Starting with a Product in Mind:
Biosolids Design Based on Beneficial Use Goals

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WEF/IWA
Residuals and Biosolids 2015
Overview

• Getting to know the plant
• Current beneficial use challenges
• Exploring new biosolids technologies
  • Biosolids Master Plan
  • Preliminary Engineering Report
• Take home points

WEF/IWA Residuals and Biosolids 2015
Getting to Know the Plant

• Little Patuxent Water Reclamation Plant
  • Savage, Maryland
  • 20 mgd (28.5 mgd)
• Biological Nutrient Removal (BNR) process
• RDP EnVessel Pasteurization
RDP EnVessel Pasteurization Process

- Heat + lime = Class A Exceptional Quality
- 40% lime addition
- Weekly production
  - 880 wet metric tons
  - 50 truckloads
- Contract to bulk agriculture
Upcoming Challenges

- Potential local agriculture limitations
  - Maryland’s Phosphorus Mgmt Tool
  - Elevated Soil pH
  - Seasonal Regulations
- Anticipated consequences
  - Longer hauling distances = $$$
  - Long term options???
- Addressing challenges

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Deciding on a New Biosolids Technology

Phase 1: Biosolids Master Plan
- Develop Goals
- Screen Management Alternatives
- Beneficial Use Market Assessment
- Select Management Alternative

Phase 2: Preliminary Engineering Report
- Visit Sites using Selected Management Alternatives
- Refined Beneficial Use Market Assessment
- Select Technology

WEF/IWA Residuals and Biosolids 2015
Step 1: Clearly Define Project Objective / Goals

- **Project objective:**
  - Foundation for *all* project decisions
    
    "Develop a biosolids master plan that provides a framework for reliable, cost-effective treatment and beneficial use of LPWRP biosolids in a changing and uncertain future regulatory environment"

- **Specific project goals**
  - Clear, measurable
  - Established 6 goals

- Howard County input critical
Step 1: Clearly Define Project Objective / Goals

Biosolids Master Plan goals:
1. Social and environmental responsibility
2. Biosolids beneficial use
3. Biosolids product
4. Volume reduction
5. Optimize processes and facilities
6. Reliable
## Step 2: Screen Management Alternatives

**Unique combination of processing technologies + products + beneficial use markets**

<table>
<thead>
<tr>
<th>No.</th>
<th>Anaerobic Digestion</th>
<th>Dewatering</th>
<th>Added Stabilization</th>
<th>Product</th>
<th>Energy Recovery</th>
<th>Beneficial Use</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>None</td>
<td>Centrifuge</td>
<td>RDP</td>
<td>EQ cake</td>
<td>NA</td>
<td>Bulk agricultural</td>
</tr>
<tr>
<td>2</td>
<td>None</td>
<td>Centrifuge</td>
<td>Drying</td>
<td>EQ granule</td>
<td>NA</td>
<td>Bulk agricultural</td>
</tr>
<tr>
<td>5</td>
<td>Mesophilic</td>
<td>Centrifuge</td>
<td>RDP</td>
<td>EQ cake</td>
<td>CHP</td>
<td>Bulk agricultural</td>
</tr>
<tr>
<td>7</td>
<td>Mesophilic</td>
<td>Centrifuge</td>
<td>Drying</td>
<td>EQ granule</td>
<td>Dryer fuel</td>
<td>Specialty fertilizer, turf, soil blending</td>
</tr>
<tr>
<td>10</td>
<td>THP/Mesophilic</td>
<td>Centrifuge /BFP</td>
<td>None</td>
<td>EQ cake</td>
<td>THP, CHP</td>
<td>Bulk agricultural</td>
</tr>
<tr>
<td>13</td>
<td>THP/Mesophilic</td>
<td>Centrifuge</td>
<td>Drying/Screening</td>
<td>EQ granule</td>
<td>THP, Dryer</td>
<td>Specialty fertilizer, turf, soil blending</td>
</tr>
</tbody>
</table>

*Material Matters, Inc.*

*WEF/IWA Residuals and Biosolids 2015*
Step 3: Beneficial Use Market Assessment

WHY????

- Understand local markets available
- Preferred/required customer product characteristics
- Market capacity
- Storage needed

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Step 3: Beneficial Use Market Assessment

Critical steps
- Define target markets
- Assess product
- Assess regulatory environment
- Identify local customers
- Phone surveys/site visits

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### Step 3: Beneficial Use Market Assessment

#### Survey Results

<table>
<thead>
<tr>
<th>Bulk Agriculture</th>
<th>Specialty Markets</th>
</tr>
</thead>
<tbody>
<tr>
<td>Established market</td>
<td>Novel market</td>
</tr>
<tr>
<td>Low marketing effort required</td>
<td>Marketing effort required</td>
</tr>
<tr>
<td>Low value</td>
<td>Higher Value</td>
</tr>
<tr>
<td>MD options likely limited in long term</td>
<td>Local markets available</td>
</tr>
<tr>
<td>One market option</td>
<td>Multiple markets</td>
</tr>
<tr>
<td>Wide range of characteristics accepted</td>
<td>Narrow range of characteristics</td>
</tr>
</tbody>
</table>

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### Step 4: Select Management Alternatives

<table>
<thead>
<tr>
<th>No.</th>
<th>Anaerobic Digestion</th>
<th>Dewatering</th>
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<th>Product</th>
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<tbody>
<tr>
<td>7</td>
<td>Mesophilic</td>
<td>Centrifuge</td>
<td>Drying</td>
<td>EQ granule</td>
<td>Dryer fuel</td>
<td>Specialty fertilizer, turf, soil blending</td>
</tr>
</tbody>
</table>

**Considerations:**

- Regulatory evaluation
- Market Survey results
- Meets project objective and goals:
  - Versatile, high quality product?  
    ![Checkmark]
  - Volume Reduction?  
    ![Checkmark]
  - Local beneficial use outlets?  
    ![Checkmark]

**WEF/IWA Residuals and Biosolids 2015**
Phase 2: Preliminary Engineering Report

Goals:
- Refine process and equipment concept
- Select specific dryer technology

Drum Dryer

Belt Dryer

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Preliminary Engineering Report - Marketing

- Obtain biosolids samples
- Confirm solids processing / digestion
- Conduct market interviews
  - Detail and confirm product preferences

Granule Size?
Dustiness?
Nutrient content?
Consistency?
Odors?

WEF/IWA Residuals and Biosolids 2015
## Preliminary Engineering Report - Results

<table>
<thead>
<tr>
<th>Product</th>
<th>Market</th>
<th>Soil Blender</th>
<th>Fertilizer Blender</th>
<th>Bulk Agriculture</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dryer</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Drum</td>
<td>Anaerobic</td>
<td>+</td>
<td>++</td>
<td>++</td>
</tr>
<tr>
<td>Belt A</td>
<td>Aerobic</td>
<td>++</td>
<td>-</td>
<td>++</td>
</tr>
<tr>
<td></td>
<td>Anaerobic</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td>Belt B</td>
<td>None</td>
<td>-</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td></td>
<td>None</td>
<td>++</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Crushed</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td></td>
<td>Crushed Pelletized</td>
<td>-</td>
<td>-</td>
<td>+</td>
</tr>
<tr>
<td><strong>Ranking of Maryland Market Availability</strong></td>
<td>1</td>
<td>3</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

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Take Home Messages

• Establish project objectives early in process
  • *Foundation for all project decisions*

• Technology decisions based on:
  • Biosolids product quality \textit{desired}
  • Local market preferences \textit{and} regulations
  • Long term biosolids product opportunities

• \textbf{Result: Reliable & sustainable biosolids management solution}

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