Treatment of Waste by Anaerobic Digestion

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Manufacturer's Zero Waste Conference
Introduction to Grifols

- Pharmaceutical Manufacturing in Clayton, NC
- ~1600 employees, 240 acres
- Manufacture products from human plasma
- Participant in NCDENR’s Environmental Stewardship Initiative (Rising Steward level)
- ISO 14001 Equivalent Program
Significant Waste Streams

- **Spent Polyethylene Glycol (PEG)**
  - Mostly water
  - Contains PEG, salts and proteins
  - Does not break down in wastewater treatment

- **Paste and Filters from plasma fractionation**
  - Derived from human plasma
  - Contains proteins, filter aid, filter papers

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Volume Increases

PEG Waste

Paste and Filters Waste

Solidify & Landfill  Compost  Anaerobic Digestion

Gamunex  Prolastin  Fractionation
Disposal Methods for PEG Waste

• Pre-2009
  – Shipped to facility about 2.5 hours away
  – Solidified and Landfilled

• Mid-2009 to 2012
  – Shipped to a facility about 1.5 hours away
  – Composted
  – Reduced cost
  – Composter had difficulty with high water content

• Beginning 2013
  – Shipped to a facility 9 miles away (20 minutes)
  – Anaerobically Digested
Full Circle Recycling, Zebulon, NC

A complicated but efficient way to treat hog waste (and Grifols waste):

1. **Transfer station for organic waste:** Trucks bring discarded produce from supermarkets (and Grifols wastes) to add to the mix.

2. **Open storage/treatment lagoon:** Hog barns

3. **Thermophilic (heated) anaerobic digester:** Microbes break down the waste and produce methane.

4. **Psychrophilic (ambient) anaerobic digester:** Original covered lagoon-style anaerobic digester. Still in use, but not strictly necessary now that the farm has installed the heated digester.

5. **Ammonia reduction system:** Hog barns

6. **Cleaned Wastewater recycled to flush waste from barns:** Hog barns

7. **Greenhouse:** Hog barns

**Treatment of Grifols’ Spent PEG**

**Irrigate Crops:** Used to water cover crops and greenhouses.

**Biogas:** Rich in methane. Used to heat greenhouses.

**Digestate:** Stabilized, cured, dewatered and spread on farm as organic compost.

**Some nutrients pulled from treated wastewater to grow hydroponic vegetables.**
Paste and Filters Waste

- **Regulated Medical Waste** (Body Fluids)
  - Derived from Human Plasma
  - Treatment – incineration at medical waste incinerators
    - Too dense to autoclave or chemically treat
- Significant shipping distances
- Labor intensive

### Options
- Landfill
- Incineration
- Anaerobic Digestion
Relationship of Agencies concerning Regulated Medical Waste (simplified)

Before…
- Grifols "treats" medical waste.
- DOT exempts Grifols waste.
- NCDENR allows alternative final treatment/disposal.

After…
- Grifols “treats” medical waste.
- OSHA still applies.
- DOT exempts Grifols waste.
- NCDENR allows alternative final treatment/disposal.
Result –
• 95% decrease medical waste stream disposal.

• Increased recycling opportunities!
Any questions, call or e-mail.

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