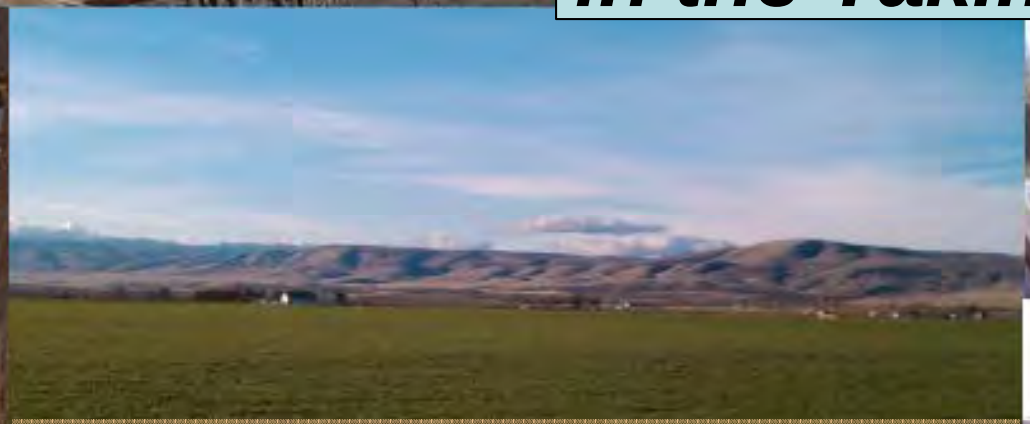
A Perspective on Water Quality Issues Across Washington State

How Well are the wells in the Yakima Valley?



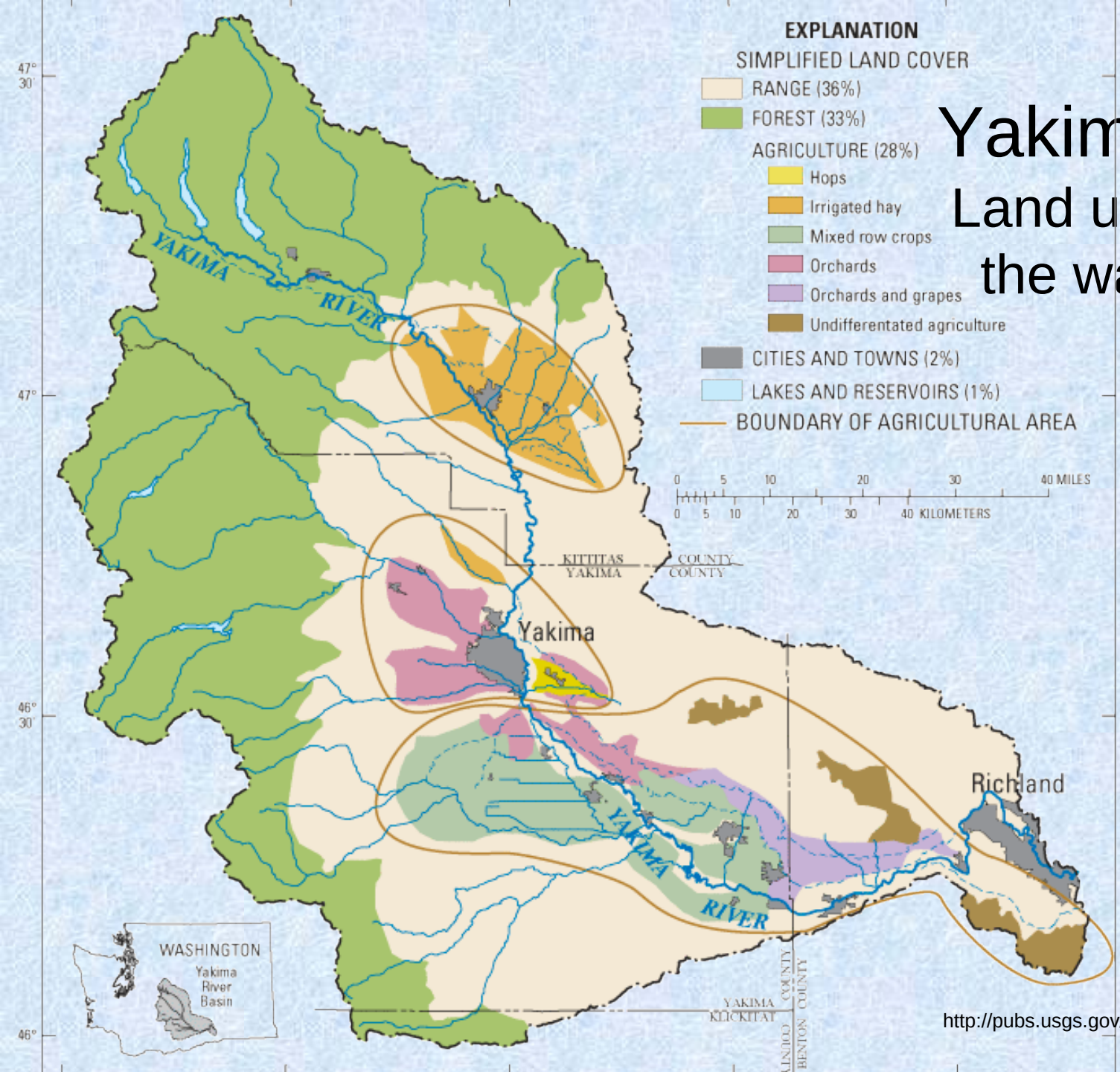
Curt Black & Sandy Halstead
EPA Region 10

Outline of Today's Discussion

- **Overview of the Yakima Valley**
  - **Where, who, why, and what**
- **EPA's involvement and approach**
  - **Three Phase source assessment study**
  - **Reducing exposure / drinking water risk**
- **Next steps / Lessons Learned**

Yakima Basin

Land use across the watershed



http://pubs.usgs.gov/sir/2008/5045/figure2.html

Complex landscape diversity

- Top Crops
  - First in the nation for
    - Milk production per cow
    - 20% of the world's hop supply
    - 42% of the nation's pears
    - 38% of the nation's concord grapes
    - 29% of the nation's sweet cherries
  - Top in the state for
    - Cattle, sheep, and bee colonies
    - Corn, spearmint, and peppermint

Media and Community Attention

In 2008, the Yakima Herald-Republic ran a series of articles titled, *Hidden Wells, Dirty Water*.

The articles highlighted:

- **Existing studies documenting groundwater pollution in the lower Yakima Valley.**
- **Public frustration with a lack of action from government agencies.**
- **Confusion over which agency is responsible for regulating groundwater**
- **EPA CARE project for community concerns**
- **Outlook School well replaced**

Yakima Valley Well Users

- Primarily Lower Yakima Valley
- 75,000 residents – 30,000 groundwater users
- Historical data:
  - 12% of 453 wells exceed NO_3 MCL
  - E. coli in shallow wells
- No one has worked out how to link land use/sources to nitrate in wells

EPA's Yakima Valley approach

- Convene/ facilitate conversations with agencies and the community
- Reduce Exposure to the most vulnerable residents
  - Outreach on health impacts
  - Assist residents with understanding their risk
- Source assessment
    - Focus on the potential dominant N sources
      - CAFO, septic, and cropped land

Environmental Justice Community

- Designated in November 2009
- Focus attention
- Provide regional resources to coordinate actions ($$, FTE, lab support, outreach)

Imminent & Substantial & Endangerment Finding under SDWA Section 1431

- Cites historical groundwater data in the valley as basis for action
- Concludes:
  - contaminants that are, or may be, present in an aquifer may present imminent and substantial endangerment to the health of persons
- Overall problem still unaddressed even though some state/local/tribal governments have taken some preliminary actions related to the contamination

Potential Sources

Potential sources for nitrate, bacteria and other pollution in the lower valley include
•inorganic fertilizer application,
•manure from dairy and non-dairy livestock,
• on-site septic systems
•industrial application of wastewater.

Potential Pollution Pathways

- **Leaching to groundwater**
- **Surface water recharge in polluted irrigation drains.**
- **Poorly constructed wells.**
- **Improperly located, constructed or abandoned wells can bring pollution from the surface to groundwater**

Summary of EPA Activities

Four Phases:

- **Phase 1: Nitrogen Loading / GIS**
- **Phase 2: Screening for Current Nitrate Concentrations**
- **Phase 3: Research Sampling**
- **Phase 4: Follow-up**

Objectives of Sampling

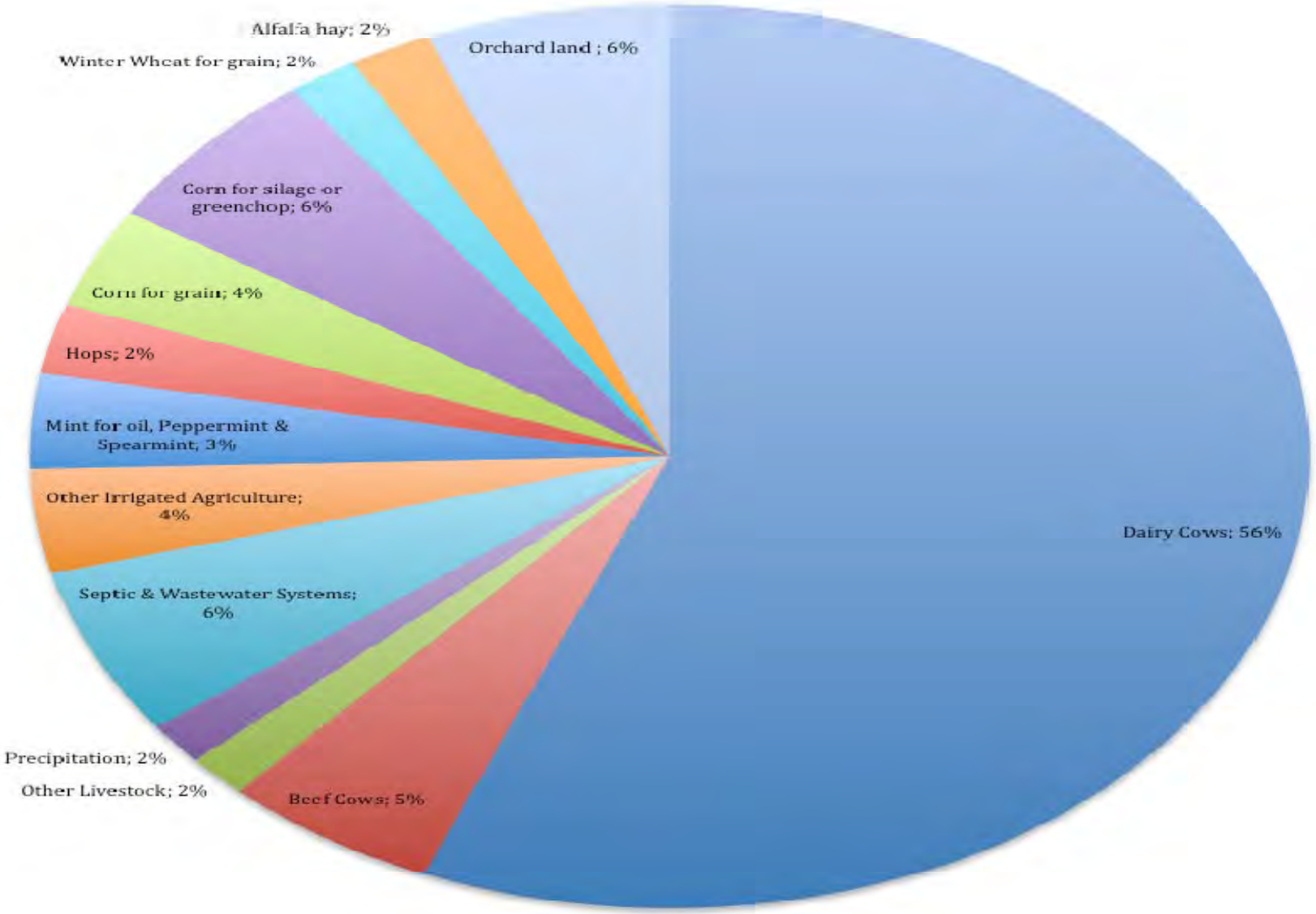
- Protect users of shallow ground water
- Determine current distribution of nitrate
- Develop tools to link high nitrate to their source(s)
- Utilize resulting information – select management options to reduce nitrate

Phase 1: Nitrogen Loading

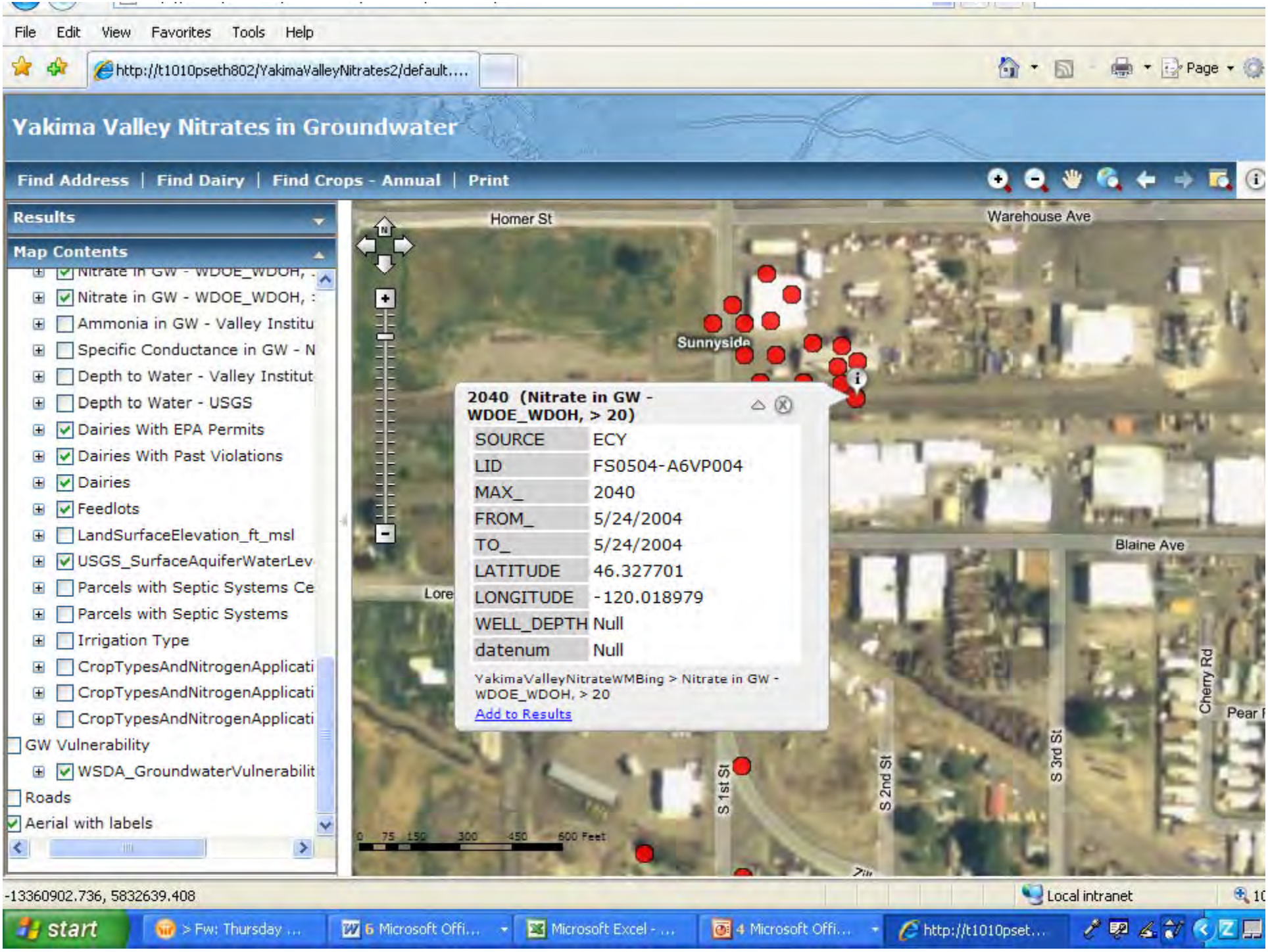
- **Purpose is to better understand relative quantities of nitrogen applied to the land within County**

- **Evaluated several sources:**
  - **crops;**
  - **livestock;**
  - **septic/wastewater treatment;**
  - **and precipitation**

SUMMARY: Nitrogen Loading Percentiles by Largest Contributor



DRAFT – does not yet include 1.2% imported biosolids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2040 (Nitrate in GW - WDOE_WDOH, > 20)
SOURCE ECY
LID FS0504-A6VP004
MAX_ 2040
FROM_ 5/24/2004
TO_ 5/24/2004
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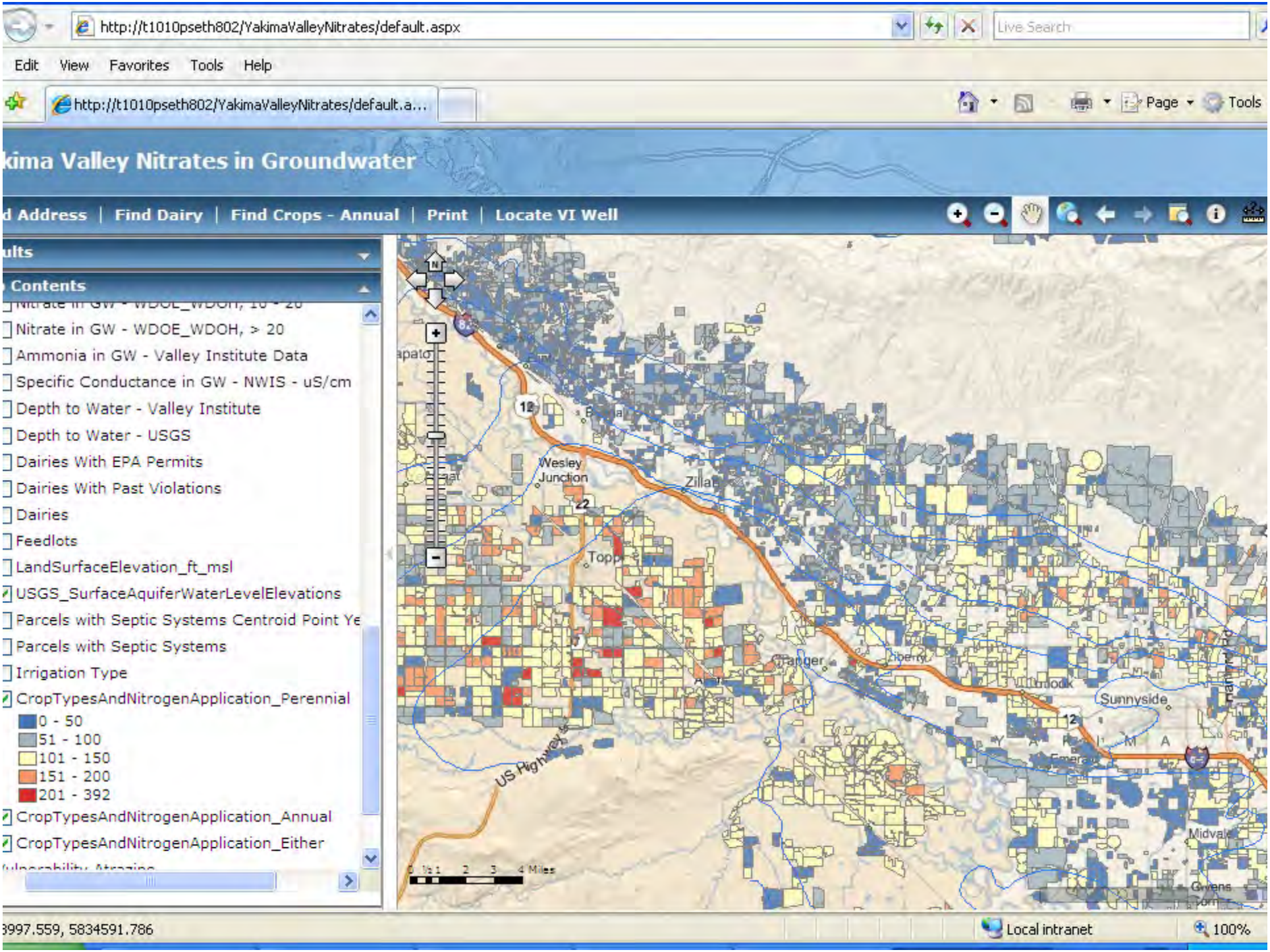
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Dairies
Feedlots
LandSurfaceElevation_ft_msl
USGS_SurfaceAquiferWaterLevelElevations
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Parcels with Septic Systems
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151 - 200
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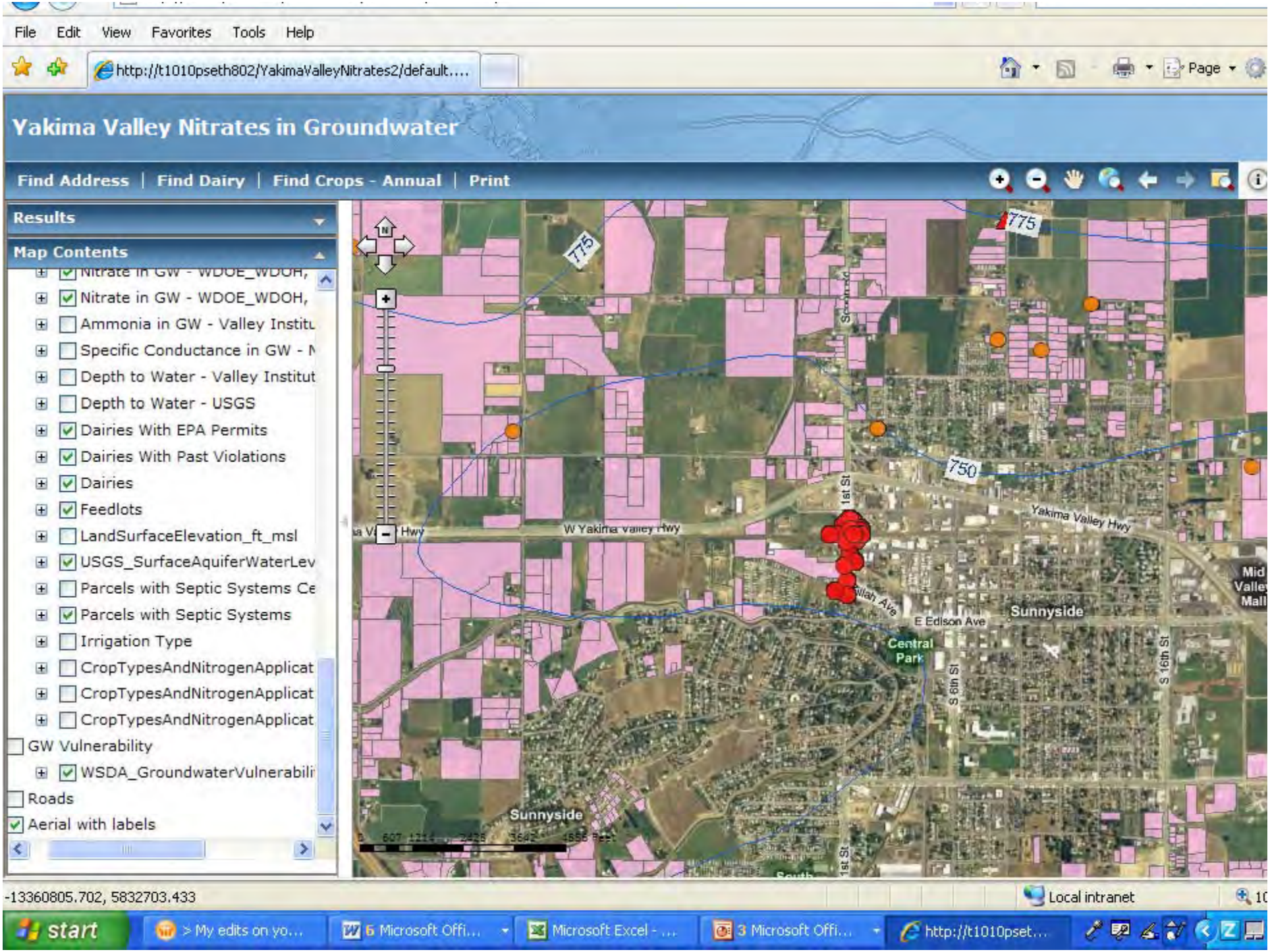
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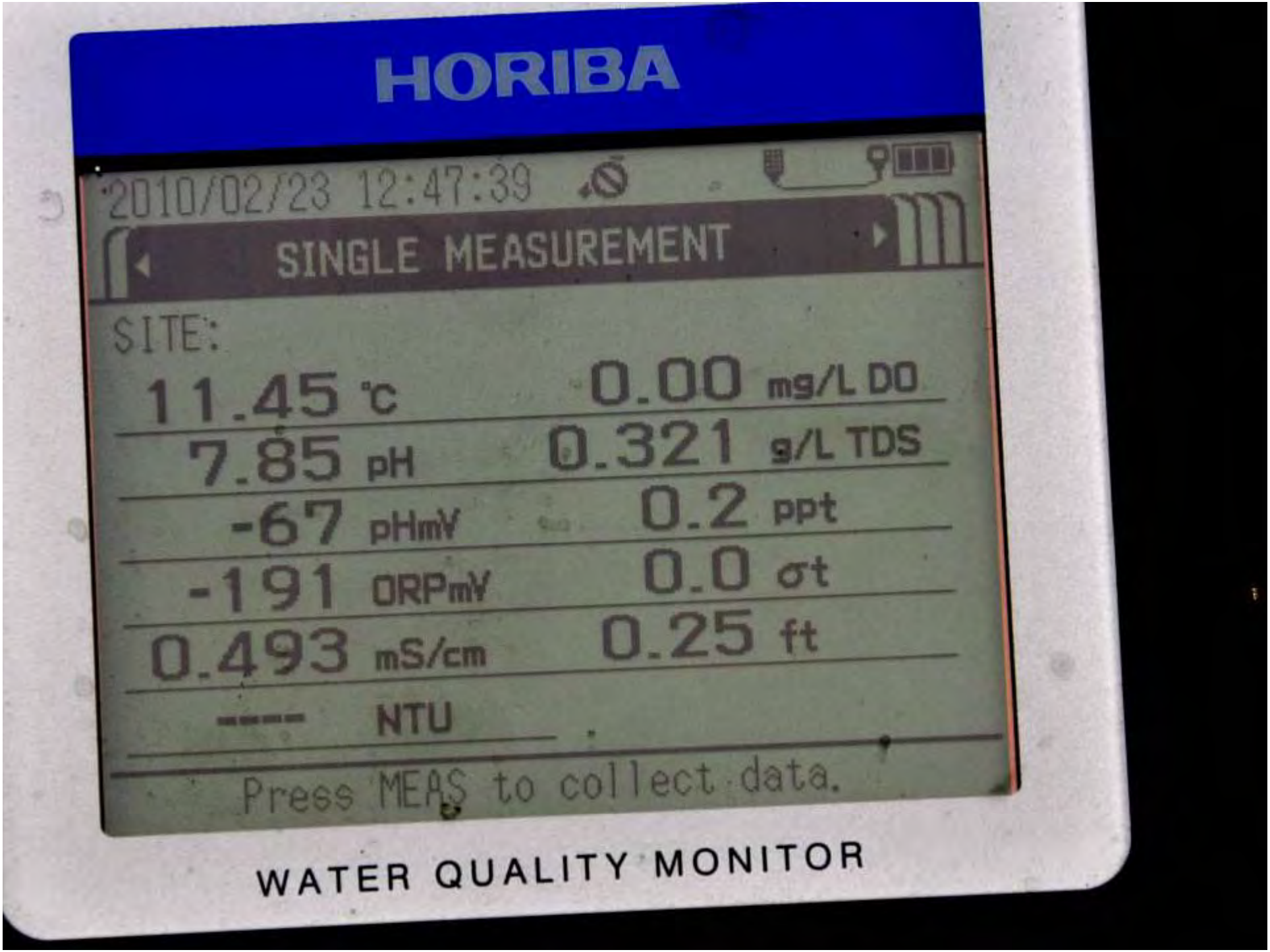
Phase 2: Screening Sampling

- **Purpose: to understand the magnitude and extent of nitrate contamination**
  - **help residents understand their drinking water risk**
  - **assist in selecting sites for more detailed sampling in Phase 3**
- **Use GIS to identify potential sites**
- **Partnered with Center for Hispanic Health Promotion for recruitment and translation**

Phase 2: Screening Results

- **Sampled 337 domestic wells in late winter 2010**
- **Sampled for nitrate and coliform along with several indicators at tap (temperature, turbidity, pH, and DO)**
- **EPA found 21% of wells selected (70) had nitrate greater than the MCL at 10 parts per million nitrate.**
- **Some wells were 4 times the standard**
- **6 wells had Total Coliform and 2 wells E.coli**
- **Results were shared with each homeowner**


02/23/2010
Waypoint # 015
Time: 9:32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2010/02/23 12:47:39
SINGLE MEASUREMENT
SITE:
11.45 ℃
0.00 mg/L DO
7.85 pH
0.321 g/L TDS
-67 pHmV
0.2 ppt
-191 ORPmV
0.0 σt
0.493 mS/cm
0.25 ft
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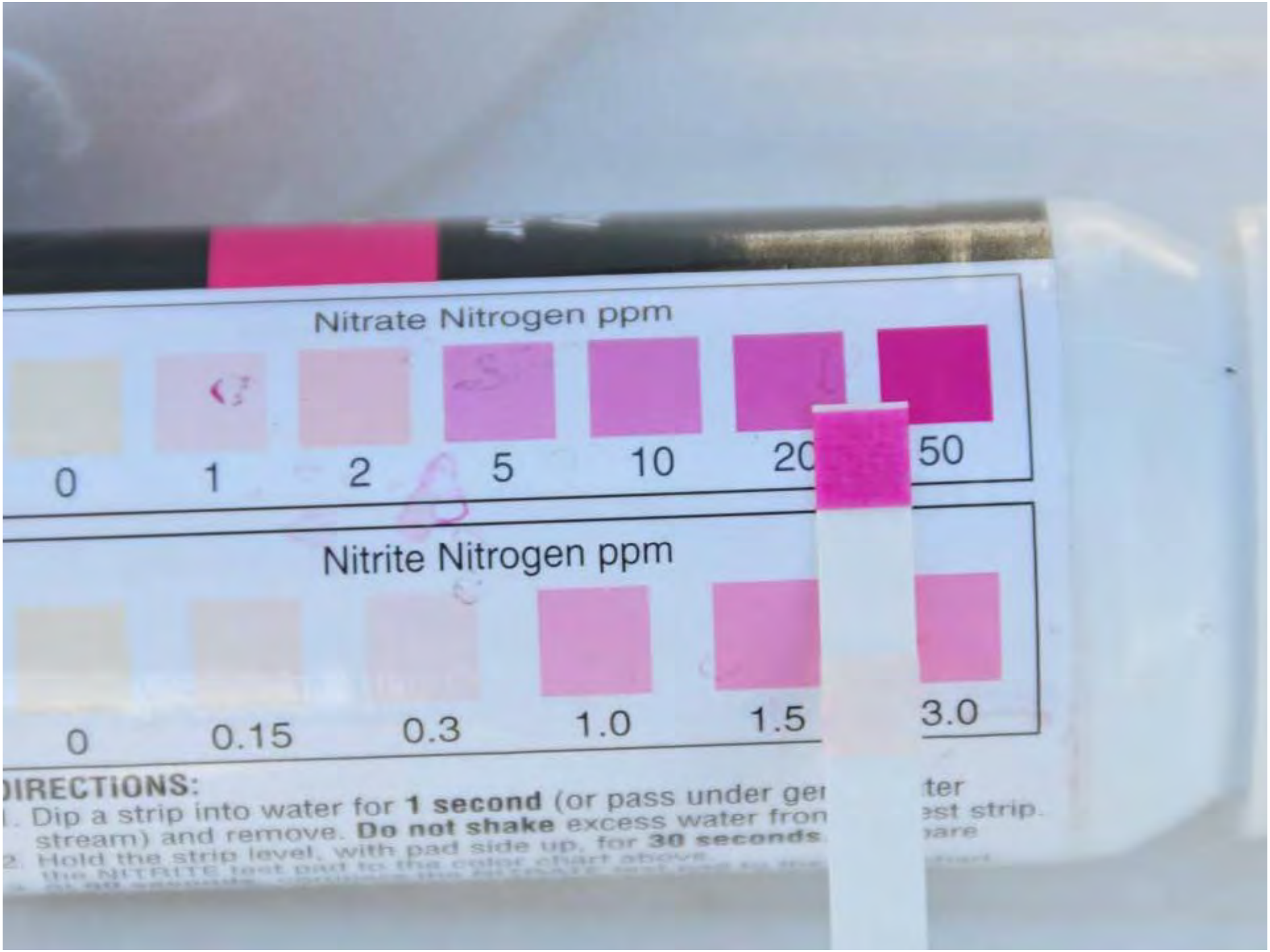
Press MEAS to collect data.
WATER QUALITY MONITOR

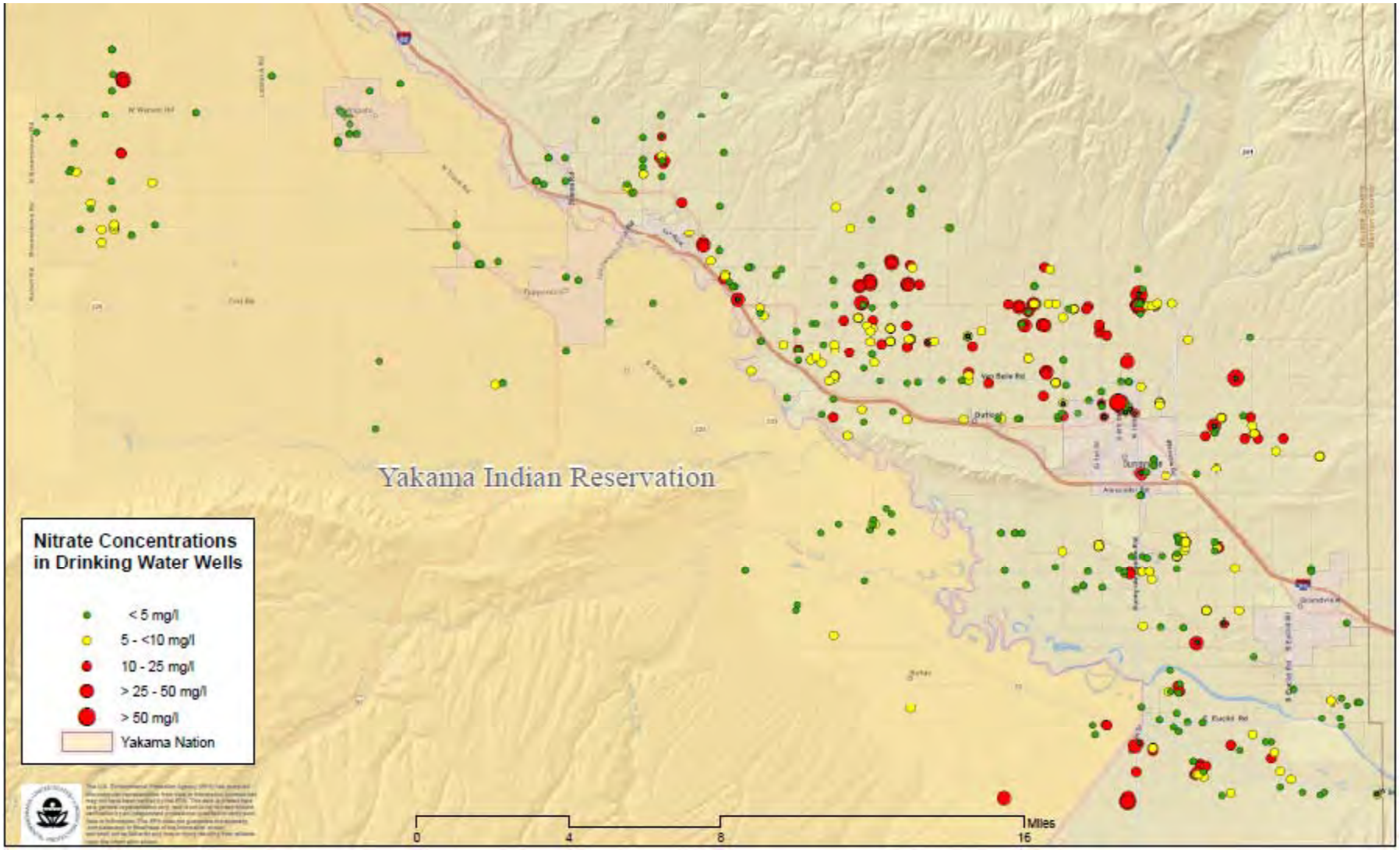

Nitrate Nitrogen ppm
0
1
2
5
10
20
50
Nitrite Nitrogen ppm
0
0.15
0.3
1.0
1.5
3.0
DIRECTIONS:
1. Dip a strip into water for 1 second (or pass under ge
stream) and remove. Do not shake excess water fron
2. Hold the strip level, with pad side up, for 30 seconds
ter
est strip.
pare

Community Right to Know

- Outreach venues including radio, TV, and community events to provide info on nitrate risk
- Sampled an additional 265 homes via voluntary sign-ups
- Nitrate Contamination rate at 20.9%

Nitrate Concentrations in Drinking Water Wells

Sampled by EPA in 2010

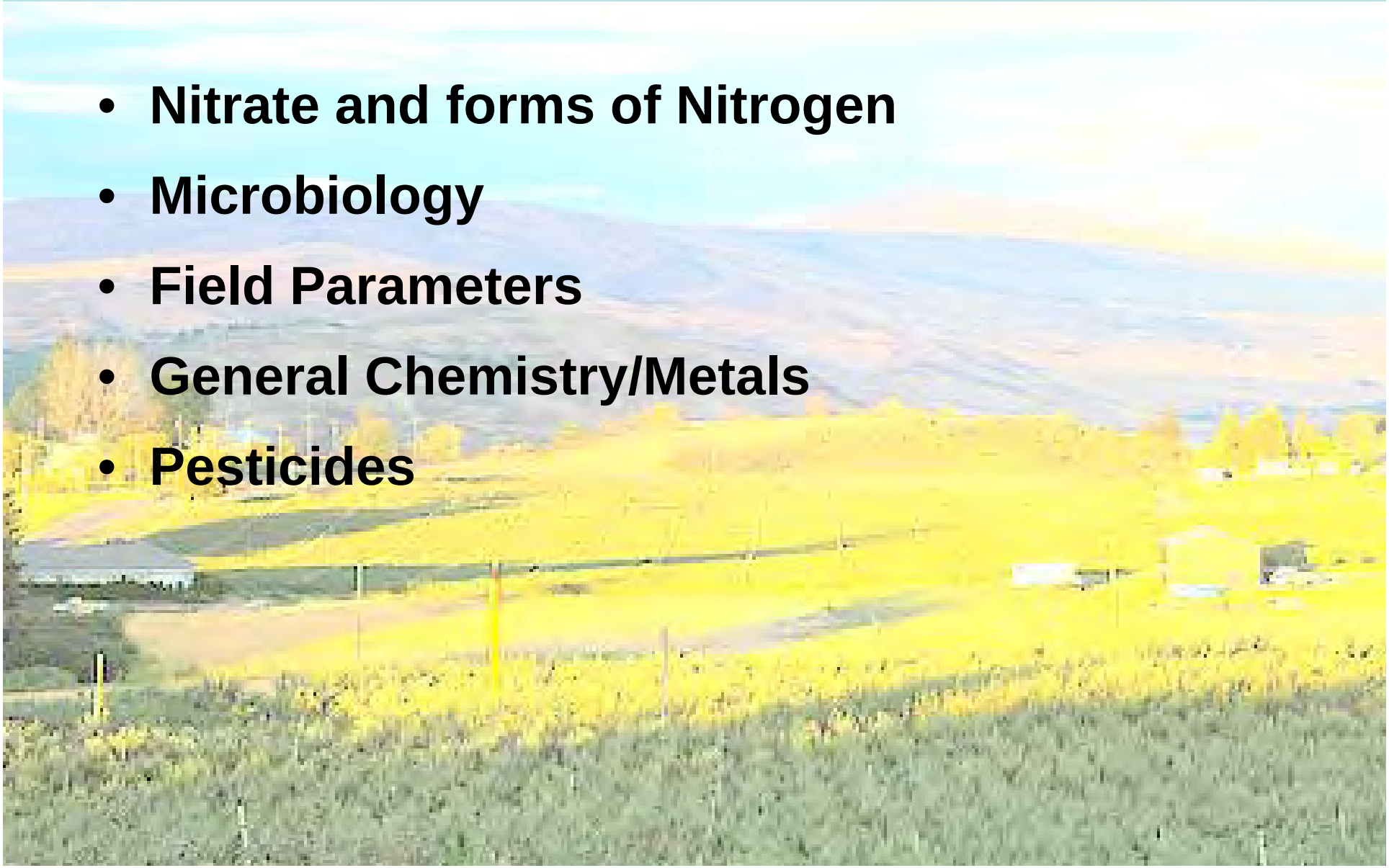


Phase 3: Research/Sampling

- **Purpose - test techniques to link specific sources to high nitrate levels seen in wells**
- **EPA used the results from Phase 2 to select 63 locations for sampling April 12 – 22, 2010**

- **Evaluated three potential sources:**
  - **Rural Residential Septic Systems**
  - **Irrigated Crop Land**
    - **(hops, corn, and mint)**
  - **Animal Feeding Operations**
    - **(lagoons, fields, manure)**

Phase 3: Research/Sampling –
200 Parameters, Analyses, Isotopes or Organisms



- Nitrate and forms of Nitrogen
- Microbiology
- Field Parameters
- General Chemistry/Metals
- Pesticides

Phase 3: Research/Sampling –
200 Parameters, Analyses, Isotopes or Organisms
2 of 2

- Androgenic & Steroid Hormones
- Isotopic Analysis of N and O in NO3 and NH4
- Age Dating of Water
- Trace Organics
- Veterinary Antibiotics
- Pharmaceuticals


DATE: 4/13/2010
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119.99
DEPTH:
1015 4201
15:30 JJ
APR

Phase 3: Summary

- **EPA collected over 1000 samples and delivered them to 7 different labs**
- **Over 10,000 pieces of data have been QA'd from 7 labs**
- **Interpretation of these data is underway**
- **Final report anticipated winter 2011**
- **QA data on website**

ftp://ftp.epa.gov/reg10ftp/sites/yakima/groundwater_data/

Lessons Learned:

On the land:

- Use of domestic wells verses monitoring wells
- Landscape complexity complicates ‘sourcing’
- Limited sampling window

In the Lab:

- Costs and QA concerns associated with organic chemical analyses
  - Narrow focus to highly specific organics & major cation/anions/metals
  - Age dating techniques still evolving
  - Isotope analysis useful but not a clear determination

Yakima County Public Services

NITRATE TREATMENT PILOT PROGRAM

Test Your Well Now

Reducing Exposure

- Legislative grant via WDOH to Yakima Co.
- $400,000 in ‘toxics tax’ funds
- January – June 2011 program
- 166 Point of Use RO system systems installed
  - Less demand than supply
  - Barriers to participation

Nitrate Lab Results

(number of tests falling within each nitrate value)

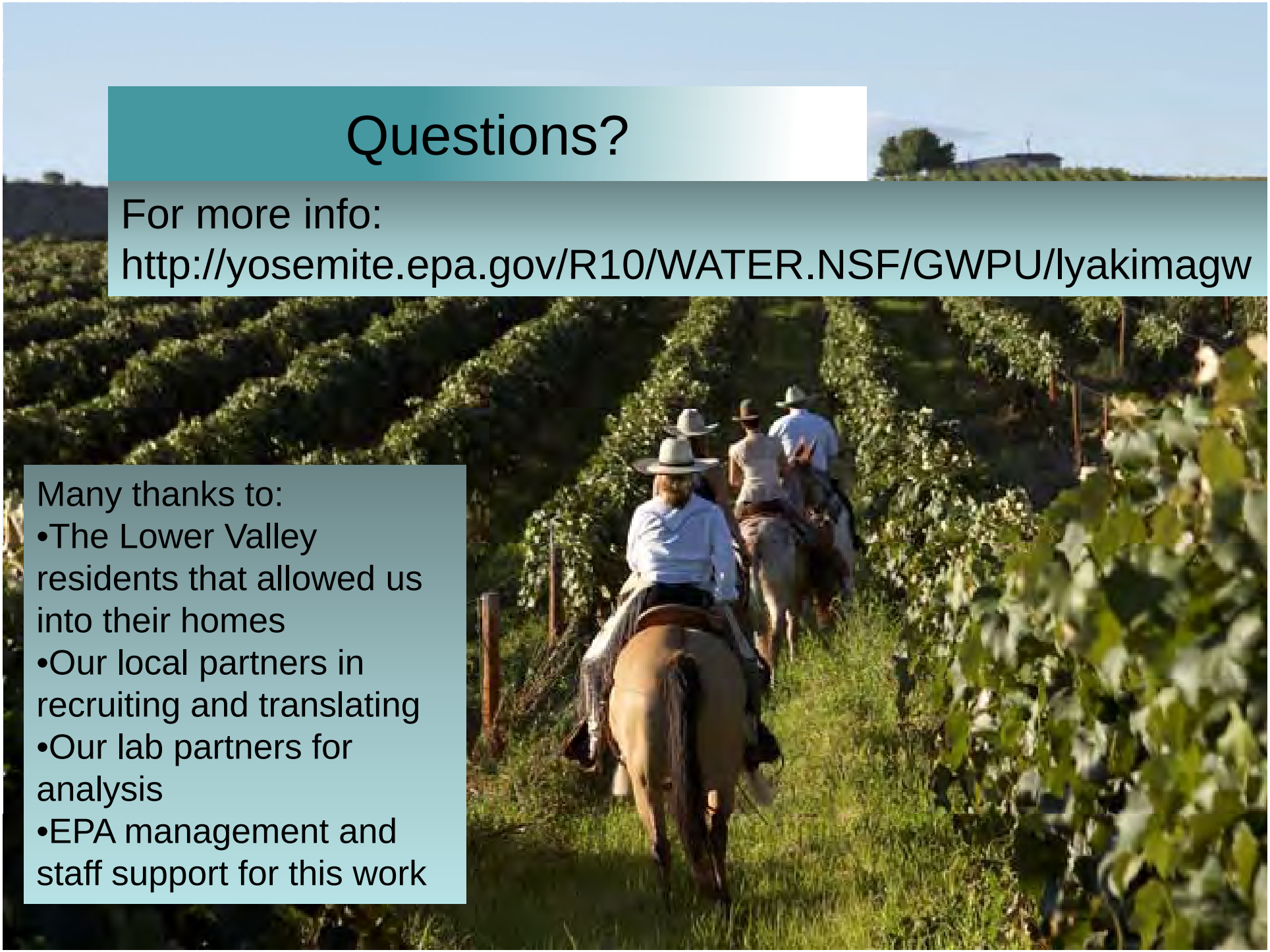
Nitrate Level	# of Tests
0.0 to less than 2.50 ppm	22
2.50 to less than 5.00 ppm	27
5.00 to less than 10.0 ppm	42
10.0 to less than 15.0 ppm	60
15.0 to less than 20.0 ppm	50
20.0 to less than 30.0 ppm	46
30.0 to less than 40.0 ppm	13
40.0 to less than 50.0 ppm	6
Above 50.0	5
Total Lab Tests Returned as of: 6/28/2011	271
Lab Tests at or above 10.0 ppm:	180

Next Steps

- Provide results to Phase 3 homeowners
- External federal peer review of draft report
- Finalize and release report
- Explore additional sampling if warranted
- Support County/State and Yakama Nation efforts to reduce groundwater contamination

Questions?

For more info:
http://yosemite.epa.gov/R10/WATER.NSF/GWPU/lyakimagw



Many thanks to:
•The Lower Valley residents that allowed us into their homes
•Our local partners in recruiting and translating
•Our lab partners for analysis
•EPA management and staff support for this work