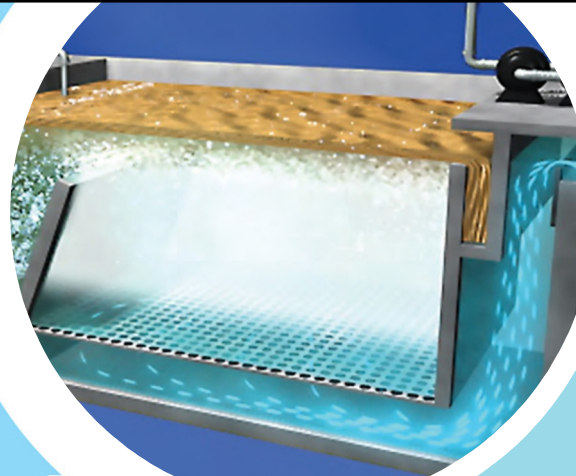


Aquadaf™

(RICTOR process)

SURFACE WATER CLARIFICATION THROUGH
RAPID FLOTATION WITH HYDRAULIC
FLOCCULATOR



**DRINKING
WATER**

CLARIFY SURFACE WATER WITH A
SIMPLIFIED ENGINEERED INTEGRATION



- Aquada**daf**TM in the fast Flotation Range
- Aquada**daf**TM in the Drinking Water Offer
- Background of Aquada**daf**TM
- Operating Principle
- Advantages of Aquada**daf**TM
- Among our References
- Case Study: Macao MSR, CHINA



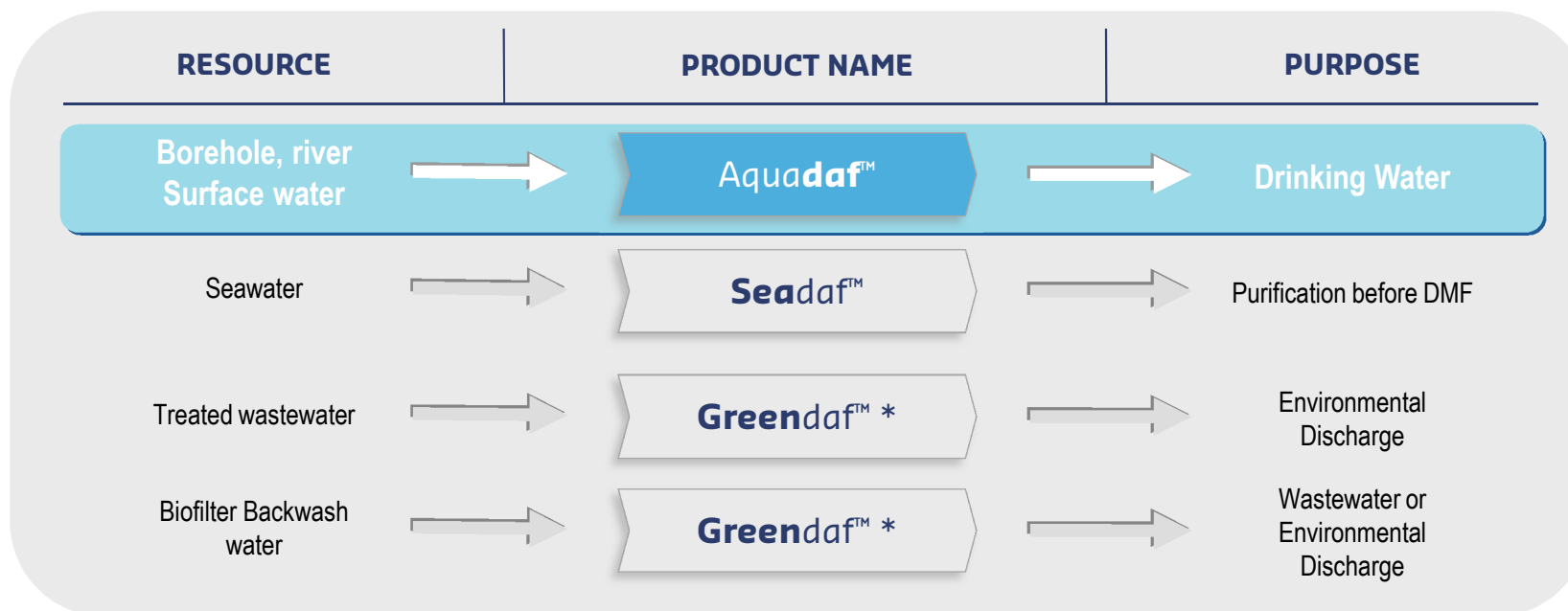
DRINKING
WATER

AquadaTM

FAST FLOTATION RANGE

As part of the line of rapid flotation solutions, the AquadaTM is designed for clarification of surface, borehole or river water.

Two types of flocculators are available: a mechanical version (MF model) or a hydraulic one (HF model).



**GreendaTM product is declined into 2 sub-products*

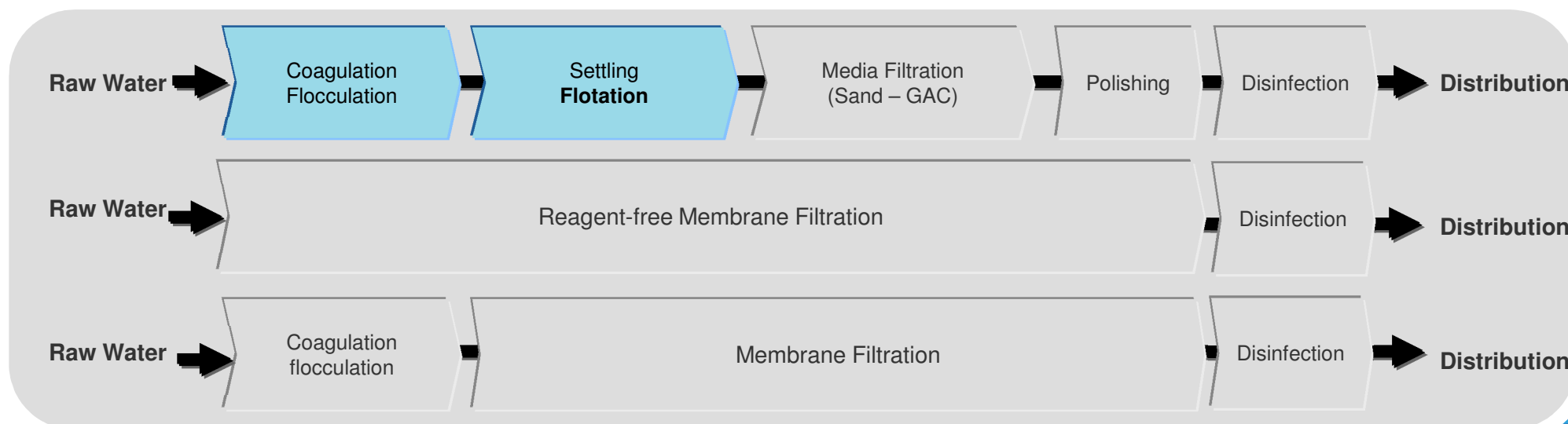
Aquadaf™ IN THE DRINKING WATER OFFER

Aquadaf™

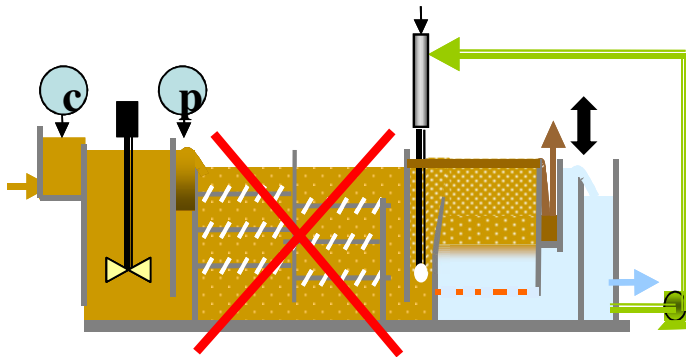
Aquadaf™ enhances the Degrémont product line for clarification of surface water.

It is unique in its versatility and fast performance during the flotation phase.

Its greatest advantage is its ease of operation.



BACKGROUND OF THE Aquadaf™



AquaDAF™ Rictor (2002)

Time coagulation flocculation = **2 + 12 min**



Degrémont 1st adaptation (2006):

Aqua~~daf~~™ MF (Mecanical Flocculation)

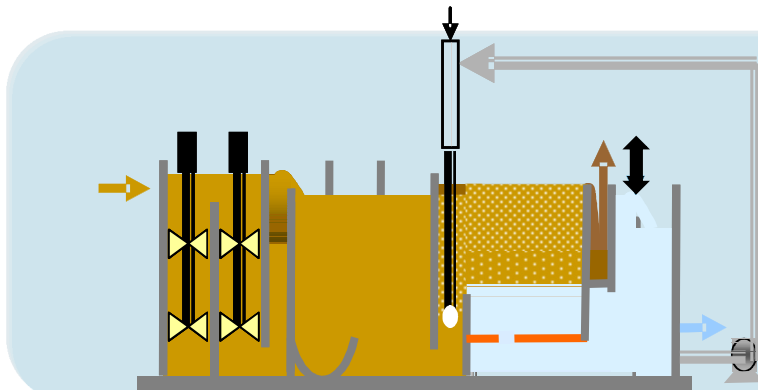
Time coagulation flocculation = **2 + 10 min**



Degrémont 2nd adaptation (2007):

Aqua~~daf~~™ HF (Hydraulic Flocculation)

Time coagulation flocculation = **3 + 5 min**



Aquadaf™ HF: OPERATING PRINCIPLE

1. COAGULATION

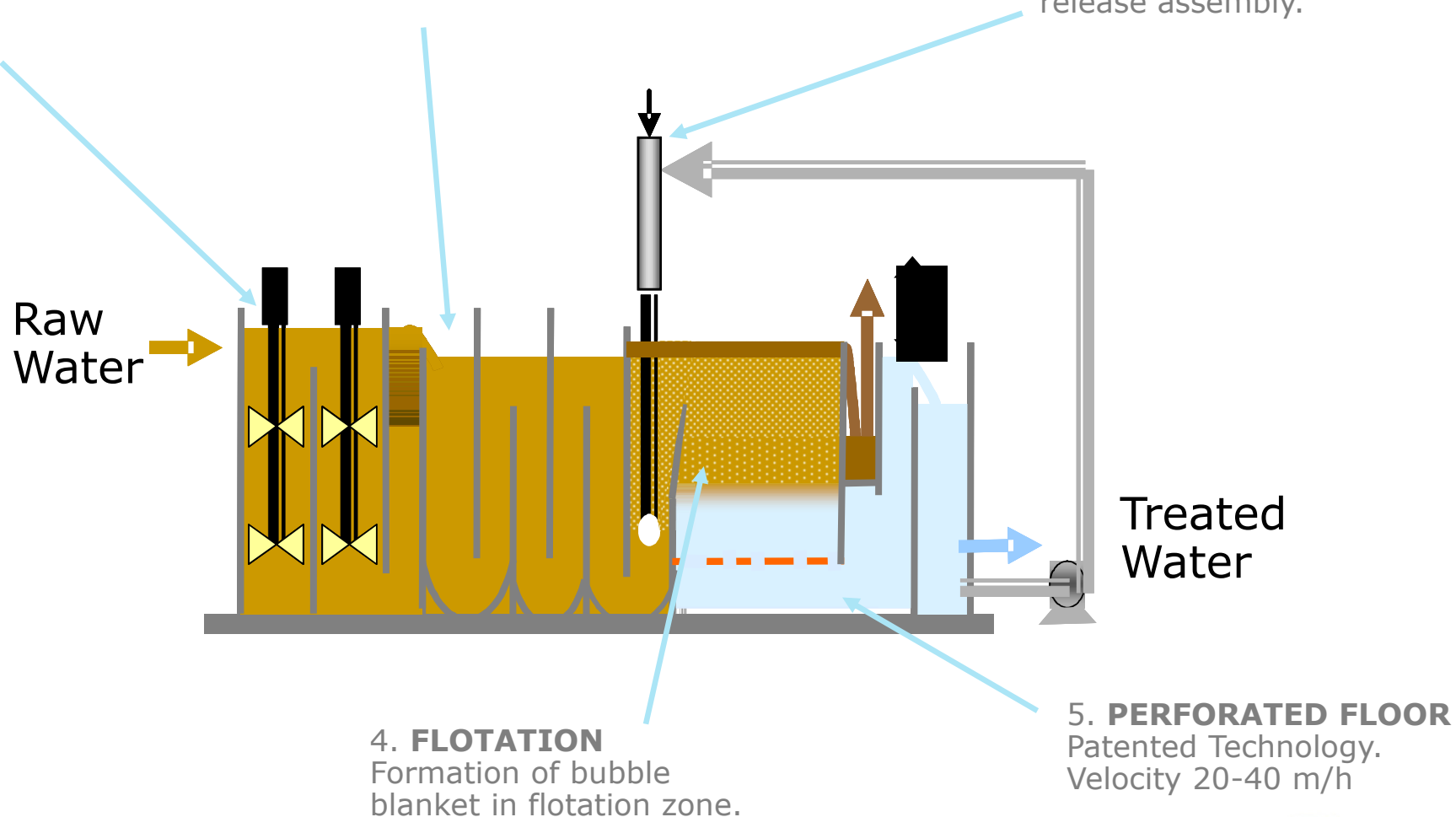
Ferric chloride or alum.
Coagulation Time
= 1 + 2 min

2. Hydraulic FLOCCULATION

Used to create micro flocs.
Flocculation Time = 5 min

3. SATURATION

8-10% recirculation,
pressurization et and
release assembly.



DRINKING
WATER

Aquadaf™

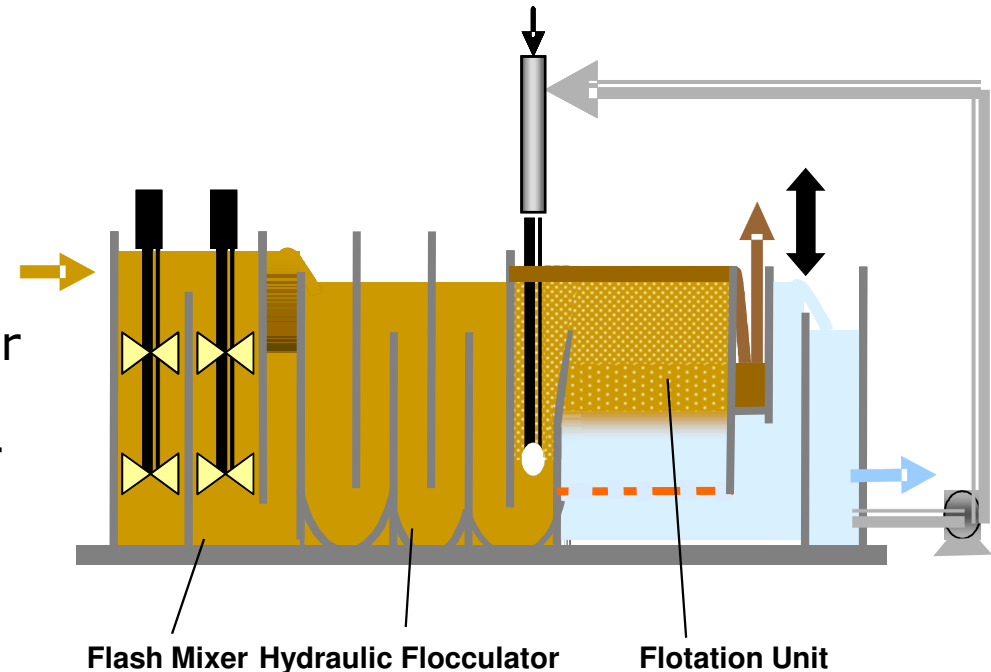
ADVANTAGES OF Aquadaf™ (1/2)

Aquadaf™ is versatile:

- It treats even very cold surface-water (as low as 0° C),
- It supports occasional peaks in SS or turbidity up to 200 NTU.

Aquadaf™ is competitive:

- Its new design for the flocculation phase:
 - reduces minimum reaction time to 5 min,
 - allows for a smaller facility footprint while maintaining performance,
 - adapts to various water types with its 2 stages of flash mixing and 4 potential reagent injection sites.



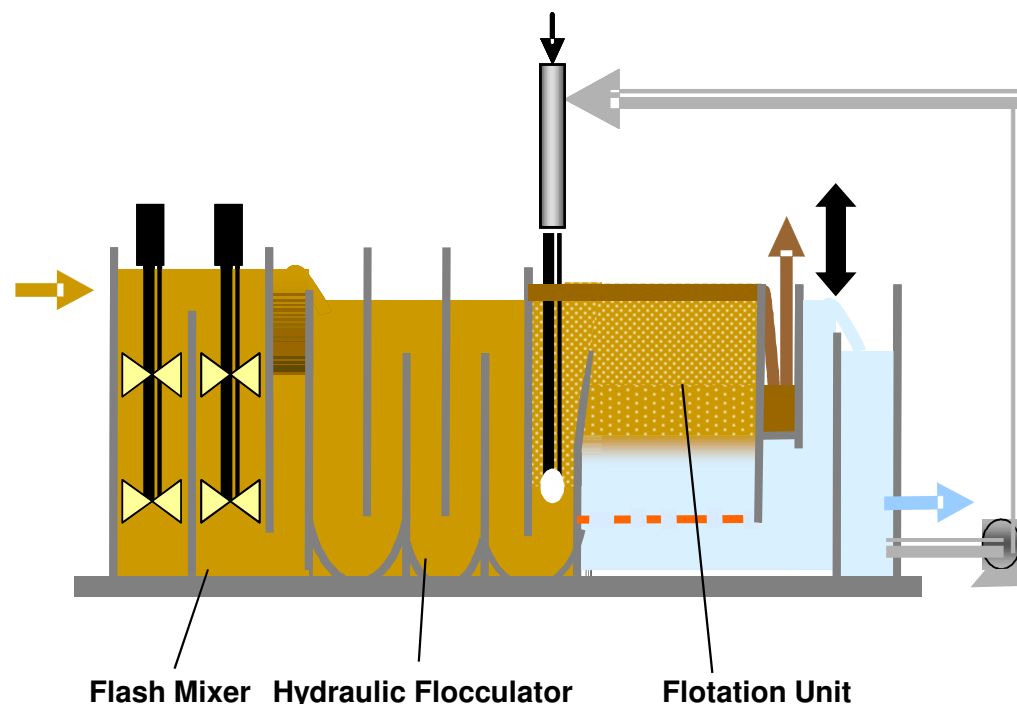
DRINKING
WATER

Aquada**daf**TM

ADVANTAGES OF Aquada**daf**TM (2/2)

Aquada**daf**TM is easy to operate:

- Easy maintenance (few mechanical parts, no lamellar modules),
- No need for materials to ballast the flocs,
- No constraints relating to complicated flocculant application (polymers),
- No major risks associated with defects or missing polymers.



**DRINKING
WATER**

AMONG OUR REFERENCES

AquadaTM

Name of Site	Capacity	Commissioning Date
MACAO MSR, China	2 × 1 340 m ³ /h	Summer 2008
La Segara, Spain	2 x 500 m ³ /h	Summer 2008
Monistrol, France	2 × 350 m ³ /h	February 2009
Apremont, France	2 × 1 100 m ³ /h	Summer 2009



CASE STUDY:

MACAO MSR, CHINA (1/4)

CONTEXT:

- Client : SAAM (Sociedade de Abastecimento de Águas de Macau) [SUEZ ENVIRONNEMENT]
- Date of work: Sept. 2006 – May 2008
- Challenge: Upstream pretreatment from membranes of water with turbidity peaks and algae content, where polymer is banned.
- 2-phase project: 2 x 60 000 m³/j

WATER PARAMETERS:

		MSR Raw Water	
		Median (min / max)	
Turbidity	NTU	8,4	(1,4/52,1)
Dissolved Fe	µg/L	< 9	(< 9 / 13)
Dissolved Mn	µg/L	< 2	(< 2 / 30)
Algae	#/100mL	530	(180 / 5 030)
Filtered UV254	m-1	2,86	(2,1 / 4)
DOC	mg/L	2	(1,4 / 2,7)
UV / DOC		1,51	(1 / 2)
Total Coliform	#/100mL	0	(0 / 10)
Fecal streptococcus	#/100mL	0	(0 / 3)
Bacteria HPC37° C	#/1mL	90	(16 / 600)



CASE STUDY:

MACAO MSR, CHINA (2/4)

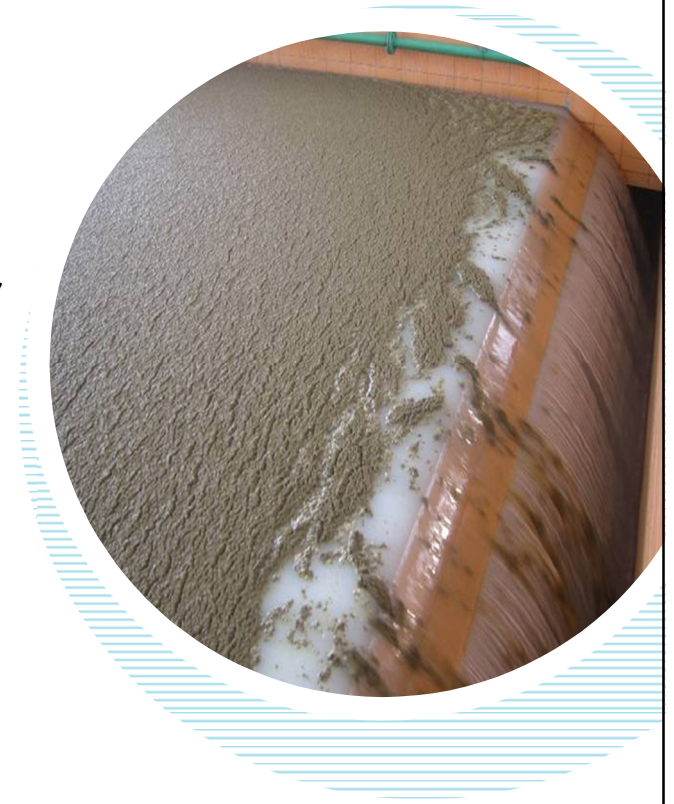
DESIGN:

OF PLANT:

- Treatment Line:
 - Screen (3 mm), Flotation with AquadafTM HF, Ultrafiltration, Post-Chlorination
- Capacity phase 1 : 60 000 m³/ jour

OF FLOTATION UNIT:

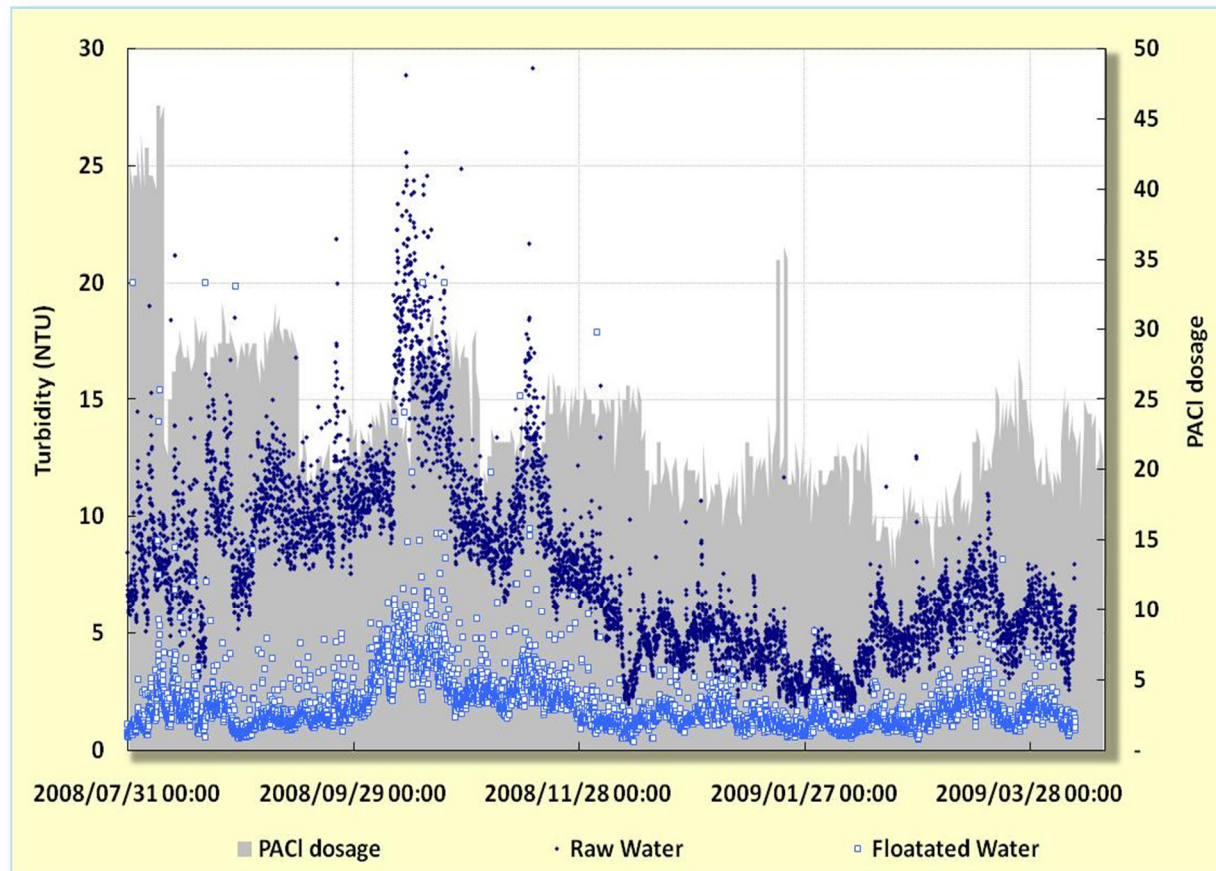
- No. of AquadafTM HF:
 - 2x48m² each treating 1 350m³/h
 - Coagulant (PACL), no polymer
- Water Recirculation for pressurization: 10% of incoming water at 5 bar.
- Sludge Removal: Every 4-5 hours (water loss approx.1%)



CASE STUDY:

MACAO MSR, CHINA (3/4)

RESULTS:



TURBIDITY

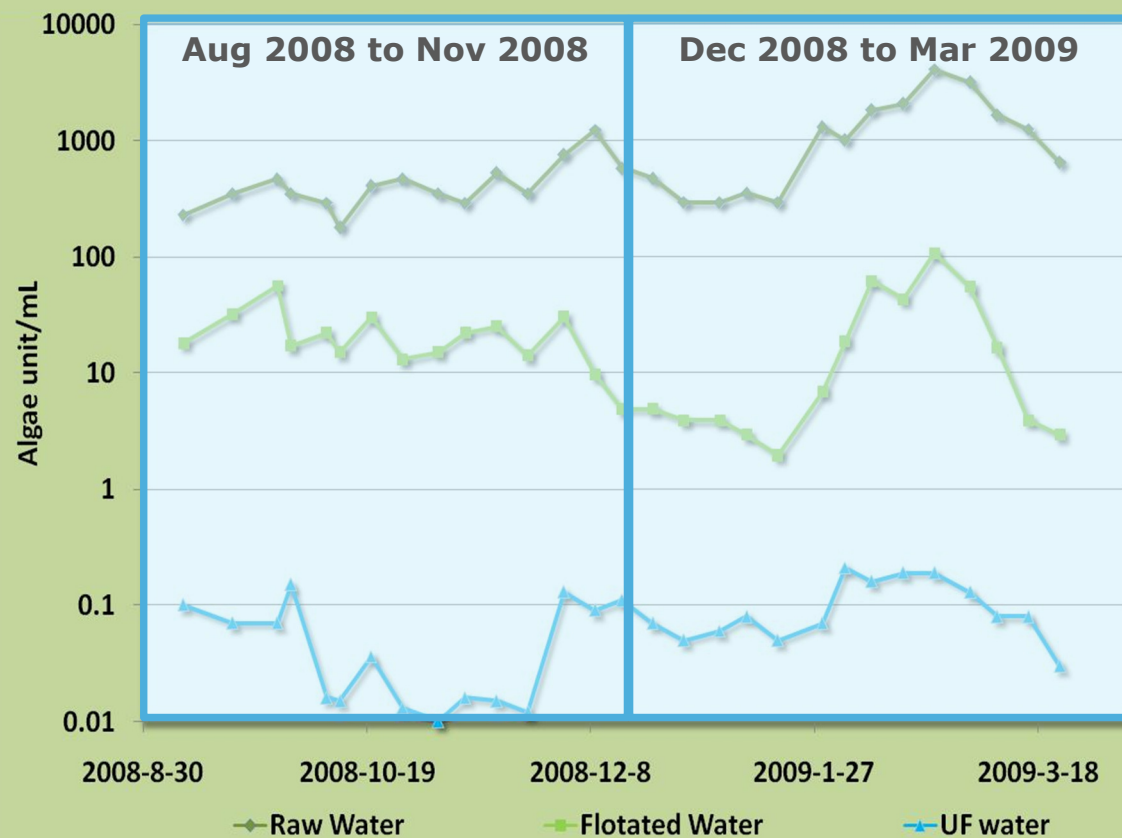
- Raw Water: 3 - 15 NTU
- Treated Water: 1 - 2,5 NTU

If Peaks:

- Raw Water: 15 - 100+ NTU
- Treated Water : 2,5 - 7 NTU (peaks to 20)



CASE STUDY: MACAO MSR, CHINA (4/4)



ALGAE

	unit/ml	Efficiency
• Raw Water:	200 - 4000	} 90-99% Average 96%
• Treated Water:	2 - 100	

