Home Water Treatments

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NORTHERN PLAINS & MOUNTAINS
Regional Water Program

Test Your Water!

Testing Your Water

- Contact your local Extension office or a lab
- List of Certified Labs
  - NDSU publication WQ-1341, “Drinking Water Quality: Testing and Interpreting Your Results”
  - www.ndsu.edu/waterquality
    NDSU Water Quality Website

What do these numbers mean?

Analytical Laboratory Report

Client: Client Name
Project: Analytical Laboratory Services
Date Collected: 1/5/08
Sample Identification: Kitchen tap

Collected by: KM
Project Number: CL000001
Time Collected: 7:35 a.m.
Lab Number: 01000

Analysis	Results	Units
Total coliform bacteria	50	#/100ml
Nitrate-nitrogen	4.55	mg/l
pH	7.50	
Iron	0.55	mg/l
Hardness as CaCo3	280	mg/l
Sulfate-sulfur	32.0	mg/l
Chloride	25.4	mg/l
Specific conductance	344	umhos/cc

The test results indicate this water sample does not meet EPA drinking water standards.

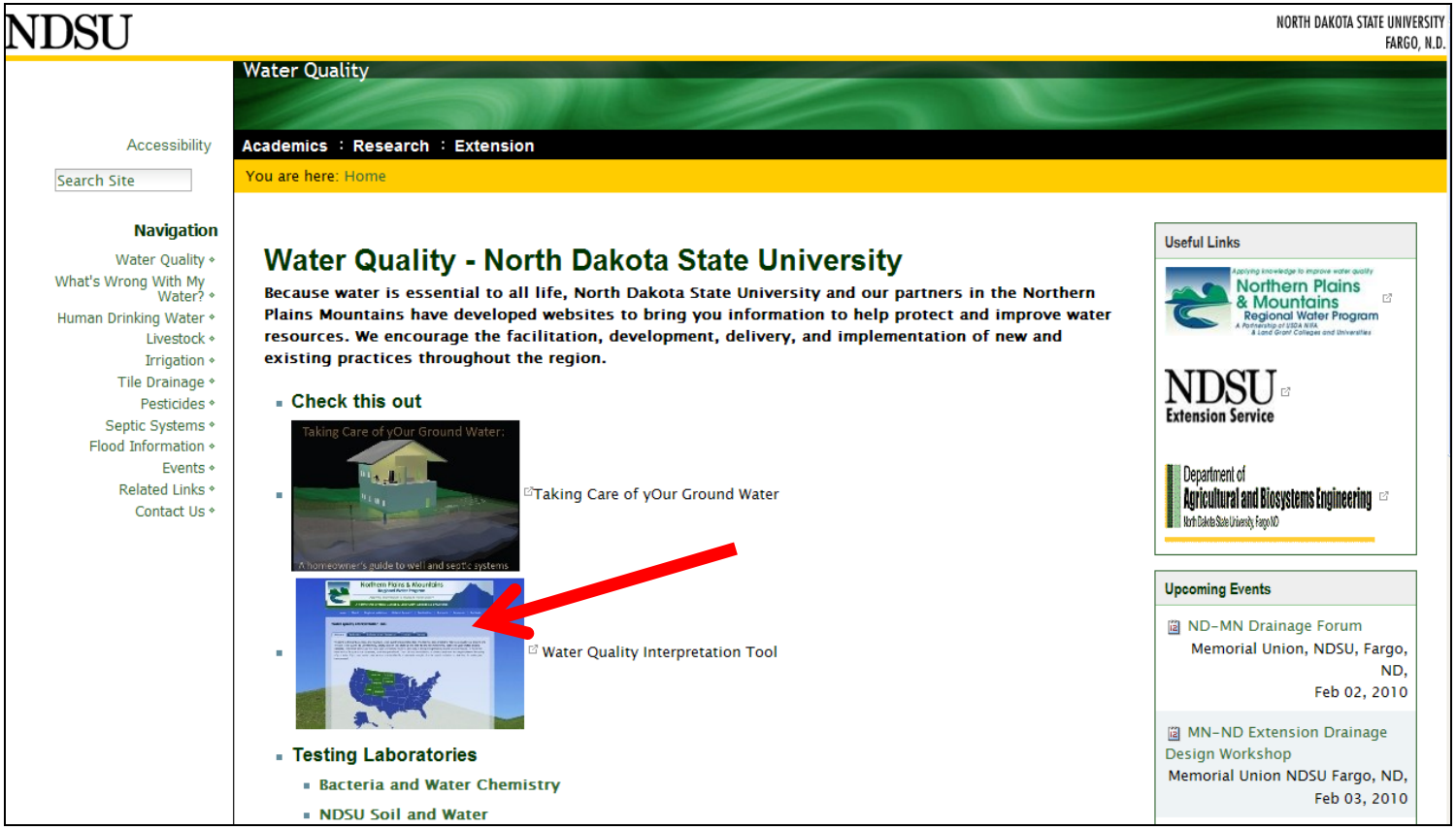
The following notes apply to this sample:

The total coliform bacteria exceeded the acceptable level of no bacteria.
The iron level exceeded the limit of 0.3 mg/l.

Submitted by: _____ Laboratory Manager

What do these numbers mean?

Water Quality Interpretation Tool
www.ndsu.edu/waterquality



Northern Plains & Mountains
Regional Water Program

Applying knowledge to improve water quality

A Partnership of USDA CSREES & Land Grant Colleges & Universities

Water Quality Interpretation Tool

Welcome to the Northern Plains and Mountains water quality interpretation tool. This tool has been created to help you evaluate your drinking and livestock water quality. **To use the tool, simply click on the state or the links to the left where you collected your water quality samples**. Then enter the values that have been provided to you by a laboratory in the spaces pertaining to your analyses results. If you do not have a value for a particular parameter, leave the space blank. Then click the submit button to obtain a table with an interpretation of the quality of your water. If you need to start over, or wish to enter data for a new water sample, click the reset form button to clear the information you have entered.

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Water Quality Interpretation Tool

Please select the type of water application you would like to evaluate:

Drinking Water ◉ Livestock Water ○

Routine Water Analysis

Alkalinity as $CaCO_3$		mg/L
Ammonium (NH_4)		mg/L
Bicarbonate		mg/L
Boron (B)		mg/L
Calcium (Ca)		mg/L
Carbonate (CO_3)		mg/L
Chloride (Cl)		mg/L
Electrical Conductivity (EC)		dS/m (mmhos/cm)
Hardness		mg/L
Magnesium (Mg)		mg/L
Nitrate as Nitrogen (NO_3-N)		mg/L
Nitrate (NO_3)		mg/L

Trace Elements Analysis

Antimony (Sb)		mg/L
Arsenic (As)		mg/L
Beryllium (Be)		mg/L
Cobalt (Co)		mg/L
Cyanide (CN) (free)		mg/L
Fluoride (F)		mg/L
Lead (Pb)		mg/L
Lithium (Li)		mg/L
Mercury (Hg)		mg/L
Radon (Rn)		mg/L
Selenium (Se)		mg/L
Silver (Ag)		mg/L

Aluminum (Al)		mg/L
Barium (Ba)		mg/L
Cadmium (Cd)		mg/L
Chromium (Cr)		mg/L
Copper (Cu)		mg/L
Iron (Fe)		mg/L
Manganese (Mn)		mg/L
Molybdenum (Mo)		mg/L
Nickel (Ni)		mg/L
Phosphorus (P)		mg/L
Zinc (Zn)		mg/L

chlordane		ug/L
methoxychlor		ug/L

Volatile Contaminants

benzene		ug/L
o-dichlorobenzene		ug/L
p-dichlorobenzene		ug/L
ethylbenzene		ug/L
monochlorobenzene		ug/L
styrene		ug/L
toluene		ug/L
trichloroethane		ug/L
xylenes (total)		ug/L

SUBMIT VALUES Reset Form

Colorado State University | Montana State University | NDSU | SDSU | Utah State University | University of Wyoming — New Thinking

USDA
United States Department of Agriculture
National Institute of Food and Agriculture

A cooperative program consisting of the USDA National Institute of Food and Agriculture and the Land Grant Colleges and Universities.

National Water Program

Water Quality Interpretation Tool

Interpretations of Drinking Water Quality for

Test Name:	Lab Result:	Interpretation:	Excellent:	Satisfactory:	Objectionable:	Additional Comments:
1) Routine Water Analysis						
Nitrate as Nitrogen (NO3-N)	4.55 mg/L	Satisfactory	<1mg/L (as Nitrogen) *	1-10.0 mg/L *	>10.0 mg/L *	
Sulfate (SO_4)	300 mg/L	Objectionable	<20 mg/L **	20 - 250 mg/L **	>250 mg/L **	This water is considered objectionable because it exceeds the secondary standard of 250 mg/l. Sulfate intake of 1000 to 2000 mg can cause diarrhea in humans. This is particularly true when a person switches from drinking water with a small concentration of sulfate to water with a high sulfate concentration. For more information on sulfate in drinking water, please visit: CSU Extension: Drinking water quality and health

* MCL (Primary Standard)
** SMCL (Secondary Standard)

Water Treatment Systems

- Who is watching out for you?

Water Treatment Systems

- **Point-of use (POU)**
  - Pour-through
  - Faucet mount
  - Countertop manual fill
  - Plumbed-in

Pour through

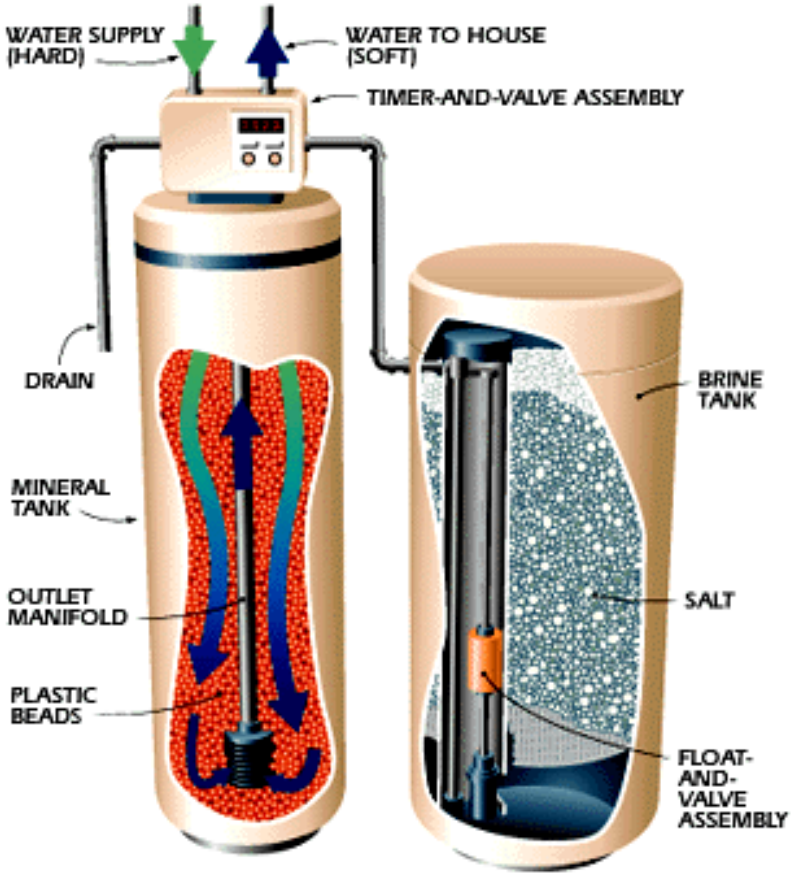
Water Treatment Systems

- **Point-of-entry (POE)**
  - Softeners
  - Sediment filters

Types of Home Treatments

- Ion exchangers (softeners)
  - Cation exchanger - Removes hardness, iron , manganese
  - Anion exchanger – Removes sulfate
- Filters
  - Removes sediment, organics, taste and odor
- Distillation and Reverse Osmosis
  - Removes minerals
- Disinfection
  - Kills or removes pathogens

Ion Exchange (water softener)



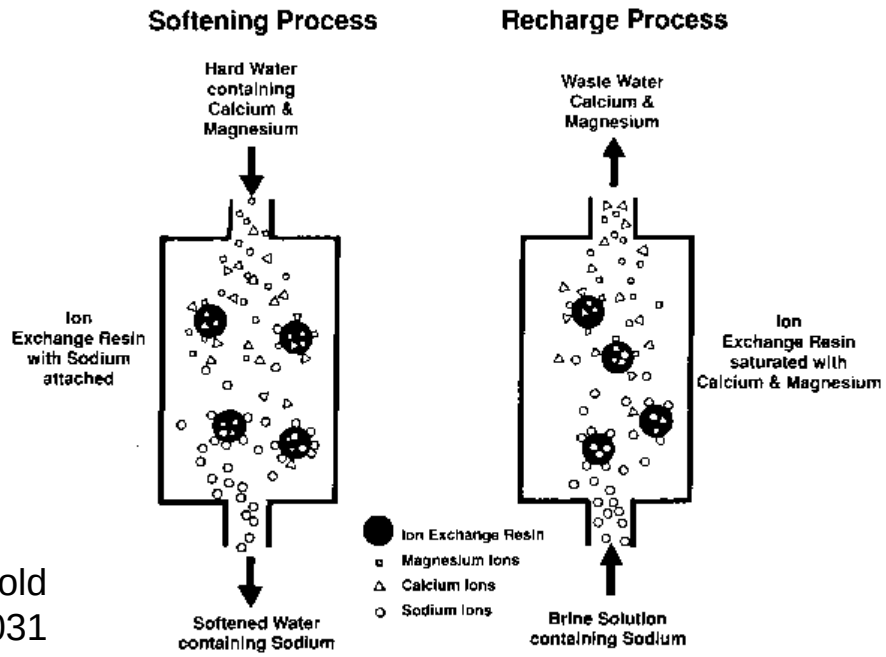
www.waterexsds.com/sdsharma/softner/softener.gif

Hard water causes:

- Scale buildup
- Reduced cleaning effectiveness
- Plugging of shower heads or faucets

Softening

- **Downside**
  - Excess iron or hydrogen sulfide may require a pretreatment
  - Sodium-restricted diets
  - Requires large quantity of water
  - Disposal of wastewater

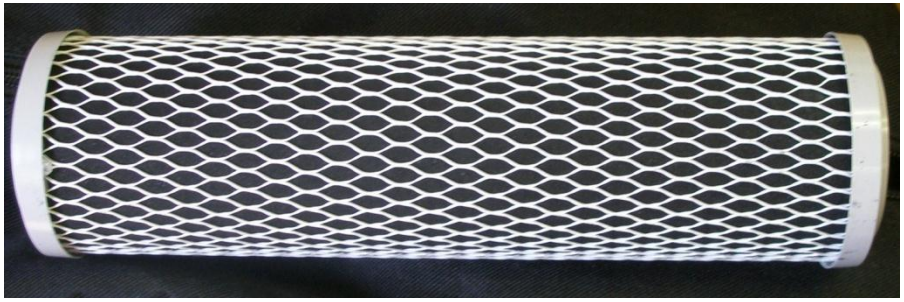


Treatment Systems for Household Water Supplies, NDSU AE1031

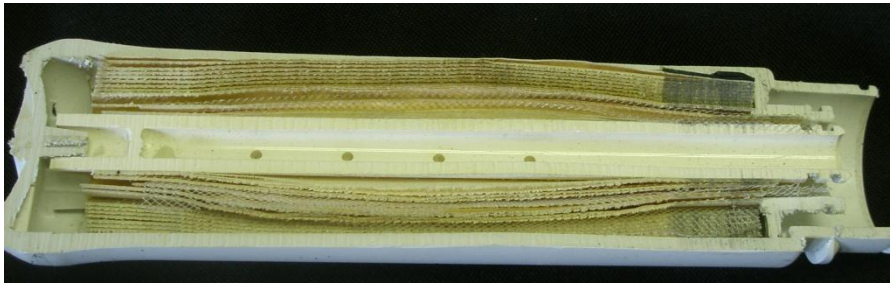
Filters

- Many types of filters
- Water moves through filter
  - Removes particles
  - Some microorganisms

Sediment filter



Activated carbon filter

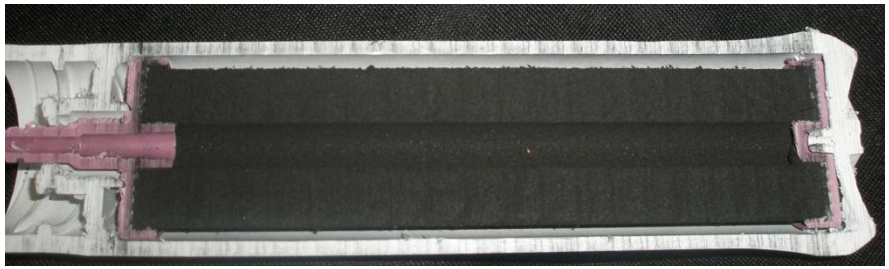


Paper filter

Cartridge Sediment Filter

- Point-of-entry
- Removes particles 1 to 20 microns
- Large surface area
- Use as prefilter
- Reduces sand, silt, rust and iron particles
- Does not remove dissolved contaminants or bacteria

- Media Filters
  - Silica sand – most practical
  - Aluminum silicate
  - Anthracite
  - Bituminous coal
  - Anthracite coal
  - Activated carbon – most popular



- Microfiltration
  - Small pore size
  - Removes particle or biological contamination
  - Porous ceramic cylinders

Reverse Osmosis

- Point-of-use
- Removes nitrates, sulfates, sodium, arsenic and total dissolved solids
- Water passes through membrane
- Rejection rate
- Read fine print
- Use a lot of water

Distillation

- **Removes**
  - Nitrate
  - Bacteria
  - Sodium
  - Hardness (calcium and magnesium)
  - Dissolved solids
  - Many organic compounds
  - Heavy metals
  - Radionuclide

Distillation

- **Downside**
  - Bland tasting water
  - Does not remove volatile organic contaminates that boil at temperatures close to water
    - These can be removed with an activated charcoal filter
  - Energy-intensive
  - Limited to point-of-use

Disinfection

- To kill bacteria and viruses
  - Ultraviolet light
  - Ozonation
  - Chlorination
    - Shock chlorination
    - Continuous chlorination

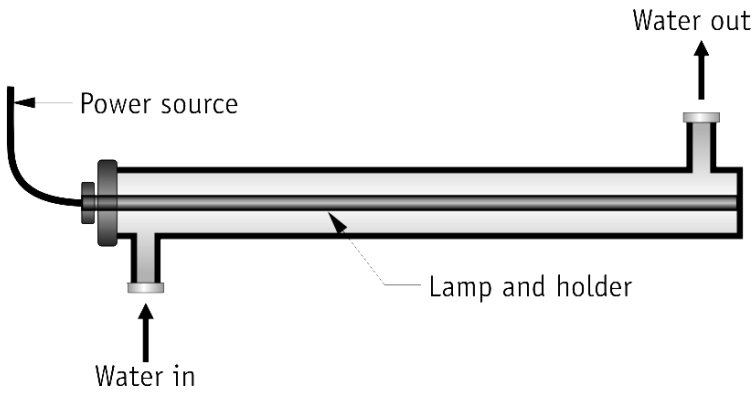
www.ndsu.edu/waterquality

Ozonation

- The good
  - Shorter contact time
  - Smaller disinfectant dose
  - No known harmful byproducts
- The bad
  - No residual time
  - High costs
  - Complex maintenance

Ultraviolet Light

- The good
  - No cancer-causing byproducts
  - No chlorine smell
- The bad
  - Water needs to be clear
  - Does not remove all viruses
  - No effect on cysts and worms
  - No residual disinfection



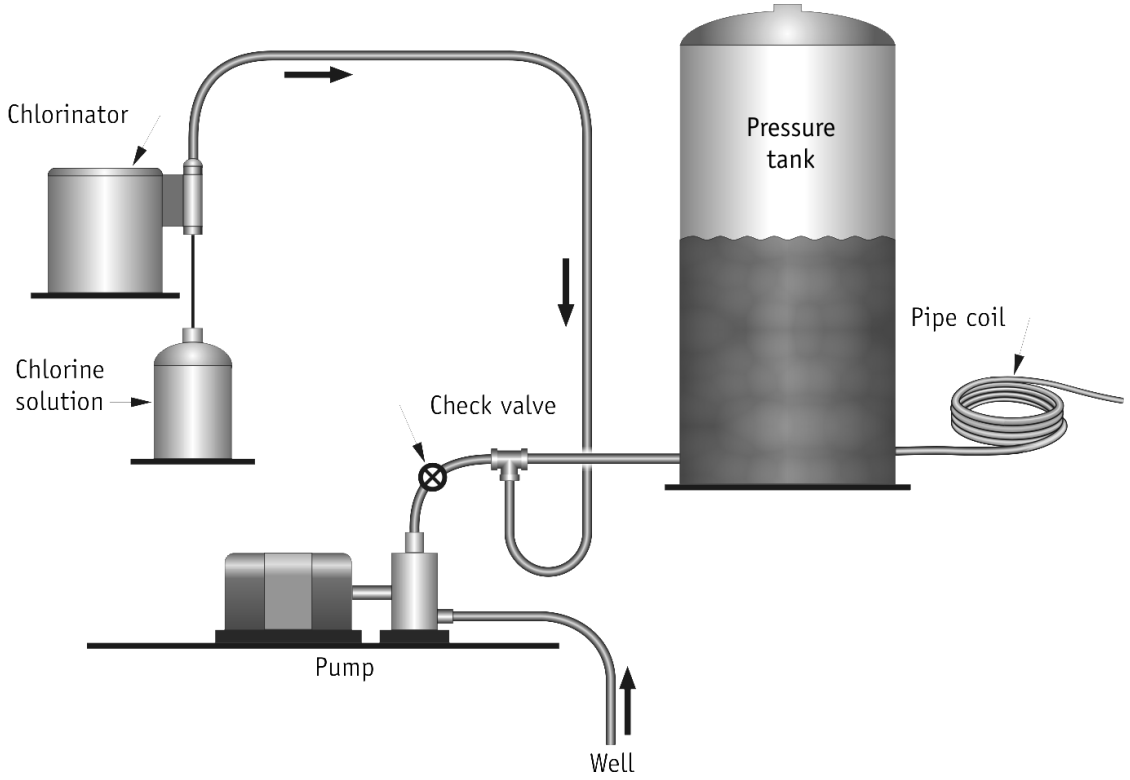
Shock Chlorination

http://waterquality.montana.edu/docs/videos/6_Chlorin_3_12_09.mov

- The good
  - Inexpensive
  - Can be done by well owner
  - Generally safe
- The bad
  - Not good for heavy contamination
  - Does not treat *Giardia* or *Cryptosporidium*
  - Treats one time

Continuous Chlorination

- Disinfection byproducts
  - trihalomethanes



Points to Remember

- Have your water tested
- Know what the numbers mean
- Know what treatment system will improve your water quality
- Ask questions specific to your situation
- Read the fine print

Questions?