Composting Industrial and Commercial Organics

Waste Reduction Partners

Quarterly Meeting

April 20, 2000

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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^{o} F. to 150^{o} F.
- Time – one to four months

Composting Technologies

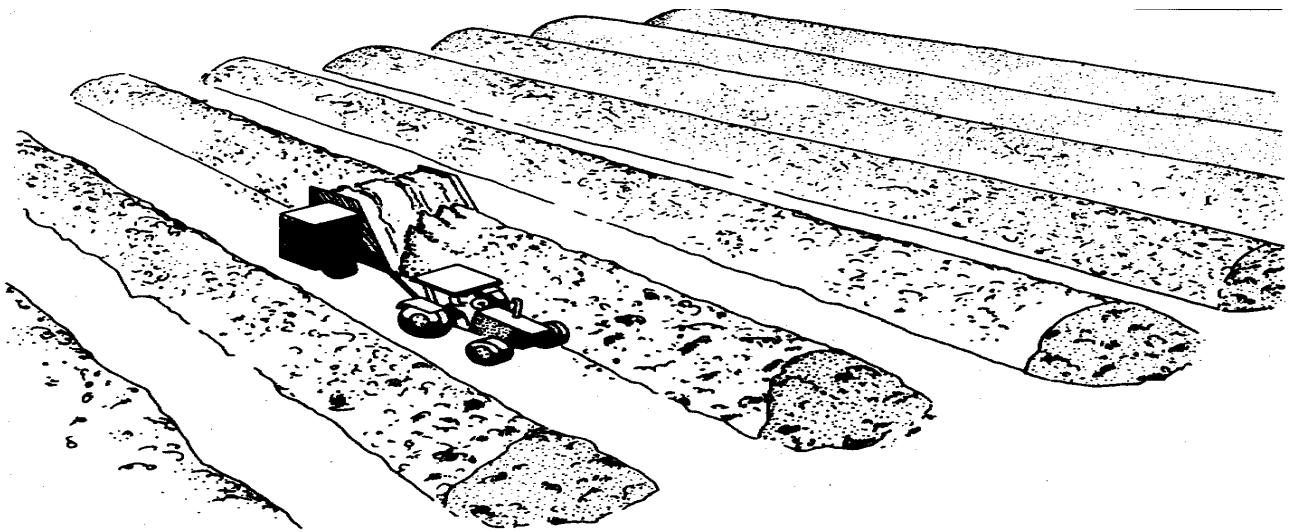
- Technology in Composting :
  - Materials Handling
  - Biological Process Optimization
  - Odor Control
- Capital Cost
  - Increases with technology
- Operational Costs
  - Decrease with technology (less labor intensive)
- Footprint (Area Required)
  - Decreases with technology (usually)

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



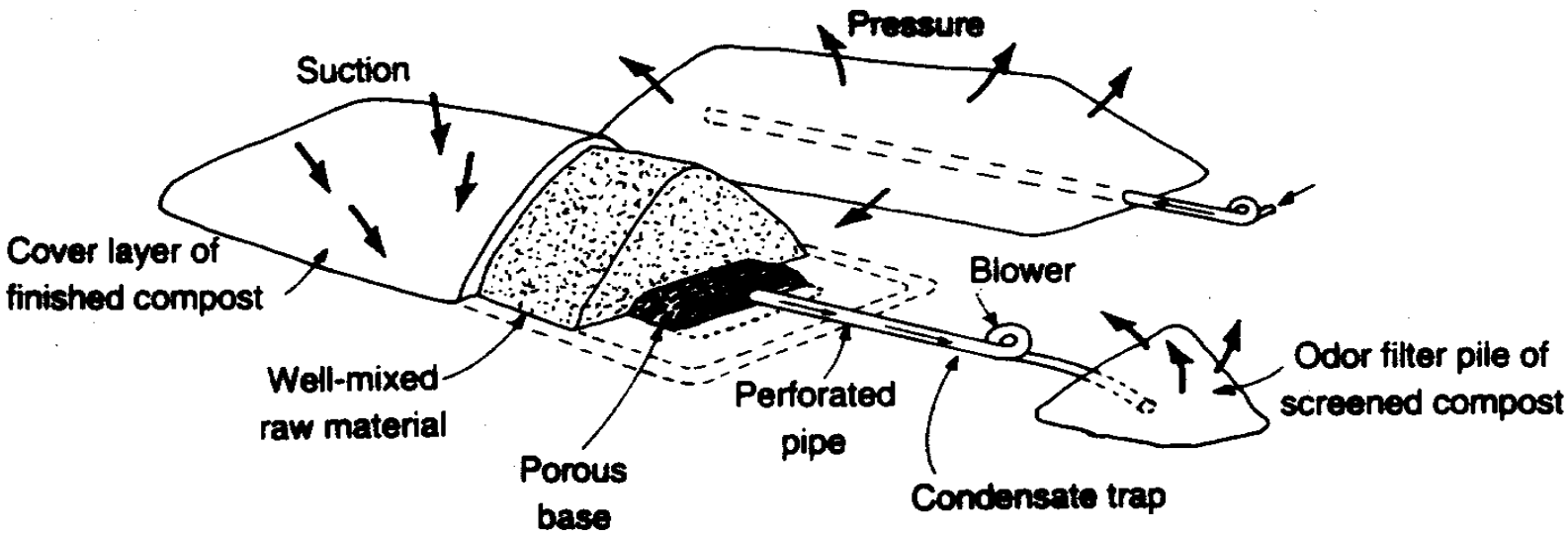
Aerated Compost Bins

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

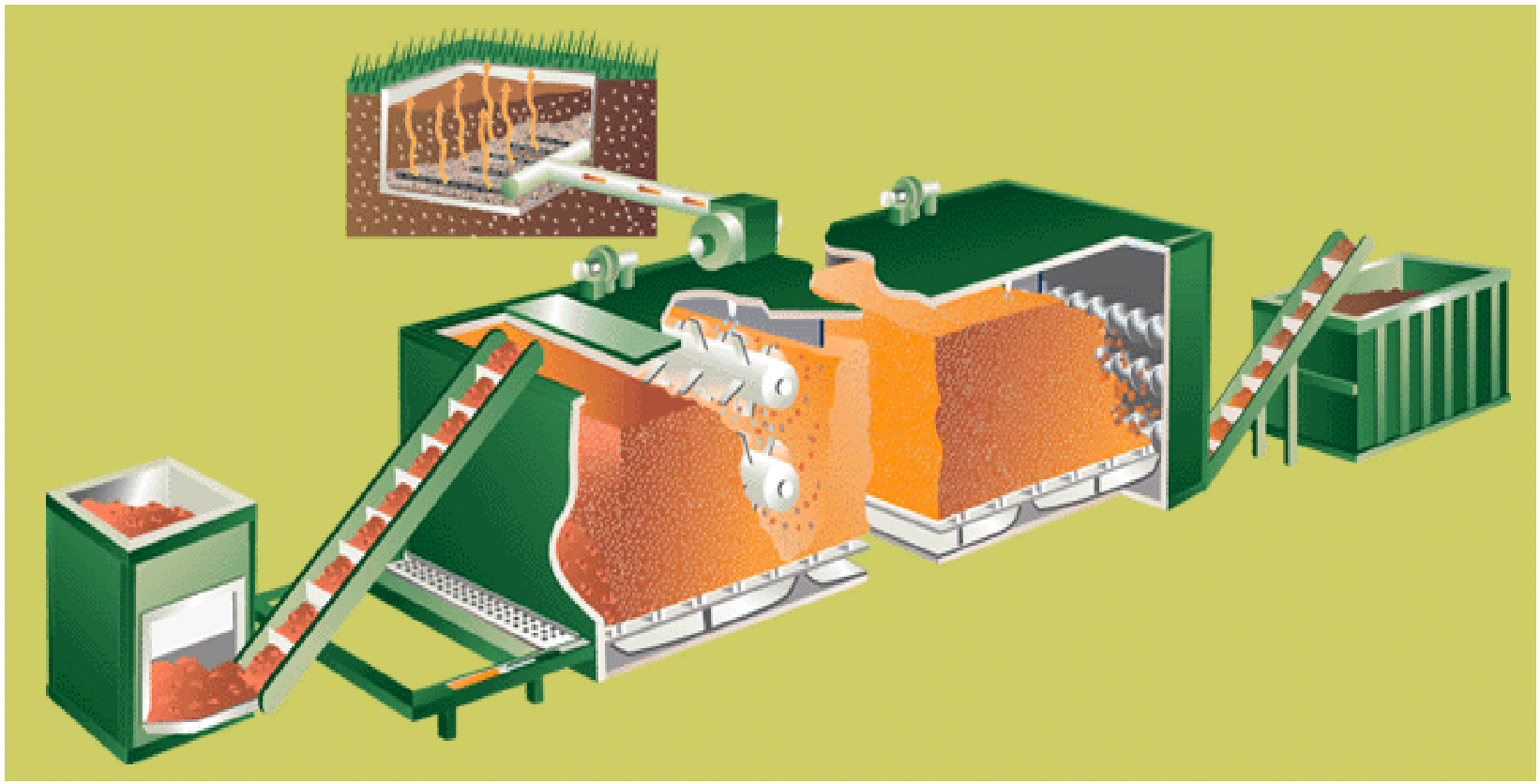


In-Vessel Systems
Rotary Drum Composters

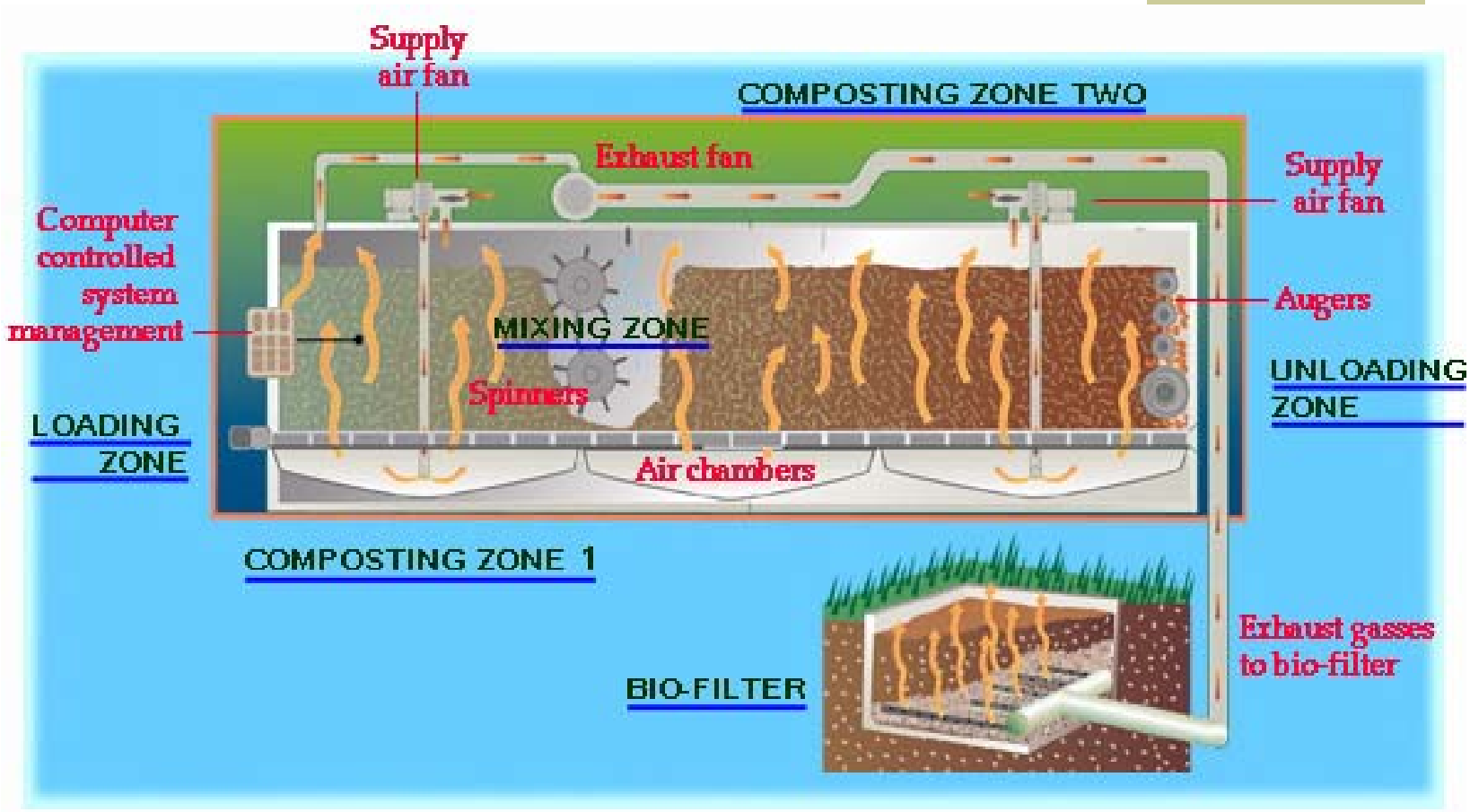
Rotary Drum Composters

- 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



Box/Tunnel Composting Systems

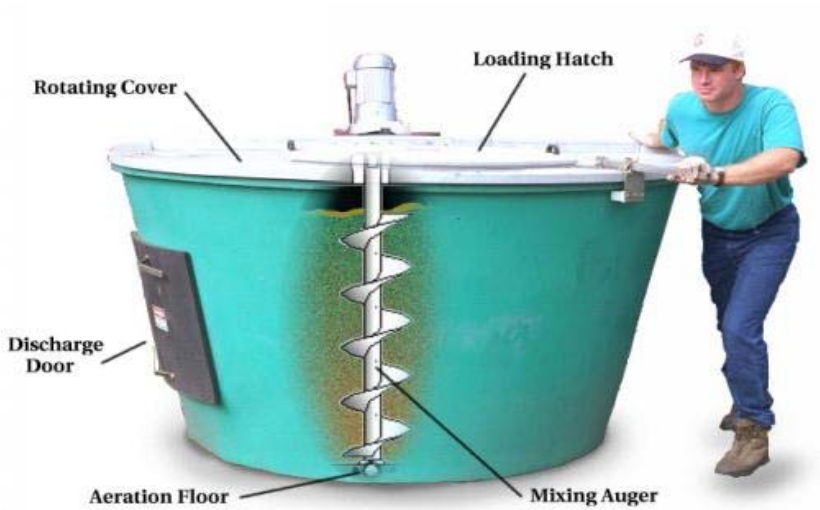


Mechanical Compost Bins

- 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


RESERVED
FOOD
COMPOST
TRUCK
24HR TOW