The Milorganite® Heat Drying Process

Milwaukee Metropolitan Sewerage District

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March 21, 2017
35th Spring Biosolids Symposium
Stevens Point, WI
MMSD Serves:

- 1.1 Million Customers
- 28 Municipalities
- 411 Square Miles
Jones Island Water Reclamation Facility

300 MGD Full Treatment Capacity
95 MGD Annual Average

Liquid Treatment Processes
Preliminary/Primary/Secondary/Disinfection

Solids Handling & Disposal
Interplant solids Pipe
Thickening (GBTS)
Dewatering (BFP)
Drying
MILORGANITE Fertilizer
South Shore Water Reclamation Facility

300 MGD Full Treatment Capacity
90 MGD Annual Average

Liquid Treatment Processes
Preliminary/Primary/
Secondary/Disinfection

Solids Handling & Disposal
Interplant pumping of solids
GBTs and Plate and Frame Digesters
Methane 1.3 MMCF
Jones Island

- Completed in 1925
- First municipal activated sludge treatment facility
- National civil engineering landmark
Milorganite®

• Since 1926
• Marketed as a commercial fertilizer
• Markets developed with turf science and professional turf care
Biosolids Technology Fact Sheet
Heat Drying

DESCRIPTION
Heat drying, in which heat from direct or indirect dryers is used to evaporate water from wastewater solids, is one of several methods that can be used to reduce the volume and improve the quality of wastewater biosolids. A major advantage of heat drying versus other biosolids improvement methods, however, is that heat drying is ideal for producing Class A biosolids.

Class A biosolids, as defined in 40 CFR Part 503, are biosolids that have met “the highest quality” pathogen reduction requirements confirmed by analytical testing and/or the use of a Process to Further Reduce Pathogens (PFRP) as defined in 40 CFR Part 257. One advantage of Class A biosolids is that they are approved for unrestricted users for many years. They can be directly applied to agricultural fields, lawns, etc. or mixed with other ingredients prior to application.

APPLICABILITY
Heat drying is an effective biosolids management option for many facilities that desire to reduce biosolids volume while also producing an end-product that can be beneficially reused. For example, the Milwaukee Metropolitan Sewage District (MMSD) has been heat-drying wastewater solids and marketing the end-product as a fertilizer since the 1920s (USEPA 1979). The technology has gained popularity since the mid-1980s, as many large urban wastewater solids generators, especially on the east coast, have shifted from ocean disposal to land-based benefi-
Current Products

- Retail
  - 36 pound bag
  - 5 pound bag
- Professional
  - 50 pound bag
  - 50 pound bag greens grade
  - 1,000 pound bag
- Blending
  - Truck
  - Railcar

- Classic
  - 5-2-0
  - 6-2-0
- Greens Grade
  - 6-2-0
  - 5-2-0
- SGN
Life in the Fertilizer Marketplace

Milorganite

Biosolids Regulations

Fertilizer Regulations

Customer Satisfaction
Product Consistency

• Compliance with Regulations
• Performance
  • Nutrients
  • Precise sizing to match fertilizer spreaders
• Over time
• Throughout the country
How do we achieve consistency with variable inputs?

Massive amounts of recycling!
Recycling Systems

• Continuous
  • Dryer to dryer
  • Central recycling bins
  • Sizing to recycling bins

• Intermittent
  • Dryer discharge screw failure
  • Single dryer
Dewatering and Drying Facility
Biosolids From the Two WRFs

• Two Plants are 12 miles apart
• 4 ISP lines: 2-14” and 2-12”
• Ductile iron force mains
Four Gravity Belt Thickeners

Purpose:
To thicken Jones Island WAS (JIWAS) and portion of South Shore WAS (SSWAS) and Digested Sludge (SS DSD)

Feed Concentration = 1% Solids
Thickened Concentration = 4-5% Solids

Ferric Chloride is added for conditioning the sludge prior to GBT thickening
Mannich Polymer for Thickening
24 Belt Filter Presses

Ashbrook Presses
Purpose: To dewater Blended Sludge (BSD) made of JI WAS, SS WAS and SS DSD
SS DSD is 25-35% of the total Blended Sludge

Feed Concentration = 3.2 %
Dewatered Cake = 18%

Ferric Chloride is added for conditioning the sludge

Mannich Polymer is added for Solids Liquid separation
12 Rotary Dryers

• Davenport Dryers- Single Pass- Rotary Drum
• Purpose: To Heat Dry BFP Cake into solid pellets commercially sold as Milorganite
• Throughput 18 tons/dryer/day
• Energy for Drying can come from either sources:
  • Waste Heat from GE Turbines
  • Waste Heat from Solar Turbines
  • Natural Gas Burners
  • Combination of NG and WH
• Future Energy Requirement be met by
  • LFG Burners
  • Combination of LFG and WH
Dryer Drum from Inside the furnace. Openings in dryer drum allow heat to enter the inside of dryer drum and contact the product.
Blue = Dryer Exhaust

Red = Heat to the dryer by Turbine WH or NG Burner.

Green = Product moving through Dryer Drum.
Silos and Loadout

- 14 Storage Silos and 4 Day Tank
- Capacity of each Silo = 1000 tons
- Silo Temperature Alarms = 105 HI Alarm 115 HI HI Alarm
- Empty Silos are used for Thermal Control (Nitrogen Purge for Emergency)
- Silos used to store and hold product until WPDES permit limits are confirmed
- Dust suppressant is added to Milo prior to distribution to railcars or trucks, rate 1.8 gallon/ton
- 75% to packaging, 25% to bulk orders
Recycle System Of the Dryers

Recycle Feed In
Dry Tons/Day

Sludge Cake Feed, Dry Tons/Day

Product returning from Recycle Bin, Dry Tons/Day

Redundant Recycle Bin and Recycle Train

South Dryers and recycle system are Mirror Image of the North

Dryer7
Dryer8
Dryer9
Dryer10
Dryer11
Dryer12

Recycle Bin

Recycle Feed In
Dry Tons/Day

Sludge Cake Feed, Dry Tons/Day

Product returning from Recycle Bin, Dry Tons/Day

Redundant Recycle Bin and Recycle Train

South Dryers and recycle system are Mirror Image of the North

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12/09/2016
Milorganite Process Control Sampling Locations

Product Leaving Recycle Bin to Classification

Screens
- Oversize Product
- Finished Product
- Dust

Daily Production Sampler (Finished Product)

Load Out Sampler (Shipped Product)

Silos (14 Silos)

Day Tank (4 Day Tanks)

Shipped Via Rail Car/Trucks

Moisture
Fecal (3/month)
Metals
PCBs
Nutrients
Iron
Screen Test
Bulk Density
Priority Pollutant (2/yr)
Dioxins and Furans (Monthly)

Moisture
Metals
Nutrients
Iron
Bulk Density
Screen Test
Milo Production-5 Years

Product Quality
- Nitrogen= 5-6%
- Iron = 4%
- Phosphorus= 4-5%
- PCB<1 ppm
- Moisture= 5%
- Bulk Density= 52 lb/cuft
- Fecal<0.22 MPN/g TS
- Metals within WPDES limits
- Particle Size Distribution