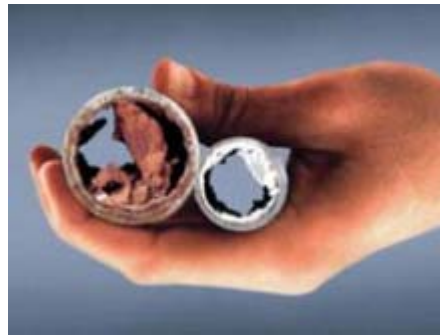


Well Water Physical Inspection Guide

Tips For Identifying Well Water Problems



CLEAN WATER
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The Basics

- Test your water for general minerals, physical and coliform bacteria. Consider testing for chemicals, pesticides, herbicides, and metals as well.
- Fill a white 5-gallon bucket and do a physical inspection of your well water.
- Determine your well water flow rate in gallons per minute.
- Check water pressure with pressure guage.
- Perform a toilet tank and water heater inspection.
- Check for odors in the water: odor in cold water? Hot water? Or both?
- Check for pipe corrosion and scale build up, unless the home is new.
- Identify the diameter of your main pipe coming in to home.

Test Your Water

If you have never had your well water tested, or the well is new, or has recently been serviced, it's a good idea to have a complete general mineral, physical and bacteriological test done. This includes common minerals, salts, metals, and bacteria. It should always include a pH test, which tells you how acidic or alkaline the water is. With these results, you can determine if you need any type of water treatment, and what type of system to select, based on your water chemistry.

If you have well water and are experiencing staining, at a minimum make sure you test for pH, hardness, iron, manganese, and total dissolved solids, – not just iron and water hardness.

If you are trying to correct an aesthetic or corrosion-related problem, such as staining, pinhole leaks in pipes, or odors, then a general mineral analysis (which would include at minimum tests for iron, manganese, tannin, pH, total dissolved solids, hardness, and alkalinity) is recommended. In some cases, additional tests for tannins are recommended.

For health-related issues at a minimum include a test for total coliform, e-coli (fecal coliform). If infants and children will be drinking the water, a complete general, mineral, metals and bacteriological test is recommended.

See this link for more information about various types of well water testing kits and services:

<http://www.cleanwaterstore.com/well-water-test-kits.htm>

Perform a Toilet Tank Inspection

Check your toilet flush tank for staining and sediment:



Symptom	Cause	Solution
White scale on float	Calcium hardness	Water softener
	Total dissolved solids	Reverse osmosis
Tank sides are white, but black, rust or sand is laying on the bottom	Decaying galvanized pipes	Replace pipes; correct corrosiveness of water
	Sand, rust or sediment in well water	Sediment and/or iron filter
Blue stains	Acidic (low pH) water	Calcite neutralizer or soda ash feeder
Rust stains	Iron	Iron filter (Birm, MangOX, Greensand, Pyrolox)
Furry, stringy red growths	Iron (and/or other) bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Furry, stringy gray or black growths	Sulfur (or other) bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Frothy, with bubbles	Iron bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Brown stains	Iron and/or Manganese	Iron filter that removes manganese (MangOX, Pro-OX, Greensand, Pyrolox)
Black stains	Iron and/or Manganese	Iron filter that removes manganese (MangOX, Pro-OX, Greensand, Pyrolox)
	Ferric Sulfide (black rust)	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox)
Pink stains	Airborne bacteria	Not water quality related; Clean with chlorine bleach



THE TOILET TANK INSPECTION LIST AND ANSWER SHEET

Top Ten Water Problem Symptoms Found in Toilet Flush Tanks

Your toilet flush tank contains a wealth of information about your water and piping! Just open the lid and look in! Check your toilet flush tank for staining and sediment.

Learn if your piping or plumbing has problems, or if your city or well water has sediment, or may be corrosive. See the Top 10 Symptoms in the chart below and see if your toilet tank matches any of these symptoms.

	SYMPTOM	CAUSES	SOLUTION
1	White scale on float	Calcium hardness	Water softer or No-Salt Conditioner
		Total dissolved solids	Reverse osmosis
2	Tank sides are white, but black, rust or sand is laying on the bottom	Rust from decaying corroded galvanized pipes	Replace pipes; correct corrosiveness of water
		Sand, rust or sediment from city or well water	Sediment filter and/or iron filter system
3	Blue stains	Copper corrosion from acidic (low pH) water	Calcite pH neutralizer or soda ash feeder
4	Rust stains	Iron in well or city water	Iron filter (Pro-OX, Greensand, Birm)
5	Furry, stringy red growths	Iron (and/or other) bacteria	Chlorination system OR ozone injection OR hydrogen peroxide... followed by filtration
6	Furry, stringy gray or black growths	Sulfur (or other) bacteria	Chlorination system OR ozone injection OR hydrogen peroxide... followed by filtration
7	Frothy, with bubbles	Iron bacteria	Chlorination system OR ozone injection OR hydrogen peroxide... followed by filtration
8	Brown stains	Iron and/or Manganese	Iron filter system that also removes manganese (Pro-OX, Greensand)
9	Black stains	Iron and/or Manganese	Iron filter system that also removes manganese (Pro-OX, Greensand)
		Ferric Sulfide (black rust)	Iron filter system (Pro-OX, Greensand)
10	Pink stains	Airborne bacteria	Not water quality related! Clean with chlorine bleach



THE TOILET TANK INSPECTION LIST AND ANSWER SHEET

Top Ten Water Problem Symptoms Found in Toilet Flush Tanks



Clean White Flush Tank

This could be a new toilet, or recently cleaned. If your tank looks like this, and it is not new or recently cleaned, then it likely indicates your water is NOT leaving sediment or deposits in your plumbing or fixtures.



Deposits in Bottom of Flush Tank

This can mean the water coming into your home has sediment or rust in it. Or if there is rust or flakes in the bottom, and your home has older style galvanized iron plumbing, it could be your piping needs replacing.



Rust or Dark Colored Water

If you are on city water, it might indicate the city main distribution pipes have been recently flushed, or just plain bad or poorly treated city water. If you are on well water, this can indicate you need an iron filter system.



Black Water and Deposits

Typically occurs on well water. Black deposits and black water means either manganese in the cold water, and/or ferric sulfide (black rust). This can also occur when the water has a rotten-egg odor. Treatment with chlorine or



Slimy Rust-Colored Deposits

Typically occurs on well water. Stringy-looking, slimy deposits growing from the side of the toilet tank indicates iron bacteria. Water may appear frothy or bubbly. Treatment with chlorine or ozone (continuous OR periodic shock treatment of well and pipes) to kill the bacteria, followed by filtration is needed.

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Questions, email us at
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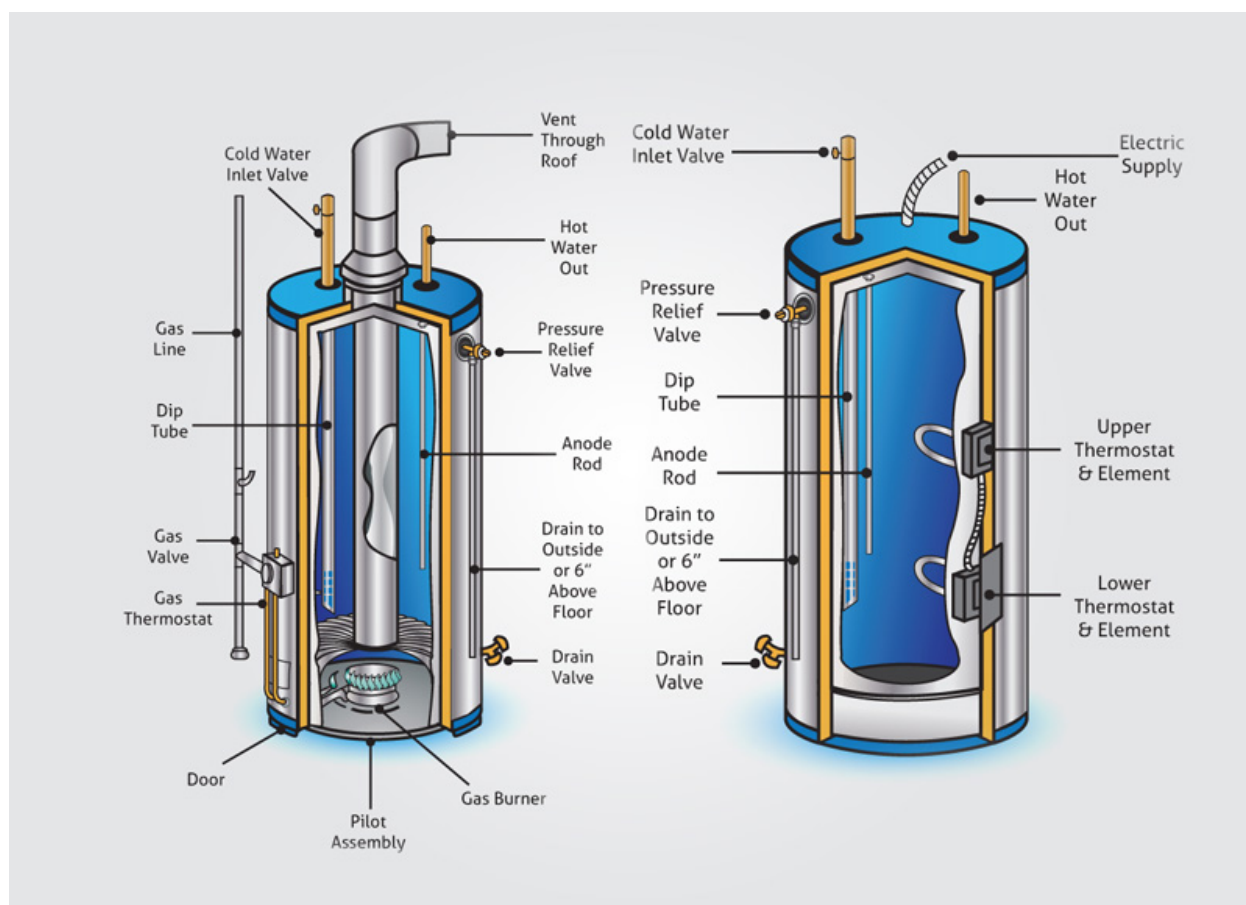
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Check Your Water Heater

It is a good idea to periodically drain and flush your water heater. You will see that on the bottom of your water heater is a hose bib, or drain valve, which is a connection where you can attach a garden hose. Simply attach a garden hose, and fill up a white 5-gallon bucket.

If the water is clean, your water heater may not have any sediment in it, or it could have sediment from calcium hardness that has solidified. If you see sand or black sediment, or white chips, or blue chips, this can indicate your water heater dip tube has deteriorated, and/or the water heater lining is going bad. If you get a lot of rust or brown looking deposits, and your pipes are not iron piping, then the well water likely contains high levels of iron or manganese.

Before draining your water heater, you may wish to buy a brass hose bib cap. These are available at all hardware stores, are inexpensive, and will allow you to cap off the drain valve on your water in the event it will not shut off once you try to close it after draining.



Check for Pipe Corrosion and Scale

Unless your home is new, it is important to check for pipe corrosion and scale build-up in the piping:



- Check for signs of blue stains in fixtures or toilet tanks that can indicate copper corrosion, and/or test water for copper.
- If you have galvanized iron pipe, look for signs of rust and scale in the toilet flush tank.
- If possible, inspect the exterior of pipes and valves, to see if you see any signs of pinhole leaks or corrosion by-products which can be crusty, bluish, white or salty looking or rusty.
- If you are having any plumbing work done on your house, inspect any sections of the pipes that have been cut to see if there is any scale build-up or signs of corrosion.

Identify Pipe Sizes

It is useful to know the size of your incoming pipes. For instance, say you decide you want to install an iron filter system for your house. They come in different pipe sizes, such as $\frac{3}{4}$ " pipe, 1" pipe etc. Generally, you want to make certain you get a filter or water treatment system that will not restrict the water flow or pressure, so if you have a 1" pipe, you would want an iron filter that has 1" pipe connectors. Knowing what size piping you have solves this problem.

It is easy to check the size of your pipes. First, check on the pipe itself, often it will be labeled or written on the side. If not, the string method which measures the circumference is probably the best way to determine your pipe size. Circumference is the distance it takes to go around the pipe once.

Remove any insulation from the pipe. Using a piece of string about 6" long (or a cloth tape measure) wrap the string around the pipe once and measure to the nearest $\frac{1}{8}$ of an inch... Once you have found the circumference, use the chart below to find your pipe or tube size.

Copper Pipe or PEX tubing

2.75" (70mm) = $\frac{3}{4}$ " pipe
3.53" (90mm) = 1" pipe
4.32" (110mm) = 1 $\frac{1}{4}$ " pipe
5.10" (130mm) = 1 $\frac{1}{2}$ " pipe

Flexible (usually black) Polyethylene Pipe

2.96-3.33" (75-85mm) = $\frac{3}{4}$ " pipe
3.74-4.24" (95-108mm) = 1" pipe
4.90-5.57" (124-141mm) = 1 $\frac{1}{4}$ " pipe
5.70-6.28" (145-160mm) = 1 $\frac{1}{2}$ " pipe

Steel Pipe or PVC Plastic Pipe

3.25" (83mm) = $\frac{3}{4}$ " pipe
4.00" (102mm) = 1" pipe
5.00" (127mm) = 1 $\frac{1}{4}$ " pipe
6.00" (152mm) = 1 $\frac{1}{2}$ " pipe

Treatment Solutions by Problem

Water Problem	Symptom	Treatment Remedy
Alkaline Water pH > 8.5	Slippery feel; soda taste; deposits;	Inject acetic acid (white vinegar); or reverse osmosis
Acidic Water pH < 5.0	Corrosion of pipe, fixtures and appliances	Inject soda ash or sodium hydroxide
Acidic Water pH < 6.0	Corrosion of pipe, fixtures and appliances	Calcite blend neutralizer filter with 90% calcite 10% "Corosex" or "FloMag.
Acidic Water pH < 7.0	Corrosion of pipe, fixtures and appliances	Calcite neutralizer filter
Arsenic	Adverse health effects, poisonous over 10 parts per billion	Arsenic filter; or chlorination followed by greensand filtration
Bacteria - Heterotrophic	Heterotrophic plate count bacteria have no health effects; it is an analytic method used to measure the variety of bacteria that are common in water. The lower the concentration of bacteria in drinking water, the better maintained the water system is.	Disinfection with chlorine, hydrogen peroxide, ultraviolet light or ozone
Bacteria - Coliform	Possible negative health effects, indicates well is under the influence of surface water so risk of parasites and harmful bacteria possible	Disinfection with chlorine, ultraviolet light or ozone
Bacteria - E. Coli (fecal)	Adverse health effects, indicates well is contaminated by septic tanks or other run-off from sewage or animal activity	Disinfection with chlorine, ultraviolet light or ozone
Chlorine	Tastes and odors, can irritate skin, dry hair	Carbon filtration; or KDF media filtration
Copper	Adverse health effects at higher levels over 1 mg/L; usually indicates corrosion of copper pipes;	Correct corrosion problem using neutralizer above; in some cases, a phosphate feeder can be used to coat the pipes; if copper is naturally occurring, use ion-exchange system.
Fluoride	Tooth discoloration, adverse health effects at higher concentration over 2.0 mg/L	Reverse osmosis; or activated alumina filter

Gasses	Air in pipes, bubbles in water, possible dangerous or negative health effects if gas is methane or carbon dioxide	Off-gas into an open storage tank, ventilate well and use caution in treating this problem; methane is flammable
Hardness (calcium)	Scale in pipes, white deposits on fixtures and surfaces; soap forms scum and does not dissolve properly; dry skin and hair; over 100 mg/L is considered hard.	Water softener; phosphate feeder.
Hydrogen Sulfide Odors	Rotten-egg odors; can cause corrosion of brass and other metals; black discoloration in fixtures and appliances; possible adverse health effects at low concentrations;	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration; in some cases greensand filtration and/or catalytic activated carbon be used
Iron Bacteria	Rust and red color slime in toilets and fixtures; can cause odor problems and slime up water heaters, toilet tanks and ruin laundry; maximum iron level recommended is 0.3 PPM	Chlorination, or ozone injection, or hydrogen peroxide, followed by filtration
Iron - Colloidal	Discolors water, causes stain in laundry and fixtures, bad tastes and odors. Very fine cloudy substance in water that does not easily settle out and is difficult to filter	Chlorination, or ozone injection, or hydrogen peroxide, followed by activated carbon filtration; OR ultra-filtration membrane; OR flocculent injection, coagulation and filtration using chemicals and sand filtration
Iron - Dissolved (Clear)	Clear when water is first drawn, water then turns orange or rusty after being exposed to air; causes build-up in pipes and fixtures, ruined laundry and water heater problems; maximum iron level recommended is 0.3 mg/L	Iron filter such as Greensand, Pro-OX, MangOX, Pyrolox, and Birm; in some cases, a water softener can be used if total dissolved solids are less than 500 PPM and the water hardness is less than 200 PPM and the pH is less than 7.0.
Iron - Oxidized (Rust)	Rust in water, is orange or brown in color. Bad tastes and odors, stains laundry and fixtures over 0.3 PPM	Iron filter such as Greensand, Pro-OX, MangOX, Pyrolox, Birm;
Manganese	Often found with iron, and causes brown, black and/or tea-colored staining, and imparts asphaltic and oily tastes, above .05 PPM.	Greensand, Pro-OX, MangOX, or Pyrolox; Or Chlorination, aeration, ozone injection, followed by filtration
Nitrate	Not usually naturally occurring is caused by run-off from chemical fertilizers, septic system discharge and livestock waste. Health problems if ingested over 10 PPM, especially for infants and pregnant women.	Anion exchange system with nitrate specific resin; Or reverse osmosis in some applications

Odors - Other	Variety of causes: metals in water, bacteria, algae, and gasses. Can have adverse health effects.	Chlorination, or ozone injection, or hydrogen peroxide, followed by activated carbon filtration
Radon	Radioactive element dissolved as a gas can increase risk of cancer	Air-stripping system with vents to the outside
Sand	Sand and grit in pipes and fixtures	Centrifugal sand separator, or sand filter screen, or cartridge filter; or sand trap settling tank
Sediment	Sediment in pipes and fixtures, clogged aerators and screens, washing machine slow to fill.	Backwash sediment filter, and/or cartridge filters
Sulfate	Salty tastes over 250 mg/L; can cause stomach upset and diarrhea at higher concentration if magnesium is also present in the water.	Reverse osmosis
Surface Water	Risk of bacteria, viruses and parasites; can be discolored and high in turbidity	Chlorination, or ozone injection, or hydrogen peroxide, followed by activated carbon filtration, sediment filtration, and ultra-filtration membrane; in some cases, the ultra-filter can be used with a simple pre-filter.
Tannin	Discolored water, color of tea, yellow or brown; can stain laundry and make disinfection more difficult if bacteria are present; over 2.0 mg/L can be a problem for some iron filters.	Anion exchange system with tannin resin
Total Dissolved Solids	At higher levels over 1000 PPM can cause corrosion, bad tastes and leave a white film and surfaces; glass can be etched; accelerates corrosion of pipes and fixtures.	Reverse osmosis
Turbidity	Turbidity is a measure of the cloudiness of water. Higher turbidity levels are often associated with higher levels of disease-causing microorganisms such as viruses, parasites and some bacteria.	Coagulation with alum or polymer followed by filtration. Chlorination, or ozone injection, or hydrogen peroxide, followed by activated carbon filtration, sediment filtration, and ultra-filtration membrane;

Treatment Solutions by Stain Type

Observe any stains on fixtures and check to see what the possible causes are:

Stain	Cause	Possible Remedy
Black stains	Manganese	Iron filter that removes manganese (Pro-OX, MangOX, Greensand, Pyrolox)
Black stains	Ferric Sulfide (black rust)	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox); chlorination followed by filtration
Blue stains	Acidic (low pH) water	Calcite neutralizer or soda ash feeder
Brown stains	Manganese	Iron filter that removes manganese (Pro-OX, MangOX, Greensand, Pyrolox)
Laundry stains black	Manganese	Iron filter that removes manganese (Pro-OX, MangOX, Greensand, Pyrolox)
Laundry stains brown or black	Ferric sulfide	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox)
Laundry stains rust	Iron	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox)
Pink stains	Airborne bacteria (not water related)	Clean fixture with chlorine bleach
Rust stains	Iron	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox); Or Water softener for low concentrations of dissolved iron
Slimy rust stains	Iron bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
White film	Total dissolved solids (salts)	Reverse osmosis
White stains	Calcium hardness	Water softener

Odor Identification and Solutions

Does the cold well water have an odor right out of the well, from an outside hose bib?

If there is an odor to the water, do all the taps in the home have the odor? Do some taps in the house (such as upstairs, or from a bathroom or fixture) have greater odor than others?

Does the hot water have the odor only, with the cold water having no odor?

Odors	Source	Possible Remedy
Asphalt or oily odor	Manganese	Iron filter that removes manganese (Pro-OX, MangOX, Greensand, Pyrolox)
Oily odor	Petroleum	Oil removal media with activated carbon (OilSorb); but in some cases it's better to develop a new water source
Cucumber odor	Iron or sulfate reducing bacteria	Disinfection with chlorine or ozone or peroxide, followed by filtration
Earthy or grass odor	Geosmin	Produced by actinomycetes, blue-green algae, and green algae.
Garlic odor or taste	Methane gas	Off-gas into an open storage tank, ventilate well and use caution in treating this problem; methane is flammable
Metallic odor	Iron, manganese, or copper	Determine cause by testing water
Pond or Algae odors	Bacteria, organic matter	Disinfection with chlorine or ozone , followed by filtration
"Rotten egg" odor	Hydrogen sulfide gas	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
	Sulfur bacteria	Chlorination, aeration, ozone injection, hydrogen peroxide, followed by filtration
Sewage odor	Leaking septic tank	Repair or re-locate septic tank or well
	Bacteria	Disinfection with chlorine or ozone or peroxide, followed by filtration; or repair or re-locate septic tank or well

Color Identification & Treatment

Color	Cause	Possible Remedy
Blue color	Copper corrosion	Calcite neutralizer or soda ash feeder to neutralize pH
Brown or rust color	Iron and/or manganese	Iron filter (Birm, Pro-OX, MangOX, Greensand, Pyrolox)
Cloudy or milky color	Colloidal clay & suspended particles	Flocculation and filtration; ultra-filtration
Cloudy water	Bacteria	Disinfection with chlorine or ozone or peroxide, followed by filtration
Dark color	Organic matter	Tannin filter
Pink color	Potassium permanganate	Water has too much chlorine, ozone or peroxide and the manganese has been converted to potassium permanganate.
Tea color	Tannins, humic acids	Tannin filter or injection with chlorine or ozone or peroxide, followed by filtration
White color	Air or gas in water	Off-gas into an open storage tank, or repair air leak
Yellow color	Colloidal iron	Tannin filter; or inject chlorine and filter with activated carbon

Flakes, Particles, and Sediment

Flakes or Particles	Cause	Possible Remedy
Black flakes, sand or grit	Lining of water heater deteriorating	Replace water heater
Black grit or particles	Corrosion from lining of galvanized pipe	Replace galvanized pipe with copper or plastic pipe
Blue flakes	Water heater dip tube deteriorating	Replace water heater
Blue or green flakes	Copper-stained calcium particles	Check for corrosion and pH
Dirt color sediment	Sediment from well water	Sediment backwash filter, or cartridge type filter
Gray sand or grit	Water heater liner deteriorating	Replace water heater
Red, yellow or orange beads	Water softener resin from broken water softener	Repair or replace water softener
Rust flakes	Rust and iron from well water	Sediment backwash filter, and/or iron filter
Rust or orange flakes	Rust from corroded pipes	Sediment backwash filter, or cartridge type filter
Sand or grit	Sand from well	Sand separator or filter
White or tan flakes	Clay or calcium particles from well water	Sediment filter
White plastic flakes	Water heater dip tube deteriorating	Replace water heater

Fixture Problems Identification

Fixture or other Physical Problems	Cause	Possible Remedy
Air or gas spitting from fixtures, or cloudy water	Air being sucked into pump or piping system	Repair pump or piping
Air or gas spitting from fixtures, or cloudy water	Carbon dioxide gas	Off-gas into an open storage tank, ventilate well and use caution in treating this problem
Air or gas spitting from fixtures, or cloudy water that clears	Methane gas	Off-gas into an open storage tank, ventilate well and use caution in treating this problem; methane is flammable
Landscape dying	High total dissolved solids	Reverse osmosis
Landscape dying	High boron	Reverse osmosis
Landscape dying	pH too high	Inject acetic acid (white vinegar)
Low water pressure	Clogged pipes and fixtures	Replace pipe or fixtures
Low water pressure	Worn out pump	Replace or service pump
Low water pressure	Stuck check valve	Replace check valve
Low water pressure	Stuck or partially closed gate valve	Replace gate valves
Soap scum in shower	Manganese or ferric sulfide (black rust)	Iron filter that removes manganese (Birm, Pro-OX, MangOX, Greensand, Pyrolox)
Soap won't dissolve	Calcium hardness	Water softener
Washing machine slow filling	Sediment	Clean washer hose screen; install sediment filter
Water heater noises	Water heater is built up with hardness or sediment	Replace water heater
White scale	Calcium hardness	Water softener
White spots	Total dissolved solids	Reverse osmosis