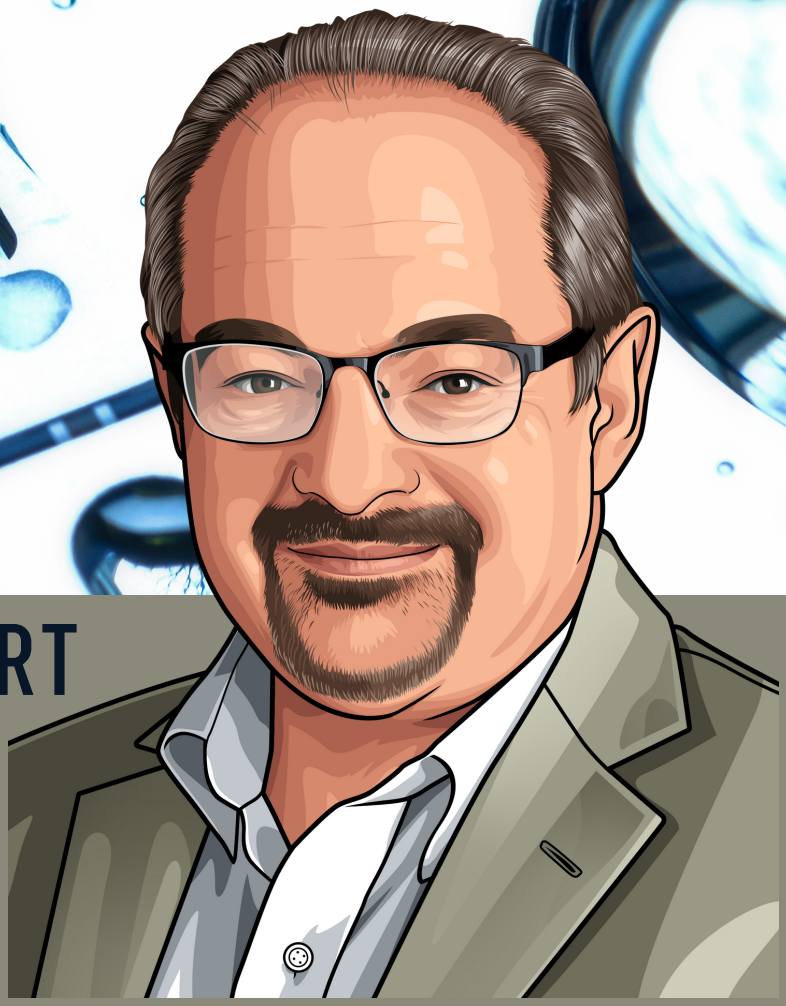
TOTAL ORGANIC CARBON

IS IT BIOBURDEN OR JUST SLIME?



WATER QUALITY EXPERT

BEYOND CLEAN

Jonathan Wilder, Ph.D. | Managing Director
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Beyond Clean Water Quality Expert:

TOTAL ORGANIC CARBON: IS IT BIOBURDEN OR JUST SLIME?

Jonathan Wilder, Ph.D. | Quality Processing Resource Group, LLC

Total organic carbon (TOC) is a measure of the amount of "organic" carbon in the water. This does not mean organic, like organic vegetables. It means "organic" like in organic chemistry. I.e., compounds of carbon with hydrogen, oxygen, nitrogen, sulfur, etc.

Where does it come from? It could be from vegetation rotting on the ground and leaching into the ground water which is then taken up into the municipal water supply. When I lived in Rochester, NY, the answer was always Kodak, since, no matter how hard a manufacturer may try not to have spills that seep into the water table, they do. And looking back over more than 100 years, starting at a point when there were no controls on chemical waste, there's a lot of buildup of organics in the ground water. My son lives near a decommissioned military air station. His ground water is nothing you want to drink either with jet fuel, airplane deicer, and a lot more in the ground.

In any case, if your washers are working correctly, it probably isn't bioburden. Or is it?

Let's look at this problem in pieces. The first is the water coming into the facility. Unlike a lot of other contaminant tests I've written about in this series, total organic carbon has to be tested for at an environmental water testing lab. It's a very inexpensive test.

If the result is 2 or less ppm, you don't have a problem. The EPA secondary drinking water standards limit TOC to 1 PPM. This condition is not met in a lot of the country, but it isn't that much of a big deal. If it were, there would have been legislation years ago to make the regulation tighter.

But you don't want slime on your instruments after washing. To decrease the amount of TOC in utility water, activated carbon filters are the answer. But they don't survive hot water, so you have to filter the cold water and have a dedicated heater for SPD.

Another source of TOC is, oddly enough, enzyme detergent residuals. If detergent isn't completely rinsed off the instruments before thermal disinfection and drying, or steam sterilization, a film of "toasted" enzymes will form on the instrument, turning shiny stainless-steel instruments gray. I did a study for a client and found the TOC levels for instruments that had been heated in oxygen to drive the carbon off as measurable carbon dioxide and the old, gray instruments had twice the level of carbon on them as new instruments. This is why it is critical to do a critical water rinse (and a utility water prerinse before the final, critical water disinfection rinse) to get the detergent off the instruments. If you can see suds in the disinfection rinse through the windows, the critical water is working too hard, and you need a utility water prerinse before it.

Does residual, cooked enzyme detergent qualify as bioburden? Well, it isn't patient soil. But it still is something that shouldn't be in the next patient. In any case, I hope this helps on this topic. See you next month.

Have more water quality questions? Contact Jonathan at: jwilder@qprgllc.com

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Dr. Wilder joined MDT Corporation in 1990 as Staff R&D Scientist, tasked with executing process and product development in sterilization, disinfection and cleaning of reusable medical devices. He started H & W Technology in 1997 and allied with SMP Laboratories from Tübingen, Germany to form Quality Processing Resource Group (QPRG) in 2016. QPRG provides clients with operational, regulatory, and technical consulting in the area of sterile processing. Its services include accreditation readiness audits, technical deep dives into the issues causing wet loads and staining, and 510(k) filing support for manufacturers. He has a Ph.D. in physical chemistry from NYU and an MBA from Rochester Institute of Technology. He is a New Yorker by birth but escaped in 1986 to a postdoctoral fellowship at the Max Planck Institute for Surface Physics, the Fritz Haber Institute, in West Berlin, Germany. He is currently happily living near his children in Philadelphia, PA.

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