ADVANCED ATAD at the Grand Chute Menasha West WWTF

MARCH 17, 2015
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Grand Chute-Menasha West WWTF

- Serves the following communities
  - Town of Grand Chute
  - Town of Menasha – West side
  - Town of Greenville
  - Part of Town of Neenah

- Completed Upgrade in 2012

- Joint Project between McMAHON & CH2M Hill

- Upgrade Design Loadings
  - Design Population: 43,897
  - Design Ave. Flow: 8.2 MGD
  - Peak Hour Flow: 31 MGD
  - Design BOD Loading: 12,700 lb/d
Summary of Improvements Made

- Increased plant capacity
- Added capability to remove ammonia
- Replaced digestion process to reduce odors, reduce ammonia and increase capacity
- Replaced equipment with more energy efficient equipment
  - Blowers
  - Ultraviolet light disinfection
  - Building heating systems
- Improved odor control
- Replaced aging and obsolete equipment and facilities
The Treatment Process

Primary Clarification

Aeration Tanks with IFAS

Secondary Clarification

Screens

Vortex Grit Removal

To Solids Processing

Blowers

Return Sludge

Sludge

To Solids Processing

Ultraviolet Light Disinfection

Effluent to Little Lake Butte des Morts
Solids Handling Process

8 Raw Sludge Holding Tanks → ATAD 1 or 2 → Heat Exchanger → SNDR #2, SNDR #1 → Odor Control Biofilter

Belt Filter Press

Liquid Biosolids Storage Tank

Cake Storage → To Land Application
Major Facilities Constructed

- Aeration Tank 3
- Secondary Clarifiers 3 & 5
- Bio-Filter Facility
- Primary Clarifier 4
- Sludge Storage Tank
Construction: After (2012)
### Design Solids Loadings

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
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</thead>
<tbody>
<tr>
<td>Total Sludge Production</td>
<td>16,734 lbs/day</td>
</tr>
<tr>
<td>Total VSS</td>
<td>13,147 lbs/day</td>
</tr>
<tr>
<td>Design Sludge</td>
<td>Co-settled WAS + Primary</td>
</tr>
<tr>
<td>Design Total Solids</td>
<td>3.5%</td>
</tr>
<tr>
<td>Design Avg. Volume</td>
<td>57,308 gpd</td>
</tr>
</tbody>
</table>
What is ATAD?

**AUTOTHERMAL**
- Self-heating!!
- Exothermic Reaction

**THERMOPHILIC**
- High temperatures, typically above 140°F

**AEROBIC**
- Oxic conditions
- High mixing intensity & aeration

**DIGESTION**
- Biodegradation of volatile solids microorganisms degrade to CO₂ & H₂O

...HIGH TEMPERATURES PROVIDE HIGH-BIOKINETICS!!
What is ATAD? continued

- **Batch Process**
  - Sludge withdrawn and added 1x/Day

- **EPA PFRP – Approved Process**
  - Class A Biosolids
  - Controls Verify Time & Temp Requirements
# Biogas Production at GCMW

## ATAD Reactors

<table>
<thead>
<tr>
<th>No.</th>
<th>Volume</th>
<th>HRT @ Avg. Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>327,000 gals</td>
<td>11.3 days</td>
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</table>

## SNDR Reactors

<table>
<thead>
<tr>
<th>No.</th>
<th>Volume</th>
<th>HRT @ Avg. Design</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>250,100 gals</td>
<td>8.7 days</td>
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</table>

## Odor Control Scrubber

<table>
<thead>
<tr>
<th>No.</th>
<th>Media</th>
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<tbody>
<tr>
<td>1</td>
<td>Lava Rock / Wood Chips</td>
</tr>
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</table>
ATAD Reactor

- Jet Mix Aeration System
- ORP Aeration Control
  - Blowers and Mix Pumps on VFD’s
- Foam Control using Foam Cone Eductor
  - Radar Gauge Measures Foam Level
  - Foam Control Pump on VFD
- Typically Operates above 140°F
ATAD Reactor
Jet Header
SNDR Reactors

- Follows ATAD Reactors
- Operates in Mesophilic Temp Range (90 – 100 °F)
- Designed for Additional VS Destruction and Nitrification
- Jet Mix Aeration
- ORP + pH Control
  - Cycle air On/Off based on pH to recover alkalinity
  - Drop in pH indicates nitrification
SNDR Reactor OPR/pH
ATAD Pump Room
ATAD & Bio-Filter
## Results

<table>
<thead>
<tr>
<th>Year</th>
<th>ATAD Feed (gpd)</th>
<th>Digested Sludge NH₃ (mg/l)</th>
<th>V.S. Destruction Through Dewater (%)</th>
<th>Cake Solids (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>2012</td>
<td>29,133</td>
<td>282</td>
<td>66.2%</td>
<td>31.2%</td>
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<tr>
<td>2013</td>
<td>35,093</td>
<td>285</td>
<td>64.4%</td>
<td>28.8%</td>
</tr>
<tr>
<td>2014</td>
<td>49,373</td>
<td>447*</td>
<td>66.4%</td>
<td>30.0%</td>
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</tbody>
</table>

SNDR 1 Off-line due to pump failure
Acknowledgements

Mr. Jim Kirk, Superintendent, Grand Chute-Menasha West

CH₂M Hill

Thermal Process Systems (TPS)