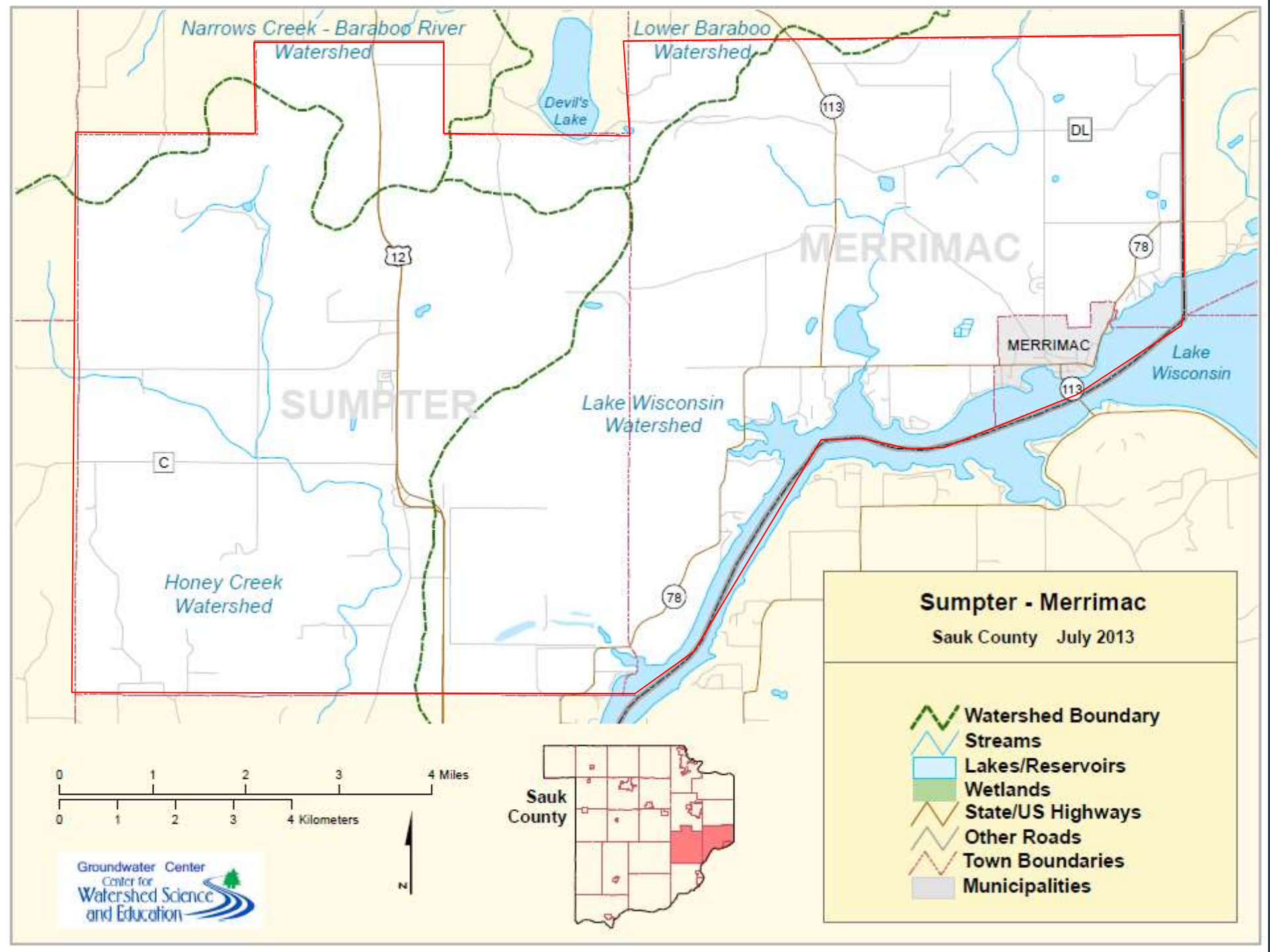
# Sauk County Community Drinking Water Program

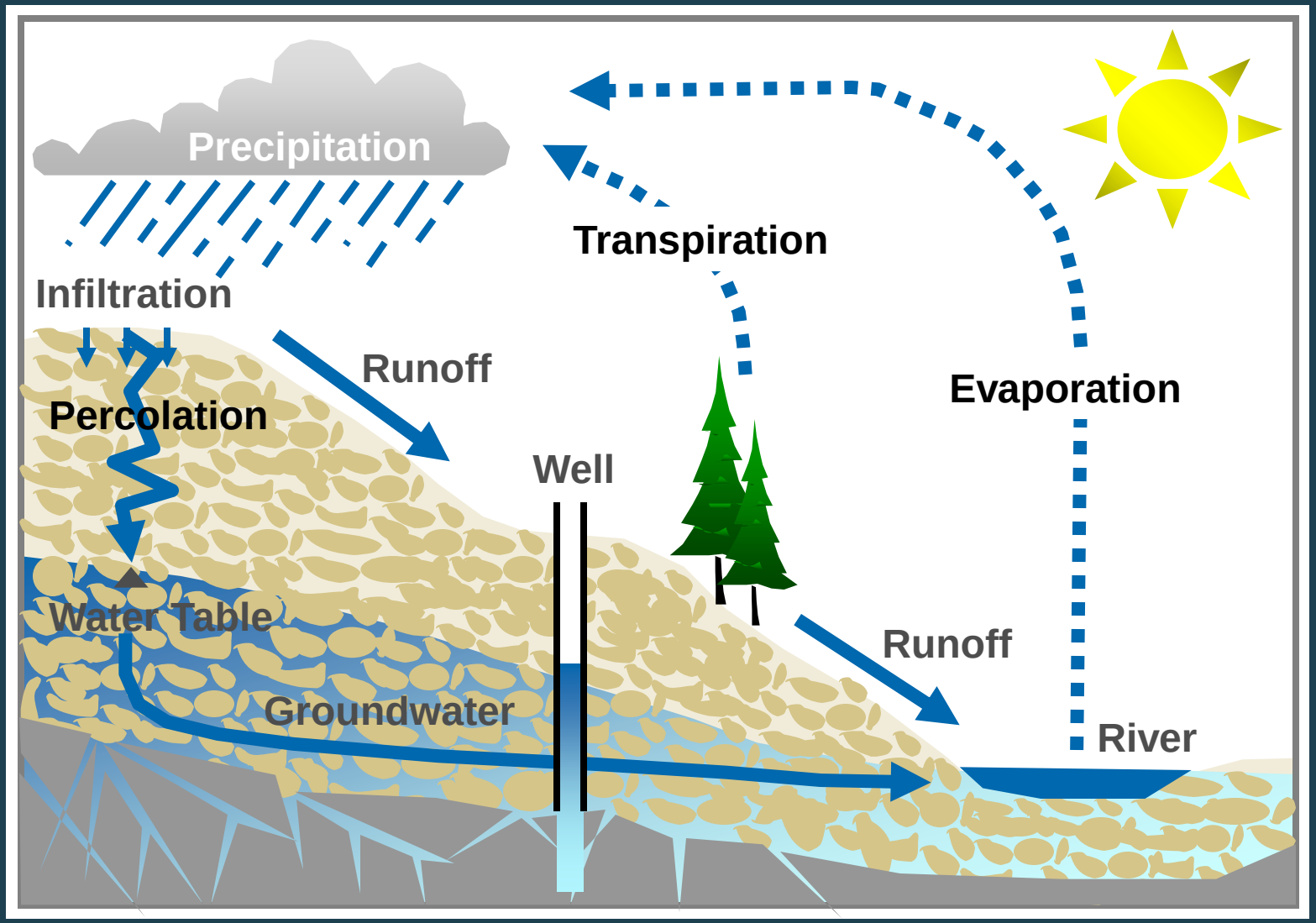
# Today's presentation

- Groundwater Basics: Where does my water come from
- Well Construction
- What do my individual test results mean?
- General groundwater quality in Towns of Merrimac and Sumpter
- Improving your water quality

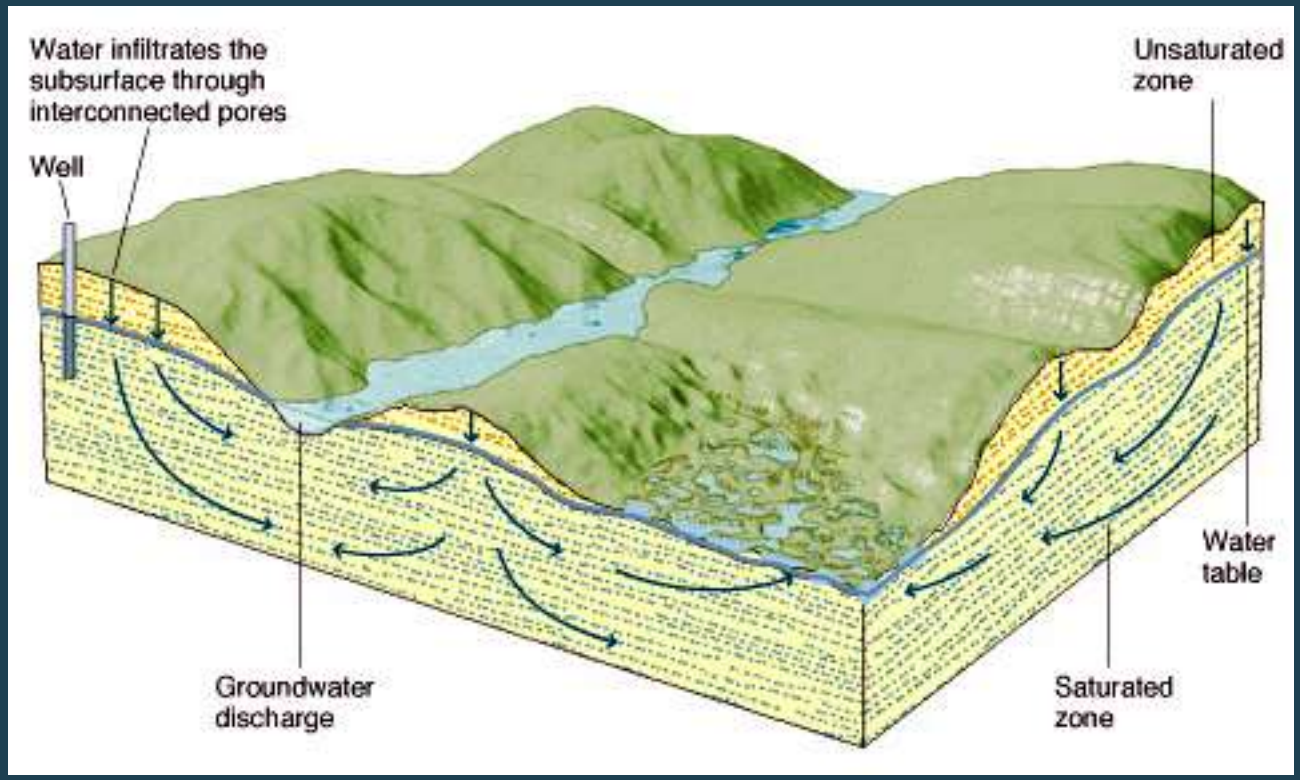

Narrows Creek - Baraboo River Watershed
Lower Baraboo Watershed
Devil's Lake
113
DL
MERRIMAC
78
12
MERRIMAC
Lake Wisconsin
SUMPTER
Lake Wisconsin Watershed
113
C
Honey Creek Watershed
78
Sumpter - Merrimac
Sauk County July 2013
Watershed Boundary
Streams
Lakes/Reservoirs
Wetlands
State/US Highways
Other Roads
Town Boundaries
Municipalities
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

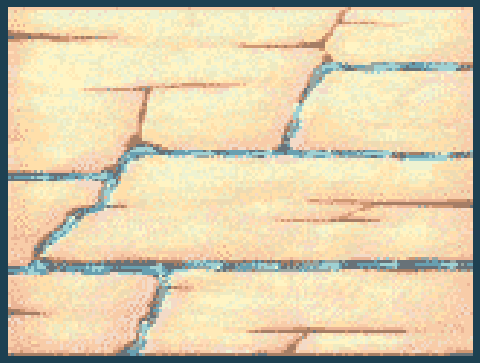

Sauk City
Merrimac
N River St
113
Image Landsat
© 2013 Google
Image USDA Farm Service Agency
Google earth

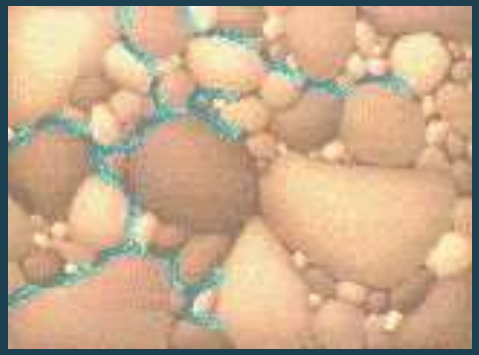
# The Water Cycle

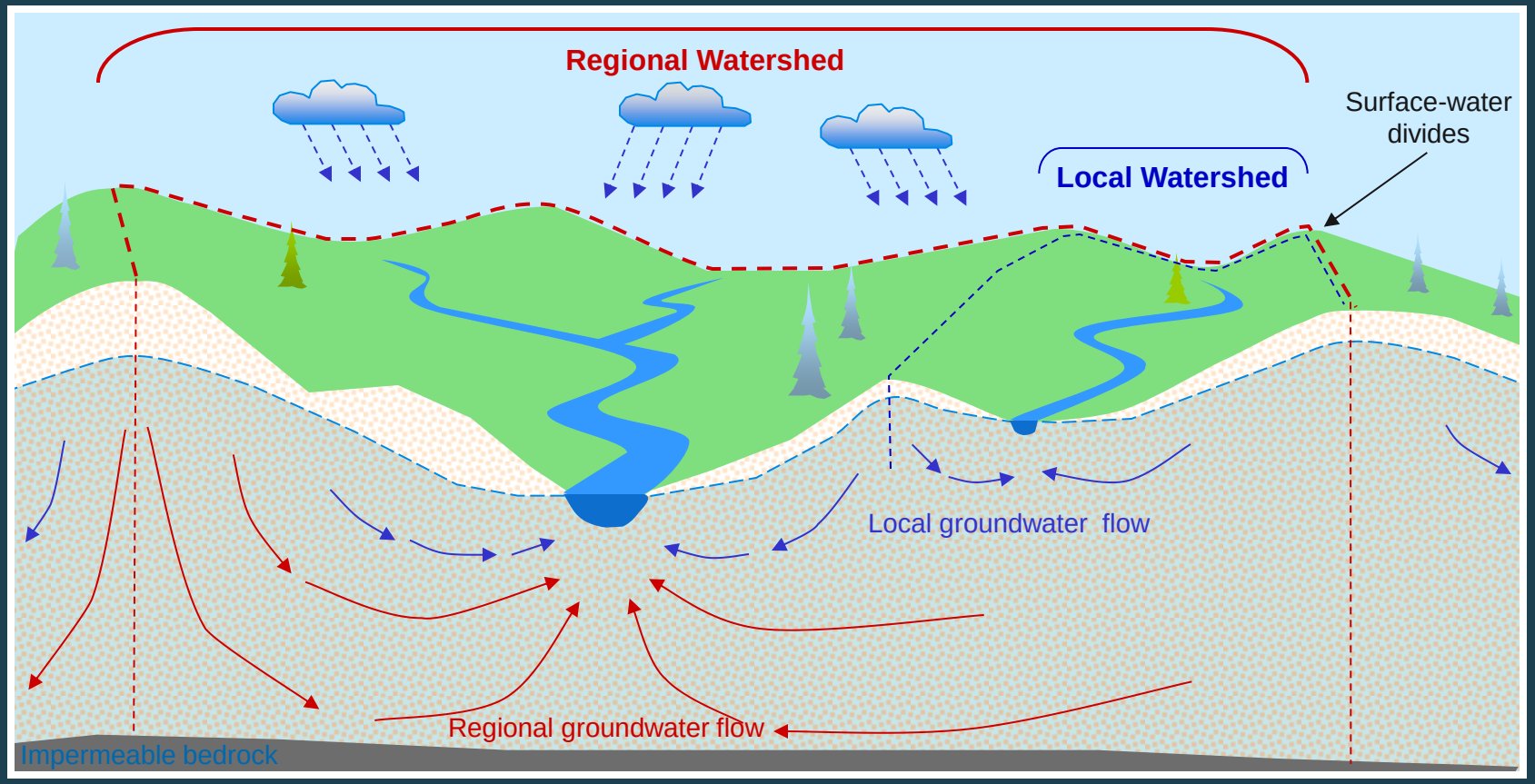


# Groundwater Movement



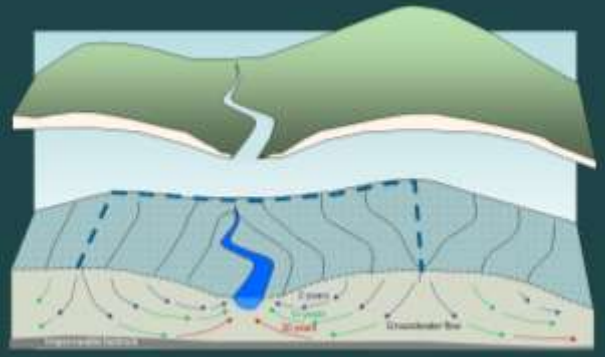



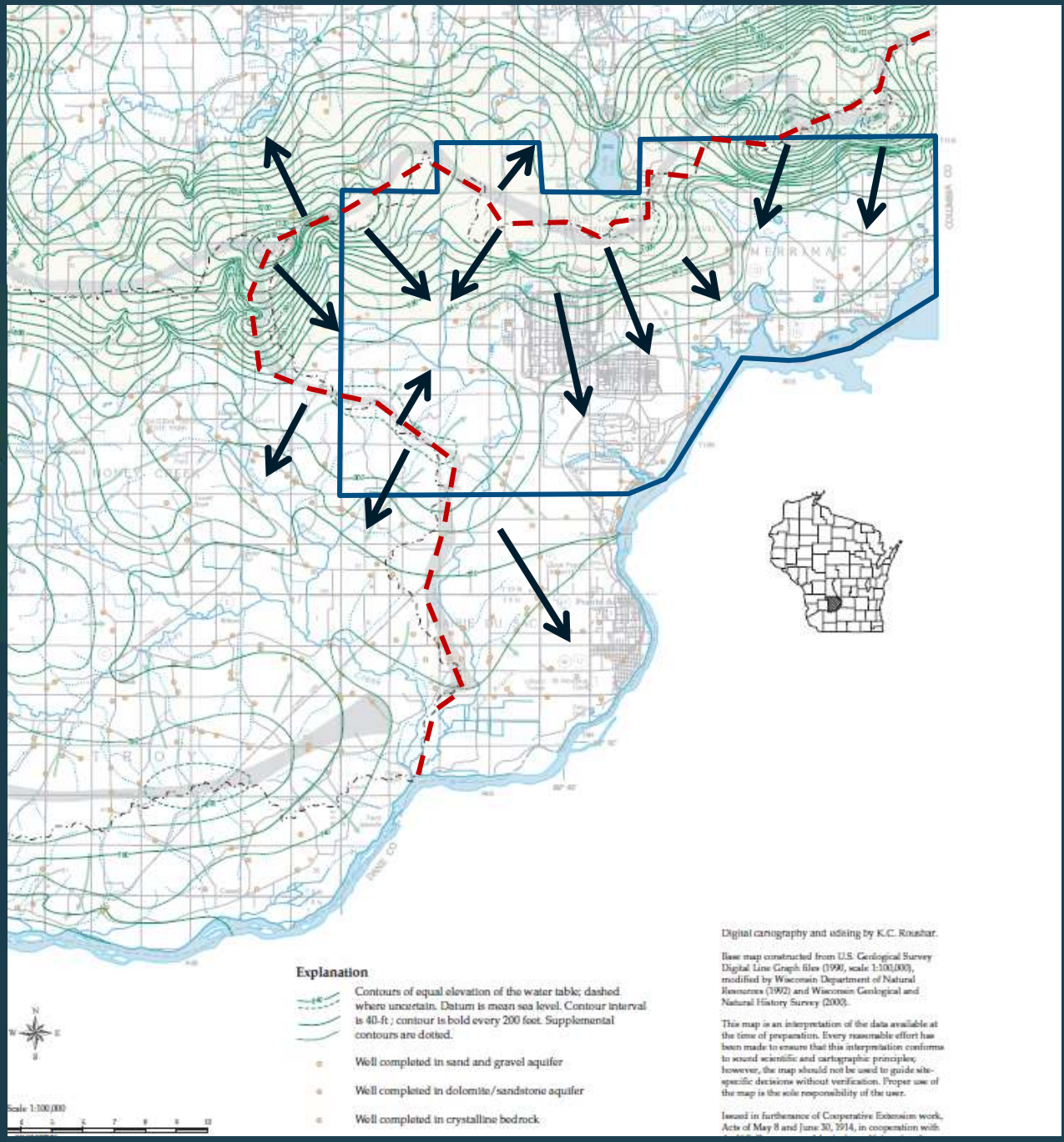


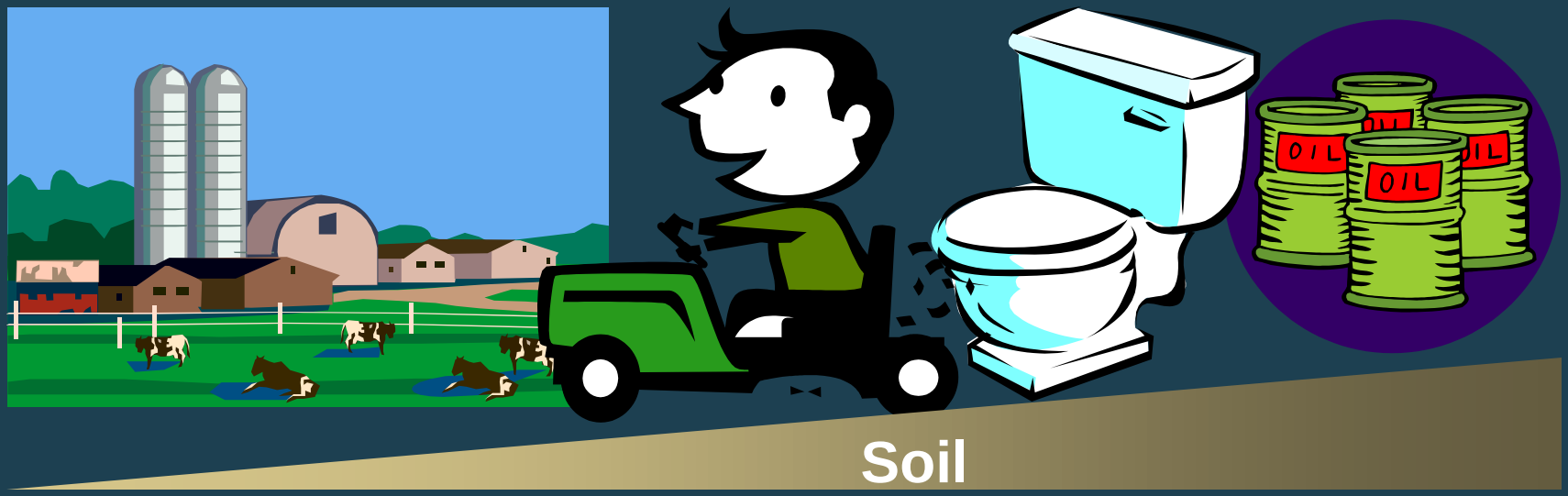


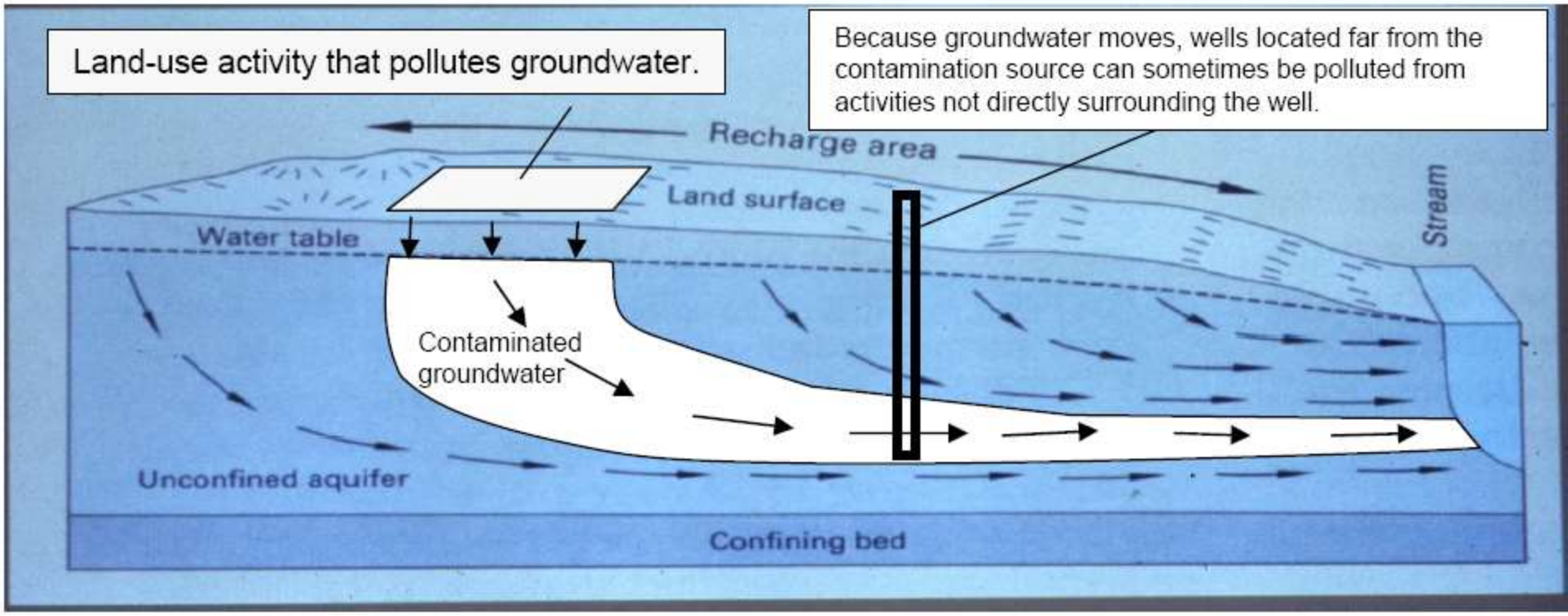

- Water converges at discharge locations
- Rivers and streams act like a drain for water to exit a watershed

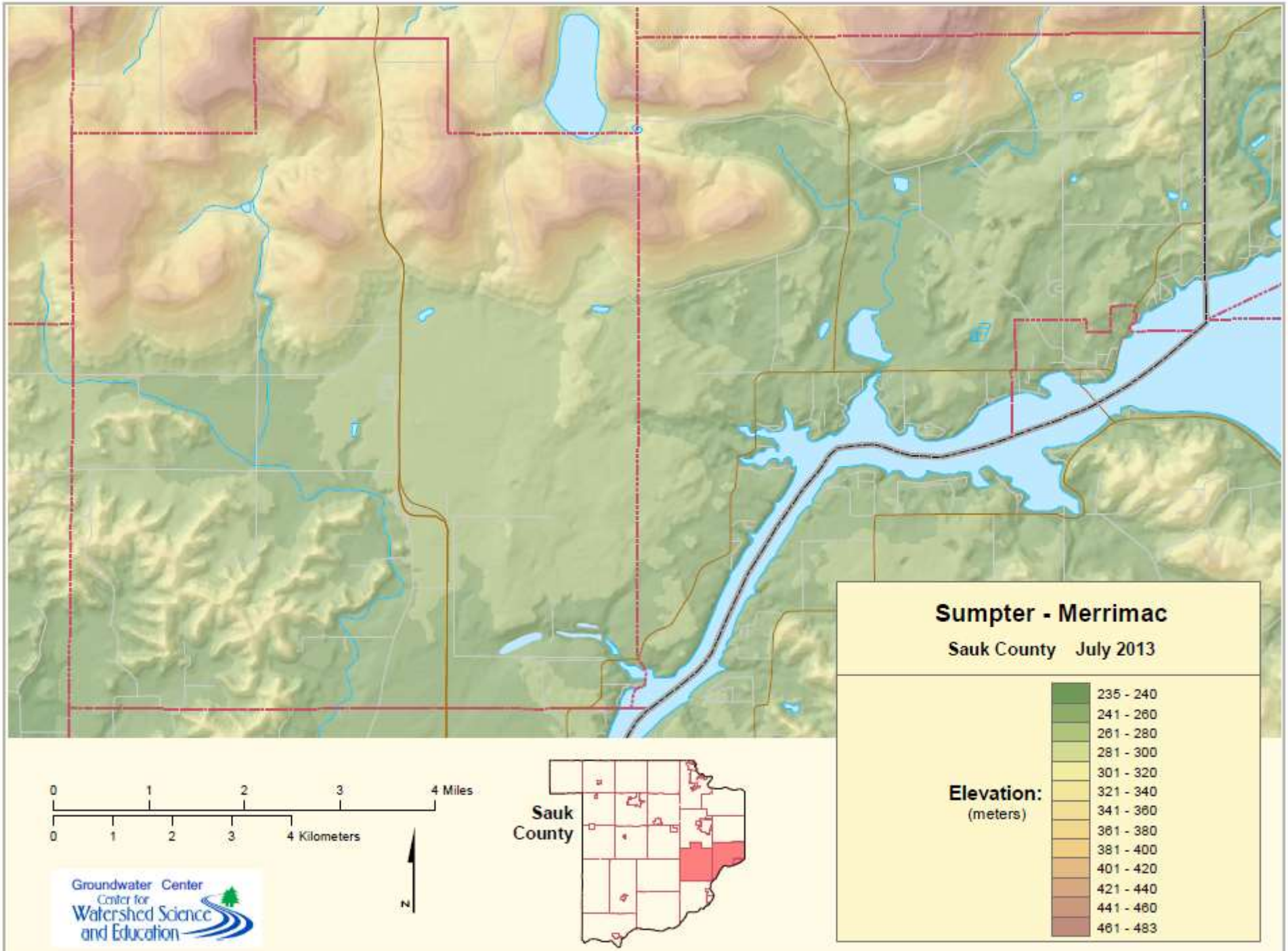
## Groundwater Residence Time





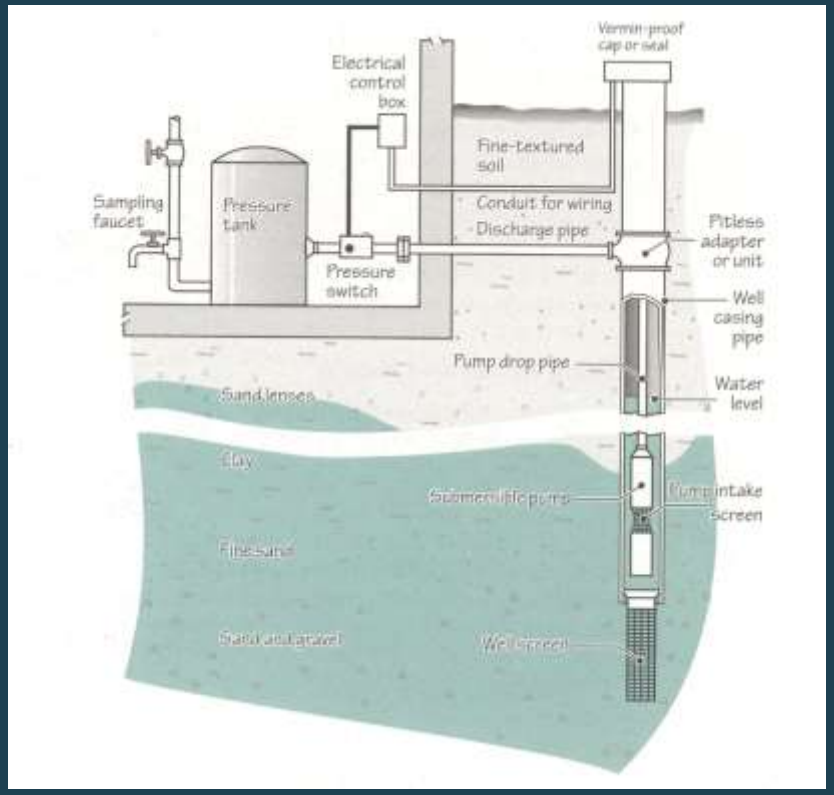

OIL
OIL
OIL
Soil


Land-use activity that pollutes groundwater.
Because groundwater moves, wells located far from the contamination source can sometimes be polluted from activities not directly surrounding the well.
Recharge area
Land surface
Water table
Stream
Contaminated groundwater
Unconfined aquifer
Confining bed


Sumpter - Merrimac
Sauk County July 2013
Elevation:
(meters)
235 - 240
241 - 260
261 - 280
281 - 300
301 - 320
321 - 340
341 - 360
361 - 380
381 - 400
401 - 420
421 - 440
441 - 460
461 - 483
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

# Types of Wells

Drilled Well




Driven Point Well

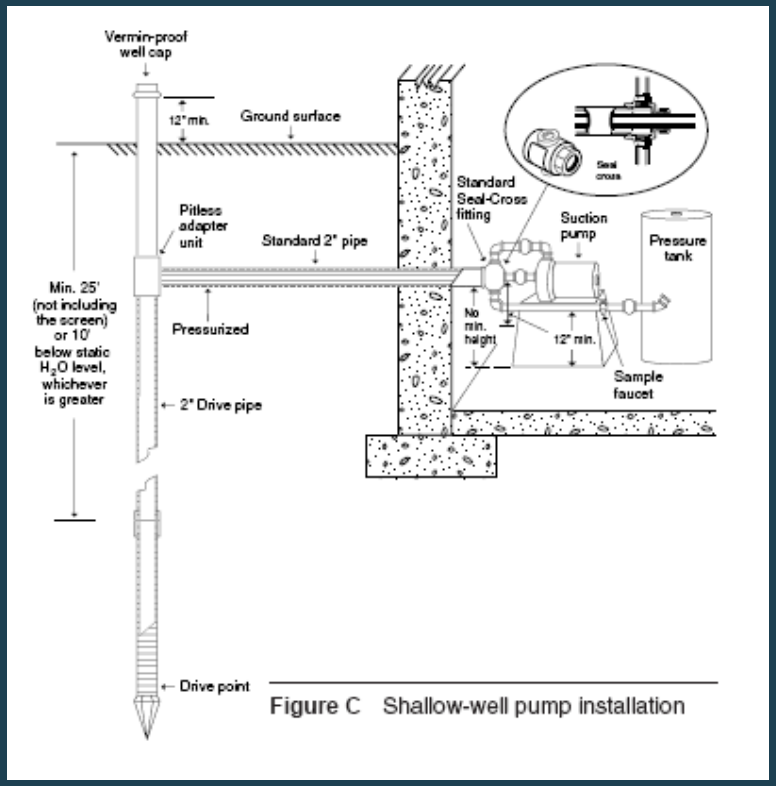
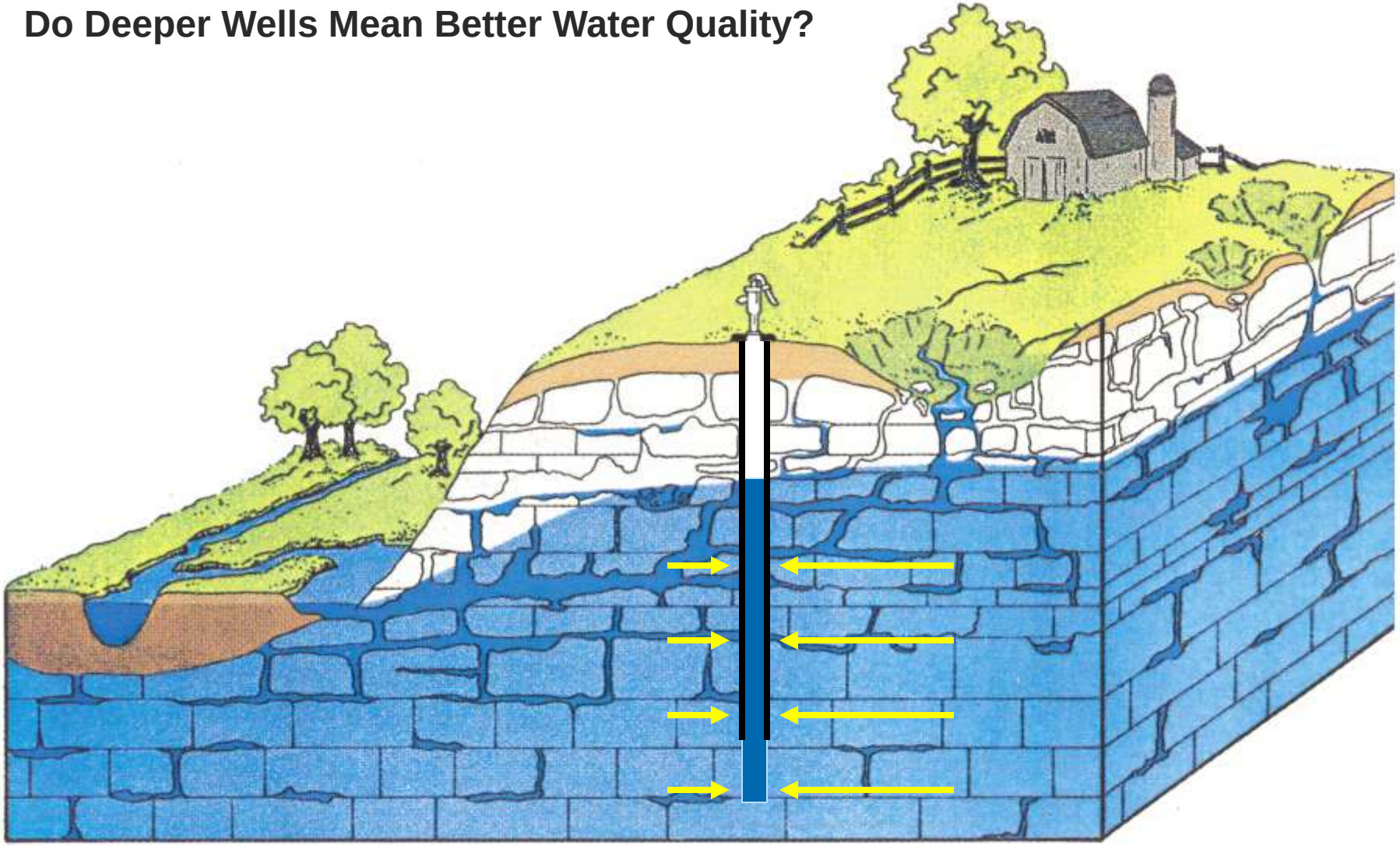
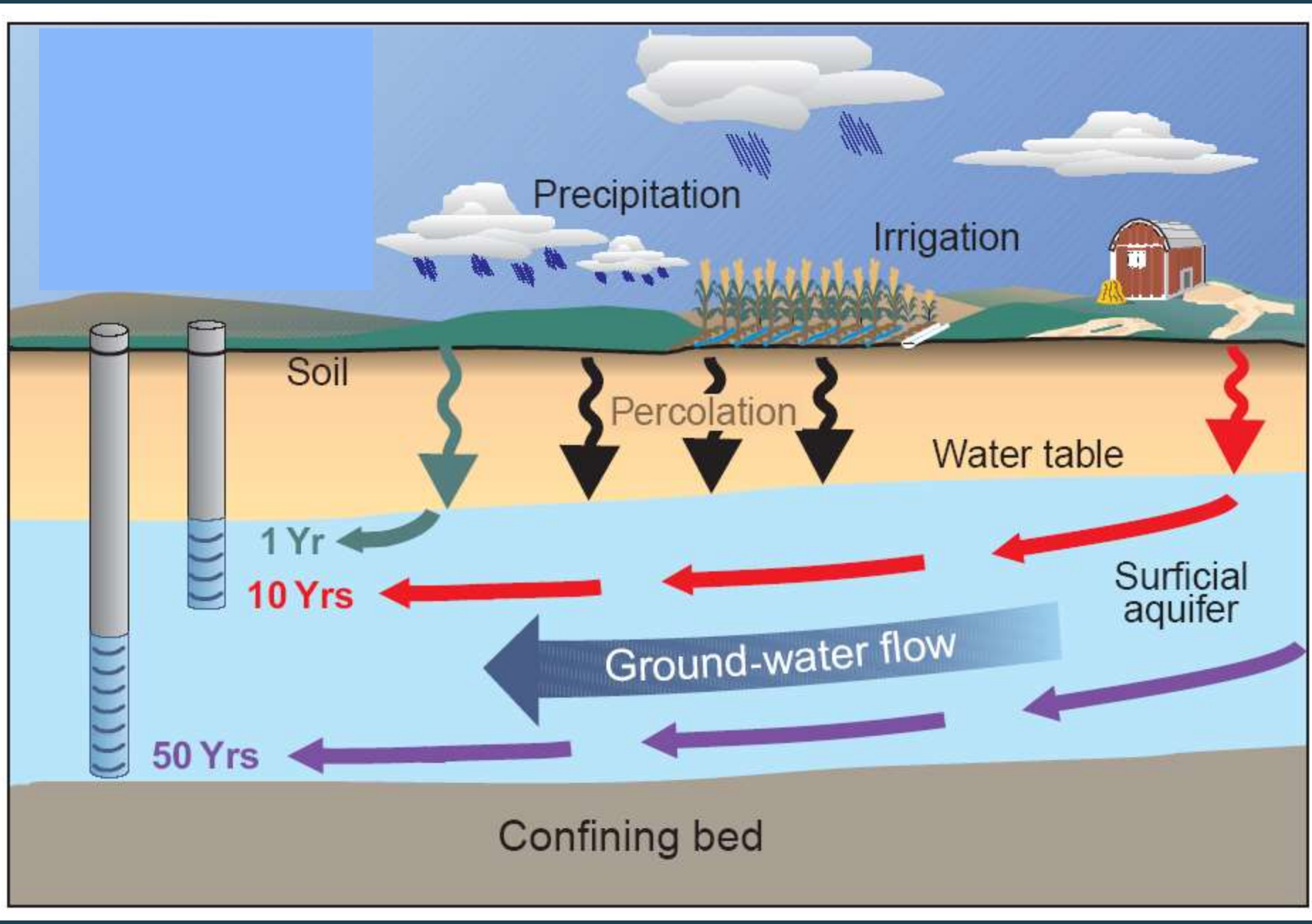



Figure C Shallow-well pump installation

# Do Deeper Wells Mean Better Water Quality?




Precipitation
Irrigation
Soil
Percolation
Water table
1 Yr
10 Yrs
Surficial aquifer
Ground-water flow
50 Yrs
Confining bed

Well Construction Report For
WISCONSIN UNIQUE WELL NUMBER **GC 566**

Department of Natural Resources
Private Water Supply — WSS
SAMPLE Box 7921
Madison, WI 53707

Property Owner: Clyde Nuenfeldt — Telephone Number:
Mailing Address: R+4
City: Oshkosh — State: WI — Zip Code:
County of Well Location: Winnebago — County Well Location Permit No.: W — Well Completion Date: 9/69

Well Constructor (Business Name): Wallace Clark — Registration #:
Address: 5411 Ripon Rd.
City: Oshkosh — State: WI — Zip Code:

2. Mark well location in correct 40-acre parcel of section.

1. Location (Please type or print, entry a blank yes.)
☑ Town ☐ City ☐ Village of Oshkosh — Fire # (if available):
Grid or Street Address or Road Name and Number (if available):
Subdivision Name: — Lot #: — Block #:
Gov't Lot # ___ or NE ¼ of NE ¼ of Section 36; T 19 N; R 16 ☑ E ☐ W

3. Well Type ☑ New ☐ Replacement ☐ Reconstruction
of unique well # ___ constructed in 19 ___
Reason for new, replaced or reconstructed well?

4. Well serves 1 # of homes and/or ___ (ex: barn, restaurant, church, school, industry, etc.)
High Capacity Well? ☐ Yes ☑ No
High Capacity Property? ☐ Yes ☑ No

☑ Drilled ☐ Driven Point ☐ Jetted ☐ Other ___

5. Well Located on Highest Point of Property, Consistent with the General Layout and Surroundings? ☐ Yes ☐ No If no, explain on back side.
Well Located in Floodplain? ☐ Yes ☐ No
Distance In Feet From Well To Nearest:

| | | | |
|---|---|---|---|
| ___ 1. Landfill | ___ 9. Downspout/Yard Hydrant | ___ 17. Wastewater Sump |
| 50 2. Building Overhang | 120 11. Foundation Drain to Clearwater | ___ 18. Paved Animal Barn Pen |
| 110 3. Septic or Holding Tank | ___ 12. Foundation Drain to Sewer | ___ 19. Animal Yard or Shelter |
| 150 4. Sewage Absorption Unit | ___ 13. Building Drain ☐ Cast Iron or Plastic ☐ Other | ___ 20. Silo — Type ___ |
| ___ 5. Nonconforming Pit | ___ 14. Building Sewer ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other | ___ 21. Barn Gutter |
| ___ 6. Buried Home Heating Oil Tank | ___ 15. Collector or Street Sewer | ___ 22. Manure Pipe ☐ Gravity ☐ Pressure ☐ Cast Iron or Plastic ☐ Other |
| ___ 7. Buried Petroleum Tank | ___ 16. Clearwater Sump | ___ 23. Other Manure Storage ___ Other NR 113 Waste Source |
| ___ 8. Shoreline/Swimming Pool | | ___ 24. ___ |

6. Drillhole Dimensions

| Dia. (in.) | From (ft.) | To (ft.) |
|---|---|---|
| 10 | surface | 66 |
| 6 | 66 | 140 |

Method of constructing upper enlarged drillhole only.
☐ 1. Rotary — Mud Circulation
☐ 2. Rotary — Air
☐ 3. Rotary — Foam
☐ 4. Reverse Rotary
☐ 5. Cable-tool Bit ___ in. dia.
☐ 6. Temp. Outer Casing ___ in. dia. Removed? ☐ Yes ☐ No If no, explain ___
☐ 7. Other ___

7. Casing, Liner, Screen

| Dia. (in.) | Material, Weight, Specification Mfg. & Method of Assembly | From (ft.) | To (ft.) |
|---|---|---|---|
| 6 | New Black 18.95 | surface | 66 |

| Dia. (in.) | screen type and material | From | To |
|---|---|---|---|

8. Grout or Other Sealing Material

| Method ___ Kind of Sealing Material | From (ft.) | To (ft.) | # Sacks Cement |
|---|---|---|---|
| Slurry clay + drillings | surface | 66 | |

Make additional comments on reverse side about geology, etc.

DNR USE ONLY

9. Geology Type, Caving/Noncaving, Color, Hardness, Etc.

| | From (ft.) | To (ft.) |
|---|---|---|
| Clay | surface | 18 |
| Sandy clay | 18 | 66 |
| Lime rock | 66 | 100 |
| Sand Stone | 100 | 140 |
| Water bearing | | |

10. Static Water Level
___ ft. above ground level
10 ft. below ground surface

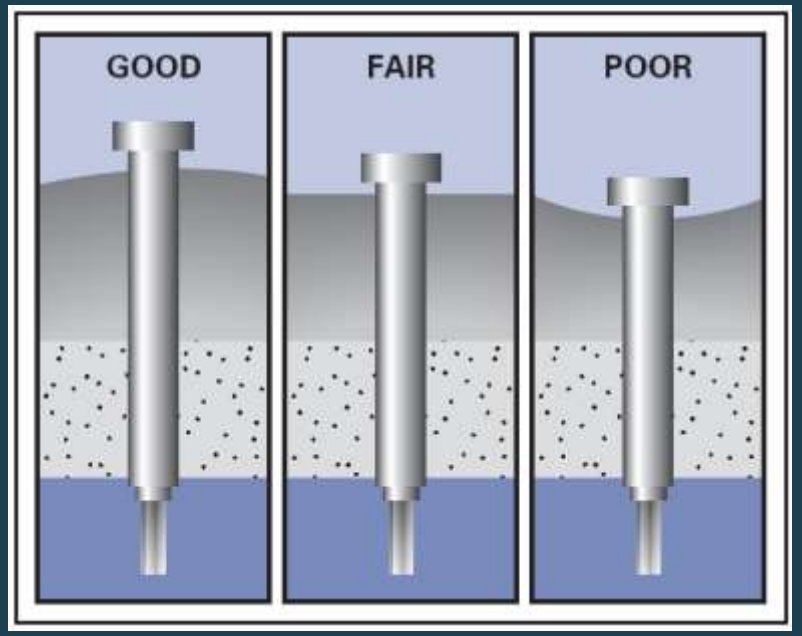
11. Pump Test
Pumping Level 13 ft. below surface
Pumping at 30 GPM for 2 hours

12. Well Is:
☑ Above ☐ Below Grade
10 in.
Developed? ☐ Yes ☐ No
Disinfected? ☑ Yes ☐ No
Capped? ☑ Yes ☐ No

13. Did you permanently seal all unused, noncomplying, or unsafe wells?
☐ Yes ☐ No If no, explain ___

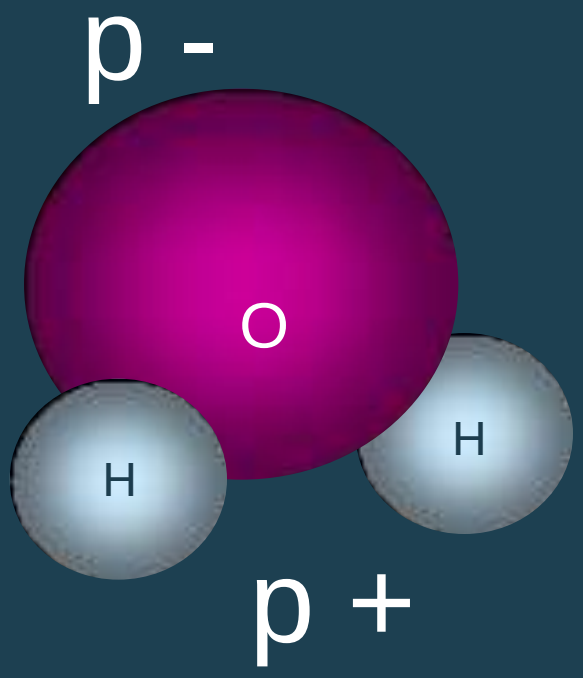
14. Signature of Print Driver or Registered Driller — Date Signed
Signature of Drill Rig Operator — Date Signed

WELL CONSTRUCTION REPORT



# water basics

- "Universal Solvent"
- Naturally has "stuff" dissolved in it.
  - Impurities depend on rocks, minerals, land-use, plumbing, packaging, and other materials that water comes in contact with.
- Can also treat water to take "stuff" out



# Interpreting Drinking Water Test Results

**Tests important to health:**

- Bacteria
- Sodium
- Nitrate
- Copper
- Lead
- Triazine
- Zinc
- Sulfate
- Arsenic

**Tests for aesthetic (taste,color,odor) problems:**

- Hardness
- Iron
- Manganese
- Chloride

**Other important indicator tests:**

- Saturation Index
- Alkalinity
- Conductivity
- Potassium

**Red = human-influenced, Blue = naturally found**

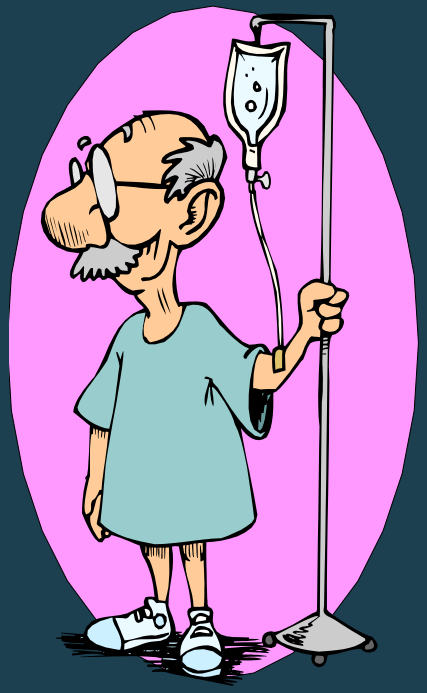
# What are the Health Concerns?

- Acute Effects – Usually seen within a short time after exposure to a substance.

  (ex. Bacteria or viral contamination which may cause intestinal disease)

- Chronic Effects – Results from exposure to a substance over a long period of time.

  (ex. Arsenic or pesticides can increase the chance of developing certain types of cancer)



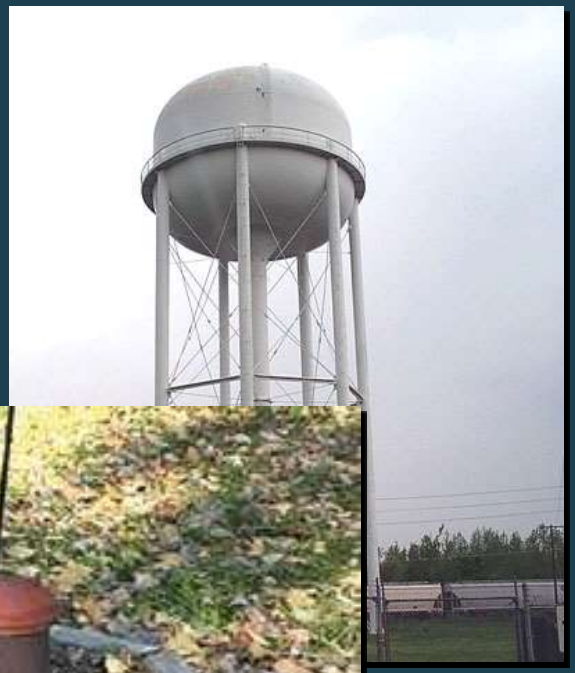
# Private vs. Public Water Supplies

## Public Water Supplies

- Regularly tested and regulated by drinking water standards.

## Private Wells

- Not required to be regularly tested.
- Not required to take corrective action
- Owners must take special precautions to ensure safe drinking water.



# Understanding Risk…?

| | |
|---|---|
| Dying from a lightning strike. | 0.013 in 1,000 chance. |
| 0.010 mg/L of arsenic in drinking water. | 3 out of 1,000 people likely to develop cancer. |
| 2 pCi of indoor radon level. | 4 out of 1,000 people likely to develop lung cancer.[1] |
| Dying in a car accident. | 4 in 1,000 chance. |
| 2 pCi of indoor radon combined with smoking. | 32 out of 1,000 people could develop lung cancer.[1] |

Drinking water quality is only one part of an individual's total risk.

[1]http://www.epa.gov/radon/healthrisks.html

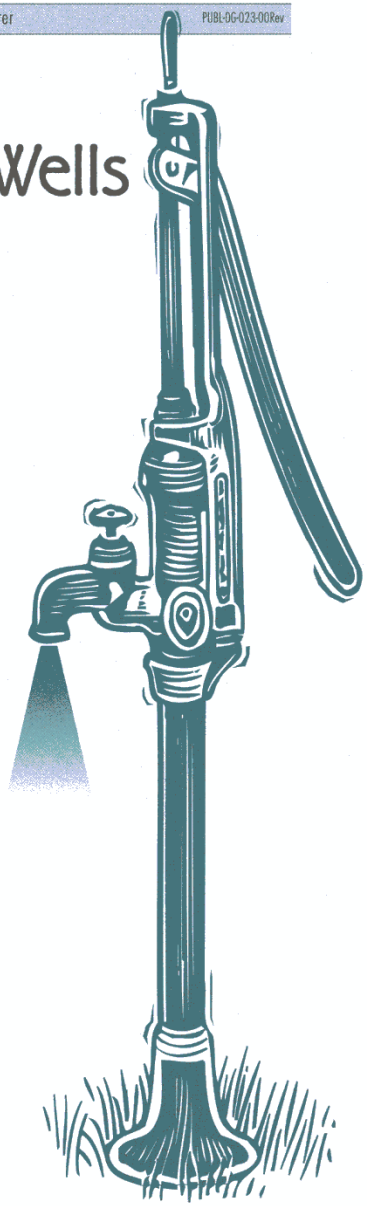
# Why do people test their water?

- Installed a new well
- Change in taste or odor
- Buying or selling their home
- Plumbing issues
- Want to know if it's safe to drink.

No one test tells us everything we need to know about the safety and condition of a water supply

Wisconsin Department of Natural Resources, Bureau of Drinking Water and Groundwater PUBL-DG-023-00Rev

# Tests for Drinking Water from Private Wells



## Why should I test my well?

As one of Wisconsin's 700,000 private well owners or private well water consumers, you probably use groundwater for doing your family's laundry, drinking, cooking, bathing and watering your garden. Municipalities are required to test their water supplies regularly to ensure the water is safe to drink. Since there is no requirement to test a private well except for bacteria when it is first drilled or the pump is changed, you are responsible for making sure your water is safe.

Most private wells provide a clean, safe supply of water; however, contaminants can pollute private wells, and unfortunately you cannot see, smell or taste most of them. Consequently, you should test your water on a regular basis. The decision on what to test your water for should be based on the types of land uses near your well.

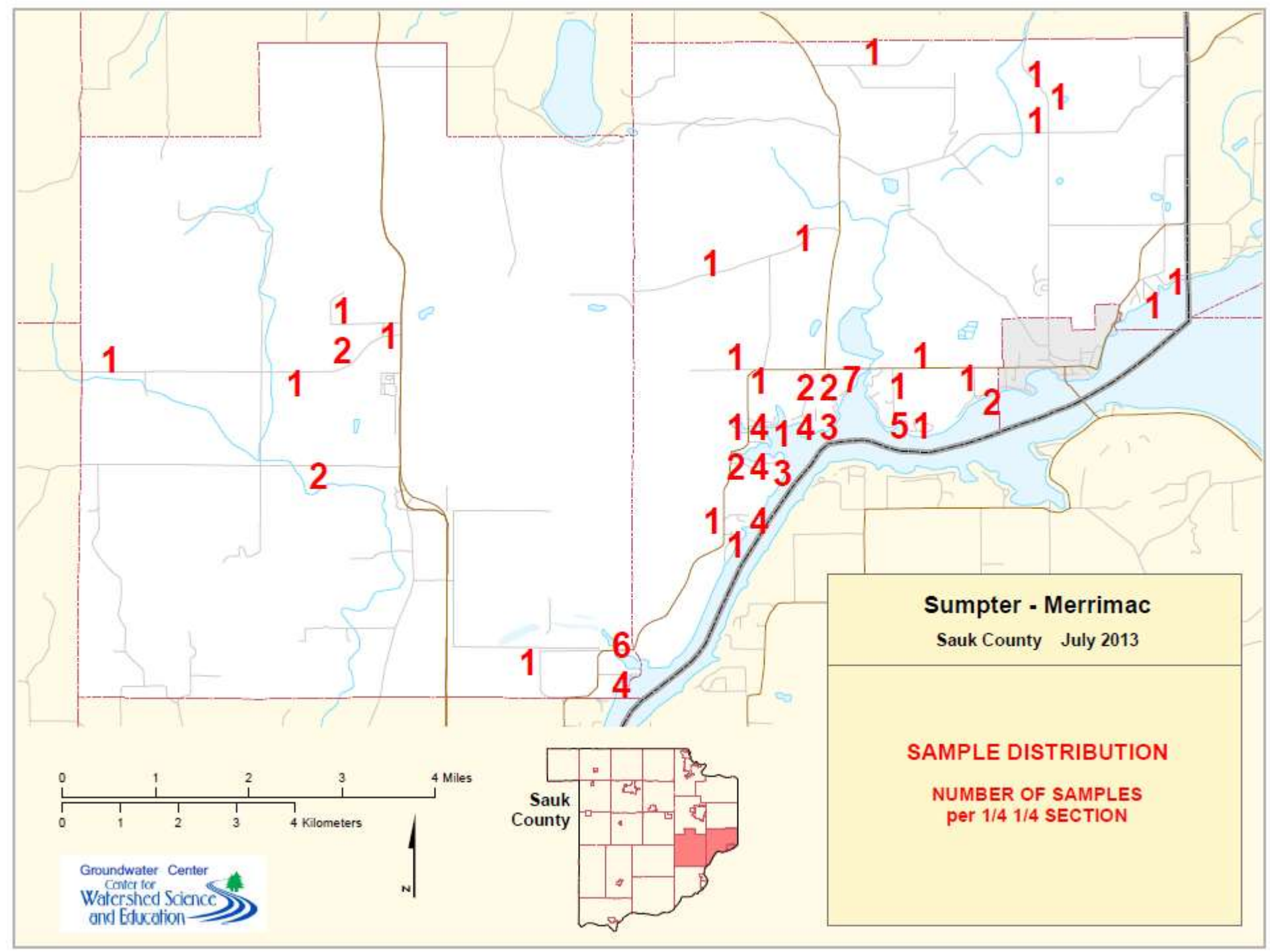
This brochure gives information about several common contaminants found in private wells. It should help you decide when to sample your well and how often, how to find a certified laboratory and who to call for help.

## What tests should be done on my water?

### Total Coliform Bacteria and E.coli

Coliform bacteria live in soil, on vegetation and in surface water. Coliform bacteria found in the intestines of warm-blooded animals and their feces are called E.coli. Some strains of coliform bacteria can survive for long periods in soil and water and can be carried into well casings by insects. Bacteria washed into the ground by rainwater or snowmelt are usually filtered out as the water seeps through the soil, but they sometimes enter water supplies through cracks in well casings, poorly sealed caps, fractures in the underlying bedrock, and runoff into sinkholes. Coliform bacteria are the most common contaminants found in private water systems. A 1994 Wisconsin survey found them in 23% of the wells tested and E.coli in 2.4% of the wells.

Most coliform bacteria do not cause illness, but indicate a breach in the water system. However, since E.coli bacteria are found in fecal material, they are often present with bacteria, viruses and parasites that can cause flu-like symptoms such as nausea, vomiting, fever and diarrhea. Private wells should be tested at least once a year for


Sumpter - Merrimac
Sauk County July 2013
SAMPLE DISTRIBUTION
NUMBER OF SAMPLES
per 1/4 1/4 SECTION
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

12/09/08 **Water and Environmental Analysis Lab, UW-Stevens Point** Page 1
**Room 200, College of Natural Resources, (715) 346-3209**

Sample ID:
Lab Number:
Group: **FDL/DODGE CO 08NOV**

| Occupant: | Owner: | Mailing: |
|---|---|---|
| Last | Last | Last |
| F/MI | F/MI | F/MI |
| Add | Add | Add |
| City | City | City |
| State **WI** Zip | State Zip | State Zip |
| Phone | Phone | Phone |
| Yrs Residence **31** | Yrs Ownership | No. Wells: **NA** |
| Well Construction: | Last Water Quality Test: | Sample Taken: |
| Date **un** | Date **un** | Date **11/17/08** |
| Drill **Un** | Lab **un** | Time **16:00** |
| Add | For **un** | Treatment Systems: |
| Casing Diam: **NA** in | Well Location: | Softener? **Yes** |
| Method: | County **FOND DU LAC** | Other |
| Depth: | Twnshp **Waupun** | Tap Samples: |
| of Casing **NA** ft | Legal | Tap Loc **kitchen, pump** |
| to Water **NA** ft | **SWSW S27 T14N R15E** | Before Treat **Yes** |
| of Well **NA** ft | | Well Depth Changed **No** |
| Distance To: | Map Coord **0: 0** | Date Change |
| Septic Tank **NA** ft | | Problems Observed: |
| Tile Field **NA** ft | Water Source: | Color Taste Corr |
| Seepage Pit **NA** ft | **Private** | Odor Health None **x** |
| Oth | Other | Oth |

**Laboratory Results:**

| Parameter | Qualifier | Result | Units |
|---|---|---|---|
| Homeowners Package: | | | |
| Bacteria-Coliform | | **Present** | (see note below) |
| Hardness-Total | | 520 | mg/l CaCO3 |
| Alkalinity | | 312 | mg/l CaCO3 |
| Conductivity | | 1012 | umhos/cm |
| pH | | 7.82 | std units |
| Saturation Index | | 0.9 | (Corrosivity Balanced) |
| Nitrogen-Nitrate/Nitrite | **Less Than** | 0.1 | mg/l N (None Detected) |
| Chloride | | 104.0 | mg/l |
| Homeowners Metal Package: | | | |
| Arsenic (VISTA-ICP-0.003) | **Less Than** | 0.003 | mg/l (None Detected) |
| Calcium (VISTA-ICP) | | 0.7 | mg/l |
| Copper (VISTA-ICP) | | 0.461 | mg/l |
| Iron (VISTA-ICP) | | 0.005 | mg/l |
| Lead (VISTA-ICP) | | 0.006 | mg/l |
| Magnesium (VISTA-ICP) | | 0.3 | mg/l |
| Manganese (VISTA-ICP) | **Less Than** | 0.001 | mg/l (None Detected) |
| Potassium (VISTA-ICP) | | 0.6 | mg/l |
| Sodium (VISTA-ICP) | | 248.9 | mg/l |
| Sulfate (VISTA-ICP) | | 88.1 | mg/l |
| Zinc (VISTA-ICP) | | 0.105 | mg/l |

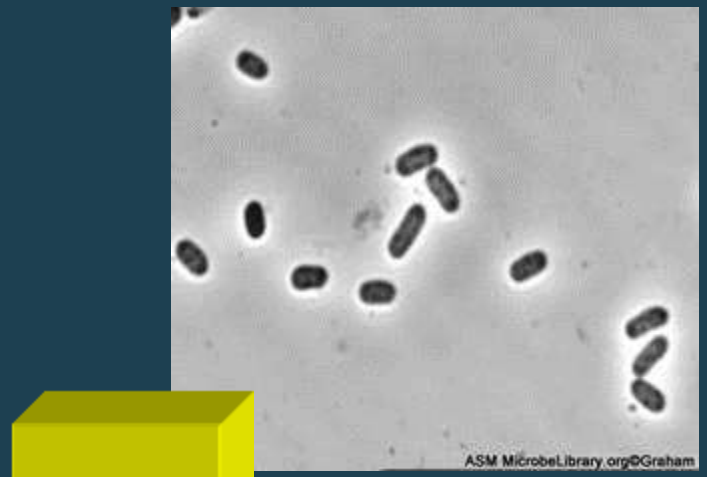
(Continued)

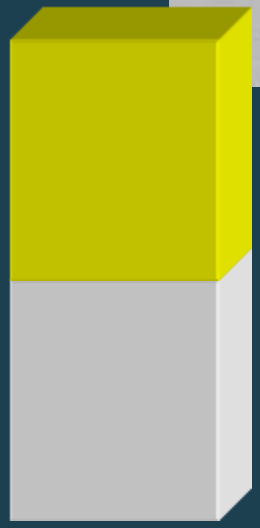
milligrams per liter (mg/l) = parts per million (ppm)

1 mg/l = 1000 parts per billion (ppb)

# Coliform bacteria

- Generally do not cause illness, but indicate a pathway for potentially harmful microorganisms to enter your water supply.
  - Harmful bacteria and viruses can cause gastrointestinal disease, cholera, hepatitis
- Sanitary water supply should not contain any coliform bacteria
- Recommend using an alternative source of water until a test indicates your well is absent of coliform bacteria
- Sources:
  - Live in soils and on vegetation
  - Human and animal waste
  - Sampling error



Present =Unsafe

Absent = Safe

# If coliform bacteria was detected, we also checked for e.coli bacteria test

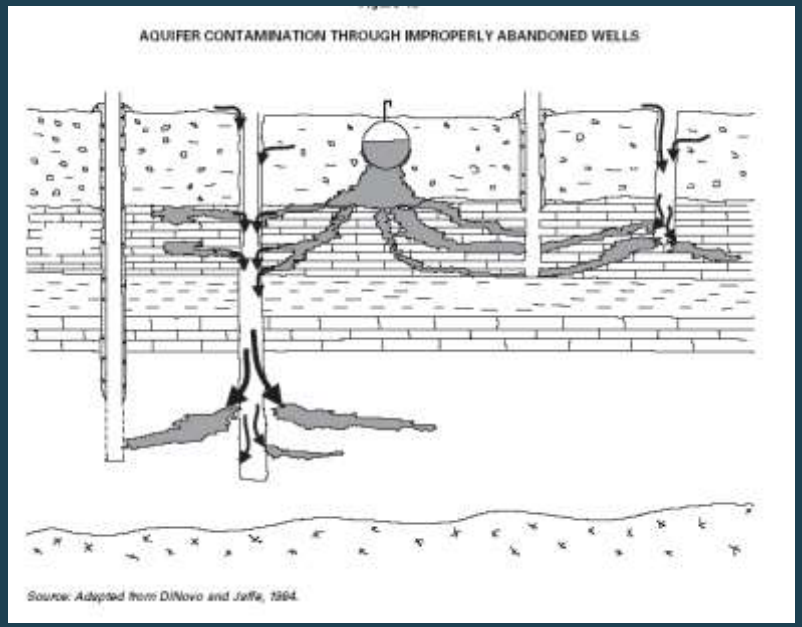
- Confirmation that bacteria originated from a human or animal fecal source.
- E. coli are often present with harmful bacteria, viruses and parasites that can cause serious gastrointestinal illnesses.
- Any detectable level of E.coli means your water is unsafe to drink.

| Contaminants | Sources | Symptoms |
|---|---|---|
| **BACTERIA** | | |
| *Escherichia coliform (E. coli)*<br>*Salmonella*<br>*Campylobacter*<br>*E. coli 0157* (Requires a special water test for detection. Causes similar, but more serious illness than other E.coli strains. Requires medical treatment.) | • Infected human and animal feces<br>• Manure<br>• Septic systems<br>• Sewage | • Gastrointestinal illness<br>• Low-grade fever<br>• Begins 12 hrs - 7 days after exposure |
| *Leptosporidia* | • Urine of livestock, dogs and wildlife<br>• Manure | • High fever, severe headache and red eyes<br>• Gastrointestinal illness<br>• Begins 2-28 days after exposure |
| **MICROSCOPIC PARASITES** | | |
| *Cryptosporidia*<br>*Giardia* | • Infected human and animal feces<br>• Manure<br>• Septic systems<br>• Sewage | • Gastrointestinal illness<br>• Begins 2-14 days after exposure |
| **VIRUSES** | | |
| Norovirus | • Infected human feces and vomit<br>• Septic systems<br>• Sewage | • Gastrointestinal illness<br>• Low-grade fever & headache<br>• Begins 12-48 hrs after exposure |
| **CHEMICALS** | | |
| Nitrate | • Fertilizers<br>• Manure<br>• Bio-solids<br>• Septic systems | Methemoglobinemia or "Blue Baby Syndrome" – No documented cases in Door County, but elevated nitrate levels in well water may indicate risk of contamination by additional pathogens. |
| Atrazine<br>(trade-name herbicide for control of broadleaf and grassy weeds) | Estimated to be most heavily used herbicide in the U.S. in 1987/89, with its most extensive use for corn and soybeans in the Midwest, including WI. In 1993, it became a restricted-use herbicide nationally. U.S. EPA set a max. contaminant level (MCL) at 3 parts per billion for safe drinking water. | Short-term exposure above the MCL may cause: congestion of heart, lungs and kidneys; low blood pressure; muscle spasms; weight loss; damage to adrenal glands.<br>Long-term exposure above MCL may cause: weight loss, cardio-vascular damage, retinal and some muscle degeneration; cancer. |

Information Sources: United States Department of Health and Human Services – Centers for Disease Control and Prevention (www.cdc.gov) and United States Environmental Protection Agency (www.epa.gov)

# Some Common Pathways for Bacteria to Enter Your Water System



# What should I do if coliform bacteria was present?

1. **Use alternative source of water for drinking**
2. **Retest**
3. **Try to identify any sanitary defects**
   - Loose or non-existent well cap
   - Well construction faults
   - A nearby unused well or pit
   - Inadequate filtration by soil
4. **Disinfect the well**
5. **Retest to ensure well is bacteria free.**

- **For reoccurring bacteria problems the best solution may be a new well.**

# Rock and Soil Impacts on Water Quality

# Tests for Aesthetic Problems

## Hardness

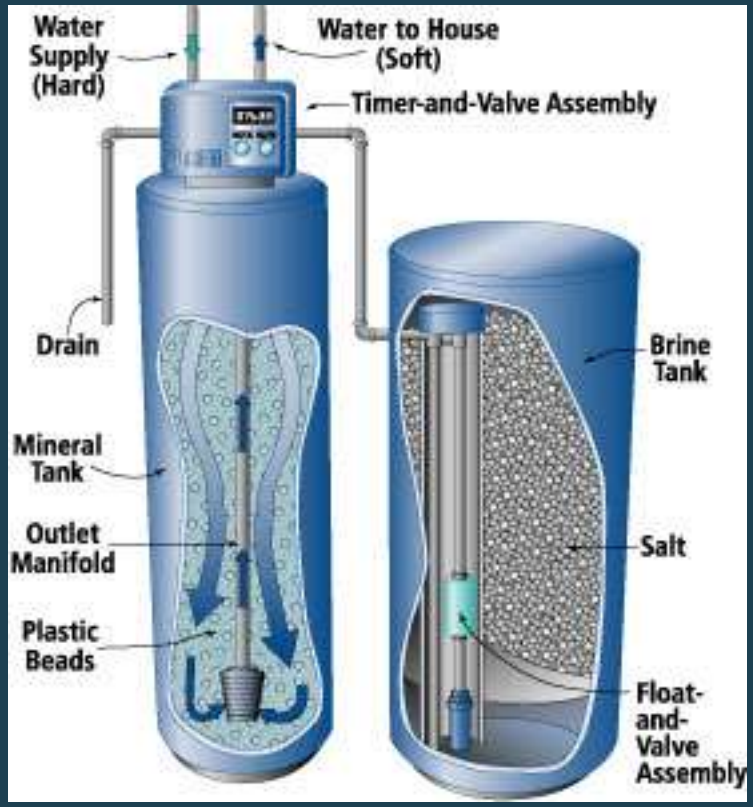
- **Natural (rocks and soils)**
- **Primarily calcium and magnesium**

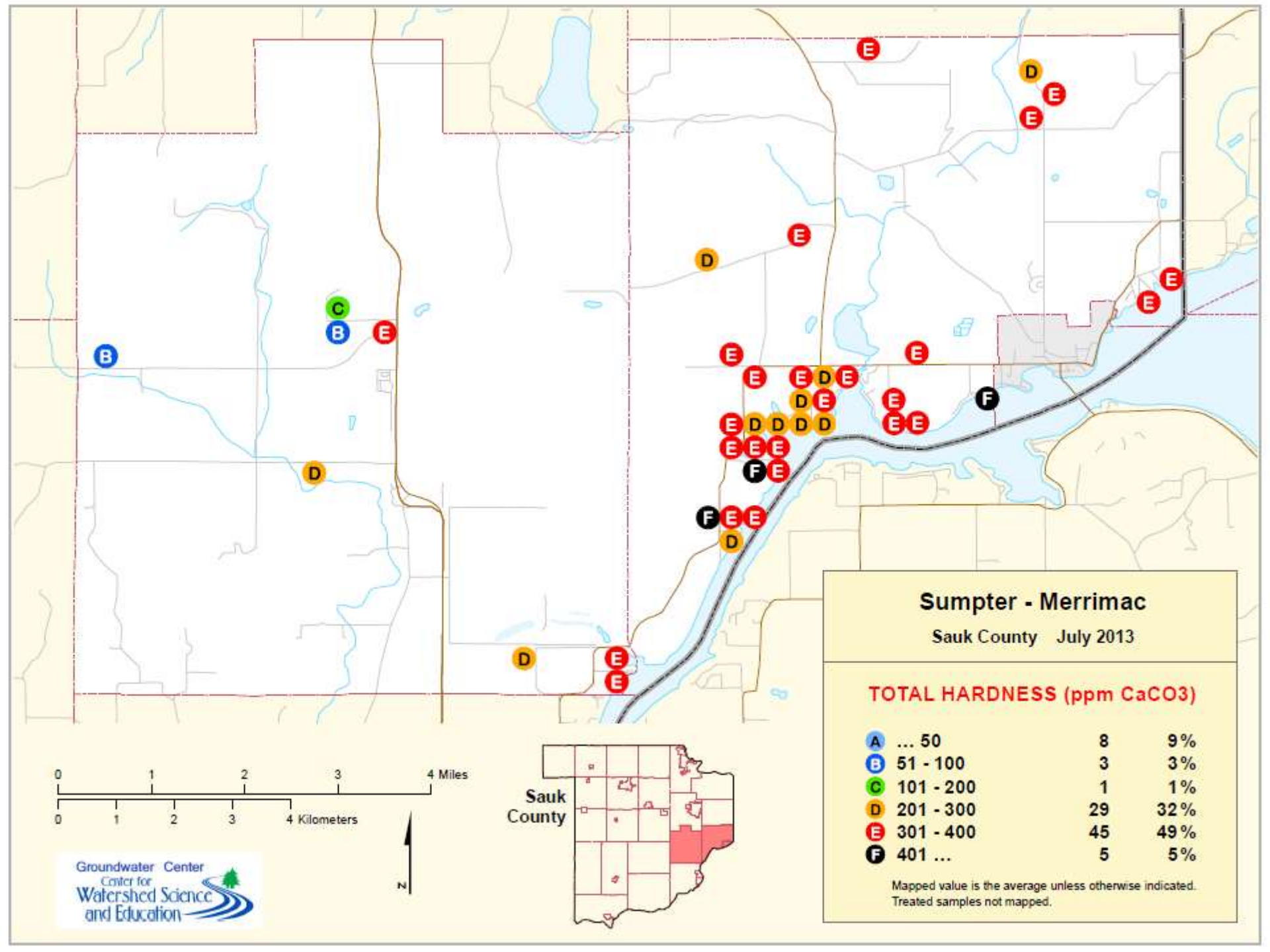

- Problems:  scaling, scum, use more detergent, decrease water heater efficiency

# Water Softening

**Water softeners remove calcium and magnesium which cause scaling and exchange it for sodium (or potassium).**

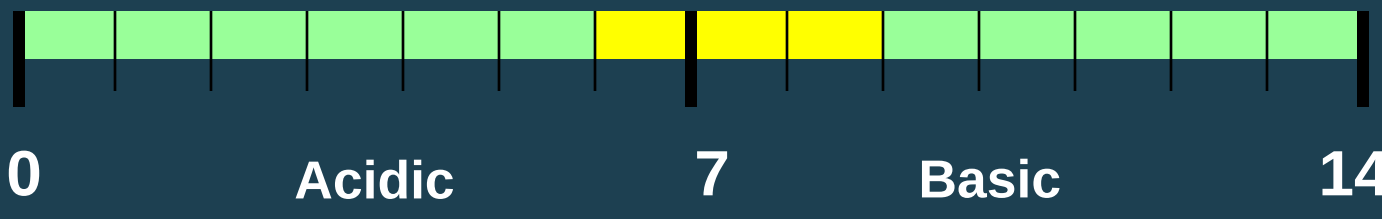
- **Negative: Increases sodium content of water.**
- **Suggestions:**
  - **Bypass your drinking water faucet.**
  - **Do not soften water for outdoor faucets.**
  - **If you are concerned about sodium levels – use potassium chloride softener salt.**




Sumpter - Merrimac
Sauk County July 2013
TOTAL HARDNESS (ppm CaCO3)
A ... 50 8 9%
B 51 - 100 3 3%
C 101 - 200 1 1%
D 201 - 300 29 32%
E 301 - 400 45 49%
F 401 ... 5 5%
Mapped value is the average unless otherwise indicated.
Treated samples not mapped.
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

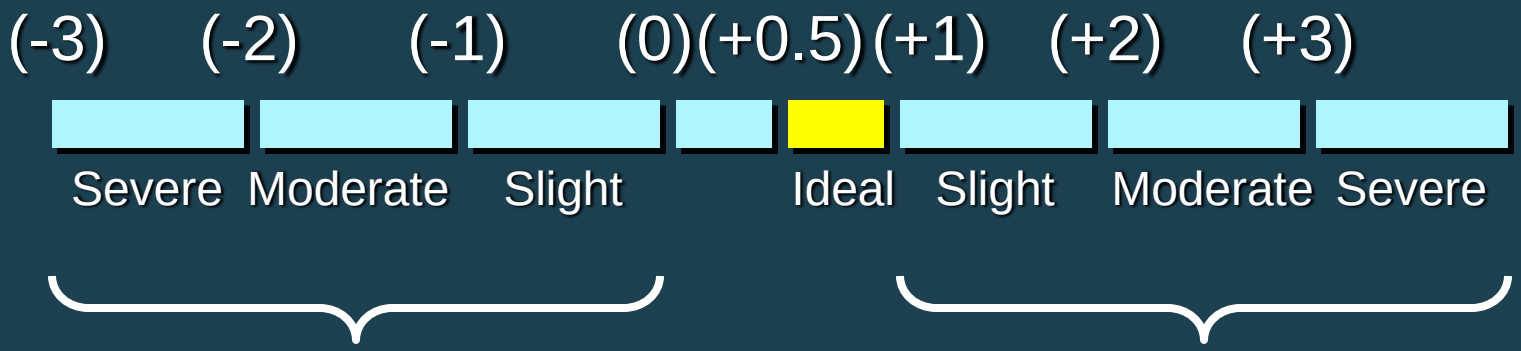
# Tests for Overall Water Quality

- Alkalinity – ability to neutralize acid
- Conductivity –
  - Measure of total ions
  - can be used to indicate presence of contaminants (~ twice the hardness)
- pH – Indicates water's acidity and helps determine if water will corrode plumbing

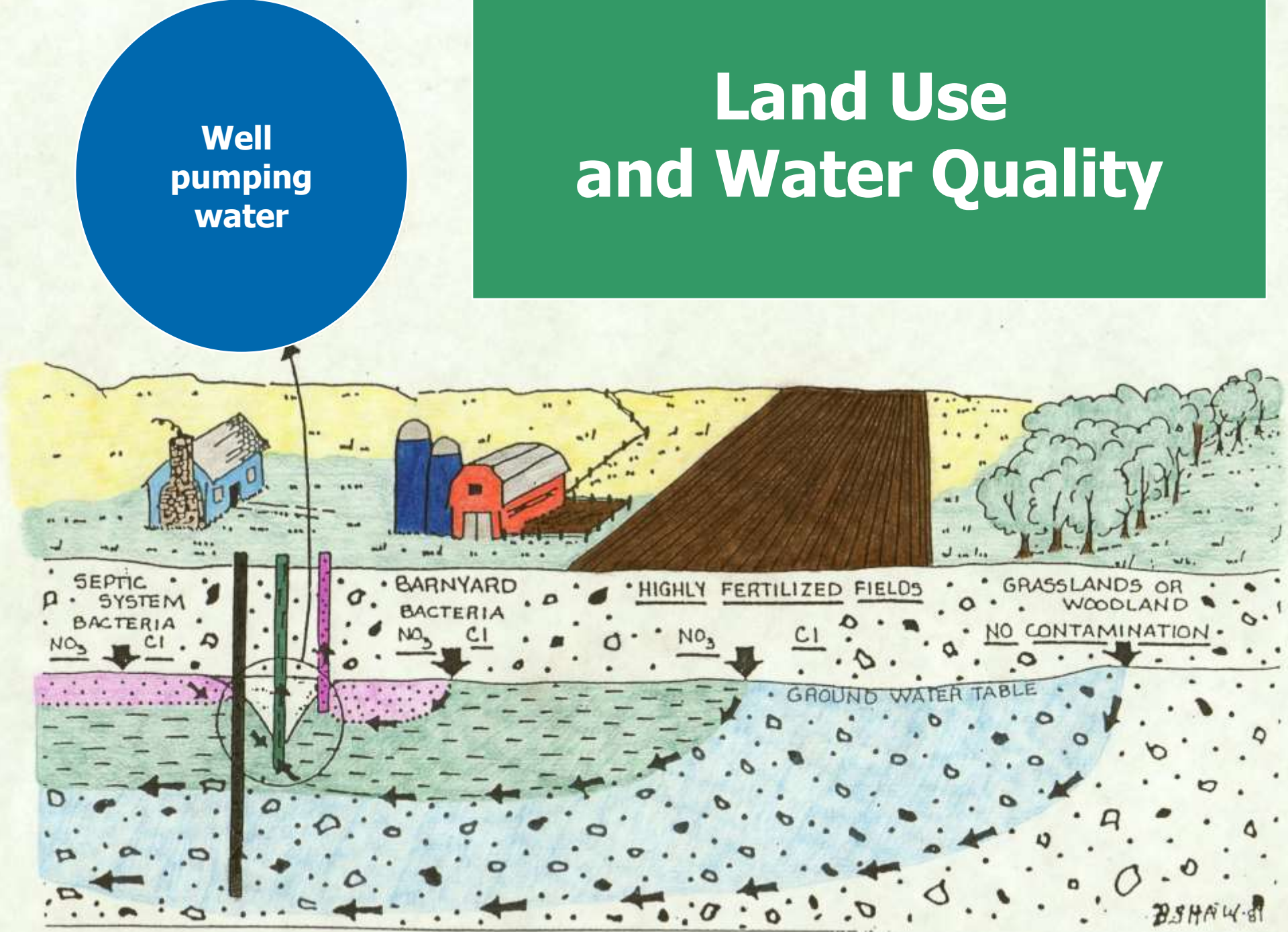


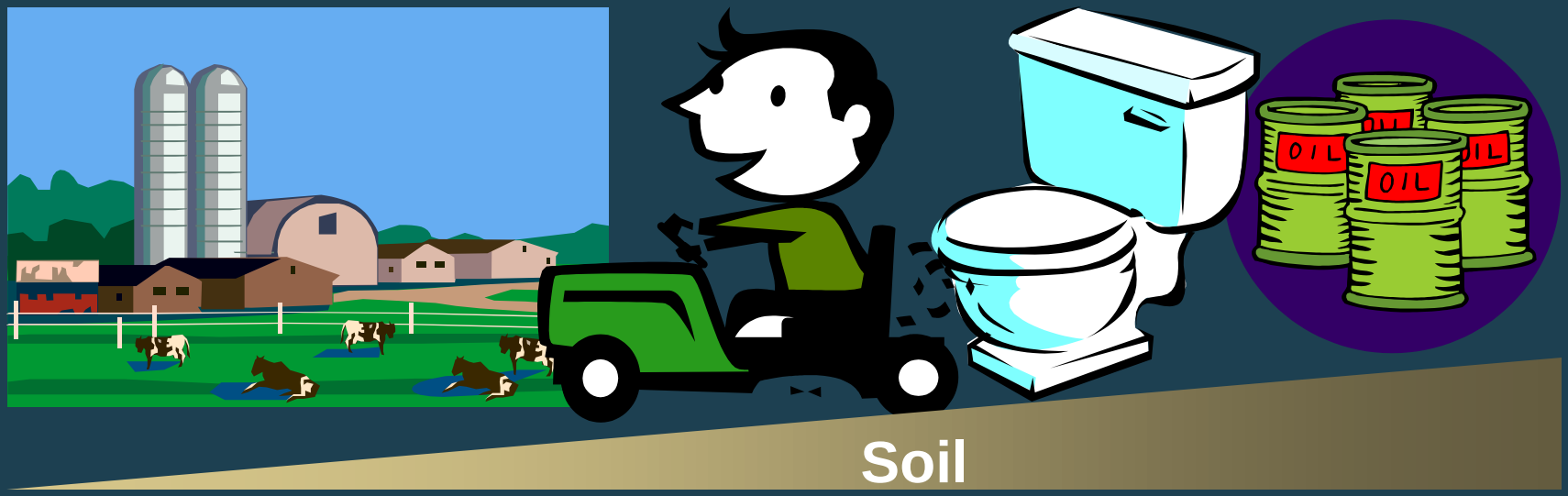
# Tests for Overall Water Quality

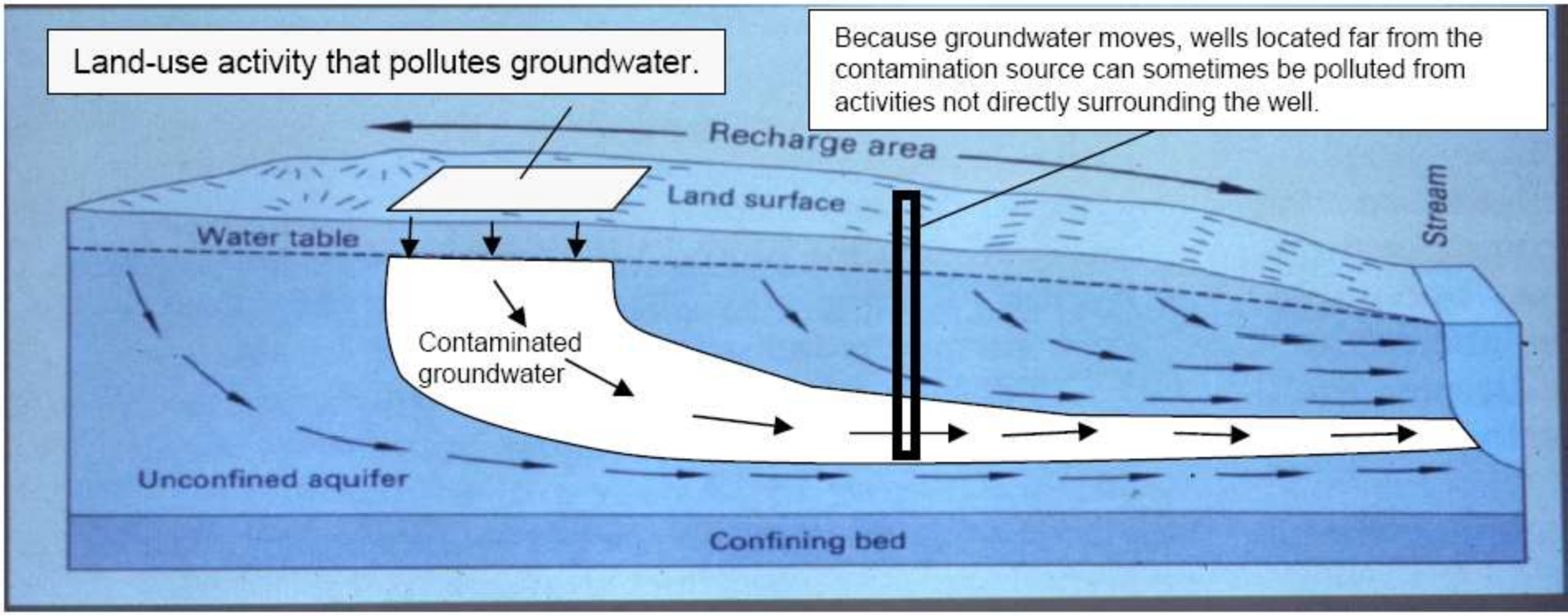
## Saturation Index

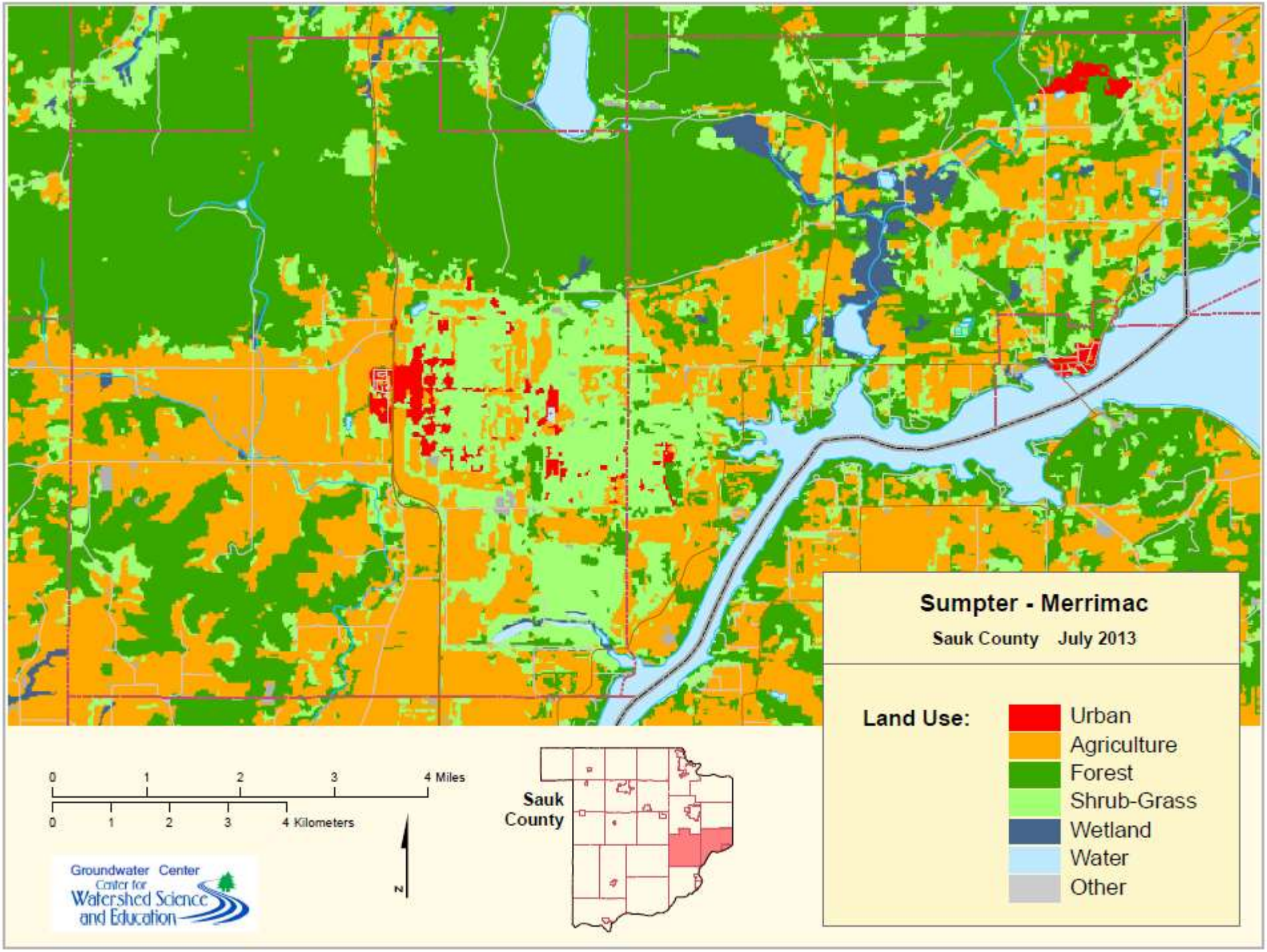


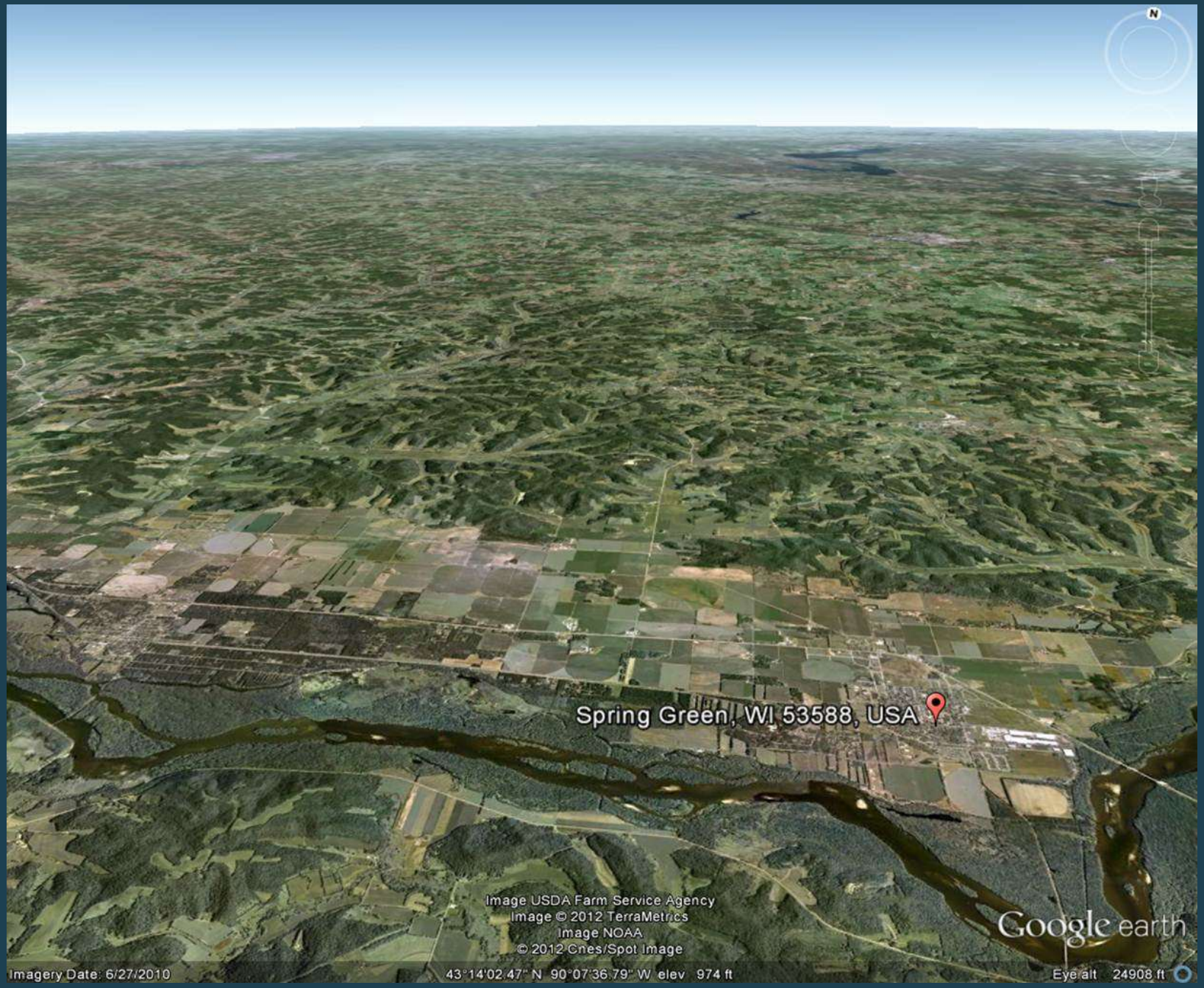

# Land Use and Water Quality




OIL
OIL
OIL
Soil


Land-use activity that pollutes groundwater.
Because groundwater moves, wells located far from the contamination source can sometimes be polluted from activities not directly surrounding the well.
Recharge area
Land surface
Water table
Stream
Contaminated groundwater
Unconfined aquifer
Confining bed

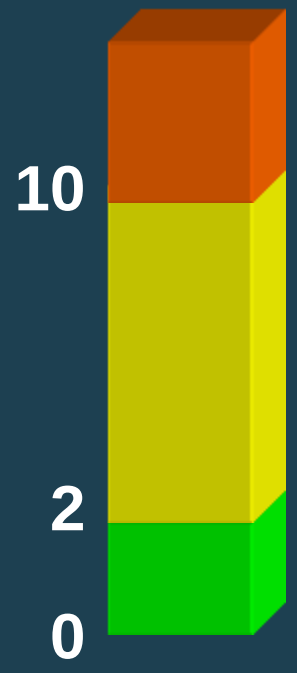

Sumpter - Merrimac
Sauk County July 2013
Land Use:
Urban
Agriculture
Forest
Shrub-Grass
Wetland
Water
Other
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education


Spring Green, WI 53588, USA
Image USDA Farm Service Agency
Image © 2012 TerraMetrics
Image NOAA
© 2012 Cnes/Spot Image
Google earth
Imagery Date: 6/27/2010
43°14'02.47" N 90°07'36.79" W elev 974 ft
Eye alt 24908 ft

# Test Important to Health

## Nitrate Nitrogen

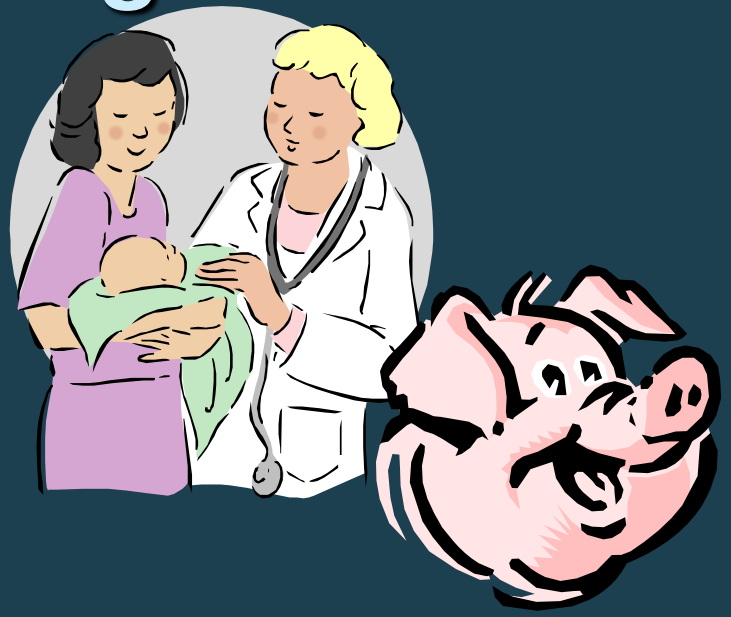
- **Greater than 10 mg/L**
  ***Exceeds State and Federal Limits for Drinking Water***
- **Between 2 and 10 mg/L**
  ***Some Human Impact***
- **Less than 2.0 mg/L**
  ***"Transitional"***
- **Less than 0.2 mg/L**
  ***"Natural"***




**UNSAFE - for infants and pregnant women; everyone should avoid long term consumption.**

**"NATURAL"**

# Nitrate-Nitrogen

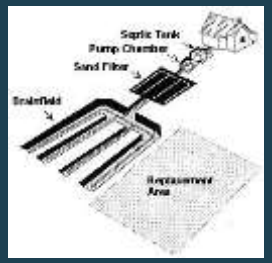


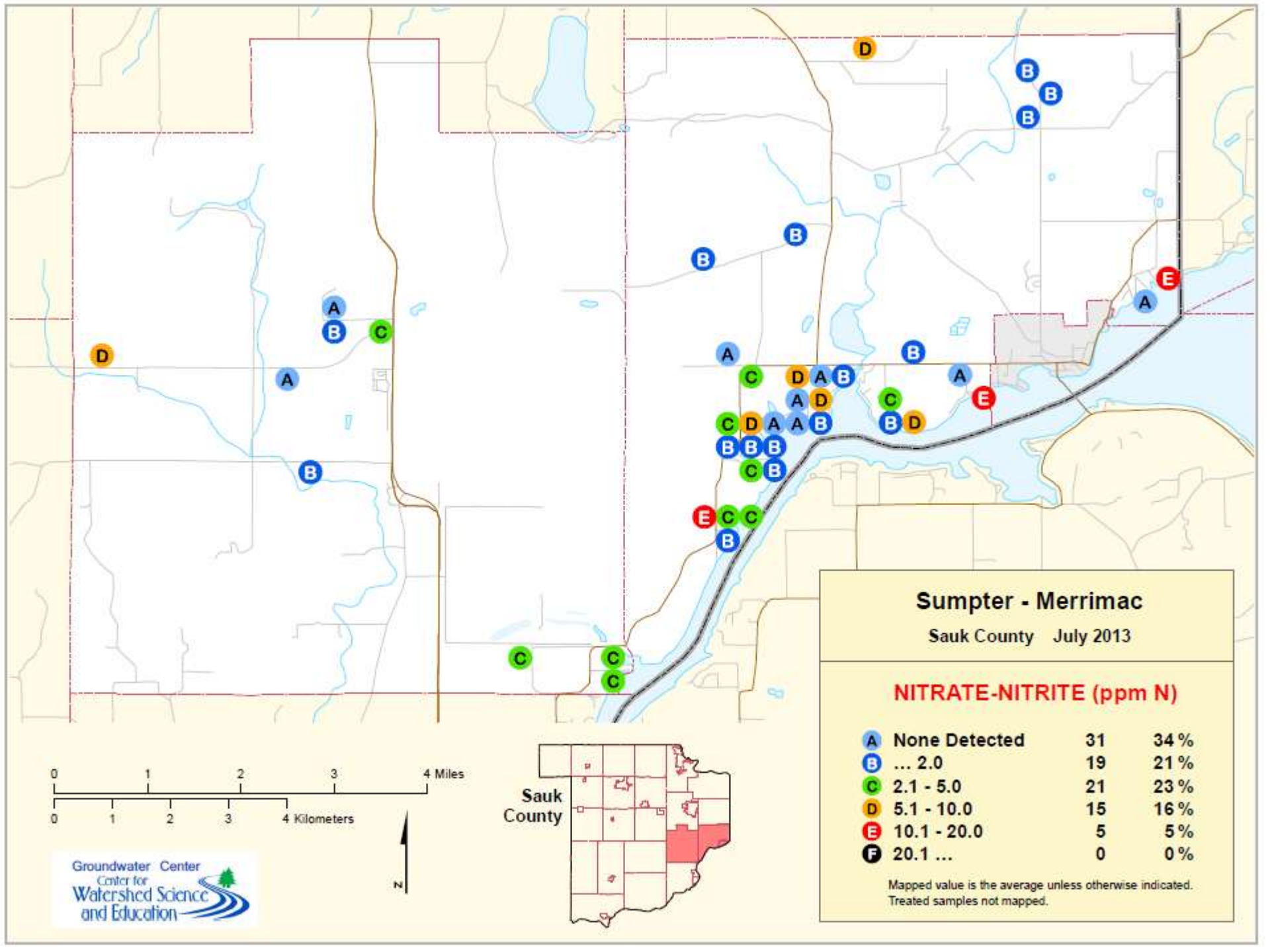
**Health Effects:**

- Methemoglobinemia (blue baby disease)
- Possible links to birth defects and miscarriages (humans and livestock)
- Indicator of other contaminants

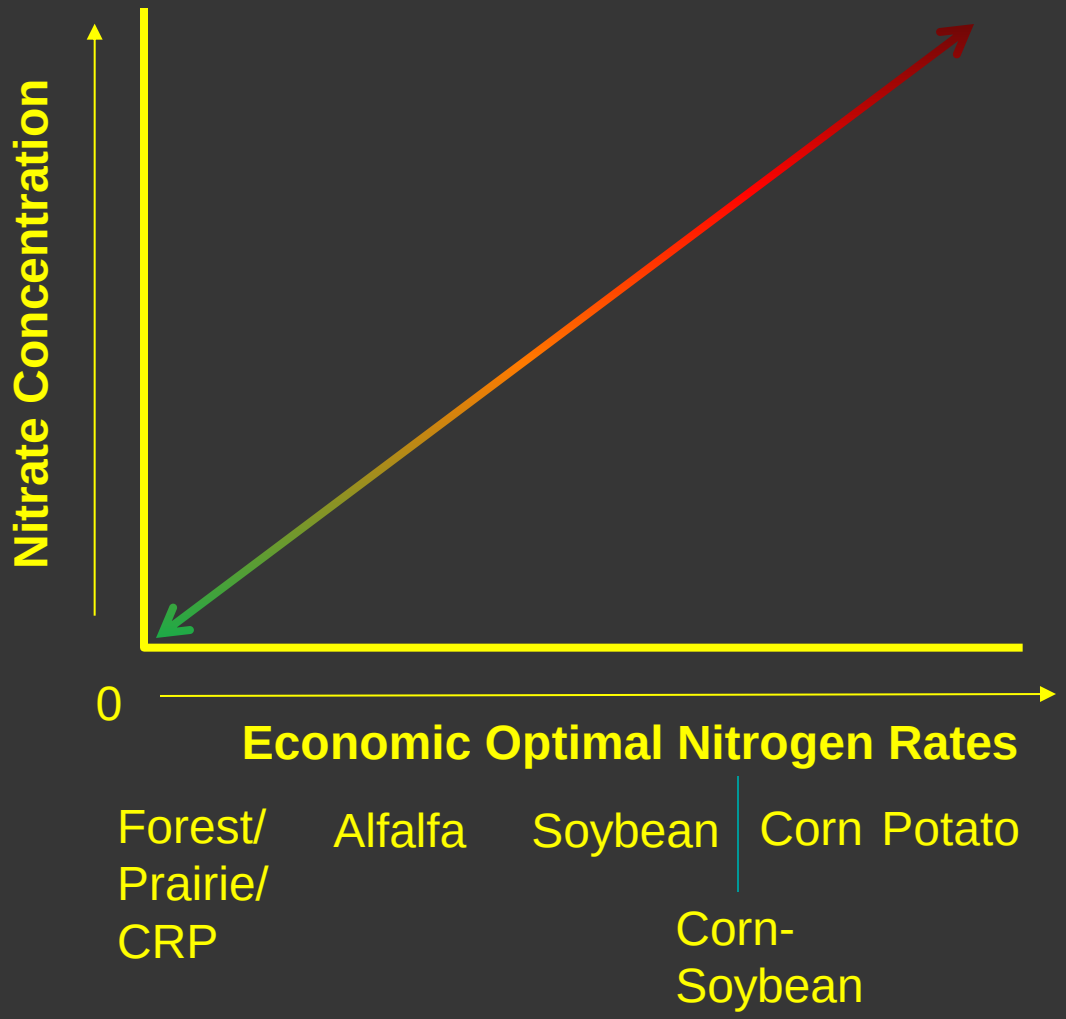
**Sources:**

- Agricultural fertilizer
- Lawn fertilizer
- Septic systems
- Animal wastes

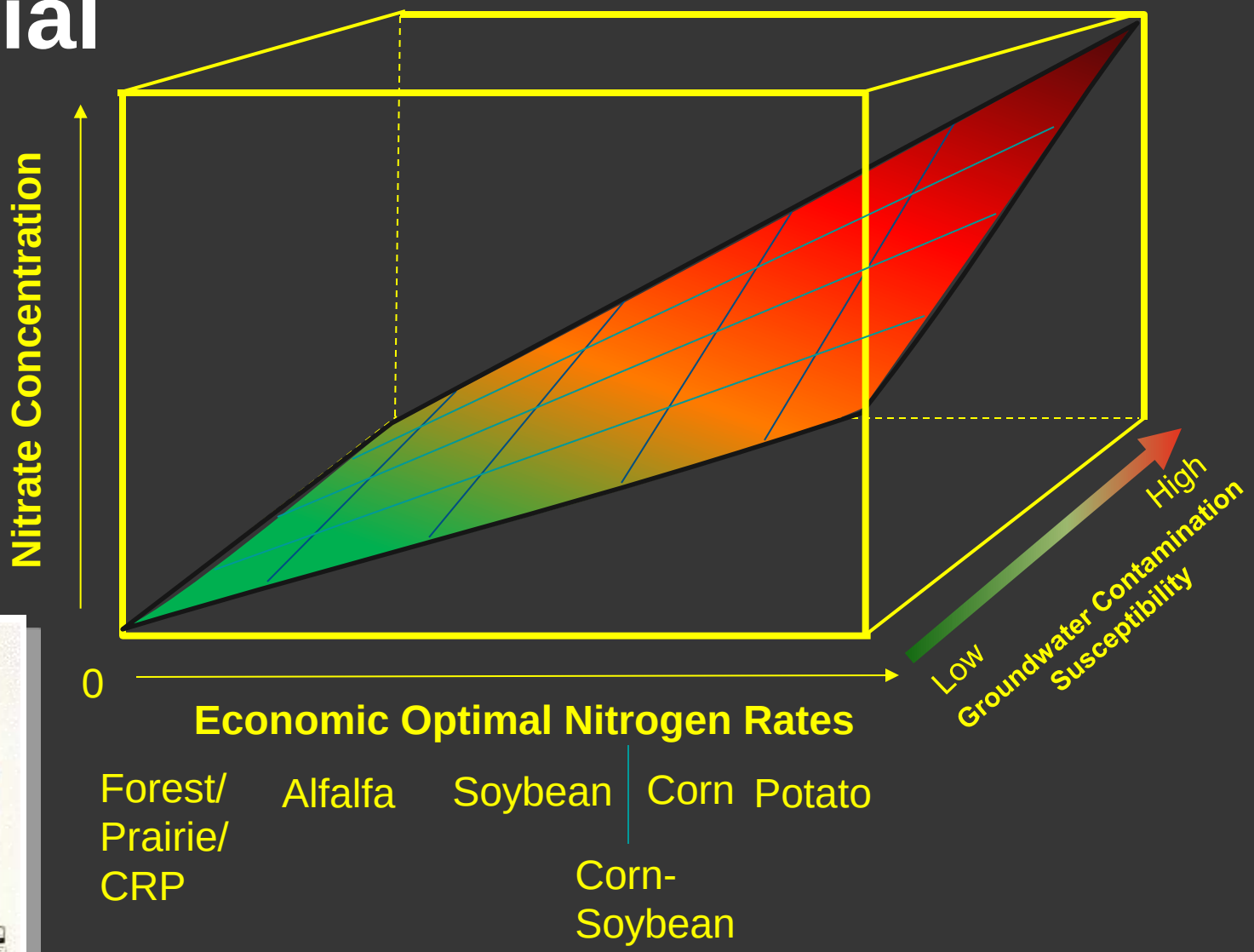



Sumpter - Merrimac
Sauk County July 2013
NITRATE-NITRITE (ppm N)
A None Detected 31 34 %
B ... 2.0 19 21 %
C 2.1 - 5.0 21 23 %
D 5.1 - 10.0 15 16 %
E 10.1 - 20.0 5 5 %
F 20.1 ... 0 0 %
Mapped value is the average unless otherwise indicated.
Treated samples not mapped.
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

# Generalized Nitrate Leaching Potential



# Generalized Nitrate Leaching Potential





Masarik, UW-Extension

# What can I do to reduce my nitrate levels?

**Solution:**

- **Eliminate contamination source or reduce nitrogen inputs**

**Short term:**

- **Change well depth or relocate well**
- **Carry or buy water**
- **Water treatment devices**
  - **Reverse osmosis**
  - **Distillation**
  - **Anion exchange**

# What can I do to reduce my nitrate levels?

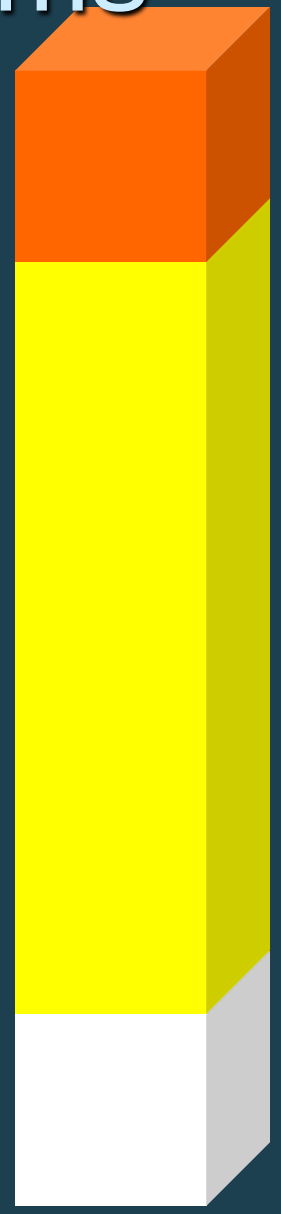
- **Long-term:**
  - **Reduce or eliminate nitrogen inputs**
- **Short term** (Lewandowski et. al. 2008)
  - **Change well depth or relocate well (not guaranteed) - $7,200**
  - **Bottled water - $190/person/year**
  - **Water treatment devices - $800 + 100/yr**
    - **Reverse osmosis**
    - **Distillation**
    - **Anion exchange**

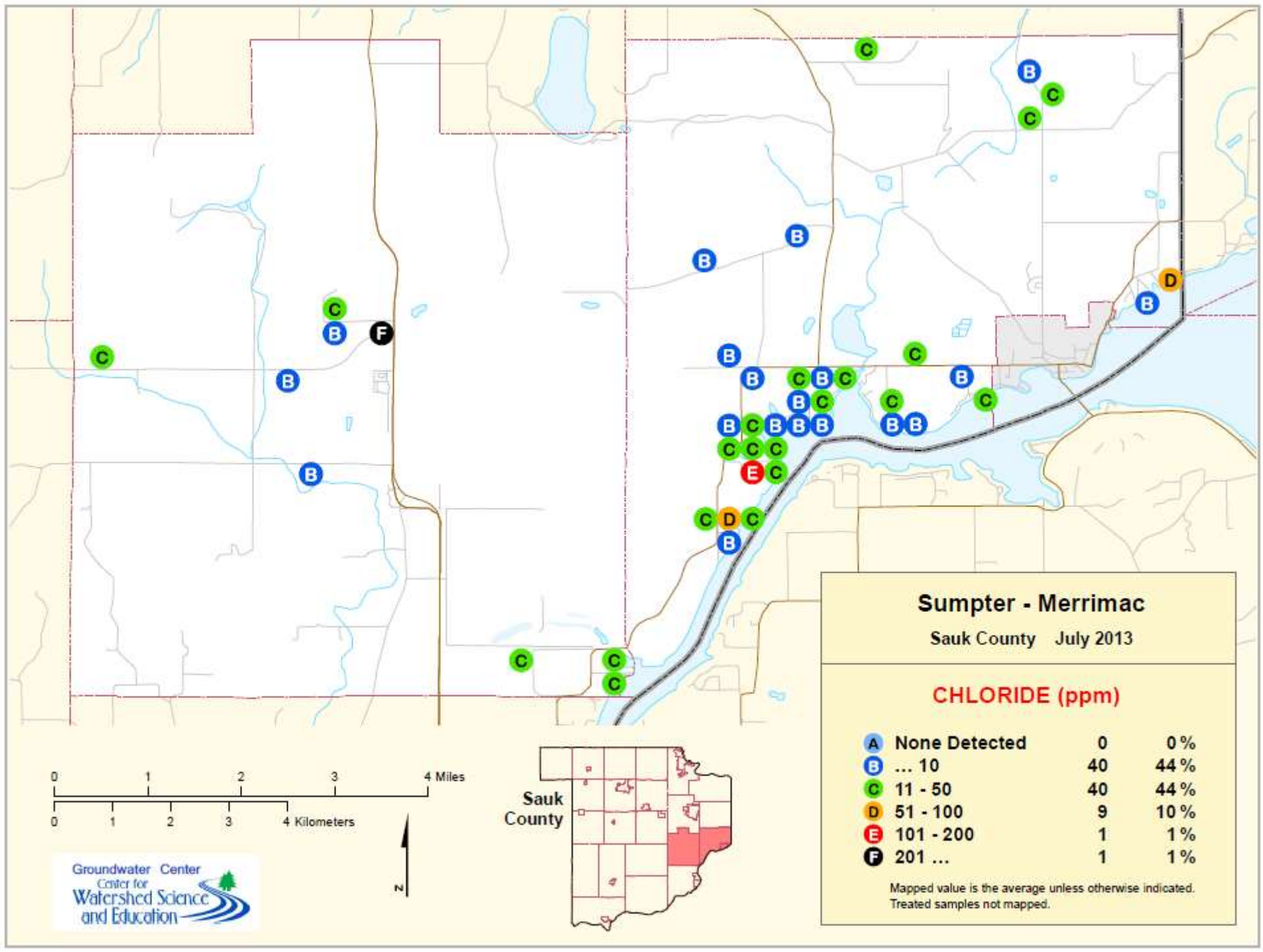
# Tests for Aesthetic Problems

## Chloride

- Greater than 250 mg/l
  - No direct effects on health
  - Salty taste
  - Exceeds recommended level
- Greater than 10 mg/l may indicate human impact
- Less than 10 mg/l

  "Natural" in much of WI

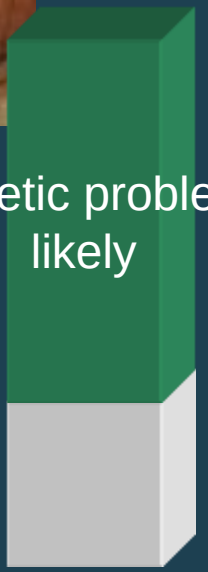



Sumpter - Merrimac
Sauk County July 2013
CHLORIDE (ppm)
A None Detected 0 0 %
B ... 10 40 44 %
C 11 - 50 40 44 %
D 51 - 100 9 10 %
E 101 - 200 1 1 %
F 201 ... 1 1 %
Mapped value is the average unless otherwise indicated.
Treated samples not mapped.
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

# Tests for Aesthetic Problems

## Iron

- Natural (rocks and soils)
- May benefit health
- Red and yellow stains on clothing, fixtures




- Potential for iron bacteria
  - Slime, odor, oily film

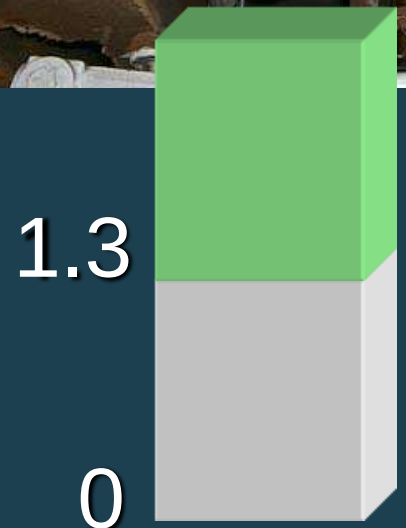
# Test Important to Health

## Copper

- **Sources: Copper water pipes**
- **Standard:  1.3 mg/L**

**Health Effects:**

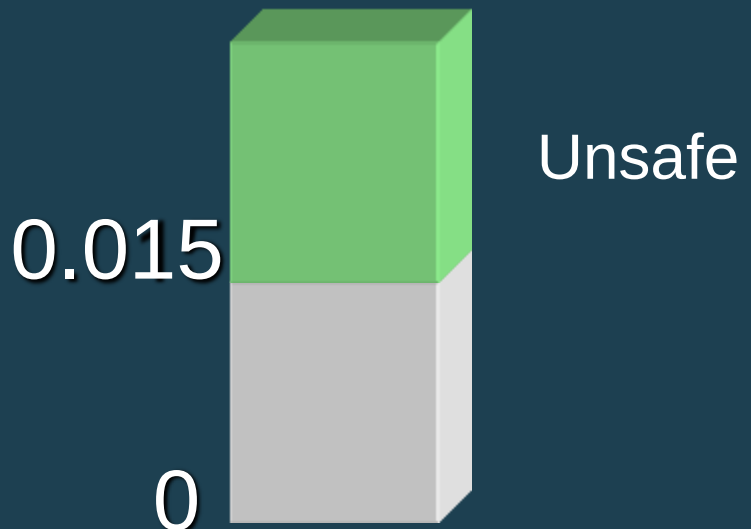
- **Some copper is needed for good health**
- **Too much may cause problems:**
  - Stomach cramps, diarrhea, vomiting, nausea
  - Formula intolerance in infants



# Test Important to Health

## Lead

- **Sources: Lead solder joining copper pipes (pre-1985)**
- **Standard: 0.015 mg/L (15 ppb)**



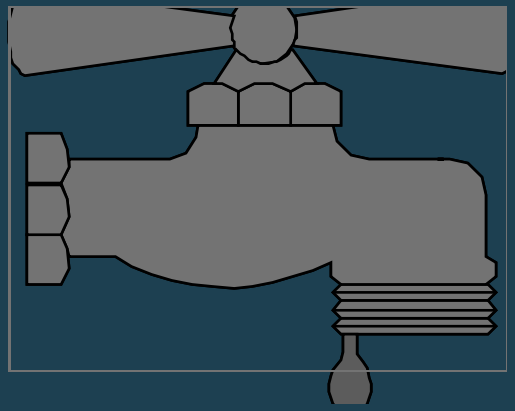

**Health Effects:**

- **Young children, infants and unborn children are particularly vulnerable.**
- **Lead may damage the brain, kidneys, nervous system, red blood cells, reproductive system.**

# Lead and Copper

**Solutions:**

- **Run water until cold before drinking.**
- **Use a treatment device.**



# Pesticides in Drinking Water

- Insecticides, herbicides, fungicides and other substances used to control pests.
- Health standards usually only account for parent compound.
- Parent compounds breakdown over time.
- Little research into health effects from the combination of chemicals..

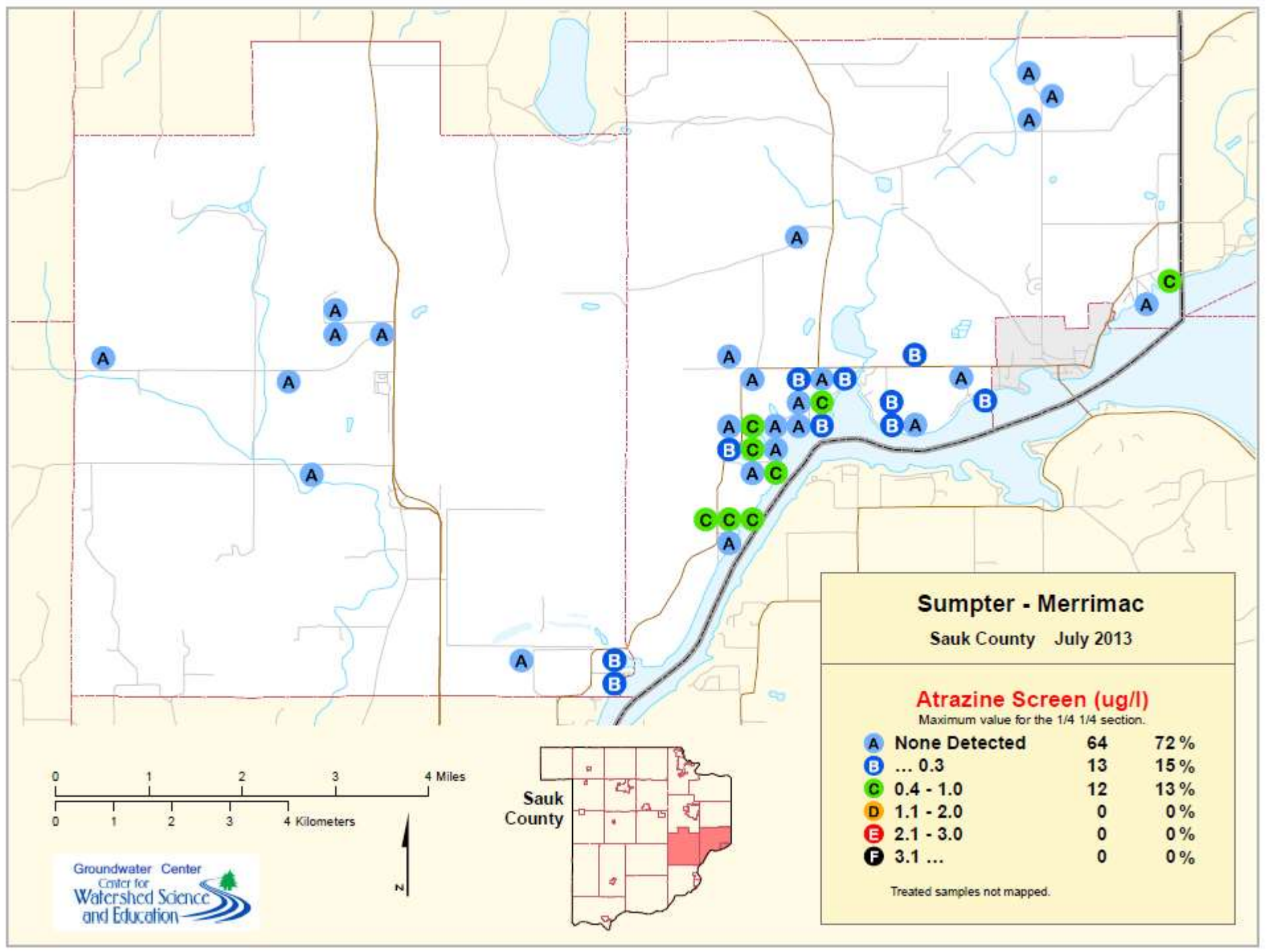
- Most frequently detected pesticides in WI:
  - Alachlor* and its chemical breakdown products
  - Metolachlor and its chemical breakdown products
  - Atrazine** and its chemical breakdown products
  - Metribuzin
  - Cyanazine and its chemical breakdown products.

- * WI public health groundwater standard for breakdown component Alachlor ESA.
- ** WI public health groundwater standard is for the total chlorinated atrazine residue

# Tests Important to Health

## DACT Screen

- Sources: Triazine pesticides (mainly atrazine used on corn crops)
- Screen: Only measures the diaminochlorotriazine (DACT) residue levels of triazine type pesticides (atrazine, simazine, propazine, cyanazine, etc)
- Specific to diaminochlorotriazine (DACT), does not account for parent compound or other breakdown components
- Drinking water limit:
  **3 ppb of total atrazine**
  *(atrazine + the 3 breakdown components)*


Sumpter - Merrimac
Sauk County July 2013
Atrazine Screen (ug/l)
Maximum value for the 1/4 1/4 section.
A None Detected 64 72 %
B ... 0.3 13 15 %
C 0.4 - 1.0 12 13 %
D 1.1 - 2.0 0 0 %
E 2.1 - 3.0 0 0 %
F 3.1 ... 0 0 %
Treated samples not mapped.
0 1 2 3 4 Miles
0 1 2 3 4 Kilometers
N
Sauk County
Groundwater Center
Center for Watershed Science and Education

# Improving water quality

- **Long-term improvements**
  - Eliminate sources of contamination

- **Short-term improvements**
  - Repair or replace existing well
  - Connect to public water supply or develop community water system
  - Purchase bottled water for drinking and cooking
  - Install a water treatment device
    - Often the most convenient and cost effective solution

# understanding water treatment

- **Advantages:**
  - + Reduce level of contaminants and other impurities
  - + Improve taste, color and odor

- **Disadvantages:**
  - – Require routine maintenance.
  - – Can require large amounts of energy.
  - – Testing is often the only way to know it is functioning properly for most health related contaminants.

- **Cautions:**
  - Treatment methods often selective for certain contaminants
  - Multiple treatment units may be necessary
  - Treatment may also remove beneficial elements from water in the process.

# Before investing in treatment….

- Always have water tested at a certified lab before investing in water treatment.
  - Know the types and amounts of chemicals you would like removed.

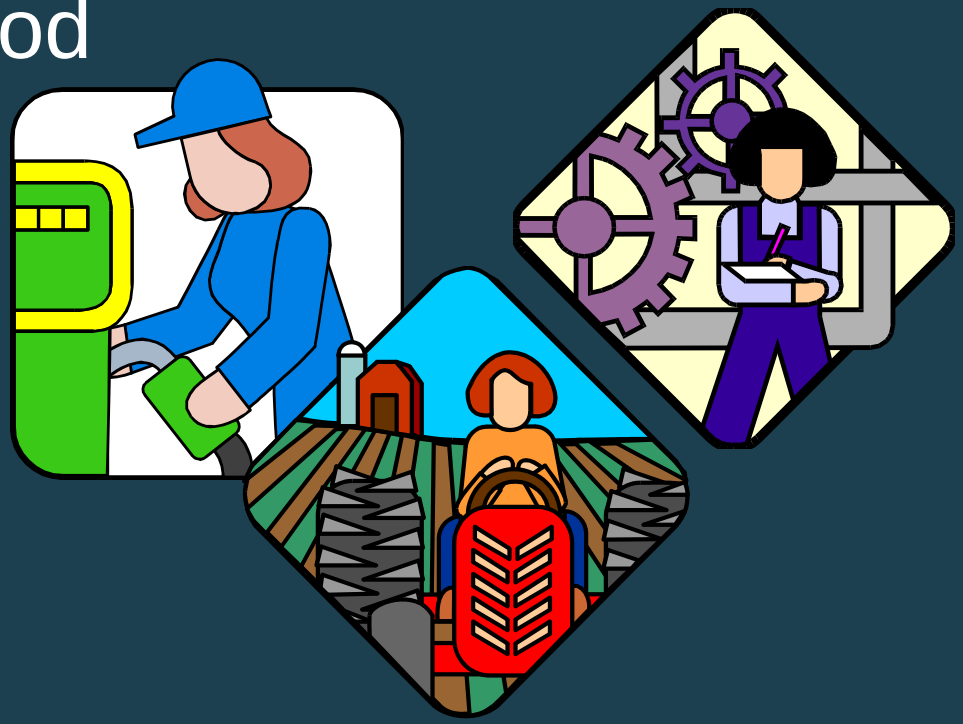
- Choose a device that has been approved by the Wisconsin Department of Commerce.
  - Ask for a copy of the approval letter.
    - or
  - Check the agency's Drinking Water Treatment Product Approval website:
    - http://commerce.wi.gov/php/sb-ppalopp/contam_alpha_list.php

# Next Steps

- Test well annually for bacteria, or if water changes color or clarity.
- If levels are elevated, test again in 15 months for nitrate.
- If you detected pesticides, you may want to perform a more extensive and accurate pesticide analysis.

# Next Steps

- Test for known or potential contaminants in your neighborhood
  - Gasoline?
  - Pesticides?
  - Solvents?



Check for known contamination sites in Sauk County at:
http://dnr.wi.gov/org/aw/rr/gis/index.htm

**WI Well Water Quality Interactive Viewer**

Use the Interactive Well Water Quality Viewer

**Homeowners and local units of government can use this tool to:**

- See what we know about general well water quality in Wisconsin.
- Compare water quality in your area to nearby towns or counties.
- Raise awareness of local groundwater quality issues.
- Promote testing and outreach efforts.
- Encourage well testing in areas where little data exists.
- Highlight the importance of testing well water on a regular basis.

Disclaimer: The viewer summarizes private well water quality data from the Center for Watershed Science and Education, the WI Dept. of Ag, Trade and Consumer Protection, and the WI Department of Natural Resources Groundwater Retrieval Network. It is not considered a scientific study and does not represent well water quality information for all known private wells.

This information is not intended to be a substitute for well water testing and does not provide site specific information for an individual well or property. The Center for Watershed Science and Education is not responsible for misuse or misinterpretation of the data.

Direct questions on using and interpreting this information to Kevin Masarik.

**Interactive Well Water Quality Viewer 1.0 created by David Mechenich, Center for Watershed Science and Education**

# WI Well Water Quality Viewer

Nearly 900,000 households rely on private wells as their primary water supply. Homeowners with private wells are encouraged to have wells tested on a regular basis to determine the safety of the water supply for purposes such as drinking and cooking. While testing is the only way to determine the types and amount of contaminants in a well water system, homeowners, health professionals and local officials often want to know more about water quality issues in their community.

## Features

- Search for information on 14 different water quality parameters
    - Health related contaminants:
        - Nitrate
        - Arsenic
        - Atrazine
        - Lead
        - Copper
- View water quality information at a county, town or section level detail
- Generate groundwater quality summaries by county, town or any user defined area greater than 1 sq. mile

Available online at:
http://www.uwsp.edu/cnr-ap/watershed/Pages/wellwaterviewer.aspx

UW Extension

University of Wisconsin-Stevens Point
College of Natural Resources

# www.uwsp.edu/cnr-ap/watershed

**Thanks to the following for helping sponsor this program:**

- **Towns of Merrimac and Sumpter**
- **Sauk County Land and Water Conservation Department**
- **Sauk County UW-Extension**

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www.uwsp.edu/cnr-ap/watershed

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