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

May 01, 2014

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 10302942, Well #: 514568
Horizontal Extended

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

05/02/2014

EQT

47 10302942
MOD

January 31, 2014

Mr. Gene Smith
West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304

Re: Modification of (BIG367)514568, 47-10302942

Dear Mr. Smith,

Attached is a modification for the above well. EQT would like to extend the length of the horizontal section. A new WW-6B, well schematics and mylar plat are enclosed for your review.

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

Vicki Roark
Permitting Supervisor-WV

Received
FEB 19 2014
Office of Oil and Gas
WV Dept. of Environmental Protection

Enc.

Cc: Derek Haught
P.O. Box 85
Smithville, WV 26178

05/02/2014

WW - 6B
(9/13)

4710302942
MOD

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 | 103 County | 4 District | 254 Quadrangle

2) Operator's Well Number: 514568 Well Pad Name: BIG367

3) Farm Name/Surface Owner : Henthorn et al Public Road Access: Rt. 74

4) Elevation, current ground: 1,475.3 Elevation, proposed post-construction: 1,442.9

5) Well Type: (a) Gas • Oil _____ Underground Storage _____

Other _____

(b) If Gas: Shallow • Deep _____

Horizontal •

DMH
2.12.14

6) Existing Pad? Yes or No: yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Target formation is Geneseo at a depth of 7422' with the anticipated thickness to be 31 feet and anticipated target pressure of 4689 PSI

8) Proposed Total Vertical Depth: 7,422
9) Formation at Total Vertical Depth: Geneseo
10) Proposed Total Measured Depth 16,810
11) Proposed Horizontal Leg Length 8,270
12) Approximate Fresh Water Strata Depths: 433, 478, 705
13) Method to Determine Fresh Water Depth: By offset wells
14) Approximate Saltwater Depths: 1965, 2130, 2168
15) Approximate Coal Seam Depths: 513, 727, 831, 882, 1019, 1190, 1680
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: _____

WW - 6B
(3/13)

47 10 3 02 942

MOD

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	77	80	80	98 CTS
Fresh Water	13 3/8	New	MC-50	54	956	956	832 CTS
Coal							
Intermediate	9 5/8	New	MC-50	40	2,900	2,900	1134 CTS
Production	5 1/2	New	P-110	20	16,810	16,810	See Note 1
Tubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
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	3,600	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.

DmH
2-12-14

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FEB 19 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

05/02/2014

WW - 6B

(3/13)

4710302942

MOD

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

Drill and complete a new horizontal well in the Geneseo formation. The vertical drill to go down to an approximate depth of 6249', then kick off the horizontal leg into the Geneseo 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 8500 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): 16.2

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 Int 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 % Calcuim 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.

Received

FEB 19 2014

Office of Oil and Gas
WV Dept. of Environmental Protection

DMH
2-12-14

05/02/2014

EQT

47 10302942
MOD

January 31, 2014

Mr. Gene Smith
West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304

Re: Casing on BIG367(514568) 47-10302942

Dear Mr. Smith,

EQT is requesting the 13 3/8" surface casing to be set 50' below the deepest red rock show to cover potential red rock issues. The proposed casing set depth is above ground elevation. The reason for this is the red rock swells during drilling of the intermediate section causing many drilling problems such as but not limited to lost drilling assemblies and casing running issues.

In reviewing the BIG367, we would like to request to set the surface casing deeper on each well. The 13 3/8" casing will be set at a depth of approximately 956' KB (50' below the anticipated red rock show).

If you have any questions, please do not hesitate to contact me at (304) 848-0076.

Sincerely,

Vicki Roark
Permitting Supervisor-WV

Received
FEB 19 2014
Office of Oil and Gas
WV Dept. of Environmental Protection

Enc.

DMH
2-12-14

05/02/2014

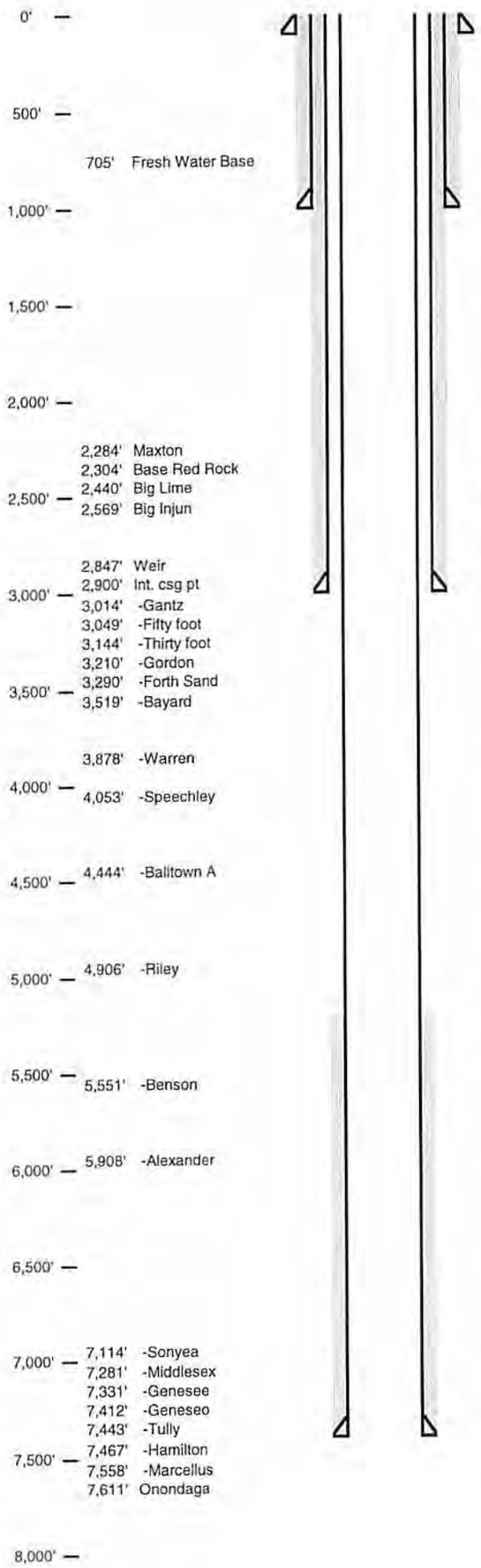
47 10302942

MOD

Well Schematic
EQT Production

Well Name	514558 (BIG367H7)
County	Wetzel
State	West Virgina

Elevation KB:	1456
Target	Genesee
Prospect	
Azimuth	162
Vertical Section	8958



DMH
2-12-14

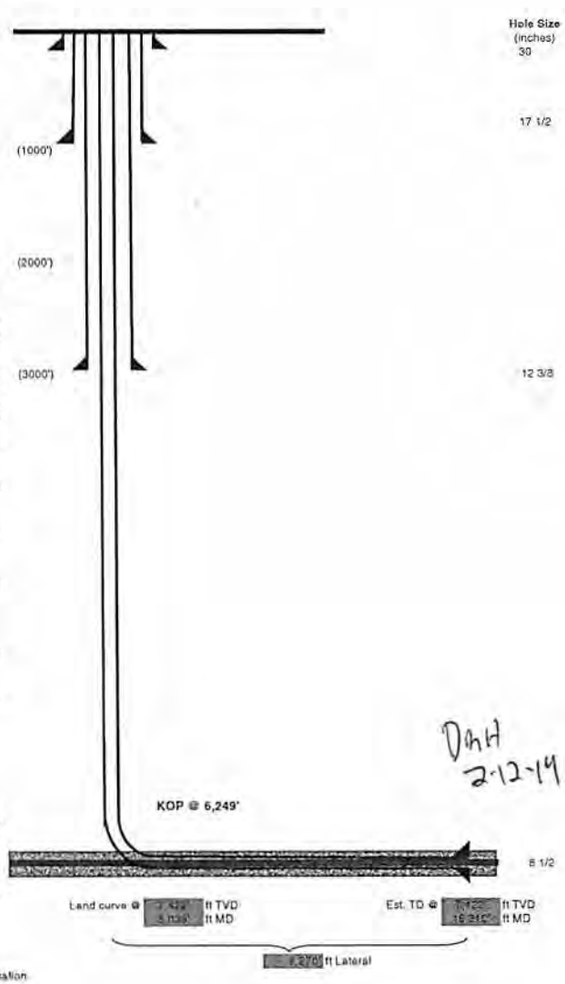
05/02/2014

4710302942

MOD

Well 514568 (BIG367H7)
EQT Production
Big Run
Wetzel West Virgina

Azimuth 162
Vertical Section 5084



Hole Size (inches)	Casing Type	Size (inches)	Wt (ppf)/Grade
30	Conductor	26	
17 1/2	Surface	13 3/8	54#/MC-50
12 3/8	Intermediate	9 5/8	40#/MC-50
8 1/2	Production Casing	5 1/2	20#/P-110

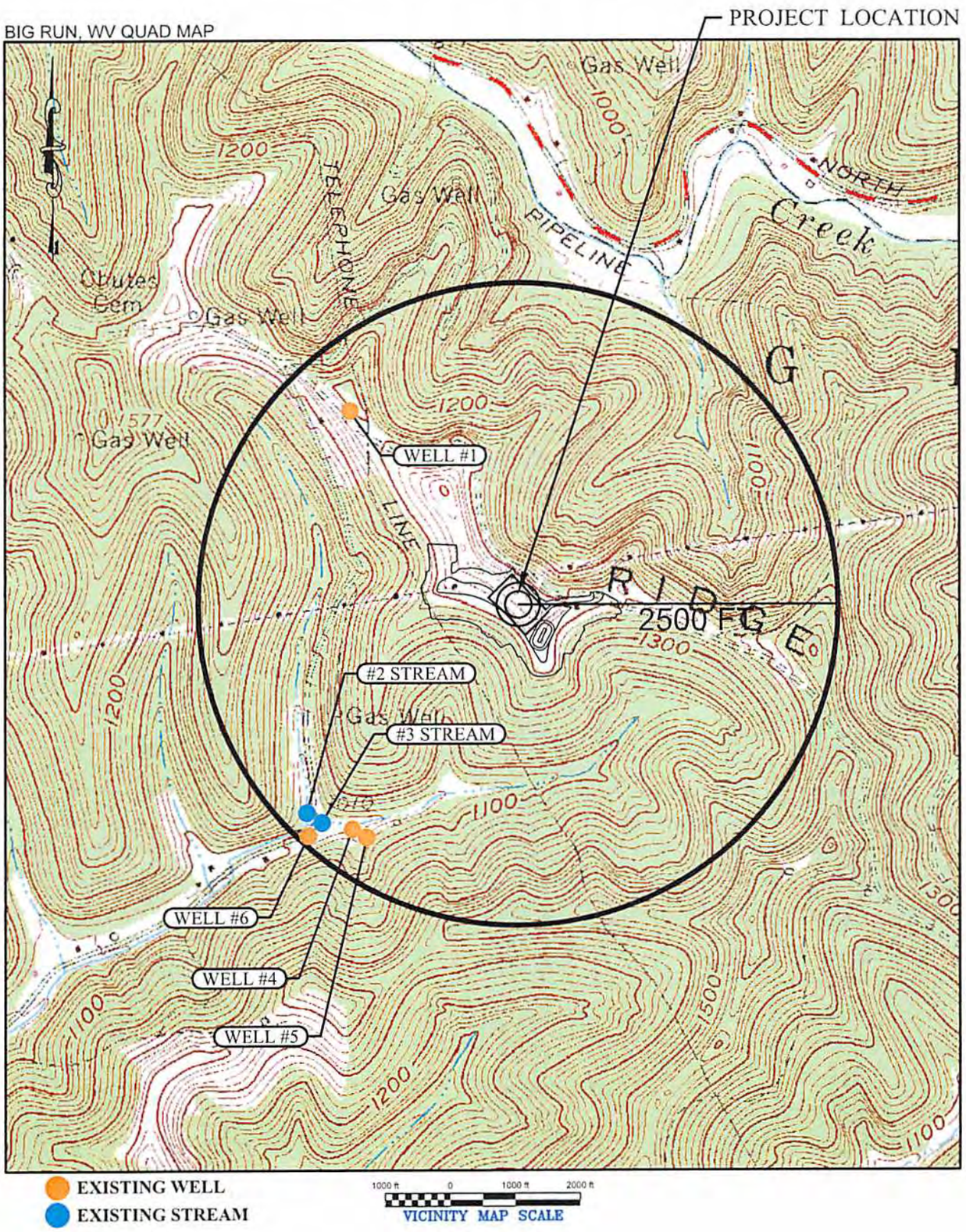
DMH 2-12-14

Proposed Well Work:
Drill and complete a new horizontal well in the Geneseo formation

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

plat spotted 10-30-2942

BIG RUN, WV QUAD MAP



05/02/2014

FORM WW-6

EQT WELL NO. 514568

10,741' TOP HOLE

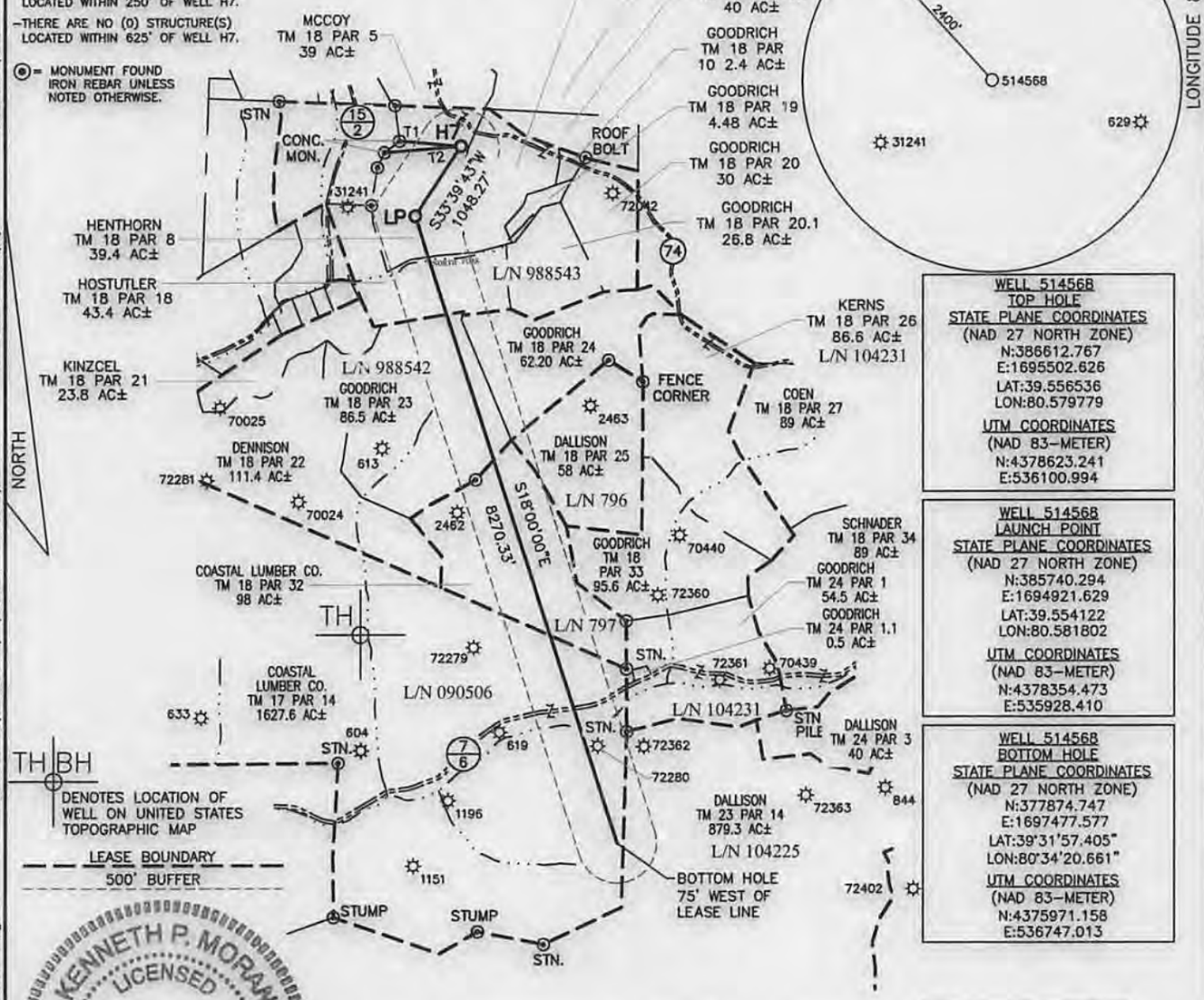
LATITUDE 39° 35' 00"

LONGITUDE 80° 32' 30"

9,763' TOP HOLE

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 H7.
-THERE ARE NO (0) STRUCTURE(S) LOCATED WITHIN 625' OF WELL H7.

◉= MONUMENT FOUND IRON REBAR UNLESS NOTED OTHERWISE.



DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAP

LEASE BOUNDARY
500' BUFFER

WELL 514568
TOP HOLE
STATE PLANE COORDINATES
(NAD 27 NORTH ZONE)
N:386612.767
E:1695502.626
LAT:39.556536
LON:80.579779
UTM COORDINATES
(NAD 83-METER)
N:4378623.241
E:536100.994

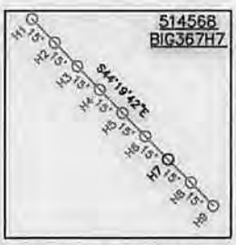
WELL 514568
LAUNCH POINT
STATE PLANE COORDINATES
(NAD 27 NORTH ZONE)
N:385740.294
E:1694921.629
LAT:39.554122
LON:80.581802
UTM COORDINATES
(NAD 83-METER)
N:4378354.473
E:535928.410

WELL 514568
BOTTOM HOLE
STATE PLANE COORDINATES
(NAD 27 NORTH ZONE)
N:377874.747
E:1697477.577
LAT:39°31'57.405"
LON:80°34'20.661"
UTM COORDINATES
(NAD 83-METER)
N:4375971.158
E:536747.013

REFERENCES
1"=500'
12" HICKORY
S45°26'40"E 362.3'
514568
N60°43'22"W 135.01'
18" WHT. ASH

LINE	BEARING	DIST.
T1	S85°07'06"E	782.83'
T2	N85°24'20"E	973.72'

514568
BIG367H7



KENNETH P. MORAN
LICENSED
No. 1333
STATE OF WEST VIRGINIA
PROFESSIONAL SURVEYOR

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 3 ,2014
OPERATOR'S WELL NO. 514568
API WELL NO. MOD
47 - 103 - 02942 H6A
STATE COUNTY PERMIT

WELL TYPE: OIL ☐ GAS ☒ LIQUID INJECTION ☐ WASTE DISPOSAL ☐ (IF "GAS"), PRODUCTION ☒ STORAGE ☐ DEEP ☐ SHALLOW ☒
LOCATION: ELEVATION: EG: 1,475.3' 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: 1894.90 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 304-624-7438

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

06/02/2014

CAD FILE: R:\030-2259 EQT BIG367 Well Pad and Access Rd\Survey\030-2259 BIG 367 -EQT 2000.dwg
PLOT DATE/TIME: 1/7/2014 - 2:25pm
LAYOUT: H7 (2)
USER: kpoth
NORTH