

# Components for Successful Compost Facility Operations

August 23, 2013

SYNAGRO

People + Planet → Synchronization



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## AGENDA

- Facility Siting Considerations
- Composting Technologies
- Permitting
- Regulatory Compliance
- Process Control
- Compost Quality
- Marketing Compost

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## FACILITY SITING CONSIDERATIONS

- Location, Location, Location!
  - Regulations
  - Nearby Compost Market
  - Sensitive Receptors
- Public Education/Politics
  - Education Begins Early
  - Keep it Simple
  - Remember the Benefits
    - Diversion
    - Soil Enhancement
    - Erosion Control
  - Don't ignore the public/politics

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## COMPOSTING TECHNOLOGIES

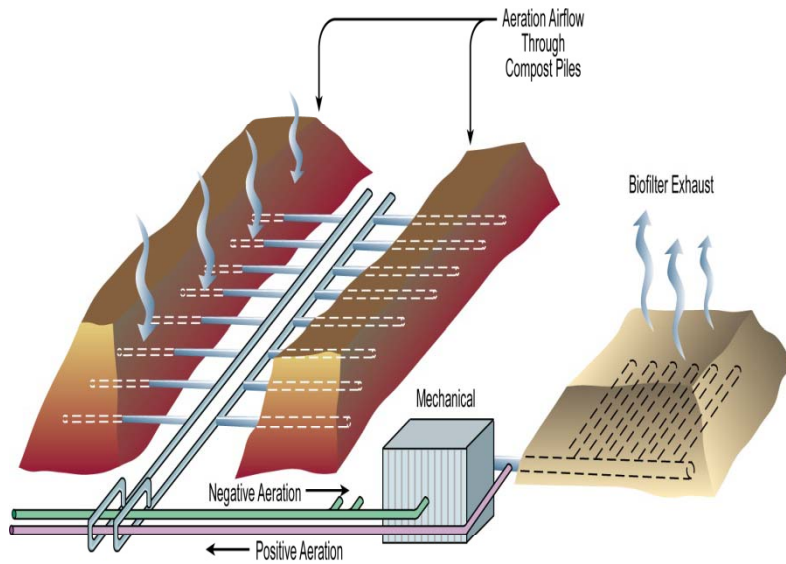
- Windrow
- Aerated Static Pile – Negative or Positive
- In-vessel





## COMPOSTING TECHNOLOGIES

### Negative Aerated Static Pile Composting



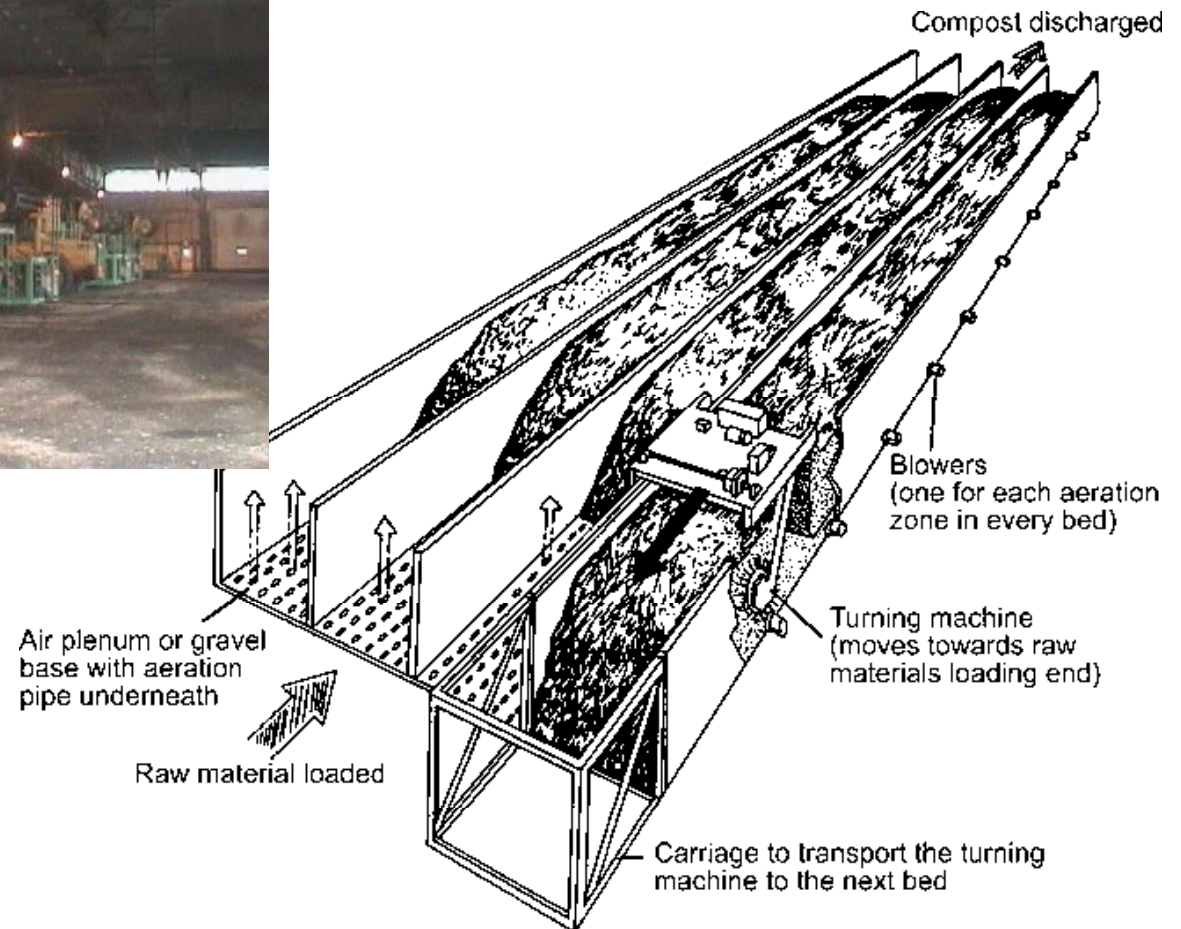
## COMPOSTING TECHNOLOGIES

### Negative Aerated Static Pile Composting









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## PERMITTING

- Local Use Permit
- Local Air District Permit
- U.S. EPA Registration

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## REGULATORY

- Inbound Materials Monitoring
  - Biosolids
  - Carbon Feedstocks
- Process Water Management
- Ground Water Monitoring
- Source Testing
- Compost Sampling
  - Metals Concentrations (max)
  - Pathogen Reduction (PFRP)

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## ESSENTIAL OPERATIONAL MEASURES

- Essential Measures:
  - Odor Control
  - Water Protection Measures
  - Emissions Reduction
  
- Failure Usually Results in a Loss of Confidence
- A Loss of Confidence Usually Results in Demise

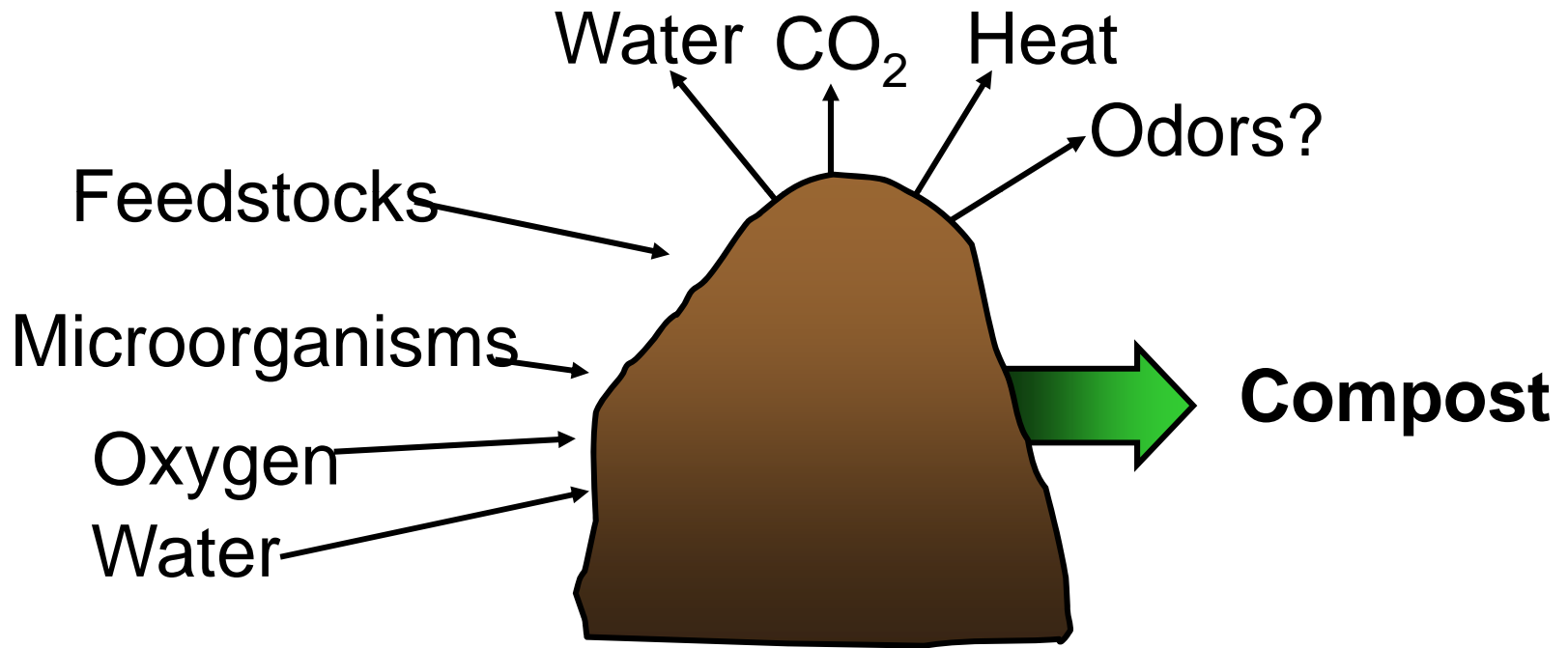
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## PROCESS CONTROL PARAMETERS

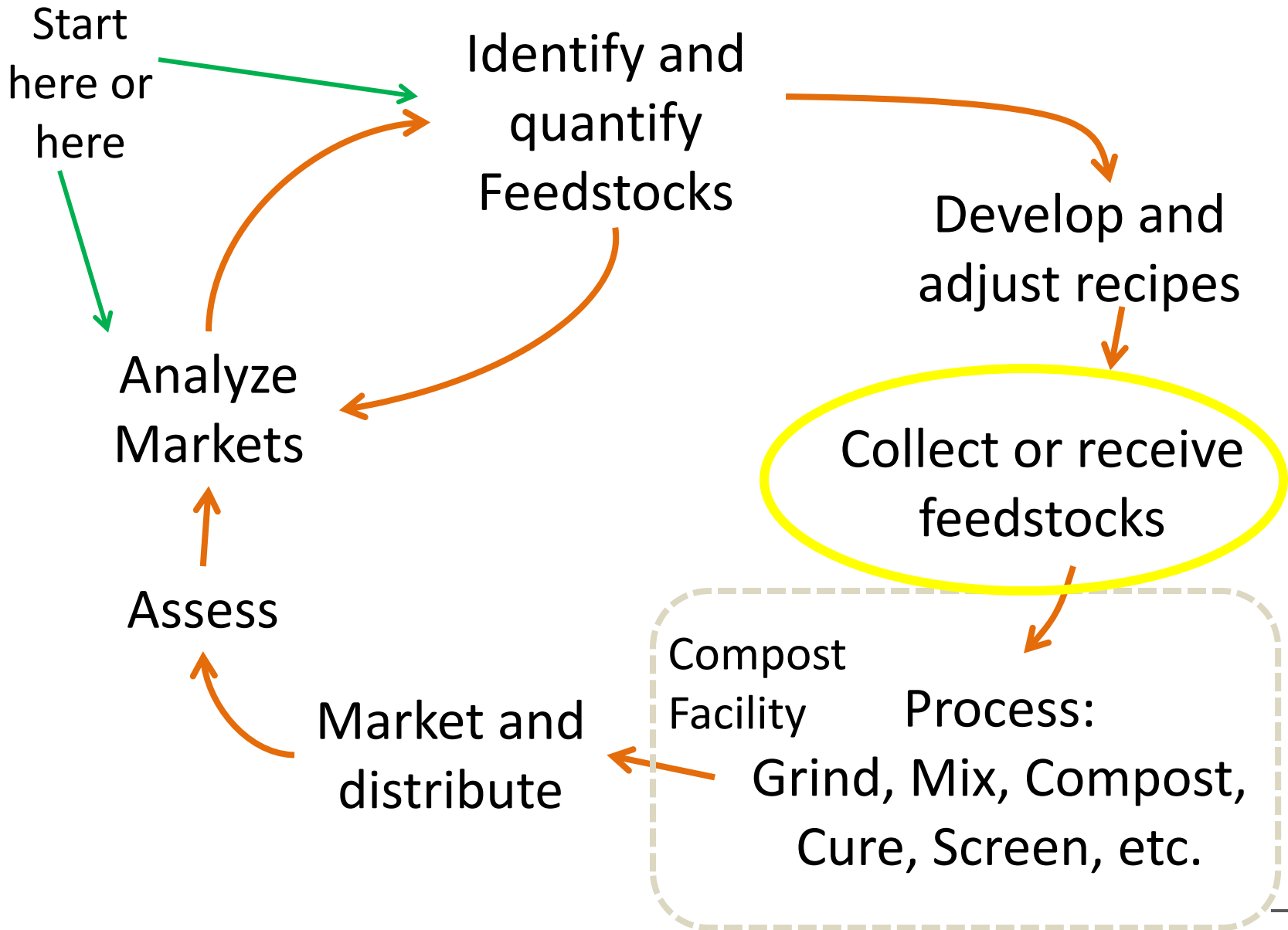
- Control Points
  - Feedstock Handling
  - Mix Ratios
  - Moisture
  - Aeration Rates
  - Temperature/PFRP

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## COMPOSTING PROCESS



# Compost Facility Feedstock-Process-Market



1. Initial feedstock mix
2. Pile moisture
3. Pile aeration
4. Pile shape and size
5. Pile temperature
6. Composting retention time



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## FEEDSTOCKS: YOUR RAW MATERIALS

### Chemical composition

- Organic Matter, Nutrients, Degradability

### Physical characteristics

- Moisture, Bulk density, Heterogeneity

### Other

- Contamination, Cost, Availability, Regulations

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## FEEDSTOCK SUMMARY

- ◆ Each feedstock has certain attributes
- ◆ The RECIPE is how feedstocks are combined
- ◆ Composting system designed for feedstocks
- ◆ Regulations are always partly based on feedstock

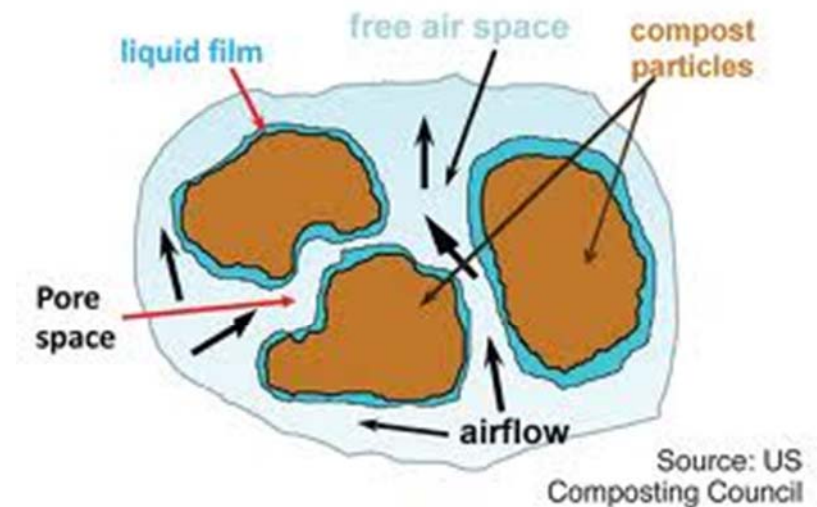
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## INITIAL MIX RATIOS

Rule of thumb for starting mix:

- Below 800 lbs/cubic yard (475 kg/m<sup>3</sup>)
  - May not hold heat
- Above 1000 (600 kg/m<sup>3</sup>)
  - increasing difficult to aerate
- Above 1200 (700 kg/m<sup>3</sup>)
  - Too dense

Starting Free Air Space: above 50%  
will assure good airflow



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## MOISTURE

- Optimum is 45-60% moisture
- Composting consumes water
  - Better to start on high end
  - Adding water is difficult
  - 25 gallons per ton raises moisture content ~10%

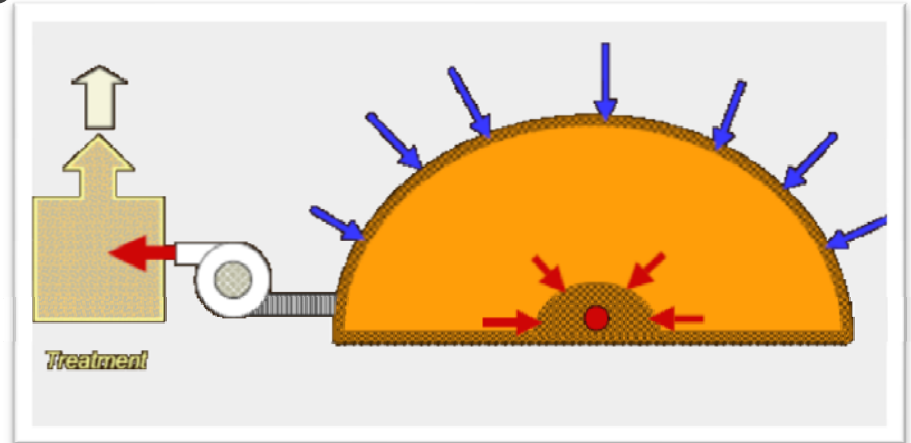
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## AERATION

- Supplies oxygen
- Ambient air is 21% oxygen
- Below 16% bacteria start switching to anaerobic respiration
- O<sub>2</sub> consumption increases with temperature

## AERATION TYPES

- Forced aeration – Negative or Positive



- Mechanical – Windrow turner



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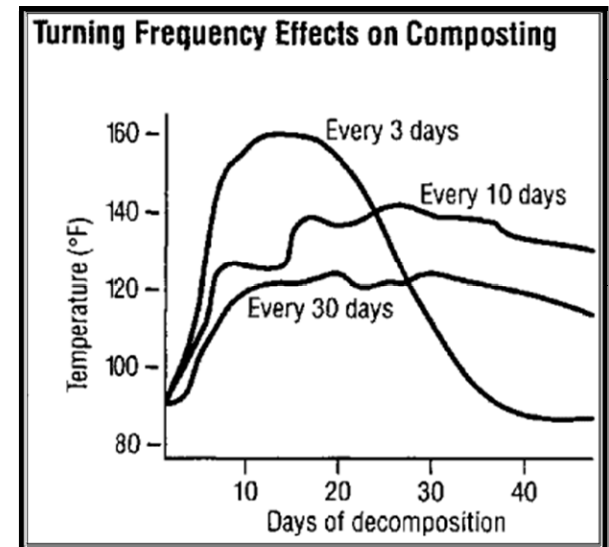
## TEMPERATURE

- Higher temps result in faster breakdown, up to 140°F
- At temps > 160°F lose microbial diversity, composting actually slows
- Most weeds and pathogens killed at temps > 130°F (55°C)
  - PFRP=Process to Further Reduce Pathogens
- Moisture moderates temperature fluctuation

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## PFRP - PROCESS TO FURTHER REDUCE PATHOGENS

- Time and Temperature requirements to assure pathogen reduction
- Aerated Static Pile and In-vessel:
  - 55°C for 3 days
- Turned windrow:
  - 55°C for 15 days with 5 turnings





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## WHEN IS IT DONE?

- AFTER CURING!
- Stability vs maturity
  - Stable: activity diminished
  - Mature: will grow plants
- Testing for completeness
  - Lab tests
  - Facility test

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**SUMMARY - KEY INITIAL PARAMETERS FOR THERMOPHILIC COMPOSTING**

<b>Condition</b>	<b>Reasonable range</b>	<b>Preferred range</b>
Moisture %	40 — 65	50 — 60
C:N	20:1 — 60:1	25:1 — 40:1
Oxygen %	Greater than 5	Greater than 10
Temperature °F	113 — 160	120 — 150
°C	45 -- 71	49 -- 66
pH	5.5 — 9.0	6.5 — 8.0
Particle size	1/8 to 2 inches .3-5 cm	Depends on feedstocks and use for compost
Porosity:		
Bulk density lbs/ yd <sup>3</sup>	Less than 1200	800-1000
(kg/l)	(.7)	(.45-.6)
Free Air Space %	40-60	50-60

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## WHY DO WE TEST COMPOST?

- Environmental health and safety
  - Pathogens and metals
- Degree of completion
  - Stability
  - Maturity
- Characteristics for End Use
  - Physical attributes
  - Chemical composition

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## HEALTH AND SAFETY

- Pathogens - Fecal Coliforms and Salmonella are the species of bacteria tested to determine if both human and plant pathogens have been reduced to safe levels.
  - Fecal Coliforms < 1000 MPN/g
  - Salmonella < 3 MPN/4g
  - Metals

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## HOW DO WE TEST FOR QUALITY?

- **Take a representative sample**
  - Analysis only as good as the sample!
- Send to a reputable laboratory for testing

List of compost labs: <http://compostingcouncil.org>

**Frequency of Monitoring for Land Application, Surface Disposal, and Incineration of Biosolids**

<b>Amounts of Biosolids* (metric tons per 365-day period)</b>	<b>Frequency</b>
Greater than zero but less than 290	Once per year
Equal to or greater than 290 but less than 1,500	Once per quarter (four times per year)
Equal to or greater than 1,500 but less than 15,000	Once per 60 days (six times per year)
Equal to or greater than 15,000	Once per month (twelve times per year)

\* Amount of biosolids (other than domestic septage) land applied, placed on an active biosolids unit, or fired in an incinerator—dry-weight basis.

# CREATING FINISHED COMPOST FOR MARKET



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## MARKETING COMPOST



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## MARKETING COMPOST

- Marketing Planning and Plans
- Marketing Strategy
- Product Branding
- Market Segments
- Public Relations



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## MARKETING PLANNING

- **Marketing planning** – a systematic approach to the development of marketing strategy and the achievement of goals
- **Marketing plan** – a specification of an organization's marketing intentions and objectives

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## ADVANTAGES OF MARKETING PLANS

- Ensures continual evaluation of objectives and strategies
- Improves decision making
- Encourages a rational and integrated approach to decision making
- Improves efficiency of resource allocation
- Involves people in discussion and increases commitment
- Ensures the organization is better prepared for change
- Greater coordination
- Helps to highlight areas that might otherwise be missed

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## METHODS FOR CONTROLLING THE MARKETING PLAN

- Performance appraisal of employees/contractors
- Variance analysis
- Budget control
- Benchmarking
- Competitor performance

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## COMPONENTS OF A MARKETING STRATEGY

- Target market
- Positioning
- Marketing mix – the right product, the right promotion, the right price and the right distribution to satisfy customers
- Competitive advantage – gives the firm an edge over its rivals

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## EXTERNAL VARIABLES

- Outside the control of the business
  - Political
  - Competition
  - Economic
  - Social
  - Technological
  - Market characteristics
  - Industry structure

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## PRODUCT BRANDING

- Branding is NOT designing fancy logos and spending hours coming up with catchy slogans.
- Branding is NOT a term, symbol, name, color, or sign.
- Branding is NOT the messaging work a company does to encourage consumers to feel a certain way about their product.
- And branding is NOT some process by which you transform a commodity into a customer experience.

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## BRANDING BASICS

- Brand image is a mental or emotional association in the customer's mind. It is initiated by the images you use in your advertising, and the by words you use to describe your products. After sufficient impressions, the customer remembers these associations. Thus, your brand is born.
- **What is image?** It's the public perception, not what the company, product or service is, but how it is perceived. It lives, or doesn't, in the mind of your public.
- **What creates this image?** Everything from packaging to identity-these being the messengers affecting the marketplace's perception. PR and word-of-mouth are also soldiers in this battlefield.

Do you know what makes a brand really great?

**A great Brand does all of your consumers thinking for them!**

- Branding is not differentiating between your products and your competitors.
- Its making your consumers think that there is only one product in the market worth any money: YOURS!



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## MARKET SEGMENTS

- Fertilizer blending
- Direct agricultural application
- Bagged retail sales
- Landscape contractors
- Nurseries

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## USING PUBLIC RELATIONS TO BUILD YOUR BRAND

- Promoting products and services through media publicity rather than paid advertising
- Enhancing public awareness
- Projecting the organization as a source of opportunities
- Obtaining favorable comments in the media

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## MARKETING SUMMARY

- Understand what your customers need and expect
- Product branding and market strategy are key to a successful organics marketing program
- Product branding makes your consumers think that there is only one product in the market worth any money: YOURS

# COMPOST IN ACTION





# USMC Camp Pendleton Pipeline Restoration Project with Biosolids Compost

**Before, Sept 2001**



**After, May 2002**



# Questions?

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# THANK YOU

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