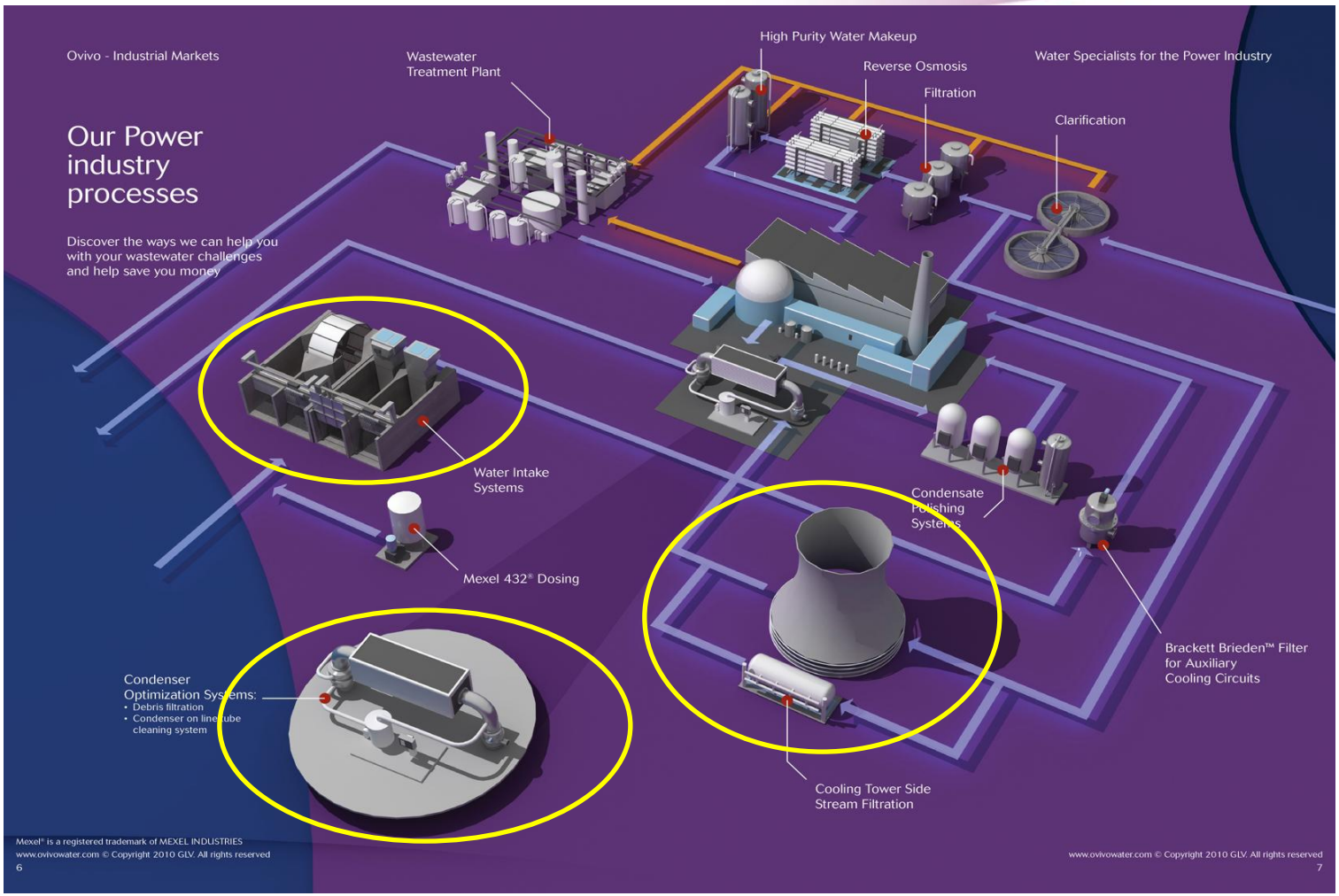
General Cooling Water Issues
May 2013

Energy Group – Power & Intakes, Americas

Energy Flowsheet - What impacts plant performance and availability?

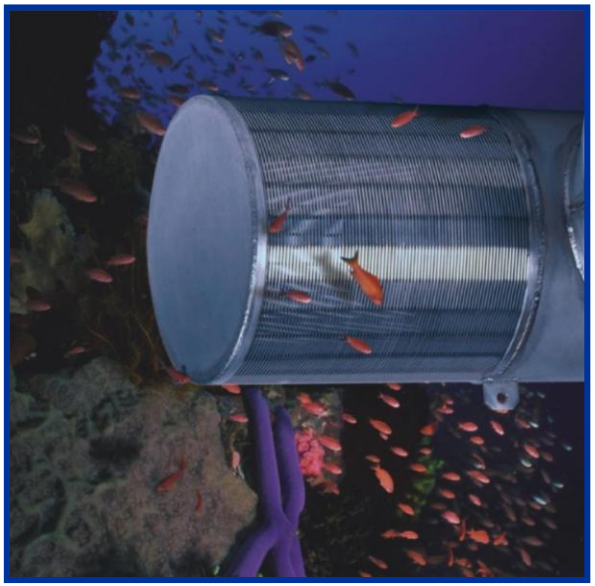


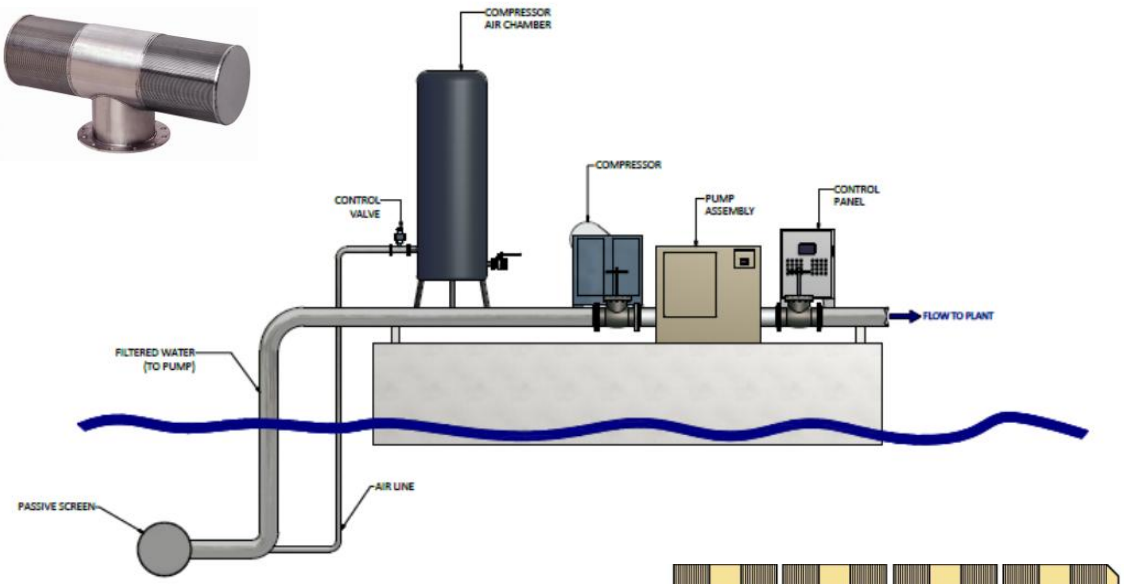
- Macro fouling - coarse or fibrous debris blocking process equipment (blown in debris, element disintegration)
- Micro fouling and scaling - inside the process equipment (condenser tubes fouled and decrease heat exchange capability)
- The presence of debris, as well as dissolved minerals in cooling water negatively impacts the plant performance, plant availability, plant operating and maintenance costs

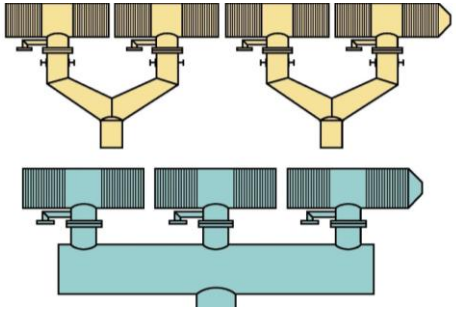
Plant Goals

- Improved thermal performance
- Increase plant output
- Increase plant availability
- Reduce environmental impact
- Reduce maintenance cost

Passive Wedge Wire Screens





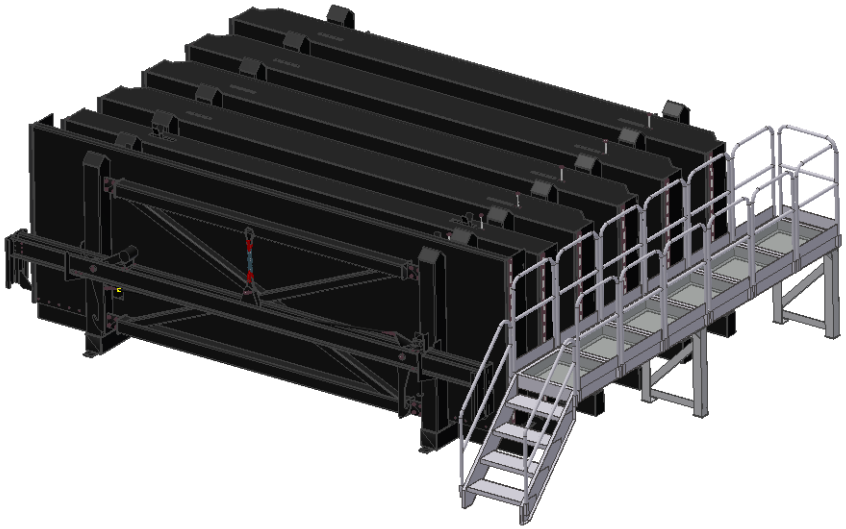


- Screens have no moving parts, therefore the term “passive screening.”
- Admits water at a low, uniform velocity.
- Aquatic life and debris remain in the water source.
- Placement is away from the shoreline avoiding high concentrations of debris and marine life.

Stop Gates

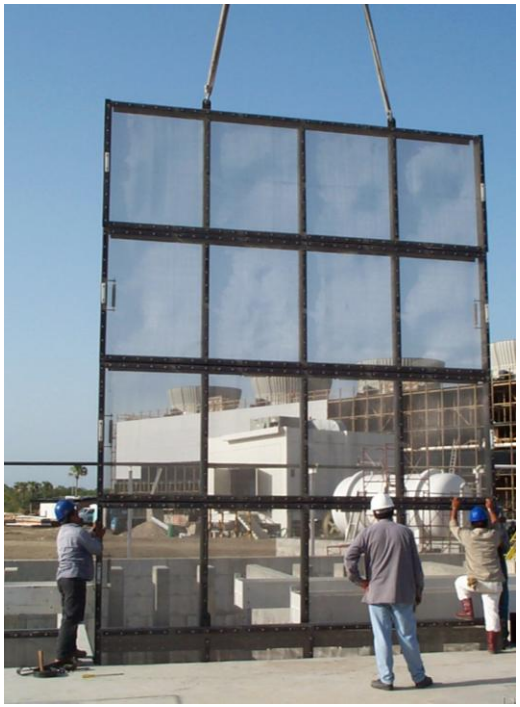
- Lifting Beam
- Guides
- Stop Gate

- **Each gate is custom made to site specific conditions**
- **Available in widths from 1m to 6m (3 to 20 feet)**
- **Variable height depending on available overhead room**
- **Options for full or partial height**



Stop gate storage racks may be single row located on the deck or in a pit within the civil works of the intake

Static or Stationary Screens



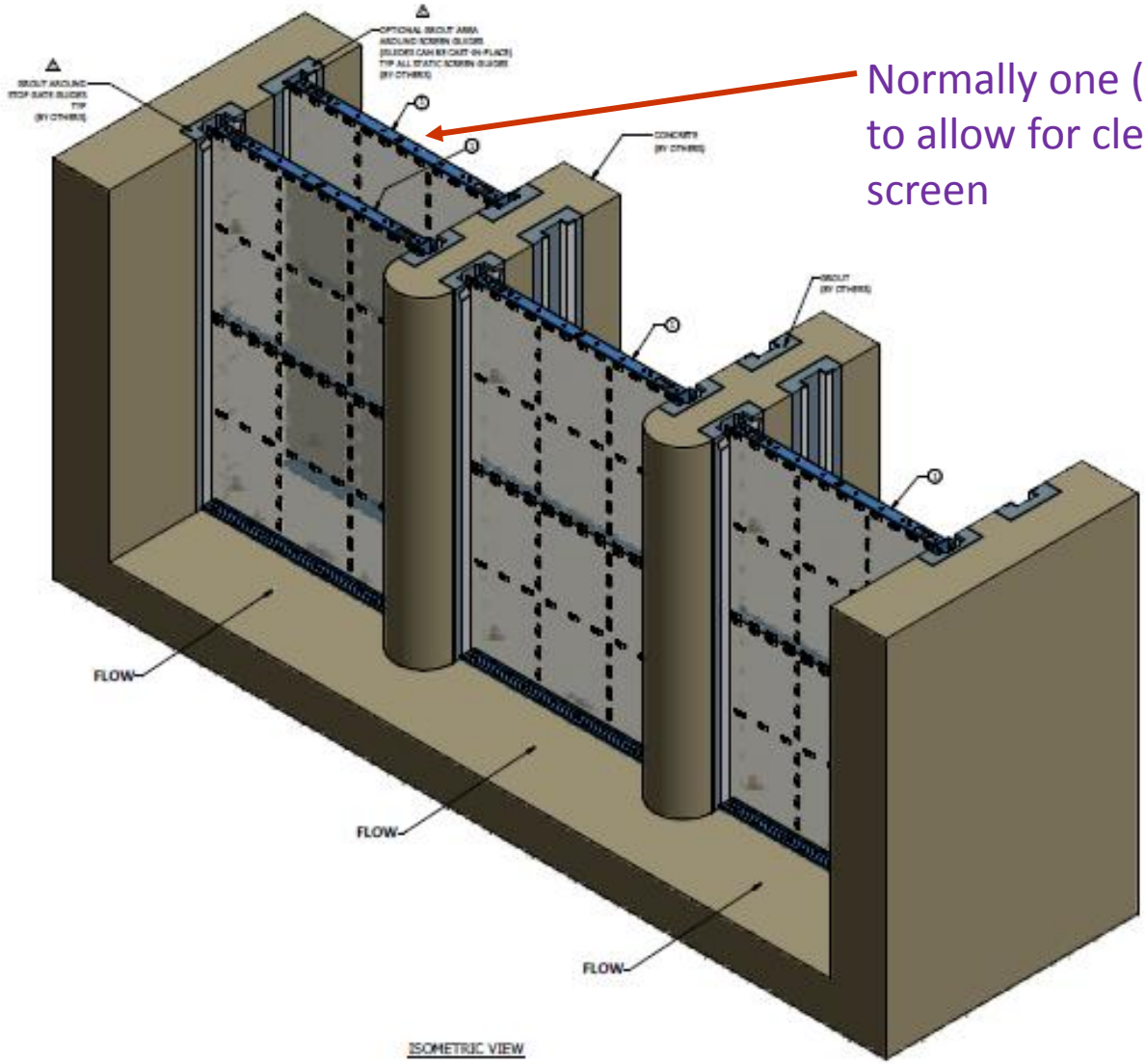
Normally used for closed loop cooling applications, sub-surface piped or low velocity intakes

Typically uses 2 per channel is series to allow hand washing of screens

Used to capture foreign debris, disintegrating cooling tower elements, etc…

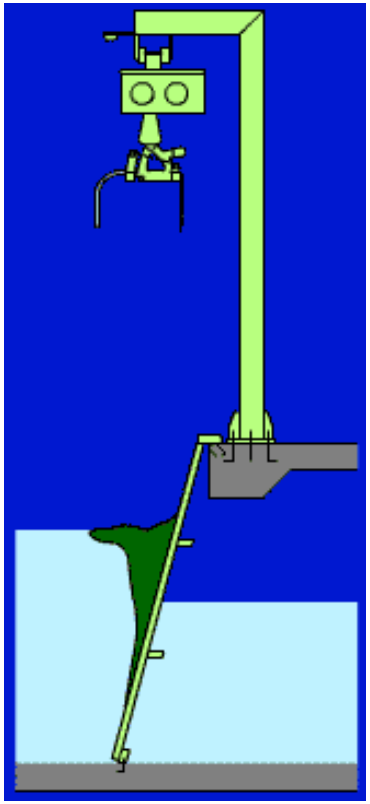
Variable widths, depths, mesh openings and materials

Static or Stationary Screens



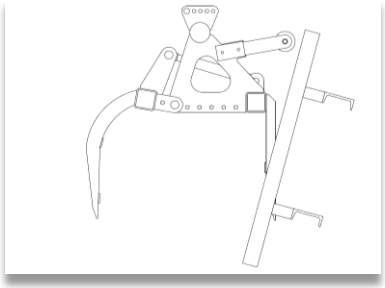
Normally one (1) roving screen used to allow for cleaning of upstream screen

Brackett Bosker®
Raking Machine



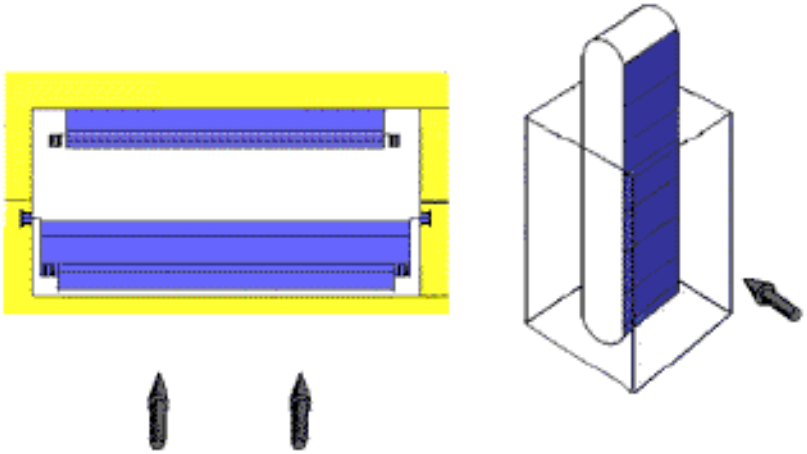
- Light Duty (LD) = 250 Kg / 550 Lb.
- Heavy Duty (HD) = 500 Kg / 1,100 Lb.
- Super Duty (SD) = 1,000 Kg / 2,200 Lb.
- Ultra Duty (UD) = 3,000 Kg / 6,600 Lb.

- Coarse Raking Machine
- Debris Conveyor
- Debris Reloading Machine



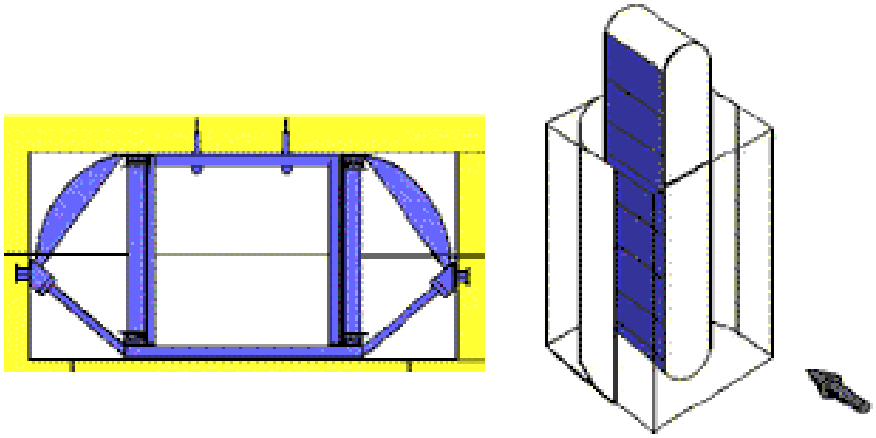
Straight Thru Screen vs. Dual Flow Screen

Influent Side is in contact with Effluent Side. **Debris Carry over cannot be avoided**.



Thru-Flow Screen

Influent Side is separated from Effluent Side. **Debris Carry over is completely eliminated.**

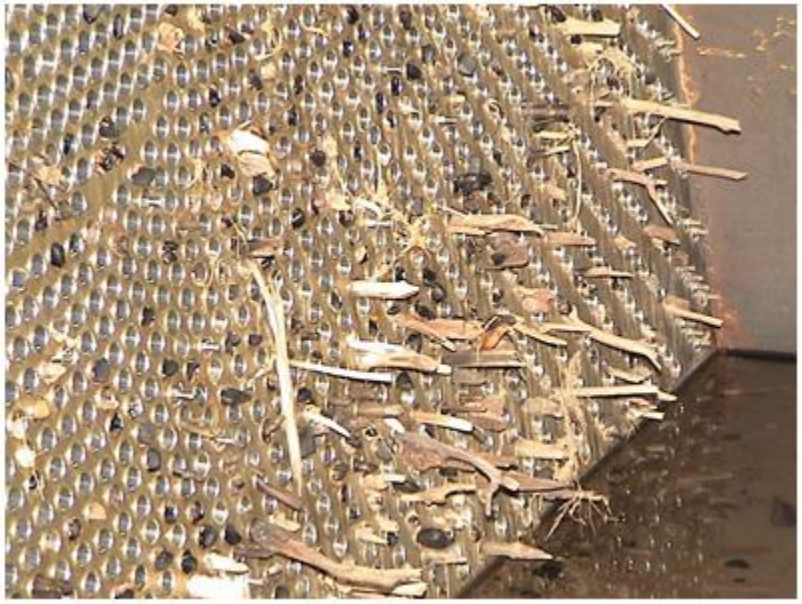


Dual Flow Screen

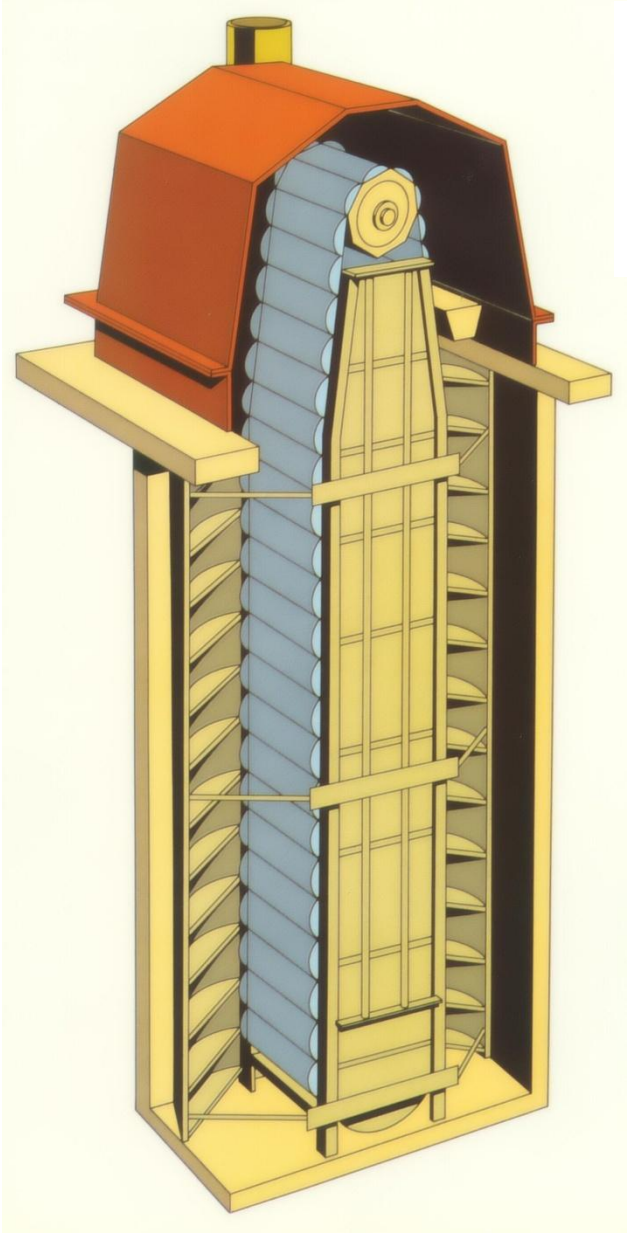
Dirty Water

Clean Water

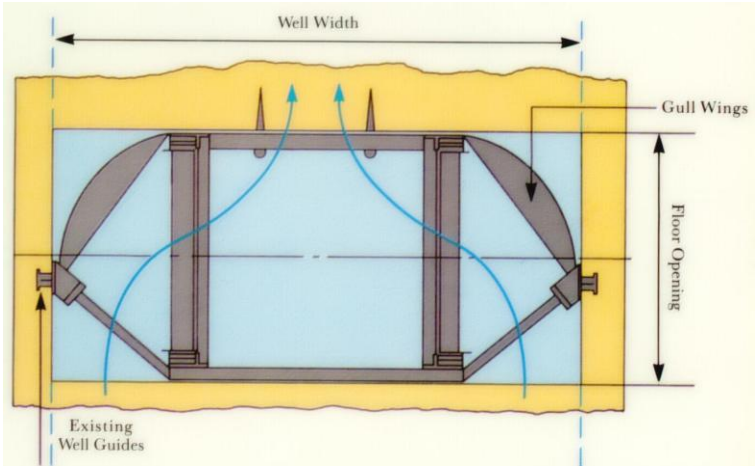
Carry over with Thru Flow

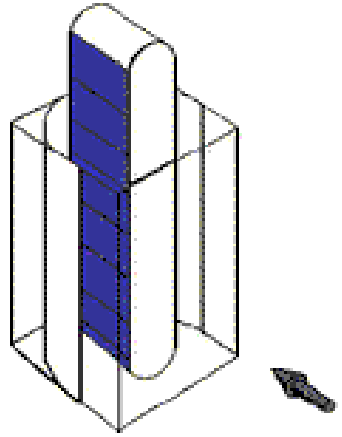


Debris in condenser from typical “thru flow screen” due to debris carry-over

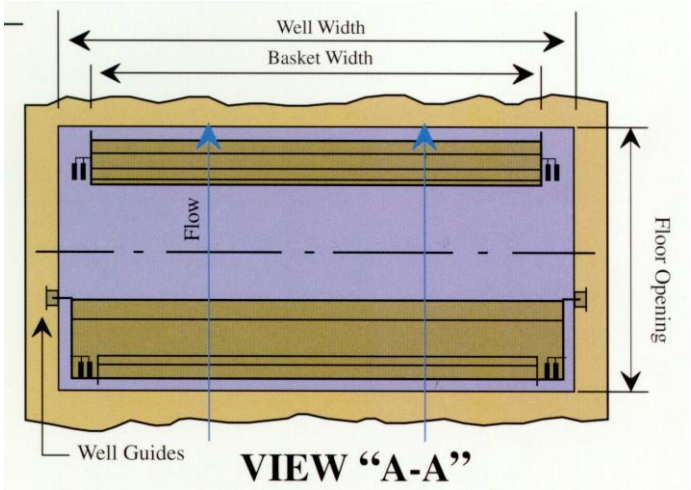


Ovivo developed the Dual Flow Conversion from existing technology that addresses virtually every aspect of screen reliability, operation and maintenance. This has been the driving force in the application of Dual Flow and Dual Flow Conversion Band Screens.

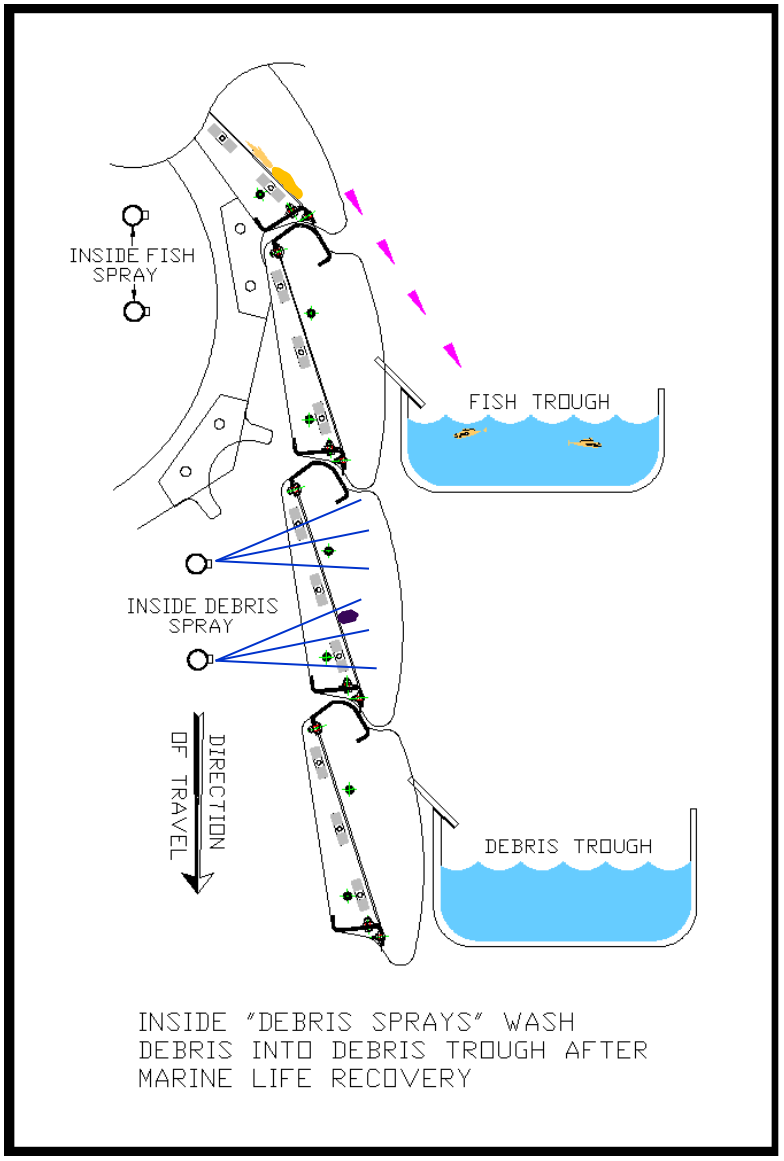


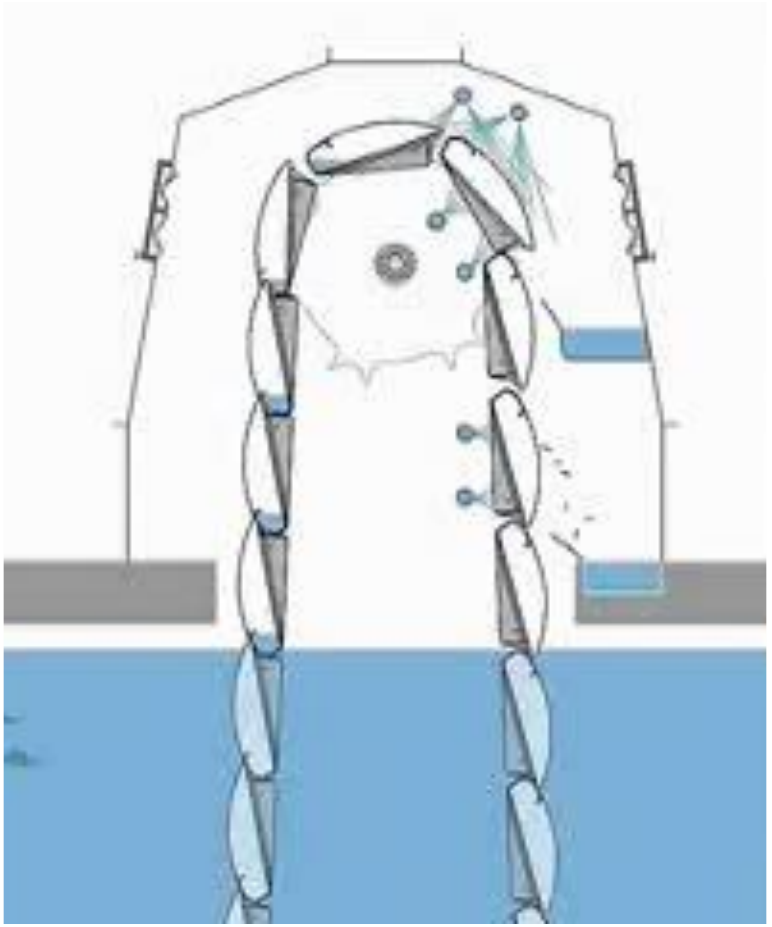


Dual Flow Screen



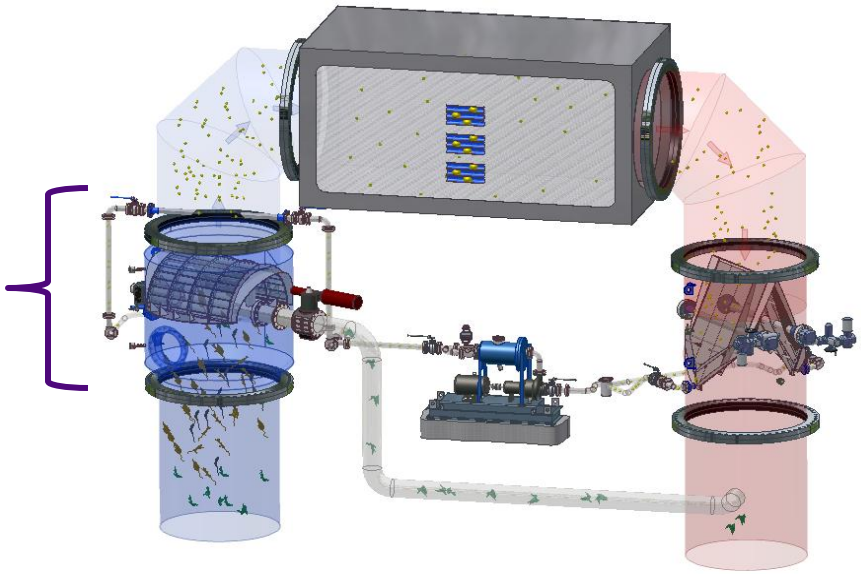
Clean Water

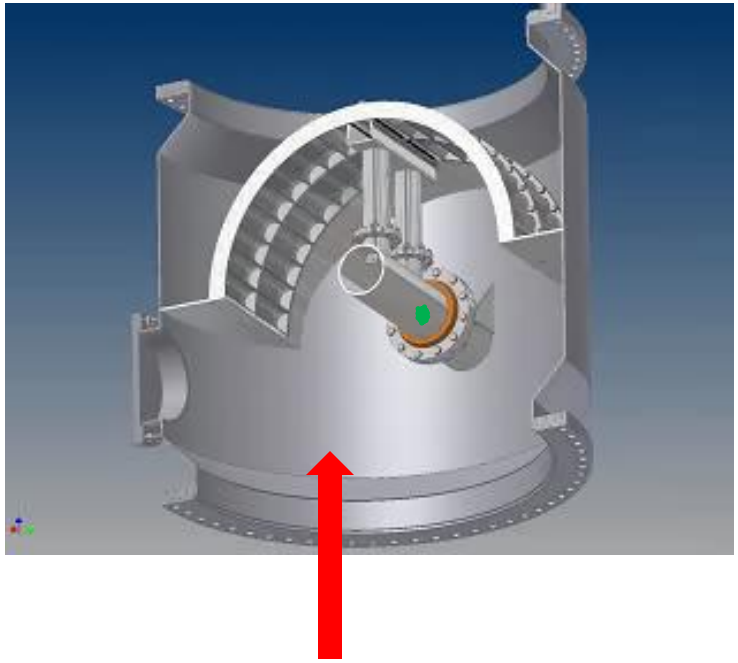




Fish handling screens are available to meet 316(b).
Debris and fish are returned in separate troughs.

Debris Filter

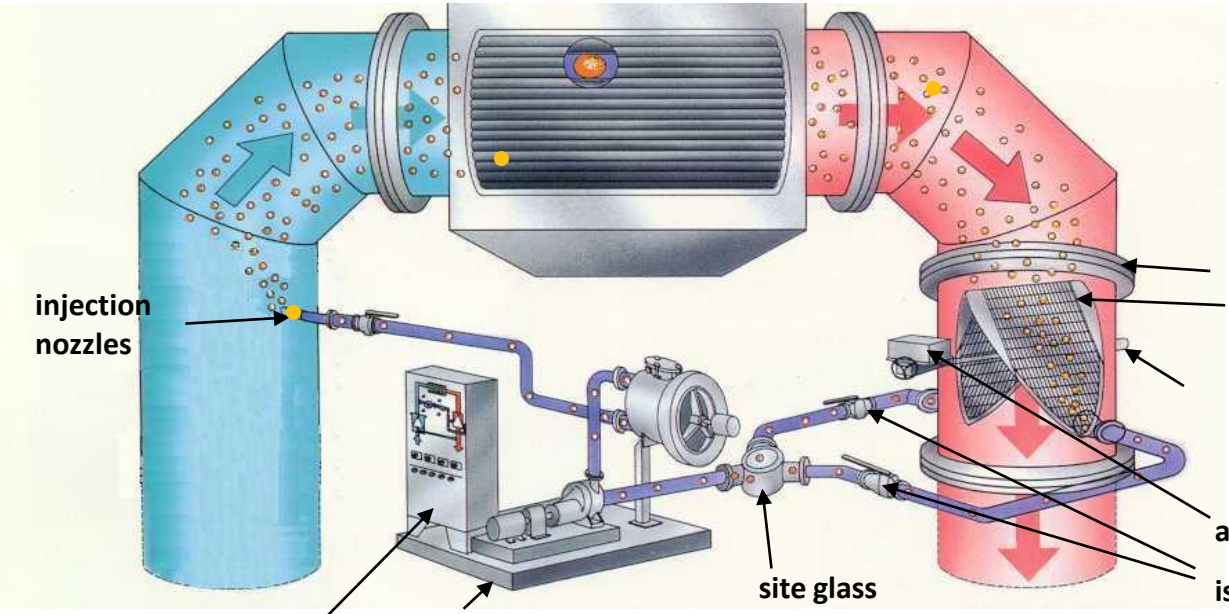




- Poor intake screening
- Carry over on screens
- Growth of fibrous material and living organisms in tunnels, channels and pipes

- Debris causes adverse effects on the plant's thermal rate.
- Accumulation of debris will cause erosion of the tubes and the tube sheets.
- Debris is often partially lodged inside the tubes, causing:
- Flow impediment
- Local erosion of the tube surface
- Tube leaks.

ATCS Components – Ball Type



Effective method for:

- eliminating scaling,
- eliminating fouling,
- eliminating MIC attach,
- eliminating surface pitting,
- eliminating under deposit corrosion,
- increasing tube life,
- improving plant heat rate.