



**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

June 16, 2014

**WELL WORK PERMIT**

**Horizontal 6A Well**

This permit, API Well Number: 47-10303006, issued to GASTAR EXPLORATION INC., 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: LACKAWANNA NO U-3H

Farm Name: M.B. INVESTMENTS

**API Well Number: 47-10303006**

**Permit Type: Horizontal 6A Well**

Date Issued: 06/16/2014

**Promoting a healthy environment.**

**06/20/2014**

## 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 (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.



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west virginia department of environmental protection

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Oil and Gas Conservation Commission  
601 57<sup>th</sup> Street, SE Charleston, WV 25304  
(304)926-0499, Ext 1656

Earl Ray Tomblin, Governor  
Randy C. Huffman, Cabinet Secretary  
dep.wv.org

June 10, 2014

Department of Environmental Protection  
Office of Oil and Gas  
Charleston, WV 25304

RE: Application for Deep Well Permit – API #47-103-03006

COMPANY: Gastar Exploration, Inc.

FARM: M B Investments – Lackawanna #U-3H

COUNTY: Wetzel      DISTRICT: Magnolia      QUAD: Porters Falls

The deep well review of the application for the above company is **APPROVED FOR TRENTON – for Point Pleasant completion.** If operator wishes to drill deeper than the Trenton, additional approval must be obtained from the OGCC.

The applicant has complied with the provision of Chapter 22C-9, of the Code of West Virginia, nineteen hundred and thirty-one (1931), as amended, Oil and Gas Conservation Commission as follows:

1. Notice of Deviation comments filed? None
2. Provided a certified copy of duly acknowledged and recorded consent and easement form from all surface owners; Yes
3. Provided a tabulation of all deep wells within one mile of the proposed location, including the API number of all deep wells, well name, and the name and address of the operator; none
4. Provided a plat showing that the proposed location is a distance of 400+ feet from the nearest lease line or unit boundary and showing the following wells drilled to or capable of producing from the objective formation within 3,000 feet of the proposed location.

Sincerely,

Cindy Raines  
Executive Assistant

WW-6B  
(9/13)

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

1) Well Operator: Gastar Exploration Inc. 494487685 Wetzel Magnolia Porters Falls 7.5'  
Operator ID County District Quadrangle

2) Operator's Well Number: U-3H Well Pad Name: Lackawanna

3) Farm Name/Surface Owner: M.B. Investments Public Road Access: County Route 30 Whiteman Hill Road

4) Elevation, current ground: 1326' Elevation, proposed post-construction: 1302'

5) Well Type (a) Gas  Oil  Underground Storage

Other \_\_\_\_\_

(b) If Gas Shallow \_\_\_\_\_ Deep

Horizontal

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):

The Point Pleasant is the target formation at a depth of 10,912' (top of formation), an anticipated thickness of 100' and an estimated pressure of 8200 psi.

8) Proposed Total Vertical Depth: 11,097'

9) Formation at Total Vertical Depth: Trenton Limestone

10) Proposed Total Measured Depth: 17,617'

11) Proposed Horizontal Leg Length: 6124'

12) Approximate Fresh Water Strata Depths: Shallowest at 70' & deepest at 1225'.

13) Method to Determine Fresh Water Depths: Noticeable flow at flowline or when needed to start soaping

14) Approximate Saltwater Depths: 1740'

15) Approximate Coal Seam Depths: Sewickley at 1079' and Pittsburgh at 1220'

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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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	26"	New	PE	85.68 #/ft		40'	49 ft <sup>3</sup> (CTS)
Fresh Water	20"	New	H-40	94 #/ft		1275'	1224 ft <sup>3</sup> (CTS)
Coal	13 3/8"	New	J-55	61 #/ft		2650'	1841 ft <sup>3</sup> (CTS)
Intermediate	9 5/8"	New	HCP-110	47 #/ft		10,100'	3163 ft <sup>3</sup> (CTS)
Production	5 1/2"	New	P-110	23 #/ft		17,617'	4036 ft <sup>3</sup> (CTS)
Tubing	2 3/8"	New	N-80	4.7 #/ft		10,913'	N/A
Liners							

DH  
4-30-14

<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	26"	30"	.312"	740 psi	See #24	1.21
Fresh Water	20"	24"	.33"	1530 psi	See #24	1.21
Coal	13 3/8"	17.5"	.4285"	3090 psi	See #24	1.2
Intermediate	9 5/8"	12.25"	.472"	9440 psi	See #24	1.32 & 1.18
Production	5.5"	8 1/2"	.4775"	13,580 psi	See #24	1.21
Tubing	2 3/8"		.19	11,200 psi		
Liners						

**PACKERS**

Kind:	N/A			
Sizes:	N/A			
Depths Set:	N/A			

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19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill through the Point Pleasant tagging less than One Hundred (100') feet from the top of the Trenton Limestone to get depths and log data. Then, set a solid cement plug from TD (11,097') to proposed kick off point (10,570'). Drill the curve and horizontal section to planned and proposed TD (17,617'). Run casing and cement. Run a bond log on part of the curve and vertical section, pressure test casing and set a master valve. Prep the well for stimulation.

DmH  
4-30-14

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

Gastar Exploration plans to fracture the well using a typical slickwater fracture design. Gastar will pump roughly 8000 bbls of water and 400,000 lbs of sand per stage. There will be approximately 31 stages.

Anticipated maximum surface pressure while fracing will be approximately 12,500 psi with an anticipated maximum rate of 90 bbls/min.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 25.45

22) Area to be disturbed for well pad only, less access road (acres): 4.01

23) Describe centralizer placement for each casing string:

Gastar will run 3 Centralizers on the Surface casing (20" casing) at an equal distance apart. The Intermediate casing (13 3/8" casing) will have 7 Centralizers at 300' spacing. The second Intermediate casing (9 5/8" casing) will have 40 Centralizers at 260' spacing. The production casing will have one centralizer every joint in the lateral, one centralizer per joint through the curve and one centralizer every third joint in the the vertical section 1500' inside of the 9 5/8" casing.

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

See attached.

25) Proposed borehole conditioning procedures:

Gastar will circulate the hole a minimum of 3 hours upon TD. We will then pull out to the bottom of the curve and circulate for another 2 hours. Then come out of the hole.

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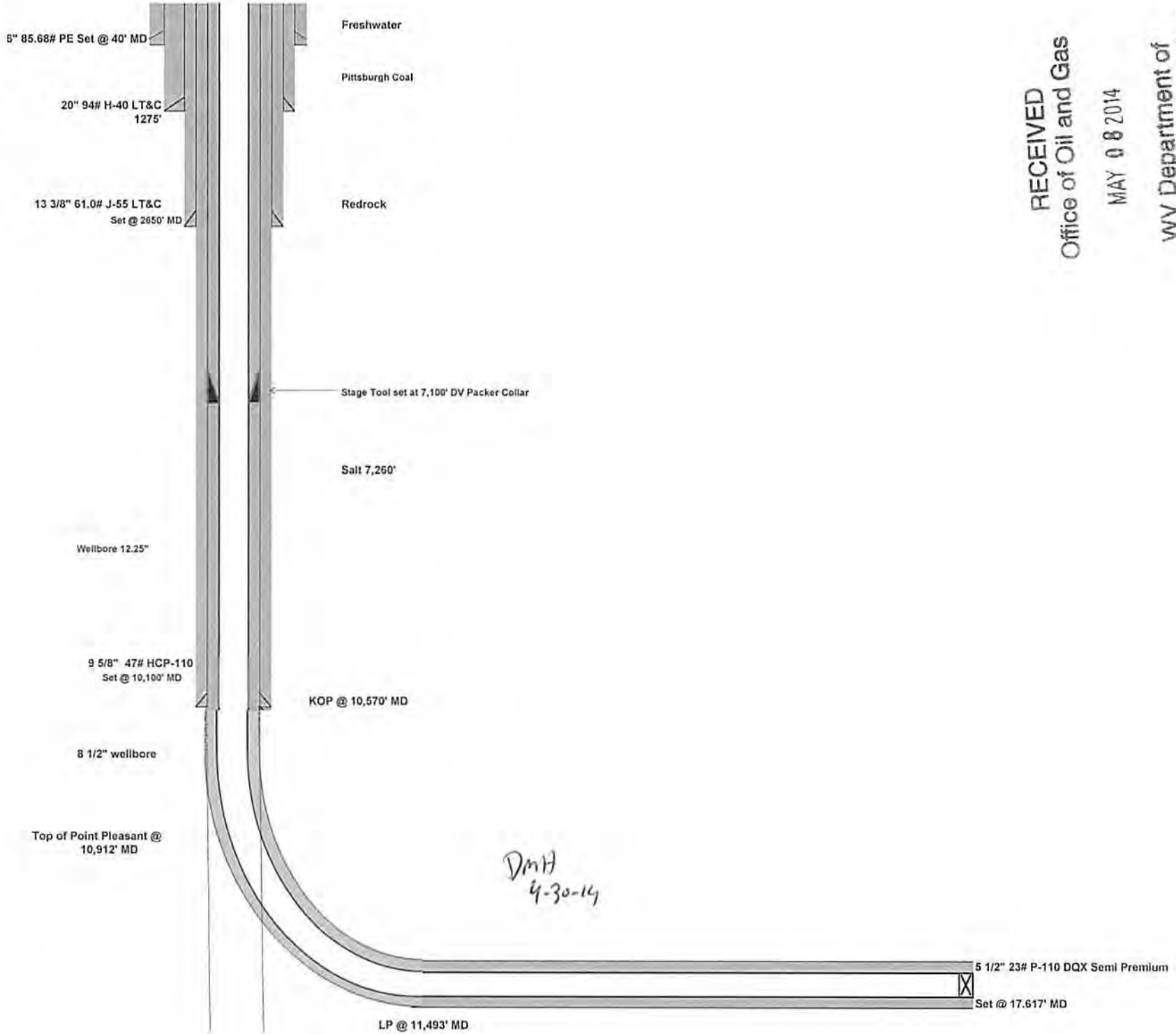
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\*Note: Attach additional sheets as needed.

4710303006

LACKAWANNA # U-3H  
Wetzel County, WV



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WW6B Attachment (2<sup>nd</sup> Revision for #24)

#24. Conductor and Surface Casing Cement: Class A + 2% CaCl

-CaCl – Calcium Chloride

Intermediate Casing: Class A + 1% EC-1 + .5% SMS + .55%BA-10A + .25#/sack Cello Flake + .75 gals/100 sacks FP-12L.

- EC-1 – Bonding Agent
- SMS – Sodium Metasilicate
- BA-10A – Bonding Agent
- Cello Flake – Cellophane Flakes
- FP-12L – Foam Preventer

Intermediate Casing #2: Lead Cement – 50:50 (Poz:Class A) + .15% R-3 + 3.9% KCl + 1.5% FL-25 + .2% ASA-301 + .75 gals/100 sack FP-12L

- R-3 – Retarder
- KCl – Potassium Chloride
- FL-25 – Fluid Loss
- ASA-301 – Free Water Additive
- FP-12L – Foam Preventer

Intermediate #2 Tail Cement – 50:50 (Poz:ClassH) + .1% R-3 + .2% CD-32 + 1.2% FL-62 + .1% ASA-301 + .4% SMS

- R-3 – Retarder
- CD-32 – Cement Dispersant
- FL-62 – Fluid Loss
- ASA-301 – Free Water Additive
- SMS – Sodium Metasilicate

Kick Off Plug Cement: Class H + .3% R-3 + .7% SMS + 1% CD-32

- R-3 – Retarder
- SMS – Sodium Metasilicate
- CD-32 – Cement Dispersant

Production Casing Cement: 50:50 (Poz:Class H) + .25% MPA-170 + 3 #/sack BA-90 + .35% R-3 + .75 gal/100 sacks FP-12L

- BA-90 – Bonding Agent
- R-3 – Retarder
- FP-12L – Foam Preventer

*PMH*  
*4-30-14*

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4710303006



# GASTAR EXPLORATION USA, INC.

Location: Wetzel County, WV  
 Field: Wetzel  
 Facility: Lackawanna Unit Pad

Slot: Slot #3U  
 Well: Lackawanna Unit U-3H  
 Wellbore: Lackawanna Unit U- 3H (PWB)

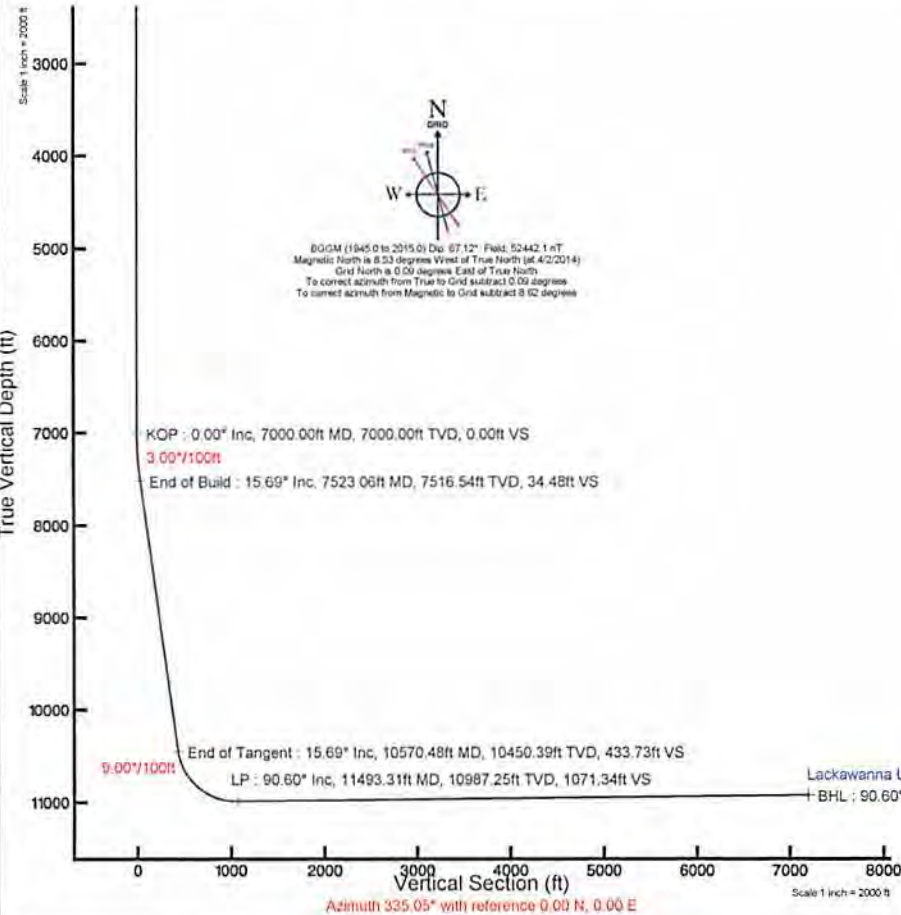


## Well Profile Data

Design Comment	MD (ft)	Inc (")	Az (°)	TVD (ft)	Local N (ft)	Local E (ft)	DLS ("/100ft)	VS (ft)
Tie On	13.00	0.000	36.076	13.00	0.00	0.00	0.00	0.00
KOP	7000.00	0.000	36.076	7000.00	0.00	0.00	0.00	0.00
End of Build	7523.06	15.692	36.076	7516.54	57.53	41.91	3.00	34.48
End of Tangent	10570.48	15.692	36.076	10450.39	723.68	527.26	0.00	433.73
LP	11493.31	90.600	335.050	10987.25	1358.05	379.25	9.00	1071.34
BHL	17617.31	90.600	335.050	10923.12	6910.24	-2203.88	0.00	7195.00

Plot reference wellpath is Lackawanna Unit U-3H EX-02

True vertical depths are referenced to Rig on Slot #3 (RT)	Grid System: NAD83 / UTM Zone 17 North, US feet
Measured depths are referenced to Rig on Slot #3 (RT)	North Reference: Grid north
Rig on Slot #3 (RT) to Mean Sea Level: 1315 feet	Scale: True distance
Mean Sea Level to Mud line (At Slot: Slot #3U): -1302 feet	Depths are in feet
Coordinates are in feet referenced to Slot	Created by: frisjesl on 4/16/2014

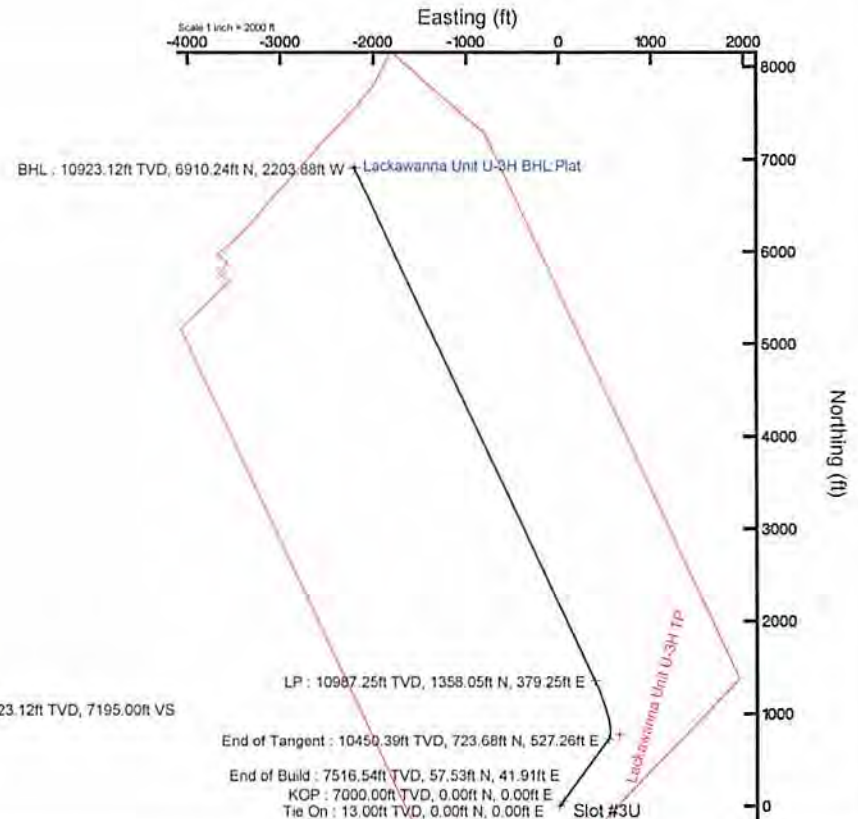


## Location Information

Facility Name	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude		
Lackawanna Unit Pad	1680777.720	1438374.840	39°36'23.34"N	80°51'24.118"W		
Slot	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Slot #3U	-39.97	-1.75	1680775.970	1438334.890	39°36'23.34"N	80°51'24.141"W
Comment	Client requested to have Slot #3 & #3U switched on 04.15.14.					
Rig on Slot #3 (RT) to Mud line (At Slot: Slot #3U)					-1302ft	
Mean Sea Level to Mud line (At Slot: Slot #3U)					-1302ft	
Rig on Slot #3 (RT) to Mean Sea Level					1315ft	

## Targets

Name	MO (ft)	TVD (ft)	Local N (ft)	Local E (ft)	Grid East (US ft)	Grid North (US ft)	Latitude	Longitude
Lackawanna Unit U-3H BHL Plat	17617.31	10023.12	6910.24	-2203.88	1678672.97	14380242.36	39°37'30.280"N	80°51'52.166"W
Lackawanna Unit U-3H TP		10987.00	774.32	651.51	1681427.22	14384108.90	39°35'29.995"N	80°51'15.801"W



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WW-9  
(9/13)

4710303006

API Number 47 - \_\_\_\_\_ - \_\_\_\_\_  
Operator's Well No. U-3H \_\_\_\_\_

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name Gastar Exploration Inc. OP Code 494487685

Watershed (HUC 10) Outlet Middle Island Creek (Undefined) Quadrangle Porters Falls 7.5'

Elevation 1302' County Wetzel District Magnolia

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: Fresh water for frac and flow back water

Will a synthetic liner be used in the pit? Yes  No  If so, what ml.? 60

Proposed Disposal Method For Treated Pit Wastes:

- Land Application
- Underground Injection ( UIC Permit Number UIC-359, UIC 2D0732540; UIC 2D0732523 )
- Reuse (at API Number \_\_\_\_\_)
- Off Site Disposal (Supply form WW-9 for disposal location)
- Other (Explain \_\_\_\_\_)

*DAH  
4-30-14*

Will closed loop system be used? If so, describe: Yes, For Vertical and Horizontal Drilling

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air for vertical / Oil for Horizontal  
Note on Vertical \*If a pocket of gas is hit. The gas flow will be diverted to the flare and SOBMs (that is previously prepared) will be pumped into the well to kill the well if necessary.

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

Additives to be used in drilling medium? Barite for weight

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. All drill cuttings will be disposed of in Wetzel County Landfill (Permit SWF-1021)

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) \_\_\_\_\_

-Landfill or offsite name/permit number? Wetzel County Landfill (SWF-1021/WV0109185)

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 Michael McCown  
Company Official (Typed Name) Michael McCown  
Company Official Title Senior VP & COO

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MAY 08 2014

Subscribed and sworn before me this 28th day of April

*David W. Perkins*



My commission expires 06/11/2020

06/20/2014

WV Department of Environmental Protection

4710303006

Form WW-9

Operator's Well No. U-3H

Gastar Exploration Inc.

Proposed Revegetation Treatment: Acres Disturbed 25.45 Prevegetation pH \_\_\_\_\_

Lime 3 Tons/acre or to correct to pH 6.5

Fertilizer type 10-20-20

Fertilizer amount 1/3 ton lbs/acre

Mulch 2.5 Tons/acre

Seed Mixtures

**Temporary**

**Permanent**

Seed Type	lbs/acre
Annual Ryegrass	40

Seed Type	lbs/acre
Fox Tail / Grassy	40
Perennial Rye	30
Crown Vetch	20

**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: [Signature]

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

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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MAY 08 2014

Title: Oil + Gas Inspector

Date: 4-30-14

Field Reviewed?  Yes  No

WV Department of  
Environmental Protection

06/20/2014



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# Well Site Safety Plan

## Gastar Exploration USA, Inc.

**Well Name:** Lackawanna U-3H

**Pad Location:** Lackawanna Pad

Wetzel County, West Virginia

**UTM (meters), NAD83, Zone 17:**

Northing – 4,384,049.2

Easting – 512,301.5

*DMH*

*4-30-14*

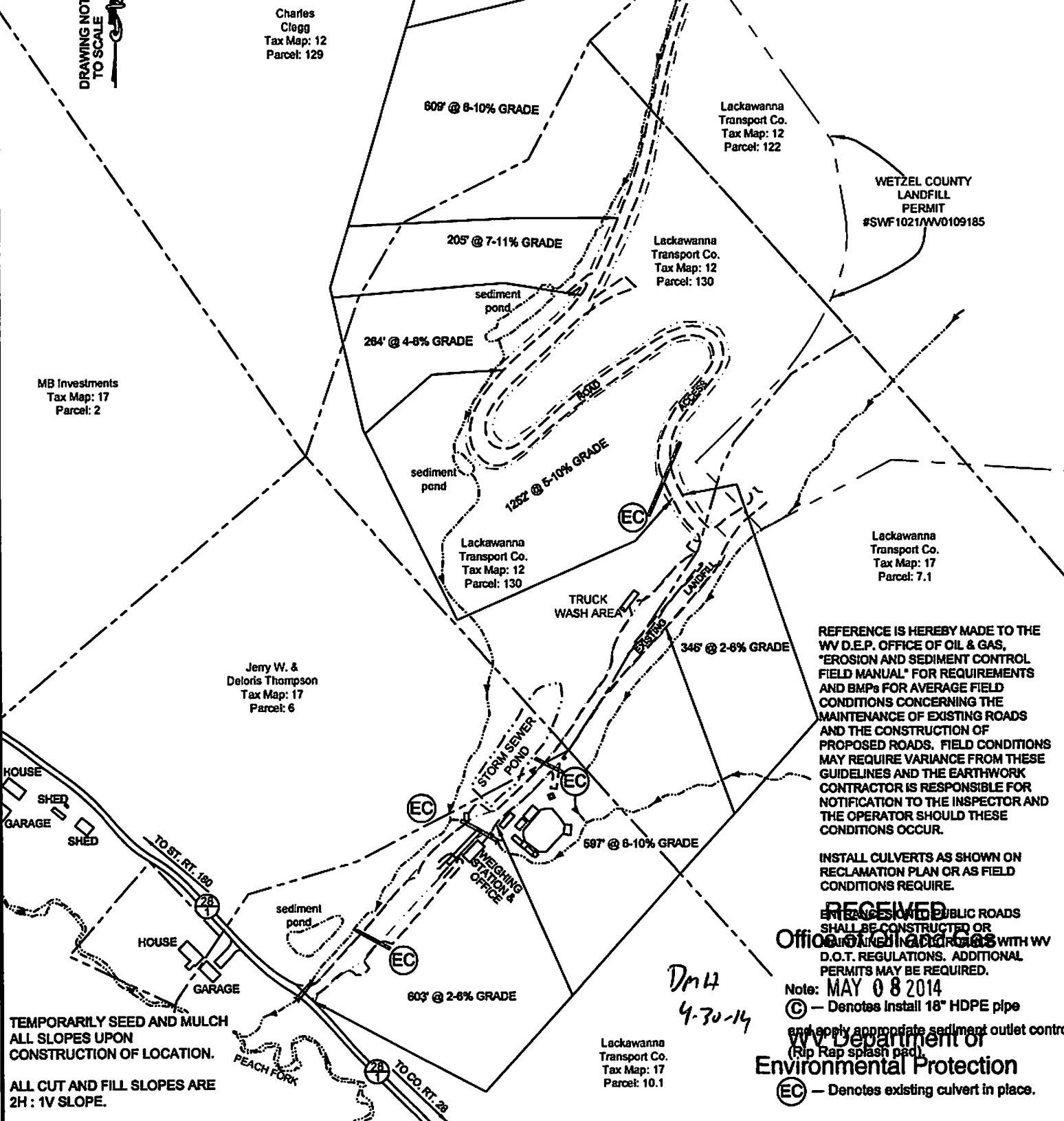
*Cynthia Raines*  
*5/15/2014*

SLR Ref: 100534.00008  
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April 2014  
MAY 08 2014

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06/20/2014

ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.



M.B. Investments  
Tax Map: 12  
Parcel: 109.1

Charles Clegg  
Tax Map: 12  
Parcel: 129

Lackawanna Transport Co.  
Tax Map: 12  
Parcel: 122

Lackawanna Transport Co.  
Tax Map: 12  
Parcel: 130

MB Investments  
Tax Map: 17  
Parcel: 2

Lackawanna Transport Co.  
Tax Map: 12  
Parcel: 130

Jerry W. & Deloris Thompson  
Tax Map: 17  
Parcel: 6

WETZEL COUNTY LANDFILL PERMIT #SWF1021/WW0109185

Lackawanna Transport Co.  
Tax Map: 17  
Parcel: 7.1

REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.

INSTALL CULVERTS AS SHOWN ON RECLAMATION PLAN OR AS FIELD CONDITIONS REQUIRE.

RECEIVED  
OFFICE OF PUBLIC ROADS  
SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED.

Office of Public Roads  
WV Department of Environmental Protection  
Note: MAY 08 2014  
© - Denotes install 18" HDPE pipe and apply appropriate sediment outlet control (Rip Rap splash pad).  
EC - Denotes existing culvert in place.

DmH  
4-30-14

TEMPORARILY SEED AND MULCH ALL SLOPES UPON CONSTRUCTION OF LOCATION.  
ALL CUT AND FILL SLOPES ARE 2H: 1V SLOPE.

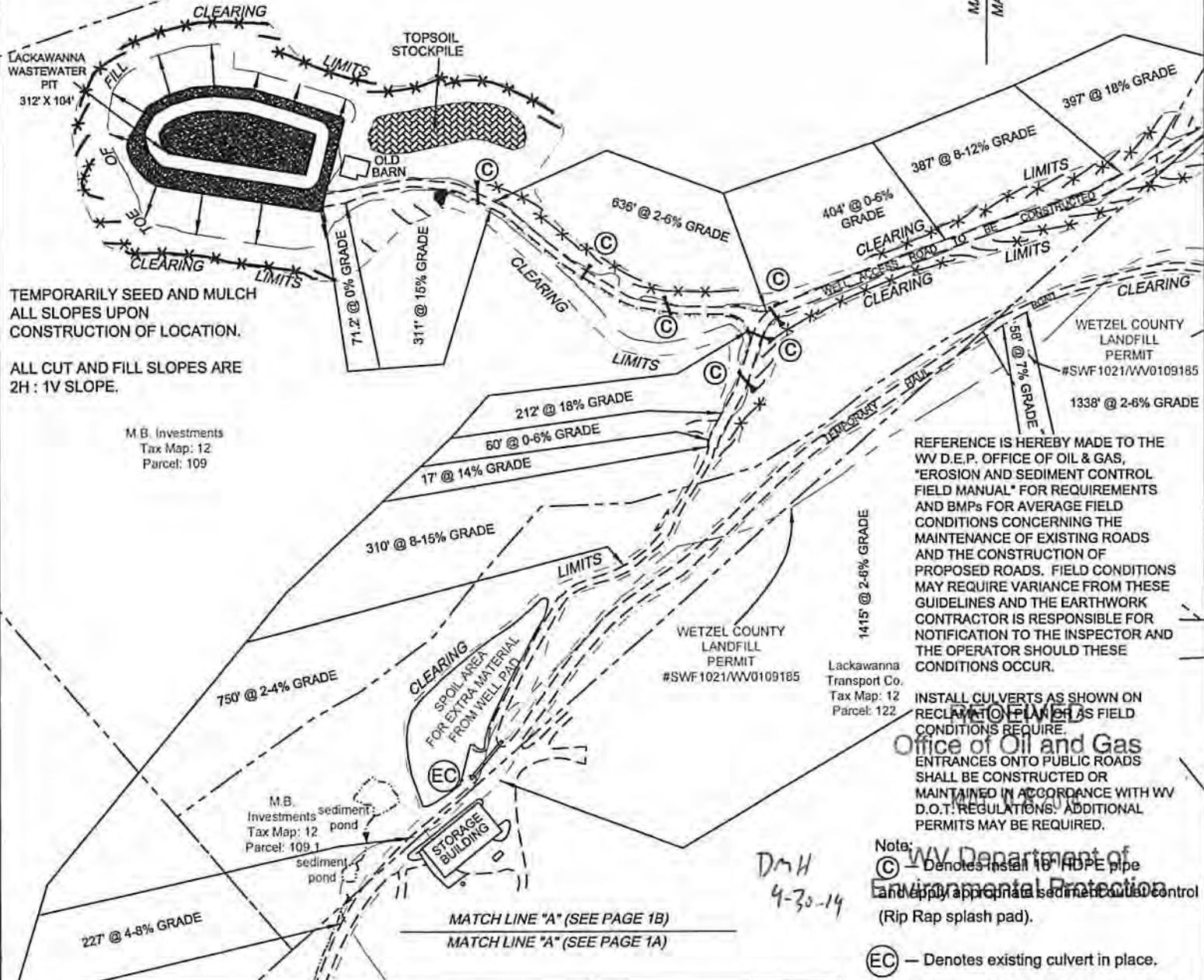
Lackawanna Transport Co.  
Tax Map: 17  
Parcel: 10.1

ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.



MB Investments  
Tax Map: 12  
Parcel: 108

M.B. Investments  
Tax Map: 12  
Parcel: 109



TEMPORARILY SEED AND MULCH ALL SLOPES UPON CONSTRUCTION OF LOCATION.

ALL CUT AND FILL SLOPES ARE 2H : 1V SLOPE.

M.B. Investments  
Tax Map: 12  
Parcel: 109

REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.

INSTALL CULVERTS AS SHOWN ON RECLAIMATION PLAN AS FIELD CONDITIONS REQUIRE. ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T.' REGULATIONS. ADDITIONAL PERMITS MAY BE REQUIRED.

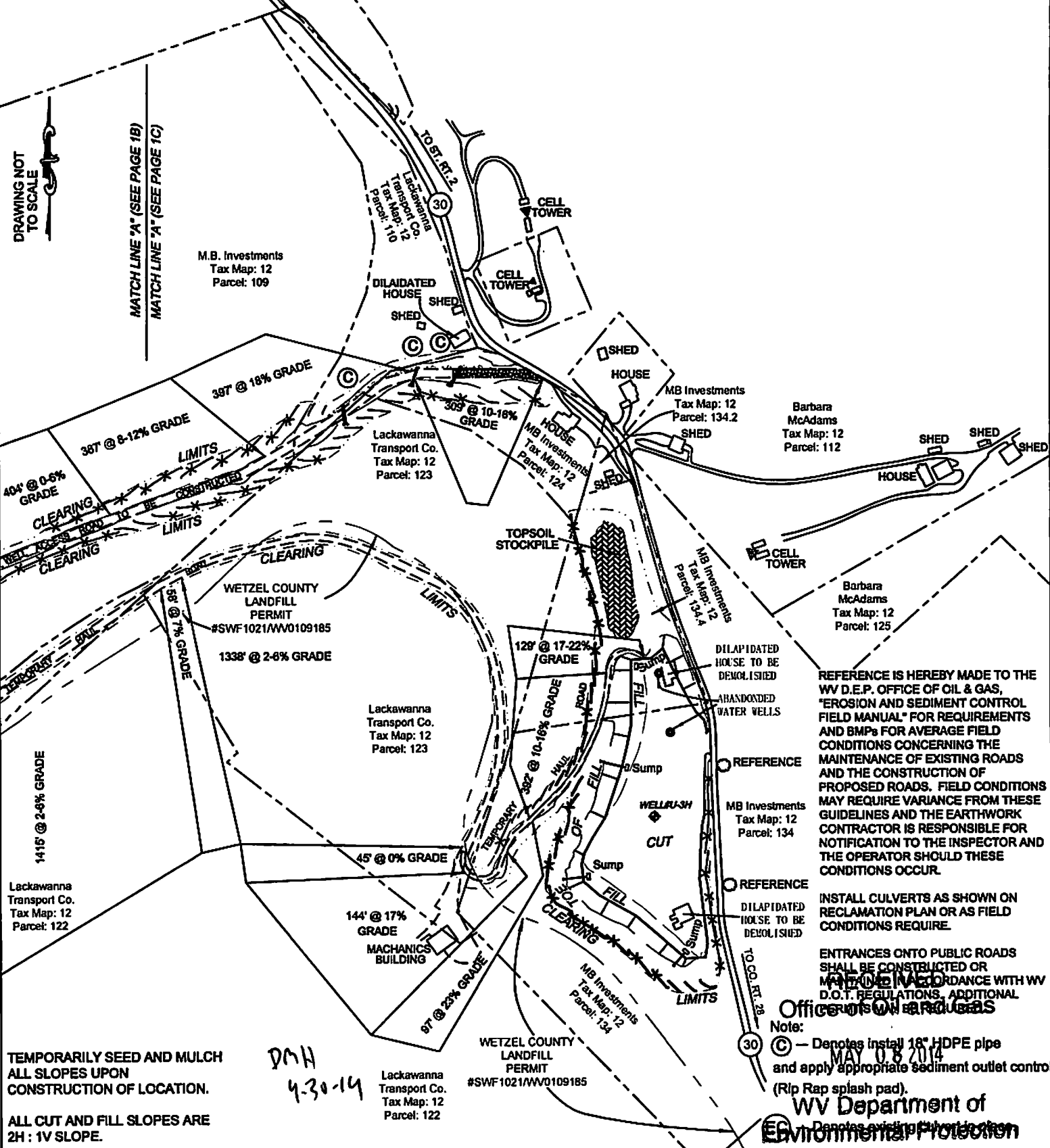
Note:   
© - Denotes install 18" HDPE pipe and apply appropriate sediment control (Rip Rap splash pad).  
EC - Denotes existing culvert in place.

- x - Silt Fence or Sediment and Erosion Control Measure.

DmH  
4-30-14

WELL NO. U-3H

ALL TREES 6-INCHES AND ABOVE ARE TO BE CUT AND STACKED. BRUSH SLASHINGS ARE TO UTILIZED DOWN SLOPE OF SITE AND STRUCTURES TO ACT AS A CONTROL BARRIER IF AVAILABLE.



TEMPORARILY SEED AND MULCH ALL SLOPES UPON CONSTRUCTION OF LOCATION.  
ALL CUT AND FILL SLOPES ARE 2H: 1V SLOPE.

DMH  
4-30-14

REFERENCE IS HEREBY MADE TO THE WV D.E.P. OFFICE OF OIL & GAS, "EROSION AND SEDIMENT CONTROL FIELD MANUAL" FOR REQUIREMENTS AND BMPs FOR AVERAGE FIELD CONDITIONS CONCERNING THE MAINTENANCE OF EXISTING ROADS AND THE CONSTRUCTION OF PROPOSED ROADS. FIELD CONDITIONS MAY REQUIRE VARIANCE FROM THESE GUIDELINES AND THE EARTHWORK CONTRACTOR IS RESPONSIBLE FOR NOTIFICATION TO THE INSPECTOR AND THE OPERATOR SHOULD THESE CONDITIONS OCCUR.

INSTALL CULVERTS AS SHOWN ON RECLAMATION PLAN OR AS FIELD CONDITIONS REQUIRE.

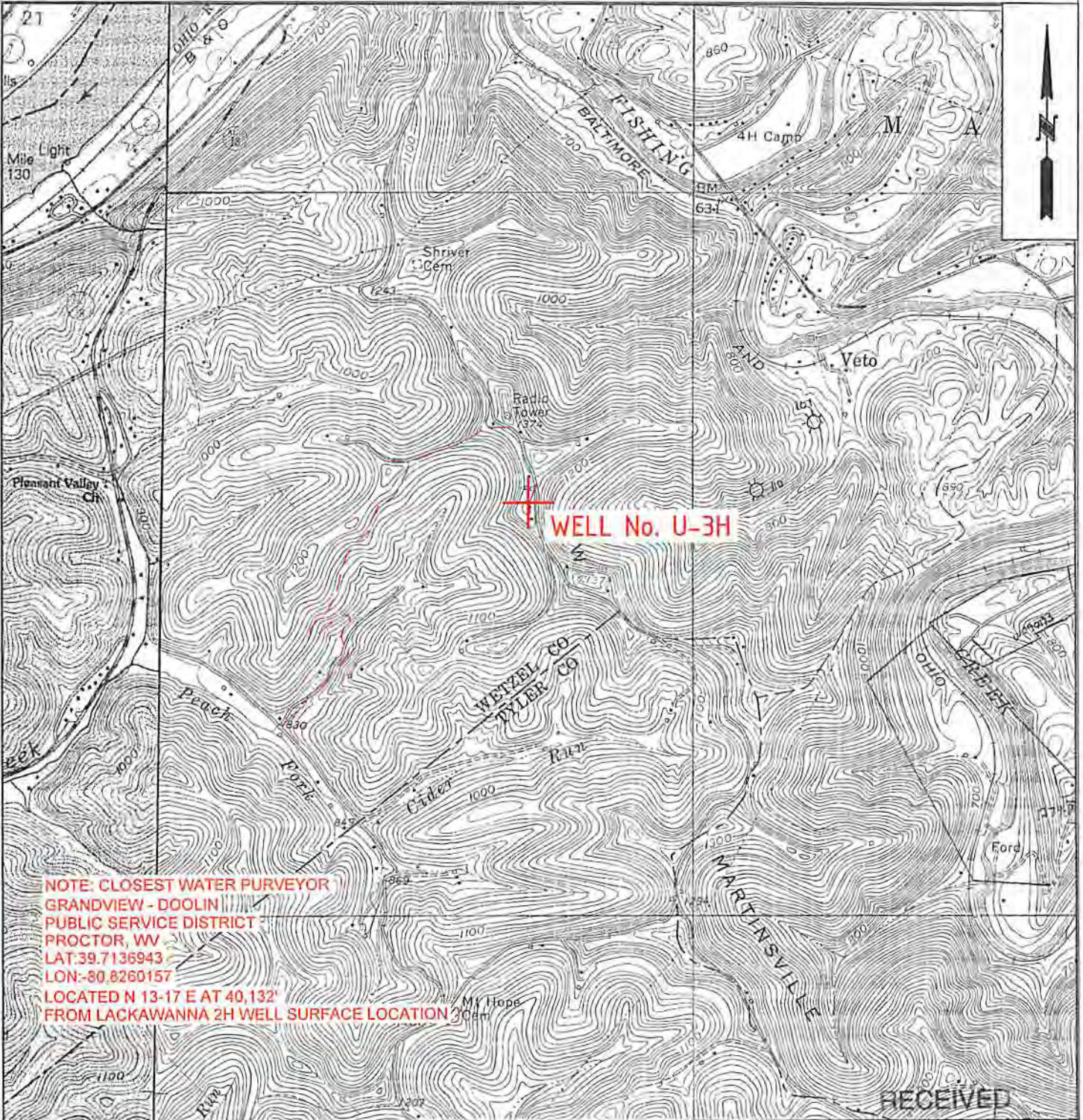
ENTRANCES ONTO PUBLIC ROADS SHALL BE CONSTRUCTED OR MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATIONS. ADDITIONAL BMPs MAY BE REQUIRED.

Office of Oil and Gas  
Note:  
© - Denotes install 18" HDPE pipe and apply appropriate sediment outlet control (Rip Rap splash pad).  
WV Department of Environmental Protection  
MAY 08 2014  
66/20/2014

WW-9

# PROPOSED LACKAWANNA WELL No. U-3H

SUPPLEMENT PG 2

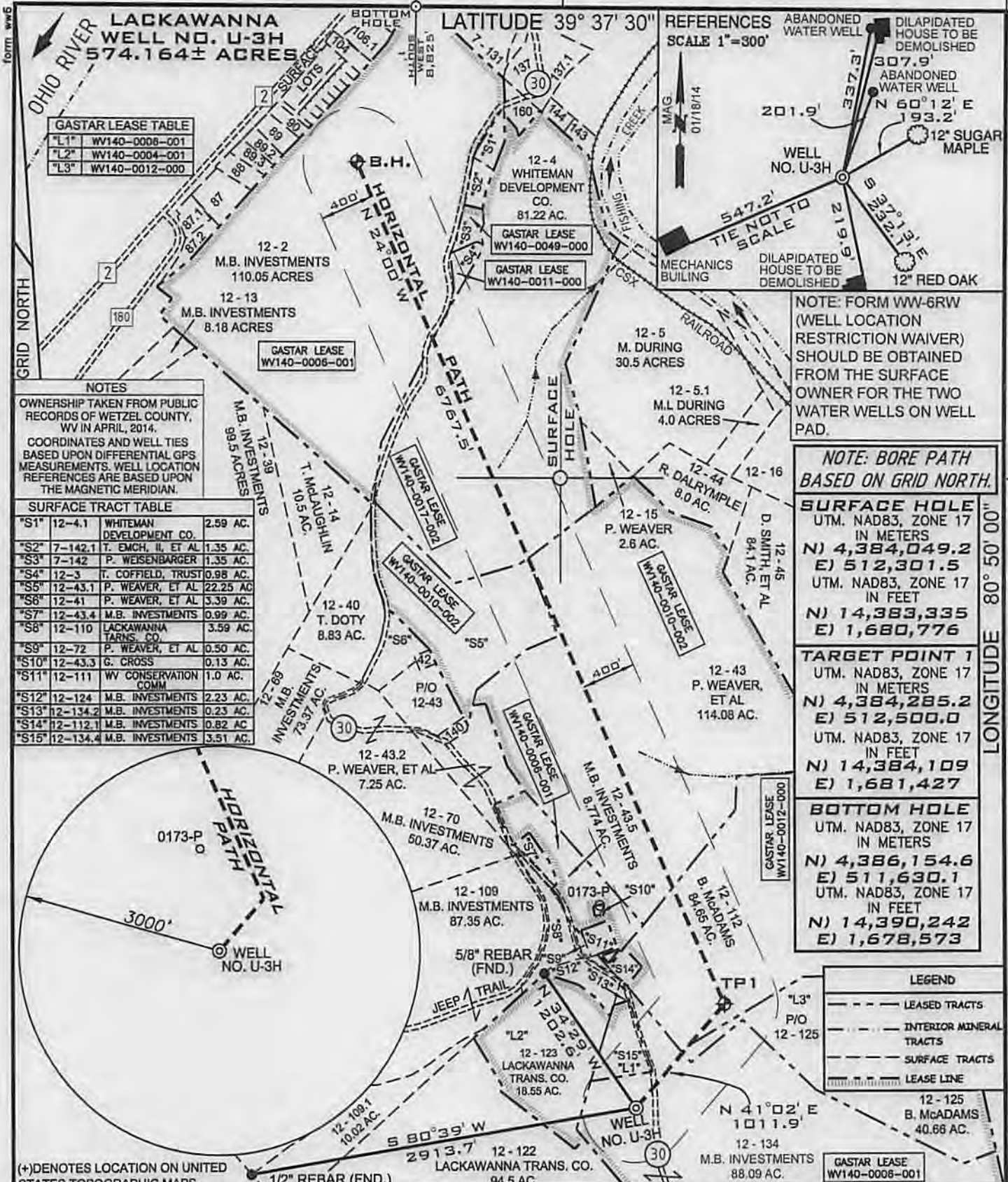


**NOTE: CLOSEST WATER PURVEYOR**  
**GRANDVIEW - DOOLIN**  
**PUBLIC SERVICE DISTRICT**  
**PROCTOR, WV**  
**LAT: 39.7136943**  
**LOX: -80.8260157**  
**LOCATED N 13-17 E AT 40,132'**  
**FROM LACKAWANNA 2H WELL SURFACE LOCATION**

RECEIVED

PmH 4-30-14 W0110309	<b>OPERATOR</b> GASTAR EXPLORATION Inc. 229 W Main Street, Suite 301 Clarksburg, WV 26301	<b>TOPO SECTION</b> PORTERS FALLS 7.5' <b>SCALE:</b> 1"=2000'	Office of Oil and Gas <b>LEASE NAME</b> LACKAWANNA 4 <b>DATE:</b> WV Department of Environment DATE: 04/21/14 06/20/2014
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**GASTAR LEASE TABLE**

"L1"	WV140-0006-001
"L2"	WV140-0004-001
"L3"	WV140-0012-000

**NOTES**  
 OWNERSHIP TAKEN FROM PUBLIC RECORDS OF WETZEL COUNTY, WV IN APRIL, 2014.  
 COORDINATES AND WELL TIES BASED UPON DIFFERENTIAL GPS MEASUREMENTS. WELL LOCATION REFERENCES ARE BASED UPON THE MAGNETIC MERIDIAN.

**SURFACE TRACT TABLE**

"S1"	12-4.1	WHITEMAN DEVELOPMENT CO.	2.59 AC.
"S2"	7-142.1	T. EMCH, II, ET AL	1.35 AC.
"S3"	7-142	P. WEISENBARGER	1.35 AC.
"S4"	12-3	T. COFFIELD, TRUST	0.98 AC.
"S5"	12-43.1	P. WEAVER, ET AL	22.25 AC.
"S6"	12-41	P. WEAVER, ET AL	3.39 AC.
"S7"	12-43.4	M.B. INVESTMENTS	0.99 AC.
"S8"	12-110	LACKAWANNA TRANS. CO.	3.59 AC.
"S9"	12-72	P. WEAVER, ET AL	0.50 AC.
"S10"	12-43.3	G. CROSS	0.13 AC.
"S11"	12-111	WV CONSERVATION COMM	1.0 AC.
"S12"	12-124	M.B. INVESTMENTS	2.23 AC.
"S13"	12-134.2	M.B. INVESTMENTS	0.23 AC.
"S14"	12-112.1	M.B. INVESTMENTS	0.82 AC.
"S15"	12-134.4	M.B. INVESTMENTS	3.51 AC.

NOTE: FORM WV-6RW (WELL LOCATION RESTRICTION WAIVER) SHOULD BE OBTAINED FROM THE SURFACE OWNER FOR THE TWO WATER WELLS ON WELL PAD.

NOTE: BORE PATH BASED ON GRID NORTH.

**SURFACE HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
 N) 4,384,049.2  
 E) 512,301.5  
 UTM. NAD83, ZONE 17  
 IN FEET  
 N) 14,383,335  
 E) 1,680,776

**TARGET POINT 1**  
 UTM. NAD83, ZONE 17  
 IN METERS  
 N) 4,384,285.2  
 E) 512,500.0  
 UTM. NAD83, ZONE 17  
 IN FEET  
 N) 14,384,109  
 E) 1,681,427

**BOTTOM HOLE**  
 UTM. NAD83, ZONE 17  
 IN METERS  
 N) 4,386,154.6  
 E) 511,630.1  
 UTM. NAD83, ZONE 17  
 IN FEET  
 N) 14,390,242  
 E) 1,678,573

**LEGEND**

- LEASED TRACTS
- INTERIOR MINERAL TRACTS
- SURFACE TRACTS
- LEASE LINE

(+) DENOTES LOCATION ON UNITED STATES TOPOGRAPHIC MAPS

FILE NUMBER W0110309  
 DRAWING NUMBER LACKAWANNA\_WP\_U-3H\_REV1  
 SCALE 1" = 1000'  
 MINIMUM DEGREE OF ACCURACY 1/200  
 PROVEN SOURCE SUBMETER MAPPING  
 OF ELEVATION 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

P.S. Jonathan N. White  
 2122



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

DATE: APRIL 21, 2014  
 OPERATORS WELL NO. LACKAWANNA NO. U-3H  
 API WELL NO. 47-103-03006464

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL   
 (IF "GAS") PRODUCTION  STORAGE  DEEP  SHALLOW   
 LOCATION ELEVATION 1302' WATERSHED (HUC 10) OUTLET MIDDLE ISLAND CREEK (UNDEFINED)  
 DISTRICT MAGNOLIA COUNTY WETZEL  
 QUADRANGLE PORTERS FALLS 7.5' LEASE NUMBER WV140-0017-002, WV140-0049-000, WV140-0011-000, WV140-0006-001, WV140-0010-002, WV140-0012-000, WV140-0004-001  
 SURFACE OWNER M.B. INVESTMENTS ACREAGE 88.09  
 OIL & GAS ROYALTY OWNER M.B. INVESTMENTS, ET AL LEASE ACREAGE 574.164  
 PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE  PLUG OFF OLD FORMATION   
 PERFORATE NEW FORMATION  OTHER PHYSICAL CHANGE (SPECIFY) \_\_\_\_\_  
 TARGET FORMATION POINT PLEASANT PLUG & ABANDON  CLEAN OUT & REPLUG   
 WELL OPERATOR GASTAR EXPLORATION INC. ESTIMATED DEPTH 11,097' + Horizontal Leg  
 ADDRESS 229 W MAIN STREET, SUITE 301 CLARKSBURG WV, 26301 ADDRESS 229 W MAIN STREET, SUITE 301 CLARKSBURG WV, 26301

06/20/2014

COUNTY NAME  
 PERMIT