



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

March 31, 2014

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 1706323 , Well #: WV 513343

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,

A handwritten signature in blue ink, appearing to read 'Gene Smith', is written over a blue circular stamp.

Gene Smith
Regulatory/Compliance Manager
Office of Oil and Gas



December 17, 2013

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

Re: Modification of (WEU6) 47-017-06323

Dear Mr. Smith,

Attached is a modification to the casing program for the above well. A new WW-6B & schematics are enclosed for your review. Due to problems encountered drilling the WEU8 wells, we have decided to set the intermediate casing deeper.

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.

cc: Douglas Newlon
4060 Dutchman Road
Macfarlan, WV 26148



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	District	8	Quadrangle	671
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2) Operator's Well Number: 513343 Well Pad Name WEU6

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

4) Elevation, current ground: 1,266.0 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: No

7) Proposed Target Formation(s), Depth(s), Anticipated Thicknesses and Associated Pressure(s):
Target formation is Marcellus at a depth of 6815' with the anticipated thickness to be 110 feet and anticipated target pressure of 4616 PSI

8) Proposed Total Vertical Depth: 6,815
9) Formation at Total Vertical Depth: Marcellus
10) Proposed Total Measured Depth: 15,271
11) Proposed Horizontal Leg Length: 7,320
12) Approximate Fresh Water Strata Depths: 352, 464, 507, 966, & 1030
13) Method to Determine Fresh Water Depth: By offset wells
14) Approximate Saltwater Depths: None Reported
15) Approximate Coal Seam Depths: 187
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: _____

Douglas Newton
1-2-2013

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CASING AND TUBING PROGRAM

8)

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	1,130	1,130	977
Isol	-	-	-	-	-	-	-
Intermediate	9 5/8	New	MC-50	40	5,426	5,426	2,128
Production	5 1/2	New	P-110	20	15,271	15,271	See Note 1
Tubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
Runners							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20	24	0.635	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	1	1.21
Isol	-	-	-	-	-	-
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						
Runners						

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.

DCW
1-2-2014

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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 5504'. Then kick off the horizontal leg into the marcellus 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): 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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DEC 19 2013

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Department of
Environmental Protection

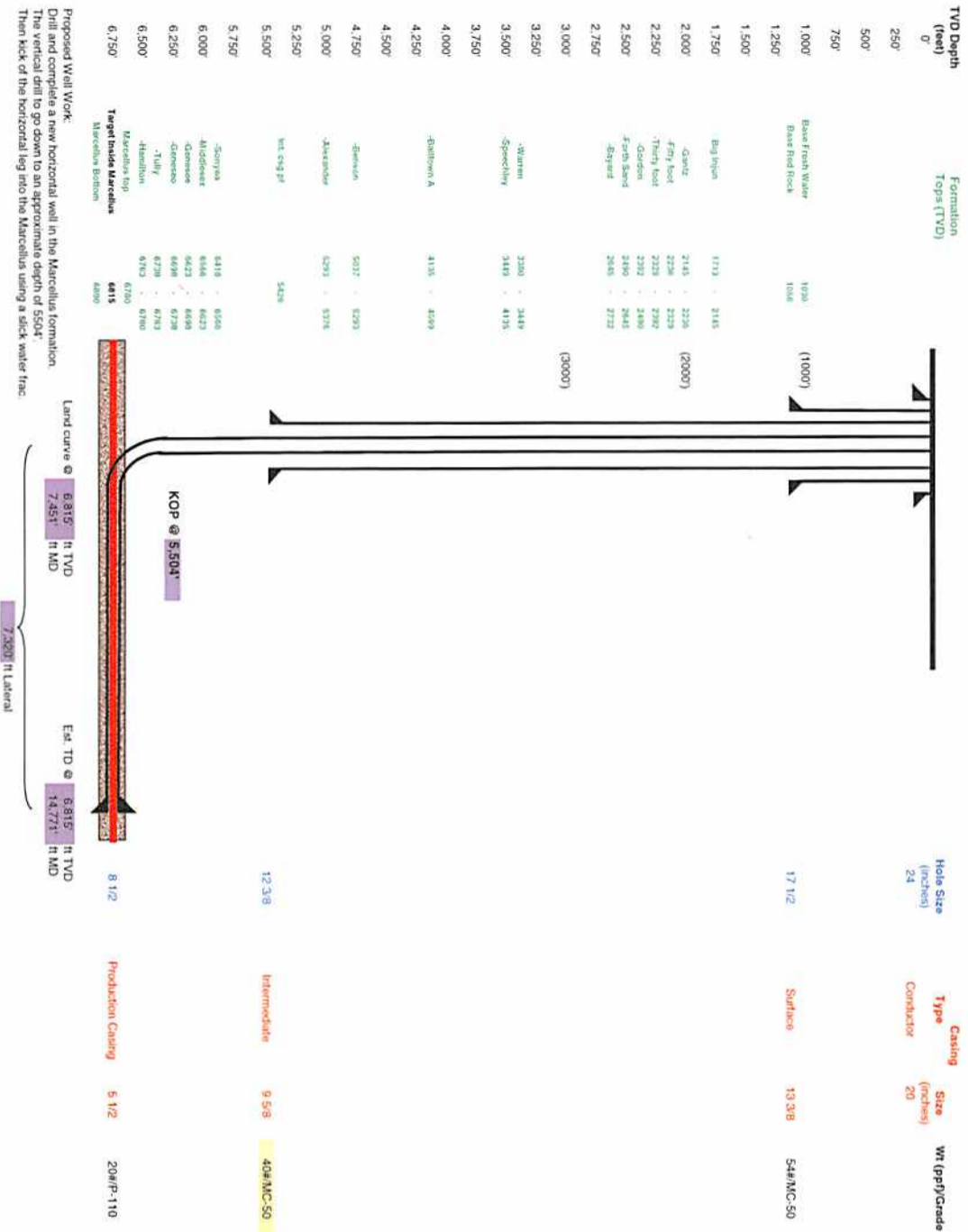
04/04/2014

4701706323

MOD

Well 513343(WEU6H2)
 EOT Production
 West Union
 Doddridge
 West Virginia

Asimuth 115
 Vertical Section 226



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 5504'.
 Then kick the horizontal leg into the Marcellus using a slick water frac.



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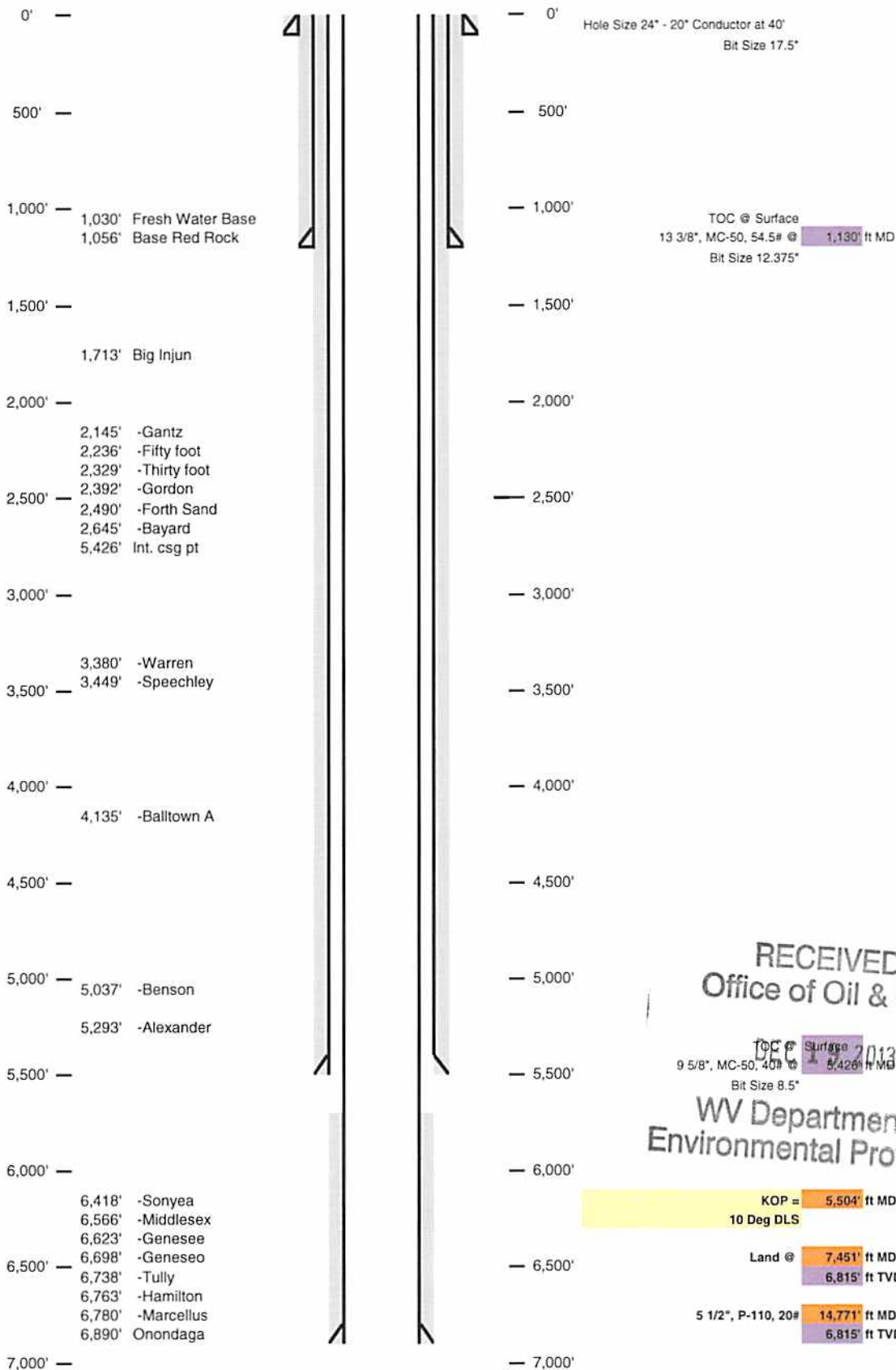
DEC 04/04/2014

WV Department of
 Environmental Protection

Well Schematic
EQT Production

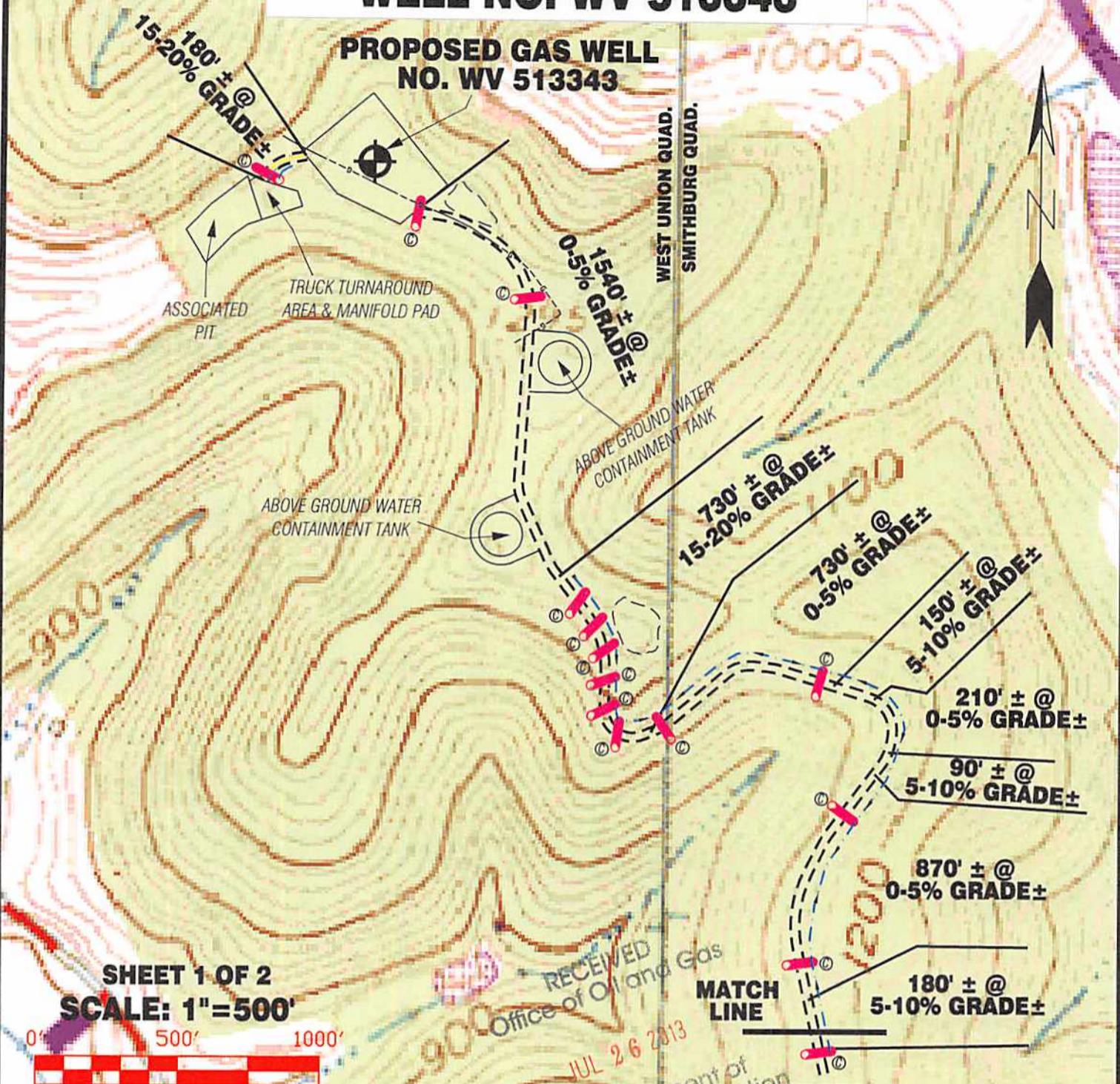
Well Name: 513343(WEU6H2)
County: Doddridge
State: West Virginia

Elevation KB: 1272
Target: Marcellus
Prospect: Marcellus
Azimuth: 165
Vertical Section: 8266



EQT PRODUCTION COMPANY LEWIS MAXWELL LEASE WELL NO. WV 513343

PROPOSED GAS WELL NO. WV 513343



SHEET 1 OF 2

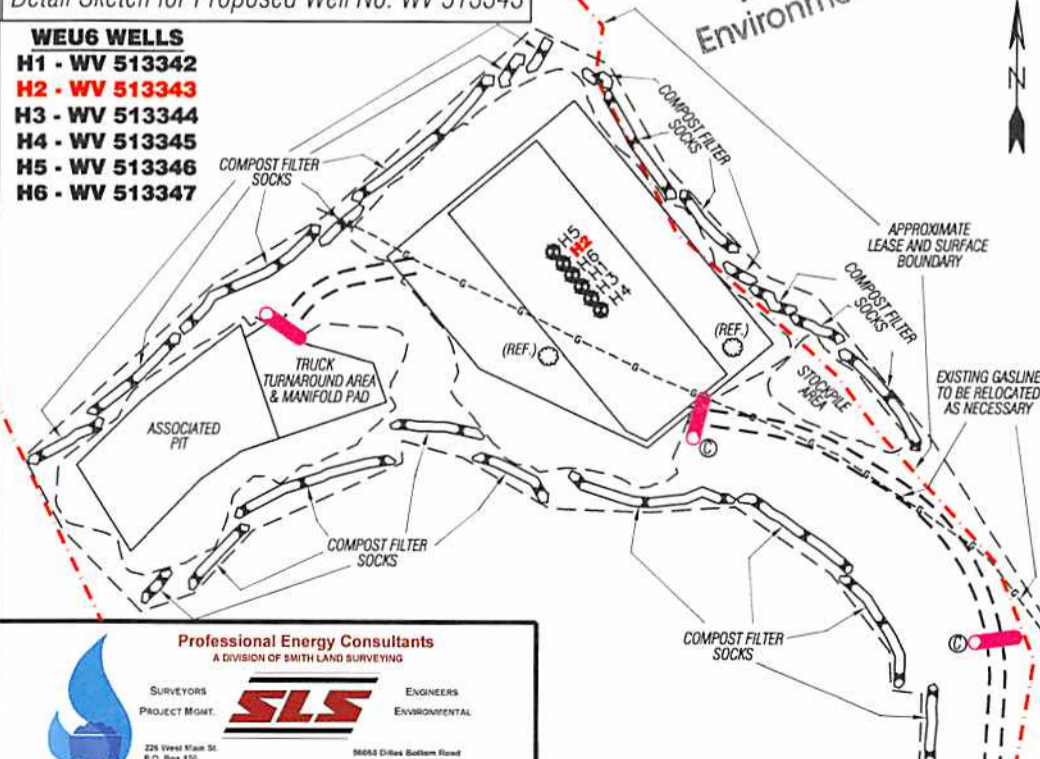
SCALE: 1"=500'



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Detail Sketch for Proposed Well No. WV 513343

- WEU6 WELLS**
H1 - WV 513342
H2 - WV 513343
H3 - WV 513344
H4 - WV 513345
H5 - WV 513346
H6 - WV 513347



ALL ROADS SHOWN HEREON ARE EXISTING UNLESS OTHERWISE NOTED AND SHALL BE MAINTAINED IN ACCORDANCE WITH WV D.E.P. OIL AND GAS BMP MANUAL ENTRANCES AT COUNTY/STATE ROADS SHALL BE MAINTAINED IN ACCORDANCE WITH WV D.O.T. REGULATION. SEPARATE PERMITS MAY BE REQUIRED BY THE D.O.T.

SEDIMENT BASINS (TRAPS) AND APPROPRIATE EROSION CONTROL BARRIERS ARE TO BE CONSTRUCTED AT ALL CULVERT AND CROSS DRAIN INLETS AND OUTLETS AS REQUIRED IN THE WV D.E.P. OIL AND GAS BMP MANUAL. FIELD CONDITIONS (ROCK OUTCROPS AND BEDROCK) MAY PROHIBIT INLET TRAPS BEING INSTALLED. WHEN THESE CONDITIONS EXIST ADDITIONAL EROSION CONTROL MEASURES SHALL BE EVALUATED AND UTILIZED AS NEEDED.

EARTHWORK CONTRACTORS ARE RESPONSIBLE FOR NOTIFICATION TO THE OPERATOR AND INSPECTOR PRIOR TO ANY DEVIATION FROM THIS PLAN.

TEMPORARY SEED & MULCH ALL SLOPES AFTER CONSTRUCTION OF LOCATION.

CUT & STACK ALL MARKETABLE TIMBER.

STACKED BRUSH MAY BE USED FOR SEDIMENT CONTROL.

APPLICATIONS FOR SEPARATE PERMITS OF THE ACCESS ROAD STREAM CROSSINGS HAVE BEEN PREPARED (IF APPLIES)

- EXISTING CULVERT
- PROPOSED CULVERT 15' MIN. UNLESS OTHERWISE NOTED
- PROPOSED STREAM CROSSING
- APPROXIMATE LIMITS OF DISTURBANCE

Professional Energy Consultants
A DIVISION OF SMITH LAND SURVEYING



SURVEYORS
PROJECT MGMT.



ENGINEERS
ENVIRONMENTAL

228 West Main St.
P.O. Box 150
Glenville, WV 26031
206-462-2634

86683 Olive Bottom Road
Shelbyville, OH 43087
(740) 671-9911

HONESTY, INTEGRITY, QUALITY

TOPO SECTION OF WEST UNION 7.5'
USGS TOPO QUADRANGLE

DRAWN BY K.D.W.	FILE NO. 7831	DATE 07/16/13	CADD FILE: 7831RECWS13343R2.DWG
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EQT PRODUCTION CO. LEWIS MAXWELL LEASE 640 ACRES± WELL NO. WV 513343

LATITUDE 39° 17' 30"

NOTES ON SURVEY

1. TIES TO WELLS, CORNERS, AND 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 167 PAGE 631 & DEED BOOK 143 PAGE 277.
3. SURFACE OWNER AND ADJOINER INFORMATION TAKEN FROM THE ASSESSOR AND COUNTY CLERK RECORDS OF DODDRIDGE COUNTY IN JULY, 2013.
4. WELL LAT./LONG. (NAD'27) ESTABLISHED BY DGPS (SURVEY GRADE TIES TO CORS NETWORK).
5. PLAT DATED 10/22/12 REVISED 07/02/13 TO SHOW NEW BOTTOM HOLE COORDINATES, 08/02/13 TO SHOW 500' SPACING FROM LATERAL, REVISED 11/01/13 TO ADD ADDITIONAL NOTES AND APPROXIMATE LOCATION OF DODDRIDGE COUNTY MIDDLE SCHOOL BASED ON IMAGERY FROM WVGIS & REVISED 11/06/13 TO SHOW ADDITIONAL WELLS ON LEASE ETC.
6. NO WATER WELLS WERE FOUND WITHIN 250 FEET OF PROPOSED GAS WELL. NO AGRICULTURAL BUILDINGS (GREATER THAN 2500 SQUARE FEET) OR DWELLINGS WERE FOUND WITHIN 625 FEET OF CENTER OF PROPOSED WELL PAD.

LONGITUDE 80° 45' 00"

WELL NO. WV 513343
STATE PLANE COORDINATES
NORTH ZONE (NAD '27)

N. 290,290.7
E. 1,645,140.6

LAT=(N) 39.290221
LONG=(W) 80.753795

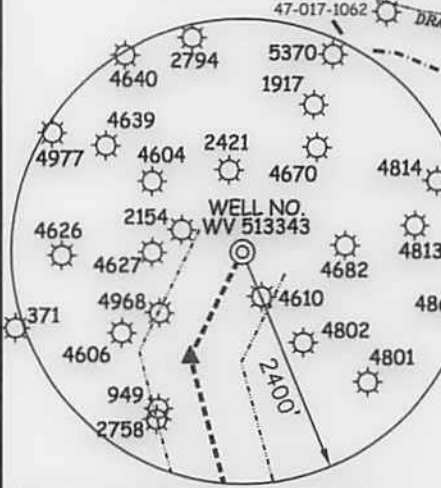
UTM (NAD'83)(METERS)
N. 4,349,021.7
E. 521,246.9

LANDING POINT
WELL NO. WV 513343
STATE PLANE COORDINATES
NORTH ZONE (NAD '27)

N. 289,206.6
E. 1,644,596.4

LAT=(N) 39.287224
LONG=(W) 80.755664

UTM (NAD'83)(METERS)
N. 4,348,688.7
E. 521,086.6

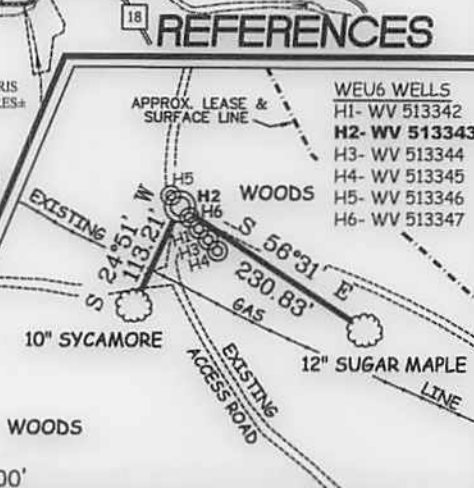


BOTTOM HOLE
WELL NO. WV 513343
STATE PLANE COORDINATES
NORTH ZONE (NAD '27)

N. 282,136.0
E. 1,646,491.0

LAT=(N) 39.267885
LONG=(W) 80.748624

UTM (NAD'83)(METERS)
N. 4,346,544.3
E. 521,699.8



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 513343
 API WELL NO. 47 - 017 - 06323 H6A
 STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200 FILE NO. 7831P513343R3 (390-47)
 PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIES TO CORS NETWORK) SCALE 1" = 2000'

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: LEASE NO. 080620
 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

COUNTY NAME PERMIT

04/04/2014