Community interest in environmentally sustainable biosolids and energy solutions

Various options available for evaluating or modifying existing solids handling system

Existing system has served the City well but is aging

Solids handling options are being evaluated to develop a forward looking plan focused on energy opportunities
Evaluation is Considering Multiple Objectives

- **Economically Viable** – life-cycle costs (capital and operating), benefit from existing assets
- **Environmentally Responsible** – meet air permit requirements, manage carbon footprint, recover green energy
- **Socially Acceptable** – provide acceptable aesthetic, acoustic, and odor control solutions
- **Operator Friendly** – provide proven reliable, flexible systems that are operator and maintenance friendly, support wastewater treatment operations

Solids Handling at the Post Point Plant

- Thickening equipment is currently operating well
- Reliable solids handling has complimented wastewater treatment in the past
- Currently wastewater treatment is adversely impacted from 5 day multiple hearth furnace operation
- Aging multiple hearth furnaces are consuming rather than producing energy, require continued maintenance, have limited redundancy and will require upgrades to meet pending air permit regulations
Solids Process Overview

Gravity Belt Thickeners
17 years old today
43 years old in 2036

Furnaces
MHF1: 37 years old today
63 years old in 2036
MHF2: 17 years old today
43 years old in 2036

Furnaces
MHF1: 37 years old today
63 years old in 2036
MHF2: 17 years old today
43 years old in 2036

Limitations of Existing Multiple Hearth Furnaces (MHFs)

- Both MHFs are required to meet solids loading requirement
- Require regular repair and maintenance
- Consume significant energy (465 therms natural gas/day)
- No energy recovery on either MHW
- Obtaining MHW replacement parts is difficult and costly
- Pending air regulations will require costly upgrades
Solids Handling Improvements
Compatible with Any Future Alternative

Need:
Reduce impact of dewatering stored sludge from 5 day operation

Solutions:
Switch to 7 day operation

Add dewatered cake storage
To eliminate impacts from dewatering and provide flexibility for 5 day or 7 day incineration operations

Dewatered Cake Storage,
Cobb County, GA

Solids Handling Improvements
Compatible with Any Future Alternative

Need:
Reduce Fats Oils and Grease (FOG) in sewers

Solution:
FOG collection program and FOG receiving facility tied in with solids handling

FOG buildup in the conveyance system is 25% of the sewer main cleaning costs

Fats Oils and Grease (FOG) Receiving,
Des Moines, IA
Solids Handling Improvements
Compatible with Any Future Alternative

Potential Biosolids Handling Alternatives

Thickening, Anaerobic Digestion, Soil Amendment, Land Application, Land Application, Land Application, Land Application, Fertilizer, Ash, Ash, Dewatering, Drying, Gasification, Incineration
Each Biosolids Handling Alternative Has Different Characteristics to Consider

Outdated Technology
- Energy consuming MHF

Proven Technology
- Energy efficient FBI
- Anaerobic Digestion
- Heat Drying

Emerging Technology
- Gasification

Complexity and Hauling Requirements of Biosolids Alternatives

- Digestion: Thickening → Digestion → Dewatering → Drying → Gasification → Incineration → Heat & Power (60% residual)
- Drying: Thickening → Digestion → Dewatering → Drying (13% residual)
- Gasification: Thickening → Digestion → Dewatering → Drying → Gasification → Incineration → Heat & Power (6% residual)
- Incineration: Thickening → Digestion → Dewatering → Drying → Gasification → Incineration → Heat & Power (15% residual)

Trucking and Utility for Energy and Power
Anaerobic Digestion

Pros:
- Electrical and heat production
- Fertilizer value
- Proven technology

Cons:
- Requires sludge distribution
- Requires long haul trucking
- Large footprint
- New lab techniques required
- Frequent truck traffic
- Structure height, visual impact
- Limited land application sites for sludge

Anaerobic Digestion Space Footprint Requirements at Post Point

Digestion with Combined Heat and Power And Truck Loadout
**Anaerobic Digestion**

- Metro Biosolids Center, San Diego, CA
- Columbia Boulevard WWTP, Portland, OR

**Drying**

- Combined Heat and Power System

**Pros:**
- Electrical and heat production
- Fertilizer value
- Reduced haul volumes
- Proven technology
- Multiple opportunities for land appl.
- Class A biosolids

**Cons:**
- Requires sludge distribution
- New lab techniques required
- Risk of thermal event (combustibility)
Drying

Heat Dryer,
Encina Water Pollution Control Facility, Carlsbad, CA

Gasification

Pros:
- Minimal ash haul volume
- Potential heat production

Cons:
- Unproven electrical production
- Low energy value gas
- Corrosive gas
- New/unproven technology
- Long haul distance of ash
Gasification

Gasification, Sanford Wastewater Treatment Plant
Sanford, Florida

Fluidized Bed Incineration

Pros:
- Potential heat and power production
- Minimal ash haul volume
- Proven technology

Cons:
- Long haul distance of ash
- Limited number of unit processes
- Staff trained already
- Compatible with new air permit regulations
Fluidized Bed Incineration with Heat and Power

Fluidized Bed Incineration, Cobb County, GA

Fluidized Bed Incineration

Fluidized Bed Incineration, Cobb County, GA
Repairing Multiple Hearth Furnaces

Pros:
- Minimal ash haul volume
- Proven technology
- Limited space footprint

Cons:
- Aged and outdated equipment
- Requires 3 operators
- Consume significant energy
- Obtaining parts difficult

Post Point Plant MHFs, Bellingham, WA
Life Cycle Costs, Carbon Footprint and Space Footprint Analysis

<table>
<thead>
<tr>
<th>Alternative</th>
<th>Projected Capital Cost</th>
<th>Annual O&amp;M Cost</th>
<th>Carbon Dioxide Footprint (tons CO₂/yr)</th>
<th>Space Footprint (ft²)</th>
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<tr>
<td>Anaerobic Digestion</td>
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<td>$1.1 M</td>
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<td>22,000</td>
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<td>Drying</td>
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<td>$1.3 M</td>
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<td>$1.1 M</td>
<td>700</td>
<td>3,500</td>
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</tbody>
</table>

Summary

- Numerous options exist for sustainable energy solutions
- Capital costs are similar, non-economic factors are important:
  - Digestion is proven and has a low carbon footprint but requires solids hauling and has a large space footprint
  - Drying is proven and has a high fertilizer value but has large space footprint and risk of a thermal event
  - Gasification requires minimal hauling and potential heat recovery but is a newer unproven technology
  - Fluidized bed incineration fits within existing space and provides energy recovery but requires long haul of the ash
  - Keeping multiple hearth furnaces is proven and maintains minimal footprint but is dependant on outdated technology and consumes significant energy
Summary

- Dewatered cake storage would provide flexibility and eliminate impact of stored sludge and is compatible with any future alternative.
- Establishing a FOG program and receiving facility would reduce FOG in sewers and associated costs with maintaining the collection system.
- Evaluation provides necessary information for making decision on sustainable biosolids and energy plan.
- Decisions need to made for the future solids processing facility.

Questions