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Episode 44 Ozone Go Zone

Michael Urbans and Dave Roenning discuss the benefits of using ozone for treatment of potable water.

What is an ozone generator?

- An ozone generator creates an electrical field, a plasma in some generators, and this takes the ambient oxygen in the air, O_2, and transfers it to O_3, which is ozone.
- Ozone has a short life and when it breaks down in water, it turns into nothing more than oxygen.
- Ozone has the benefit of being non-reactive. You put chlorine in water, it can react with organic matter and produce disinfection by products such as trihalomethane.

Ozone Generator Improvements

- The greatest improvement in ozone generators has been improved power supplies.
    - Depending on the models – most of them have transformers. If you put in too high a voltage, it will put out too high a voltage. Depending on where you live and the power grid the voltage will vary all over the place.
    - On older model generators the voltage would spike up maybe to 170 volts, typically, to 135 or 140. The transformer would go right along and crank up the output voltage.
    - With improvements the newest units are much more reliable although there are older units that have been operating successfully for 20 years.

Ozone Applications

- Eliminate sulfur odor and iron.
- Nothing comes close to ozone when it comes to removing manganese.
    - Manganese tends to have a different valence that doesn't really lend itself to be easily removed, especially where manganese exceeds one part per million.
- Combine ozone with a basic primary oxidant mineral of your choice (MJU suggests using Pyrolox Advantage, there are other options). As long as it's properly applied and maintained the system will have a long life.
- Dave mostly uses ultraviolet for bacteria. When faced with large amounts of very, very polluted water, a good injection of ozone – at the right level – will do things that you can't do with ultraviolets, simply because it works around the turbidity in the water much better. Whereas ultraviolet has a problem with turbidity.

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Using Ozone Generators

- Unlike a pump which pushes the chemical into the water stream, ozone is sucked into the water stream. The type of venturi used will affect the efficiency of how much mass transfer of ozone you can get.
    - Mazzei makes a very good Venturi which has 99 percent mass transfer, which means you're able to mix it into the water very well. The better you mix it into the water, the better it can oxidize the iron, manganese, sulfur, or whatever else you're trying to oxidize.
- The generator is activated by water flow.
- A retention tank isn't required because ozone works fast. Depending on the type and concentration of bacteria, ozone will kill bacteria, 3,200 times as fast as chlorine.
- Ozone residual lasts 10 minutes, 15 minutes max before it turns back into oxygen.
    - A typical application would be to place a Venturi in front of a pressure tank, and the time that the water spent going in and out of the pressure tank would be more than enough to perform its oxidation.
    - If you're running a steady stream of water, you would then run it into an oxidation filter with the media of your choice.
- When properly maintained these systems can last 10 to 20 years.

Limitations

- The drier the air, the more ozone you'll produce, and the less byproducts you'll produce.
- Nitric acid is a byproduct of ozone. It has not shown to be a major problem over time to Dave, but you need to be aware when cleaning the generator tubes that there is nitric acid on the tubes. It is sticky and yellow. If you get it on your pants, it will burn a hole. If you get it on your fingers it will sting.
- Never use nylon fittings and expose them to ozone. They will very quickly look like you took a propane torch to the fitting, it will literally melt it.
- Avoid using ozone where there is a large quantity of aerobic bacteria present.

Why Customers Like Ozone Systems

- Ozone systems have replaced many chlorination systems that were being used for sulfur, iron, etc. The customers are happy they don't have to handle and keep track of the chemicals. The lack of ongoing maintenance is a big plus with the customer

Estimated Cost

- Depending on the system, they - typically they run from $2,400 on up, depending upon the application.
- When treating 20 or 30 parts per million of iron, use a bigger generator and use more oxidation minerals. It just depends on the water analysis.

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WQRF Water Contaminant Map

https://www.wqrf.org/map.html

USGS Water Data Map

https://dashboard.waterdata.usgs.gov/app/nwd/?region=lower48&aoi=default

WQA National Convention

https://www.wqa.org/convention

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