WATER FILTRATION BASICS

TYPES OF IRON IN WATER

1. **Ferrous Iron**-Iron that you **can't** see in water, but can be tasted and smelled and does still have a staining effect on fixtures, clothes, etc. This type of iron is in "solution" in the water.
2. **Ferric Iron**-Iron that you **can see** in the water. This may come in the form of just cloudiness, or it may come in a way that makes the water have a reddish tint, what some people say makes the water look like "red cool-aid". This type of iron is in "suspension" in water. Often called "Red-Water Iron".
3. **Iron Bacteria**- Glutomous bacteria-laden slime buildup which is formed when certain types of anerobic bacteria feed and grow off of the iron which is present in a water source. Many times this bacteria goes hand in hand with high amounts of ferric iron. This type of bacteria is not usually detrimental to your health, but it can cause aesthetic problems with how the water looks, tastes, and smells.

HOW TO REMOVE FERRIC IRON FROM WATER

1. **Mechanical Filtration**-By running water through a sand and/or sediment filter, most times you can catch and trap the floating iron which is in suspension. No chemical reaction takes place for removal in this case. The filter physically "traps" the iron, and gets rid of it by way of a backwash which occurs periodically. (Usually every 4-6 days).

Repco filters recommended for this application: **15RG-Greensand Filter**
15RM-Multi-Media Filter
15RA-Acid Neutralizer
15RS-Sediment Filter
15RI-FA Greensand /Pot Perm Feed System

These filters are recommended due to the fact that they all have a backwash flow rate that is 5 GPM minimum. This is important when trying to remove the heavy iron buildup that occurs on the media in the filter during service.

HOW TO REMOVE FERROUS IRON IN WATER

1. Oxidation-When soluble iron in water is brought into contact with air, the resulting reaction causes the iron to fall out, or come out of solution immediately. At this point, what you have basically done is transform iron from the ferrous state (in solution where you can't see it) to the ferric state (where you can see it). The iron is now in suspension. Oxidation is the process of adding oxygen to the water in order to get the ferrous iron (clear-water iron) into the ferric form (a form you can see) so that the filter can then mechanically trap it, and eventually backwash it out.

Repco Filters recommended for oxidation: **15RI-FA-Manganese Greensand Filter**
15RG-Chem-Free Greensand Filter w/ Quantum Aeration Pckg
Repco Iron Gate or Iron Vision Chem- Free Iron Filter

The **15RI-FA** is a filter with a bed consisting of a media called **Manganese Greensand Plus**. This mineral has an affinity to attract oxygen when introduced into the system. When this unit is in service, water comes in contact with the greensand-which is loaded with oxygen. The iron which is in solution is oxidized out and into suspension, where it is

mechanically trapped and caught in the filter. Periodic backwashing gets rid of the excess iron left in the bed. The bed is recharged with oxygen during this same time (usually every 4-6 days) using an oxidizer called **potassium permanganate (KMnO4)**. This is drawn into the filter by way of a venturi system on the head of the filter which takes the water-dissolved-pot-perm from a 5 gallon tank and puts it into the top of the filter where it is then slowly permeated down through the greensand. The next cycle of the regeneration process flushes the excess pot-perm out of the mineral bed and the last cycle refills the pot-perm tank with brining water.

The **15RG** is a unit which also uses oxygen as the way of getting the **ferrous** iron into the **ferric** form. **Manganese Greensand Plus** is the mineral of choice in this filter as well. When brought into contact with the oxygen, The Greensand treats iron the same way that the **15RI-FA** does in that it acts as a catalyst to bring the ferrous iron together with the oxygen in the bed to convert the iron to ferric form where it is then mechanically trapped in the bed and backwashed out periodically. The main difference between the **15RG** and the **15RI-FA** is that the oxygen is not brought in all at once in one batch (like is done when pot-perm is added to the **15RI-FA** every 4-6 days) but it is constantly drawn into the water system.

Two methods of introducing natural air into the system

1) By way of a **Micronizer,** which is a venturi device with a nozzle letting the flow of water draw air into the water line. This would be plumbed on the well side of the check valve entering the pressure tank to keep the air draw consistent.
2) By way of a **Mini Air Pump,** which would run at pre-selected intervals to flood the water with air as it enters the home.

The oxygen is also **not** part of any other chemical (like pot-perm). It is drawn in from the everyday air we breathe."**Chemical free**" systems seem to be growing in popularity throughout the industry, even though in all actuality, both units utilize the same basic technology to remove the iron.

In some parts of the country, there is already enough naturally occurring oxygen in the water so no **Micronizer** or **Air Pump** would be required to force the oxygen/iron reaction in a **15RG Greensand Filter**. But in cases where an air introduction device is needed, an **air release package** would also be used in order to vent the excess air introduced by the **Micronizer or Air Pump**. This would be installed before the pressure tank so that the excess oxygen doesn't interfere with the tank's normal operation, and also to keep any air from spitting at the faucet.

Another benefit of the **Oxidizing Greensand Filters** is **hydrogen sulfide removal** . This is a nice feature due to the fact that more and more water supplies are coming back with results indicating a presence of this "rotten egg" odor.

2. **Ionic Exchange**-This process takes any ferrous iron, manganese and hardness ions that exist in solution in the water and exchanges those ions with soft sodium ions that have been previously attached to the Hi-Cap Resin beads of the softener. When the softener regenerates (usually every 4-6 days) salt water brine is brought into contact with the resin in the mineral tank. The exchange process is then reversed with the iron, manganese and hardness ions being released off of the resin beads and sent out to drain, to be replaced with the newly introduced sodium which attaches itself back onto the resin beads. This is called **"recharging"** the resin. It is a much cleaner method of removing minerals because they never have to get put into the "cloudy"(or suspended) form to remove them. This process is an actual chemical reaction that exchanges ions back and forth, continuously recharging the cation softener resin with sodium prior to service, and removing iron, manganese, and hardness from the dirty resin during the regeneration process.

Repco filter recommended for Ionic Exchange: 5R45-2 Water Softener