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

May 14, 2014

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-10302981, issued to EQT PRODUCTION COMPANY, 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: 515274
Farm Name: HHENTHORN, DENCIL ET AL
API Well Number: 47-10302981
Permit Type: Horizontal 6A Well
Date Issued: 05/14/2014

Promoting a healthy environment.

05/16/2014

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

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 fill material shall be within plus or minus 2% of the optimum moisture content as determined by the standard proctor density test, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort. Each lift must meet 95 % compaction of the optimum density based on results from the standard proctor density test of the actual soils used in specific engineered fill sites. 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)

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
W.VA. CODE §22-6A - WELL WORK PERMIT APPLICATION

1) Well Operator: EQT Production Company

	Operator ID	County	District	Quadrangle
		103	4	254

2) Operator's Well Number: 515274 Well Pad Name: BIG387

3) Farm Name/Surface Owner : Dencil Henthorn et al Public Road Access: RL 74

4) Elevation, current ground: 1,475.5 Elevation, proposed post-construction: 1,442.9

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 Thicknesses and Associated Pressure(s):

Target formation is Genesso at a depth of 7422' with the anticipated thickness to be 31feet and anticipated target pressure of 4589 PSI

8) Proposed Total Vertical Depth: 7,422

9) Formation at Total Vertical Depth: Genesso

10) Proposed Total Measured Depth 17,845

11) Proposed Horizontal Leg Length 9,040

12) Approximate Fresh Water Strata Depths: 433, 478, & 705

13) Method to Determine Fresh Water Depth: By offset wells

14) Approximate Saltwater Depths: 1565, 2130, & 2168

15) Approximate Coal Seam Depths: 513, 727, 831, 882, 1019, 1190, & 1580

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

17) Does proposed well location contain coal seams directly overlying or adjacent to an active mine?

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

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CASING AND TUBING PROGRAM

18)

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu.Ft.)
Conductor	26	New	MC-50	81	80	80	98 C.T.S.
Fresh Water	13 3/8	New	MC-50	54	956	956	832 C.T.S.
Coal							
Intermediate	9 5/8	New	MC-50	40	2,900	2,900	1,134 C.T.S.
Production	5 1/2	New	P-110	20	17,845	17,845	See Note 1
Tubing	2 3/8		J-55	4.6			
Liners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	26	30	0.312	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	1	1.21
Coal						
Intermediate	9 5/8	12 3/8	0.395	3,590	1	1.21
Production	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
Tubing						
Liners						

Packers

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

Note 1: EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at least 500' above the shallowest production zone, to avoid communication.

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3-6-14

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

Drill and complete a new horizontal well in the Genesee Formation. The vertical drill to go down to an approximate depth of 5440'.

Then kick off the horizontal leg into the Genesee using a slick water frac.

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

Hydraulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from freshwater sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, gelling agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum anticipated treating pressures are expected to average approximately 6500 psi, maximum anticipated treating rates are expected to average approximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

21) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 16.20 ±

22) Area to be disturbed for well pad only, less access road (acres): 15.42 ±

23) Describe centralizer placement for each casing string.

- Surface: Bow spring centralizers – One at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers – One cent at the shoe and one spaced every 500'.
- Production: One spaced every 1000' from KOP to fnl csg shoe

24) Describe all cement additives associated with each cement type. Surface (Type 1 Cement): 0-3% Calcium Chloride Used to speed the setting of cement slurries.

0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

Intermediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement slurries. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) to a thief zone.

Production:

Lead (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time.

0.3% CFR (dispersant). Makes cement easier to mix.

Tail (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time.

0.2-0.3% CFR (dispersant). This is to make the cement easier to mix.

60 % Calcium Carbonate. Acid solubility.

0.4-0.6% Halad (fluid loss). Reduces amount of water lost to formation.

25) Proposed borehole conditioning procedures. Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on and circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

Intermediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance hole cleaning use a soap sweep or increase injection rate & foam concentration.

Production: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. Perform a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across the shakers every 15 minutes.

*Note: Attach additional sheets as needed.

DaH
3-6-14

05/16/2014

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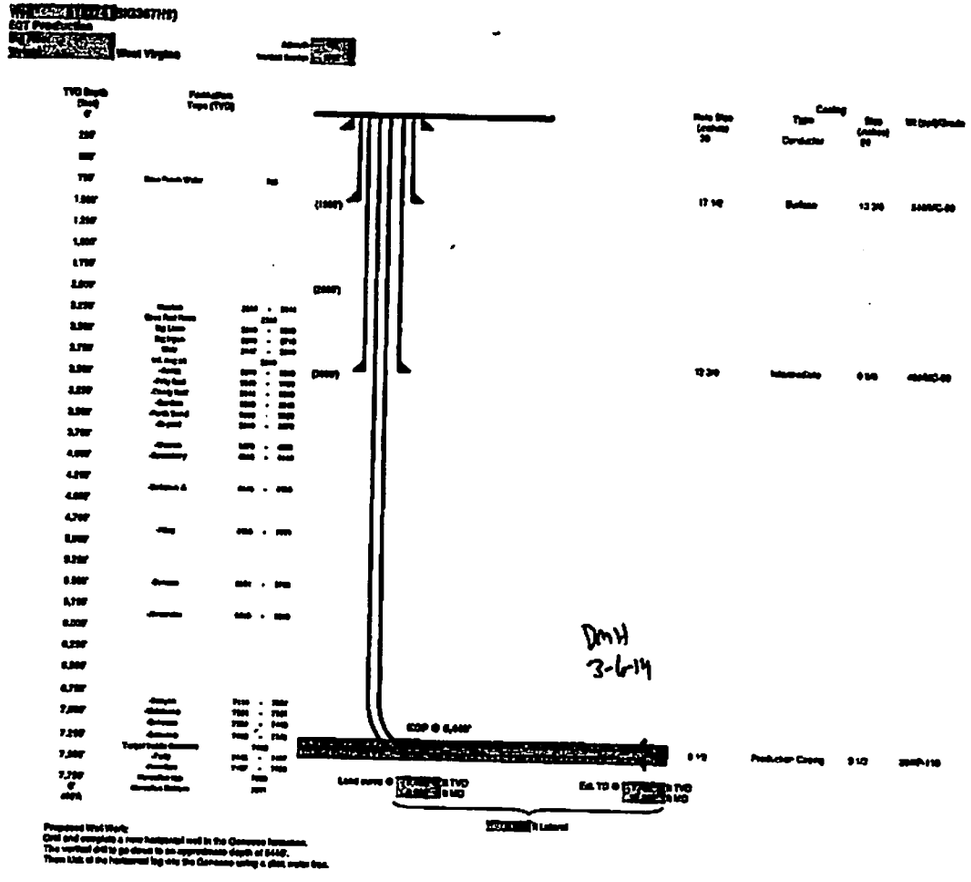
Formation Tops (TVD)
Casing
Type
Size
Conductor
Surface
Intermediate
Production Casing
DmH
3-6-14

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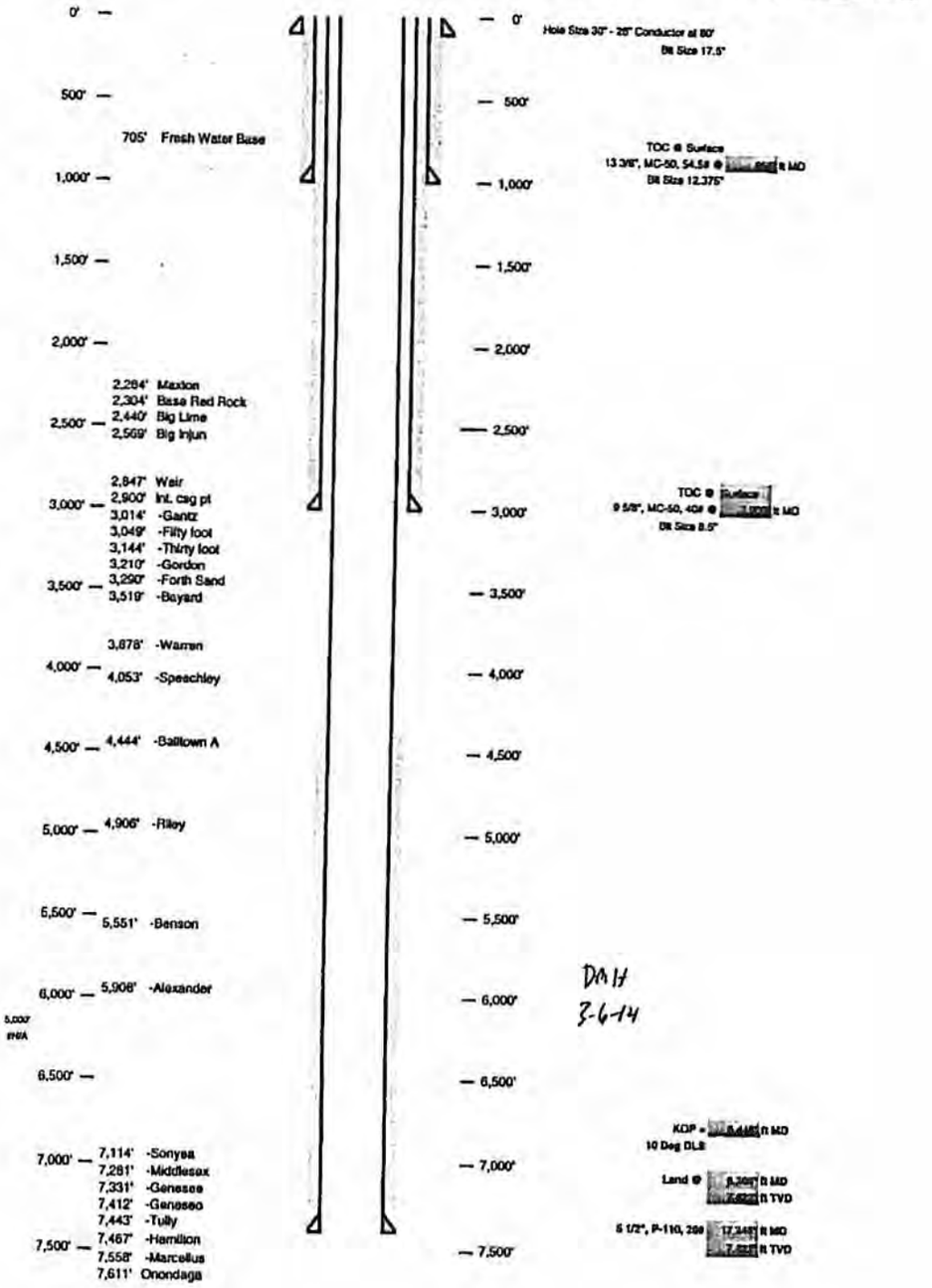
Well Schematic
EQT Production

Well Name [redacted]
County [redacted]
State West Virginia

Elevation KB: [redacted]
Target [redacted]
Prospect [redacted]
Azimuth [redacted]
Vertical Section [redacted]



DMH
3-6-14

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WW-9
(5/13)

Page ____ of ____
API No. 47 - 103 - 0
Operator's Well No. 515274

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

Fluids/Cuttings Disposal & Reclamation Plan

Operator Name BIG367 OP Code ____

Watershed (HUC10) North Fork of Fishing Creek Quadrangle Big Run 7.5'

Elevation 1442.9 County Wetzel District Grant

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes x No ___

Will a pit be used ? Yes: ____ No: X

If so please describe anticipated pit waste: ____

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

Proposed Disposal Method For Treated Pit Wastes:

____ Land Application
• Underground Injection (UIC Permit Number 0014, 8462, 4037)
____ Reuse (at API Number ____)
• Off Site Disposal (Supply form WW-9 for disposal location)
____ Other (Explain ____)

Will closed loop system be used ? Yes. The closed loop system will remove drill cuttings from the drilling fluid. The drill cuttings are then prepared for transportation to an off-site disposal facility.

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air is used to drill the top-hole sections of the wellbore. Surface, intermediate, and Pilot hole sections, water based mud is used to drill the curve and lateral. DMB 3-6-14

If oil based, what type? Synthetic, petroleum, etc ____

Additives to be used in drilling medium? MILBAR, Viscosifier, Alkalinity Control, Lime, Chloride Salts,Rate Filtration Control, Deflocculant, Lubricant, Detergent, Defoaming, Walnut Shell, X-Cide, SOLTEX Terra. Of the listed chemicals the following are generally used when drilling on air: lubricant, detergent, defoaming. Water based fluids use the following chemicals: MILBAR, viscosifier, alkalinity control, lime, chloride salts, rate filtration control, deflocculant, lubricant, detergent, defoaming, walnut shell, x-cide, SOLTEX terra

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? See Attached List

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) Victoria J. Roark
Company Official Title Permitting Supervisor

Subscribed and sworn before me this 18 day of February, 20 14

____ Notary Public

My commission expires 4/27/2018

OFFICIAL SEAL
STATE OF WEST VIRGINIA
NOTARY PUBLIC
Nicholas L. Bumgardner
Rt. 1, Box 4
Liberty, WV 25124
My Commission Expires July 27, 2018

05/16/2014

WW-9

47103029 81

Operator's Well No. 515274

Proposed Revegetation Treatment: Acres Disturbed 16.2± Prevegetation pH 6

Lime 3 Tons/acre or to correct to pH 6.5

Fertilize type

Fertilizer Amount 1/3 lbs/acre (500 lbs minimum)

Mulch 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
KY-31	40	Orchard Grass	15
Alsike Clover	5	Alsike Clover	5
Annual Rye	15		

Attach:
Drawing(s) of road, location,pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by:

Comments:

Title: Oil + Gas Inspector Date: 3-6-14

Field Reviewed? (✓) Yes ( ) No

05/16/2014

RECEIVED
MAY 6 2014

47 10302981

EQT

Where energy meets innovation.™

Site Specific Safety and Environmental Plan For

EQT BIG367 Pad

Jacksonburg Wetzel County, WV

For Wells:

515274

Date Prepared: July 23, 2013

EQT Production

Permitting Supervisor
Title

2-18-14
Date

WV Oil and Gas Inspector

Oil & Gas Inspector
Title

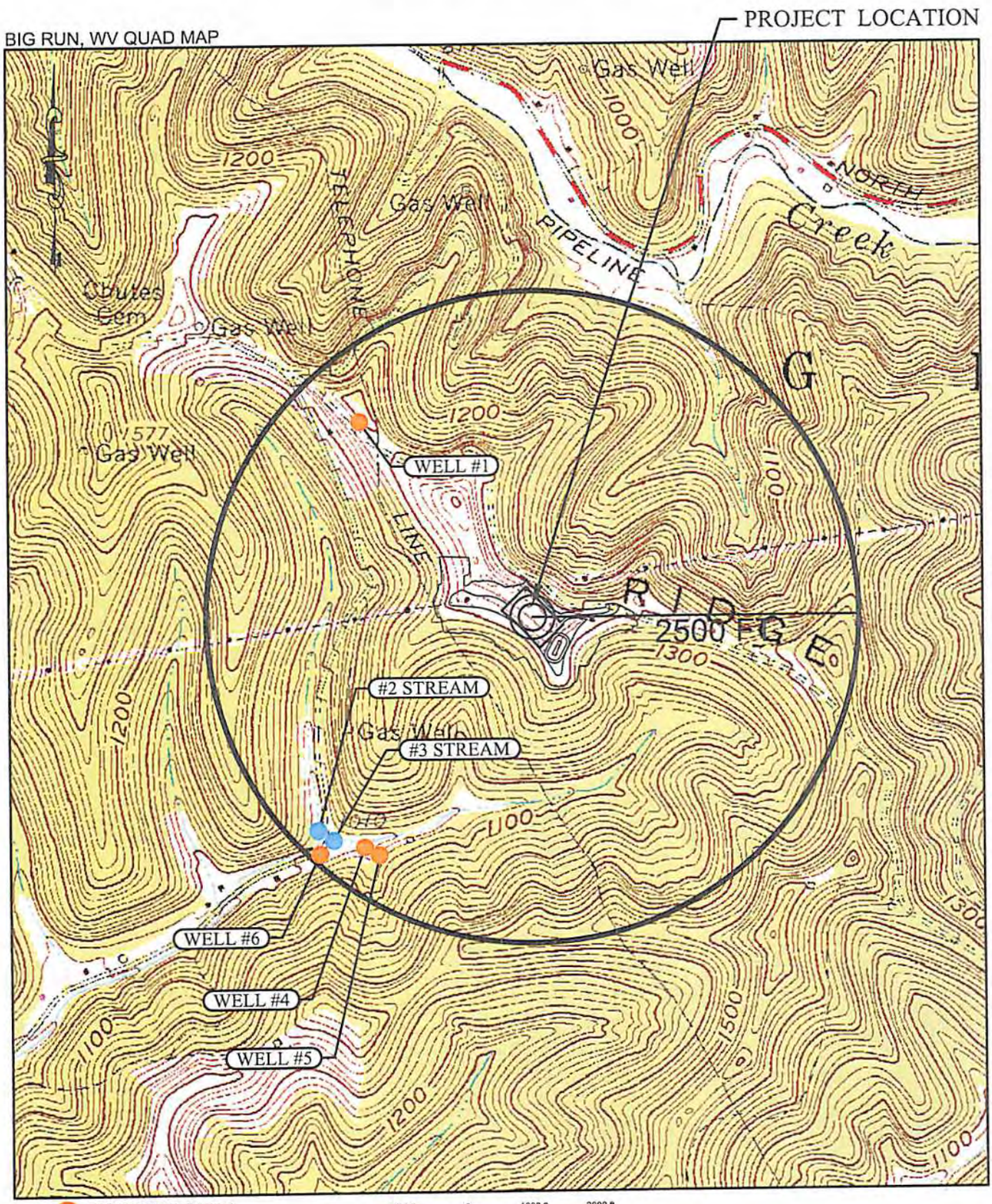
3-6-14
Date

05/16/2014

47103029 81
plat spotted

EQT PRODUCTION
BIG 367 WELL PAD AND ACCESS ROAD
WETZEL COUNTY, WV

BIG RUN, WV QUAD MAP



EXISTING WELL
EXISTING STREAM

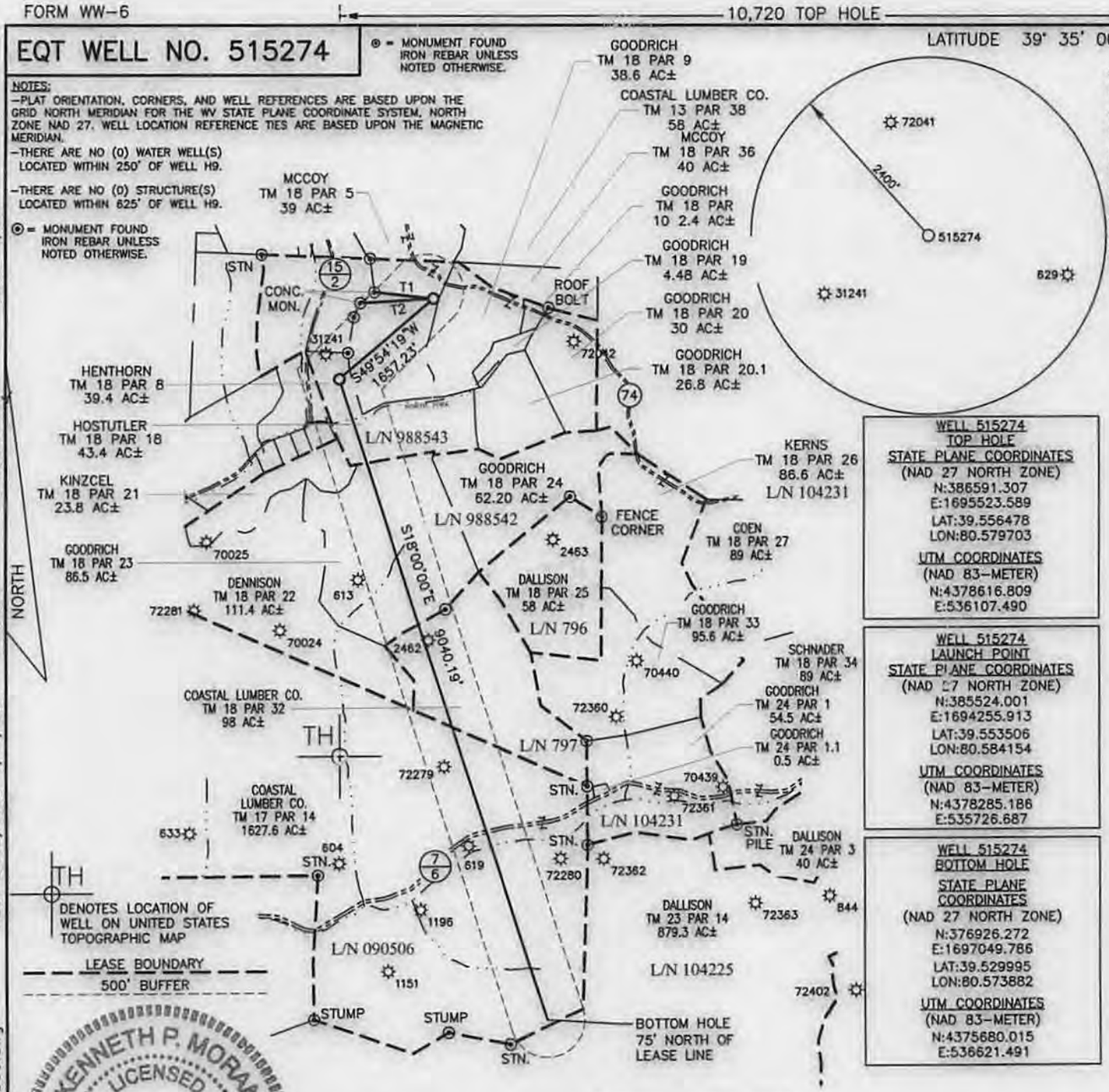
1000 ft 0 1000 ft 2000 ft
VICINITY MAP SCALE

FORM WW-6

EQT WELL NO. 515274

⊙ = MONUMENT FOUND IRON REBAR UNLESS NOTED OTHERWISE.

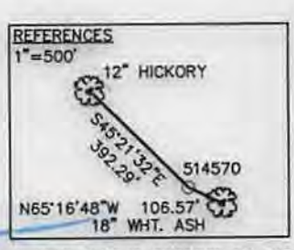
NOTES:
-PLAT ORIENTATION, CORNERS, AND WELL REFERENCES ARE BASED UPON THE GRID NORTH MERIDIAN FOR THE WV STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 27. WELL LOCATION REFERENCE TIES ARE BASED UPON THE MAGNETIC MERIDIAN.
-THERE ARE NO (0) WATER WELL(S) LOCATED WITHIN 250' OF WELL H9.
-THERE ARE NO (0) STRUCTURE(S) LOCATED WITHIN 625' OF WELL H9.



WELL 515274 TOP HOLE STATE PLANE COORDINATES (NAD 27 NORTH ZONE)	
N:386591.307	
E:1695523.589	
LAT:39.556478	
LON:80.579703	
UTM COORDINATES (NAD 83-METER)	
N:4378616.809	
E:536107.490	

WELL 515274 LAUNCH POINT STATE PLANE COORDINATES (NAD 27 NORTH ZONE)	
N:385524.001	
E:1694255.913	
LAT:39.553506	
LON:80.584154	
UTM COORDINATES (NAD 83-METER)	
N:4378285.186	
E:535726.687	

WELL 515274 BOTTOM HOLE STATE PLANE COORDINATES (NAD 27 NORTH ZONE)	
N:376926.272	
E:1697049.786	
LAT:39.529995	
LON:80.573882	
UTM COORDINATES (NAD 83-METER)	
N:4375680.015	
E:536621.491	



LINE	BEARING	DIST.
T1	S83°43'29"E	805.78'
T2	N86°44'12"E	993.17'

KENNETH P. MORAN P.S. 1333

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. 030-2259
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 JANUARY 13 ,2014
OPERATOR'S WELL NO. 515274
API WELL NO.
47 - 103 - 02981 HGA
STATE COUNTY PERMIT

WELL TYPE: OIL ☐ GAS ☒ LIQUID INJECTION ☐ WASTE DISPOSAL ☐ (IF "GAS"), PRODUCTION ☒ STORAGE ☐ DEEP ☐ SHALLOW ☒
LOCATION: ELEVATION: EG: 1,475.5' PROP: 1,442.90' WATER SHED: NORTH FORK OF FISHING CREEK
DISTRICT: GRANT COUNTY: WETZEL
QUADRANGLE: BIG RUN ACREAGE: 39.4 AC±
SURFACE OWNER: DENCIL HENTHORN ET AL LEASE ACREAGE: 297.5/280 AC+
OIL & GAS ROYALTY OWNER: SHIBEN ESTATE, INC., CNX GAS CO., LLC LEASE NO. 988543/988542 797/090506
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: GENESEO ESTIMATED DEPTH: TVD/MD

THRASHER
THE THRASHER GROUP, INC.
600 WHITE OAKS BLVD.
BRIDGEPORT, WV 26330
PHONE: 304-933-3178

05/16/2014

RECEIVED
Office of Oil & Gas
FEB 24 2014
WV Department of Environmental Protection

WELL OPERATOR: EQT PRODUCTION
ADDRESS: 115 PROFESSIONAL PLACE BRIDGEPORT, WV 26330
DESIGNATED AGENT: REX C. RAY
ADDRESS: 115 PROFESSIONAL PLACE BRIDGEPORT, WV 26330

CAD FILE: R:\030-2259 EQT BIG367 Well Pad and Access Rd\Survey\030-2259 BIG 367 -EQT 2000.dwg PLOT DATE/TIME: 1/11/2014 - 11:08am LAYOUT: H9 USER: kpoth