Evaluating the Future of Biosolids Drying: Louisville MSDs Decision

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Louisville Metropolitan Sewer District

March 3rd, 2015
History

MSD has been drying biosolids at the Morris Forman Water Quality Treatment Center since 2001, and actively marketing since 2004.

All solids generated at five regional facilities in Louisville & Jefferson County are transported to MFWQTC by truck or force main.

MFWQTC processes approximately 25,000 dry tons per year of biosolids with the majority of final product historically being used by bulk agriculture.
Morris Forman Solids Processing Additions / Improvements

- **Digestion** – converted solids storage tanks to anaerobic digesters
- **Dewatering** – 5 High Solids centrifuges
- **Drying** – 4 Drum Drying Systems – largest capacity in US at the time
Solids Process Flow Diagram
MSD first produced biosolids pellets in late 2001

By April 2002, most solids were pelletized. Although solids were still going to the Landfill, the reduced volume meant an immediate cost savings for MSD.
Increased equipment wear and tear, and major maintenance, limited drying equipment availability.
Coordination with Marketer allowed for distribution of material previously disposed of in the landfill.
But,

And there’s always a but...

MSD had a decision to make regarding the future of biosolids drying.
Preseparator Replacement

NEED

MAINTENANCE

VERSUS

IMPROVEMENTS

Thermal Oxidizer Manifold

WANT

Maintenance & Money

Courtesy of Cornerstone Engineering, Inc.

Courtesy of BTM Engineering, Inc.
Industrial Waste Department
SIUs
Trunk Line Monitoring

Morris Forman Influent Nickel Data

Louisville Green Nickel Data

Product Analysis / 503s

2008-2009 Nickel “event”
Market Demands & Weather

August 4, 2009

http://water.epa.gov/scitech/wastetech/biosolids/guide.cfm
Decision Point

Dryers were just over 10 years old
Largest Capital Project in MSD history at the time
Land application of biosolids environmentally sound
Avoided landfill costs
Potentially save 8 – 10 employee positions

Dryers were increasingly labor intensive
Landfilling cake or pellets potentially cheaper
Capital improvements needed to continue drying
Utility costs harder to project / budget
Potential write of ~$22 Million in assets
MSD Board requested a business case study of solids processing & disposal options with third party review

Evaluate 3 Options:
1. Landfill dewatered biosolids (not pellets)
2. Landfill dried biosolids (low-grade pellets)
3. Continue marketing Louisville Green

Options evaluation based on:
- Historical trends in natural gas and electricity costs
- Average LG revenue over past 5 years
- Labor costs specific for each alternative
- Maintenance costs based on historical costs plus annualized projections of major rebuild/replacement
Moving Forward

MSD Staff Recommendations:

– Continue to produce and market Louisville Green
– Pursue high dollar markets
– Make needed repairs to reliably produce Louisville Green pellets

Board Decision: Issue a Request for Proposals for Distribution and Marketing of Louisville Green but directed consideration of alternative approaches to LG marketing, to see if lower cost options existed
<table>
<thead>
<tr>
<th>EVALUATION CATEGORY</th>
<th>Max Points</th>
<th>&quot;A&quot;</th>
<th>&quot;C&quot;</th>
<th>&quot;D&quot;</th>
<th>&quot;B&quot;</th>
</tr>
</thead>
<tbody>
<tr>
<td>CONTRACTOR AND FINANCIAL PROFILE</td>
<td>10</td>
<td>9.4</td>
<td>9.4</td>
<td>8.8</td>
<td>9.1</td>
</tr>
<tr>
<td>CONTRACTOR EXPERIENCE / STAFF QUALIFICATION</td>
<td>15</td>
<td>13.4</td>
<td>10.3</td>
<td>9.9</td>
<td>13.8</td>
</tr>
<tr>
<td>CONTRACTOR DISTRIBUTION / MARKETING APPROACH</td>
<td>30</td>
<td>28.6</td>
<td>28.6</td>
<td>25.0</td>
<td>30.0</td>
</tr>
<tr>
<td>CUSTOMER EVALUATION of PROPOSER’S PAST EXPERIENCE</td>
<td>15</td>
<td>14.1</td>
<td>10.2</td>
<td>9.6</td>
<td>13.5</td>
</tr>
<tr>
<td>SUBTOTAL: QUALIFICATIONS RATING:</td>
<td>70</td>
<td>65.5</td>
<td>58.4</td>
<td>53.3</td>
<td>66.4</td>
</tr>
</tbody>
</table>

| QUALIFICATIONS RANKING:                                 | 2          | 3    | 4    | 1    |

<table>
<thead>
<tr>
<th>COST CATEGORY</th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>PROPOSER'S ANNUAL PAYMENT (COST)</td>
<td></td>
<td>577,600</td>
<td>588,000</td>
<td>$2,437,500</td>
<td>462,500</td>
</tr>
<tr>
<td>ESTIMATED ANNUAL DRYER OPERATING COST</td>
<td></td>
<td>($2,133,984)</td>
<td>($2,028,131)</td>
<td>($2,257,500)</td>
<td>($2,352,239)</td>
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<tr>
<td>ESTIMATED ANNUALIZED CAPITAL UPGRADE</td>
<td></td>
<td>($2,961,614)</td>
<td>($2,845,361)</td>
<td>($2,527,500)</td>
<td>($3,076,714)</td>
</tr>
<tr>
<td>SUBTOTAL: REVENUE/PRICE PROPOSAL SCORE</td>
<td>30</td>
<td>24.1</td>
<td>25.1</td>
<td>30.0</td>
<td>23.2</td>
</tr>
</tbody>
</table>

| TOTAL EVALUATION RATING:                                | 89.6       | 83.6  | 83.3  | 89.6  |
| TOTAL EVALUATION RANKING:                               | 1(TIE)     | 3     | 4     | 1(TIE) |
Competing Interests?

Green vs Green aka vs

[Image of money and green plant]
MSD entered into a contract with a marketer and continues to distribute Class A, EQ biosolids
## By The Numbers Today

### Biosolids Disposition Alternatives Cost Comparisons

<table>
<thead>
<tr>
<th>Description of Alternative</th>
<th>Type of Solids Produced</th>
<th>MSD Expenses</th>
<th>MSD Income</th>
<th>Net</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pellets (95% solids)</td>
<td>Landfill fees (including I F Avoidance Fees)</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td>Pellets (92% solids)</td>
<td>On-site charges by disposal company</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td>Dewatered Cake (30% solids)</td>
<td>Utilities - Gas, Water, Electric</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>External lab and inspection costs</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Labor for Dryer Operation (including benefits)</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Dryer/RTO Equipment Maintenance</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TOTAL through sale of Louisville Green</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Income minus Expenses</td>
<td>$/yr</td>
<td>$/yr</td>
</tr>
</tbody>
</table>

### Basis of Estimate:

- **2014**
- **2014**
- **2014**

<table>
<thead>
<tr>
<th>Description of Alternative</th>
<th>Units: wet tons/yr</th>
<th>2014 Basis of Estimate</th>
<th>Total Processing Unit Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Dewatered Cake: Landfill.</td>
<td>-</td>
<td>2014</td>
<td>$3,764,795</td>
</tr>
<tr>
<td>Dried Pellets: Landfill.</td>
<td>-</td>
<td>2014</td>
<td>$3,910,191</td>
</tr>
<tr>
<td>Dried Pellets: Market</td>
<td>27,807</td>
<td>2014</td>
<td>$3,810,494</td>
</tr>
</tbody>
</table>

### Total Processing Unit Cost

- **3.8% more for pellets to landfill**
- **1.2% more for pellets to market**

What it really cost to process solids by disposition method.
Competing Interests?

Green vs Green

aka

Green vs

money vs plant
AgNP

Engineered silver nanoparticles (AgNPs) <20nm 20 – 15,000 silver atoms
An emerging environmental contaminant of concern
Antimicrobial properties
Consumer products is increasing rapidly
Enter terrestrial ecosystems through land-application of biosolids
Microbial communities in organic matter and nutrient cycling in ecosystems

Triclosan / Triclocarban

Soaps, toothpaste, shampoo, kitchenware, pencils
Lipophilic-readily available for absorption and
bioaccumulation in fatty tissues
Antimicrobial properties
Photodegrades
Public pressure causing manufacturers to remove
from products
Minnesota bans triclosan from consumer and PPCPs
Pharmaceuticals and Personal Care Products (PPCPs)

PPCPs include:
- Prescription and over-the-counter therapeutic drugs
- Veterinary drugs
- Fragrances
- Cosmetics
- Sun-screen products
- Diagnostic agents
- Nutraceuticals (e.g., vitamins)

Sources of PPCPs:
- Human activity
- Residues from pharmaceutical manufacturing (well defined and controlled)
- Residues from hospitals
- Illicit drugs
- Veterinary drug use, especially antibiotics and steroids
- Agribusiness
What is the future of biosolids?

Truly an “A” to “Z” approach:

- Source
  - Digestion
  - Conditioning
  - Thickening
  - Dewatering
  - Minimization
  - Resource Recovery
    - Nutrients
    - Heat
    - Energy
  - Disposition
  - Compliance

- Purpose
Thank you!

Robin Burch
Joe Falleri
Sharon Worley
Alex Novak