GLWA Owned-NEFCO Operated
Biosolids Drying Facility
Biosolids Seminar – Replanting Detroit
July 21, 2016
Presentation Outline

- Benefits of Biosolids Drying
- Thermal Drying Process at GLWA/NEFCO
- Product Distribution & Marketing
- Regulatory Considerations
Municipal Benefits of Biosolids Dryer Facility

- Brings specialized expertise to the complex operating environment.
- Shares burden of meeting environmental standards to the private sector.
- Long-term cost certainty - Offers predictable operations budgeting process.
  - Commodities – electricity, fuel chemicals
    - Escalation tied to indices
    - Pass-throughs with guarantees
- Working relationship between NEFCO and GLWA critical to success of project
Environmental Benefits

- **Class A EQ Product**
  - Protective of public health
  - Higher level of treatment = Lowered Burden of Biosolids Management
  - GLWA - largest sludge nutrient recycler in the nation.

- **Truck Traffic**
  - 4 Truckloads of cake = 1 Truckload of dried product.
  - Reduced noise impacts on the community.
  - Reduced emissions from trucking.
Environmental Benefits

- **Odor Potential**
  - Contained, odor-controlled facility.
  - Product has negligible odor, reducing odors during trucking.

- **Fugitive Dust**
  - Pellet oiling system to minimize product dust.
  - Fabric filters to reduce dust at the facility.

- Low-Nuisance technology, low impact on neighbors.
Thermal Drying Technology

- Class A EQ Product with multiple outlets.
- Proven Technology
- Volume Reduction (4 to 1).
- Nutrients in biosolids remain available after drying – product suitable for beneficial use.
- No additional need for bulk chemical addition to stabilize cake.
Drying Undigested Sludge – BDF Connection

- Cost savings – no separate thickening/digestion
- Class A EQ product – less trailing solids management
- Less nutrient recycle – nutrients bound in dried solids
# Feed Characteristics Affect Product Quality

<table>
<thead>
<tr>
<th>Sludge Type</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Primary Sludge</strong></td>
<td>- Highly variable</td>
</tr>
<tr>
<td></td>
<td>- Good dewaterability</td>
</tr>
<tr>
<td></td>
<td>- Can contain extraneous materials</td>
</tr>
<tr>
<td><strong>Waste Activated Sludge</strong></td>
<td>- More homogenous than PS</td>
</tr>
<tr>
<td></td>
<td>- Better binding properties</td>
</tr>
<tr>
<td></td>
<td>- Better binding properties</td>
</tr>
<tr>
<td></td>
<td>- Unstabilized WAS can be prone to odors</td>
</tr>
<tr>
<td><strong>Digested Sludge – Not produced at GLWA</strong></td>
<td>- Low volatility</td>
</tr>
<tr>
<td></td>
<td>- Homogenous, but poor binding properties</td>
</tr>
<tr>
<td></td>
<td>- Better product quality</td>
</tr>
<tr>
<td></td>
<td>- Low odors from dried product</td>
</tr>
</tbody>
</table>
Biosolids Drying Facility – Material Flows

GLWA WWTP

- SLUDGE
- SCREENED FINAL EFFLUENT
- PLANT DRAINS, CENTRATE, SANITARY WASTE

NEFCO BDF

- PROCESS CHEMICALS (CAUSTIC, BLEACH, GLYCERIN, POLYMER)
- AIR EMISSIONS
- CLASS A EQ PELLETS
- CLASS A EQ WASTE (INORGANICS, ETC.)

UTILITIES (GAS, POTABLE WATER, ELECTRICITY)
Sludge Feed – Chopper Pumps at GLWA

Centrifugal Chopper Pumps
1 Run/1 Off Duty
Biosolids Drying Facility

- Located across the street from the WWTP.
- Four parallel dryer trains.
- 316 dtpd firm capacity (440 dtpd peak).
- Dewatering included in the facility.
- Air Quality Control Systems included in facility.
Sludge Feed to Trains

- Sludge Grinder
- PD Sludge Pumps
- 1/Centrifuge
Centrifuges - Dewatering

Centrifuges
2x/Train
Incoming Sludge: 2.5-6% Solids
Outgoing Cake: 26-35% Solids
Drying Process

Solids System Components

Drying & Air Quality Controls
Dryer Feed – Cake and Dried Recycle Mixture

- Recycle Screw Feeder
  1/Train
  Regulates recycle into dryer

- Weighbelt Conveyor
  1/Train
  Monitors how much cake enters dryer

- Pugmill Mixer
  1/Train
  Mixes recycle and cake.
  Coats recycle with cake to make new pellets
  55-65% solids
Dewatered Cake

Dried Material

- Pellets shaped during the mixing step.
- Eliminates “plastic” or “sticky” phase during drying.
- Easy drying of surface moisture.
- Dewatered cake characteristics affect mixing.
Dryer and Air Quality Control Equipment

- **Regenerative Thermal Oxidizer (RTO)**
  1/Train
  1500°F Chamber Temp
  Destroys VOC, Odors, CO, other air pollutants

- **Rotary Dryer – Gas Fired**
  1/Train
  3-pass
  Air-Conveyance
  Incoming Pug Mix: 55-65% Solids
  Dried Product: 95% Solids

- **Impingement Tray Scrubber**
  1/Train
  Removes particulates and combustion gases from recycled air stream
  Fed by SFE
Cyclone Separator

Gas recycled back to IT scrubber
Mixture of conveying gas and dried solids

Separated Dried Solids to Screener – Through Rotary Airlock

Dryer Exhaust
Mixture of conveying gas and dried solids

Return Air

Mixed Flow

Solids
Dried Biosolids Separation Equipment

1. Separated Dried Solids to Screener – From Rotary Airlock
2. Fines Cut – To Recycle Bin
3. Pellet Cut – Finished Product
4. Oversized Cut – Through Crusher – To Recycle Bin
5. Trash Cut (Puppy Chow) – To Landfill

Pellet Cooler (blue) – Acts like radiator to cool pellets
On Site Product Storage - Silos

Silo Capacity 600 DT/Each
5 Train-Days Storage/Each
Product Shipping – Bulk Trailers

8-10 truckloads/day
6 days/week
~40 Tons/Truckload
Land Application
Biosolids are not a waste to be managed but a product we make with intent.

- Public perception & acceptance
- Regulatory Acceptance
  - US EPA
  - Canadian Food Inspection Agency
- Accepted
- Proven Results
Developing Relationships

- Understand customer needs
- Address and acknowledge concerns
- Educate and involve
End Uses for Dried Biosolids

- Bulk land application
- Fertilizer blending
- Land Reclamation
- Alternative Fuels
  - Cement kilns
  - Power generation
  - Renewable fuel
Dried Biosolids for Bulk Land Application

**Benefits of Land Application**

- High organic content
- Increased soil carbon storage
- Slow release nutrients
- Natural micronutrients
- Faster plant establishment
- Increased water retention
NEFCO BDF Land Application (FY 16)

- Corn
- Wheat
- Soybeans
- Hay

US Distribution
~24,500 DT shipped

Canadian Distribution
~5,800 DT shipped
**Dried Product Quality Requirements**

**Chemical Characteristics**

- **Nutrient Guarantee - Fertilizer**
- **Metals – Ceiling Concentrations dictated by EPA/MDEQ**

<table>
<thead>
<tr>
<th>ANALYSIS</th>
<th>Average</th>
<th>Guaranteed</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total Nitrogen</td>
<td>4.75%</td>
<td>4.00%</td>
</tr>
<tr>
<td>3.95% Water Insoluble Nitrogen</td>
<td>3.15%</td>
<td>3</td>
</tr>
<tr>
<td>0.25% Water insoluble Nitrogen</td>
<td>0.17%</td>
<td>0</td>
</tr>
<tr>
<td>Available Phosphorus (as P2O5)</td>
<td>2.90%</td>
<td>N/A</td>
</tr>
<tr>
<td>Potassium (as K20)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Iron</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Nutrients Derived from Treated Biosolids

Detroit, MI Product Analysis
Regulatory Considerations – Class A EQ

- GLWA permit in Michigan
- Wintertime land application – Allowable in Michigan
  - Land slope
  - Frozen ground
  - Precipitation forecast
- Storage
  - 21 Day Uncovered Field Storage
  - 90 Day MDEQ approved covered storage
Physical Characteristics

- Granular product: Free flowing, suitable for traditional spreading.
- Larger pellets with undigested solids.
- Friable/Dusty – Use Glycerin as dust suppressant.
Wrap-Up

- Benefits of Drying Solids
- Process Overview
  - Dewatering
  - Drying
  - Separations
  - Air Quality
- Biosolids Marketing
- Product Quality
Acknowledgements

- Great Lakes Water Authority
- NEFCO
  - Steve Miller
  - Manuel Irujo
  - Sherika Gibson
  - Hari Santha
  - Larry Bishop