Overview of Electrostatic Precipitation

Air Management Practices Assessment Tool (AMPAT)

Project Team:
- Jay Harmon, Prof of Ag & Biosystems Engineering
- Steve Hoff, Professor of Ag & Biosystems Engineering
- Angie Rieck-Hinz, Manager, Iowa Manure Management Action Group

Application

- Mitigation of particulate matter in ventilation air
  - May be applied as air leaves the building or within the animal room

Basic Operation

- A power supply generates -30 kV DC at a low current of 2 mA.
- Stainless steel electrodes create a corona discharge that induces a negative charge on particles.
- Dust particles stick to grounded surfaces.
Dust accumulates on surfaces

Generally removed by leaf blower or power washer
Electrostatic Precipitators - Pros

• Works within the building to clean air.
• Workers may benefit from clean air.
• Animals may exhibit improved productivity.

Electrostatic Precipitators - Cons

• Dust accumulation on surfaces requires periodic (weekly) cleaning.
• Potential for slight shock if the electrodes are touched. Not a dangerous level.
• Effectiveness may be influenced by relative humidity.

Effectiveness

<table>
<thead>
<tr>
<th>Component</th>
<th>Reduction</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>NH₃</td>
<td>-21 to 17%</td>
<td>Dust reduction may have increased NH₃ in poultry</td>
</tr>
<tr>
<td>H₂S</td>
<td>Unreported</td>
<td></td>
</tr>
<tr>
<td>Odor</td>
<td>12%+</td>
<td>May reduce odor transmission potential</td>
</tr>
<tr>
<td>Particulate Matter</td>
<td>39 to 63%</td>
<td>Total Suspended Particles</td>
</tr>
<tr>
<td></td>
<td>49 to 57%</td>
<td>PM₁₀ (2.5 to 10 microns)</td>
</tr>
<tr>
<td></td>
<td>45 to 65%</td>
<td>PM₂.⁵ (&lt;2.5 microns)</td>
</tr>
<tr>
<td>Volatile Organic Compounds (VOC)</td>
<td>5%</td>
<td>Methane</td>
</tr>
<tr>
<td>Cost</td>
<td>$5</td>
<td>Electric/materials/labor</td>
</tr>
</tbody>
</table>
For Further Information:

• If you are an educator and wish to have copies of powerpoint files, contact Jay Harmon (jharmon@iastate.edu).