



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 06, 2013

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

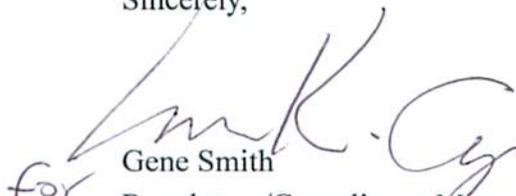
Re: Permit Modification Approval for API Number 1706186 , Well #: 514654
changed target formation

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

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

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Operator ID County District Quadrangle

2) Operator's Well Number: 514654 Well Pad Name SMI28

3 Elevation, current ground: 1,254 Elevation, proposed post-construction: 1,254

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 Geneseo at a depth of 6684' with the anticipated thickness to be 40 feet and anticipated target pressure of 4482 PSI

7) Proposed Total Vertical Depth: 7182'

8) Formation at Total Vertical Depth: Onondaga

9) Proposed Total Measured Depth: 12,682'

10) Approximate Fresh Water Strata Depths: 22, 81, 100, 123, 260, 285, 366, 390, 427, 478, 500, 570

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

12) Approximate Saltwater Depths: n/a

13) Approximate Coal Seam Depths: 42, 281, 577, 628, 1207, 1376

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

15) Does land contain coal seams tributary or adjacent to, active mine? no

16) Describe proposed well work: Drill and complete a new horizontal well. The vertical drill to go down to approximately depth of 7182' tagging the Onondaga not more than 100' then plug back to approximately 5646' and kick off the horizontal leg into the Geneseo 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): 0 additional

19) Area to be disturbed for well pad only, less access road (acres): 0 additional

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MAY 13 2013

Office of Oil and Gas
WV Dept. of Environmental Protection

4701706186

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#	72	72	69
Fresh Water	13 3/8	New	MC-50	54#	670'	670'	593
Coal	—	New	—	—	—	—	—
Intermediate	9 5/8	New	MC-50	40#	5327'	5327'	2,104
Production	5 1/2	New	P-110	20#	12,682	12,682	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	—	Class A	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

*DCW
5-31-2013*

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 so that the intermediate casing shoe can be monitored during stimulation and the well can be safely plugged and abandoned in the future.

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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 % Calcium 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.

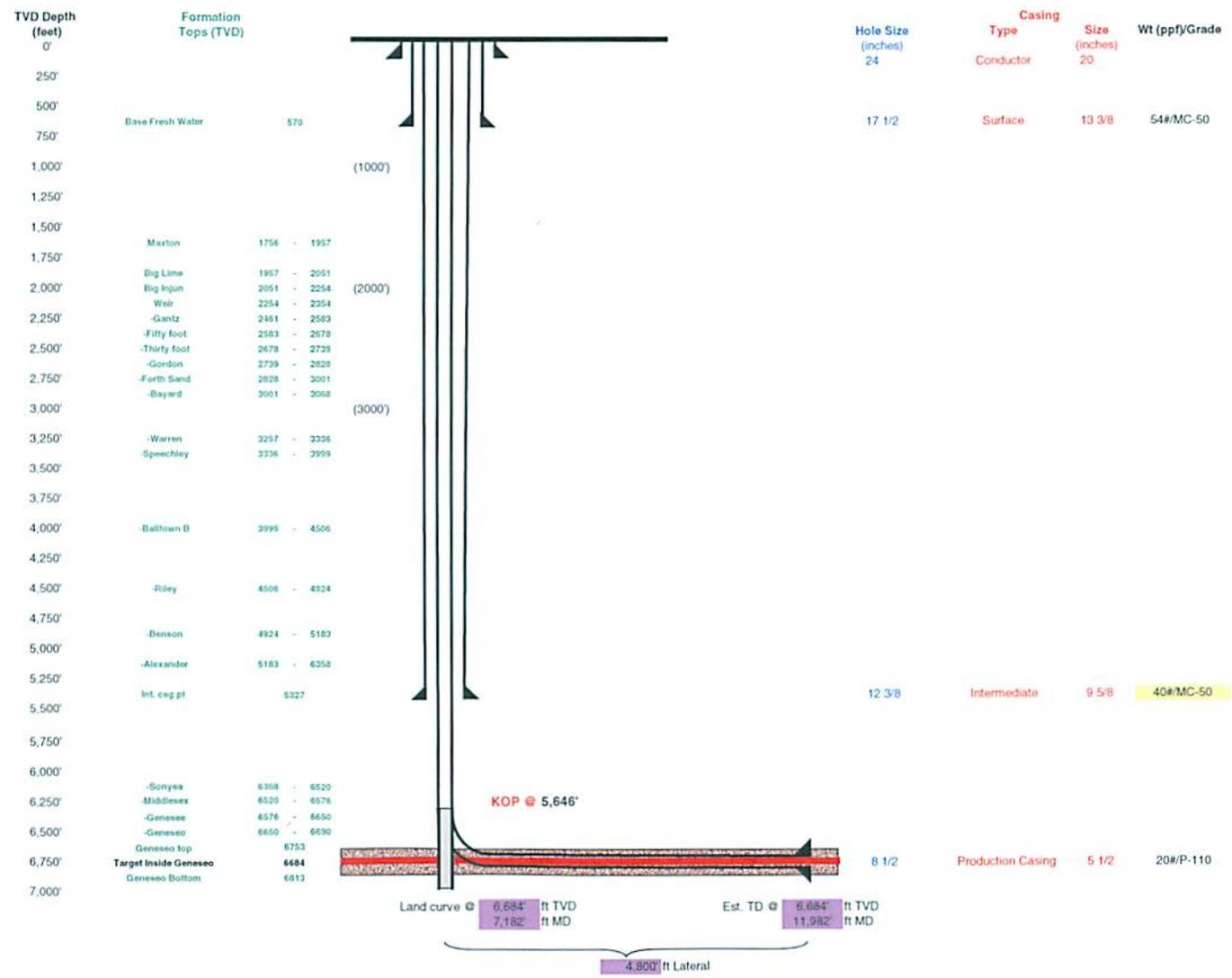
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4701706186 Mod

Well 514654 (SMI28H14)
 EQT Production
 Smithburg
 Doddridge West Virginia

Azimuth 195
 Vertical Section 5370



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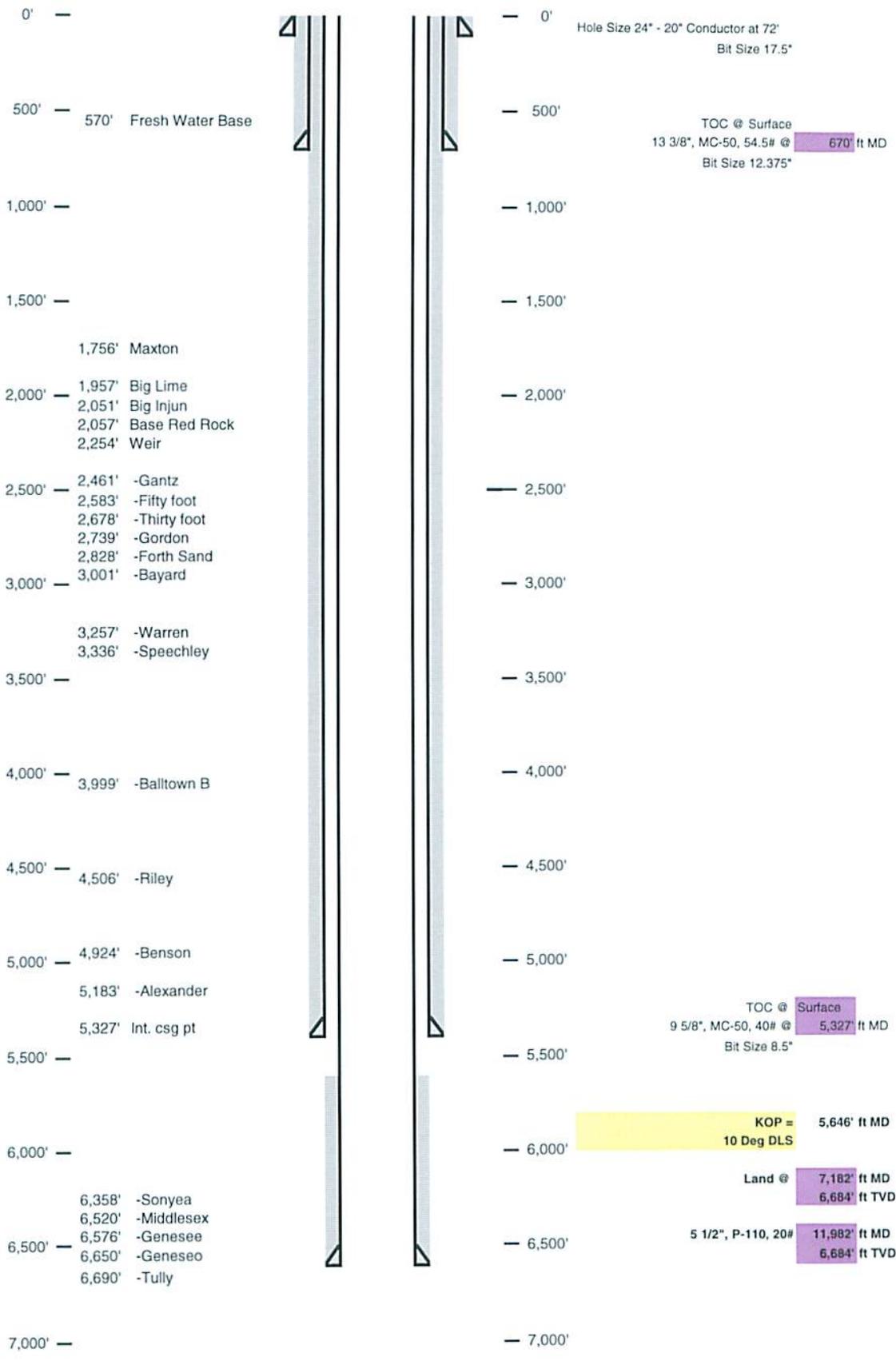
MAY 13 2013

Office of Oil and Gas
 WV Dept. of Environmental Protection

Well Schematic
EQT Production

Well Name: 514654 (SMI26H14)
County: Doddridge
State: West Virginia

Elevation KB: 1264
Target: Genesee
Prospect: 155
Azimuth: 5270
Vertical Section

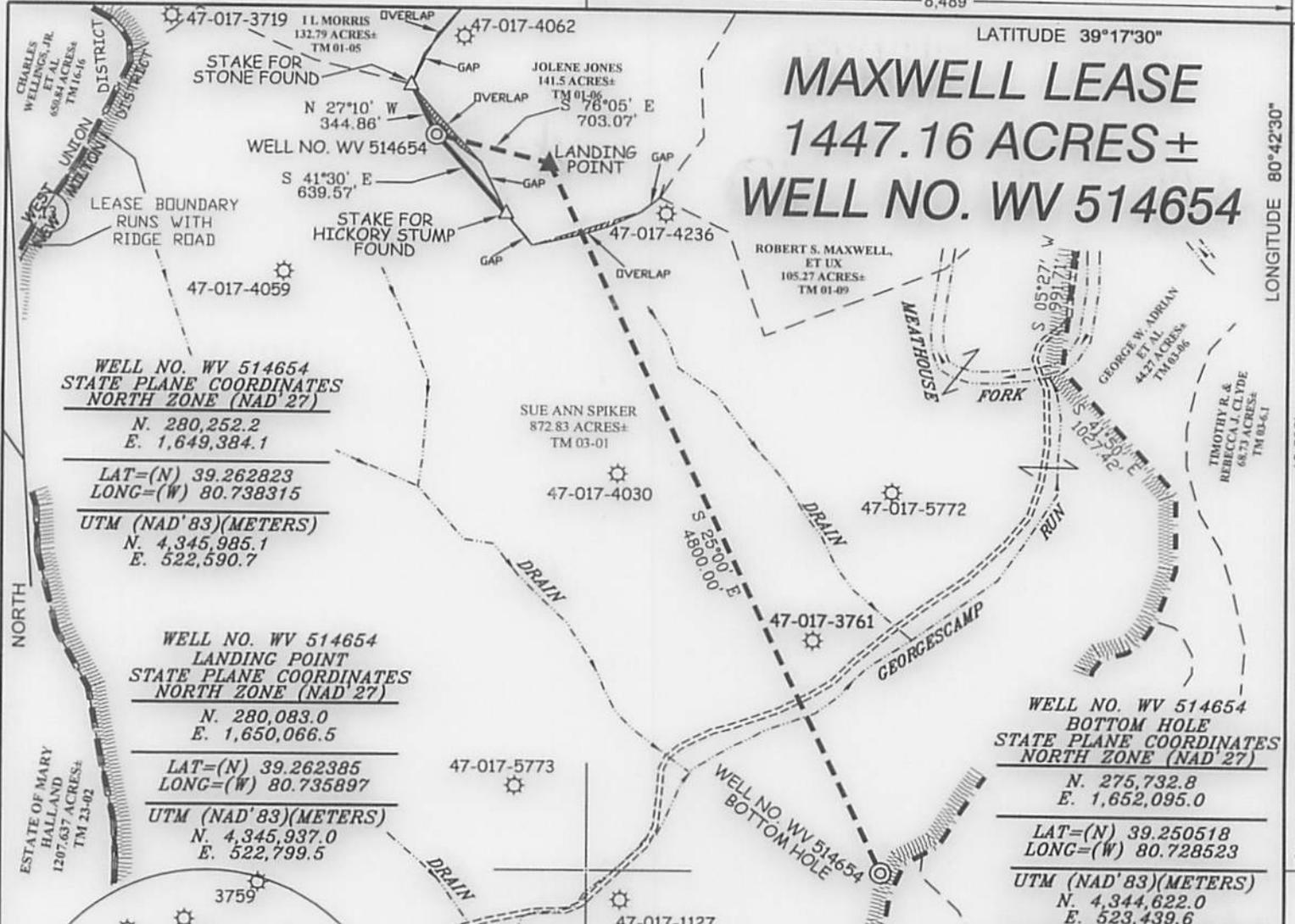


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Office of Oil and Gas
WV Dept. of Environmental Protection

MAXWELL LEASE 1447.16 ACRES ± WELL NO. WV 514654



**WELL NO. WV 514654
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)**
N. 280,252.2
E. 1,649,384.1

LAT=(N) 39.262823
LONG=(W) 80.738315

UTM (NAD'83)(METERS)
N. 4,345,985.1
E. 522,590.7

**WELL NO. WV 514654
LANDING POINT
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)**
N. 280,083.0
E. 1,650,066.5

LAT=(N) 39.262385
LONG=(W) 80.735897

UTM (NAD'83)(METERS)
N. 4,345,937.0
E. 522,799.5

**WELL NO. WV 514654
BOTTOM HOLE
STATE PLANE COORDINATES
NORTH ZONE (NAD'27)**
N. 275,732.8
E. 1,652,095.0

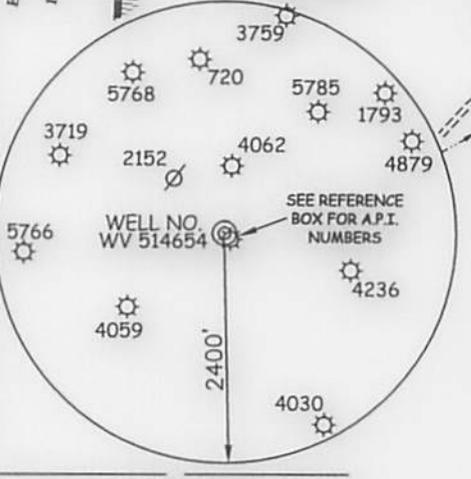
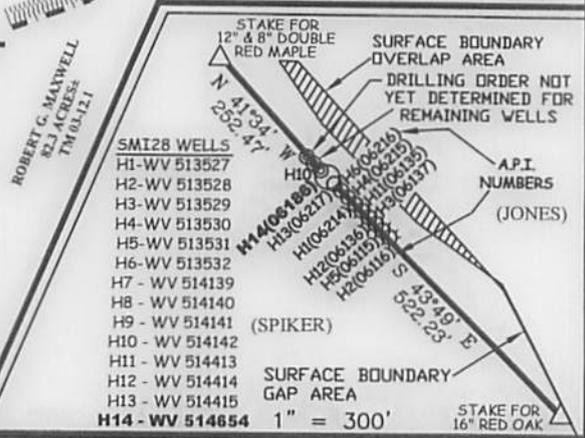
LAT=(N) 39.250518
LONG=(W) 80.728523

UTM (NAD'83)(METERS)
N. 4,344,622.0
E. 523,439.6

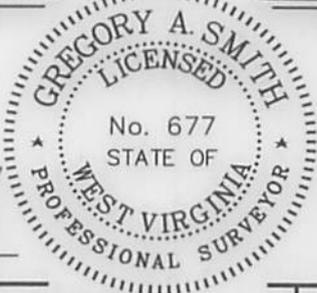
REFERENCES

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 103 PAGE 185, DEED BOOK 126 PAGE 238 & DEED BOOK 133 PAGE 310.
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 TIE TO CORS NETWORK).
5. ORIGINAL PLAT REVISED 04/26/13 TO CHANGE TARGET FORMATION AND BOTTOM HOLE COORDINATES, 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.



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
DATE DECEMBER 12, 20 12
REVISED DATE APRIL 26, 20 13
OPERATORS WELL NO. WV 514654
API WELL NO. 47-017-06186 MOD H6A
STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/2500 FILE NO. 7428P514654R
PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE 1" = 1,000'

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 1254' (PAD ELEVATION) WATERSHED TRIBUTARY OF GEORGESCAMP RUN
DISTRICT NEW MILTON COUNTY DODDRIDGE QUADRANGLE SMITHBURG 7.5'

SURFACE OWNER SUE ANN SPIKER ACREAGE 872.83±
ROYALTY OWNER LEWIS MAXWELL HEIRS LEASE ACREAGE 1447.16±
PROPOSED WORK: LEASE NO. 080617

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 GENESEO
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