Helpful Water Information

First things first….

Point of Entry filters provide clean water to every faucet and fixture in the house because water treatment occurs either at the well or where the water line enters the house.

Point of Use filters are placed at a single faucet or fixture to provide clean drinkable water in that area only. POU filters are typically put under the kitchen counter or installed in a refrigerator to treat ice and drinking water.

Typical water problems:

Acidity (pH)
Acidity in water is measured as a pH value. The pH value is measured on a scale of 0-14, with 7 being neutral. Water having a pH value of 6.8-6.9 is considered slightly acidic and may result in blue/green or rusty stains. A pH value of 6.0-6.7 is considered moderately acidic and may eventually corrode plumbing fixtures and water using appliances, necessitating their repair or replacement. A pH value of 4.0 to 5.9 is considered extremely acidic and corrosion may be even more destructive.

Hardness
Hardness, measured in grains per gallon (gpg) is the amount to calcium and magnesium in a water supply. These hardness minerals are responsible for soap curd, scale build up in pipes, bathtub ring and numerous other household cleaning problems. The extent of these problems will depend on the level of hardness impurities in the water. Softening of the water will reduce or help eliminate these problems; help lower water heating costs and provide soap savings. The Water Quality Association classifies degrees of hardness as follows:

Soft Water	0 to 1.0 gpg
Slightly Hard Water	1.1 to 3.5 gpg
Moderately Hard Water	3.6 to 7.0 gpg
Hard Water	7.1 to 10.5 gpg
Extremely Hard Water	10.6 or more gpg

Please note that the above is a guide, there are no National Drinking Water Standards in regard to hardness.

Iron
Iron is a very common water problem. This metal accounts for five percent of the earth's crust and is one of the most common elements in nature. Iron in water is measured in parts per million (ppm). When present in levels of 0.3 ppm or greater it may cause yellow or rusty satins in sinks, toilet bowls, and on clothing. Iron is most commonly found in three forms:

Clear Water (ferrous) iron is clear when drawn, but when exposed to air develops a rusty or red color.

Red Water (ferric) iron has a red, yellow or rusty color when drawn.

Bacterial Iron is a group of bacteria which thrives in iron bearing water supplies utilizing iron as an energy source. While not a health hazard, its presence may clog or foul plumbing lines and water using appliances in addition to staining. Aesthetically, bacterial iron is very displeasing.

Manganese
Manganese does not pose a threat to health, but can cause bitter or metallic taste and dark brown or black stains in laundry and plumbing fixtures. Water treatment is recommended only if these particular symptoms are causing a problem. Manganese is found in the same three forms as iron: clear water manganese, precipitated (oxidized) manganese, and organic manganese. Also, manganese is almost always found in conjunction with iron and can be treated by the same methods as iron. It will typically stain in levels of .05 ppm or above.

Hydrogen Sulfide
Hydrogen Sulfide or sulfur is a naturally occurring contaminant which gives water a disagreeable "rotten egg" odor and taste. It is corrosive to metals and can even tarnish silver. It frequently occurs in well water sources which also contain appreciable levels of iron/manganese or that have low pH. Because it is a gas that comes out of solution very quickly, an accurate test for hydrogen sulfide must be made at the site.

Turbidity
Turbidity in water is due to the presence of suspended matter; sand, silt, clay or dirt, causing the water to appear cloudy.

Taste and/or Odor
Bad tastes or odors in water may occur from various causes – dissolved minerals or gases, organic contamination, or from chlorination. One of the most objectionable tastes and odors in water supplies is caused by hydrogen sulfide gas. It gives water a rotten egg taste and odor.

***Please Note: The above list is far from exhaustive. There are many more elements and compounds typically found in water. The above is a list of those that cause the most problems in the Georgia region.*

Common filtration media:

(The following media are used in filter tanks with automatic backwashing valves)

Mang Ox based filters

Purpose: This filter system is primarily used to remove iron, manganese, and hydrogen sulfide (sulfur/rotten egg odor) as well as provide general filtration.

Advantages: The WS1MO-10 is very low maintenance. The filter system is topped by an digital filter valve that is set to backwash every 2 days at about 2 am. No other maintenance is needed.

Disadvantages: No real disadvantages. Mang Ox needs a flow rate of at least 8-10 gpm for a thorough backwash.

How it works: This system is used when the pH of the water is neutral (7.0) or higher. The only mineral used in this system is Mang Ox. Mang Ox is a granular mineral that is black in appearance. It uses a surface action oxidation process to remove iron, manganese and hydrogen sulfide from water. Mang Ox systems work by oxidizing the iron, manganese and hydrogen sulfide into a particulate and trapping it on the surface of the filter media granule. Since it is the surface of the media granule itself that oxidizes the incoming contaminants, it is important to keep the surface of the granules clean. As the granules become more and more coated with oxidized contaminants, they lose their ability to oxidize the incoming sulfur, iron and manganese during service the flow. Once the media is thoroughly coated, the contaminants will bleed through the system into the house. To avoid exhausting the system in this manner, the system is set to automatically backwash every night. An adequate backwash is imperative to break the contaminants loose and wash to drain. Mang Ox needs a flow rate of at least 8-10 gpm for a thorough backwash. Hydrogen sulfide removal or heavy iron may require the optional addition of a chlorine pellet feed tank.

Neutralizing Filters

Purpose: This filter system is primarily used to raise the pH of the water and provide general filtration.

Advantages: The WS1NC-10P is an automatic system that backwashes itself and is very low-maintenance. With this system, there is no need to monitor the pH of the water because the system is designed to raise the pH automatically without the mixing of chemicals as with a chemical feed system. (It is possible to raise pH by using a soda ash mixture that is fed into the water by a chemical feed pump. The soda ash method does not add hardness to the water, but it is very maintenance inclusive and must be monitored closely.)

Disadvantages: The Calcite/Corosex mineral slowly dissolves over time adding hardness to the water. The level of hardness added to the water is typically unnoticeable to the homeowner, but if a significant amount of hardness is already present in the water the homeowner may want to add a softener to the system at a later date. Also, since the mineral dissolves slowly over time, the mineral will need to be "recharged" or replaced after a significant amount of time. (Usually 12 to 18 months depending on the system)

How it works: We use two minerals in this system, Calcite and Corosex. *Calcite* is granular in texture and near white in color that closely resembles salt or sugar in appearance. *Corosex* is near white, flaky and resembles oatmeal in appearance. They are both used in conjunction to raise the pH of the water, typically to a level of 7.2-7.6. Since Calcite and Corosex are self-sacrificing minerals, they will slowly dissolve over time. As a result of the very slow dissolve, the Calcite and Corosex will add hardness to the water. Typically, the hardness added to the treated water is small and not noticeable to the homeowner. In about 18 months, the filter will need to be "recharged" and more Calcite and Corosex will need to be added to the filter. If the filter is not recharged, the pH of the water will drop to a corrosive level and may damage plumbing or household appliances. Also, a blue-green stain may appear in toilets, showers and sinks indicating the corrosion of copper fittings

in the plumbing or appliances. To recharge the filter, you will need to contact a Filter Tech authorized dealer for replacement calcite/corosex. Please note that the length of time it takes for Calcite/Corosex to dissolve is dependent on many variables including water usage, pH, TDS (Total Dissolved Solids), temperature of the water and level of other contaminants in water such as iron or manganese. Some systems will need to be recharged earlier than others depending on the chemistry of the water it is filtering.

Manganese Greensand Filters

Purpose: This system uses Manganese Greensand to remove iron, manganese and Hydrogen Sulfide. Potassium permanganate or 3" Potable Chlorine Tablets are required to regenerate the media bed.

Advantages: Manganese Greensand is one of the best methods of removing high levels of iron, manganese and hydrogen sulfide. Since it is a granular media, it also has the ability to filter particulates down to 20-30 microns in size.

Disadvantages: Manganese greensand removes hydrogen sulfide through a catalytic oxidation method similar to that of iron and manganese. When the hydrogen sulfide gas contacts the manganese greensand, oxidation occurs and the unfilterable gas is converted to an insoluble sulfur particle. This yellow powder can then be removed from the water through filtration and subsequently removed from the filter system by a thorough backwash.

Since this system regenerates with potassium permanganate or chlorine tablets, regular upkeep of this regenerant is necessary for the successful maintenance of this system. Since manganese greensand is not designed to affect pH, a neutralizer may also be necessary if the pH of the influent water falls under 6.5 (7.0 preferred for best oxidation).

How it works: Iron and manganese pose no health risks but can be aesthetically displeasing when these naturally occurring elements discolor water, bathroom fixtures or clothing. Iron and manganese are pumped from the well in a dissolved, invisible soluble state. Only when these elements mix with air (a process called oxidization) do they precipate into their stain causing insoluble visible form. Iron and manganese *cannot be filtered* from water in their pre-oxidized, soluble state. They must be oxidized into their insoluble particulate state before they can be filtered. Manganese greensand is an oxygen rich mineral that oxidizes the iron and manganese into an insoluble particulate upon contact with influent water and then traps the particulate among its granular medium. Clean non-staining water is a result.

Hydrogen sulfide is a gas sometimes present in well water. It is best detected by its extremely strong "rotten egg" odor. Like iron and manganese, hydrogen sulfide can be aesthetically unbearable. In rare higher doses, it can be poisonous and flammable. Unlike iron and manganese, hydrogen sulfide gas can be extremely corrosive and can damage plumbing and fixtures it contacts.

This gas is created from decaying organic matter deep in the water aquifer. Hydrogen sulfide may sometimes appear in water sources that have no previous history of producing this gas. Experts believe that hydrogen sulfide may suddenly appear as a result of new fractures opening in the aquifers due to recent drought conditions and the changes in the water table.

Manganese greensand is a black granular medium used for removing soluble iron, manganese and hydrogen sulfide from well water supplies. The greensand is coated with manganese dioxide that acts as a catalyst in the oxidation reduction reaction of iron, manganese and hydrogen sulfide. During filtration, the manganese coating is exhausted and requires regeneration using potassium permanganate. Continuous exhaustion of manganese greensand without proper regeneration with potassium permanganate will result in a non-working filter.

Granular Activated Carbon

Purpose: Granular activated carbon (GAC) is the most common method of treatment for dechlorination and other taste and odor conditions. Carbon is also used to filter organic contaminants from well and surface waters.

Advantages: The most widely used and most versatile product in water treatment. There are over a hundred different types of GAC made from coal, coconut shell, nuts, peat and other carbon containing material. Carbon's biggest advantage is its surface area. One gram of granular carbon can literally have a surface area of a thousand square meters giving it a tremendous ability to adsorb organic contaminants as well as chlorine. In certain forms carbon can filter down to 1 micron or less. Carbon adds nothing to the water supply.

Disadvantages: Carbon's network of pores act as a safe harbor for organisms to multiply, but rarely are these organisms found to be pathogenic in nature. Water regularly passing through the carbon medium discourages these organisms from building up. Eventually, carbon becomes exhausted and loses it capacity to further treat water. When taste and odor problems return, the bed of activated carbon will need to be replaced. Activated carbon has a shorter life span than other granular filter minerals.

How it works: Carbon owes its widespread success to its amazing *adsorption* abilities (not a*b*sorption) and its tremendous surface area due mainly to its many pore structures. Adsorption occurs when an adsorbent's (such as carbon) surface energy attracts a particulate or molecular item from water. These atoms and molecules are then held on the surface of the carbon until the carbon can no longer handle new contaminants. This is referred to as "exhaustion". If the carbon becomes exhausted, or "used up" and is not changed, backwashed, or otherwise treated, desorption will

eventually occur and the carbon will release everything it has adsorbed into the water supply. As with other granular mineral, granular activated carbon is best used in a system that includes backwashing and rinse to remove trapped material from the filter bed. A backwash and rinse will also partially restore the adsorptive quality of the adsorptive bed. Even with regular backwashing, expect to replace the granular activated carbon every two to three years.
Activated carbon is most commonly used to remove taste, odor and chlorine from the water. Odors can often be associated with the presence of organic matter and gases in the water supply. Chlorine-caused odors are usually not the chlorine itself, but the byproduct of the chlorine treatment process. Taste may come from dissolved minerals or organic byproducts as well. Carbon also effectively reduces or removes petroleum products, detergents, cleaning agents, disinfection by-products, agriculture chemicals as well as many other water contaminants. Call Filter Tech for more information about special filtration needs.

Reverse Osmosis (RO)

Purpose: RO is most commonly used for extremely clean drinking water. Units are placed at point-of-use, typically under the kitchen counter. RO can remove virtually all particulate matter, turbidity, bacteria, microorganisms, asbestos and single molecules of the heavier organics.

Advantages: Delivers extremely clean water. Along with distillation, reverse osmosis produces the cleanest water known to man. RO does not need electrical power and is small enough to fit under the kitchen counter for use (through a separate faucet) at the kitchen sink.

Disadvantages: About 2-3 gallons of water is directed down the drain for every gallon of clean water produced by the RO system. Although RO is a very inexpensive technology for Point-Of-Use water needs, the price multiplies expedientially when adapted to Point-Of-Entry usage.

How it works: Reverse Osmosis uses a semi permeable membrane to filter even the smallest contaminants out of municipal or well waters. The RO membrane is a very thin polymer that looks a lot like household sandwich wrap. It is the ultimate mechanical filter, straining out virtually all particulate matter, turbidity, bacteria, microorganisms, and asbestos – even single molecules of the heavier organics. It also removes dissolved impurities, even impurities smaller than a water molecule itself! The pores on a reverse osmosis membrane measure around .0005 microns (a human hair is 50 – 75 microns in diameter) or .0000002 of an inch. The membrane rejects impurities in part by repelling them from its surface and allowing water molecules to permeate through and collect on the other side of the membrane. With the exception of distillation, Reverse Osmosis is the only process able to effectively remove the following types of impurities:

1. Particulate matter, turbidity, sediment, etc.

2. Colloidal matter
3. Total Dissolved Solids
4. Toxic Metals
5. Radioactive Elements
6. Microorganisms
7. Asbestos
8. Pesticides and Herbicides
9. Heavier organic molecules

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