west virginia department of environmental protection

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

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

March 02, 2015

WELL WORK PERMIT

Horizontal 6A Well

This permit, API Well Number: 47-4902362, issued to XTO ENERGY, INC., is evidence of permission granted to perform the specified well work at the location described on the attached pages and located on the attached plat, subject to the provisions of Chapter 22 of the West Virginia Code of 1931, as amended, and all rules and regulations promulgated thereunder, and to all conditions and provisions outlined in the pages attached hereto. Notification shall be given by the operator to the Oil and Gas Inspector at least 24 hours prior to the construction of roads, locations, and/or pits for any permitted work. In addition, the well operator shall notify the same inspector 24 hours before any actual well work is commenced and prior to running and cementing casing. Spills or emergency discharges must be promptly reported by the operator to 1-800-642-3074 and to the Oil and Gas inspector.

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

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

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

James Martin
Chief

Operator's Well No: SWEARINGEN 1H
Farm Name: CARDER, DON E
API Well Number: 47-4902362
Permit Type: Horizontal 6A Well
Date Issued: 03/02/2015

API Number: 4902362

PERMIT CONDITIONS

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

CONDITIONS

1. This proposed activity may require permit coverage from the United States Army Corps of Engineers (USACE). Through this permit, you are hereby being advised to consult with USACE regarding this proposed activity.

2. If the operator encounters an unanticipated void, or an anticipated void at an unanticipated depth, the operator shall notify the inspector within 24 hours. Modifications to the casing program may be necessary to comply with W. Va. Code § 22-6A-5a (12), which requires drilling to a minimum depth of thirty feet below the bottom of the void, and installing a minimum of twenty (20) feet of casing. Under no circumstance should the operator drill more than fifty (50) feet below the bottom of the void or install less than twenty (20) feet of casing below the bottom of the void.

3. When compacting fills, each lift before compaction shall not be more than 12 inches in height, and the moisture content of the fill material shall be within limits as determined by the Standard Proctor Density test of the actual soils used in specific engineered fill, ASTM D698, Standard Test Method for Laboratory Compaction Characteristics of Soil Using Standard Effort, to achieve 95 % compaction of the optimum density. Each lift shall be tested for compaction, with a minimum of two tests per lift per acre of fill. All test results shall be maintained on site and available for review.

4. Operator shall install signage per § 22-6A-8g (6) (B) at all source water locations included in their approved water management plan within 24 hours of water management plan activation.

5. Oil and gas water supply wells will be registered with the Office of Oil and Gas and all such wells will be constructed and plugged in accordance with the standards of the Bureau for Public Health set forth in its Legislative rule entitled *Water Well Regulations,* 64 C.S.R. 19. Operator is to contact the Bureau of Public Health regarding permit requirements. In lieu of plugging, the operator may transfer the well to the surface owner upon agreement of the parties. All drinking water wells within fifteen hundred feet of the water supply well shall be flow tested by the operator upon request of the drinking well owner prior to operating the water supply well.

6. Pursuant to the requirements pertaining to the sampling of domestic water supply wells/springs the operator shall, no later than thirty (30) days after receipt of analytical data provide a written copy to the Chief and any of the users who may have requested such analyses.

7. If any explosion or other accident causing loss of life or serious personal injury occurs in or about a well or well work on a well, the well operator or its contractor shall give notice, stating the particulars of the explosion or accident, to the oil and gas inspector and the Chief, within 24 hours of said accident.

8. During the casing and cementing process, in the event cement does not return to the surface, the oil and gas inspector shall be notified within 24 hours.

9. Operator shall provide the Office of Oil & Gas notification of the date that drilling commenced on this well. Such notice shall be provided by sending an email to DEPOOGNotify@wv.gov within 30 days of commencement of drilling.

WW-6B
(9/13)

4704902362

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

4 606

1) Well Operator: XTO Energy Inc.	494487940	Marion	Mannington	Shinnston
	Operator ID	County	District	Quadrangle

2) Operator's Well Number: Swearingen 1H Well Pad Name: Swearingen Pad

3) Farm Name/Surface Owner: Don Carder Public Road Access: Harrison County Rt. 3 (Robinson Wyatt Run)

4) Elevation, current ground: 1,374' Elevation, proposed post-construction: 1,376'

5) Well Type (a) Gas ■ Oil _____ Underground Storage _____
Other _____
(b)If Gas Shallow ■ Deep _____
Horizontal ■

6) Existing Pad: Yes or No No

7) Proposed Target Formation(s), Depth(s), Anticipated Thickness and Associated Pressure(s):
Target Formation: Marcellus, Depth 7,590, Anticipated Thickness: 150', Associated pressure: 4,650 psi

8) Proposed Total Vertical Depth: 7,590'

9) Formation at Total Vertical Depth: Marcellus

10) Proposed Total Measured Depth: 12,900'

11) Proposed Horizontal Leg Length: 4,925'

12) Approximate Fresh Water Strata Depths: 70'

13) Method to Determine Fresh Water Depths: Offsetting Reports

14) Approximate Saltwater Depths: 680'

15) Approximate Coal Seam Depths: 600'

16) Approximate Depth to Possible Void (coal mine, karst, other): 600'

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: _____

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10-20-14

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18) **CASING AND TUBING PROGRAM**

TYPE	Size	New or Used	Grade	Weight per ft. (lb/ft)	FOOTAGE: For Drilling	INTERVALS: Left in Well	CEMENT: Fill-up (Cu. Ft.)
Conductor	20"	New	H-40	94#	40'	40'	50 cuft - C.T.S
Fresh Water	13 3/8"	New	MS-50	48#	650'	650'	600 cuft - C.T.S.
Coal							
Intermediate	9 5/8"	New	J-55	36#	3100'	3100'	Lead 700/Tail 700 - C.T.S.
Production	5 1/2"	New	CYP-110	17#	12,900'	12,900'	2700 cuft
Tubing							
Liners							

WSH
10-20-14

TYPE	Size	Wellbore Diameter	Wall Thickness	Burst Pressure	Cement Type	Cement Yield (cu. ft./k)
Conductor	20"	24"	0.438"	960	Type 1	1.19
Fresh Water	13 3/8"	17.5"	0.33"	2,160	Type 1	1.19
Coal						
Intermediate	9 5/8"	12.25"	0.352"	3,520	Type 1	Lead 1.26/Tail 1.19
Production	5 1/2"	8.75" 8.5"/7.875"	0.304"	10,640	Type 1	1.32
Tubing						
Liners						

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 a new horizontal Marcellus well, utilizing synthetic mud and a closed loop system for both drilling and completion. Install new casing with centralizers.

20) Describe fracturing/stimulating methods in detail, including anticipated max pressure and max rate:

1. Acid Stage - Typically 1500 gallons of 7.5% hydrochloric acid to clear the perforation path in the wellbore. 1500 gals 15% HCl acid. 2. Sand / Proppant Stages - Several stages of pumping water combined with sand at a targeted 80 bpm rate. The maximum pressure and rate used is 10,000 psig and 120 bpm. The sand size may vary from 100 mesh to30/50 mesh size. 12,500 bbls slick water with 220,000 lbs 40/70, 270,000 lbs 100 mesh sands and 2,200 gals FR 133, 1,500 gals Bioplex 301 and 1,500 gals Bioplex 301 and 1,190 gals antiscale 30. 3. Flush Stage - Slickwater water stage to fill the wellbore to flush the sand from the wellbore. Depending on the water quality, a biocide, friction reducer, iron control, and scale inhibitor may be injected during the completion as well.

21) Total Area to be disturbed, including roads, stockpile area, pits, etc., (acres): 41.335 +/-

22) Area to be disturbed for well pad only, less access road (acres): 7.6 +/-

23) Describe centralizer placement for each casing string:

Conductor: none
Fresh Water: 1"-6" above float shoe, 1 at float collar, & 1 at every 4th joint to surface
Intermediate: 1"-6" above float shoe, 1 at float collar, & 1 at every 4th joint to surface
Production: 1 at every 4th joint from the kickoff point to 1000' above the kickoff point

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

Conductor - Type 1 - no additives
Fresh Water - Tail - Type 1 - 2% Calcium Chloride, Super Flake
Intermediate - Lead - Type 1 - 2% Calcium Chloride, Super Flake
Tail - Type 1 - 2% Calcium Chloride, Super Flake
Production - Tail 50/50 POZ - Type 1 - Sodium Chloride, Bentonite, Super Flake, Air-Out, R-1, AG-350

25) Proposed borehole conditioning procedures:

See attached sheet

*Note: Attach additional sheets as needed.

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Swearingen 1H – Mine Void Encounter Plan

Per communications with the WV Geology and Economic Survey there is a possible mine void in the Pittsburgh Coal seam under the Swearingen Pad in Marion County, WV. In preparation for drilling through a mine void, we will nipple up an annular preventer to be able to handle any flow should the void actually be encountered. We expect it to come in around 600' TVD from GL. We plan to set 13 3/8" casing as a surface/coal protective string ~50' below the base of this void.

A cement basket will be run as close as possible to the top of the void.

A cement balance job will be performed to cement the shoe and the annulus below the mine if circulation cannot be established. A grout cement job will be performed on the annulus to cement above the mine.

Once cemented in place, we will continue on with our normal casing design, which would be to set 9 5/8" intermediate casing at ~3000'.

Morgan O'Brien
Drilling Engineer
XTO Appalachia
Cell: 724-272-8097
Morgan_OBrien@xtoenergy.com

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Swearingen 1H Detailed Casing and Cementing Program

Type	Hole Size (inches)	Casing Design/Program								Cementing Program			
		Csg Size (in)	Length (ft)	Top/Bottom of String	Grade	Weight (ppf)	Wall Thickness	Burst Pressure Rating	Centralizer Placement	Type	Yield (cu. ft/sk)	Additives (trade names are Superior Well Services)	Estimated Volume (cu. ft.)
Conductor	24	20	40	0' / 40	H-40	94	0.438	960	none	Type 1	1.19	none	50
Coal	19	16	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD	TBD
Surface / Mine	17.5	13 3/8	650	0' / 650	MS-50	48	0.33"	2160	1-6" above float shoe 1-at float collar 1-every 4th jt to surface	Tail -Type 1	1.19	Calcium chloride, Super Flake	600
Intermediate	12.25	9 5/8	3100	0' / 3100'	J-55	36	0.352"	3520	1-6" above float shoe 1-at float collar 1-every 4th jt to surface	Lead-Type 1	1.26	Calcium Chloride, Super Flake	700
										Tail -Type 1	1.19	Calcium chloride, Super Flake	700
Production	8.75/ 8.5/ 7.875	5 1/2	12,900	0' / 12900'	CYP-110	17	0.304	10640	centralizers will be run every 3rd joint from top of cement to landing point	Tail-50/50 POZ:Type 1	1.32	Sodium chloride, bentonite, Super Flake, Air-Out, R-1, AG-350	2700
Tubing													
Liners													

Swearingen 1H Proposed Directional Data

Hole Section	Hole Size	Drilling Fluid	Condition Procedures			
			Drilling	At TD	Running Casing	Prior to Cementing
Conductor	24	Air/Water	Hole will be circulated with high pressure air	Hole will be blown clean with air prior to pulling out of hole to run casing	Hole will be filled with fluid and circulated to surface if conditions require	Casing will be filled with fluid and returns taken at surface prior to pumping cement
Coal	20	Air/Water	Hole will be circulated with high pressure air	Hole will be blown clean with air prior to pulling out of hole to run casing	Hole will be filled with fluid and circulated to surface if conditions require	Casing will be filled with fluid and returns taken at surface prior to pumping cement
Fresh Water	17.5	Air/Water	Hole will be circulated with high pressure air	Hole will be blown clean with air prior to pulling out of hole to run casing	Hole will be filled with fluid and circulated to surface if conditions require	Casing will be filled with fluid and returns taken at surface prior to pumping cement
Intermediate	12.25	Air/Water	Hole will be circulated with high pressure air	Hole will be blown clean with air prior to pulling out of hole to run casing	Hole will be filled with fluid and circulated to surface if conditions require	Casing will be filled with fluid and returns taken at surface prior to pumping cement
Production	8.75 8.5"/7.875"	Air / Non-aqueous based mud	cuttings out of the hole, MW will be approximately 11.5ppg-14.0ppg for stability and overbalance. As required, the hole will be circulated at high pump	The hole will be circulated at maximum possible pump rate and the drill string will be rotated at the maximum rpm.	Hole will be circulated as necessary while running casing.	Hole will be circulated at least one bottoms up prior to pumping cement.
Tubing						
Liners						

Swearingen 1H Proposed Directional Data

Other directional data

KOP	4500
LP	7975
approx. TD	12900 (rounded up)

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Swearingen 1H

Marion County, West Virginia

New Drill Horizontal Well

XTO ENERGY

MUD SYSTEM	Elevation 1376'	CASING SIZE	HOLE SIZE	CEMENT FILL
	40' - GL	20"	24"	cement to surface
Air/Hammer		13-3/8"	17-1/2"	cement to surface
	650'			
Air/Motor/Steering Tool		9-5/8"	12-1/4"	cement to surface
	3100'			
Air/Motor/Steering Tool		8-3/4" in vertical		
MWD Mud Motor	KOP Turn/Build KOP @4500'	5-1/2"		Cement back to 3000
		8-1/2" in curve / 7-7/8" in lateral.		

500' 1000' 1500' 2000' 2500' 3000' 3500' 4000' 4500' 5000' 5500' 6000' 6500' 7000' 7500'

TD: ~12900' MD / 7590' TVD

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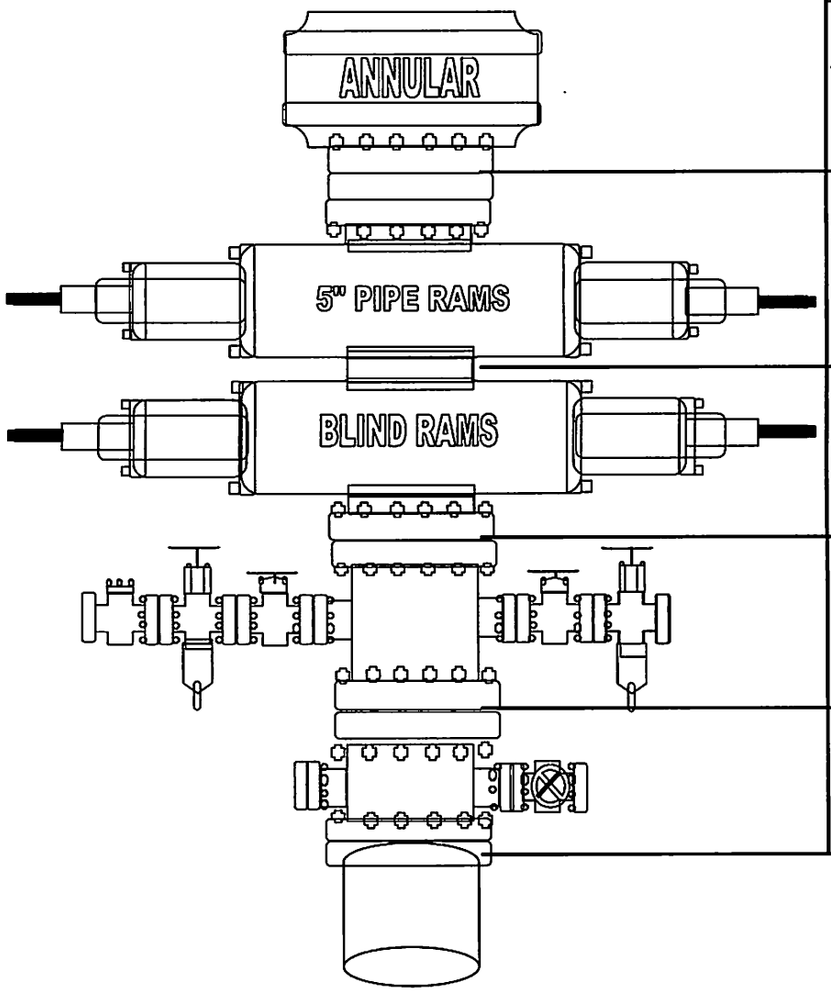
BOP Equipment Specifications/Diagram/Testing Schedule



Type	Model	Size	Pressure Rating	Testing Schedule -full pressure test to 100% of rating	
				Vertical Hole	Horizontal Hole
Annular	Shaffer Spherical	11"	5,000 psi	. upon installation . every 30 days	. upon installation . after each bit trip . weekly
Pipe Ram	Cameron Type U	11"	5,000 psi	. upon installation . every 30 days	. upon installation . after each bit trip . weekly
Blind Ram	Cameron Type U	5"	5,000 psi	. upon installation . every 30 days	. upon installation . after each bit trip . weekly
Mud Cross					
Wellhead		11"	5,000 psi		

WW-9
(9/13)

API Number 47 - 4704902362
Operator's Well No. Swearingen 1H

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

FLUIDS/ CUTTINGS DISPOSAL & RECLAMATION PLAN

Operator Name XTO Energy Inc. OP Code 494487940

Watershed (HUC 10) Bingamon Creek (0502000206) Quadrangle Shinnston

Elevation 1,376' County Marion District Mannington

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

Will a pit be used? Yes ☐ No ☑

If so, please describe anticipated pit waste: _____

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

Proposed Disposal Method For Treated Pit Wastes:

_____ Land Application
■ Underground Injection (UIC Permit Number 4707302523, 4705500319, 4708505151, 4708509721, 3416729577, 3412124037, 3405320968)
_____ Reuse (at API Number _____)
_____ Off Site Disposal (Supply form WW-9 for disposal location)
_____ Other (Explain _____

Will closed loop system be used? If so, describe: Depending on brand, system would entail 2 centrifuges & another cutting drying method: grinder, drying shakers or verti-g mud

Drilling medium anticipated for this well (vertical and horizontal)? Air, freshwater, oil based, etc. Air/water to 7100', then switch to synthetic

-If oil based, what type? Synthetic, petroleum, etc. Synthetic

Additives to be used in drilling medium? See additional page

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

-If left in pit and plan to solidify what medium will be used? (cement, lime, sawdust) NA

-Landfill or offsite name/permit number? Meadowbrook Landfill - #SWF 1032, S&S Landfill - #SWF 4902

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

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

Company Official Signature _____

Company Official (Typed Name) Gary Beall

Company Official Title Production Superintendent

Subscribed and sworn before me this 17th day of October, 2014

_____ Notary Public

My commission expires 12/22/18

OFFICIAL SEAL
NOTARY PUBLIC
State of West Virginia
TIMOTHY SANDS
XTO Energy Inc.
PO Box 1008
Jane Lew, WV 26378
My Commission Expires December 22, 2018

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Form WW-9

Operator's Well No. Swearingen 1H

XTO Energy Inc.

Proposed Revegetation Treatment: Acres Disturbed 41.335+/- Prevegetation pH _____

Lime 2-4 Tons/acre or to correct to pH _____

Fertilizer type 10-20-20 or Equivalent

Fertilizer amount 500 lbs/acre

Mulch 2-3 Tons/acre

Seed Mixtures

Temporary		Permanent	
Seed Type	lbs/acre	Seed Type	lbs/acre
Per Plans			

Attach:
Drawing(s) of road, location, pit and proposed area for land application (unless engineered plans including this info have been provided)

Photocopied section of involved 7.5' topographic sheet.

Plan Approved by: Bill Hendershot

Comments: _____

Title: Environmental Inspector Date: 10-20-14

Field Reviewed? (✓) Yes ( ) No

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XTO Drilling Additives

Product Name	CAS #	Approximate Amount on Location (lbs)
Bentone 910	14808-60-7	2500
Cedar Fiber	n/a	5000
CyberDrill	93762-80-2	20000
Calcium Chloride	10043-52-4	20000
CyberCoat	111-40-0 26952-14-7 62442-97-7	3000
CyberMul	70321-73-2	3000
CyberPlus	71-36-3	3000
Lime	1305-62-0	15000
New Carb	1317-65-3	3000
Walnut Shells	n/a	2500
New Bar	7727-43-7 1332-58-7 14808-60-7 471-34-1	200000
OptiThin	68442-97-7	8000
Oil Dry	12174-11-7 14808-60-7 01309-48-4	600
OptiClean	9016-45-9 68131-71-5 1310-73-2 27176-87-0 1300-72-7 7758-29-4	1800
OptiG	12002-43-6	5000
SynDril 470	64741-86-2	81000

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XTO Energy Inc.
Well Site Safety Plan

Swearingen Pad
39.463754
-80.353989

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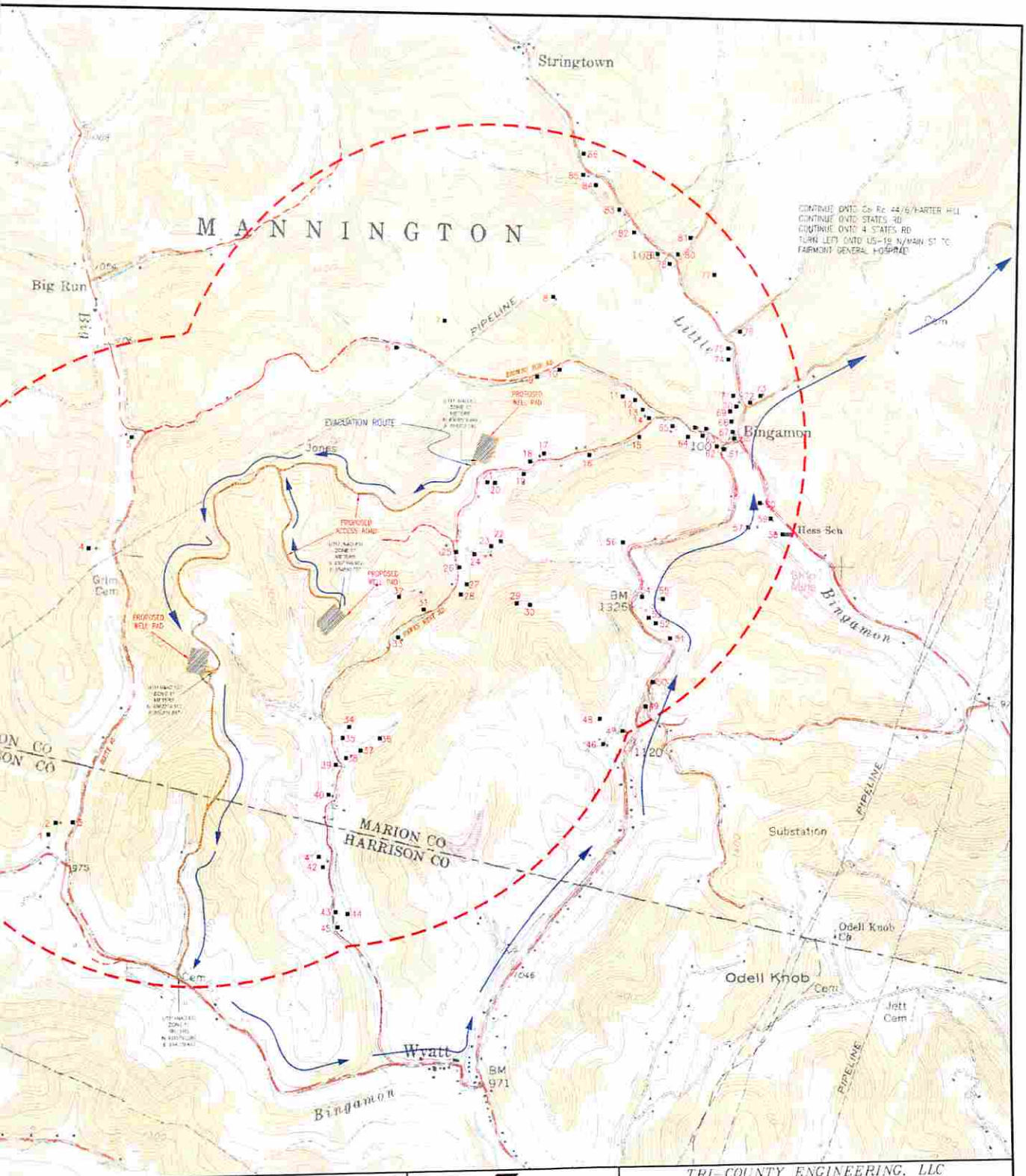


XTO ENERGY
810 HOUSTON STREET
FORT WORTH, TX 76102

GRAPHIC SCALE 1" = 1000'

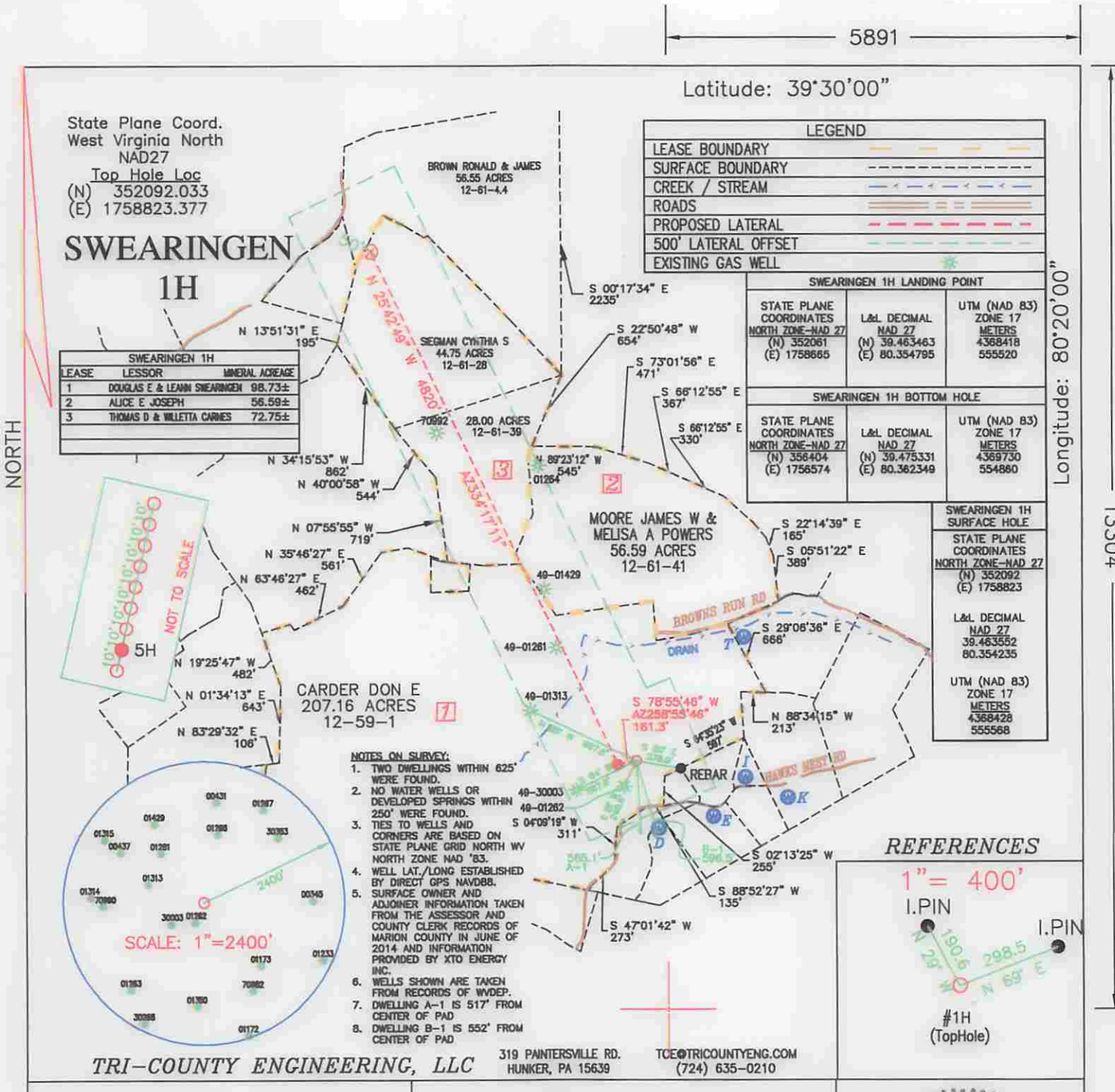
TRI-COUNTY ENGINEERING, LLC
319 Paintersville Road
Hunker, PA 15639
Voice (724) 635-0210
www.tricountyeng.com
Fax (724) 635-0678

Innovative Engineering Solutions Since 1979

HUGHES, ROCKWELL & SWEARINGEN WELL PAD AND ACCESS ROAD SAFTEY PLAN

XTO ENERGY, INC.
MARION & HARRISON COUNTY
WEST VIRGINIA

DRAWN BY	DATE	MANNINGTON & FAIRMONT
BMV	07/08/14	MARION & HARRISON, WEST VIRGINIA
SCALE	1"=1000'	SHEET 1-1
		TAX MAP 57-09



FILE # XTOOG57

DRAWING # OG57-10-1H

SCALE: 1"= 1200'

MINIMUM DEGREE OF ACCURACY: 1:2500

PROVEN SOURCE OF ELEVATION: DIRECT GPS

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 REGULATIONS ISSUED AND PRESCRIBED BY THE DEPARTMENT OF ENVIRONMENTAL PROTECTION.

Signed: Donald R Hixson

R.P.E.: 17818 L.L.S.:

DONALD R. HIXSON JR. REGISTERED 17818 STATE OF WEST VIRGINIA PROFESSIONAL ENGINEER

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(+) DENOTES LOCATION OF WELL ON UNITED STATES TOPOGRAPHIC MAPS

WVDEP
OFFICE OF OIL & GAS
601 57TH STREET
CHARLESTOWN, WV 25304

PLACE SEAL HERE

DATE: 11/29/2014

OPERATOR'S WELL #: SWEARINGEN 1H

API WELL #: 47 (STATE) 49 (COUNTY) 02362 (PERMIT) HGA

Well Type: ☐ Oil ☐ Waste Disposal ☒ Production ☐ Deep
☒ Gas ☐ Liquid Injection ☐ Storage ☒ Shallow

WATERSHED: BINGAMON CREEK WATERSHED ELEVATION: 1376' (PROPOSED GRADE)

COUNTY/DISTRICT: MARION – MANNINGTON QUADRANGLE SHINNSTON 7.5'

SURFACE OWNER DON E CARDER ACREAGE 207.16

OIL & GAS ROYALTY OWNER: DON E CARDER ACREAGE 397.54

DRILL ☒ CONVERT ☐ DRILL DEEPER ☐ REDRILL ☐ FRACTURE OR STIMULATE ☒

PLUG OFF OLD FORMATION ☐ PERFORATE NEW FORMATION ☐ PLUG & ABANDON ☐

CLEAN OUT & REPLUG ☐ OTHER CHANGE ☐ (SPECIFY):

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TARGET FORMATION MARCELLUS ESTIMATED DEPTH: 7590'/12900'

WELL OPERATOR XTO ENERGY INC.
Address 810 HOUSTON STREET
City FORT WORTH State TX Zip Code 76102

DESIGNATED AGENT GARY BEALL
Address P.O. BOX 1008
City JANE LEW State WV Zip Code 26378