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

February 21, 2014

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 1706252 , Well #: 514320
Changed Azimuth and 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

02/28/2014

EQT

October 24, 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 47-103-06252 (514320)

Dear Mr. Smith,

Attached is a modification to the above well. The well is being modified from a Marcellus well to a Genesseo with a change in the azimuth. The top hole has NOT changed from the original permit and no new leases were affected. I am enclosing a new WW-6B, well schematics and a mylar plat.

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

Sincerely,

Vicki Roark
Permitting Supervisor-WV

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

RECEIVED
Office of Oil and Gas
OCT 28 2013
WV Department of
Environmental Protection

EQT Production 115 Professional Place I P.O. Box 280 I Bridgeport, WV 26330
T 304.848.0000 I F 304.848.0040 I www.eqt.com

02/28/2014

RECEIVED
Office of Oil and Gas

WW - 6B
9/13)

4701706252

MOD

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

) Well Operator: EQT Production Company

	103	4	286
Operator ID	County	District	Quadrangle

) Operator's Well Number: 514320 Well Pad Name CPT11

) Farm Name/Surface Owner : Flint Run of McElroy Creek Public Road Access: CR 12

) Elevation, current ground: 1,130.0 Elevation, proposed post-construction: 1,111.0

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

Other _____

(b) If Gas: Shallow • Deep _____

Horizontal •

DCN 11-4-2013 MDG

) Existing Pad? Yes or No: Yes

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

Target formation is Genesseo at a depth of 6843' with the anticipated thickness to be 46 feet and anticipated target pressure of 4691 PSI

) Proposed Total Vertical Depth: 6,843

) Formation at Total Vertical Depth: Genesseo

0) Proposed Total Measured Depth 15,332

1) Proposed Horizontal Leg Length 6,660

2) Approximate Fresh Water Strata Depths: 66, 337, 386, 406, 616, 704

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

4) Approximate Saltwater Depths: 1389, 1661

5) Approximate Coal Seam Depths: 852, 1264

6) 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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4701706252

/W - 6B
/13)

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CASING AND TUBING PROGRAM

3)

YPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
onductor	20	New	Varies	Varies	40	40	38
resh Water	13 3/8	New	MC-50	54	804	804	705
oal					5,242	5,242	2,066
ıtermediate	9 5/8	New	MC-50	40			
roduction	5 1/2	New	P-110	20	15,332	15,332	See Note 1
ubing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
iners							

CTS
CTS

Doug Newton
11-4-2013
Michael Duff

YPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
onductor	20	24	0.635	-	Construction	1.18
resh Water	13 3/8	17 1/2	0.380	2,480	1	1.21
oal						
ıtermediate	9 5/8	12 3/8	0.395	3,590	1	1.21
roduction	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
ubing						
iners						

Packers

ind:	N/A			
izes:	N/A			
epths Set:	N/A			

lote 1: EQT plans to bring the TOC on the production casing cement job 1,000' above kick off point, which is at east 500' above the shallowest production zone, to avoid communication.

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WW - 6B

(3/13)

017 06252

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 Genesseo formation. The vertical drill to go down to an approximate depth of 5868'.

Then kick off the horizontal leg into the Genesseo 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): 43.82

22) Area to be disturbed for well pad only, less access road (acres): 15.68

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.

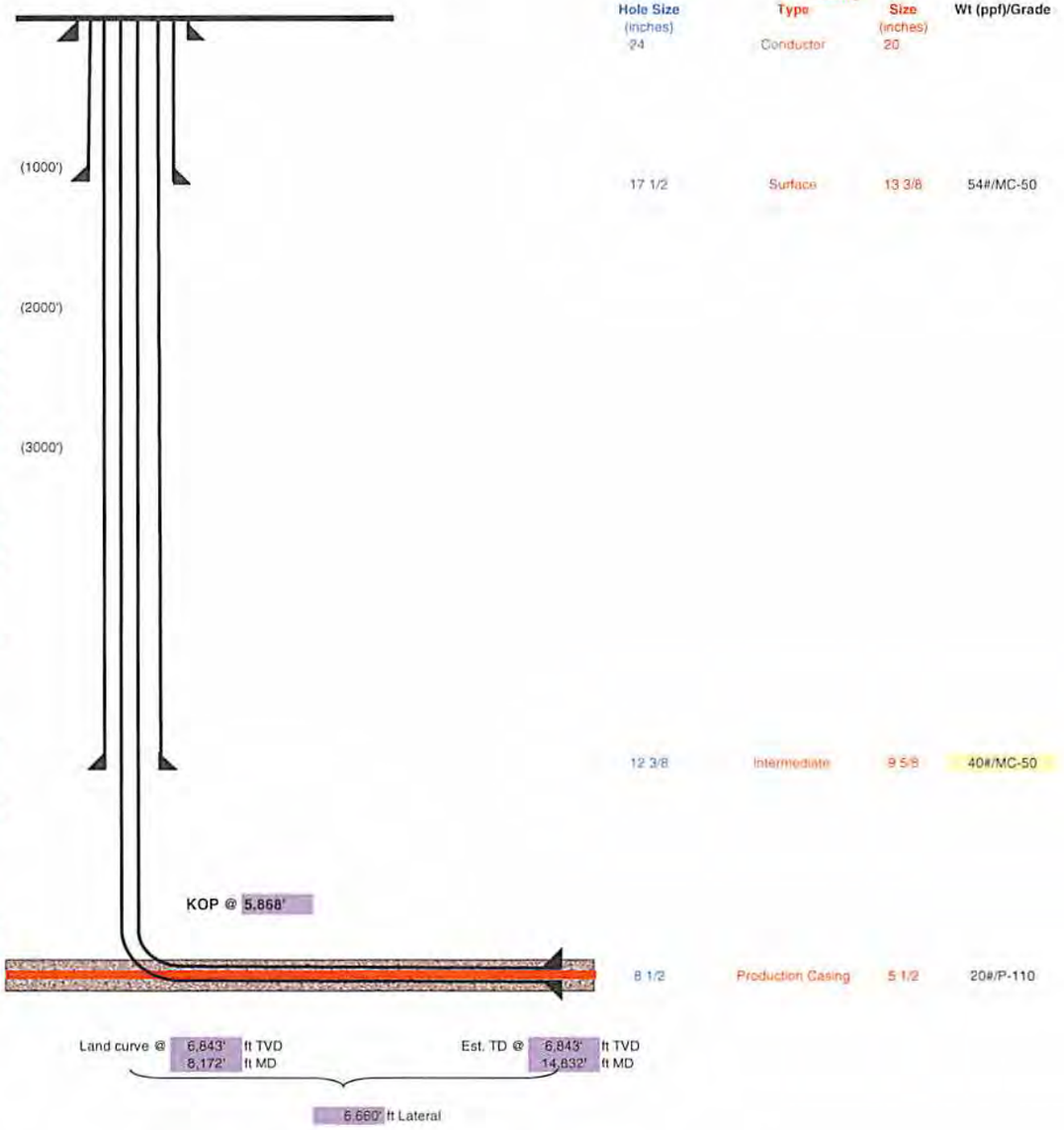
*Note: Attach additional sheets as needed.

MOD

017 06252

Well 514320 (CPT11H5)
EQT Production
Center Point
Doddridge West Virgina

Azimuth 185.87
Vertical Section 7457



TVD Depth (feet)	Formation	Formation Tops (TVD)		
0'			1652762.3	
250'				
500'				
750'	Base Fresh Water		704	
1,000'				
	Base Red Rock		**1097**	
1,250'				
1,500'				
1,750'				
	Maxton	1950	2032	
2,000'	Big Lime	2120	2216	
	Big Injun	2216	2383	
2,250'	Weir	2487	2552	
	-Gantz	2619	2674	
2,500'	-Fifty foot	2685	2734	
	-Thirty foot	2825	2850	
2,750'	-Gordon	2912	2976	
	-Forth Sand	2975	3074	
3,000'	-Fifth Sand	3074	3151	
3,250'				
3,500'	-Warren	3550	3606	
3,750'	-Speechley	3757	3856	
	-Balltown A	3987	4410	
4,000'				
4,250'				
	-Bradford	4420	4542	
4,500'				
4,750'				
5,000'				
	-Benson	5125	5192	
5,250'	Int. csg pt		5262	
5,500'	-Alexander	5545	5669	
	-Elks	5869	6583	
5,750'				
6,000'				
6,250'	-Sonyea	6583	6677	
6,500'	-Middlesex	6725	6761	
	-Genesee	6761	6843	
6,750'	Geneseo top		6843	
	Target Inside Geneseo		**6843**	
7,000'	Geneseo Bottom		6971	

Hole Size (inches)	Casing Type	Size (inches)	Wt (ppf)/Grade
24	Conductor	20	
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

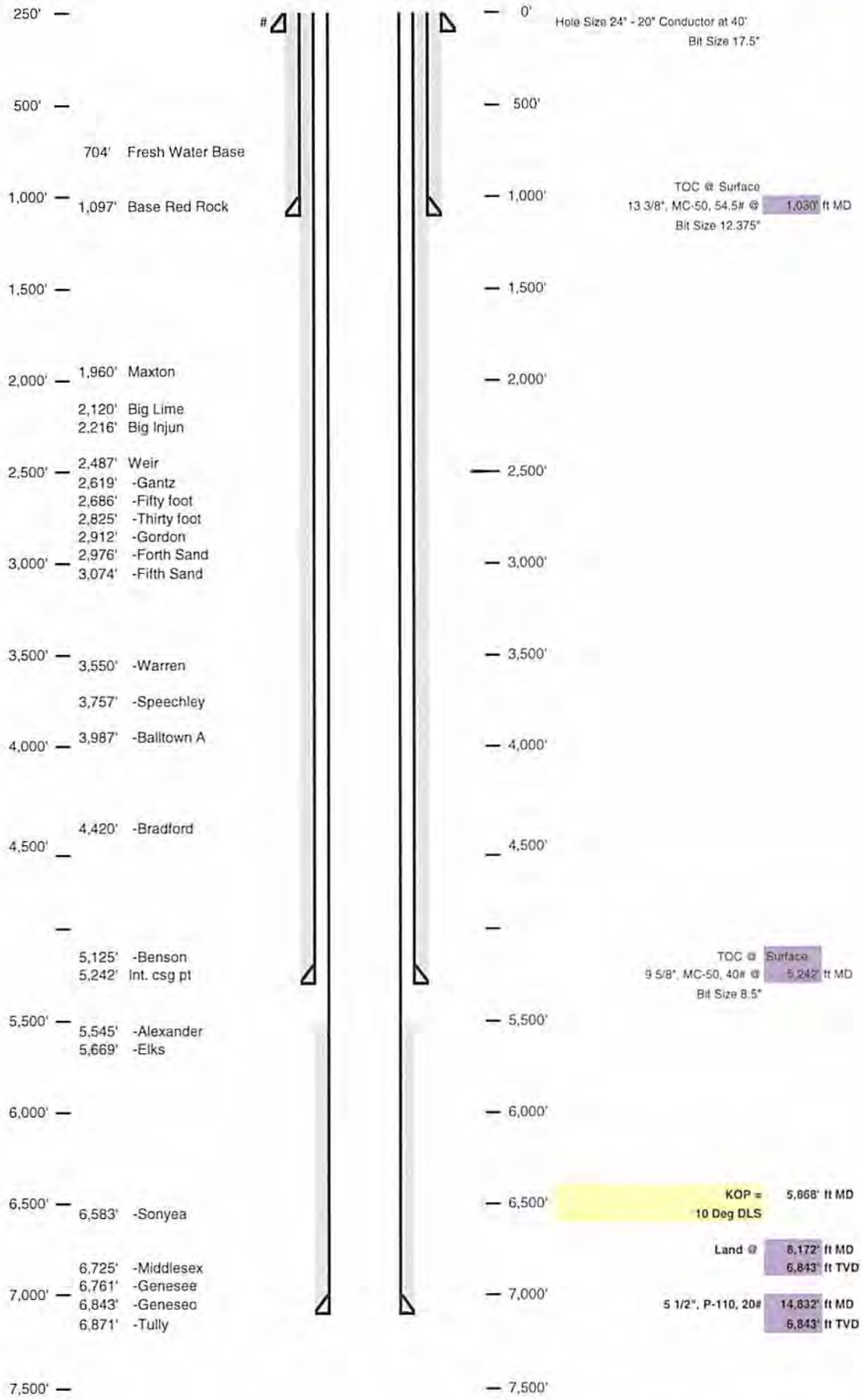
Proposed Well Work:
Drill and complete a new horizontal well in the Geneseo formation.
The vertical drill to go down to an approximate depth of 5868'.
Then kick of the horizontal leg into the Geneseo using a slick water frac.

MOD

017 06252

Well Schematic
EQT Production

Well Name	514320 (CPT11H5)
County	Doddridge
State	West Virgina
Elevation KB:	1121
Target	Geneseo
Prospect	
Azimuth	165.87
Vertical Section	7467

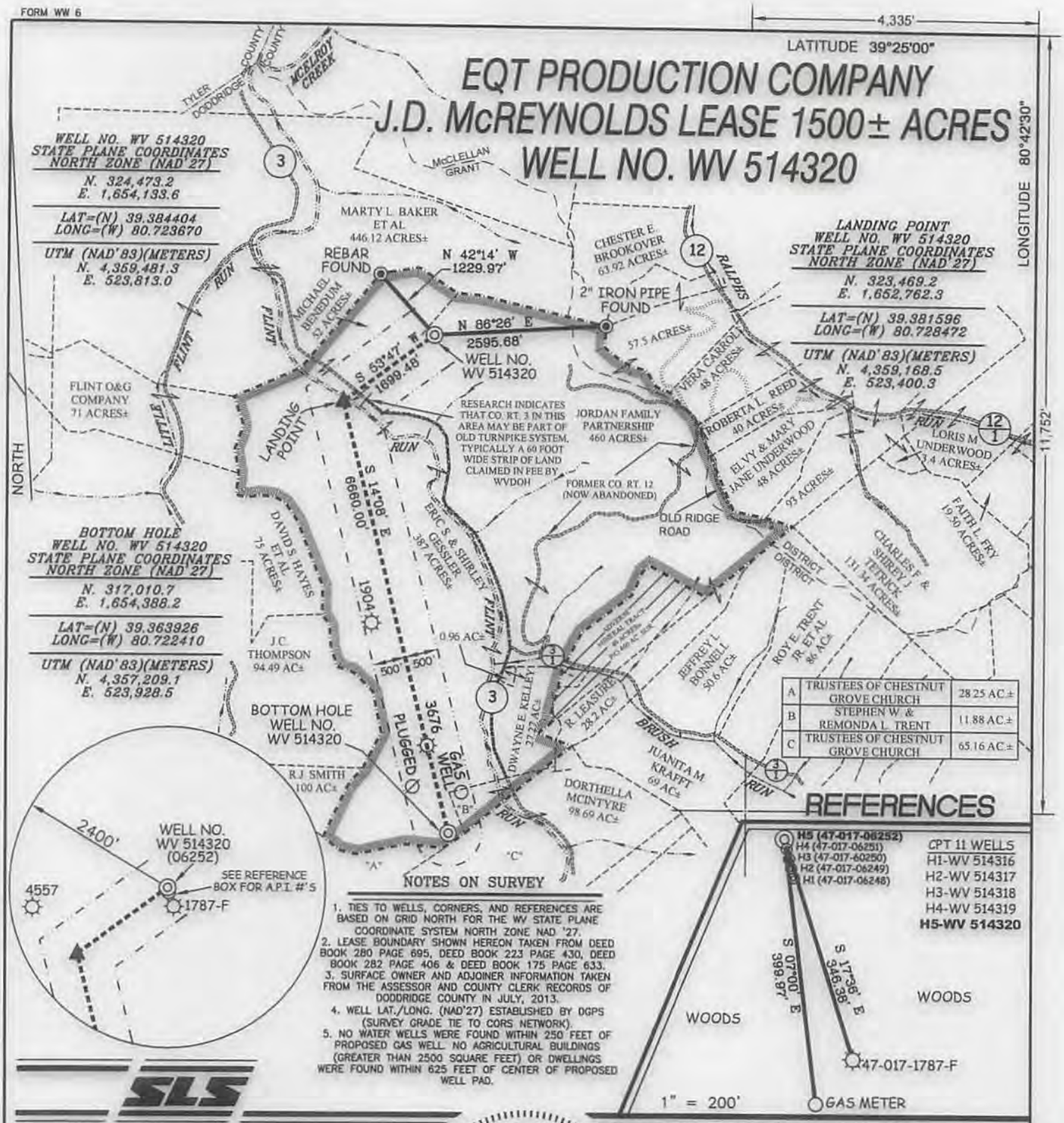


JMD 41,452'

02/28/2014

FORM WW 6

EQT PRODUCTION COMPANY
J.D. McREYNOLDS LEASE 1500± ACRES
WELL NO. WV 514320



SLS

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

GREGORY A. SMITH LICENSED No. 677 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.

DATE MARCH 15 , 20 13

REVISED DATE OCTOBER 17 , 20 13

OPERATORS WELL NO. WV 514320

API WELL NO. 47 — 017 — 06252 MOD H6A

STATE — COUNTY — PERMIT

MINIMUM DEGREE OF ACCURACY 1 / 200

PROVEN SOURCE OF ELEVATION DGPS (SURVEY GRADE TIE TO CORS NETWORK)

FILE NO. 7749P514320R

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 1,130' (GROUND) 1,111 (PROPOSED) WATERSHED FLINT RUN OF McELROY CREEK
DISTRICT GRANT COUNTY DODDRIDGE QUADRANGLE CENTER POINT 7.5'
SURFACE OWNER JORDAN FAMILY PARTNERSHIP ACREAGE 460±
ROYALTY OWNER J. D. McREYNOLDS HEIRS/ASSIGNS ACREAGE 1500± 02/28/2014
PROPOSED WORK:
LEASE NO. 090500
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 GENESSO
ESTIMATED DEPTH TVD 6843

COUNTY NAME

PERMIT

WELL OPERATOR EQT PRODUCTION COMPANY
ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280
BRIDGEPORT, WV 26330

DESIGNATED AGENT REX C. RAY
ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280
BRIDGEPORT, WV 26330