

Water Treatment Technologies (WTTs) used in Turkey

Türkiye'de Kullanılan Su Arıtma Teknolojileri

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Aim

- To share the process information & experience gained by Turkey in the field of water treatment .
- Share the experience gained by State Water Works (DSI) and by Water Administrations of Istanbul, Ankara, Bursa etc (ISKI, BUSKI ..)

Turkey: Characteristics for WTTs

Strong Points:

- Cheaper **Land Area** (Daha ucuz arazi)
 - Cheaper
 - **Concrete** Costs (Daha ucuz Beton)
 - **Workmanship** (Ucuz İşçilik)
 - **Salaries** of Technical Personnel (Teknik elaman)
 - **Chemicals** (Aluminium Sulfate, Cl₂... production)
- Cheaper **Capital & Operational** Costs
(Daha ucuz ilk yatırım ve işletme)

WTTs: Weak Points

Expensive : (Daha Pahali)

- **Electro-mechanical** parts & maintenance
- **PLC Control Systems**
- **Chemicals : Coagulation Aids** (Polimer)

Water Treatment Technologies (WTTs) Experienced in Turkey

(Türkiye'nin Su Arıtma
Teknolojileri Tecrübeleri)

WTTs

- 1) **Slow Sand Filtration** (Yavaş Kum F.)
- 2) **Compact Units-Accelerators** (Dekantörler)
- 3) **Conventional WTTs** (Konvansiyonel Arıtma)
- 4) **USB: Upflow Sludge Blanket Clarifiers** (Yukarı Akışlı Çamur Battaniye Sistemi)
- 5) **“Super”-Pulsators**
- 6) **Micro Sand (Actiflo):** (Mikrokum)

Search for:

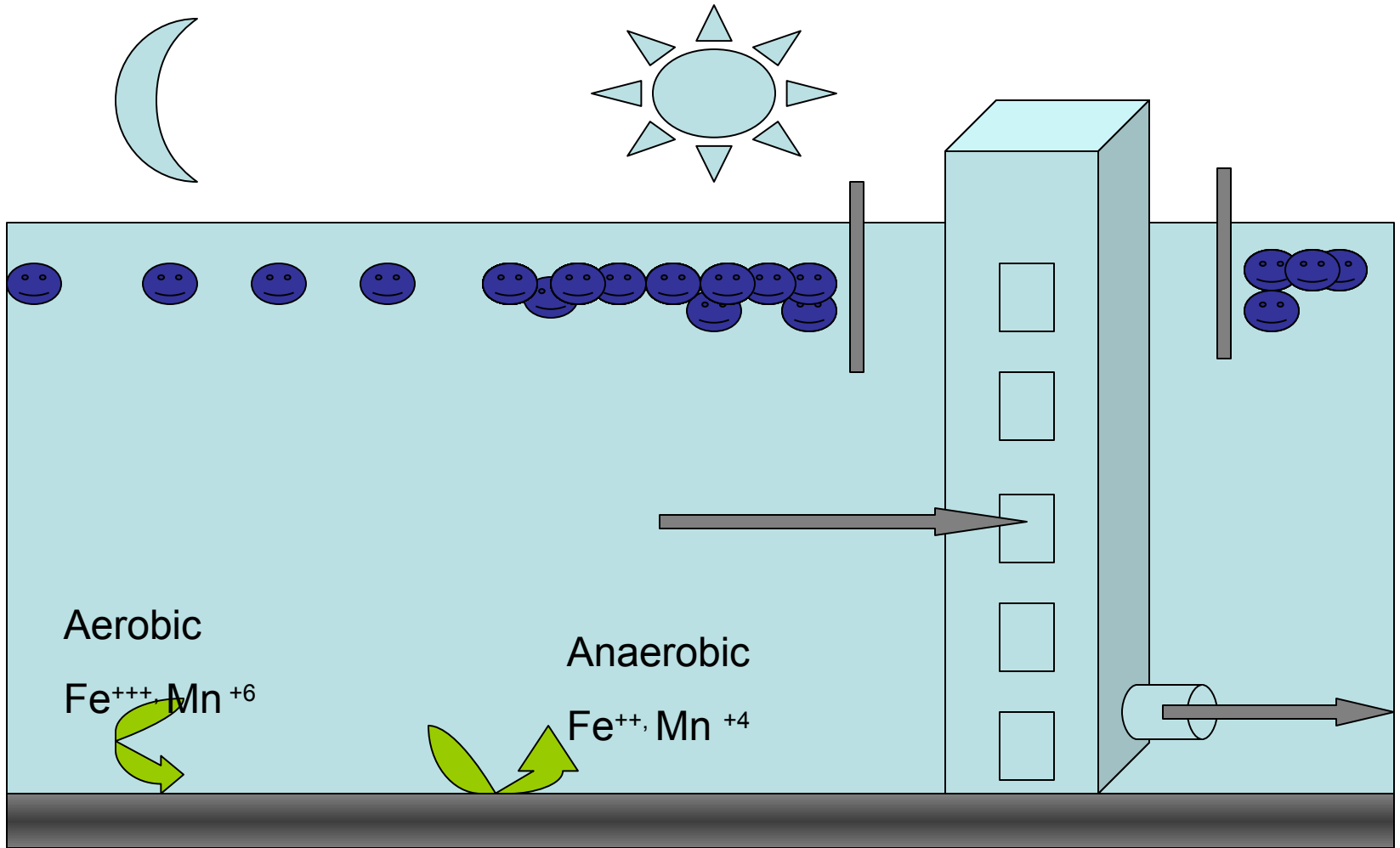
Simple & Robust Water Treatment Technologies that can work in **rural** areas as well as in **metropolises** when there is enough land area.

Requirements (Gerekli Hususlar)

- **Robust Processes (Dayanıklı) :**
 - **High Turn Down Ratios: Q_{max}/Q_{min}** (Yük Oranları)
 - **High Fluctuations in water quality: (Ani kalite değişimleri)**
 - **Turbidity** :Shallow Reservoirs, River waters (Eskişehir, Porsuk), (Nehir suyu) (B. Çekmece) (**Bulanıklık**)
 - **Algal Blooms: (Ömerli) (Alg patlamaları)**
 - **Fe & Mn (Red Water)**
- **Simple Processes :**
 - **Operation (Basit İşletme)**
 - **Maintenance (Basit Bakım & Onarım)**

Algae & Red Water Problems

Intake from Different Levels: (Kademeli Alış)



Algae (Ömerli Reservoir)



CASCADE AERATION

(Kaskat Havalandırma)



Closed Cascade Aeration

(Kapalı Kaskat Havalandırma)



Water Treatment Technologies Experienced in Turkey

(Denenen Su Arıtma Teknolojileri)

1) Slow Sand Filtration (Yavaş Kum F.)

The oldest WTPs, simple but large land area requirements.

2) Accelerators: Compact Units- (Dekantörler)

Coagulation, Flocculation and
Sedimentation in the same tank

SLOW SAND FILTERS & ACCELERATORS

(Kağıthane- Dekantörler)



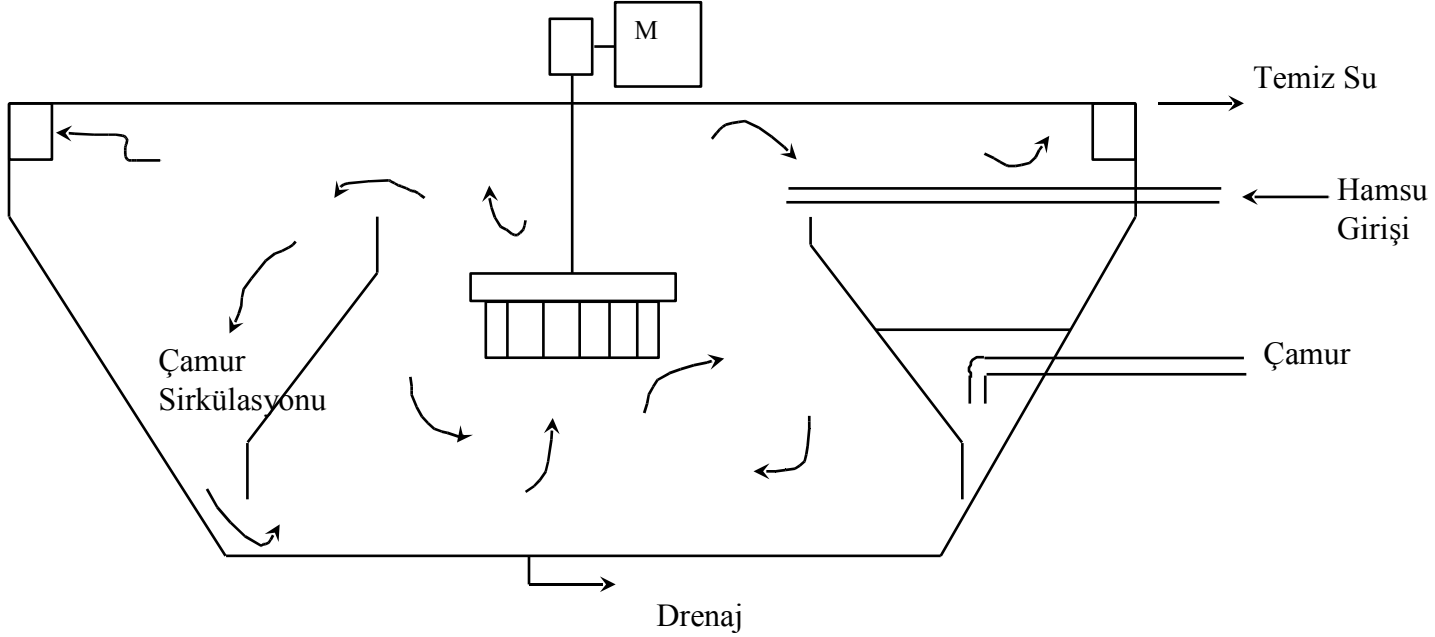
Elmalı WTP



Elmalı WTP



Kompakt Akseleratör Sistemleri



Hızlı, yavaş karıştırma ve çökeltme aynı tankta yapıldığı akseleratör (Osmaniye SAT - Ömerli)



WT Technologies

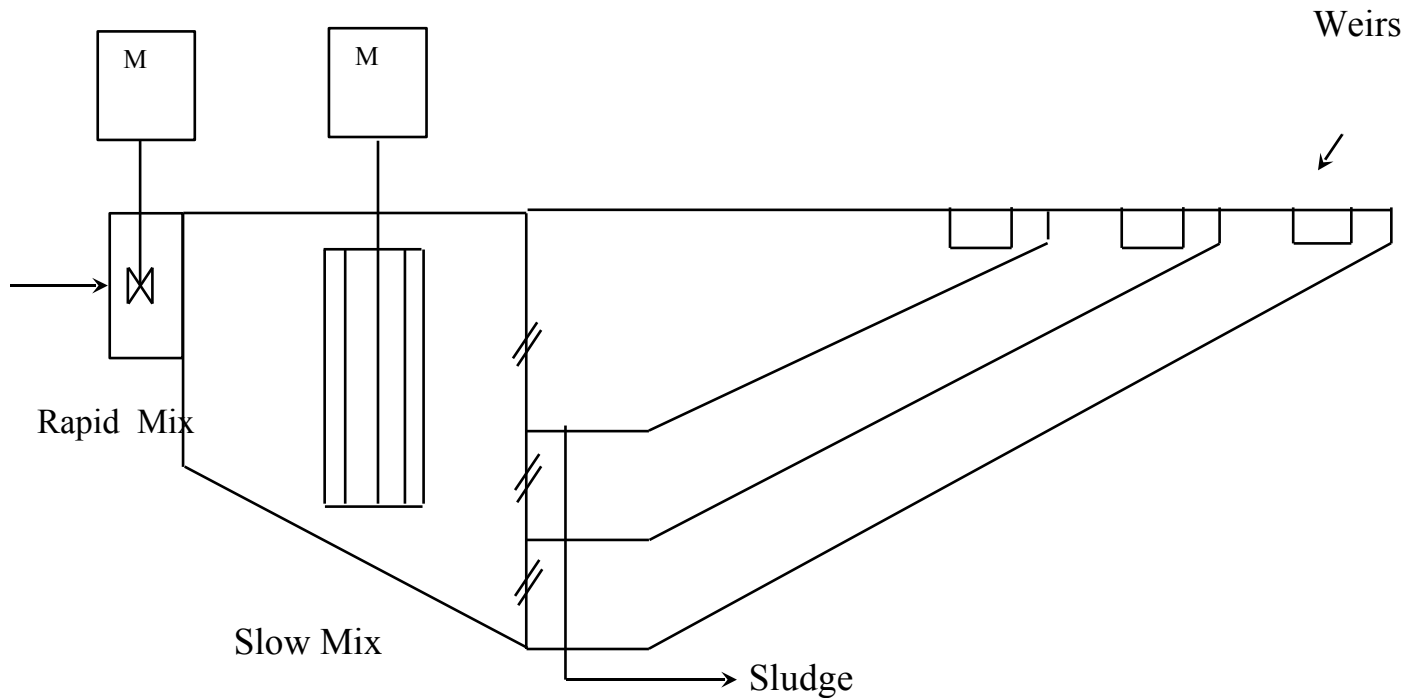
3. Conventional (Konvansiyonel Arıtma) 😊

All Proseses are Seperate:

Aeration → Coagulation → Flocculation →
Sedimentation → Filtration → Chlorination

Conventional Treatment

(Konvansiyonel Sistem)



(Orhaniye WTP - Ömerli)

Orhaniye & K.Hane WTPs



Mechanical Rapid Mix – Mekanik Hızlı Karıştırma



Rapid Mix Using FreeFall



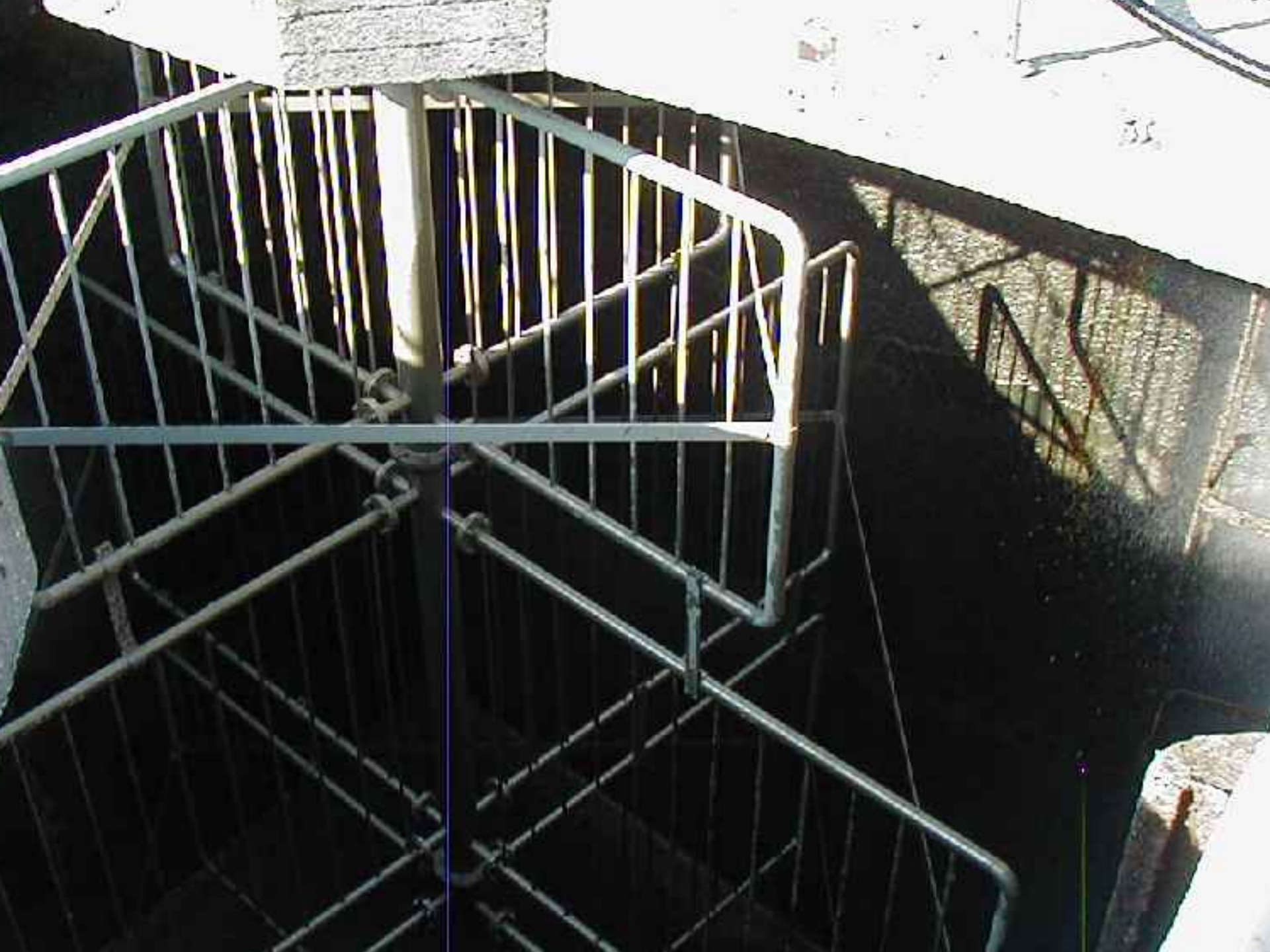


Equal Distribution



Flocculation





Technologies

4). **USB**: Upflow Sludge Blanket Clarifiers 😊 (Yukarı Akışlı Çamur Battaniye Sistemi)

B. Çekmece SAT



İkitelli SAT



İkitelli WTPs



O₃

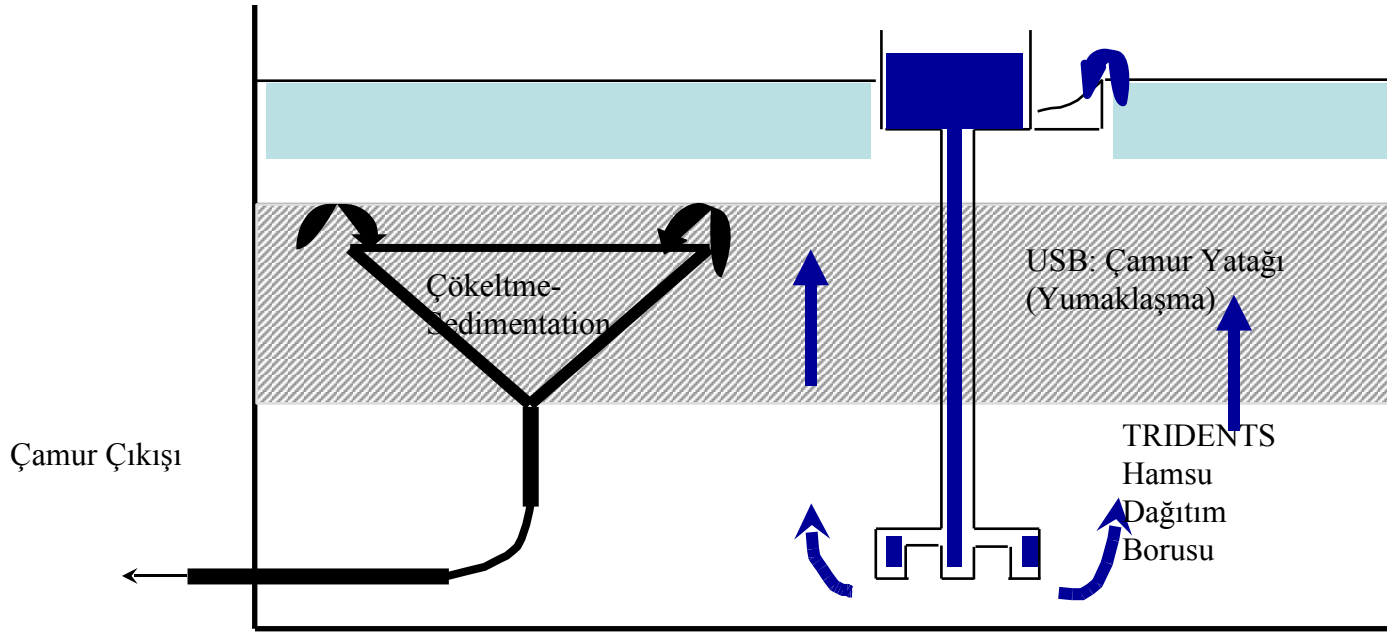


İkitelli WTPs



Flat Bottom Upflow Sludge Blanket Clarifiers

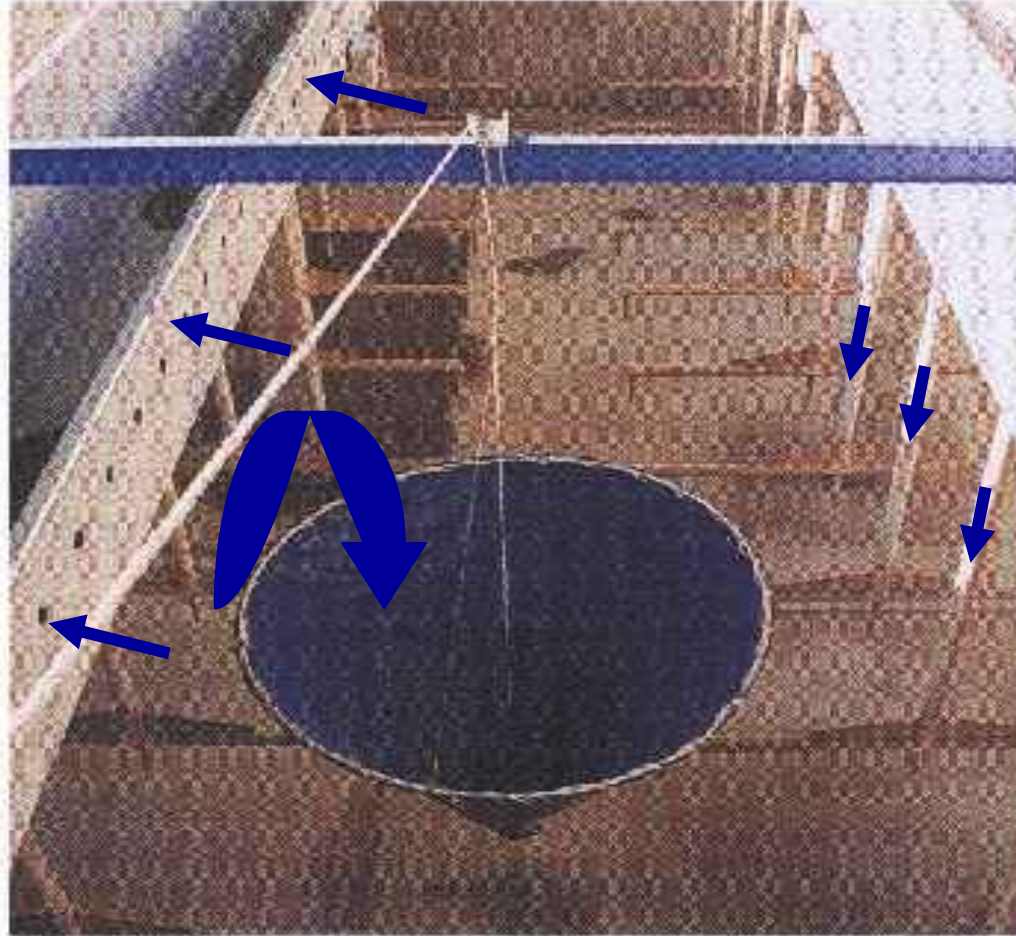
Yukarı Akışlı Çamur Battaniyesi



USB: Upflow Sludge Blanket Clarifiers

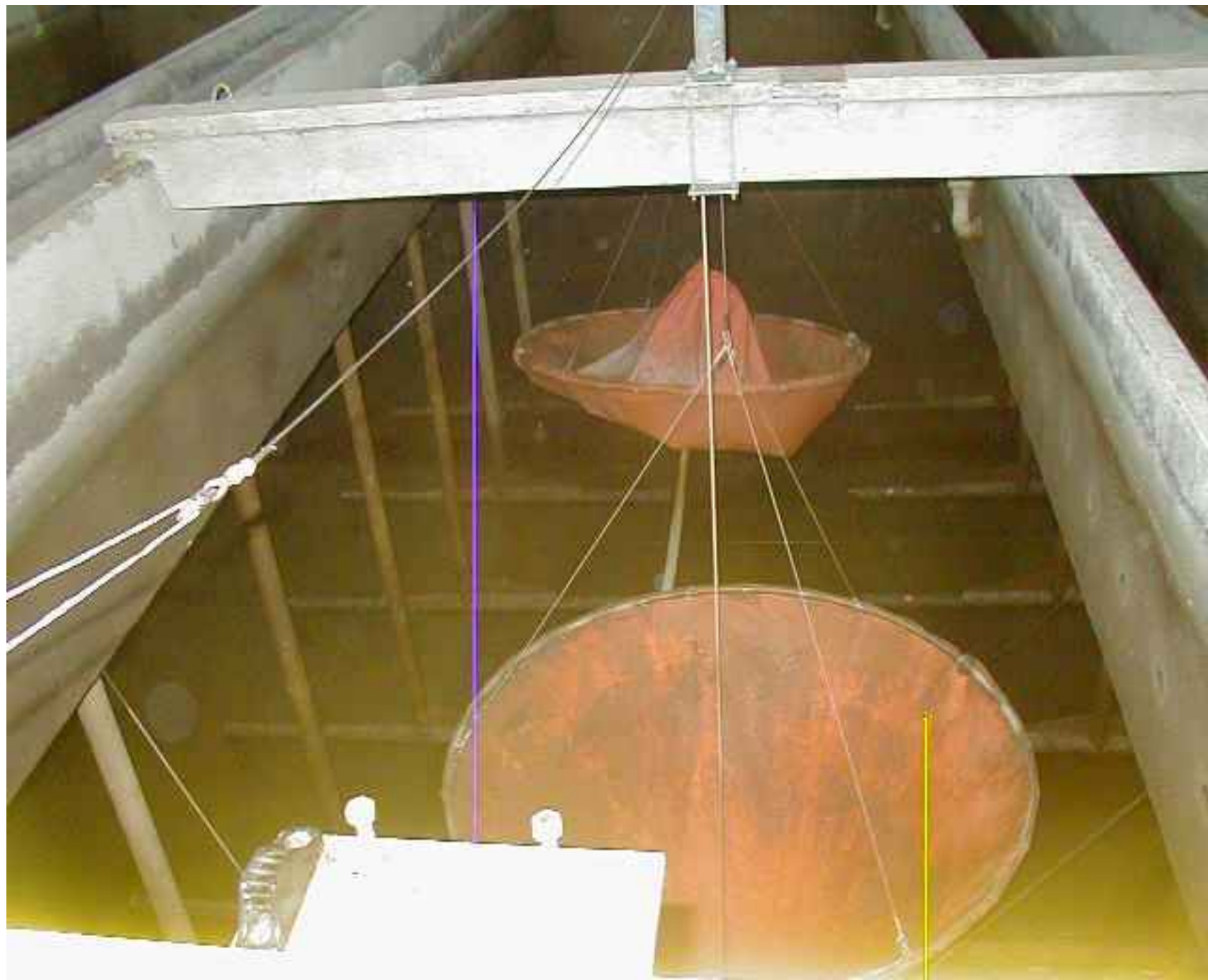
Yukarı akışlı çamur battaniyesi prosesi (FSM SAT İkitelli)

İkitelli SAT: Çamur Hunileri



Çamur Battaniyesi: Çamur Toplama







Eskişehir SAT



USB: Upflow Sludge Blanket Clarifiers

Düz Tabanlı Yukarı Akışlı Çamur Battaniyesi SAT

<i>Su Arıtma Tesisi</i>	<i>Kapasite</i> <i>1000 m³/g</i>
<i>İstanbul – Büyükçekirce</i>	400 (200)
<i>İstanbul – İkitelli FSM</i>	2 * 420
<i>Ufa</i>	300
<i>Eskişehir</i>	320 (80)
<i>Ankara</i>	1.200
<i>Konya</i>	104
<i>İzmit</i>	400
<i>Niğde – Asarçay</i>	50

2 600 000 m³/d

13 mill PE

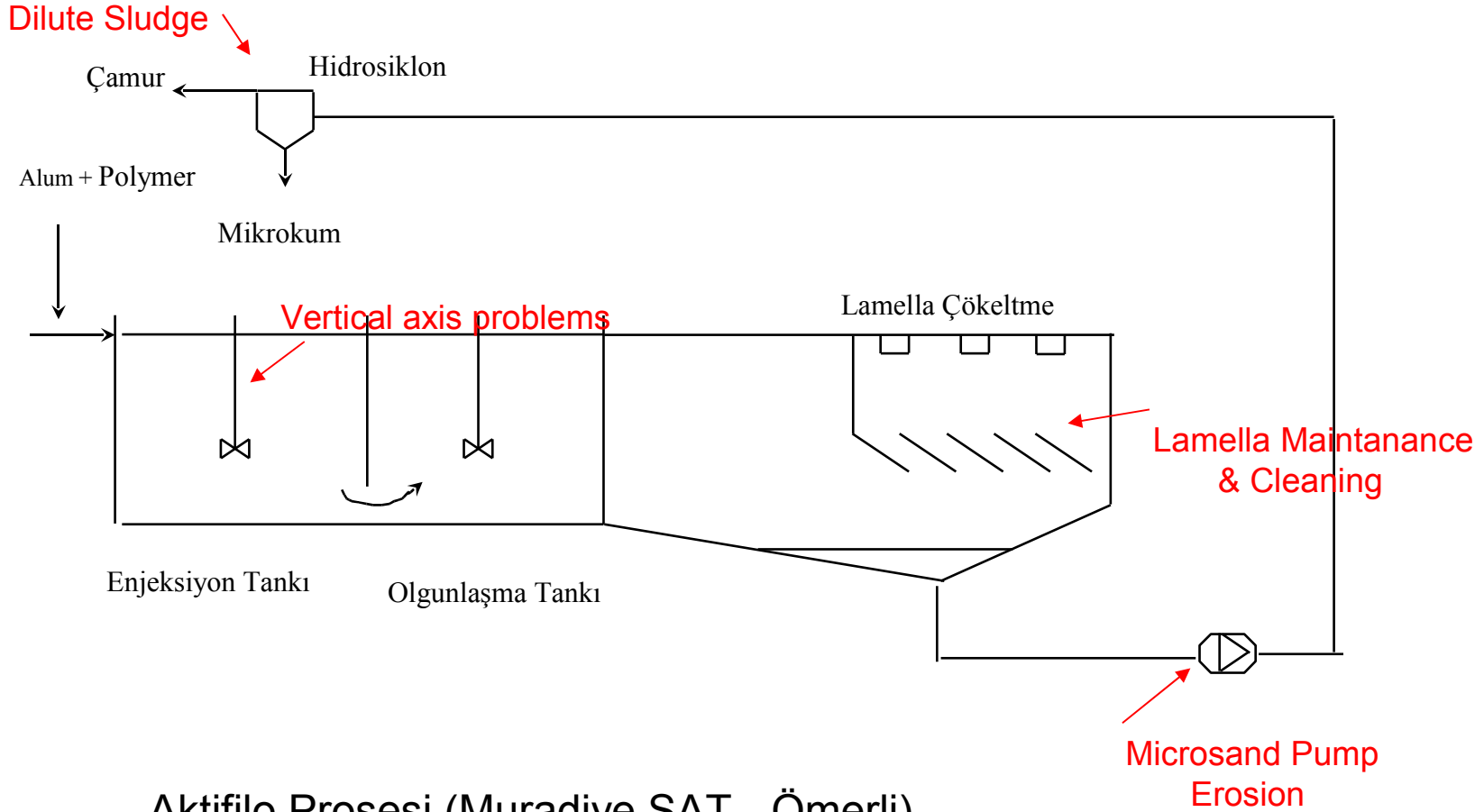
Technologies

5) Micro Sand (Actiflo): (Mikrokum) ☹️

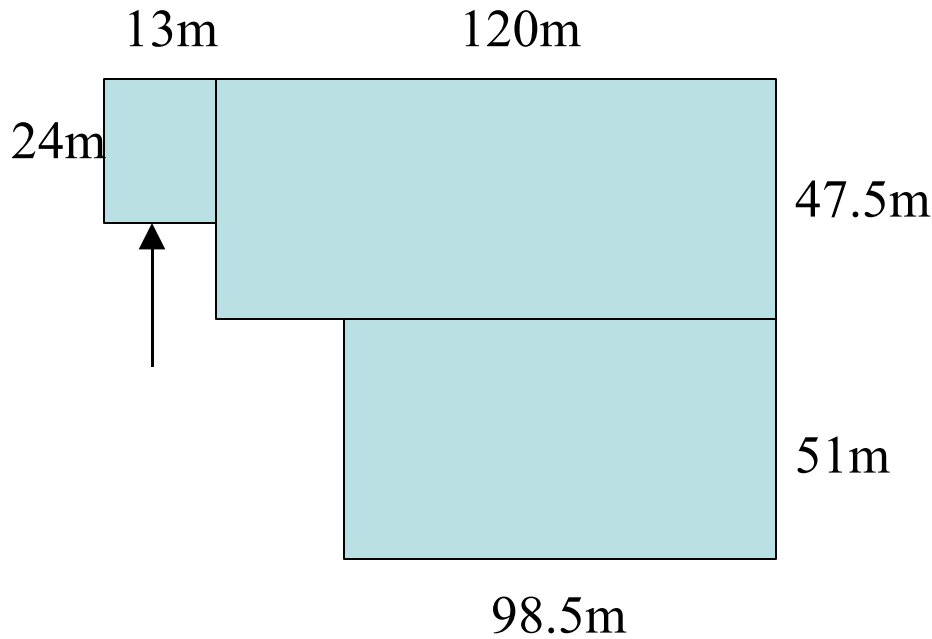
- Compact
- Uses **microsand ballast** to enhance sedimentation
- More **electro-mechanical** parts

Micro-Sand:ACTIFLO

(Mikrokum Kullanılarak Hızlandırılmış Yumaklaşma (Cyclofloc, Aktiflo))



Aktifilo Prosesi (Muradiye SAT - Ömerli)

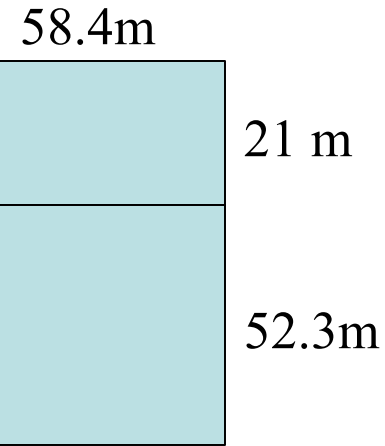


Orhaniye WTP-Ömerli -550

Debi = Flow= 550000 m³/gün

Alan =Area= 11000 m²

Q/Area = 21m²/(1000 m³/gün)



Muradiye WTP-Ömerli-300

Debi= 300000 m³/gün

Alan = 4300 m²

Q/Alan = 15m²/ (1000 m³/gün)

Area Gain ~%25

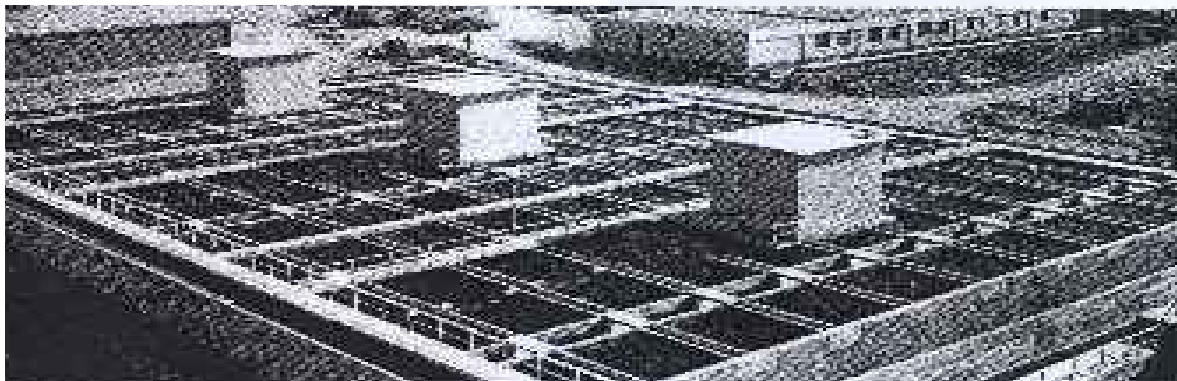
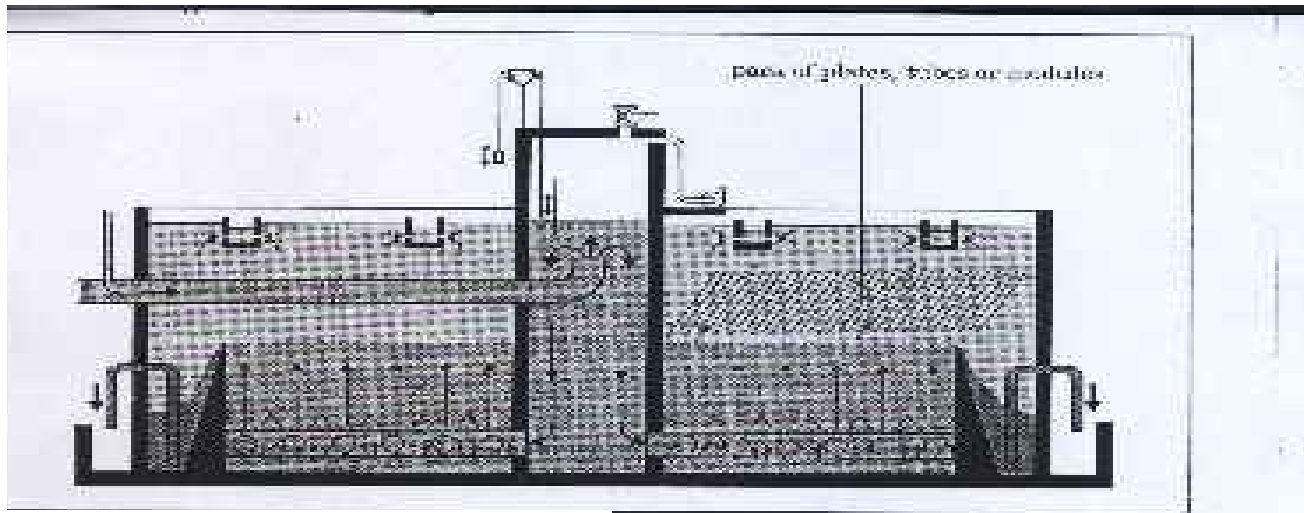
Ömerli Reservoir



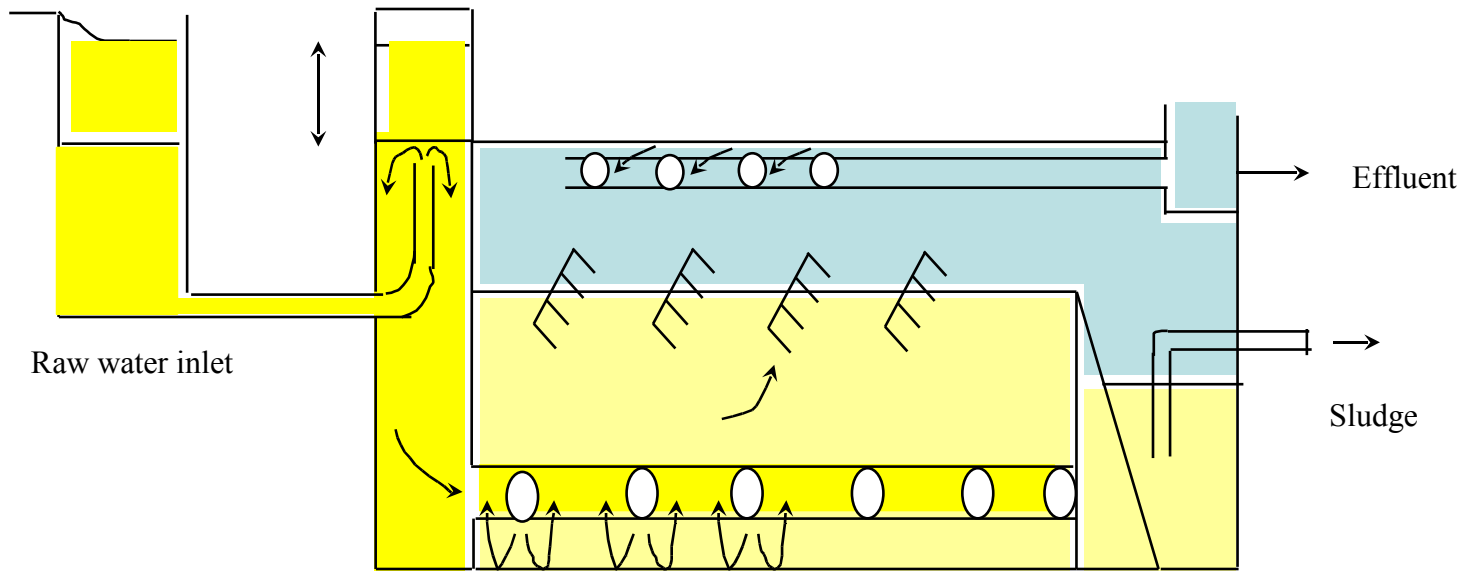
WT Technologies

5) Super-Pulsators ☹️

Super-Pulsator



Super - Pulsator



Super- Pulsator (Emirli WTP - Ömerli)



Use of FeCl_3 (Ömerli (Emirli) FeCl_3 Eklenmesi)



Asit & Base Addition to adjust pH for optimum treatment

(pH Ayarı Geremediği Halde Asit veya Baz Eklenmesi)



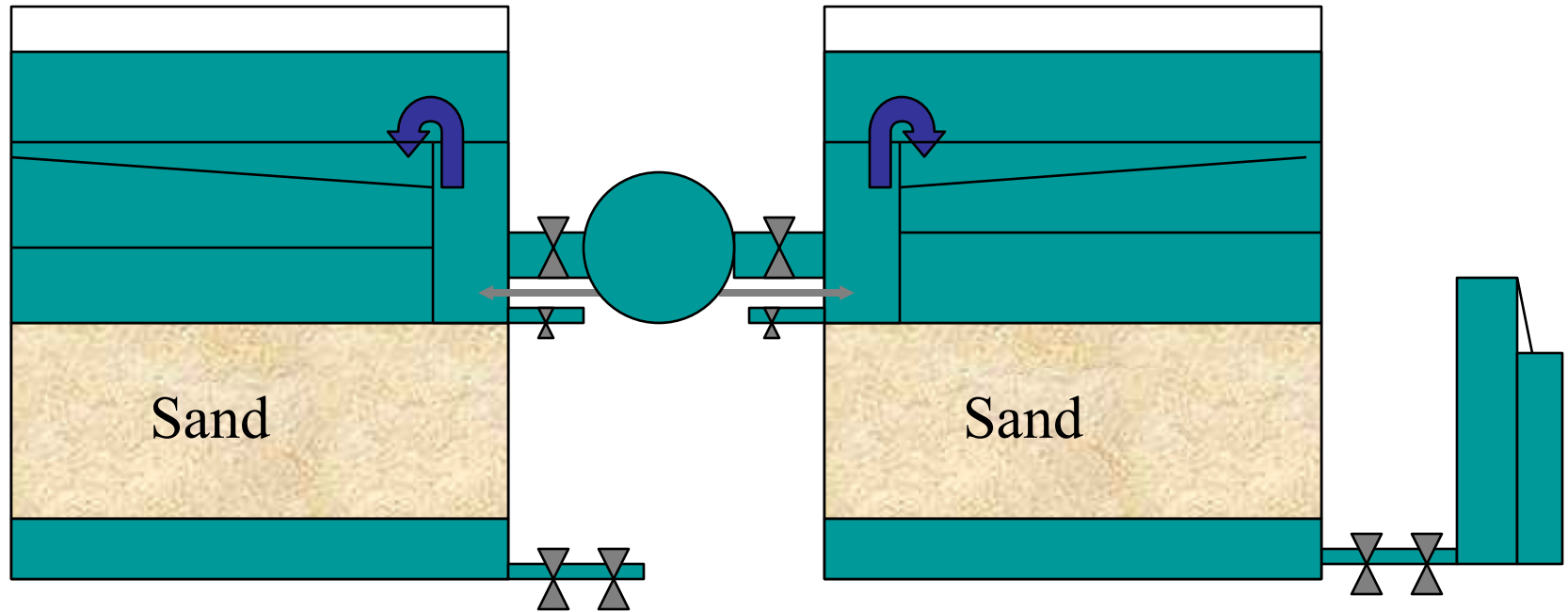
Conclusions (Sonuçlar)

- 1) Slow Sand Filtration 
- 2) Compact Units-Accelerators (Dekantörler) 
- 3) Conventional (Konvansiyonel Arıtma) 
- 4) USB: Upflow Sludge Blanket Clarifiers 
(Yukarı Akışlı Çamur Battaniye Sistemi)
- 5) Micro Sand (Actiflo): (Mikrokum) 
- 7) Super-Pulsators 

Thank You !

Declining Rate Filtration

(Azalan Debili Filtreler)



Ömerli (Muradiye SAT)



Kırıkkale SAT- Filtreler



Eskişehir-Filtreler



Kırıkkale SAT: Filtreler



Kırıkkale SAT: Filtreler



