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

December 19, 2013

EQT PRODUCTION COMPANY
POST OFFICE BOX 280
BRIDGEPORT, WV 26330

Re: Permit Modification Approval for API Number 10302733, Well #: 513924 EQT PRODUCTIC
move + extend horizontal leg

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

mod

October 30, 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 47-10302733

Dear Mr. Smith,

Attached is a modification to the above well. The top hole has NOT changed from the original application however, we have moved the horizontal leg and extended it. I am enclosing a new WW-6B, WW-6A1,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.

Received
OCT 31 2013
Office of Oil and Gas
WV Dept. of Environmental Protection

V - 6B
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4710302733

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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	254
	Operator ID	County	District	Quadrangle

Operator's Well Number: 513924 Well Pad Name BIG190

Farm Name/Surface Owner : Mills-Wetzel Public Road Access: CR 15/2

Elevation, current ground: 1,473.5 Elevation, proposed post-construction: 1,473.5

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

Other _____

(b) If Gas: Shallow • Deep _____

Horizontal •

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Existing Pad? Yes or No: YES

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

Target formation is Marcellus at a depth of 7533 with the anticipated thickness to be 62 feet and anticipated target pressure of 4764 PSI

Proposed Total Vertical Depth: 7,533

Formation at Total Vertical Depth: Marcellus

Proposed Total Measured Depth 14,300

Proposed Horizontal Leg Length 5,708

Approximate Fresh Water Strata Depths: 672, 677, 744

Method to Determine Fresh Water Depth: By offset wells

Approximate Saltwater Depths: n/a

Approximate Coal Seam Depths: 411, 1204, 1222

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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105-02755

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CASING AND TUBING PROGRAM

E	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill- up (Cu.Ft.)
ductor	20	New	Varies	Varies	40	40	38
sh Water	13 3/8	New	MC-50	54	844	844	738
l							
rmediate	9 5/8	New	MC-50	40	3,474	3,474	1,366
duction	5 1/2	New	P-110	20	14,300	14,300	See Note 1
ing	2 3/8		J-55	4.6			May not be run, if run will be set 100' less than TD
rs							

E	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
ductor	20	24	0.635	-	Construction	1.18
sh Water	13 3/8	17 1/2	0.380	2,485	1	1.21
l						
rmediate	9 5/8	12 3/8	0.395	3,600	1	1.21
duction	5 1/2	8 1/2	0.361	12,640	-	1.27/1.86
ing						
rs						

Packers

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d:	N/A			
es:	N/A			
oths Set:	N/A			

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

- 6B

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3)

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 approxmate depth of 6226'. Then kick off the horizontal leg into the Marcellus using a slick water frac.

Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

aulic fracturing is completed in accordance with state regulations using water recycled from previously fractured wells and obtained from water sources. This water is mixed with sand and a small percentage (less than 0.3%) of chemicals (including 15% Hydrochloric acid, g agent, gel breaker, friction reducer, biocide, and scale inhibitor), referred to in the industry as a "slickwater" completion. Maximum pated treating pressures are expected to average approximately 8500 psi, maximum anticipated treating rates are expected to average oximately 100 bpm. Stage lengths vary from 150 to 300 feet. Average approximately 200,000 barrels of water per stage. Sand sizes from 100 mesh to 20/40 mesh. Average approximately 200,000 pounds of sand per stage.

Total area to be disturbed, including roads, stockpile area, pits, etc, (acres): no additional disturbance

Area to be disturbed for well pad only, less access road (acres): no additional disturbance

Describe centralizer placement for each casing string.

rface: Bow spring centralizers – One at the shoe and one spaced every 500'.

ermediate: Bow spring centralizers– One cent at the shoe and one spaced every 500'.

oduction: One spaced every 1000' from KOP to Int csg shoe

Describe all cement additives associated with each cement type. **Surface (Type 1 Cement):** 0-3% Calcium Chloride l to speed the setting of cement slurries.

% flake. Loss Circulation Material (LCM) is used to combat the loss of the cement slurry to a thief zone.

rmediate (Type 1 Cement): 0-3% Calcium Chloride. Salt is used in shallow, low temperature formations to speed the setting of cement ies. 0.4% flake. Loss Circulation Material (LCM) is used to combat the loss of whole drilling fluid or cement slurry (not filtrate) thief zone.

duction:

l (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time.

% CFR (dispersant). Makes cement easier to mix.

l (Type H Cement): 0.25-0.40% Lignosulfonate (Retarder). Lengthens thickening time.

0.3% CFR (dispersant). This is to make the cement easier to mix.

% Calcuim Carbonate. Acid solubility.

0.6% Halad (fluid loss). Reduces amount of water lost to formation.

Proposed borehole conditioning procedures. **Surface:** Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 utes. To ensure that there is no fill, short trip two stands with no circulation. If there is fill, bring compressors back on circulate hole clean. A constant rate of higher than expected cuttings volume likely indicates washouts that will not clean up.

rmediate: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at ace. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. If foam drilling, to enhance cleaning use a soap sweep or increase injection rate & foam concentration.

duction: Pump marker sweep with nut plug to determine actual hole washout. Calculate a gauge holes bottoms up volume. form a cleanup cycle by pumping 3-5 bottoms up or until the shakers are clean. Check volume of cuttings coming across shakers every 15 minutes.

ote: Attach additional sheets as needed.

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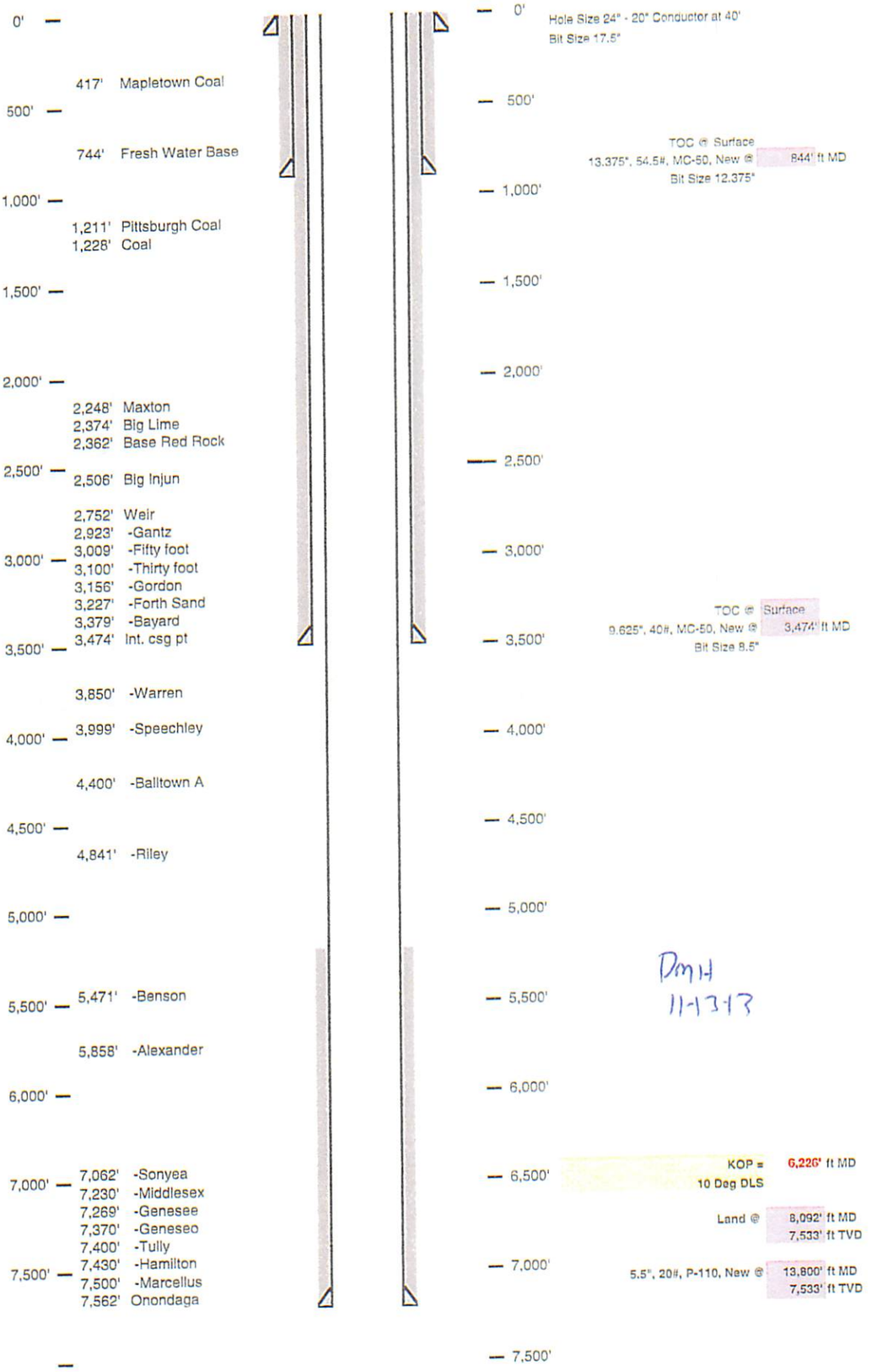
Well Schematic
EQT Production

Well Name	513924 (BIG190H8)
County	Wetzel
State	West Virgina

Elevation KB:	1482
Target	Marcellus
Prospect	
Azimuth	342
Vertical Section	6038



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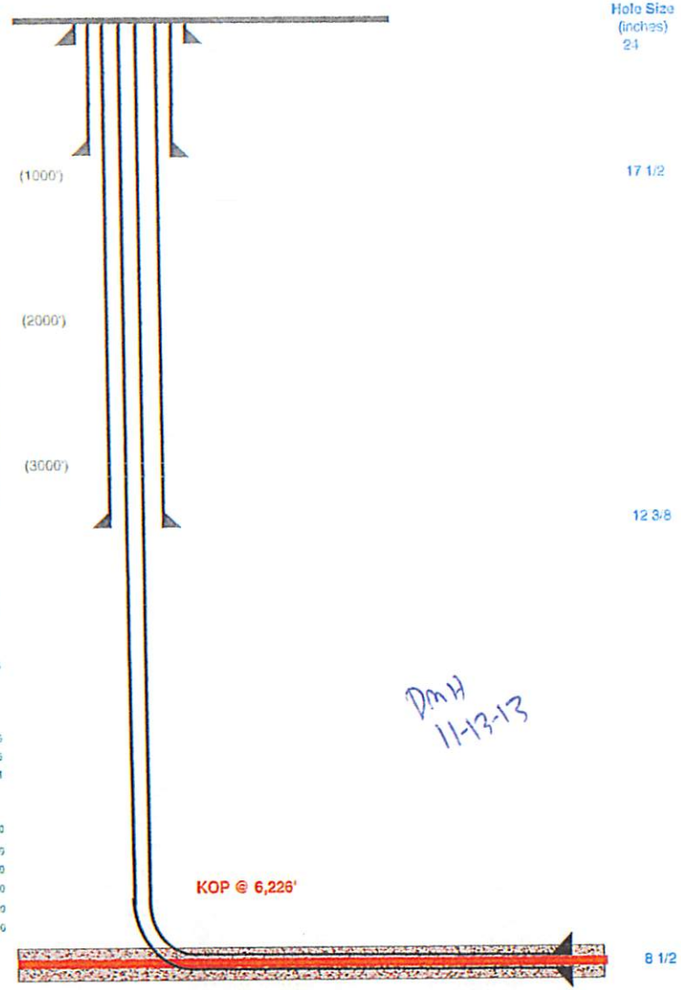
Well 513924 (BIG190H8)
EQT Production
Pine Grove
Wetzel West Virgina

Azimuth 342
Vertical Section 6038

TVD Depth (feet)	Formation Tops (TVD)		
0'			
250'			
	Mapletown Coal	417	
500			
750'	Base Fresh Water	741	
1,000'			(1000')
	Pittsburgh Coal	1211	
1,250'	Coal	1229	
1,500'			
1,750'			
2,000'	Maxton	2246 - 2393	(2000')
	Big Lime	2374 - 2471	
2,250'	Base Red Rock	2392	
	Big Injun	2396 - 2752	
2,500'	Weir	2732 - 2804	
	-Gantz	2923 - 2969	
2,750'	-Fifty foot	3003 - 3044	
	-Thirty foot	3100 - 3159	
3,000'	-Gordon	3196 - 3226	(3000')
	-Forth Sand	3227 - 3283	
3,250'	-Bayard	3379 - 3424	
	Int. coq pt	3474	
3,500'			
3,750'			
	-Warren	3850 - 3906	
4,000'	-Speechley	3909 - 4016	
4,250'			
	-Balltown A	4400 - 4496	
4,500'			
4,750'			
	-Riley	4841 - 4926	
5,000'	-Benson	5171 - 5526	
	-Alexander	5353 - 6021	
6,000'			
6,500'	-Sonyea	7092 - 7230	
	-Middlesex	7230 - 7269	
7,000'	-Genesee	7269 - 7370	
	-Geneseo	7370 - 7400	
	-Tully	7400 - 7430	
7,250'	-Hamilton	7430 - 7500	
	Marcellus top	7500	
	Target Inside Marcellus	7533	
7,500'	Onondaga	7592	



Land curve @ 7,533' ft TVD
8,092' ft MD

Est. TD @ 7,533' ft TVD
13,800' ft MD

5,708' ft Lateral

Run Logs, Plug back to KOP at 6226
Kick off for horizontal well in Marcellus

Hole Size (inches)	Casing Type	Size (inches)	Wt (ppf)	Grade
24	Conductor	20	81#	MC-50
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

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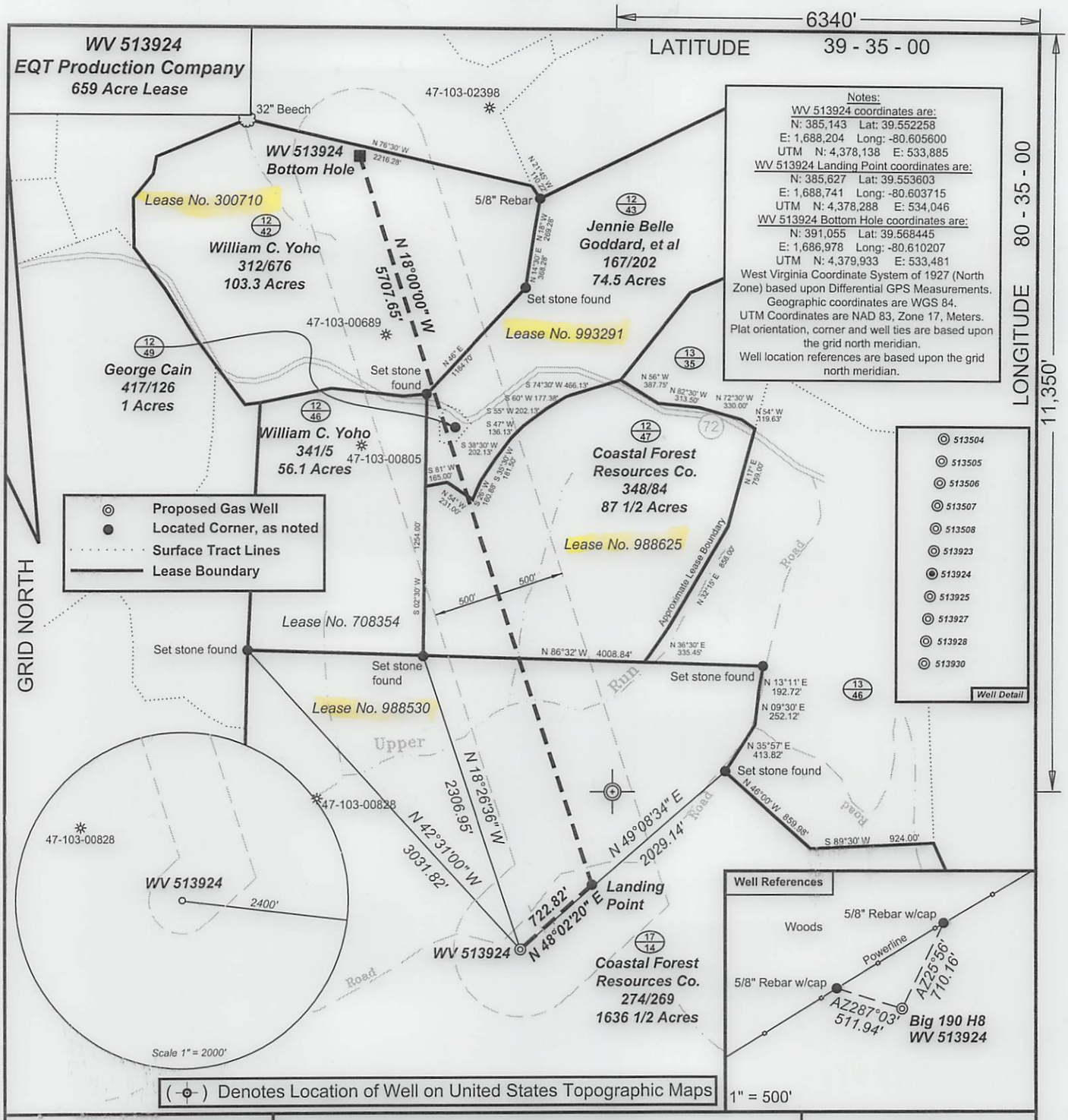

Allegheny Surveys, Inc. Established 1988

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 Department of Environmental Protection.

Ben R. Singleton

P.S. 2092

Ben R. Singleton LICENSED NO. 2092 STATE OF WEST VIRGINIA PROFESSIONAL SURVEYOR

SEAL

FILE NO: 196-34-G-10
DRAWING NO: 196-10 Big 190 H8 Plat rev 9-11-2012.dwg
SCALE: 1" = 1000'
MINIMUM DEGREE OF ACCURACY: 1:2500
PROVEN SOURCE OF ELEVATION: NGS CORS Station

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

DATE: October 23 20 13
OPERATOR'S WELL NO. WV 513924
API WELL NO
47 - 103 - 02733
STATE COUNTY PERMIT

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WELL TYPE: ☐ OIL ☒ GAS ☐ LIQUID INJECTION ☐ WASTE DISPOSAL
(IF GAS) PRODUCTION : ☐ STORAGE ☐ DEEP ☒ SHALLOW
LOCATION: ELEVATION: 1473.5' (As-built) WATERSHED Upper Run and North Fork QUADRANGLE: Big Run
DISTRICT: Grant COUNTY: Wetzel
SURFACE OWNER: Coastal Forest Resources Co. f/k/a Coastal Lumber Company ACREAGE: 1,636.5
ROYALTY OWNER: Mills-Wetzel Land, Inc., Piney Holdings Inc. et. al., Barbara Ann Roche et. al., James Douglas White et. al. LEASE NO: 988530, 988625 993291, 300710 ACREAGE: 659, 87.5, 74.5, 103.3
PROPOSED WORK: ☒ DRILL ☐ CONVERT ☐ DRILL DEEPER ☒ FRACTURE OR STIMULATE ☐ PLUG OFF OLD FORMATION
☐ PERFORATE NEW FORMATION ☐ OTHER PHYSICAL CHANGE IN WELL (SPECIFY)
☐ PLUG AND ABANDON ☐ CLEAN OUT AND REPLUG TARGET FORMATION: Marcellus ESTIMATED DEPTH: TVD=7,800 MD=15,250

WELL OPERATOR: EQT Production Company DESIGNATED AGENT: Rex C. Ray
ADDRESS: 115 Professional Place P.O. Box 280 ADDRESS: 115 Professional Place P.O. Box 280
Bridgeport, WV 26330 Bridgeport, WV 26330