Fish Friendly Recover and Return Screening Systems: The WIP

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Topics

– A Screening Story: Beaudrey
– Water intake challenge
– Beaudrey's Environmental Protection Principals
– Beaudrey’s Water Intake Protection (WIP)
– Beaudrey's WIP Testing and Application
– Beaudrey’s other environmentally firendly systems
BEAUDREY: A SCREENING STORY

A fourth generation Family owned business established in 1912, Beaudrey has over 4850 filters installed in over 80 countries worldwide.
The Environmental Act (EA) 1995 incorporates and amends the Salmon and Freshwater Fisheries Act (SFFA) 1975.
Water Screening: An Environmental Challenge

- The Environment Agency “Screening for Intake and Outfalls” (2005)
- Water Resources Act 1991
- Environmental Protection Agency (EPA) is developing regulations under the Clean Water Act 316(b)
Water Screening: An Environmental Challenge

- Article 44 of the law no. 2006-11 (05.01.2006)
- The EC Water Framework Directive 2000/60EC)
Beaudrey’s Environmental Protection Principals

- Minimising the impingement time to 30 seconds
- Minimising entrainment of aquatic life
- Aquatic life should not be exposed to air
- Aquatic life should not be subjected to skin injury
- Aquatic life should not be subjected to brutal water pressure
- Aquatic life should not fall from a height greater than 500mm
- Sufficient water to provide adequate return capability
– Minimum impingement time
– An efficient sealing system (for rotating screens up to 0.5mm)
– A system designed for continuous rotation
– An aquatic life recovery and return system
A WIP Module slid into the existing screen guides and resting on the floor

- A plate-mounted “W” debris filter with special Hidrostal pump
- One rotating wheel divided in a number of radial deep storage compartments
  - Fits into most intake channels, new or retrofit
  - Fits without civil structure modifications into any standard bandscreen pit
The wheel shaft is held by radial arms to the support plate.
The drive wheel is located on the screened water side.
A number of wall-plates are positioned into the wall guides on top of the "WIP" modules to prevent the water from by-passing the "WIP" modules.
The wall-plates support the vertical backwash pipes that run up to the deck.
A fixed backwash suction scoop secured to the carrying plate. The Hidrostal pump is of a special fish friendly type.
Downstream side of the compartments are fitted with the patented Beaudrey Nocling fish friendly, jelly-fish friendly, and fibre-proof screening panel.
The Nocling panel offers a perfectly smooth and flat resting surface which avoids fish skin damage and surface trauma.

Nocling is by far the most fish-friendly screening media.
- Single spiral vane and large free passage
- Extremely fish and eel friendly
- Avoids exposing water life to the air
- Proven record of transferring aquatic life without injury
The North Omaha Power Station
WIP Fish survival Station

EA Engineering, Science, and Technology, Inc.
The North Omaha Power Station

WIP

- Coal fired generating station
- The Nebraska bank of the Missouri River
- The station has five generating units with a combined capacity of 663 megawatts
- Utilises a once-through cooling system that draws water from the Missouri River
- Located 185 miles downstream of Gavins Point Dam
- Average Flow = 28,850 cfs
The North Omaha Power Station
WIP

- Average Slope = 1 ft/mile
- Normal Flow Velocity = 7 ft/s
- Bedrock Elevation = 958 feet
- Low Water Level = 963 feet
- Normal Water Level = 972 feet
- High Water Level = 1,000 feet
The North Omaha Power Station
WIP Fish survival Station
Easy retrofit:
- No Civil Work Modification
- WIP module is slid into the band screen guides
- The complete module is lifted and lower in less than a shift
Fish Survival studied

Target:
- Evaluate the impingement mortality
- Evaluate the 48-hour latent survival of fish removed by the WIP

Facts
- Realised by EA Engineering & Science
- From April 2007 to August 2008
- Hatchery and native Missouri river fish
The results suggest little if any mortality observed during the survival studies at the North Omaha Station could be attributed to impingement.” (North American Journal of Fisheries Management 2010)
The bio-flush rake is designed to lift off larger fish arrested by the bar rack, bring them to deck level in a large fish tray and discharge them by water-flushing into a water-filled trough that returns them to the water, well clear of the intake.
Bio-Flush Trash Rake

- When the rake tilts at deck level, the fish fall with the flush water into the deck flume where a sufficient water level is maintained to cushion their fall.
- The flume is then emptied and the fish returned to their natural environment.
- This system is being installed at the new Power Plant in Wilhelmshaven in Germany.
Beaudrey Scoop of fish

- Fish friendly recovery system that can be used in conjunction with rotating screens
- Tests carried out by EDF at Blayais Nuclear Power Station
- Results comparable to those at Omaha
Zero Ball Loss

- Installed at Big Bend Power Plant, Tampa, Florida
- To resolve problems arising from the discharge of cleaning sponge balls from the conventional CTCS
Conclusion

– Changing legislation has required further development of existing systems and a radically new approach
– Beaudrey have developed and continue to develop fish and eel friendly systems
– WIP practical testing results suggest little if any mortality could be attributed to impingement
– Impinged, removed and recovered fish from the Beaudrey WIP exhibited survival rates consistently at or above the performance standard
Thank you for your attention

Questions?