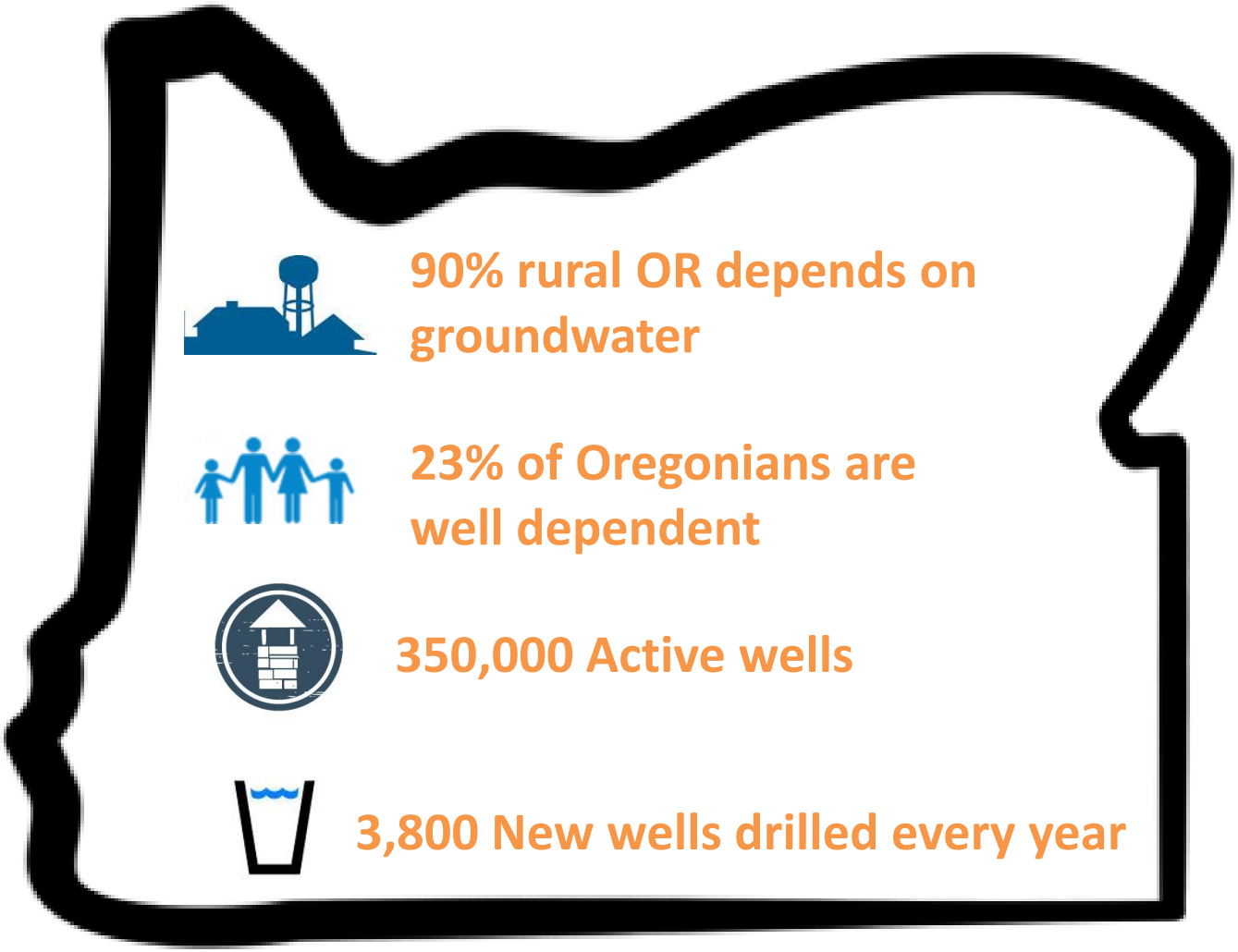
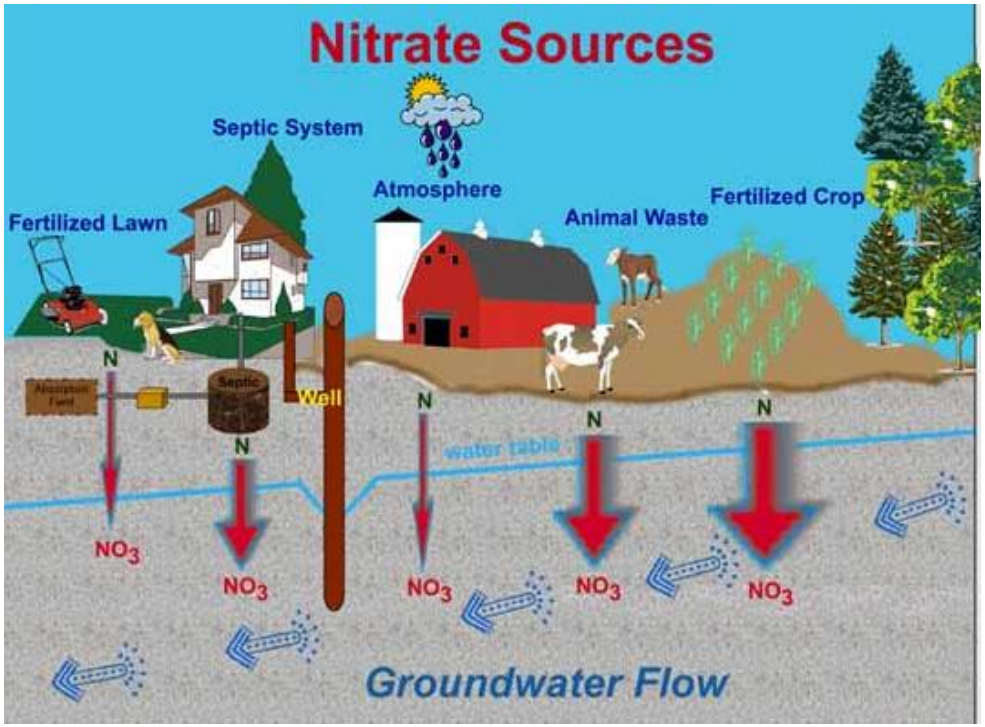
Contaminated Well Water: A Hidden Public Health Threat

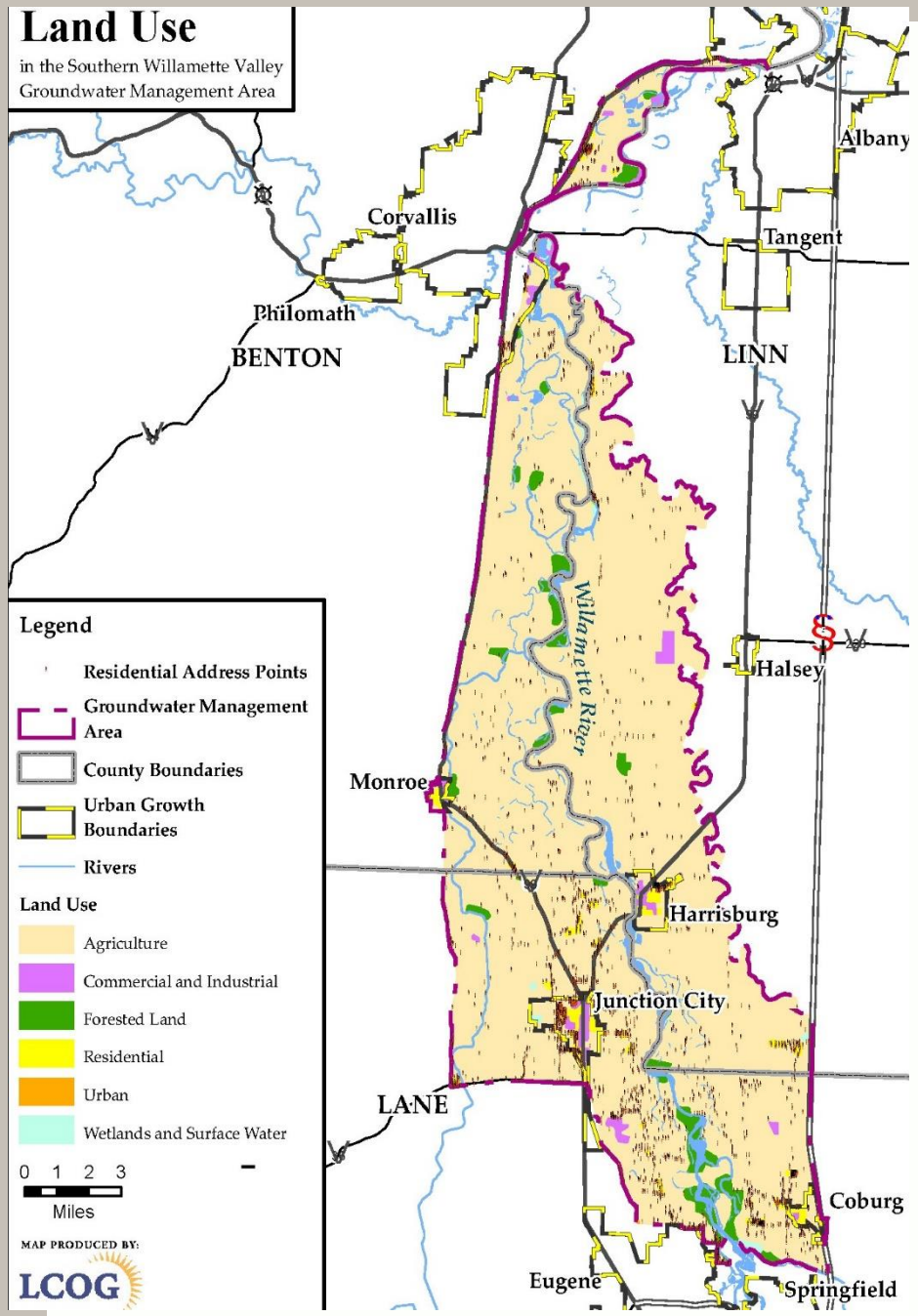


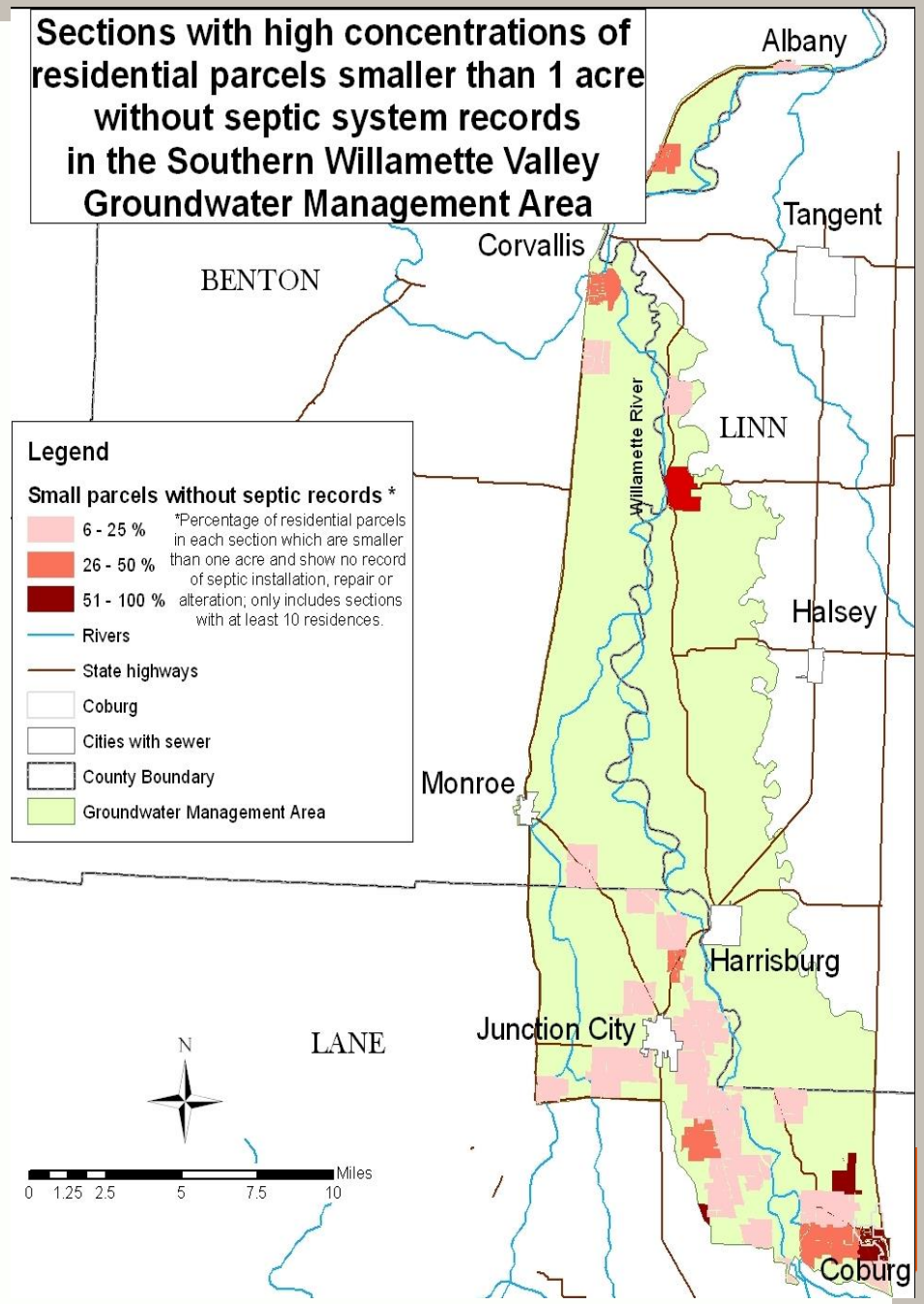
Oregon Health Authority

Nitrate

- Nitrates are commonly found in agricultural areas
- Colorless, odorless, and tasteless
- Exposure to high levels can cause methemoglobinemia
  - Headache, dizziness, weakness or difficulty in breathing
  - Blueish tint to skin
  - Infants are most susceptible ("blue baby syndrome")




Land Use
in the Southern Willamette Valley Groundwater Management Area
Albany
Corvallis
Tangent
Philomath
BENTON
LINN
Willamette River
Halsey
Monroe
Harrisburg
Junction City
LANE
Coburg
Eugene
Springfield
Legend
Residential Address Points
Groundwater Management Area
County Boundaries
Urban Growth Boundaries
Rivers
Land Use
Agriculture
Commercial and Industrial
Forested Land
Residential
Urban
Wetlands and Surface Water
0 1 2 3
Miles
MAP PRODUCED BY:
LCOG


Sections with high concentrations of residential parcels smaller than 1 acre without septic system records in the Southern Willamette Valley Groundwater Management Area
Albany
Tangent
Corvallis
BENTON
LINN
Willamette River
Halsey
Monroe
Harrisburg
Junction City
LANE
Coburg
Legend
Small parcels without septic records *
6 - 25 %
26 - 50 %
51 - 100 %
*Percentage of residential parcels in each section which are smaller than one acre and show no record of septic installation, repair or alteration; only includes sections with at least 10 residences.
Rivers
State highways
Coburg
Cities with sewer
County Boundary
Groundwater Management Area
N
0 1.25 2.5 5 7.5 10
Miles

SWGWMA Focus Groups

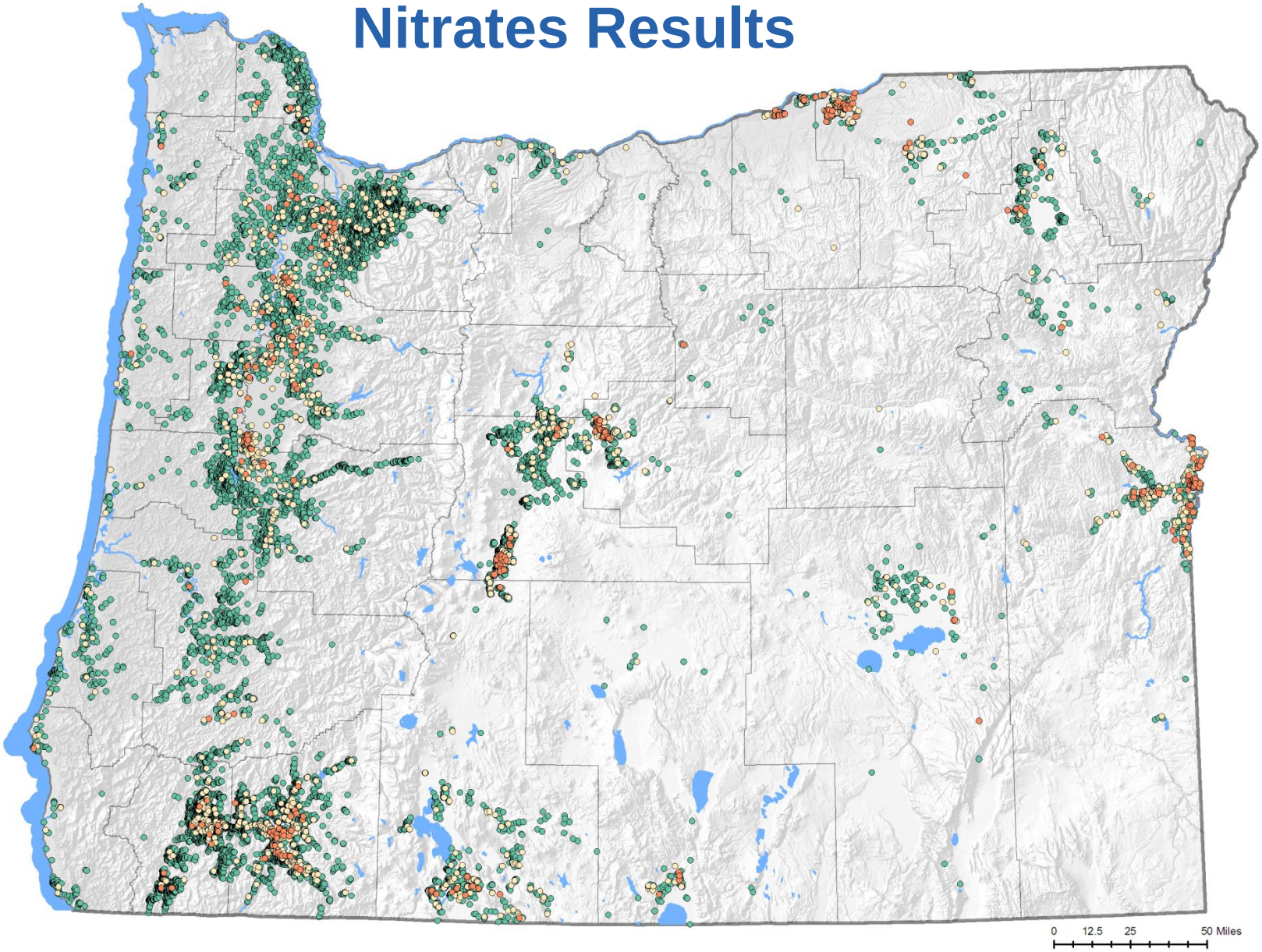
Rural Residential

- Lacked a basic understanding of groundwater
- Hadn't heard term GWMA
- Most had treatment system, but didn't know why?
- Taste = Safe
- Barriers to Testing
- Barriers to Action

Commercial Agriculture

- High level of understanding
- Knew about GWMA
- Testing schedule and test plots of land
- Struggle with Economic Needs vs. Environmental ideals
- Urban contributions
- Lack of representation to general population

Nitrates Results

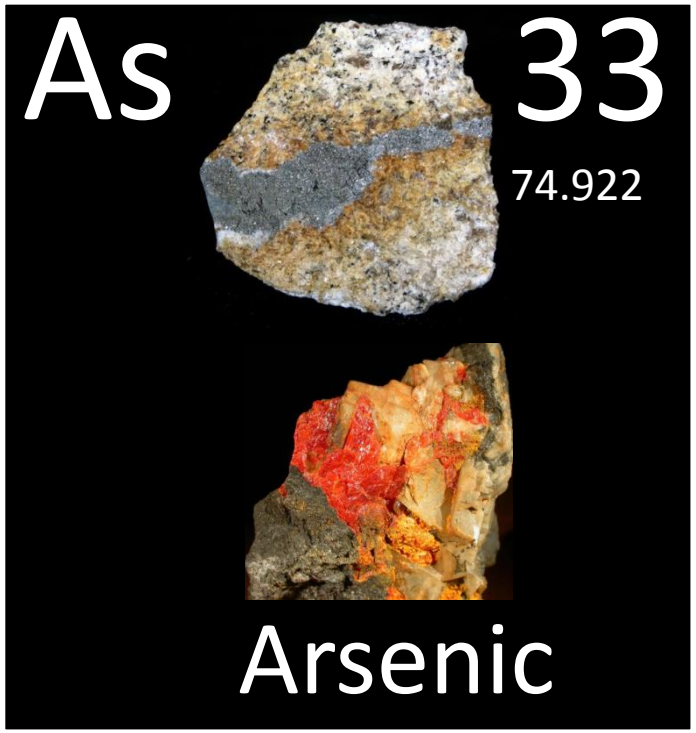


Real Estate Transaction Data
Nitrates 1989 - 2015

DOMESTIC WELL SAFETY PROGRAM

Arsenic

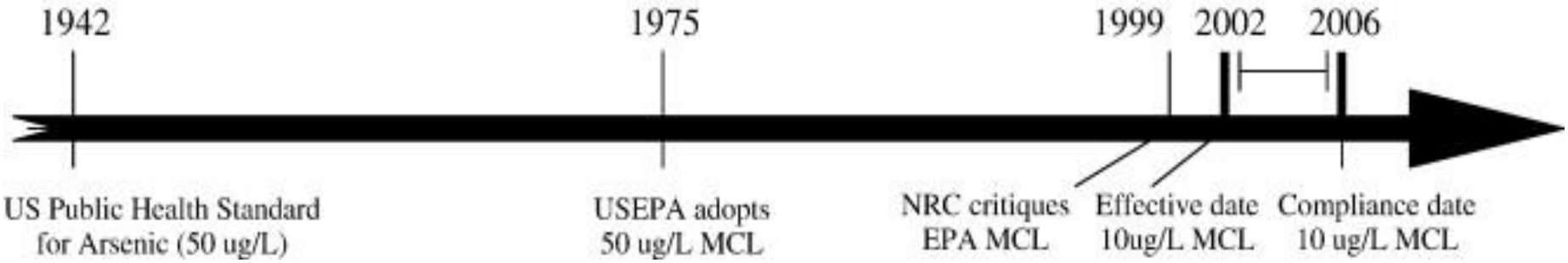
- Arsenic is a naturally occurring element
- Colorless, odorless and tasteless
- Exposure over a long period of time is harmful to health
  - Bladder, liver, lung and skin cancer
  - Skin discoloration and keratosis
  - Premature birth and low birthweight
  - Type II diabetes
  - Susceptibility to infections



Arsenic rules have changed

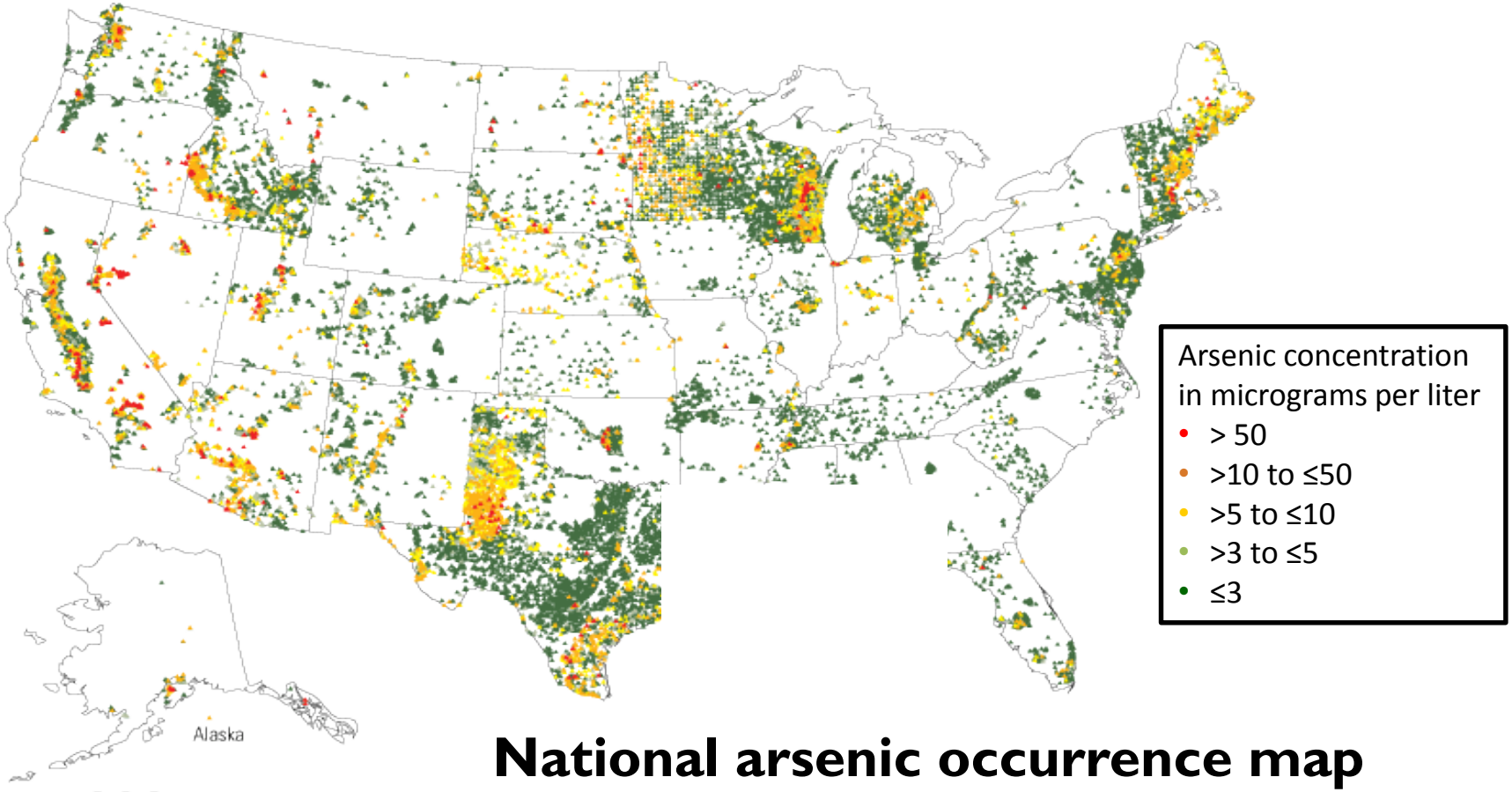
- Drinking water standard was lowered from 50 µg/L to 10 µg/L. The lower standard was set at a level that protects consumers by maximizing health risk reduction benefits at a cost that is justified by the benefits

- Oregon Senate Bill 739 requires any real estate sale that includes a well that supplies ground water for drinking water purposes shall be tested for arsenic, nitrates and total coliform bacteria (effective January 2010)



Arsenic is commonly found in groundwater

It is odorless, colorless, and tasteless. The only way to know if it is there is to test for it.



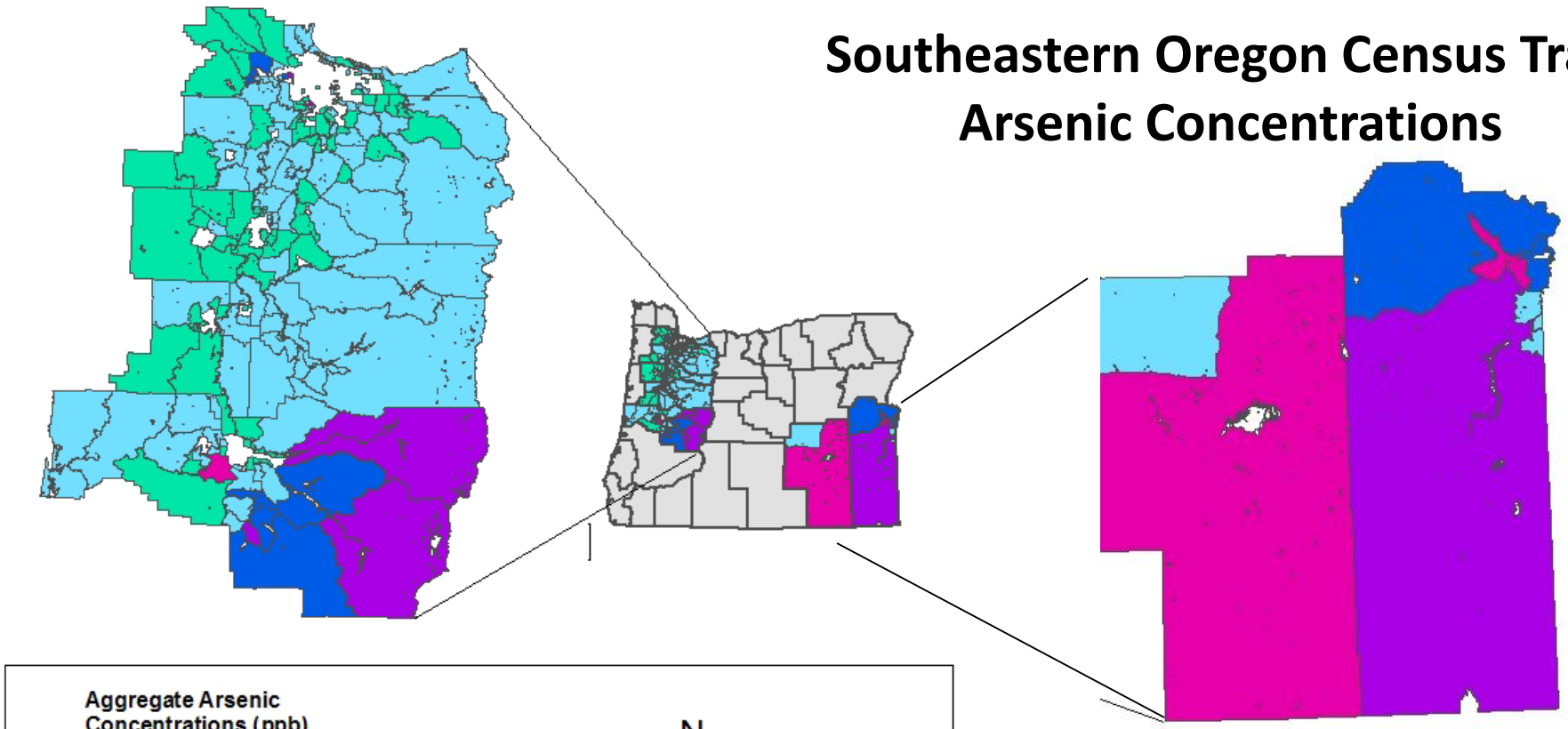
USGS
science for a changing world

National arsenic occurrence map

Locations and arsenic concentrations for 31,000 wells and springs sampled between 1973 and 2000

Willamette Valley Census Tract Arsenic Concentrations

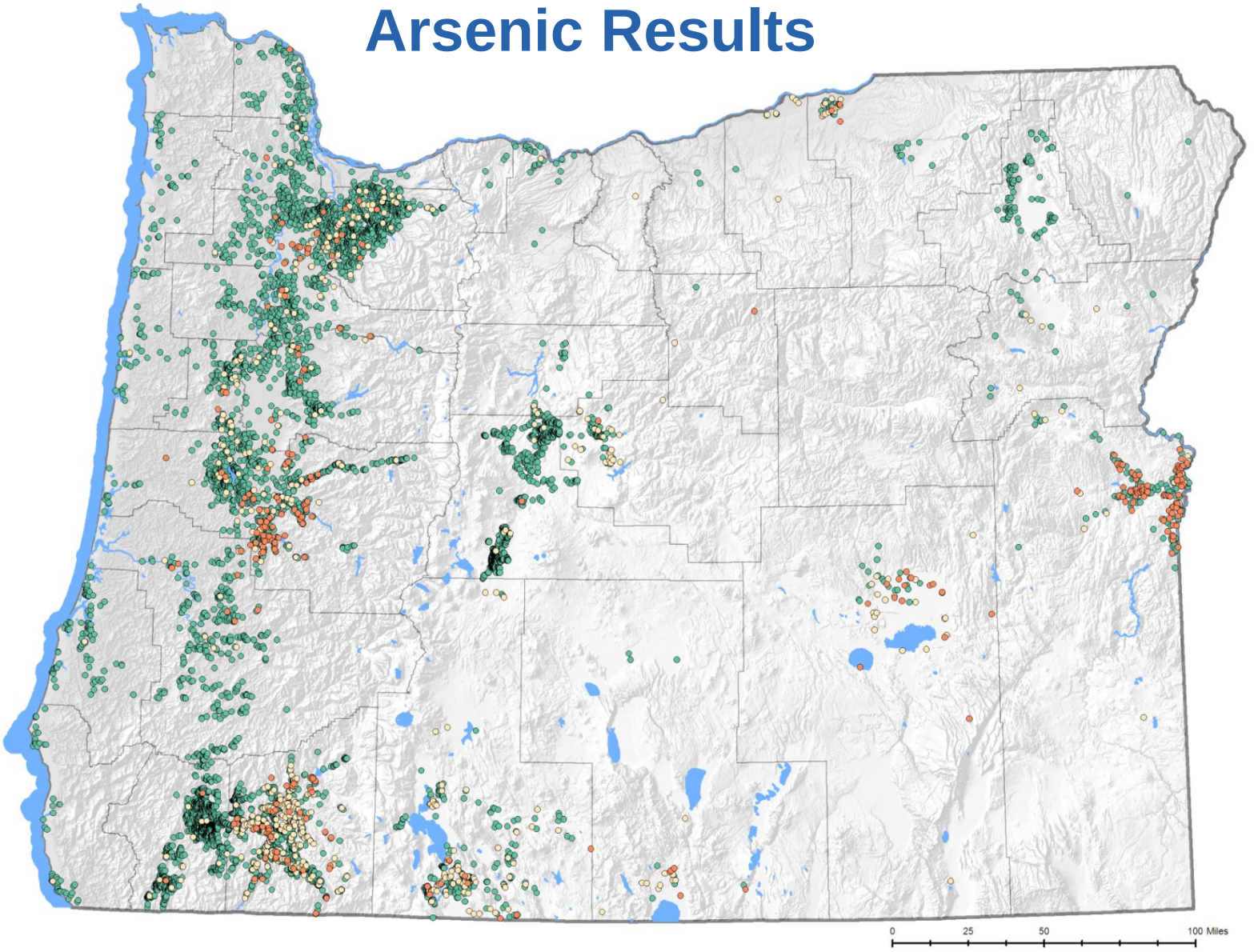
Southeastern Oregon Census Tract Arsenic Concentrations



Data Sources: USGS National Water Information System and Oregon DHS Drinking Water Program

Source: Fleming HS. (2007) Groundwater arsenic concentrations and cancer incidence rates: A regional comparison in Oregon. OSU Masters Thesis.

Arsenic Results



0 ppb

1-9 ppb

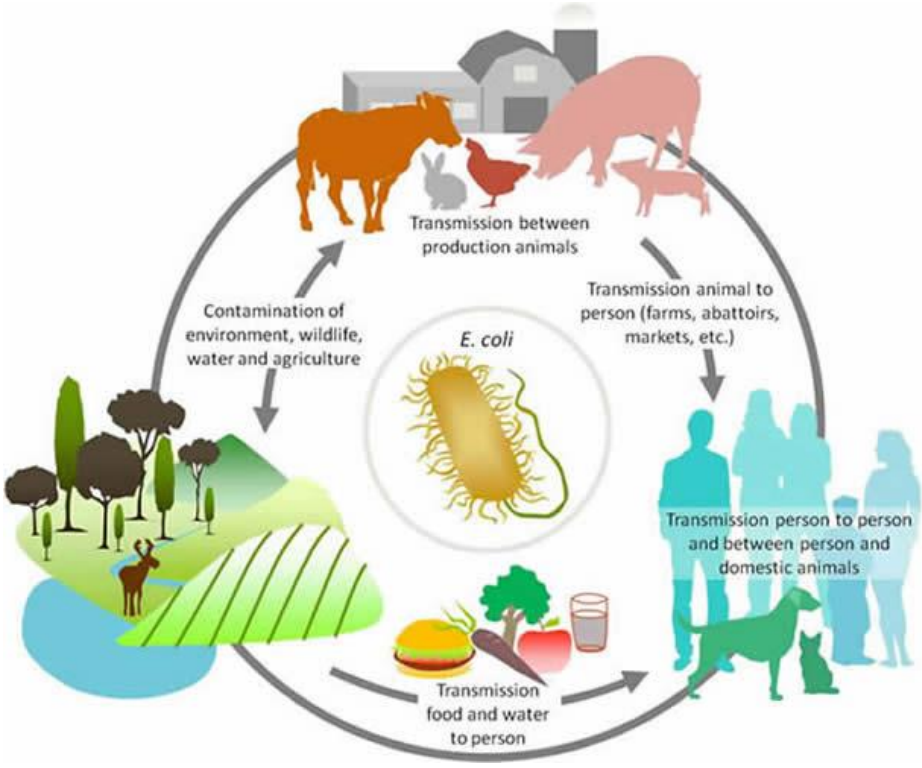
10+ ppb

Real Estate Transaction Data
Arsenic 1989 - 2015

DOMESTIC WELL SAFETY PROGRAM

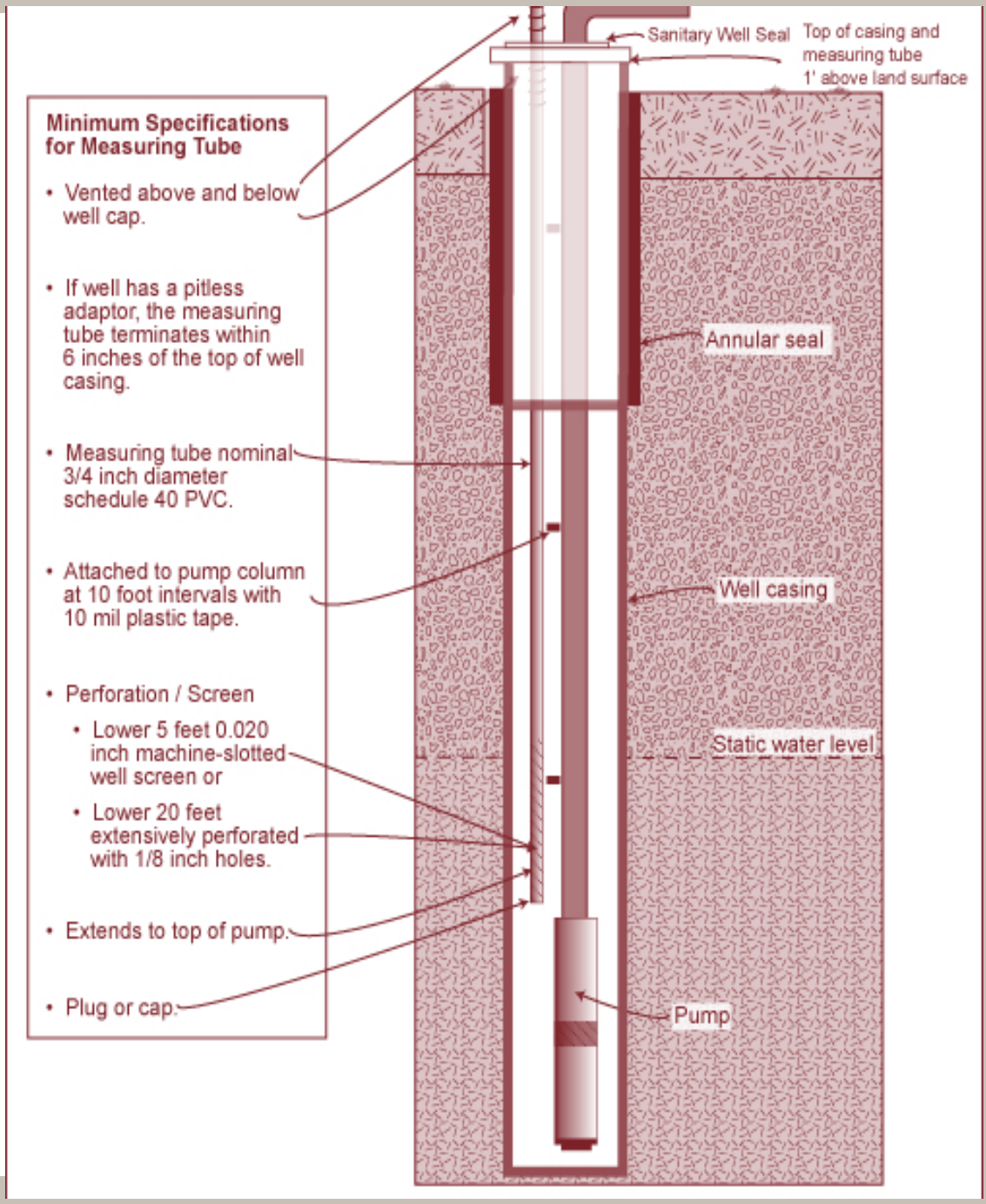
E. Coli

- E. Coli is a bacteria found in fecal material of animals and humans
- Presence of E. Coli in well water indicates recent sewage contamination (animals or septic tanks)
- Many strains of E. Coli are harmful to people
  - Diarrheal disease



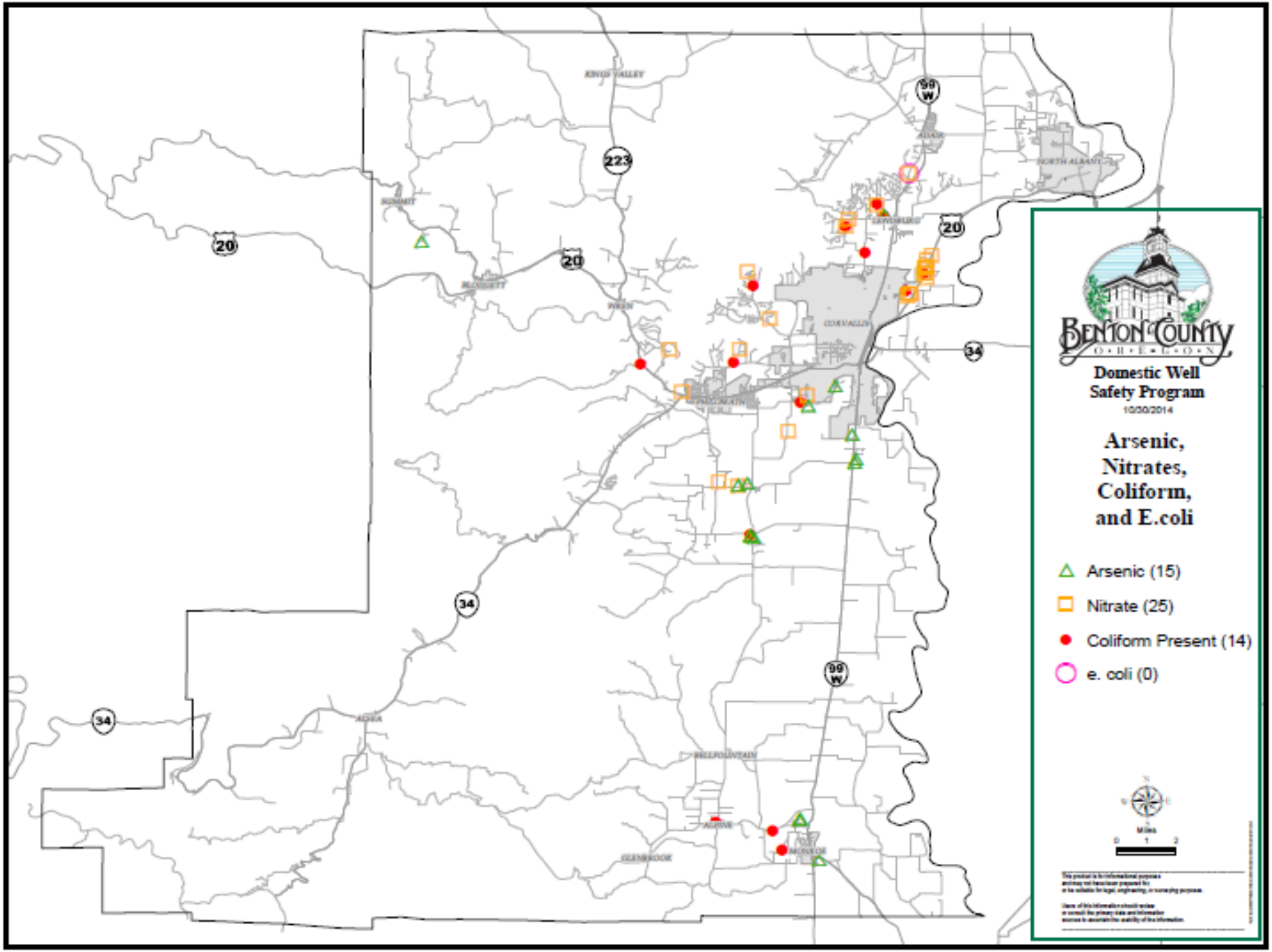
Coliform Bacteria

- Surface to groundwater interaction
  - Well Construction Issues
    - Missing Caps
  - Contaminant seepage through well casing
  - Contaminant seepage along casing from improper grout seal.
  - Flooding
  - Manure sources
    - Failing septic systems
    - Uncovered manure sources



2014 Domestic Well Safety Program (DWSP) Summary

- Tested 90 wells for levels of arsenic, nitrate, coliform, and E. coli
- Examined each well for proper well maintenance
- Review well logs and tagging of wells
- Performed outreach events with the help of Oregon State Extension Services to promote the DWSP and proper well maintenance


KINGS VALLEY
223
99W
20
SUMMIT
BLODGETT
WREN
ALBANY
NORTH ALBANY
LEWISBURG
CORVALLIS
34
ADAIR
BELLFOUNTAIN
ALPINE
GLENBROOK
FORT HOSKINS
Benton County
OREGON
Domestic Well
Safety Program
10/30/2014
Arsenic,
Nitrates,
Coliform,
and E.coli
Arsenic (15)
Nitrate (25)
Coliform Present (14)
e. coli (0)
N
W
E
Miles
0
1
2

2014 DWSP Results: Benton County

Test Performed	Percent of Total Wells Containing Some Level of Contamination
Nitrate	29%; (26/89)
Arsenic	16%; (14/89)
Coliforms	15%; (13/89)

2014 DWSP Results: Benton County

Well Contaminant	Percent of Wells With Contaminant
Nitrate (0.5-9.9 ppm)	26%; (23/89)
Nitrate (≥10 ppm)	3%; (3/89)
Arsenic (0.001-0.009 ppm)	11%; (10/89)
Arsenic (≥0.010 ppm)	4%, (4/89)
Coliform (Present)	15%; (13/89)
E.coli (Present)	0%, (0/89)

Domestic Well Safety Take Away Message

- All rural Oregonians deserve to drink clean, safe water that meets basic water quality standards and doesn't threaten their health.
- Help communities to better protect their groundwater aquifers.
- Any new domestic wells that are constructed should at a minimum be required to be test for total coliforms, arsenic, and nitrate before being placed into service.
- Knowing test results will help homeowners decide:
  - What if any treatment is needed.
  - When to install treatment.
  - Health risks to all family members