



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

August 05, 2013

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

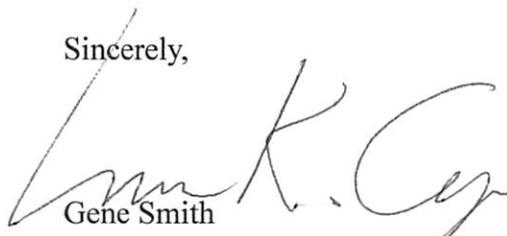
Re: Permit Modification Approval for API Number 1706060 , Well #: 514138 - CARR
increased TVD, extended lateral

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

Promoting a healthy environment.

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: 017 County: 3 District: 611 Quadrangle

2) Operator's Well Number: 514138 Well Pad Name: SMI27

3 Elevation, current ground: 1,194.0 Elevation, proposed post-construction: 1,179.0

4) Well Type: (a) Gas Oil

Other

(b) If Gas: Shallow Deep

Horizontal

5) Existing Pad? Yes or No: yes

6) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):

Target formation is Marcellus at a depth of 7021 with the anticipated thickness to be 46 feet and anticipated target pressure of 4723 PSI

7) Proposed Total Vertical Depth: 7,149

8) Formation at Total Vertical Depth: Marcellus

9) Proposed Total Measured Depth: 11,774

10) Approximate Fresh Water Strata Depths: 25, 344, 444, 654, 849, 919

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

12) Approximate Saltwater Depths: 1,187

13) Approximate Coal Seam Depths: n/a

14) Approximate Depth to Possible Void (coal mine, karst, other): none reported

15) Does land contain coal seams tributary or adjacent to, active mine? none reported

16) Describe proposed well work: Drill and complete a new horizontal well. The vertical drill to go down to approximately depth of 7149'

Tagging the Onondaga not more than 100' then plug back to approximately 5868' and kick off the horizontal leg into the marcellus using a slick water frac.

17) Describe fracturing/stimulating methods in detail:

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). Stage lengths vary from 150 to 450 feet. Average approximately 400,000 gallons of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 400,000 pounds of sand per stage.

18) Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): 41.9

19) Area to be disturbed for well pad only, less access road (acres): 19.7

Doug Newlin
4-1-2013
DNE
4-1-13

RECEIVED
Office of Oil and Gas
APR 1 11 2013
DEPARTMENT OF ENVIRONMENTAL PROTECTION

API# 47-017-06060 MOD

CASING AND TUBING PROGRAM

20)

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu.Ft.)
Conductor	20	New	MC-50	81#	40	40	38
Fresh Water	13 3/8	New	MC-50	54#	1,019	1,019	884
Coal	—	—	—	—	—	—	—
Intermediate	9 5/8	New	MC-50	40#	3,249	3,249	1,269
Production	5 1/2	New	P-110	20#	11,774	11,774	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
Conductor	20	24	0.635	—	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.

Doug Newlon

4-1-2013

DML
4-1-13

RECEIVED
Office of Oil and Gas

APP 10 2013

The Department of
Energy and Environmental Protection

21) 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

22) 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.

23) 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.

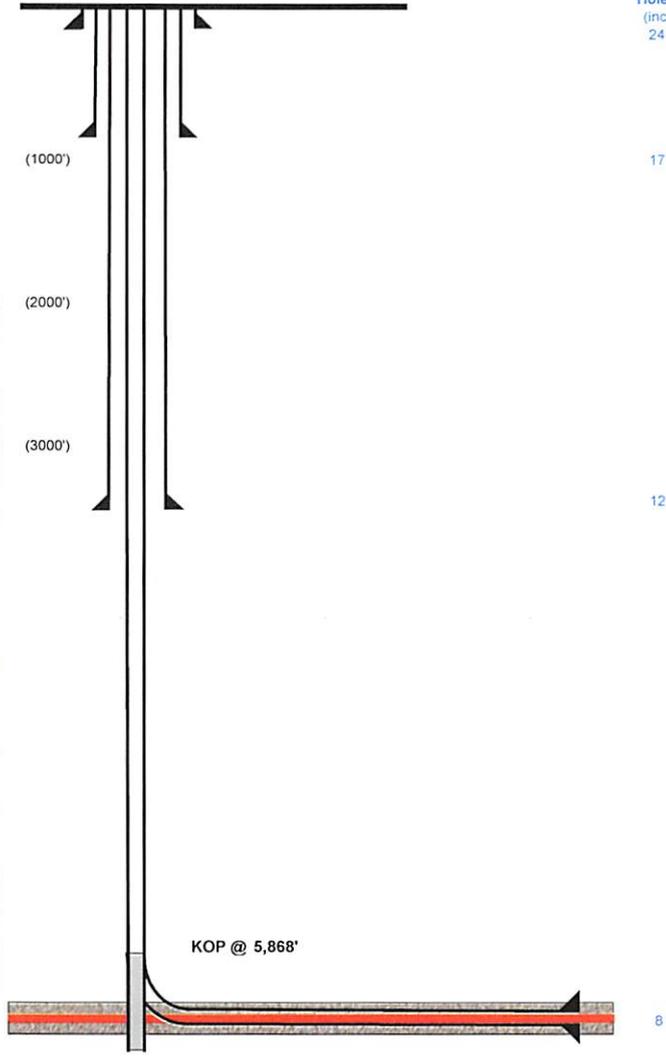
RECEIVED
Office of Oil and Gas
APR 01 2013
Department of
Environmental Protection

API 47-017-06060 MOD

Well 514138 (SMI27H10)
 EQT Production
 Smithburg
 Doddridge West Virginia

Azimuth 155
 Vertical Section 4195

TVD Depth (feet)	Formation Tops (TVD)	Hole Size (inches)	Casing Type	Casing Size (inches)	Wt (ppf)/Grade
0'		24	Conductor	20	
250'					
500'					
750'					
1,000'	Base Fresh Water 919	17 1/2	Surface	13 3/8	54#/MC-50
1,250'					
1,500'					
1,750'					
2,000'	Maxton 2008 - 2080				
2,100'	Big Lime 2168 - 2264				
2,200'	Big Injun 2264 - 2431				
2,500'	Top Devonian 2867 - 0				
2,600'	-Gantz 2667 - 2722				
2,700'	-Fifty foot 2734 - 2782				
2,800'	-Thirty foot 2873 - 2898				
2,900'	-Gordon 2960 - 3024				
3,000'	-Forth Sand 3024 - 3122				
3,100'	-Fifth Sand 3122 - 3199				
3,200'	Int. csj pt 3249	12 3/8	Intermediate	9 5/8	40#/MC-50
3,300'	-Warren 3598 - 3654				
3,750'					
4,000'					
4,250'					
4,500'	-Bradford 4468 - 4590				
4,750'					
5,000'					
5,250'	-Benson 5173 - 5240				
5,500'	-Alexander 5593 - 5717				
5,750'					
6,000'	-Elk 6036 - 6444				
6,100'	-Sonyea 6631 - 6725				
6,200'	-Middlesex 6773 - 6809				
6,300'	-Genesee 6809 - 6891				
6,400'	-Genesee 6891 - 6919				
6,500'	-Tully 6919 - 6943				
6,600'	-Hamilton 6943 - 7003				
6,700'	Marcellus top 7003				
6,800'	Target Inside Marcellus 7021				
6,900'	Marcellus Bottom 7049				
7,000'		8 1/2	Production Casing	5 1/2	20#/P-110
7,250'					



KOP @ 5,868'

Land curve @ 7,021' ft TVD
 7,482' ft MD

Est. TD @ 7,031' ft TVD
 11,274' ft MD

3,810' ft Lateral

7,500' TD Pilot Hole @ 7149
 100' below top of Onondaga
 7,750' Run Logs, Plug back to KOP at 5868
 Kick off for horizontal well in Marcellus

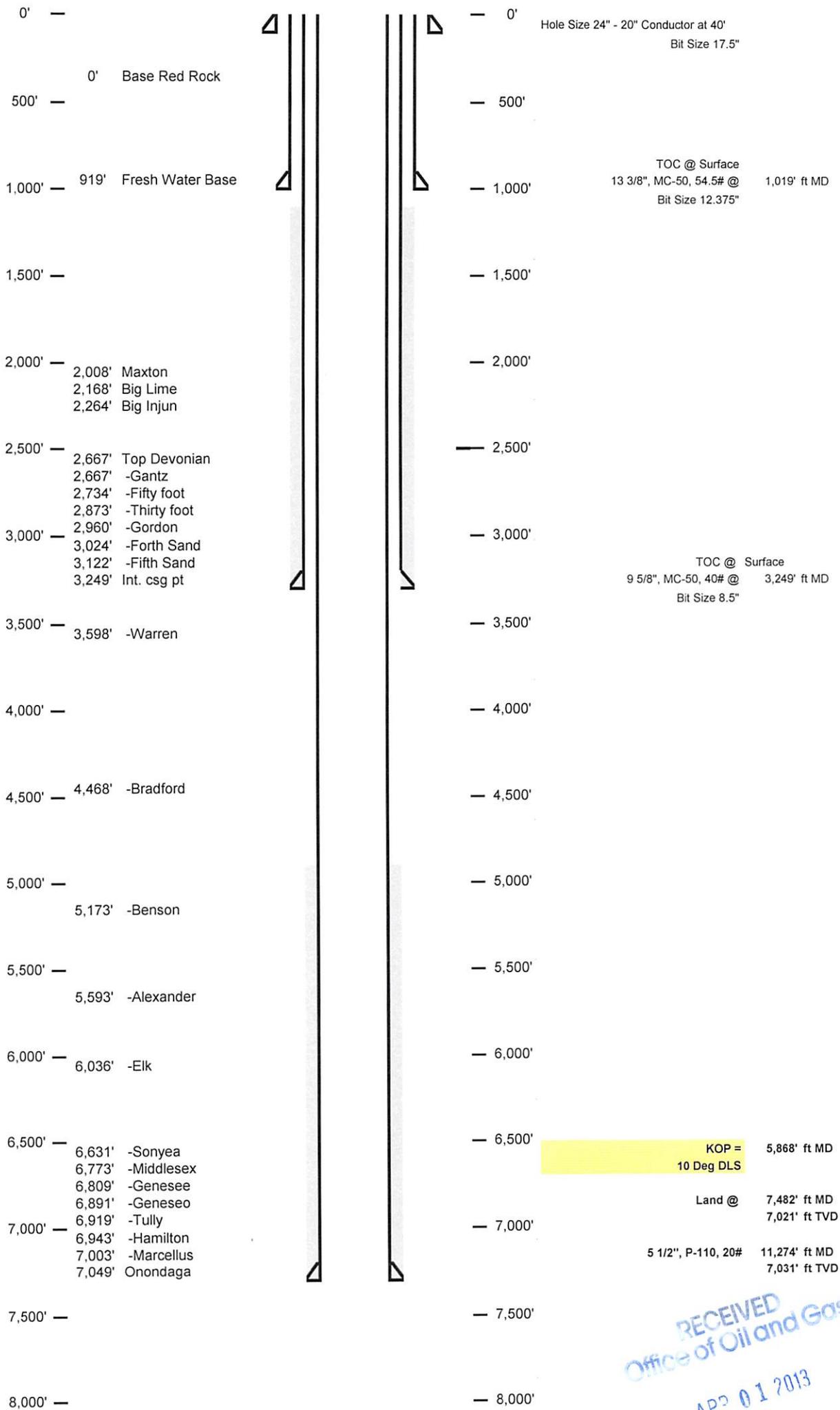
RECEIVED
 Office of Oil and Gas
 APR 01 2014
 WV Department of
 Environmental Protection

Well Schematic
EQT Production

Well Name 514138 (SMI27H10)
County Doddridge
State West Virginia

Elevation KB:
Target
Prospect
Azimuth
Vertical Section

1189
Marcellus
155
4195



RECEIVED
Office of Oil and Gas
APR 01 2013
West Virginia Department of
Environmental Protection

WELL NO. WV 514138
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)

N. 318,094.4
E. 1,661,500.0

LAT=(N) 39.367164
LONG=(W) 80.697310

UTM (NAD'83)(METERS)

N. 4,357,575.5
E. 526,089.6

JORDAN FAMILY PARTNERSHIP
460 ACRES±

R. LEASURE
28.2 AC±

JUANITA KRAFFT ET AL
69 AC±

D. McINTYRE
98.69 ACRES±

M. WILSON
20 ACRES±

M. WILLIAMS
59.75 ACRES±

FLINT RUN

DRAIN

EQT PRODUCTION COMPANY WELL NO. WV 514138 CARR LEASE 351 AC±

LONGITUDE 80° 40' 00"

LANDING POINT
WELL NO. WV 514138
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)

N. 317,557.1
E. 1,661,244.4

LAT=(N) 39.365735
LONG=(W) 80.698189

UTM (NAD'83)(METERS)

N. 4,357,416.6
E. 526,014.4

BOTTOM HOLE
WELL NO. WV 514138
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)

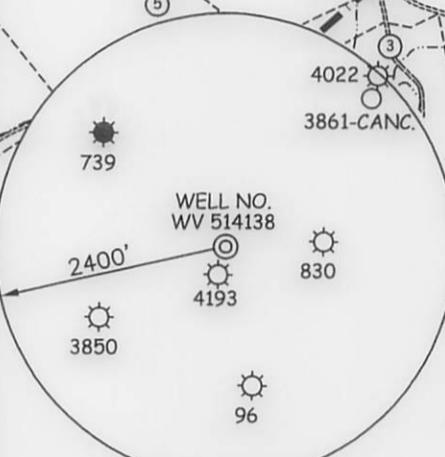
N. 314,124.1
E. 1,662,854.6

LAT=(N) 39.356314
LONG=(W) 80.692333

UTM (NAD'83)(METERS)

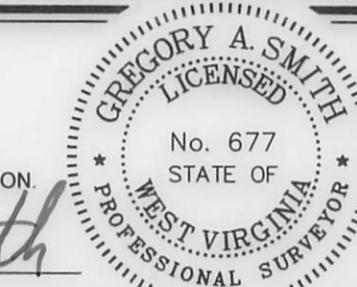
N. 4,356,372.8
E. 526,522.5

REFERENCES



NOTES ON SURVEY

1. TIES TO WELLS, CORNERS & REFERENCES ARE BASED ON GRID NORTH FOR THE WV STATE PLANE COORDINATE SYSTEM NORTH ZONE NAD '27.
2. LEASE BOUNDARY SHOWN HEREON TAKEN FROM DEED BOOK 185 PAGE 459 & DEED BOOK 29 PAGE 255.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF DODDRIDGE COUNTY IN JULY, 2012.
4. WELL LAT./LONG. (NAD'27 ESTABLISHED BY DGPS (SURVEY GRADE).
5. ORIGINAL PLAT DATED 07/26/2011, REVISED 08/02/11 AND REVISED 09/23/2011. REVISED 1/28/13 TO CHANGE ADDRESS, REFERENCE DETAIL AND LATERAL LENGTH, ETC.



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.

P.S. 677
Gregory A. Smith

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE OCTOBER 12, 20 11
 REVISED DATE JANUARY 28, 20 13
 OPERATORS WELL NO. WV 514138
 API WELL NO. 47-017-06060
 STATE 017 COUNTY 06060 PERMIT

MINIMUM DEGREE OF ACCURACY 1/200 FILE NO. 7584P514138R4F2 (329-71)
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 2000'

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



WELL TYPE: OIL GAS X LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION X STORAGE DEEP SHALLOW X
 LOCATION: ELEVATION 1,194' (GROUND) / 1,179' (PROPOSED) WATERSHED BRUSH RUN
 DISTRICT GRANT COUNTY DODDRIDGE QUADRANGLE SMITHBURG 7.5'
 SURFACE OWNER BETH CROWDER & DAVID WENTZ ACREAGE 30±
 ROYALTY OWNER PATTY J. & R. KEITH CRIHFIELD (351 AC±) / NEVA RITTER ET AL (907 AC±) / EDISON RITTER ET AL (160 AC±)
 PROPOSED WORK: LEASE NO. 104916 / 090499 / 17086
 DRILL X CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE X PLUG OFF OLD
 FORMATION PERFORATE NEW FORMATION PLUG AND ABANDON CLEAN OUT AND REPLUG OTHER
 PHYSICAL CHANGE IN WELL (SPECIFY) TARGET FORMATION MARCELLUS
 ESTIMATED DEPTH

WELL OPERATOR EQT PRODUCTION COMPANY DESIGNATED AGENT REX C. RAY
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

COUNTY NAME PERMIT