Technology and Hubris vs Common Sense
Northeast Residuals & Biosolids Specialty Conference
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Facility

• 100 to 200 tpd SSO composting facility
• Fully enclosed proprietary tunnel composting system
• Rural Location – agricultural area
• State of the art SCADA system
• Four part odor control system
Issues

• Facility operating more than a year with persistent odor impacts
• Owners had engaged residence early
• Formed residence group and had many meetings with residence
• However, relations with neighbors deteriorated
• They had promised ZERO odor
Initial Steps

• Enclosed curing area

• Hired a public facilitator
  ✓ Reestablish community discussions
  ✓ Odors will be very rare and not impact life
  ✓ Facilitator hired technical adviser
Consequences of Poor Relations

- Press involved
- Regulator regular monitoring and involvement
- Residence and press develop their own theories for causes
  - C/N Ratio incorrect
  - Diapers in waste
- Theories have to be addressed
- Trust was lost
How Things Progressed

- Facilitator eased tensions with residence
  - Got the two sides talking again

- Owner began to feel they had done all they needed to do
  - Their facility was state of the art
  - 4 levels of odor control

- Owner reluctant to have outsiders inside the facility
  - Facilitator had panel of experts give opinion about facility

- Regulators forced the issue and required independent third party review of facility
  - Facility on reduced tonnage until something improved
Facility Configuration

- Two separate trains caused uneven loading of biofilters

![Diagram showing Facility Configuration]

- COMPOSTING BAYS
- AMMONIA SCRUBBERS
- BIOFILTERS
- STACK 100 FT
- BIOSCRUBBERS
Facility Evaluation

Goals – Find odor source
• Fugitive emissions?
• Poor system performance?
• Both?
Search for Fugitive Emission

• Smoke test the building
• System walkdown
• Some leaks – not significant
Poor Performance

• Air & water testing
  ✓ Air input and output of each component
  ✓ Water feeding scrubber and in sump

• Inspection of all components
  ✓ Visual and smoke test all parts of the facility – tunnels through stack

• Performance data review
  ✓ Good records of everything available from SCADA
## Water Testing

<table>
<thead>
<tr>
<th>Sample Description</th>
<th>Sample ID</th>
<th>Dissolved O$_2$ mg/l</th>
<th>pH</th>
<th>TSS mg/l</th>
<th>NH$_3$ mg/l</th>
<th>Nitrate mg/l</th>
<th>Nitrite mg/l</th>
<th>Sulfide mg/l</th>
<th>BOD mg/l</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bioscrubber water below spray intake</td>
<td>BS-1</td>
<td><strong>5.46</strong></td>
<td>7.94</td>
<td>38</td>
<td><strong>12.1</strong></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td><strong>28.5</strong></td>
</tr>
<tr>
<td>Bioscrubber spray water (newly added)</td>
<td>BS-2</td>
<td><strong>0.83</strong></td>
<td>7.34</td>
<td>33</td>
<td><strong>71.5</strong></td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td><strong>55.1</strong></td>
</tr>
<tr>
<td>Stormwater Retention Pond 1 (north)</td>
<td>P-1</td>
<td>7.16</td>
<td>8.16</td>
<td>64</td>
<td>0.395</td>
<td>ND</td>
<td>ND</td>
<td>ND</td>
<td><strong>15.6</strong></td>
</tr>
<tr>
<td>Stormwater Retention Pond 2 (south)</td>
<td>P-2</td>
<td>7.13</td>
<td>8.01</td>
<td>29</td>
<td>25.1</td>
<td>2</td>
<td>ND</td>
<td>ND</td>
<td><strong>11.9</strong></td>
</tr>
</tbody>
</table>
### Air Testing

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Odour (D/T = OU/m³)</td>
<td>15,030</td>
<td>11,295</td>
<td>25%</td>
<td>6,266</td>
<td>45%</td>
<td>58%</td>
</tr>
<tr>
<td>Hydrogen Sulfide (ppb)</td>
<td>ND</td>
<td>19</td>
<td></td>
<td>48</td>
<td>-153%</td>
<td></td>
</tr>
<tr>
<td>Carbonyl Sulfide (ppb)</td>
<td>24</td>
<td>22</td>
<td>8%</td>
<td>18</td>
<td>18%</td>
<td>25%</td>
</tr>
<tr>
<td>Methyl Mercaptan (ppb)</td>
<td>190</td>
<td>99</td>
<td>48%</td>
<td>76</td>
<td>23%</td>
<td>60%</td>
</tr>
<tr>
<td>Dimethyl Sulfide (ppb)</td>
<td>130</td>
<td>88</td>
<td>32%</td>
<td>70</td>
<td>20%</td>
<td>46%</td>
</tr>
<tr>
<td>Carbonyl Sulfide (ppb)</td>
<td>13</td>
<td>12</td>
<td>8%</td>
<td>10</td>
<td>17%</td>
<td>23%</td>
</tr>
<tr>
<td>Dimethyl Disulfide (ppb)</td>
<td>48</td>
<td>14</td>
<td>71%</td>
<td>16</td>
<td>-14%</td>
<td>67%</td>
</tr>
</tbody>
</table>

*Note: Removal efficiency calculations.*
Operational Data Review

Biofilters

- Low residence time
- Temperatures fluctuates from mesophilic to thermophilic – above and below 40°C

<table>
<thead>
<tr>
<th>Biofilter Cell</th>
<th>Airflow (m³/hr)</th>
<th>Media Volume (m³)</th>
<th>Residence time (seconds)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Biofilter T2A</td>
<td>35,000</td>
<td>323</td>
<td>33</td>
</tr>
<tr>
<td>Biofilter T2B</td>
<td>40,000</td>
<td>323</td>
<td>29</td>
</tr>
<tr>
<td>Biofilter T3</td>
<td>72,000</td>
<td>646</td>
<td>32</td>
</tr>
<tr>
<td>Biofilter T4</td>
<td>33,000</td>
<td>646</td>
<td>70</td>
</tr>
</tbody>
</table>
Need to Improve Biofilter Conditions
Improvements Made
Other Things The Owner Did

• Increase the stack height from 100 ft to 140 ft

• Add dilution air at the stack
Impact of Cooling Towers
Not Quite There

- Still some complaints
- Routine air sampling showed poor biofilter performance

<table>
<thead>
<tr>
<th>Location</th>
<th>Average Odor Concentrations (D/T)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between composting and ammonia scrubbers</td>
<td>27,525</td>
</tr>
<tr>
<td>Between ammonia scrubbers &amp; bioscrubbers</td>
<td>15,395</td>
</tr>
<tr>
<td>Between bioscrubbers and biofilters</td>
<td>8,013</td>
</tr>
<tr>
<td>Between biofilters and stack</td>
<td>5,256</td>
</tr>
<tr>
<td>Exiting the stack with dilution air included</td>
<td>2,486</td>
</tr>
</tbody>
</table>
Not Quite

- Individual flows measured did not match SCADA
- Total flow to Biofilters did not match flow at stack

<table>
<thead>
<tr>
<th>Biofilter</th>
<th>SCADA Readings</th>
<th>Flow Measured</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 &amp; 2</td>
<td>38,823</td>
<td>57,318</td>
</tr>
<tr>
<td>3</td>
<td>37,628</td>
<td>18,488</td>
</tr>
<tr>
<td>4</td>
<td>30,061</td>
<td>Instrument failure</td>
</tr>
<tr>
<td>5</td>
<td>45,366</td>
<td>Instrument failure</td>
</tr>
<tr>
<td>Total Foul Air</td>
<td>152,878</td>
<td>97,941</td>
</tr>
</tbody>
</table>
“The most incomprehensible thing about the universe is that it is comprehensible.”

Albert Einstein