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

PERMIT MODIFICATION APPROVAL

January 08, 2014

PDC MOUNTAINEER LLC
POST OFFICE BOX 26
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 9101261 , Well #: UNB 4HM
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

91-0126I MOD

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 4HM 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: 13,750'

11) Proposed Horizontal Leg Length: 6000'

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: ____
Seam: ____
Owner: ____

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(9/13)

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"	new	H-40	94#	80'	80'	CCTS
Fresh Water	13 3/8"	new	H-40	48#	450'	450'	CCTS
Coal					Bryan Harris 10-9-13		
Intermediate	9 5/8"	new	J-55	36#	2500'	2500'	CCTS
Production	5 1/2"	new	P-110	20#	13,750'	13,750'	900 SX
Tubing							
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
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. There will not be a pilot hole drilled. Production string cement will go at least 100' into intermediate string, if not CCTS.

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

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*Note: Attach additional sheets as needed.

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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 Metasillicate – Free water control + Solid suspension

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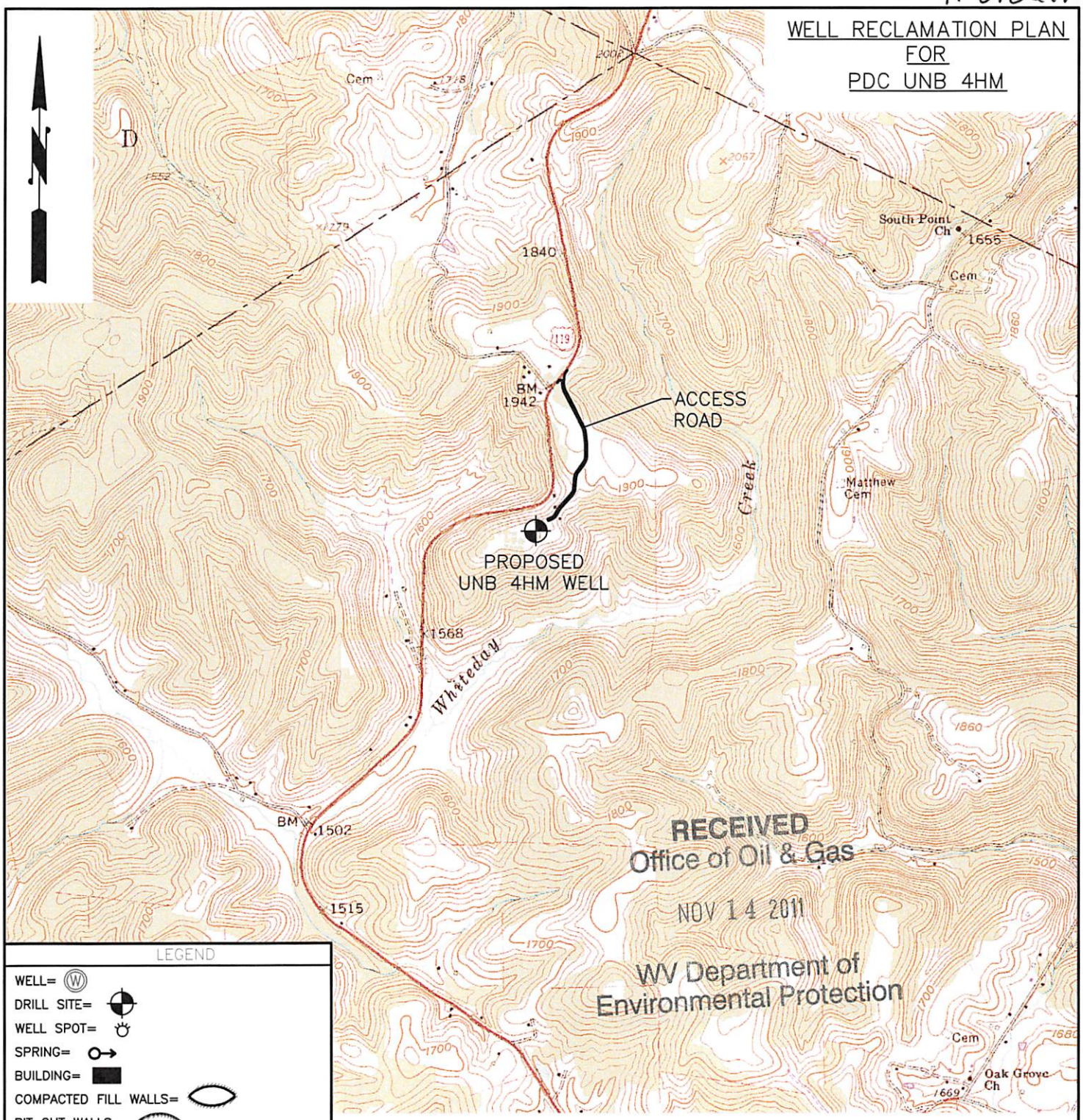
Vendor	Product	Code Number	Component	CAS-NO.
Schlumberger	100-mesh Sand	S100	Crystalline silica	14808-60-7
Schlumberger	30/50 mesh sand	S012-3050	Crystalline silica	14808-60-7
Schlumberger	40/70 mesh sand	S012-4070	Crystalline silica	14808-60-7
Schlumberger	Corrosion Inhibitor	A264	Methanol	67-56-1
			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

91-01261 MOD

MOD

91-01261H6A

WELL RECLAMATION PLAN FOR PDC UNB 4HM



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LEGEND

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

WELL RECLAMATION PLAN
DONALD VINCENT 101
FELLOWSVILLE 7.5 QUADRANGLE

2000' 0 2000' 4000'

THRASHER ENGINEERING
PHONE (304) 624-4108 (FAX) (304) 624-7831
CIVIL, ENVIRONMENTAL, AND CONSULTING
30 COLUMBIA BOULEVARD – CLARKSBURG, WV 26301

WELL RECLAMATION PLAN FOR

SCALE: NOT TO SCALE
DRAWN: JCP
CHECKED:
APPROVED:

PROJECT# 030-1999

SHEET No. 4

FORM WW-6

PDC MOUNTAINEER, LLC
WELL NO. UNB 4HM

7,738' TOP HOLE

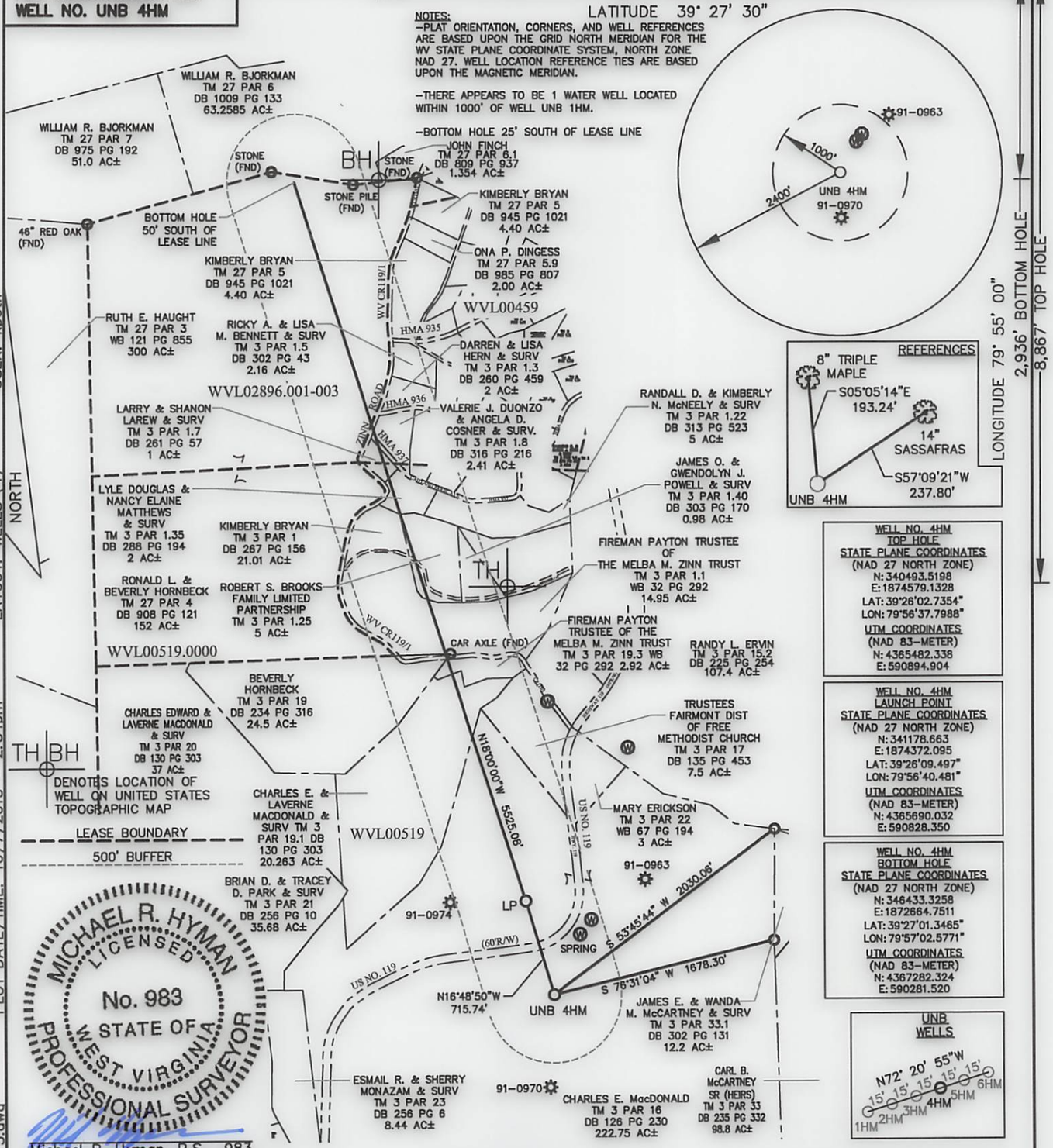
9,679' BOTTOM HOLE

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.

-BOTTOM HOLE 25' SOUTH OF LEASE LINE



MICHAEL R. HYMAN LICENSED No. 983 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

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. 030-1999

SCALE: 1"=1000'

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 ,2013

OPERATOR'S WELL NO. UNB NO. 4HM

API WELL NO. MOD

47 - 091 - 01261 HGA
STATE COUNTY PERMIT

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

LOCATION: ELEVATION: 1878' WATER SHED: WHITE DAY CREEK
DISTRICT: FETTERMAN COUNTY: TAYLOR
QUADRANGLE: GLADESVILLE 7.5' ACREAGE: 222.75 AC±
SURFACE OWNER: CHARLES E. MacDONALD LEASE ACREAGE: 420.88 AC +
OIL & GAS ROYALTY OWNER: UNION NAT'L BANK, TRUSTEE FOR GORE-MORRIS, ET. AL. LEASE NO. WVL00459 WVL00519 WVL02896.001-003

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: 7,830' TVD / 13,750' 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:\030-1999 PDC Compton A\Survey\030-1999 WELLS 9-3-13.dwg PLOT DATE/TIME: 10/7/2013 - 2:34pm LAYOUT: WELLS (4) USER: kpoth