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

March 02, 2015

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-10303073, issued to AMERICAN ENERGY-MARCELLUS, 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: MARY MILLER GRT WZ 7H
Farm Name: DELANEY, DALE K.
API Well Number: 47-10303073
Permit Type: Horizontal 6A Well
Date Issued: 03/02/2015

Promoting a healthy environment.

API Number: 103-03073

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

1. 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.

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.

9. 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.

WW-6B
(9/13)

47 10303073

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

1) Well Operator:	American Energy-Marcellus, LLC	4945100500	Wetzel	Center	Big Run
		Operator ID	County	District	Quadrangle

2) Operator's Well Number: Mary Miller GRT WZ 7H Well Pad Name: Mary Miller GRT WZ

3) Farm Name/Surface Owner: MA Miller Public Road Access: SLS 58

4) Elevation, current ground: 1364' Elevation, proposed post-construction: 1364'

5) Well Type (a) Gas ■ Oil ■ Underground Storage
Other
(b)If Gas Shallow ■ Deep
Horizontal ■

DMH 2-19-15

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Marcellus, Approximate TVD 7439', approximate thickness 50', +/- 4600 psi
Onondaga ↗
LLA 2/20/15

8) Proposed Total Vertical Depth: 7439'

9) Formation at Total Vertical Depth: Onondaga (less than 50')

10) Proposed Total Measured Depth: 17650'

11) Proposed Horizontal Leg Length: 9269

12) Approximate Fresh Water Strata Depths: 539'

13) Method to Determine Fresh Water Depths: Based on drilling history in nearby wells

14) Approximate Saltwater Depths: 2175'

15) Approximate Coal Seam Depths: 1265'

16) Approximate Depth to Possible Void (coal mine, karst, other): None anticipated

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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Environmental Protection

WW-6B
(10/14)

API NO. 47- 4710303073
OPERATOR WELL NO. Mary Miller GRT WZ 7H
Well Pad Name: Mary Miller GRT WZ

18) **CASING AND TUBING PROGRAM**

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	20"	New	J-55	94#	100'	100'	330, CTS
Fresh Water	13-3/8"	New	J-55	54.5#	1350'	1350'	625, CTS
Coal							
Intermediate	9-5/8"	New	J-55	40#	3500'	3500'	1650, CTS
Production	5-1/2"	New	P-110	20#	17650'	17650'	4400
Tubing	2-3/8"	New	N-80	4.7#			
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Max. Associated Surface Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438	2110	50	Class A	1.2
Fresh Water	13-3/8"	17-1/2"	0.38	2740	600	Class A	1.2
Coal							
Intermediate	9-5/8"	12-1/4"	0.395	3950	1500	Premium H/50-50 Poz H	Tail 1.27, Lead 1.51
Production	5-1/2"	8-3/4"	0.361	12640	5000	Premium H/50-50 Poz H	Tail 1.27, Lead 1.51
Tubing	2-3/8"	4.778"	0.19	11200			
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, case, cement, and complete a horizontal Marcellus well. No pilot holes planned. Conductor rig will be used to set conductor and then another rig will move in to drill out of conductor to proposed total depth.

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

Plan we hydraulically fracture/stimulate the well with "slickwater" frac technique. Will utilize a plug and perforation technique through cased hole. Max surface pressure during the frac will be 10,000 psi. Max BHP (bottom hole pressure) would be 13,500 psi at 8,000 ft TVD.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 0

22) Area to be disturbed for well pad only, less access road (acres): 4.32

23) Describe centralizer placement for each casing string:

Conductor: N/A
Surface: Centralizer every 3 joints or 120'
Intermediate: Centralizer every 3 joints or 120'
Production: Run 1 spiral centralizer every 120' from the first 5.5" long joint to the top of the curve
Run 1 spiral centralizer every 200' from the top of the curve to surface

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

Conductor: Class A Cement(see attachment for complete description)
Surface: Class A Cement (see attachment for complete description)
Intermediate: Premium H/50-50 Poz H Cement (see attachment for complete description)
Productions: Premium H/50-50 Poz H Cement (see attachment for complete description)

25) Proposed borehole conditioning procedures:

The wellbore will be properly circulated at TD of each section until as much of the residual drill cuttings have been removed from the wellbore as possible, residual drilling gas has been circulated out and until the mud and wellbore are both constant and stable. Mud properties will be adjusted if needed. Hole cleaning times may vary from well to well, hole section to hole section.

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*Note: Attach additional sheets as needed.

47103073

Cement Additives for WW-6B

Class A – Neat + 2% BWOC Calcium + Chloride + .25% BWOC Flo-Seal Additives are Polyflake LCM

Class H Premium + 0.75% Fl 17 + 0.1% C41P + 0.15%C45 +3pps gilsonite + 0.2% C20 Additives are FL-17, C41-P, C-45, Gilsoite, and C-20

50/50 Poz H + 0.5 %FL 17 +5% Gyp + 0.1%C41P + 0.15% C51 + 0.1% C20 Additives are FL-17, Gypsum, C41-P, C-51, and C-20

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47 10 3 0 3 0 73

WW-9
(9/13)

API Number 47 - _____ - _____
Operator's Well No. Mary Miller GRT WZ 7H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name American Energy - Marcellus, LLC OP Code 4945100500

Watershed (HUC 10) Fishing Creek Quadrangle Big Run

Elevation 1364' County Wetzel District Center

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: Closed loop system no pits will be used

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

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
■ Underground Injection (UIC Permit Number see attached sheet titled UIC Wells and Landfills)
■ Reuse (at API Number next anticipated well)
■ Off Site Disposal (Supply form WW-9 for disposal location)
_____ Other (Explain _____

Will closed loop system be used? If so, describe: yes; see attached sheet titled Closed loop typical description

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air, Freswater mist, and Synthetic based oil

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

Additives to be used in drilling medium? see attached sheet titled drilling additives

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) _____

-Landfill or offsite name/permit number? see attached sheet titled UIC Wells and Landfills

DMH
2-19-15

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) American Energy - Marcellus, LLC

Company Official Title Field Coordinator

Subscribed and sworn before me this 16 day of Dec 20 14

_____ Notary Public

My commission expires 1/23/18

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FEB 20 2015

AMBER KOLLOCK
NOTARY PUBLIC
14000742
EXP. 01/23/18
STATE OF OKLAHOMA

WV Department of Environmental Protection

47 10 3 0 3 0 73

Form WW-9

Operator's Well No. Mary Miller GRT WZ 7H

American Energy - Marcellus, LLC

Proposed Revegetation Treatment: Acres Disturbed 9.22 Prevegetation pH _____

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 500 lbs/acre

Mulch minimum of 2-3 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
See attached		See attached	

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: _____

Comments: _____

Title: Oil + Gas Inspector Date: 2-15-15

Field Reviewed? (✓) Yes ( ) No

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Closed Loop Typical Description

A series of storage tanks that separate liquids and solids along with screen shakers, hydro cyclones, centrifuges and collection equipment (e.g., vacuum trucks, shale barges) may be on site. The wastes created are minimizes and transfer red off-site for disposal.

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4710303073

UIC WELLS and Landfills

Disposal Location	Type	Permit No.
Wetzel County Landfill –	Landfill	SWF-1021/WV010985
Short Creek Landfill –	Landfill	SWP-1034/WV0109517
Brooke County –	Landfill	SWF-1013/WV0109029
Kemble -	UIC Well	34-119-2-8780-00-00
Elkhead-	UIC Well	34-157-2-5511-00-00
Kent Injection Well	UIC Well	34-119-2-7350-00-00
Moran Well	UIC Well	34-089-2-4412-00-00

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Drilling Additives

Air mist system additives are commonly; Rock Drill Oil, Drilling Foam, Drilling Soap, and occasionally Shale Stabilizer (KCl).

Synthetic Oil Based Additives

The base oil is the main ingredient, and it will run approx. 70% of the fluid volume, water will make up about 25%, the remaining 5% by volume will include a mixture of the following:

ANCO Gel

Cottonseed Hulls

D294

Anco Bar

Petrogel 100

Claytone

Lime

Calcium Chloride

Anco Trol

Base Oil (Kensol 48H)

Anco Mul Mod

Anco Mul OW

Anco Mul P

Anco Mul S

Anco Mul Thin

Anco Thunder Plug

Calcium Carbonate M

Cedar Fiber

LCF Blend

Mica Fine

Walnut Shell Med

Anco Drill A

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4710303073

Temporary and Permanent Seed Mix

250 lbs. /acre

Mix Details

Medium red clover	4%
Alsike clover	4%
Birds foot trefoil	5%
Forage tall fescue	45%
Forage perineal rye	20%
Annual rye	11%
Winter wheat	10%

Straw

Winter – 3 ton per acre

Summer – 2 ton per acre

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FEB - 4 2015

Office of Oil and Gas
WV Dept. of Environmental Protection

AMERICAN ENERGY
UTICA

47 10303073

December 30th, 2014

West Virginia Department of Environmental Protect
Office of Oil and Gas
Attn: Laura Cooper or whomever concerned
601 57th Street
Charleston, West Virginia 25304

Re: Site Safety Plan for a Permit to Drill
Mary Miller GRT WZ 7H

Dear Ms. Cooper,

American Energy – Marcellus, LLC respectfully submits the site safety plan on the enclosed CD. Also included on the CD is a file that contains all of our safety data sheets for both drilling and fracing.

If you need any additional information, please feel free to contact me.

Best Regards,

Ariel Bravo
Regulatory Technician
ariel.bravo@aep-lp.com
Cell 405-403-4803
Office 405-607-5529

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JAN 02 2015

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4710303073

Mary Miller GRT WZ 1H, 3H, 5H & 7H Site Safety Plan

AMERICAN ENERGY
MARCELLUS

DMH
2-19-15

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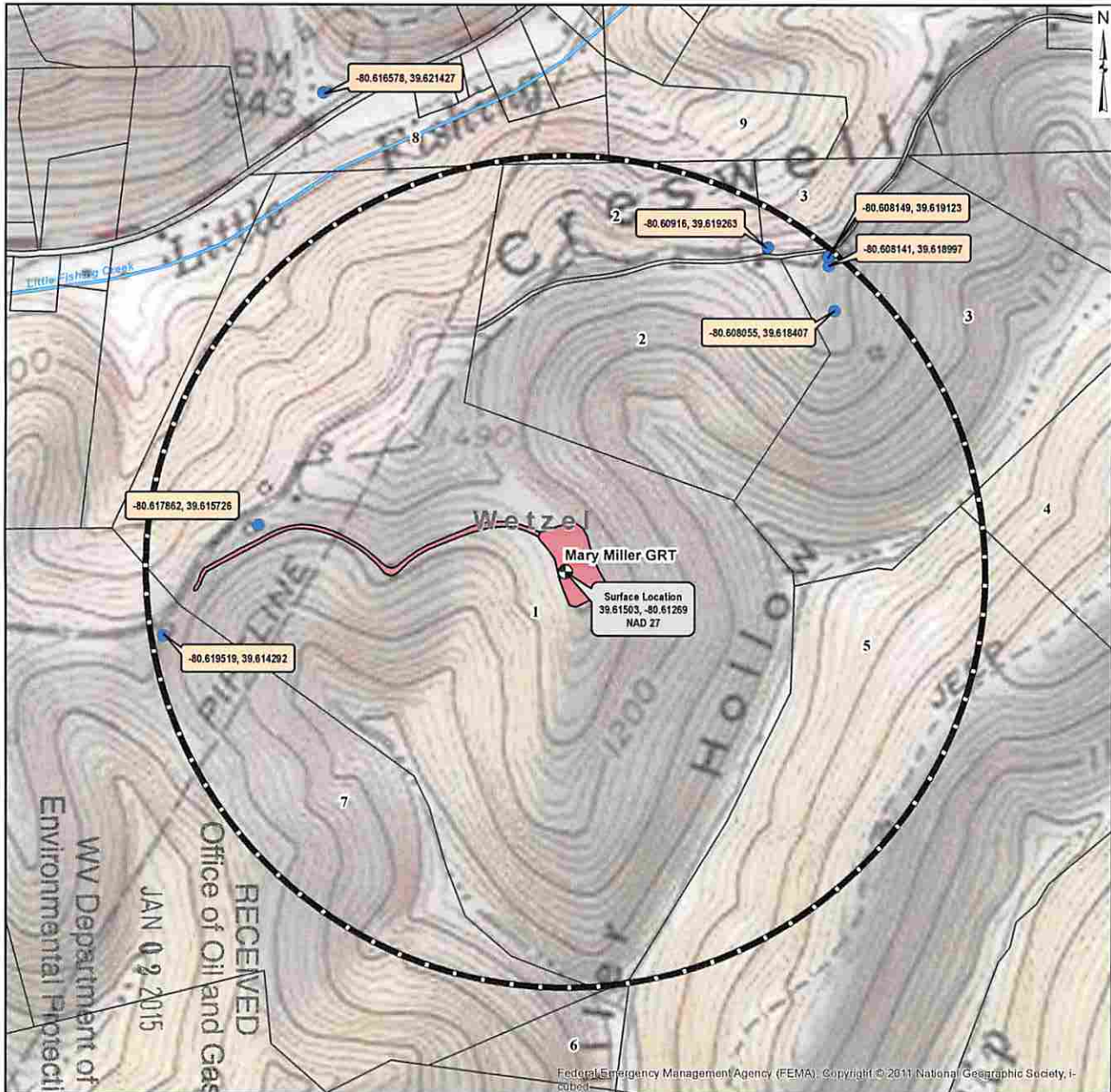
4710303073



PROPERTY DATA			
PROPERTY ID	PARCEL NO.	OWNER	OWNER ADDRESS
1	01 1800230000	DALE K. DULANEY & DONALD DULANEY	HC 62 BOX 95 BURTON WV 26562
2	04 200030001	RAYMOND LEE & BILLIE L. YOHO	HC 61 BOX 55A WILEYVILLE WV 26186
3	01 1800180000	TODD & SONYA SIEGFRIED	431 QUAIL DR ALLENTOWN PA 18104
4	04 200040000	JOHN C. & DEBBIE COMER	223 BOYSCOUT RD SMITHTON PA 15479
5	04 200050000	EDWIN LEO & LINDA L. DULANEY	HC 61 BOX 1A WILEYVILLE WV 26186
6	04 200030000	DALE K. & SHERRY L. DULANEY	RT 2 BOX 127 BIG RUN WV 26061
7	01 1800310000	JAMES L. DULANEY	HC 62 BOX 95 BURTON WV 26562
8	01 1800070000	BILLY RAY DENT	HC 61 BOX 27 WILEYVILLE WV 26581
9	01 1800140000	PELMA B MORRIS	HC 61 BOX 29 WILEYVILLE WV 26186

- Water Well Location WV
- AEU Surface Location
- AEU Testing Radius (2000')
- Miller Well Pad NAD83
- Miller Access Road NAD83
- Streams and Rivers
- 100 Year Flood Zones
- Wetzel County Parcel Line
- WV County Lines

250 0 250 500 Feet

REVISIONS		
NO.	DATE	DESCRIPTION

AMERICAN ENERGY UTICA

WATER SAMPLING FIELD MAP

MARY MILLER WELL PAD

WETZEL COUNTY, WV

cesa
CREATION TO COMPLETION
www.cesainc.com
Engineering - Architecture - Survey - Construction Mgt - Environmental

ISSUE: EXHIBIT
DATE: 12.03.2014
JOB NO.: 751009
DRAWN: CHD
SHEET NO. 1

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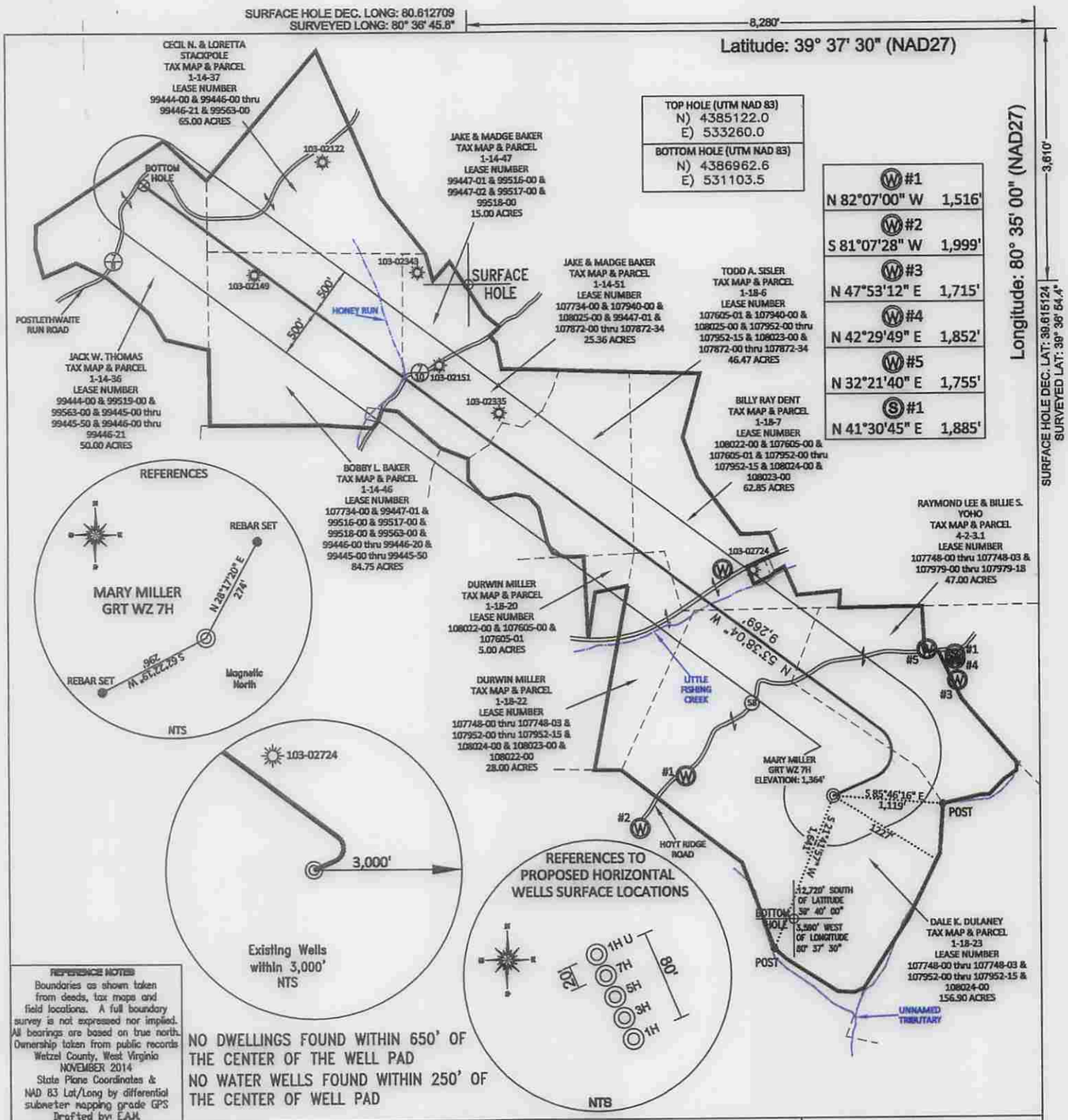

REFERENCE NOTES
Boundaries as shown taken from deeds, tax maps and field locations. A full boundary survey is not expressed nor implied. All bearings are based on true north. Ownership taken from public records Wetzel County, West Virginia NOVEMBER 2014
State Plane Coordinates & NAD 83 Lat/Long by differential submeter mapping grade GPS
Drafted by: EAM

FILE #: AE001
DRAWING #: 2457
SCALE: PLAT – 1" = 1400' TICK MARK – 1" = 2000'
MINIMUM DEGREE OF ACCURACY: 1/200
PROVEN SOURCE OF ELEVATION: SUBMETER MAPPING GRADE GPS

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 DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: _____

L.L.S. #2124 : Ernest J. Benchek III

ERNEST J. BENCHEK III LICENSED No. 2124 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTON, WV 25304

DATE: FEBRUARY 23, 2015
OPERATOR'S WELL #: MARY MILLER GRT WZ 7H
API WELL #: 47 (STATE) 103 (COUNTY) 03073HeA (PERMIT)

Well Type: ☐ Oil ☐ Waste Diposal ☐ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: FISHING CREEK
ASBUILT ELEVATION: 1,364'
COUNTY/DISTRICT: WETZEL / CENTER
QUADRANGLE: BIG RUN, WV
SURFACE OWNER: DALE K. DULANEY
ACREAGE: 156.90 +/–
OIL & GAS ROYALTY OWNER: PATSY C. FISH, ARTHUR R. & JOAN E. MILLER, CONNIE S. WHITE, KEITH R. MOORE
ACREAGE: 564.33 +/–
LEASE NUMBERS:

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒
PLUG OFF FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐
CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY):

TARGET FORMATION: MARCELLUS
ESTIMATED DEPTH: TVD: 7,439' TMD: 17,650'
WELL OPERATOR: American Energy–Marcellus LLC.
DESIGNATED AGENT: Eric B. Gillespie
ADDRESS: 3501 NW 63rd Street
ADDRESS: 103 Taryn Lane
CITY: Oklahoma City STATE: OK ZIP CODE: 73116
CITY: Cross Lanes STATE: WV ZIP CODE: 25313