



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

Austin Caperton, Cabinet Secretary
www.dep.wv.gov

Thursday, October 25, 2018
PERMIT MODIFICATION APPROVAL
Horizontal 6A / New Drill

EQT PRODUCTION COMPANY
625 LIBERTY AVE., SUITE 1700

PITTSBURGH, PA 15222

Re: Permit Modification Approval for BIG 245 H16
47-103-03235-00-00

Modified Conductor Size to 26"

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.

A blue ink signature of James A. Martin.

James A. Martin
Chief

Operator's Well Number: BIG245H16
Farm Name: ET BLUE GRASS, LLC
U.S. WELL NUMBER: 47-103-03235-00-00
Horizontal 6A New Drill
Date Modification Issued: October 25, 2018

Promoting a healthy environment.

4

WW-6B
(04/15)

API NO. 47-103 - 03235 MOD
OPERATOR WELL NO. BIG245H16
Well Pad Name: BIG245

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: BIG245H16 Well Pad Name: BIG245

3) Farm Name/Surface Owner: E.T. Bluegrass Public Road Access: Rt. 19/2

4) Elevation, current ground: 1480 Elevation, proposed post-construction: 1430

5) Well Type (a) Gas X Oil _____ Underground Storage _____

Other _____

(b) If Gas Shallow X Deep _____

Horizontal X _____

6) Existing Pad: Yes or No No *DMH 8/15/18*

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Expected Pressure(s):
Marcellus, 7531, 51, 2620 PSI

8) Proposed Total Vertical Depth: 7531

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 19040

11) Proposed Horizontal Leg Length: 9873

12) Approximate Fresh Water Strata Depths: 229, 507, 662, 752, 1011

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

14) Approximate Saltwater Depths: None

15) Approximate Coal Seam Depths: 925, 1024, 1132

16) Approximate Depth to Possible Void (coal mine, karst, other): None

17) Does Proposed well location contain coal seams directly overlying or adjacent to an active mine? Yes _____ No X

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

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WV Department of
Environmental Protection

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	49ft ³ / CTS
Fresh Water	13 3/8	New	J-55	54.5	1179	1179	1086 ft ³ / CTS
Coal							
Intermediate	9 5/8	New	A-500	40	2925	2855	1108 ft ³ / CTS
Production	5 1/2	New	P-110	20	19040	19040	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							

DMH 8/15/18

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	1378	17	Class A	1.18
Fresh Water	13 3/8	17 1/2	.38	2700	2160	See Variance	1.19
Coal							
Intermediate	9 5/8	12 3/8	.395	3950	3160	Class H	1.07
Production	5 1/2	8 1/2	.361	12640	10112	Class H	1.123/2.098
Tubing	2 3/8	NA	.19	7700			
Liners							

PACKERS

Kind:					RECEIVED Office of Oil and Gas
Sizes:					OCT - 9 2018
Depths Set:					WV Department of Environmental Protection

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 2995'. Kick off and drill curve. Drill the lateral in the Marcellus. Cement casing.

DMAH 8/15/18

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 350,000 barrels of water per stage. Sand sizes vary from 100 mesh to 20/40 mesh. Average approximately 400,000 pounds of sand per stage.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): +/- 40.35

22) Area to be disturbed for well pad only, less access road (acres): +/- 34.59

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 solid body cent spaced every joint from production casing shoe to KOP

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

Conductor: Class A no additives
 Surface (Type 1 Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries. 25% Flake Loss Circulation Material (LCM)
 Intermediate (Class H Cement): 0-3% Calcium Chloride. Used to speed the setting of cement slurries. 0.25% flake. Loss Circulation Material (LCM) .6% Super FL-300 (fluid loss/lengthens thickening time)
 Production:
 Lead (Class 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 (Class 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 fluid loss
 formation. 60 % Calcium Carbonate. Acid solubility

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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 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.

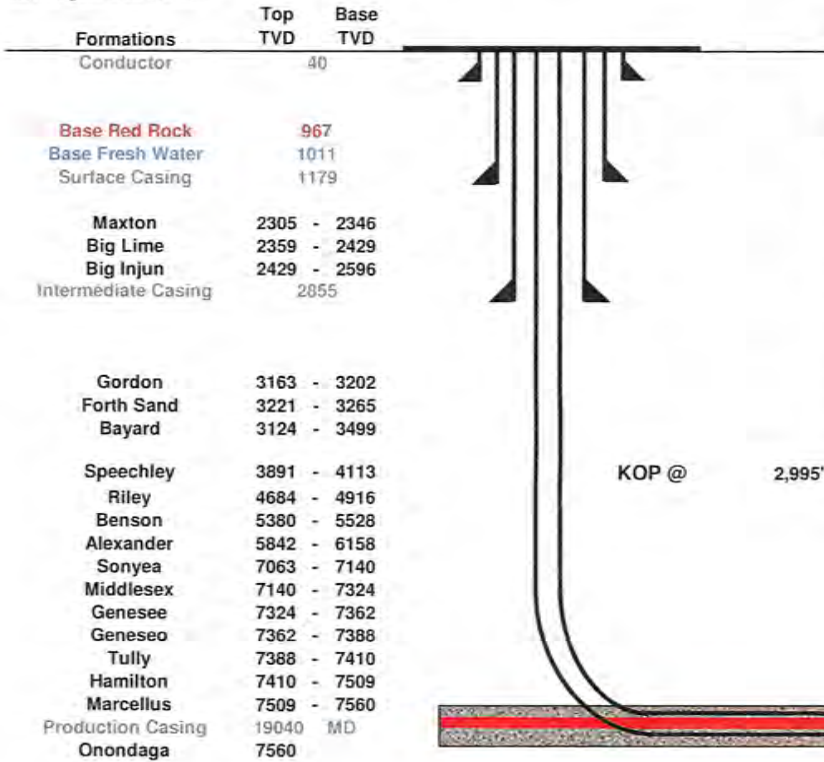
WV Department of Environmental Protection

*Note: Attach additional sheets as needed.

Well **BIG245H16**
 EQT Production
 Big Run Quad
 Wetzel County, WV

ENERTIA # 515609
 Azimuth 335
 Vertical Section 9129

Note: Diagram is not to scale.



Casing and Cementing			Deepest Fresh Water: 1,011'	
Type	Conductor	Surface	Intermediate	Production
Hole Size, In.	30	17 1/2	12 3/8	8 1/2
Casing Size, OD In.	26	13 3/8	9 5/8	5 1/2
Casing Wall Thickness, In.	0.312	0.380	0.395	0.361
Depth, MD	40'	1,179'	2,855'	19,040'
Weight	85.6#	54.5#	40#	20#
Grade	A-500	J-55	A-500	P-110
New or Used	New	New	New	New
Burst (psi)	1378	2,700	3,950	12,640
Cement Class	A	A / Type 1	H	H
Cement Yield	1.18	1.19	1.07	1.123/2.098
Top of Cement (Planned)	Surface	Surface	Surface	500' above top Producing Zone
Method	Displacement	Displacement	Displacement	Displacement
Est. Volume (cu ft)	49	1,086	1,108	2,895
Possible Additives	N/A	Calcium Chloride	Calcium Chloride, Fluid Loss, Defoamer, Dispersant, POZ, Bonding Agent, Extender, Retarder, Flake/LCM	Calcium Carbonate, Fluid Loss, Extender, Dispersant, Viscosifier, Defoamer, POZ, Bonding Agent, Retarder, Anti-Settling/Suspension Agent

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 Drill and complete a new horizontal well in the Marcellus formation.
 Drill the vertical to an approximate depth of 2995'.
 Kick off and drill curve. Drill lateral in the Marcellus. Cement casing.

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 Environmental Protection

103-03235
 moj

**BIG245
BIG245H16
EQT PRODUCTION COMPANY**

TAG	TM-PAR.	SURFACE OWNERS	ACRES
A	G-TM-3-2	JOSEPH F & GAY BLAKE IRREVOCABLE GRANTOR TR.	194 AC.
B	G-TM-3-5	COASTAL FOREST RESOURCES CO	179 AC.
C	G-TM-3-6	VIRGINIA RUTH BLAKE	5.75 AC.
D	G-TM-3-10	CHARLES STONEKING ET AL.	9.75 AC.
E	G-TM-3-11	VIRGINIA RUTH BLAKE	2.5 AC.
F	G-TM-3-13	EDWARD LEE DULANEY, II	164.3/4 AC.
G	G-TM-3-14	CHARLES STONEKING ET AL.	70.50 AC.
H	G-TM-3-15	CHARLES STONEKING ET AL.	45 AC.
I	G-TM-3-16	CHARLES STONEKING ET AL.	14.11 AC.
J	G-TM-3-18	VIRGINIA RUTH BLAKE	28.75 AC.
K	G-TM-3-23	COASTAL FOREST RESOURCES CO	167.75 AC.
L	G-TM-3-24	COASTAL FOREST RESOURCES CO	35.89 AC.
M	G-TM-3-25	CHARLES STONEKING ET AL.	34.4 AC.
N	G-TM-3-26	VIRGINIA RUTH BLAKE	20.69 AC.
O	G-TM-3-27	VIRGINIA RUTH BLAKE	45.83 AC.
P	G-TM-3-30	THOMAS E & CHERYL A LEASURE	51.80 AC.
Q	G-TM-3-31	HEARTWOOD FORESTLAND FUND II LP	27.56 AC.
R	G-TM-3-34	MIKE & MADELINE WHITE	30.6 AC.
S	G-TM-7-3	COASTAL FOREST RESOURCES CO	178 AC.
T	G-TM-7-3.2	COASTAL FOREST RESOURCES CO	156.98 AC.
U	G-TM-8-1	DANNY STOCKSLAGER ET AL.	170 AC.
V	G-TM-8-2	MIKE & MADELINE WHITE	40.13 AC.
W	G-TM-8-3	MIKE & MADELINE WHITE	3 AC.
X	G-TM-8-4	DUANE M GOODRICH	1.625 AC.
Y	G-TM-8-5	DUANE M GOODRICH	130 SQ RDS
Z	G-TM-8-6	DUANE M GOODRICH	164 SQ RDS
AA	G-TM-8-7	JAMES E & MARTIN A STONEKING	19.12 AC.
BB	G-TM-8-8	WANDA L BYARD	59.16 AC.
CC	G-TM-8-10	GARLAND E MINOR	48.1 AC.
DD	G-TM-8-11	BONNIE M HENTHORNE	63 1/2 AC.
EE	G-TM-8-12	SHIRLEY A TITUS	41.9 AC.
FF	G-TM-8-12.1	DALE F SAPP L/E, LOLA J SAPP	10.1 AC.
GG	G-TM-8-13	NEAL UTT	3.75 AC.
HH	G-TM-8-13.1	DUANE M GOODRICH	3.56 AC.
II	G-TM-8-14	NEAL UTT	51 AC.
JJ	G-TM-8-15	JOHN MICHAEL BYARD	71.60 AC.
KK	G-TM-8-18	COASTAL FOREST RESOURCES	337 AC.
LL	G-TM-8-19	PHILLIP & KIMBERLY BRENT	46.45 AC.
MM	G-TM-8-21	IKEY JOE WILLEY	76.27 AC.
NN	G-TM-8-22	ET BLUE GRASS LLC, C/O EQT PRODUCTION CO	138.93 AC.
OO	G-TM-8-23	DALE K, JAMES L & DONALD J DULANEY	70.81 AC.
PP	G-TM-8-23.1	JAMES L DULANEY	3.19 AC.
QQ	G-TM-8-25	JAMES ARTHUR YOHO	6.25 AC.



SUBSURFACE AGREEMENT		
IKEY JOE WILLEY	76.27 AC.±	G-TM-08-21
ROYALTY OWNERS		
STONE HILL MINERAL HOLDINGS, LLC ET AL.	60 AC.±	LEASE NO. 121807
ACROPOLIS, INC ET AL.	74 AC.±	LEASE NO. 121160
BONNIE M. HENTHORNE	64 AC.±	LEASE NO. 125426
GARLAND E. MINOR ET AL.	49 AC.±	LEASE NO. 125440
JOSEPH SHIBEN & MINNIE SHIBEN ESTATE ET AL.	1030 AC.±	LEASE NO. 102814
SHIBEN ESTATES INC. ET AL.	109 AC.±	LEASE NO. 102813

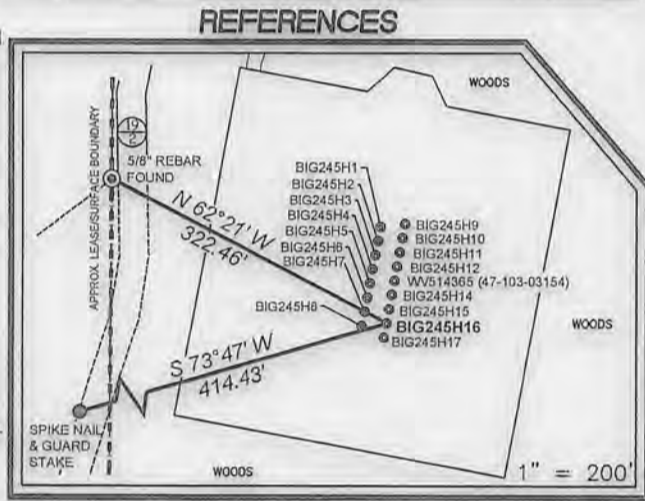
TAG	TM-PAR.	SURFACE OWNERS	ACRES
RR	G-TM-8-27	JAMES ARTHUR YOHO	21.75 AC.
SS	G-TM-8-28	JAMES ARTHUR YOHO	61 AC.
TT	G-TM-8-38	DALE K & SHERRY L DULANEY	28.82 AC.
UU	G-TM-8-39	DORN H HIGGINBATHAM ET AL	23.62 AC.
VV	G-TM-8-53	DORN H HIGGINBATHAM ET AL	196.21 AC.
WW	G-TM-8-38.1	JAMES L DULANEY	137 AC.
XX	G-TM-8-37	JAMES L & KAREN DULANEY	14.1 AC.
YY	G-TM-8-36	JAMES L & KAREN DULANEY	14.1 AC.
ZZ	G-TM-8-30	JAMES & JIM YOHO	7.50 AC.
AAA		FRANKLIN M. BLAKE HEIRS AND/OR ASSIGNS	3.25 AC.

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)
 NAD'27 S.P.C.(FT) N. 400,679.42 E. 1,698,777.05
 NAD'27 GEO. LAT.(N) 39.595178 LONG.(W) 80.568946
 NAD'83 UTM (M) N. 4,382,925.493 E. 537,027.237
LANDING POINT
 NAD'27 S.P.C.(FT) N. 399,280.73 E. 1,696,508.14
 NAD'27 GEO. LAT.(N) 39.588518 LONG.(W) 80.576895
 NAD'83 UTM (M) N. 4,382,183.144 E. 536,348.147
BOTTOM HOLE
 NAD'27 S.P.C.(FT) N. 407,300.07 E. 1,692,492.47
 NAD'27 GEO. LAT.(N) 39.613146 LONG.(W) 80.591531
 NAD'83 UTM (M) N. 4,384,910.536 E. 535,078.948

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www.slsurveys.com

NOTES ON SURVEY

- NO WATER WELLS WERE FOUND WITHIN 250' OF PROPOSED GAS WELL NO AGRICULTURAL BUILDINGS 2500 SQ. FT. OR GREATER WERE FOUND WITHIN 625' OF THE CENTER OF PROPOSED WELL PAD.
- WELL SPOT CIRCLE (SHEET 1) AND TOPO MARK SCALE ARE 1" = 2000'.



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. 849 *C. Victor Moyers*



(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS.
 DATE MAY 1, 20 18
 REVISED 8/6/18
 OPERATORS WELL NO. BIG245H16
 API WELL NO. 47 - 103 - 03235
 STATE WV COUNTY MORGAN PERMIT 17107

MINIMUM DEGREE OF ACCURACY 1 / 2500 FILE NO. 7812PBIG245H16-R.dwg
 HORIZONTAL & VERTICAL CONTROL DETERMINED BY DGPS (SURVEY GRADE TIE TO CORS NETWORK) SCALE SEE NOTE 2

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

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

LOCATION: GROUND ELEV. 1488' PROPOSED ELEV. 1430' WATERSHED ROCKCAMP RUN OF WILLEY FORK

DISTRICT GRANT COUNTY WETZEL QUADRANGLE BIG RUN 7.5'

SURFACE OWNER ET BLUE GRASS, LLC ACREAGE 138.93±

ROYALTY OWNER SHIBEN ESTATES, INC ACREAGE 140±

PROPOSED WORK: LEASE NO. 125397

DRILL CONVERT DRILL DEEPER REDRILL FRACTURE OR STIMULATE 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 7532'

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

COUNTY NAME
PERMIT

BIG245
BIG245H16
EQT PRODUCTION COMPANY

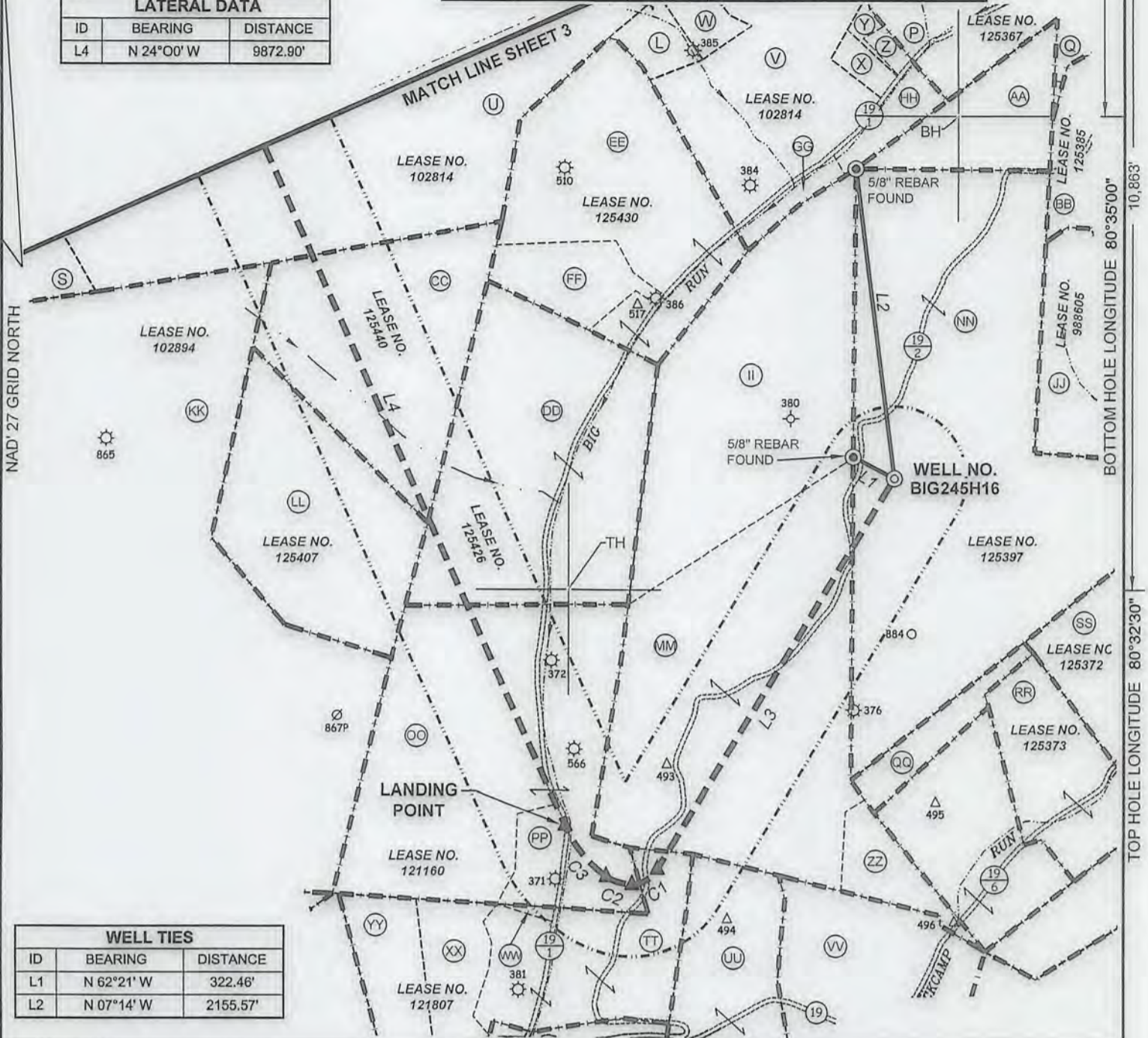
BUILD OUT DATA

ID	BEARING	DISTANCE
L3	S 31°13' W	3154.59'

CURVE	ARC LENGTH	RADIUS	CHORD BEARING	CHORD LENGTH
C1	211.81'	206.64'	S 58°30'41" W	202.66'
C2	190.14'	326.63	N 72°45'56" W	187.47'
C3	455.29'	807.67'	N 38°55'11" W	449.29'

LATERAL DATA

ID	BEARING	DISTANCE
L4	N 24°00' W	9872.90'



WELL TIES

ID	BEARING	DISTANCE
L1	N 62°21' W	322.46'
L2	N 07°14' W	2155.57'



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 www.slsurveys.com



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FILE NO. 7812PBIG245H16-R.dwg SCALE SEE NOTE 2

DATE MAY 1, 20 18

REVISED 8/6/18

OPERATORS WELL NO. BIG245H8

API WELL NO. 47 - 103 - 03235
 STATE COUNTY PERMIT

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. 849 *C. Victor Moyers*

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



(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)

NAD'27 S.P.C.(FT)	N. 400,664.67	E. 1,698,774.30
NAD'27 GEO.	LAT.-(N) 39.595137	LONG.-(W) 80.568955
NAD'83 UTM (M)	N. 4,382,920.986	E. 537,026.476
LANDING POINT		
NAD'27 S.P.C.(FT)	N. 398,256.77	E. 1,695,593.84
NAD'27 GEO.	LAT.-(N) 39.588422	LONG.-(W) 80.580137
NAD'83 UTM (M)	N. 4,382,171.188	E. 536,069.714
BOTTOM HOLE		
NAD'27 S.P.C.(FT)	N. 405,868.50	E. 1,692,204.87
NAD'27 GEO.	LAT.-(N) 39.609206	LONG.-(W) 80.592490
NAD'83 UTM (M)	N. 4,384,472.93	E. 534,998.591

LEGEND

COUNTY ROUTE	⊖	LEASE LINE	-----
PROPOSED WELL	⊙	SURFACE LINE	-----
EXISTING WELL	⊗	WELL LATERAL	-----
PERMITTED WELL	⊕	OFFSET LINE	-----
DRILL PATH BEND POINT	⊙	TIE LINE	-----
GRANT DISTRICT TAX MAP-PARCEL	⊙-TM-00-00	CREEK	-----
		ROAD	-----

WELL OPERATOR EQT PRODUCTION COMPANY
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280
 BRIDGEPORT, WV 26330

DESIGNATED AGENT JASON RANSON
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280
 BRIDGEPORT, WV 26330

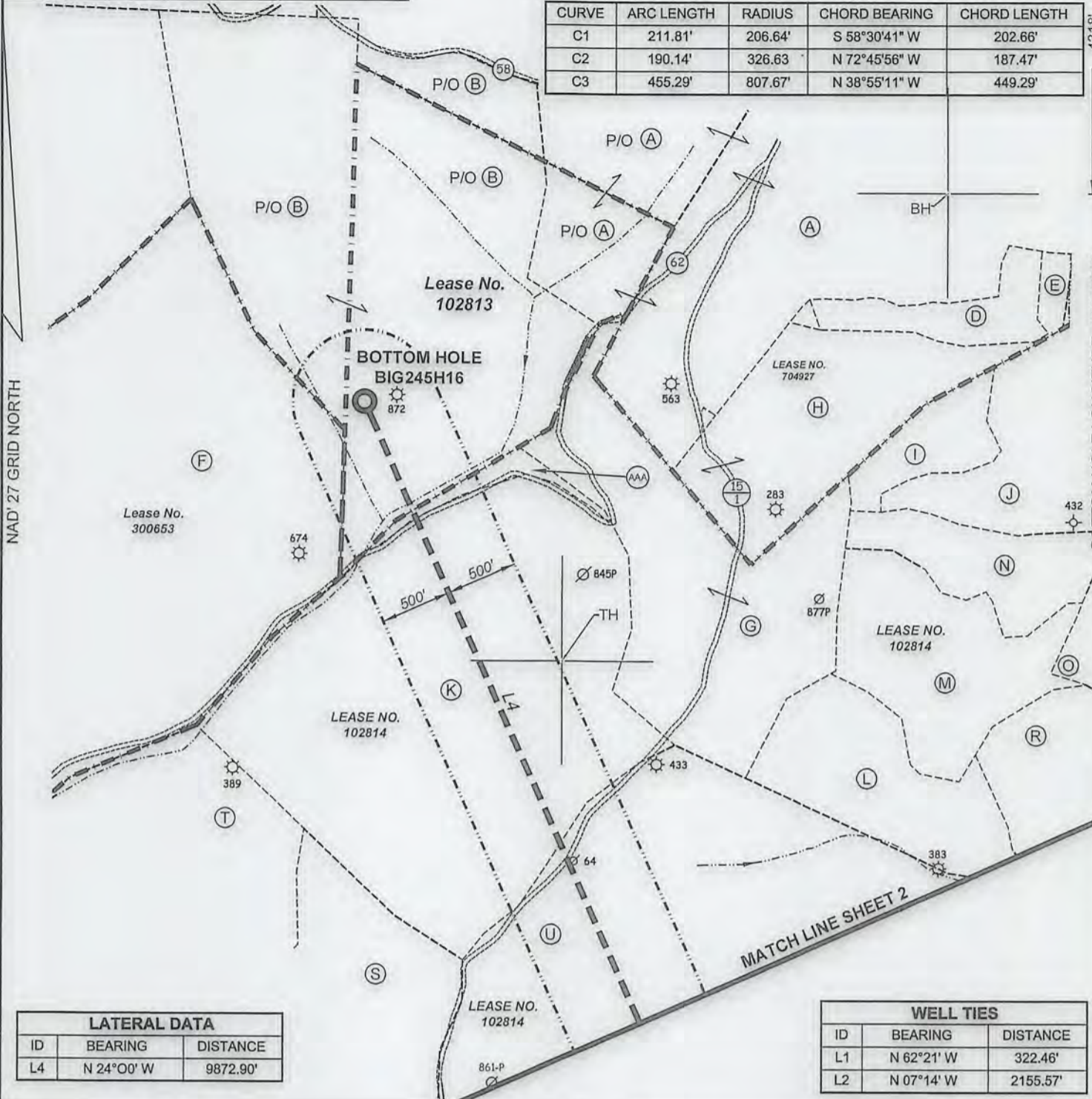
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NAD'27 GRID NORTH



BOTTOM HOLE LONGITUDE 80°35'00"

TOP HOLE LONGITUDE 80°32'30"

10,863'

LATERAL DATA		
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L4	N 24°00' W	9872.90'

WELL TIES		
ID	BEARING	DISTANCE
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STATE OF WEST VIRGINIA
 DIVISION OF ENVIRONMENTAL PROTECTION
 OFFICE OF OIL AND GAS

(S.P.C. NORTH ZONE) (UTM(M) ZONE 17 NORTH)		
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LEGEND	
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PERMITTED WELL	OFFSET LINE
DRILL PATH BEND POINT	TIE LINE
GRANT DISTRICT TAX MAP-PARCEL	CREEK
	ROAD

WELL OPERATOR EQT PRODUCTION COMPANY
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

DESIGNATED AGENT JASON RANSON
 ADDRESS 115 PROFESSIONAL PLACE P.O. BOX 280 BRIDGEPORT, WV 26330

COUNTY NAME PERMIT



Laura Adkins
WVDEP
Office of Oil and Gas
601 57th Street SE
Charleston WV 25304-2345

Re: Modification of wells BIG245H8 (47-103-03234), BIG245H16 (47-103-03235), and
BIG245 (47-103-03236)

Dear Ms. Adkins

Attached are the modifications for the above API numbers. The conductor casing size has
been changed for the conductor only.

If you have any questions, please do not hesitate to contact me at (304) 848-0035.

Sincerely,

Rebecca Wanstreet
Landman I – Permitting WV

Enc.

RECEIVED
Office of Oil and Gas

OCT - 9 2018

WV Department of
Environmental Protection