Anaerobic Digester Foaming Workshop

April 21, 2010
Brief Survey Summary

• About 216 WWTPs have anaerobic digestion:
  – Illinois: 64
  – Minnesota: 56
  – Wisconsin: 96

• Ad hoc committee developed questionnaire to gauge the extent of anaerobic digester foaming problems at WWTPs

• Follow-up calls and e-mails
Survey – 94 Responses (44%)

• Significant Digester Foaming in Last 10 Years?

- Yes: 53%
- No: 47%

50 of the 94 Responses
23% (min) of the 216 WWTPs
Survey Responses

• Was Cause of Digester Foaming Determined?

- Yes: 55%
- No: 45%
Survey Trends

• Size of WWTP
• Type of Liquid Biological Treatment
• Foaming in Activated Sludge?
• Nutrient Removal
• Type of Anaerobic Digestion
• Digester Detention Time
• Digester Mixing System
Survey Trends
Size of WWTPs

Percent of Plants w/ Digester Foaming

- < 1.0 mgd: 6 of 19 (32%)
- 1 to 5 mgd: 27 of 45 (60%)
- 5 to 20 mgd: 12 of 24 (50%)
- > 20 mgd: 6 of 7 (86%)
Survey Trends
Type of Biological Treatment

Percent of Plants with Digestion Foaming:
- Activated Sludge: 43 of 73 (59%)
- Trickling Filters: 10 of 25 (40%)
- RBCs: 3 of 10 (30%)
Survey Trends
Foaming in Activated Sludge?

- Percent of Plants w/ Digester Foaming
  - Yes: 70% (14 of 20)
  - No: 58% (32 of 55)
Survey Trends
Phosphorus Removal

Percent of Plants w/ Digester Foaming

- CPR: 30 of 49 (61%)
- BPR: 14 of 22 (64%)
- No P Removal: 8 of 26 (31%)
Survey Trends
Nitrogen Removal

Percent of Plants w/ Digester Foaming

- NH$_3$ Removal: 41 of 68 (60%)
- Total N Removal: 2 of 4 (50%)
- No N Removal: 9 of 24 (38%)
Survey Trends
Digestion Process

Percent of Plants w/ Digester Foaming

- Meso Only: 56% (46 of 82)
- Thermo Only: 0 of 1
- TPAD: 43% (3 of 7)
- Acid-Gas: 0 of 3
Survey Trends
Digester Detention Time

<table>
<thead>
<tr>
<th>Percent of Plants w/ Digester Foaming</th>
<th>3 of 5</th>
<th>14 of 23</th>
<th>16 of 34</th>
<th>19 of 32</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 - 10 days</td>
<td>60%</td>
<td>61%</td>
<td>47%</td>
<td>59%</td>
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<td>11 - 20 days</td>
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<td>21 - 30 days</td>
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<td>&gt; 30 days</td>
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Survey Trends
Digester Mixing System

Percent of Plants w/ Digester Foaming

<table>
<thead>
<tr>
<th>System</th>
<th>Percentage</th>
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</thead>
<tbody>
<tr>
<td>Gas - Canon</td>
<td>70%</td>
</tr>
<tr>
<td>Gas - Lances</td>
<td>64%</td>
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<tr>
<td>Liquid - Pumped Recirc.</td>
<td>61%</td>
</tr>
<tr>
<td>Liquid - Draft Tube</td>
<td>33%</td>
</tr>
</tbody>
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7 of 10
18 of 28
22 of 36
7 of 21