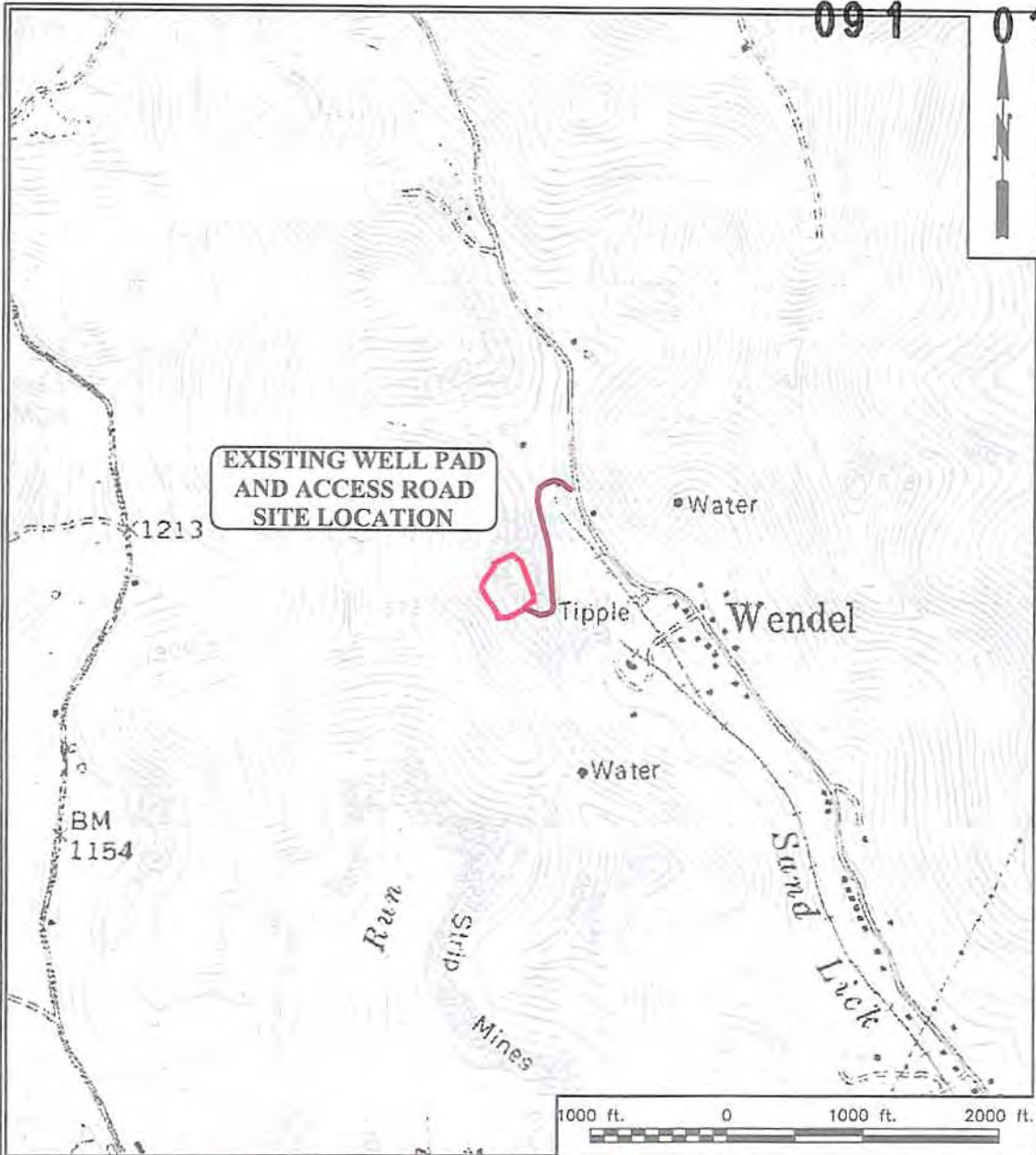
Title: WVDEP Oil & Gas Inspector

Date: 11-22-13

Field Reviewed?  Yes  No

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09 1 01 2 8 7



CAD FILE: N:\000-4810 PDC - Adair- Coaltrain Well Pad Wellhead #4 in Taylor County\Drawings\4810-Taylor-Strip-Mines.dwg  
 PLOT DATE/TIME: 3/21/2014 9:49 AM

# 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

COALTRAIN WELL PAD AND ACCESS ROAD  
 SITE TOPOGRAPHIC LOCATION MAP

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03/21/2014

COURT HOUSE DISTRICT, TAYLOR COUNTY, WV

04/04/2014

PDC MOUNTAINEER, LLC. WELL NO. COALTRAIN 20HM

11,135' BOTTOM HOLE  
LATITUDE 39° 20' 00"

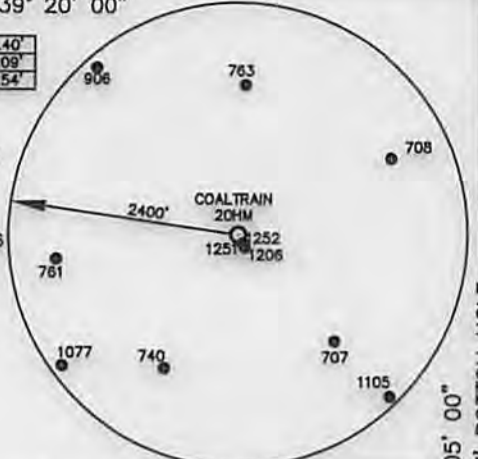
NOTES:  
-PLAT ORIENTATION, CORNERS, AND WELL REFERENCES ARE BASED UPON THE GRID NORTH MERIDIAN FOR THE WV STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 83. WELL LOCATION REFERENCE TIES ARE BASED UPON THE MAGNETIC MERIDIAN.

-THERE ARE NO (0) WATER WELL(S) LOCATED WITHIN 250' OF WELL 20HM.

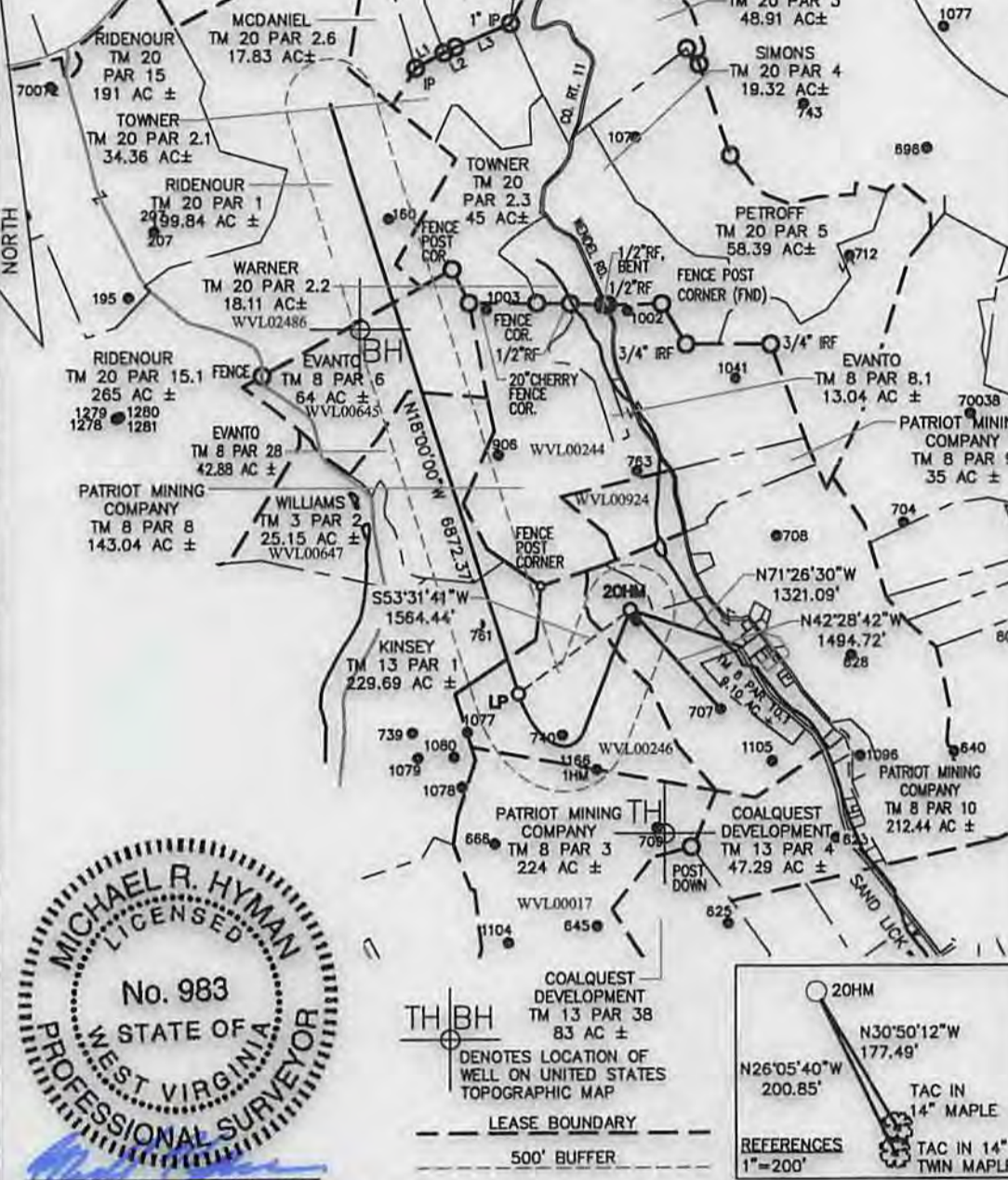
-THERE ARE NO (0) DWELLINGS OR AGRICULTURAL BUILDINGS WITHIN 625 FEET OF WELL 23HM

○ = MONUMENT FOUND  
○ = IRON REBAR UNLESS NOTED OTHERWISE.

L1	N61°43'49"E	356.40'
L2	N64°33'24"E	142.09'
L3	N67°01'21"E	671.54'



LONGITUDE 80° 05' 00"  
7,557' BOTTOM HOLE  
13,133' TOP HOLE



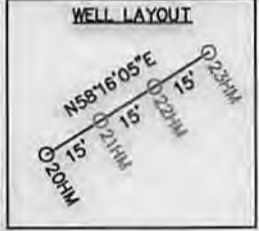
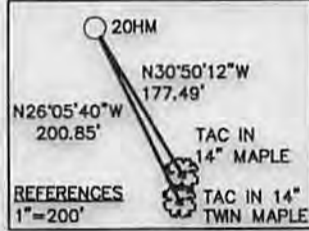
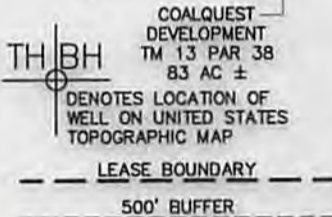
**WELL NO. 20HM TOP HOLE**  
STATE PLANE COORDINATES (NAD 27 NORTH ZONE)  
N: 290968.066  
E: 1827203.087  
LAT: 39°17'50.493"  
LON: 80°06'37.365"  
UTM COORDINATES (NAD 83-METER)  
N: 4350152.904  
E: 576710.962

**STATE PLANE COORDINATES (NAD 27 NORTH ZONE)**  
N: 290038.118  
E: 1825945.043  
LAT: 39°17'41.217"  
LON: 80°06'53.288"  
N: 4349863.197  
E: 576332.375

**WELL NO. 20HM BOTTOM HOLE**  
STATE PLANE COORDINATES (NAD 27 NORTH ZONE)  
N: 296574.129  
E: 1823821.364  
LAT: 39°18'45.671"  
LON: 80°07'20.875"  
UTM COORDINATES (NAD 83-METER)  
N: 4351843.723  
E: 575652.263



Michael R. Hyman, P.S. 983



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.

FILE NO. 050-4915  
SCALE: 1"=2000'  
MINIMUM DEGREE OF ACCURACY: 1 in 2500  
PROVEN SOURCE OF ELEVATION: OPUS SURVEY GRADE GPS

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

DATE OCTOBER 2, 2013  
OPERATOR'S WELL NO. COALTRAIN NO. 20HM  
API WELL NO. 47 - 091 - 01287 H&A  
STATE COUNTY PERMIT

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  (IF "GAS"), PRODUCTION  STORAGE  DEEP  SHALLOW   
LOCATION: ELEVATION: 1267.91' WATER SHED: SAND LICK RUN OF SIMPSON CREEK  
DISTRICT: COURTHOUSE COUNTY: TAYLOR  
QUADRANGLE: GRAFTON 7.5' ACREAGE: 212.44 AC±  
SURFACE OWNER: PATRIOT MINING COMPANY, INC. LEASE ACREAGE: 972.85 AC±  
OIL & GAS ROYALTY OWNER: GLEN C. LAREW ET AL LEASE NO. WVL00017 WVL00244 WVL00246 WVL00645 WVL00647 WVL00924 WVL02486



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: 7,675' TVD / 15,920' MD

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

CAD FILE: R:\050-4915 PDC - Asbuilt Coaltrain Well Pad Wendel Rd in Taylor City\Survey\050-4915 CLTRAIN 20HM-23HM.dwg PLOT DATE/TIME: 10/16/2013 - 8:46am USER: kpoth LAYOUT: 20HM