



# Summary of Selected USGS Data on Domestic Well Water Quality for the CDC-EPHT Program

**A Web-Based Overview by**

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**March 24, 2008**

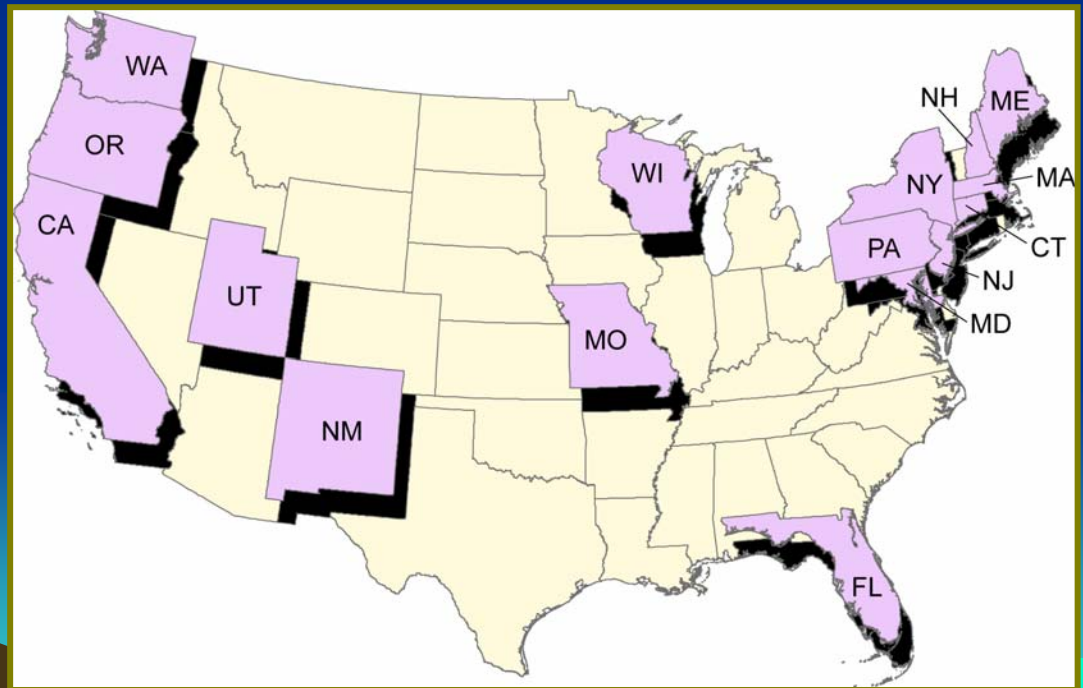
# Purpose of this Presentation

- **Provide overview of recently released USGS Scientific Investigations Report 2007-5213:**
  - **Description of data sources**
  - **Selection of contaminants**
  - **Summary of combined state data**
  - **Summary of individual state data (NJ example)**
  - **Review of Appendices and State Summary Files**

# Background

- Need to incorporate water-quality component in tracking work
- USGS participation on Indicators Work Group led to USGS-CDC collaborative effort in Fall 2006
- Focus on domestic well (private supplies) water-quality data from 16 EPHT grantee states
- **Reported released on-line November 2007**

EPHT Grantee States

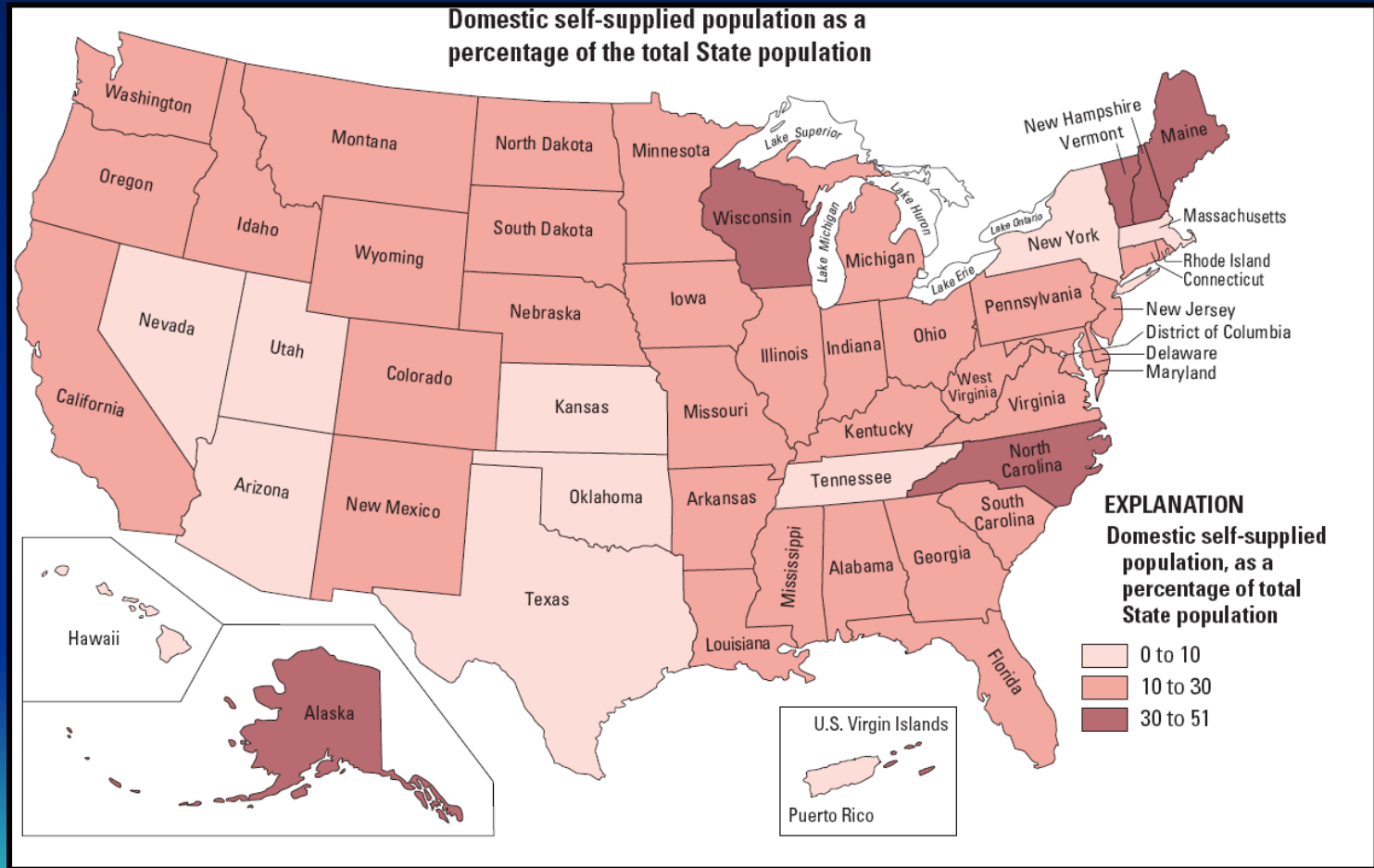




# Report Objectives

- **Describe USGS water-quality, use, and ancillary databases of potential interest to EPHT states**
- **Identify contaminants of interest in domestic wells**
- **Analyze water-quality data from private water supplies from multiple USGS sources**
- **Summarize and interpret USGS data in a consistent manner so that comparisons between one or more states is possible**

# Why focus on domestic well (private supplies) water-quality?



# Description of USGS Data Sources

- **Water-Quality Data Sets:**
  - National Water Quality Assessment Program (NAWQA)
  - National Water Information System (NWIS)
- **Water-Use Data**
  - State, County, and 1990 Census Block estimates
- **Ancillary Spatial Data**
  - principal aquifers, population density, land use

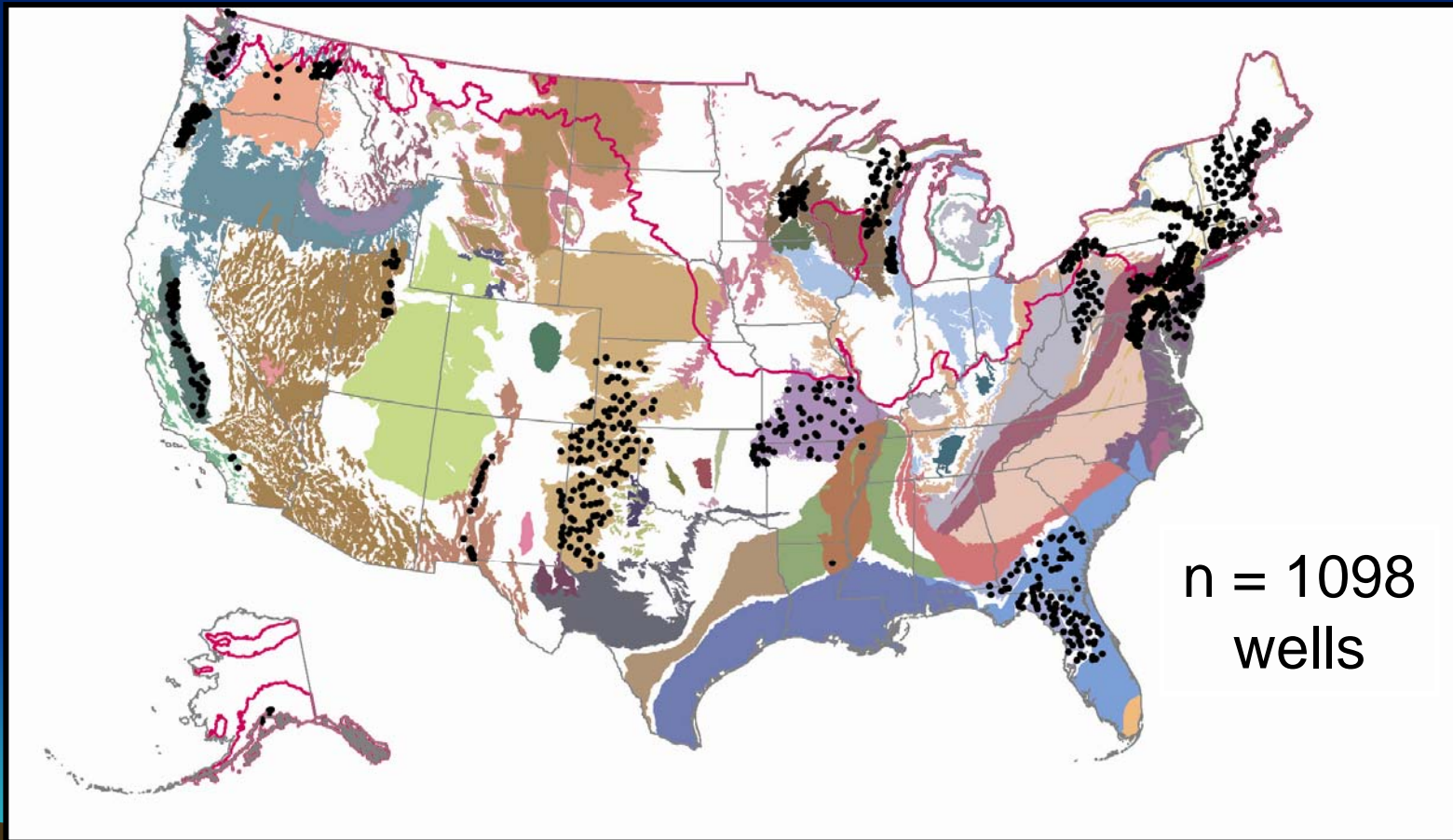
# Water-Quality Data Sources

Category	NAWQA	USGS State data
Temporal coverage	1991–2006	1925–2006.
Geographic extent	Variable, few to zero samples for certain States	Variable within each State.
Sampling design	Random stratified sampling of about 30 wells in a single aquifer study	Variable depending on objectives of study. Samples for some studies may have been collected in areas of known contamination.
Sampling protocols	Consistent	Various depending on study type.
Analytical methods	Consistent; reporting levels for some constituents changed over time	Variable, some analytical methods have changed over time with reporting levels changing over time.
Quality control/quality assurance	Consistent plan for field sampling and laboratory analysis	Variable depending on the study.



# Private Wells in NAWQA Data Base

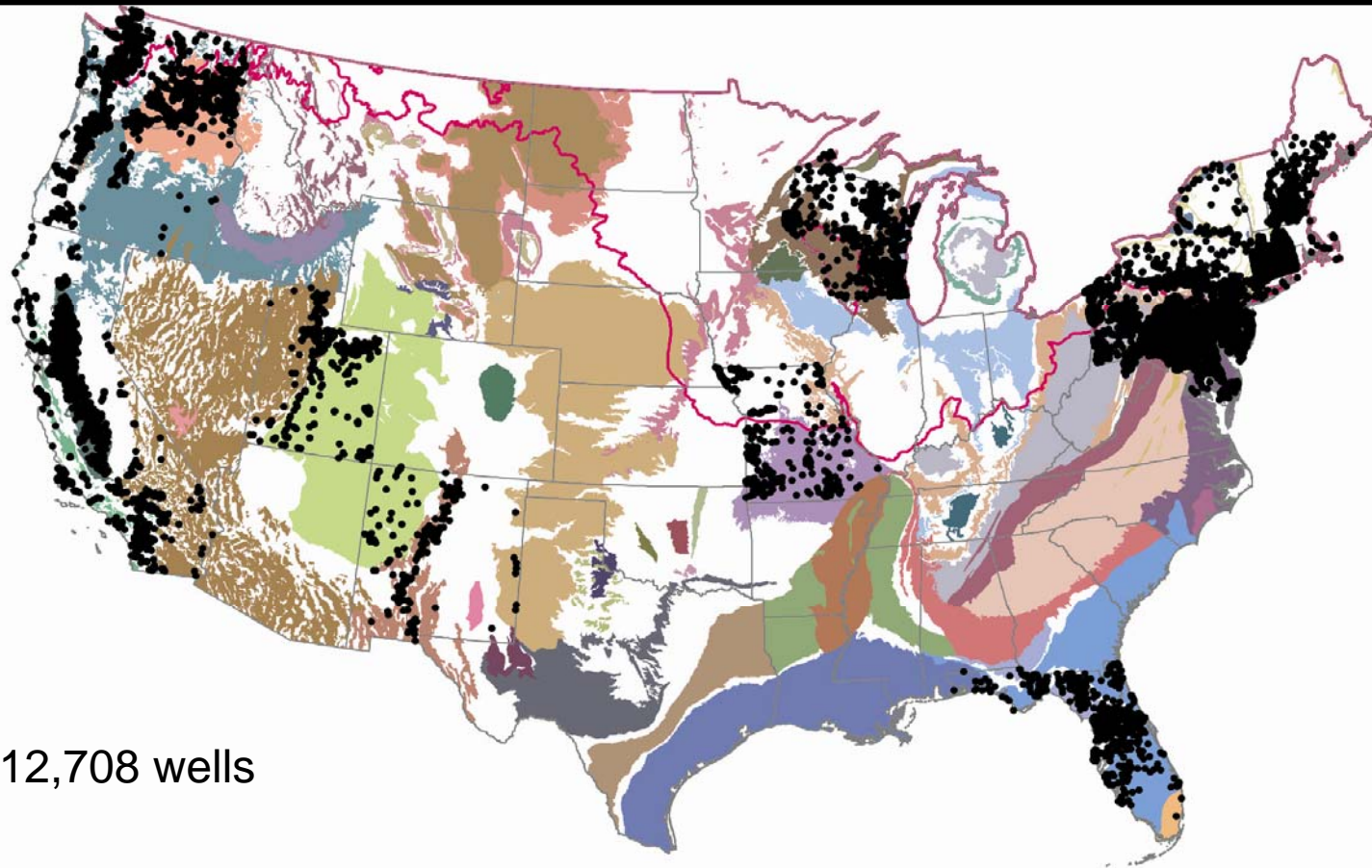
Consistent sampling and analytical protocols allow national, regional, and aquifer-wide comparisons of contaminant occurrence





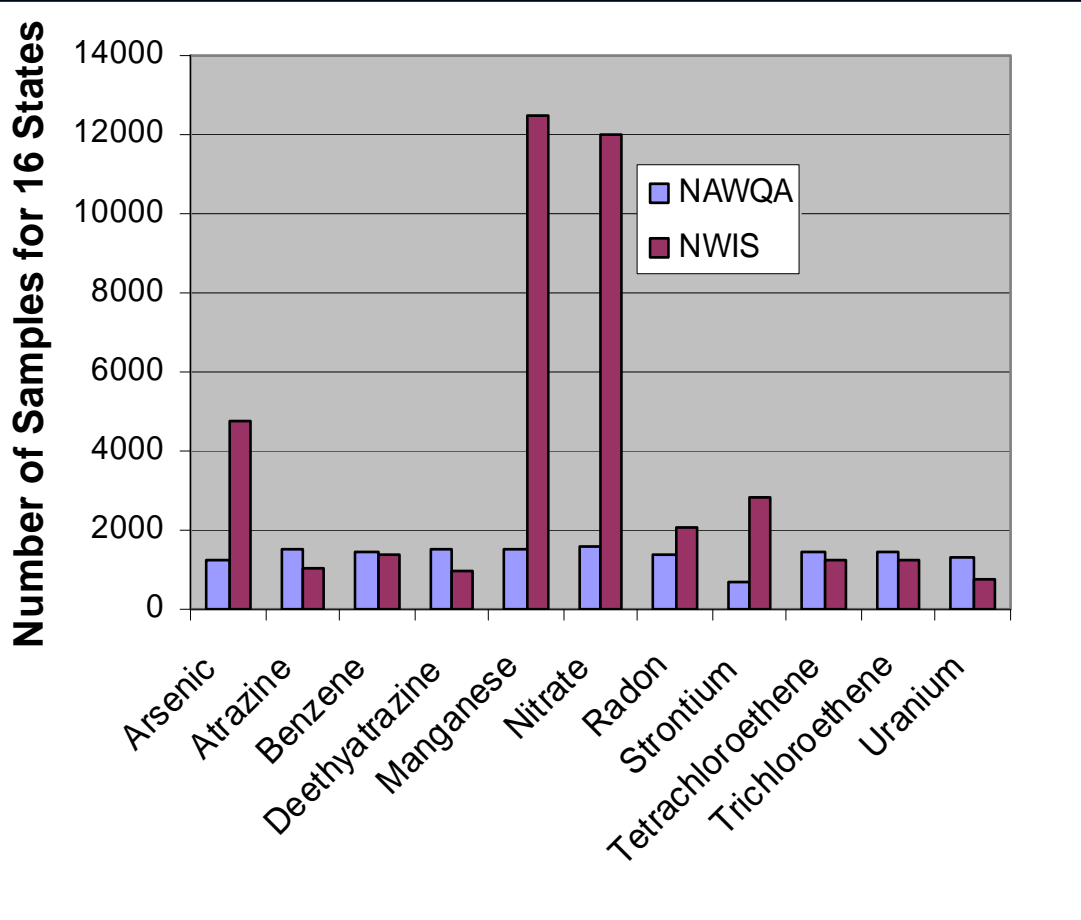
# Private Wells in NWIS Data Base 'USGS State Data'

Not to be used for occurrence comparisons. Used to provide spatial data



12,708 wells

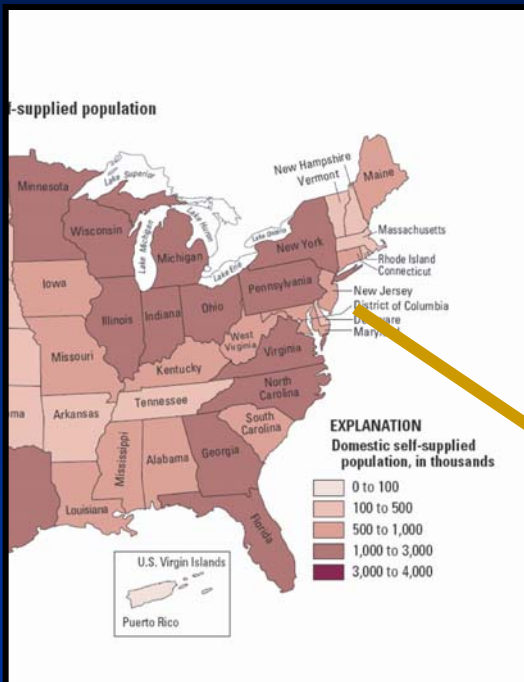
# Amount of NAWQA versus NWIS data varies by Constituent and from State to State



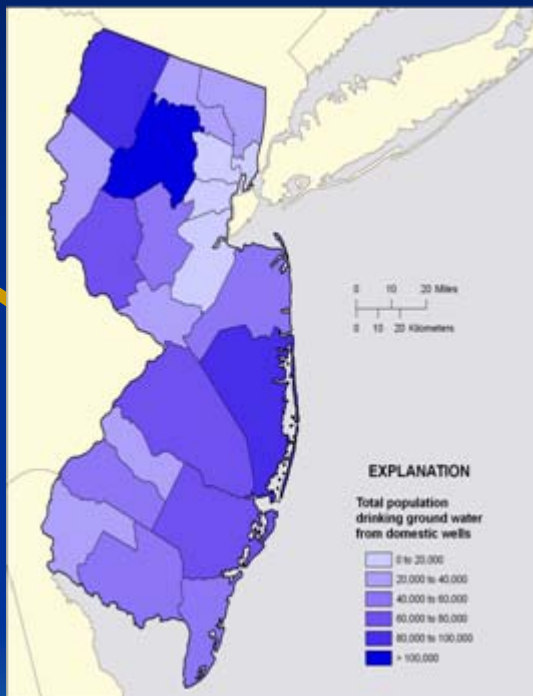
No. of Private Wells		
	NAWQA	NWIS
CA-arsenic	59	1555
WA-arsenic	29	641
CA-benzene	59	227
WA-benzene	58	117

# Water Use Data

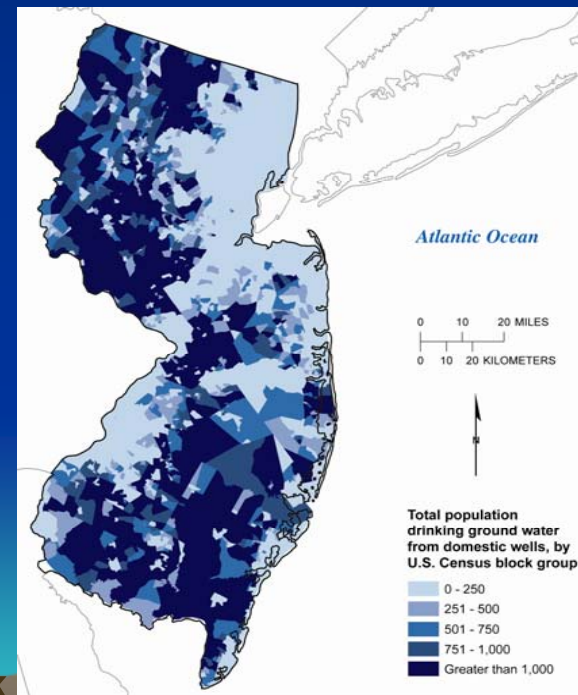
## 2000 State Data



## 2000 County Data (Appendix 9)



## 1990 Census Block Group



# Identification of Target Contaminants

- Using national data sets, 29 constituents were selected for consideration based on:
  - Frequent occurrence in ground water
  - Concentrations greater than human health benchmarks
- From these, 11 were selected on basis of:
  - Most frequently detected or highest concentrations
  - Identified as potentially important contaminants for human health (vs MCLGs, MCLs and LHAs)
  - Represent mix of natural and human-derived contaminants

# 11 Target Contaminants

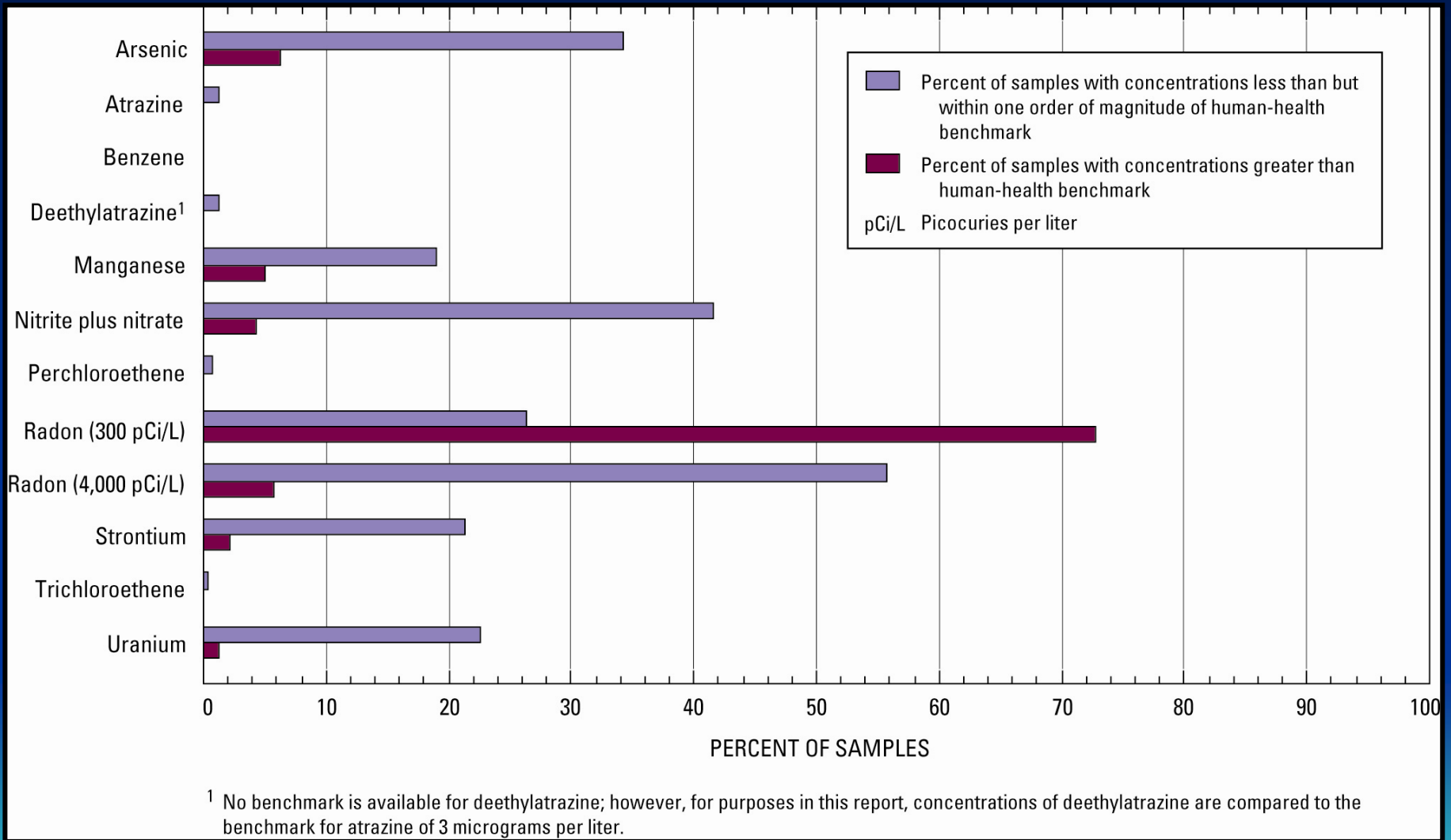
## Organics

- Atrazine
- Benzene
- Deethylatrazine (DEAT)
- Tetrachloroethene  
(Perchloroethene, PCE)
- Trichloroethene (TCE)

## Inorganics

- Arsenic
- Manganese
- Nitrate
- Radon
- Strontium
- Uranium

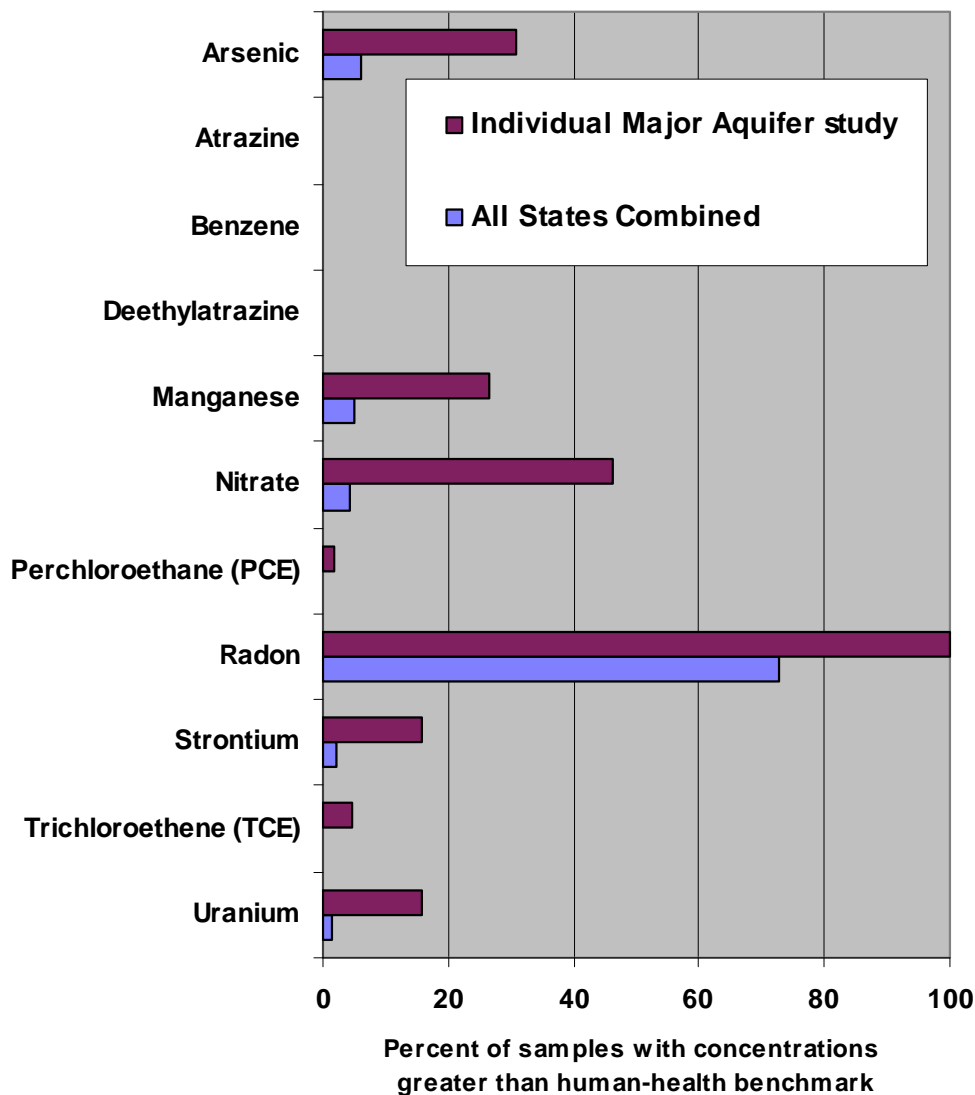
# Results for Combined State Data





# Analysis by Individual Aquifer Study indicates that some Constituents are more Important in certain Aquifers

Data for 32 Major Aquifer studies are summarized in Appendix 5



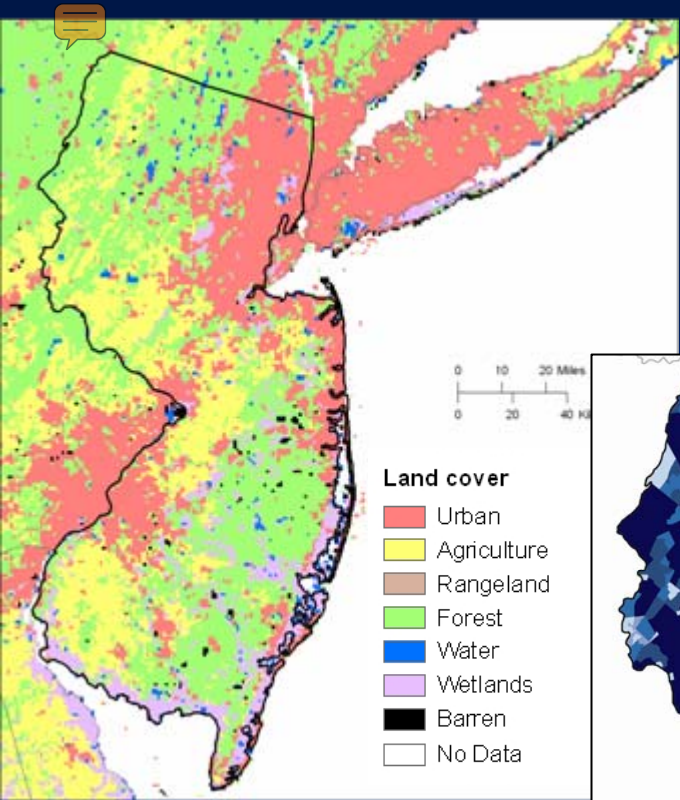




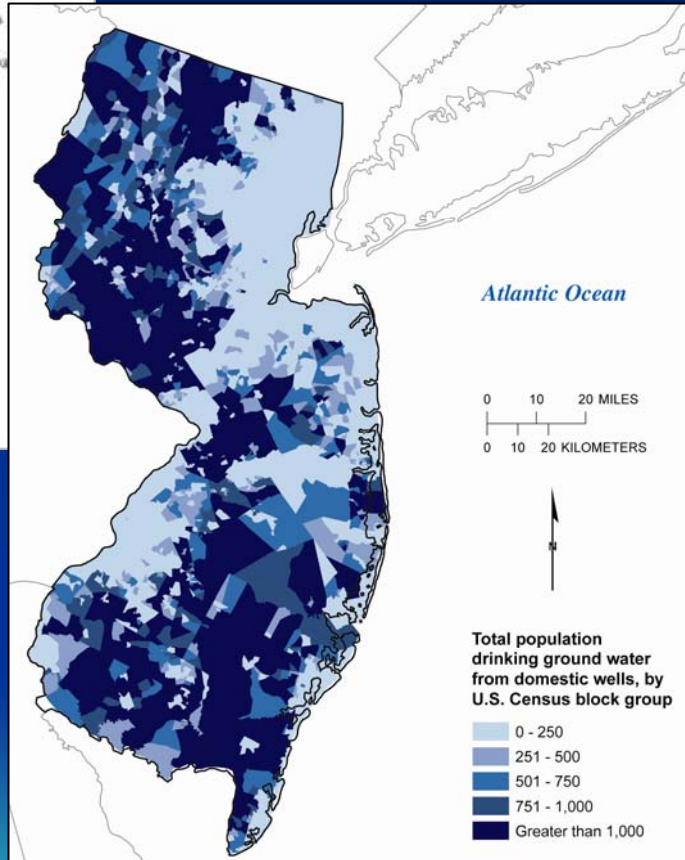
# Individual State Analyses-NJ Example

- **Provide each state with a consistent set of USGS data products and analyses including:**
  - **Data files**
  - **Summary Data Tables**
  - **Graphs and Map Figures**
  - **Executive Summary**
- **Each state has it's own appendix with links to all products on the report website**
- **Review examples produced for New Jersey**

# Define Environmental Setting

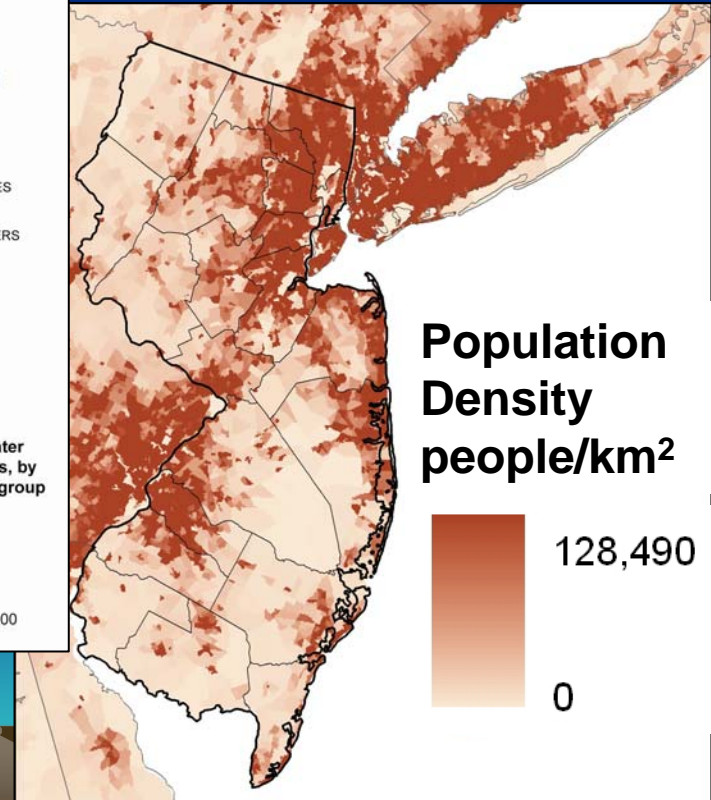


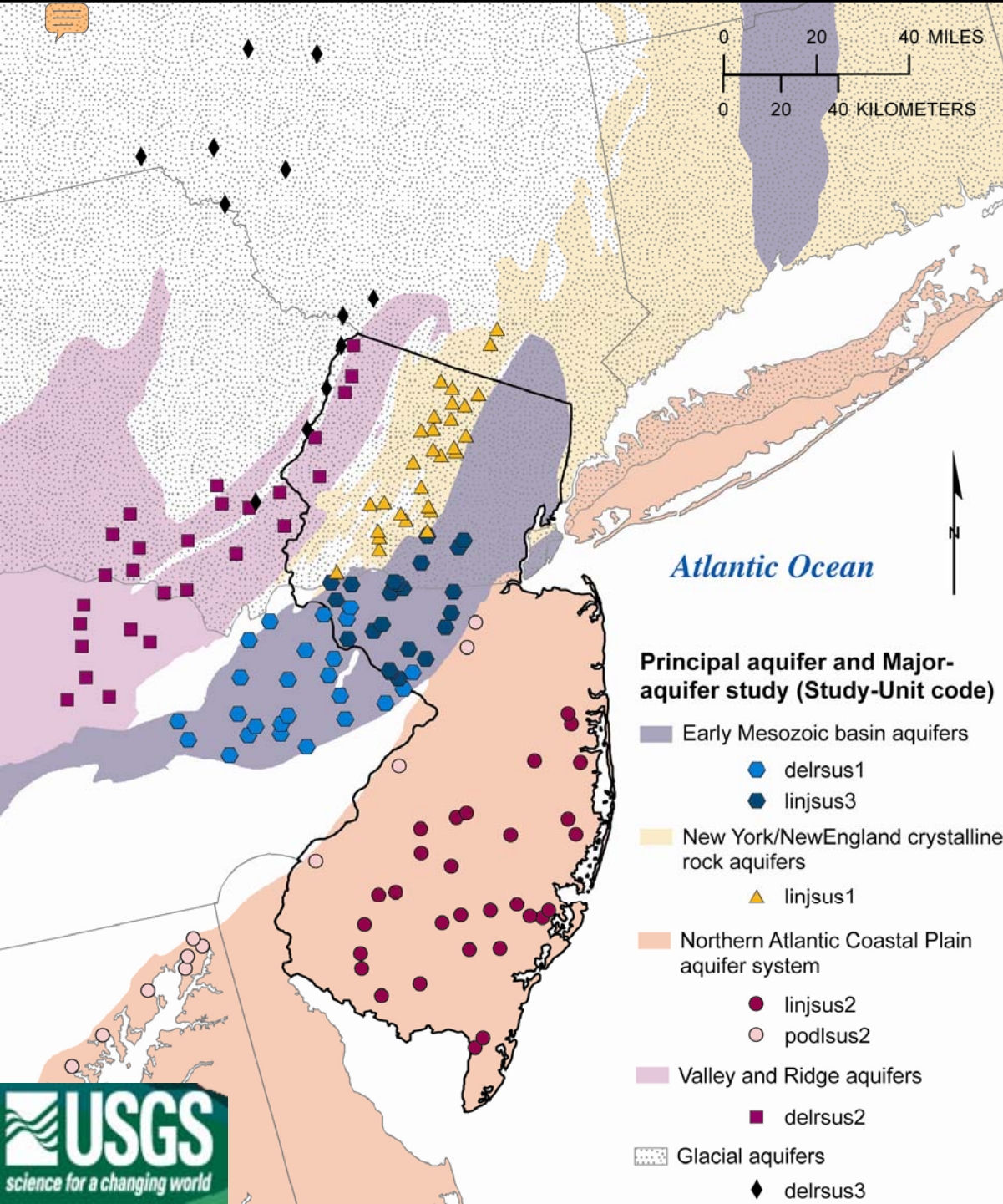
Land use



Water use

# Pop Density



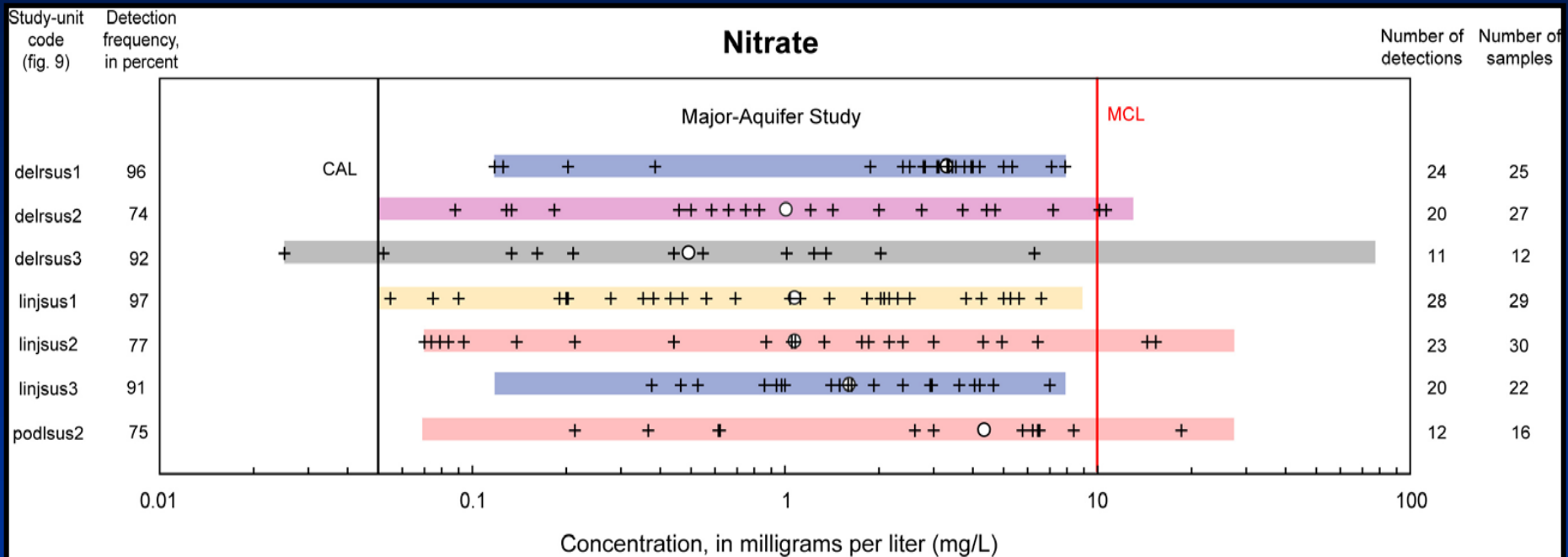


# Location map showing private wells in relation to principal aquifers of New Jersey

This map is for NAWQA wells. Note principal aquifer studies include wells outside of New Jersey.



# Summary Statistics were Calculated for all 11 Target Contaminants



## EXPLANATION

**Principal Aquifer** - Length of shaded bar represents the range of concentrations detected within the entire aquifer including samples collected outside the grantee State

- Early Mesozoic basin aquifers
- Valley and Ridge aquifers
- Glacial aquifers
- New York/New England crystalline-rock aquifers
- North Atlantic Coastal Plain aquifer system

**+** **Detected Concentration** - Concentrations are shown for all samples collected in the major-aquifer study without the application of a common assessment level

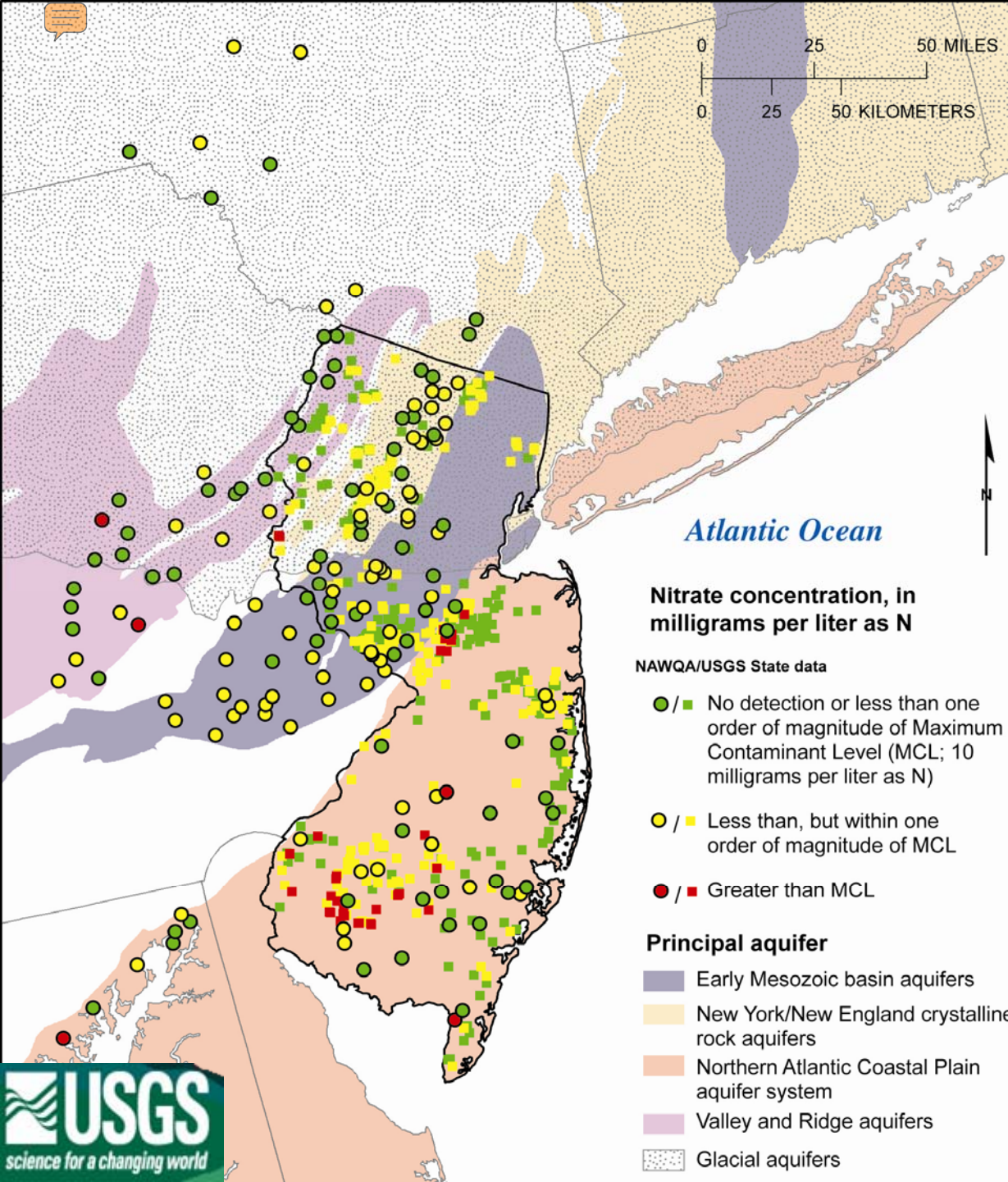
**|** Maximum Contaminant Level (MCL), Lifetime Health Advisory (HA), or proposed MCL

**|** Common assessment level (CAL)

**○** Median of all detections - no application of a common assessment level

96 Detection frequency, in percent, at the common assessment level

24 Number of detections at or above the common assessment level

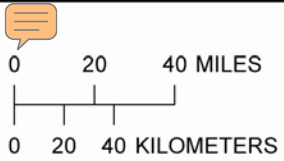


Map contaminant concentrations relative to human health benchmark

One map for each constituent

New Jersey: Nitrate





Canada

**EXPLANATION**

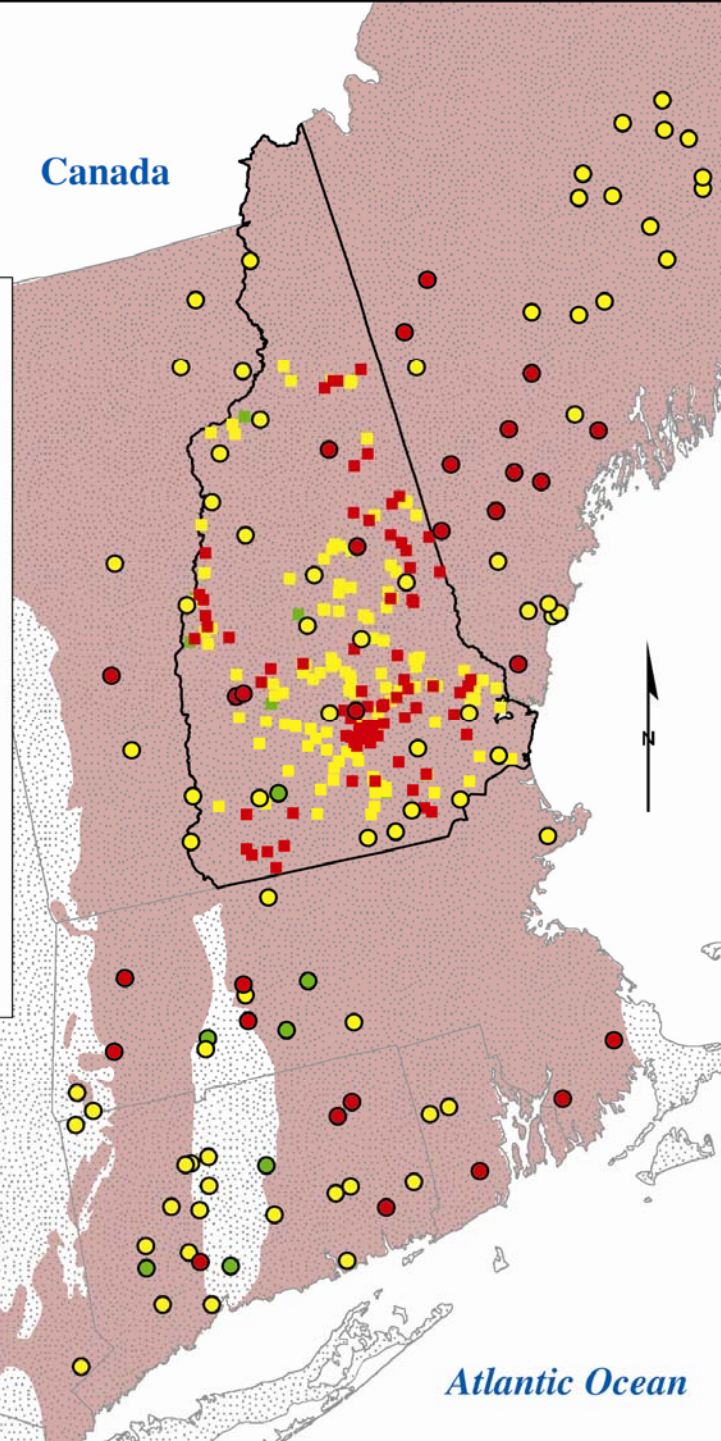
**Radon concentration, in picocuries per liter**

NAWQA/USGS State data

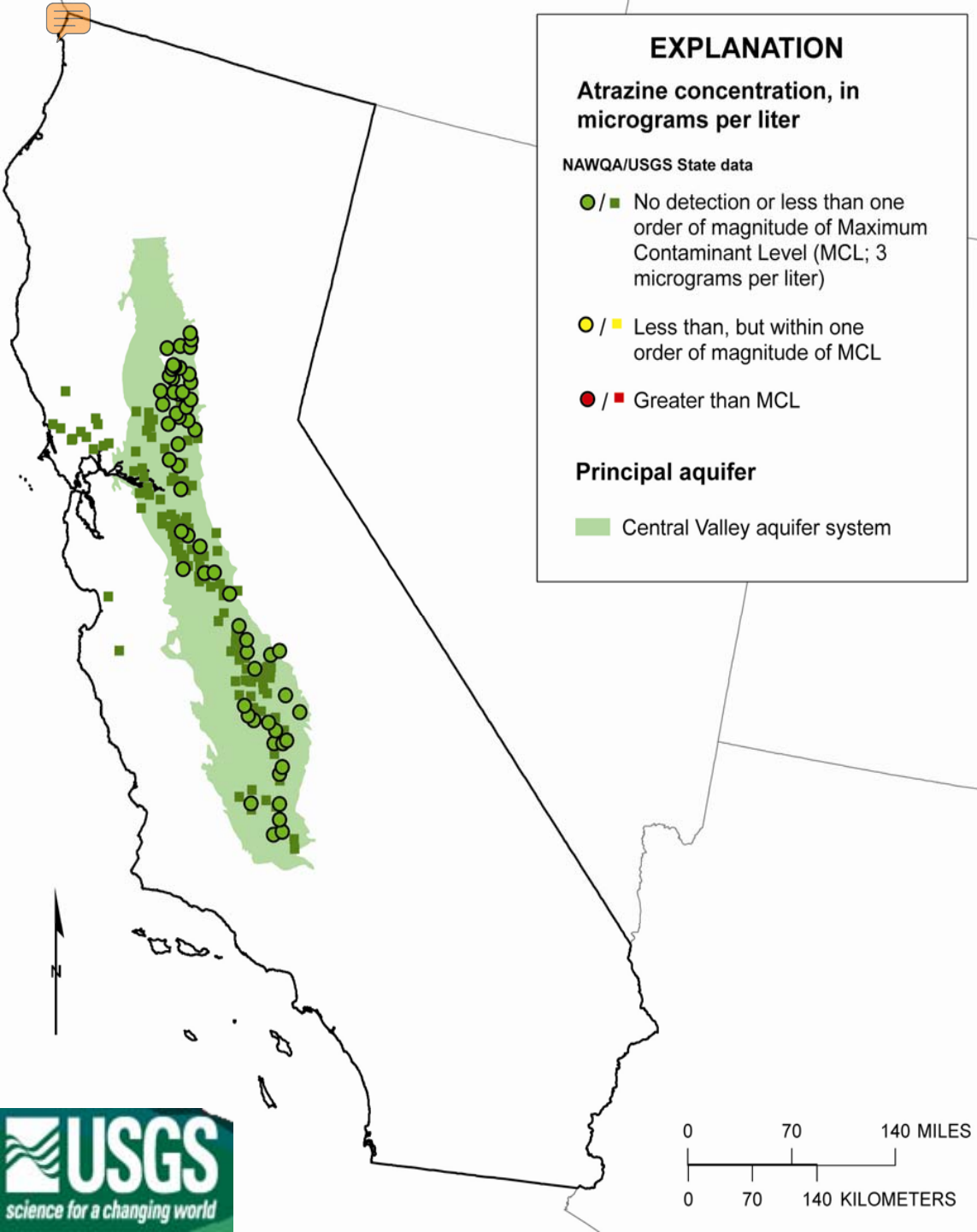
- / ■ No detection or less than proposed Maximum Contaminant Level (proposed MCL; 300 picocuries per liter)
- / ■ Greater than proposed MCL and less than alternative proposed MCL (AMCL; 4,000 picocuries per liter)
- / ■ Greater than AMCL

**Principal aquifer**

- New York/New England crystalline-rock aquifers
- Glacial aquifers



**New Hampshire:  
Radon**



# California: Atrazine



# Features of State Summaries

- Description of environmental setting
  - Consistent set of tables, graphs, and maps
- **Description of NAWQA/USGS State data available for the state**
- Discussion of important contaminants (based on frequent occurrence, no of exceedances)
- **Discussion of contaminant occurrence as a function of land use and hydrogeology**
- Selected USGS reports for each state

# On-line Citation



Prepared in cooperation with the Centers for Disease Control and Prevention

## Summary of Selected U.S. Geological Survey Data on Domestic Well Water Quality for the Centers for Disease Control's National Environmental Public Health Tracking Program

Scientific Investigations Report 2007-5213

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

<http://pubs.usgs.gov/sir/2007/5213/>

# Additional Information: General

- **Appendix 1. Description of Selected USGS Databases**
  - **National Water-Quality Assessment Database**
  - **Water-Use Data by County**
  - **National Water Information System Database**
  - **National Stream Quality Accounting Network Database**
  - **National Atmospheric Deposition Program/National Trends Network Database**
  - **Health-Based Screening Level Database**
- **Appendix 2. Selected USGS References for Additional Information**
  - **References for GW Flow (Aquifer Characteristics) / SW Flow**
  - **References for Water Chemistry**
  - **References for Contaminant Models (SW and GW)**
  - **References for Water Use**

# Additional Information: Data Files

- **Appendix 3. Spreadsheets containing all NAWQA data**
- **Appendix 4. Spreadsheets containing all USGS State data**
- **Appendix 5. Spreadsheets containing all NAWQA data by major-aquifer study**
- **Appendix 6. Spreadsheets containing NAWQA data by individual state**
- **Appendix 7. Spreadsheets containing NAWQA data by individual state by major-aquifer study**
- **Appendix 8. Spreadsheets containing USGS State data for EPHT Grantee States**
- **Appendix 9. Spreadsheets Containing USGS Water-Use Data**

# Future NAWQA Reports

## Reports planned summarizing:

**Domestic-well water quality (Fall 2008)**

**Source-Water Quality Assessment studies-SW and GW (Fall 2008)**

**Radionuclides in Ground Water (U, Ra, and Rn)**

**Public supply-well water quality (Fall 2009)**

**Ground-water quality of selected Principal Aquifers (next 2-3 years)**

**<http://water.usgs.gov/nawqa/>**