



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 14, 2014

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 1706325 , Well #: WV 513347

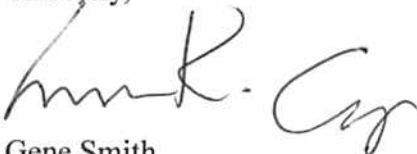
Modified Casing

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



May 13, 2014

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

Re: Casing Modification on 47-017-06325 & 47-017-06323

Dear Mr. Smith,

Attached is a casing modification for the above wells on the WEU6 pad. EQT had previously permitted the intermediate casing depth for 5400' (modification) because of losses on nearby locations. EQT has been able to prove that the formation will hold 12.5 ppg fluid and we are requesting that the intermediate depth be changed to 3100', which was originally permitted for these wells. The inspector, Douglas Newlon, has verbally approved the change and is being copied on this modification.

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

Sincerely,

A handwritten signature in blue ink, appearing to read 'Vicki Roark'.

Vicki Roark
Permitting Supervisor-WV

Enc.

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

1) Well Operator: EQT Production Company

Operator ID	County	District	Quadrangle
	017	8	671

2) Operator's Well Number: 513347 Well Pad Name WEU6

3) Farm Name/Surface Owner: Maxwell Public Road Access: Rt. 50

4) Elevation, current ground: 1,265.0 Elevation, proposed post-construction: 1,261.0

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 Marcellus at a depth of 6880' with the anticipated thickness to be 110 feet and anticipated target pressure of 4616 PSI

8) Proposed Total Vertical Depth: 6,880

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 14,616

11) Proposed Horizontal Leg Length: 5,770

12) Approximate Fresh Water Strata Depths: 356, 468, 511, 970, 1034

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

14) Approximate Saltwater Depths: None Reported

15) Approximate Coal Seam Depths: 191

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

1B)

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	1,134	1,134	980
Coal	-	-	-	-	-	-	-
Intermediate	9 5/8	New	MC-50	40	3,100	3,100	1,207
Production	5 1/2	New	P-110	20	14,616	14,616	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							

CTS
CTS

GCS
5/14/14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./ft)
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.

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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 marcellus formation. The vertical drill to go down to an approximate depth of 5701'. Then
kick off the horizontal leg into the marcellus using a slick water track.

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): 49.7

22) Area to be disturbed for well pad only, less access road (acres): 17.5

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

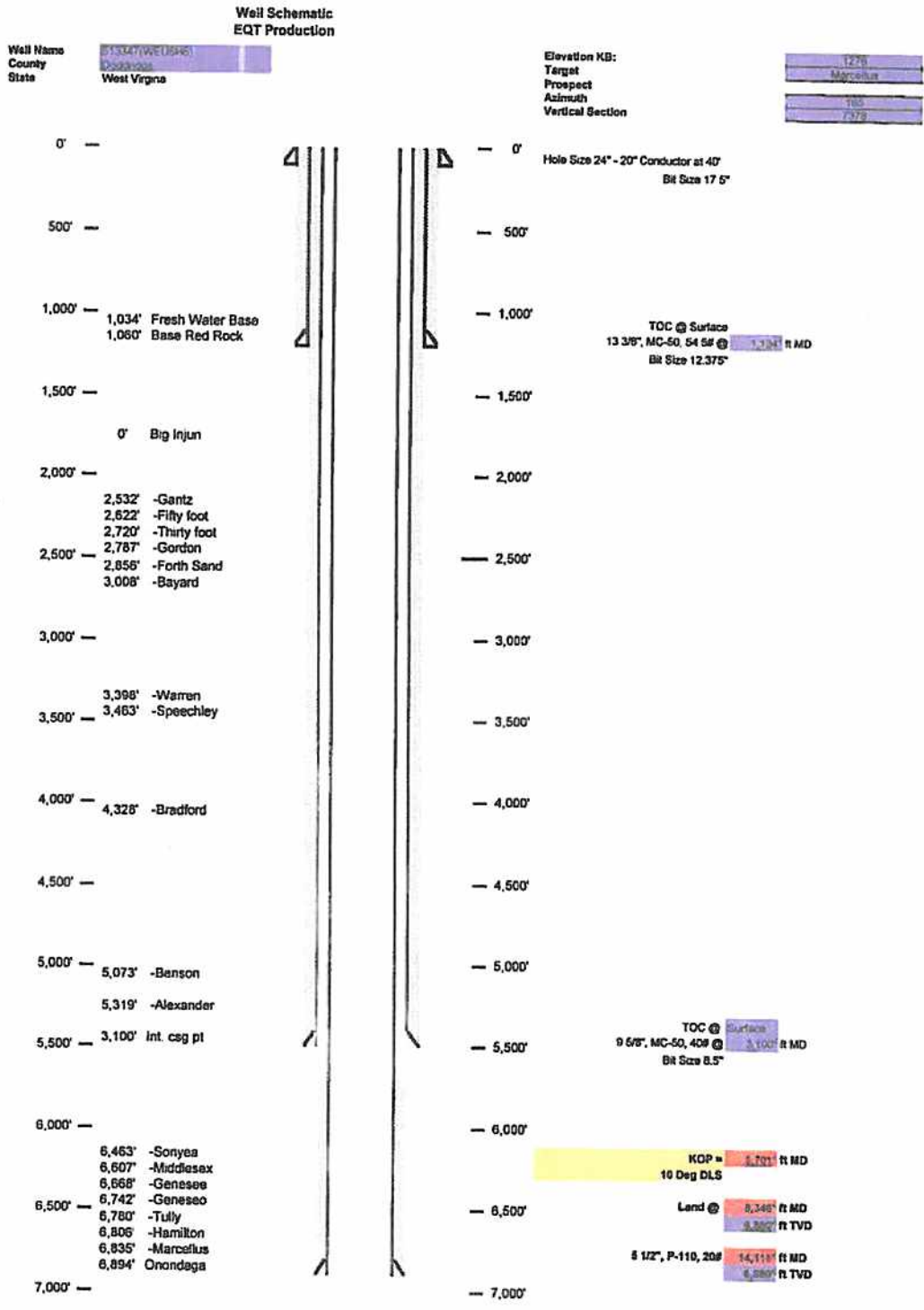
25) Proposed borehole conditioning procedures. Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating
one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5
minutes. To ensure that there is no 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.

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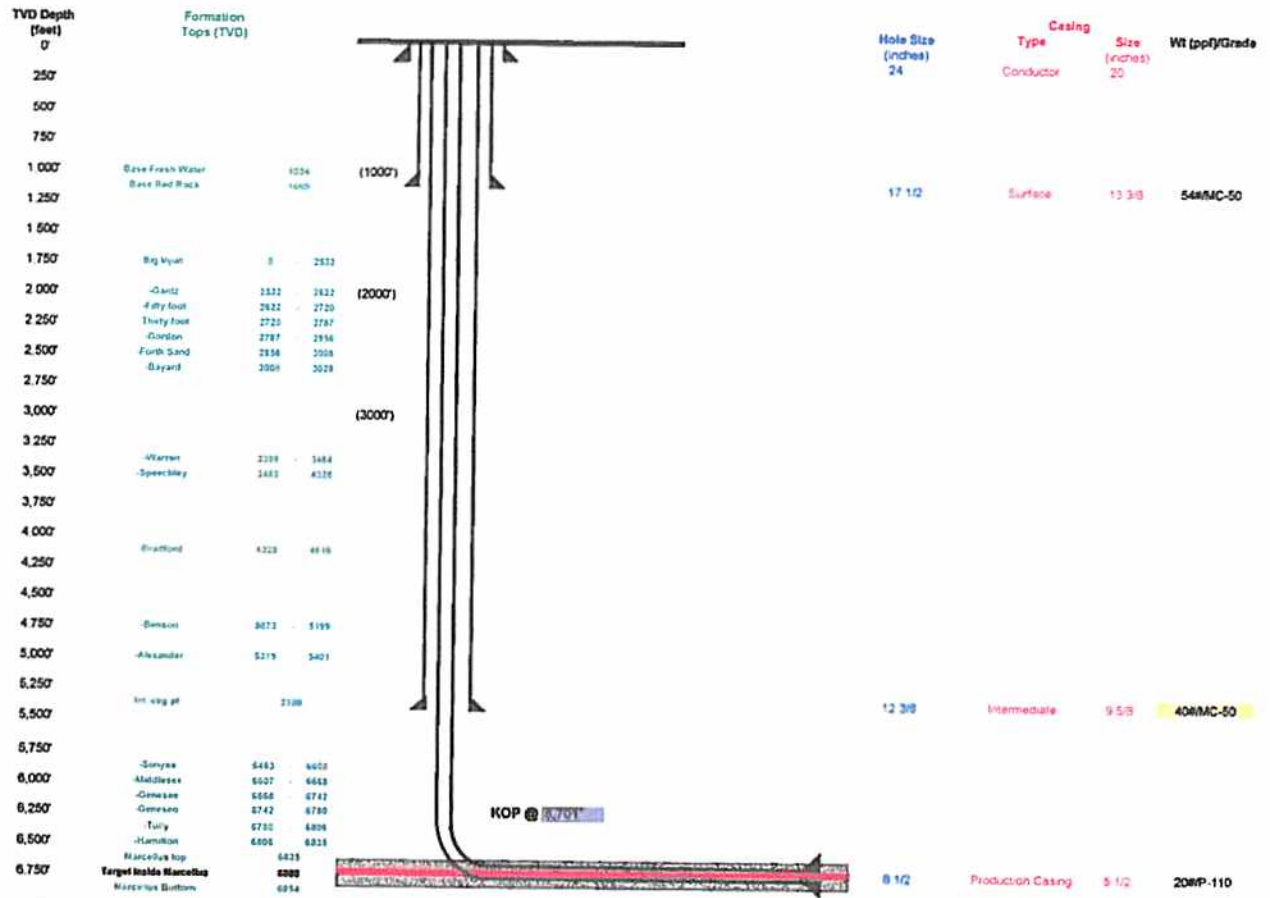
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17-06325

Well: 513347 (WEU6H6)
 EQT Production
 West Union
 Doddridge West Virginia

Azimuth: 185
 Vertical Section: 7378



Proposed Well Work
 Drill and complete a new horizontal well in the Marcellus formation
 The vertical drill to go down to an approximate depth of 5701'
 Then kick the horizontal leg into the Marcellus using a slick water frac

Land curve @ 5,950' R TVD
 5,240' R MD

Est TD @ 6,000' R TVD
 14,110' R MD

5,700' R Lateral

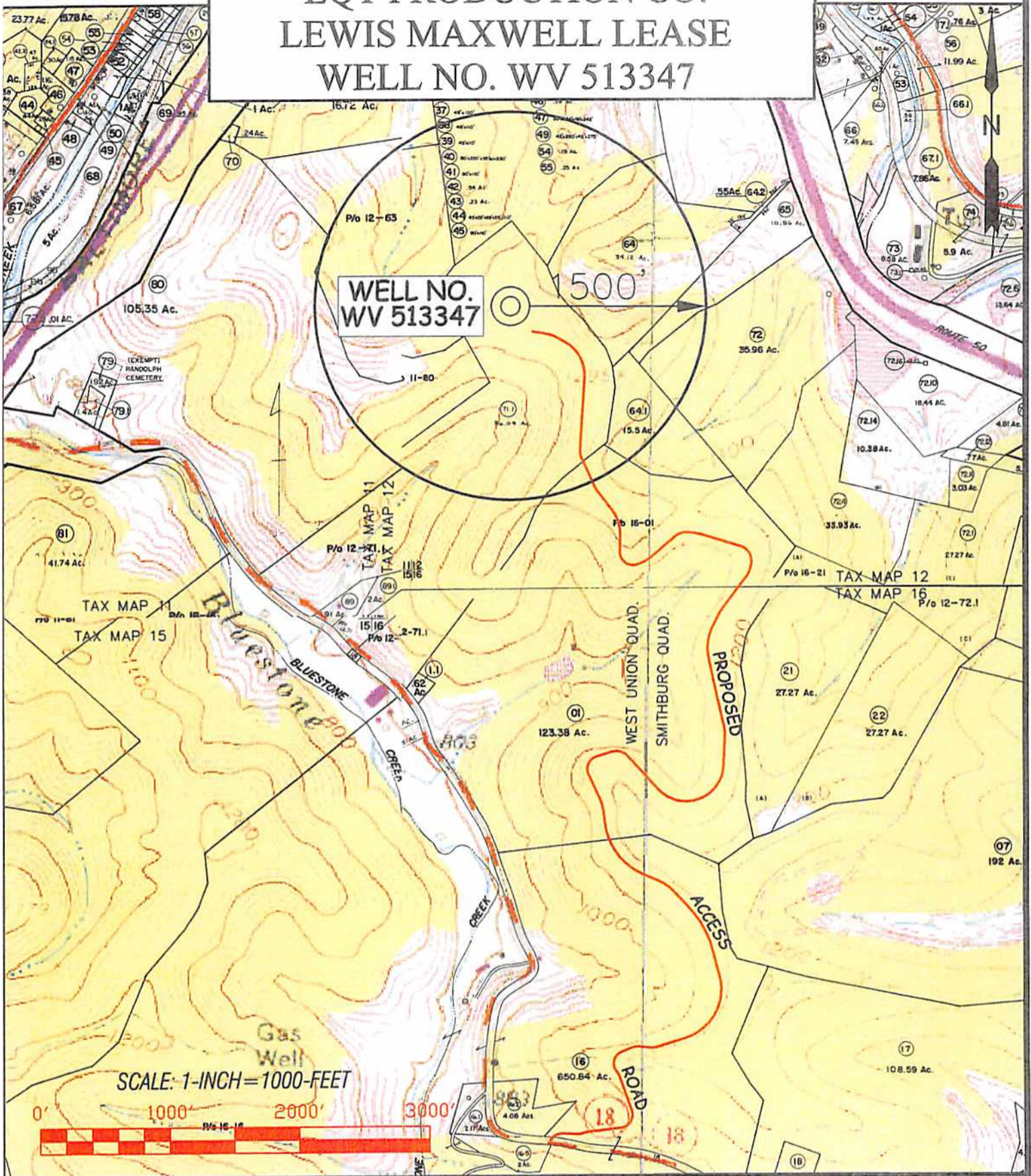
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WATER SAMPLES

EQT PRODUCTION CO.
LEWIS MAXWELL LEASE
WELL NO. WV 513347



Professional Energy Consultants
A Division of Smith Land Surveying

SLS
SURVEYORS
PROJECT MANAGERS
ENGINEERS

200 King Hill Rd.
P.O. Box 153
Martinsburg, WV 26157
(304) 413-3333

2042 67th Street NW
Shawnee, OK 74801
(580) 677-7041

MEMBER: SURVEYORS' ASSOCIATION OF WEST VIRGINIA

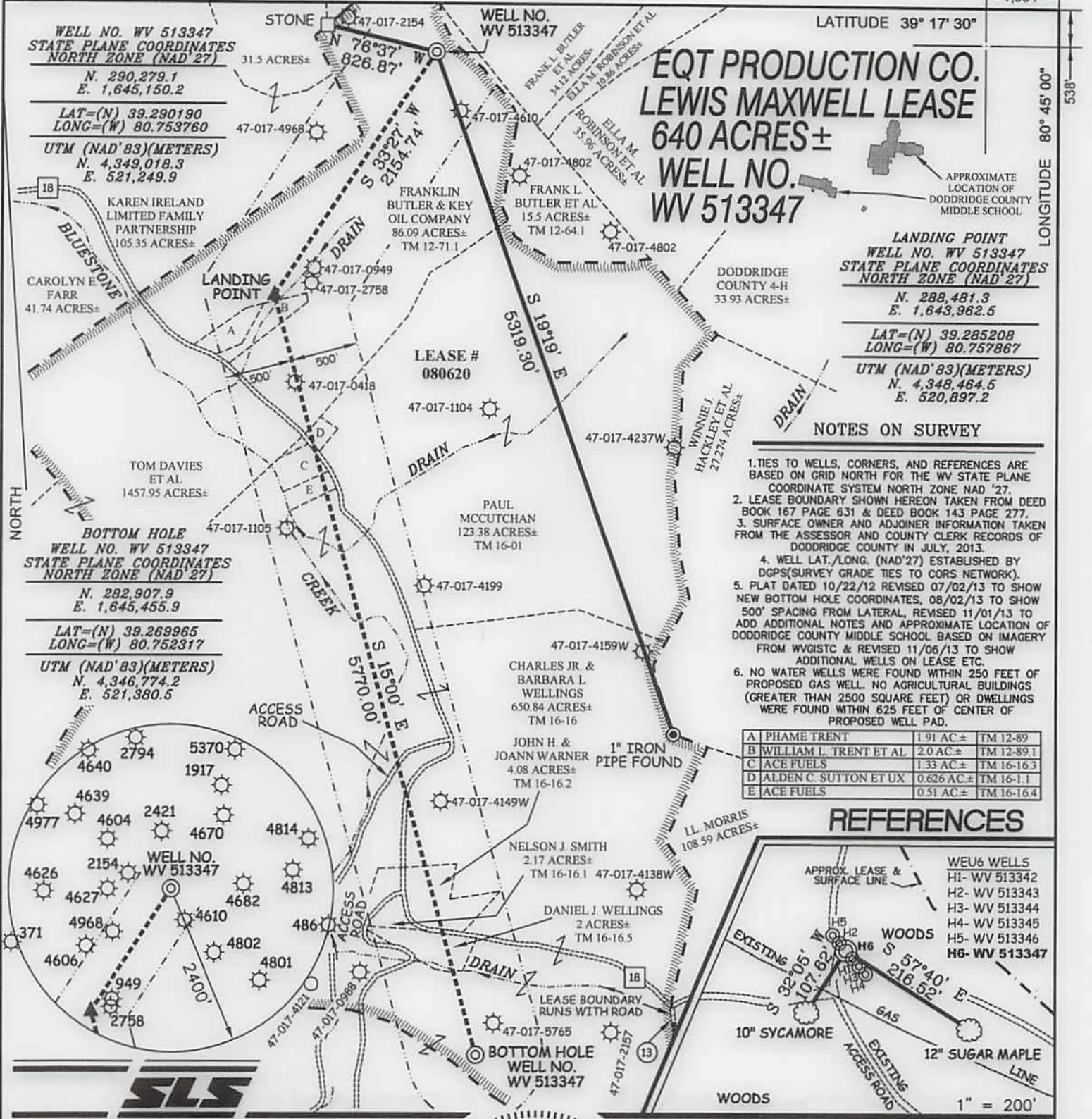
DRAWN BY: K.D.W.
FILE NO.: 7831
DATE: 07/17/13
CADD FILE: 7831W513347ROAD.DWG

TOPO SECTION OF:
WEST UNION, WV 7.5' QUAD.

DISTRICT	COUNTY	TAX MAP-PARCEL NO.
WEST UNION	DODDRIGE	12-71.1

OPERATOR:
EQT PRODUCTION CO.
115 PROFESSIONAL PLACE
P.O. BOX 280
BRIDGEPORT, WV. 26330

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JUL 26 2013
05/16/2014
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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 NOVEMBER 6, 20 13
 OPERATORS WELL NO. WV 513347
 API WELL NO. 47-017-06325 H6A
 STATE 47 COUNTY 017 PERMIT 06325

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7831P513347R3 (390-47)
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIES TO CORS NETWORK) SCALE 1" = 1000'

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

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL IF "GAS" PRODUCTION STORAGE DEEP SHALLOW

LOCATION:
 ELEVATION 1,266 (GROUND) 1,261' (PROPOSED) WATERSHED BLUESTONE CREEK & MIDDLE ISLAND CREEK
 DISTRICT WEST UNION COUNTY DODDRIDGE QUADRANGLE WEST UNION 7.5'
 SURFACE OWNER FRANKLIN BUTLER & KEY OIL COMPANY ACREAGE 86.09±
 ROYALTY OWNER LEWIS MAXWELL HEIRS ACREAGE 640±
 PROPOSED WORK:
 DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE 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

05/16/2014