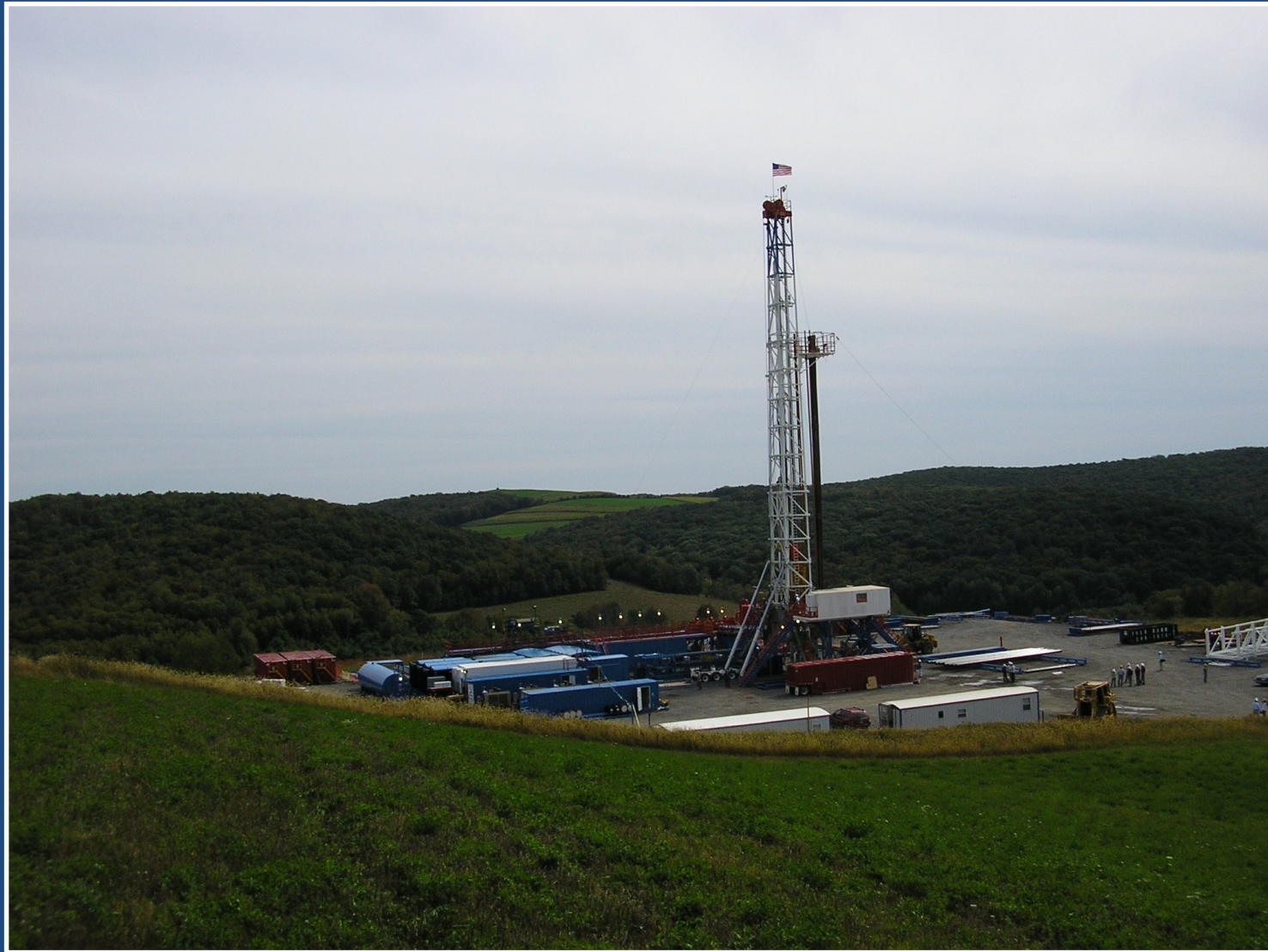


# 2011 Great Lakes and St. Lawrence Cities Initiative Niagara Falls, Ontario

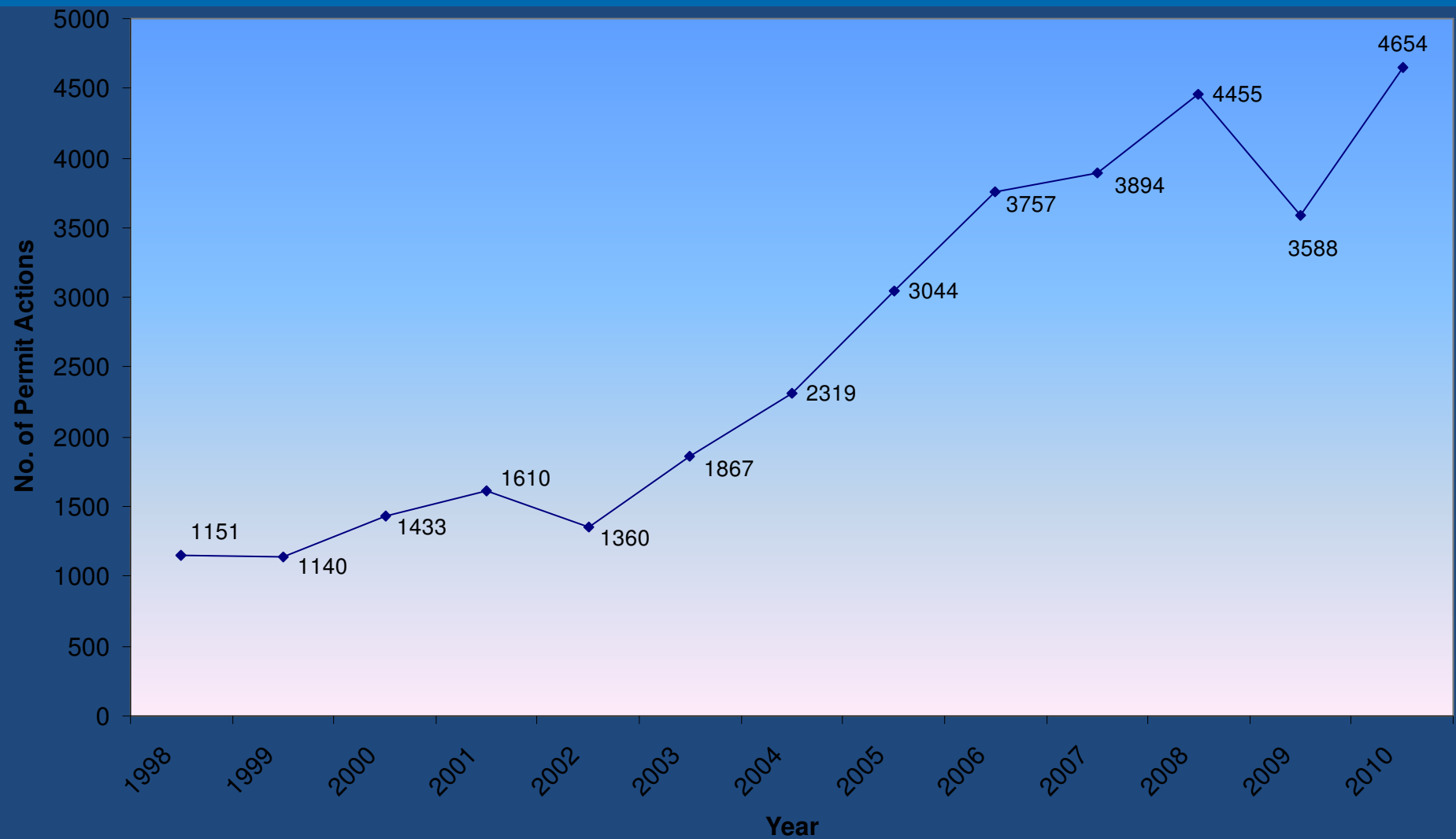
- *Kelly A. Burch*
- *Regional Director*
- *Pa. Dept. Of Environmental Protection*

# Marcellus Shale Drilling in Pennsylvania

# PA DEP Oil & Gas Management Program

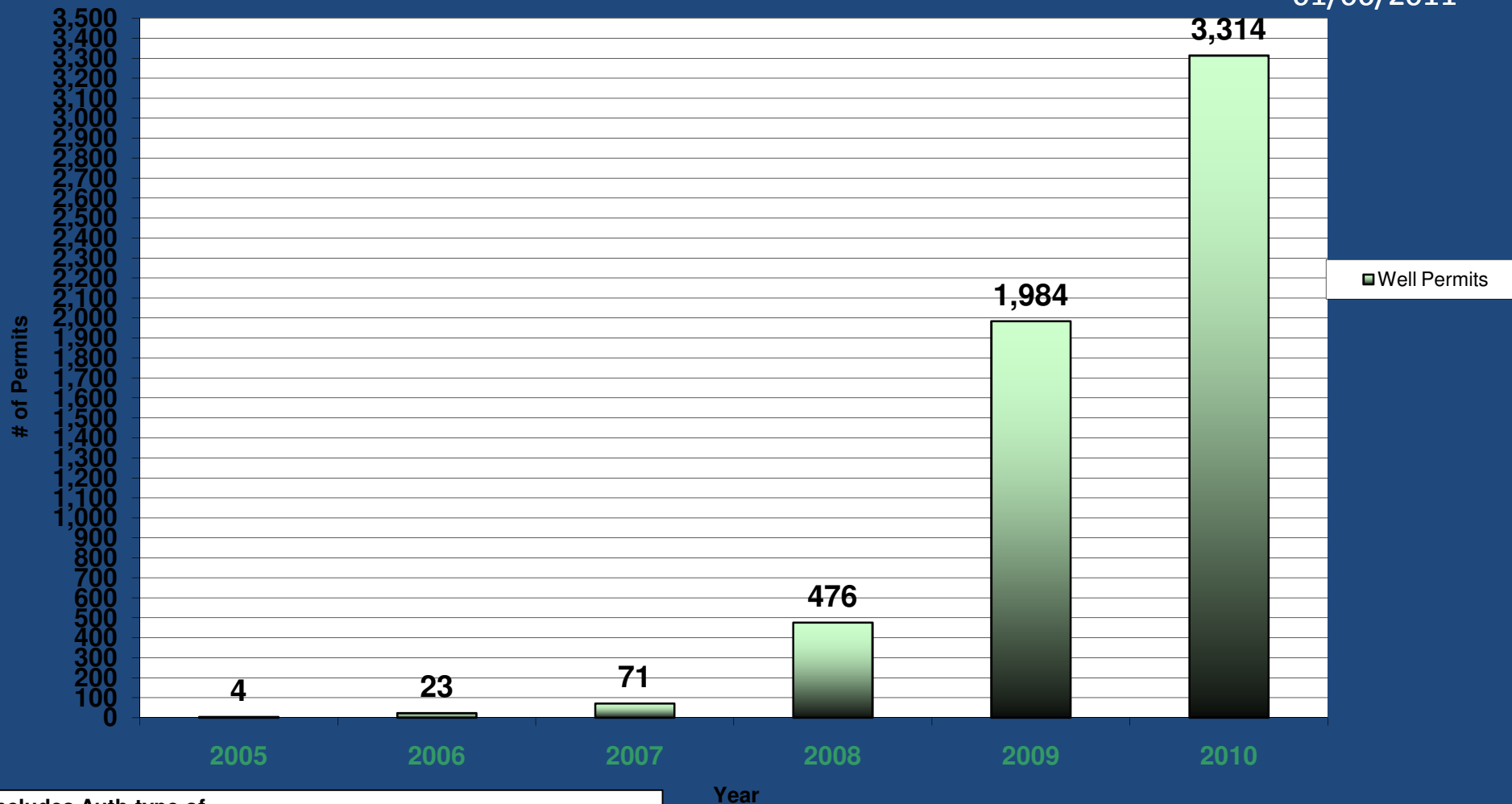


# Northwest Regional Office Permit Actions 1998-2010



# Marcellus Shale Permits Issued by Year

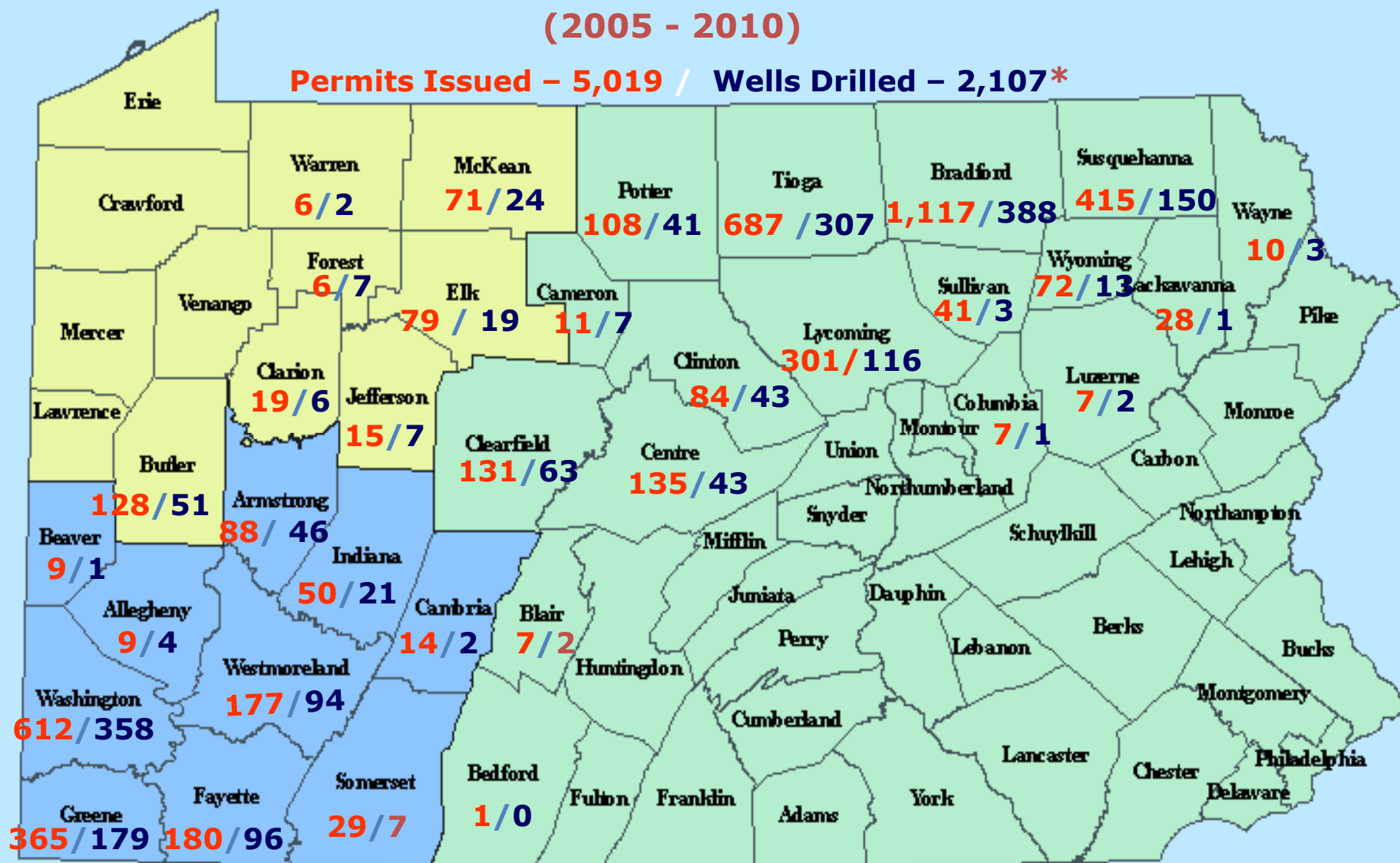
01/06/2011



Includes Auth type of  
Drill & Operator Well Permits, Drill Deeper and Redrills.

**Department of Environmental Protection  
Bureau of Oil and Gas Management  
Marcellus Shale Permits Issued & Wells Drilled  
(2005 - 2010)**

**Permits Issued – 5,019 / Wells Drilled – 2,107\***



Updated 10/01/2010

\* As reported by Operators

# Staff Changes


- 105 new hires since January 2009
  - 20 Meadville
  - 50 East Region
  - 21 Pittsburgh
  - 14 Harrisburg
- East Region Office April 2009
- 202 employees Oil & Gas Management
- Program is funded by permit fees



**pennsylvania**  
DEPARTMENT OF ENVIRONMENTAL PROTECTION

COMMONWEALTH OF PENNSYLVANIA  
DEPARTMENT OF ENVIRONMENTAL PROTECTION  
Oil and Gas Management Program  
WELL LOCATION PLAT

DEP USE ONLY	DEP Application Tracking #	G: <i>100</i>
	Permit # <i>031-25442</i>	<i>11/10/10</i>
	Project #	C:

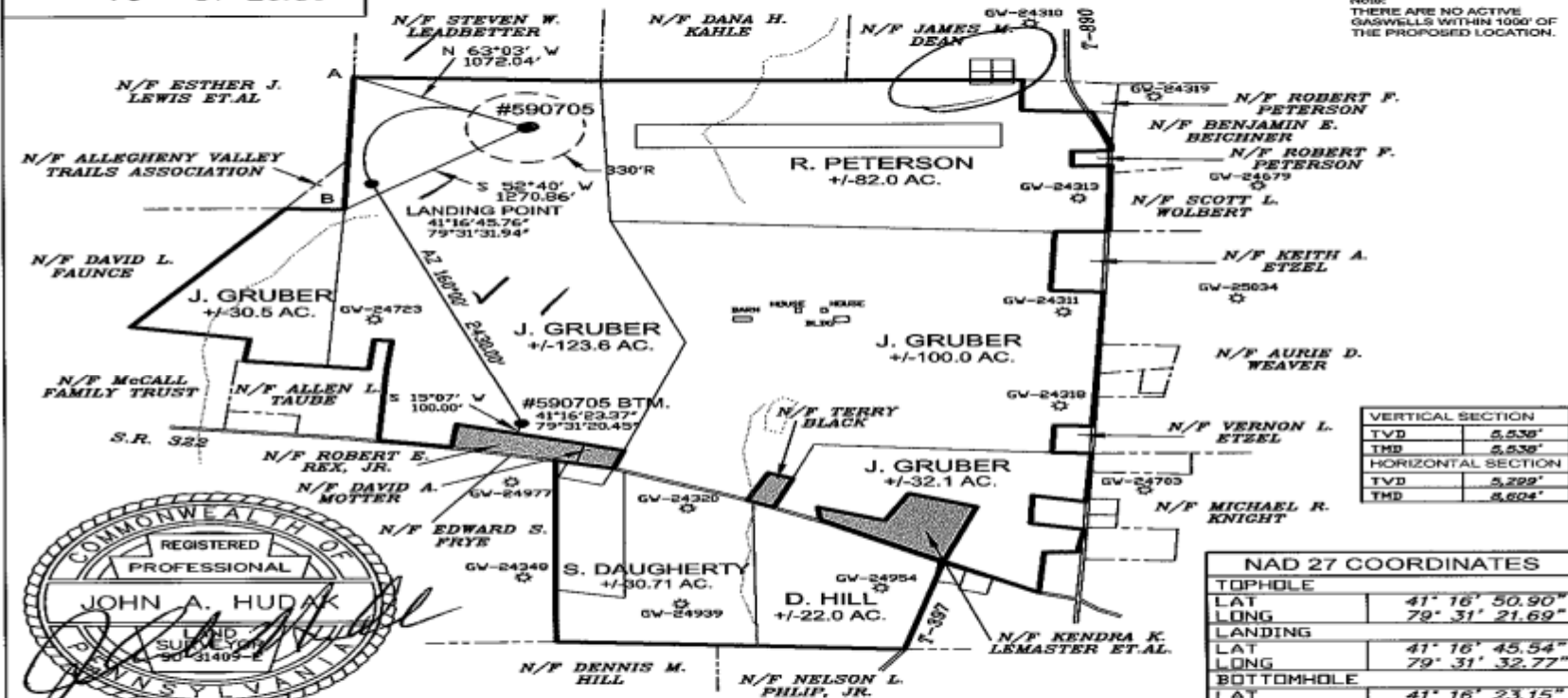
	Denotes location of well on topo map.
True Latitude: NORTH	$41^{\circ} 16' 51.12''$
True Longitude: WEST	$79^{\circ} 31' 20.86''$

 = NOT INCLUDED IN LEASE

NOTE:  
THE PURPOSE OF THIS PLAT IS FOR THE LOCATION OF  
PROPOSED GAS WELLS AND DOES NOT REPRESENT A  
FINISHED BOUNDARY SURVEY. SOME PROPERTY LINES  
AND OWNERS WERE OBTAINED FROM TAX RECORDS.

NOTE:  
AZIMUTH BASED ON LANDING POINT AND  
BOTTOM HOLE PA STATE PLANE COORDINATES,  
NORTH ZONE. GRID NORTH

**Note:**  
THERE ARE NO ACTIVE  
GASWELLS WITHIN 1000' OF  
THE PROPOSED LOCATION



Well is located on topo map 6,173 feet west of longitude

$$\frac{19}{30} = \frac{61}{60}$$

Tract  
Acreage  $\pm 123.6$  AC

Elevation Metadata Method		GPS		Accuracy +/- 1' ft.		Datum		NGVD 1929		Survey Date		3-5-10	
Well(Farm) Name						J. GRUBER		Well #		590705		Serial #	
County - Code						CLARION-16		Municipality		ELK TWP.		Well Type	
USGS 71/2 Quadrangle Map Name						USGS 71/2		Map Section		Surface Elevation		GAS	

Kossuth		0801	9	1453 ft.
Angle & Course of Deviation (Drilling)		Anticipated Total Depth		
HORIZONTAL		TVD 5,538' TMD 8,604'		
Owner, Lessee, or Operator of Workable Coal Seam		Name of Coal Seam Owned, Leased, or Operated		
NON COAL		RECEIVED		

RECEIVED

NOV 10 2010

ENVIRONMENTAL PROTECTION  
NORTHWEST REGIONAL OFFICE



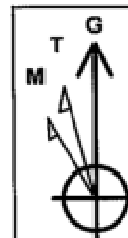


**PHOENIX**

TECHNOLOGY SERVICES USA INC.

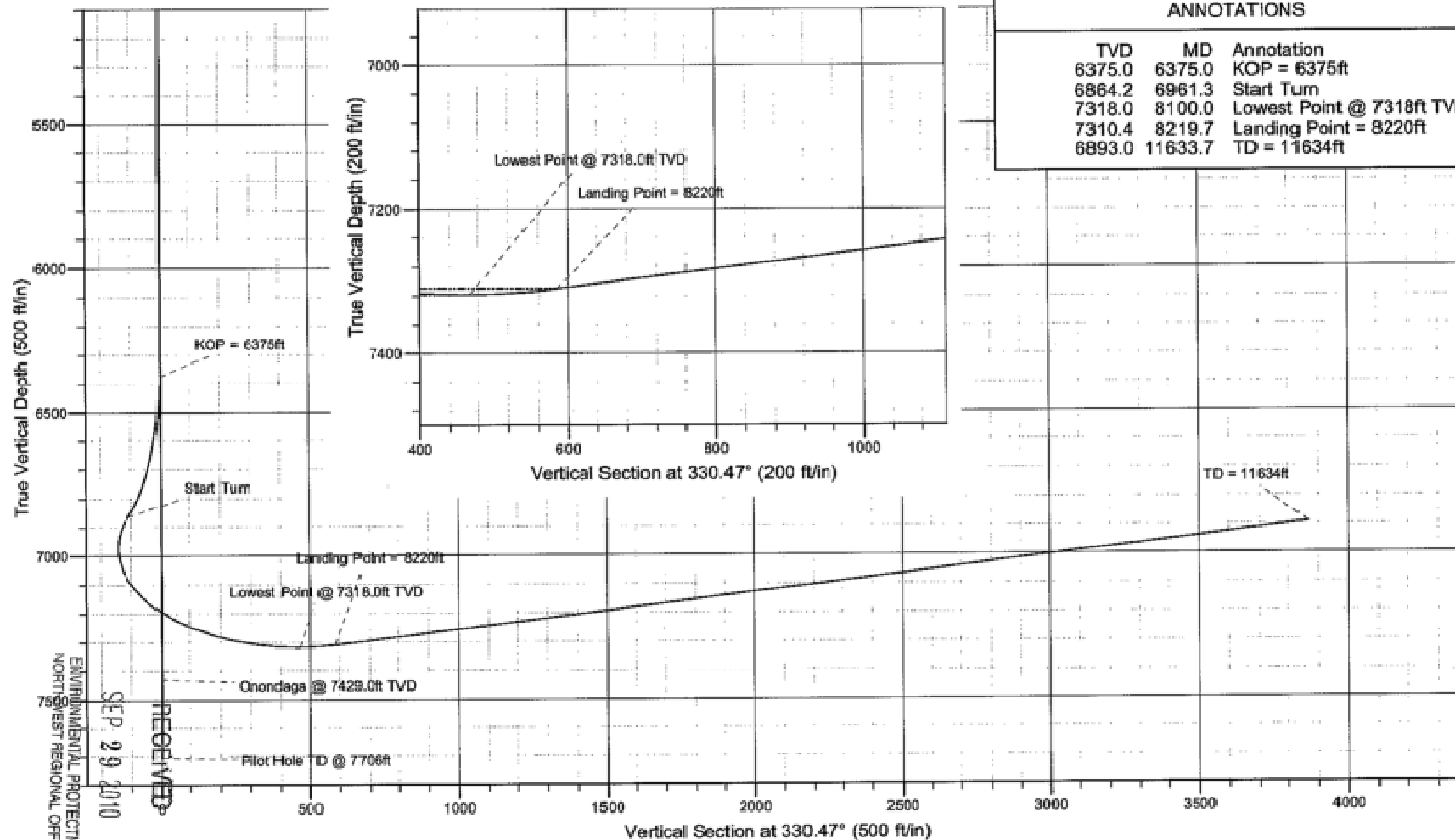
## EQT Production - Marcellus

Project: Tioga County, PA  
Site: Tioga County 590925  
Well: Well #590925  
Wellbore: Main Wellbore  
Design: 590925 Plan3

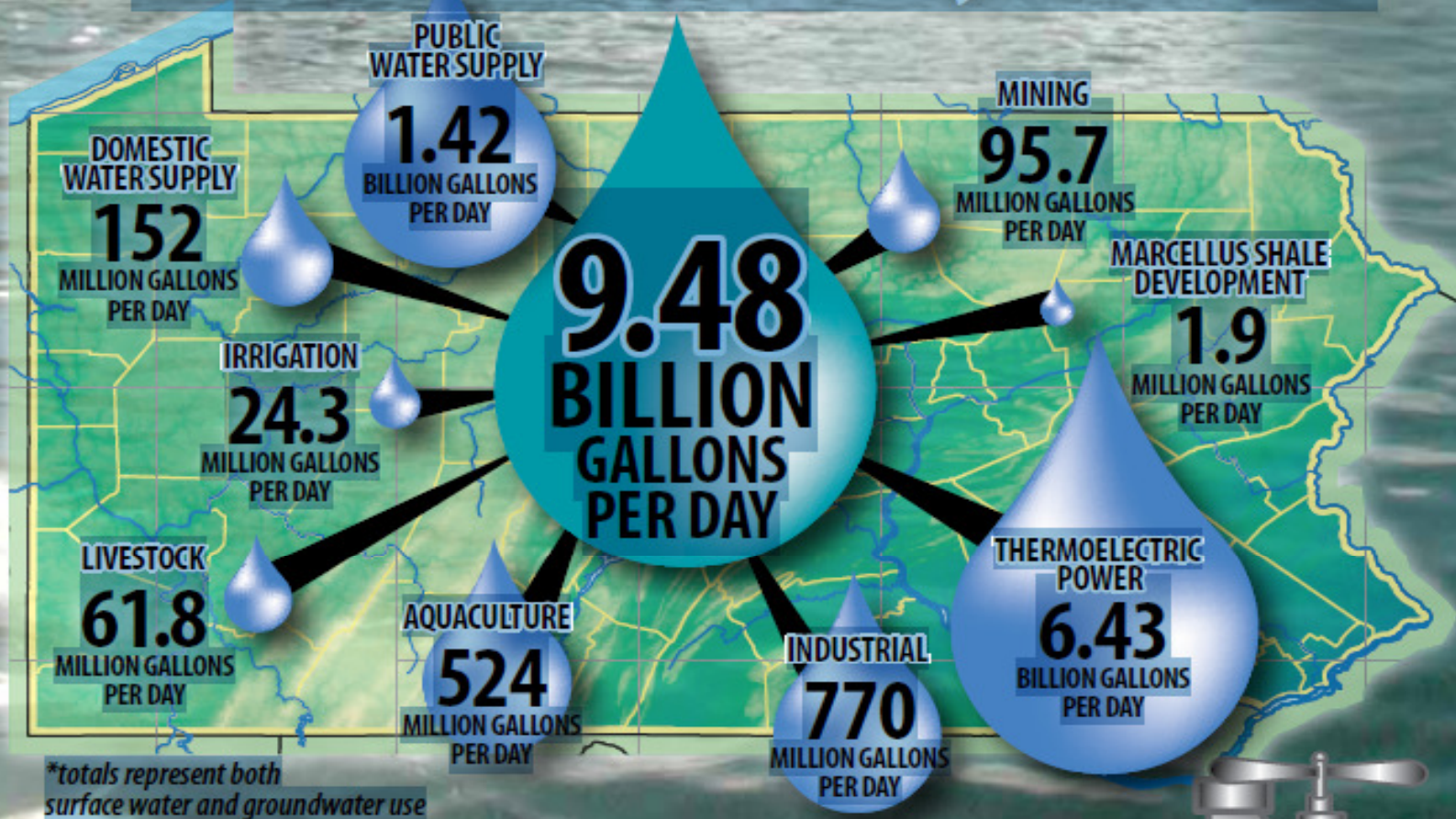


Azimuths to Grid North  
True North:  $-0.30^\circ$   
Magnetic North:  $-11.69^\circ$

Magnetic Field  
Strength: 53450.8nT  
Dip Angle:  $68.49^\circ$   
Date: 8/18/2010  
Model: IGRF2010\_14



# PA Water Withdrawals by Water Use\*



Sources: J. F. Kenny, N. L. Barber, S. S. Hutson, K. S. Linsey, J. K. Lovelace and M. A. Maupin. 2009. *Estimated use of water in the United States in 2005*. U. S. Geological Survey Circular 1344. 52 p.

Marcellus Shale Gas Development Water Use: June 1, 2008 - May 21, 2010 Susquehanna River Basin Commission basin-wide reported daily use of 0.99 MGD expanded to statewide estimate. Water sources: 29% Public water supplies/71% Surface water withdrawals  
 $1 \text{ MGD daily use in Susq. Basin} \div \text{wells drilled in Susq. Basin/wells drilled statewide} = 1 \text{ MGD} \div (765/1428)$

# Impoundment / Dams



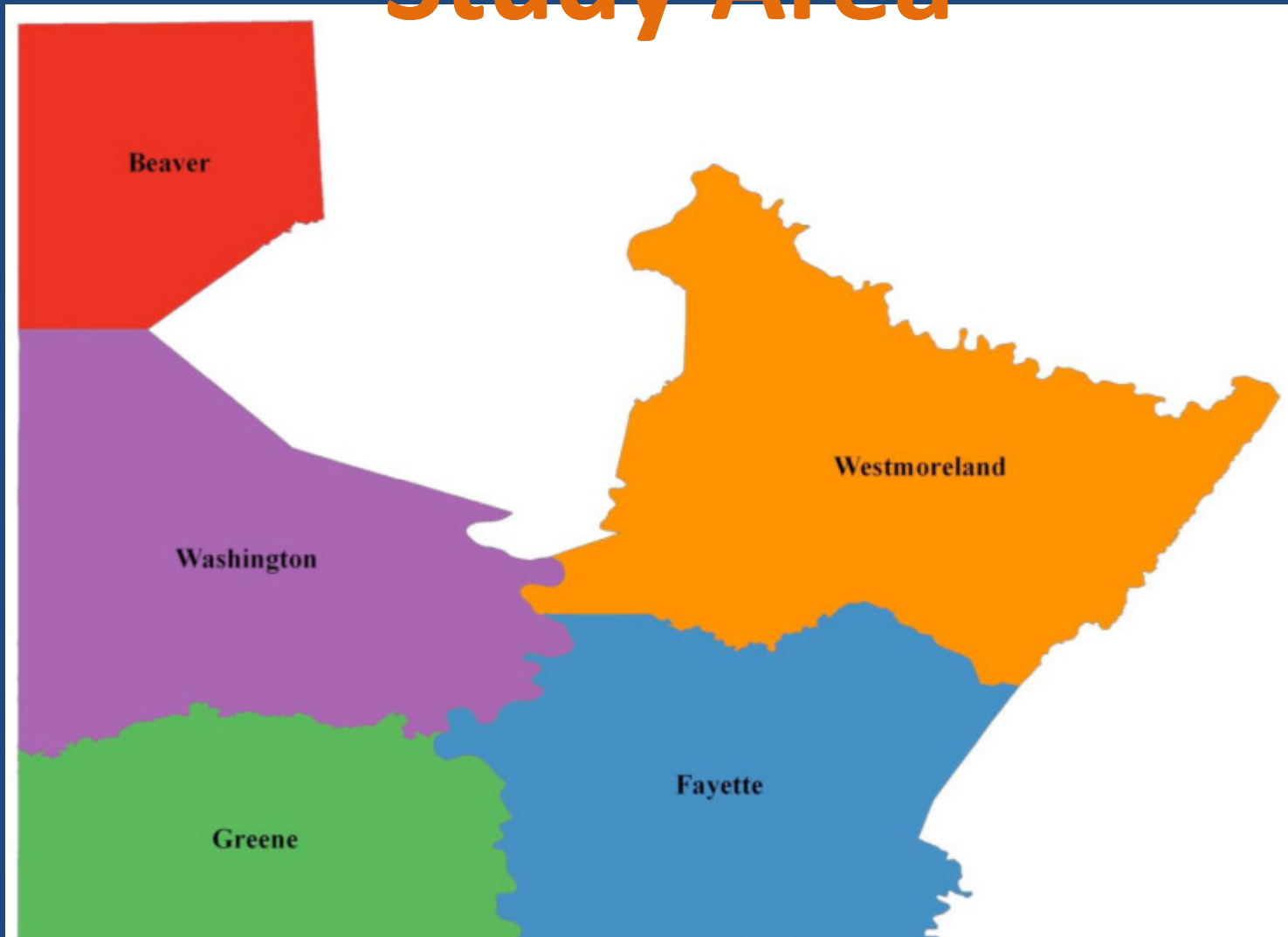
# Recent Events

- 2009 – Permit Fee Increases
- February 5 – Amended Regulations
  - Casing & Cementing Plan
  - Casing & Cementing - lost circulation
  - Cement Standards
  - Gas Migration response
  - Pre-Drill Surveys
- May 19, Frac Flowback disposal only at facilities with new TDS treatment standard
- Recommendations to Marcellus Shale Commission



*Penn State*  
*Economic Analysis*

# Study Area



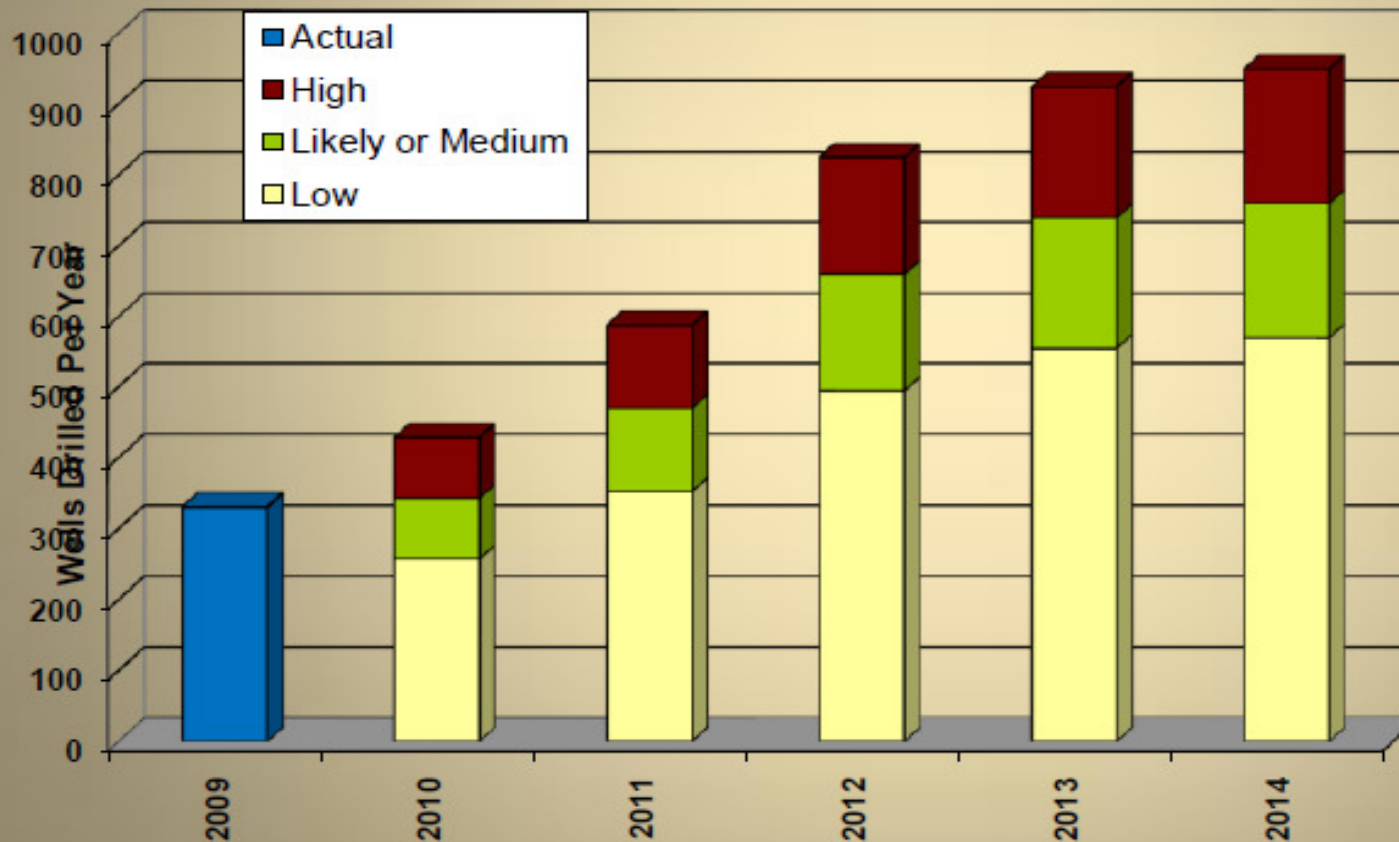
PENNSTATE



OLD MAIN

# Southwest Well Estimates

Actual/Projected SW PA Marcellus Wells Drilled Per Year



PENNSTATE

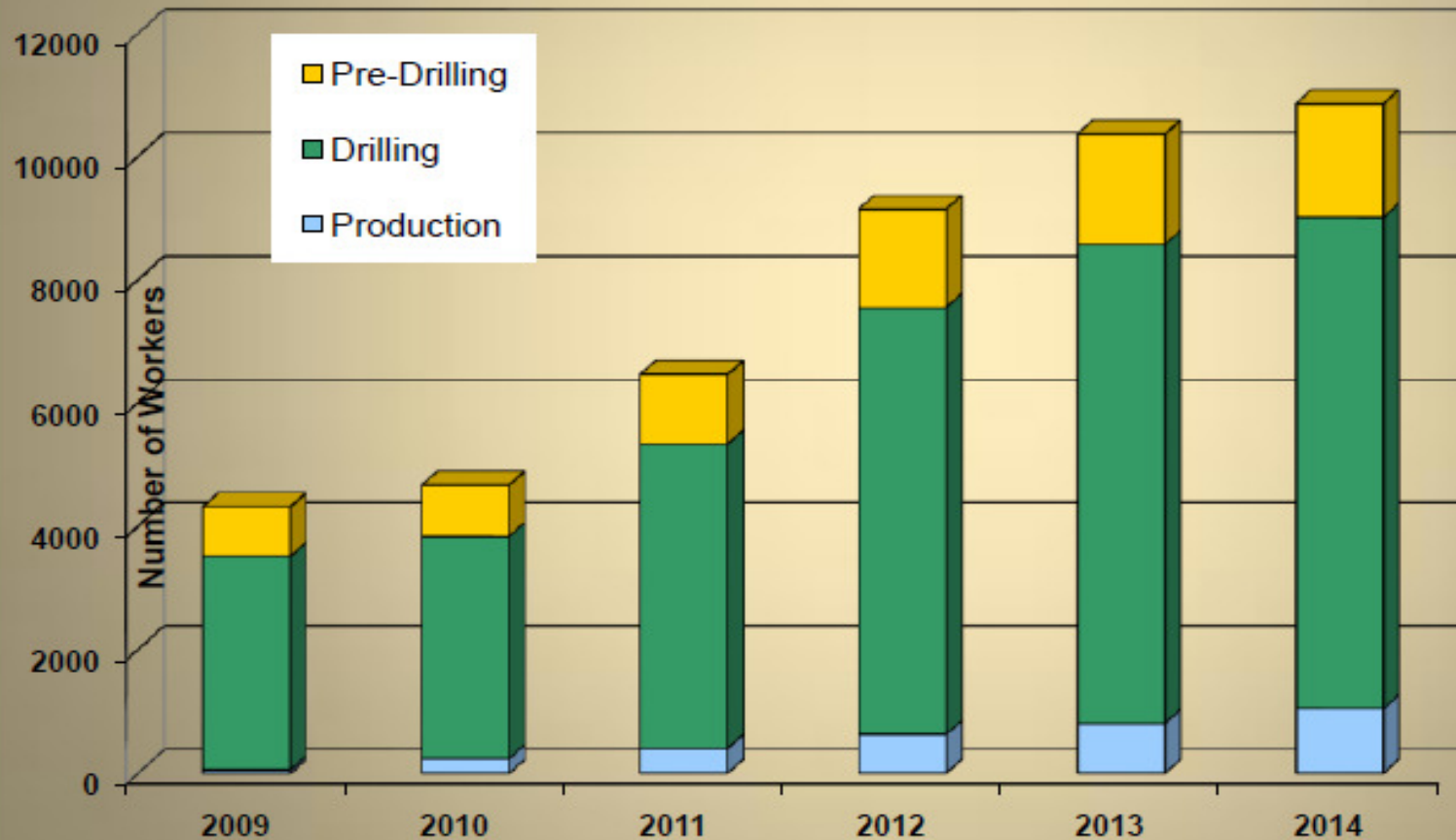


OLD MAIN

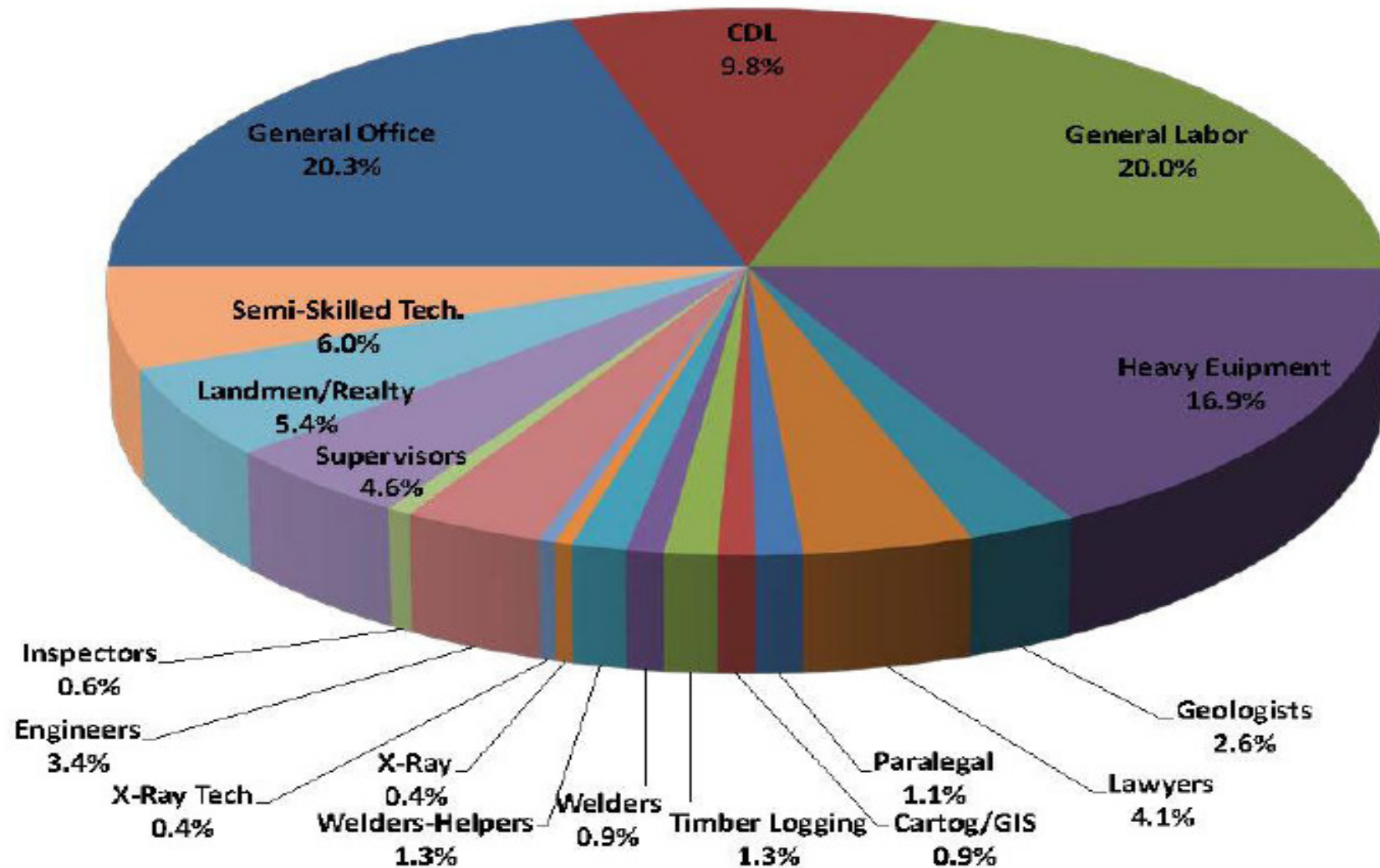


# What does this mean in terms of Jobs?

Medium or 'Likely' Scenario: Estimated SW PA  
Marcellus Shale Workforce Requirements By Phase



# What specific jobs are required?



## 5-County Workforce Summary...

- The direct job opportunities will likely increase dramatically
  - Most jobs will be “Blue Collar”
  - Based on current estimates
    - Workforce required to drill a single well will require 420 individuals working across 150 different occupations/jobs
    - Each well requires **12.91** full time equivalent workers & **.18** full time production jobs
    - High BTU gas processing increases production related employment from roughly **2 FTE's** for 10 wells to **4 FTE's** for 10 wells
    - Approximately **7,360 - 12,266** pre-drill & drilling FTE jobs by 2014
    - Approximately **801 - 1,293** FTE production jobs



# Thank you!

For additional information:

[keburch@state.pa.us](mailto:keburch@state.pa.us) or

814-332-6816