

Small and medium desalination unit for remote area

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Presentation Contents

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- **The small plants consumers**
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Water Sources on the Globe

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- **71% of the Globe is covered with Oceans**
- **29% remaining of the Globe is Land**
- **Hereunder is the main sources of water:**

Sources	Percent
Oceans	97.24%
Glaciers	2.14%
Underground Water	0.61%
Lakes	0.009%
Humidity	0.005%
Atmosphere	0.001%
Rivers	0.0001%



The need for desalination

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Who needs small – medium desalination units?

- **Hotels & Resorts**
- **Coastal Villages**
- **Seaside Villas**
- **Island-Based Businesses**
- **Fish Processing Plants**
- **Seaside Work Sites**
- **Military Camps**
- **Islands**

Problems in producing water in isolated areas

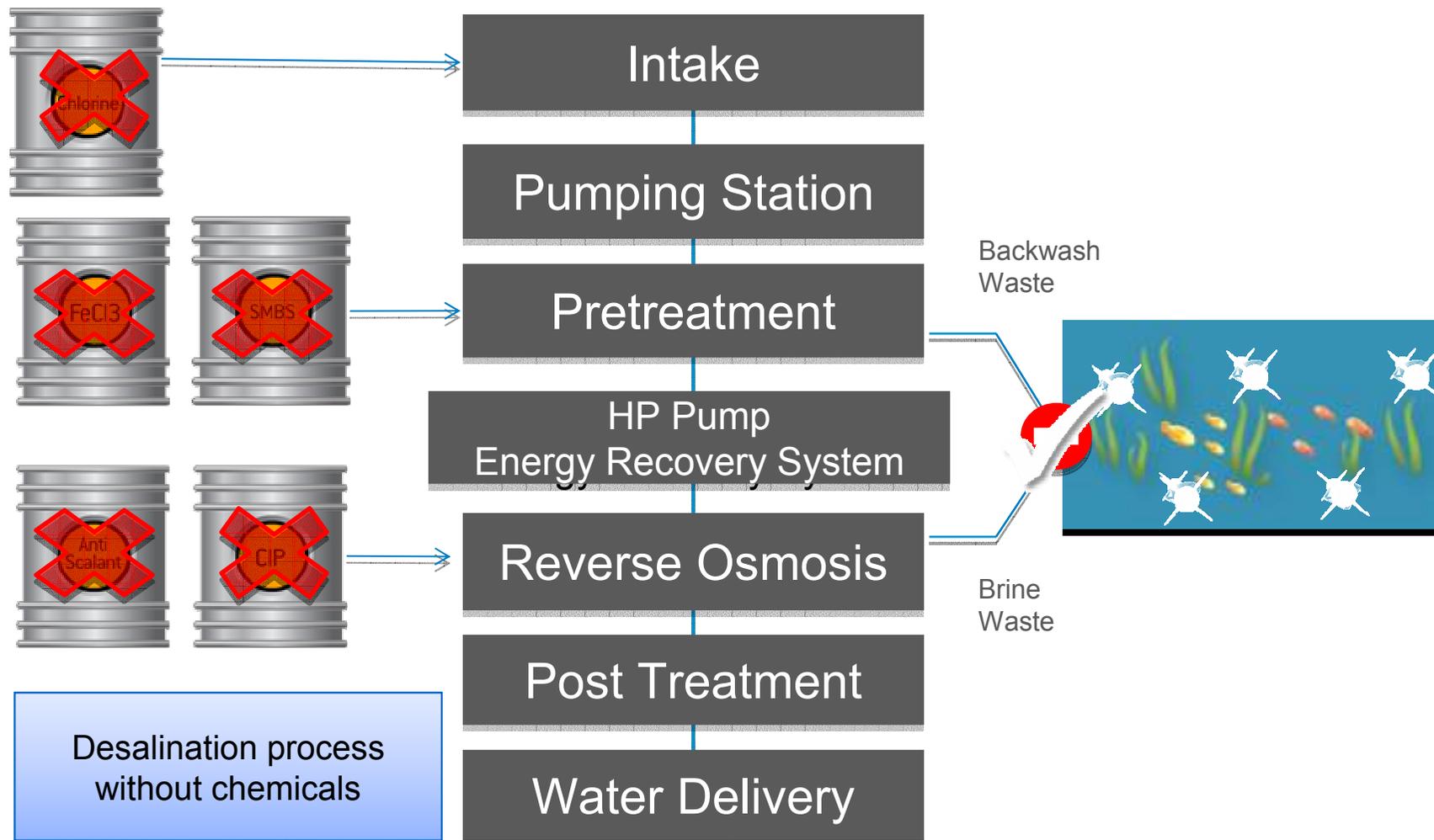
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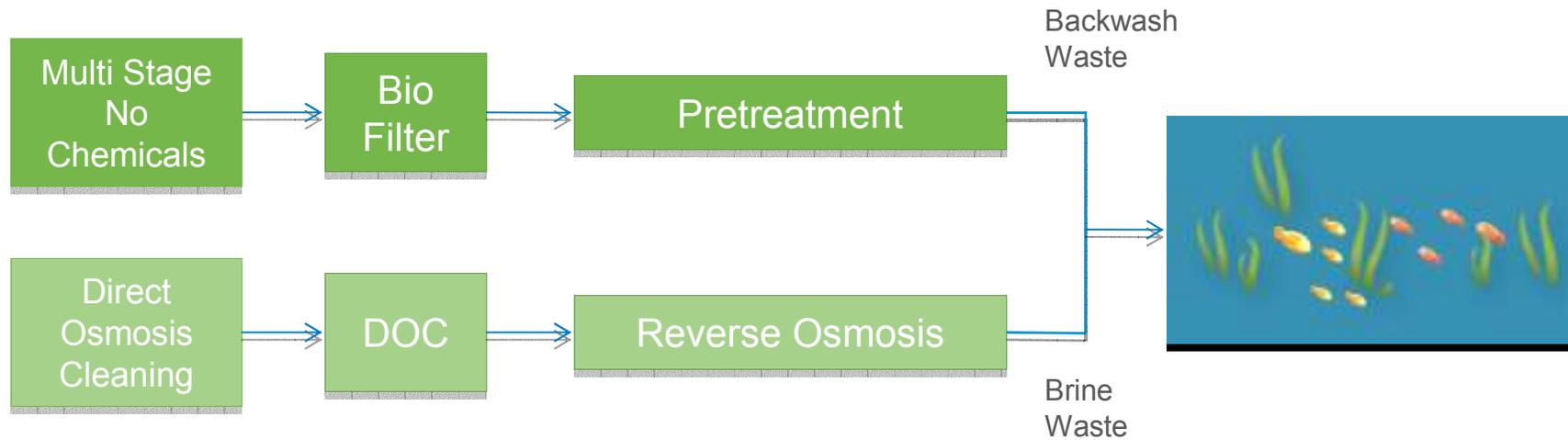
- **Distance from the sea**
- **Raw water quality**
- **Availability of Energy**
 - **Electricity**
 - **Sun**
 - **Wind**
 - **Geothermal**
 - **Waste Heat**
 - **Cost of energy**
- **Availability of chemicals**
- **Distance from consumer**

The Desalination Process

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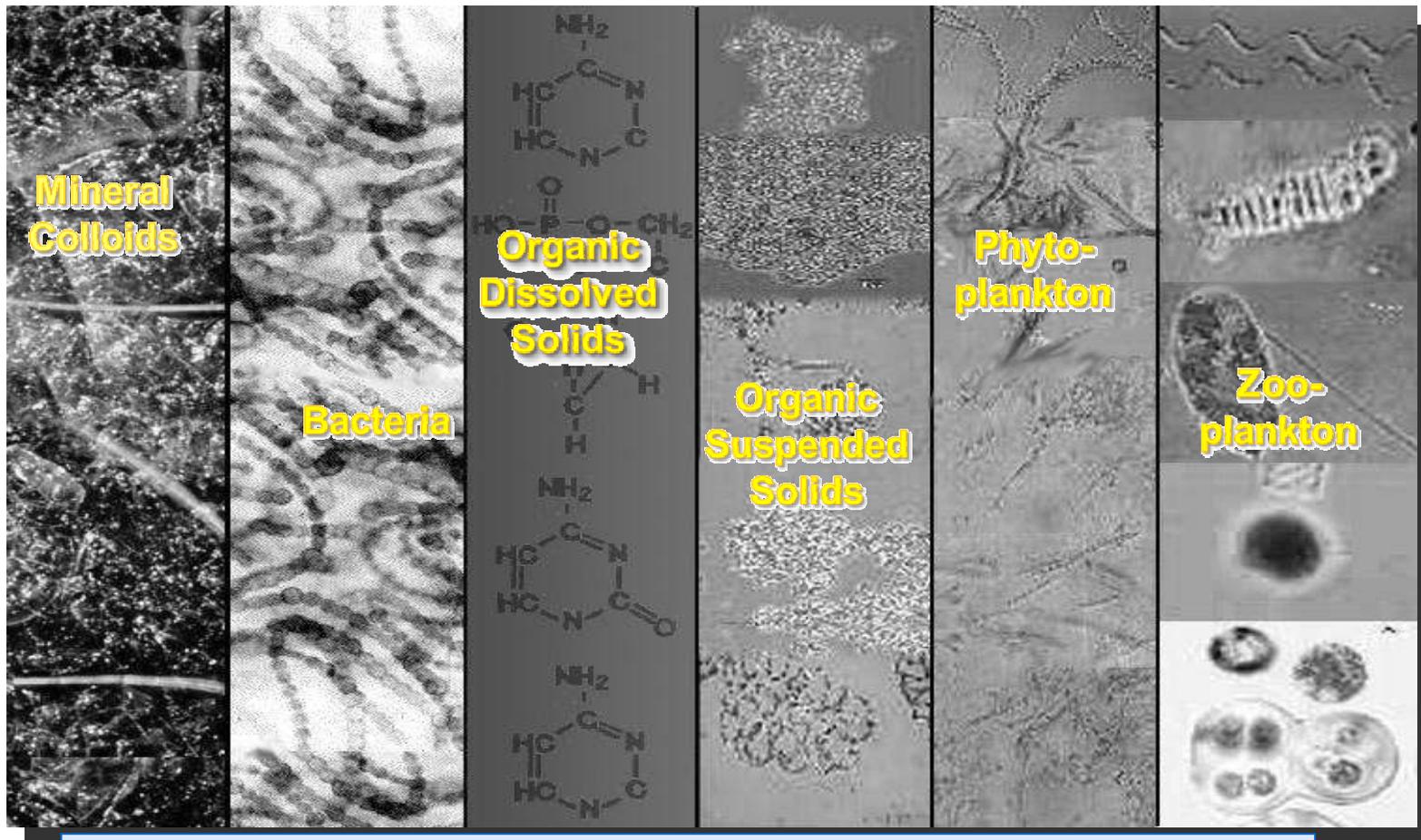


Pretreatment



Seawater Composition

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To treat seawater without using chemicals, it is important to understand the water composition

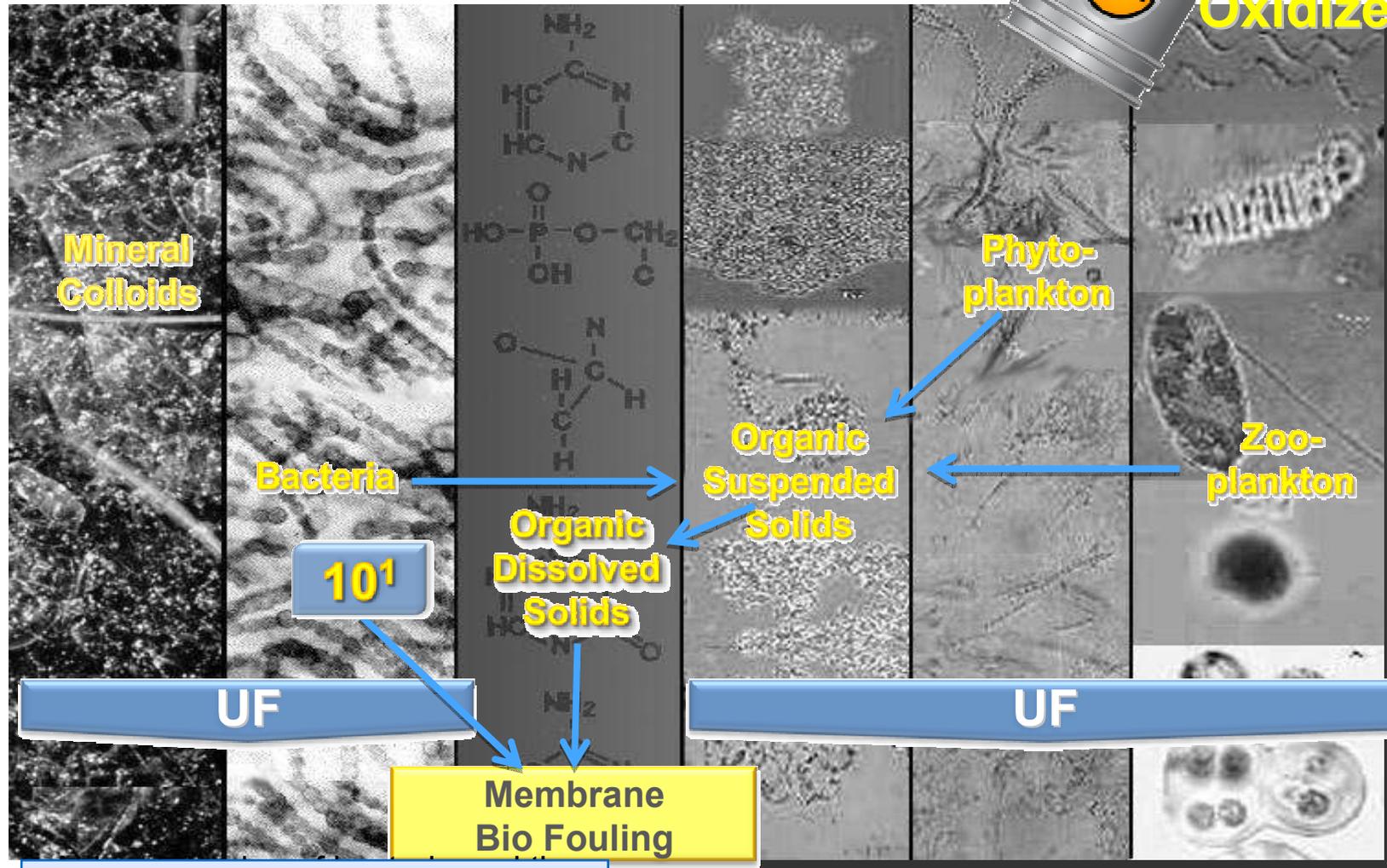
Change in Seawater Composition

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If

Oxidized



Ultrafiltration also requires large quantities of chemicals to maintain a workable state

Green Treatment Technology Used to Transform Seawater Composition

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**Not
Oxidized**

Mineral Colloids

Bacteria
 10^7

Organic Dissolved Solids

Organic Suspended Solids

Phyto-plankton

Zoo-plankton

Contact Media Coagulation

Media Filtration

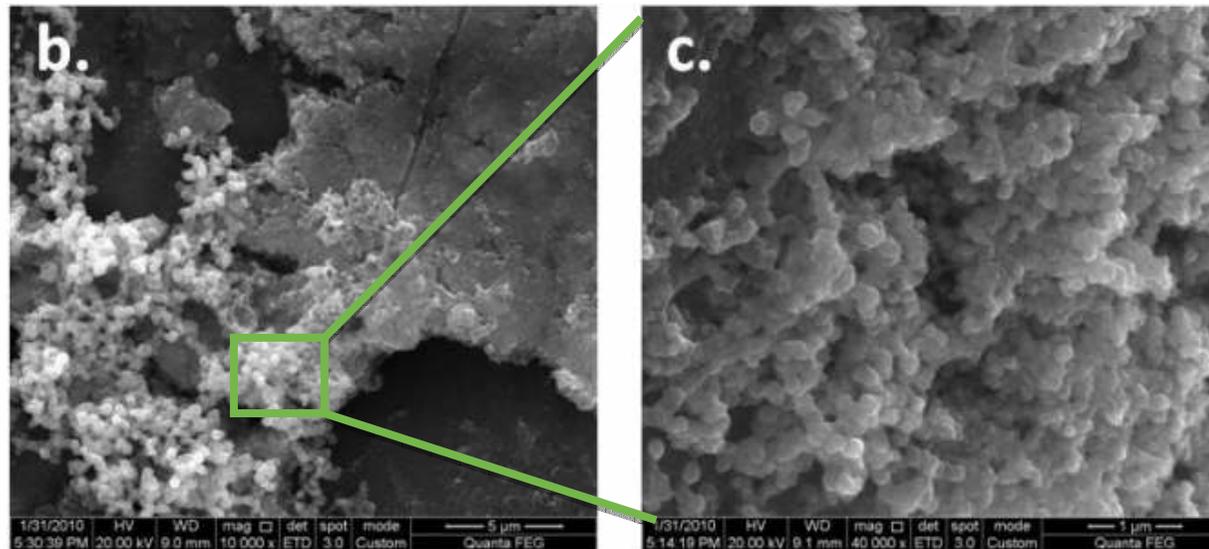
Instead, two processes are used:
1. Contact Media Coagulation
2. Media Filtration

Contact Coagulation

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- Contact coagulation uses porous media to develop a natural type bacteria that normally lives in the sea
- To attract particles from stable colloids, bacteria produces and covers itself in enzymes that act as a glue
- For this reason, coagulants are not needed to destabilize the colloids
- Contact coagulation is successful if technology is utilized to keep the media continuously clean.

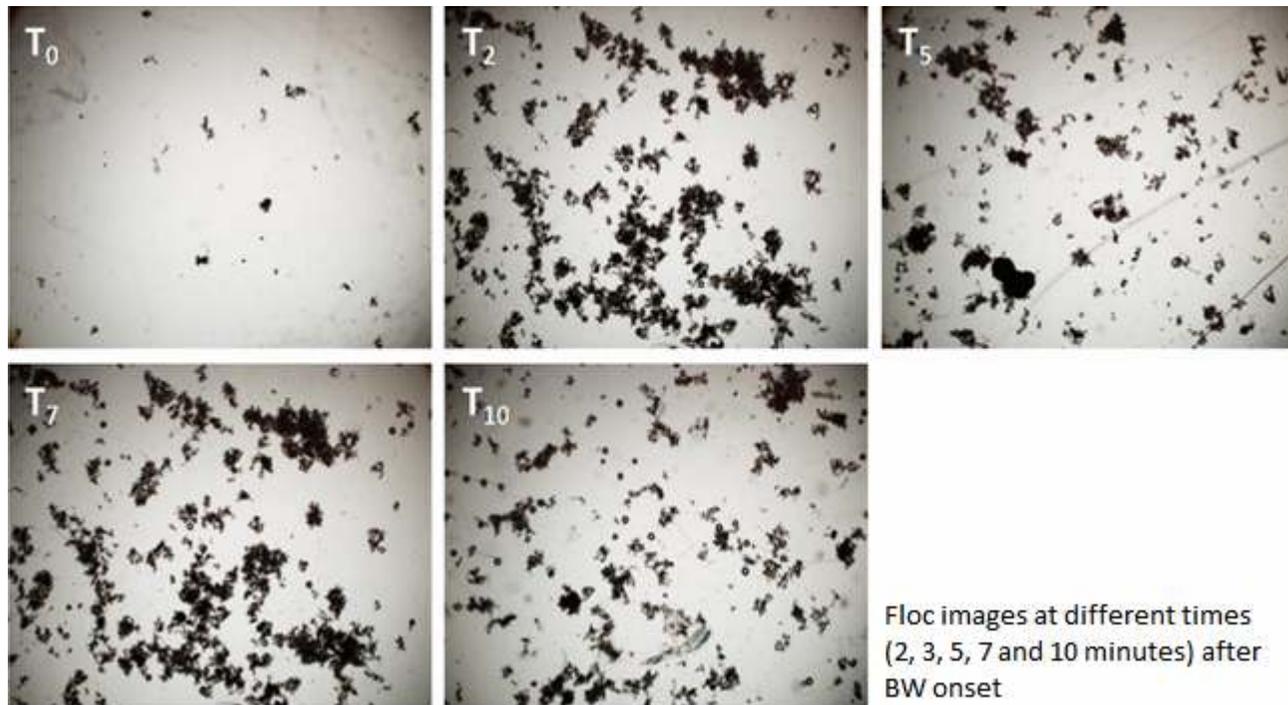


Flocs Moving from Contact Coagulator to Media Filter

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- Suspended solids move as flocs between the flocculator and filter
- The difference between these flocs and regular flocs is that instead of ferric hydroxide, suspended solid flocs are made from bacteria enzymes and coagulated suspended solids



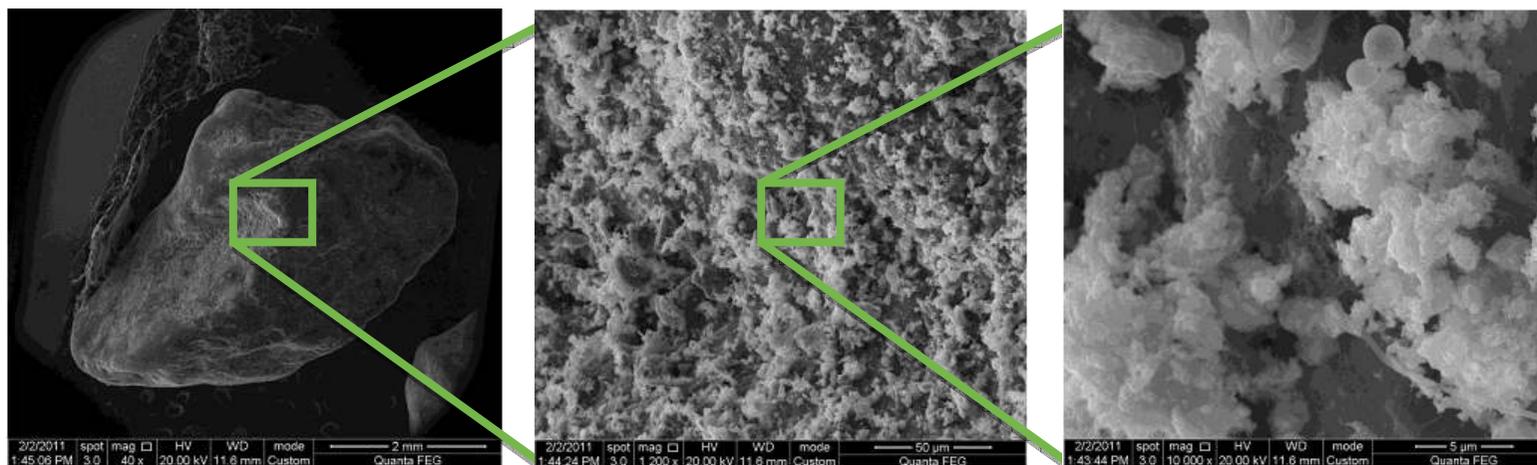
Floc images at different times (2, 3, 5, 7 and 10 minutes) after BW onset

Media Filtration

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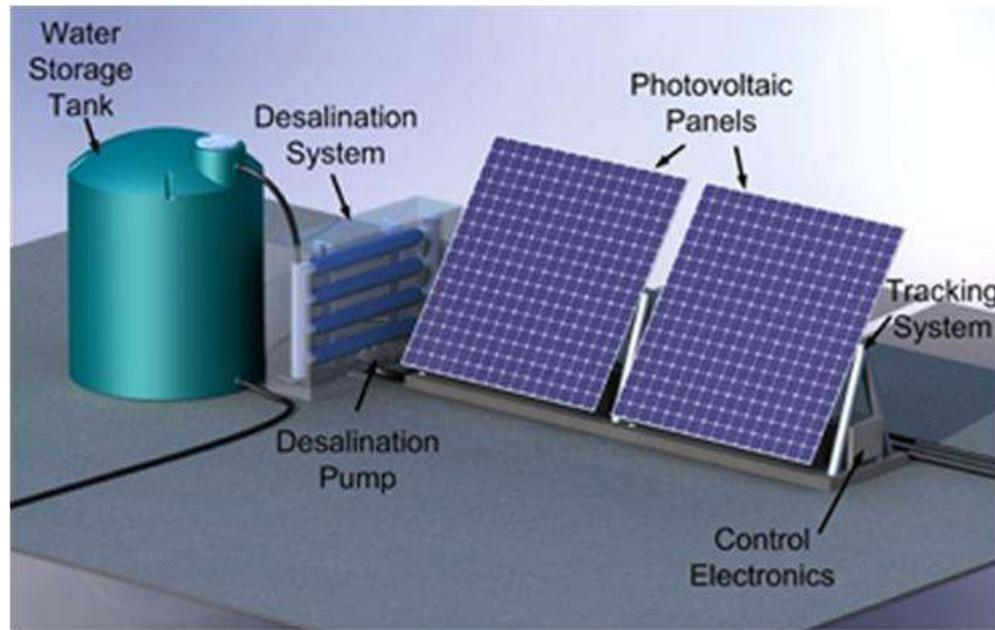
- The media filtration takes place at a higher velocity (at ~10-15 m/hr)
- A different but also natural seawater bacteria settles on the filtration media
- The bacteria is able to continuously consume dissolved organic material from the water
- The bacteria causes the water to reach a state of starvation, lacking oxygen
- The lack of oxygen is key to keeping corrosion at a low level
- The filter backwash water can be discharged directly to the sea without treatment as the filter does not use any chemicals



Photos

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Thank you for your attention!