Composting Industrial and Commercial Organics

Waste Reduction Partners
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What is Compost?

- Humus manufactured by the controlled biological decomposition of organic matter
- Sanitized by the generation of heat
- Stabilized to benefit plant growth
- Improves physical, chemical and biological characteristics of soils
- Benefits to soil - -
  - 25 lbs/ton Nitrogen
  - 13 lbs/ton Phosphorus
  - 7 lbs/ton Potassium
  - Trace Elements
How is Compost Manufactured?

- Produced through activity of aerobic microorganisms
- Nitrogen-containing wastes are mixed with carbon-containing bulking agents (i.e. wood chips)
- Natural decomposition process heats up compost pile to kill pathogens
- Material is cured to finish biological decomposition
- Finished compost may be screened (depending on bulking agents used and
Suitable Materials for Composting

- Biodegradable waste streams from manufacturing
  - Wood wastes, textile wastes, food processing wastes
- Food wastes and paper from on-site cafeterias
- Food wastes and paper from grocery stores and restaurants
- Waxed-coated cardboard from packaging
- Sludge from wastewater treatment
- Off-spec product (biodegradable)
- Animal manures
Feedstock and Compost Quality

- Feedstocks must pass TCLP
- Compost must meet metals and pathogen limits:
  - Arsenic 41 mg/kg
  - Cadmium 39 mg/kg
  - Copper 1500 mg/kg
  - Lead 300 mg/kg
  - Mercury 17 mg/kg
  - Nickel 420 mg/kg
  - Selenium 36 mg/kg
  - Zinc 2800 mg/kg
  - Total Coliform <1000 MPN/gm
  - Manmade Inerts < 1” in size
Composting Essential Elements

- **Nutrients**
  - Carbon/Nitrogen (C/N) – 20:1 to 35:1
  - Carbon/Phosphorus (C/P) – 100:1 to 150:1
- **Moisture Content** – 50 to 60 percent (wet basis)
- **Particle Size** – 1/2” to 1” optimum
- **Porosity** – 35 to 50 percent
- **pH** – 6.5 to 8.0
- **Oxygen concentration** – greater than 5 percent
- **Temperature** – 130° F. to 150° F.
- **Time** – one to four months
Composting Technologies

- Technology in Composting:
  - Materials Handling
  - Biological Process Optimization
  - Odor Control

- Capital Cost
  - Increases with technology

- Operational Costs
  - Decrease with technology (less labor intensive)

- Footprint (Area Required)
  - Decreases with technology (usually)
Composting Systems

- **Low - Tech**
  - Windrow

- **Mid - Tech**
  - Aerated Static Pile
  - Aerated Compost Bins

- **High - Tech (In-Vessel)**
  - Rotary Drum Composters
  - Box/Tunnel Composting Systems
  - Mechanical Compost Bins
Windrow Composting

- Long, narrow piles agitated/turned regularly
- Aeration by natural/passive air movement
- Better suited to larger volumes
- Composting Time: 3 - 6 Months
Aerated Compost Bins

- Aeration Through Porous Floor Plates/Channels
- Composting Time: 2 - 3 Weeks
- Curing Time: 2 Months
- Durable Materials of Construction
- Equipment Needed: Front End Loader
- Vector/Vermin Control Needed With Food Wastes (cover with compost)
- Capacities: 3 - 4 Days Waste & Bulking Agent Per Bin
Aerated Static Pile

- Aeration Provided By Mechanical Blowers
- Can Shorten Composting time to 3 - 5 Weeks (followed by 30 days curing)
- Better suited to biosolids and sludges
In-Vessel Systems
Rotary Drum Composters
Rotary Drum Composters

- Rotation Mixes, Aerates Compost Mix
- Second - Stage Curing/Composting Needed
- Waste Grinding and Mixing With Bulking Agent Needed Prior to Feeding Drum
- Recipe For Drum Composting (by volume):
  - Food waste: 2 Parts Wood Chips, 1 Part Sawdust, 2 Parts Food Waste
  - Seafood waste: 3 Parts Wood Waste, 1 Part Seafood waste
Box/Tunnel Composting Systems
Mechanical Compost Bins

- Green Mountain Technologies “Earth Tub”
- Modular Design, Batch Operation
- Capacity: 200 lbs/day
- Composting Time: 4 Weeks; Curing: 1 Month
- Footprint: 1 Parking Space
- Cost: $6,000
- Labor: 1 Operator
GMT “Earth Tub” Installations

- UNC – Asheville
- UNC – Charlotte
- UNC - Greensboro
- Univ. of Georgia
- Hyatt Regency, Chicago
- Univ. of South Carolina
- Connecticut DEP
- Flushing Hospital, NY
- Texas A&M University
Composters in WNC

- East Coast Compost, Asheville (828-628-4340)
  - Food wastes from grocery store; animal manures
- Mountain Organic Materials, Asheville (828-665-9899)
  - Wood wastes from sawmill and pallet manufacturing; animal manures
- Jennings Trout Farm, Canton (828-648-3010)
  - Aquaculture wastes and mortalities
- East Fork Growers, Brevard (828-862-4070)
  - Aquaculture wastes; food wastes; yard wastes
On-Site Composting in NC

- Jeld-Wen Fibers, Marion
  - Urea formaldehyde wood wastes
- Gaia Herbs, Asheville
  - Process wastes
- Mattamuskeet Seafood, New Holland
  - Seafood processing wastes
- Hoover Aquatic Farms, Brevard*
  - Trout farm mortalities
- Bayboro Dehydrating, Bayboro*
  - Crab processing wastes
- National Fruit Co., Lincolnton*
  - Apple culls

*Not currently operating
Grocery Store Food Wastes Diversion

- Food Lion: Fairview
- Winn-Dixie: 2 stores in Sanford, one in Clayton
- Lowe’s Foods: 5 stores in Orange and Chatham Counties
- IGA: 2 stores in Johnston County
- Wellspring Groceries, Durham
- Weaver St. Market in Chapel Hill
- Fearrington Market in Fearrington Village (Chatham)
On-Site Composting Elsewhere

- Johnston Industries, Columbus, GA
  - 5K TPY cotton fiber
  - Saving over $220K annually in disposal costs

- Carrier Corp., Syracuse, NY
  - 100 TPY food waste, sawdust and landscape debris
  - Saved over $40K in 1998 in disposal costs
On-Site Composting Elsewhere, cont.

- Anheuser-Busch Corp. (several plants)
  - Beechwood chips, agricultural wastes, animal wastes (from theme parks)
- Greif Bros. Papermill, Lynchburg, VA
  - 1100 TPY sludge from WWTP
  - ROI estimate is 2.5 years
Other Recycling Options

- Land application
- Anaerobic digestion with methane recovery/use
- Divert to animal feed
  - Bruce Foods, Wilson
  - Goldsboro Milling
- Direct product sales
  - Miller Brewing, Eden – filter press cake sold as “Farm-On”
Questions to Consider

- Onsite Composting
  - Assess resources available
    - Capital, equipment, space, feedstocks
  - Select composting method
  - Feedstocks collection, storage, and transportation
  - Employee education
  - Program monitoring and assessment
  - ROI, Operating costs, Compost revenues
Questions to Consider

- Offsite Composting
  - Locate composting facility
  - Waste liability (who keeps/takes title?)
  - Transportation logistics
  - Feedstocks collection, storage, and transportation
  - Employee education
  - Program monitoring and assessment
  - Cost savings over current practices