

STATE OF OHIO
DEPARTMENT OF NATURAL
RESOURCES

Division of Oil and Gas
Resources Management
WELL PERMIT

API WELL NUMBER
34-013-2-0970-00-00

OWNER NAME, ADDRESS XTO ENERGY INC. 190 THORN HILL RD WARRENDALE PA 15086	DATE ISSUED 10/2/2015	PERMIT EXPIRES 10/1/2017
	TELEPHONE NUMBER	(724) 772-3500

IS HEREBY GRANTED PERMISSION TO: Reissue new well, horizontally AND ABANDON WELL IF UNPRODUCTIVE
PURPOSE OF WELL: Oil & Gas
COMPLETION DATE IF PERMIT TO PLUG:

DESIGNATION AND LOCATION:		SURFACE NAD27	TARGET NAD27
LEASE NAME	WASSMANN UNIT B	X: 2478643	2483260
WELL NUMBER	5H	Y: 729226	721271
COUNTY	BELMONT	LAT: 39.989732272262	39.96765741079
CIVIL TOWNSHIP	PULTNEY	LONG: -80.7917399011187	-80.7758080248153
TRACT OR ALLOTMENT			
SURFACE FOOTAGE LOCATION	3606'SL & 1298'WL OF SEC 4 (PULTNEY TWP)		
TARGET FOOTAGE LOCATION	333'SL & 845'WL OF SEC 33 (MEAD TWP)		

TYPE OF TOOLS: Air Rotary/Fluid Rotary	GEOLOGICAL FORMATION(S):
PROPOSED TOTAL DEPTH 19520 FEET	POINT PLEASANT
GROUND LEVEL ELEVATION 1230 FEET	

SPECIAL PERMIT CONDITIONS: Permit is subject to the attached terms and/or conditions
Horizontal Drilling Well Permit Conditions
Horizontal Well/Pre-Permitting Site Conditions
Water Well Sampling Results must be Submitted Prior to Drilling

CASING PROGRAM (CASING MUST BE CENTRALIZED AND IS SUBJECT TO APPROVAL OF THE OIL AND GAS INSPECTOR):

- 30" CONDUCTOR APPROX. 100' CEMENTED TO SURFACE
- 24" SURFACE CASING MINIMUM OF 300' CEMENTED TO SURFACE
- 20" MINE STRING 650' AND CEMENTED
- 13 3/8" APPROX. 2350' THRU BEREA WITH CEMENT CIRCULATED TO SURFACE
- 9 5/8" INTERMEDIATE APPROX. 8900' AND CEMENTED
- 5 1/2" PRODUCTION CASING TO T.D. CEMENTED IF PRODUCTIVE
- "BLOW OUT PREVENTOR REQUIRED" HAZARDOUS CONDITIONS MAY BE ENCOUNTERED

This permit is NOT TRANSFERABLE. This permit, or an exact copy thereof, must be displayed in a conspicuous and easily accessible place at the well site before permitted activity commences and remain until the well is completed. Ample notification to inspector is necessary.

OIL AND GAS WELL INSPECTOR: ANDREW CORDER (740) 255-2467 BRENT BEAR - Supervisor (740) 412-2945 DISTRICT #: (740) 588-0631	FIRE AND EMERGENCY NUMBERS FIRE: (740) 699-0425 MEDICAL SERVICE (740) 699-0425
INSPECTOR NOTIFICATION The oil and gas inspector must be notified at least 24 hours prior to: 1. Commencement of site construction 2. Pit excavation and closure 3. Commencement of drilling, reopening, converting or plugback operations 4. Installation and cementing of all casing strings 5. BOP testing 6. Well stimulation 7. Plugging operations 8. Well pad construction The oil and gas inspector must be notified immediately upon: 1. Discovery of defective well construction 2. Detection of any natural gas or H2S gas during drilling in urban areas 3. Discovery of defective well construction during well stimulation 4. Determination that a well is a lost hole 5. Determination that a well is a dry hole	Richard J. Simmers CHIEF, Division of Oil and Gas Resources Management
FLARING NOTIFICATION The oil and gas inspector and local fire authority must be notified prior to flaring.	

STATE OF OHIO
DEPARTMENT OF NATURAL
RESOURCES

Division of Oil and Gas
Resources Management
WELL PERMIT

API WELL NUMBER
34-013-2-0970-00-00

ATTN MELISSA BREITENBACH
XTO ENERGY INC
190 THORN HILL RD
WARRENDALE, PA 15086

The Ohio Department of Natural Resources
The Division of Oil and Gas Resources Management
2045 Morse Road, Building F-2
Columbus, Ohio 43229-6693

HORIZONTAL DRILLING PERMIT CONDITIONS

Within sixty (60) days of completion of drilling operations, the following items **must** be submitted to the Division of Oil and Gas Resources Management:

- A copy of the bore hole deviation survey
- A revised surveyor's plat showing:
 1. Surface Location;
 2. Actual location of the first perforation;
 3. Actual location of the last perforation;
 4. Actual ending point of the bore hole in the target formation;
 5. X, Y coordinates of the above four points.
- A fifty-dollar (\$ 50.00) fee for the revised surveyor's plat.



Ohio Department of Natural Resources
Division of Oil and Gas Resources Management
2045 Morse Rd. Bldg. F-2 – Columbus OH 43229-6693



Pre-Construction Permit Conditions

Application Number	Permit Number	Inspection Date	Modification Date (if applicable)
apatt028111	2-0970-00	3-3-2015	
Company	XTO Energy	Lease Name/Well #	Wassman Well Pad (Unit B #5H)
County	Belmont	Township	Pultney Well Pad
Section/Lot	4	Urban Area (if applicable)	Non-Urban
Inspected By	Anthony Carson		
Accompanied By	Randy Cutlip (XTO), Pat Warner (Waco)		

Directions to Location Travel State Route 147 to 3 miles west of Bellaire, Ohio. Turn left on Winding Hill Road. Site is on the right approximately 0.5 miles.

ITEM	<u>LEASE ROAD, WELL SITE CONSTRUCTION</u>	<u>Comments:</u>
1	Tree/Brush Removal/Disposition	Anything greater than 4 inch that has timber value will be stock piled for landowner, remaining trees will be chipped
2	Topsoil Removal/Stockpiles/Placement	Soils will be preserved, stockpiled, and immediately stabilized with seed/straw. (See engineered plans)
3	Erosion/Sediment Control (Silt Fence, Berms)	As per engineered plans
4	Drainage Controls (Diversion Ditches, Culverts, Waterways, Crossings)	Up to 1 culverts w/ rock check dams. Permanent channels for access road drainage.
5	Signage	As required, at entrance.
6	Apron/Culverts/Road Materials	As per engineered plans
7	Pull Off Area	If needed
8	Parking	Yes, At companys direction
9	GPS – Access Road	39.991158 N, 80.787900 W (NAD 83)
10	GPS – Well Stake	39.989797 N, 80.791597 W (NAD 83)
11	GPS – Tank Battery	N/A
12	GPS – Pit Location	N/A
13	Site Construction Plan	Engineered plans submitted by M. J. McTish & Associates

ITEM	<u>DRILLING CONSIDERATIONS</u>	<u>Comments:</u>
14	Location Dimensions (Length, Width, Approximate Acreage)	550' by 300': 13.6 Acres for LOD
15	Multiple Wells	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No 2 Wells
16	Rig Type	RTAF
17	Is a blow-out preventer required?	<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No
	If No, explain:	
18	Equipment Placement/ Orientation (Rig/Frac Tanks/Etc.)	Not Specified

19	Mine Voids	Yes	<input type="checkbox"/>	Yes	<input type="checkbox"/>	No	Bt-110 Underground Mine
20	Verify Water Wells Within 300'	None					
21	Verify Structures Within 500'	None					
22	Verify Streams and Drainage	UNT-Pinch Run & Brooks Run					
23	Flood Plain	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No		
24	Stream Crossing	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No		
	Corps of Engineers Notified	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No		
25	Wetlands	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No		
	EPA Notified	<input type="checkbox"/>	Yes	<input checked="" type="checkbox"/>	No		

<u>ITEM</u>	<u>PITS</u>	<u>Comments:</u>
26	Source of water for drilling	Local Source
27	Source of water for hydrofrac	Local Source
28	Drilling Pits (Placement/Orientation)	None proposed
29	Pit Dimensions (Length, Width, Depth)	N/A
30	Estimated Volume/Capacity	N/A
31	Number & Type of Liners	N/A
32	Thickness of Liner	N/A
33	Type of Material Under Liner	N/A
34	Pit Construction Plan	N/A
35	Fencing (Pits/Entire Location)	None showed on engineered plans.

<u>ITEM</u>	<u>RESTORATION</u>	<u>Comments:</u>
36	Pit Closure – (Standard/Solidification/Off-Site Disposal – state time frame)	Off-site disposal, standard time frame
37	Site-Specific Time Frame for Restoration	Standard as per ORC 1509-072
38	Erosion/Sediment Control	Maintain & Monitor, as per engineered plans
39	Drainage Control	As per engineered plans

<u>ITEM</u>	<u>PRODUCTION</u>	<u>Comments:</u>
40	Is the Access Road Gate required?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	If No, explain:	Not considered urban, if a gate is present and locked, a key must be provided to ODNR- DOGRM.

<u>ITEM</u>	<u>WAIVERS</u>	<u>Comments:</u>
41	Is the Company required to submit a waiver?	<input type="checkbox"/> Yes <input checked="" type="checkbox"/> No
	If yes, submit the following waiver requests:	

Is the Company required to submit revised drawings? Yes No

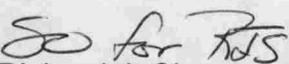
THE FOLLOWING ITEMS HAVE BEEN CHANGED FROM THE ORIGINAL APPLICATION:

1/2013

Completed By Anthony Carson

Memorandum

To: Permit File- 34013209700000


From: Richard J. Simmers, Chief

Date: October 1, 2015

Subject: Variance Request- XTO Energy Inc.
Wassmann B 5H, Pultney Township, Belmont County

Pursuant to Section 1501:9-1-04 (E)(2) of the OAC, I hereby grant the variance request to the spacing requirements of Sections 1501:9-1-04 (C)(4) of the OAC to XTO Energy Inc.

Approval of this variance reduces the setback distance at the heel portions of this horizontal shale well from 500 feet to no less than 150 feet to the unit boundary.

In the attached documents, the applicant has demonstrated that the approval of the variance will protect correlative rights and promote conservation by permitting oil and gas to be produced that could not otherwise be produced.

An "as drilled" survey plat showing the location of the perforations at the heel sections of the well shall be submitted within 60 days of perforating the well.

cc: Steve Opritza, Geologist

Proof Sheet

APPL NUMBER	aPATT028111
OWNER NUMBER	8063
OWNER NAME	XTO ENERGY INC.
EXISTING WELL	-1
API PERMIT NO	34013209700000
APPL TYPE	RHX
TYPE OF WELL	OG
VARIANCE REQUEST	
WELL NAME	WASSMANN UNIT B
WELL NUMBER	5H
PREV/PROPOSED TD	19520
DRILL UNIT ACRES	227.2119
TYPE OF TOOL	RTAF
WELL CLASS	Pool
FIRE PHONE	(740) 699-0425
MEDICAL PHONE	(740) 699-0425
COUNTY CODE	13
COUNTY NAME	BELMONT
COAL (Y=-1/N=0)	-1
CIVIL TOWNSHIP	PULTNEY
SURF QUAD	BUSINESSBURG
Nad 27 SURF ORIG X	2,478,643
Nad 27 SURF ORIG Y	729,226
GROUND ELEVATION	1230
SURF SEC	4
SURF LOT	
SURF QTR TWP	
SURF ALLOT	
SURF TRACT	
SURF FRACTION	

URBANIZED AREA ?	<input type="checkbox"/>
NAME	
STATE LAND ?	<input type="checkbox"/>
MP Check #	0
PROPOSED FORMATIONS	POINT PLEASANT
UTICA/PT PLEASANT	<input checked="" type="checkbox"/>
MARCELLUS	<input type="checkbox"/>
TAKE POINT ORIG X	2,479,620
TAKE POINT ORIG Y	729,406
TARG COUNTY CODE	13
TARG COUNTY NAME	Belmont
TARG CIVIL TWP	MEAD
TARG QUAD	BUSINESSBURG
Nad 27 TARG ORIG X	2,483,260
Nad 27 TARG ORIG Y	721,271
TARG ELEV	1130 -0
TARG SECTION	33
TARG LOT	
TARG QTR TWP	
TARG ALLOT	
TARG TRACT	
TARG FRACTION	

Proof Sheet

SURFACE FOOTAGE

3606'SL & 1298'WL OF SEC 4 (PULTNEY TWP)

TAKE POINT FOOTAGE

3818'SL + 2267'WL of sec 4 (Pultney Twp)

TARGET FOOTAGE

333'SL & 845'WL OF SEC 33 (MEAD TWP)

CASING PROGRAM

SPECIAL CONDITIONS/COMMENTS

18	30	100
60	24	300
93	20	650
08	13 3/8	2350
13	9 1/8	8900
21	3 1/2	
26		

-PER
#WSC
HD
INNER

PH#20776
BE=2077
21V-1150

COMPLETION DT

MINES APPROVAL

AFFIDAVIT APPROV

GIS: no drift no water wells
mine BT-110 21V-650

SOURCES OF WATER

WATERSHED LAKE ERIE OHIO RIVER

RUMA ATTACHED

EST WITHDRAWAL RATE (GAL/DAY)

NON AGREEMENT AFFIDAVIT ATTACHED

EST TOTAL VOLUME (GALLONS)

RECYCLED WATER EST TOTAL VOLUME (GALLONS)

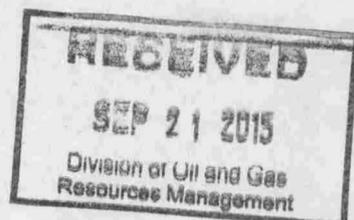
WATER WELL SAMPLING RESULTS

DATE SUBMITTED

1473
8250



OHIO DEPARTMENT OF NATURAL RESOURCES
DIVISION OF OIL AND GAS RESOURCES MANAGEMENT
2045 MORSE RD., BLDG. F-2, COLUMBUS, OH 43229-6693
Phone: (614) 265-6922 • Fax: (614) 265-6910



APPLICATION FOR A PERMIT (Form 1)

(REVISED 0915)

APR 40 28111

SEE INSTRUCTIONS ON BACK

1. We (applicant) XTO ENERGY, INC. 2. OWNER NUMBER: 8063
Address: 190 Thorn Hill Road - Warrendale, PA 15086 Phone Number: (724) 772 - 3500
hereby apply this date 9/18, 2015 for a permit to:

Drill Vertical Well Revised Location Convert
 Drill Horizontally Plug Back Deepen
 Drill Directionally Plug and Abandon Reopen
 Reissue Temporary Inactive: 1st year 2nd year 3rd year _____th year

3. TYPE OF WELL: Oil & Gas Annular Disposal Saltwater Injection
 Stratigraphic Test Gas Storage Other (explain):
 Solution Mining* Enhanced Recovery* (*if checked, select appropriate box below)
 Input/Injection Water Supply Observation Production/Extraction

4. Is the well location or production facility(s) within an urbanized area as defined by ORC 1509.01 (Y)? Yes No

20. TYPE OF TOOLS: Cable Rotary (Air Fluid)
 Cable/Rotary Service Rig

5. MAIL PERMIT TO: Attn: Melissa Breitenbach
190 Thorn Hill Road
Warrendale PA 15086

21. SOURCE(S) OF GROUND AND/OR SURFACE WATER USED IN PRODUCTION OPERATION:
Belmont County Water / Ohio River / McMahan Creek
Watershed: Lake Erie Ohio River

6. COUNTY: BELMONT Estimated Withdrawal Rate (gal/day): 1,200,000

7. CIVIL TOWNSHIP: Pultney Estimated Total Volume (gal): 12,000,000

8. SECTION: 4 9. LOT: _____ If Recycled Water – Estimated Total Volume (gal): 820,000, if needed

10. FRACTION: _____ 11. QTR TWP: _____

12. TRACT/ALLOT: _____ 22. EMERGENCY TELEPHONE NUMBERS (closest to well site):
Fire: (740) 699-0425
Medical: (740) 699-0425

13. WELL NUMBER: 5H 23. MEANS OF INGRESS AND EGRESS:
Road: I70 / SR9 / SR147 / CR44

14. LEASE NAME: Wassmann Unit B 24. ROAD USE FOR HORIZONTAL WELL:
 Maintenance Agreement Attached
 Non-agreement Affidavit Attached
 State Route (Not Required)

15. PROPOSED TOTAL DEPTH: 19,520 25. ARE THE SURFACE RIGHTS OWNED BY THE STATE OF OHIO?
Agency Name: N/A

16. PROPOSED GEOLOGICAL FORMATION(S):
Point Pleasant 26. FOR PLUGGING APPLICATIONS: Date of Last Production:
Amount of Oil: _____ (bbl) Gas: _____ (mcf)

17. DRILLING UNIT ACRES: 227.212 (227.219)

18. ATTACH LANDOWNER ROYALTY LISTING:

19. IF PERMITTED PREVIOUSLY:
API Number: 34013209700000

27. PROPOSED CASING AND CEMENTING PROGRAM

Type Casing	Borehole Diameter (in)	Borehole Depth (ft)	Casing Diameter (in)	Casing Depth (ft)	Cement Volume (sacks)	Formation	Zone Tested or Produced (✓ if Yes)	Hydraulic Fracturing (✓ if Yes)
Drive Pipe								
Conductor	36	100	30	100	~240			
Mine String								
Surface	26	420	18.625	400	~770	Thru Pgh coal, if needed		
1 st Intermediate	17.5	2370	13.375	2350	~1780	Ohio Shale (thru Berea)		
2 nd Intermediate	12.25	8920	9.625	8900	~1430	Queenston, if needed		
Production	8.5	19520	5.5	TD	~2810	Pt. Pleasant	✓	✓
Liner	TBD	TBD	TBD	TBD	TBD	TBD		

I, the undersigned, being first duly sworn, depose and state under penalties of law, that I am authorized to make this application, that this application was prepared by me or under my supervision and direction, and that the facts stated herein are true, correct, and complete, to the best of my knowledge.
I, the undersigned, further depose and state that I am the person who has the right to drill on the tract or drilling unit and to drill into and produce from a pool and to appropriate the oil or gas that I produce therefrom either for myself or others as described in this application. And furthermore, I the undersigned, being duly sworn, depose and state at this time that I am not liable for any final nonappealable order of a court for damage to streets, roads, highways, bridges, culverts, or drainage ways pursuant to Section 5577.12 of the Ohio Revised Code (ORC). I, the undersigned, further depose and state that all notices required by 1509.06 (A) (9) ORC for this application have been duly provided by me. If applying for a permit to plug and abandon a well, I hereby certify that the written notices, as required in Section 1509.13, ORC, have been given.
That I hereby agree to conform with all provisions of Chapter 1509., ORC and Chapter 1501., OAC, and all orders and conditions issued by the Chief, Division of Oil and Gas Resources Management.

Signature of Owner/Authorized Agent: Melissa Breitenbach
Name (Type or Print): Melissa Breitenbach Title: Regulatory Coordinator

_____ if signed by Authorized Agent, a certificate of appointment of agent must be on file.
Sworn to and subscribed before me this the 18th day of September, 2015.

COMMONWEALTH OF PENNSYLVANIA
Notarial Seal
Kimberly Beth Wilson, Notary Public
Hampton Twp., Allegheny County
My Commission Expires June 10, 2016
MEMBER, PENNSYLVANIA ASSOCIATION OF NOTARIES

Kimberly Beth Wilson
(Notary Public)
June 10, 2016
(Date Commission Expires)



XTO Energy Inc.
190 Thorn Hill Road
Warrendale PA 15086
(724) 772-3500
(724) 772-3505 Fax

September 18, 2015

Ohio Dept of Natural Resources
Division of Oil & Gas Resources Management
Attn: Mr. Steve Opritza
2045 Morse Road, Building F-2
Columbus, OH 43229-6693

Re: Wassmann Unit B 5H (34-013-2-0970-00-00)
Reduced Spacing Request from Takepoint to Unit Boundary
Pultney Township, Belmont County

Dear Mr. Opritza,

XTO Energy, Inc. respectfully requests a variance to reduce spacing from take point to unit boundary for the Wassmann Unit B 5H (34-013-2-0970-00-00) located in Pultney Township, Belmont County. In accordance with OAC 1501.9-1-04(E)(2) XTO requests reduced spacing from the heel/first take point to a minimum distance of 150 feet of the horizontal wellbore to unit boundary. This reduction in spacing will still protect correlative rights while enabling XTO to more efficiently recover resources that would otherwise be left unrecovered. Unless otherwise stated, the productive section of the wellbore will maintain a minimum 500 foot distance to the unit boundary (measured perpendicularly).

At the heel/first take point, Parcel #26-01876.000 Martha Wassmann-Winn (Martha Wassman-Winn & Michael J. Shaheen), is Ascent Resources, LLC (formerly AEU) acreage operated by XTO per attached Affidavit; and therefore does not require a waiver.

In support of this request, please find attached a copy of Chesapeake's Temporary Minimum Spacing Request submitted to the Technical Advisory Council, November 6, 2013. Their request demonstrates that the current setback distances for the take points to the unit boundary leaves substantial reserves undeveloped. Furthermore, it demonstrates that there is little impact to acreage beyond the drilling unit. Reducing the take point setbacks will improve well economics; allow access to reserves that would otherwise be left behind within the proposed drilling unit, while still protecting correlative rights.

Should you have any questions concerning this request, please feel free to contact me at (724) 772-8715.

Sincerely,
XTO ENERGY, INC.

Melissa Breitenbach
Regulatory Coordinator



November 6, 2013

Douglas Gonzalez, Chair
Technical Advisory Council
2045 Morse Road
Columbus, OH 43229-6639

RE: Temporary Minimum Spacing Request

Dear Chairman Gonzalez:

Ohio has a proud, longstanding history of oil and natural gas exploration and production. Such history would not have been possible without effective management of Ohio's mineral development. Ohio's current spacing and setback regulations, as applied to unconventional horizontal development, are incongruent with its tradition of conservation and protection of correlative rights. As Ohio encounters new frontiers in exploration, it has at its disposal the tools necessary for the vigilant management of its mineral resources. Accordingly, for the Council's consideration, Chesapeake Exploration, L.L.C. respectfully submits the foregoing Temporary Minimum Spacing Request.

Ohio Administrative Code § 1501:9-1-04(D) provides the Chief, upon consideration of an application by an owner in an affected area, with the authority to order temporary well spacing for a particular pool or field in an area. The Chief's order also requires the approval of this Council.

Pursuant to OAC § 1501:9-1-04(D)(1), the Chief's order must contain the following:

(a) Description of the area covered by the order;

While much of the horizontal drilling in Ohio is concentrated in certain counties, it is far too early in the development to define the geographic area of the play. To avoid multiple operators making repeated and redundant requests, Chesapeake advocates applying the order to any county where a permit to drill a horizontal well which targets the Utica or Point Pleasant has been issued prior to the submission of this application.

Chesapeake Energy Corporation
P.O. Box 6070 • Charleston, WV 25362 • 414 Summers St. • Charleston, WV 25301
304-353-5016 • fax 304-353-5231 • Jody.C.Jones@chk.com

(b) Identification of the pool, field or horizons covered by the order;

Chesapeake agrees with the Chief's previous finding that the Utica Shale and Point Pleasant are the target formations for the "Utica" play¹; therefore, suggests the same consistent identification of the field. *See Attachment 1.*

(c) Minimum distance wells may be drilled from the tract or drilling unit boundaries;

As discussed in further detail below, in order to promote conservation and protect correlative rights, Chesapeake proposes that the minimum distance from first or last perforation of a horizontal well to any tract or drilling unit boundary be 50 feet.

(d) Minimum distance between wells;

Chesapeake proposes that the minimum distance between any first or last perforations between adjacent horizontal wells be 100 feet.

(e) Minimum acreage for tracts or drilling units; and may contain other requirements deemed necessary by the chief to accomplish the purpose of paragraph (D) of this rule.

Chesapeake proposes no changes to the minimum acreage requirement for drilling units.

DISCUSSION

Shale Formations and Fracture Propagation

Horizontal wells are drilled differently than vertical wells. Instead of a vertical wellbore penetrating the target formation(s), a horizontal well changes orientation (i.e. curves) from vertical to horizontal and "lands" in the target formation(s) then maintains that horizontal orientation until the terminus of the wellbore. Therefore, a horizontal well has the length of the wellbore (the "lateral"), in addition to the curved portion (the "heel") and terminus of the wellbore (the "toe"). To achieve optimal development and to greatly reduce surface disturbance, multiple horizontal wells are drilled from a common pad.

Ohio's current spacing and setback regulations were created for vertical wells, and thus prove to be counterproductive for efficient horizontal shale wells. OAC § 1501:9-1-04(C)(4) substantively provides that wells deeper than 4,000 feet for the production of oil or gas be a minimum of 500 feet from a drilling unit boundary and 1,000 feet from a well producing from the same formation. *See Attachment 2.*

¹ "The Concept of 'Take Point' as it Applies to Horizontal Shale Wells" presented by DOGRM to the TAC on 8/7/2012.

For the initial horizontal wells drilled into the Utica/Point Pleasant, the Division used the entry point (where the wellbore entered the target formation) and the terminus of the wellbore (bottom hole location, or BHL) as the measuring points for calculating spacing and setback compliance. The dilemma with that approach was that the entry point and BHL did not accurately reflect the measuring points where production is flowing in to the wellbore, resulting in otherwise recoverable oil and gas being left in place. Following consultation with the industry, the Division proposed to this Council the application of takepoint spacing, which used the first and last perforation as the measurements for spacing and setbacks. This Council unanimously approved the Division's request, and was implemented via Order No. 2012-24.² *See Attachment 3.*

The application of takepoint spacing was an improvement in maximizing recovery; however, the current spacing and setbacks regulations, as applied to horizontal shale wells, are still incongruent and fail to promote conservation by leaving oil and gas in place, to the detriment of mineral owners and the state of Ohio. These unrecovered minerals could be recoverable with a revision of the current 500 foot setback to 50 feet, thus promoting conservation and still protecting correlative rights. *See Attachment 2.* To understand why oil and gas is left in place, an elementary understanding of how a horizontal shale well is drilled and completed is needed.

Target formations for oil and gas development are typically described in terms of their porosity and permeability. Generally speaking, porosity is the ability of the rock to hold hydrocarbons, and permeability is the ability of the hydrocarbons to move through the rock. Shales are known for having low porosity, and very low permeability; and thus, are sometimes referred to as "tight". Hydraulic fracturing is the process by which pathways (i.e. permeability) are created in the shale to allow the hydrocarbons trapped in the pore space to travel into the wellbore.

Horizontal wells are drilled in a particular direction (azimuth) in order to take advantage of the formation stresses in place. In the Utica/Point Pleasant, the formation stress orientation is northwest or southeast. When a horizontal well is completed, the perforating and hydraulic fracturing process is optimized by creating transverse fractures to the wellbore and therefore maximizing the reservoir area contacted. The primary goals in hydraulic fracturing are to apply pressure to overcome the horizontal minimum stress in the reservoir to create fractures, and then to place proppant in those fractures to create a conductive pathway through which the hydrocarbons can flow.

The propagation of fractures begins from the perforations. As all fluid will travel the path of least resistance, the fractures will open against the horizontal minimum principle stress (parallel to the wellbore if drilled in the typical direction) of the reservoir, then the fractures will typically grow vertically until a vertical stress barrier is encountered. In the case of the Utica Shale, the vertical stress barriers are the Trenton beneath the Point Pleasant and either the Middle or Upper Utica. The vertical stress profile (and thus the vertical barriers) is determined via dipole sonic logs and calibrated with pump-in tests. *See Attachment 4.* Once the fractures reach the vertical

² Division of Oil and Gas Resources Management Order No. 2012-24 "Take points to determine spacing to unit lines." Issued 8/21/2012

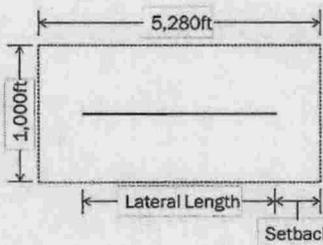
stress barrier, they grow towards the horizontal maximum principle stress (perpendicular to the wellbore). *See attachment 5.*

Reservoir Drainage

A horizontal well's production, and ultimately its success, is dependent on the ability to create surface area to accomplish reservoir depletion. Reservoir drainage is a function of the distance between the fractures, and likewise, the distance between the perforations (also known as "cluster spacing"). Completion design, which includes cluster spacing as a parameter, can be engineered to maximize reservoir drainage. Through multiple drilled, completed, and producing horizontal wells Chesapeake's internal technical team of engineers and geoscientists has identified that the distance between perforations has a significant impact on well performance, and more importantly, well production performance improves dramatically by decreasing cluster spacing. As a result of our research, modeling and testing, Chesapeake's designed cluster spacing has been reduced to approximately 50 feet between clusters. While ongoing study of cluster spacing will determine the most effective cluster spacing design, all current data indicates that **to efficiently develop the reserves along the completed lateral the cluster spacing should not exceed approximately 50 feet.** In stark contrast to the 50 foot cluster spacing along the completed lateral is the 500 foot setback to the drilling unit boundary and 1,000 foot spacing between opposing wells. **An alternate expression would be to say that cluster spacing between the first and last perforations of offset wells is 1,000 feet, or 20 times what is proven to be the maximum for efficient reservoir drainage.**

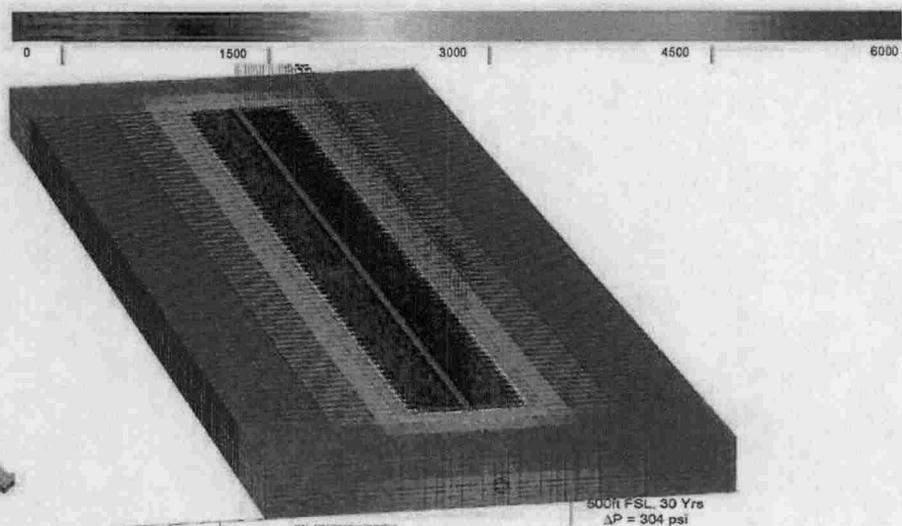
Numerical Simulation

To demonstrate the impact of the current setback and spacing restrictions, below is a multi-layer numerical simulation which utilizes reservoir rock and fluid properties of the Utica/Point Pleasant shale formation. The reservoir and fluid properties were derived using proprietary analysis of multiple cores, well logs, and produced fluid samples throughout eastern Ohio. The model parameters represent Chesapeake's current understanding of the reservoir properties in southern Carroll County, which has been Chesapeake's most active area to date. The development of this model allows for multiple setback scenarios to be examined in order to quantify the impact setbacks have on oil and gas recovery and rate of depletion from the first and last perforations to the unit boundary. This simulation is a single well unit model with constant dimensions (shown below) in which multiple lateral length scenarios (shown below) are evaluated in order to demonstrate the impact of the heel/toe setback.



Scenario	Take Point Setback	Effective Lateral Length
1 _(Current)	500ft	4,280ft
2	250ft	4,780ft
3	125ft	5,030ft
4 _(Proposed)	50ft	5,180ft

Simulation Results



This model illustrates that after 30 years of production the pressure depletion at the unit boundary using the current 500 foot setback is less than 5 percent, stranding a significant portion of oil and gas reserves between the take point and the unit boundary. As a comparison, under the proposed 50 foot setback, for the same 30-year time period, the pressure depletion at the unit boundary is 70 percent, which represents a considerable improvement to drainage efficiency. This improved efficiency also has a dramatic impact to ultimate recovery of reserves in the unit. Estimated ultimate recovery (EUR) increases 18% from 5.02 billion cubic feet of gas equivalent (or BCFE) to 5.95 BCFE for the 500 feet to 50 feet scenario, respectively. With over 15,000 wet and dry gas wells to be drilled across eastern Ohio, decreasing setbacks from the heel/toe to the unit boundary could potentially translate into 14 trillion cubic feet of recoverable gas equivalent.

This increased recovery not only improves well economics, but results in additional revenues to mineral owners and the state of Ohio.

Conservation

The concept of conservation has always included two important principles. The first principle is achieving the maximum drainage with the fewest wells. The ability to drill multiple horizontal wells from a single pad has greatly advanced the ability to drain a large area while reducing surface footprint. In order to fully achieve the potential of horizontal drilling, setback and spacing provisions must allow for the most efficient and maximum drainage. If not, recoverable reserves are simply left behind. The second principle is correlative rights, or allowing mineral owners to benefit from the recovery of their minerals while protecting offset mineral owners. As demonstrated by the model above, the current 500 foot setback leaves recoverable hydrocarbons in place, thus depriving mineral owners of that revenue. The proposed 50 foot setback allows for a higher, more efficient, depletion at the unit boundary, but requires decades to achieve. Thus, offset mineral owners have an abundance of time to develop their resources. Accordingly, the proposed 50 foot setback strikes a fair, but realistic balance, between allowing a mineral owner the opportunity to benefit from the recovery of their reserves, while still protecting the correlative rights of offset mineral owners.

CONCLUSION

Every day horizontal wells are being drilled in the Utica/Point Pleasant in Ohio, and oil and gas is being left behind, running afoul of the principles of conservation and failing to protect correlative rights. As core areas are developed, without change to Ohio's current spacing and setback regulations, recoverable minerals will be relegated to uneconomically recoverable status. The early stages of the Utica/Point Pleasant development present a prime opportunity to establish spacing and setbacks which maximize efficiency and recovery, the keystones of conservation. Accordingly, Chesapeake proposes that this Council approve temporary minimum spacing of 50 feet from the first and last takepoint to the unit boundary.

Chesapeake appreciates your consideration of this request and looks forward to formally presenting to the Council at the earliest opportunity.

Sincerely,



Jody C. Jones
Manager, Regulatory Affairs

Wassmann Unit B - 5H
 Questions 18- Landowner Royalty Listing
 Mead and Pultney Townships / Belmont County

Tract #	Parcel #	Surface Owner	Surface Owner Address	Royalty Owner	Royalty Owner Address
1	26-01876.000	Martha Wassmann-Winn	55014 Winding Hill Road Bellaire, OH 43906	Martha Wassmann-Winn	55014 Winding Hill Road Bellaire, OH 43906
1	26-01876.000	Martha Wassmann-Winn	55014 Winding Hill Road Bellaire, OH 43906	Michael J. Shaheen	P.O. Box 597 St. Clairsville, OH 43950
5	26-00975.000	John R. Patt and Elaine Patt	55590 Winding Hill Road Bellaire, OH 43906	John R. Patt and Elaine Patt	55590 Winding Hill Road Bellaire, OH 43906
8	26-03107.001	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947
9	26-01670.007	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947
42	26-03107.000	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947
43	26-03108.000	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947
44	26-01804.000	Sherol L. Rayl	55987 New Cut Road Shadyside, OH 43947	Sherol L. Rayl	55987 New Cut Road Shadyside, OH 43947
44	26-01804.000	Scott D. Dague	55987 New Cut Road Shadyside, OH 43947	Scott D. Dague	55987 New Cut Road Shadyside, OH 43947
45	26-01804.001	Sherol L. Rayl	55987 New Cut Road Shadyside, OH 43947	Sherol L. Rayl	55987 New Cut Road Shadyside, OH 43947
46	26-00379.000	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947	Michael B. Koonce	55745 New Cut Road Shadyside, OH 43947
47	14-00251.000	Eric W. Heller and Kim Heller	55984 New Cut Road Shadyside, OH 43947	Eric W. Heller and Kim Heller	55984 New Cut Road Shadyside, OH 43947
48	14-00229.000	Herbert F. May and Mary Lee May	61781 Webb Heights Road Shadyside, OH 43947	Herbert F. May and Mary Lee May	61781 Webb Heights Road Shadyside, OH 43947

Wassmann Unit B - 5H
 Questions 18- Landowner Royalty Listing
 Mead and Pultney Townships / Belmont County

Tract #	Parcel #	Surface Owner	Surface Owner Address	Royalty Owner	Royalty Owner Address
74	14-00091.000	George J. Palmer and Theresa A. Palmer	61739 Webb Heights Road Shadyside, OH 43947	George J. Palmer and Theresa A. Palmer	61739 Webb Heights Road Shadyside, OH 43947
75	14-00038.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
76	14-00157.006	Adam J. Hughes and Tracie Lynn Hughes	57256 New Cut Road Shadyside, OH 43947	Adam J. Hughes and Tracie Lynn Hughes	57256 New Cut Road Shadyside, OH 43947
77	14-00179.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
78	14-00230.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
79	14-00081.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
85	14-00358.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
87	15-00676.000	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947	Robert G. Gibson, II	61461 Webb Heights Road Shadyside, OH 43947
99	26-01679.000	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947	Robert P. DeLong and Cecillia A. DeLong	55125 New Cut Road Shadyside, OH 43947



XTO Energy Inc.
190 Thorn Hill Road
Warrendale PA 15086
(724) 772-3500
(724) 772-3505 Fax

September 21, 2015

Ohio Dept of Natural Resources
Division of Oil & Gas Resources Management
Attn: Mr. Steve Opritza
2045 Morse Road, Building F-2
Columbus, OH 43229-6693

Re: Wassmann Unit B 5H (34-013-2-0970-00-00)
Reissue Permit Application & Variance Request
Pultney Township, Belmont County

Dear Mr. Opritza,

Please find enclosed for your review and approval a Reissue Permit Application for the Wassmann Unit B 5H (34-013-2-0970-00-00) located in Pultney Township, Belmont County, along with a check in the amount of \$250.00 covering the reissue permit fee. Please note: The casing plan has been revised.

Also, enclosed is a Reduced Spacing Request from Heel/ First Take Point to Unit Boundary for the Wassmann Unit B 5H. Please note: XTO is only requesting a waiver for the Heel/First Take Point. A waiver was previously granted on 8/31/2015 for both the Heel & Toe portions; XTO would like to withdrawal the original request for the Toe waiver. The Toe is now set at 500ft on the attached plat for your review.

Should you have any question or need additional information, please feel free to contact me at (724) 772-8715.

Sincerely,
XTO ENERGY, INC.

A handwritten signature in black ink that reads "Melissa Breitenbach".

Melissa Breitenbach
Regulatory Coordinator

RESTORATION PLAN (Form 4)

Ohio Department of Natural Resources

Division of Oil and Gas Resources Management, 2045 Morse Road, Bldg. F-2, Columbus OH 43229-6693

1. DATE OF APPLICATION: 18-Sep-15	
2. OWNER NAME, ADDRESS, & TELEPHONE NO.: XTO ENERGY, INC. 190 THORN HILL WARRENDALE, PA 15086 724-772-3500	3. API #: 34-013-2-0970-00-00 4. WELL #: 5H 5. LEASE NAME: Wassmann Unit B 6. PROPERTY OWNER: Martha Wassmann-Winn 7. COUNTY: Belmont 8. CIVIL TOWNSHIP: T5, R3 Pultney 9. SECTION: 4 10. LOT:
11. CURRENT LAND USE: <input type="checkbox"/> Cropland <input type="checkbox"/> Commercial <input type="checkbox"/> Pasture <input type="checkbox"/> Idle Land <input type="checkbox"/> Wetlands <input type="checkbox"/> Recreational <input type="checkbox"/> Residential <input type="checkbox"/> Industrial <input type="checkbox"/> Unreclaimed strip mine <input checked="" type="checkbox"/> Woodland: <input checked="" type="checkbox"/> Broadleaf <input type="checkbox"/> Needlelike	17. TYPE OF WELL: <input type="checkbox"/> Oil <input checked="" type="checkbox"/> Gas <input type="checkbox"/> Other 18. STEEPEST SLOPE GRADIENT CROSSING SITE: <input type="checkbox"/> 0 to 2% <input type="checkbox"/> 2.1 to 8% <input type="checkbox"/> 8.1 to 10% <input type="checkbox"/> 10.1 to 24% <input checked="" type="checkbox"/> greater than 24%
12. SLOPE GRADIENT & LENGTH DETERMINED FROM: <input checked="" type="checkbox"/> Ground Measurement <input type="checkbox"/> U.S. Geological Survey Topographical Maps <input type="checkbox"/> Other: (explain) _____	19. LENGTH OF STEEPEST SLOPE CROSSING SITE: <input checked="" type="checkbox"/> 1 to 100 ft. <input type="checkbox"/> 101 to 200 ft. <input type="checkbox"/> 201 to 400 ft. <input type="checkbox"/> greater than 400 ft.
13. TYPE OF FALL VEGETAL COVER: <input type="checkbox"/> Little or no vegetal cover <input type="checkbox"/> Short grasses <input type="checkbox"/> Tall weeds or short brush (1 to 2 ft.) <input type="checkbox"/> Brush or bushes (2 to 6 ft.) <input type="checkbox"/> Agricultural crops <input checked="" type="checkbox"/> Trees with sparse low brush <input type="checkbox"/> Trees with dense low brush	20. RESTORATION OF DRILLING PITS: ** <input type="checkbox"/> Haul drilling fluids and fill pits <input checked="" type="checkbox"/> Use steel circulating tanks <input type="checkbox"/> Proposed alternative _____
14. SOIL & RESOILING MATERIAL AT WELLSITE: <input checked="" type="checkbox"/> Stockpile and protect topsoil to be used when preparing seedbed <input checked="" type="checkbox"/> Use of soil additives (e.g., lime, fertilizer) <input type="checkbox"/> No resoiling planned <input type="checkbox"/> Proposed alternative _____	21. BACKFILLING AND GRADING AT SITE: <input type="checkbox"/> Construct diversions channeled to naturally established drainage systems <input type="checkbox"/> Construct terraces across slopes <input type="checkbox"/> Grade to approximate original contour <input checked="" type="checkbox"/> Grade to minimize erosion & control offsite runoff <input type="checkbox"/> Proposed alternative _____
15. DISPOSAL PLAN FOR TREES AND TREE STUMPS: <input type="checkbox"/> No trees disturbed <input type="checkbox"/> Haul to landfill <input checked="" type="checkbox"/> Cut into firewood <input type="checkbox"/> Sell to lumber <input type="checkbox"/> Bury with landowner's approval company <input checked="" type="checkbox"/> Mulch small trees and branches, erosion control <input type="checkbox"/> Use for wildlife habitat with landowner approval <input type="checkbox"/> Proposed alternative _____	22. VEGETATIVE COVER TO BE ESTABLISHED AT SITE: <input checked="" type="checkbox"/> Seeding plan <input type="checkbox"/> Sod <input type="checkbox"/> Agricultural crops <input type="checkbox"/> Trees and/or Bushes <input type="checkbox"/> Proposed alternative _____
16. SURFACE AND SUBSURFACE DRAINAGE FACILITIES: <input checked="" type="checkbox"/> No existing drainage facilities for removal of surface and/or subsurface water <input type="checkbox"/> Tile drainage system underlying land to be disturbed <input type="checkbox"/> Drain pipe(s) underlying land to be disturbed <input type="checkbox"/> Surface drainage facilities on land to be disturbed	23. ADDITIONAL HOLES: <input type="checkbox"/> Rat/Mouse, if used, will be plugged 24. PROPOSED OR CURRENT LENGTH OF ACCESS ROAD: <input type="checkbox"/> 100 ft. or less <input type="checkbox"/> 101 to 500 ft. <input checked="" type="checkbox"/> 501 to 1500 ft. <input type="checkbox"/> greater than 1500 ft.
16. SURFACE AND SUBSURFACE DRAINAGE FACILITIES: (continued)	25. CURRENT LAND USE OF PATH OF ACCESS ROAD: <input type="checkbox"/> Cropland <input type="checkbox"/> Pasture <input type="checkbox"/> Commercial <input type="checkbox"/> Idle land <input type="checkbox"/> Wetlands <input type="checkbox"/> Recreational <input type="checkbox"/> Industrial <input type="checkbox"/> Residential <input type="checkbox"/> Unreclaimed strip mine <input checked="" type="checkbox"/> Woodland: <input checked="" type="checkbox"/> Broadleaf <input type="checkbox"/> Needlelike

****PITS MUST BE FILLED WITHIN TWO MONTHS AFTER COMMENCEMENT OF THE WELL AND WITHIN FOURTEEN DAYS AFTER COMMENCEMENT OF THE WELL IN AN URBANIZED AREA.**

REQUIRED BY SECTION 1509.06 (A)(10), OHIO REVISED CODE -- FAILED TO SUBMIT MAY RESULT IN AN ASSESSMENT OF CRIMINAL FINES NOT LESS THAN \$100.00 NOR MORE THAN \$2,000.00 OR CIVIL PENALTIES NOT LESS THAN \$4,000.00.



Ohio Department of Natural Resources

JOHN R. KASICH, GOVERNOR

JAMES ZEHRINGER, DIRECTOR

Memorandum for Proposed Wells Sites Without Affected Mines

TO: Patty Nicklaus, Office Assistant 3, Division of Oil and Gas Resources Management, Bonding and Surety Section

FROM: The Division of Mineral Resources Management, designated Affected Mine Review Committee (Brent Heavlin, Michael Kosek, John Ziants, James Bishop, Terry Beverly and Cassandra Morrison)

Date: October 1, 2015

Subject: Review of Oil and Gas Well Application: APATT028111

We have reviewed the aforementioned Oil and Gas Well permit application and find there are **NO** affected mines in the area referred to on the proposed well site map enclosed with the permit application.

Therefore, pursuant to 1509.08 of the Ohio Revised Code (ORC), we are recommending approval of the oil and gas permit for application number APATT028111.

C: Permit file

Nicklaus, Patricia

From: Morrison, Cassie
Sent: Thursday, October 01, 2015 10:17 AM
To: Opritza, Steven; Nicklaus, Patricia
Cc: Erdos, Lanny; Terry, Beverly
Subject: O&G Well Applications - no letter

Mr. Opritza and Ms. Nicklaus,

These permit applications have been reviewed.

apatt 28109, apatt 28110, apatt 28111, apatt 28138, apatt 28139, apatt 28140,
apatt 28141, apatt 28142, apatt 28143, apatt 28144, apatt 28145, apatt 28146,
apatt 28147, apatt 28155, apatt 28157, apatt 28158, apatt 28159, apatt 28163

It has been determined that there are no affected mines in the area.

Thank you,

Cassie Morrison
College Intern
Ohio Department of Natural Resources
Division of Mineral Resources Management
43029 Industrial Park Road
Cadiz, OH 43907
Phone: 740.942.9150
Fax: 740.942.9140
cassie.morrison@dnr.state.oh.us