



west virginia department of environmental protection

Office of Oil and Gas
601 57th Street, S.E.
Charleston, WV 25304
(304) 926-0450
fax: (304) 926-0452

Earl Ray Tomblin, Governor
Randy C. Huffman, Cabinet Secretary
www.dep.wv.gov

PERMIT MODIFICATION APPROVAL
/ Horizontal 6A Well - 1

EQT PRODUCTION COMPANY
120 PROFESSIONAL PLACE

BRIDGEPORT, WV 26330

Re: Permit Modification Approval for 514562

Additional Lease Added

EQT PRODUCTION COMPANY

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.

If there are any questions, please feel free to contact me at (304) 926- 0450.



James A. Martin
Chief

Operator's Well Number: 514562
Farm Name: HENTHORN, DENCIL ET AL
U.S. WELL NUMBER: **47-103-02980**
/ Horizontal 6A Well - 1
Date Issued: 8/11/2016

Promoting a healthy environment.



June 8, 2016

Mr. Gene Smith
West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304

4710302980 MCB

Re: Modification of 47-103-02980

Dear Mr. Smith,

Please accept the attached updates for the above referenced permit. Upon inspection of our as-drilled plat, we noted the curve geometry crossed into 1 additional lease, #993904. Enclosed is an updated WW-6A1, WW-6B, mylar plat and rec plan reflecting corrections to update the permit file to be consistent with the as-drilled well bore.

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

Sincerely,

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

Vicki Roark
Permitting Supervisor-WV

Enc.

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STATE OF WEST VIRGINIA
DEPARTMENT OF ENVIRONMENTAL PROTECTION, OFFICE OF OIL AND GAS
WELL WORK PERMIT APPLICATION

1) Well Operator: EQT Production Company 306686 Wetzel Grant Big Run
Operator ID County District Quadrangle

2) Operator's Well Number: 514562 Well Pad Name: BIG367

3) Farm Name/Surface Owner: Dencil Henthorn et al Public Road Access: Rt 74

4) Elevation, current ground: 1442.9 Elevation, proposed post-construction: 1442.9

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

(b) If Gas Shallow Deep
Horizontal

6) Existing Pad: Yes or No Yes

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 7625', 56', 2620 PSI

8) Proposed Total Vertical Depth: 7625

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 12009

11) Proposed Horizontal Leg Length: 3250

12) Approximate Fresh Water Strata Depths: 436,481,708

13) Method to Determine Fresh Water Depths: From offset wells

14) Approximate Saltwater Depths: 1968,2133,2171

15) Approximate Coal Seam Depths: 516,730,834,885,1022,1193,1683

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? Yes No

(a) If Yes, provide Mine Info: Name: _____
Depth: _____
Seam: _____
Owner: _____

47 103 02980

18)

CASING AND TUBING PROGRAM

TYPE	Size (in)	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling (ft)	INTERVALS: Left in Well (ft)	CEMENT: Fill-up (Cu. Ft.)/CTS
Conductor	26	New	A-500	85.6	40	40	57.82 ft ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	961	961	975.8 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2911	2911	1268.5 ft ³ / CTS
Production	5 1/2	New	P-110	20	11976	11976	500' above top producing zone
Tubing	2 3/8		J-55	4.7		May not be run, if run set 40' above top perf or 80° inclination	
Liners							

TYPE	Size (in)	Wellbore Diameter (in)	Wall Thickness (in)	Burst Pressure (psi)	Anticipated Max. Internal Pressure (psi)	Cement Type	Cement Yield (cu. ft./k)
Conductor	26	30	.312	884	707	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	Class A	1.19
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	Class A	1.18
Production	5 1/2	8 1/2	.361	12640	10112	Class H	1.25/2.06
Tubing	2 3/8	NA	.19	7700			
Liners							

47 103 02980 MoD

PACKERS

Kind:				
Sizes:				
Depths Set:				

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19) 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. Drill the vertical to an approximate depth of 4190'. Kick off and drill curve. Drill the lateral in the Marcellus. Cement casing.

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 internal casing pressure is expected to be approximately 10000 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:

47 103 02090 MOD

- Surface: Bow spring centralizers – One centralizer at the shoe and one spaced every 500'.
- Intermediate: Bow spring centralizers– One centralizer at the shoe and one spaced every 500'.
- Production: One solid body centralizer spaced every other joint from production casing shoe to KOP

24) Describe all cement additives associated with each cement type:

Conductor: Class A no additives
 Surface (Class A Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries
 Intermediate (Class A Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries.
 Production:
 Lead (Type H Cement): 0.2% CD-20 (dispersant makes cement easier to mix). .15% SuperFL-300 (fluid loss/lengthens thickening time) .15% SEC-10 (fluid loss) 50:50 POZ (extender)
 Tail (Type H Cement): 0.2% Super CR-1 (Retarder). Lengthens thickening time. .3% Super FL-200 (fluid loss) .2% SEC-10 (Fluid loss). .2% SuperFL-350 (fluid loss) Reduces amount of water lost to formation. 60 % Calcium Carbonate. Acid solubility.

25) Proposed borehole conditioning procedures:

Surface: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.
 Intermediate: Circulate hole clean while rotating & reciprocating the drill string until cuttings diminish at surface.
 Production: Pump marker sweep with nut plug to determine actual hole washout. Calculate gauge hole 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.

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*Note: Attach additional sheets as needed.

EQT WELL NO. 514562

AS DRILLED COORDINATES FOR WELL NO. WV 514562

NOTES:

- PLAT ORIENTATION, CORNERS, AND WELL REFERENCES ARE BASED UPON THE GRID NORTH MERIDIAN FOR THE WV STATE PLANE COORDINATE SYSTEM, NORTH ZONE NAD 27. WELL LOCATION REFERENCE TIES ARE BASED UPON THE MAGNETIC MERIDIAN.
-THERE ARE NO (O) WATER WELL(S) LOCATED WITHIN 250' OF WELL H1.
-THERE ARE NO (O) STRUCTURE(S) LOCATED WITHIN 625' OF WELL H1.

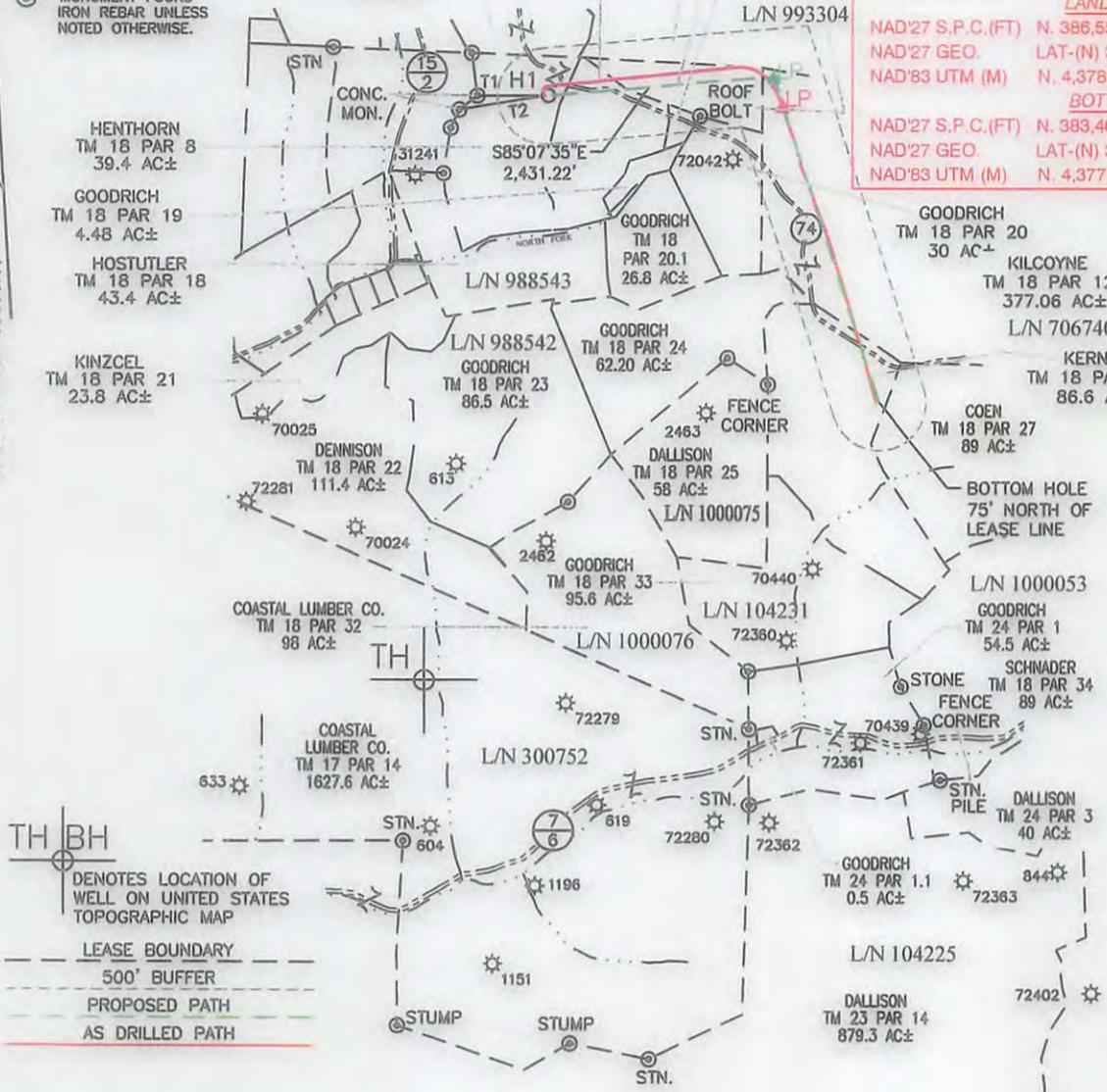
MONUMENT FOUND IRON REBAR UNLESS NOTED OTHERWISE.

Table with 3 columns: NAD'27 S.P.C.(FT), NAD'27 GEO., NAD'83 UTM (M) and 2 columns: N, E. Includes sub-sections for LANDING POINT and BOTTOM HOLE.

NAD'27 GRID NORTH

LONGITUDE 80°32'30"

9,700 TOP HOLE



TH BH DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAP
LEASE BOUNDARY
500' BUFFER
PROPOSED PATH
AS DRILLED PATH

SPECIAL NOTES
-LEASE AND SURFACE INFO SHOWN HEREON WAS TAKEN FROM PERMIT PLAT DATED JUNE 23, 2014 FOR API# 47-103-02980H.
-AS DRILLED INFORMATION PROVIDED BY EQT.

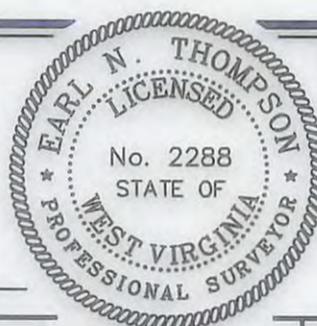
Table with 3 columns: LINE, BEARING, DIST. Includes lines T1 and T2.

Table with 3 columns: LEASE NO., ROYALTY OWNER, ACRES. Includes leases 706740 and 104231.



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. 2288 Earl N. Thompson



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS. DATE JUNE 23, 2014

REVISED AUGUST 25, 2015 & JUNE 06, 2016

OPERATORS WELL NO. WV 514562

API WELL NO. 47-103-02980H STATE COUNTY PERMIT

MINIMUM DEGREE OF ACCURACY 1/2500 FILE NO. 8471BIG 367 WELLSR2 HORIZONTAL & VERTICAL CONTROL DETERMINED BY OPUS (SURVEY GRADE GPS) 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: PAD ELEVATION 1,442.9' WATERSHED NORTH FORK OF FISHING CREEK DISTRICT GRANT COUNTY WETZEL QUADRANGLE BIG RUN 7.5'

SURFACE OWNER DENCIL HENTHORN ET AL ACREAGE 39.4± ROYALTY OWNER SHIBEN ESTATE, INC. ACREAGE 297.50±

PROPOSED WORK: 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 MARCELLUS ESTIMATED DEPTH 7,565'

WELL OPERATOR EQT PRODUCTION COMPANY DESIGNATED AGENT REX C. RAY ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

COUNTY NAME

PERMIT

**INFORMATION SUPPLIED UNDER WEST VIRGINIA CODE
Chapter 22, Article 6A, Section 5(a)(5)
IN LIEU OF FILING LEASE(S) AND OTHER CONTINUING CONTRACT(S)**

Under the oath required to make the verification on page 1 of this Notice and Application, I depose and say that I am the person who signed the Notice and Application for the Applicant, and that –

- (1) the tract of land is the same tract described in this Application, partly or wholly depicted in the accompanying plat, and described in the Construction and Reclamation Plan;
- (2) the parties and recordation data (if recorded) for lease(s) or other continuing contract(s) by which the Applicant claims the right to extract, produce or market the oil or gas are as follows:

Lease Name or Number	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
See attachment				

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**Acknowledgement of Possible Permitting/Approval
In Addition to the Office of Oil and Gas**

471030298 MOD

The permit applicant for the proposed well work addressed in this application hereby acknowledges the possibility of the need for permits and/or approvals from local, state, or federal entities in addition to the DEP, Office of Oil and Gas, including but not limited to the following:

- WV Division of Water and Waste Management
- WV Division of Natural Resources WV Division of Highways
- U.S. Army Corps of Engineers
- U.S. Fish and Wildlife Service
- County Floodplain Coordinator

The applicant further acknowledges that any Office of Oil and Gas permit in no way overrides, replaces, or nullifies the need for other permits/approvals that may be necessary and further affirms that all needed permits/approvals should be acquired from the appropriate authority before the affected activity is initiated.

Well Operator: EQT Production Company
 By: Victoria J Roark
 Its: Permitting Supervisor

Lease No.	Grantor, Lessor, etc.	Grantee, Lessee, etc.	Royalty	Book/Page
988543	<u>Shiben Estates Inc. (current royalty owner)</u>		***	
	Shiben Estates Inc.	Consolidated Gas Supply Corp.		OGB54A/503
	Consolidated Gas Supply Corp.	Consolidated Gas Transmission Corp.		LB66A/69
	Consolidated Gas Transmission Corp.	CNG Transmission Corp.		CB13/151
	CNG Transmission Corp.	Dominion Transmission Inc.		MiscBk 96/307
	Dominion Transmission Inc.	Antero Resources Appalachian Corp.		OGB95A/937
	Antero Resources Appalachian Corp.	EQT Production Company		OGB127A/195
993304.01	<u>Della McCov(current royalty owner)</u>		min pd 1/8	
	Della McCov (0.66667%)	EQT Production Company		DB 140A/684
993304.02	<u>Chesapeake Appalachia LLC (current royalty owner)</u>		min pd 1/8	
	Chesapeake Appalachia, L.L.C. (0.33333%)	SWN Production Company, LLC		DB 157A/634
	SWN Production Company, LLC (Development Agreement)	Statoil USA Onshore Properties Inc.		DB 158/132
	SWN Production Company, LLC/Statoil USA Onshore Properties Inc. (Development Agreement)	EQT Production Company		DB 167A/310
706740	<u>EQT Production Company(current royalty owner)</u>		in fee	
	Benedum-Trees Oil Company et al	Carnegie Natural Gas Company		OG 2A/180
	Carnegie Natural Gas Company	Carnegie Production Company		OG 78A/513
	Carnegie Production Company (USX Corporation)	Equitable Resources, Inc.		unrecorded purchase and sale agreement see attached
	Equitable Resources, Inc.	Equitrans, LP		DB 105/908
	Equitrans, LP	EQT Production Company		DB 131A/81
104231	<u>EQT Production Company et al (current royalty owner)</u>		***	
	J. L. Newman	The Philadelphia Co. of WV		LB47A/282
	The Philadelphia Co. of WV	Pittsburgh & WV Gas Co.		OGB22A/352
	Pittsburgh & WV Gas Co.	Equitable Gas Company		DB187/321
	Equitable Gas Company	Equitrans, Inc.		LB71A/287
	Equitrans, LLC	EQT Production Company		AB192/19 Doddridge

*** We will pay one-eighth of the total amount paid to or received by or allowed to the owner of the working interest at the wellhead for the oil or gas so extracted, produced, or marketed before deducting the amount to be paid to or set aside for the owner of the oil or gas in place, on all such oil or gas to be extracted, produced, or marketed from the well.

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PURCHASE AND SALE AGREEMENT

PURCHASE AND SALE AGREEMENT, dated as of May 27, 1999 (this "Agreement"), by and between USX CORPORATION, a Delaware corporation, ("USX") and EQUITABLE RESOURCES, INC., a Pennsylvania corporation (hereinafter referred to as "Buyer").

WHEREAS, USX owns directly or indirectly all of the outstanding capital stock or other evidence of an equity interest of the following companies (each a "Carnegie Company" and collectively the "Carnegie Companies"), which are involved in one or more of the production, gathering, transportation, treatment, distribution and sale of natural gas: (i) Carnegie Natural Gas Company, a Pennsylvania corporation, ("Carnegie"), (ii) Carnegie Interstate Pipeline Company, a Delaware corporation, ("CIPCO"), (iii) Carnegie Production Company, a Pennsylvania corporation, ("CPC"), (iv) Carnegie Natural Gas Sales, Inc., a Delaware corporation, ("CNGS") and (v) Carnegie Gas Storage, LLC, a Delaware limited liability company, ("CGS"); and

WHEREAS, USX desires to sell to Buyer and Buyer desires either for itself and/or one or more designated subsidiaries to purchase from USX one hundred percent (100%) of the capital stock and other evidence of equity interest in the Carnegie Companies;

NOW, THEREFORE, for and in consideration of the premises and the representations, warranties, covenants and agreements herein set forth and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, the parties hereto, intending to be legally bound, agree as follows:

ARTICLE I
DEFINITIONS

4740302980 M6D

Unless otherwise specifically stated in the text of this Agreement, the following terms shall have the following meanings:

Section 1.1 The "1935 Act" shall mean the Public Utility Holding Company Act of 1935, as amended.

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103-02980

5.13 No Third-Party Rights. Nothing in this Agreement, expressed or implied, shall or is intended to confer upon any Person other than the parties hereto or their respective successors or assigns.

IN WITNESS WHEREOF, the parties have executed, delivered and entered into this agreement as of the day and year first above written.

USX Corporation

By: V. G. Beghini
Typed Name: V. G. Beghini
Title: Vice Chairman - Marathon Group

Equitable Resources, Inc.

By: David L. Porges
Typed Name: David L. Porges
Title: Senior Vice President and Chief Financial Officer

4710302980 MRP

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May 24, 2016

Mr. James Martin
West Virginia Department of Environmental Protection
Office of Oil and Gas
601 57th Street SE
Charleston, WV 25304

Re: BIG367, 514562, 47-10302980

Dear Mr. Martin,

EQT Production Company is submitting an application for a new well work permit for the above well number. Upon information and belief, Operator's lease and/ or other real property rights permit it to conduct drilling operations for the subject well in the location shown on the plat, including under any public roads that the well lateral crosses.

Sincerely,

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

Vicki Roark
Permitting Supervisor-WV

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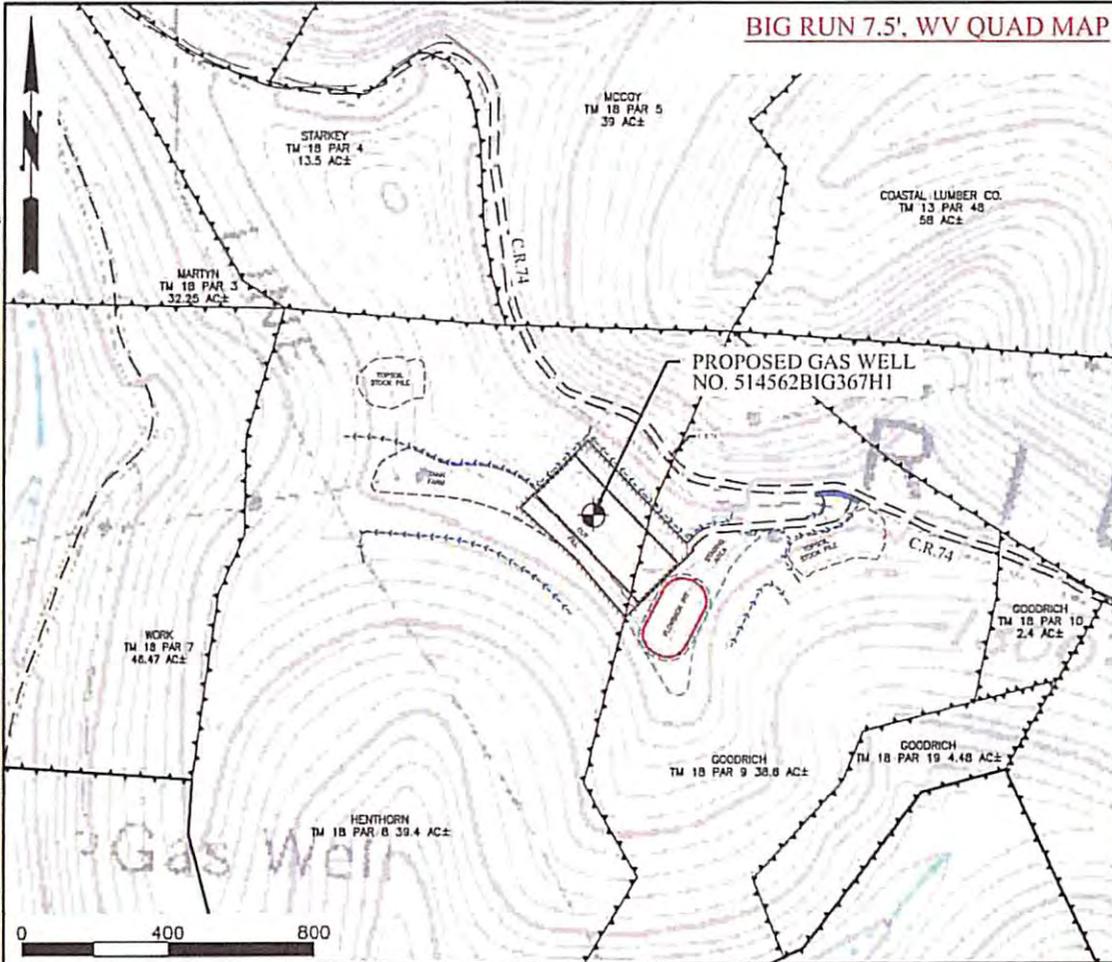
103-02980

USER: pitman

LAYOUT: H1-REC PLAN

PLOT DATE/TIME: 9/5/2013 - 3:28pm

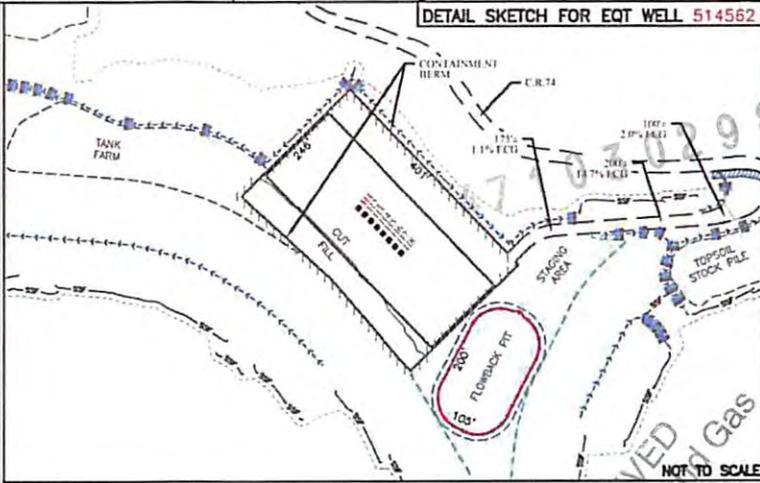
CAD FILE: R:\030-2259 EQT BIG367 Well Pad and Access Rd\Drawing\3-well hole rec plan.dwg



GENERAL NOTE

1. This drawing is a schematic representation of the proposed well site and access road. Proposed structures such as well site pad, drilling pit, roadway, culverts, erosion and sediment control barriers, etc., are shown in approximate pre-planning configurations.
2. Trees and slash will be cleared as necessary before any proposed road, drill pad or pipeline construction begins. Any residue materials available from clearing will be windrowed below the anticipated fill outslope(s) to intercept and retain sediment from the disturbed areas. Silt fence will be additionally installed as shown on the Reclamation Plan. All marketable timber above 6" will be cut and stacked in areas adjacent to operations for eventual removal.
3. All roads shown on reclamation plan are identified as either existing or new construction. Unless otherwise noted all access roads whether existing or new shall be maintained in accordance with WV D.E.P. Office of Oil and Gas Erosion and Sediment Control BMP Field Manual as revised 2/08. Entrances upon county/state roads shall be maintained in accordance with WV D.O.T. regulations, however, separate permits may be further required by the WV D.O.T. Existing roads will be upgraded with additional stone as necessary. Newly constructed access roads will be stabilized with stone as necessary for ingress and egress to the drill site.
4. All culvert pipes installed will be a minimum of 12" in diameter with length determined by field conditions. All installed and existing culvert pipes will be accompanied by an entrance sump, new culverts installed at an angle to ensure proper flow and protected from erosion and sedimentation using large rocks, rip-rap or other sediment control devices including the placement of hay bales at the sump inlet and outlet. All ditches will be maintained as required during the construction, drilling, completion and reclamation phases of this operation as required by the WV D.E.P. Office of Oil and Gas Erosion and Sediment Control BMP Field Manual. Stormwater from the ditches and culvert pipes will be directed to stable natural vegetative areas. During reclamation all water bars necessary for erosion and sedimentation control will be installed.
5. All cut and fill slopes will be immediately stabilized, seeded and mulched after construction.
6. All existing utilities within the construction area will be identified, marked and if necessary relocated by the contractor or company.
7. Earthwork contractors are responsible for notification to the operator and inspector prior to any deviation from this plan.

DETAIL SKETCH FOR EQT WELL 514562



NOTE:
EG= EXISTING GRADE
ECG= ESTIMATED CONSTRUCTION GRADE

LEGEND

- DRILL SITE= [Symbol]
- ROCK CHECK DAM= [Symbol]
- BUILDING= [Symbol]
- COMPACTED FILL WALLS= [Symbol]
- PIT CUT WALLS= [Symbol]
- SUPER SILT FENCE= [Symbol]

- PROPERTY LINE= [Symbol]
- LIMIT OF DISTURBANCE= [Symbol]
- PLANNED FENCE= [Symbol]
- ROAD= [Symbol]
- OPEN DITCH= [Symbol]
- CULVERT= [Symbol]

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EQT

WELL RECLAMATION PLAN FOR EQT BIG367 H1

SCALE: AS SHOWN
DRAWN: JDP
CHECKED:
APPROVED:

SHEET NO. 1

PROJECT# 030-2259