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Sustainable Water Integrated Management (SWIM) - Support Mechanism

SUB-REGIONAL WORKSHOP 9-12 July 2012 Israel

Waste Water Reuse

Description of the state-of-the-art of wastewater treatment for reuse

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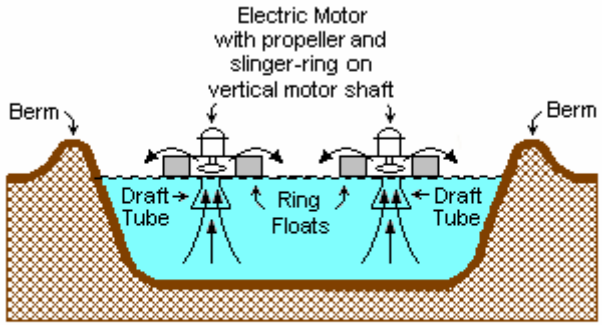
Existing Solutions for Wastewater Treatment

- Range from very basic pretreatment to very advanced tertiary treatment
- Low-tech, low-energy to energy intensive high-tech solutions
- Wide range of land requirements
- Wide range of residuals production (sludge, etc)

Extensive Solutions

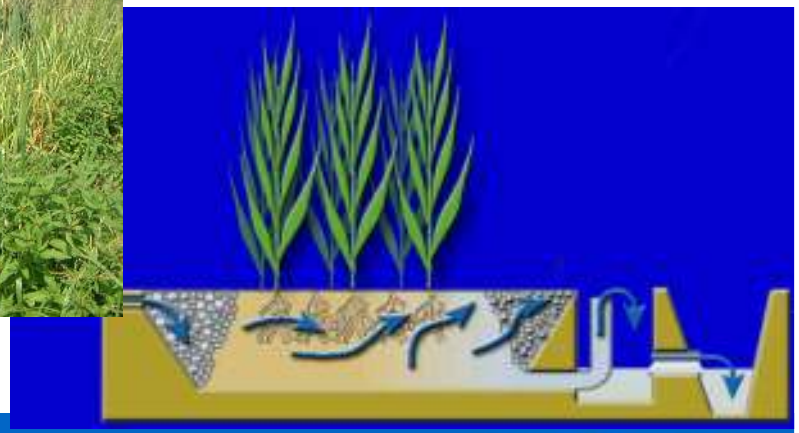
- lagoons



A TYPICAL SURFACE – AERATED BASIN

Note: The ring floats are tethered to posts on the berms.

- wetland

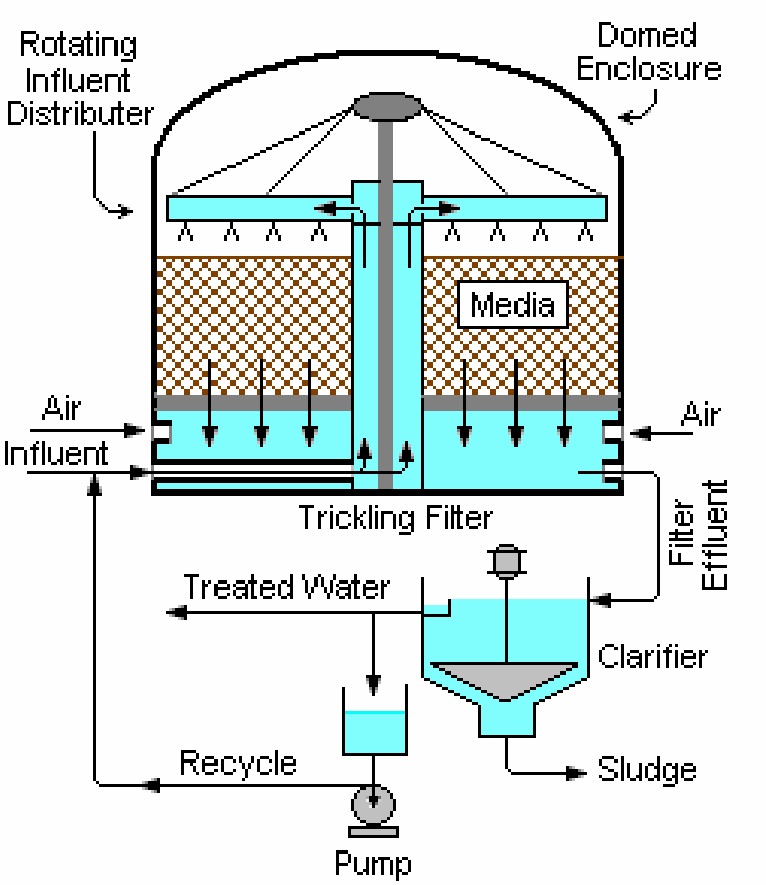


Semi-Intensive (fixed bed) Solutions

- trickling filter

- RBC

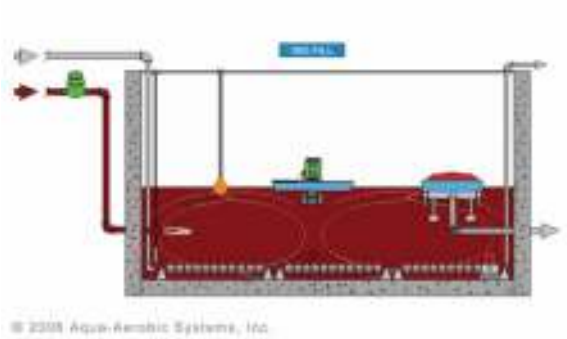
- biofilters
- etc. (sand filters,…)



Intensive Solutions

- Classical activated sludge

- SBR

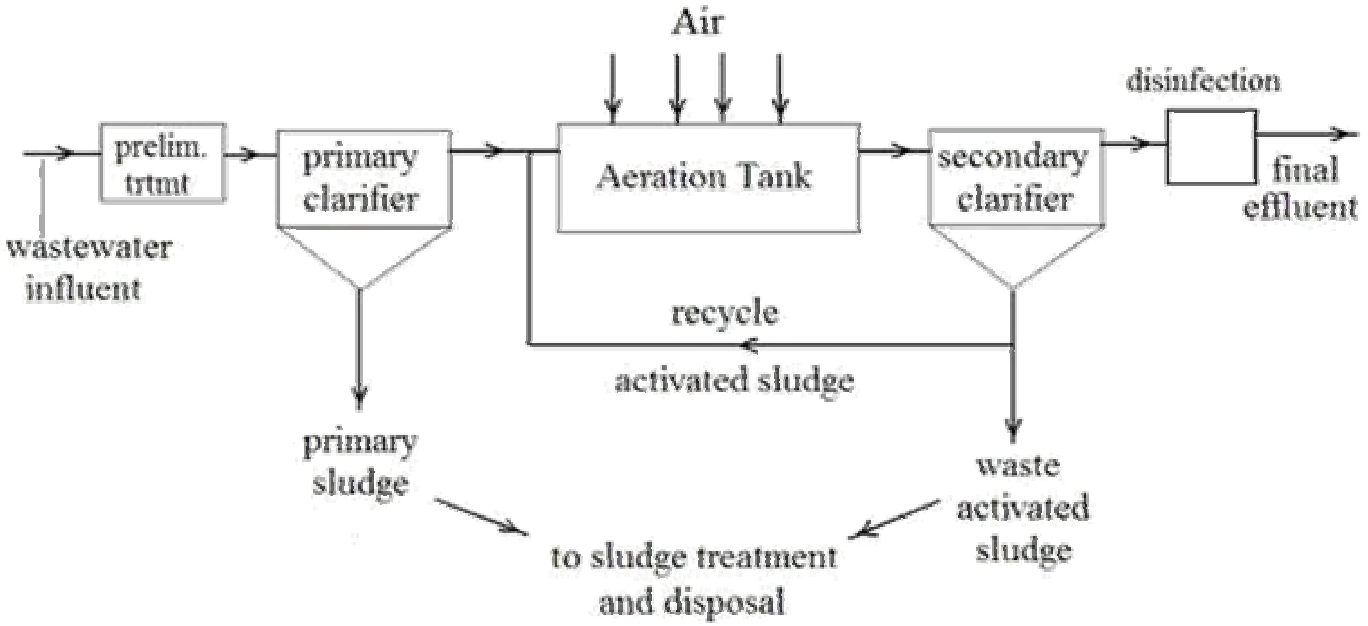


- MBR

Good engineering practice required at all types of technologies!

http://www.youtube.com/watch?feature=endscreen&NR=1&v=dRZIlUYcNKk

Typical CAS process scheme



Activated Sludge Wastewater Treatment Flow Diagram

Example CAS Soreq WWTP Jerusalem

Conventional Activated Sludge Inherent Disadvantages

- Large area/volume needed
- Multi-stage/complex operation
- Prone to process upsets
- Expensive to install and operate
- High sludge production
- Low effectiveness on complex organics
- “Old fashion”

Modern requirements for reuse

- Effluent quality:
  - Nutrient removal (N,P)
  - Reduced solids / better turbidity
  - Disinfection
- Sustainability and financial related:
  - Reduce CAPEX and OPEX
  - Minimize land
  - Limit environmental impact

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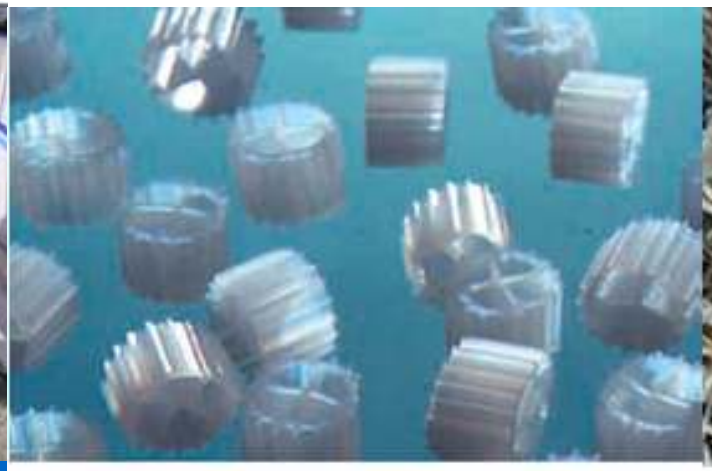
How many modern technologies on the wagon?

“In the process” nutrient removal (BNR)

- Nitrification – denitrification
- Biological phosphorus removal

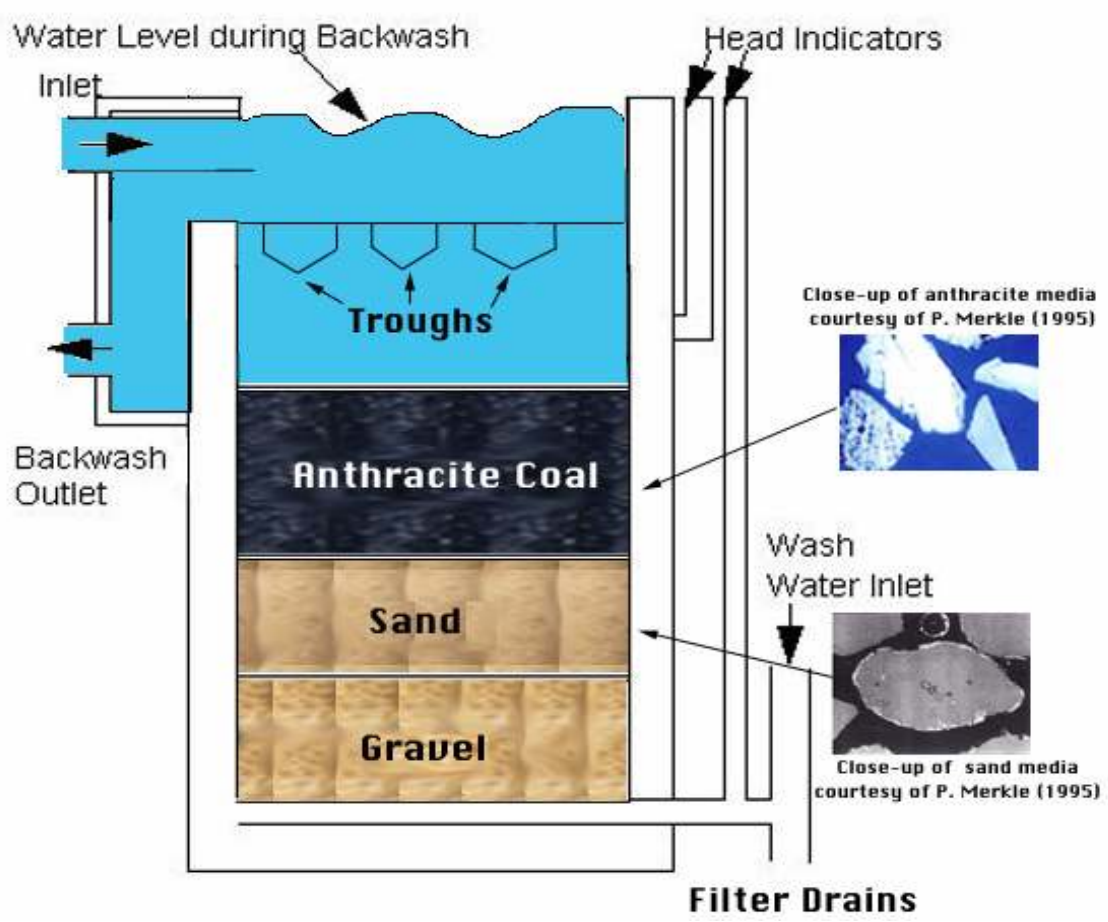
MBBR - Moving bed biological reactor

- Combined suspended and fixed film sludge
- Durability of biomass
- Reduction of reactors volume and foot print
- Operational flexibility
- Simultaneous BOD and BNR removal on the film

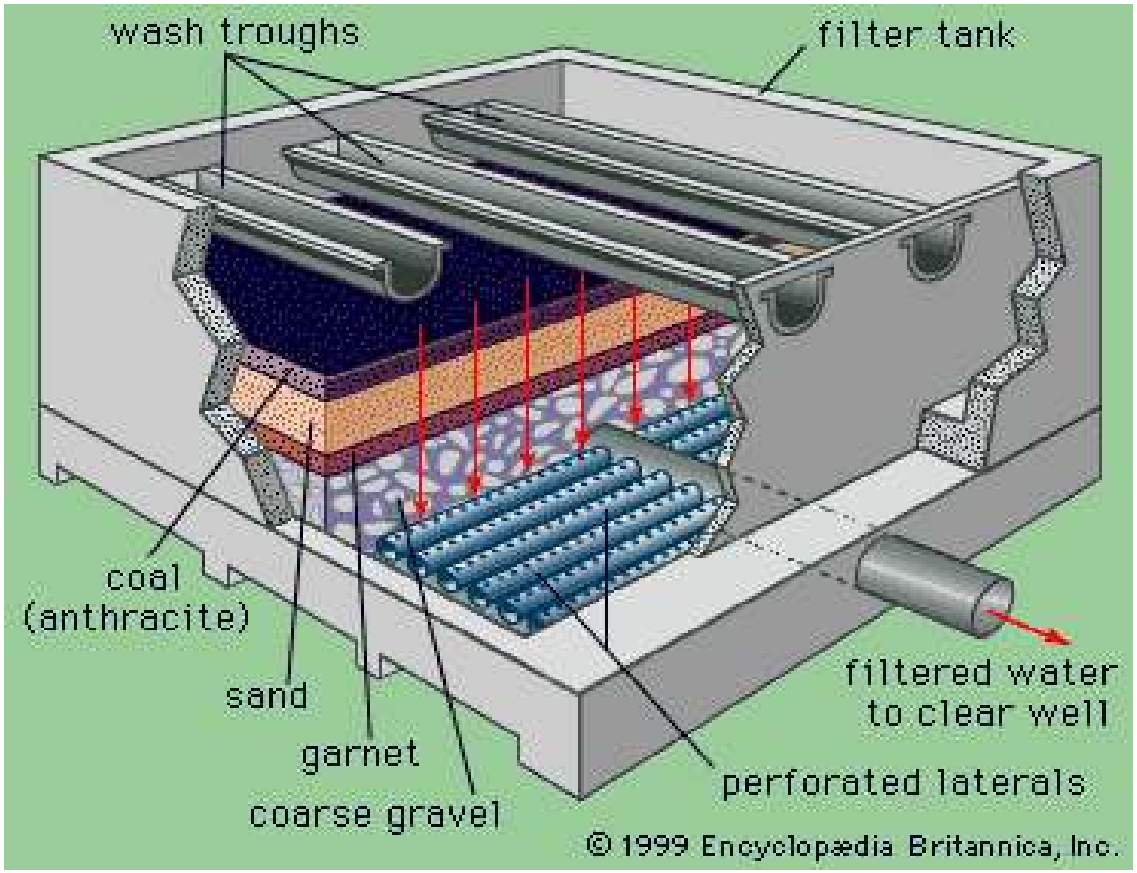


Sand filtration

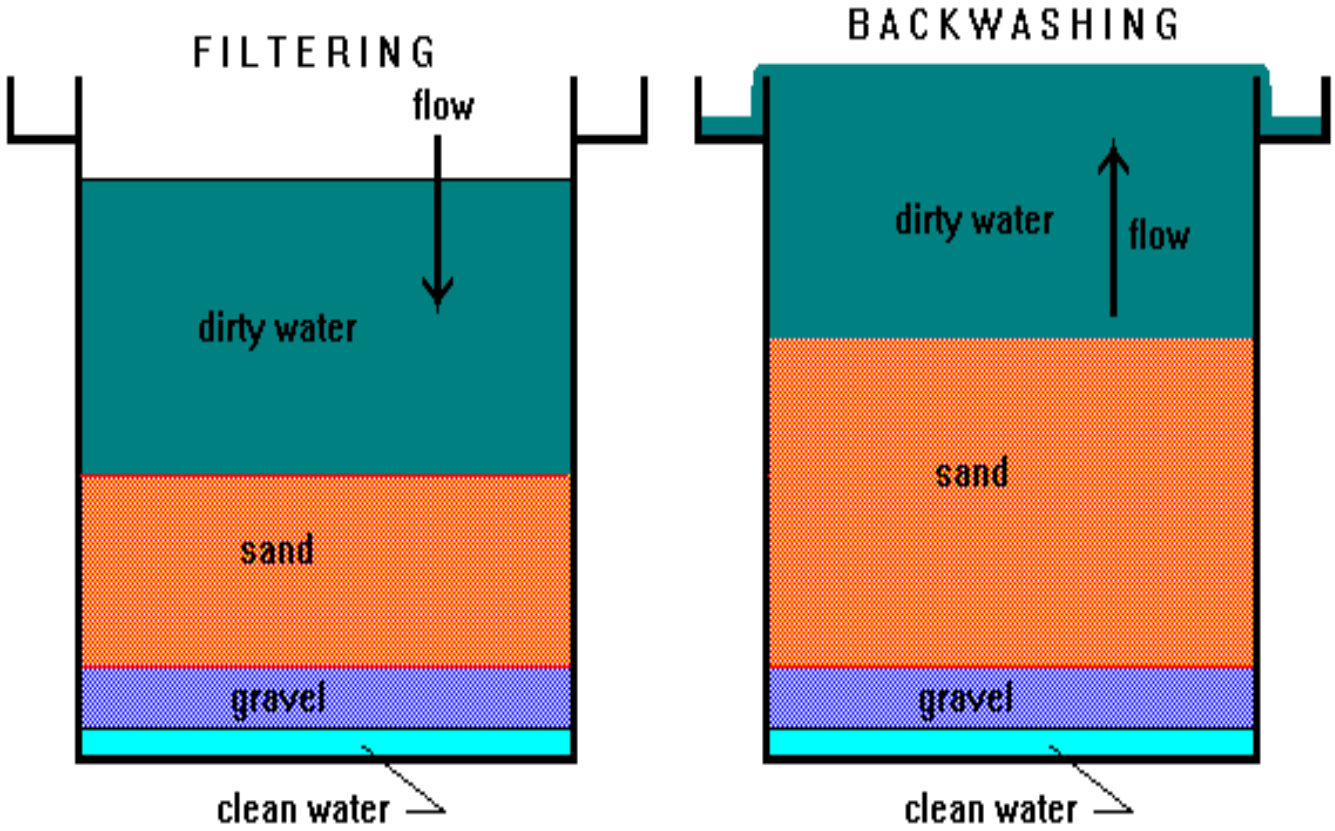
- Typical filter scheme
- Filtration cycle
- Quick/slow flow
- Gravity/pressurized
- Backwash and residue
- Redundancy



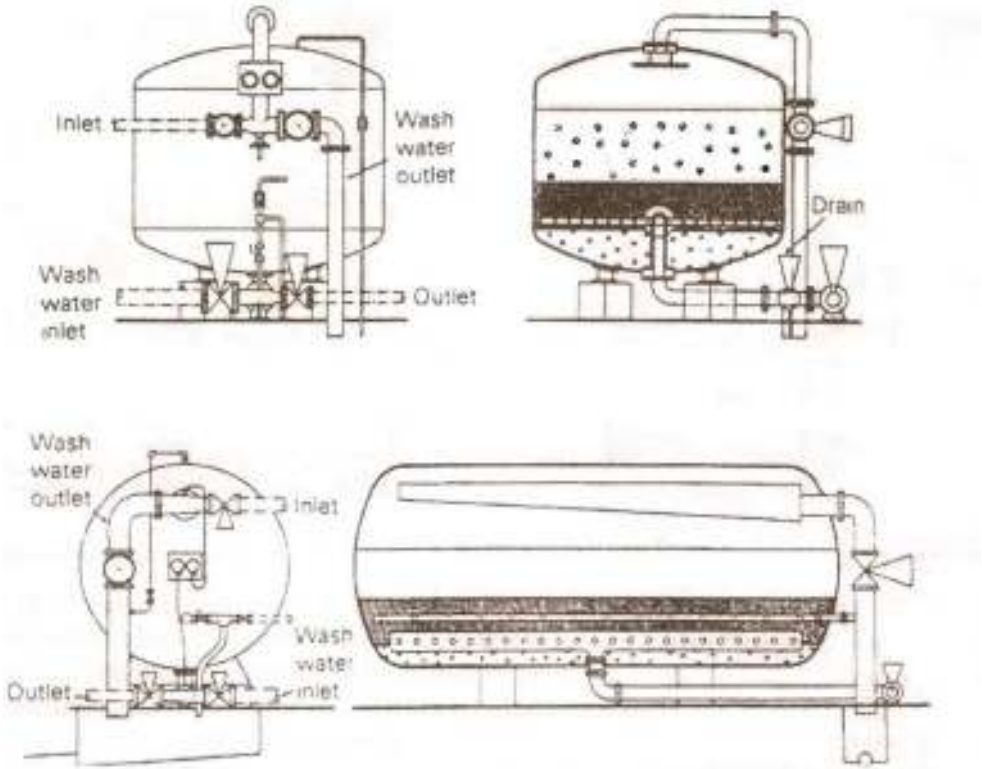
Gravity sand filter



Filter cycle

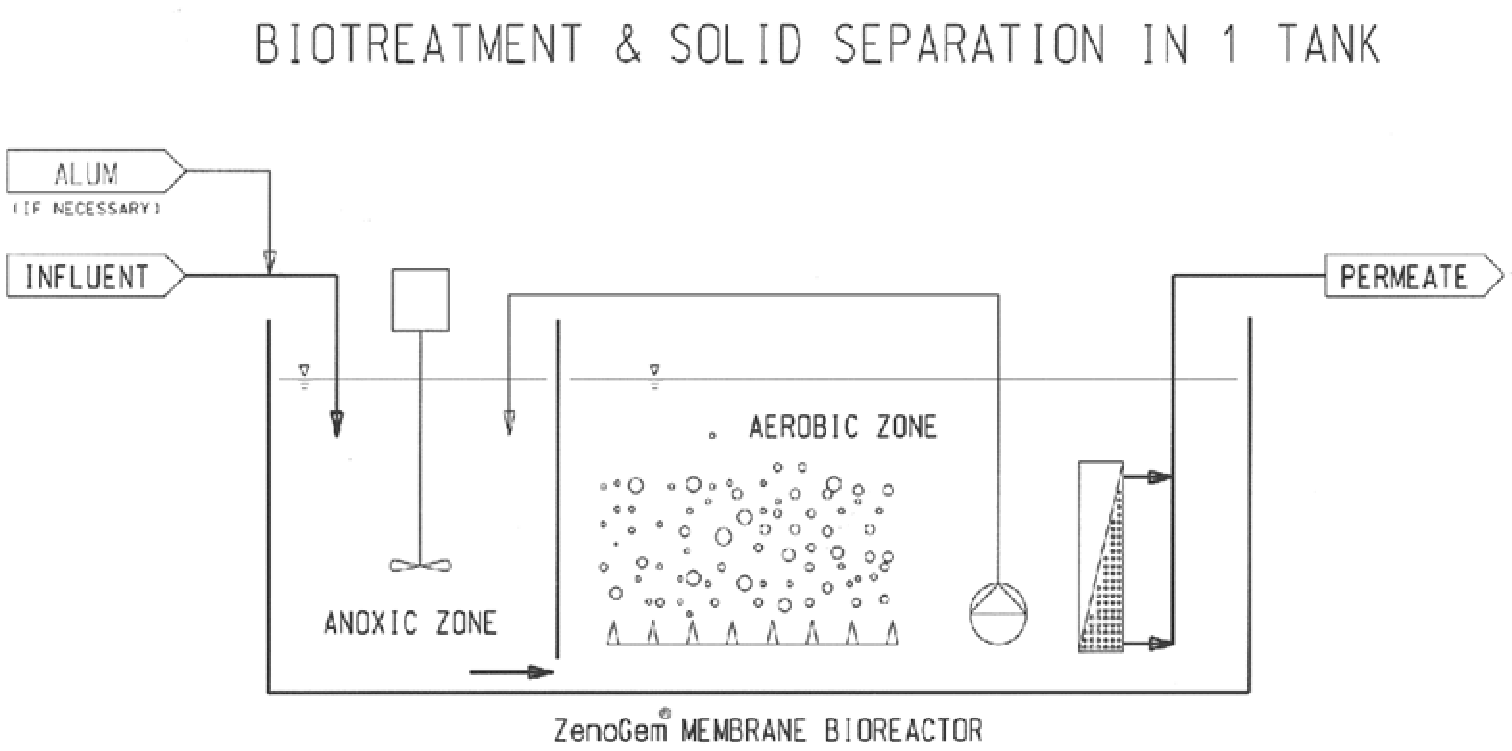


Pressure sand filter



Pressure filters. Top: Vertical pressure filter, Bottom: Horizontal pressure filter

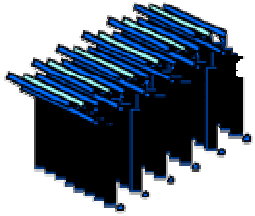
Membrane bioreactor (MBR)



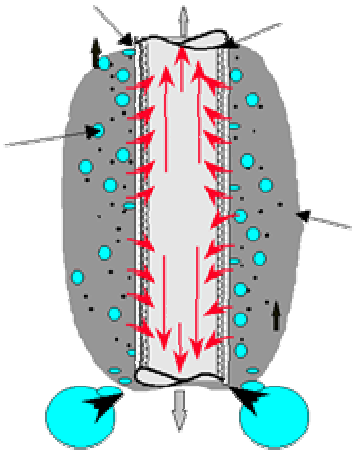
MBR Process Advantages

- Improved effluent quality (because of the absolute nature of the membrane)
- Less vulnerable to upsets Improved biological degradation of retained organics
- Reduced sludge production
- Capital and operating costs comparable to other biological treatment processes
- Compact in size

1 Cartridge
8 ZeeWeed Modules



20' ZenoFrame Rack
6 cartridges
48 modules



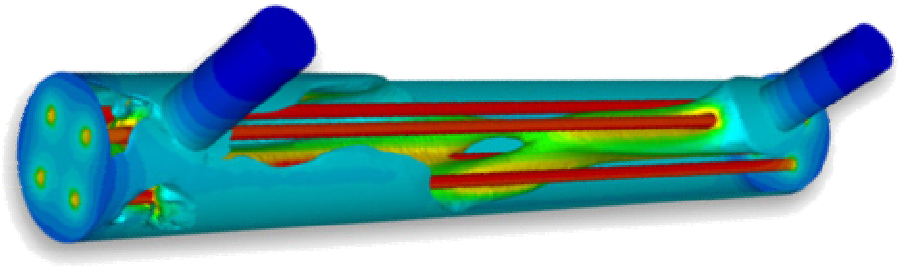
Pore Size
0.035 micron (nominal)
0.1 micron (absolute

Chemical disinfection

- Most common method for effluent disinfection
- Chemicals – mainly chlorine (chlorine gas or hypochlorite), ozone
- Residual disinfection
- Contact chamber for reaction

UV radiation disinfection

- Newer technology applied since 1980's
- Inactivation of pathogen DNA (bacteria & virus)
- 254 nm wave length, radiation dose
- UV transmission parameter (required >70%)
- Application open channel / closed reactor
- Lamp cleaning



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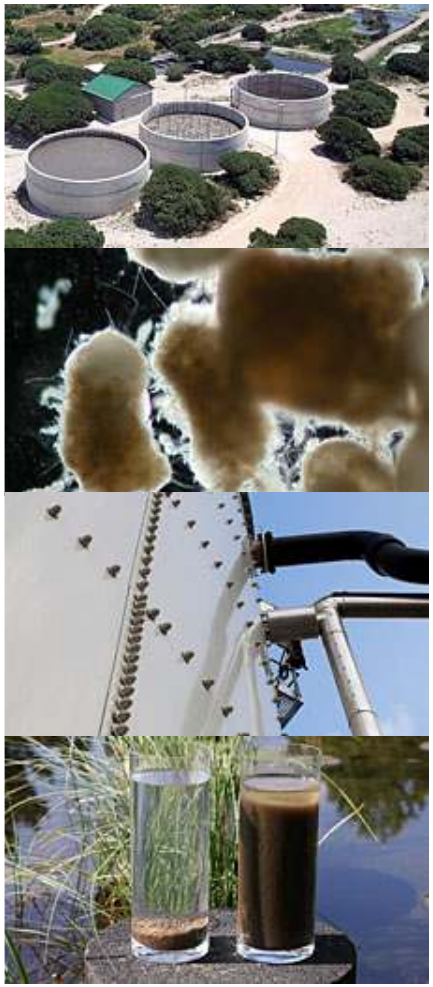
DHV



DHV's breakthrough technology for wastewater treatment using natural granular biomass

- improved sustainability and cost-effectiveness
- small footprint and low energy use
- applied for municipal and industrial wastewater

Thank you.

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