



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

June 12, 2014

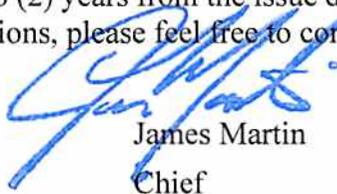
WELL WORK PERMIT
Horizontal 6A Well

This permit, API Well Number: 47-10302991, issued to EQT PRODUCTION COMPANY, is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

Please be advised that form WR-35, Well Operators Report of Well Work is to be submitted to this office within 90 days completion of permitted well work, as should form WR-34 Discharge Monitoring Report within 30 days of discharge of pits, if applicable. Failure to abide by all statutory and regulatory provisions governing all duties and operations hereunder may result in suspension or revocation of this permit and, in addition, may result in civil and/or criminal penalties being imposed upon the operators.

In addition to the applicable requirements of this permit, and the statutes and rules governing oil and gas activity in WV, this permit may contain specific conditions which must be followed. Permit conditions are attached to this cover letter.

Per 35CSR-4-5.2.g this permit will expire in two (2) years from the issue date unless permitted well work is commenced. If there are any questions, please feel free to contact me at (304) 926-0499 ext. 1654.



James Martin
Chief

Operator's Well No: 513833
Farm Name: KILCOYNE, JOHN W. & FLOREN'
API Well Number: 47-10302991
Permit Type: Horizontal 6A Well
Date Issued: 06/12/2014

Promoting a healthy environment.

PERMIT CONDITIONS

West Virginia Code § 22-6A-8(d) allows the Office of Oil and Gas to place specific conditions upon this permit. Permit conditions have the same effect as law. Failure to adhere to the specified permit conditions may result in enforcement action.

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.
2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.
3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.
4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.
5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations*, 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.
6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.
7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.
8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.
9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

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	County	District	Quadrangle
	103	4	254

2) Operator's Well Number: 513833 Well Pad Name BIG176

3) Farm Name/Surface Owner: Kilcoyne Public Road Access: CR 15

4) Elevation, current ground: 860.0 Elevation, proposed post-construction: 860.0

5) Well Type: (a) Gas Oil Underground Storage

Other _____

(b) If Gas: Shallow Deep

Horizontal

6) Existing Pad? Yes or No: Yes

DMH
4-7-14

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

Target formation is Genesee at a depth of 6872' with the anticipated thickness to be 34 feet and anticipated target pressure of 4342 PSI

8) Proposed Total Vertical Depth: 6,872

9) Formation at Total Vertical Depth: Genesee

10) Proposed Total Measured Depth: 12,395

11) Proposed Horizontal Leg Length: 4,422

12) Approximate Fresh Water Strata Depths: 65 & 135

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

14) Approximate Saltwater Depths: 1457, 1459, 1390, 1521

15) Approximate Coal Seam Depths: 109, 174, 239, 495, 602

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: _____

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Office of Oil and Gas

APR 26 2014

WV Department of
Environmental Protection

WW - 63
(3/13)

CASING AND TUBING PROGRAM

18)

TYPE	Size	New or Used	Grade	Weight per ft.	FOOTAGE: for Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu.Ft.)
Conductor	26	New	MC-50	77	1080	1080	49 C.T.S.
Surface	20	New	J-55	94	300	300	378 C.T.S.
Surface	13 3/8	New	MC-50	54	825	825	722 C.T.S.
Coal							
Intermediate	9 5/8	New	MC-50	40	3,072	3,072	1,206 C.T.S.
Production	5 1/2	New	P-110	20	12,395	12,395	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							

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4-7-14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	26	30	0.312	-	Construction	1.18
Surface	20	24	0.438	2,110	1	1.21
Surface	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

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.

(3/13)

19) Describe proposed well work, including the drilling and plugging back of any pilot hole:

Drill and complete a new horizontal well in the Genesee formation. The vertical drill to go down to an approximate depth of 5066'. Then kick off the horizontal leg into the Genesee 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): No additional disturbance

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

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.

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4-7-14

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.

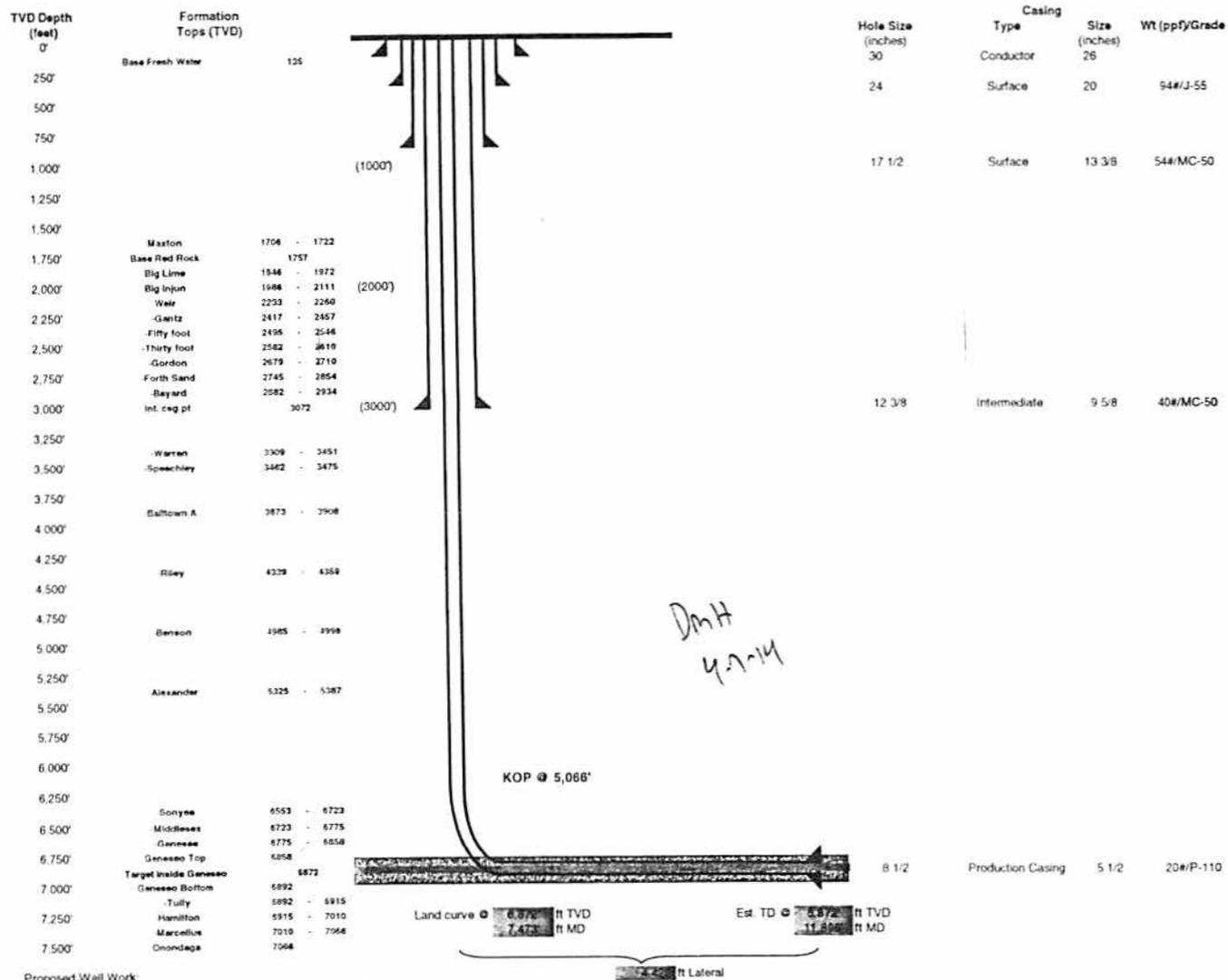
25) Proposed borehole conditioning procedures. Surface: Circulate hole clean (Approximately 30-45 minutes) rotating & reciprocating one full joint until cuttings diminish at surface. When cuttings returning to surface diminish, continue to circulate an additional 5 minutes. To ensure that there is no 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.

4710302991

Well: 513833 (BIG176H16)
 EQT Production
 Big Run
 Wetzal West Virginia

Azimuth: 251
 Vertical Section: 425



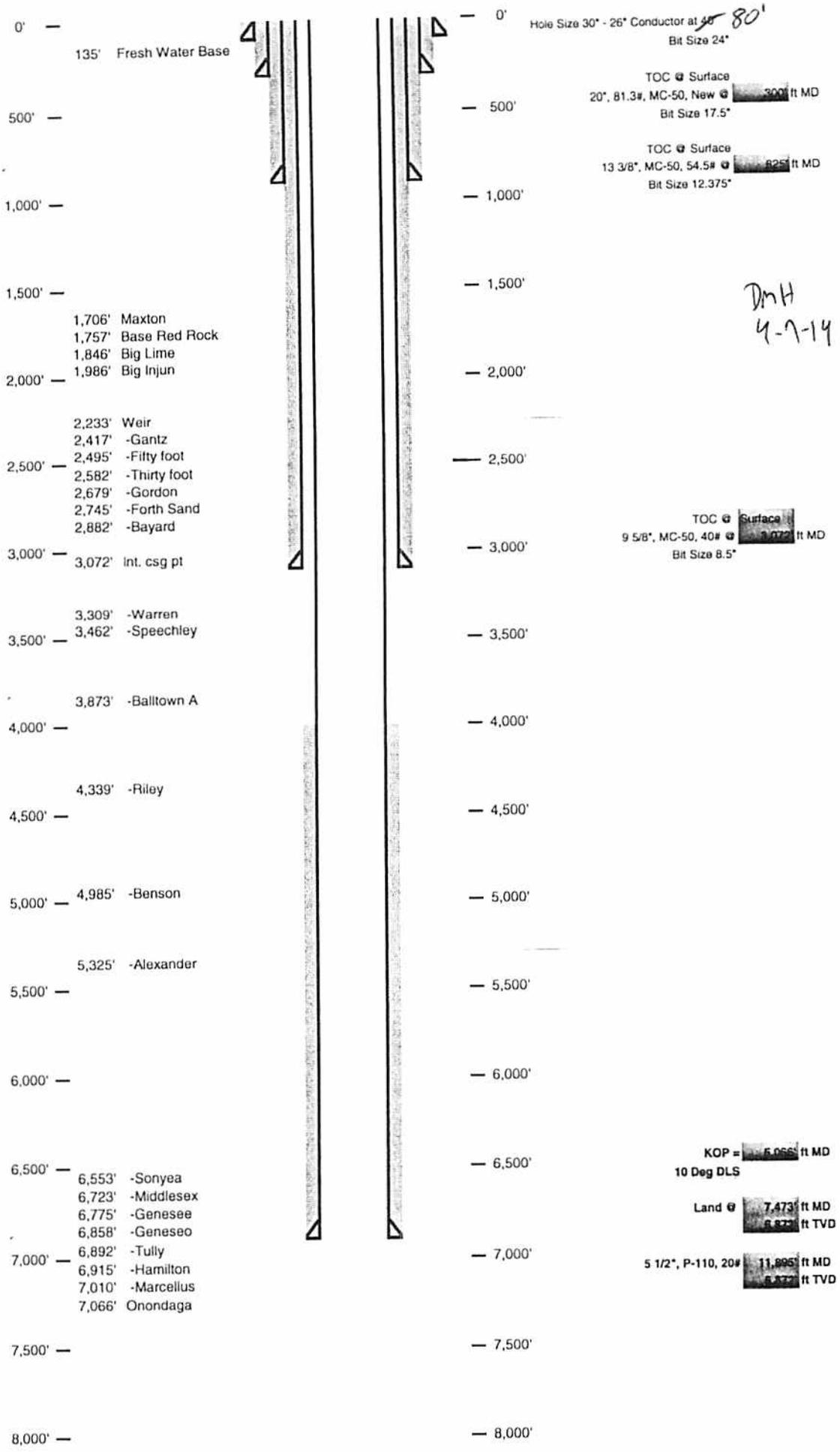
Proposed Well Work:
 Drill and complete a new horizontal well in the Genesee formation.

Well Schematic
EQT Production

Well Name 513833 (BIG176H16)
County [Redacted]
State West Virginia

Elevation KB:
Target
Prospect
Azimuth
Vertical Section

873
337
1322



WW-9
(5/13)

Page _____ of _____
API No. 47 - 103 - 0
Operator's Well No. 513833

STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS

Fluids/Cuttings Disposal & Reclamation Plan

Operator Name EQT Production Co. OP Code _____

Watershed (HUC10) North Fork Fishing Creek Quadrangle Big Run 7.5'

Elevation 860.0 County Wetzel District Grant

Do you anticipate using more than 5,000 bbls of water to complete the proposed well work? Yes x No _____

Will a pit be used? Yes: _____ No: X

If so please describe anticipated pit waste: _____

Will a synthetic liner be used in the pit? Yes _____ No X If so, what ml.? 60

Proposed Disposal Method For Treated Pit Wastes:

- _____ Land Application
- Underground Injection (UIC Permit Number 0014, 8462, 4037)
- _____ Reuse (at API Number _____)
- Off Site Disposal (Supply form WW-9 for disposal location)
- _____ Other (Explain _____)

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Will closed loop system be used? Yes, The closed loop system will remove drill cuttings from the drilling fluid. The drill cuttings are then prepared for transportation to an off-site disposal facility.

Drilling medium anticipated for this well? Air, freshwater, oil based, etc. Air is used to drill the top-hole sections of the wellbore. Surface, Intermediate, and Pilot hole sections, water based mud is used to drill the curve and lateral.

If oil based, what type? Synthetic, petroleum, etc _____

Additives to be used in drilling medium? MILBAR, Viscosifer, Alkalinity Control, Lime, Chloride Salts, Rate Filtration Control, Deflocculant, Lubricant, Detergent, Defoaming, Walnut Shell, X-Cide, SOLTEX Terra. Of the listed chemicals the following are generally used when drilling on air: lubricant, detergent, defoaming. Water based fluids use the following chemicals: MILBAR, viscosifer, alkalinity control, lime, chloride salts, rate filtration control, deflocculant, lubricant, detergent, defoaming, walnut shell, x-cide, SOLTEX terra

Drill cuttings disposal method? Leave in pit, landfill, removed offsite, etc. Landfill

- If left in pit and plan to solidify what medium will be used? (Cement, Lime, sawdust) n/a
- Landfill or offsite name/permit number? See Attached List

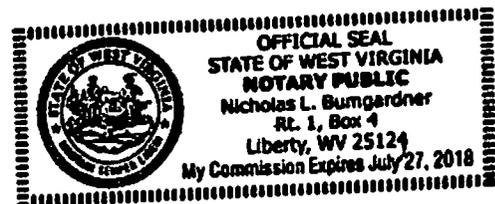
I certify that I understand and agree to the terms and conditions of the GENERAL WATER POLLUTION PERMIT issued on August 1, 2005, by the Office of Oil and Gas of the West Virginia Department of Environmental Protection. I understand that the provisions of the permit are enforceable by law. Violations of any term or condition of the general permit and/or other applicable law or regulation can lead to enforcement action.

I certify under penalty of law that I have personally examined and am familiar with the information submitted on this application form and all attachments thereto and that, based on my inquiry of those individuals immediately responsible for obtaining the information, I believe that the information is true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine or imprisonment.

Company Official Signature [Signature]
Company Official (Typed Name) Victoria J. Hoark
Company Official Title Permitting Supervisor

Subscribed and sworn before me this 27 day of MARCH, 2014

[Signature] Notary Public
My commission expires 4/27/2018



WW-9

Operator's Well No. 513833

Proposed Revegetation Treatment: Acres Disturbed No additional disturbance Prevegetation pH 5.9

Lime 3 Tons/acre or to correct to pH 6.5

Fertilize type _____

Fertilizer Amount 13 lbs/acre (500 lbs minimum)

Mulch 2 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
KY-31	40	Orchard Grass	15
Alsike Clover	5	Alsike Clover	5
Annual Rye	15		

Attach:

Drawing(s) of road, location, pit and proposed area for land application.

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: [Signature]

Comments: _____

Title: Oil & Gas Inspector Date: 4-7-14

Field Reviewed? (/) Yes () No

EQT Production Water plan
Offsite disposals for Marcellus wells

CWS TRUCKING INC.

P.O. Box 391
 Williamstown, WV 26187
 740-516-3586
 Noble County/Noble Township
 Permit # 3390

BROAD STREET ENERGY LLC

37 West Broad Street
 Suite 1100
 Columbus, Ohio 43215
 740-516-5381
 Washington County/Belpre Twp.
 Permit # 8462

LAD LIQUID ASSETS DISPOSAL INC.

226 Rankin Road
 Washington, PA 15301
 724-350-2760
 724-222-6080
 724-229-7034 fax
 Ohio County/Wheeling
 Permit # USEPA WV 0014

TRIAD ENERGY

P.O. Box 430
 Reno, OH 45773
 740-516-6021 Well
 740-374-2940 Reno Office Jennifer
 Nobel County/Jackson Township
 Permit # 4037

TRI COUNTY WASTE WATER MANAGEMENT, INC.

1487 Toms Run Road
 Holbrook, PA 15341
 724-627-7178 Plant
 724-499-5647 Office
 Greene County/Waynesburg
 Permit # TC-1009

KING EXCAVATING CO.

Advanced Waste Services
 101 River Park Drive
 New Castle, Pa. 16101
 Facility Permit# PAR000029132

Waste Management - Meadowfill Landfill

Rt. 2, Box 68 Dawson Drive
 Bridgeport, WV 26330
 304-326-6027
 Permit #SWF-1032-98
 Approval #100785WV

Waste Management - Northwestern Landfill

512 E. Dry Road
 Parkersburg, WV 26104
 304-428-0602
 Permit #SWF-1025 WV-0109400
 Approval #100833WV

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Office of Oil and Gas
 Bureau of Land Management



Where energy meets innovation.™

Site Specific Safety Plan

EQT BIG176 Pad

BIG RUN

Wetzel County, WV

For Wells:

513830 513831 513832 513833 513835

Date Prepared:

February 25, 2014

[Signature]

 EQT Production
Permitting Supervisor

 Title
3-27-14

 Date

[Signature]

 WV Oil and Gas Inspector
Oil & Gas Inspector

 Title
4-7-14

 Date

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 APR 24 2014
 WV Department of
 Environmental Protection

4710302991

Well Number: 513833 (BIG176H16)

Casing and Cementing			Deepest Fresh Water: 135'		
Type	Conductor	Mine Protection	Surface	Intermediate	Production
Hole Size, In.	30	24'	17 1/2	12 3/8	8 1/2
Casing Size, OD In.	26	20	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.312	0.438	0.380	0.395	0.361
Depth, MD	40' 80'	300'	825'	3,072'	12,395'
Depth, TVD	40' 80'	300'	825'	3,072'	6,872'
Centralizers Used	Yes	Yes	Yes	Yes	Yes
Weight/Grade	77#/MC-50	94#/J-55	54#/MC-50	40#/MC-50	20#/P-110
New or Used	New	New	New	New	New
Pressure Testing	-	20% Greater than exp. Pressure	20% Greater than exp. Pressure	20% Greater than exp. Pressure	20% greater than exp. fracture pressure
After Fracture Pressure Testing	-	-	-	-	20% greater than exp. shut pressure
ID, in	25.376	19.124	12.615	8.835	4.778
Burst (psi)	-	2,110	2,480	3,590	12,640
Collapse (psi)	-	520	1,110	2,470	11,100
Tension (mlbs)	-	1402	455	456	587
Cement Class	-	-	-	-	H
Cement Type	Construction	1	1	1	-
Cement Yield	1.18	1.200	1.21	1.21	1.27/1.86
Meets API Standards	-	Yes	Yes	Yes	Yes
WOC Time	-	Min. 8 hrs	Min. 8 hrs	Min. 8 hrs	Min. 8 hrs
Top of Cement (Planned)	Surface	Surface	Surface	Surface	4,066'
Fill (ft.)	40' 80'	300'	825'	3,072'	7,829'
Percent Excess	-	30	20	20	10
Est. Volume (cu ft)	49	378	722	1,206	1,999
Est. Volume (BBLs)	9	67	129	215	356

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APR 24 2014

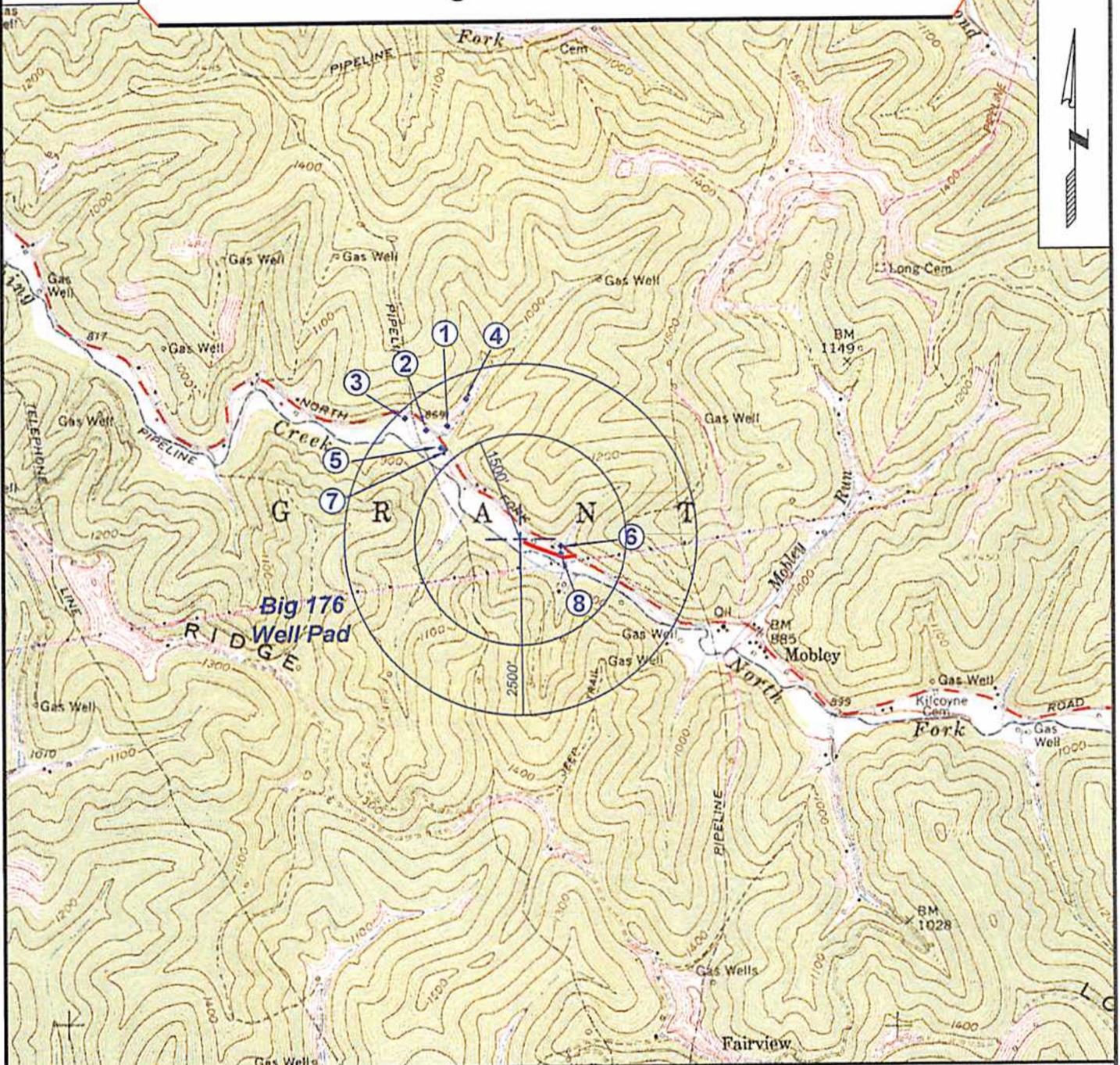
Department of
Energy and Conservation

Topo Quad: Big Run 7.5' Scale: 1" = 2000'
 County: Wetzel Date: March 28, 2014
 District: Grant Project No: 145-34-G-10

Water

Big 176 Well Pad

Topo



SURVEYING AND MAPPING SERVICES PERFORMED BY:
ALLEGHENY SURVEYS, INC.
 1-800-482-8606
 P.O. BOX 438
 BIRCH RIVER, WV 26610
 PH: (304) 649-8606
 FAX: (304) 649-8608

PREPARED FOR:

EQT Production Company
 115 Professional Place
 P.O. Box 280
 Bridgeport, WV 26330

Received

MAR 31 2014

BIG 176
WV 513833
EQT Production Company

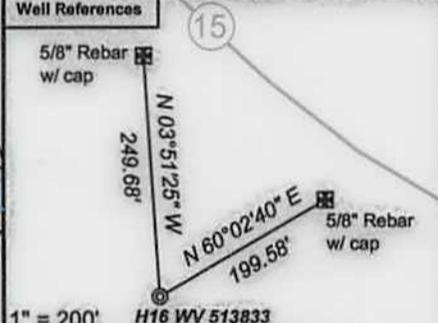
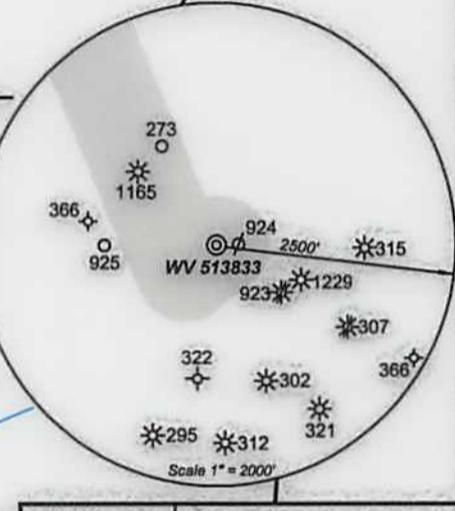
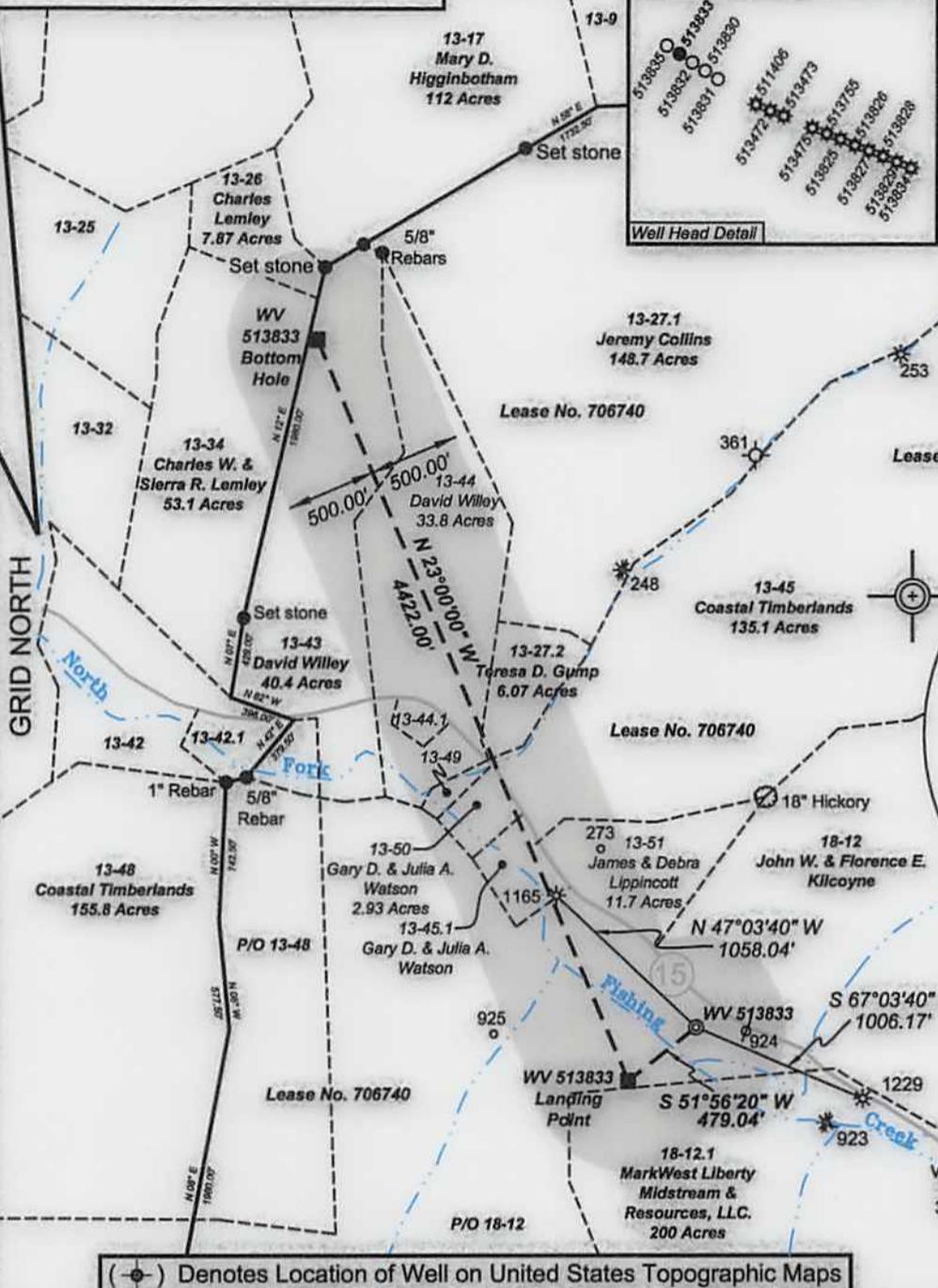
LATITUDE 39 - 35 - 00

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

Notes:
WV 513833 coordinates are:
N: 388,084.21 Lat: 39.560670
E: 1,700,924.42 Long: -80.560798
UTM N: 4,379,099.15 E: 537,745.37
WV 513833 Landing Point coordinates are:
N: 387,788.88 Lat: 39.559847
E: 1,700,547.25 Long: -80.562124
UTM N: 4,379,007.25 E: 537,631.95
WV 513833 Bottom Hole coordinates are:
N: 391,859.35 Lat: 39.570965
E: 1,698,819.44 Long: -80.568423
UTM N: 4,380,238.57 E: 537,084.90

West Virginia Coordinate System of 1927 (North Zone) based upon Differential GPS Measurements.
Plat orientation, corner and well ties are based upon the grid north meridian.
Well location references are based upon the grid north meridian.
UTM coordinates are NAD83, Zone 17, Meters.

LONGITUDE 80 - 32 - 30



(⊙) 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: 145-34-G-10
DRAWING NO: 145-10 Big 176 H16
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: June 3 20 14
OPERATOR'S WELL NO. 513833
API WELL NO
47 - 103 - 0299146A
STATE COUNTY PERMIT

WELL TYPE: OIL GAS LIQUID INJECTION WASTE DISPOSAL
(IF GAS) PRODUCTION: STORAGE DEEP SHALLOW
LOCATION: ELEVATION: As-built 860' WATERSHED North Fork of Fishing Creek QUADRANGLE: Big Run
DISTRICT: Grant COUNTY: Wetzel
SURFACE OWNER: John W. and Florence E. Kilcoyne ACREAGE: 377.06
ROYALTY OWNER: EQT Production Company, Inc. LEASE NO: 706740 ACREAGE: 1003.75
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: Genesee ESTIMATED DEPTH: TVD=7100'
MD=14,500'

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