

Composting Industrial and Commercial Organics

Waste Reduction Partners

Quarterly Meeting

April 20, 2000

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Section/DPPEA

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

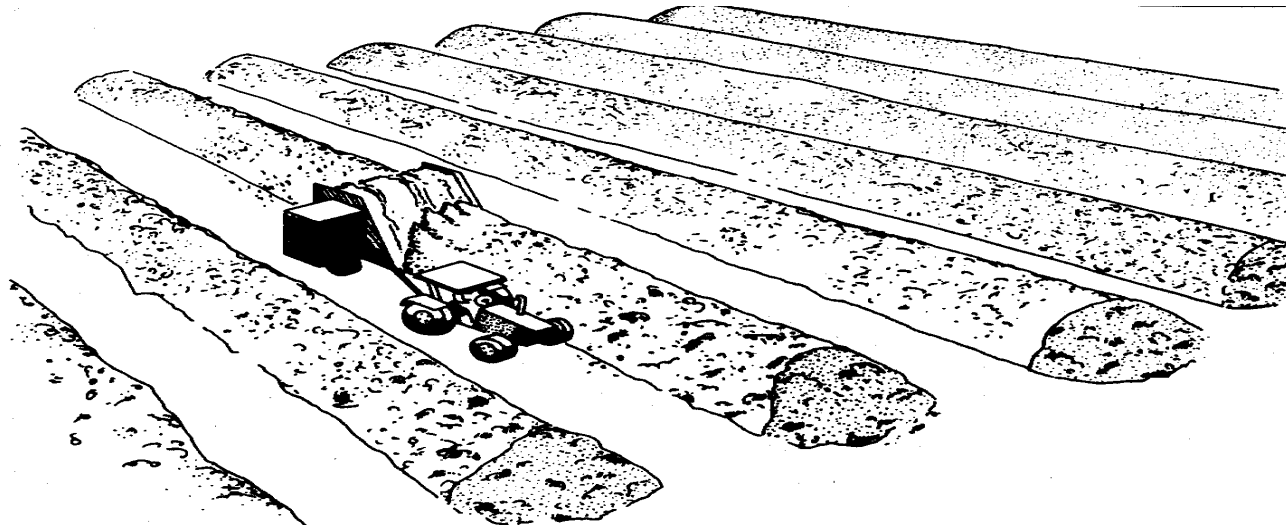
- ◆ Technology in Composting :
 - Materials Handling
 - Biological Process Optimization
 - Odor Control
- ◆ Capital Cost
 - Increases with technology
- ◆ Operational Costs
 - Decrease with technology (less labor intensive)
- ◆ Footprint (Area Required)
 - Decreases with technology (usually)

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

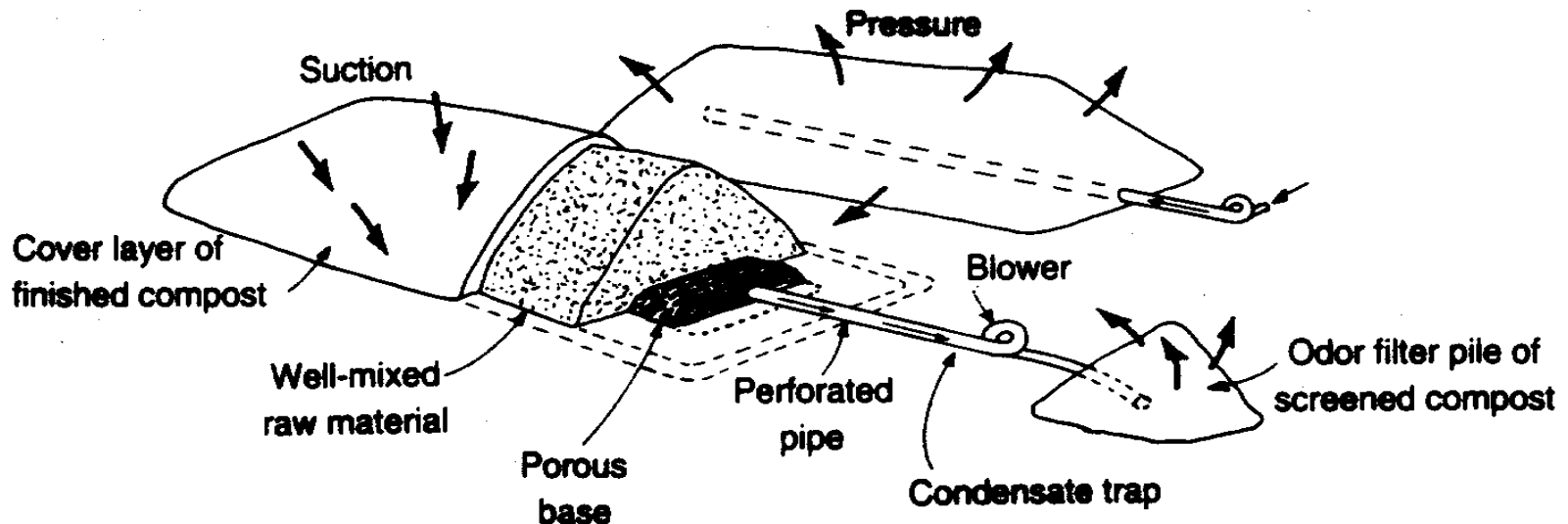


Aerated Compost Bins

- ◆ 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



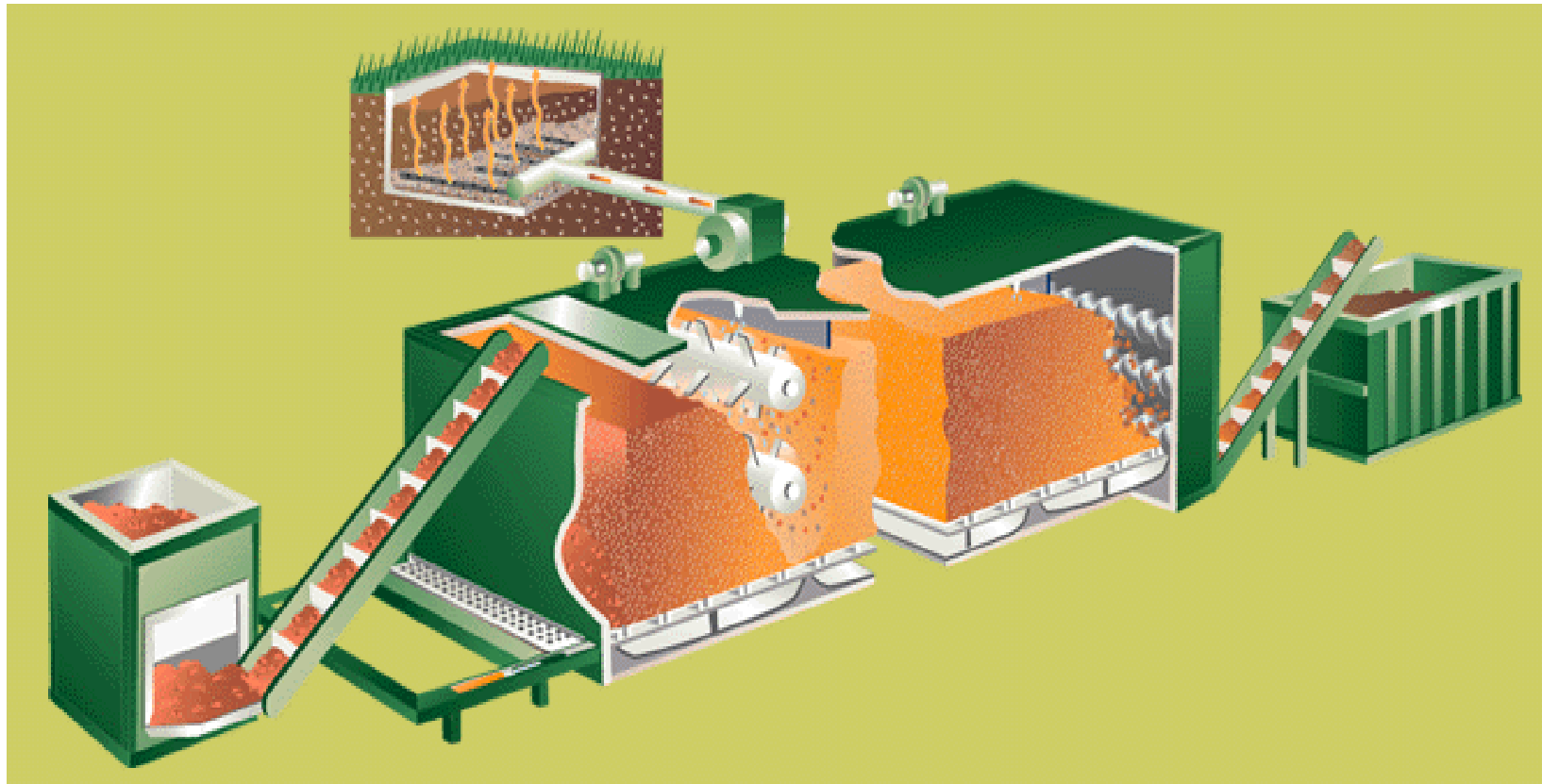
In-Vessel Systems Rotary Drum Composters



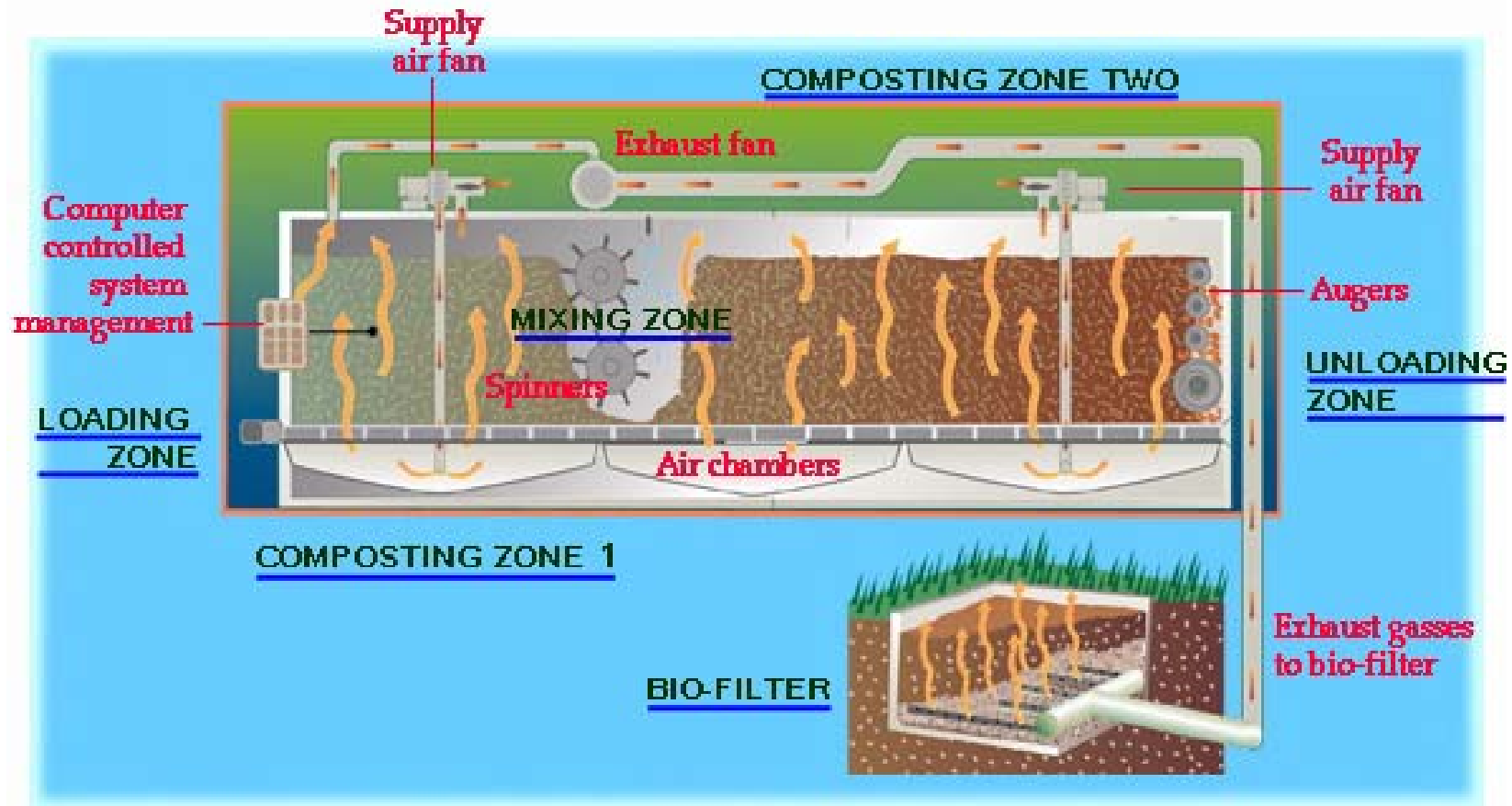
Rotary Drum Composters

- ◆ 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



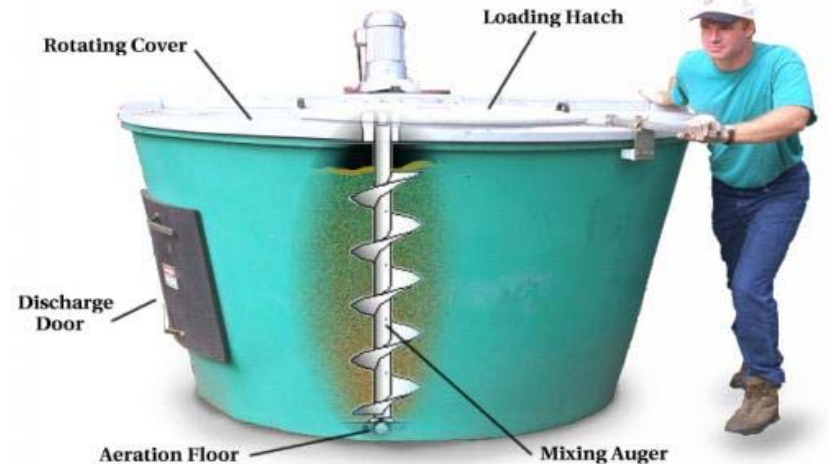
Mechanical Compost Bins



- ◆ 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
- ◆ Fearington Market in Fearington 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