



Continuous Backwash Filters for Sidestream Filtration

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Overview

- Cooling Towers
- Side Stream Filtration
- How Sand Filtration Works
- Flow diagram of a Conventional Filtration System
- How the DynaSand Works
- DSF Components
- Packages vs. Modules
- Contact Filtration

Cooling Towers

Inexpensive/dependable heat rejection device

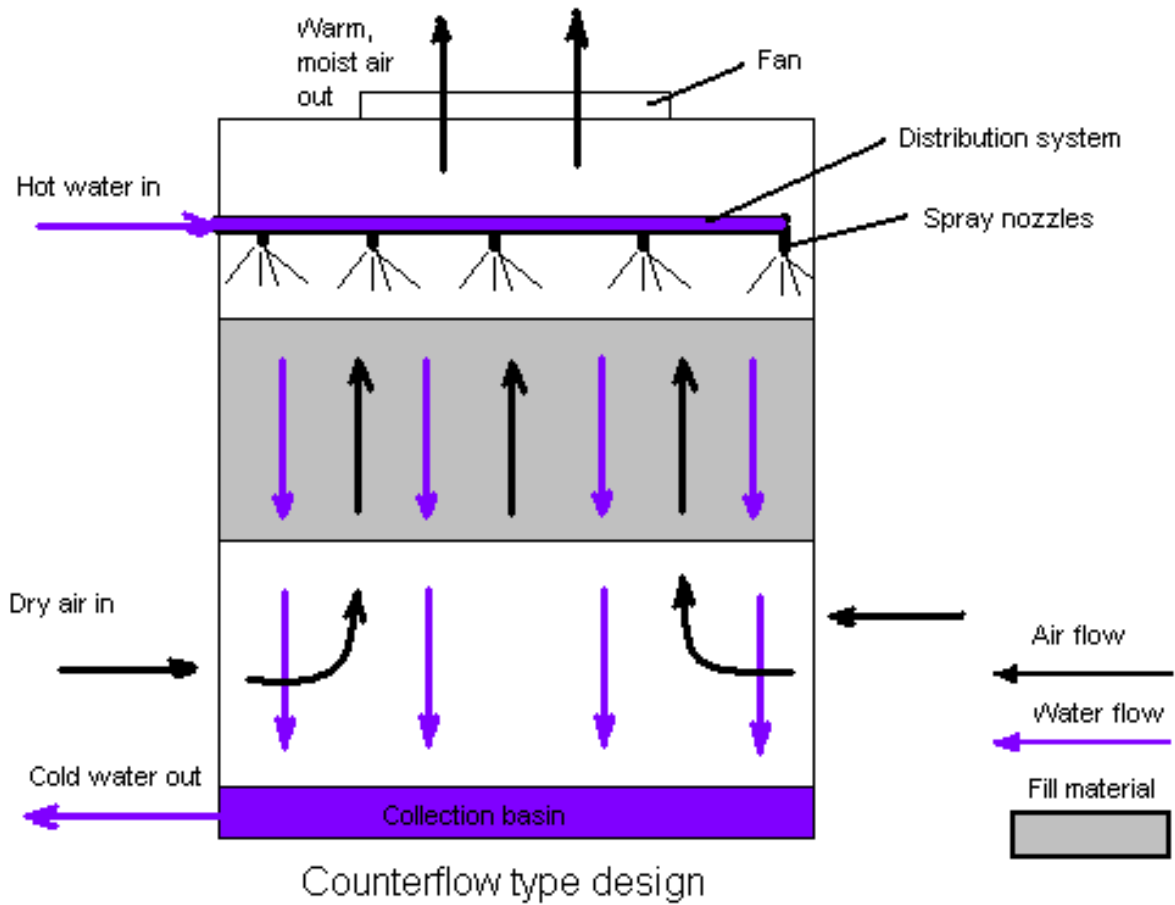
Evaporative coolers that cool water to near ambient temperature

Make up water replenishes water lost to evaporation

Water falls on fill material to increase contact time and heat transfer

Common applications include:

- **Refineries, chemical industries, power and building cooling**



Cooling Tower

Why we Need Sidestream Filtration?

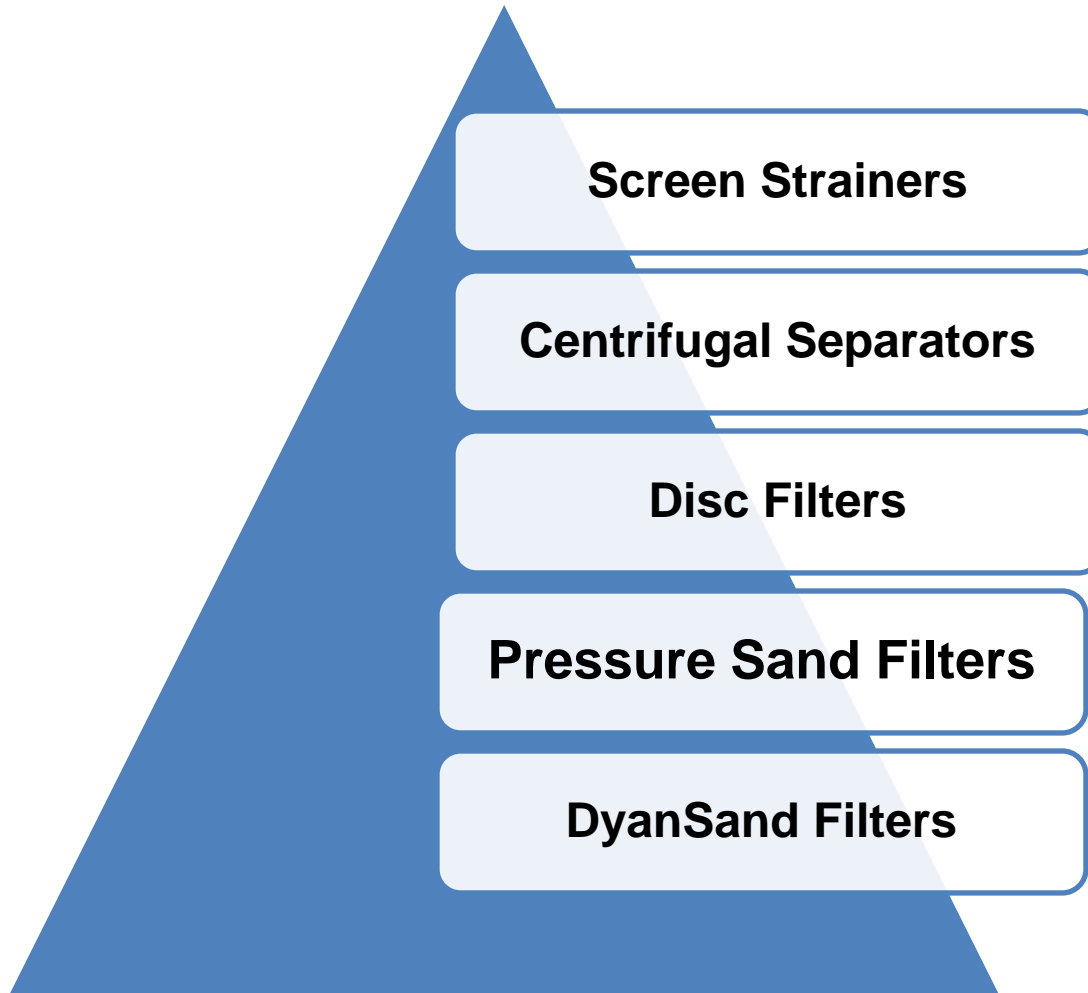
Cooling towers
make excellent air
scrubbers/
washers

Accumulate
dirt, grit, sand,
and chemical
residues

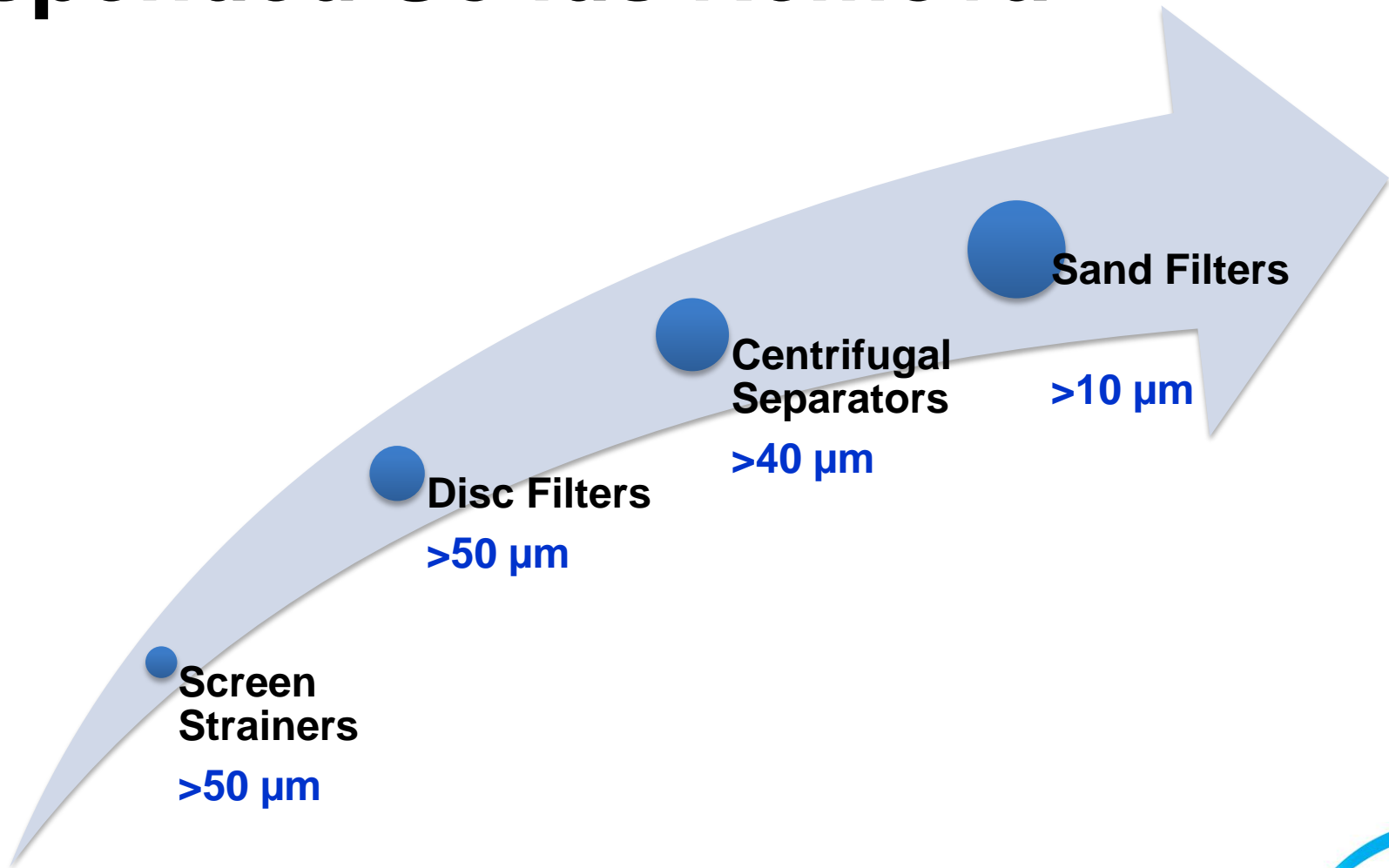
Solids can
clog cooling
tower spray
nozzles and
reduce
operating
efficiency
(heat
transfer)

Critical in
the Middle
East during
sand storms

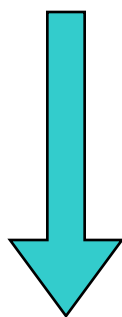
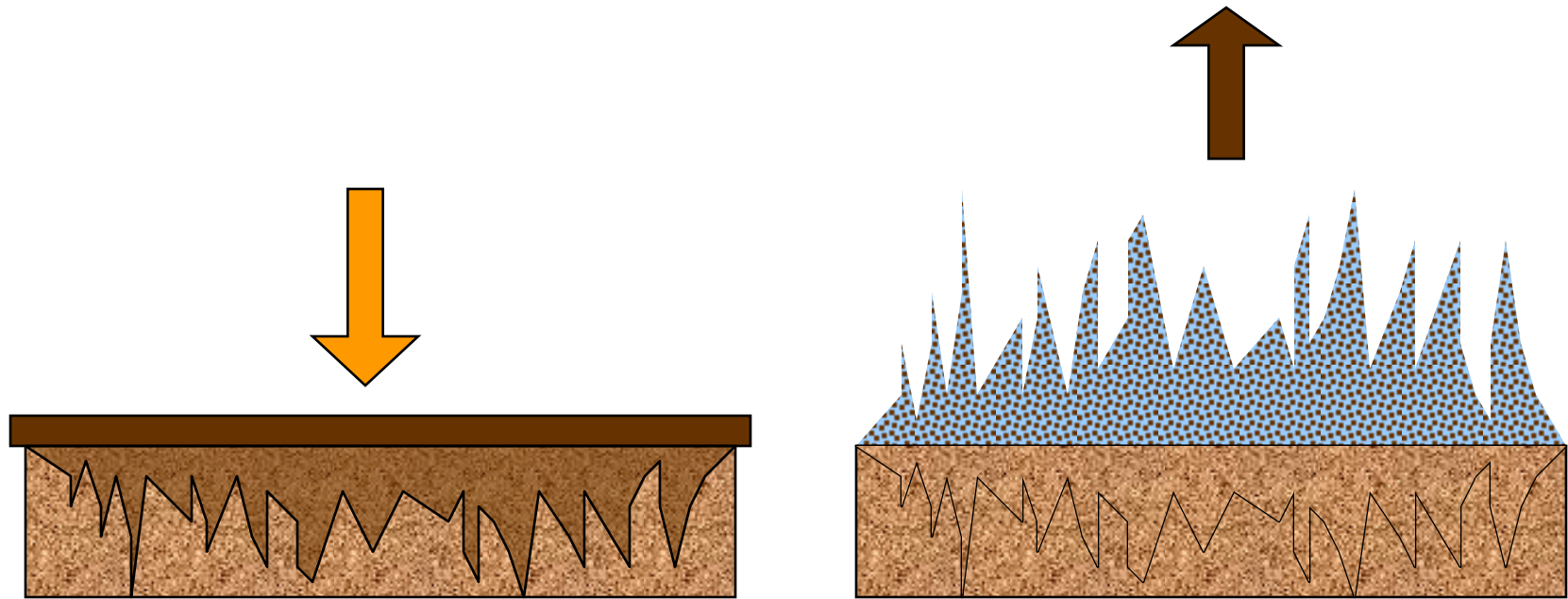
Available Options



Suspended Solids Removal



Conventional Filtration

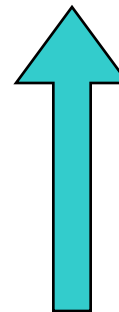


Physical barrier between influent and filtrate

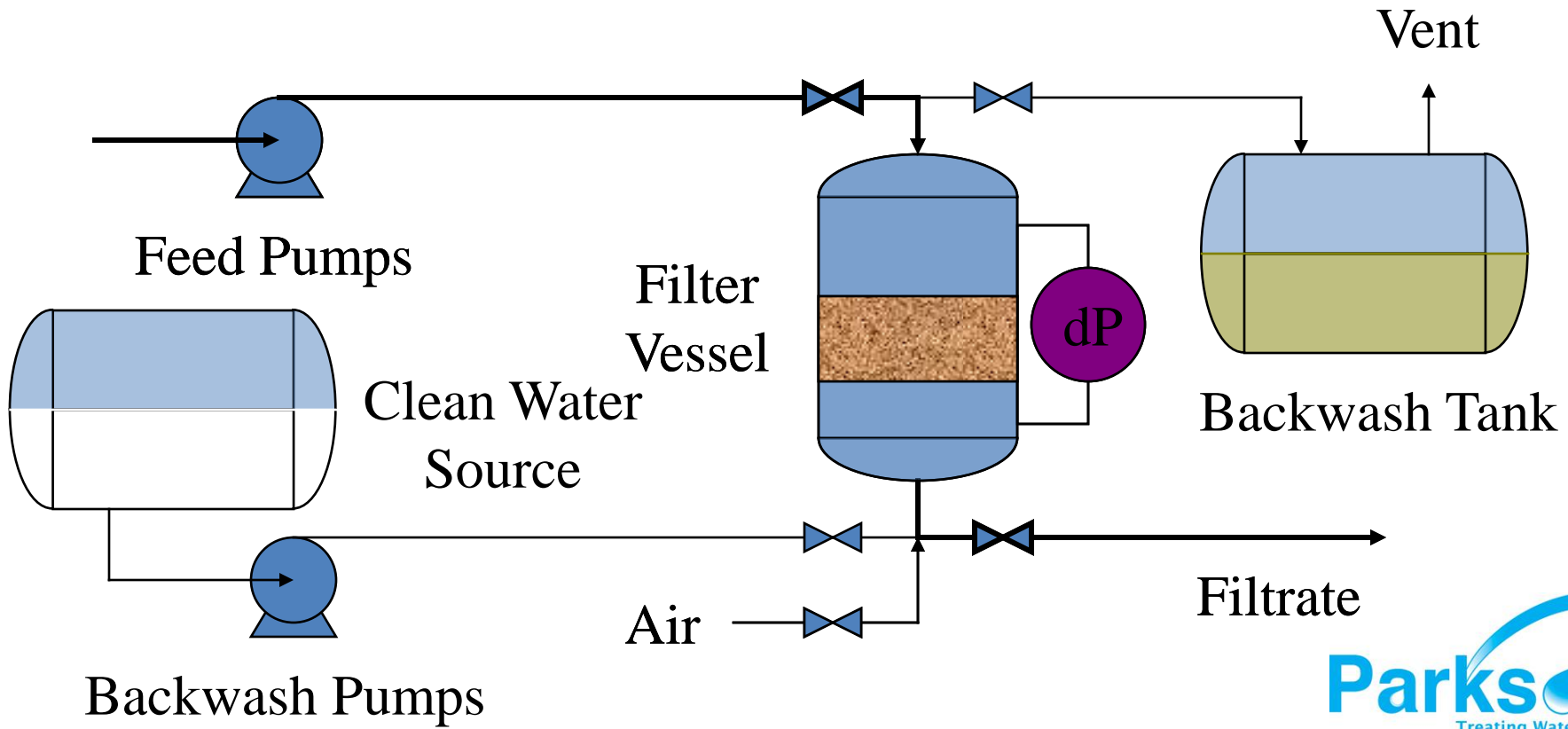
Solids bind to media

Terminal headloss

Air scour to dislodge solids and backwash to flush solids from media



Conventional Filtration Flow Sheet



DynaSand[®] Filter

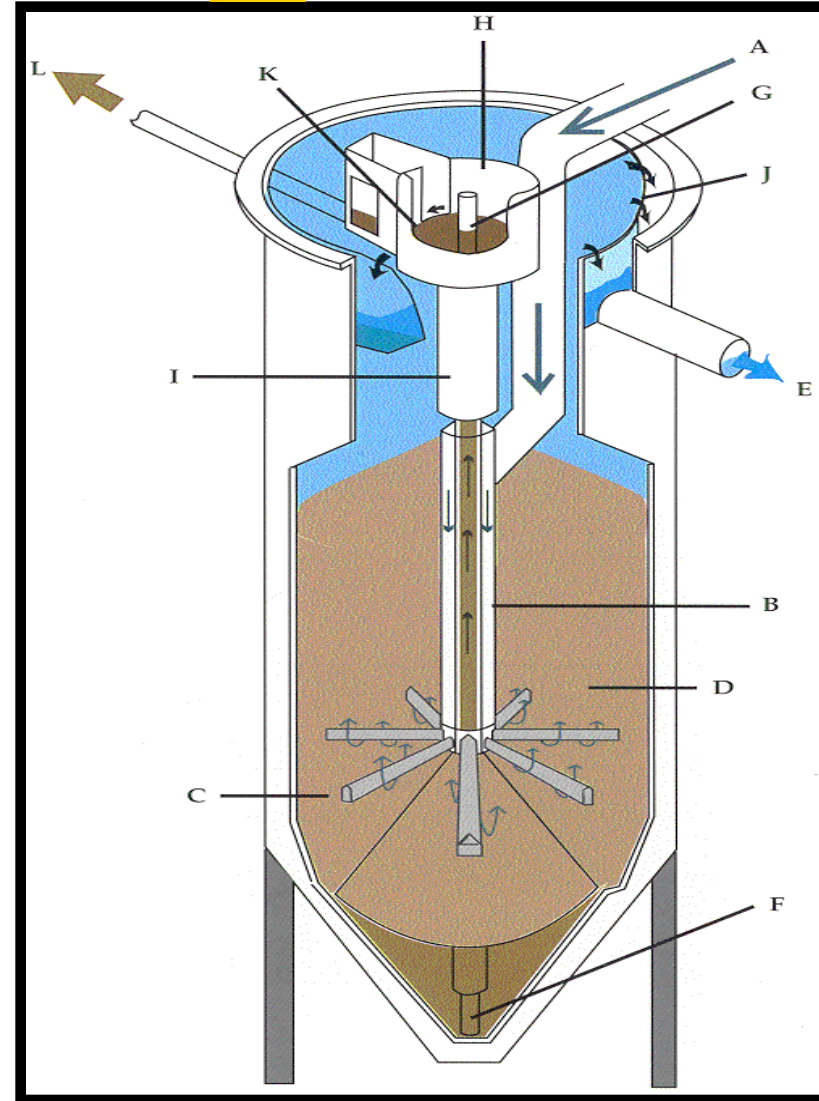


- Upflow
- Deep bed
- Continuous backwash
- Gravity sand filter



DynaSand® Filter

- A- Feed
- B- Feed assembly
- C- Distribution
- D- Sand bed
- E- Filtrate
- F- Airlift pump
- G- Airlift discharge
- H- Reject compartment
- I- Washer section
- J- Filtrate weir
- K- Reject weir
- L- Reject line



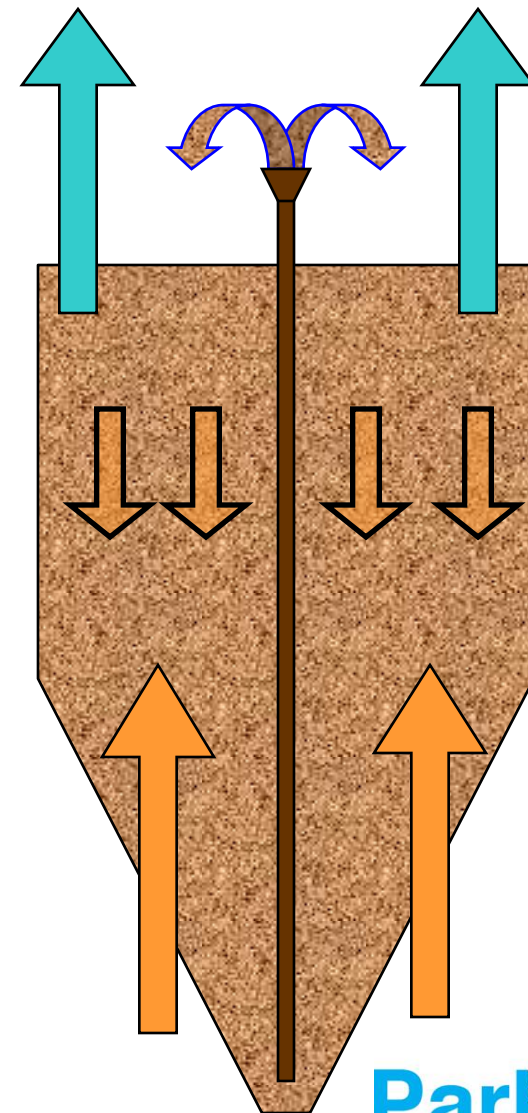
Continuous (moving bed) Backwash

Upflow Design – Filtrate leaves the media from the top.

Air lift pumps media to Washer at top of filter & provides constant air scour.

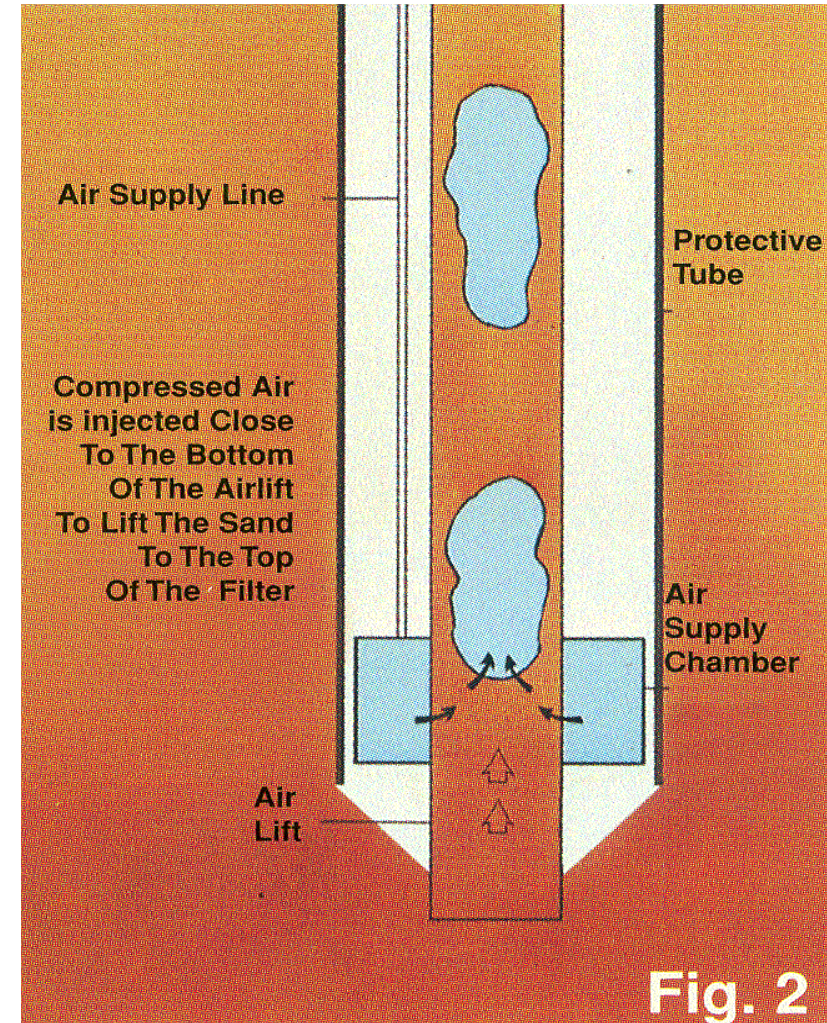
Head differential in Washer assembly provides constant backwash with filtrate.

Very forgiving to process upsets.



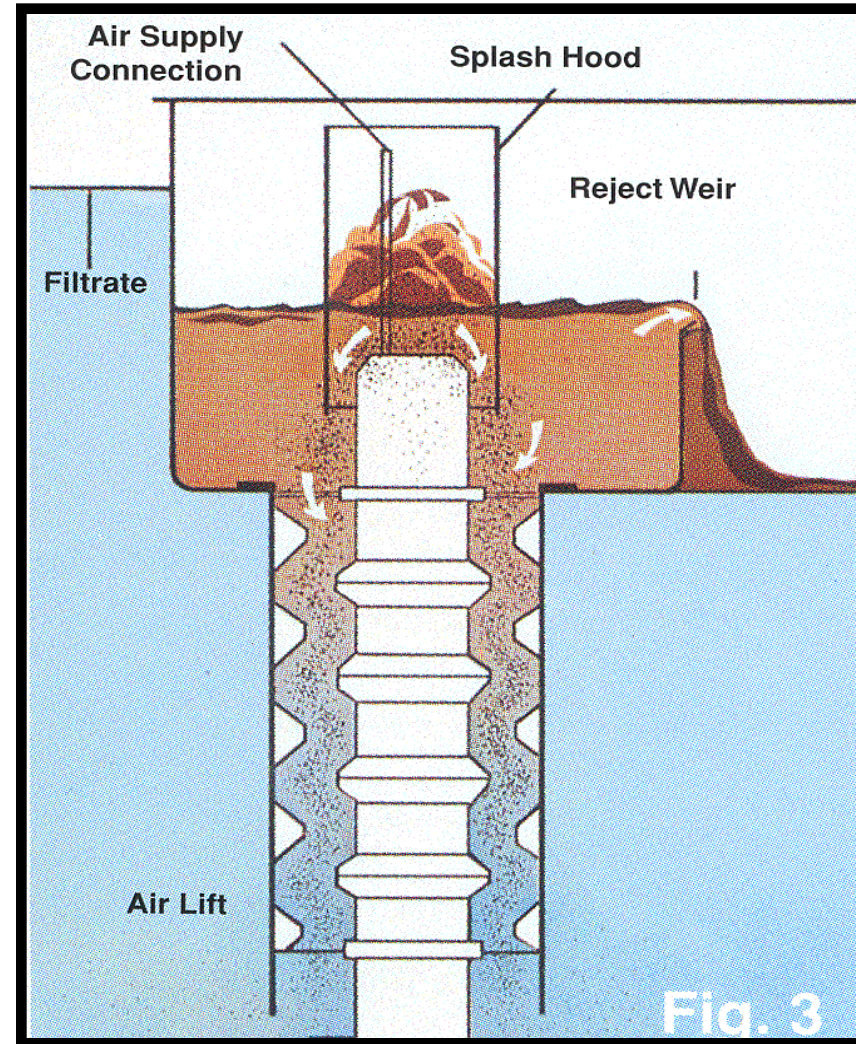
Bottom of Airlift Pump

- 2-3 scfm of air at a pressure of 15 – 20 psi (All utility required)
- Heavy scouring of sand (in excess of 150 scfm/sq.ft.)



Top of Airlift & Washer

- Heavier sand is washed and lighter floc is rejected
- Filtered water used for backwash
- Hydraulic differential creates barrier
- Backwash loading rate > 80 gpm/sq.ft
- Avg. reject rate = 5%



Top View of a Pilot Unit



Sand Return

- Clean sand returns to top of bed
- View through porthole



Benefits

- Continuously cleaned sand bed
- No moving parts
- Low pressure drop (36"-48")
- High solids capacity (100 mg/L TSS)
- Elimination of ancillary equipment.
- Even flow distribution with multiple units.
- Can do routine maintenance with while filter still filtering

Package units

- All stainless steel and fiberglass parts
- Only one spare part
- Loading rates up to 10 gpm per square foot
- Packaged units are shipped totally assembled except for platforms/handrails



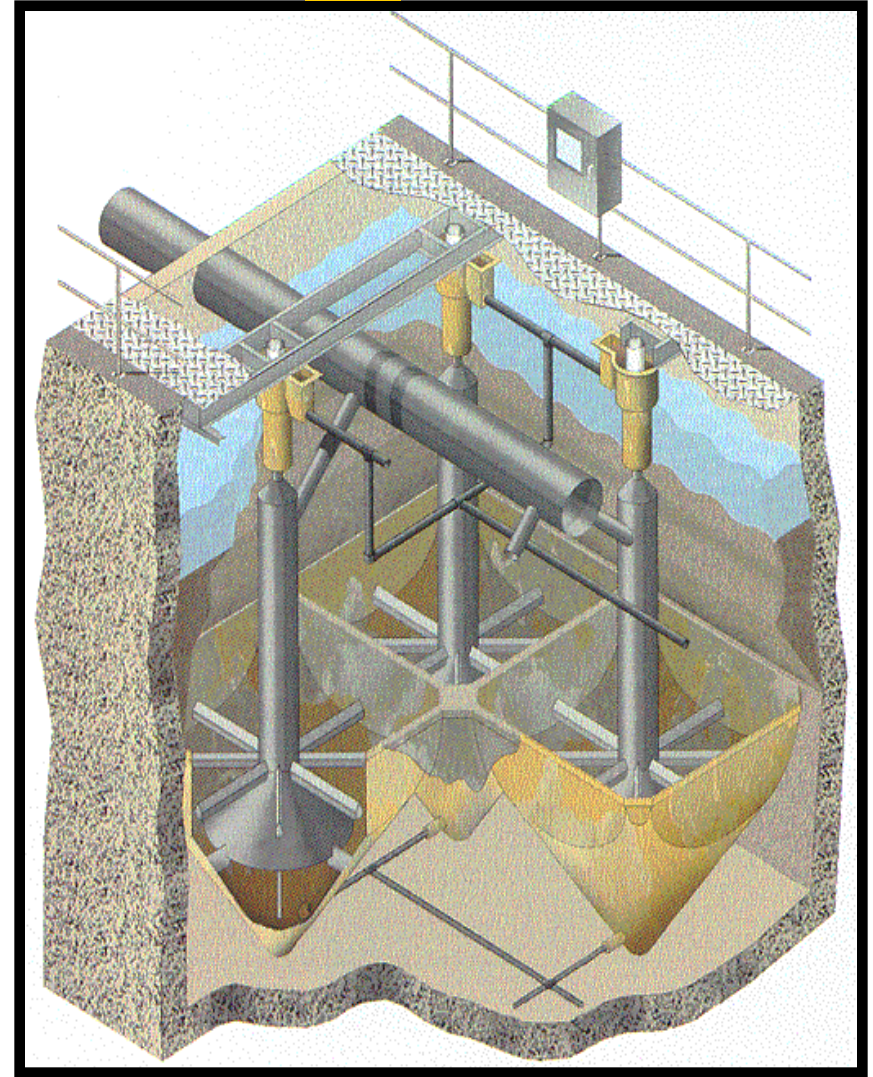
Package Units

- DSF-7
- DSF-12
- DSF-19
- DSF-38
- DSF-50
- DSF-64
- DSF-78
- DSF-100



Concrete Modules

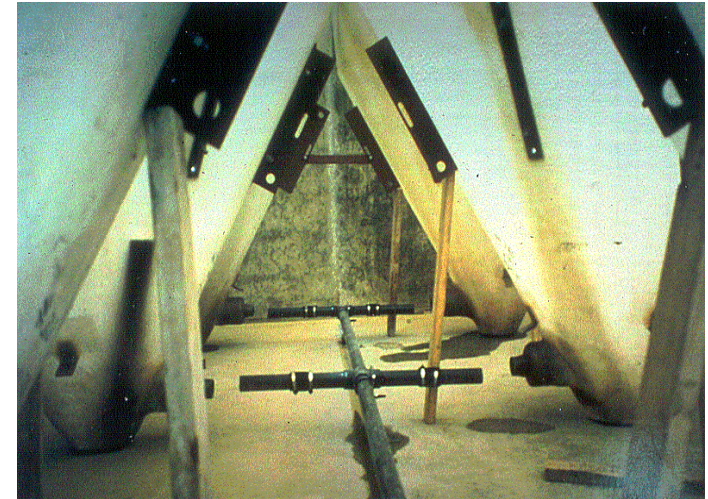
- For larger flows, we install multiple 50 ft² modules in concrete tanks by others
- Internals are shipped in easy-to-assemble sections
- Up to 12 modules per cell (600 ft²)
- Alternative materials of construction are available
- Each module takes 20 man-hrs to install
- Media shipped to jobsite in SuperSacks or pneumatic truck



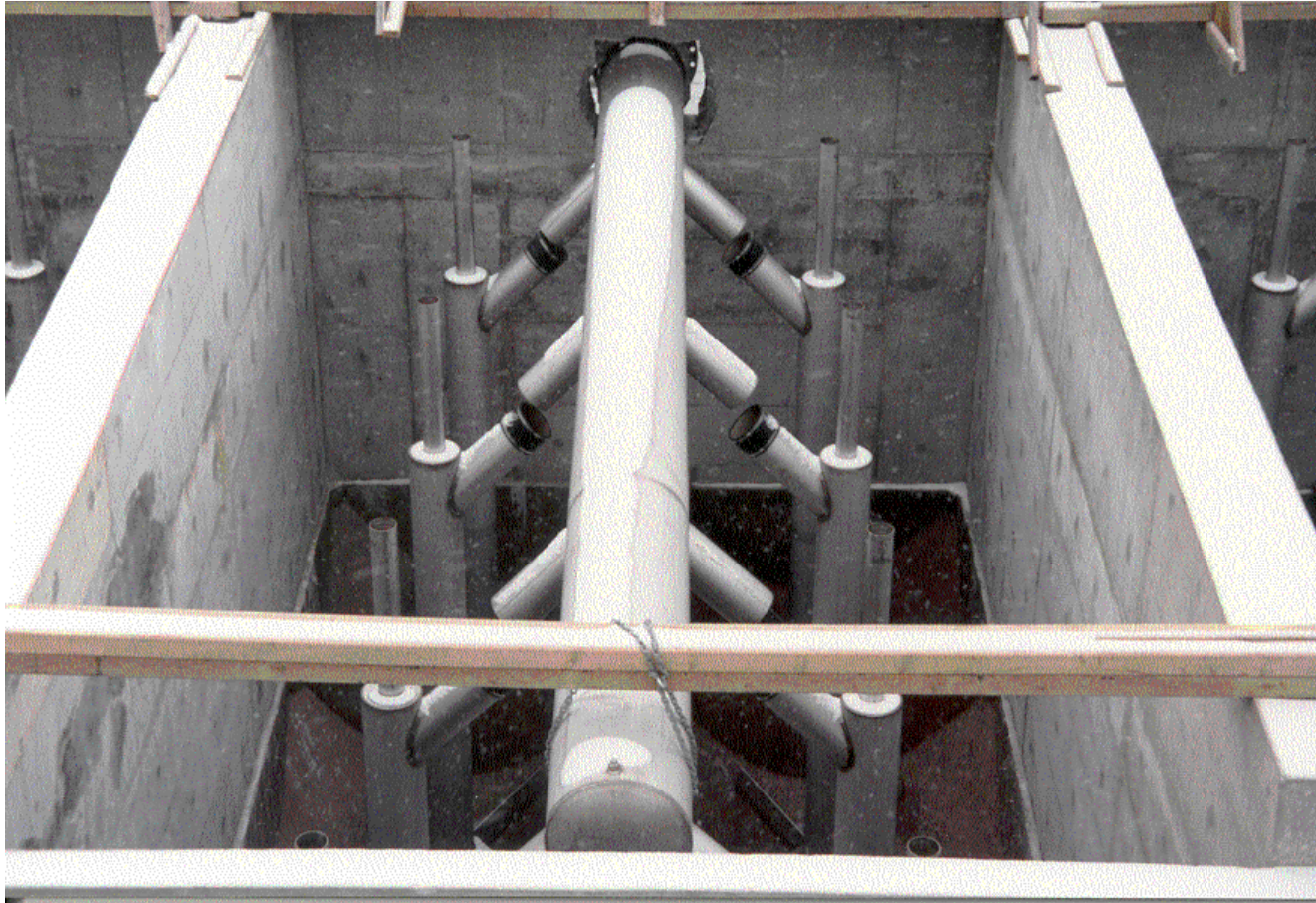
Concrete Modules



Installation of Concrete Modules



Installation of Concrete Modules



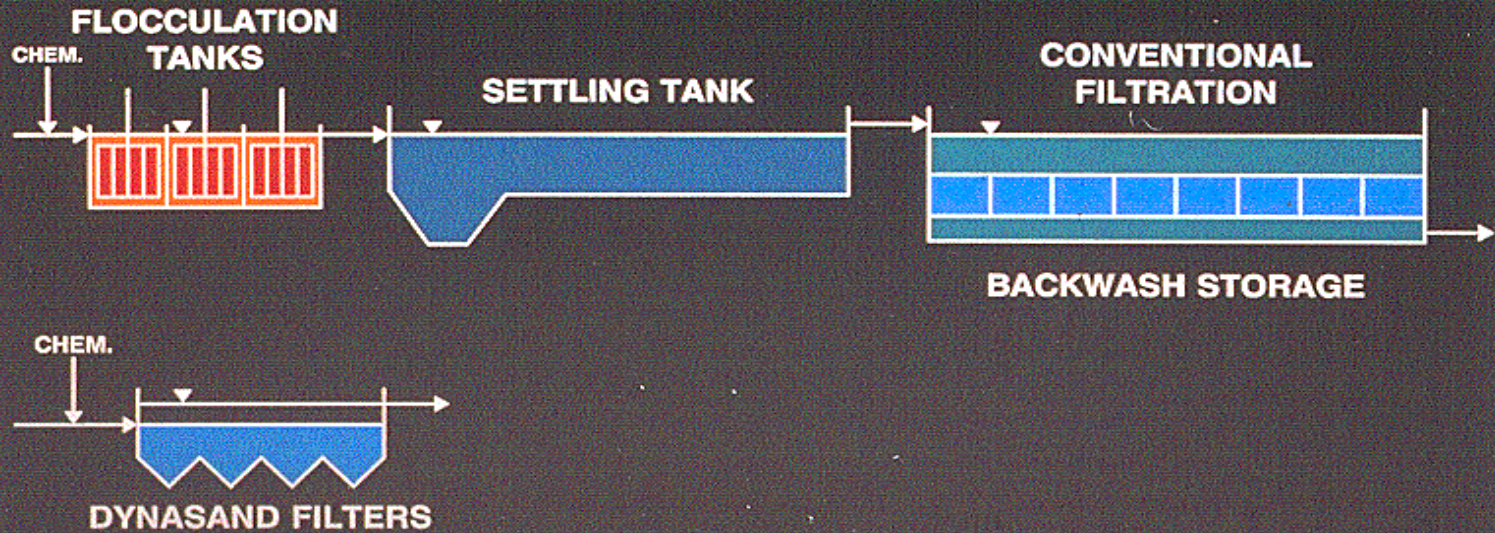
Continuous Contact Filtration

- Process which combines coagulation, flocculation and filtration in one operation
- Flocculation and settling basins are eliminated ahead of the filters
- Floc forms quickly when pumping energy is dispersed in the sand bed
- Pin point flocs are formed
- Coagulant dosage reduced by 30%

Continuous Contact Filtration

DynaSand Continuous Contact Filtration

Scaled Comparison



Continuous Contact Filtration

- Phosphorus removal
- Nitrogen removal
- Algae removal
- River water treatment
- Potable water production
- Ground water treatment (Fe & Mn removal)
- Arsenic

Q&A