



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 PRODUCTIVE
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,

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

Vicki Roark
Permitting Supervisor-WV

Enc.

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

4710302733

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
Operator ID: 103 County: 4 District: 254 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

Existing Pad? Yes or No: YES

DMH
11-13-13

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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105-02125

4710302733

mod

- 6B
3)

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

DmH
11-13-13

d:	N/A			
as:	N/A			
ths 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.

1050212

- 6B

47 10302733

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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 approximate depth of 3228'. 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:

Hydraulic 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, surfactant, 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 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. 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

Describe all cement additives associated with each cement type. Surface (Type 1 Cement): 0-3% Calcium Chloride to speed the setting of cement slurries. 0.5% 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: 0.1% (Type 1 Cement): 0.2-0.7% Lignosulfonate (Retarder). Lengthens thickening time. 0.5% CFR (dispersant). Makes cement easier to mix. Intermediate (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. 0.5% Calcium 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 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 recirculate 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 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. 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.

Note: Attach additional sheets as needed.

Dm1
11-13-13

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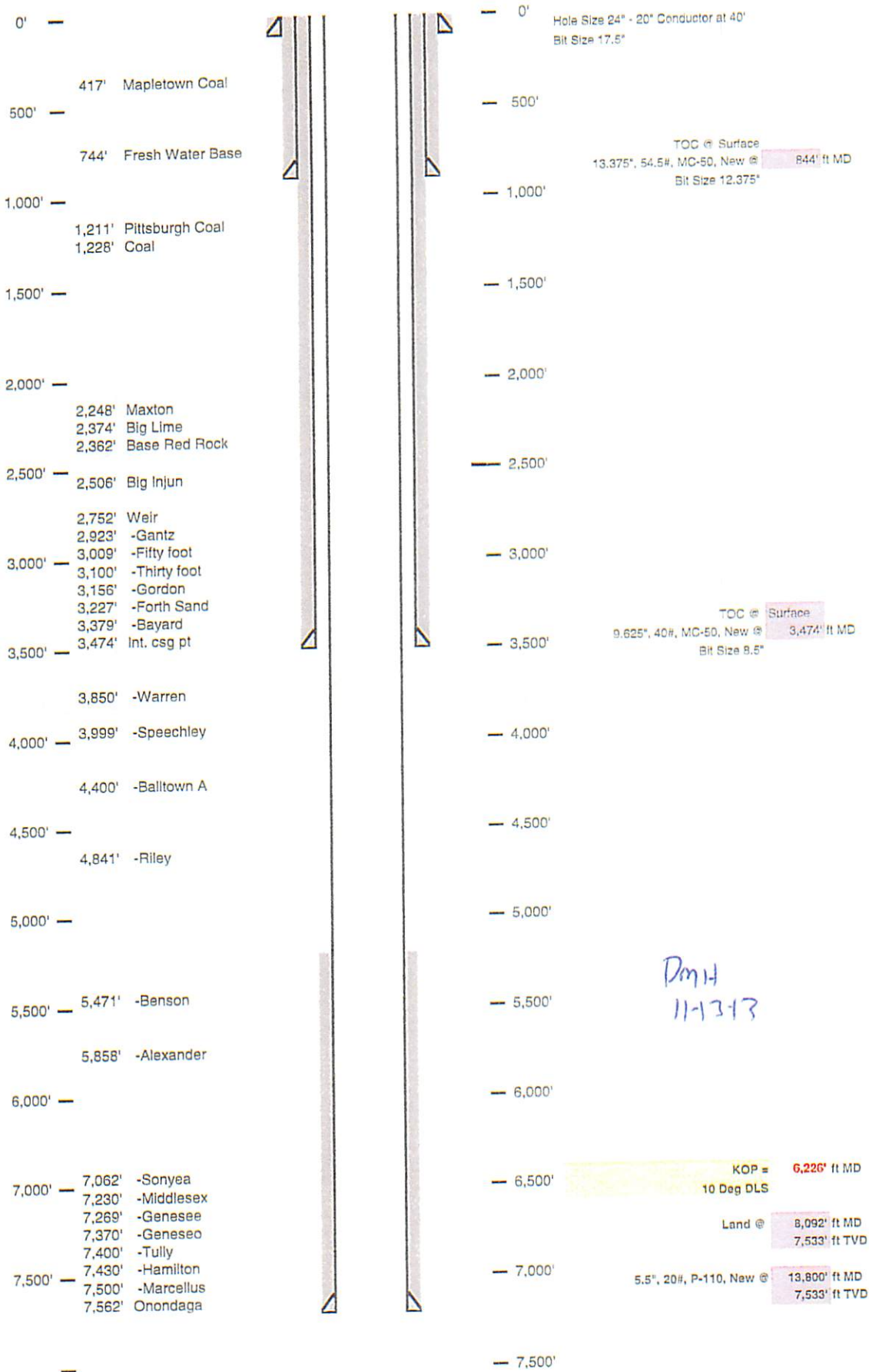
Well Schematic
EQT Production

Well Name: 513924 (BIG190H8)
County: Wetzel
State: West Virginia

Elevation KB:
Target
Prospect
Azimuth
Vertical Section

1482
Marcellus
342
6058

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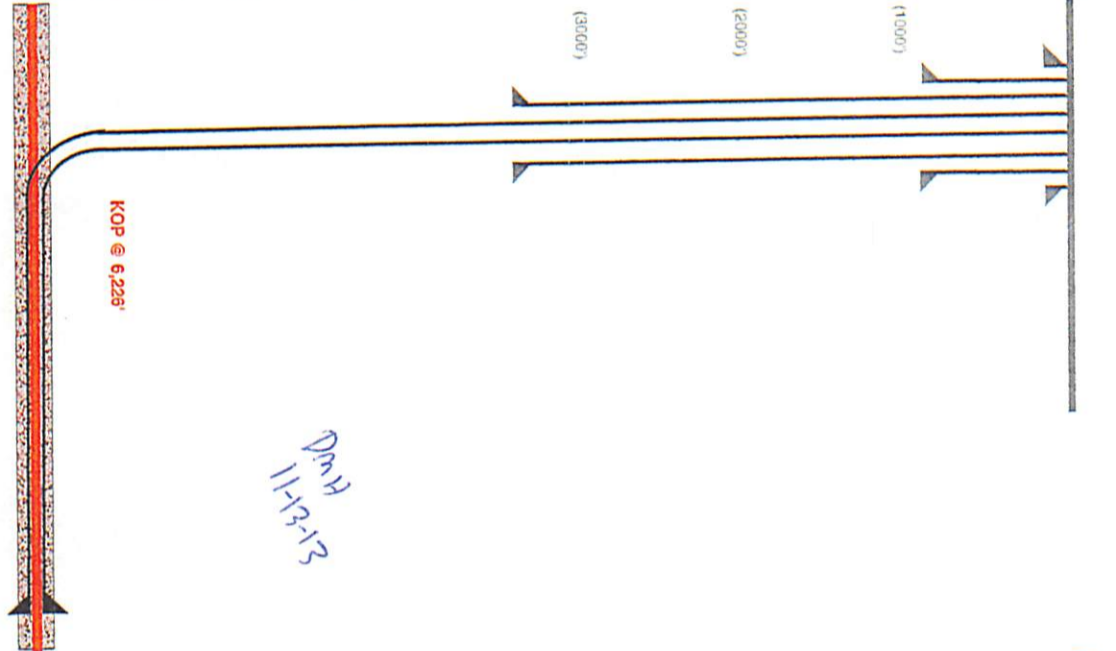
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max

Well 513924 (BIG190H8)
 EQT Production
 Phoebe Grove
 West Virginia

Admuth 312
 Vertical Section 6033

TVD Depth (feet)	Formation Tops (TVD)	Admuth Vertical Section
0		
250'	Maplewood Coal	417
500		
750	Base Fract. Water	711
1,000'	Pittsburgh Coal	1211
1,250'	Coal	1229
1,500'		
1,750'		
2,000'	Abandon	2311 - 2323
2,250'	Big Luma	2371 - 2371
2,500'	Base Fract. Bed	2392
2,750'	Big Luma	2396 - 2752
	Water	2398 - 2398
	Coal	2923 - 2923
	Fract. Bed	3959 - 3644
	Thinly bed	3190 - 3195
	Gasden	3155 - 3225
	Fract. Bed	3227 - 3227
	Bayard	3373 - 3124
	Int. exp. pl	3471
3,500'		
3,750'		
4,000'	Warma	3530 - 3905
	Speckley	3939 - 4936
4,250'		
4,500'	Edgemoor A	4100 - 4695
4,750'		
5,000'	Edgemoor	4331 - 4326
	Edgemoor	5171 - 5226
	Edgemoor	5333 - 6021
6,000'		
6,500'	Edgemoor	7052 - 7220
	Middlesex	7230 - 7295
	Edgemoor	7259 - 7370
	Edgemoor	7370 - 7400
	Tully	7400 - 7420
	Hamilton	7420 - 7500
7,250'	Marcellus top	7500
	Target Inside Marcellus	7533
7,500'	Onondaga	7532



Depth (ft)	Wellbore Size (inches)	Casing Type	Casing Size (inches)	WT (ppf)	Grade
0 - 7,250	21	Conductor	20	81#	MIC-50
7,250 - 7,500	17 1/2	Surface	13 3/8	54#	MIC-50
7,500 - 7,533	8 1/2	Production Casing	5 1/2	20#	P-110
7,533 - 13,800	8 1/2	Production Casing	5 1/2	20#	P-110

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

Hand
 3-1-13

Land curve @ 7533' ft TVD
 8,092' ft MD

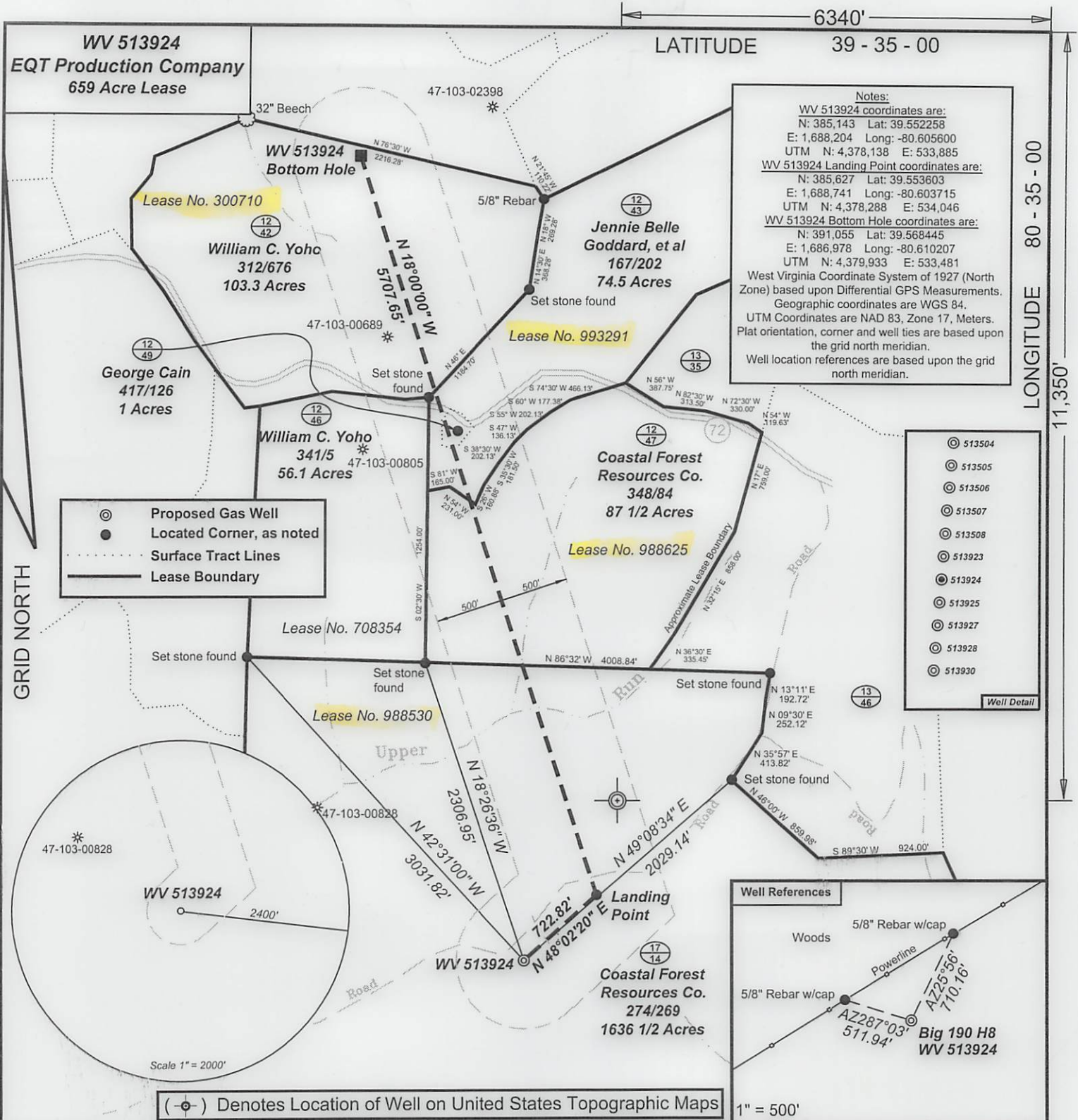
Est. TD @ 7533' ft TVD
 13,800' ft MD

5,708' ft Lateral

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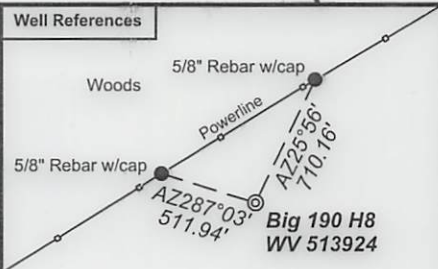
WV Department of
 Environmental Protection



Notes:
 WV 513924 coordinates are:
 N: 385,143 Lat: 39.552258
 E: 1,688,204 Long: -80.605600
 UTM N: 4,378,138 E: 533,885
 WV 513924 Landing Point coordinates are:
 N: 385,627 Lat: 39.553603
 E: 1,688,741 Long: -80.603715
 UTM N: 4,378,288 E: 534,046
 WV 513924 Bottom Hole coordinates are:
 N: 391,055 Lat: 39.568445
 E: 1,686,978 Long: -80.610207
 UTM N: 4,379,933 E: 533,481
 West Virginia Coordinate System of 1927 (North Zone) based upon Differential GPS Measurements.
 Geographic coordinates are WGS 84.
 UTM Coordinates are NAD 83, Zone 17, Meters.
 Plat orientation, corner and well ties are based upon the grid north meridian.
 Well location references are based upon the grid north meridian.

- ⊙ 513504
- ⊙ 513505
- ⊙ 513506
- ⊙ 513507
- ⊙ 513508
- ⊙ 513923
- ⊙ 513924
- ⊙ 513925
- ⊙ 513927
- ⊙ 513928
- ⊙ 513930

⊙ Proposed Gas Well
 ● Located Corner, as noted
 Surface Tract Lines
 ——— Lease Boundary

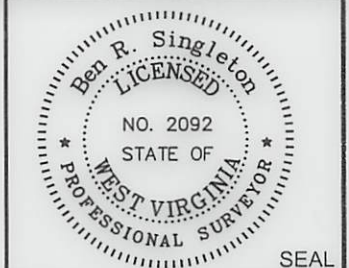


(⊙) Denotes Location of Well on United States Topographic Maps



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



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

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 Bridgeport, WV 26330
 ADDRESS: 115 Professional Place P.O. Box 280 Bridgeport, WV 26330