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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

January 08, 2014

PDC MOUNTAINEER LLC  
POST OFFICE BOX 26  
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 9101260 , Well #: UNB 3HM

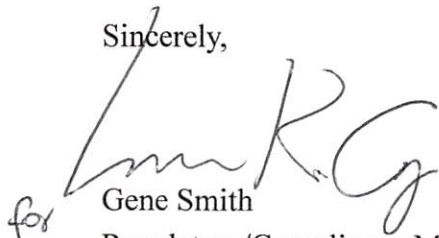
**Adjusted lateral direction**

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  
(9/13)

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

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

2) Operator's Well Number: UNB 3HM      Well Pad Name: UNB

3) Farm Name/Surface Owner: Charles MacDonald      Public Road Access: US 119     

4) Elevation, current ground: 1878'      Elevation, proposed post-construction: 1880'

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 approx 7830' Thickness 80' Pressure 3900PSI

8) Proposed Total Vertical Depth: 7830'

9) Formation at Total Vertical Depth: Marcellus Shale

10) Proposed Total Measured Depth: 14,360'

11) Proposed Horizontal Leg Length: 6500'

12) Approximate Fresh Water Strata Depths: 37', 148', 254', 339'

13) Method to Determine Fresh Water Depths: Well Records

14) Approximate Saltwater Depths: None Reported

15) Approximate Coal Seam Depths: 340', 402', 507'

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: \_\_\_\_\_ RECEIVED  
 Seam: \_\_\_\_\_ Office of Oil and Gas  
 Owner: \_\_\_\_\_ OCT 11 2013

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WW-6B  
(9/13)

18)

**CASING AND TUBING PROGRAM**

<b>TYPE</b>	<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					<i>Buyer Hunt</i>	<i>10-9-13</i>	
Intermediate	9 5/8"	new	J-55	36#	2500'	2500'	CCTS
Production	5 1/2"	new	P-110	20#	14,360'	14,360'	850 SX
Tubing							
Liners							

<b>TYPE</b>	<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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WW-6B  
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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. There will not be a pilot hole drilled.

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

Slick water frac, pumping 80BBLs maximum. Each stage to contain approx 10,000 of water and 40,000 lbs of sand.  
Max pressure 8500PSI

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 3.6

22) Area to be disturbed for well pad only, less access road (acres): 1.3

23) Describe centralizer placement for each casing string:

Conductor: None  
Surface 13 3/8" 1 centralizer every 90' of pipe and a basket  
Intermediate 9 5/8" One every 7 joints & a basket  
Production 5 1/2" one every 12 joints in the vertical section then 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 mud for at least 4 hours with high viscosity sweeps ran occasionally

\*Note: Attach additional sheets as needed.

**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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01/10/2014

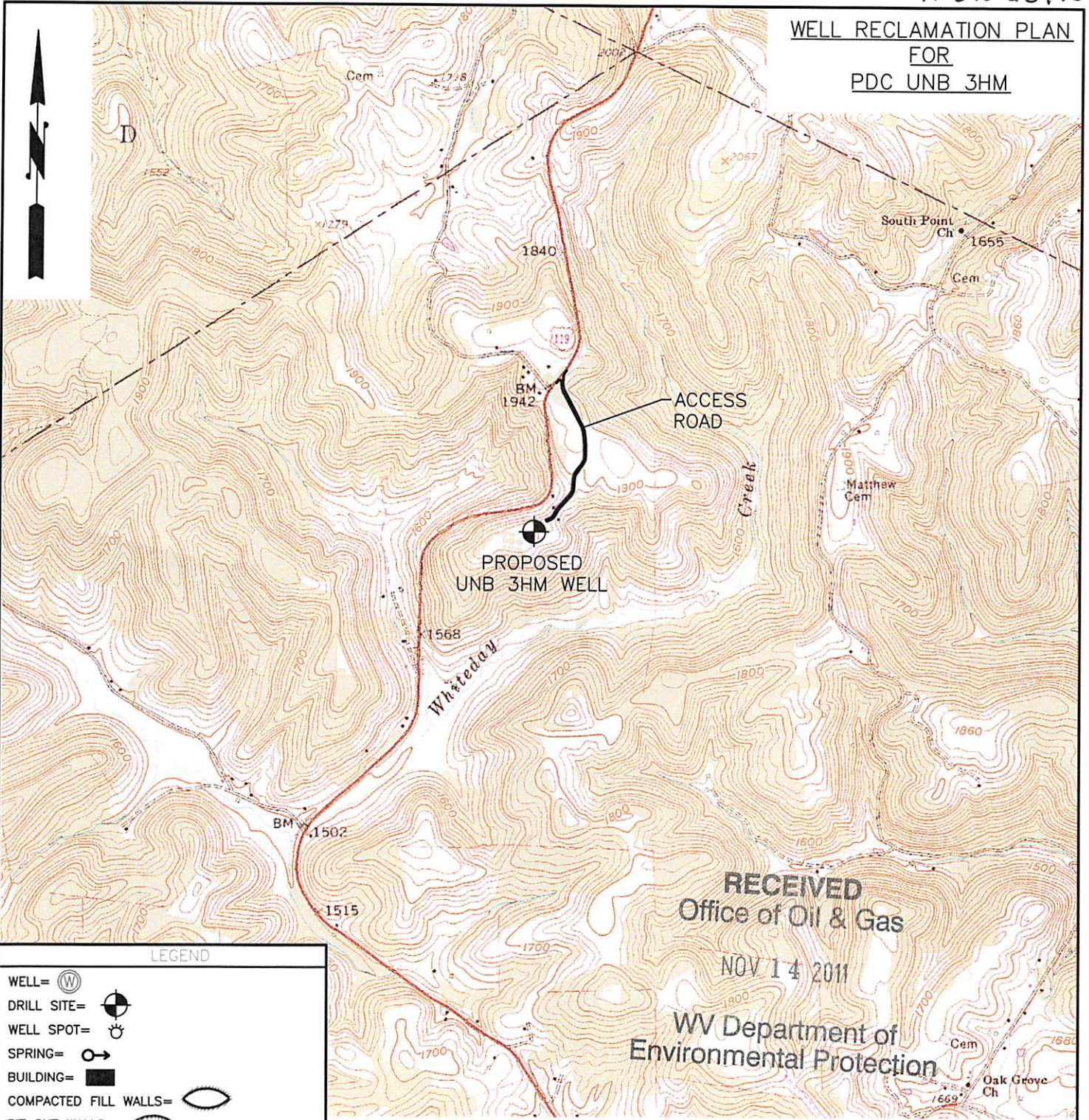
<b>Vendor</b>	<b>Product</b>	<b>Code Number</b>	<b>Component</b>	<b>CAS-NO.</b>
Schlumberger	100-mesh Sand	S100	Crystalline silica	14808-60-7
Schlumberger	30/50 mesh sand	S012-3050	Crystalline silica	14808-60-7
Schlumberger	40/70 mesh sand	S012-4070	Crystalline silica	14808-60-7
Schlumberger	Corrosion Inhibitor	A264	Methanol	67-56-1
			Prop-2-yn-1-ol	107-19-7
Schlumberger	Surfactant	F108	Methanol	67-56-1
Schlumberger	HCL	H028	Hydrochloric Acid	7647-01-0
Schlumberger	Gelling Agent	J590	Propan-2-ol	67-63-0
Schlumberger	Friction Reducer	J609	Ammonium sulfate	7783-20-2
Schlumberger	Iron Stabilizer	L058	Sodium erthorbate	6381-77-7
XCHEM	Scale Inhibitor	TS-30	Sodium polycarboxylate	ND
XCHEM	Bleach	449610	Sodium chloride	7647-14-5
			Sodium hydroxide	1310-73-2
			Sodium Hypochlorite	7681-52-9
XCHEM	Chlorite	ADOX 3125/8125	Sodium chlorite	7758-19-2

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 Office of Oil and Gas  
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 WV Department of  
 Environmental Protection

91-01260 MOD



WELL RECLAMATION PLAN  
FOR  
PDC UNB 3HM



RECEIVED  
Office of Oil & Gas  
NOV 14 2011

WV Department of  
Environmental Protection

**LEGEND**

- WELL= (W)
- DRILL SITE= (Symbol)
- WELL SPOT= (Symbol)
- SPRING= (Symbol)
- BUILDING= (Symbol)
- COMPACTED FILL WALLS= (Symbol)
- PIT CUT WALLS= (Symbol)
- PIT WASTE= (Symbol)
- GRAVEL= (Symbol)
- SILT FENCE= — SF — SF —
- PROPERTY LINE= (Symbol)
- EXISTING FENCE= — x — x —
- PLANNED FENCE= — o — o —
- ROAD= (Symbol)
- OPEN DITCH= (Symbol)
- STREAM LINE= (Symbol)
- CROSS DRAIN= (Symbol)
- FILTER STRIP= (Symbol)
- DIVERSION= (Symbol)

WELL RECLAMATION PLAN  
DONALD VINCENT 101  
FELLOWSVILLE 7.5 QUADRANGLE



**THRASHER**  
ENGINEERING  
CIVIL, ENVIRONMENTAL, AND CONSULTING  
30 COLUMBIA BOULEVARD - CLARKSBURG, WV 26301

PHONE (304) 824-4108 (FAX) (304) 824-7831

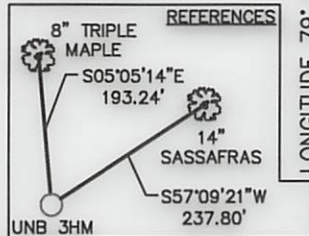
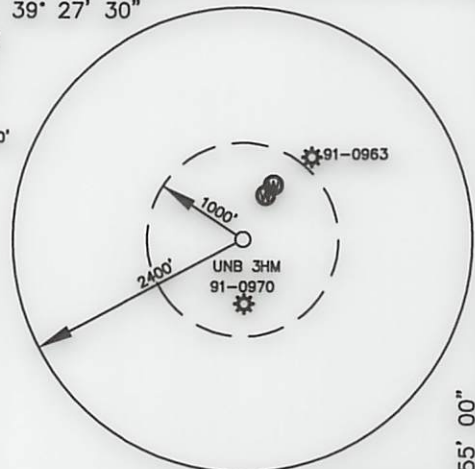
WELL RECLAMATION PLAN FOR	SCALE: NOT TO SCALE	SHEET No. <b>4</b>
	DRAWN: JCP	
	CHECKED:	
PROJECT# 030-1999 01/10/2014		APPROVED:



PDC MOUNTAINEER, LLC  
WELL NO. UNB 3HM

10,663' BOTTOM HOLE  
LATITUDE 39° 27' 30"

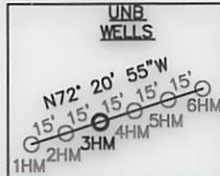
NOTES:  
-PLAT ORIENTATION, CORNERS, AND WELL REFERENCES ARE BASED UPON THE GRID NORTH MERIDIAN FOR THE WV STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 27. WELL LOCATION REFERENCE TIES ARE BASED UPON THE MAGNETIC MERIDIAN.  
-THERE APPEARS TO BE 1 WATER WELL LOCATED WITHIN 1000' OF WELL UNB 1HM.



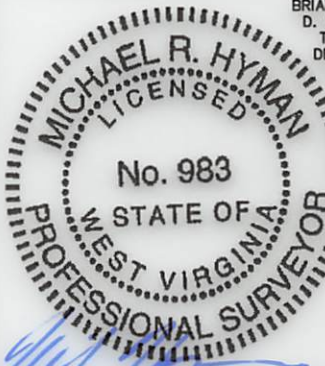
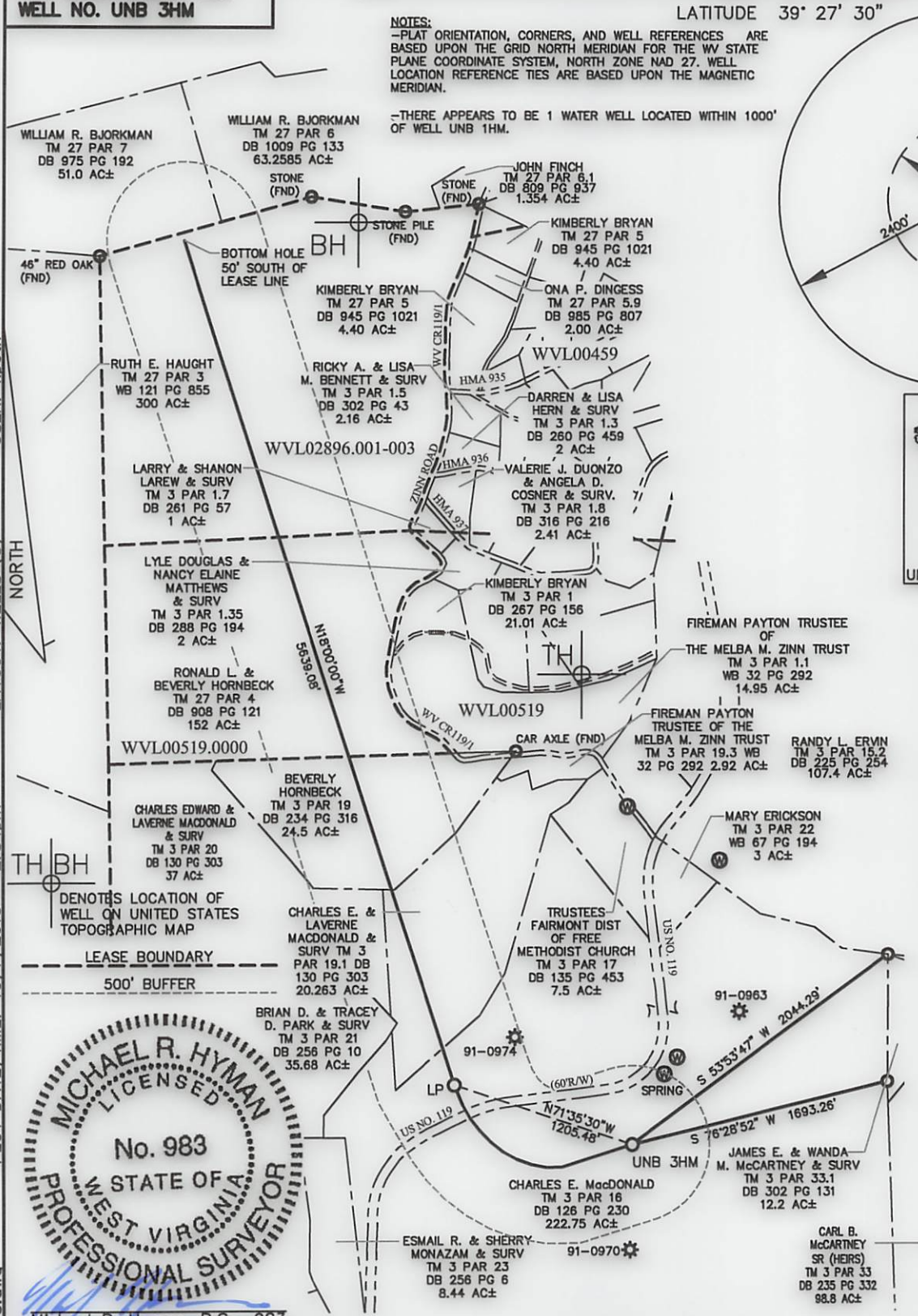
WELL NO. 3HM  
TOP HOLE  
STATE PLANE COORDINATES  
(NAD 27 NORTH ZONE)  
N: 1874564.8391  
E: 1874564.8391  
LAT: 39°26'02.6898"  
LON: 79°56'37.9807"  
UTM COORDINATES  
(NAD 83-METER)  
N: 4365480.880  
E: 590890.572

WELL NO. 3HM  
LAUNCH POINT  
STATE PLANE COORDINATES  
(NAD 27 NORTH ZONE)  
N: 340869.6459  
E: 1873421.0380  
LAT: 39°26'06.3958"  
LON: 79°56'52.5836"  
UTM COORDINATES  
(NAD 83-METER)  
N: 4365591.053  
E: 590540.138

WELL NO. 3HM  
BOTTOM HOLE  
STATE PLANE COORDINATES  
(NAD 27 NORTH ZONE)  
N: 346232.7337  
E: 1871678.4651  
LAT: 39°26'59.3147"  
LON: 79°57'15.1383"  
UTM COORDINATES  
(NAD 83-METER)  
N: 4367216.200  
E: 589982.024



USER: kpoth  
LAYOUT: WELLS (3)  
PLOT DATE/TIME: 10/17/2013 - 2:34pm  
CAD FILE: R:\030-1999-PDC Comp\030-1999 WELLS 9-3-13.dwg



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 REGULATIONS ISSUED AND PRESCRIBED BY THE DIVISION OF ENVIRONMENTAL PROTECTION.

FILE NO. <u>030-1999</u>	DATE <u>OCTOBER</u> , 2013
SCALE: <u>1"=1000'</u>	OPERATOR'S WELL NO. <u>UNB NO. 3HM</u>
MINIMUM DEGREE OF ACCURACY: <u>1 in 2500</u>	API WELL NO. <u>HGA</u>
PROVEN SOURCE OF ELEVATION: <u>OPUS SURVEY GRADE GPS</u>	<u>47</u> - <u>091</u> - <u>0160MOD</u>
STATE COUNTY PERMIT	
WELL TYPE: OIL <input type="checkbox"/> GAS <input checked="" type="checkbox"/> LIQUID INJECTION <input type="checkbox"/> WASTE DISPOSAL <input type="checkbox"/> (IF "GAS"), PRODUCTION <input checked="" type="checkbox"/> STORAGE <input type="checkbox"/> DEEP <input type="checkbox"/> SHALLOW <input checked="" type="checkbox"/>	
LOCATION: ELEVATION: <u>1878'</u> WATER SHED: <u>WHITE DAY CREEK</u>	
DISTRICT: <u>FETTERMAN</u> COUNTY: <u>TAYLOR</u>	
QUADRANGLE: <u>GLADESVILLE 7.5'</u> ACREAGE: <u>222.75 AC±</u>	
SURFACE OWNER: <u>CHARLES E. MacDONALD</u> LEASE ACREAGE: <u>419.51 AC +</u>	
OIL & GAS ROYALTY OWNER: <u>UNION NAT'L BANK, TRUSTEE FOR GORE-MORRIS, ET. AL</u> LEASE NO. <u>WVL00519 WVL02896.001-003 WVL00519.0000</u>	
PROPOSED WORK: DRILL <input checked="" type="checkbox"/> CONVERT <input type="checkbox"/> DRILL DEEPER <input type="checkbox"/> REDRILL <input type="checkbox"/> FRACTURE OR STIMULATE <input checked="" type="checkbox"/> PERFORATE NEW FORMATION <input type="checkbox"/> PLUG OFF OLD FORMATION <input type="checkbox"/> OTHER PHYSICAL CHANGE IN WELL (SPECIFY) _____	
PLUG AND ABANDON _____ CLEAN OUT AND REPLUG _____	
TARGET FORMATION: <u>MARCELLUS SHALE</u> ESTIMATED DEPTH: <u>7,830' TVD / 14,360' MD</u>	
WELL OPERATOR: <u>PDC MOUNTAINEER, LLC</u> DESIGNATED AGENT: <u>JAMES A HAGA</u>	
ADDRESS: <u>120 GENESIS BOULEVARD</u> ADDRESS: <u>120 GENESIS BOULEVARD</u>	
<u>BRIDGEPORT, WV 26330</u> <u>BRIDGEPORT, WV 26330</u>	

01/10/2014