



Oil and Gas Management

Environmental Protection and Unconventional Shale Well Development in the Commonwealth of Pennsylvania

**Potomac Drinking Water Source Protection
Partnership will hold its 2014 Annual
Meeting**

November 20, 2014



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Oil and Gas Management



Roadmap

- Background
- Exploration, Production and Economic Impacts
- Structure of PA DEP
- Environmental Protection
- Available Information
- Unconventional Shale Gas in the Potomac Basin in PA



Oil and Gas Management

PENNSYLVANIA OIL AND GAS HISTORICAL DEVELOPMENT

➤ Once Upon a Time in 1859



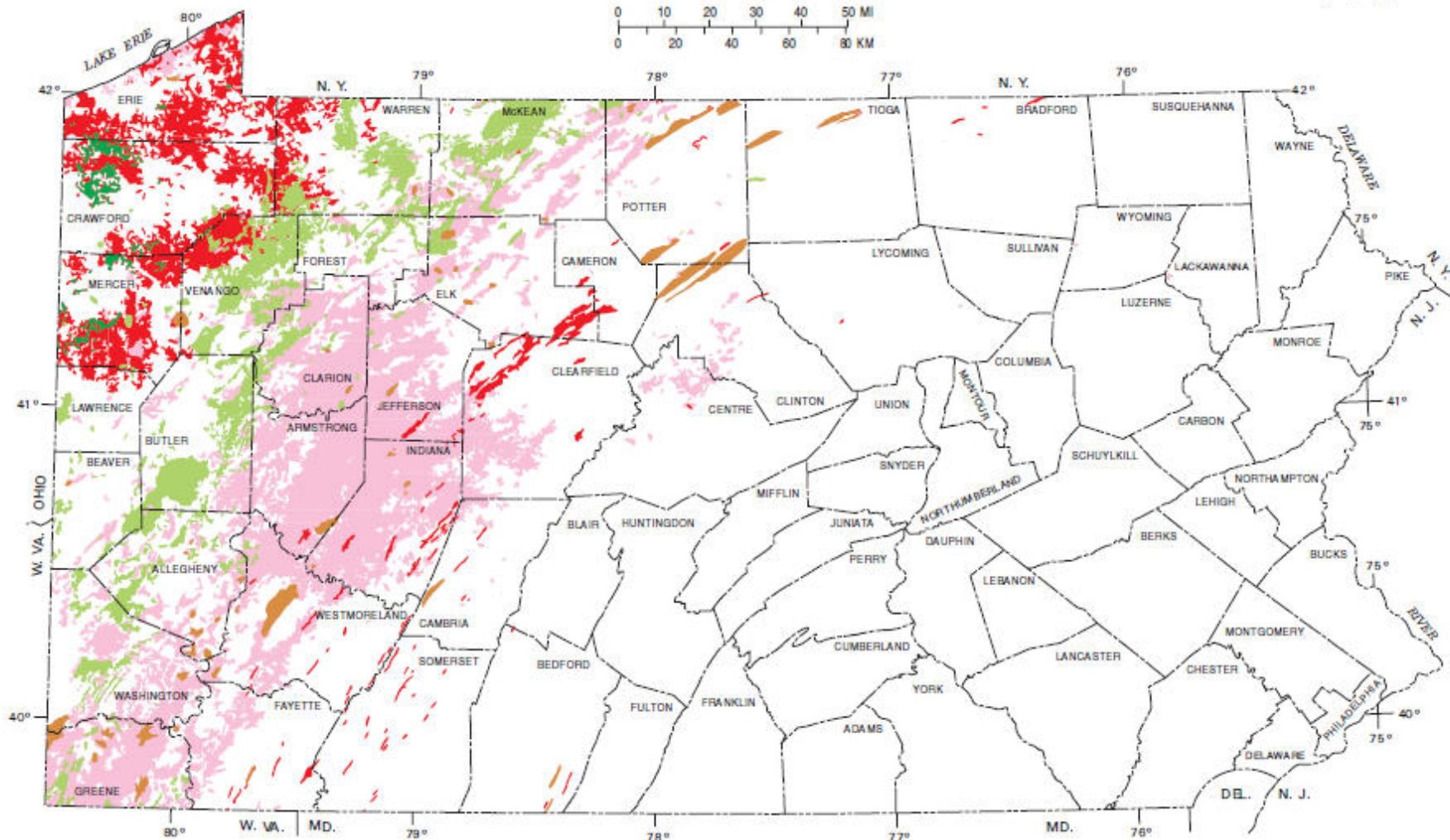


OIL AND GAS FIELDS OF PENNSYLVANIA

COMMONWEALTH OF PENNSYLVANIA
DEPARTMENT OF
CONSERVATION AND NATURAL RESOURCES
BUREAU OF TOPOGRAPHIC AND GEOLOGIC SURVEY
www.dcnr.state.pa.us/topogeo

SCALE 1:2,000,000

0 10 20 30 40 50 MI
0 20 40 60 80 KM



EXPLANATION



Shallow oil field



Deep oil field



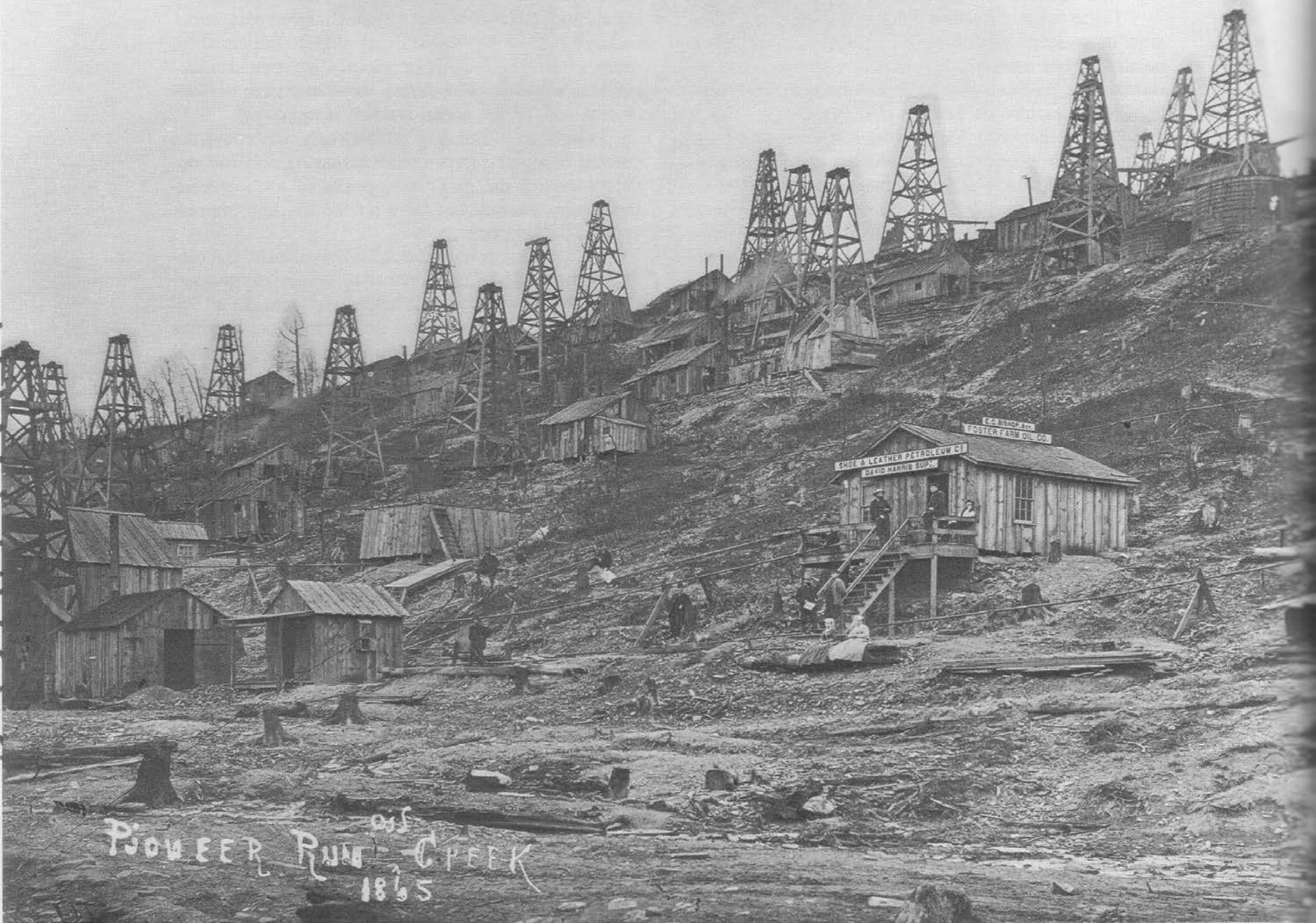
Shallow gas field



Deep gas field



Gas storage area



PIONEER RUN CREEK
1865





Oil and Gas Management

PENNSYLVANIA SHALE GEOLOGY

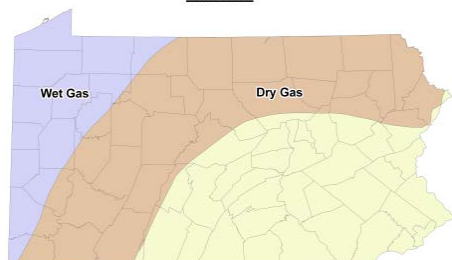


Black Shale Formations

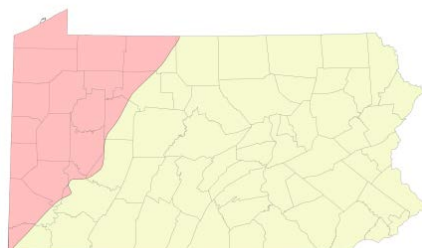
Generalized Stratigraphic Section for Oil and Gas Region

- **Marcellus**
 - **Utica**
 - **Rhinestreet**
 - **Huron**
- **Upper Devonian**
 - **Dunkirk**
 - **Pipe Creek**
 - **Middlesex**
 - **Geneseo**
 - **Burket**

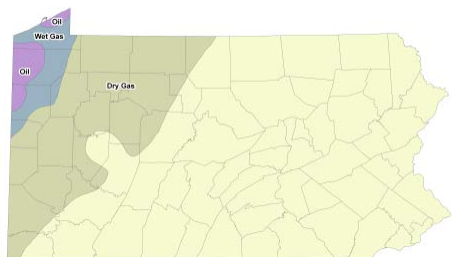
Marcellus



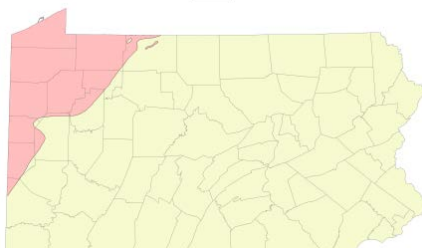
Rhinestreet



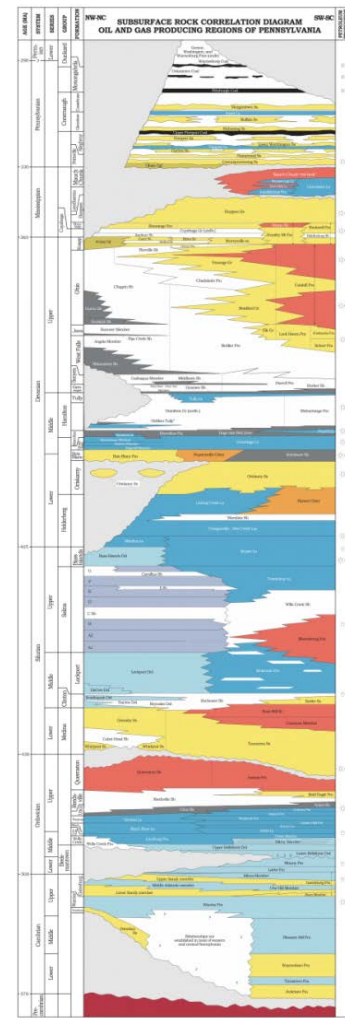
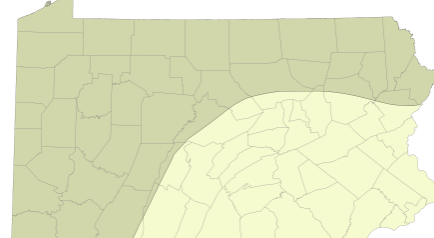
Utica

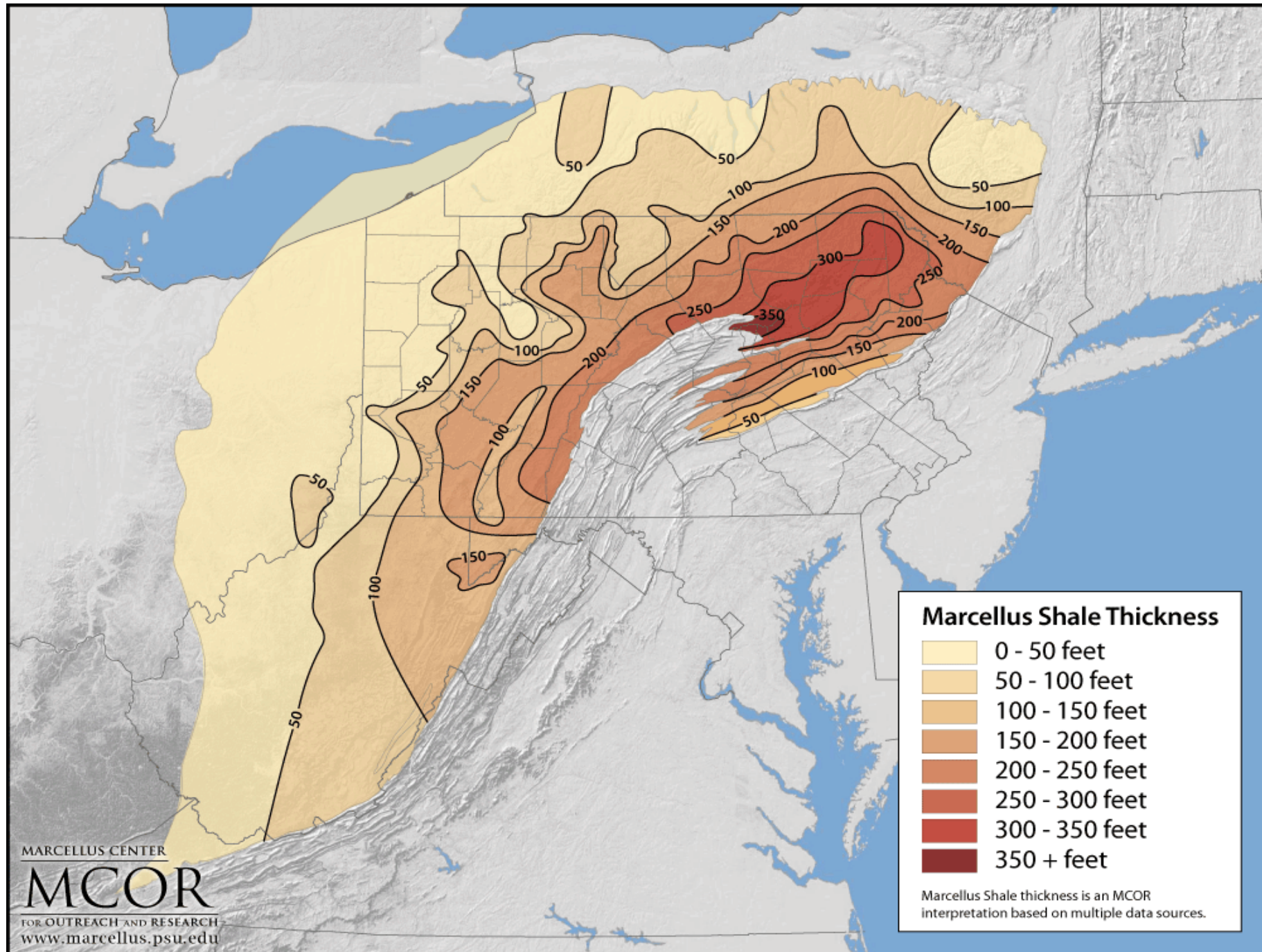


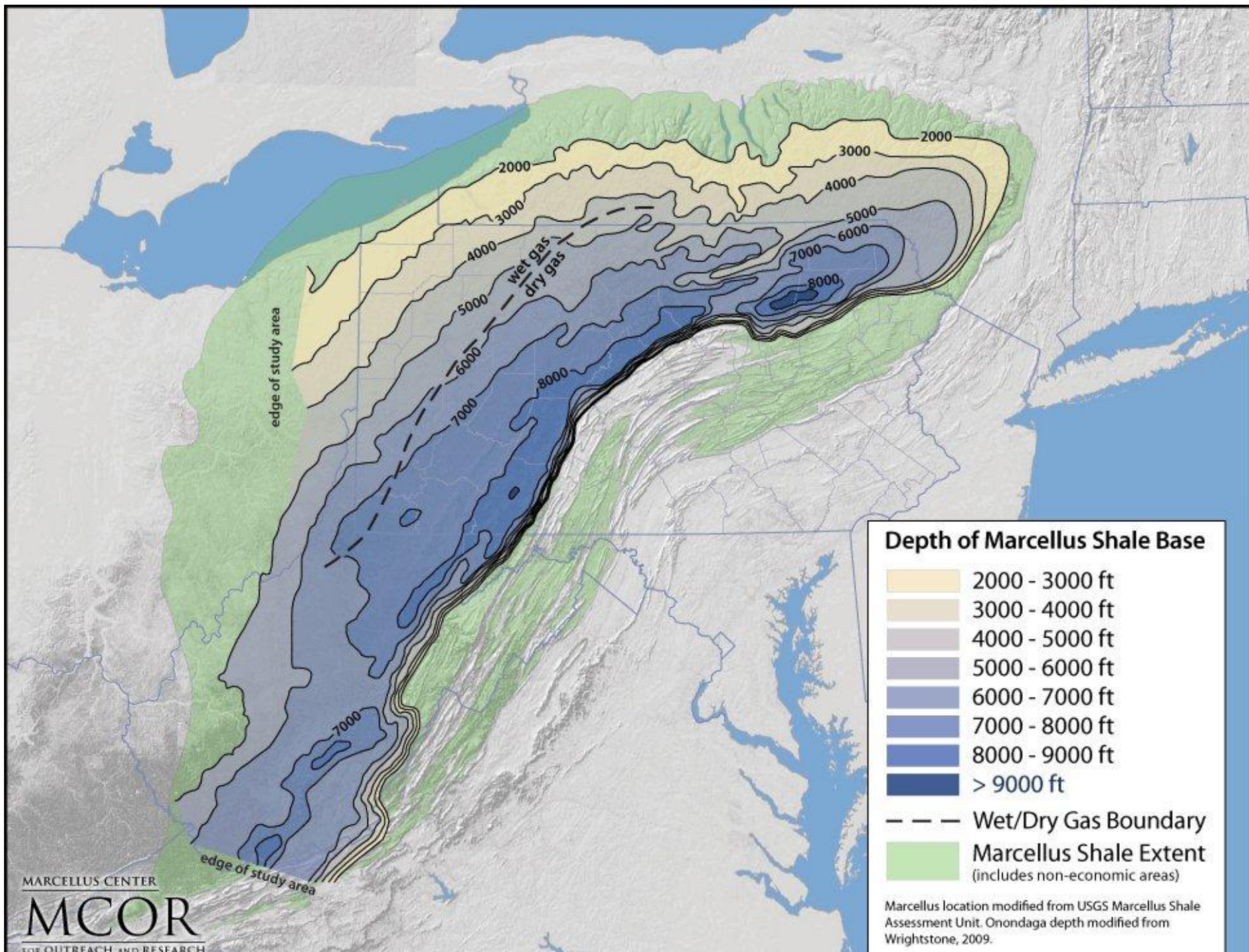
Huron

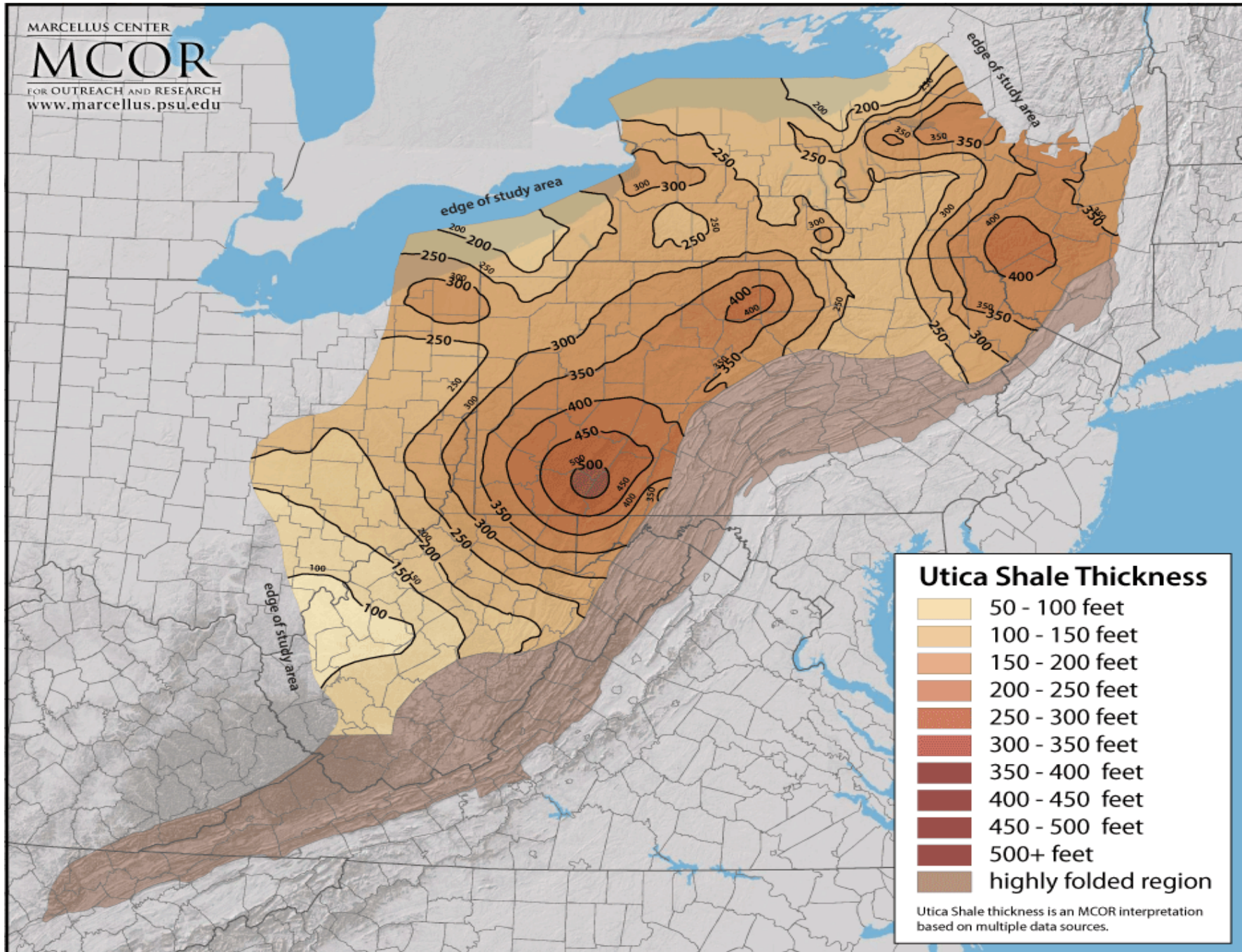


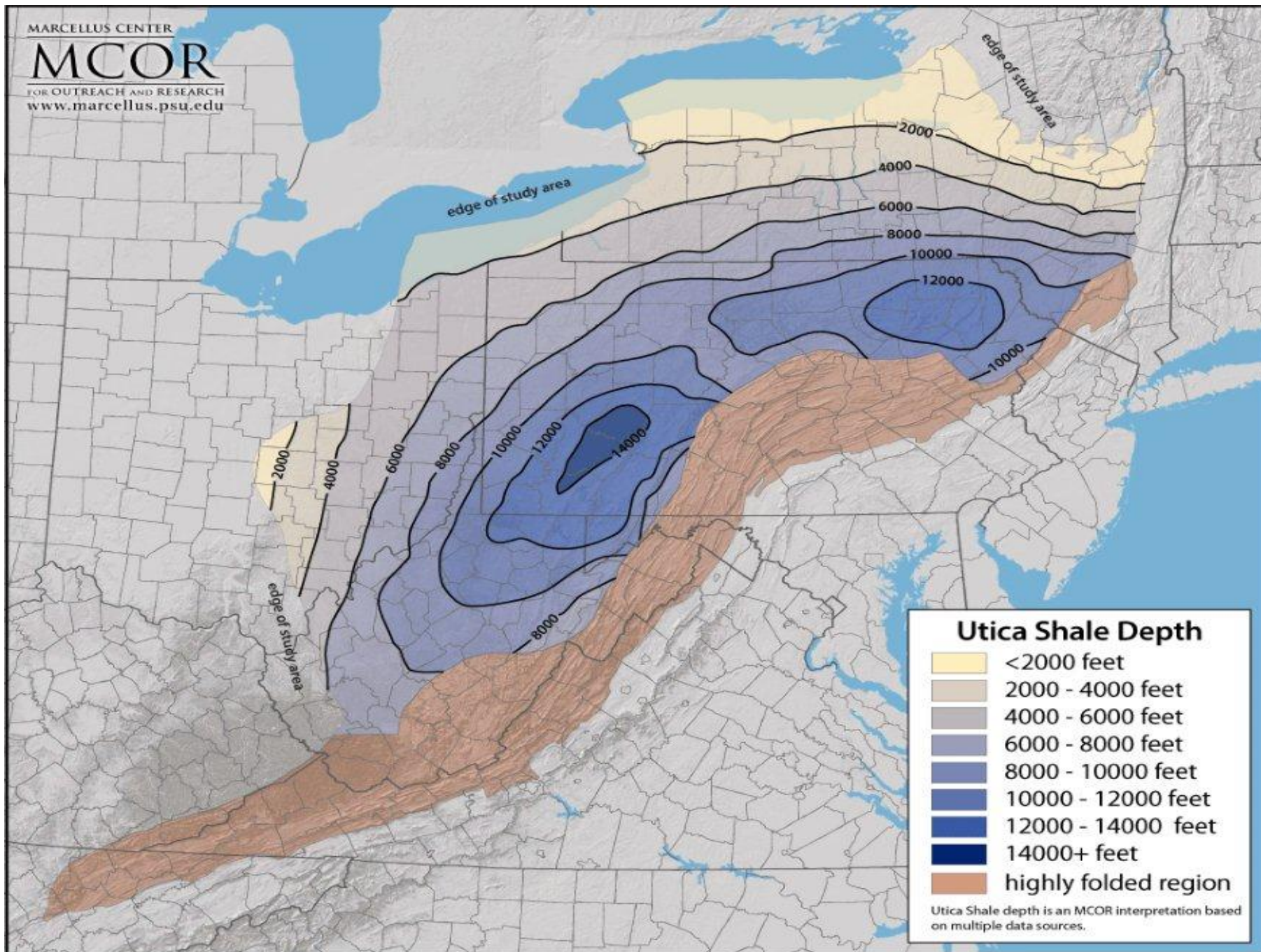
Miscellaneous Upper Devonian Formations
(Dunkirk, Pipe Creek, Middlesex, Geneseo, Burket)











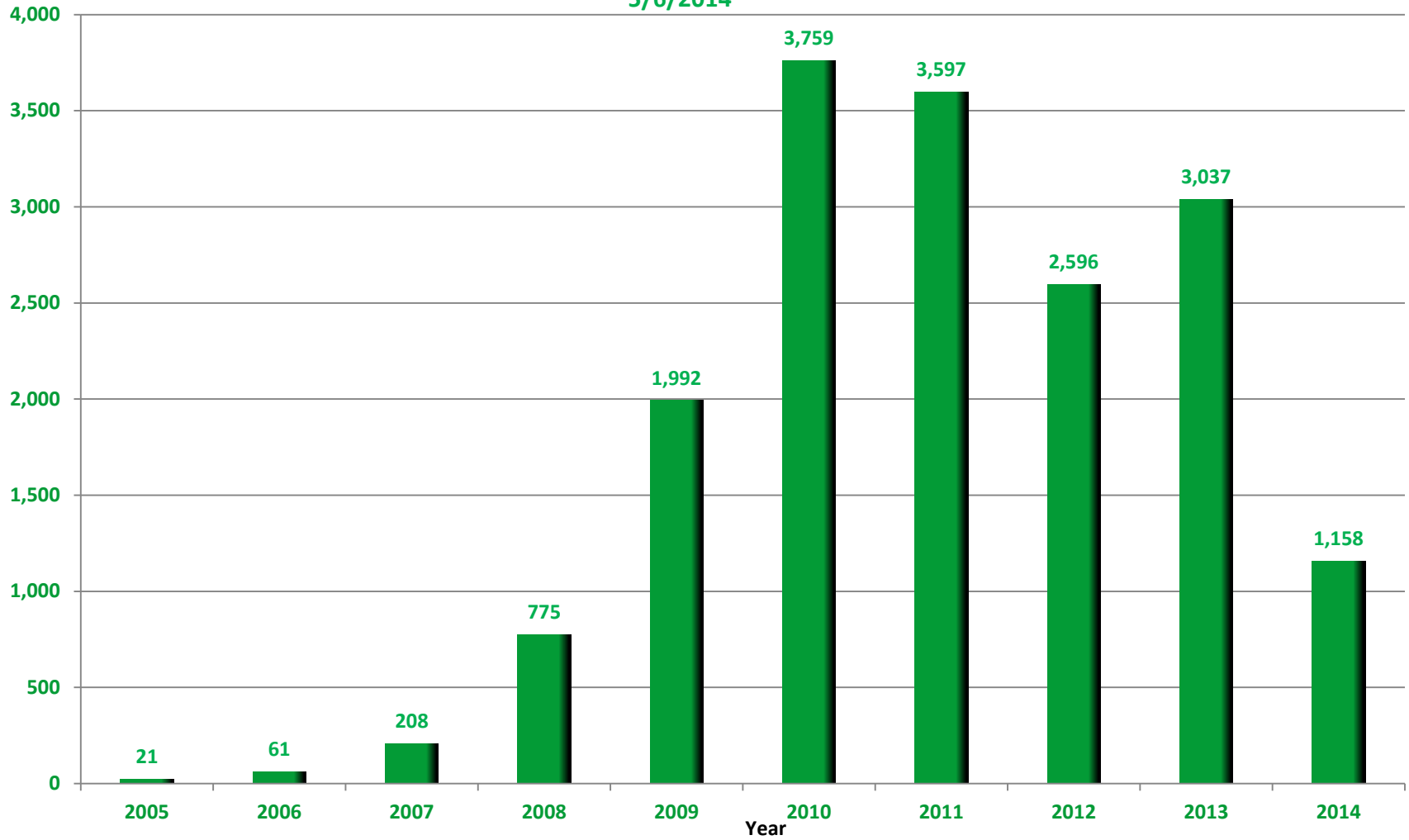


Oil and Gas Management

CURRENT DATA – WELL PERMITTING, DRILLING AND PRODUCTION

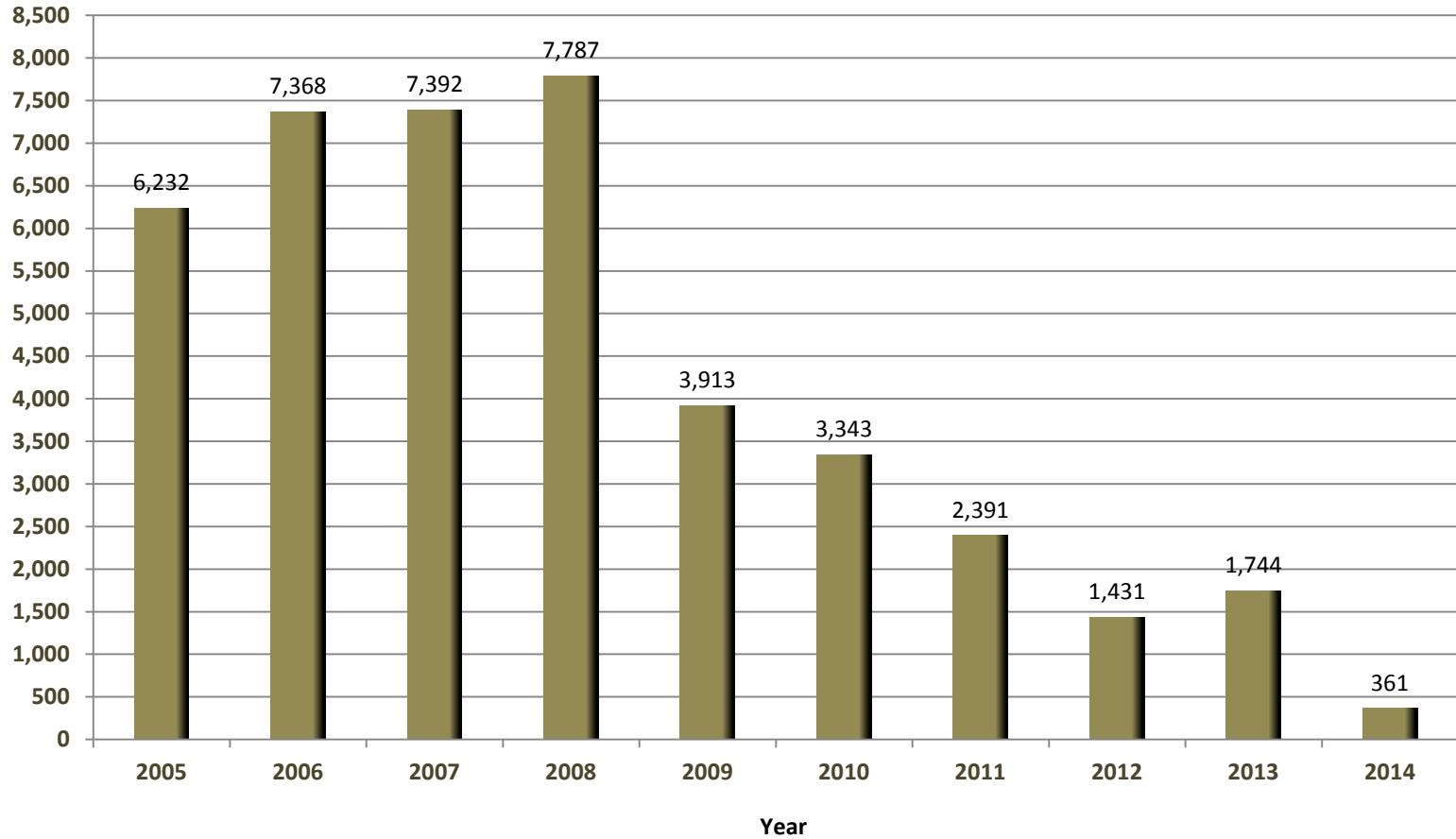
Unconventional Well Applications Received

5/6/2014



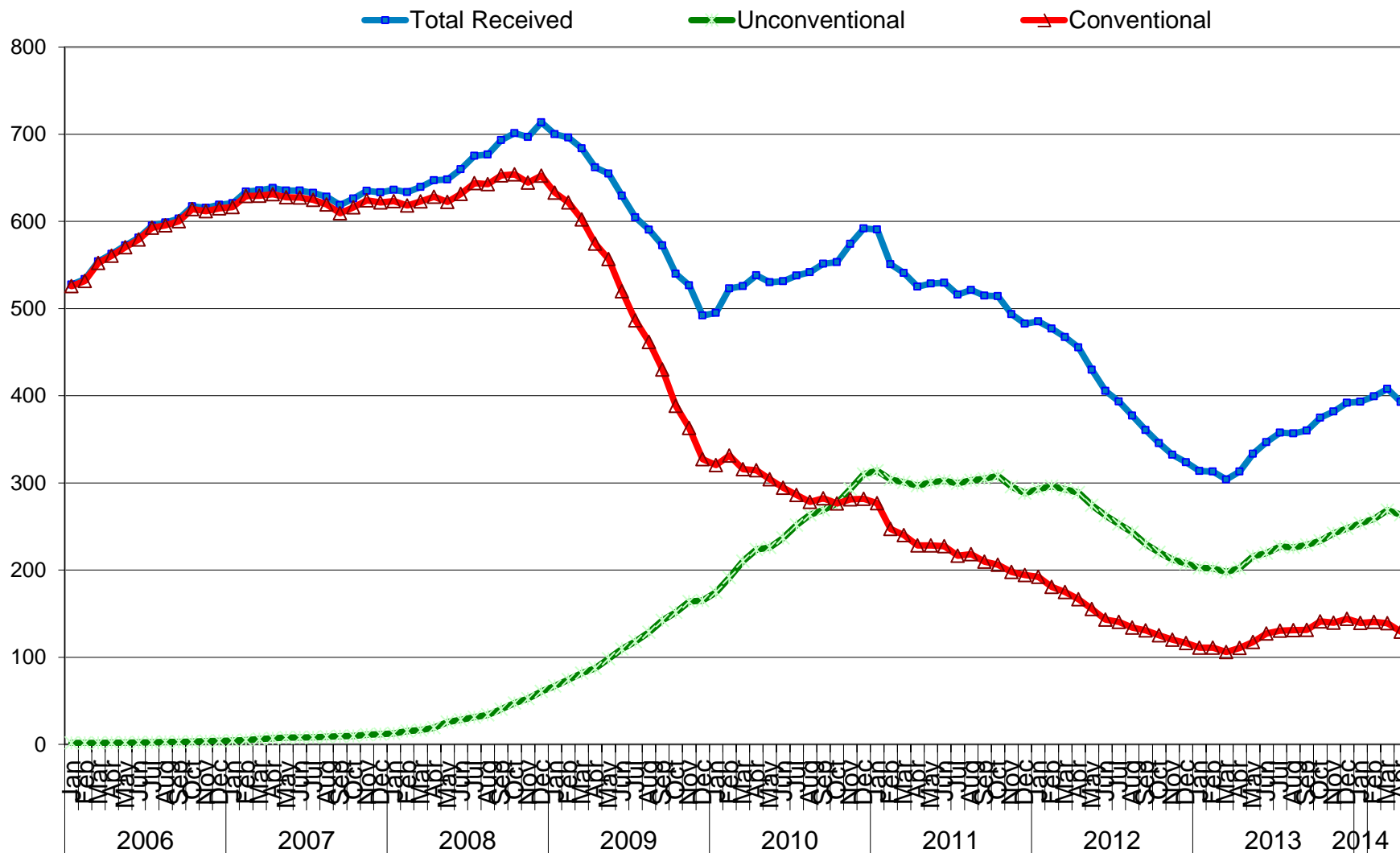
Conventional Well Applications Received

5/6/2014



Well Permit Applications Received - 12 Month Average

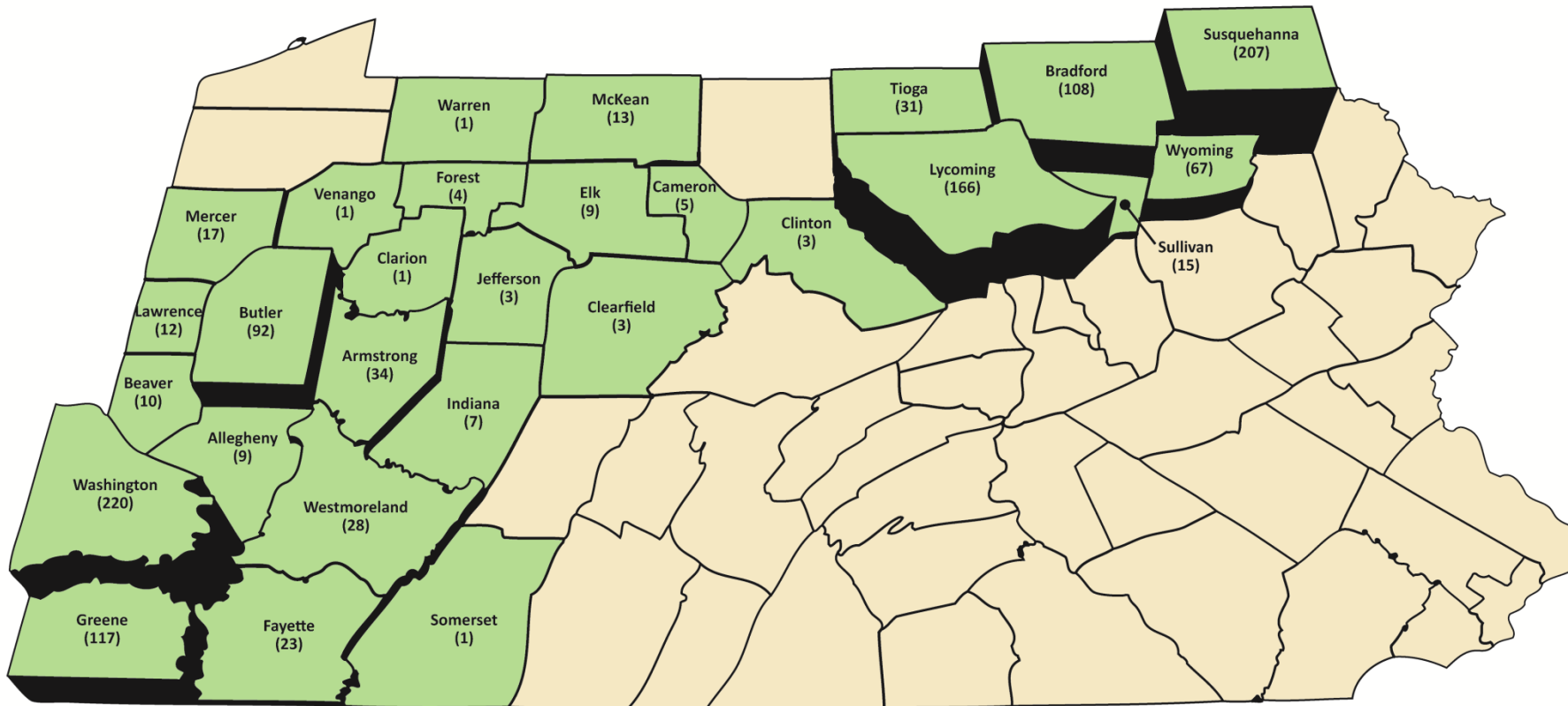
5/6/2014



Department of Environmental Protection

Office of Oil and Gas Management

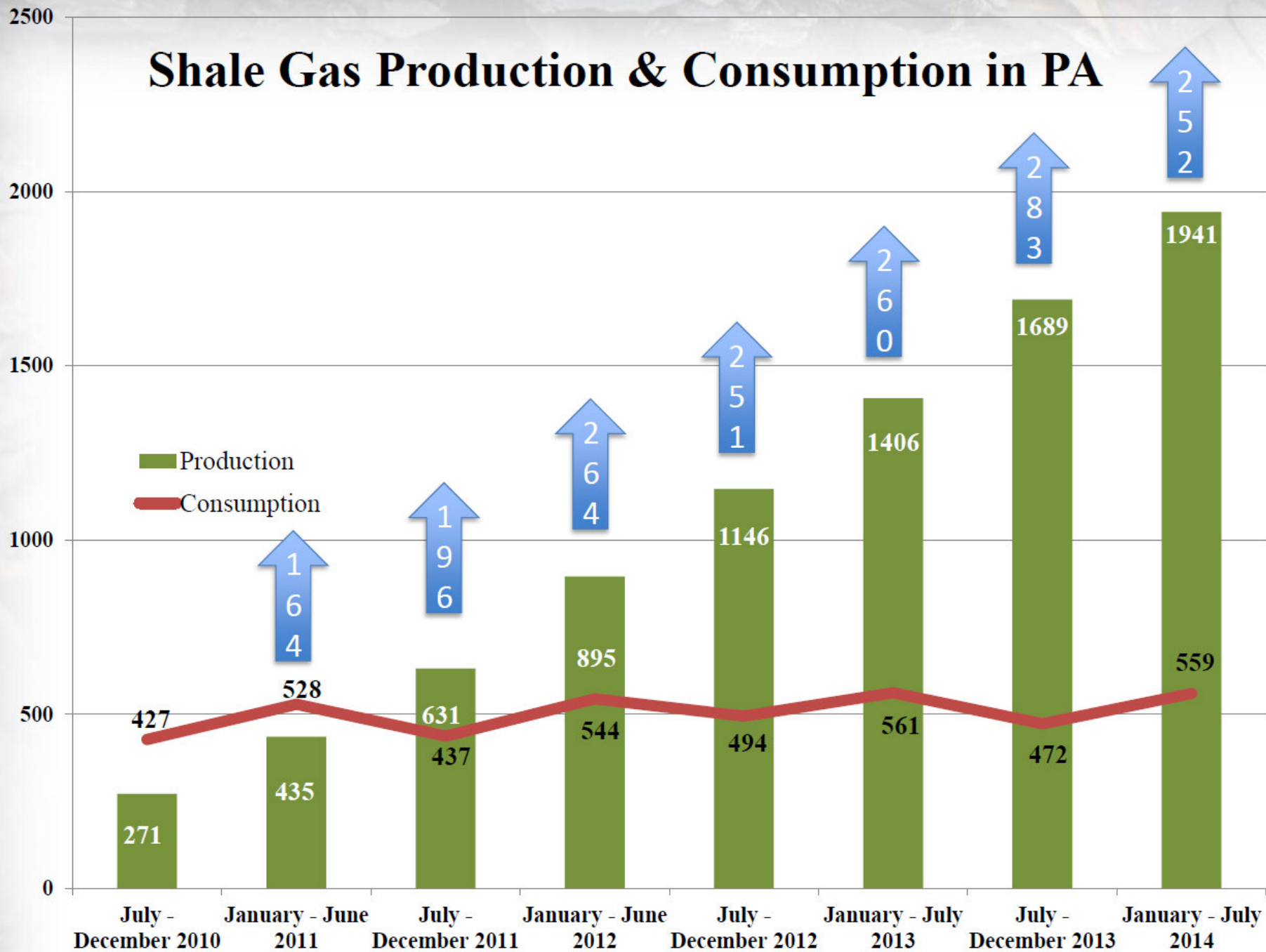
Unconventional Wells Drilled in 2013



Shale Gas Production & Consumption in PA

Billion Cubic Feet

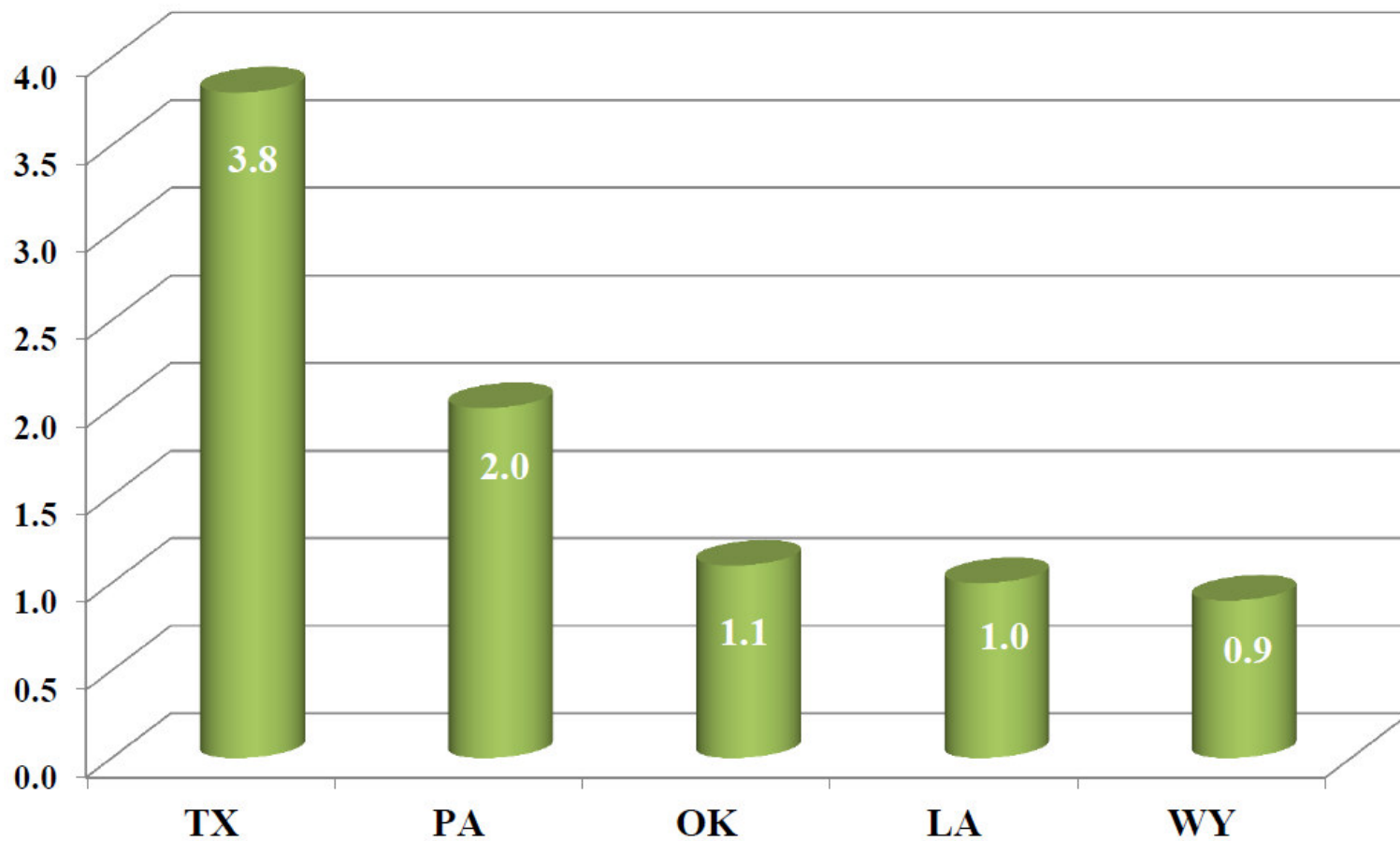
Production
Consumption





2014 Top NG Producers

(through June, 2014)





Oil and Gas Management

PROGRAM IMPLEMENTATION

Office of Oil and Gas Management



Laws and Regulations

- 2012 Oil and Gas Act
 - 25 Pa. Code Chapter 78 (relating to Oil and Gas Wells)
- Oil and Gas Conservation Law
- Coal and Gas Resource Coordination Act
- Clean Streams Law
 - 25 Pa. Code Chapter 91 (relating to General Provisions)
 - 25 Pa. Code Chapter 93 (relating to Water Quality Standards)
 - 25 Pa. Code Chapter 95 (relating to Wastewater Treatment Requirements)
 - 25 Pa. Code Chapter 102 (relating to Erosion and Sediment Control)

Laws and Regulations Continued

- Dam Safety and Encroachments Act
 - 25 Pa. Code Chapter 105 (relating to Dam Safety and Waterway Management)
- Solid Waste Management Act
- Air Pollution Control Act
- Land Recycling and Environmental Remediation Standards Act
- Environmental Laboratory Accreditation Act

Oil and Gas Statutory, Regulatory and Policy Changes

- Marcellus Shale Advisory Commission (2011)
- Act 13 of 2012 (Feb 2012)
- PUC Spud Well List – Act 13 Impact Fees (2011)
- Act 9 – Emergency Response for Well Sites (Feb 2012)
 - Reg: Emergency Response Planning at Unconventional Well Sites (Jan 2013)
- Well Permit Fee Increase (Proposed July 2013, Final June 2014)
- Spills/Release Policy at Oil & Gas Wells and Access Roads (Sept 2013)

➤ Oil and Gas Statutory, Regulatory and Policy Changes

- Chapter 78 Subchapter D (Feb 2011)
 - Casing and Cementing and Well Construction Standards
- Chapter 78 Subchapter C (Proposed Dec 2013)
- Erosion and Sedimentation Controls : Chapter 102 (Dec 2012)
 - Stormwater Policy
 - Erosion and Sedimentation Control GP 2
- Total Dissolved Solids Rule: Chapter 95 (Aug 2010)
 - Wastewater Recycling Call (April 2011)

Constant Analysis

- TENORM Study
- Long-Term Air Quality Monitoring Study
- Barto Compressor Station Monitoring
- Mine Influenced Water (MIW) for Hydraulic Fracturing
- State Review of Oil and Natural Gas Environmental Regulations (STRONGER)
- Independent Laboratory Review

➤ Continuous Regulatory Improvement

- Air Quality Exemption No. 38
- Air GP5 (Natural Gas Compression Facilities)
- Beneficial Use of Liquid Waste from Oil and Gas (WMGR123)
- Mechanical Integrity Assessment

Permitting

- Well Permit
- Erosion and Sediment Control
- Stream and Wetland Encroachment
- Commercial Waste Processing
- Centralized Wastewater Impoundment
- Alternative Waste Management at Well Sites

Effective and Efficient Permitting

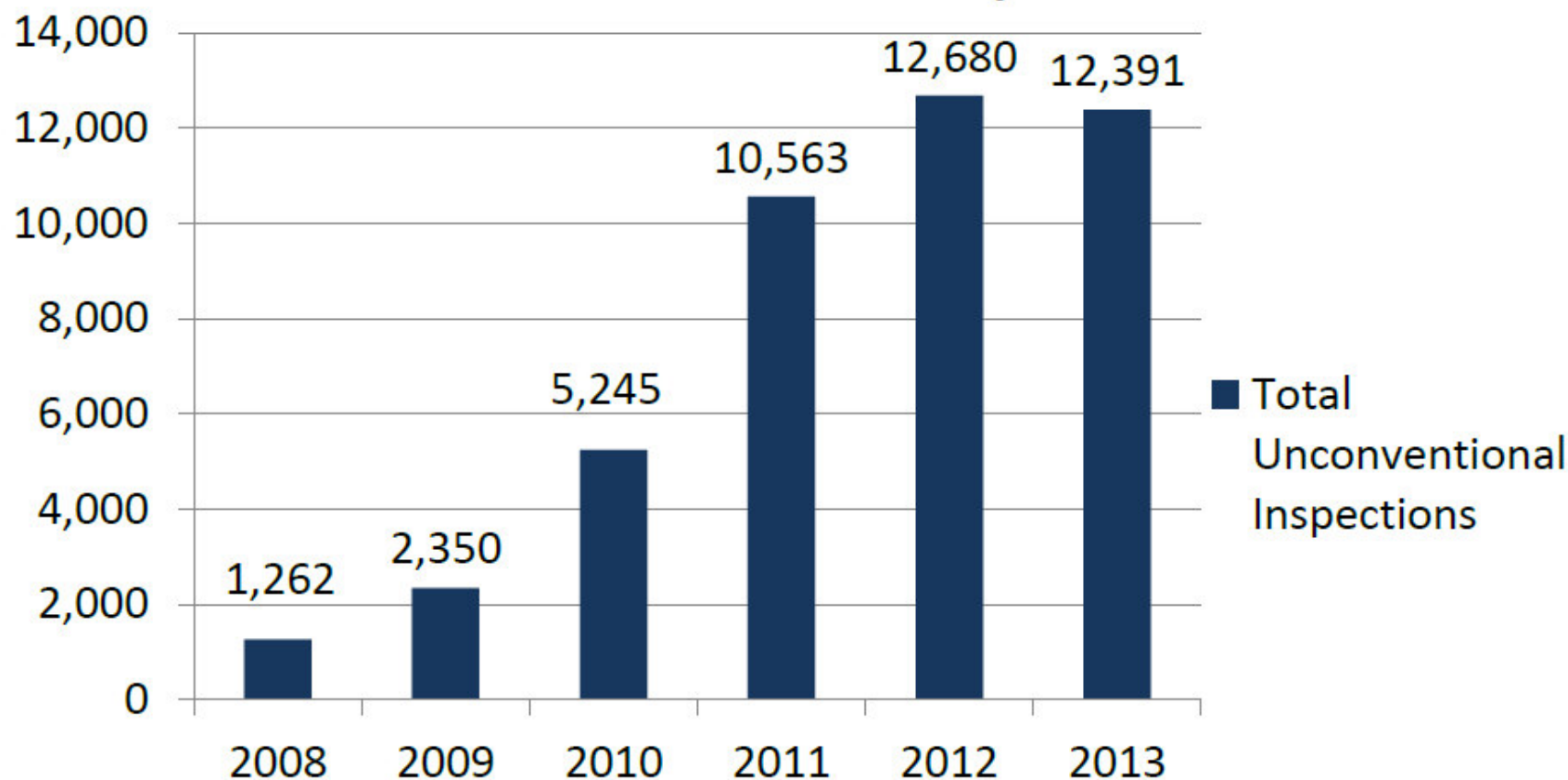
- Assessment philosophy
 - Site-specific vs. standard approach
- Clear standards applied consistently
- Properly staffed, trained properly
- Documentation
 - Frequently Asked Questions (external)
 - Standard Operating Procedures (internal)
 - Technical guidance/statements of policy (both)

Inspections - Inspectors

- Biologists – Surface Disturbances
- Geologists/Engineers Former Drillers – Subsurface Disturbances
- Inspection Trends

Inspections 2008-2013

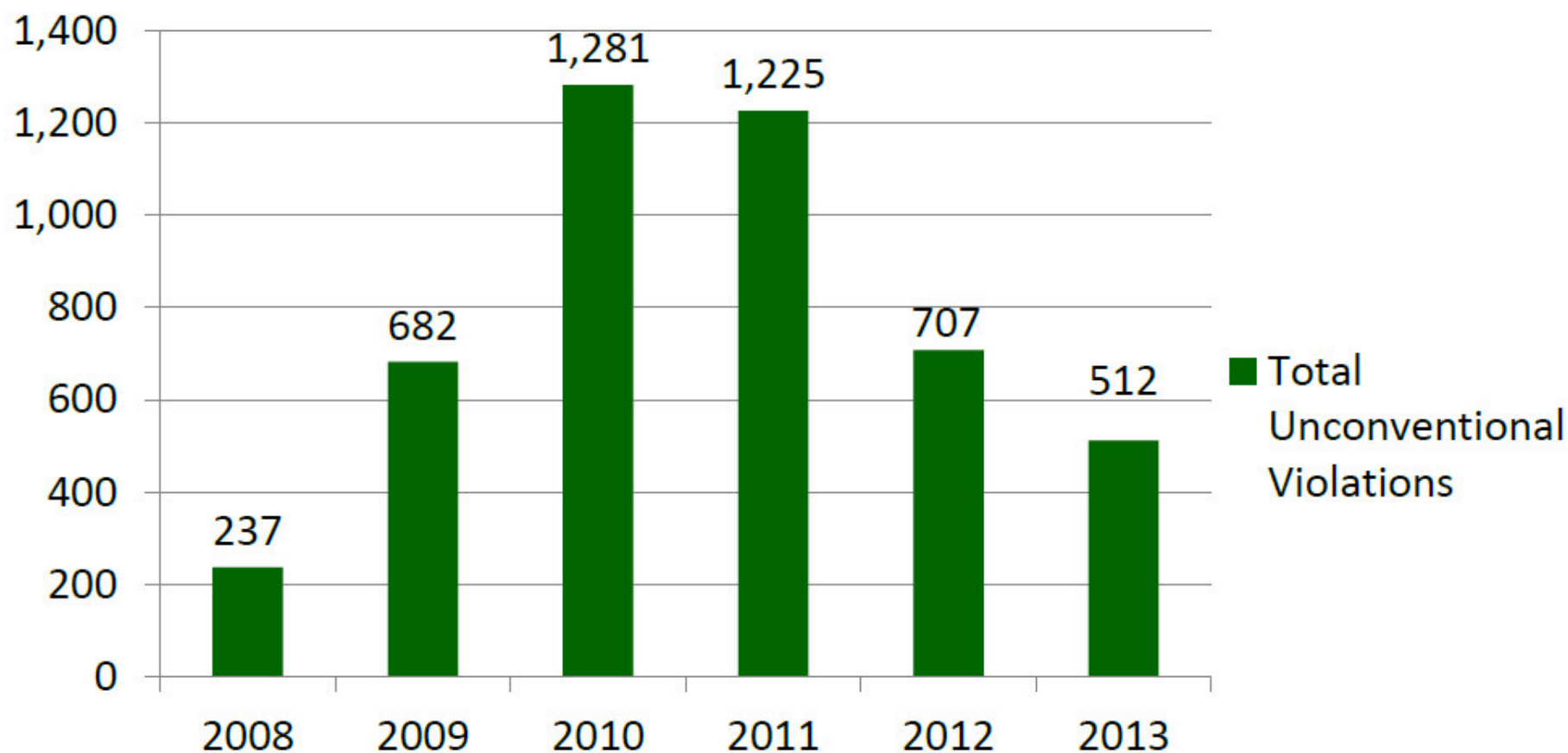
Total Unconventional Inspections



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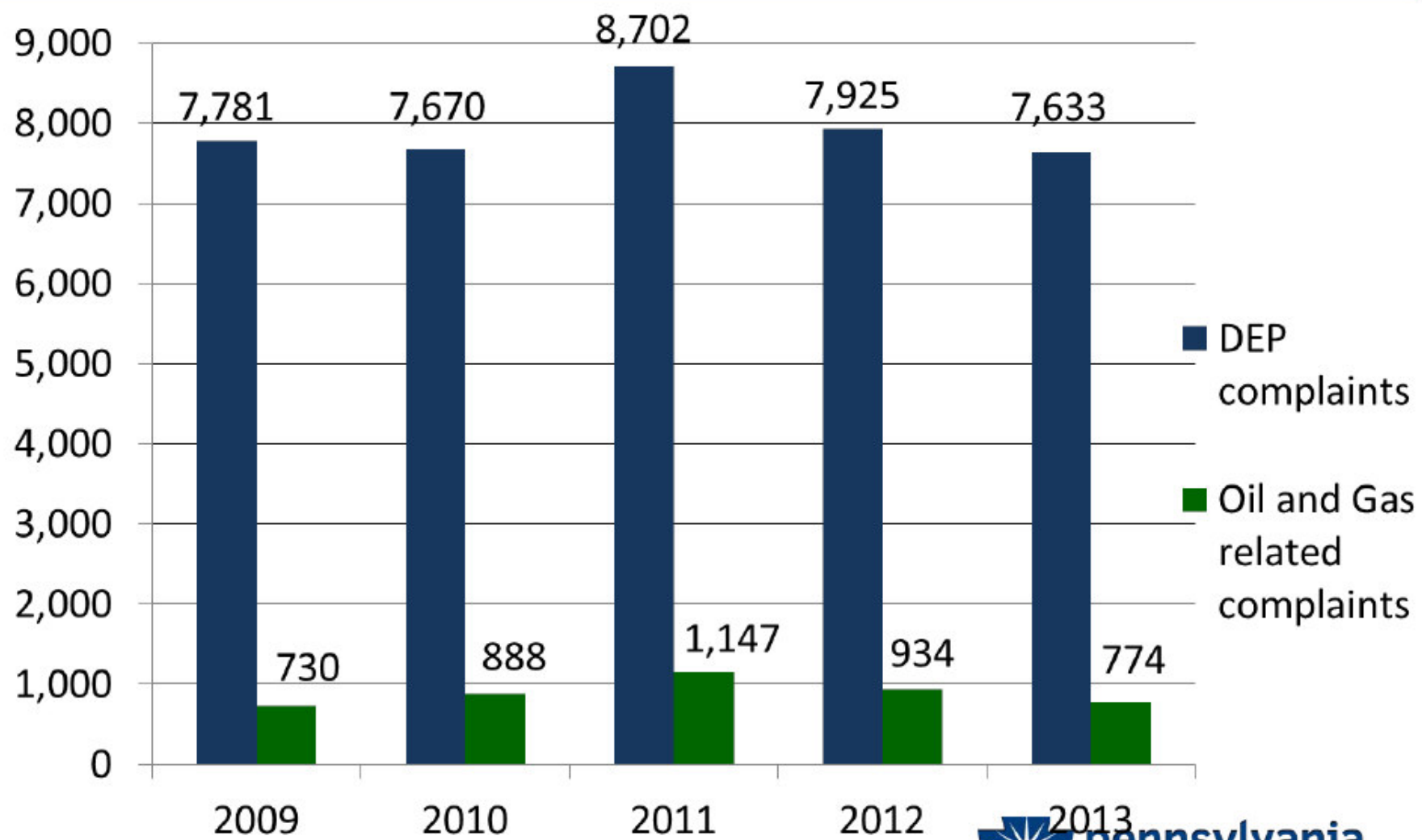
Violations 2008-2013

Total Unconventional Violations



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Complaints 2009-2013



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Inspections - Notifications

- Spud date (commencement of drilling)
- Resumption of drilling
 - 30-day (or longer) break in drilling
- Cementing of all casing strings
- Conducting pressure tests of the production casing
- Stimulation of a well
- Abandoning or plugging of a well

Types of Inspections

Well Pad Inspections (Surface)

- Water Quality Specialists
 - Erosion and Sedimentation Controls (mandatory; before drilling)
 - Inspect waste containment

Well Drilling Inspections (Sub-surface)

- Oil and Gas Inspectors
 - Perform inspections when well drilling commences and ongoing drilling activities
 - (setting casings, cementing jobs, etc.)
 - Inspect well fracturing operations

Other DEP Inspections

- Air Quality
- Waste Management
- Water Management (Water Quality)

Act 13 – Chapter 78 Revisions

- Pre-Hydraulic Fracturing Review
- Promote Recycling of Flowback Water
- Spill Prevention, Reporting and Clean Up
- Freshwater Impoundments
- Rock Pits
- Temporary Pipelines
- Horizontal Directional Drilling for Gathering Lines



Oil and Gas Management

Environmental Protection

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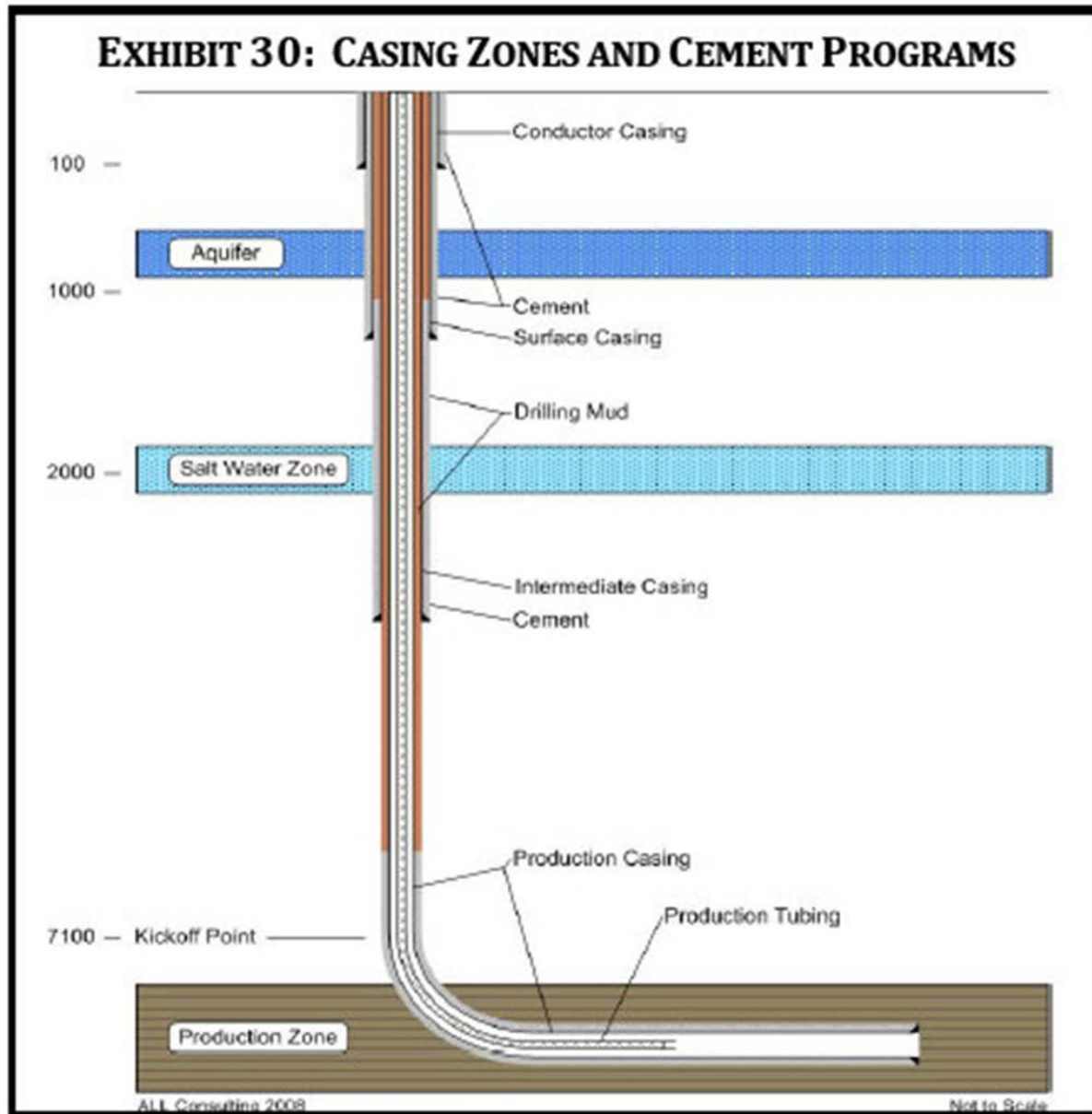
Oil & Gas Mapping Tool

Streets ☐ Topo ☐ ESRI Imagery ☒ ESRI Street and Imagery ☐ PA MAP Imagery and ESRI Imagery

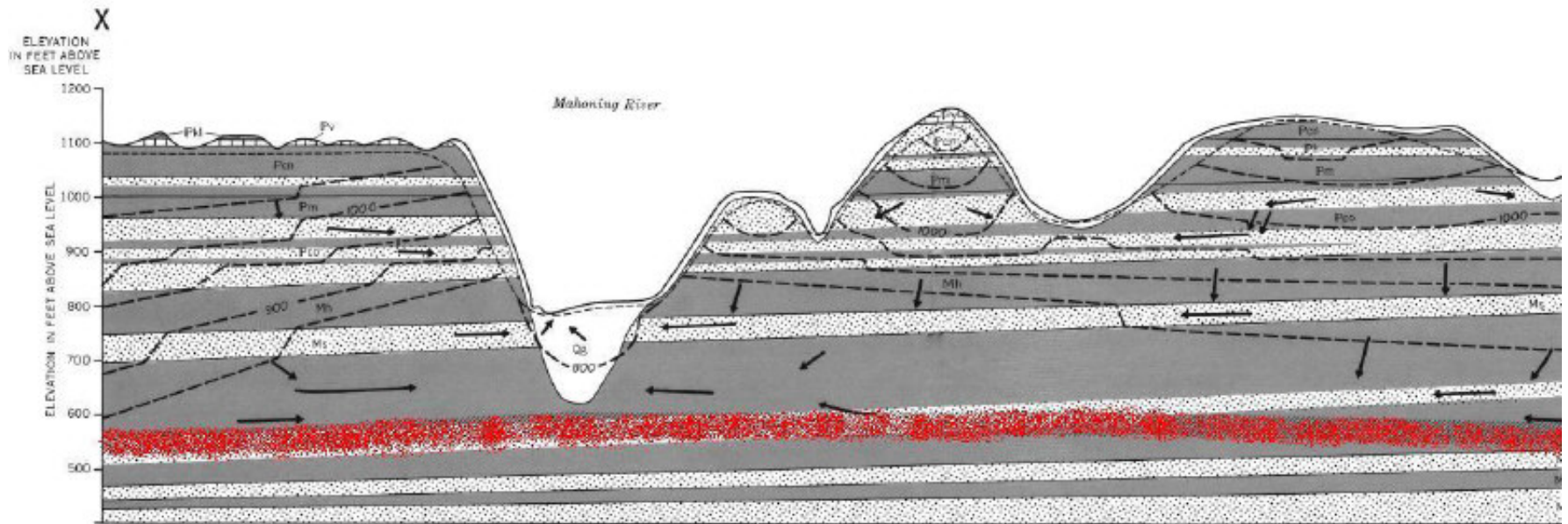
ESRI Streets ESRI Imagery



Deepest Fresh Groundwater



Deepest Fresh Groundwater

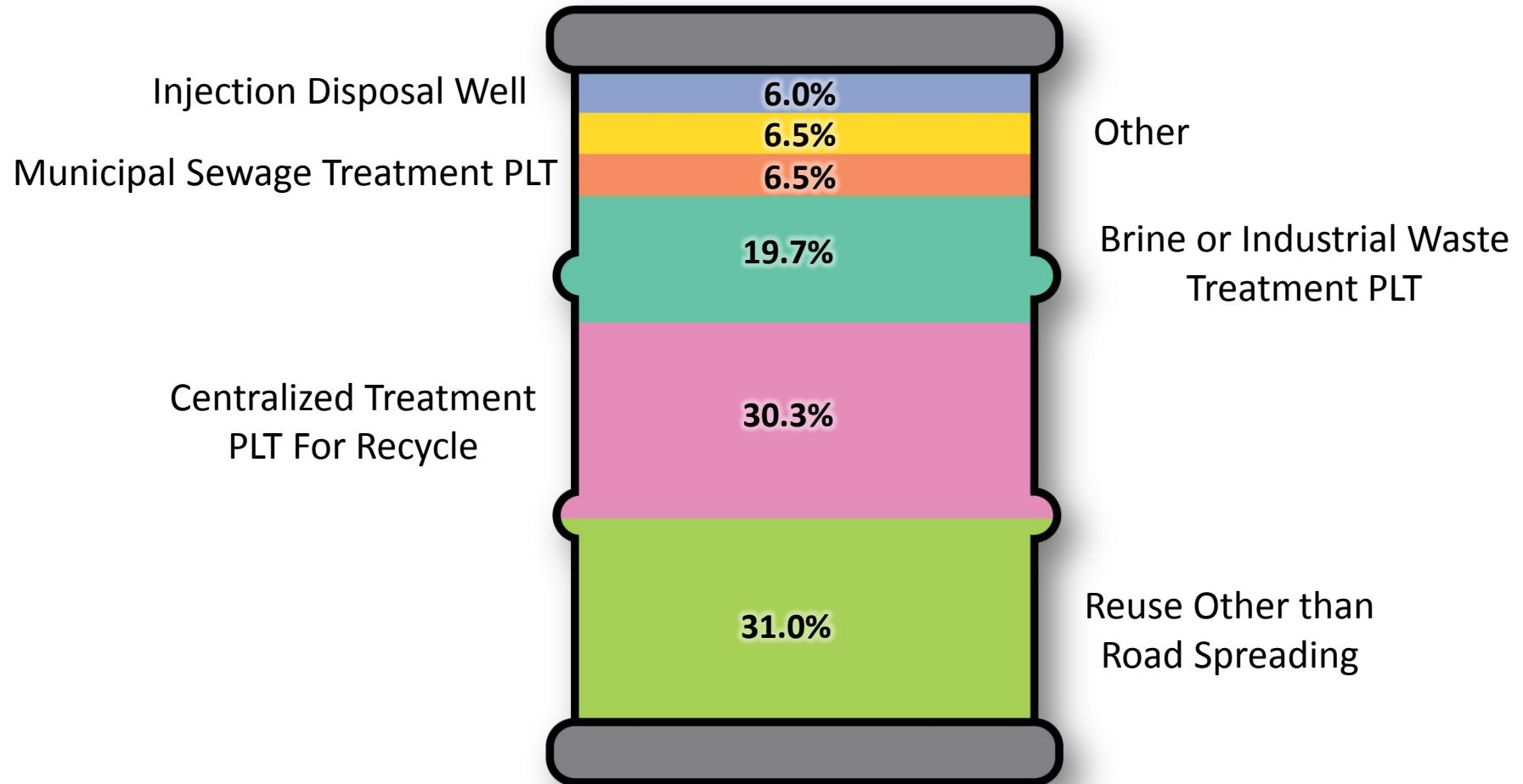


Approximate contact of "circulating fresh water and connate brine"

From: Carter, 2011

Unconventional Well Waste Summary

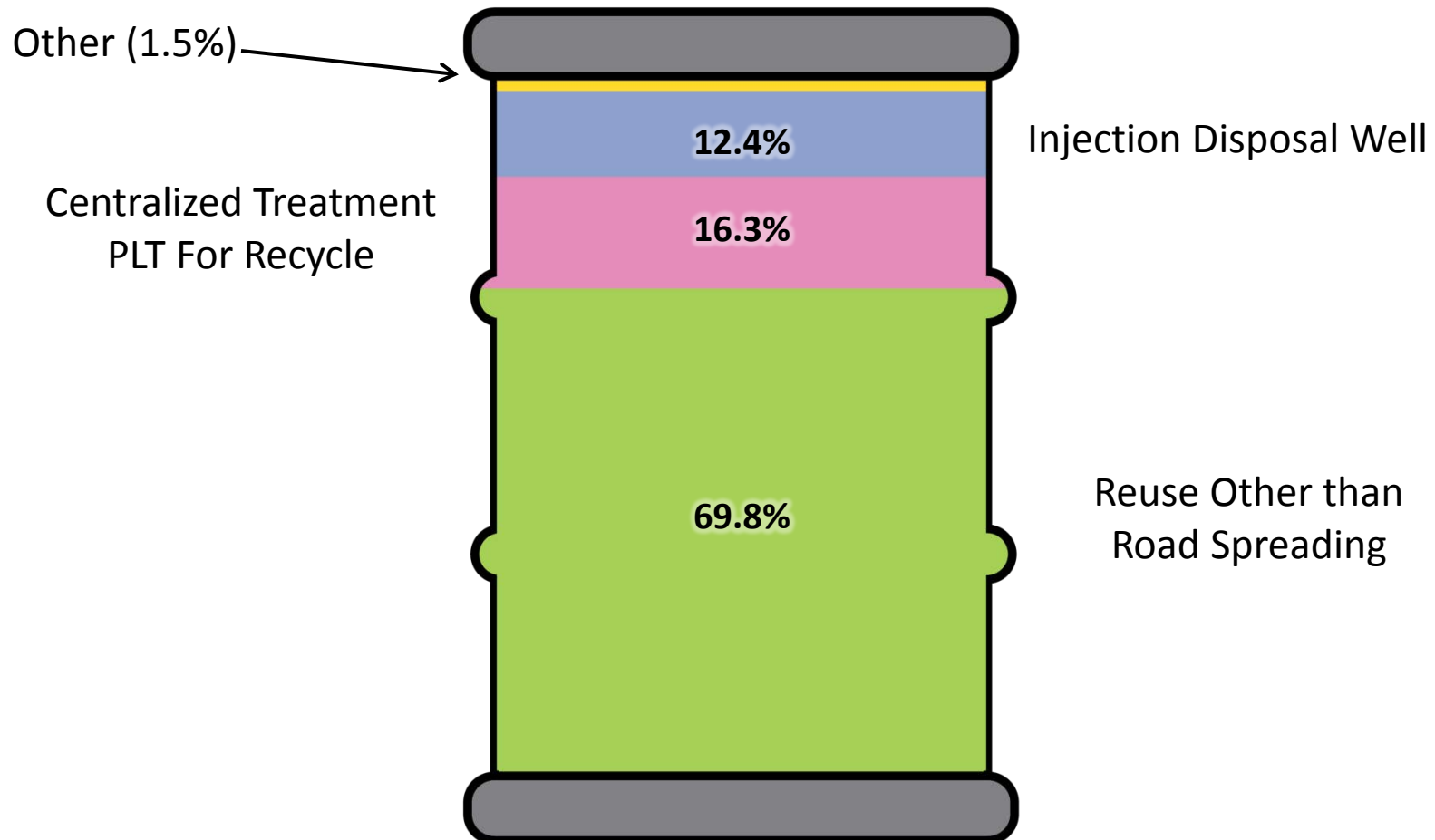
2008 – 2011



Total Waste: 44,347,869 bbl

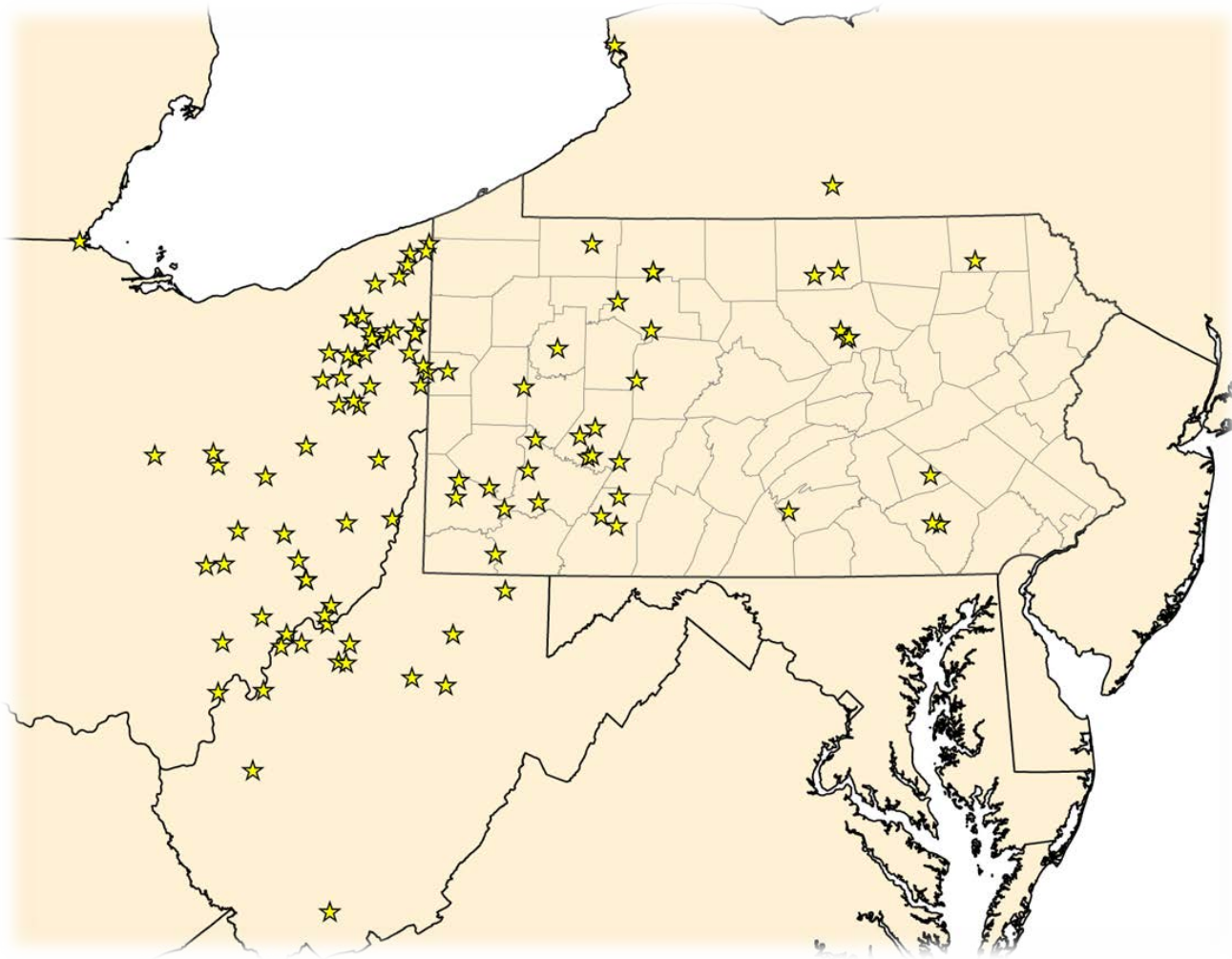
Unconventional Well Waste Summary

2012



Total Waste: 29,124,485 bbl

► Disposal Locations for Oil & Gas Waste





Oil and Gas Management

Available Information

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Waste

Water

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Public Participation Center

Permits, Licensing & Certifications

Growing Greener Grant Awards

Each year, DEP invests millions of dollars in watershed protection projects to improve watersheds, reduce stormwater runoff and acid mine drainage (AMD), and support educational programs, among other environmental efforts through its annual Growing Greener Grants. These projects will reduce nonpoint source pollution in impaired streams by implementing agricultural and stormwater best management practices; developing, repairing or installing passive systems to treat AMD; and supporting the establishment of riparian buffers, among other methods.



1 2 3



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Energy Plan



Oil and Gas
Annual Report



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West Nile
Virus



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06/03/2014 [DEP Certifies Exelon Hydroelectric Power Project in Lancaster County as part of Federal Relicensing](#)

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Oil and Gas Reports

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Interactive Map

[Oil and Gas Mapping](#)

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Office of Oil and Gas Management

Conservation Law

Contacts & Directions

Oil and Gas Related Topics

Marcellus Shale

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Oil and Gas Production Reports

Public Resources

Industry Resources

Operator Electronic Registration – Oil and Gas Reporting

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FAQ

Abandoned & Orphan Well Program

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Permits, Licensing & Certifications

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Grants, Loans and Rebates

Environmental Education

Tools

Public Records

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[Monthly – Permits Issued by County and Well Type Report](#)

[Year to Date – Permits Issued by County and Well Type Report](#)

[Permitted Well Inventory](#)

[Oil and Gas Compliance Report](#)

[SPUD Data Report](#)

[Wells Drilled By County](#)

[Wells Drilled By Operator](#)

[All Abandoned and Orphan Wells](#)

[Oil and Gas Well Formations Report](#)

[Oil and Gas Well Pad Report](#)

[Oil and Gas Production Reports](#)

[Well Permit Workload Report \(PDF\)](#)

[Interactive Reports Modifications \(PDF\)](#)

[Report Instructions \(PDF\)](#)

[Report Instructions \(PDF\)](#)

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- ▶ [Operator Electronic Registration – Oil and Gas Reporting](#)
- ▶ [Applications & Authorization Forms](#)
- ▶ [FAQ](#)
- ▶ [Abandoned & Orphan Well Program](#)
- ▶ [Marcellus Shale Advisory Commission](#)
- ▶ [Oil and Gas Technical Advisory Board](#)
- ▶ [Laws, Regulations & Guidelines](#)

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Oil and Gas Reports

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Interactive Map

[Oil and Gas Mapping](#)

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 - ▶ Contacts & Directions
 - ▶ Oil and Gas Related Topics
 - ▶ Marcellus Shale
 - ▼ Oil and Gas Reports
 - ▶ Oil and Gas Production Reports
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 - ▶ Abandoned & Orphan Well Program

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[Oil and Gas Mapping](#)


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Oil & Gas Mapping Tool



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Oil & Gas Well Layers

Well Designation

Select at least one well designation from this list.

☐ Unconventional Wells
☒ Conventional Wells

Select Both Clear Both

Well Type

Select at least one type from this list.

<input checked="" type="checkbox"/> Gas	<input checked="" type="checkbox"/> Comb. Oil & Gas
<input checked="" type="checkbox"/> Oil	<input checked="" type="checkbox"/> Coalbed Methane
<input type="checkbox"/> Injection	<input type="checkbox"/> Dry Hole
<input type="checkbox"/> Test	<input type="checkbox"/> Multiple Wellbore
<input type="checkbox"/> Undetermined	<input type="checkbox"/> Waste Disposal
<input type="checkbox"/> Observation	<input type="checkbox"/> Storage Well

Select All Types Clear All Types

Well Status

Select at least one status from this list.

<input checked="" type="checkbox"/> Active	<input type="checkbox"/> DEP Orphan
<input type="checkbox"/> Plugged	<input type="checkbox"/> DEP Plugged
<input checked="" type="checkbox"/> Abandoned	<input type="checkbox"/> DEP Abandoned
<input type="checkbox"/> ORND	<input type="checkbox"/> Regulatory Inactive
<input type="checkbox"/> PBNM	

Select All Status Clear All Status

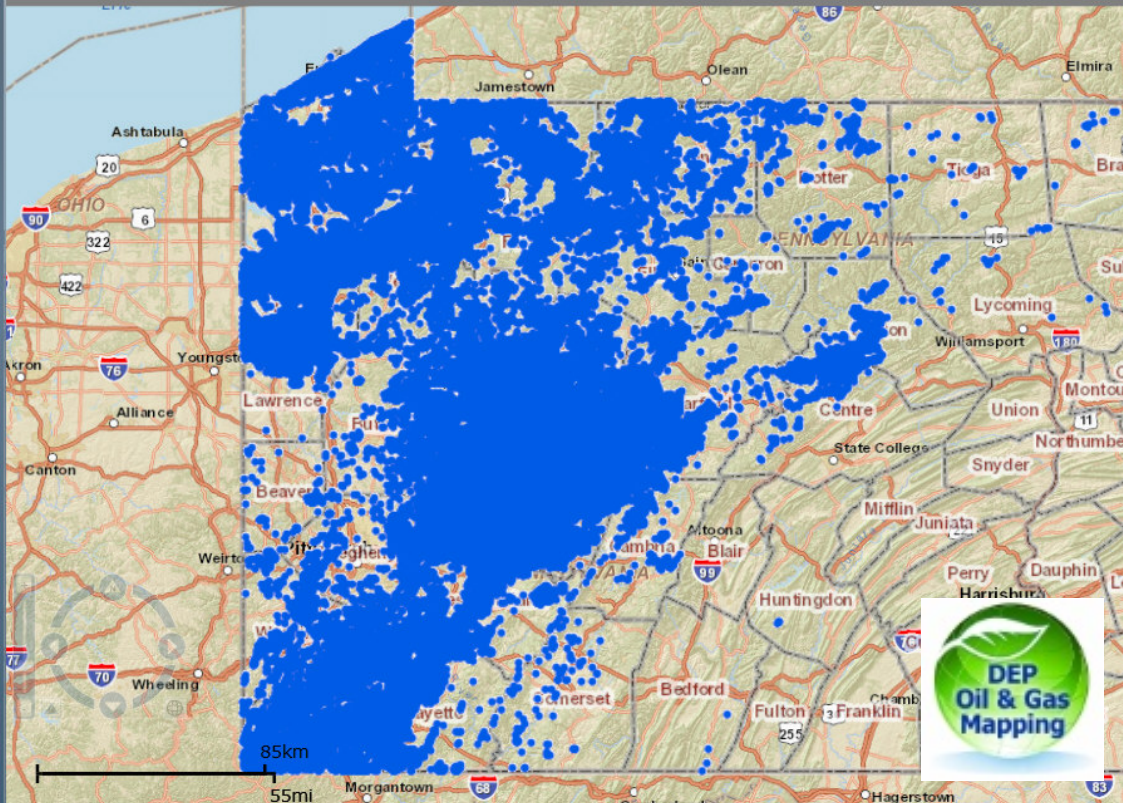
Select All Clear All

Submit Request

Current Tool: Pan

ESRI Streets ESRI Topo ESRI Imagery ESRI Street and Imagery PA MAP In

ESRI Streets ESRI Imagery



Oil & Gas Mapping Tool

The screenshot displays the Oil & Gas Mapping Tool interface. At the top, a toolbar contains icons for map navigation and information. Below the toolbar, the 'Current Tool: Identify' is selected. The map layer is set to 'ESRI Street and Imagery'. The 'Identify Results' window shows one result: 'GDC.UNCONVENTIONAL_WELLS_INT_V - BURKE BRA 5H'. The results table lists the following details:

Permit Number	015-21743
Well Name	BURKE BRA 5H
Operator	CHESAPEAKE APPALACHIA LLC
Operator No.	OGO-65420
Well Type	GAS
Well Status	Active
Permit Date	8/11/2011
SPUD Date	9/19/2011
Conservation Well	N
Well Configuration	Horizontal Well

The background map shows an aerial view of an industrial facility, likely a wellhead or processing site, surrounded by green fields and a road.

Oil & Gas Mapping Tool

The screenshot displays the Oil & Gas Mapping Tool interface. The main map area shows a topographic map of Pennsylvania with various overlays, including a red line for US-119 and a blue line for a river. A scale bar indicates 1km and 1mi. The interface includes a toolbar at the top with icons for map navigation and data layers. The 'Current Tool: Identify' window is active, showing search results for 'STEVE S YOSCHAK 2'.

Current Tool: Identify

ESRI Streets | Topo | ESRI Imagery | **ESRI Street and Imagery** | PA MAP Imagery and ESRI Imagery

ESRI Streets | ESRI Imagery

Identify Results: 1 result returned.

(1) Conventional Oil and Gas Wells - STEVE S YOSCHAK 2

Permit Number	063-28220
Well Name	STEVE S YOSCHAK 2
Operator	KEystone ENERGY OIL & GAS INC
Operator No.	OGO-24997
Well Type	GAS
Storage Field Name	
Well Status	Active
Permit Date	8/27/1984
SPUD Date	2/25/1985

Identify Results: 1 result returned.

(1) Conventional Oil and Gas Wells - STEVE S YOSCHAK 2

Well Configuration	Vertical Well
Coal	NonCoal
Well Pad Name - ID	
UIC ID	
UIC Type Description	
Site ID	121934
Site Name	STEVE S YOSCHAK 2 WELL
Authorization Documents	Click to display documents
Inspections	Click to display inspections

Include All Wells
Include Only Wells Meeting Search Criteria

Operators that have Reporting Wells:
KEYSTONE ENERGY OIL & GAS INC

Get Wells

Close

Powered by **esri**

DEP Oil & Gas Mapping

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Oil & Gas Mapping Tool

8000-PM-OOGM0002 4/2012



COMMONWEALTH OF PENNSYLVANIA
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OIL AND GAS MANAGEMENT PROGRAM
WELL LOCATION PLAT

PAGE 1 Surface Location

DEP	Auth ID #:	11314
USE	Permit #:	115-21644
ONLY	Project #:	568

Denotes location of well on topo map.

N 041° 50' 51.25"
N 041.84756889
W 075° 45' 25.46"
W 075.75707194

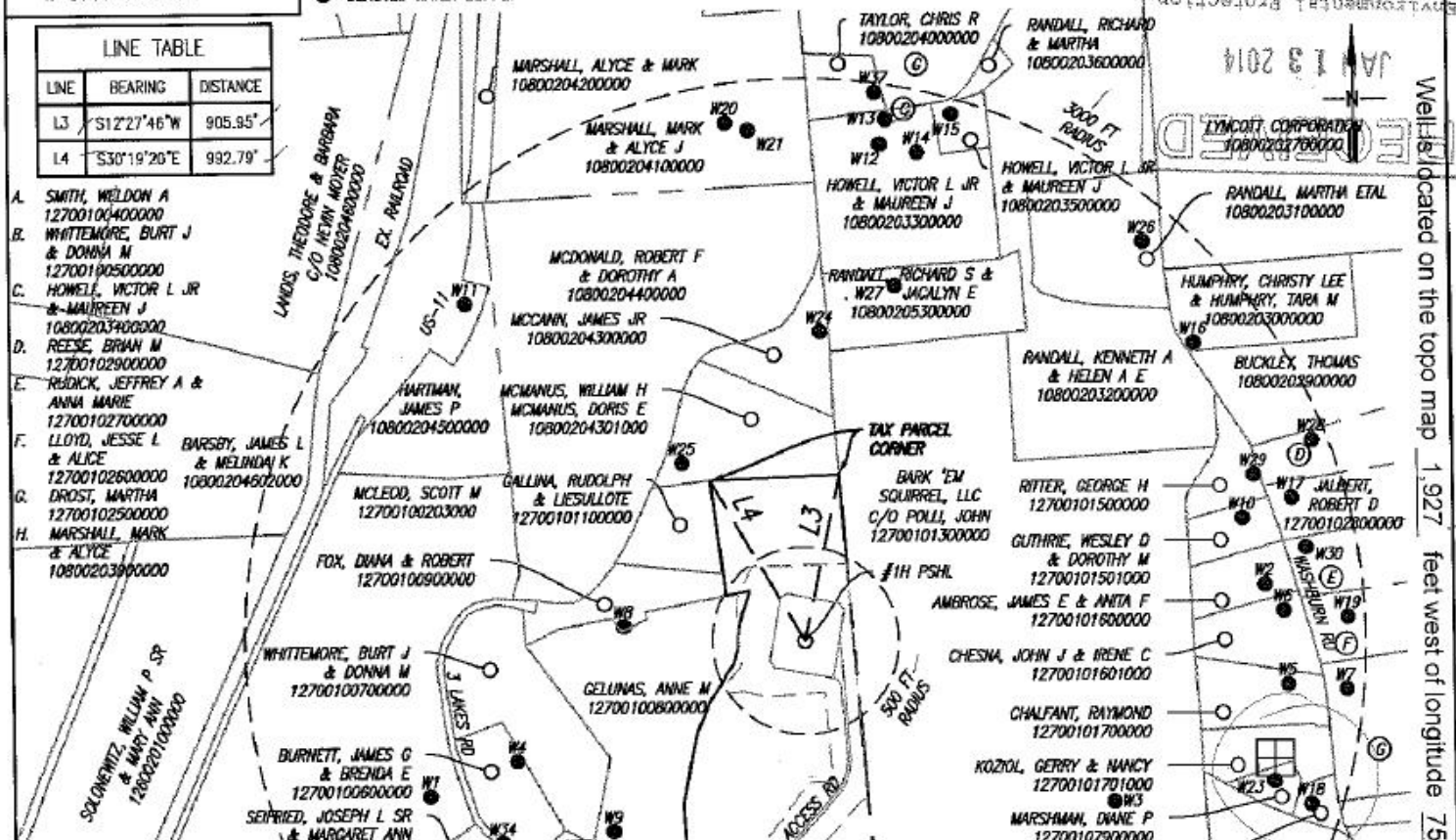
LINE TABLE		
LINE	BEARING	DISTANCE
L3	S12°27'46"W	905.95'
L4	S30°19'20"E	932.79'

- A. SMITH, WELDON A
1270010400000
- B. WHITEMORE, BURT J
& DONNA M
1270010050000
- C. HOWELL, VICTOR L JR
& MAUREEN J
1080020340000
- D. REESE, BRIAN M
1270010290000
- E. RIDICK, JEFFREY A &
ANNA MARIE
1270010270000
- F. LLOYD, JESSE L &
ALICE
1270010260000
- G. DROST, MARTHA
1270010250000
- H. MARSHALL, MARK
& ALICE
1080020390000

Well is located on topo map 9,995 feet south of latitude 41° 52' 30"

"This plat does not represent a complete boundary survey. The property lines and corners were established using deed and tax map information and are shown for well location purposes only. There has not been a title search made in preparation of this plat. This property is subject to any easements, rights-of-way and encumbrances both apparent and recorded."

● DENOTES WATER SUPPLY



Well is located on the topo map 1,927 feet west of longitude 75

Hydraulic Fracturing Chemical Registry

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HYDRAULIC FRACTURING
HOW IT WORKS

GROUNDWATER
PROTECTION

CHEMICAL
USE

REGULATIONS
BY STATE

FIND A WELL
BY STATE

FREQUENT
QUESTIONS

FracFocus 2.0

HUNDREDS OF COMPANIES. THOUSANDS OF WELLS.

Welcome to FracFocus 2.0! We're excited about our latest upgrades designed to dramatically enhance the site's functionality for the public, state regulatory agencies and industry users. Our user-friendly 'Find A Well' chemical disclosure registry now includes more extensive search options.

FracFocus continues to evolve and expand, adding more participating companies and reported wells from across the country. Our continued success is the result of nationally recognized organizations working with state governments and the oil and natural gas industry to provide public transparency.

[FIND OUT MORE](#) >

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[Hydraulic Fracturing](#)

[Casing & Cement](#)

[State Regulations](#)

[Chemical Use](#)

*Is groundwater
protected?*

Groundwater Protection: Priority Number One

Oil and natural gas producers have stringent requirements for how wells must be

Looking for information about a
well site near you?



Search for nearby well sites that have been hydraulically fractured to see what chemicals were used in the process.

TOTAL WELL SITES
REGISTERED **5 5 9 7 8**

FAQs

◀ 1/3 ▶

Q. How do the search forms work?

A. There are two search forms available in FracFocus: Map Search and Standard Search. The data available to be searched upon (e.g.,

Hydraulic Fracturing Chemical Registry

Find a Well

Map Search

Standard Search

STATE:
Pennsylvania

COUNTY:
Susquehanna

WELLS IN COUNTY:
Choose a Well Name

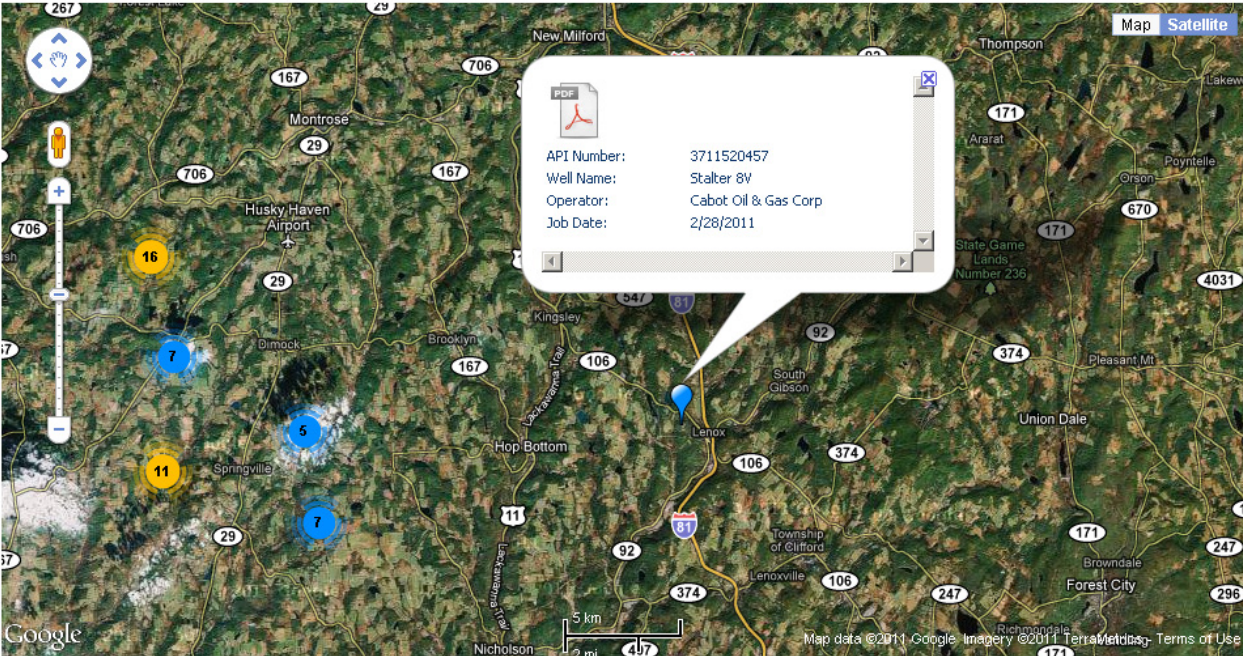
OPERATOR:
Choose One

API WELL NUMBER:

WELL NAME:

Search


Reset



PDF

API Number: 3711520457
Well Name: Stalter 8V
Operator: Cabot Oil & Gas Corp
Job Date: 2/28/2011

All FracFocus well site information is voluntarily provided by participating oil and natural gas operators. Wells hydraulically fractured after January 1, 2011 will be added to the database over time.
See the full list of [participating production companies](#).

 **pennsylvania**
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Hydraulic Fracturing Chemical Registry

Hydraulic Fracturing Fluid Product Component Information Disclosure

Job Start Date:	5/11/2013
Job End Date:	5/16/2013
State:	Pennsylvania
County:	Bradford
API Number:	37-015-22083-00-00
Operator Name:	Chesapeake Operating, Inc.
Well Name and Number:	KNAPP BRA 5H
Longitude:	-76.55136000
Latitude:	41.79445100
Datum:	NAD27
Federal/Tribal Well:	NO
Total Base Water Volume (gal):	6,119,862
Total Base Non Water Volume:	357,211



Hydraulic Fracturing Fluid Composition:

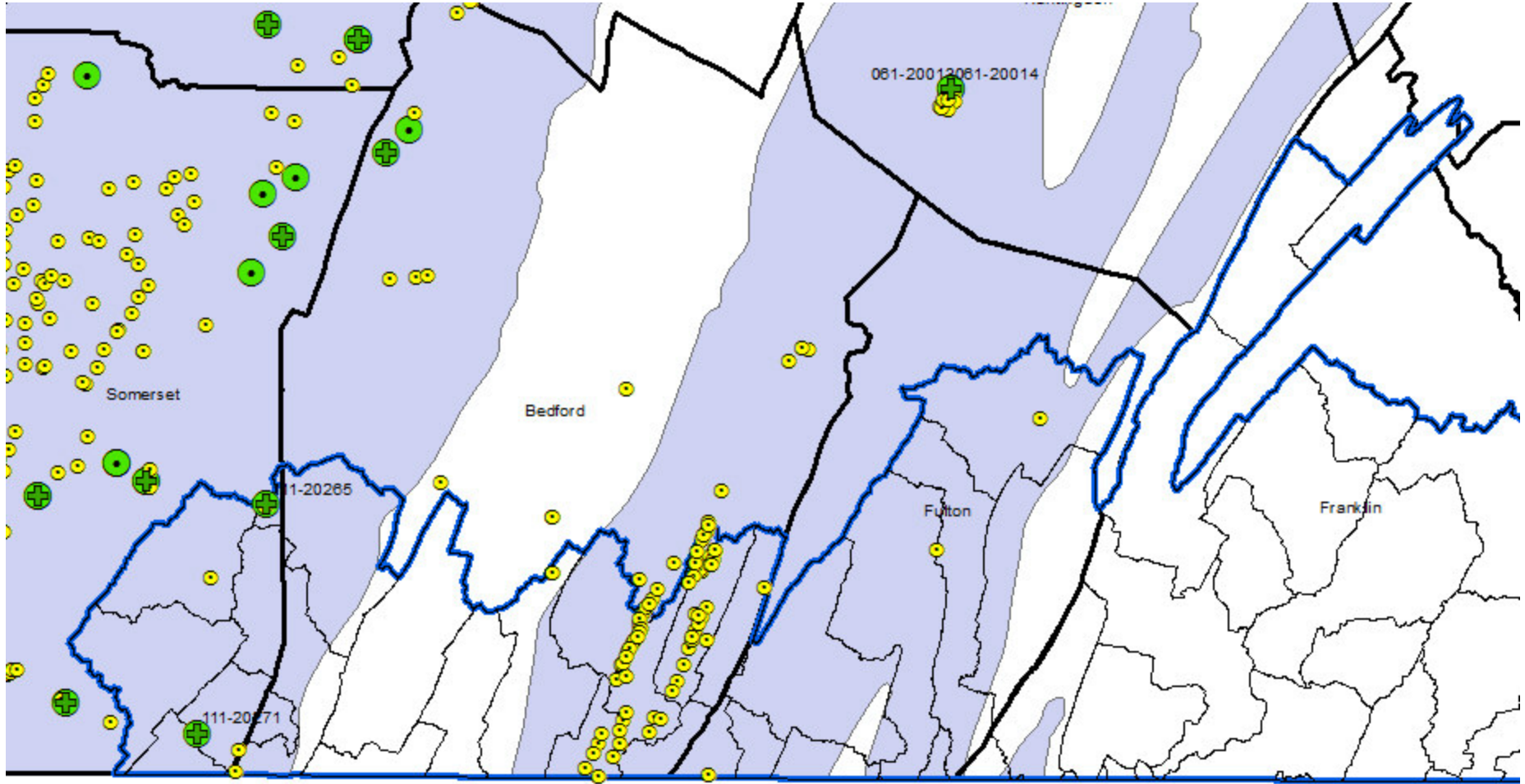
Trade Name	Supplier	Purpose	Ingredients	Chemical Abstract Service Number (CAS #)	Maximum Ingredient Concentration in Additive (% by mass)**	Maximum Ingredient Concentration in HF Fluid (% by mass)**	Comments
Fresh Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00000	80.92383	
Northern White Sand	FTS INTERNATIONAL	Proppant - Natural	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00000	10.82109	
Recycled Produced Water	CHESAPEAKE ENERGY	Carrier/Base Fluid	Water	007732-18-5	100.00000	6.40463	
100 Mesh Sand	FTS INTERNATIONAL	Proppant - Natural	Crystalline Silica (Quartz Sand, Silicon Dioxide)	014808-60-7	100.00000	1.33678	
10.1 - 15 HCL	FTS INTERNATIONAL	Acid	Water	007732-18-5	85.00000	0.32535	
			Hydrochloric Acid	007647-01-0	15.00000	0.05742	
FRW-600	FTS INTERNATIONAL	Friction Reducer	Petroleum Distillate Hydrotreated Light	064742-47-8	30.00000	0.02764	
B84	X CHEM	Anti-Bacterial Agent	Glutaraldehyde (Pentanedial)	000111-30-8	27.00000	0.00748	
			Didecyl Dimethyl Ammonium Chloride	007173-51-5	8.00000	0.00222	
			Quaternary Ammonium Compound	068424-85-1	8.00000	0.00152	



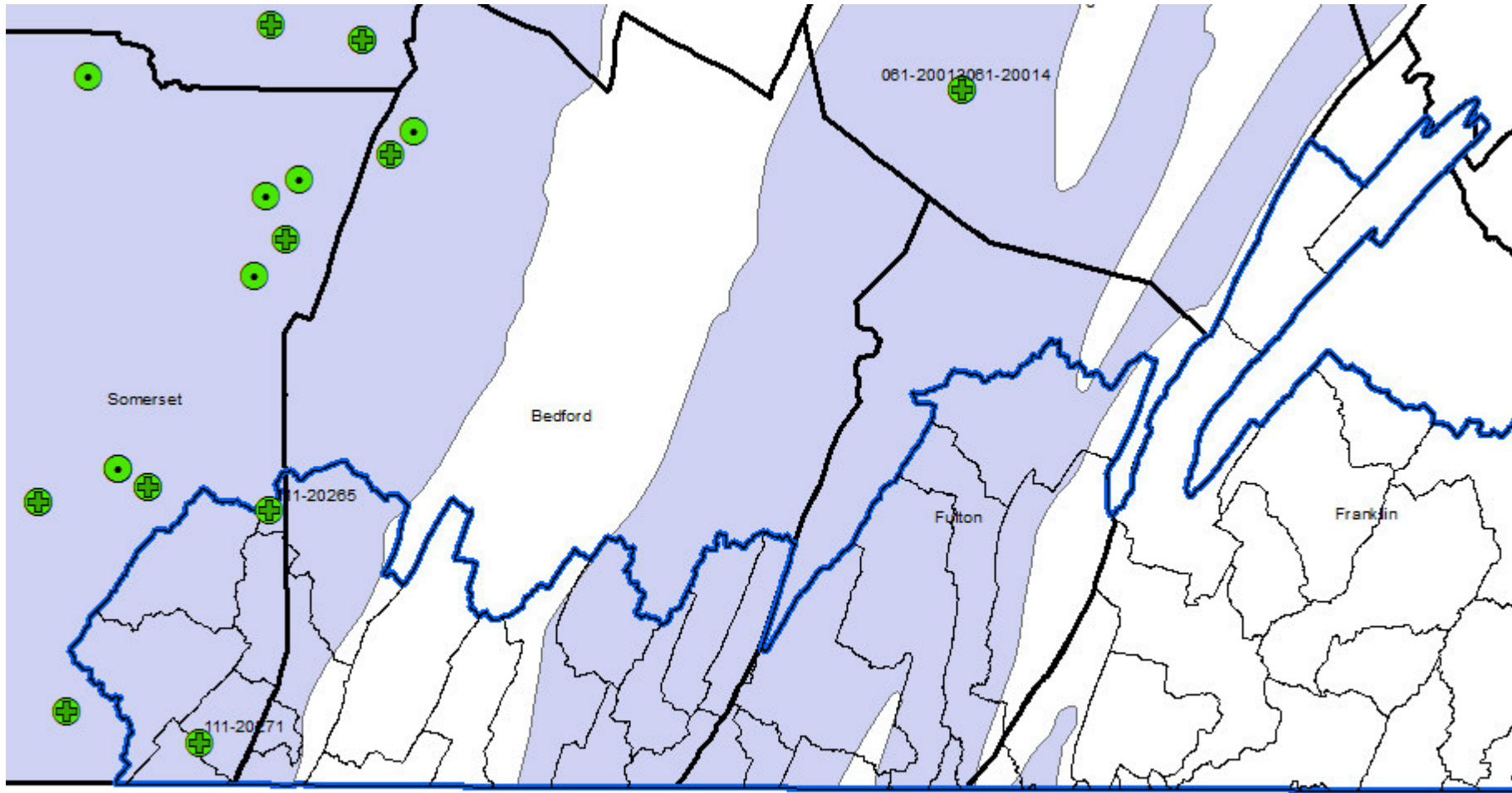
Oil and Gas Management

Unconventional Shale Gas Development in the Potomac River Basin in PA

Potomac - Unconventional Sahle Gas



Potomac - Unconventional Sahle Gas



Potomac - Unconventional Sahle Gas



Potomac - Unconventional Sahle Gas

Enforcement Type Description	Date Executed	End Date Final	Enforcement Final Status Description	Penalty Amount	Total Amount
▶ Consent Assessment of Civil Penalty	5/10/2012	5/10/2012	Comply/Closed	\$18,079.00	\$18,079.00
Notice of Violation	3/16/2011	4/13/2012	Administrative Close Out	\$0.00	\$0.00



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

Oil and Gas Management



Questions?

Joseph J. Lee, Jr., P.G.

**Director, Division of Plugging and Subsurface
Activities**

**Bureau of Oil and Gas Planning and Program
Management**

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