Water Treatment Questions 2/6/24

1. How long until the algorithm takes full effect for the customers to see the true efficiency of the units.

The algorithm or method of determining the frequency of regeneration and salt dosage is determined by 3 factors:
1. The actual water used
2. The average water used per day
3. Water usage history

It will use these factors and start moving around, either up or down in frequency and salt dosage in 3-4 weeks of water usage history. If water usage is higher in that time the unit will adjust higher if needed. The control will try to keep the unit in a 2-5 day regeneration frequency, but depending on water usage, may go longer between regeneration cycles. The 2 goals are to keep the customer in soft water and to move to a lower salt dosage. Lower salt dosages result in higher capacity gained per pound of salt used.
This, along with the upflow brining, gives the system its efficiency; Both in salt consumption and water used per regeneration.

2. What is the threshold for a refiner being able to treat water with sodium in it? At what point do we need to do Whole Home RO?

It would take extreme levels of Sodium to affect the ion exchange equilibrium.
For Whole Home RO considerations, there are also multiple factors. I would look at the complete composition of the TDS and any potentially dangerous contaminants that would indicate a strong need for Whole Home RO.

The EPA recommendation for potable water is 500 ppm of sodium. The water softener may function on higher sodium levels but the performance, hardness bleed, and the aesthetics of the treated water may require further treatment. For these rare instances, it may be better to contact Tech Services for guidance with a complete water analysis.

3. Are nitrates a concern for working water (showering/bathing)?

Nitrates (measured as Nitrogen) as listed in the EPA primary drinking water standard, has a MCL (Maximum Contaminant Level) of 10 mg/l. The main concern is ingestion of water with higher concentrations of nitrates in infants below the age of 6 months. Nitrates are not absorbed through the skin. The concern may be during showers or ingesting bath water. Adult digestive systems are more able to tolerate higher levels of nitrates.

4. Is there a reason why a customer would want to remove nitrates for a whole home vs just drinking water?

The concern may be the water consumed during the shower, bath or brushing teeth. Although, this may be a small amount depending on the concentration of nitrates. They may want to consider treatment of all working water in the home.

5. How high is too high for sulfates?

One of the best resources here are the EPA Primary and Secondary standards. For Sulfates, the secondary MCL is 250 mg/l. Anything above this level I would suggest treating from an aesthetic perspective.

The main issue is the laxative effect when combined with magnesium. Reverse Osmosis would be an option for reducing sulfates along with other minerals.

https://www.epa.gov/ground-water-and-drinking-water/national-primary-drinking-water-regulation-table

The best practice is to have a more comprehensive water test done which would include sulfates. When you have the test results contact EWS Tech Service for sizing and application.

6. If we're supposed to be changing membranes at 75% reduction, how do we determine that number when adding an alkaline filter.

Depending on the contaminant to be reduced, using the EPA primary/secondary drinking water standards and the Product performance data from the manual will help determine the need for membrane replacement. On our monitored Reverse Osmosis units, the trip point is below 75% product water TDS, suggested at that level to replace membrane or trouble-shoot system for problems.

One way to test the TDS of a Reverse Osmosis system is:

1. Turn off the storage tank and open the faucet to relieve the pressure.
2. Disconnect the yellow line connected to the storage tank.
3. Collect the water from the yellow line from the reverse osmosis manifold. This is as close as you can get to the product water out of the membrane.

Another way this can be done is:

1. Replace the alkaline and the post filter with the 2 sanitizing filter kits.
2. Run the water through the faucet for the sample.
3. Run the water for a minute to ensure you are flushing out the sanitizing post filters and the lines feeding the faucet.

5.What is the difference between 6, 8, and 10 percent resin?

Crosslinking percentage of resin is the measure of material used in the manufacture of the resin bead. The materials used are Styrene and Divinylbenzene. The higher the percentage, the more cross bonded the material used. This then gives the bead more resistance to physically breaking when water containing strong oxidizers such as chlorine is present. Chlorine resistant labeling means the resin has a higher crosslinking but will still be affected by oxidizers. Other factors that speed up resin degradation, along with oxidizers are metals such as Copper, Iron, Manganese, warmer water temperatures and higher service flow rates.

6.Recommended way to treat water with Uranium present.

Depending on the concentration and water usage, two common ways to treat Uranium are RO and Ion Exchange. With RO, you could either treat just the drinking water supply (low levels under the 30 ppb SMCL), or the entire household for higher levels or more complex water chemistry with other concerns. Ion Exchange can also be used for whole home applications but is dependent on additional water chemistry.

7. When there is a boil, advisory is the microbiological filter sufficient or do they still need to boil water and if they do choose to use the reverse osmosis, what cleaning/replacement would need to happen once the boiled advisory is lifted?

Technically, an MB filter should be sufficient to keep the water potable. After a boil water event, it would still be advisable to replace the filter because these types of events are typically accompanied by excess turbidity and a high disinfection residual that may affect the filter's life and performance. For an RO, you should have potable water feeding it. After a boil water notice, you will want to replace all three cartridges and sanitize the system.

8. How does Iron and Manganese affect the resin on softener/refiner.

EPA secondary drinking water standards for Iron is 0.3 mg/l and Manganese is 0.05mg/l which means they are not enforceable guidelines but may cause cosmetic effects. When working with a source of water containing Clear Water Iron and Manganese, Ion Exchange (softening) is a best practice treatment method. Iron and Manganese are attracted to the resin bead the same as hardness (Calcium and Magnesium) minerals. We suggest adjusting the raw water hardness setting up 5 grains for every 1mg/l Ferrous Iron and 5 grain for every 0.05 mg/l Manganese.

The issue is not the exchange rate when setting the raw water hardness higher, we set the hardness higher to force the unit to recharge a little more often and use a little more salt. The issue is that Iron and Manganese will oxidize (change forms) to a staining form (fouling) which will affect the resins' ability to soften water, reducing capacity. This staining form will cover exchange sites on the resin bead fouling it. The frequent use of resin bed cleaner is recommended. Resin bed cleaners are a reducing agent lowering

the pH of the regeneration brine (salt/water/bed cleaner mix). This lower pH will change oxidized Iron and Manganese to an exchangeable form that can be removed from the resin by the sodium. How often resin bed cleaners are needed depends on raw water iron and manganese content and water usage. The use of resin bed cleaners is also beneficial on city waters that may contain small amounts of Iron, Manganese and even Copper. Most municipal water is treated and may only require infrequent use. Use of a refiner on Iron/Manganese bearing water is not suggested.

9. Can you use resin bed cleaners on any EcoWater tank systems?

The use of resin bed cleaners (reducing agents) will not affect any of the softeners, conditioners, or refiners. Some powder cleaners have a smell buffer such as the wintergreen. Do not use these in a refiner.

10. Explain the benefits of Air injection tank filters. We typically don't use the AIV we order the EIV and for most Iron/Manganese applications we add filox (depending on flow rate).

The main benefit is that we are not using any chemicals to help in the oxidation process. Chemicals such as Chlorine and Potassium permanganate. Air injected filters use air as an oxidizer for the treatment of Iron, Manganese, and small amounts of Hydrogen Sulfide. Air has oxygen which is used as an oxidizer. During regeneration the unit backwashes, then draws air which will saturate the filter media. The regeneration process ends leaving a head of air in the tank to help with the oxidation process. Efficiency of this process does depend on water chemistry. Having a pH above 7 will allow air to work as a sufficient oxidant for Iron. An empty EIV filter is available as water conditions vary and the use of other media besides Turbidex may be used. Application principles should be applied such as water chemistry, service flow rates required and backwash water availability.

10. Benefits of an AIV (Air Aspirated Filter) over an APF (All Purpose Filter) when dealing with Iron?

AIV/EIV tank filters use air as an oxidizer and can treat Clear Water Iron, Manganese and small amounts of Hydrogen Sulfide that are still dissolved and have not been oxidized into a suspended form.

All-purpose filters (shipped empty) will vairy depending on the media loaded. For example, Tubidex media will filter oxidized Iron/Manganese and sediment particles. Shell and catalytic carbon will reduce Chlorine/Chloramines in a municipal water supply. These are typically used in red water (Ferric) applications where the Iron is already in a suspended form.

11. Explain using a water softener to treat nitrates and how it works with both an actual softener for hard water on the same application as a "Nitrate Softener."

A water softener is a technology that uses Ion Exchange. In Ion Exchange, we use resin to replace one ion for another. The primary rule for Ion Exchange is that you can ONLY exchange ions of the same charge. A water softener uses a cation resin that exchanges positively charged ions such as Calcium, Magnesium, Sodium, Potassium, and Iron.

Nitrates and Nitrites are anions and have a negative charge. They require a different anion resin. Because Nitrate reduction only requires a weak base resin, these units can be regenerated using brine, which is why they are called a “Nitrate Softener”.

If both are being used on the same application, the softener is adding Sodium to the water, and the Nitrate system is adding Chloride. This has the potential to create a salty taste if the Chloride level rises above around 250 mg/l.

12. The use of a 5-micron filter before UV light is highly recommended to make sure the light is as effective as it can be.

Pretreatment ahead of the UV system is highly recommended to ensure turbidity is reduced. The use of the 5-micron prefilter reduces any sediment that may hide bacteria from the UV light. Always follow the manufacturers pretreatment water quality recommendations.

13. Does an Alkaline filter add electrolytes to water?

An electrolyte is technically anything dissolved in the water that increases the conductivity of the water sample. Conductivity is what we measure when testing for TDS (Total Dissolved Solids). Because an Alkaline filter is adding minerals to the water, the TDS is increased as well as the conductivity. This would meet the definition of adding an electrolyte.

14. Does a carbon filter increase the risk of Legionnaires in water heaters?

Legionella is a waterborne disease. These diseases are destroyed through disinfection, such as Chlorination. This is the benefit of having a chlorine residual sustained in a water supply - you can confirm that the water is safe from microbial diseases.

An activated carbon filter’s primary job is to remove Chlorine. If there is no Chlorine residual in the water, there is no further disinfection or way to guarantee that waterborne diseases, such as Legionella, are not present. These microbes may enter water systems at the end tap and migrate their way upstream through a water system if there is no disinfection present.

15. What are the benefits of Alkaline water?

First off, we are not medical professionals and should never make any health claims in connection to Alkaline water.

With an Alkaline filter, we are adding minerals such as carbonates to the water. These minerals will increase the pH by absorbing excess Hydrogen ions in the water. Alkalinity technically, is a measure of the water's ability to neutralize an acid.

From a consumer standpoint, a common opinion is that Alkaline water tastes better. This is because straight RO water has very little taste. By adding minerals, many consumers notate a distinct increase in the aesthetic taste quality of the water. When water tastes better, you drink more of it.

16. Water Softeners are heavily restricted in some areas of California, so they push a lot of Water Conditioners. The popular brand is Futursoft. They claim to use a treatment process called Template Assisted Crystallization. What's your and Bob's opinion on salt-free water softener alternative systems and treatment method?

In my opinion, a salt-free system (not using Ion Exchange) cannot be considered a Water Softener. This is because they do not remove Calcium or Magnesium ions from the water. There is also no way to truly test these systems as a water test would still show hardness due to the continues presence of Calcium and Magnesium, even if they are in an "altered form."

The EcoProTechT system will continue to leave the Calcium and Magnesium ions in the water but will convert them into a crystalline form that is less likely to cause scale. The EcoWater anti-scale system also uses TAC (Template Assisted Crystallization technology). This solution is a great alternative to a water softener in areas with mild to moderate hardness and in areas with water shortages or restrictions.

The EcoProTechT Anti-Scale product is NOT a Water Softener. It does not remove Calcium and Magnesium from water as softeners do. It is a scale management solution using proprietary PTT media. The PTT media converts hardness minerals from their ionic form to a small crystalline form. This crystalline form does not readily attach to pipes, appliances, and fixture surfaces. In fact, these microscopic crystals are simply rinsed away by the normal flow of water.

18. Would regenerating using Potassium-based salt rather than Sodium-based salt make a difference?

Depending on the location, it may be the Sodium that is the issue but also the addition of Chlorides to the drain stream. They are recycling some of the water for irrigation. For applications requiring the most efficient water softeners/conditioners/refiners, which use an algorithm, upflow regeneration, water usage metered and being able to set the unit to a high efficiency setting (4000 gr/lb), these features make EcoWater units the best choice in a challenging market.

19. In addition to that, I've seen a lot of electronic water descalers. Are they effective in preventing scale and hard water effects?

These systems may have limited functionality. Just like with the "Salt Free Softener," there are no tests that can be performed to confirm the function of such technologies.

20. Does drinking water that comes from a galvanized system have any health risks with or without a refiner and from a well or city water source?

The answer to this depends on the corrosiveness of the water in the system. If the water is corrosive, it has the potential to dissolve water piping and increase the amount of certain potentially dangerous metals in the water. It is best to perform a water analysis for Lead and Copper if these are of specific concern to a homeowner. An easy way to determine if a water supply is corrosive is through an LSI calculation. For this calculation you will need to know the pH, TDS, hardness, Alkalinity, and temperature. There are many calculator tools on the internes such as: https://www.lenntech.com/calculators/langelier/index/langelier.htm

If the LSI is negative, the water is corrosive and may leach from existing plumbing.

21. How effective are UV lights at killing bacteria? I understand it will kill bacteria in the water that's been sitting there for a while but as water is being used, is there enough UV exposure to kill all bacteria in the water?

The use of a UV filter has multiple factors including the turbidity of the water. This is a disinfecting system that uses light to mutate microorganisms so that they are unable to multiply. They are not killed or removed technically from the water. Any turbidity, organic matter, scale, etc. can interfere with the effectiveness of these systems.

If you are using a UV system, it is advisable to adhere strictly to the specifications and requirements from the manufacturer's owner's manual. Would need additional information and potential water analysis.

22. Since an Alkaline cartridge has Magnesium in it could it not cause calcification on Reverse Osmosis faucets?

There is the potential for scale or spotting to form after an Alkaline filter on RO faucets. This is because we are introducing minerals back to the water and the water is no longer considered high purity RO water.