


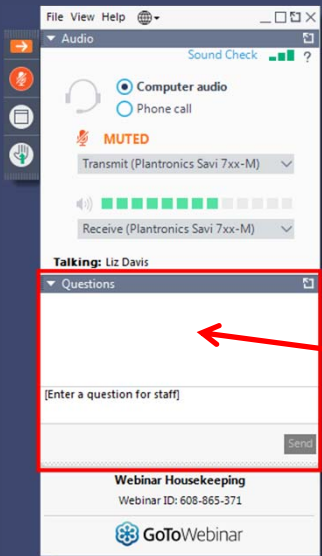
Optimizing biological treatment performance by monitoring carbon levels

Adit Jatkar – SUEZ - Product Applications Specialist
Darin Clum – CEO of Top Water LLC
February 11th 2020


ready for the resource revolution 


1

How to Participate Today



- **Audio Modes**
 - Listen using Mic & Speakers
 - Or, select “Use Telephone” and dial the conference (please remember long distance phone charges apply).
- **Submit your questions using the Questions pane.**
- A recording will be available for replay shortly after this webcast.

Webinar Housekeeping
Webinar ID: 608-865-371




2

Outline

- Industrial Wastewater
- Treatment Processes
- Total Organic Carbon
- What is Biological Treatment
- Types of Biomass
- Suspended Biomass: Conventional Treatment
- Fixed Biomass: MBBR, Fixed Film
- F:M and Nutrient Balancing
- Q&A Conversation with Darin Clum of Top Water

3

Wastewater

The diagram features a central dark blue square labeled 'Industries'. Surrounding it are five dark blue circles, each containing a wastewater source: 'Food and Beverage' at the top, 'Petrochemical' on the left, 'Chemical' on the right, 'Municipal' at the bottom left, and 'Pharmaceutical' at the bottom right. Arrows point from each of these circles towards the central 'Industries' box.

Why Treat Wastewater

- Discharge Permits
- Environmental Protection
- Water Scarcity and Reuse
- Fines and Penalties

41

4

Wastewater

Components of Wastewater

- Organics
- Nutrients
- Pathogens
- Metals

Primary
Treatment –
Physical
Separations

Secondary
Treatment

Tertiary
Treatment

51

5

Total Organic Carbon

Carbon monitoring

- Total amount of **carbon** in water.
- Includes all carbon-hydrogen containing compounds, which are amenable to oxidation.
- Comes from natural and synthetic sources.

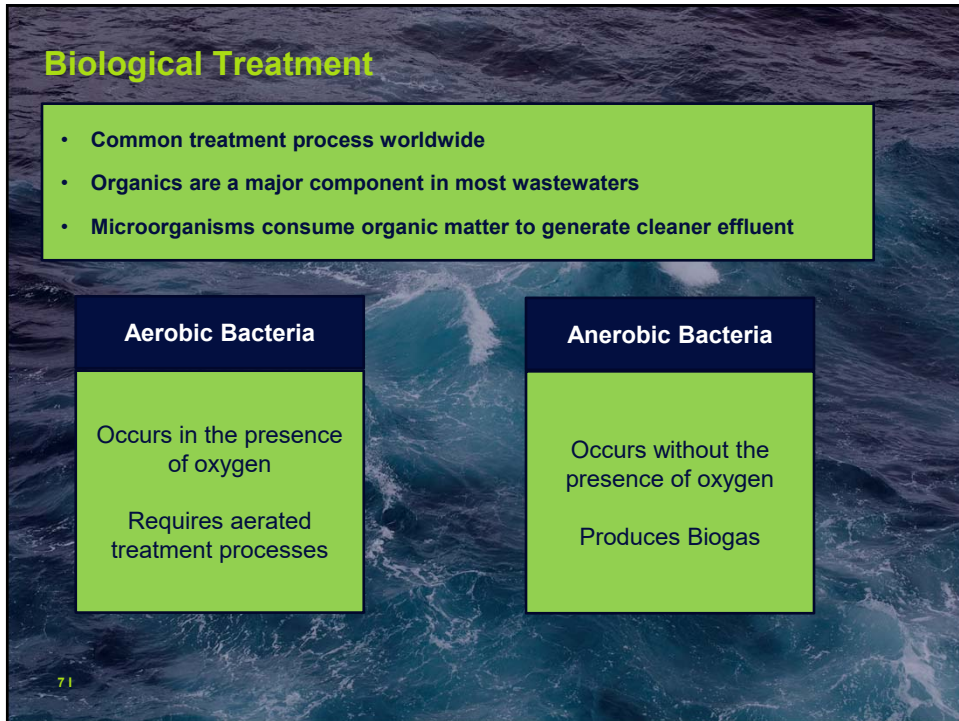
Where does TOC come from?

<ul style="list-style-type: none"> Natural Organic Matter Taste & Odor Compounds Reclaim & Waste Industrial Effluents Microbes & Bacteria 	<ul style="list-style-type: none"> Pharmaceutical & Personal Care Products Hydrocarbon, Oil, Gas, Chemical Processing Solvents, polluted condensate, resin leaching
--	--

Total Organic Carbon

TOC, as defined in EPA Method 415.3, "is the gross amount of organic matter found in natural water. Suspended particulate, colloidal, and dissolved organic matter are part of the TOC measurement."

6



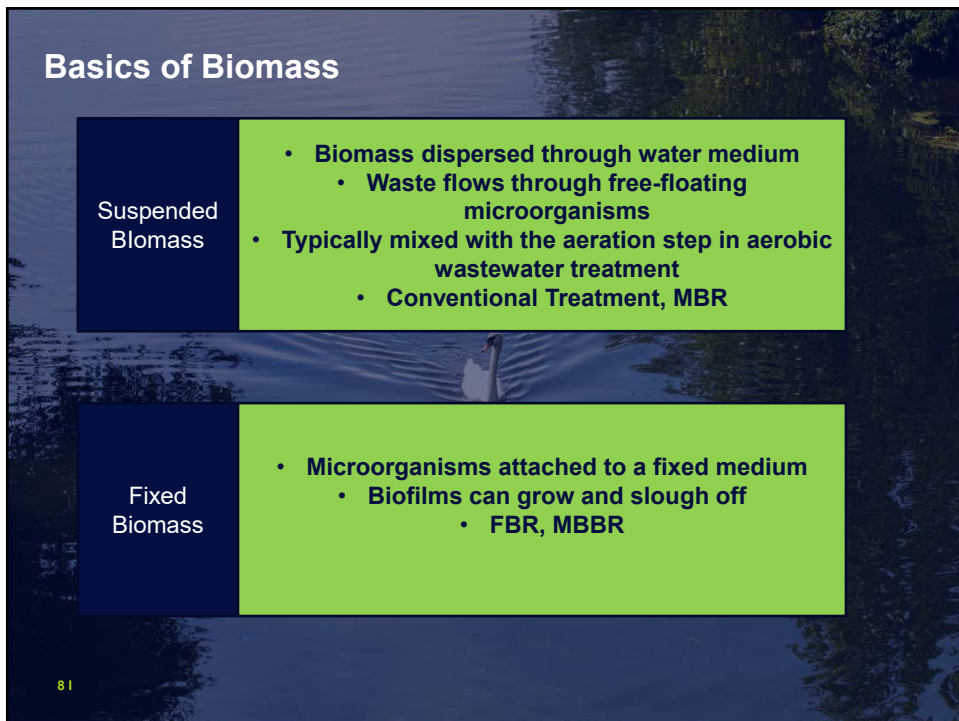
Biological Treatment

- Common treatment process worldwide
- Organics are a major component in most wastewaters
- Microorganisms consume organic matter to generate cleaner effluent

Aerobic Bacteria	Anerobic Bacteria
Occurs in the presence of oxygen	Occurs without the presence of oxygen
Requires aerated treatment processes	Produces Biogas

71

7



Basics of Biomass

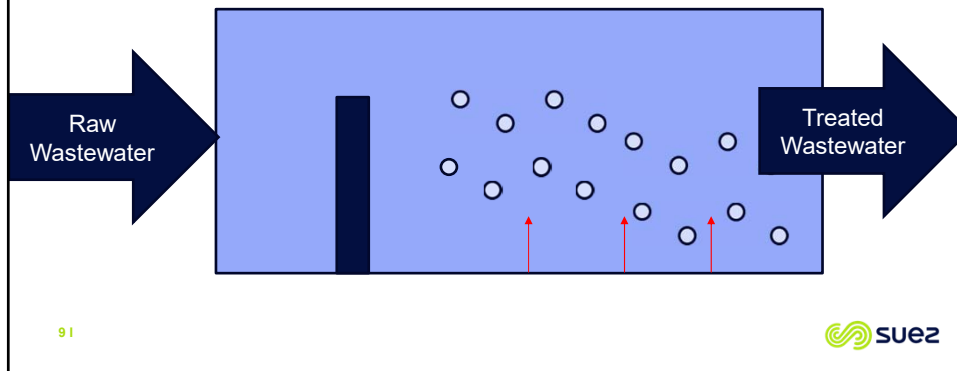
Suspended Biomass	<ul style="list-style-type: none">• Biomass dispersed through water medium<ul style="list-style-type: none">• Waste flows through free-floating microorganisms• Typically mixed with the aeration step in aerobic wastewater treatment<ul style="list-style-type: none">• Conventional Treatment, MBR
Fixed Biomass	<ul style="list-style-type: none">• Microorganisms attached to a fixed medium<ul style="list-style-type: none">• Biofilms can grow and slough off<ul style="list-style-type: none">• FBR, MBBR

81

8

Suspended Biomass - Conventional Biological Treatment

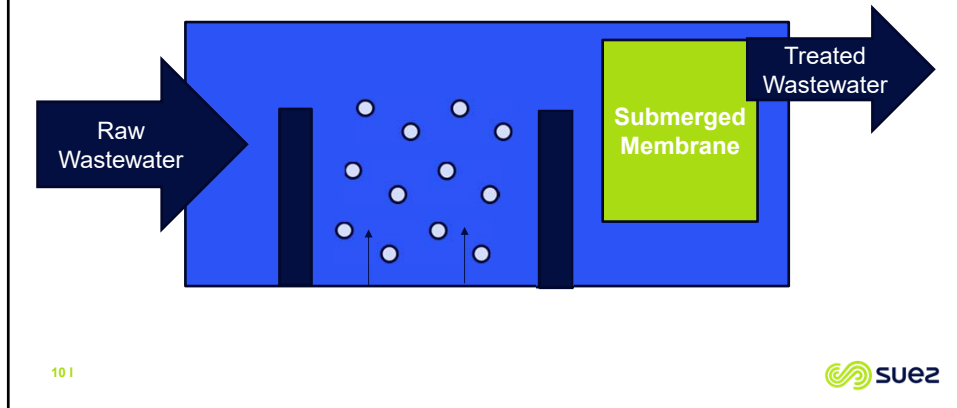
- Biomass freely suspended in tank – “Activated Sludge”
- Continuously aerated tank



9

Suspended Biomass - Membrane Bioreactors

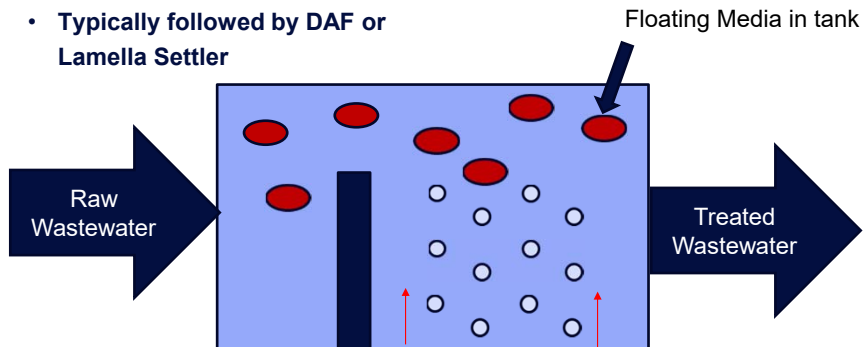
- Another suspended biomass
- Much higher concentration
- Smaller footprint
- Submerged membrane



10

Fixed Biomass – Moving Bed Bioreactors (MBBR)

- Biomass grown on media in tank
- Overall aerobic systems
- Can generate significant solids
- Typically followed by DAF or Lamella Settler



111



11

Food to Microorganism Ratio

- Maintaining biomass health is essential to effective wastewater treatment
- F:M ratio ensures proper quantity of food going to microorganisms
 - F = BOD₅
 - M = MLSS or MLVSS
- Too much food – microorganisms grow too fast
- Insufficient food – Bulking
- Tracking carbon throughout process is the most effective way to monitor effective treatment efficiency and make rapid real-time process adjustments

FOLLOW THE CARBON!

12

6

C

12.0107

CARBON

C

<u>Biochemical Oxygen Demand (BOD)</u>	<u>Chemical Oxygen Demand (COD)</u>	<u>Total Organic Carbon (TOC)</u>
<ul style="list-style-type: none"> ○ Amount of oxygen required for microbial degradation of contaminants in water ○ <u>Factors to Consider</u> ○ Time – 5 days at 20C ○ Precision – Wide range of +/-10-20% and limited reproducibility for treated waters ○ Interferences – samples containing microbial inhibitors like sanitizers, chlorine, salts 	<ul style="list-style-type: none"> ○ Amount of oxygen required for the chemical oxidation of contaminants in water ○ <u>Factors to Consider</u> ○ Time – 2-3 hours typically ○ Interferences – some organics are resistant to dichromate oxidation and chlorides, nitrite, ferrous iron, and sulfide may interfere ○ Hazardous chemicals – dichromate is toxic 	<ul style="list-style-type: none"> ○ Gross amount of organic matter found in water. Includes suspended particulate, colloidal, and dissolved organic matter ○ <u>Factors to Consider</u> ○ Time – < 10 minutes real time information for operational monitoring ○ Accuracy and Precision – typically within +/-5% over a large range (influent-effluent) ○ Interferences – robust TOC analysis can handle complex matrices with minimal interferences

13

Q&A with Darin Clum, CEO of Top Water LLC



Adit Jatkar is the Global Product Application Specialist for the Sievers™ product line by SUEZ. Adit is responsible for the development and deployment of organics monitoring solutions for industrial and environmental markets.



Darin Clum is the CEO of Top Water LLC. Darin has over 20 years' experience holding multiple key roles from Regional Sales Director, Project Engineer, and Business Development Leader. He is focused on makeup water, process water and wastewater projects.



14

Tell us your process challenges!

Visit: <https://www.suezwatertechnologies.com/lp-ai-follow-the-carbon>

And receive a free t-shirt!



15

Questions?

adit.jatkar@suez.com



16