PROCESS FAILURES WITH HIGH OZONE RESIDUAL IN WATER - REASONS

It is very common to hear clients complaining that they do not get bacteria free water in spite of the fact that they have high residual ozone in the water. This is particularly very true in process involving removal of gram negative pathogens especially pseudomonas.

On analysis of the ozone treatment design, we would find that in many installations the CT factor is never considered. CT factor is the product of ozone dose and the contact time required for the pathogen kill. Each pathogen has a particular CT factor. Hence in some cases when the ozone dose is designed well, the contact time is never achieved due to wrong design of the contact tank, level controls etc. With the result that the water is ozonated for a lesser time than required and the pathogens are not exposed to the lethal dose. Pathogens like pseudomonas will escape disinfection and find shelter somewhere in the distribution loop (particularly in primary/secondary bio fouling matter) and proliferate subsequently when conditions are favorable to them. Hence client will find a sudden appearance of pseudomonas in their water.

How to Design Contact Tanks and Distribution of Water Inside the Tank

This aspect need to be carefully considered to avoid short cut of incoming raw water into the treated water stream. The incoming water must be from the top and introduced just a few 100 mm from the top and never right up to the bottom of the tank. Taking this to the bottom of the tank means this water will find its way into the treated water stream normally tapped from the bottom of the tank. The recirculation line must be up to somewhere at the middle portion of the tank. This must be diagonally opposite the raw water pipe. It must have a mass multiplier nozzle at the end to increase ozone mass transfer. The outgoing water from the ozonation tank must be from the bottom of the tank only.

Where Do You Locate the Dissolved Ozone Sensor

Many process failures with high residual ozone reading are due to the fact that the sensor is located just after ozone introduction. These locations have 10 times more ozone since it is fresh after introduction and the distinction and dissolution of ozone is incomplete. Some fraudulent ozone suppliers use this technique to hoodwink the client and blame the client for faulty tank maintenance and likely bio fouling in the distribution loop. They do this to compensate the low ozone production from their ozone generators. Clients need to be aware of these so called techniques. You need to locate the ozone sensor at a location far away from the contact tank, may be just before you destroy the ozone before process.

Solubility of ozone: Ozone is fairly soluble in water even at water temperatures up to 30°C. Clients should note that for raw water ozonation, suggestions of 5–10 ppm ozone introduction are absurd. Raw water ozonation (potable) requires not more than 2–3 ppm of ozone. Any suggestions of ozone dose as high as 5–10 ppm for potable water ozonation need to be questioned with suspicion on the ozone system itself.

So what should be the Residual ozone requirement: In most cases residual ozone of 0.2–0.3 ppm is more than enough, provided your ozone contacting is designed well. 10 out of 10 times you should get bacteria free water. You strive for higher ozone residual (1.0 ppm) only when the water is to be used for CIP.

Can You Use ORP for Process Control

Many MNC and bottled water companies use ORP to control their process. This is because ORP systems are very economical unlike the dissolved ozone analyzers that may cost more than the ozone generator itself. Though there are various studies to link high ORP value to residual ozone levels, they are not very accurate. When the bacteriological reports take up to 4 days, you really need a more reliable method to measuring dissolved ozone levels is the only way to go, if you want accuracy and reliability.

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