



***Groundwater Quality of Potter County, PA***

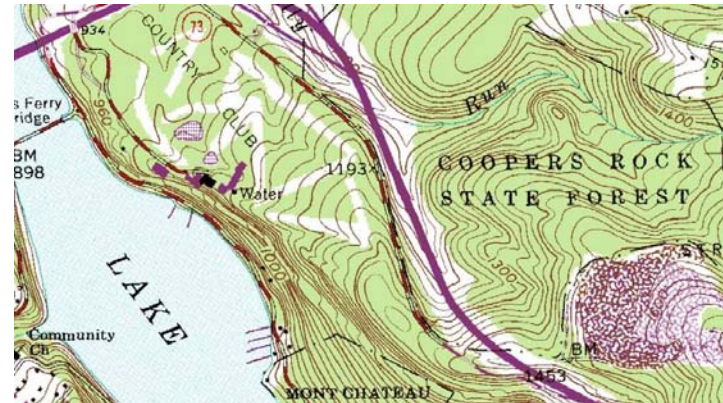
Dan Galeone

[dgaleone@usgs.gov](mailto:dgaleone@usgs.gov)

## Geology (resources, earthquakes, etc..)



## Geography (topo maps, spatial, etc.)



## Water (flooding, water quality, etc.)

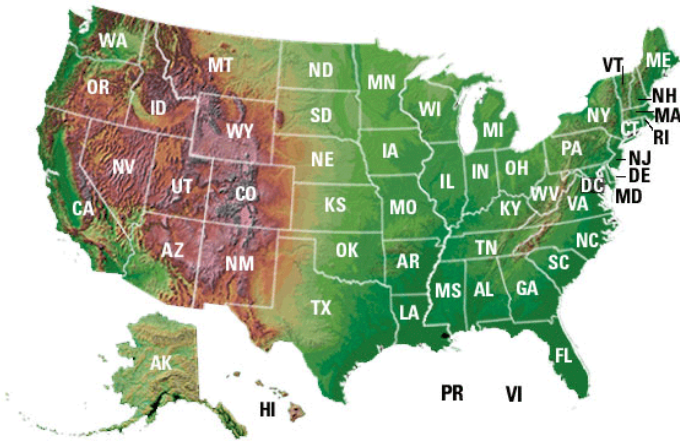


## Biology (mammals, fish, etc.)

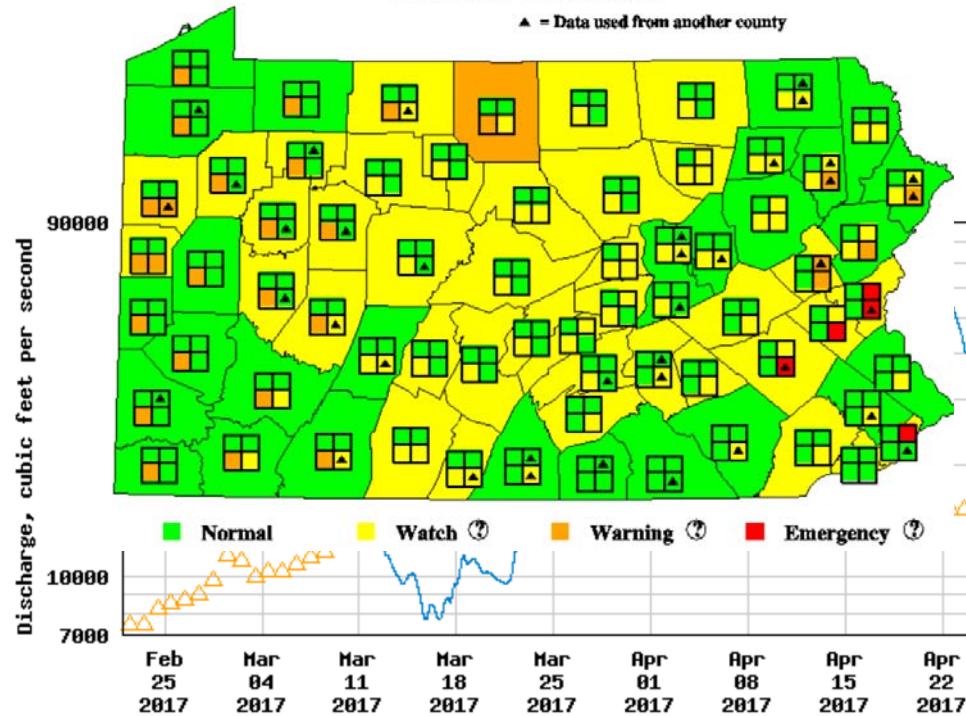


*The USGS provides unbiased, objective, and impartial scientific information to resource managers, planners, and other entities*

# USGS Science



Precipitation  Surface Water  
 Palmer Index  Ground Water  
 ▲ = Data used from another county



Stream Gage  
 National  
 Observation Well  
 Bradford Co  
 Coop





# Introduction

# Introduction

# Problem/Need



Private land owners, local communities, conservation groups, consultants and natural resource agencies need a characterization of current chemical quality conditions of groundwater and to better assess natural and anthropogenic influences on local aquifers.

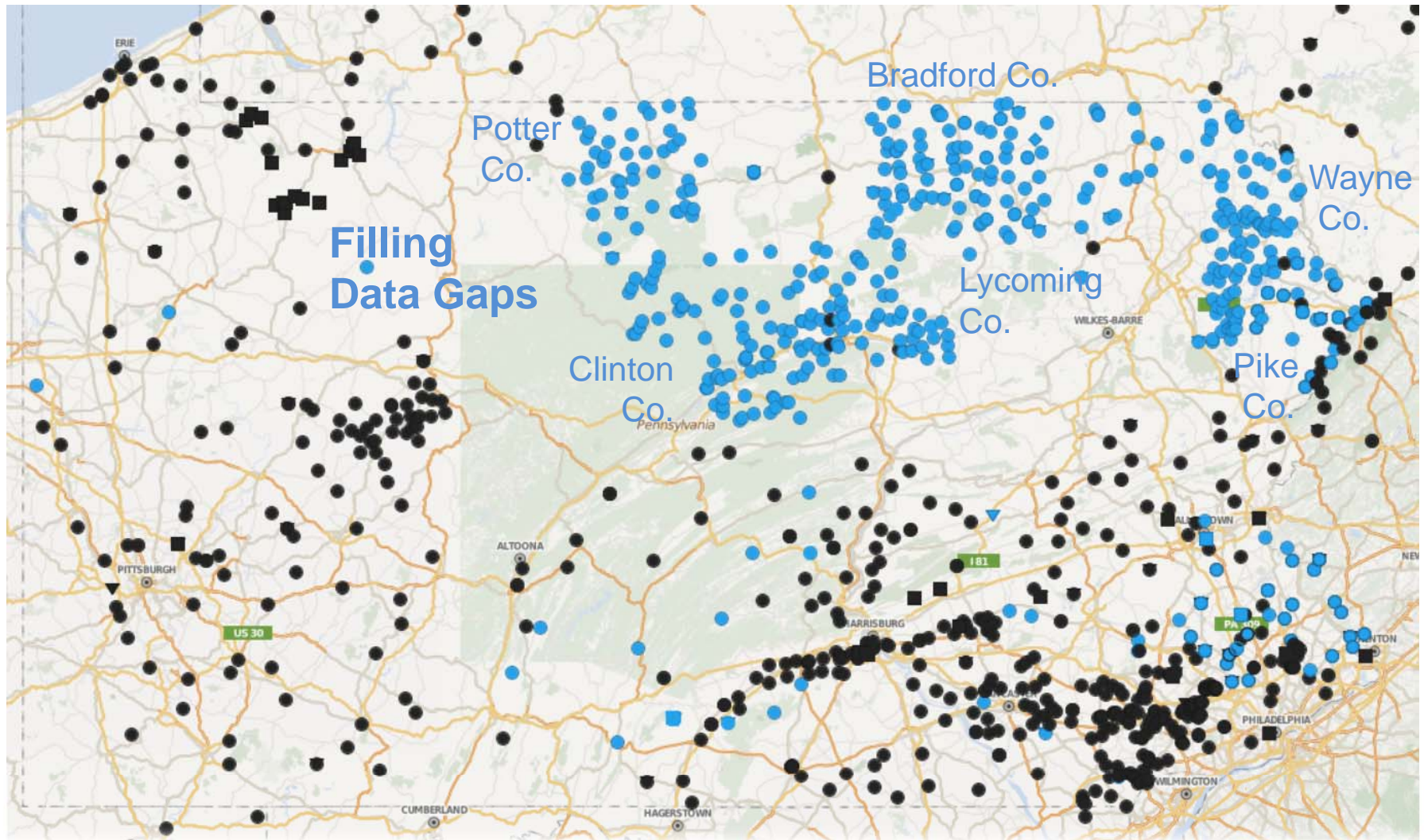


# Introduction

# Problem/Need

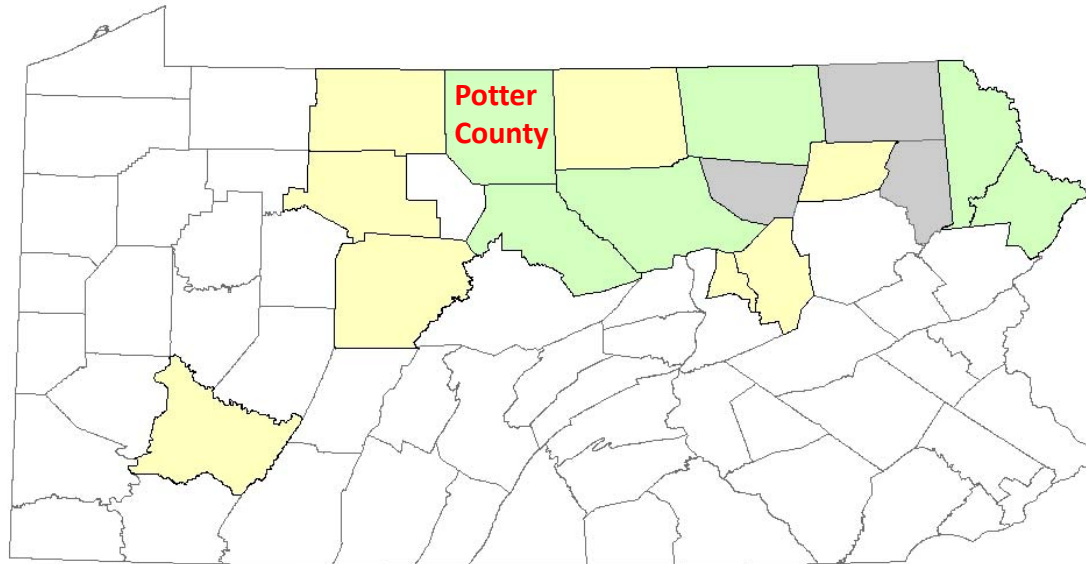
*Before 2011*

*After 2011*



# Introduction

# County Groundwater Studies

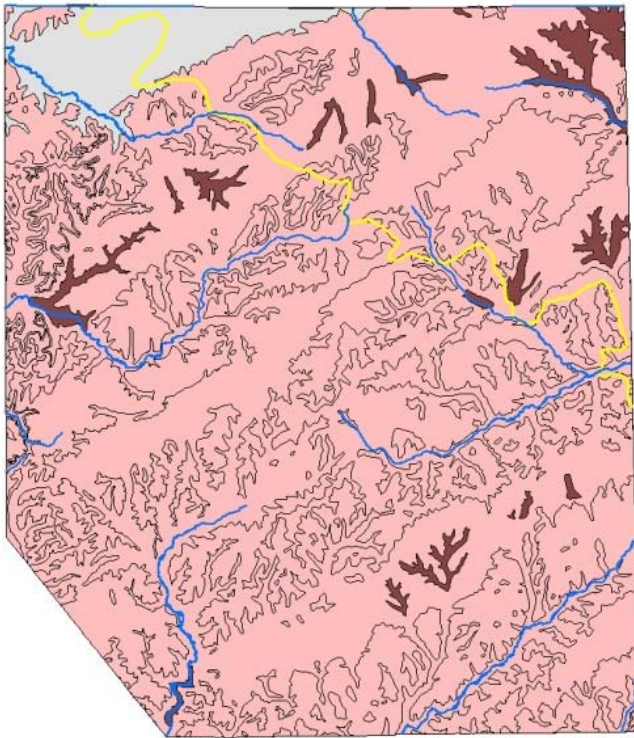


**County groundwater baseline studies**  
The purpose of this presentation is to provide a (1) **drinking water health standards** comparison and (2) a **chemical analysis** of groundwater for 47 **Domestic Wells** in **Potter County**, Pennsylvania

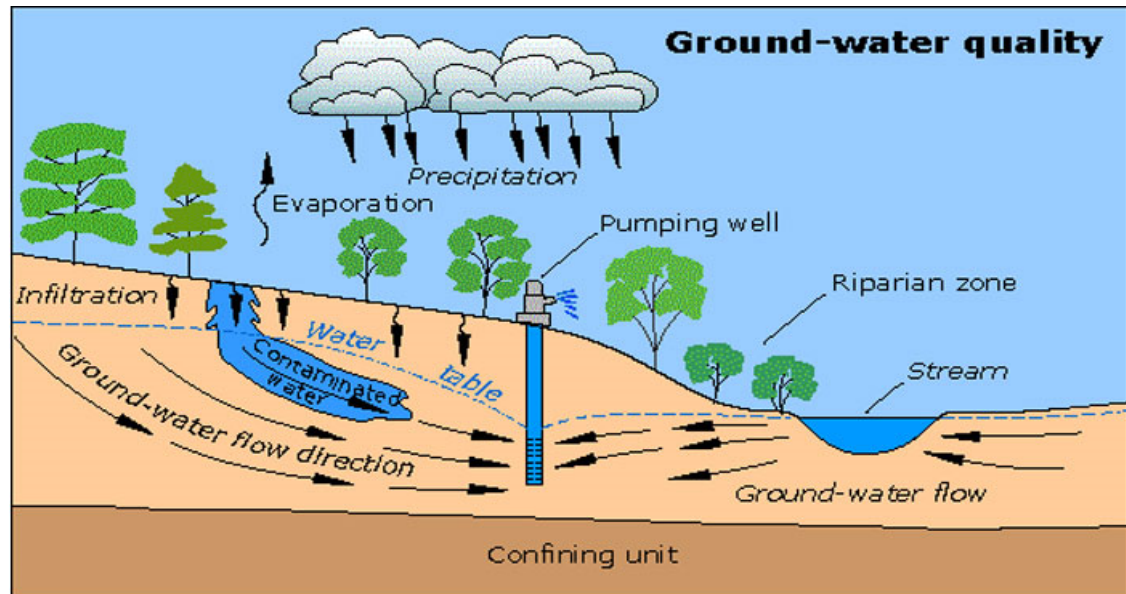


# Study Area

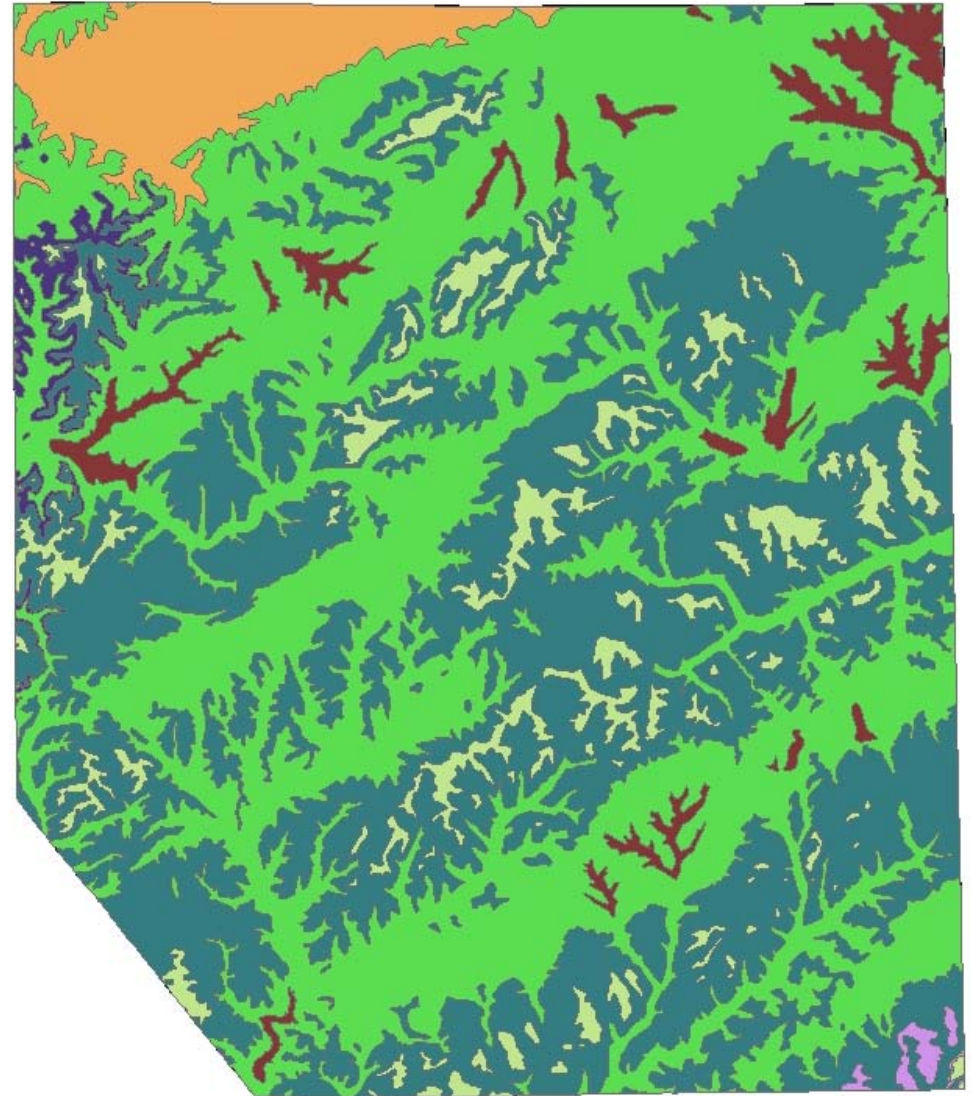




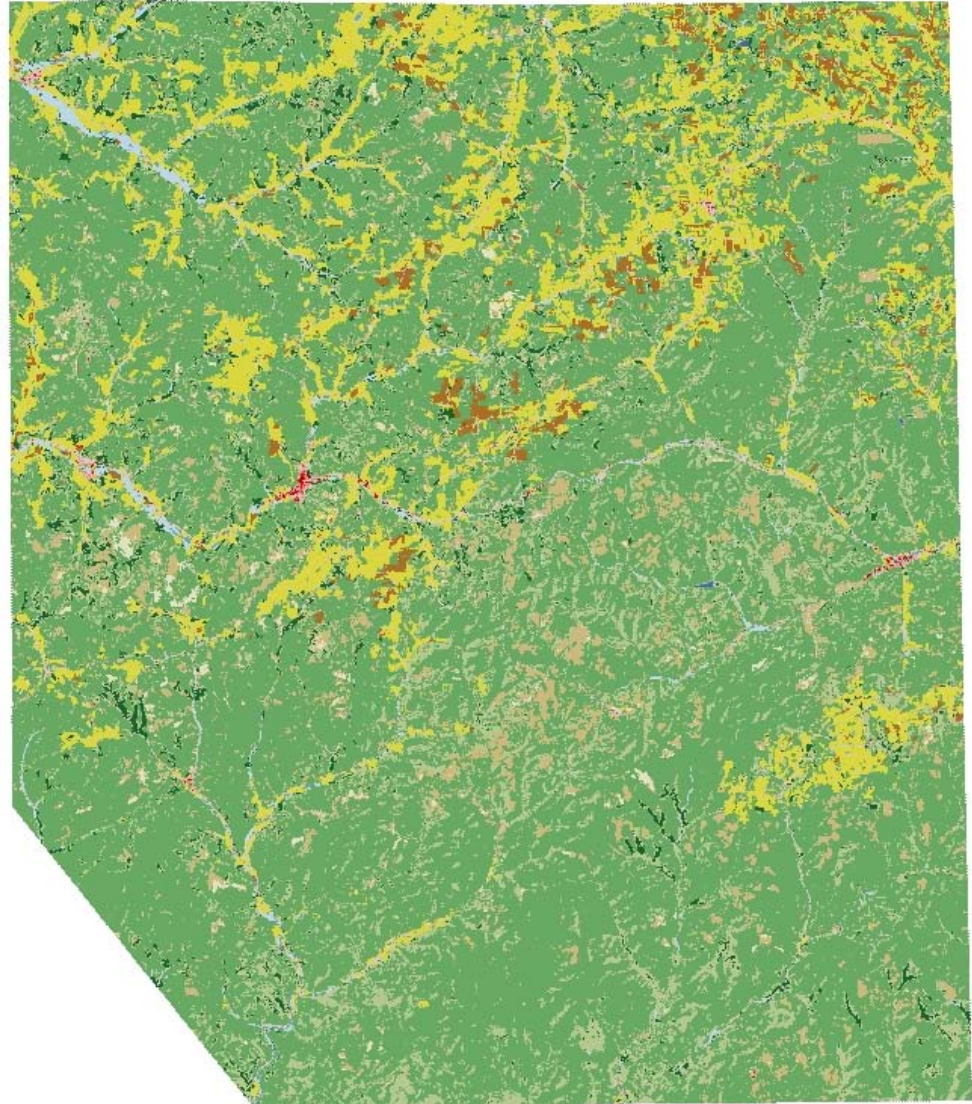
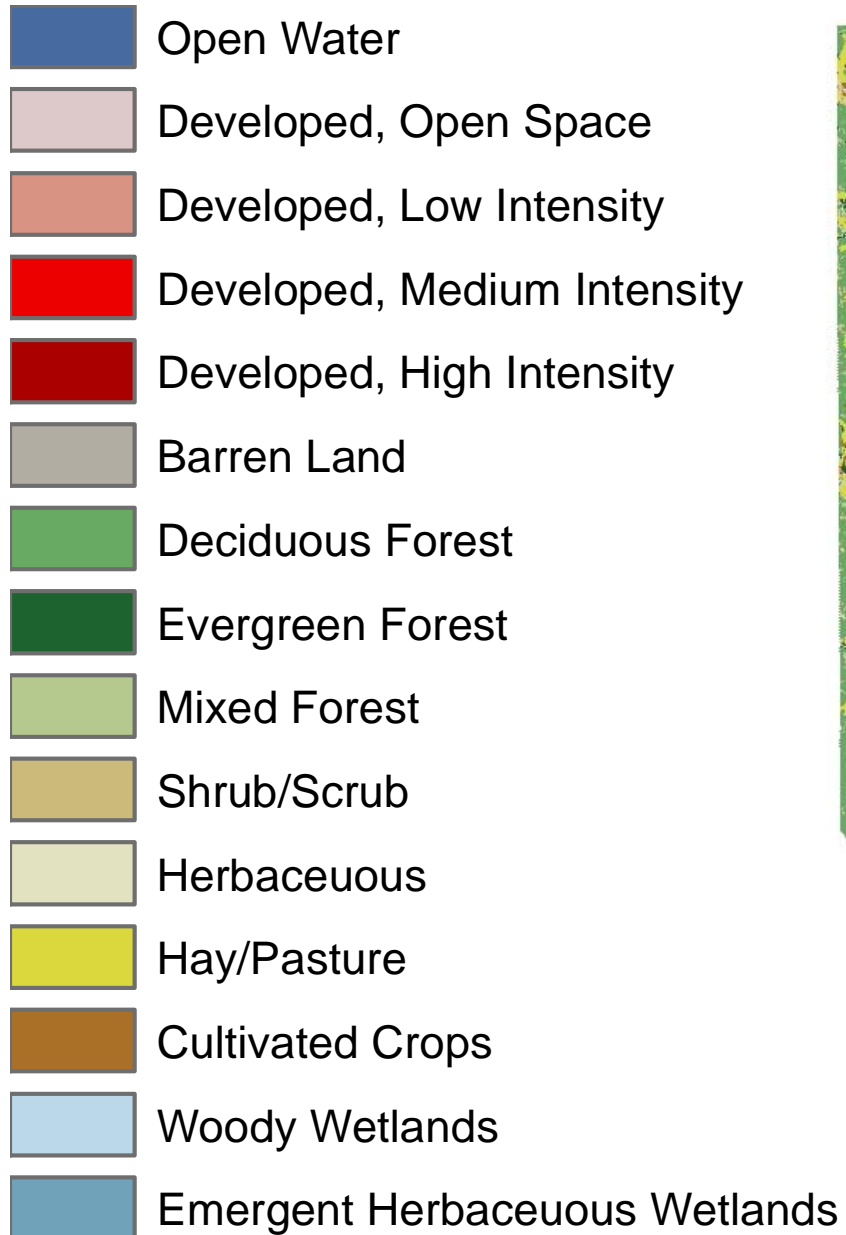
*Private wells pump groundwater that has picked up dissolved constituents (minerals, etc.) from the local geology, land use activities, and the well construction/plumbing.*



# GEOLOGY



# Land Use

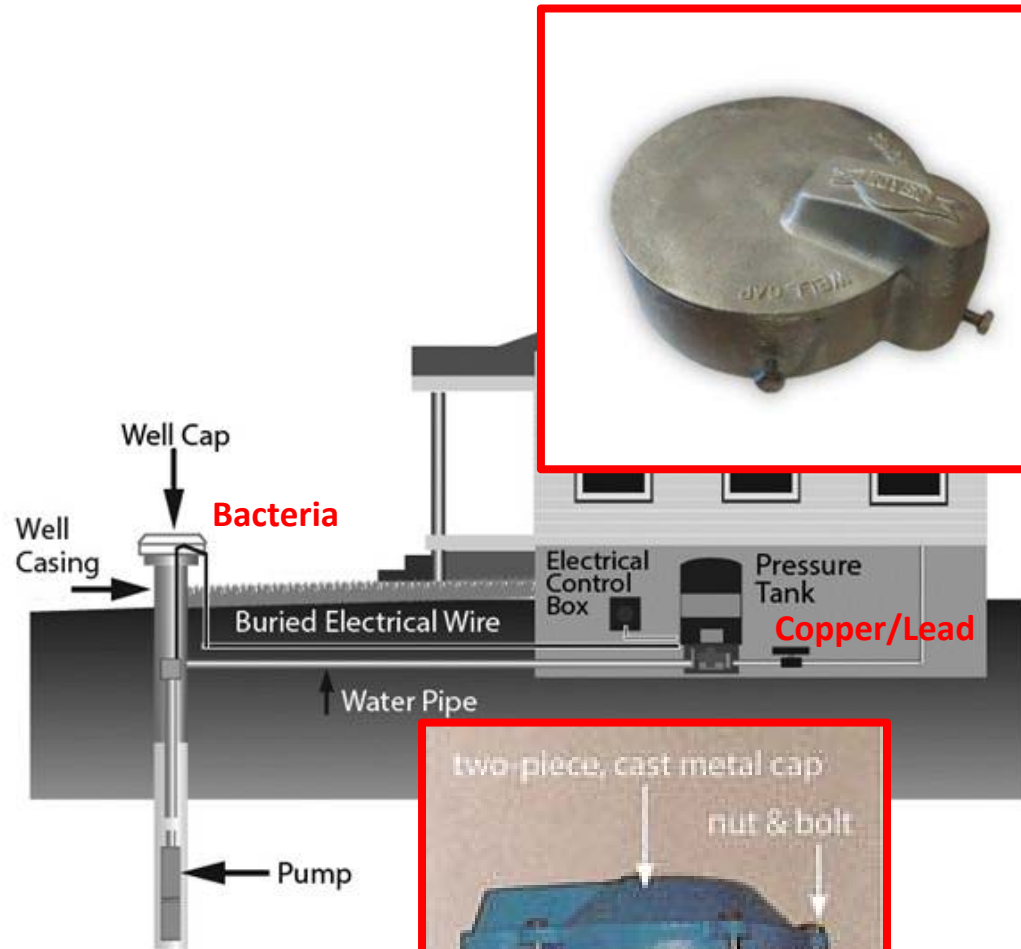




# Methods

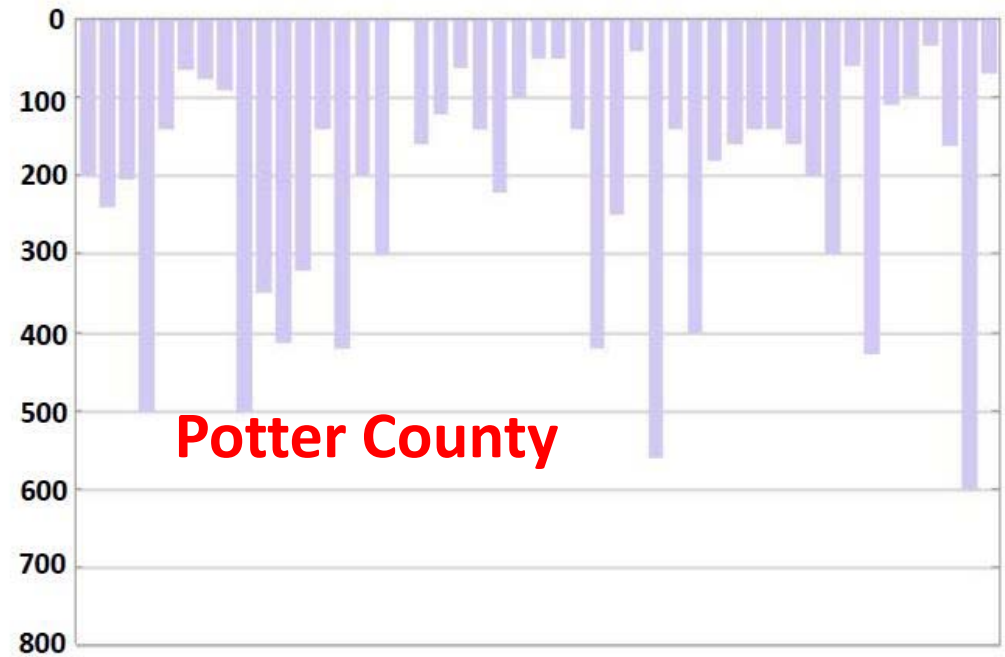
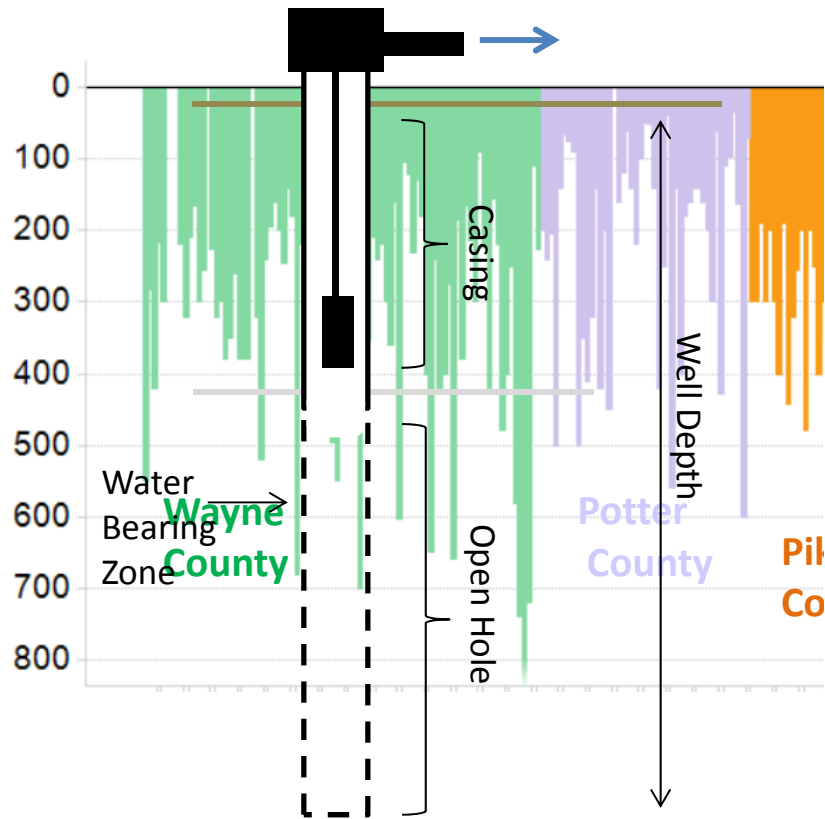
# Methods

# Private Water Supply



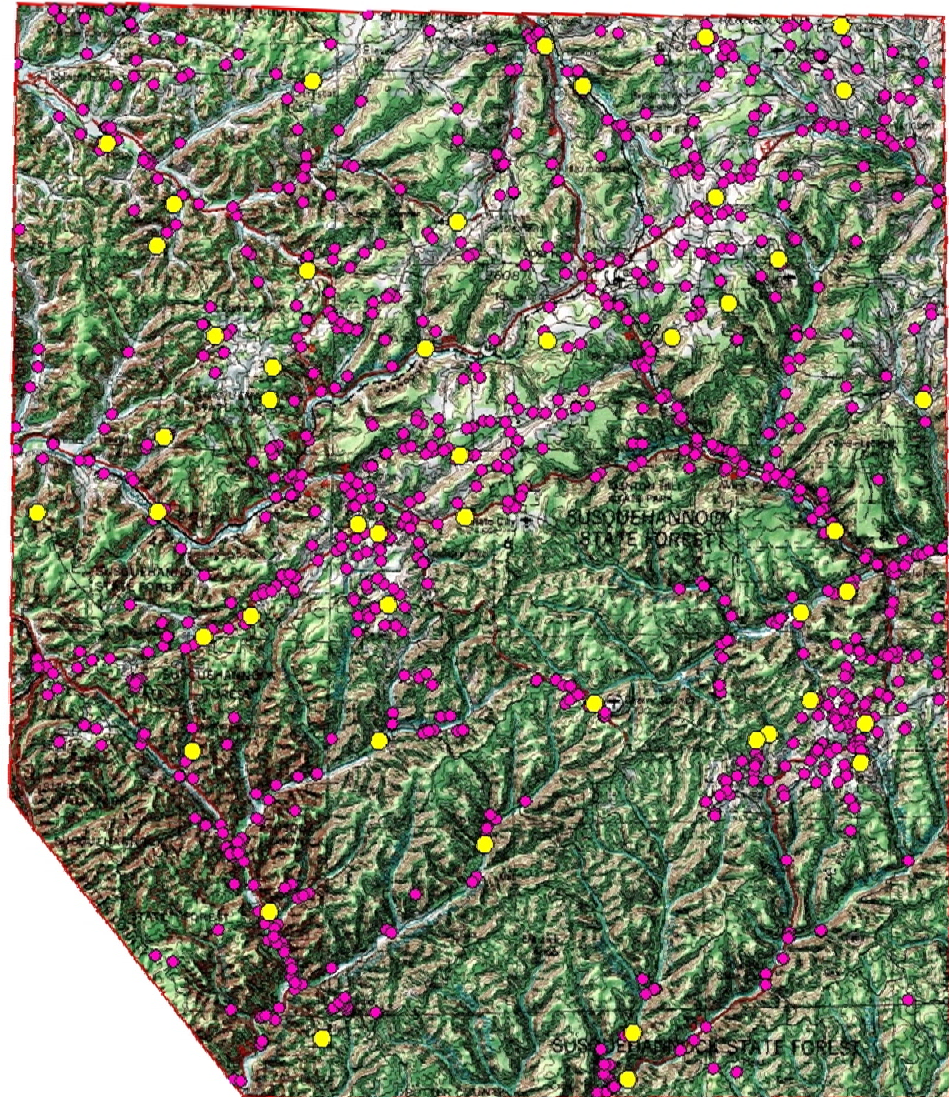


# Well Construction



# WELLS SAMPLED

- Sampled wells
- Other wells  
In database



**When: May – Sept. 2017**

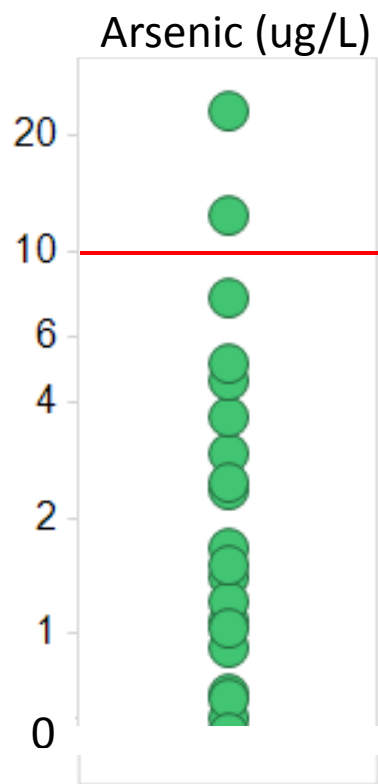




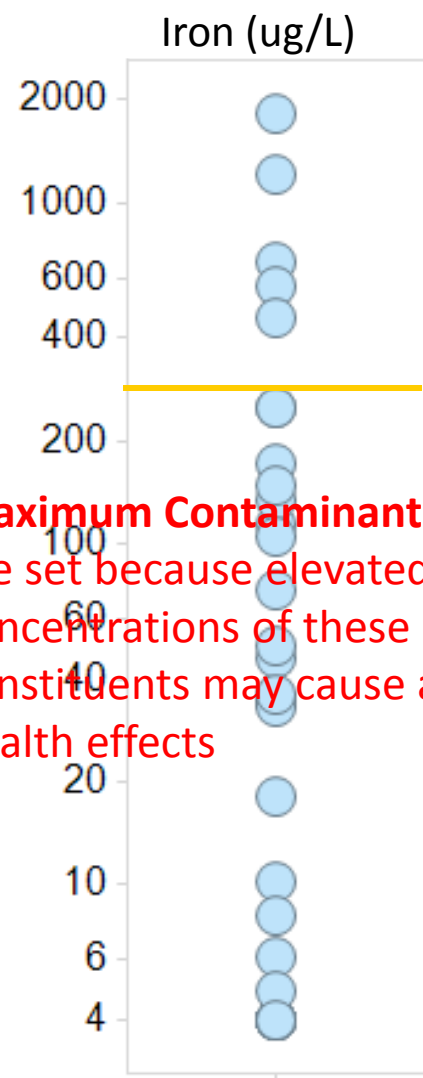
# Drinking Water Health Standard Comparison

# Drinking Water Standards

USEPA Drinking Water Standards were developed to ensure safe water for public water supplies and can be used as a guide for private domestic wells.



**MCL** → **Maximum Contaminant Levels** are set because elevated concentrations of these constituents may cause adverse health effects

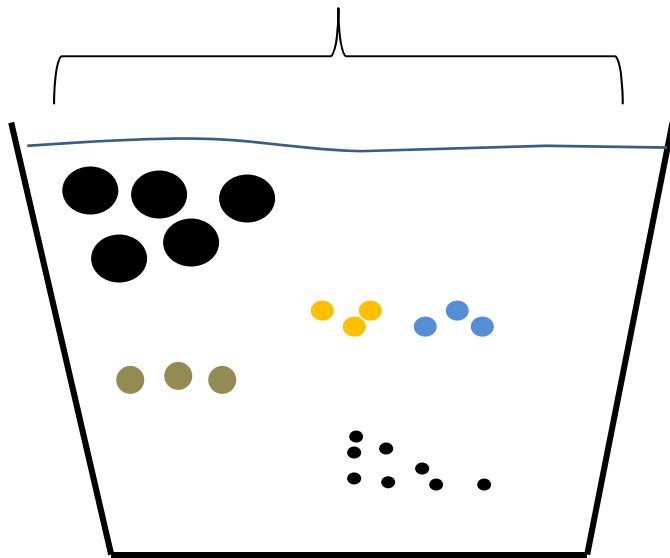


**SMCL** → **Secondary Maximum Contaminant Levels** are set for aesthetic reasons and elevated concentrations of these constituents may impart an undesirable taste or odor to water

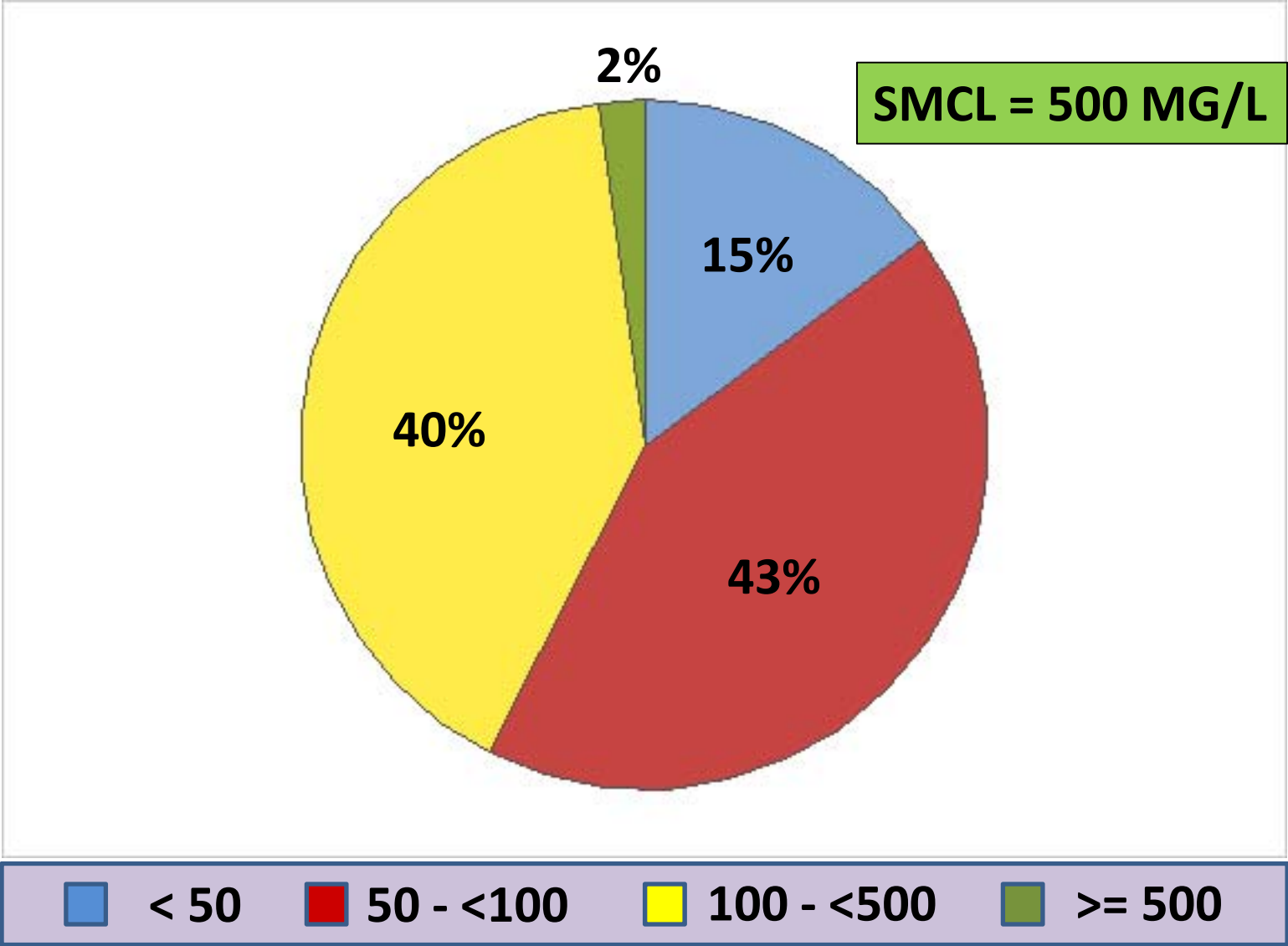
# Inorganics

# Total Dissolved Solids

## Total Dissolved Solids



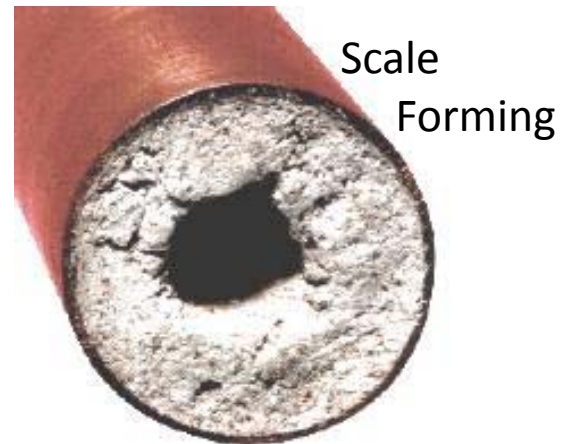
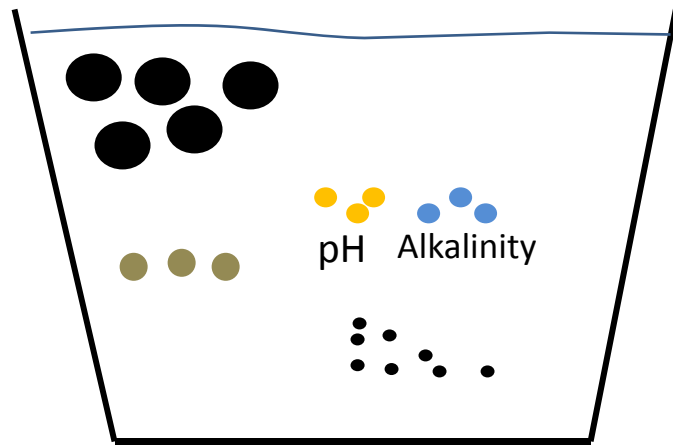
# Total Dissolved Solids (MG/L)



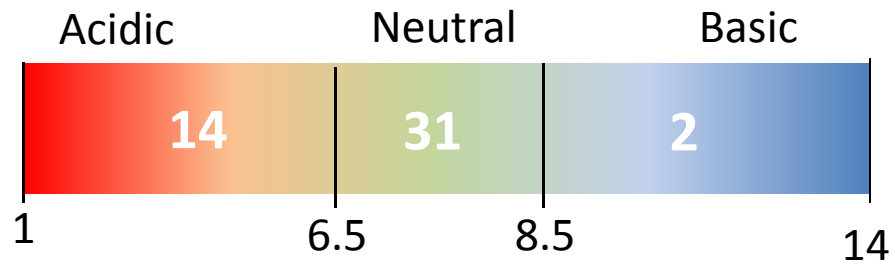
\* All graphics are provisional until verified and analyzed for publication

# Inorganics

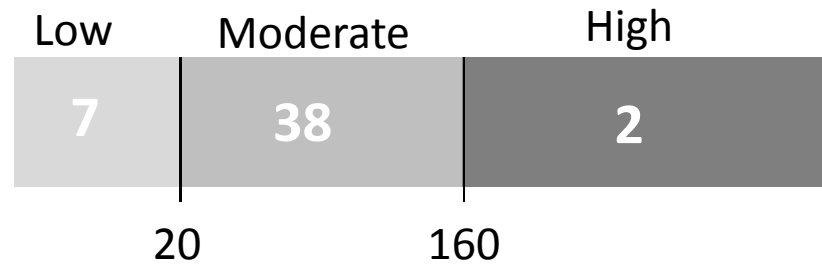
# pH/Alkalinity



# pH

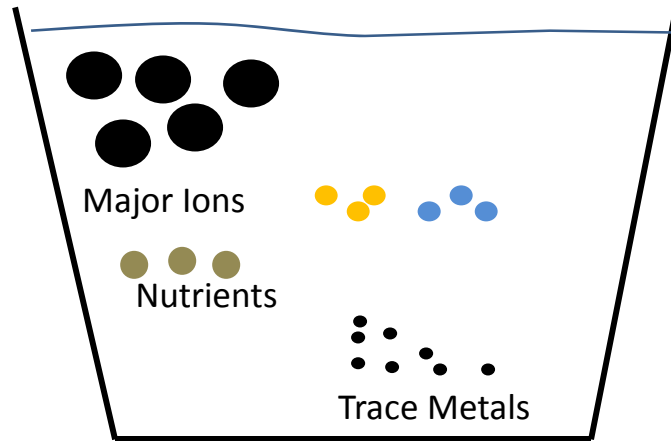


# Alkalinity (mg/L)

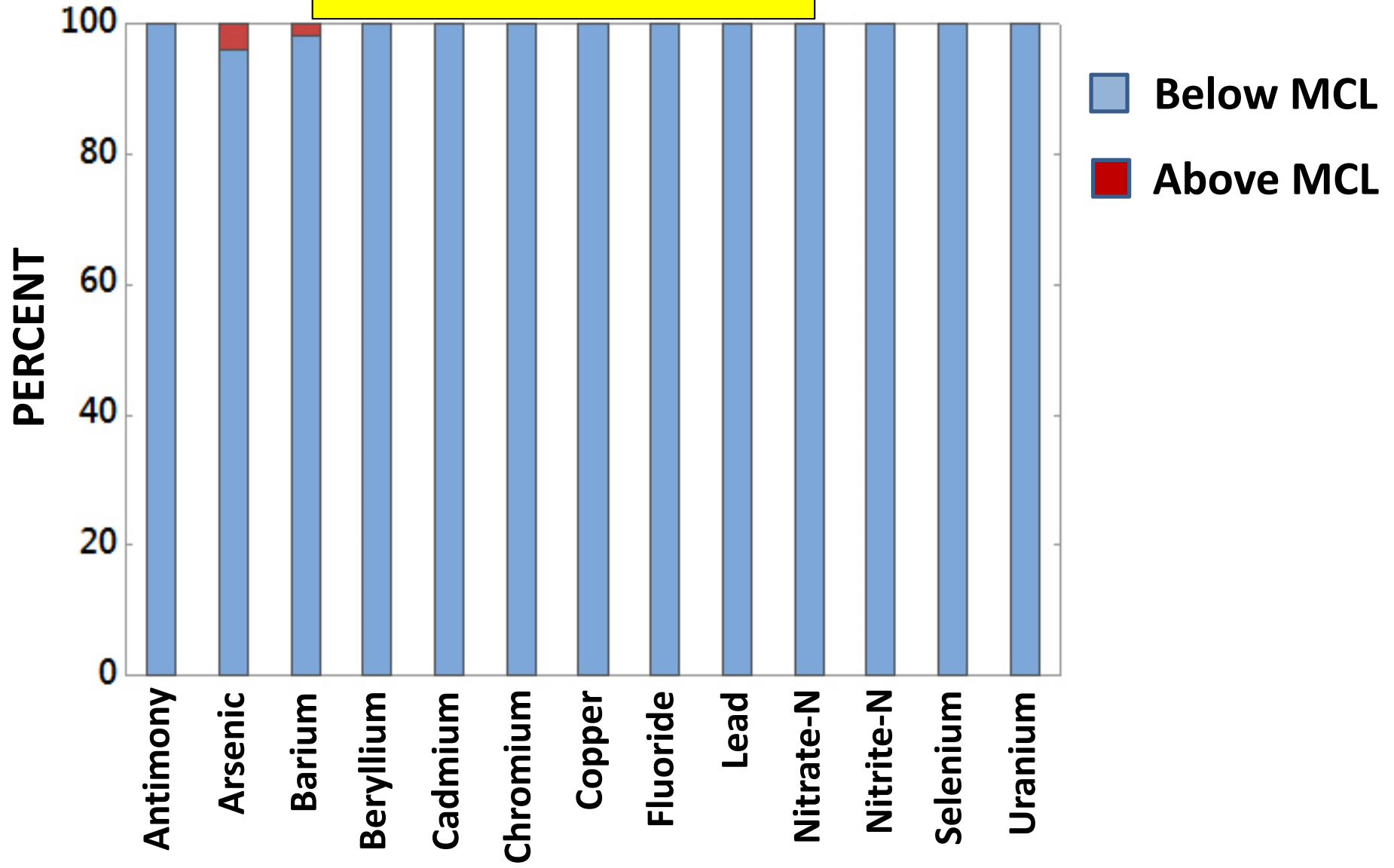


# Inorganics

# Majors Ions/Metals



# INORGANICS - MCLs



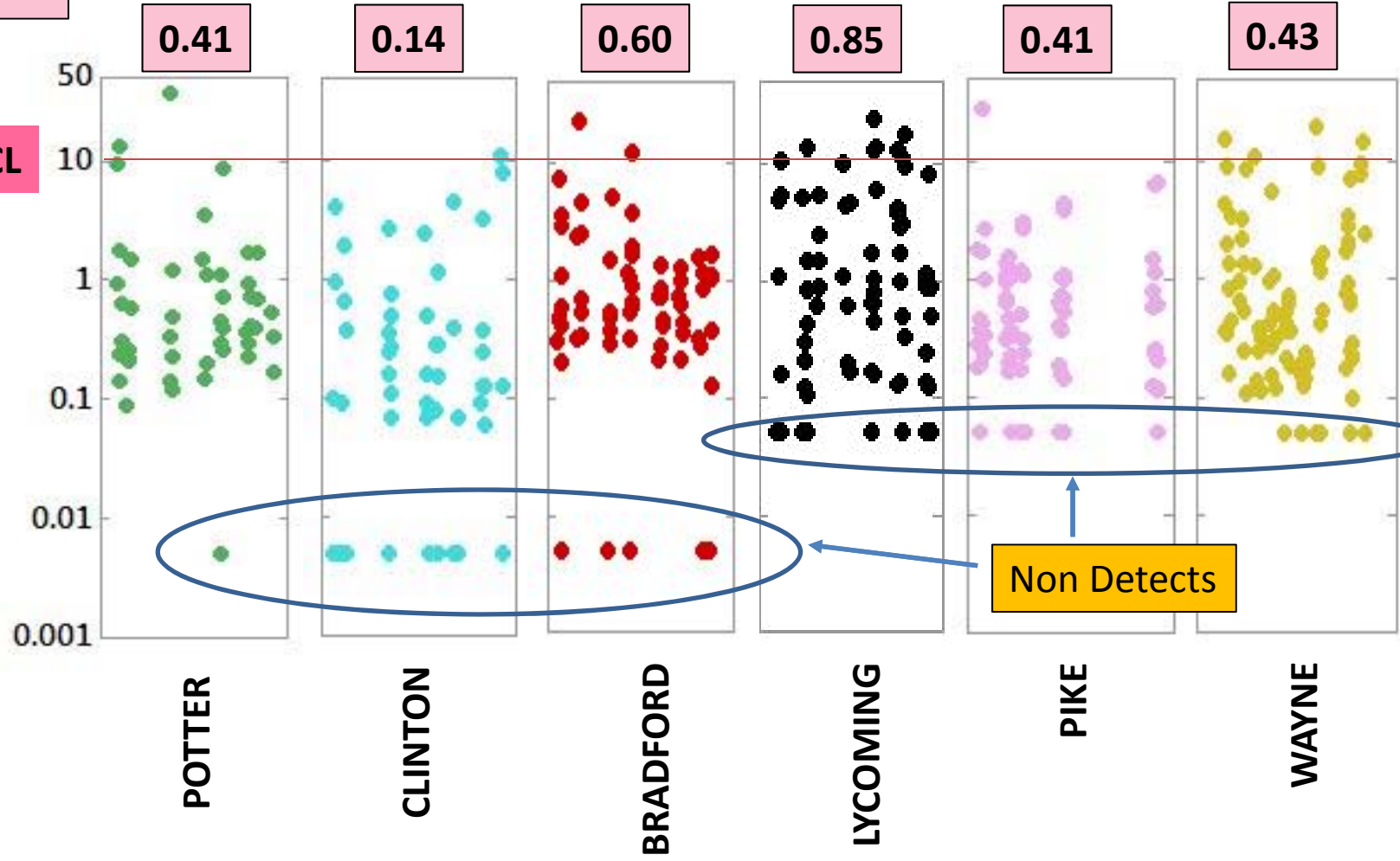
\* All graphics are provisional until verified and analyzed for publication



# Arsenic, dissolved, micrograms/liter

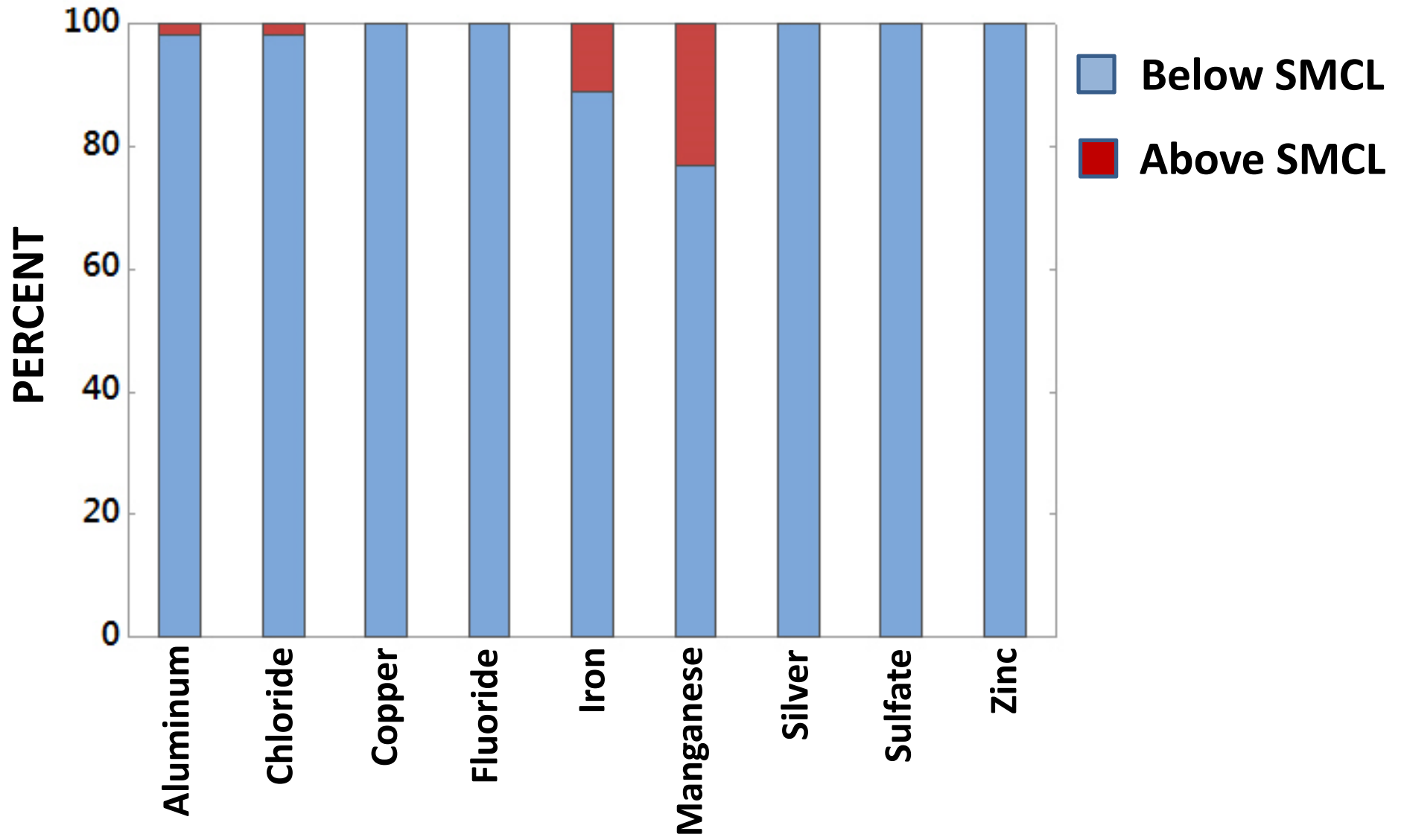
Median

MCL



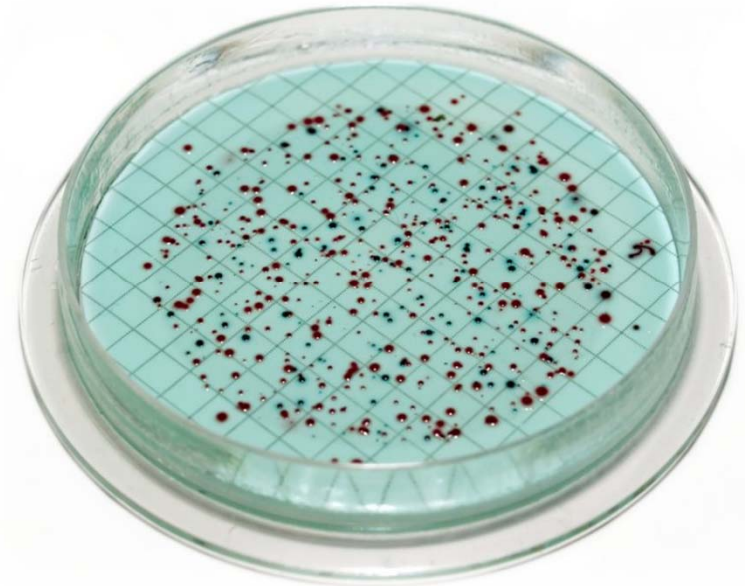
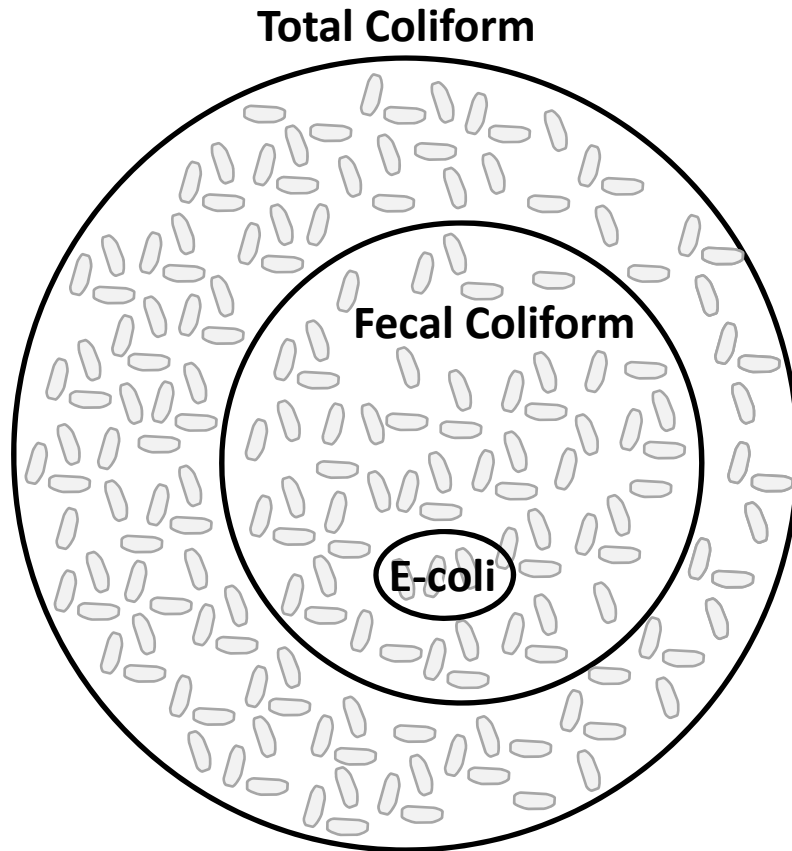
Non Detects

# INORGANICS - SMCLs



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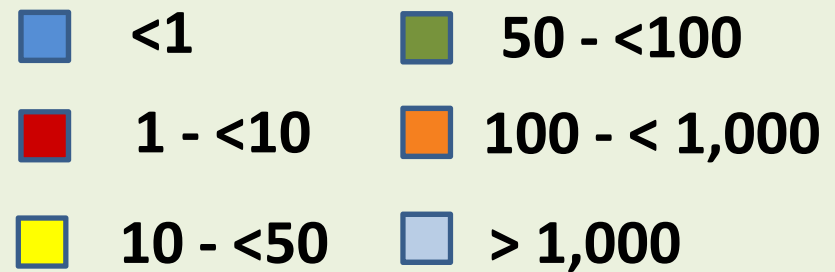
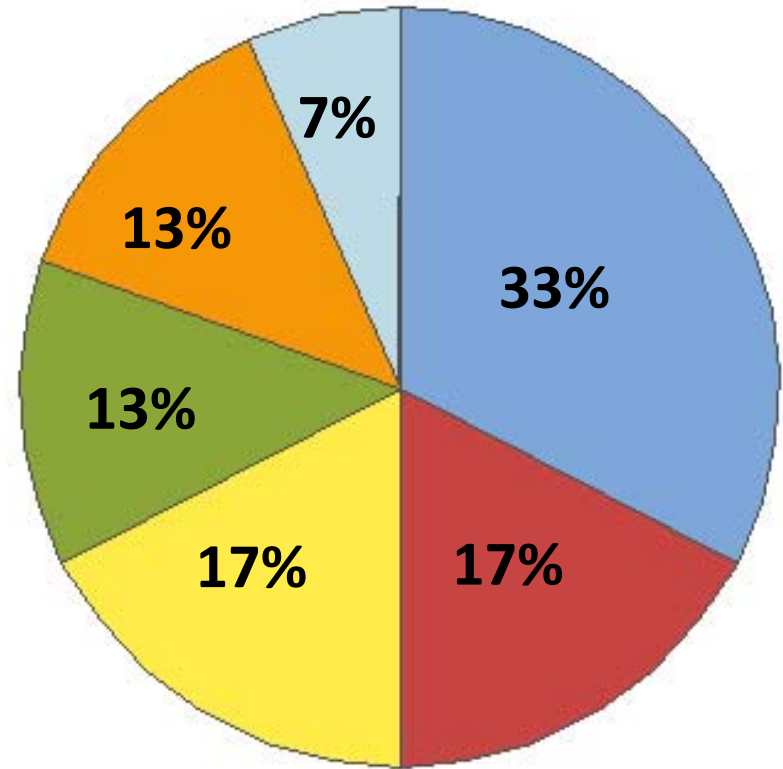
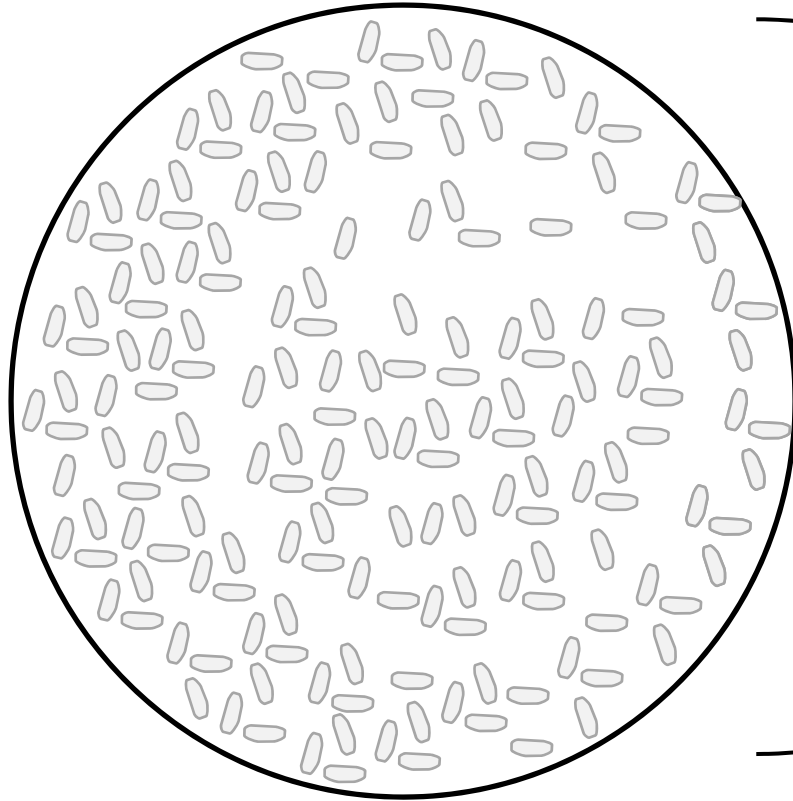
# Bacteria



**MPN/100 ml = Most Probable Number of Bacteria in 100 milliliters**

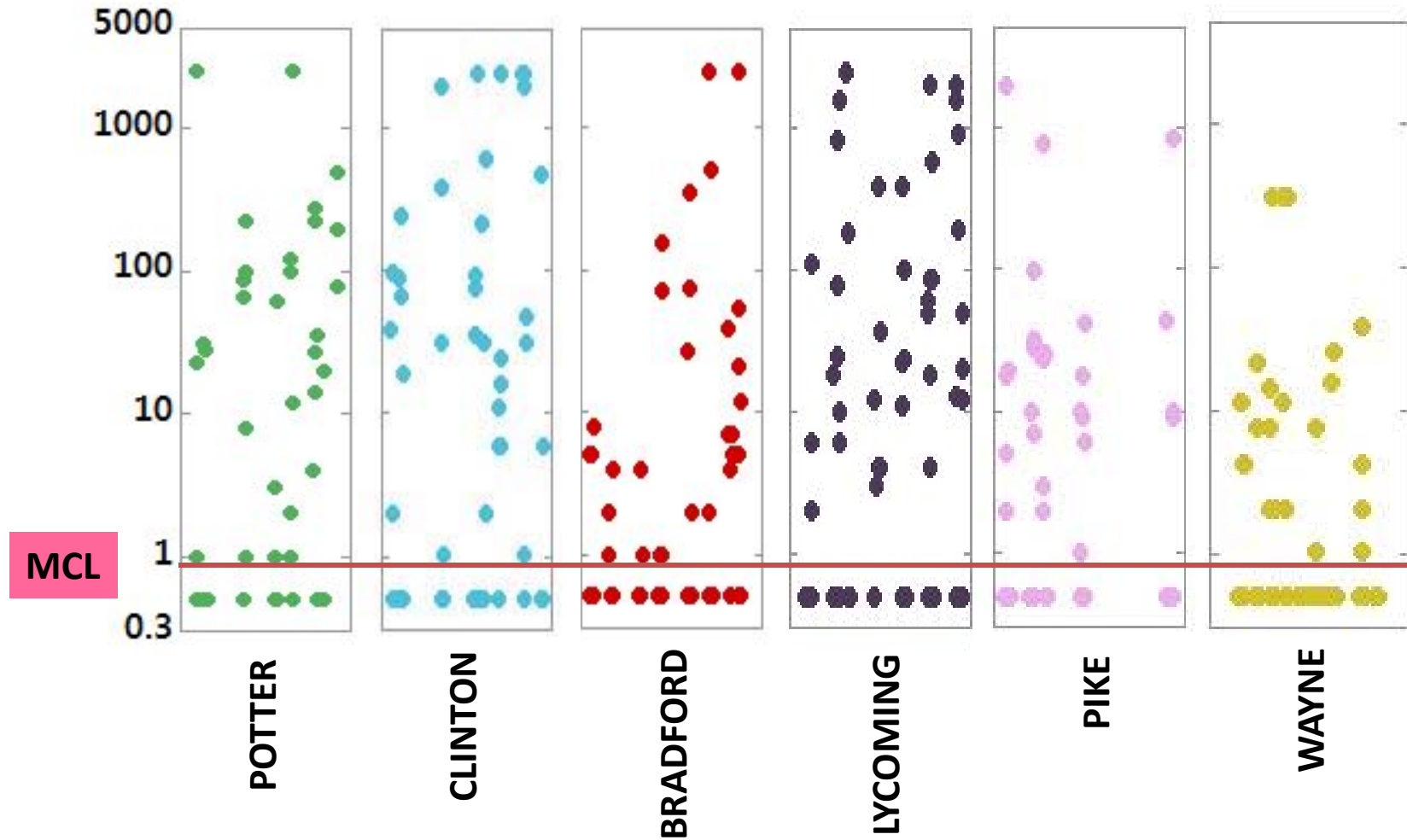
# Total Coliform Bacteria (MPN/100 ml)

Total Coliform

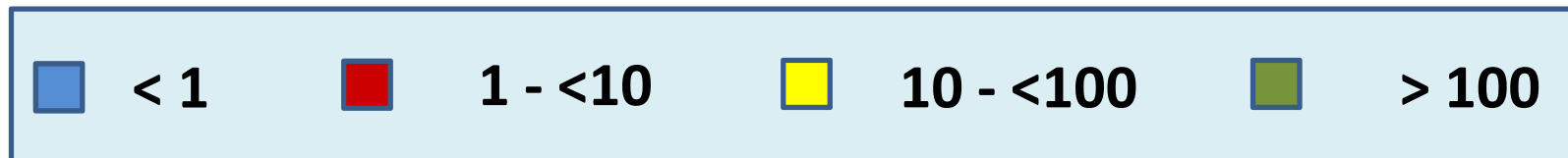
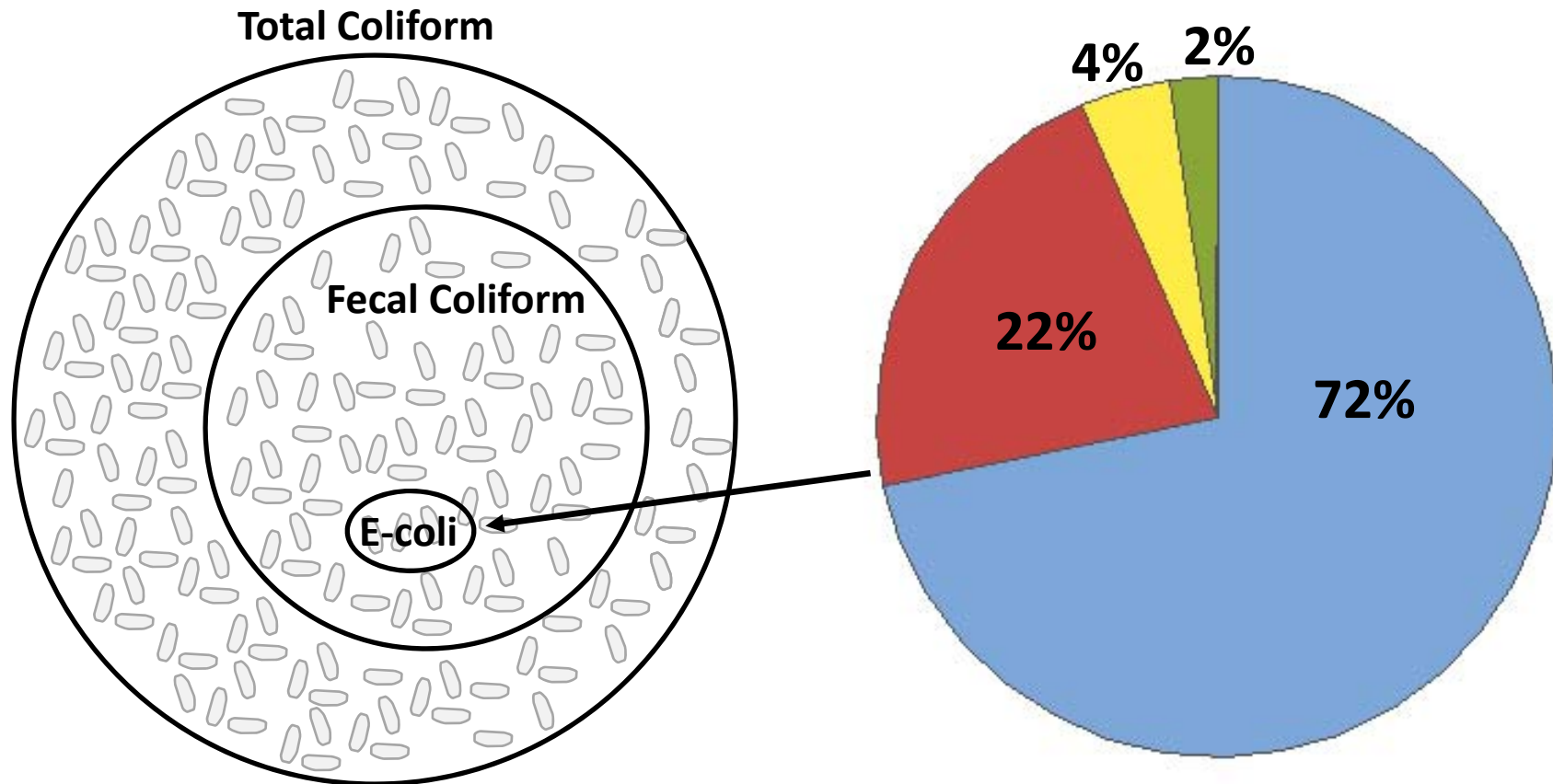


- All graphics are provisional until verified
- and analyzed for publication

# Total Coliform Bacteria (MPN/100 ml)

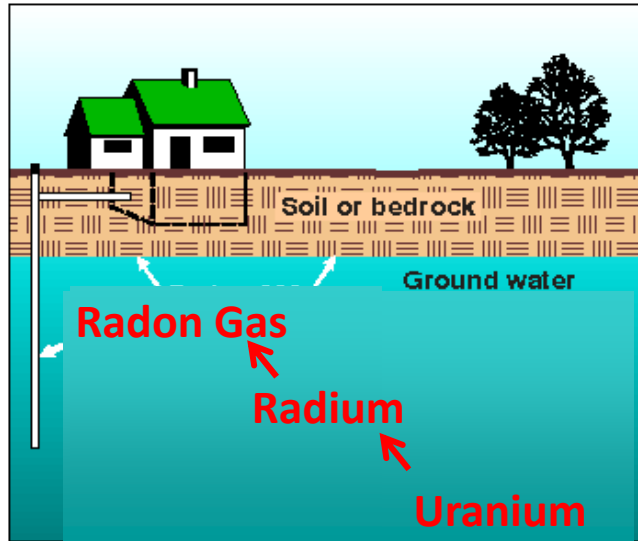


# E-coli Bacteria (MPN/100 ml)

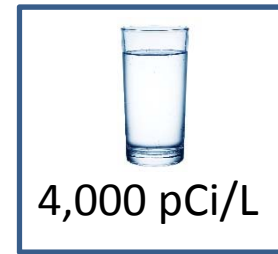


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# Radiochemicals

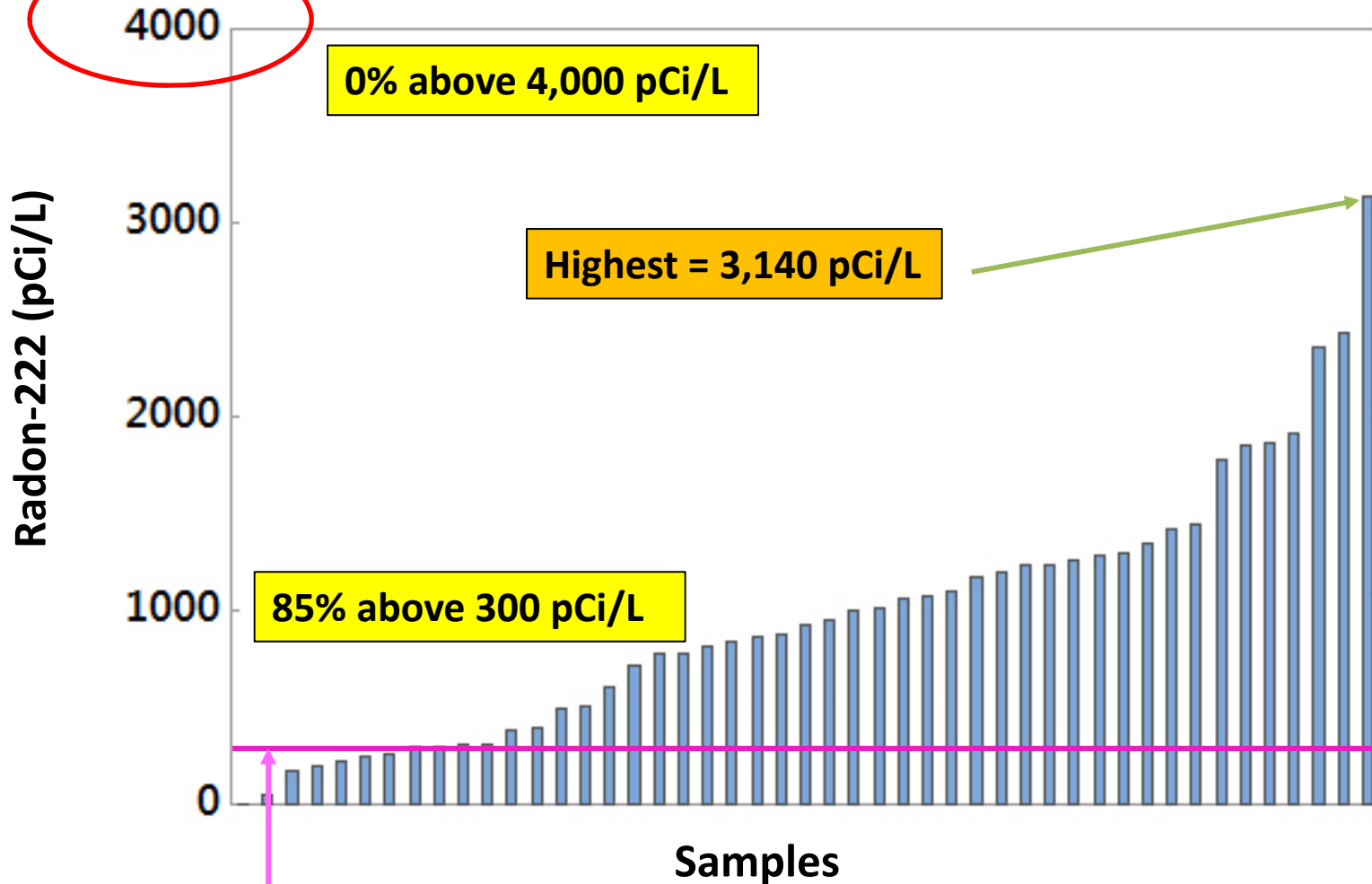


Modified from Clark and Briar, 1993



*Recommended MCL for states with indoor program*

# RADON

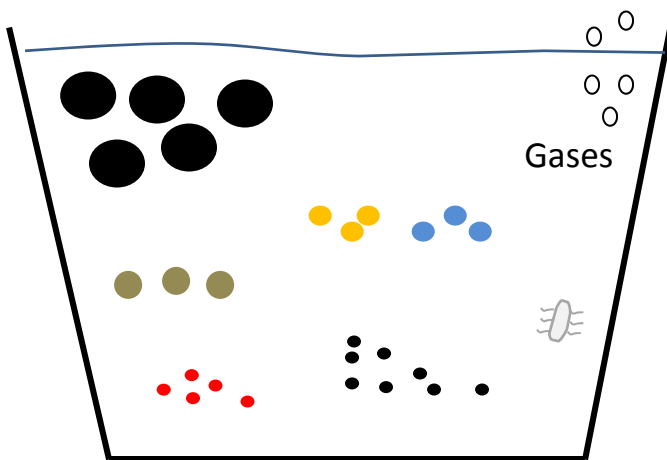


300 pCi/L recommended MCL for states with no indoor program

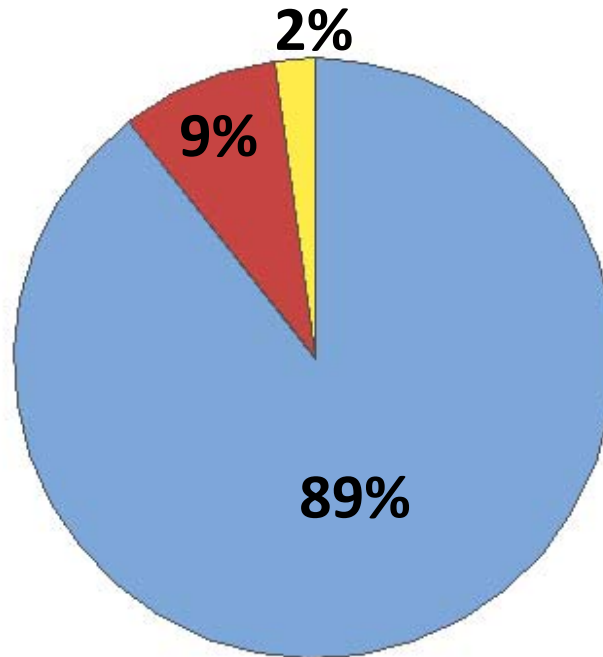
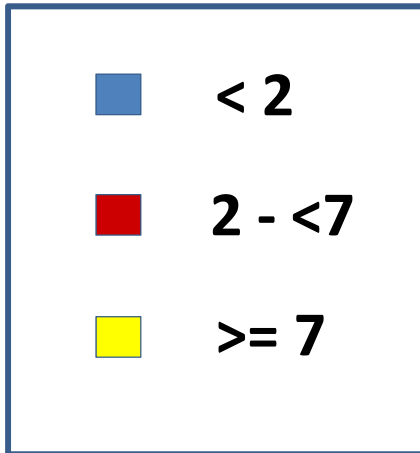


# Dissolved Hydrocarbon Gases

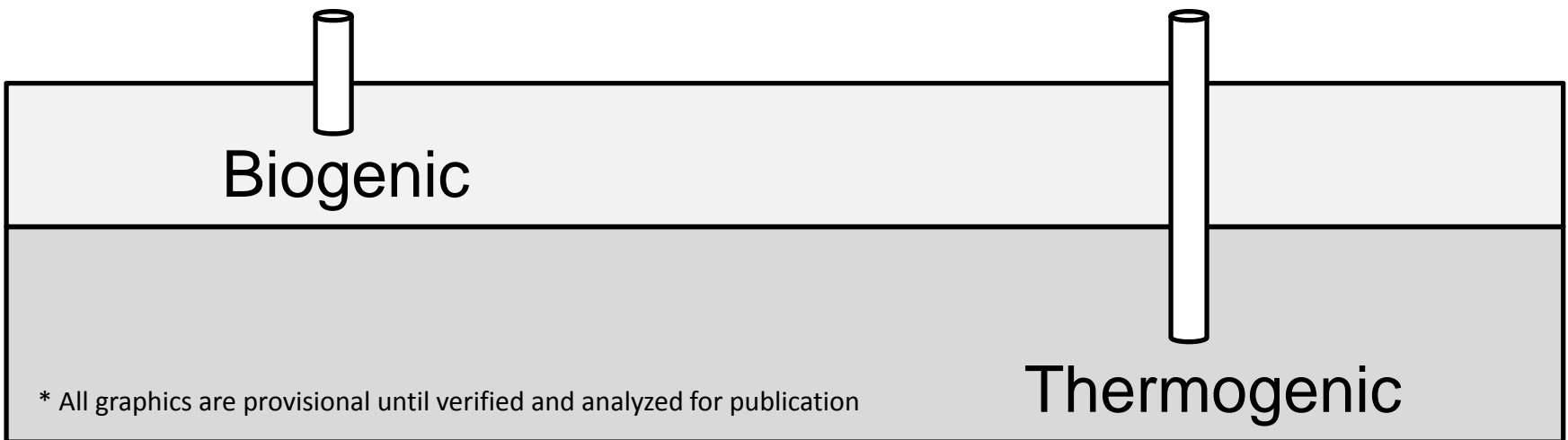
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# Methane, MG/L

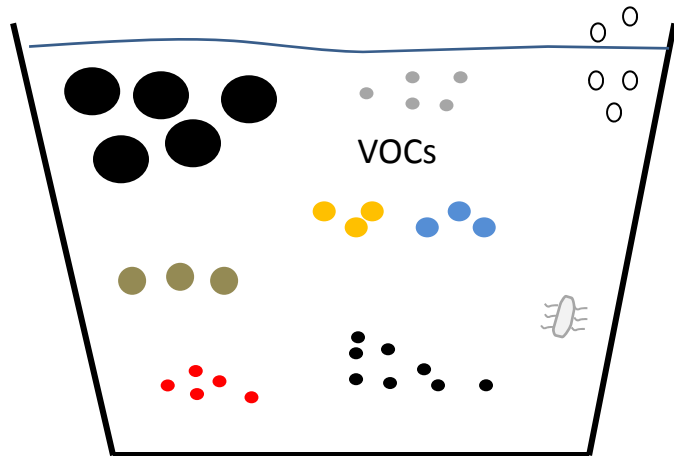


Maximum detected  
= 11 MG/L



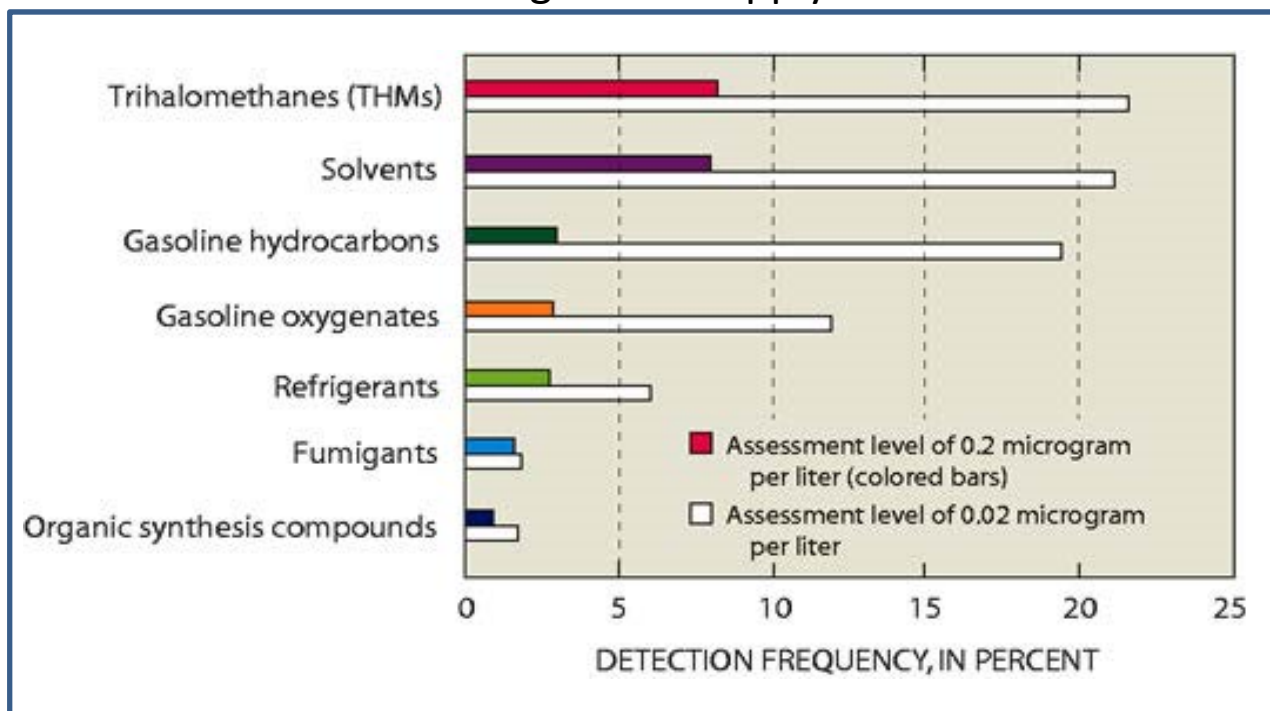
# Volatile Organic Compounds (VOCs)

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**Common Sources:**  
Septic systems  
Urban land  
Hazardous waste sites  
Underground storage tanks

## USGS NAWQA Study - Volatile Organic Compounds in the Nation's Ground Water and Drinking-Water Supply Wells



### **Samples collected 1985-2001 across U.S.A.**

3,500 Domestic and public-supply wells (2/3 domestic)

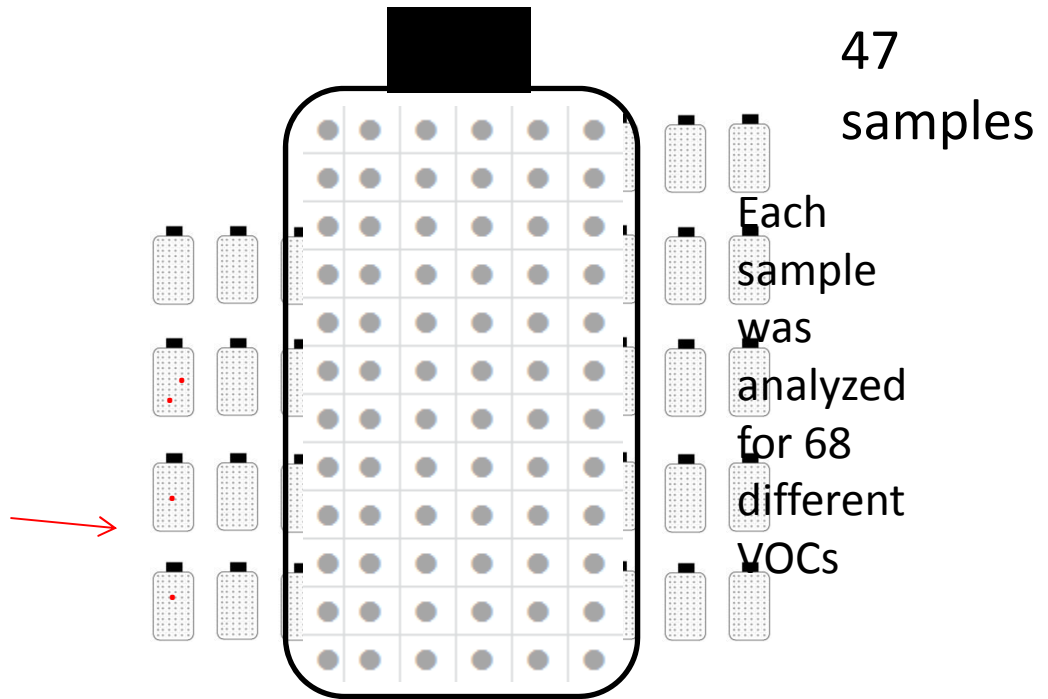
20% wells had detectable VOCs at 0.2 ug/L detection level

50% wells had detectable VOCs at 0.02 ug/L detection level

# VOCs

**3,196** Results

**4** Detections in 3 Samples



Only 6% of wells in Potter had detectable (at 0.5 ug/L) VOCs



# Chemical Analysis of Groundwater

# Interpretive Analysis & Report



Prepared in cooperation with the  
**A Reconnaissance Assessment of Groundwater in Pennsylvania**

Prepared in cooperation with the Wayne Conservation District  
**Baseline Assessment of Groundwater in Wayne County, Pennsylvania, 2014**

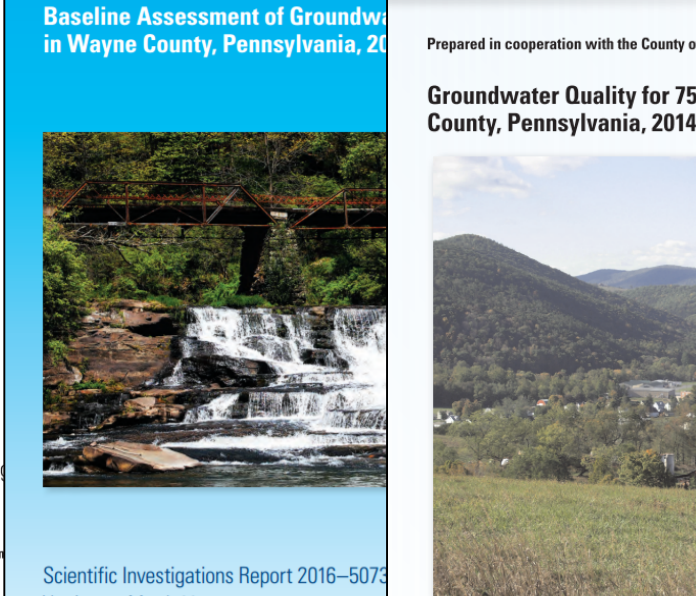


Scientific Investigations Report 2016-5073  
Version 1.1, March 2017

U.S. Department of the Interior  
U.S. Geological Survey

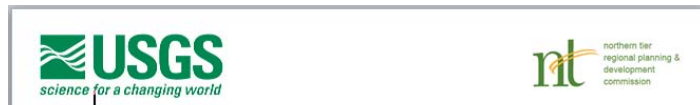


Prepared in cooperation with the County of Lycoming  
**Groundwater Quality for 75 Domestic Wells in Bradford County, Pennsylvania, 2014**



Scientific Investigations Report 2016-5143

U.S. Department of the Interior  
U.S. Geological Survey



Prepared in cooperation with the  
North Tier Regional Planning & Development Commission

**Drinking Water Health Standards Comparison and Chemical Analysis of Groundwater for 72 Domestic Wells in Bradford County, Pennsylvania, 2015**



U.S. Department of the Interior  
U.S. Geological Survey

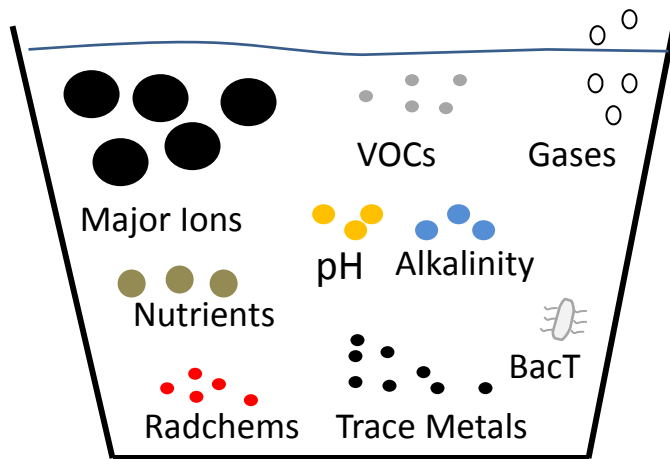


# Summary





# Summary



47 wells were sampled in **Potter County** to characterize the quality of the groundwater

Results indicate generally **good groundwater quality** for the wells sampled in Potter County

Exceedances for **MCLs** (Total Coliform, E-coli, Arsenic, Barium) and **SMCLs** (TDS, Chloride, Aluminum, Iron, and Manganese) along with the results for radiochemicals, dissolved gases and VOCs were **consistent with values from other county studies**

A detailed chemical analysis and interpretation of the results will be published in a **USGS report**



**Thank You**

Dan Galeone

[dgaleone@usgs.gov](mailto:dgaleone@usgs.gov)

# Partners

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This study could not have been possible with the **voluntary cooperation of the 47 well owners of Potter County** and the support of the following partners:



**PADEP**



**Penn State Extension**