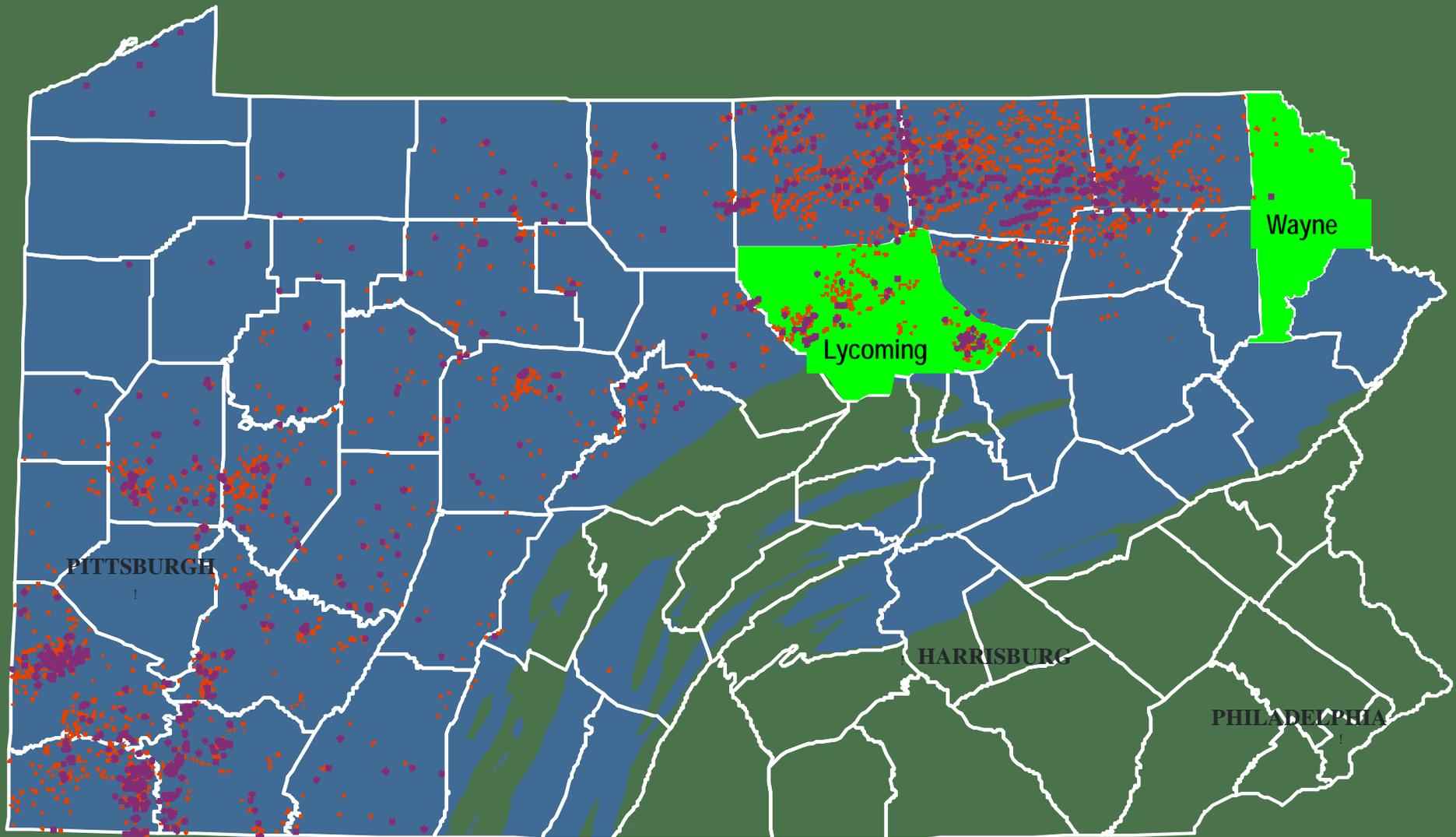




# Baseline Groundwater Quality Assessment Using Domestic-Supply Wells

# Baseline Groundwater Quality Assessments



- Extent of Marcellus Shale in Pennsylvania
- Well Permits as of March 9, 2012
- Completed Wells as of March 9, 2012

# Objectives

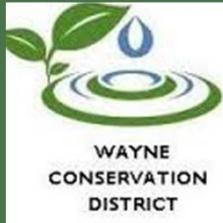
- Characterize the current chemical quality of groundwater from shallow freshwater aquifers used by private domestic-supply wells
- Fill a gap in our understanding of groundwater quality in rural areas relying on well water



# Project Partners



Lycoming County



Wayne Conservation District



Pennsylvania DEP



West Branch Regional Authority



PA Regional Health Systems



# What is being Analyzed?

## *Local PADEP Accredited Laboratory*

Major Ions and Metals

Dissolved Gases

Organic Indicators, Diss. and Suspended Solids

Bacteria

Volatile Organic Chemicals

Alcohols and Total Kjeldahl Nitrogen

## *Test America Laboratories*

Gross Alpha and Beta

Radium - 226 and 228

## *USGS NWQL and Isotech Laboratories*

Radon - 222

Major Ions, Metals, and Nutrients

Isotopic Analyses



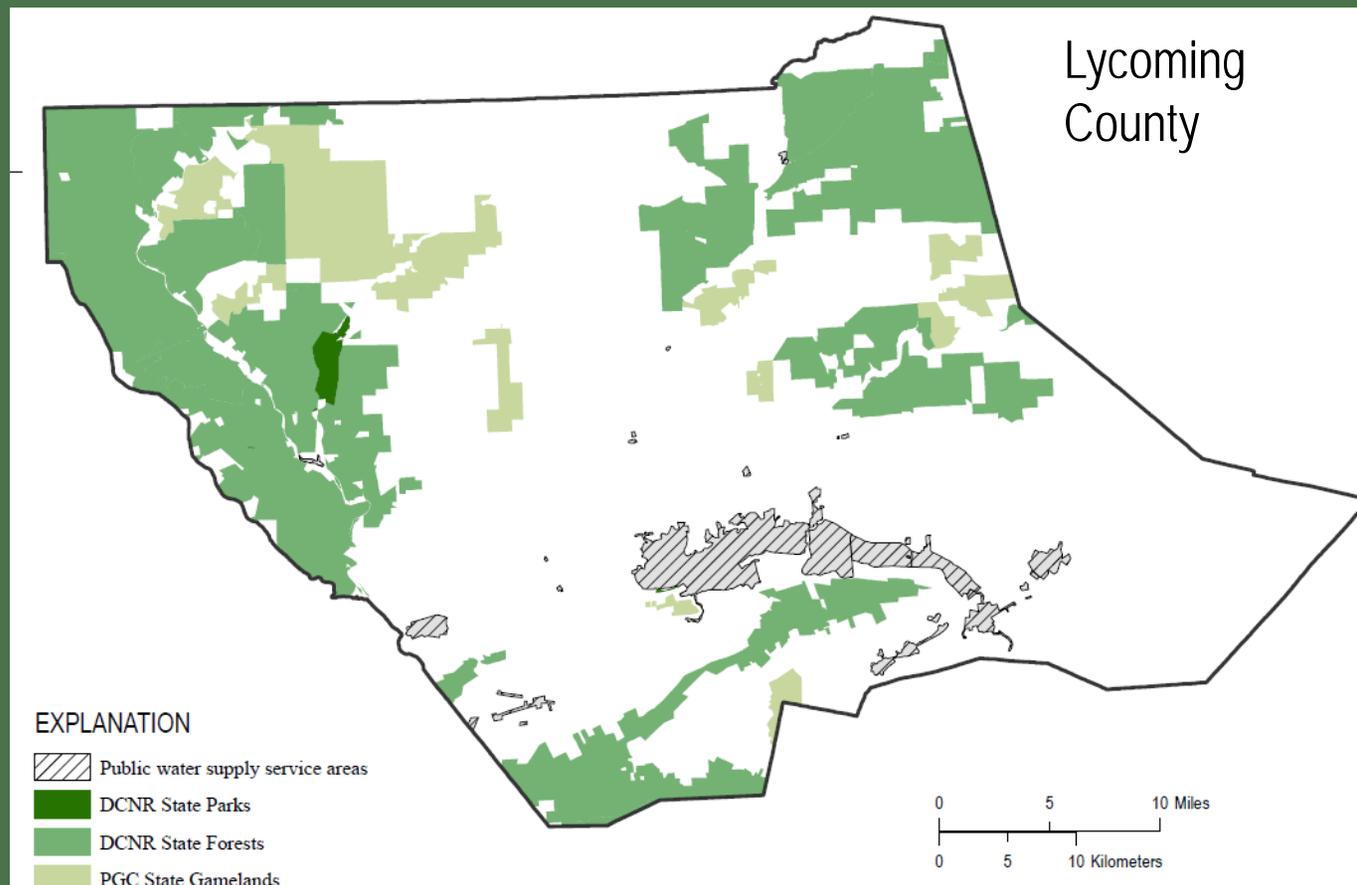
# Site Selection Methodology

- Establish study area
- Divide study area and create site-selection points
- Obtain well record data
- Establish well selection criteria
- Identify potential wells for sampling
- Contact homeowner to obtain sampling permission

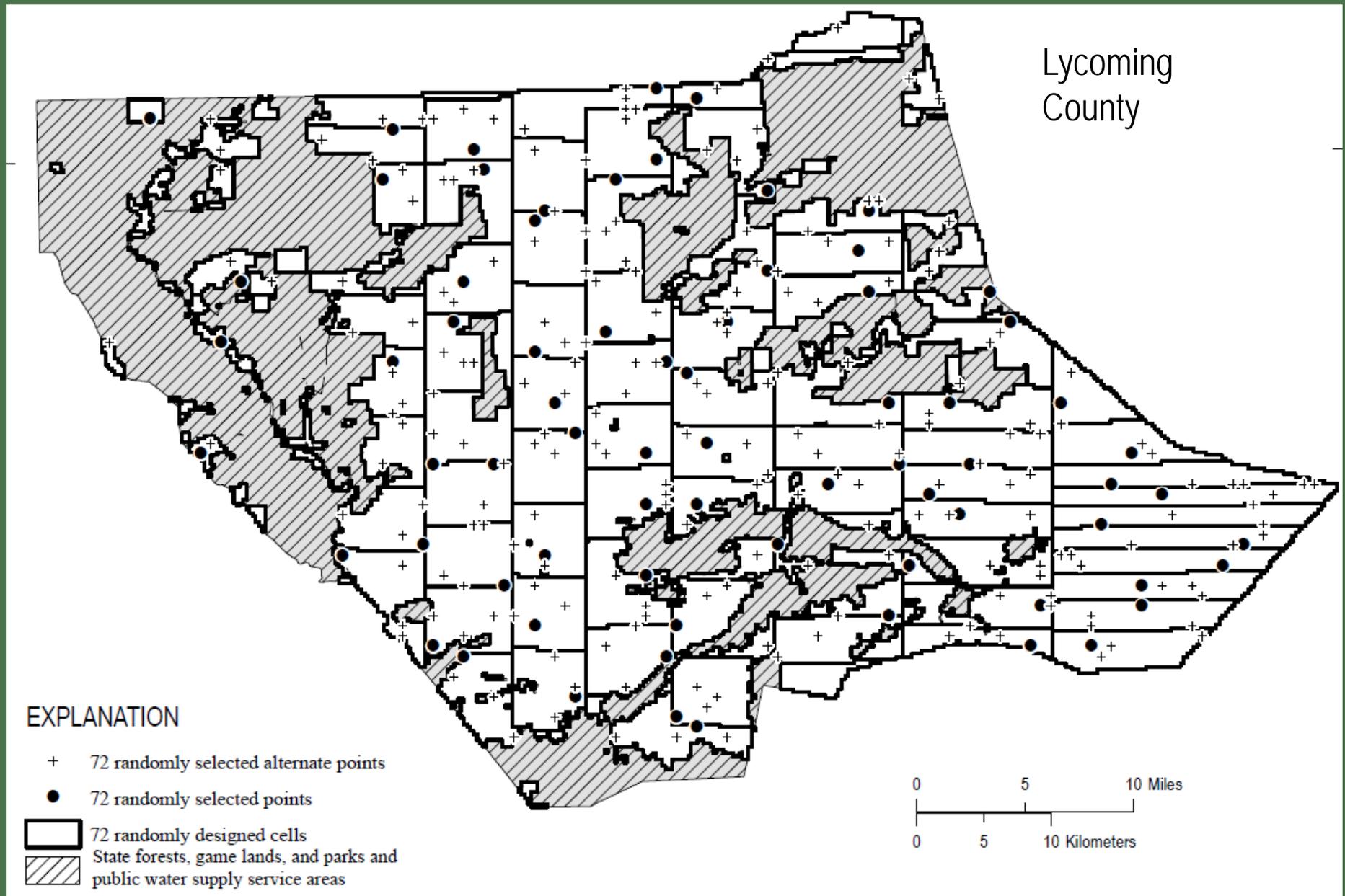


# Establish Study Area

- Removed widely unpopulated areas and public water supply service areas from site-selection process
- Removal of these areas ensures that site-selection points will be within proximity of domestic-supply wells



# Divide Study Area and Create Site-Selection Points



# Well Selection Criteria

- Well used for domestic supply
- Has a point where a “raw” untreated sample can be collected.
- Well should be near a randomly generated point
- Must have associated drill record.
- Drilled after 1970
- Not dug or in a pit.



# Obtain Well Record Data

- Pennsylvania Department of Conservation and Natural Resources, Bureau of Topographic and Geologic Survey -- Groundwater Information System

**Multiple Criteria Search**  
You must enter at least one search item.

Multiple Criteria 
  Polygon Search 
  Radial Search

County:

Municipality:

PA Well ID:

Driller License:

Date Drilled:  To:

Driller Name:  [Currently Licensed Driller List](#)

Well Owner:

Driller Well Reference:

[Preview List](#) [Create List](#) [Clear Selections](#)

"Preview List" creates a list which contains links to individual well information. You can choose to create a comma separated list from the preview.  
 "Create List" creates a comma separated list without viewing the selection first. If you choose to open the file it may open in Excel if you have Microsoft Office installed.

Total Records Returned : 5472 Records Click on the column headers to sort the Search Results.

PA Well ID	Driller	Driller Ref	Date Drilled	Owner	County	Municipality	Image
<a href="#">399399</a>	NEW WAY DRILLING INC		1/4/2017	STONER	LYCOMING	ELDRED TWP.	<a href="#">View</a>
<a href="#">511275</a>	NEW WAY DRILLING INC	5158	12/24/2013	LOCKCUFF	LYCOMING		
<a href="#">54448</a>	SWANK & SON						

### WATER WELL DETAILS

Well Driller: <b>NEW WAY DRILLING INC</b>	PA Well ID: <b>511275</b>
Driller License: <b>1417</b>	Driller Well ID: <b>5158</b>
Type of Activity: <b>New Well</b>	Local Permit #:
Date Drilled: <b>12/24/2013</b>	Original Well By: <b>CURRENT DRILLER</b>
	Drilling Method: <b>AIR PERCUSSION</b>
Owner: <b>ROBERT LOCKCUFF</b>	Zipcode:
Address of Well:	County: <b>LYCOMING</b>
	Municipality:
Coordinate Method: <b>GPS - Global Positioning System</b>	
Quadrangle:	Latitude: <b>41.27833</b> Longitude: <b>-77.13517</b>
Well Depth (ft): <b>300</b>	Well Finish: <b>OPEN HOLE</b>
Depth to Bedrock (ft): <b>5</b>	Did Not Encounter Bedrock:
Well Yield (gpm): <b>2</b>	Yield Measure Method: <b>VOLUMETRIC, WATCH &amp; BUCKET</b>
Static Water Level: <b>120</b> (ft below land surface)	Water level after yield test: <b>180</b> (ft below land surface)
Length of Yield Test: <b>60</b> (minutes)	Saltwater Zone (ft):
Use of Well: <b>WITHDRAWAL</b>	Use of Water: <b>DOMESTIC</b>

### DRILLER'S LOG

UNIT TOP	UNIT BOTTOM	DESCRIPTION OF UNITS PENETRATED
Unit Top 1: <b>0</b>	Unit Bottom 1: <b>5</b>	Unit 1: <b>DIRT &amp; STONE</b>
Unit Top 2: <b>5</b>	Unit Bottom 2: <b>45</b>	Unit 2: <b>RED SHALE</b>
Unit Top 3: <b>45</b>	Unit Bottom 3: <b>75</b>	Unit 3: <b>GRAY</b>
Unit Top 4: <b>75</b>	Unit Bottom 4: <b>100</b>	Unit 4: <b>RED</b>
Unit Top 5: <b>100</b>	Unit Bottom 5: <b>130</b>	Unit 5: <b>GRAY</b>

# Contact Homeowner for Permission

## PLANNING AND COMMUNITY DEVELOPMENT

### Commissioners:

Jeff C. Wheeland, Chairman  
Ernest P. Larson, Vice Chairman  
Tony R. Mussare, Secretary

Location:  
Executive Plaza  
330 Pine Street  
Williamsport Pennsylvania 17701



www.lyco.org

Kurt Hausammann, Jr., AICP, Director

Voice: (570) 320-2130  
Fax: (570) 320-2135  
e-mail: lycoplan@lyco.org

Mailing Address:  
48 West Third Street  
Williamsport Pennsylvania 17701

April 1, 2014

Dear Lycoming County Domestic Well Owner:

The County of Lycoming is conducting a groundwater study in partnership with the U.S. Geological Survey (USGS) and other organizations during the summer of 2014 to determine the quality of groundwater currently being withdrawn by privately owned wells within the County. As part of this study, the County and USGS are prepared to offer comprehensive **well water quality sampling** to at least 72 randomly selected well owners in Lycoming County at no charge. These wells will be chosen from the pool of all eligible applicants interested in participating in the study.

The objective of this study is to characterize the quality of groundwater from freshwater aquifers used by private domestic supply wells. Water can contain a variety of suspended and dissolved substances such as minerals, gasses, and even bacteria. These substances are often naturally occurring but can also be influenced by activities occurring on the land surface. A comprehensive list of water quality parameters will be analyzed for each well as part of the study. Please see the enclosed fact sheet or visit the County's Planning & Community Development Department website at [www.lyco.org](http://www.lyco.org) for additional information.

If you volunteer to participate in this **no-cost study**, and are selected, you will receive a letter documenting the results for detected concentrations of the parameters tested in your well. In addition, you will receive information on potential health effects if these concentrations exceed any established levels that are designed to protect human health.

### Selected wells should meet the following criteria:

- 1) The well owner has an available driller record or is able to contact a driller who can provide information to verify the depth of the well.
- 2) The well was drilled after 1970.
- 3) The well has an accessible raw water sampling point. This would include a spigot, preferably outdoors, where water can be collected before it enters any water softening, chemical

## Well Water Sampling Procedures

### Before sampling

Prior to sampling your well, the U.S. Geological Survey (USGS) will contact you to set up a date and time to conduct a plumbing review of your well to ensure that it meets sampling criteria. The plumbing review is in advance of and separate from well sampling and ensures that we are able to collect a raw, untreated sample that is representative of the underground aquifer. Typical home treatment systems that will need to be bypassed before sampling include water softeners, filters, or ultra violet light.

During the plumbing review, we will determine a sampling point such as an outdoor spigot or hydrant that utilizes well water. You will also be asked to sign a permission form that is required prior to well sampling.

After the initial plumbing review is complete, you will be contacted to schedule an additional time for USGS to sample your well. If the sampling point is outside of your home, you do not necessarily need to be present during the sample collection appointment.



### During sampling

Your well water will be sampled from the point identified during the plumbing review. Total well sampling time should take no more than 3 hours. During their visit, USGS staff will:

- 1) **Measure the water depth level:** This involves removing the well cap and inserting a sterilized metal measuring tape down the well until it makes contact with water.
- 2) **Purge the well:** Fittings and a hose will be attached to the sampling point and the water will be turned on to purge the well in order to ensure water from the aquifer is sampled rather than water that has been sitting in the well and pipes for a long time. This step typically takes 30 minutes to an hour.
- 3) **Collect water samples:** The sample will be collected by filling several bottles with the running water. We will keep the water running as far away from your home as possible and can run the water somewhere specific if you prefer, like into a flower bed or vegetable garden.



### After sampling

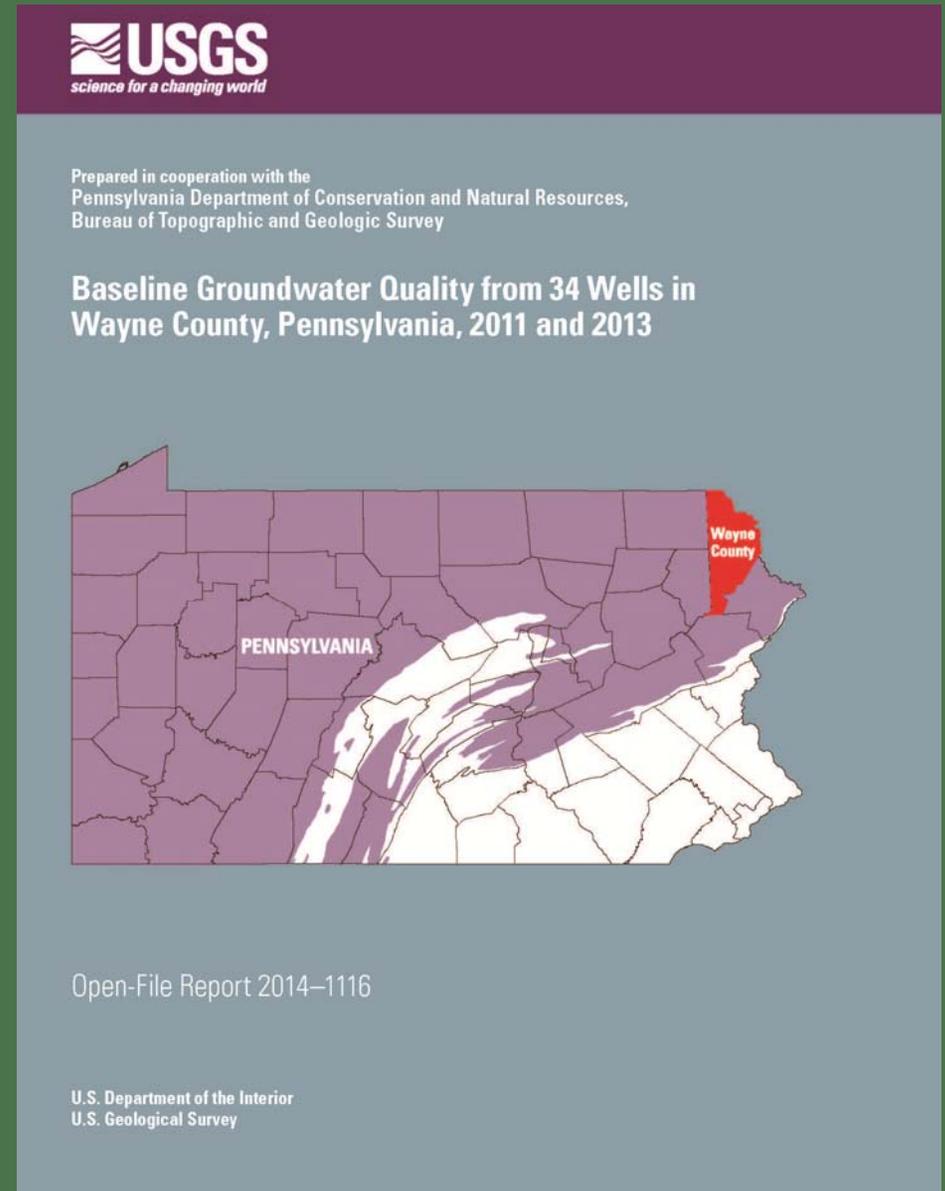
Samples will be sent to several different laboratories for testing. The laboratories will analyze the samples and send USGS the results. It can take anywhere from several weeks to several months to receive the final laboratory reports. Once we have received and reviewed the results, we will send you a letter with the results of the groundwater tests. The letter will also include information on potential health effects if concentrations of detected elements exceed any established levels that are designed to protect human health.



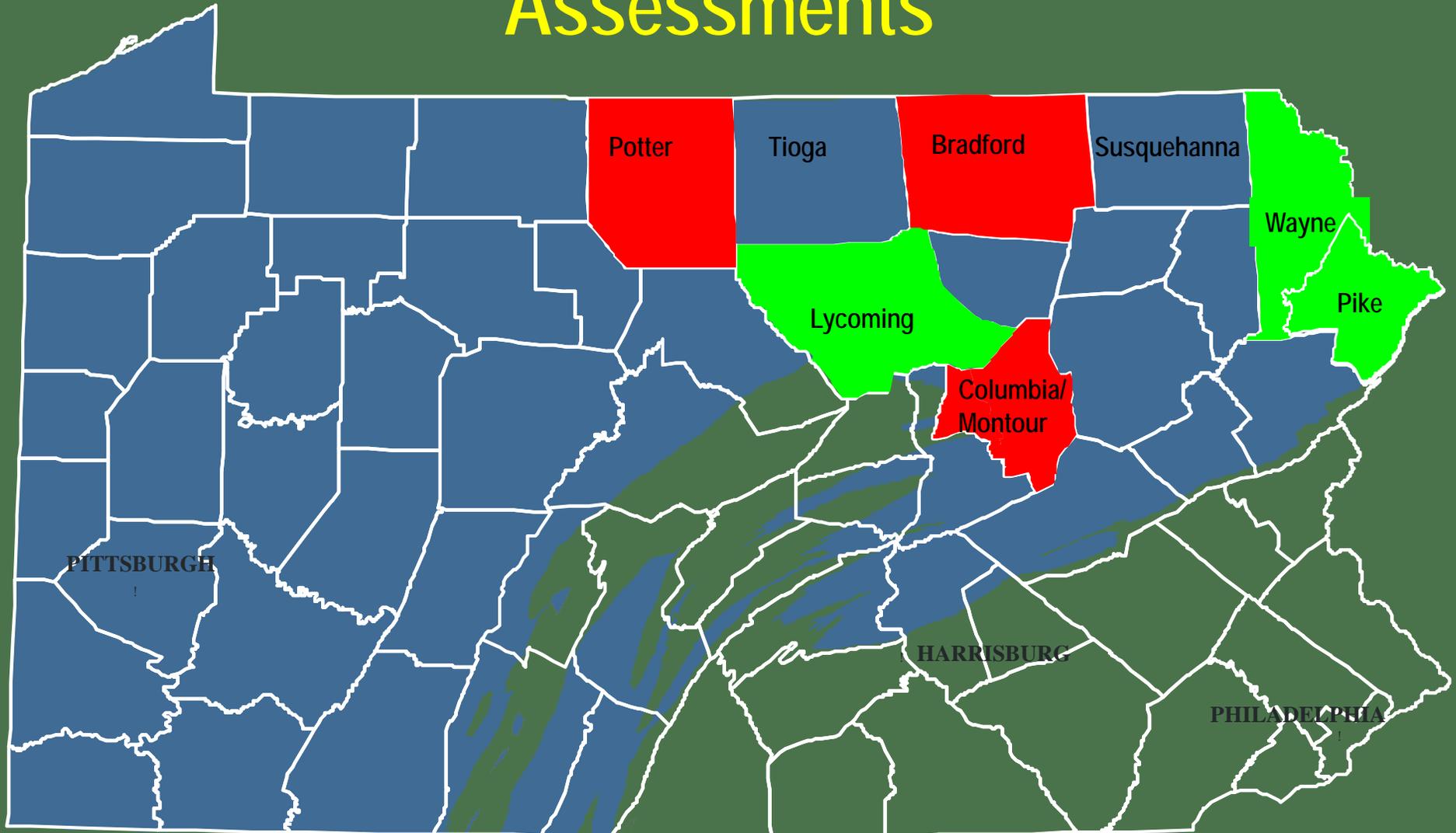


# Products

- Data stored in USGS National Water Information System (NWIS)
- Available via the internet -- <http://waterdata.usgs.gov/pa/nwis>
- Results furnished to each well owner with an explanation letter
- A peer-reviewed USGS Open-File Report will be published. Available to the public in perpetuity.



# Proposed Baseline Groundwater Quality Assessments



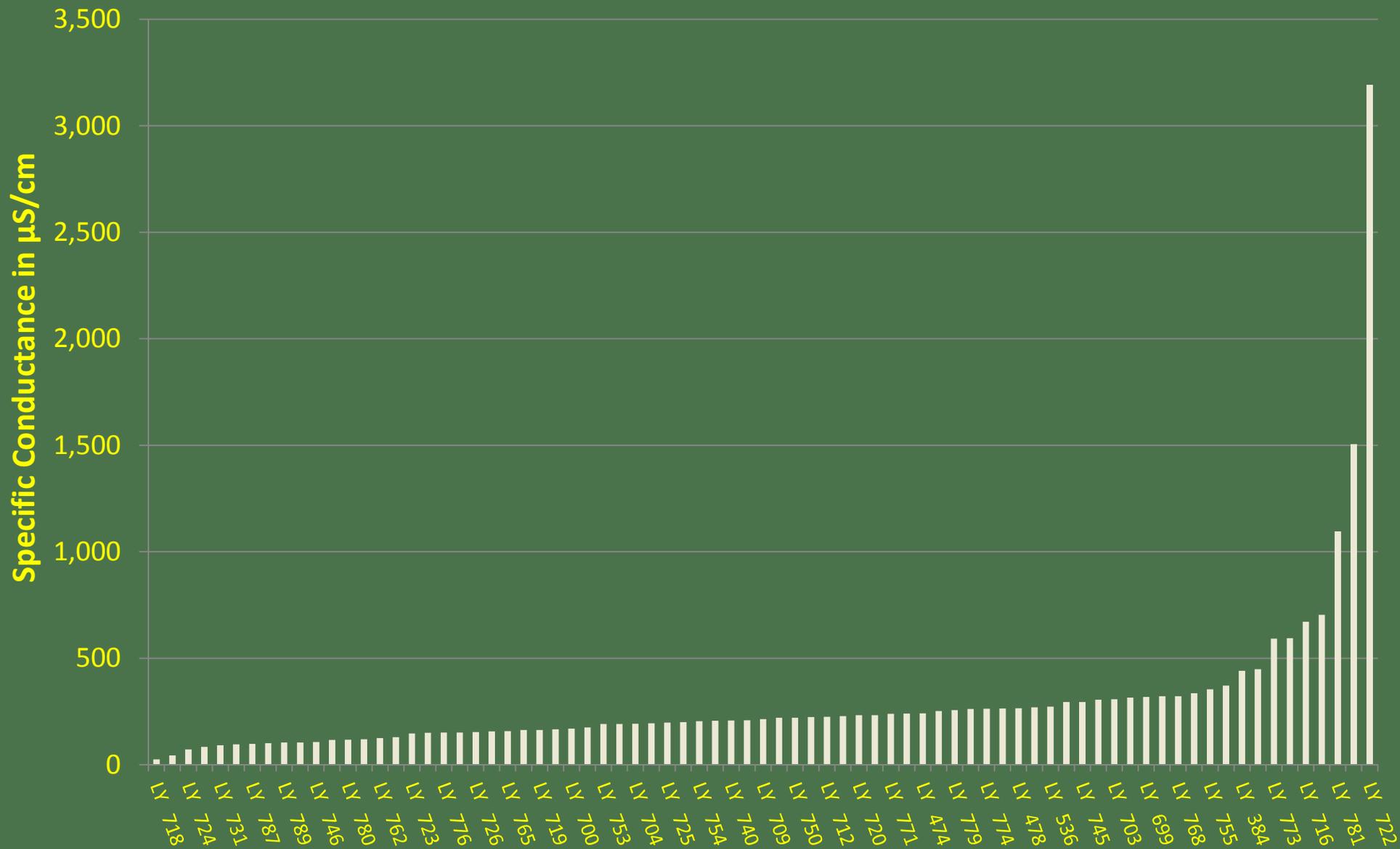
■ Extent of Marcellus Shale in Pennsylvania



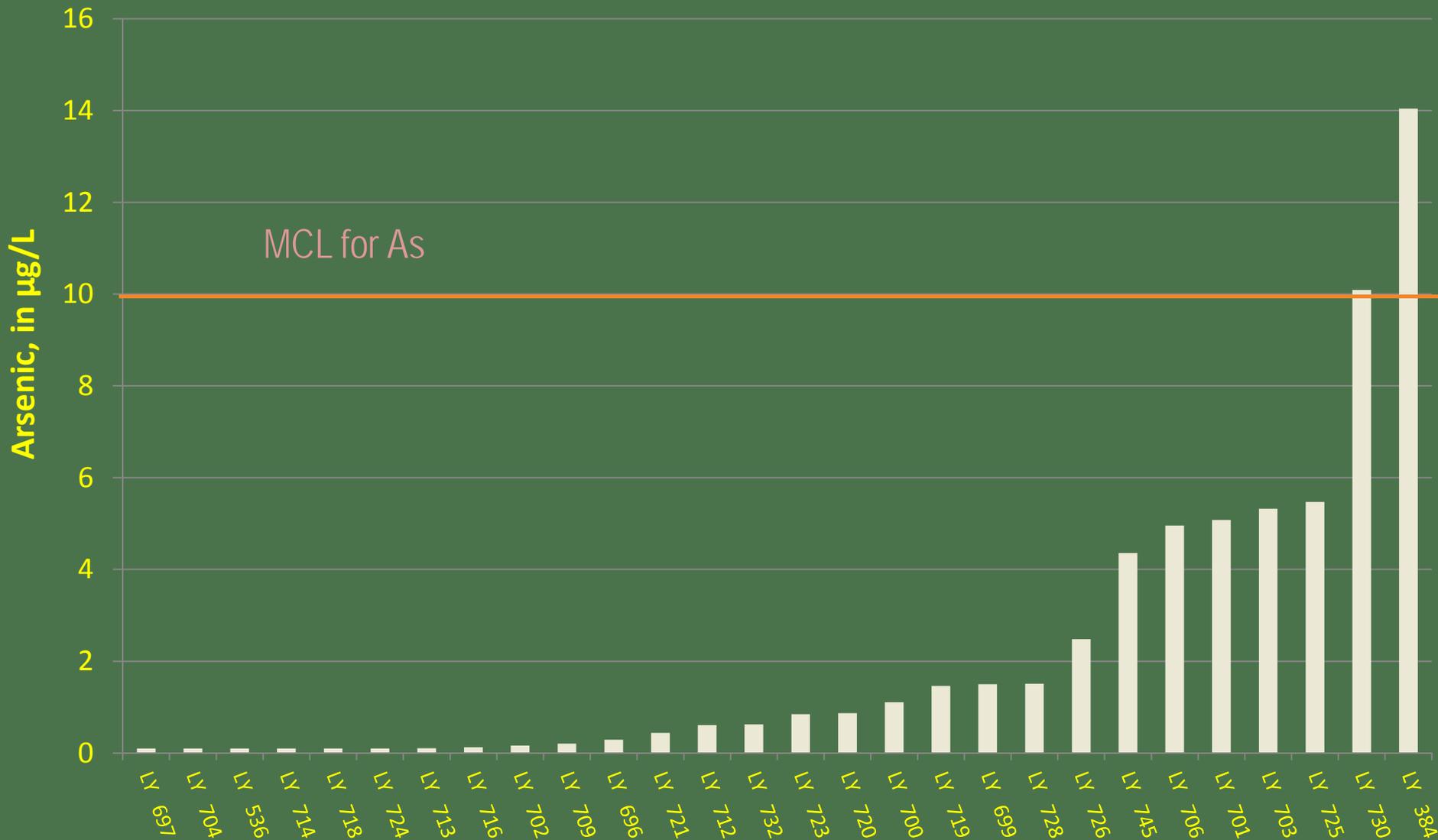
# Provisional Results

- Concentrations of major ions, metals, gross alpha activity, and gross beta activity are available for approximately 28 of the 75 wells
- In these 28 wells, concentrations of nutrients, most metals, gross alpha and gross beta activity, are below established MCLs

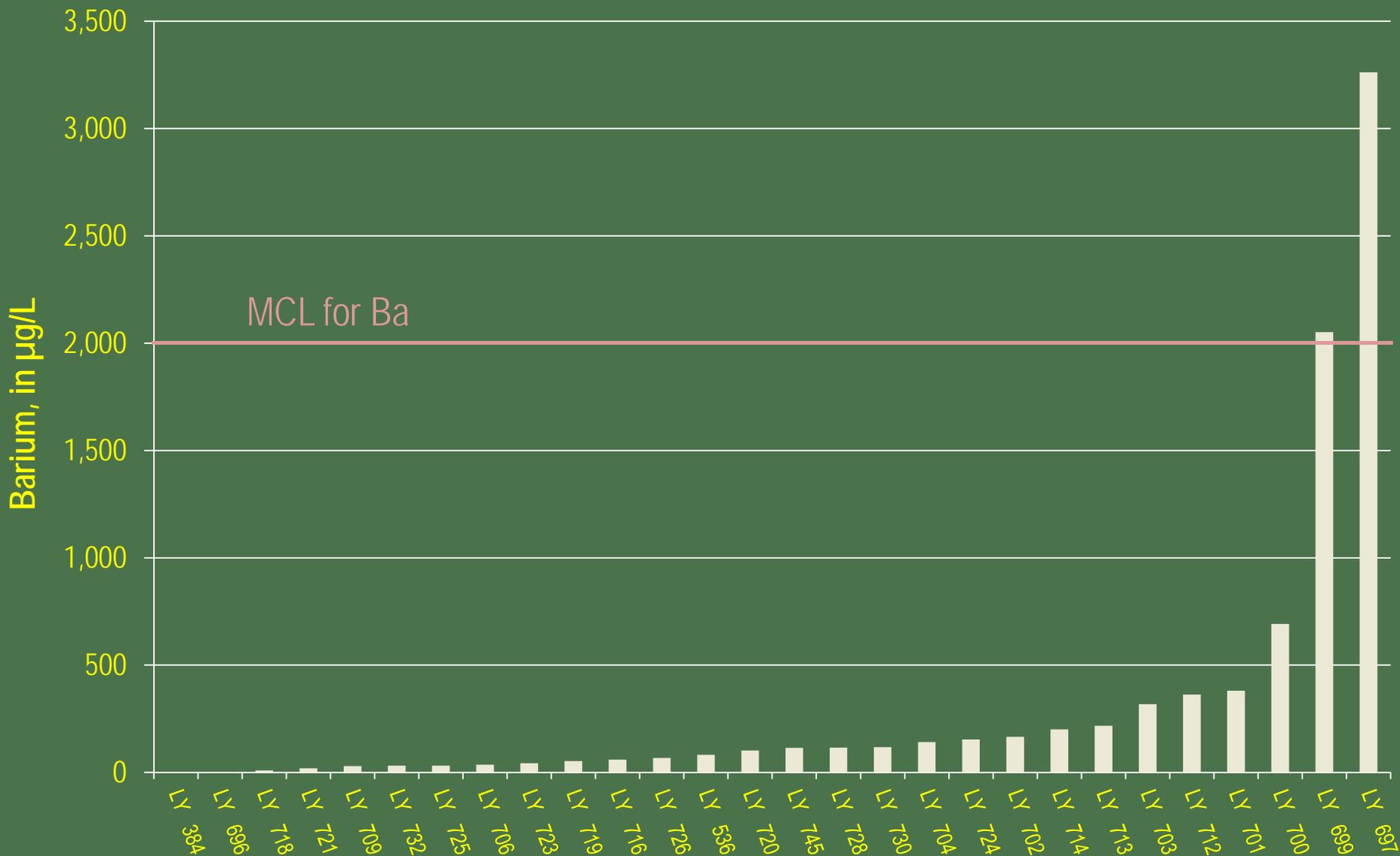
# Provisional Results for Specific Conductance



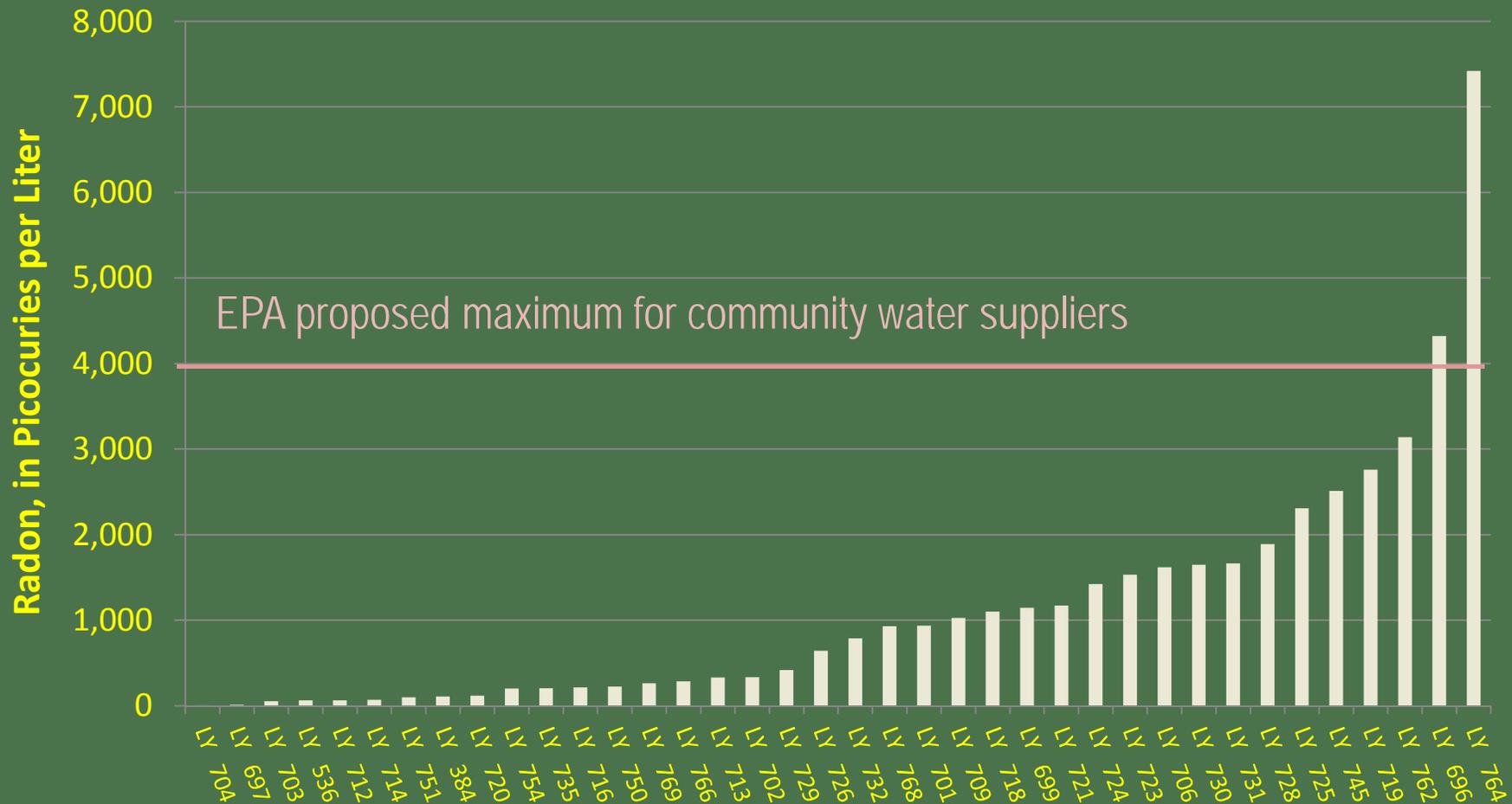
# Provisional Results for Arsenic



# Provisional Results for Barium



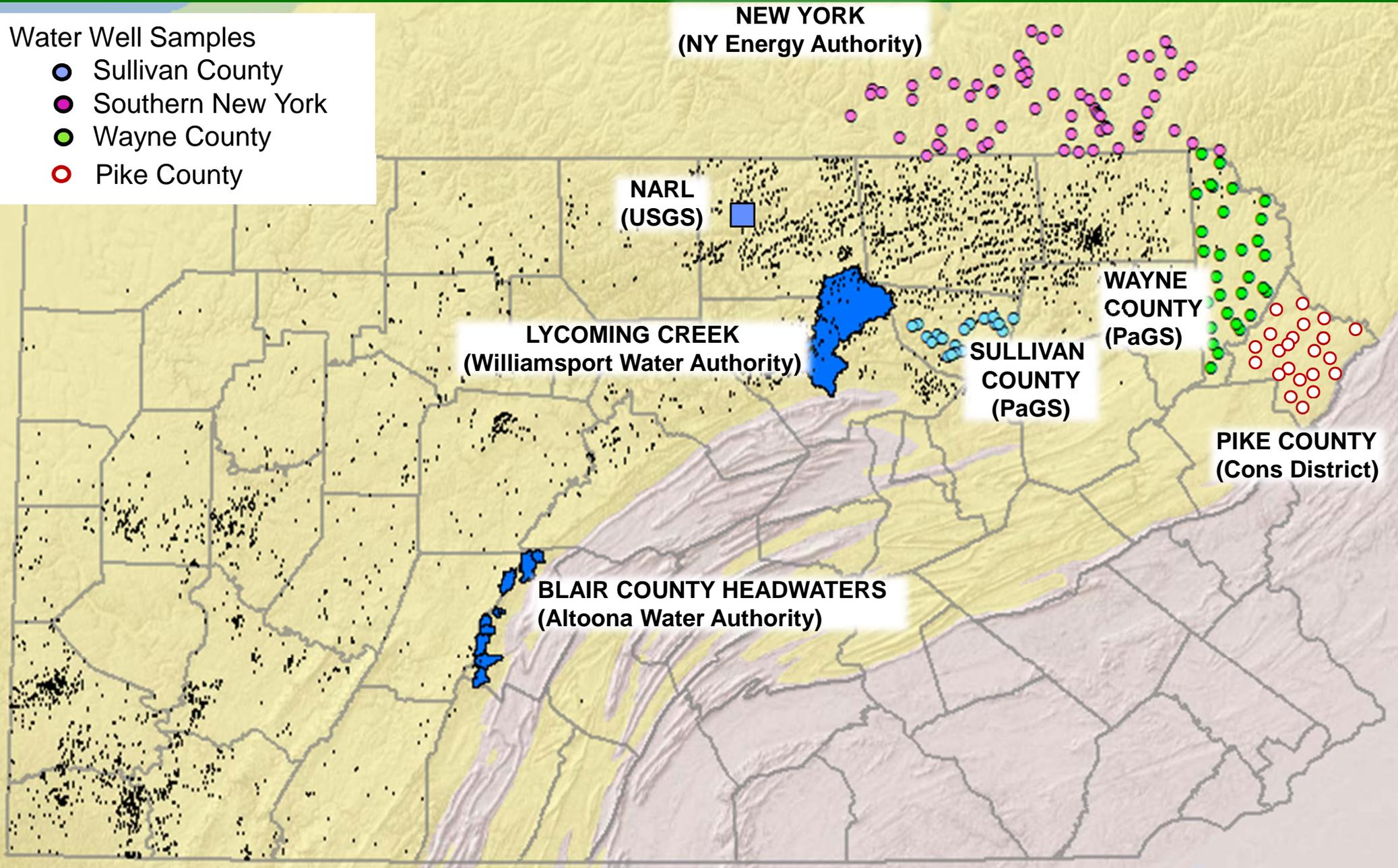
# Provisional Results for Radon



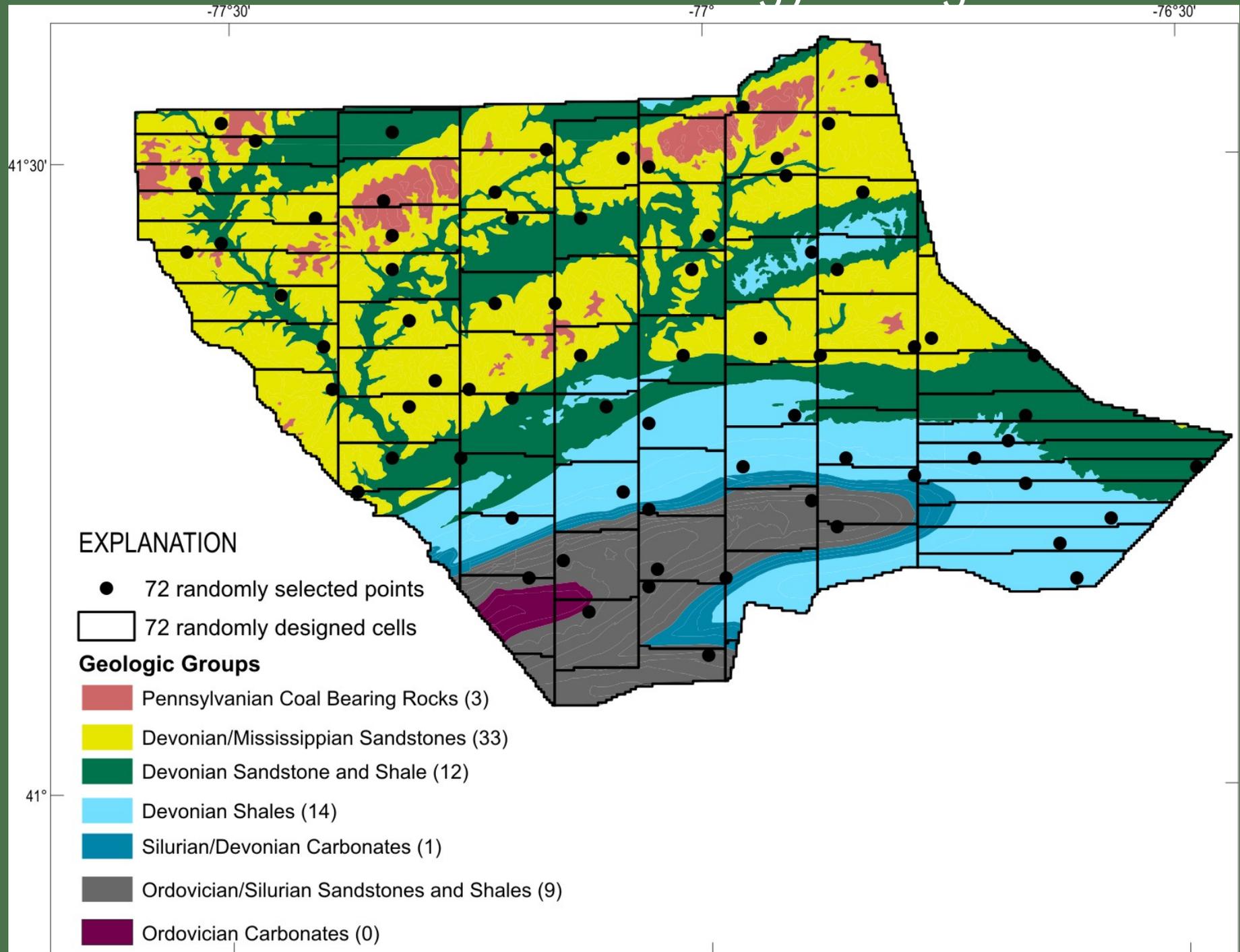
# Other Assessments

## Water Well Samples

- Sullivan County
- Southern New York
- Wayne County
- Pike County

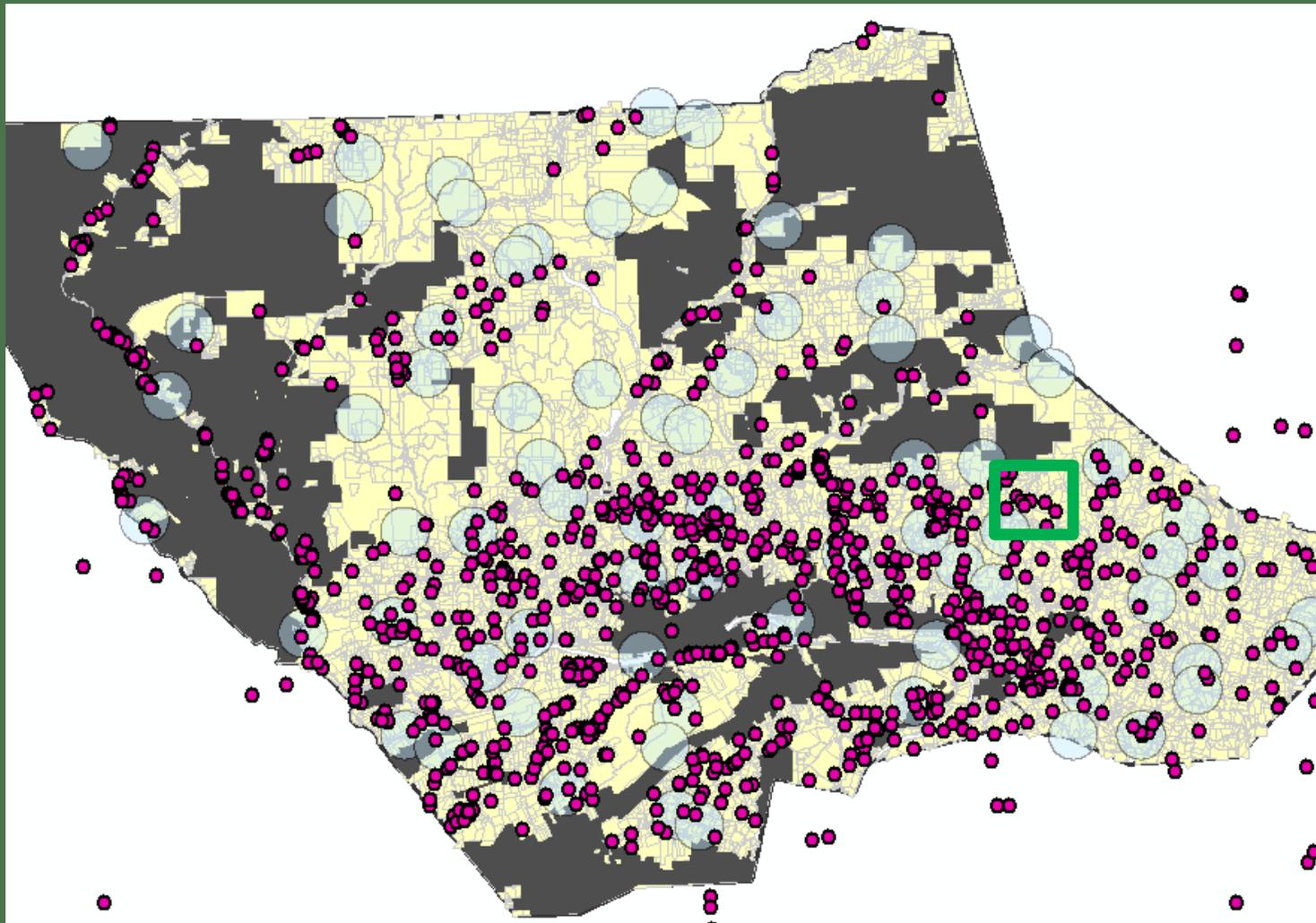


# Random Grid with Geology Background

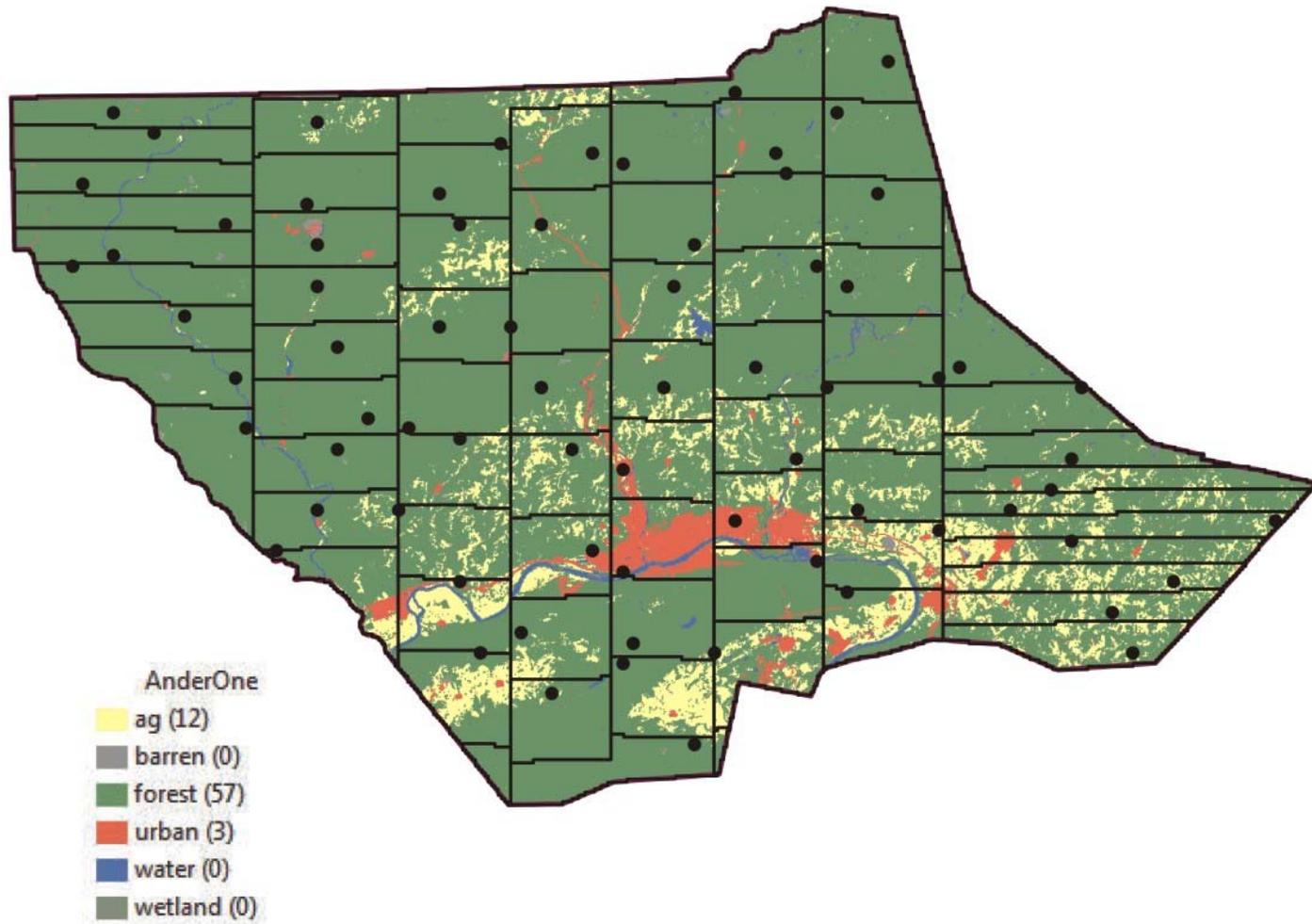


# Identify potential wells for sampling

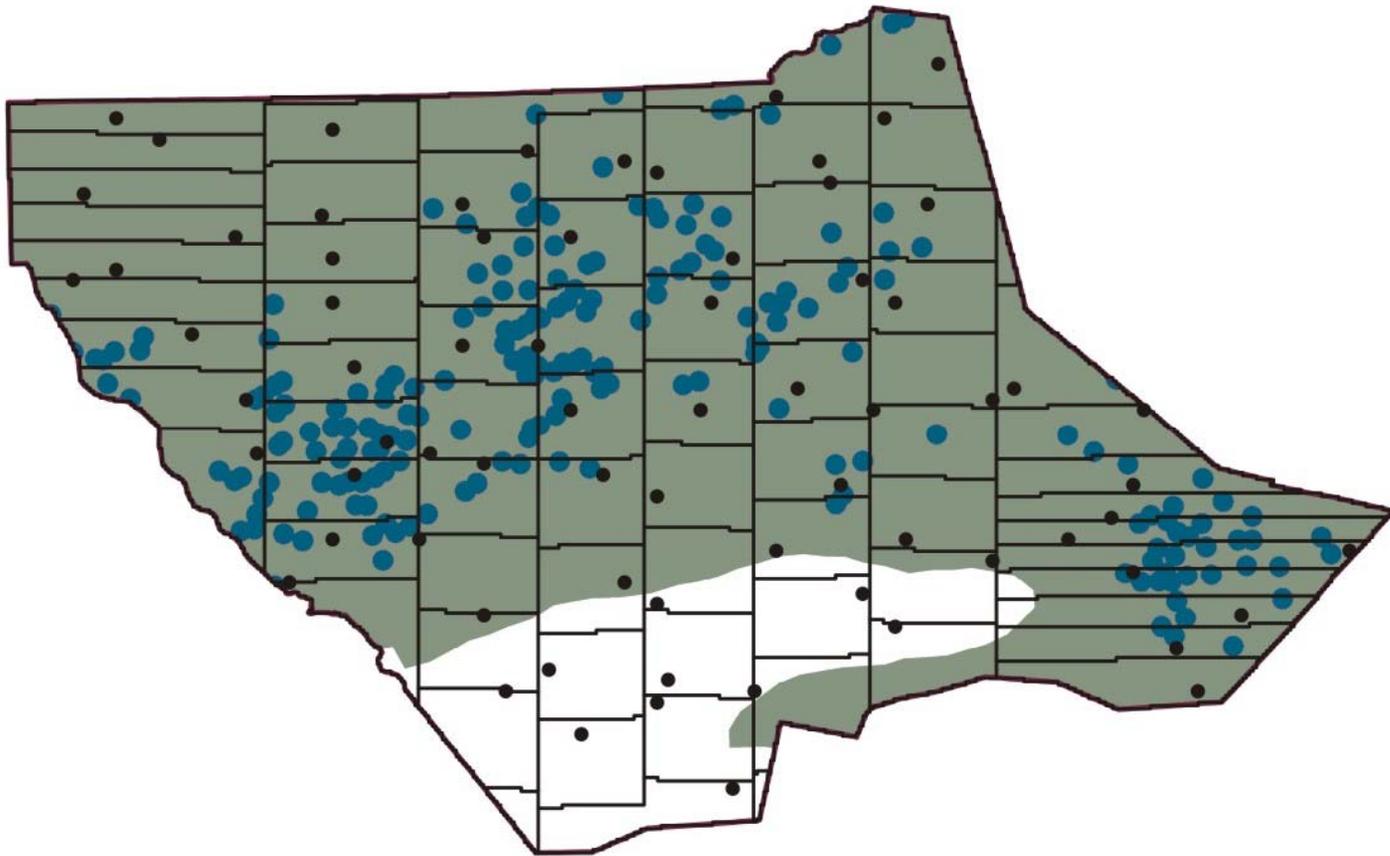
- Drill record data associated with 1,227 records were matched up with tax parcel data to obtain homeowner addresses



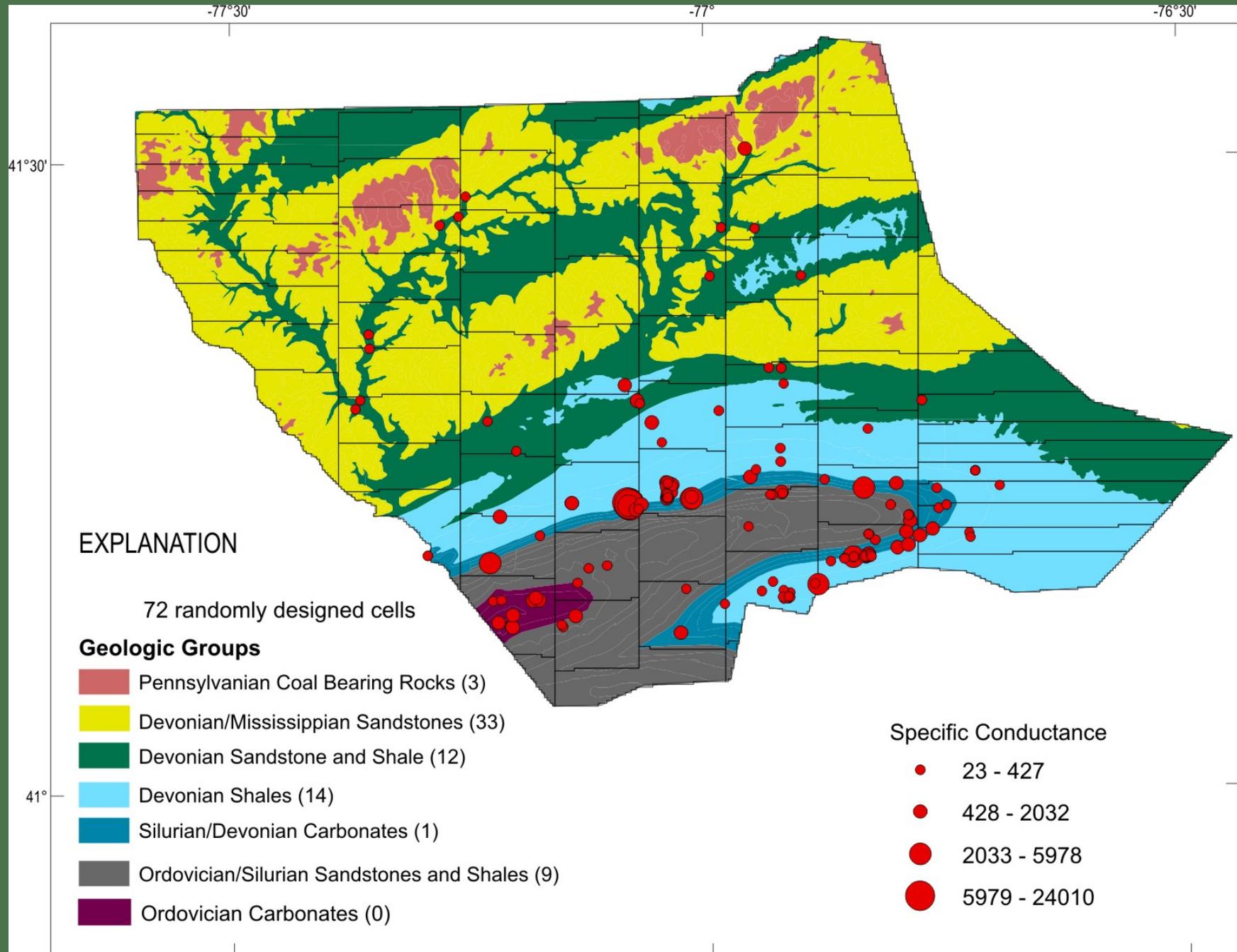
# Random Grid with Landuse Background



# Random Grid with Buffered Marcellus Wells



# Specific Conductance and Geology



# Random Locations and PAGWIS wells

