Perforated Plate Screening
Opportunities and Challenges

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Boyne Mountain- 2016

Presented By:

Duperon® ADAPTIVE TECHNOLOGY™
Agenda:
1. Background on Screening
2. Reasons to go Finer
3. Types of Fine Screens
4. Challenges of Fine Screening
1. Background on Screening
2. Reasons to go Finer
3. Types of Fine Screens
4. Challenges of Fine Screening
Background on Screening

Manual screens or Comminutors used to be the only way to remove or cut up influent flow debris.
Background on Screening

FIGURE 4 TYPICAL COMMINUTOR INSTALLATION

Source: Reynolds/Richards, 1996.
61.2 Fine Screens

61.21 General

- Fine screens, as discussed in this Paragraph, have openings of approximately 1/16 inch (2mm). The amount of material removed by fine screens is dependent on the waste stream being treated and screen opening size.
Background on Screening

Debris Removal

Average Screenings Quantities - Coarse Screens
MOP Survey Data 2008 - 95 Percent Confidence Interval

Screen opening [mm]

Average Wet Screenings Collected [ft³/1,000 gal]

Average Screenings Collected [L/1,000 m³]

Screen opening [in]

Average
Upper Limit
Lower Limit
61.2 Fine Screens

61.21 General

- Fine screens should not be considered equivalent to primary sedimentation. However, they may be used in lieu of primary sedimentation where subsequent treatment units are designed on the basis of anticipated screen performance.
61.2 Fine Screens

61.21 General

- Selection of screen capacity should consider flow restriction due to retained solids, gummy materials, frequency of cleaning, and extent of cleaning. Where fine screens are used, additional provision for removal of floatable oils and greases shall be considered.
61.2 Fine Screens

61.22 Design

- Tests should be conducted to determine BOD$_5$ and suspended solids removal efficiencies at the design maximum day flow and design maximum day BOD$_5$ loadings. Pilot testing for an extended time is preferred.
Background on Screening

61.2 Fine Screens

61.22 Design

- A minimum of two fine screens shall be provided with each unit being capable of independent operation. Capacity shall be provided to treat design peak instantaneous flow with one unit out of service.
1. Background on Screening
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4. Challenges to Fine Screening
Reasons to go Finer

Driving Factors

MBR
- Performance Guarantees

MBBR

IFAS

Removing More at the Headworks
Reasons to go Finer

Driving Factors

Plugging in Downstream Process

- Grit Removal
- Clarifiers
- Dewatering Systems – Centrifuges
- Pumps
- Equipment Plugging
- Cost Savings
Reasons to go Finer

Driving Factors

- Physical Appearance
1. Background on Screening
2. Reasons to go Finer
3. Types of Fine Screens
4. Challenges of Fine Screening
Types of Fine Screens

- Band Screen
- Drum Screen
- Helical Screw
- Multi Rake with Fixed-Element Screen
Types of Fine Screens

Band Screen

- Screens that move around tracks or sprockets that utilize woven wire mesh or perforated plate, either in a continuous belt or interlocking panels.
Types of Fine Screens

Band Screen
Types of Fine Screens

Drum Screen

- Cylinder Screen rotates as influent passes through. Screenings are collected in the center of the drum and are moved out typically by way of spiral screw technology.
Types of Fine Screens

Drum Screen
Types of Fine Screens

Helical Screw

- Influent is screened through a drum-type screen where brushes sweep the solids off the screen. They are then transported up the shaftless spiral.
Types of Fine Screens

Helical Screw
Types of Fine Screens

Multi-Rake Fixed-Element Perforated Plate

- Influent is screened through a static plate. Screenings are collected by rotating debris lifter rakes and discharged in a similar fashion as a mechanical bar screen.
Types of Fine Screens

Multi-Rake Fixed-Element Perforated Plate
1. Background on Screening
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4. Challenges of Fine Screening
Challenges Facing Most Technologies

- Increased Maintenance
- Carry Over
- Seal Failure
- Blinding or Time to Blind
- Stapling
- Brush Wear
- Increased Headloss
Challenges of Fine Screening

Increased Maintenance

- Downstream Damage
- Process Unreliability
Challenges of Fine Screening

Carryover
Challenges of Fine Screening

Carryover
Seals
Challenges of Fine Screening

Seal Leakage
Challenges of Fine Screening

Seal Leakage
Challenges of Fine Screening

Seal Leakage
Challenges of Fine Screening

Seal Leakage
Challenges of Fine Screening

Determining Seal Failure
Mixed Liquor Sieve Test
Challenges of Fine Screening

Blinding
Challenges of Fine Screening

Stapling
Challenges of Fine Screening

Brush Wear
Challenges of Fine Screening

Increased Headloss
Questions?
Thank You.
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