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west virginia department of environmental protection

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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](http://www.dep.wv.gov)

## PERMIT MODIFICATION APPROVAL

December 09, 2014

EQT PRODUCTION COMPANY  
303 SAND CUT ROAD  
CLARKSBURG, WV 26301

Re: Permit Modification Approval for API Number 10302980, Well #: 514562

**Modify formation, Azimuth, and shorten lateral.**

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,

Gene Smith  
Assistant Chief of Permitting  
Office of Oil and Gas



June 16, 2014

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

Re: Modification of 47-10302980

Dear Mr. Smith,

EQT would like to modify the formation and azimuth of the above well. I have enclosed a new WW-2B, well schematics, WW-6A1, mylar plat and copy of rec plan for your review.

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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JUL 03 2014  
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**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	80	80	98 C.T.S.
Fresh Water	13 3/8	New	MC-50	54	956	956	832 C.T.S.
Coal							
Intermediate	9 5/8	New	MC-50	40	2,900	2,900	1,134 C.T.S.
Production	5 1/2	New	P-110	20	12,168	12,168	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							

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	26	30	0.312	-	Construction	1.18
Fresh Water	13 3/8	17 1/2	0.38	2,480	* See Note 2	1.21
Coal						
Intermediate	9 5/8	12 3/8	0.395	3,590	* See Note 2	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.

**Note 2:** Reference Variance 2014-17.

DMH  
6-18-14

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(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 marcellus formation the vertical drill to go down to an approximate depth of 4693 then kick off the horizontal leg into the marcellus 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): 16.2 ±

22) Area to be disturbed for well pad only, less access road (acres): 15.42 ±

- 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.

DmH 6-18-14

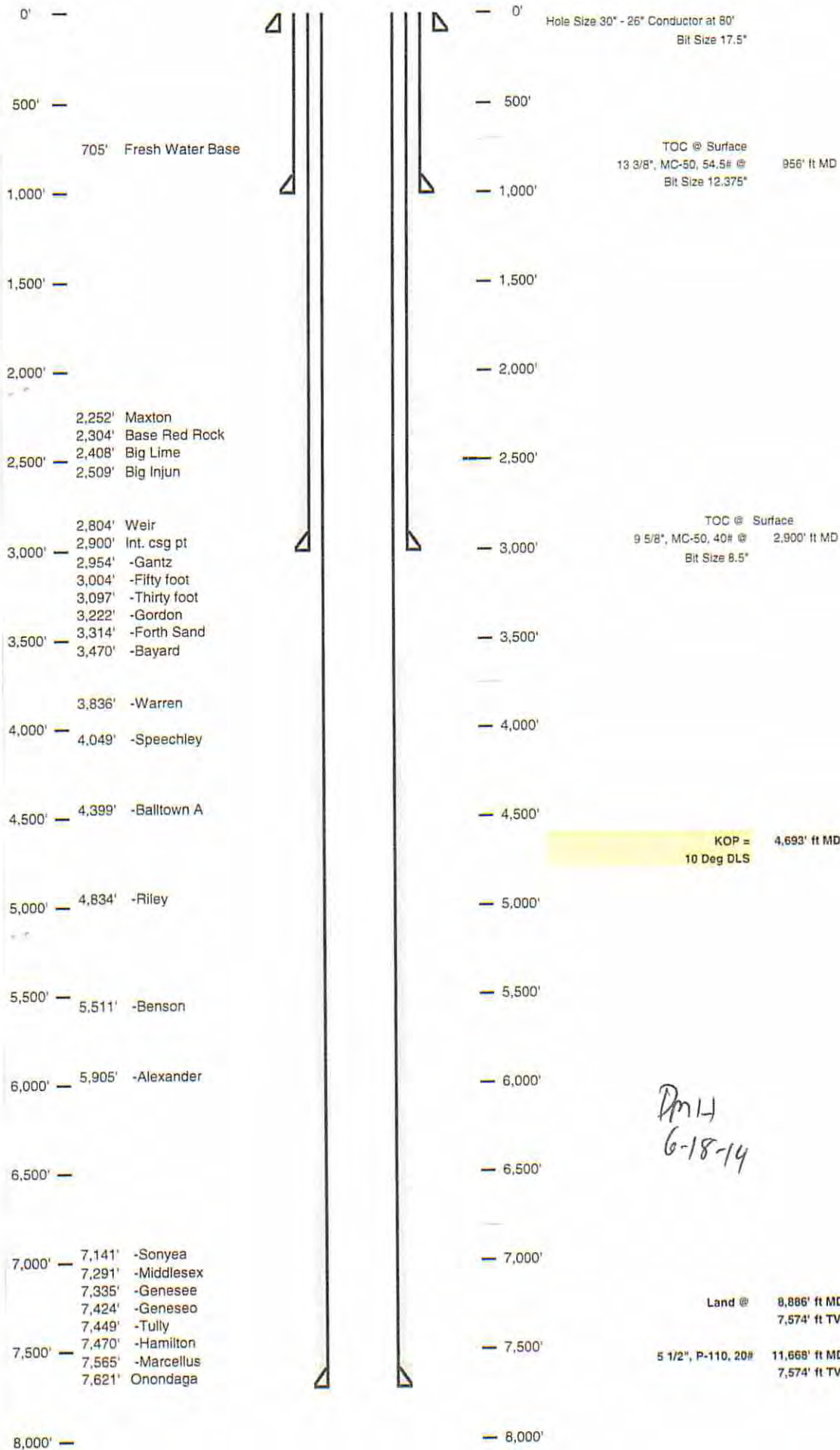
RECEIVED Office of Oil and Gas 12/12/14 JUL 03 2014 WV Department of Environmental Protection

Well Schematic  
EQT Production

Well Name 514562 (BIG367H1)  
County Wetzel  
State West Virginia

Elevation KB:  
Target  
Prospect  
Azimuth  
Vertical Section

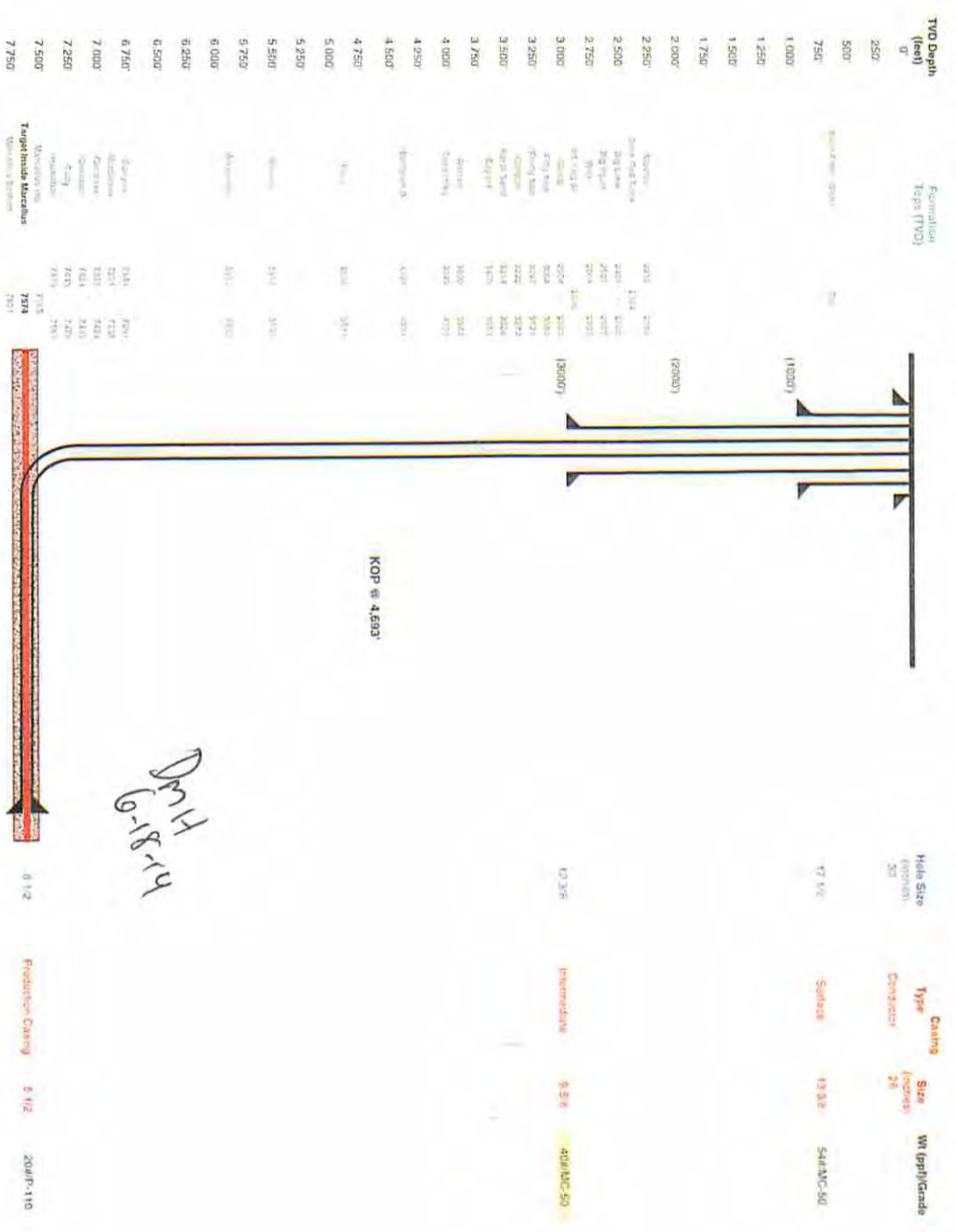
1456
Marcellus
162
4593





Well: 514562 (BIG367H1)  
 EOT Production  
 Big Run  
 Metzler

West Virginia  
 Vertical Section  
 4383



Proposed Well Work  
 Drill and complete a new horizontal well in the Marcellus formation  
 The vertical well to go down to an approximate depth of 4593'  
 Then kick of the horizontal leg into the Marcellus using a slick water frac



*DWH 11-8-14*

KOP @ 4.693'

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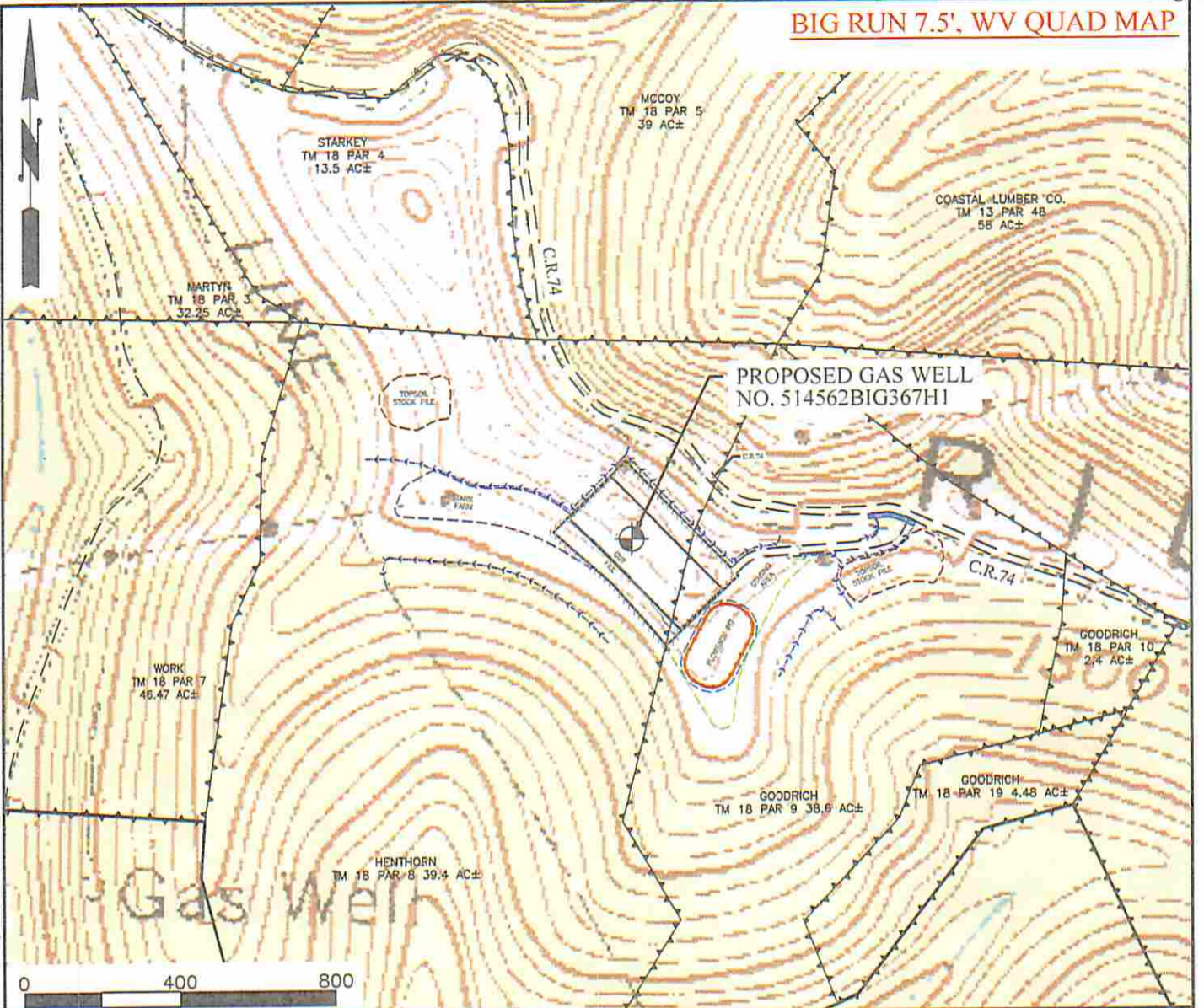


USER: pescoriza

LAYOUT: H1-REC PLAN

PLOT DATE/TIME: 12/19/2013 - 10:01am

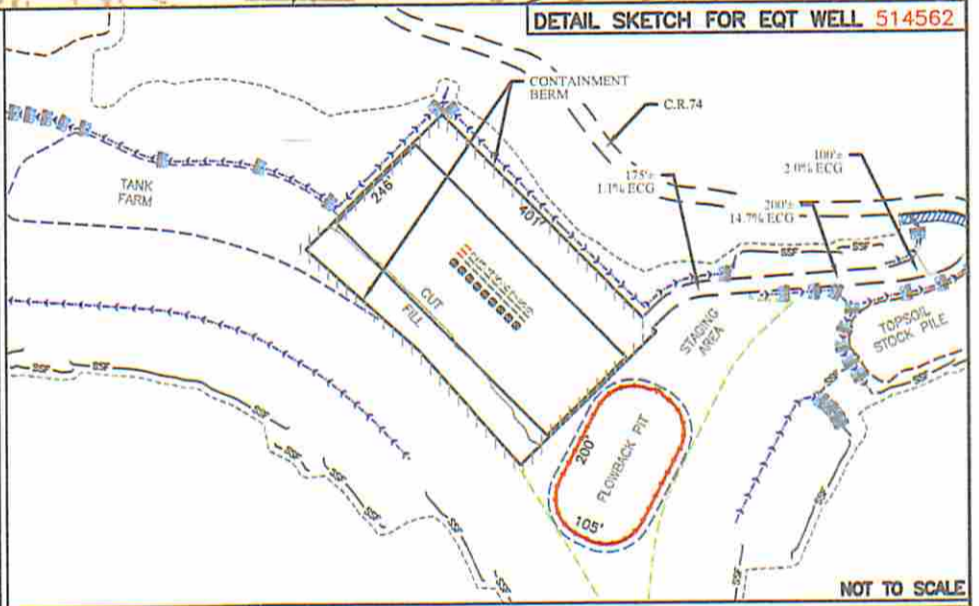
CAD FILE: R:\030-2259 EQT BIG367 Well Pad and Access Rd\Drawing\ss-well hole rec plan.dwg



DETAIL SKETCH FOR EQT WELL 514562

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 2/98. 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.



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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Office of Oil and Gas

JUL 02 2014

**THRASHER**  
 CIVIL • ENVIRONMENTAL • CONSULTING • FIELD SERVICES  
 30 COLUMBIA HILLWAY • CLARKSBURG, WV 26301  
 PHONE (304) 624-4400  
 FAX (304) 624-7321

EQT Where energy meets innovation.

WELL RECLAMATION PLAN

FOR EQT BIG367 H1

SCALE: AS SHOWN

DRAWN: JCP

CHECKED: [Blank]

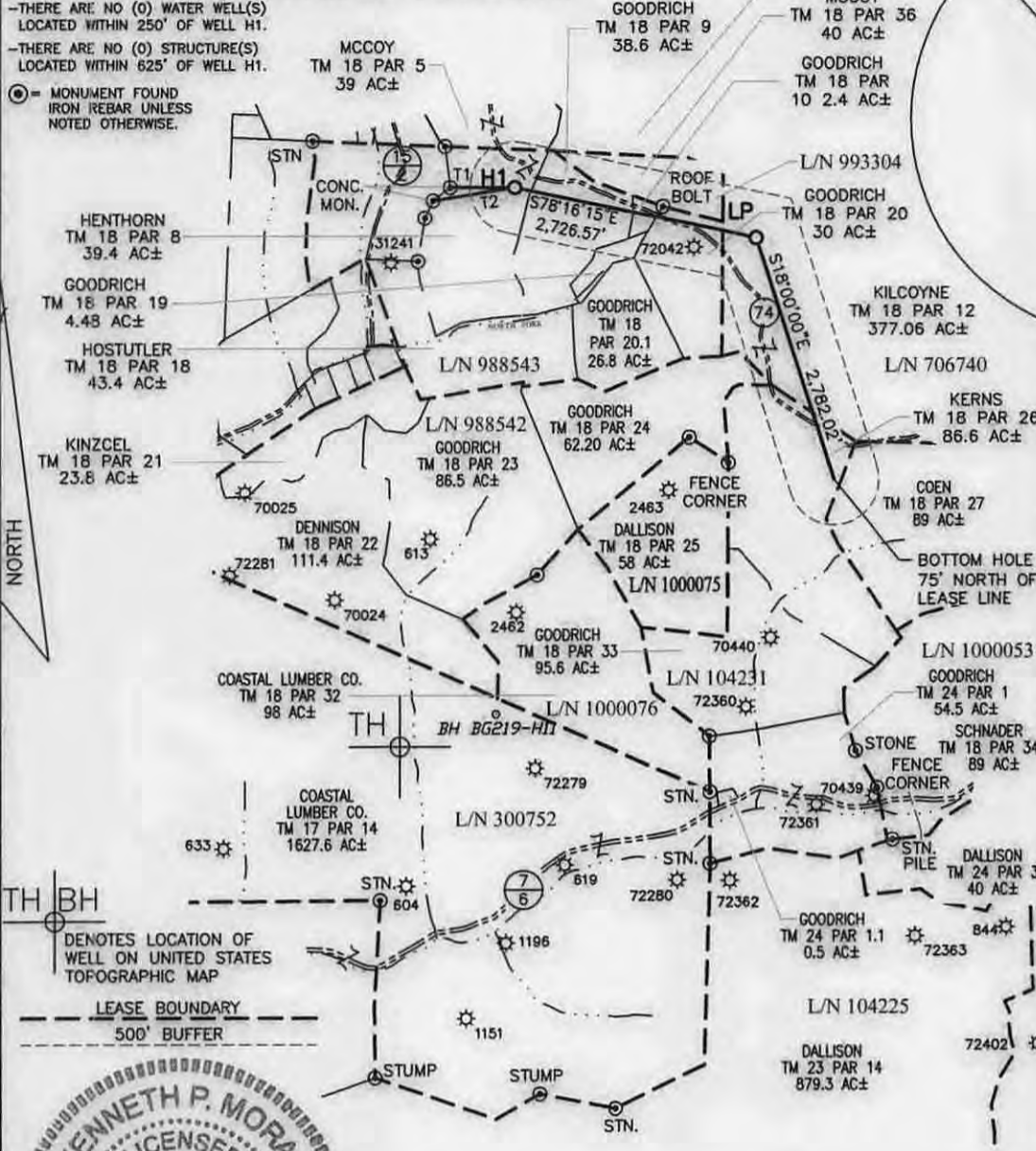
SHEET No.

Department of 1 Environmental Protection



**EQT WELL NO. 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.  
 (M) = MONUMENT FOUND IRON REBAR UNLESS NOTED OTHERWISE.



**WELL 514562 TOP HOLE**

STATE PLANE COORDINATES (NAD 27 NORTH ZONE)  
 N:386677.150  
 E:1695439.735  
 LAT:39.556711  
 LON:80.580004

UTM COORDINATES (NAD 83-METER)  
 N:4378642.535  
 E:536081.507

**WELL 514562 LAUNCH POINT**

STATE PLANE COORDINATES (NAD 27 NORTH ZONE)  
 N:386122.813  
 E:1698109.335  
 LAT:39.555277  
 LON:80.570511

UTM COORDINATES (NAD 83-METER)  
 N:4378487.246  
 E:536897.654

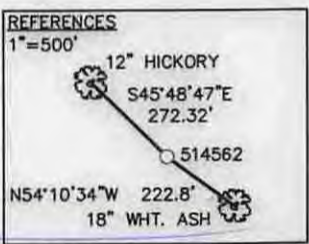
**WELL 514562 BOTTOM HOLE**

STATE PLANE COORDINATES (NAD 27 NORTH ZONE)  
 N:383476.957  
 E:1698969.119  
 LAT:39.548041  
 LON:80.567353

UTM COORDINATES (NAD 83-METER)  
 N:4377685.533  
 E:537173.021

LINE	BEARING	DIST.
T1	S89°49'17"E	717.10'
T2	N81°05'07"E	459.40'

LEASE NO.	ROYALTY OWNER	ACRES
706740	EQT PRODUCTION CO.	1003.75±
104231	JOYCE M. MARTIN et al	300±



KENNETH P. MORAN P.S. 1333

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 RULES ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

FILE NO. 030-2259  
 SCALE: 1"=2000'  
 MINIMUM DEGREE OF ACCURACY: 1 in 2500  
 PROVEN SOURCE OF ELEVATION: OPUS SURVEY GRADE GPS

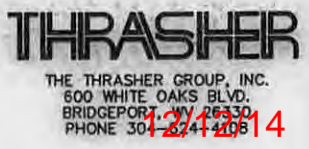


DATE JUNE 23, 2014  
 OPERATOR'S WELL NO. 514562  
 API WELL NO. MOD  
47 - 103 - 02980  
 STATE COUNTY PERMIT

WELL TYPE: OIL  GAS  LIQUID INJECTION  WASTE DISPOSAL  (IF "GAS"), PRODUCTION  STORAGE  DEEP  SHALLOW

LOCATION: ELEVATION: EG: 1,475.5' PROP: 1,442.90' WATER SHED: NORTH FORK OF FISHING CREEK  
 DISTRICT: GRANT COUNTY: WETZEL  
 QUADRANGLE: BIG RUN ACREAGE: 39.4 AC±  
 SURFACE OWNER: DENCIL HENTHORN ET AL LEASE ACREAGE: 297.50 AC±  
 OIL & GAS ROYALTY OWNER: SHIBEN ESTATE, INC. LEASE NO. 988543

PROPOSED WORK: DRILL  CONVERT  DRILL DEEPER  REDRILL  FRACTURE OR STIMULATE   
 PERFORATE NEW FORMATION  PLUG OFF OLD FORMATION  OTHER PHYSICAL CHANGE IN WELL (SPECIFY) \_\_\_\_\_



PLUG AND ABANDON \_\_\_\_\_ CLEAN OUT AND REPLUG \_\_\_\_\_  
 TARGET FORMATION: MARCELLUS SHALE ESTIMATED DEPTH: \_\_\_\_\_ TVD: 7,565  
 WELL OPERATOR: EQT PRODUCTION DESIGNATED AGENT: REX C. RAY  
 ADDRESS: 115 PROFESSIONAL PLACE ADDRESS: 115 PROFESSIONAL PLACE  
 BRIDGEPORT, WV 26330 BRIDGEPORT, WV 26330

USER: kpoth  
 LAYOUT: H1 5-29-14  
 PLOT DATE/TIME: 6/24/2014 - 8:28am  
 NORTH  
 CAD FILE: R:\030-2259 EQT BIG367 Well Pad and Access Rd\Survey\030-2259 BIG 367 H1 H10-H13\_6-23-14.DWG



**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
✓ <u>Lease 988543</u>	Shiben Estates Inc.	Consolidated Gas Supply Corp.	min pd 1/8	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
✓ <u>Lease 104231</u>	J. L. Newman	The Philadelphia Co. of WV	min pd 1/8	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
✓ <u>Lease 706740</u>	Benedum-Trees Oil Company et al	Carnegie Natural Gas Company	min pd 1/8	OG 2A/180
	Carnegie Natural Gas Company	Carnegie Production Company		OG 78A/513
	Carnegie Production Company	Equitable Production-Eastern States Oil & Gas Inc.		Unrecorded purchase & s agreement - see attached
	Equitable Production-Eastern States Oil & Gas Inc.	Equitable Production Company		Corp. Bk. 13/14
	Equitable Production Company	EQT Production Company		Corp. Bk. 13/14

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.

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

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: \_\_\_\_\_

Its: Permitting Supervisor

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