

# **An Overview of Tertiary Filtration Using Cloth Media Filtration Technology**

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# Acknowledgements

## ▶ **Manufacturers:**

- **Aqua-Aerobics Systems, Inc.**
- **Parkson Corporation**
- **Siemens Water Technologies**
- **Veolia Water Solutions and Technologies – Kruger Inc.**

# Outline

- ▶ **What is Cloth Media Filter (CMF) Technology?**
- ▶ **Applications**
- ▶ **Geometries Available**
- ▶ **Flow Direction Options**
- ▶ **Selected Manufacturers**
- ▶ **Project Application – 30 MGD peak retrofit**
- ▶ **Questions**

# What is CMF Technology?

## ▶ Cloth Media Filter Technology:

- Since early 1990's
- Cloth woven or fiber pile construction (manufacturer dependent) for 10 micron TSS removal.
- Can get  $< 5$  mg/L TSS , f(flux, influent TSS, etc.)
- Filtration option in addition to granular media, microscreens, and membrane.
- Several process technology manufacturers
- Most common geometry is disc. (aka "Disc filters")

# CMF Technology Applications

- ▶ **Applications: Solids or precipitant removal**
  - Effluent TSS polishing
  - Reuse or membrane pretreatment
  - Phosphorus removal
  - Others
- ▶ **Applied in new or retrofit applications in frame/concrete tank or package/steel tank units.**
- ▶ **Benefits of high flux rates in small process footprints at reasonable headloss.**

# CMF Geometries Available

- ▶ **Vertical disc is most common and standard offering from technology manufacturers**
- ▶ **Maximum number of disc modules per unit varies with flow direction**
- ▶ **Disc surface area variable**
- ▶ **One manufacturer offers other geometries:**
  - **Drum**
  - **Diamond lateral**

# CMF Flow Direction Options

- ▶ **Two influent flow directions available in the industry**
  - Inside – Outside
  - Outside – Inside
  
- ▶ **Flow direction choice primarily affects:**
  - Method of solids removal via backwash/reject
  - Submerged or active filter area
  - Type of cloth media and active filter depth

# CMF Flow Direction Options: Outside - Inside

## ▶ Configuration

- Individual vertical discs. Common or individual disc filtrate/effluent collection.
- Installed in pairs. 2 – 12 discs/unit.

## ▶ Submergence

- Completely, thus 100% active filter area in the influent water

## ▶ Cloth

- Fiber pile, 10 micron (nominal)

## ▶ Active filter depth - 3-5 mm

## ▶ Clarifier or settling tank capacity - Yes.

# **CMF Flow Direction Options: Outside – Inside (cont)**

## **▶ Solids removal**

- Settled – by pump
- Cloth – by vacuum pumps and stationary vacuum bar. Disc rotates.

## **▶ Reject/Backwash**

- Water source – Filtrate (effluent)
- Quantity - 1 to 3% of applied flow
- Triggered on level sensor and/or timer (or manual)
- Filtration is active as only a small portion of media area is backwashed during cycle.

# CMF Flow Direction Options: Inside – Outside

## ▶ Configuration

- Panels connected to central feed drum for disc.
- Installed with up to 24 discs/unit.

## ▶ Submergence

- Typically ~65%, thus ~65% active filter area in the filtrate (effluent).

## ▶ Cloth

- Woven, 10 micron (absolute)

## ▶ Active filter depth - NA

## ▶ Clarifier or settling tank capacity - NA.

# **CMF Flow Direction Options: Inside – Outside (cont)**

## **▶ Solids removal**

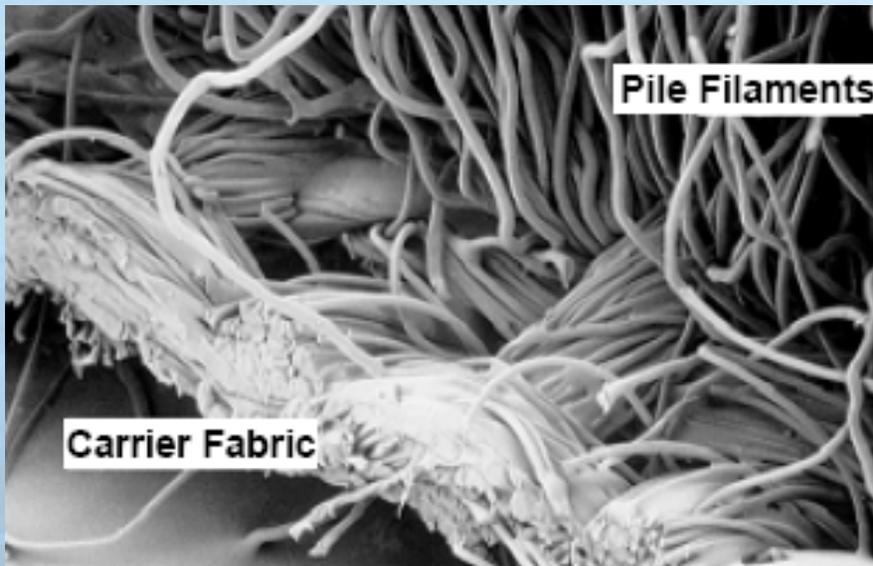
- **Cloth – by pressure wash using spray nozzles and wash water pump. Disc rotates and previously non-submerged area active.**

## **▶ Reject/Backwash**

- **Water source – Filtrate (effluent)**
- **Quantity – 0.5 to 3% of applied flow**
- **Triggered on level sensor and/or timer (or manual)**
- **Filtration is active as only a small portion of media area is backwashed during cycle.**

# Cloth: Pile and Woven

**Pile**



**Woven**



# Selected Manufacturers

- ▶ **Aqua-Aerobics Systems, Inc.**
  - AquaDisk®, AquaDiamond®
- ▶ **Parkson Corporation**
  - DynaDisc® Filter
- ▶ **Siemens Water Technologies**
  - Forty-X™ Disc Filter
- ▶ **Veolia Water Solutions and Technologies – Kruger Inc.**
  - Hydrotech Disc Filter

# Aqua-Aerobics Systems, Inc AquaDiamond®

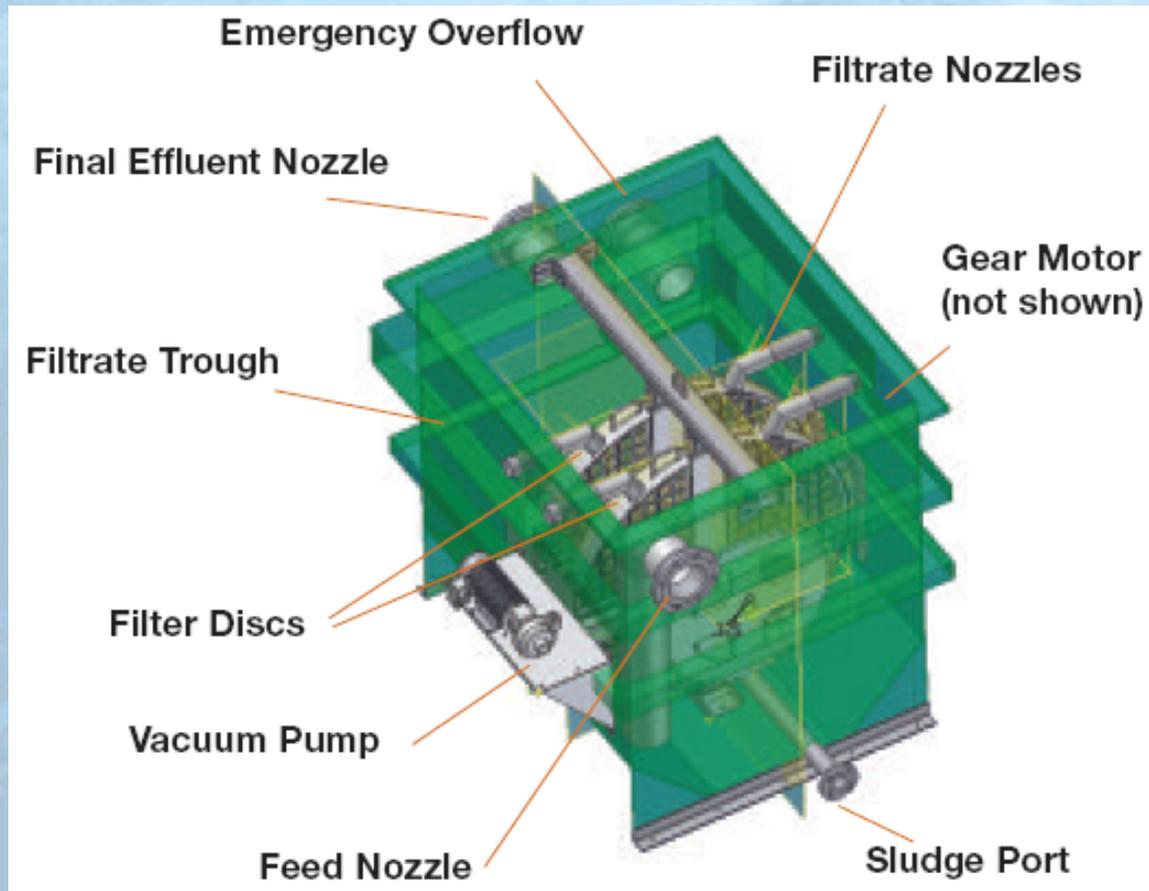
- ▶ **Flow Direction: Outside – Inside**
- ▶ **Cloth: Pile**





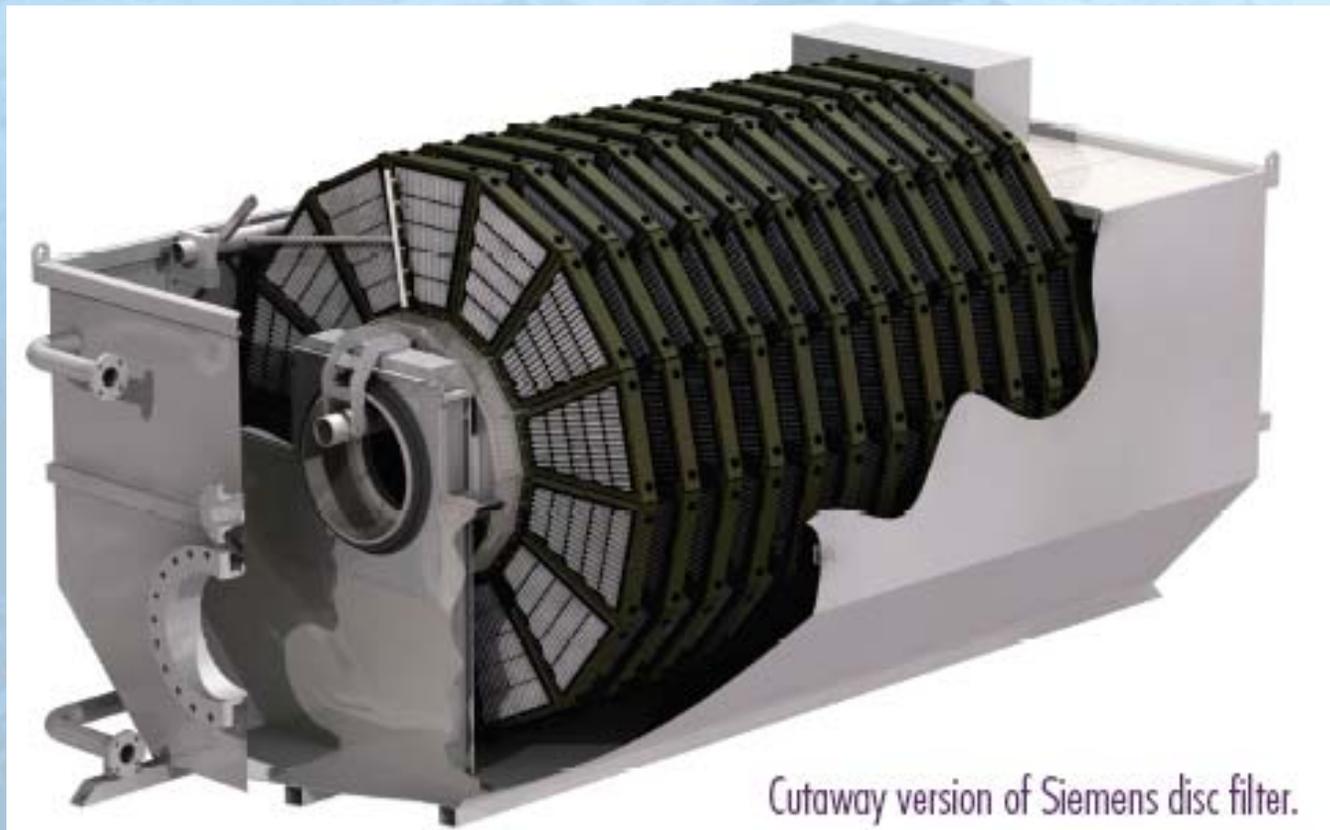
# Parkson Corporation DynaDisc® Filter

- ▶ Flow Direction: Outside – Inside
- ▶ Cloth: Pile



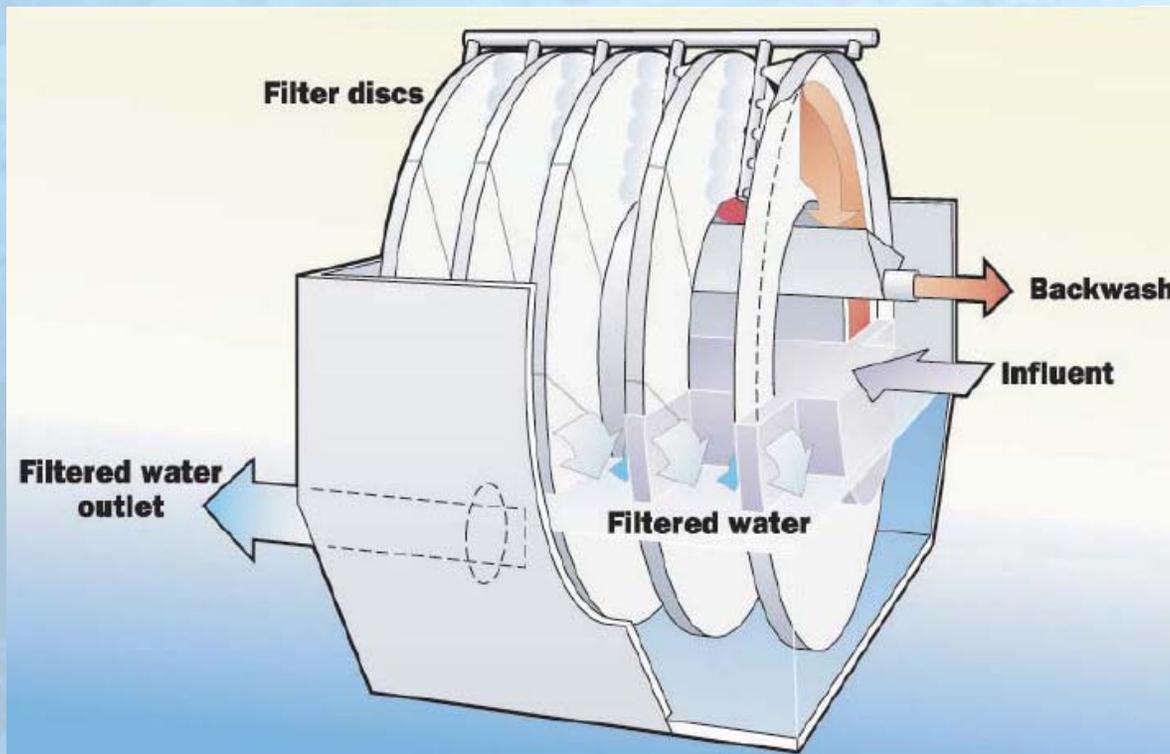
# Siemens Water Technologies Forty-X™ Disc Filter

- ▶ Flow Direction: Inside – Outside
- ▶ Cloth: Woven



# Veolia WS &T – Kruger Inc. - Hydrotech Disc Filter

- ▶ **Flow Direction: Inside – Outside**
- ▶ **Cloth: Woven**



# Project Application

## – 30 MGD peak retrofit

### ▶ Application:

- Tertiary filtration, effluent polishing

### ▶ Design criteria

- Conceptual/PER level
- Retrofit within existing 1971 era Microscreen Building (10 mgd Avg, 15 mgd Peak)
- Criteria:

Parameter	Peak	Average
Flow (MGD)	30	10
Influent TSS (mg/L)	30	15
Effluent TSS (mg/L)	10	5

# Aerial View of WWTP



Microscreen Building

# Existing Microscreens

- ▶ (5) units, 10ft diameter



# CMF Technology Options for 30+MGD

- ▶ Table summary of frame/concrete tank CMF units that met that fit in the retrofit area and had Peak Q  $\geq$  30 MGD.

Description	# of Units	# of Filter Disks per Unit	Peak Hydraulic Loading Rate (gpm/ft <sup>2</sup> )
Aqua-Aerobic Systems, Inc. AquaDisk Filter	5	12	6.5
Parkson Corporation - DynaDisc Filter <sup>1</sup>	5	12	6
Veolia Water - Kruger Inc. Hydrotech DiscFilter	5	18	6
Siemens Water Technologies - Forty-X Disc Filter <sup>1</sup>	5	18	6

# Summary

- ▶ **Overview of Cloth Media Filter (CMF) Technology**
  - Flow direction types
  - Technology differences.
- ▶ **Four manufacturers mentioned (others)**
- ▶ **Selection for the 30 MGD retrofit has not been made at this time.**

# Questions



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# Plant Site Plan

