General Cooling Water Product Presentation
October 2012
Energy Group – Power & Intakes, Americas
Overall for Circulating Cooling Water Systems

- Debris Filter
- ATCS Ball Strainer
- Band Screens
- Raking Machine
- Bar Screen
- FDS
- Stop Gate
FGS Acoustic Fish Barrier Technology
Fish Deterrent Systems
Fish Deterrent Systems
Applications

- Behavioral barrier and guidance system to prevent entrance into raw water intakes

- Increase survival rates by modifying the migratory path of endangered species

- Prevention of either endangered, nuisance or invasive species into undesired locations
Fish Deterrent Systems

Types

The Sound Projector Array or ‘SPA’

- Thermal plant CW intakes
- Water supply intakes

The BioAcoustic Fish Fence or ‘BAFF’

- Hydroelectric intakes
- Invasive species barriers

- Sound contours
- Air curtain
- Sound projectors
- Concrete ballast
- Cable channel
Stop Gates
Stop Gates

- A steel fabricated gate used to allow the dewatering of the intake for screen, pump or intake maintenance

- Not a stop log (wooden) or stem operated sluice or slide gate

- Normally located in a “stored” position until needed (3 to 5 years)
Stop gates normally used in conjunction with an apron wall to strengthen intake for seismic and aid in preventing entrance of floatables such as leaves, weeds, jelly fish, etc.
Static or Stationary Screens
Static or Stationary Screens

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

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

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

Variable widths, depths, mesh openings and materials
Passive Wedge Wire Screens
What is Passive Screening

- 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.
Installation options
Brackett Bosker® Main Components

Monorail
Trolley
Column
Gripper
Bar Screen
Bosker aligns itself over each bar screen section to be raked

Bosker rakes while it descends vs. ascending to positively retain debris

Bosker teeth penetrate the bar screen all the way to the invert preventing build up of debris

Bosker can transport debris to virtually any dumpsite and has no submerged parts to maintain
Sites from 25 ft. wide..................
To sites from 300+ ft. wide.....
RAW WATER INTAKES

ROTATING TRAVELING SCREENS

- Thru-Flow

- Dual Flow or Conversion

- Fish Handling Options
Typical Thru Flow Screen
Straight Thru Flow Screen

Debris not removed is “Carried Over” to “Clean Side”

Influent Side is in contact with Effluent Side. Debris Carry over cannot be avoided.
Primary issues with Thru Flow Screens:

• Debris “carry-over” CANNOT be avoided, even with high pressure and multiple spray systems, thus causing a significant loss of operating efficiency.

• Thru flow screens are typically 1\textsuperscript{st} or 2\textsuperscript{nd} highest plant maintenance item and often require up to 300 man-hours per year per screen.
Carry over with Thru Flow
Clean side of screen after spray wash
Debris in condenser from typical “thru flow screen” due to debris carry-over
Out - To - In Dual Flow Screen
Primarily used for raw water intakes

Influent Side is totally separated from Effluent Side.

How can this be applied to an existing intake?
Brackett Green 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.
Typically Basket Width + 1’-2”

Diverters may be steel or concrete

Existing or new guides for simple box construction

Thru Flow existing well or new well outfitted with Dual Flow Conversion
A Dual Flow is NOT a Thru Flow Screen turned sideways as there are numerous differences such as frame loadings, thrust accommodations, roll around foot terminal plus updates such as shaft mounted drives, oversized chains, etc.
S.I.M.P.L.E. Fish Recovery Process

- S Stabilized (flow across basket rail)
- I Integrated (into basket rail)
- M Marine (juvenile fish recovery)
- P Protection (from harmful vortices)
- L Lifting (removal from intake flow)
- E Environment (sheltered region)
Fish Recovery Band Screen
Bridgeport Harbor GS with Fish Recovery Band Screens
Drum Screens – Flow Patterns

The Single Entry Drum Screen allows zero carry over and is commonly employed for shallow applications.

The Double Entry Drum Screen allows zero carry over and is commonly employed for high flow applications.
Drum Screens – Double Entry

View of an “in-to-out” flow pattern Drum screen
Drum Screens – Double Entry

Looking out from the CW intake underneath Drum screen
- Lingo Ao NPS, China
Condenser Protection

Debris Removal Equipment
• Self flushing, In-Line Debris Filters
• Self flushing, In-Line Automatic Strainers

Automatic Tube Cleaning Equipment
• Ball Type
• Brush / Basket Type
Debris Filter
HRDF Operation
Tube sheet without debris filter
Tube sheet with a Debris Filter
Effective method for:

- eliminating scaling,
- eliminating fouling,
- eliminating MIC attach,
- eliminating surface pitting,
- eliminating under deposit corrosion,
- increasing tube life,
- improving plant heat rate.
On-Line Automatic Tube Cleaning System (ATCS)
ATCS Components – Ball Type

- Ball Type
- Differential Pressure Transmitter
- Ball Strainer Shell
- Screen(s)
- Injection Nozzles
- Site Glass
- Isolation Valves
- Actuator
- Control Unit
- Motor
- Ball Collector
- Special Recirculation Pump
- Control Valve

Skid
How does it work?

Balls are designed and injected in such a way to provide a uniform distribution inside the water box.

Diameter of the sponge ball is larger than the inside diameter of the tube.

Tubes kept clean by the scrubbing and wiping action of the balls which prevents the deposit of micro-foulants on the inside tube surface.
Elastomeric rubber balls
Ball collector and recirculation pump
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