The New Jersey Private Well Testing Program: An Evaluation of Domestic Well Water Quality in New Jersey

By

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Presented December 2, 2011

NJ Water Monitoring Summit

Private Wells in New Jersey

- Estimated that there are 400,000 private wells in New Jersey.
- Estimated that 13% of the population (1,130,000 people) have private wells for their drinking water supply.

New Jersey Private Well Testing Act - Summary of Rules

- Program began September 2002
- Testing is required when a property is sold, or if a property is leased.
- Chemical results are valid for 1 year, fecal coliform/E. coli results for 6 month.
- Data is confidential.
- Primarily a Right-to-Know Statute

Sampling Requirements

- Samples are **raw water** collected before any treatment.
- Certified laboratories collect and analyze samples.

What does PWTA Measure?

PRIMARY STANDARDS

Total Coliform (if positive, fecal or E. coli)

26 Volatile Organic Chemicals with MCLs

Inorganics

- Arsenic (12 northern counties)
- Mercury (9 southern counties)
- Nitrates

Radiological

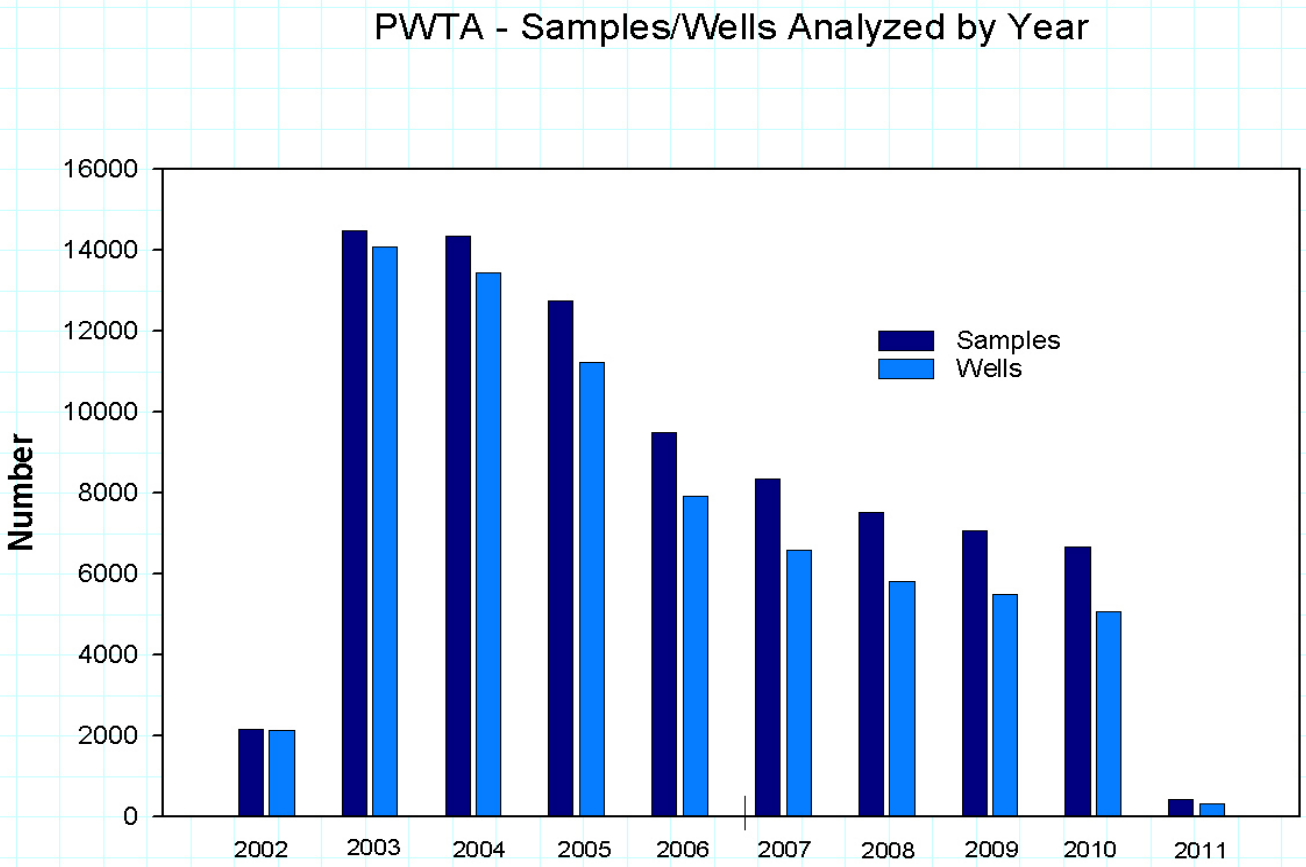
- Gross Alpha (12 southern and central counties)

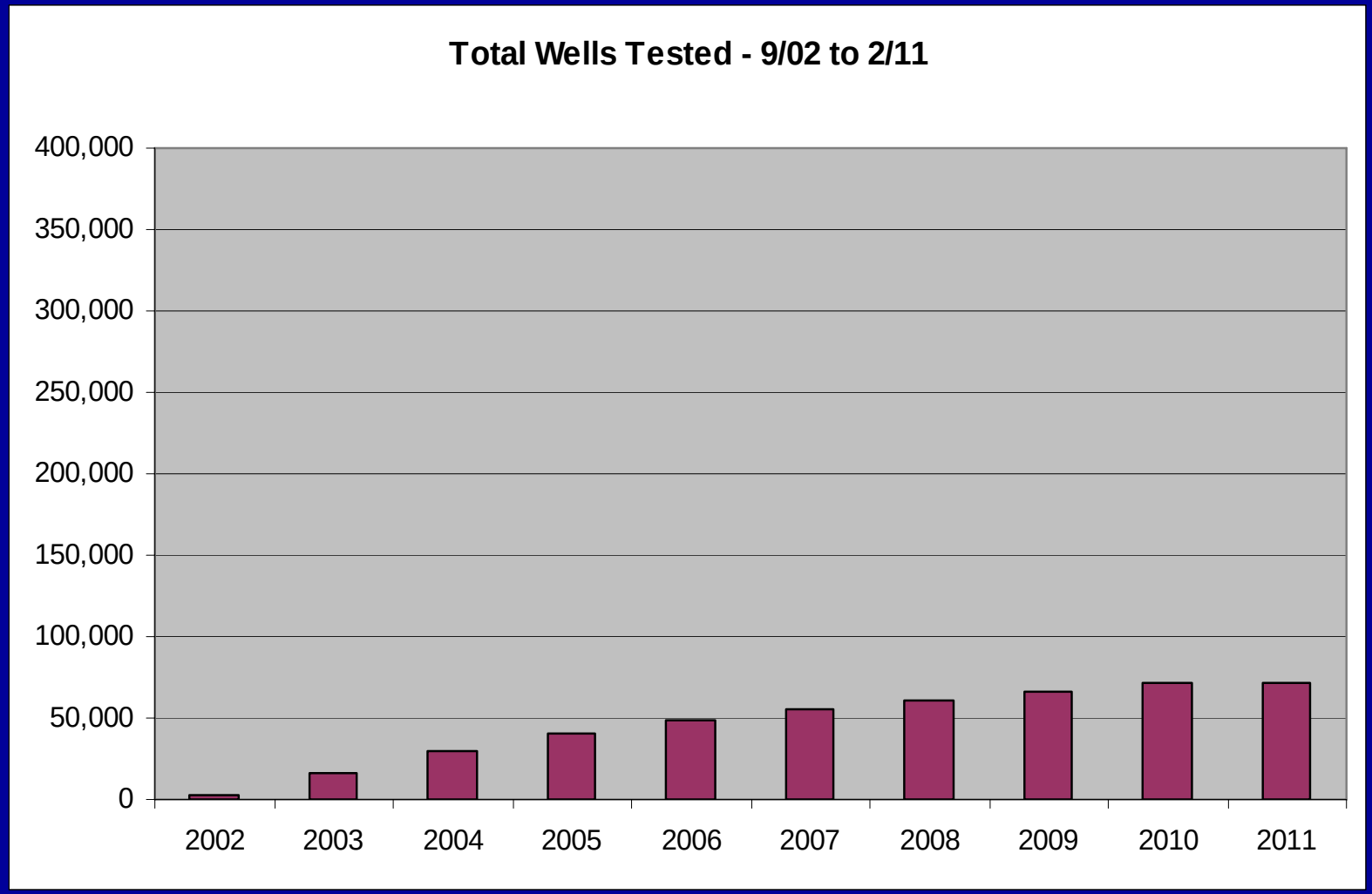
SECONDARD STANDARDS

- Iron, Manganese & pH

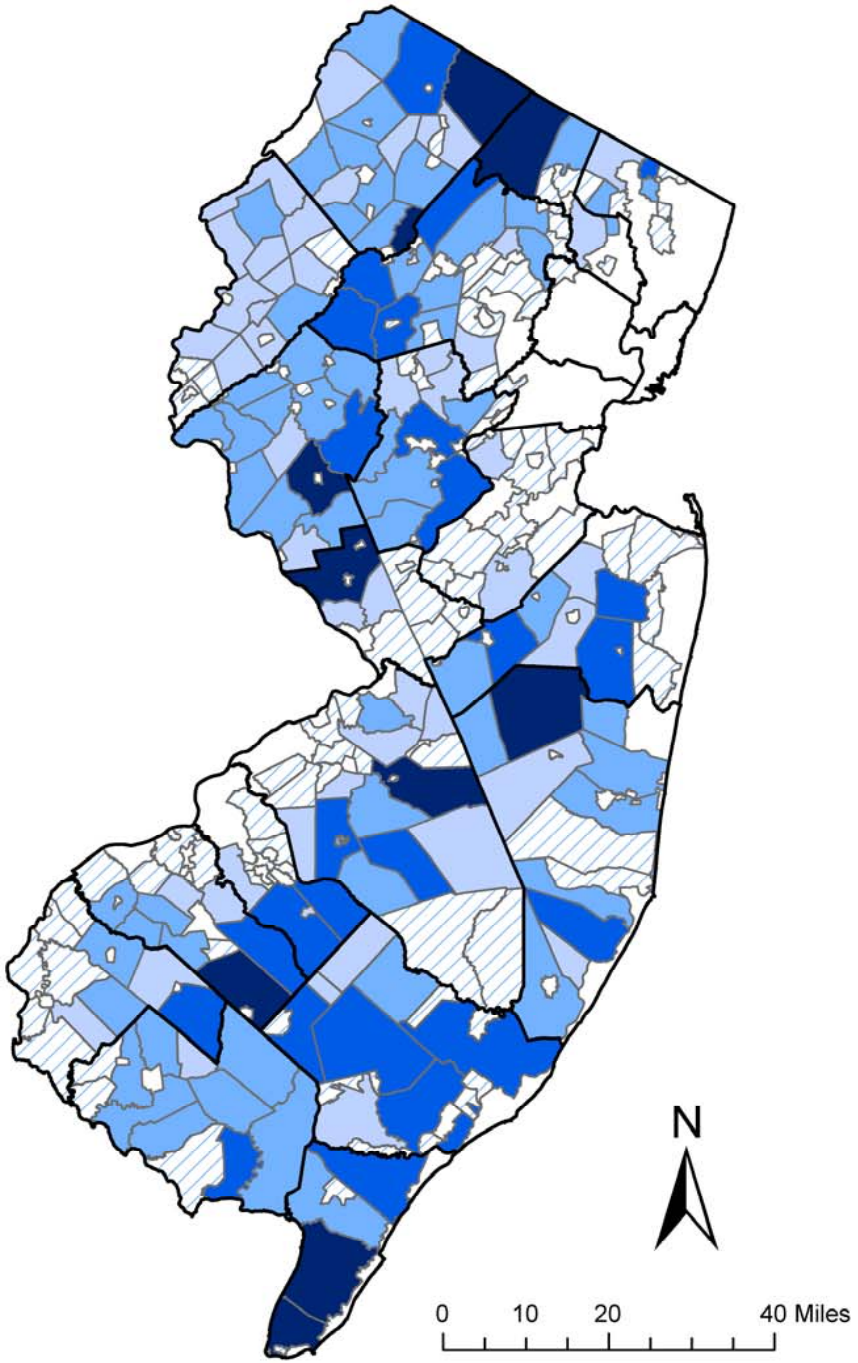
Data Required

- Location – Address, Block, Lot, Municipality, County, XY Coordinates
- Analytical Results
- Data is reported electronically from the laboratory to DEP, and stored in a database
- Data is available to county health officials


PWTA - Samples/Wells Analyzed by Year
Number
16000
14000
12000
10000
8000
6000
4000
2000
0
Samples
Wells
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011


Total Wells Tested - 9/02 to 2/11
400,000
350,000
300,000
250,000
200,000
150,000
100,000
50,000
0
2002
2003
2004
2005
2006
2007
2008
2009
2010
2011

Number of Private Wells Tested in NJ Municipalities



Physiographic Provinces of New Jersey

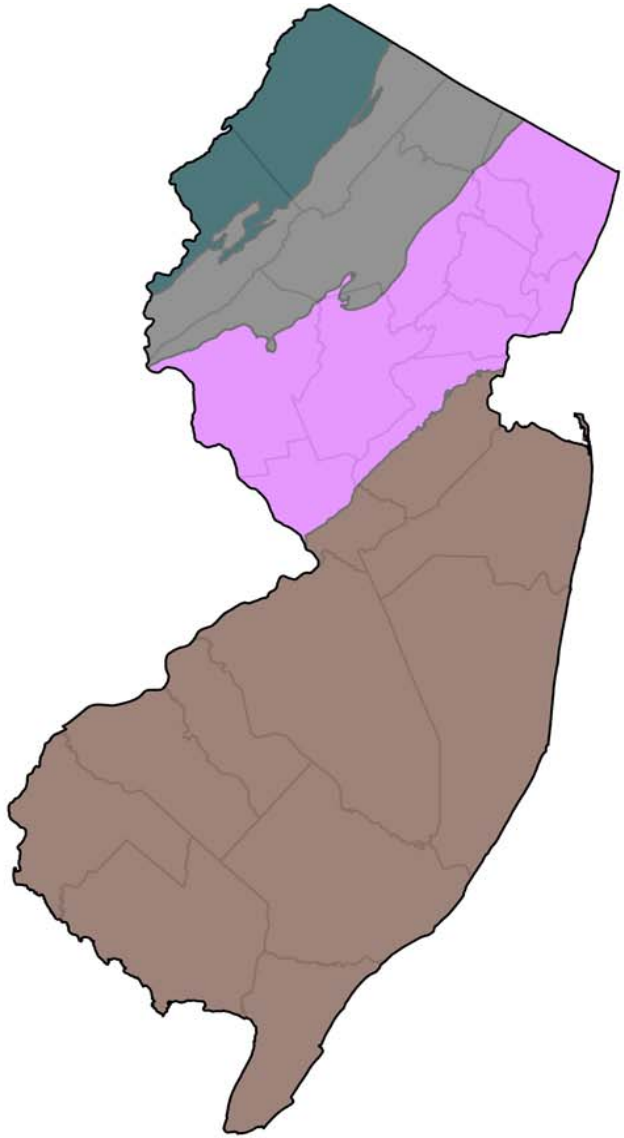
Provinces

Valley and Ridge
meta-sediments and limestones
fracture and cavernous flow

Highlands
granites and schists
limited fracture flow

Piedmont (Newark Basin)
marine shales and sandstone
fracture and bedding plane flow

Coastal Plain
unconsolidated sands, gravels and clay
porous flow



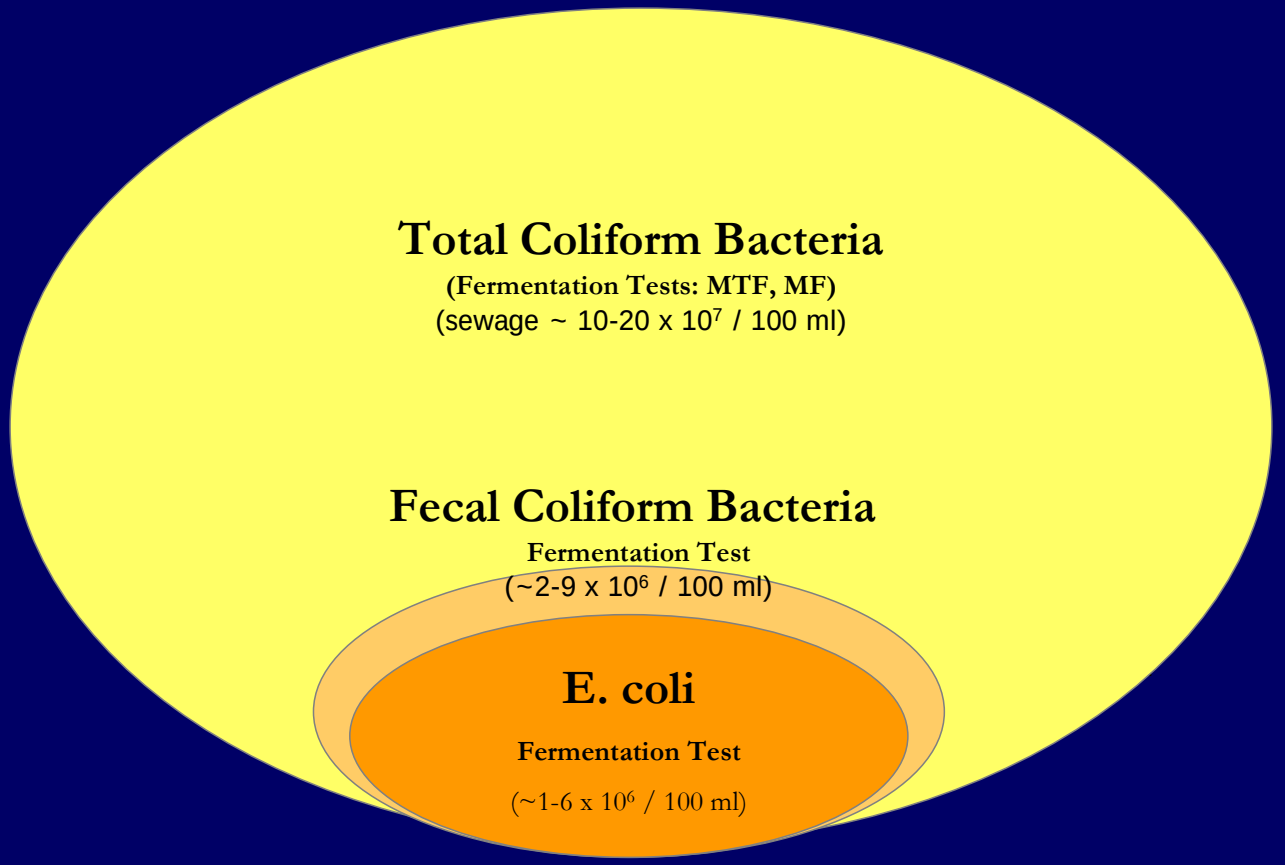
Contaminants with Primary MCLs

Private Well Data

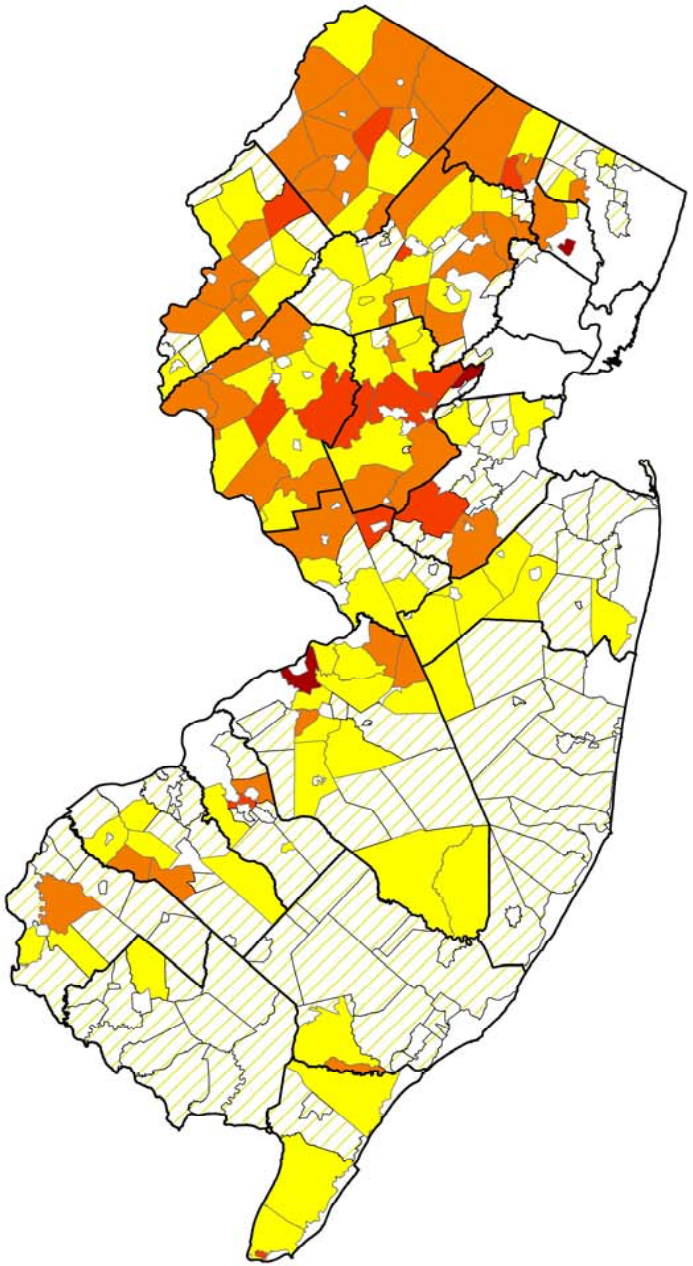
- September 2002 – April 2009
- 70,954 Samples
- 63,036 Individual Wells

Total Coliform – Fecal Coliform/E. coli

Relationship of Coliform Groups



Private Well Testing Act
Fecal Coliform/E.coli Positive Wells



Percent of Wells Testing Positive for Fecal Coliform/E.coli

- 0 to 9 Wells Tested
- less than or equal to 1%
- >1 to 2.5%
- > 2.5 to 5%
- > 5 to 10%
- >10 - 15%

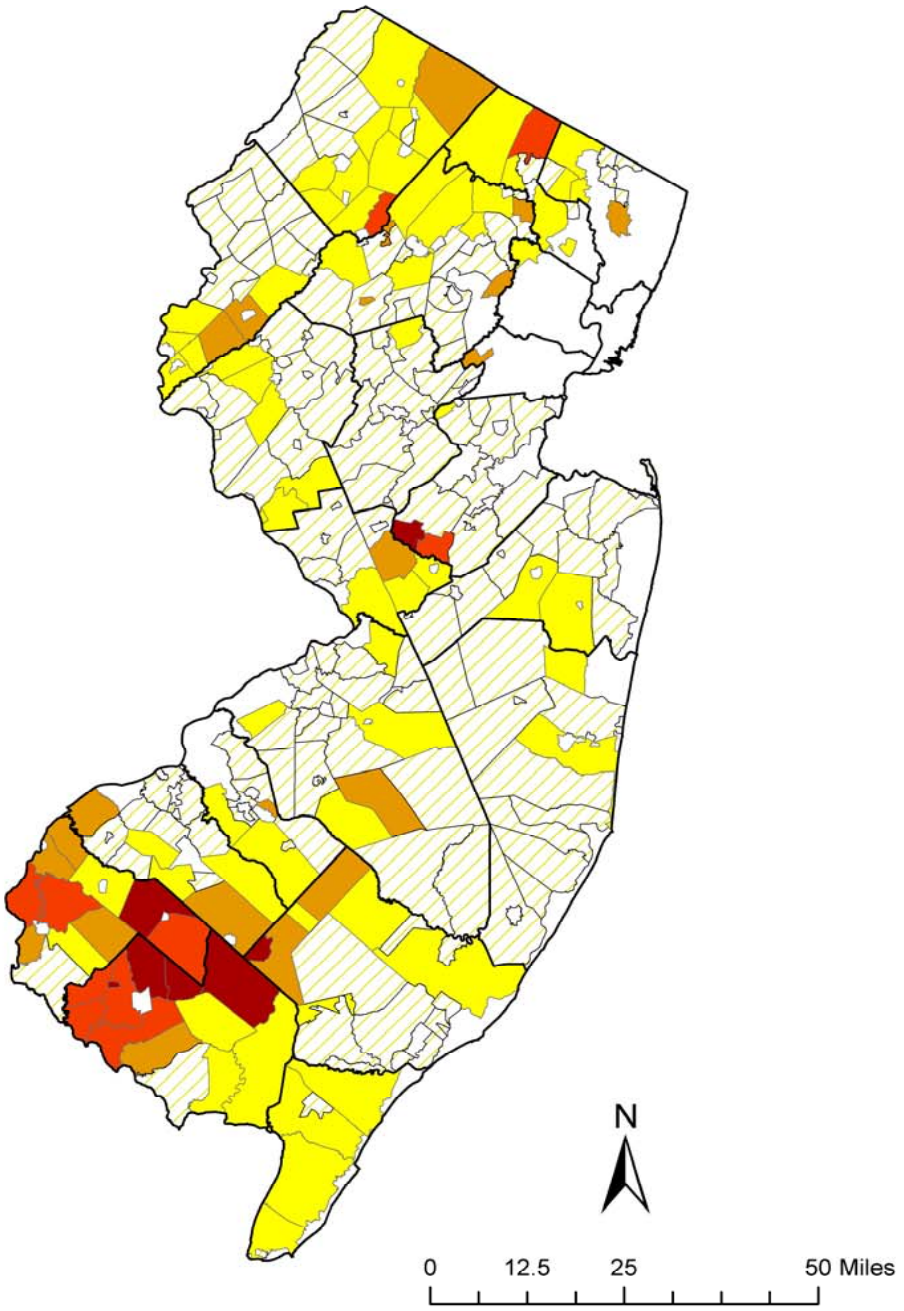
N

0 20 40 80 Miles

Fecal Coliform Exceedances
Overall 1.9% of the Wells Tested Positive

Province	**% Positive**
Valley and Ridge	3.5%
Highlands	2.3%
Piedmont	3.3%
Coastal Plain	0.9%

PWTA Results by Municipality
Nitrate Exceedances



Percent of Wells Exceeding the Nitrate Standard

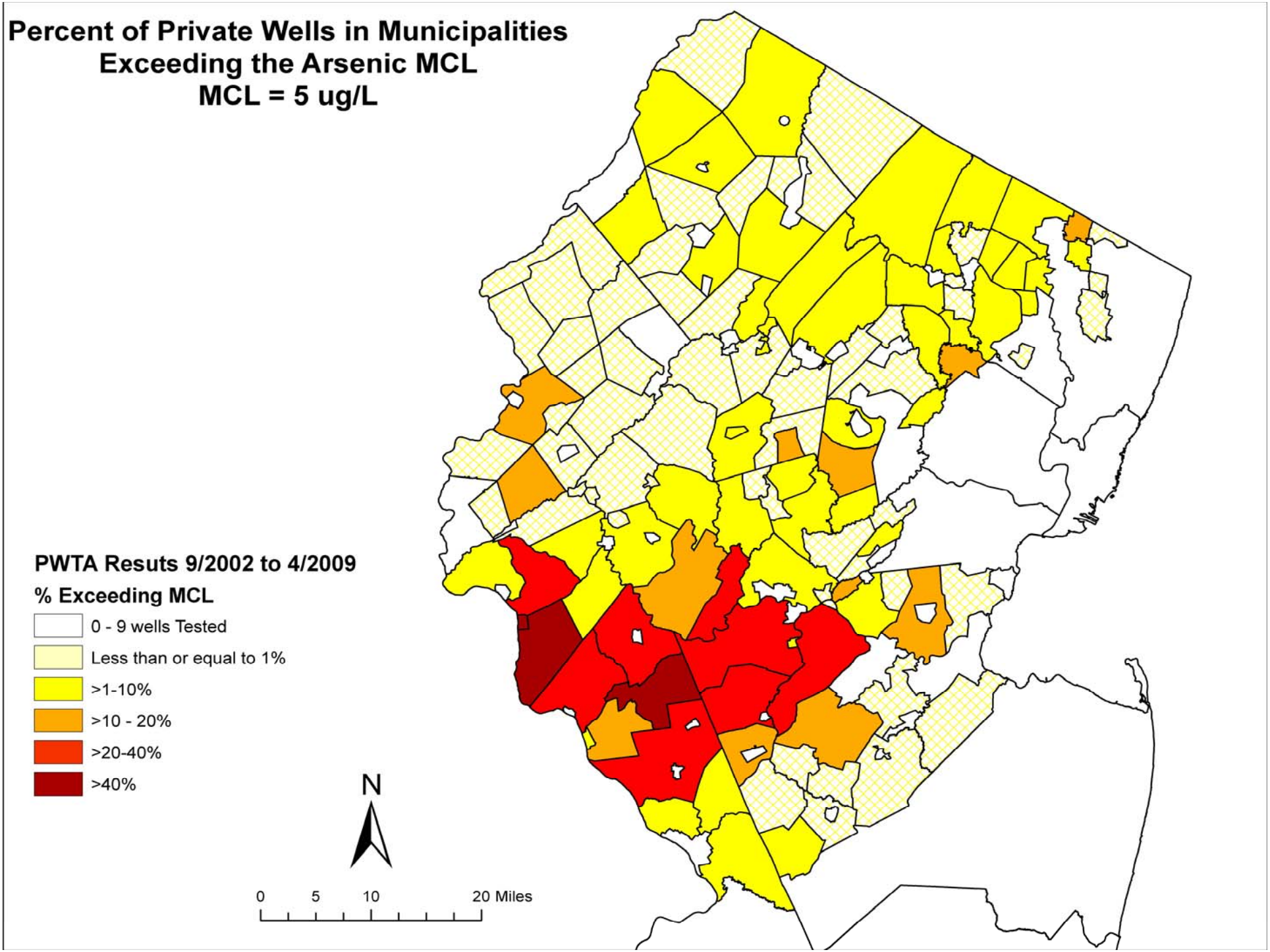
MCL = 10 mg/l

- 0 to 9 Wells Tested
- Less than or equal to 1%
- >1% to 5%
- >5% to 10%
- >10% to 20%
- >20%

Nitrate Exceedances Overall 2.9% of Wells

Province	% Exceedance of MCL
Valley and Ridge	1.3%
Highlands	3.4%
Piedmont	0.8%
Coastal Plain	3.7%

Percent of Private Wells in Municipalities Exceeding the Arsenic MCL
MCL = 5 ug/L

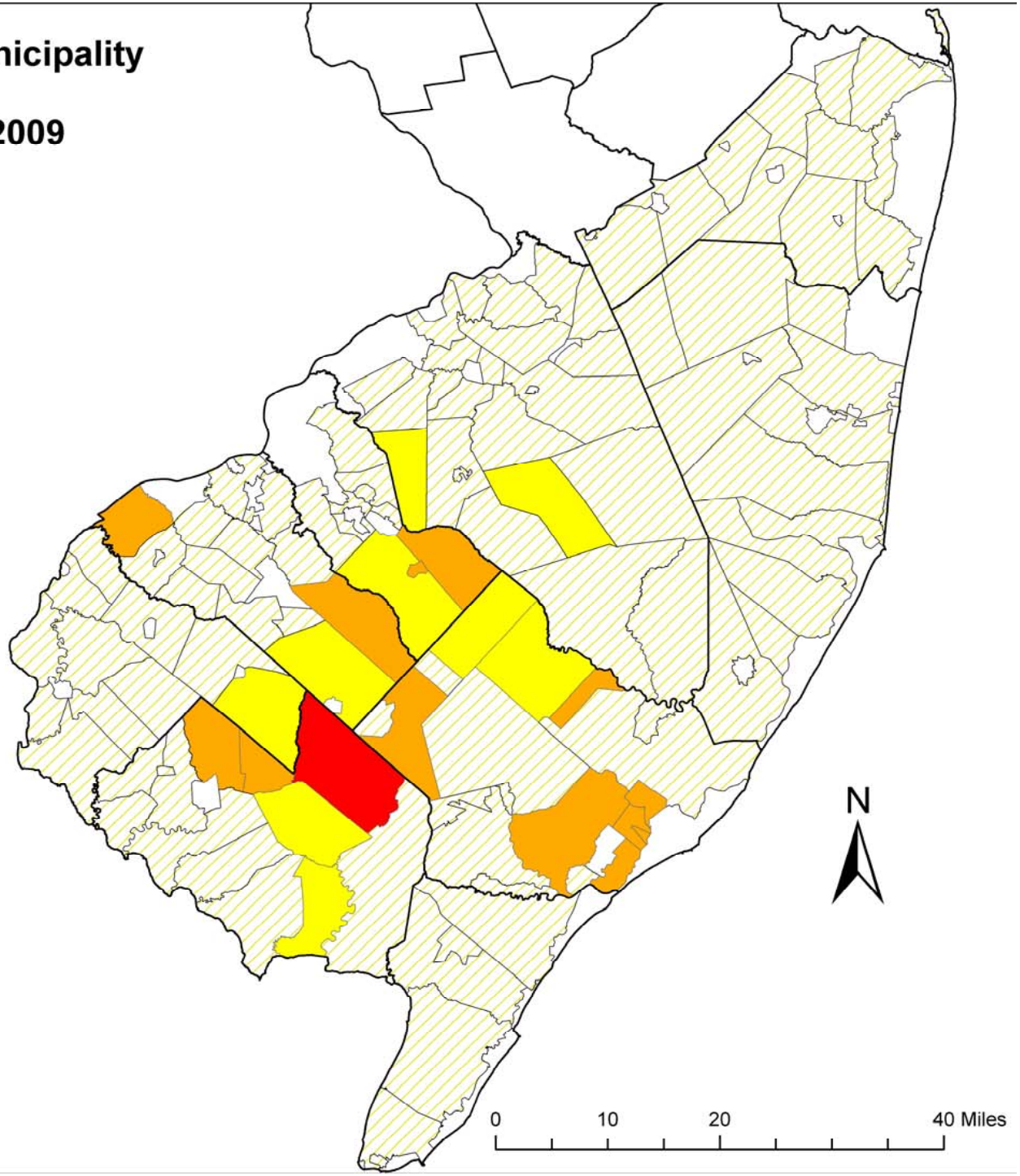


Arsenic Exceedances

Overall 11.2% exceed the NJ MCL, 3.6% exceed the Federal MCL

Province	Exceedance of NJ Standard (5 ug/l)	Exceedance of Federal Standard (10 ug/l)
Valley and Ridge	1.4%	0.5%
Highlands	1.2%	0.5%
Piedmont	16.8%	5.6%
Coastal Plain	1.0%	0.7%

PWTA Mercury Results by Municipality
31,412 Wells Tested
September 2002 to April 2009



Percent Exceeding the Mercury MCL

MCL = 2 ug/l

- 0 to 9 Wells Tested
- less than or equal to 1%
- >1 to 2.5%
- >2.5 to 5%
- >5%

Mercury Exceedances

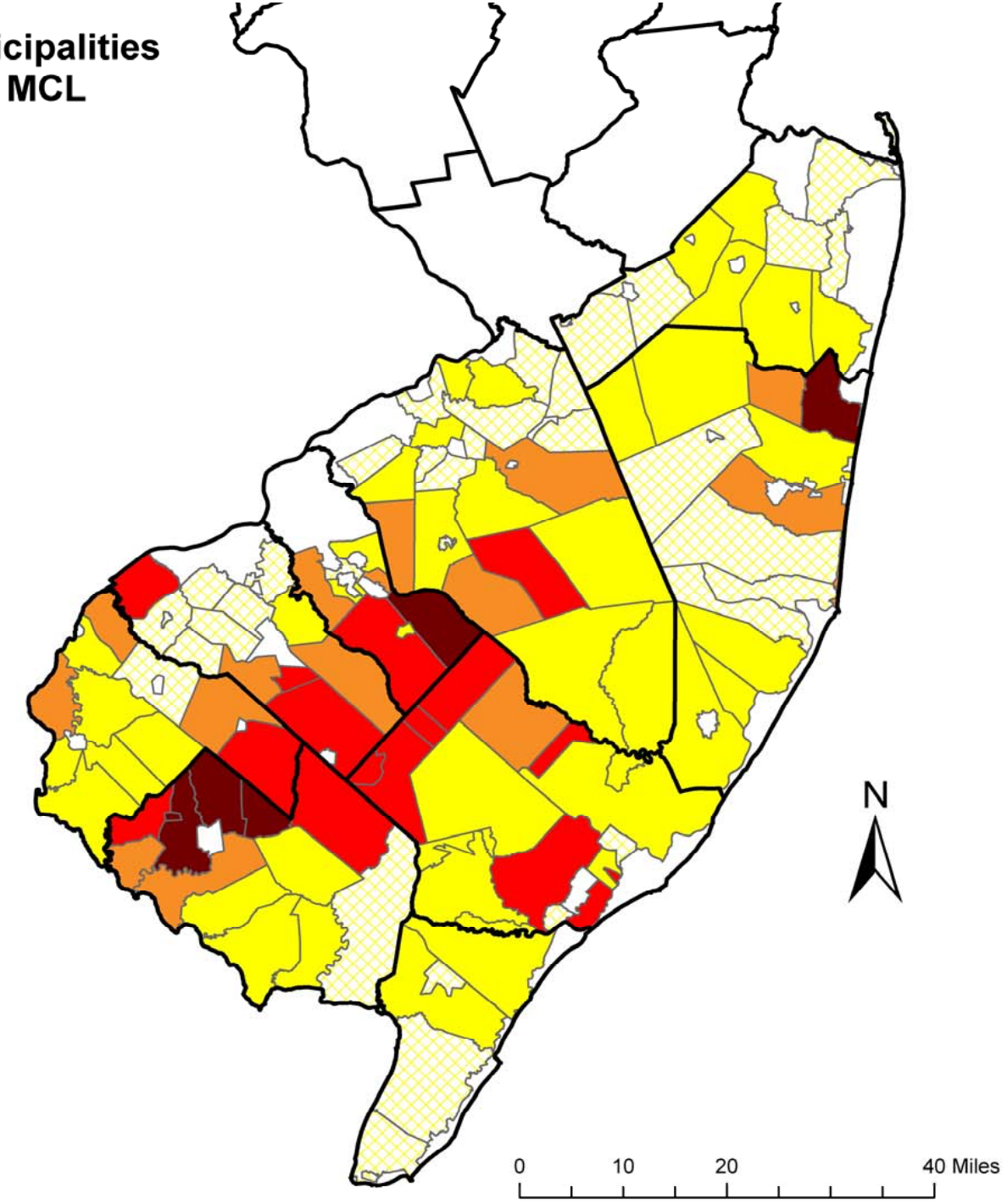
- 290 out of 31,635 wells (0.9%) exceeded the mercury standard of 2 ug/l
- Range - ND to 83.3 ug/l

Gross Alpha
New Jersey Method

- Radium 224, Radium 226, Radium 228

- New Jersey 48 hour Gross Alpha Test
  - First sample (24 hours), if gross alpha is greater than 5 pCi/l
  - Second sample (48 hours), if gross alpha >15pCi/l

Percent of Private Wells in Municipalities Exceeding the Gross Alpha MCL
MCL = 15 pCi/L



VOC table
Number Exceeding MCL

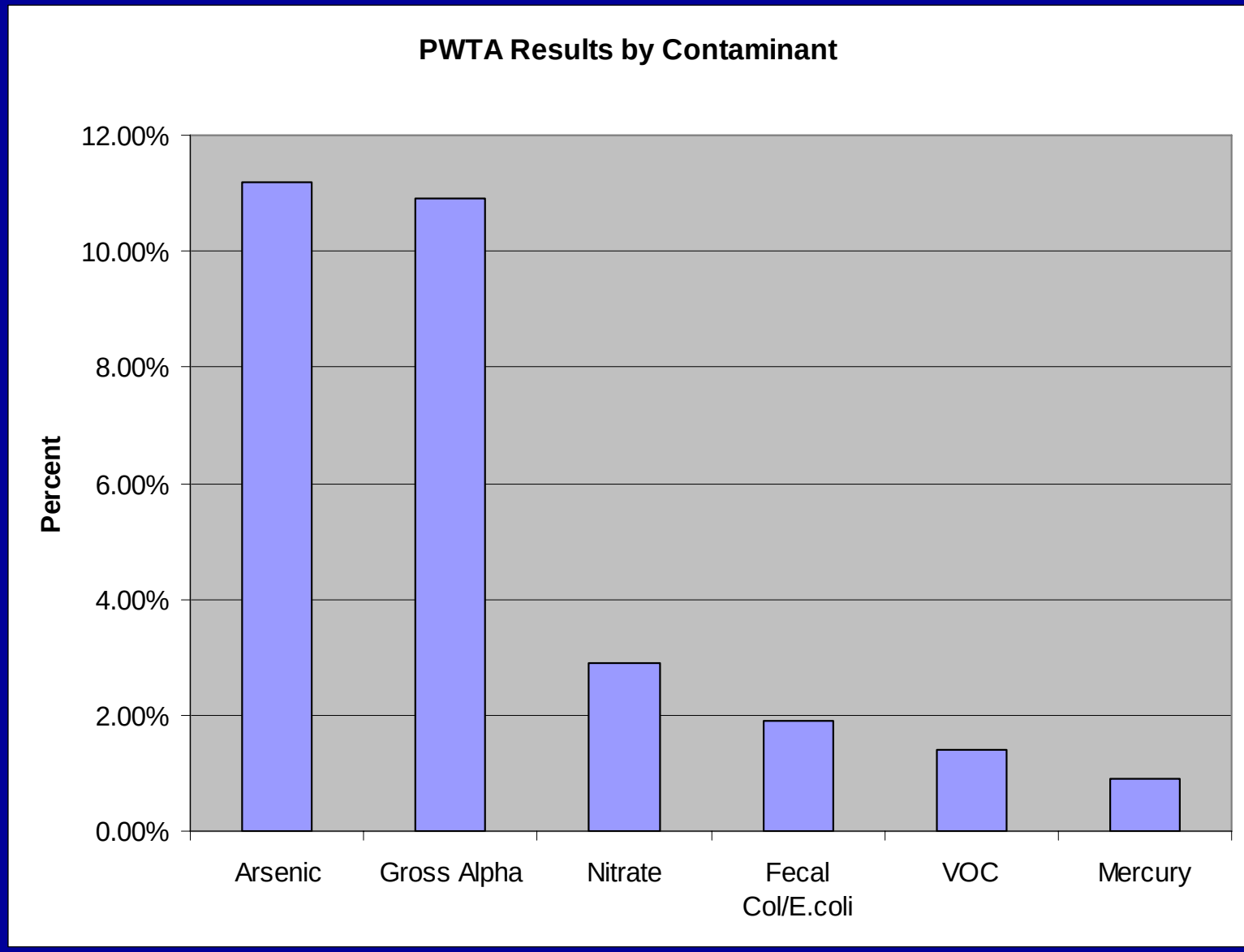
VOC	NJ MCL (ug/l)	Exceed MCL
Trichloroethylene	1	316 (0.50%)
Tetrachloroethylene	1	228 (0.36%)
Carbon Tetrachloride	2	83 (0.13%)
Benzene	1	79 (0.13%)
Methylene Chloride	3	58 (0.09%)
MTBE	70	42 (0.07%)

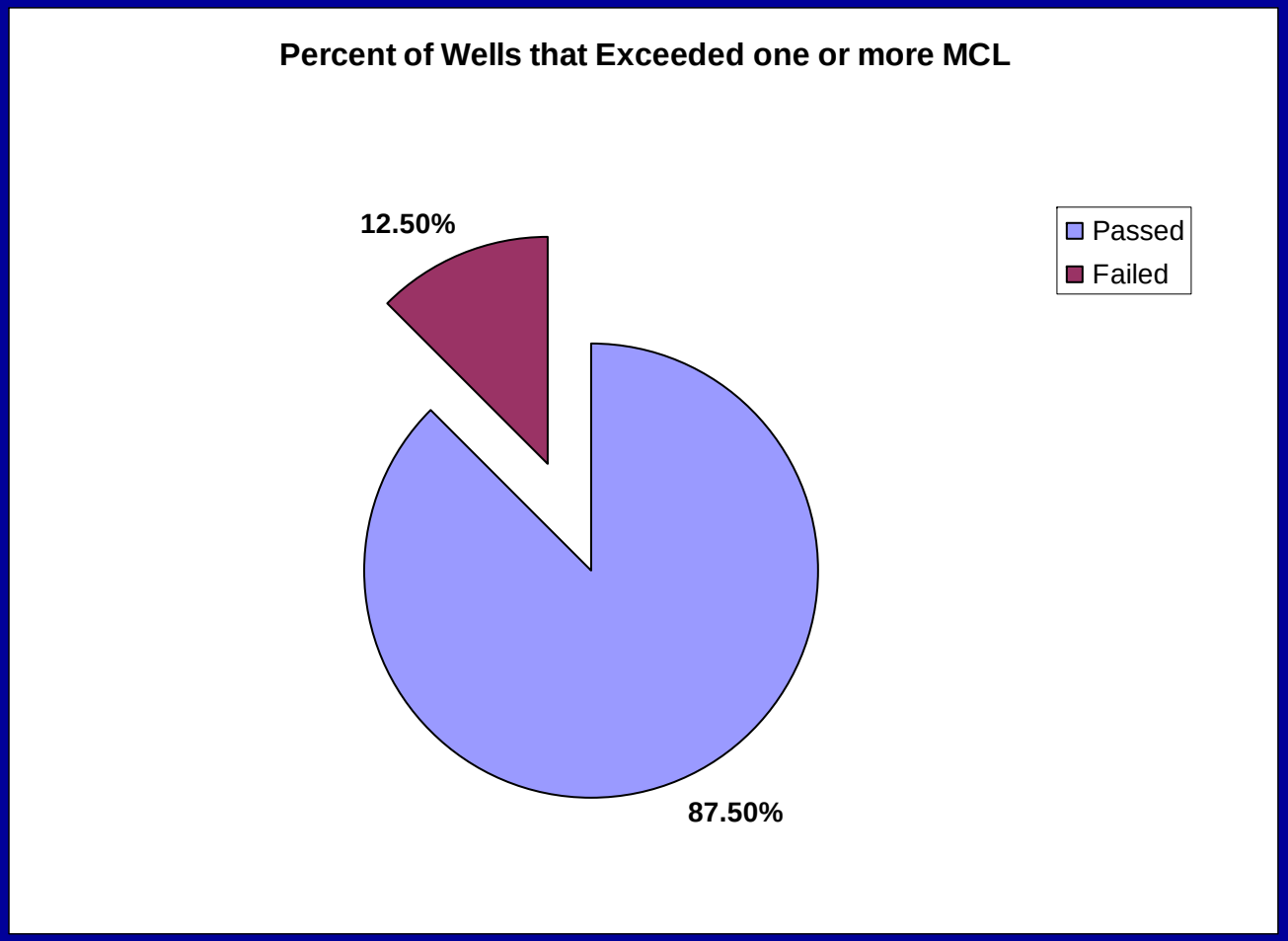
VOC Detected

VOC	Detected > 0.5 ug/l
MTBE	4,767 (7.56%)
Toluene	3,186 (5.05%)
Trichloroethylene	533 (0.85%)
Tetrachloroethylene	460 (0.73%)
1,1-Dichloroethane	444 (0.70%)
Methylene Chloride	396 (0.63%)

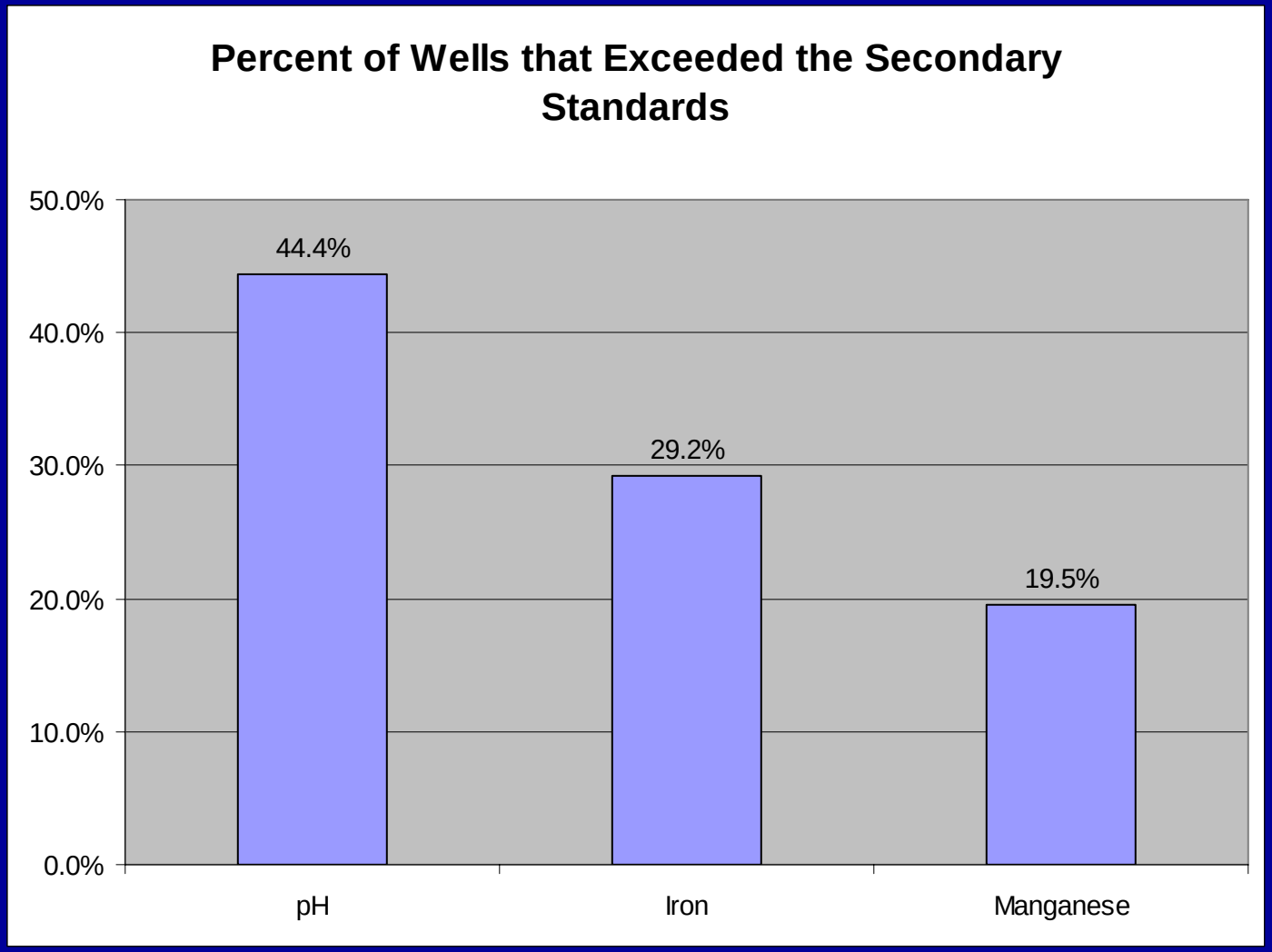
26 Volatile Organic Chemicals were analyzed in 63,063 Wells

- 1.4% of the wells exceeded the MCL for one or more VOCs
- 5 wells had 3 VOCs over their MCLs
- 63 wells had 2 VOCs over their MCLs

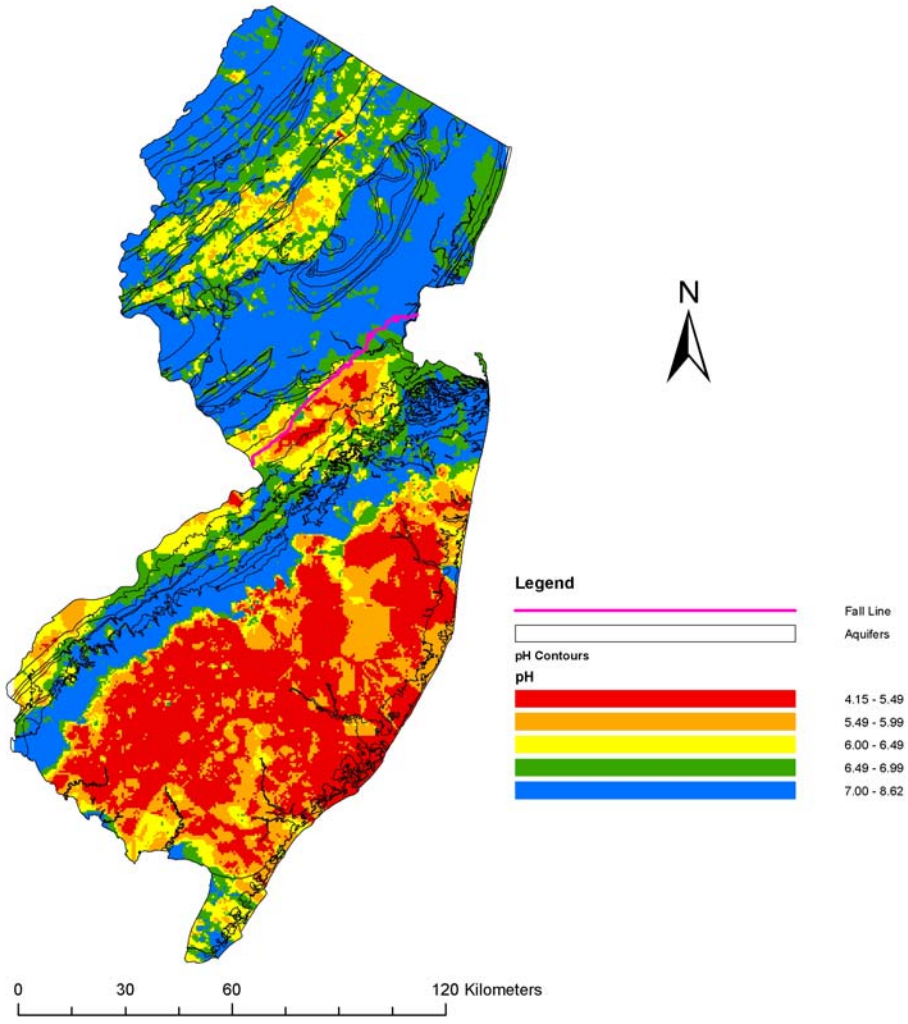

PWTA Results by Contaminant
Percent
12.00%
10.00%
8.00%
6.00%
4.00%
2.00%
0.00%
Arsenic
Gross Alpha
Nitrate
Fecal Col/E.coli
VOC
Mercury


Percent of Wells that Exceeded one or more MCL
12.50%
87.50%
Passed
Failed

Secondary Parameters


Percent of Wells that Exceeded the Secondary Standards
50.0%
40.0%
30.0%
20.0%
10.0%
0.0%
44.4%
29.2%
19.5%
pH
Iron
Manganese

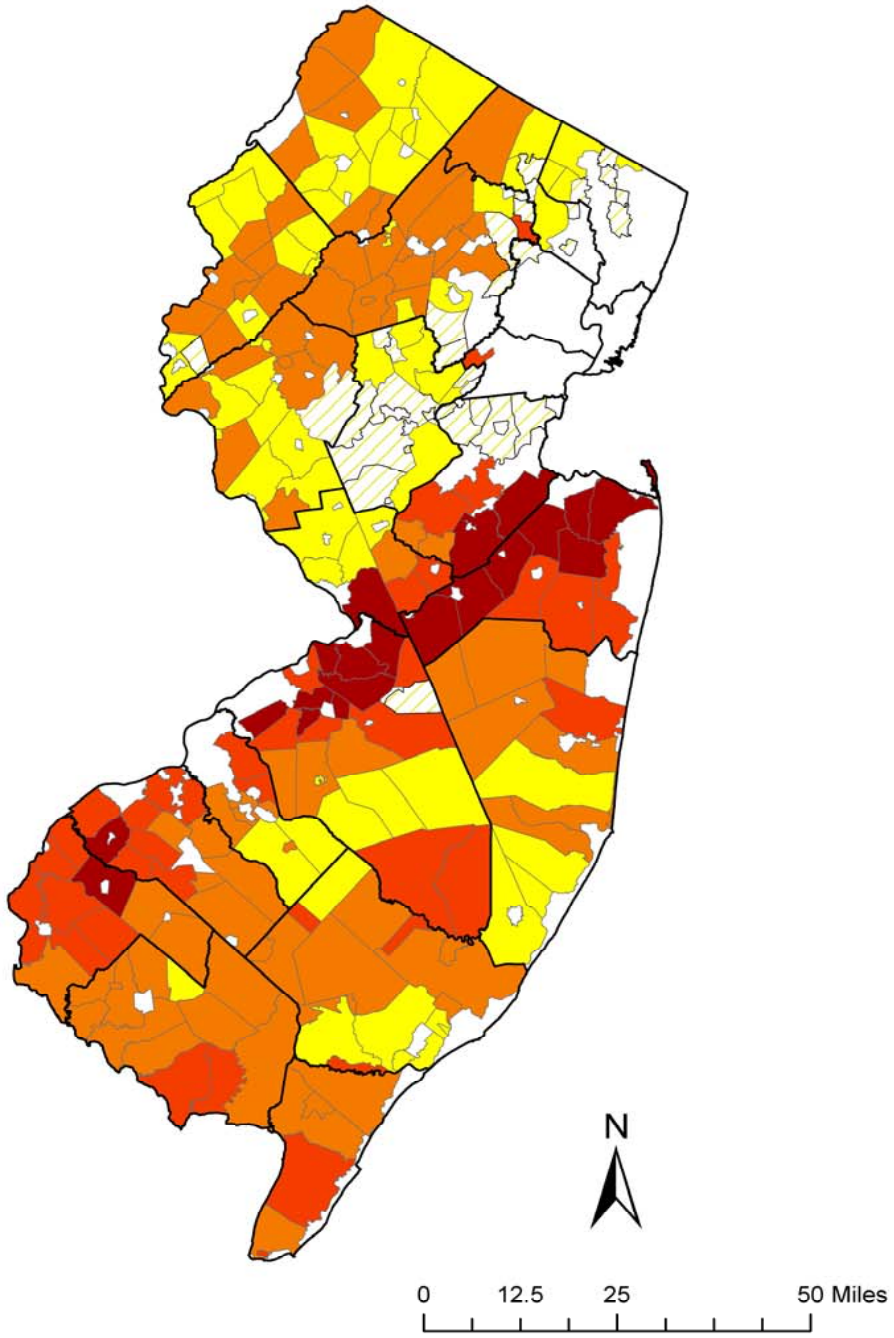
NJ Ground Water pH Contours



Iron Exceedances of Secondary Standard Overall – 29.2%

Province	**% of Samples with Iron > 0.3 mg/l**
Valley Ridge	22.6%
Highland	26.4%
Piedmont	12.3%
Coastal Plain	40.7%

Private Well Testing Results
Iron



Iron Exceedance of Secondary Standard

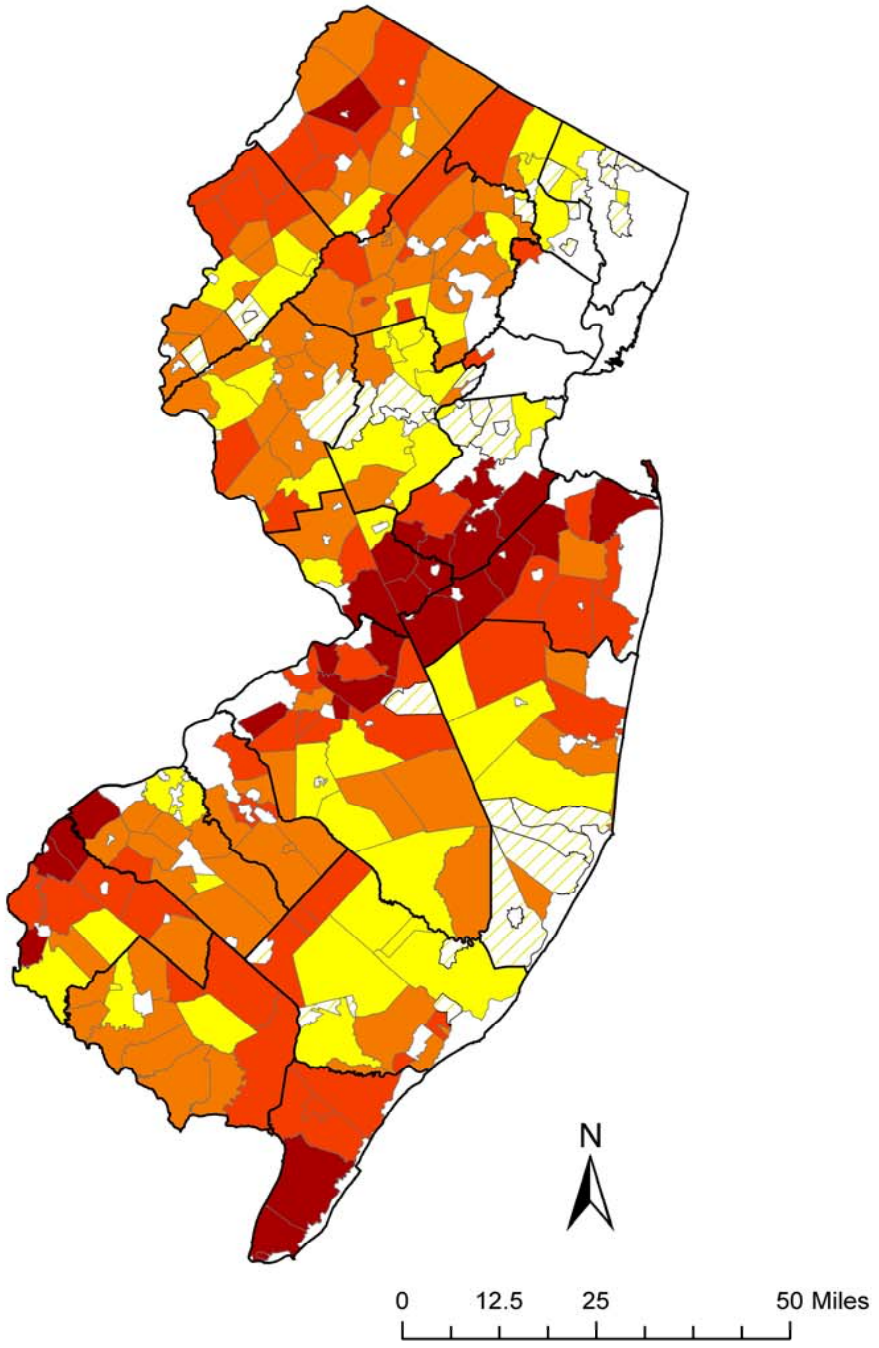
Secondary Standard = 0.3 mg/l

- 0 to 9 wells
- less than or equal to 10%
- >10 to 20%
- >20 to 40%
- >40 to 80%
- >80%

Manganese Exceedance of Secondary Standard
Overall – 19.5%

Province	**% of Samples with Manganese >0.05 mg/l**
Valley and Ridge	27.2%
Highlands	19.8%
Piedmont	9.6%
Coastal Plain	23.7%

Private Well Testing Results
Manganese



Manganese Exceedance of Secondary Standard

Secondary Standard - 0.05 mg/l

- 0 to 9 Wells Tested
- less than or equal to 5%
- >5 to 10%
- >10 to 20%
- >20 to 40%
- >40%

Exceedance of Manganese Health Advisory

- Health Advisory for Manganese is 0.3 mg/l
- 3.1% of the wells exceeded the Health Advisory

Limitations of PWTA Data

- No Information about well depths
- Single Sample
- Requires corrections for Municipality, Lot and Block, and GPS locations
- Differentiate No. Samples from No. Wells
- Evaluate Analytical Data

Summary of PWTA Data Results

- Largest known database of private well water quality in the United States. This makes it an invaluable resource for groundwater studies.
- The contaminants most frequently reported over the MCL are:
  - Gross Alpha and Arsenic
  - Nitrate and Fecal Coliform/E. coli
  - VOCs and Mercury

For Additional Information

- Contact: judy.louis@dep.state.nj.us
- PWTA website:
  http://www.state.nj.us/dep/pwta