

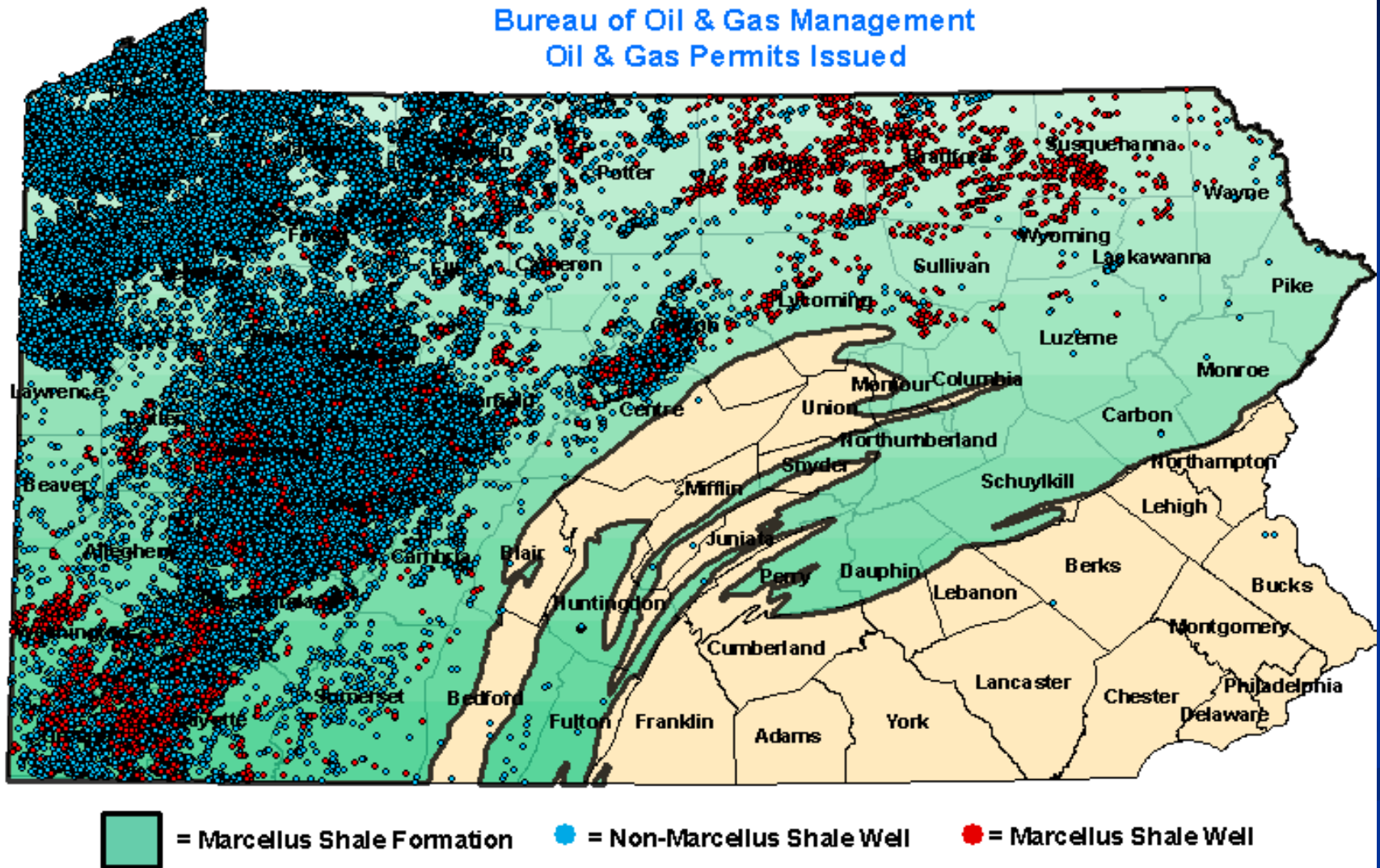


New Water Demands – Challenges and Opportunities for Energy Development



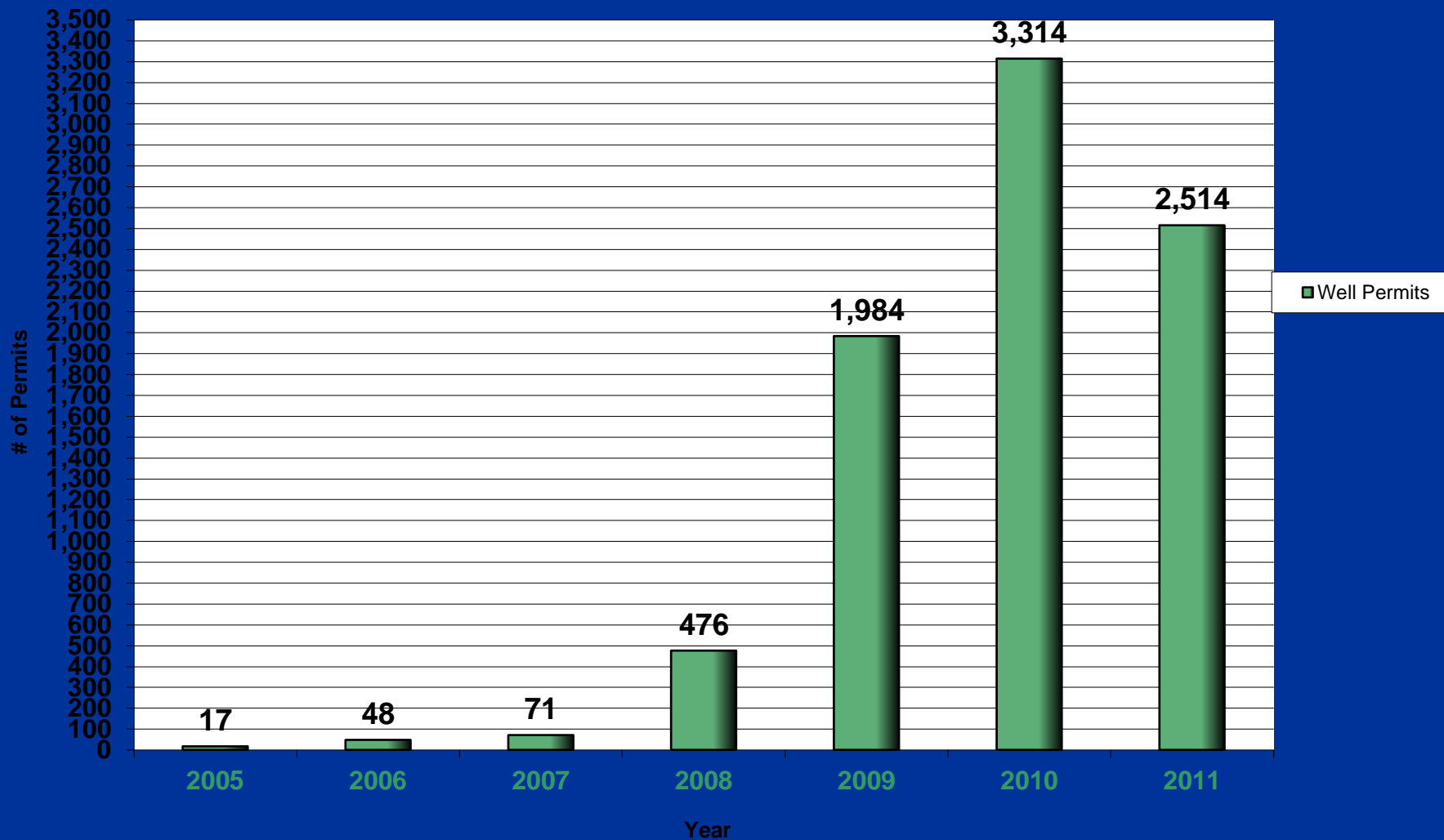
Scott Perry
Acting Deputy Secretary
Office of Oil and Gas Management

Pennsylvania Department of Environmental Protection
Bureau of Oil & Gas Management
Oil & Gas Permits Issued



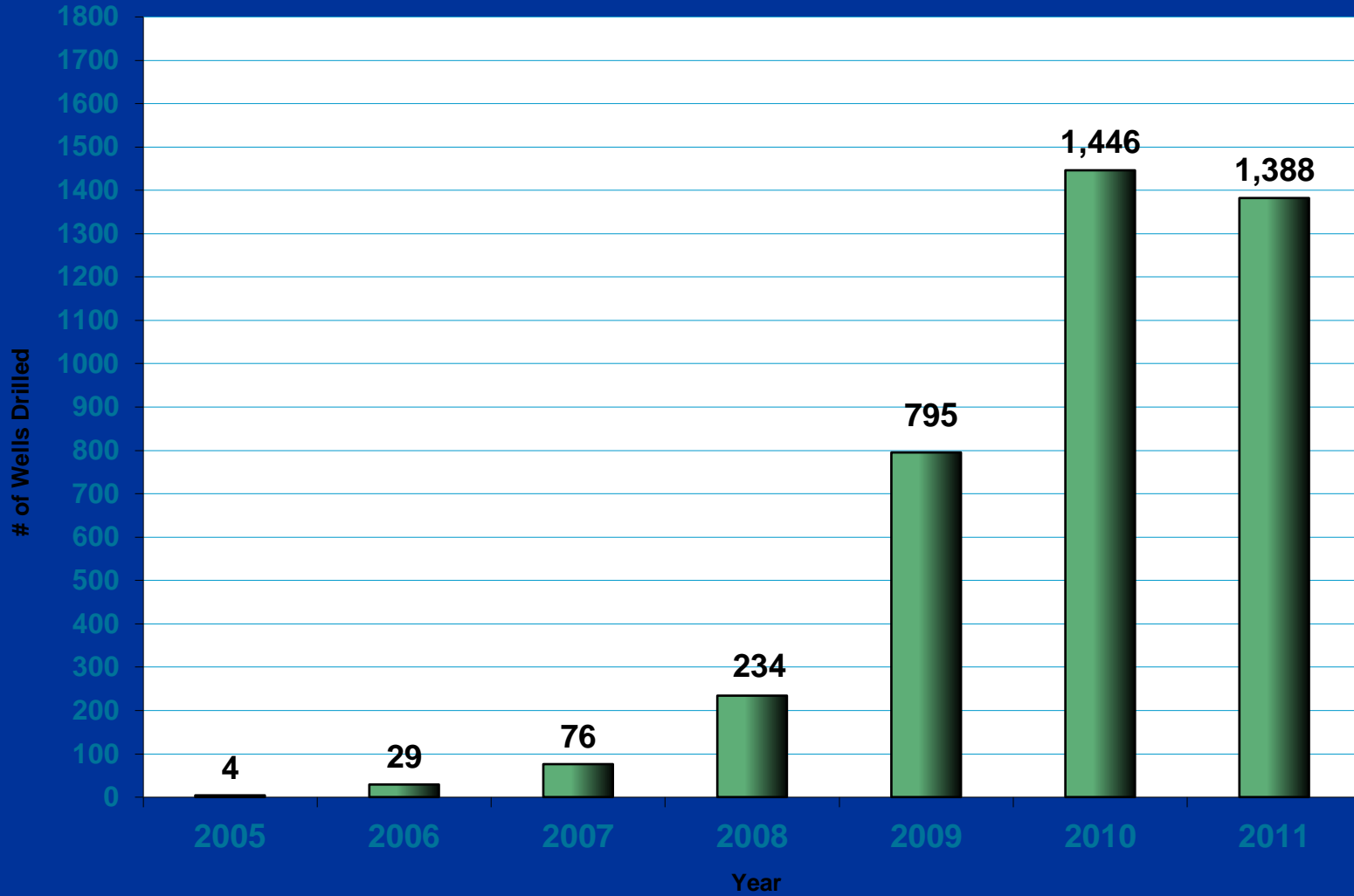
Well Permits Issued by Year Marcellus Shale

as of 09/30/2011



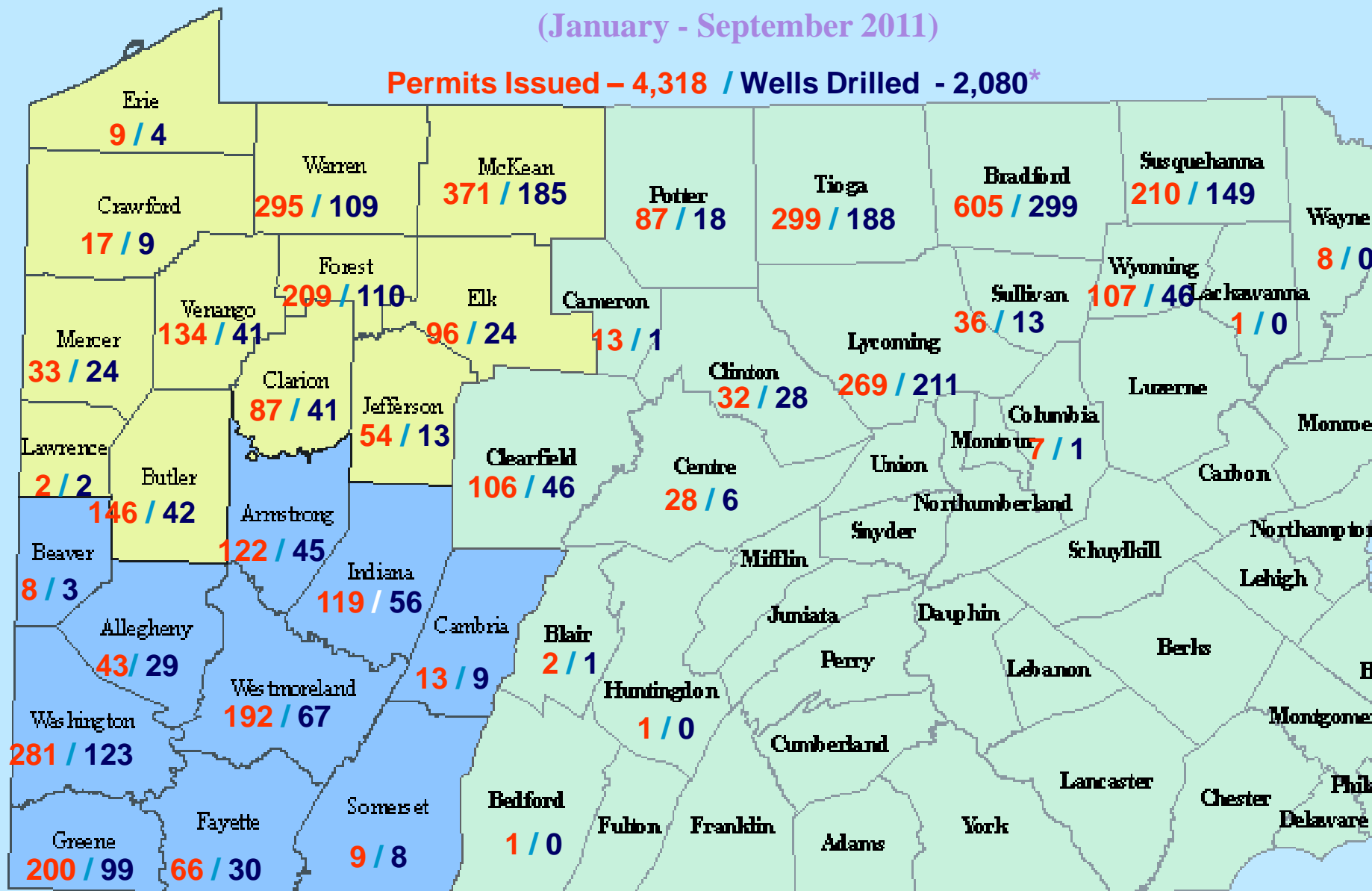
Wells Drilled by Year Marcellus Shale

09/30/2011



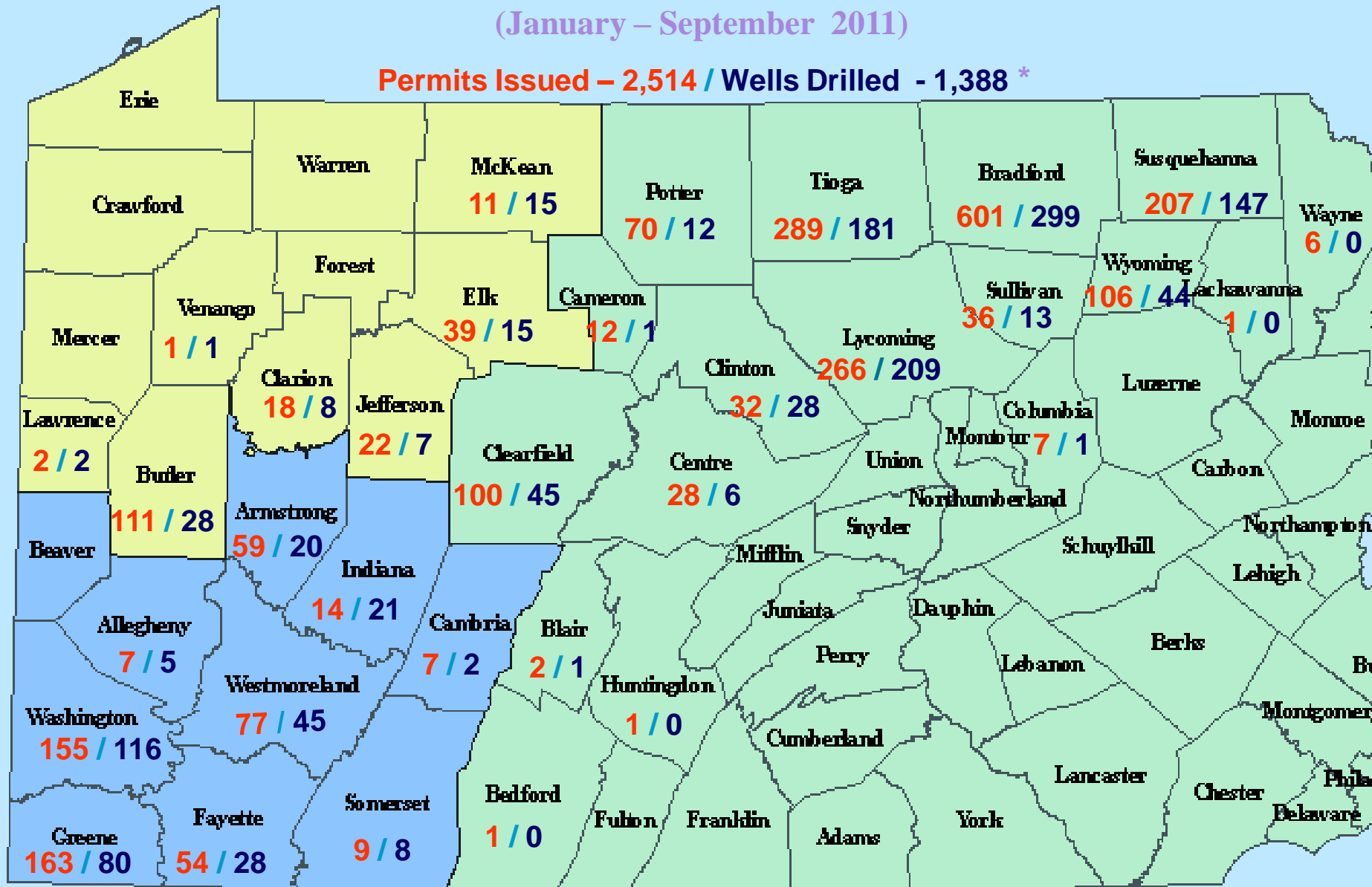
Department of Environmental Protection
Bureau of Oil and Gas Management
All Permits Issued & Wells Drilled
(January - September 2011)

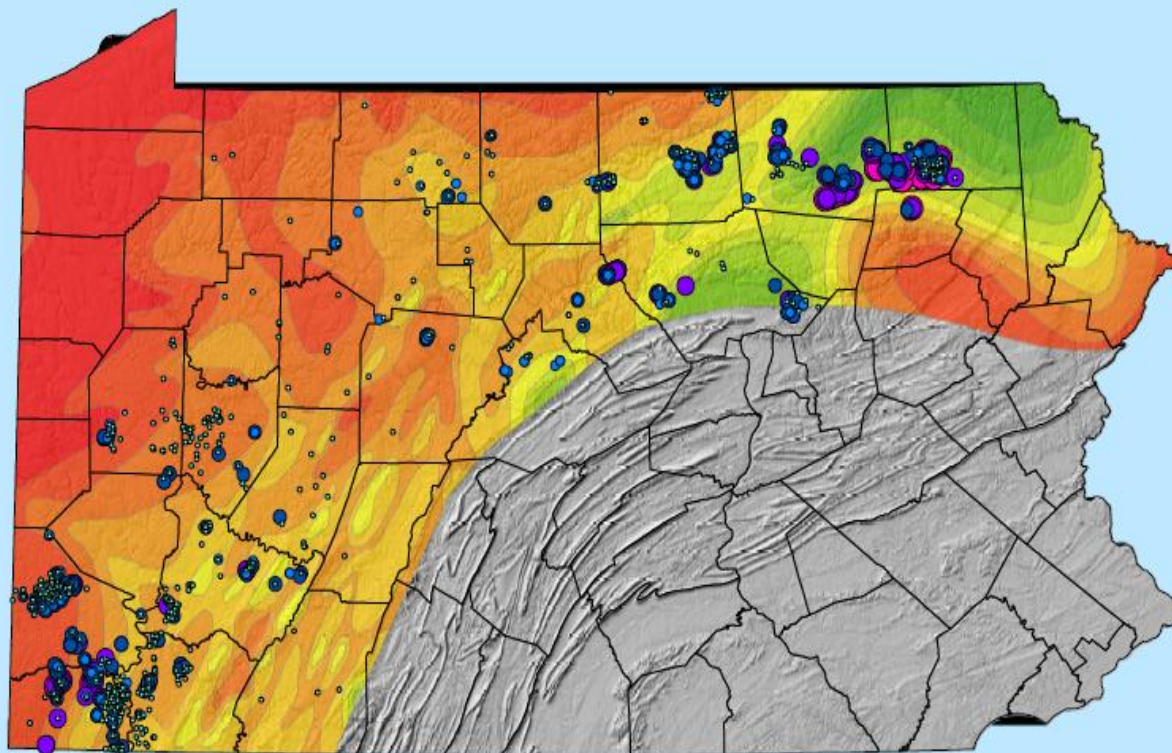
Permits Issued – 4,318 / Wells Drilled - 2,080*



Department of Environmental Protection
Bureau of Oil and Gas Management
Marcellus Shale Permits Issued & Wells Drilled
(January – September 2011)

Permits Issued – 2,514 / Wells Drilled - 1,388 *





Legend

Production Data (1/11 to 6/11)

Mcfd

- >0 - 1000
- >1000 - 2000
- >2000 - 4000
- >4000 - 8000
- >8000 - 17,000

County Boundaries

Marcellus Shale Isopach Data

Thickness (Feet)

- >250
- 225-250
- 200-225
- 175-200
- 150-175
- 125-150
- 100-125
- 75-100
- 50-75
- 25-50
- 0-25

Footnotes:

Marcellus Shale Isopach Basemap from Bureau of Topographic and Geologic Survey (DCNR)
Hillshade Basemap from GNET Server
Map created on 9/2/2011 (MSP)

Laws and Regulations

- Oil and Gas Act
- Coal and Gas Resource Coordination Act
- Oil and Gas Conservation Law
 - 25 Pa Code Chapter 78
- Clean Streams Law
 - 25 Pa Code Chapters 91-102
- Dam Safety and Encroachments Act
 - 25 Pa Code Chapter 105
- Solid Waste Management Act
- Air Pollution Control Act
- Storage Tank and Spill Prevention Act
- Environmental Laboratory Accreditation Act

Potential Impacts to Water Supplies

- Site Construction
- Water Withdrawal
- Well Drilling and Fracing
- Wastewater Management

Erosion and Sediment Control

- Erosion and Sediment Control General Permit
 - 5 Acres or more of earth disturbance.
 - For expedited review, NOI, E&S and post construction plan signed and sealed by registered professional.
 - Documents submitted 14 business days prior to earth moving.

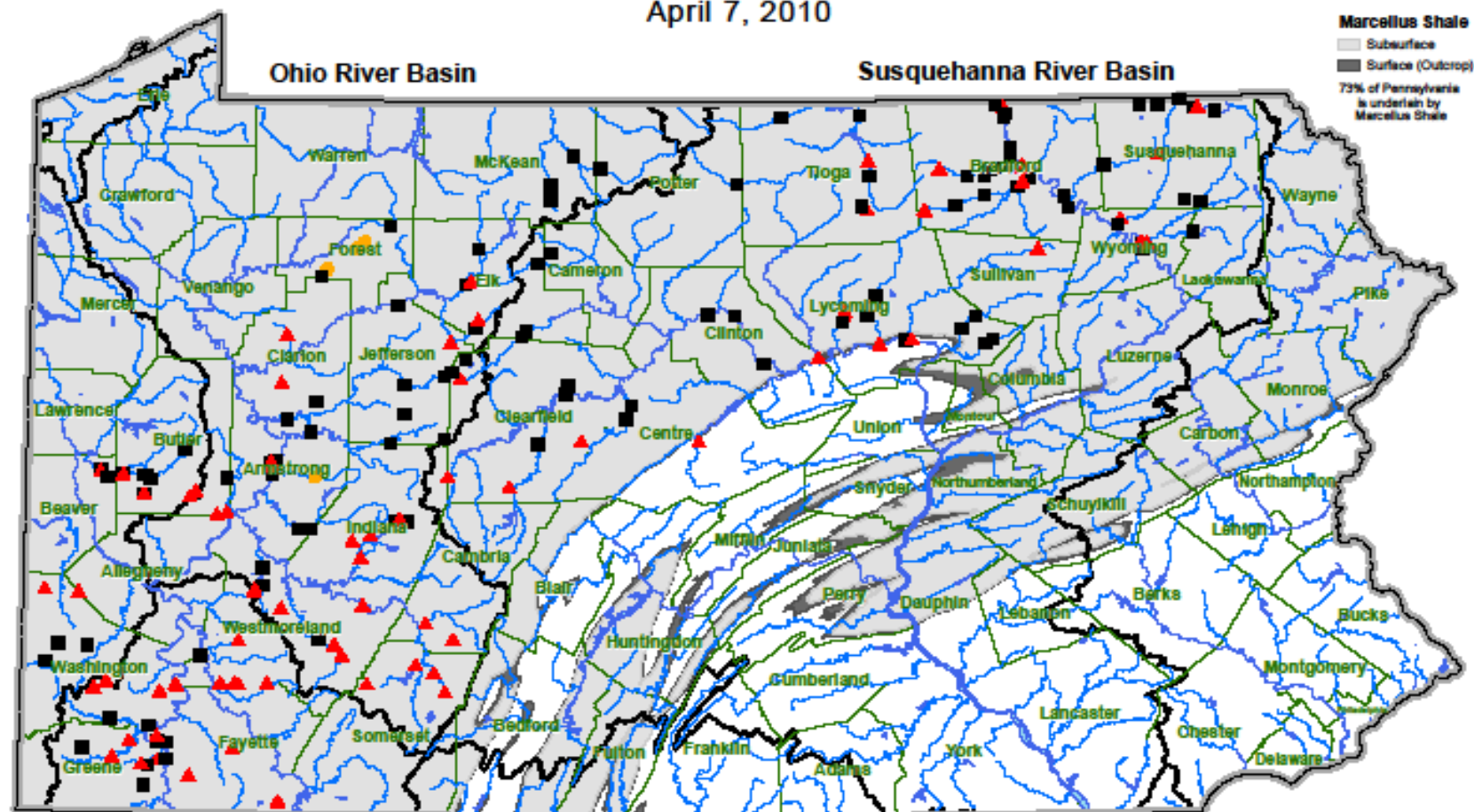


Water Withdrawal

- Single water management plan covers multiple well sites.
- Applies in Ohio, Susquehanna and Delaware basins.
- Required to protect existing and designated uses – 25 Pa. Code Chapter 93.
- Water Resources Planning Act (Act 220) registration.
- Use of alternative water sources.
 - Recycling
 - AMD-impacted water.
 - Treated effluent.

Marcellus Shale Natural Gas Well Development in Pennsylvania Water Management Plans (WMPs)

April 7, 2010



WMP Summary for State and River Basins

Number of Gas Operators				Individual Sources				Approved Daily Maximum Use, mgal/d			Reported Water Use		
34				Type	Susquehanna	Ohio	State	Susquehanna	Ohio	State	Susquehanna	Ohio	State
				Surface water	61	56	117	57.4	61.6	139.2			
				Ground water	0	10	10						
				Purchase	31	55	86						
				Total	92	121	213						
				%	43%	57%							

WMP Withdrawal Sources

Source Type

- Ground water
- Surface water
- Purchase



Disclaimer: Intended as general information and may not include all WMP information submitted to DEP for the period stated.



Well Construction and Groundwater Protection

- Operator responsible for replacing water supply if quality or quantity affected
- Complaint – DEP has 10 days to investigate and 45 days to make a determination
- Presumed to cause pollution if drilled within 6 months and 1000 feet from water supply

Well Construction Practices

- Upgrades casing standards:
 - Pressure ratings for new casing
 - Pressure testing of new and welded casing.
- Upgrades cement standards:
 - Notice before cementing surface casing
 - Eight-hour cement set period
 - Zone of critical cement

Reporting Requirements

- Requires mandatory electronic production reporting to DEP.
- New well record and completion reporting requirements submitted by the operator as part of the stimulation record include pump rates, pressure, total volume and list of hydraulic fracturing chemicals used, the volume of water used, and the identification of water sources used pursuant to an approved water management plan.

Hydraulic Fracturing Wastewater Management, continued

- TDS strategy
- New and Expanded Sources Only
 - 500 Mg/l TDS
 - 250 Mg/l Chlorides
 - 10 Mg/l Barium and Strontium
- Underground Injection Control Program
 - EPA administers
 - Only 8 class II UIC disposal wells in PA.
 - New UIC well development likely.

Recent Issues

- Wastewater Certification
- Mobile Waste Processing
- Use of AMD to Frac Wells
- DRBC Regulation Development
- Pipeline Development – SPGP4
- Marcellus Shale Advisory Commission

Marcellus Shale Advisory Commission Recommendations

- Imposition of stiffer penalties
- Increased ability to withhold or revoke permits
- Increase bond amounts
- Greater protection for public parks and forests
- Expand public notification and presumptive liability zone
- Increase setbacks and protect floodplains
- Engage in a process of continuous improvement

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