2019 AAEES E3S Award – Small Firms
Town of Moorefield/Hardy County
Regional WWTP Upgrade with the MOB™ Process

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About Nuvoda

• Environmental engineers dedicated to innovative, sustainable and renewable wastewater treatment technologies.

• Founded in 2006 and Headquartered in Raleigh, NC; R&D in Blacksburg, VA.

• Research, develop, manufacture, integrate and deliver industry leading, cutting-edge biofilm and granular technologies.

NUVODA
Innovative Wastewater Solutions
Town of Moorfield, WV and a local poultry factory collaborated to build a new WWTP in 2013.

- 6.2 MGD
- Discharges into Chesapeake Bay Watershed
- State-of-the-art 5-stage Bardenpho biological treatment process
- 90% industrial flow and 10% municipal flow
The WWTP faced several challenges from the poultry waste soon after startup.

- High nutrients (N>30ppm, P>10ppm) but low BOD (<600ppm)
- High dependency on expensive chemicals (sodium aluminum) to meet discharge limits
- Sanitation Chemicals
- Multiple upsets throughout the year
- High repair cost and slow recovery

https://www.drovers.com/article/poultry-sectors-face-margin-challenges
Nuvoda’s solution: The MOB™ Process

• **ORGANIC** lignocellulosic media – Kenaf (*Hibiscus cannabinus*)
  - Industry’s first plant-based biofilm carrier with strong mechanical properties
  - Offsets carbon footprint, highly renewable and sustainable
Nuvoda’s solution: The MOB™ Process

• The Mobile Organic Biofilm (MOB™)
• Fully MOBILE within the process
  • Increase settleability in clarifiers
  • Easy retrofit with minimal modifications
Nuvoda’s solution: The MOB™ Process

- Support dense **BIOFILM** growth
  - Stratified biofilm promotes simultaneous nutrient removal (similar to granular sludge)
  - High surface area increases treatment capacity
Granular-sludge-like Kenaf media has all the benefits of granular sludge and more.
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- Multiple redox condition
  - simultaneous nutrient removal
- High mechanical strength and stability
  - Resistant to shear and toxicity and shock loadings
- High settleability
  - low SVI, reduced footprint
- High biomass retention
  - higher treatment capacity

✓ Kenaf’s high surface area readily supports dense biofilm growth without the intricate granular cultivation process.
✓ Reduced overall operation and energy cost
Upgrade Goals

- Improve biological nutrient removal and treatment capacity
  - High surface area kenaf supports dense biofilm growth
  - Reduce SRT
- Reduce chemical usage
  - Increase bio-P removal and reduce sodium aluminum usage
- Eliminate system upsets
  - Robust kenaf granules resist toxicity shocks
- Reduce energy costs
  - Reduce MLSS and reduce blower capacity
- Improve sludge dewatering and reduce polymer feed
  - Extracellular polymeric substance (EPS) improves flocculation and sludge thickening and reduce polymer usage
MOB™ Process Upgrade Results – Cost

Background

Challenges

Solutions

Results

Summary
MOB™ Process Upgrade Results – SVI30 (87% Reduction)

**Background**

**Challenges**

**Solutions**

**Results**

**Summary**
MOB™ Process Upgrade Results – SRT (80% reduction)
MOB™ Process Upgrade Results – Sludge Blanket

Background

Challenges

Solutions

Results

Summary
Total Phosphorous Removal Cost Since 2014

Moorefield WWTP TP Removal Cost

<table>
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<tr>
<th>Year</th>
<th>USD/lb.</th>
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Summary: All the upgrade goals for the Moorefield WWTP were accomplished.

• Improve biological nutrient removal and treatment capacity
• Reduce chemical usage
• Eliminate system upsets
• Reduce energy costs
• Improve sludge dewatering and reduce polymer feed