Combinación de tecnologías de filtrado para reducción de costos operativos y/o mejorar el producto

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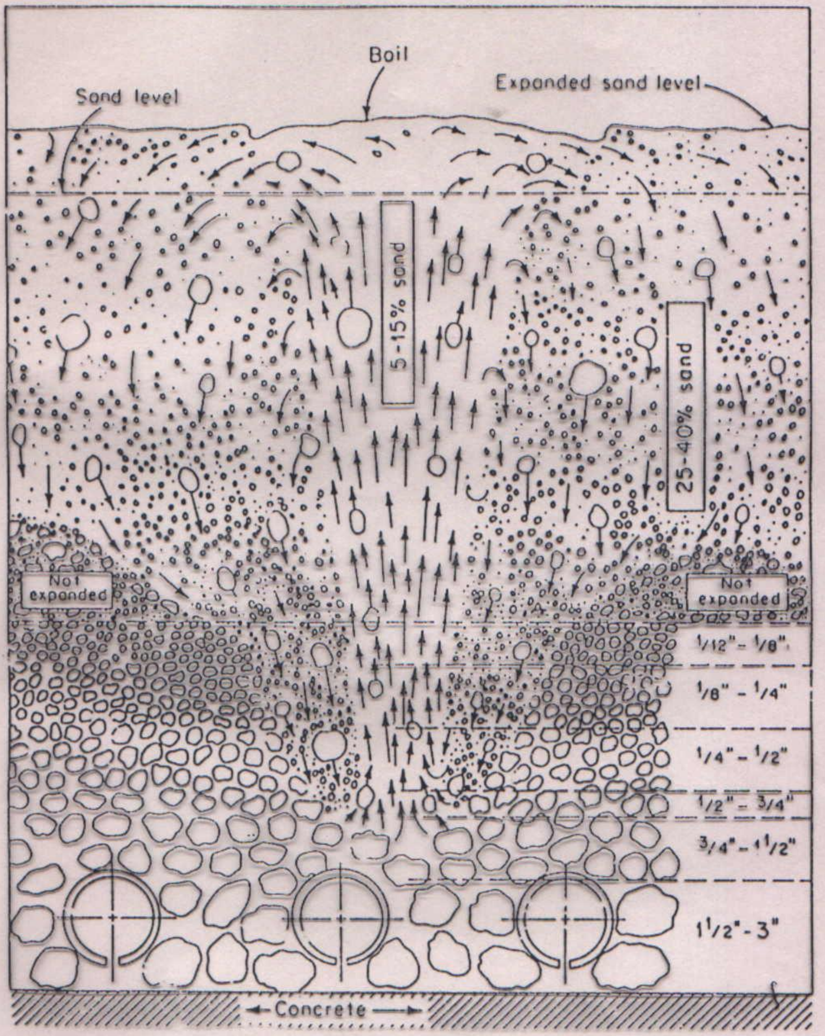


Fig. 14 Diagram of sand boil in filter bed.

- Desplazamiento de la media filtrante por falta de uniformidad de la circualción del agua durante el retrolavado

Consecuencias de la ruptura de la homogeneidad en el medio filtrante a causa de retrolavados defectuosos. Formación de regiones saturadas lo que obliga al agua a circular a mayor velocidad creando laberintos.

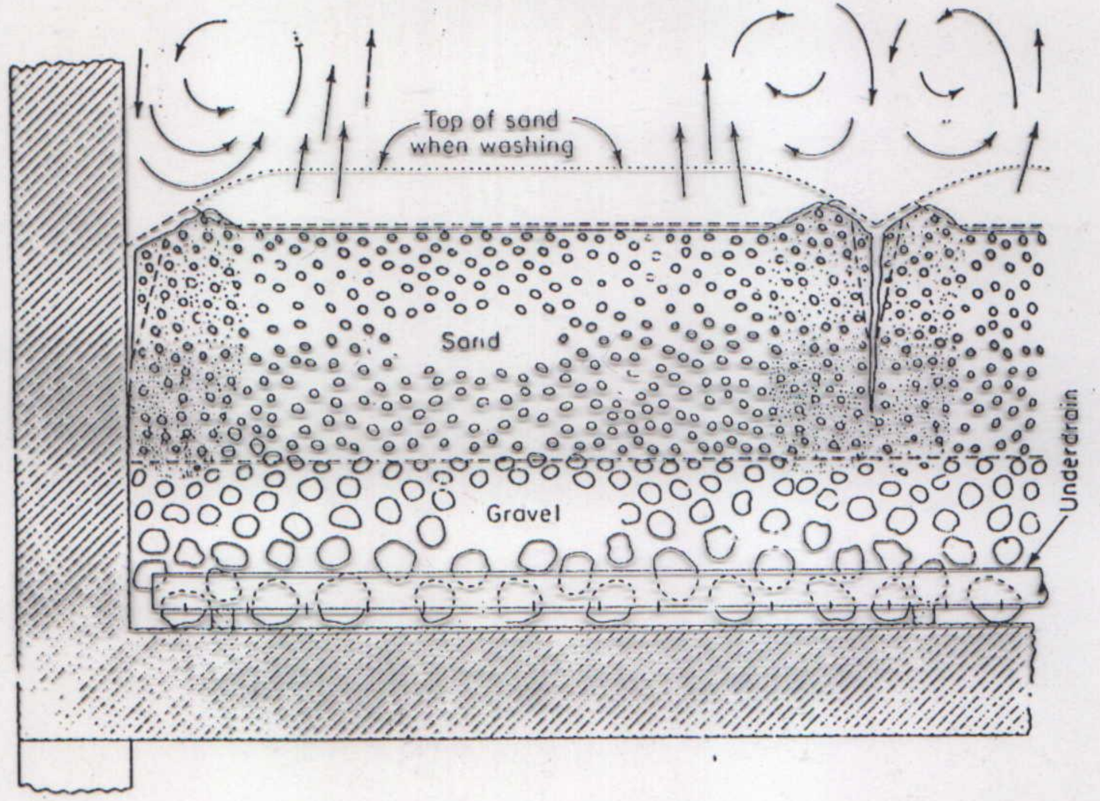


Fig. 25 Clogged areas in a filter bed.

La formación de “trufas” (mezcla de solidos, quimicos y media filtrante) que generan laberintos em el medio filtrante

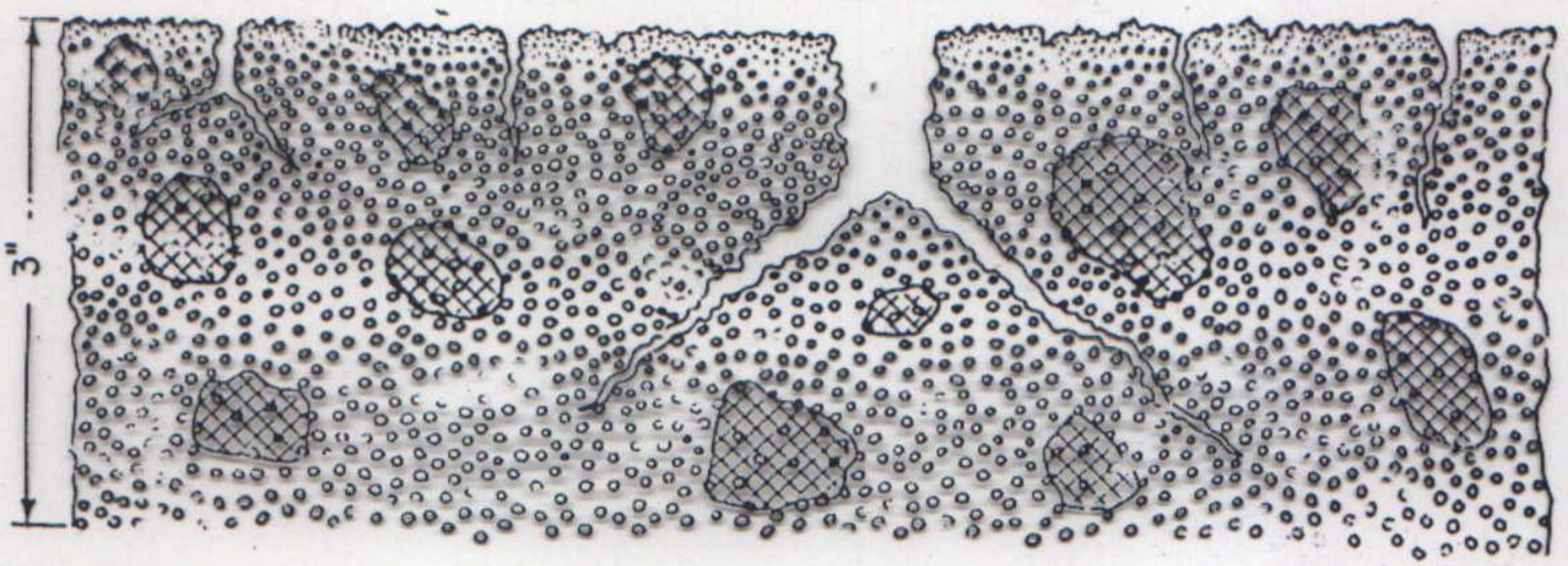


Fig. 24 Sketch showing typical surface cracks in top 3 in. of filter beds.

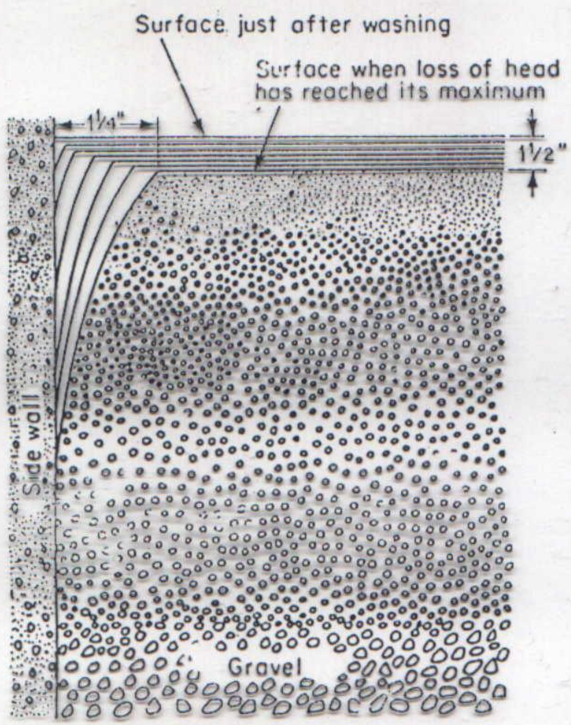
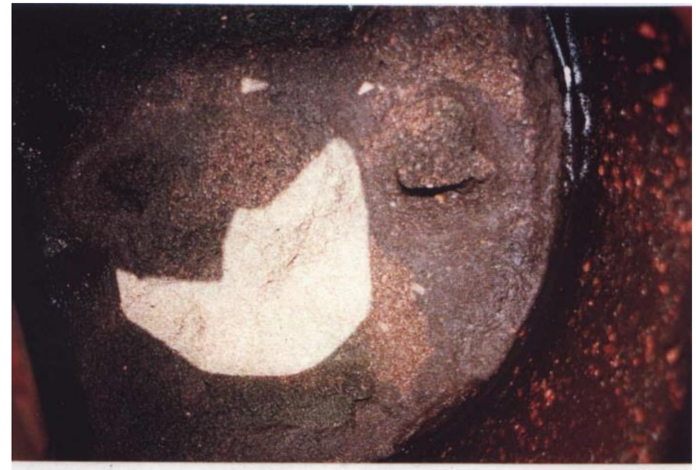


Fig. 23 Cracks along sidewalls of filters.

- La saturación repentina del filtro de grava, produce el llamado “efecto colchón” (al estar saturada la media es presionada y se separa de las paredes del filtro permitiendo el pasaje de agua sin filtrar



Nuestro mayor desafío

"desarrollar tecnologías avanzadas de filtrado que sean compatibles con las necesidades del mercado y los valores y principios de AMIAD"

Nuestro mayor desafio en America Latina

Convencer en abandonar el preconcepto de la industria del tratamiento del agua de que los filtros mecanicos son solamente buenos para situaciones de proteccion y hacer que sean considerados como parte misma del proceso de tratamiento de agua

Los nuevos fundamentos en la concepcion de sistemas de filtrado em el siglo XXI

ROI = Return on Investment (Retorno de la inversion)

el costo de capital por m3 de agua a filtrar

ROE = Return on Environment (Retorno al Medio Ambiente)

el costo directo y ambiental en producir la misma agua a lo largo de toda la vida util del equipo

Nuestra vision – nuestra tecnologia

- Menor costo energetico
- Menor consumo de agua
- Reduccion del uso de productos quimicos
- Menor necesidad de mano de obra
- Reduccion de consumibles
- Menor espacio físico: peso/tamaño

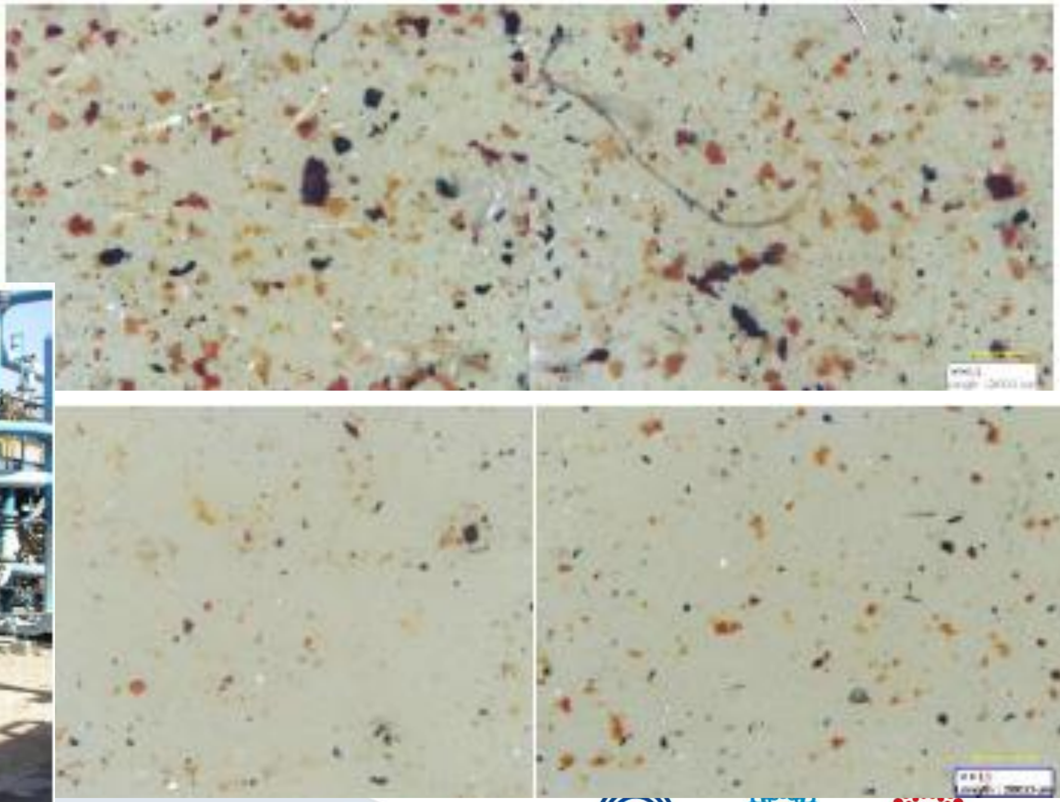
Agua limpia con tecnologías verdes

Cual es la función de un filtro ?

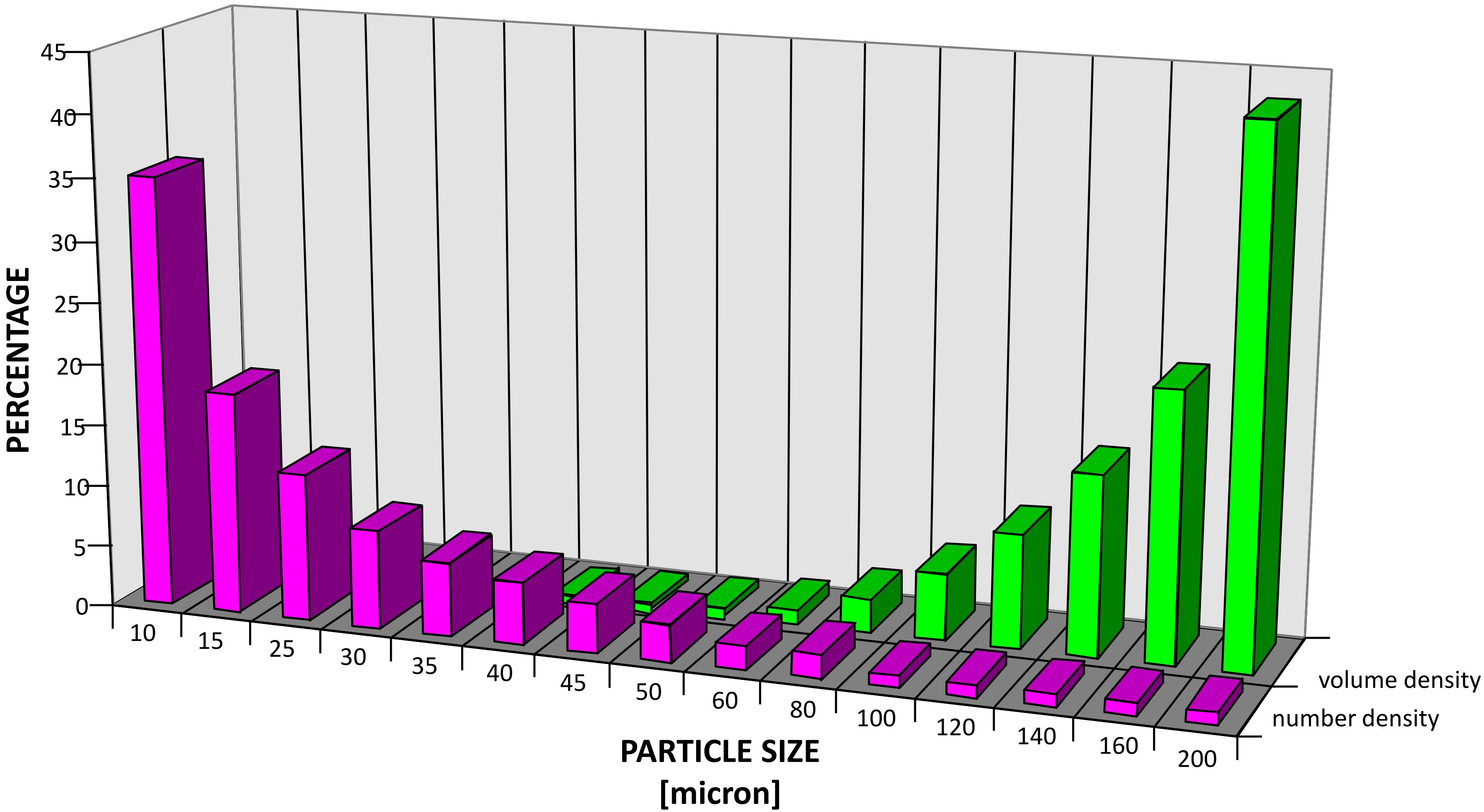
APOLLO 10	Turbidity NTU	SS> 25µm (mg/m³)	SS>50 µm (mg/m³)
Inlet	5.4	100	30
Outlet	5.3	45	8
Retention %	2%	55%	73%

TSS medido em mg/l es un dato suficiente?
TUBIDEZ, es un dado suficiente?

Que ocupa mas lugar um kilo de plomo o um kilo de plumas?
Em terminos de filtrado, que nos interesa mas, el peso o
 el volumen que ocupa la particula?



Comparativas



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  En que medida la naturaleza orgánica/inorganica de los TSS podría alterar nuestros diseños de sistema de filtrado cuando nos basamos solo en resultados de análisis como ser TSS medido en mg/l o por la turbidez del agua?
- Para poder diseñar correctamente un sistema de filtrado, no se debería saber la proporción de solidos orgánicos/inorganicos en el agua? Ej. cuanto pesaría una medusa (jellyfish) en un análisis de TSS dado en mg/l frente a cuanta área filtrante neutralizaría en el filtro al ser retenida?

Mejoras em el rendimiento de filtros de multimedia mediante la instalación de uma etapa de prefiltrado mecánico

Comparison test of a Spin Klin protected media (sand) filter with a non-protected media filter in the Lake of Galilee , Israel , 2005-2009

The pilot system compares the performance of two equal parallel media filters with an equal treatment regime. One filter (1) receives the water directly from the source, the other (2) receives the water after the 20µ Spin Klin pre-filtration.

The test platform results are also compared to the full-scale water treatment plant results (on the same site), which utilizes a sand filter protected by a similar sand filter.

The water source is an open intake in the Lake of Galilee. The water quality of the lake is according to two seasons each year: the period of blooming of the Dinoflagellate Peridinium Gatunense and the rest of the year.

Peridinum Gatunense, the main bloom-forming species in Lake Kinneret, acquires a carbon-concentrating mechanism (CCM) over the progression of the annual winter-spring bloom.

Typical Results

Five micron membrane photos: a sample of 20 liters was drawn from each one of the tested filters by the 25µ CCM device.

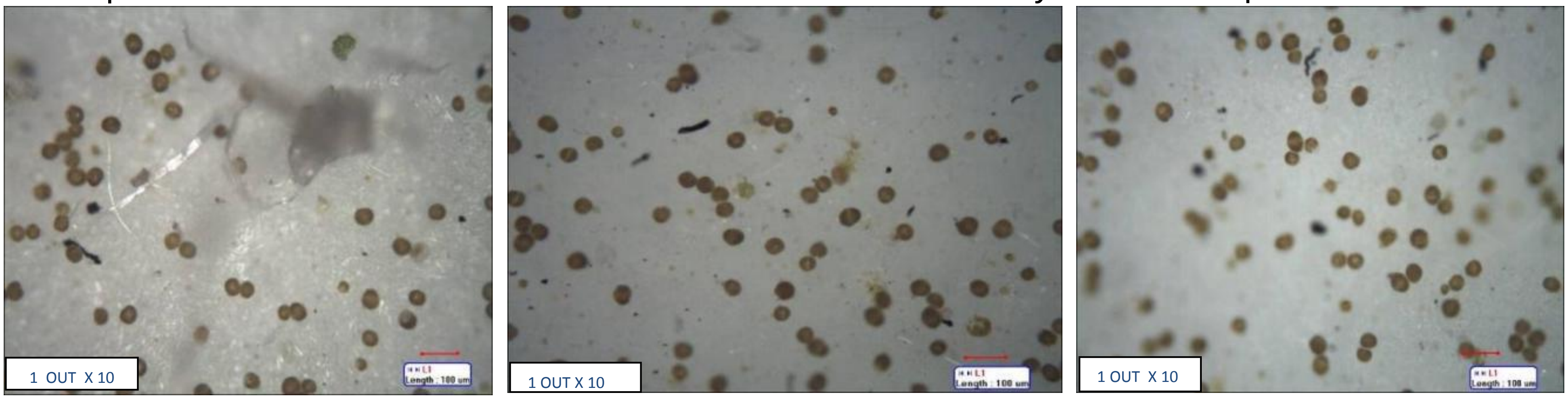
Each membrane was used to filter the material flushed with distilled water from a 25µ CCM screen, tich hat was used to filter the effluents of the test platform media filters and the Spin Klin pre-filter.

10/07/07

Effluents of the stand alone Media filter TSS=0.07 mg/l	Effluents of Spin Klin pre-filter 20µ SS=0.095 mg/l	Effluents of the SK 20µ protected Media filter SS=0.005 mg/l

Microscopic photos of the five micron membranes of the test-platform-media filters (see their pictures on the previous slide) . The circular green spots are peridinum units that had passed through the media filters (10/07/07).

A sample of 20 liters was drawn from each one of the tested filters by the CCM 25μ device



Effluents of the stand alone media filter (1). Time until CCM's Δp =5m was 03:31 min.

Effluents of the Spin Klin protected media filter(2). Time until CCM's Δp =5m was 29:21 min.

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Preliminary Summary of the Comparison Test

Spin Klin with 20 micron filtration discs operating in the Lake of Galilee, provides the media filter with essential protection.

As a result:

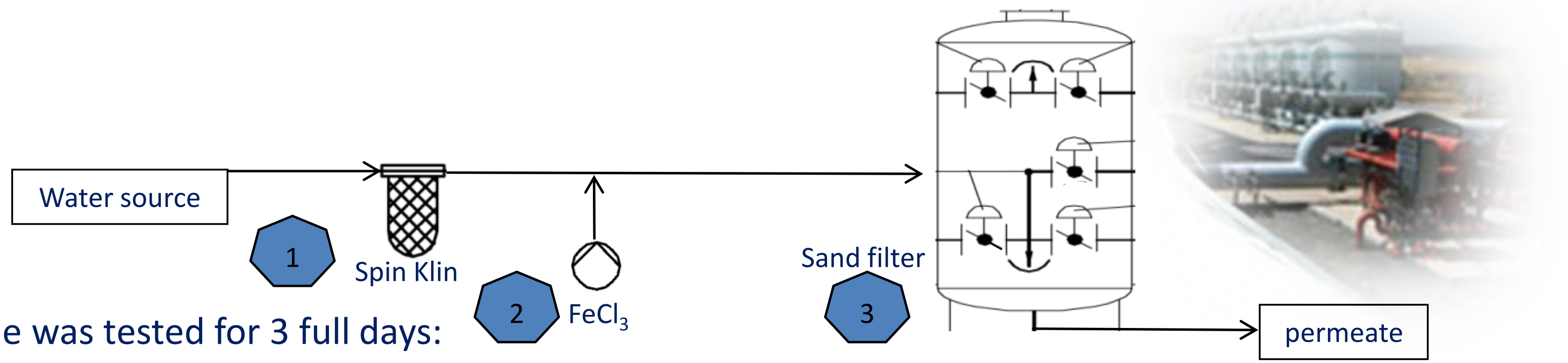
1. The protected media filter's train process achieves more efficient removal of organic particles from the water.
2. The protected media filter effluents have lower turbidity levels.
3. The protected media filter has longer filtration cycles and uses less water for backwash.

More results on the next slides

Tertiary Treatment Plant, Israel 2007

Water source: secondary treated effluents of municipal wastewater

Full -scale system tests of four different operation regimes.



Each regime was tested for 3 full days:

Date	Operation regime	Process description	Average turbidity removal (%)	Average Inlet turbidity (NTU)
1/8/07	Sand 3	Standard Tertiary treatment by sand filter without any pre-filtration or injection of chemicals.	13	4.04
9/8/07	Spin Klin + Sand 1 + 3	Treatment by sand filter with Spin Klin disc pre-filtration , without injection of chemicals	26	2.2
14/8/07	$FeCl_3$ + Sand 2 + 3	Treatment by sand filter without Spin Klin pre-filtration, with injection of Ferric Chloride	57	4.99
7/8/07	Spin Klin+$FeCl_3$+Sand 1 + 2 + 3	Treatment by sand filter with Spin Klin disc pre-filtration , followed by injection of Ferric Chloride	73	3.79

Arsenico

Agua de pozo/naciente → Coagulation → Media catalitica → AMF (2µ) → <10 ppb As

Purpose of AMF	• **cope with DW current standards < 10 ppb As (or even < 5 ppb)** • **serve as a polishing filter following media filters**
Main Advantages	• very effective when high reliability & integrity are required • cost effective & stable even in changing conditions • Low required water for flushing → high recovery ratio • very low chemical consumption
Water Source	Usually -Well water. Rarely – mixed water (combined well & surface water)
Remarks	In case of mixed water, proper pre-filtration required
Region	Arsenic concentration in water is found usually in the American continent (North, Central, and South America), Northern Europe, Turkey, India, Bangladesh, etc.

Hierro & Manganeso

Pozo o naciente → Oxidacion → AMF (2 or 3μ) → <0.3 ppm Fe <0.05 ppm Mn

Purpose of AMF	Removal of particles created in the oxidation stage (pre-treatment)
Advantages	• cost effective & stable even in changing conditions • Low required water for flushing → high recovery ratio • CIP may be performed periodically at low frequency
Remarks	In cases where Iron (Fe) is higher than 3 ppm or Manganese (Mn) higher than 1 ppm, pretreatment is recommended. Oxidation may be performed by aeration, ozone or chemicals
Region	Mainly in Mexico, Russia, Australia, Philippines, Brazil, and others

Agua Potable (superficie)

Agua con ~100 NTU → Coagulacion & floculacion → Sedimentacion (~10 NTU) → 25-50µ Amiad Screen filter → AMF (2 or 3µ) → < 1 NTU → Desinfeccion

Agua con ~30 NTU → 50-100µ Amiad Screen/Disc filter → Coagulacion → Filtro de media bajo (~10 NTU) → AMF (2 or 3µ) → < 1 NTU → Desinfeccion

Rios/casacadas, nacientes~40 NTU → 30-50µ Screen filter → Coagulacion (optional) → AMF (2/3µ) → < 1 NTU → Desinfeccion

Purpose of AMF	• **Turbidity reduction for 1 NTU or less** • **In developed countries, at times turbidity requirements are <0.3NTU – in these cases – a special design is required**
Main Advantages	• In most cases, additional coagulation prior to the AMF is not required • Compact foot print • High recovery ratio
Region	Worldwide

Agua potable de pozo

Pozo ~1-10 NTU → Hydrocyclon (optional) → 50-80µ Screen filter → AMF (2/3µ) → < 1 NTU → Desinfeccion

Purpose of AMF	• **Reduce Turbidity to required value - usually <1NTU, at times <0.3NTU in developed countries**
Advantages	• In most cases, additional coagulation prior to the AMF is not required • Compact foot print • High recovery ratio
Remarks	In developed countries, at times turbidity requirements are <0.3NTU – in these cases – a special design is required
Region	Worldwide

Sistemas pequeños de desalinización mediante NF/RO

Agua salda o salobre → Amiad disc filters 20-100µ (oceano) → AMF (2µ) → SDI<3 → NF/RO

Purpose of AMF	• **Replace sand filters and/or cartridge filtration before NF/RO** • **Operate as pre-filtration in small-medium RO/DI units (10-2,000 m^3/h)**
Advantages	• In most cases, additional coagulation prior to the AMF is not required • Compact foot print • High recovery ratio Especially Competitive in cases such as: • If required flow is equivalent to the recommended flow of one of AMF models • If there is back-up of cartridge/tank downstream the AMF • Places where shutdown for cartridge replacement implies high costs – AMF avoids shutdown • Cartridges are replaced often, approximately once a week or more
Remarks	• sometimes coagulation prior to AMF is needed to improve the SDI value • usually RO plants operate continuously – 24 hr/day • process is similar to the city/well water application above. Amiad Disc filters are necessary for pre-filtration in order to continuously reduce the load and protect the AMF during algae bloom • AMF model designed for brine and seawater is required • Special attention for humid environment required– in term of parts, control board etc.
Region	Worldwide, relevant for factories with boiler feeds or pure/ultrapure water requirements

Thank You

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