Food Recovery Hierarchy

Source Reduction
Reduce the volume of surplus food generated

Feed Hungry People
Donate extra food to food banks, soup kitchens and shelters

Feed Animals
Divert food scraps to animal feed

Industrial Uses
Provide waste oils for rendering and fuel conversion and food scraps for digestion to recover energy

Composting
Create a nutrient-rich soil amendment

Landfill/Incineration
Last resort to disposal

Most Preferred

Least Preferred
or•gan•ics

1. Of, relating to, or derived from living organisms: organic matter
2. Yard & landscape trimmings—leaves, grass, tree & brush
3. Agricultural & land-clearing/forestry debris
4. Manures & biosolids
5. Food scraps & food processing residues
6. Non-recyclable/soiled paper—napkins, paper towels, pizza boxes & other paper products
7. Items manufactured from organics—"certified compostable" bags, plates, cups, bowls, other serviceware
Percentage of Organics in MSW

- Largest component of MSW
  - 56%
  - Yard trimmings are recycled at 57%
  - Less than 6% of food scraps are recovered

- 30-40% of food is wasted in the U.S.
  - 62.5 Million Tons annually
Benefits of the Hierarchy

- Reduced disposal needs & costs
- Reduced greenhouse gas emissions
- Food recovery helps those in need
- Composting stimulates the local economy
  - Creates local jobs & business development
- Composting provides valuable soil amendment
- Anaerobic digestion generates energy
  - Utilizing locally generated resources
Step 1: Arrange for Processing

- Off-site composting or AD
  - Commercial compost operation
  - Farm operation
  - Community composting
- Onsite composting
- How to finance?
Step 2: Arrange for Hauling

- Processor may provide hauling
- Ask current hauler(s)
- Other trash/recycling haulers
- Dedicated food scrap hauler
  - Agri-Cycle
- Municipal hauling
Step 3: Collection System

- Staffed site is best
  - Monitor materials, helps reduce contamination
  - Controlled access
  - Answer resident questions about acceptable materials
Collection System, cont.

- Placement of collection containers
  - Transfer station
  - Public works yard
  - Landfill or recycling center
  - Other location(s) in a community (e.g., retail center)
Collection System, cont.

Private contractors
- Typically provide rental containers
- Transportation to a processing site

Municipal/Public
- Existing containers; used containers
- Existing municipal vehicles & equipment
Containers

- Food scraps only
  - 32-65 gallon carts on wheels
  - Dumpsters – 2-yard
    - Aeration system?
- Mixed yard waste/food scraps
  - 30-40 cubic yard roll-off dumpsters
- Storage of sawdust
Regulations

- Can collect meat & dairy
  - ✓ IF collection ONLY
- If TS has standard permit
  - ✓ Check with DES to see if a modification is needed
- Permit By Notice
  - ✓ Notify DES
  - ✓ Update Operating Plan
Regulations, cont.

- Actively managed
  - ✔ BMPs for facility
- No less than once per week pickup
  - ✔ Recommended
- Cover daily with sawdust
- Fully enclosed containers
Quality begins with the Generator
Promotion

- Simple, concisely worded fliers
  - Distribute at start of the collection program; periodically
- Signage at the point of collection
  - Hauler usually labels carts
  - Banner
- Website & social media
Collection Containers
Certified Compostable Liners

Kitchen Collection Buckets
Issues to Address

- Keeping bears & other critters out
- Odor control
  - Completely cover scraps with a thin layer of sawdust
  - Lock & secure bins at night
  - Empty at least weekly
Transfer Station Collection
Bear-resistant Containers
Science of Composting
Composting

- Controlled, aerobic biological process
- Results in the decomposition of organic materials
- Macroorganisms & Microorganisms
  - Digest organic residues for food and energy
  - Speeds up the decomposition process
- Primary end-products—carbon dioxide, water, & compost
What is Compost?

- Stable, soil/humus-like material
- Rich in organic matter & organisms
- Free of unpleasant odors
- Easy to handle
- Can be stored for long periods
- Valuable soil & potting media amendment
Benefits of Compost on Soil

- **Improves Physical Properties**: Increases water retention; improves soil aeration and structural stability; resistance to water and wind erosion; root penetration; soil temperature stabilization.

- **Enhances Chemical Properties**: Increases macro- and micronutrient content; availability of beneficial minerals; pH stability; converts nutrients to a more stable form, reducing fertilizer requirements.

- **Improves Biological Properties**: Increases the activity of beneficial micro-organisms; promotes root development; can increase agricultural crop yields; suppresses certain plant diseases; acts as biofilter, bonding heavy metals.
Raw materials

- Organic matter - including carbon, chemical energy, protein and nitrogen
- Mineral nutrients - including nitrogen and other elements
- Water
- Microorganisms

Process

- water
- heat
- CO₂

Product

- Finished compost containing organic matter - including carbon, chemical energy, nitrogen, protein, humus, mineral nutrients, water and microorganisms

Recycled Organics University
www.recycledorganics.com
Elements of Composting

- **Aeration**
  - Oxygen concentrations: 10-14+%.
- **Carbon to Nitrogen (C:N) Ratio:** 20:1-60:1
  - Preferred 30:1-50:1
- **Moisture:** 40 to 65 percent
  - Preferred 50–60%
  - Like a damp sponge
Elements of Composting, cont.

- Optimum pH range - 5.5 to 8
  ✓ Preferred 6.5 – 8.0
- Temperature – 120° - 160°F.
  ✓ Process to Further Reduce Pathogens
  ✓ 131°F for 3-15 days (f of system)
Elements of Composting, cont.

- Bulk density < 1000 lbs. per cubic yard
- Porosity, structure, texture - particle size, shape & consistency influence aeration
  - Adjust with bulking agents
  - Compost recipe
  - Grinding or mixing
Elements of Composting, cont.

- Particle size 3-13 mm
  - Smaller particles
  - More surface area upon which the microorganisms can feed
  - Helps to speed up the decomposition process
  - Improves porosity (air flow)
  - A more homogeneous compost mixture
  - Mowing, grinding, chipping, or shredding
Natural Air Circulation in a Compost Windrow
COMPOSTING
Feedstocks & Recipe Development
Feedstocks

- What feedstock(s) do you have available?
- Characteristics?
  - Nutrient content
  - C:N ratio
  - Moisture content
  - Particle size
  - Bulk density—how easy the material is to mix & handle
  - pH
  - Potential for odors—food scraps, grass clippings
  - Contamination
Recipe Basics

- “Green” materials (Nitrogen)
  - Food scraps, grass clippings, manure
- “Brown” materials (Carbon)—
  - Manure w/animal bedding, paper, dry leaves, wood shavings, brush
- Bulking agents – wood shavings, chips
  - Provide porosity
  - Pile stabilization
  - Aids air flow
Recipe Basics, cont.

- Mix ingredients together to create a better balance—homogeneous mix
- Adding food scraps
  - No more than 20%
  - Balance C:N ratio, moisture, bulk density
- Observation, temperature, look & feel of compost, trial & error
- Calculations
High Carbon
3 volumes

High Nitrogen
1 volume
## Sample Carbon and Nitrogen Ratios of Various Organics

<table>
<thead>
<tr>
<th>Carbon Sources</th>
<th>Carbon: Nitrogen Ratio</th>
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<tbody>
<tr>
<td>Yard wastes</td>
<td>50 - 90:1</td>
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<tr>
<td>Straw/hay</td>
<td>50 - 80:1</td>
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<tr>
<td>Wood chips/sawdust</td>
<td>250 - 500:1</td>
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<tr>
<td>Vegetable scraps</td>
<td>10 – 30:1</td>
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<tr>
<td>Fruit scraps</td>
<td>10 – 30:1</td>
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<tr>
<td>Grass &amp; garden gleanings</td>
<td>10 – 20:1</td>
</tr>
<tr>
<td>Chicken manure</td>
<td>10 – 25:1</td>
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<tr>
<td>Cow manure</td>
<td>20 – 30:1</td>
</tr>
<tr>
<td>Horse manure</td>
<td>25 – 30:1</td>
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</tbody>
</table>

Getting the Right Mix

- Green Mountain Technologies

- Compost Mix Calculator

- Highfields Recipe & Pad Size Calculation Worksheets
  - [www.highfieldscomposting.org](http://www.highfieldscomposting.org)
Healthy biological activity is essential to successful composting—setting up the right environment and conditions is fundamental to the process.
COMPOSTING

Compost Methods & Systems
Determine the Right System

- What’s the feedstock
  - Availability & handling issues
  - Tip fees
- Annual processing needs & capacity
- Financial plan
  - Capital for equipment, labor, storage, feedstocks, marketing, etc.
- Determine the end-use for the finished product
- View as many real-life situations as you can
Windrow Composting
Low-to-Intermediate Technology, Costs, & Labor
Windrows
Windrows Basics

- Land for the operation
- Minimum staffing
- Front loader, backhoe, manure spreader, or windrow turner
  - Mix materials, form & turn windrows
Windrows Basics, cont.

- Access to water
- Monitor temperatures
  - ✔️ PFRP - 131°F for 15 days, turning 5 times
- Cover – Chips, tarp, GORE™
Windrows BMPs

- 10’ – 16’ wide by 3’ – 8’ high
- Keep windrow piles as straight & uniform as possible
- Blend materials without compacting them
- Check & adjust moisture level
  ✓ Add water or dry bulking agent
Windrows BMPs, cont.

- Move materials from surface to center of windrow and vice versa
  - When turning with a frontend loader, lift material, let it cascade down to maximize aeration & porosity
  - Re-shape the windrow for consistent dimensions & smooth sides

- If building more than one windrow, leave sufficient space between them for drainage & to allow for turning
  - Track when windrows were formed
Windrows BMPs, cont.

- Monitor temperatures daily during the active compost phases & after turning
  - Take measurements at various depths & at least every 75 feet along the windrow
  - Always turn and aerate a pile or windrow if temperatures reach above 160°F
Windrows BMPs, cont.

- Moisture management is important
  - If is too dry, add water when turning & rebuilding the windrow
    - Start by watering the outside of the pile before mixing materials into the center
    - Shape the windrow to increase rain infiltration
  - If the windrow is too wet
    - Turn it to release excess water vapor or mix more dry carbon material into the pile
Windrows BMPs, cont.

- Once the active composting phase for PFRP is met, turn materials weekly or as needed until ready for curing
- Windrows typically reduce 60% in volume during active composting
  - Two windrows can then be combined into one to free up space
- Curing time can range from 30 to 60 days
Windham Solid Waste Management District
WSWMD - Specifics

- 20 member towns
- 497 tons SSO processed in 2016
- Screened to 3/8 inch
  - Compost product & compost/soil mix product
- Cash positive operation
  - Tipping fee $65/ton
  - Compost sells $20/cy
Aerated Static System
Moderate Technology, Costs & Labor
Aerated Static Systems

- Forced air compost system
  - Compost pile is built on top
- Perforated pipe (10-inch diameter) is connected to a blower system
- Create homogeneous mixture prior to forming pile
- Cover with a layer of peat, wood chips, or finished compost
  - Insulation & odor control
ASP, cont.

- Speeds up the composting process by ensuring proper air flow
- Initial moderate capital costs & operating costs
  - Purchase & installation of pipes and blowers
  - Utilities & ongoing maintenance
  - Less daily labor
  - Portable aeration equipment can be installed for $15,000 or less
    • Suitable for a 10,000 TPY compost facility
ASP Best Management Practices

- Homogenous “haystack” type pile 4’ – 6’ high
  - No more than 6’ high and 12’ wide to ensure sufficient air movement
- Start with a higher initial moisture content
- Include a bulking agent or carbon source with higher percent of larger particles to promote greater aeration
ASP BMPs, cont.

- Use a porous, well-aged capping layer
  - Wood chips or finished compost
- Sufficient space should be available for additional piles
  - Depending on the volume of organics
- Place a layer of woodchips over aeration pipes to help protect the pipes & assist in air flow through the pile
ASP BMPs, cont.

- In 2-10 weeks of composting, material can be turned into another aerated system or windrowed to finish the compost process
  ✓ Up to 6 months to produce compost ready for curing
Aerated Static Windrow
Protecting The Pipes

Photo Cr.: Green Mountain Technologies/Compost Design Services
Green Mountain Compost
GMC - Specifics

- **Equipment**: Front loader, vertical auger mixer, ASP system, star
- **Food scraps processed**: 4026 traditional food scraps (+ ~770 tons pre-consumer food residuals)
- **Tipping fee**: $45/ton
- **Sells**: Compost for $40.50; Blended average ($59 retail)/cy
Onondaga County Resource Recovery Agency
3-Bin System

Photo Cr.: George McDonald, Maine DEP
In-Vessel
Equipment

- Pre-processing equipment:
  - Mixer, manure spreader, tub grinder, horizontal grinder
- A frontend loader
  - 500 – 5,000 cubic yards/year or less
- Windrow turner
- Post-processing equipment: trammel screen
Front-End Loader vs. Turner

- Front-end loader works well for small scale operations (<500-2,500 yd³/yr)
  - >2,500 yd³/yr, loader tends to be time intensive
- Turner physically agitates ingredients & can accomplish task in half the time
- Turner requires a tractor to run, therefore additional cost
OCCRA EQUIPMENT

- 2 front-end loaders
- 2 skid loaders
- 1 compact excavator
- 1 vertical mixer on truck chassis
- 1 slow speed shredder
- 1 high speed grinder
- 1 trommel screen (2 – drums, ½” and ¼”)
- 1 portable compost bagger
Front Loader
Tractor with bucket
Windrow Turner
Mixer
Auger
Screening
Screener

Photo Cr.: Mark King
Covers

- Types
  - Impermeable
  - Microporous Membrane
  - Spun or open weave fabrics
- Can help control moisture levels
- Reduces temperature variability
- Helps control odors
COMPOSTING

Facility Development & Management
Successful Composting Requires

- A solid plan of action
- Available land
- Appropriate equipment
- Proper training and management
- Community support
Planning a Compost Operation

- Estimate the volume expected
- Needs assessment: determine available space, staffing, & equipment
  - And, additional land/operating space, staffing, & equipment required
- Capital & operating requirements necessary for start-up, as well as ongoing expenses
Planning, cont.

- Know your regulations/permit requirements
  - Consult state agencies
- Feasibility of the operation
- Public involvement
Funding Options

- **Tip Fees**
  - Residents
  - Landscapers & other small commercial generators
  - Keep fees lower than solid waste tip fees

- **Sales of compost product**
  - Mulch – grind brush, wood, pallets
  - Compost – quality product can be sold to offset costs
Cost Control

- Sharing equipment & labor
- Using available public land
- Used equipment
- Calculating avoided disposal costs
- Reduced soil & fertilizer purchase costs through use of compost
Financing

- Capital & operating requirements will vary
  - Needs for smaller scale operations will be minimal, if existing land & equipment are available for use
- Site preparation & drainage requirements can potentially be conducted in house, depending on the requirements
  - If equipment is needed & more extensive site preparation required, financing professionals should be consulted
Siting Parameters

- Check with state & local regulatory agencies prior to siting
- “Set-backs” or distances from waterways & structures may vary depending on the materials & volume to be composted
General Guidance

- From 100’ – 500’ from wells and potable water sources
- Adequate distance from wetlands, surface water bodies (streams, ponds), and flood plains
  - Recommended at 200’
- Minimally 200’ away from residences & 50’ from property lines
General Guidance

- A low water table to reduce flooding risk on the site
- A high soil percolation rate, but not excessively permeable soils in order to avoid standing water.
- Gently sloped surface (1-3% grade)
Land Requirement

The amount of land required for the composting site depends on the volume and type of material accepted, the composting system, and the amount of time required for the process to complete.

- Typically 2 - 20 acres is adequate for most small operations
Site Plan

- Material receiving area
- Mixing area
- Active composting area
- Curing area
Mixing Area

- Storage of carbon & bulking materials should be near mixing area
- Mixing & chipping/shredding can be done in or near the material receiving area
- Dump food scraps onto a bed of bulking materials to absorb liquid
- Cover & mix food scraps immediately upon dumping
Mixing Area

Photo Cr.: BioCycle
Mixing Area

Photo Cr.: Bob Spenser, WCSWMD
Mixing Area
Grow Compost
Mixing Area Under Cover
Siting Specifics

- Site
- Materials flow
- Leachate & storm water management
- Equipment & personnel list
  - ✓Qualifications and/or training
Siting Specifics, cont.

- Composting method
- Safety & fire emergency plan
- Monitoring techniques & record keeping
- Provisions for controlling odors
- Contingency plan
Site

- Year-round accessibility
  - Prepare for vehicle access
  - Space for future expansion
- Access to a water source is necessary
- Gate & a perimeter fence
- Control access to site
  - Prevent illegal dumping
Site, cont.

- **Signage**
  - Control incoming traffic
  - Restrict public access to areas where equipment will be operating

- **Area to store finished compost**
  - Accessible to the public
Plan site so that customers see the end product...not the receiving & mixing area
Set up the site so that the oldest finished product can be moved first
Material movement is in as linear a fashion as site constraints allow
✓ Nothing should move more than twice in its same physical condition
Site, cont.

- A neat site appearance is important
  - Don’t let weeds grow on finished product
  - Deal effectively with leachate or ponding
  - Consider the view from the road
A “buffer zone” will alleviate nuisance issues

- Noise, blowing material, dust, potential traffic concerns, & odor
- Use shrubbery or fencing to block view
Compost Pad

- Firm & stable surface to support heavy equipment under varying weather conditions
  - Compacted soil is adequate
  - Native soil with moderate permeability is best
Compost Pad, cont.

- Hard packed or cement mixing area
  - Recommended if affordable
  - Limit mud problems
  - Good foundation for equipment
Compost Pad, cont.

- 6 inches of compacted, graded sand or gravel should be installed if soil conditions are not sufficient for drainage
  - Small diameter dark gravel is recommended
  - Gravel can become mixed in with the composting materials
Drainage/Buffer

- A grassy or vegetated filter/buffer
  - Relatively low cost drainage field
- Rain gardens & marsh areas
  - Work for smaller sites
- Check with state/local agencies to determine if drainage system is adequate
Drainage/Buffer, cont.

- Site grading to divert surface runoff from the up-slope side of piles
- Trenching to capture or divert leachate
- Install piping around larger piles or windrows or where seepage is an issue
- Capture wastewater and divert it to the filer area, drainage pond, or holding tank
  ✓ Reuse water
Grow Compost – Grassy Buffer
Grow Compost – Grassy Buffer
Crushed Glass Drainage Filter

Image Cr. Mark King
Controlling Odors

Photo Cr.: BioCycle
Biofiltration

Photo Cr.: Bruce Fulford
Good Neighbor Strategy

- Know your neighbors & keep them happy
- Give them compost!
- Respond appropriately & quickly to complaints
Food Waste Composting

Tara Mae Albert
SWOT Coordinator
Is a Permit Required?

No permit to compost:

- only leaf and yard waste, manure, and approved bulking agents

- food at the site of generation (homes, schools, farms)
Is a Permit Required?

**Yes**, when food scraps:

- are from *off-site*
- include *meat/dairy*
Is a Permit Required?

No extra permit to compost food waste at Transfer Stations that already hold a Permit-by Notification (PbN)

- Up to 20% of compost operations
- No meat or dairy
- Update Operating Plan
- Notify NHDES
What’s the Deal with Meat/Dairy?

Odors & Pests
# Quick Check

## Is a Permit Required?

<table>
<thead>
<tr>
<th></th>
<th>No permit needed</th>
<th>Permit-by-Notification</th>
<th>Standard Permit</th>
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<tr>
<td><strong>Yard Waste</strong></td>
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<tr>
<td><strong>Food Scraps</strong></td>
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<tr>
<td>• On-site</td>
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<td>-</td>
</tr>
<tr>
<td>• From off-site</td>
<td>-</td>
<td>X (&lt; 30 TPD)</td>
<td>X (&gt; 30 TPD)</td>
</tr>
<tr>
<td>• Meat &amp; Dairy</td>
<td>-</td>
<td>-</td>
<td>X</td>
</tr>
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</table>
Food Composting Rules

PAPERWORK!

- Written Operating Plan
- Annual Reporting to NHDES
Food Composting Rules for PbN Holders

- Do not allow food to remain uncovered > 2 hrs.
- Blend food into pile within 24 hours.
- Keep under aerobic conditions.
- Stabilize compost prior to distribution.
SOMETHING NEW IS ON ITS WAY...
Questions?

ONE DOES NOT

SIMPLY START A COMPOST PILE BY THROWING FRUIT IN THE CORNER OF A YARD
COMPOSTING

Process Management & Quality Control
Key Tips for Success

- Location
- Precondition materials
- Bulking agents
- Mix ratios
- Monitor loads
- Drop & cover
- PFRP
Process Management

- Know the compost process
- Essential equipment: loader, screen, thermometer
- Cover
- Keep records
Best Management Practices (BMPs)

- Produce compost in shortest time possible with:
  - Minimum odors
  - Minimum environmental impacts
  - Minimum process-related problems
BMPs

- Efficient Materials Movement
  - Nothing should move more than twice in its same physical condition
  - Move in as linear a fashion as site constraints allow
  - Timing production
Process to Further Pathogen Reduction

- **Turned Windrow:** 15 consecutive days with temperatures $\geq 131^\circ F$ (55°C) with 5 turnings
- **Aerated Static Pile:** 3 days with temperatures $\geq 131^\circ F$ (insulated pile)
- **In-vessel:** 3 days with temperatures $\geq 131^\circ F$
Staffing

- For most small community operations one or two employees will be sufficient
  - Staff may be shared
    - If operation is co-located with a transfer station or other facility
  - One person should have the role of compost operator or manager
  - All employees should understand & know all aspects of the operation
    - How to deal effectively with issues that arise
Duties

- Monitoring materials as they come into the operation
- Ensuring BMPs
- Monitoring & maintaining records
Employee Training

- Basic understanding of the compost process
- Know how to monitor & record temperatures & assess moisture levels
- Be familiar with general troubleshooting guidelines to manage issues as they arise
- **Equipment operators** must be trained & properly certified
Monitoring Equipment

- Long-stem, non-mercury compost thermometer at least 2’ -3’ long
- Moisture meters & oxygen probes
- Windsock
  - Monitor wind direction
- Safety equipment: hard hats; steel-toe boots; safety vests; dust masks; eye/hearing protection
Thermometer
Observing, monitoring, and record keeping should be the foundation for decisions and activities at the compost operation, whether it’s turning the materials and adding water because temperatures are below 120°F and moisture content is low or adding carbon or bulking agents because the materials are too wet.
BE ONE WITH THE PILE
Monitoring the Process

- **Daily Observation**
  - Are the windrows or piles steaming?
  - Are materials looking different
    - Is decomposition occurring
    - Materials starting to slowing look like soil?
    - Is the pile uniformly composting?
  - Are strong odors present?
Monitoring the Process

- Are there persistent puddles of leachate or water?
- *Compost feel*
  - Does the squeeze test indicate that there is moisture in the material
  - Does it feel like a damp sponge so that when a handful is squeezed, it sticks together & hand is moist
Monitoring the Process

- **Oxygen**—Smell is the best measure of properly aerated composting
- Unpleasant odor – indicative of anaerobic conditions
  - Pile needs to be turned
Monitoring the Process

- *Daily temperature monitoring*
  - Is the temperature rising appropriately for rapid compost?
  - Does the temperature rise to at least 131°F in windrows
  - Maintain for PFRP
Monitoring the Process

- Once the temperature goes below 120°F materials should be turned until temperatures no longer rise.
- Materials should also be turned if temperatures rise above 140°F.
- Depending on the materials, system, & compost management, the active composting phase will last 6 – 10 weeks.
## Log Book

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Composter Name(s)</th>
<th>Moisture Rating</th>
<th>Odor Rating</th>
<th>Temp 1</th>
<th>Temp 2</th>
<th>Turned (Y/N)</th>
<th>Other Actions Taken</th>
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</table>
Ready for Curing

- Ingredients are digested & bacterial activity declines
- Compost pile heats up very little
  ✔ Even after turning or aerating the pile
- Finished compost will have a uniform, crumbly appearance, earthy smell
Curing

- Necessary part of the compost process
  - Should be cured for a minimum of 45 days
  - Ensures compost is completely done & ready for use

- Cured compost is stable
  - Ammonia nitrogen converts to nitrate nitrogen
  - Large woody particles continue to break down

- Compost ingredients not recognizable
  - Wood chips may not entirely decompose & will require screening
Curing Piles
Curing Piles
Quality Assurance

- Observe, monitor, sample, analyze, test

  - **Keep accurate compost records**
    - Track feedstock sources, materials, problems
    - Track lot numbers, problems
    - Track turning frequency, temperature
    - Odor issues

- Train your staff
Product Quality Certification

- Seal of Testing Assurance ("STA"/USCC)
- Woods End
- Rodale Quality Seal
- Soil Foodweb
- Organics/“Approved” for use

- University Testing
- Other
Why Test? Why Certification?

- Standardization of products, practices, & applications
- Helps to improve customer confidence in the compost product and its utilization
Compost Test

- At a minimum—analyze the basic nutrient content—nitrogen, phosphorous, & potassium (N:P:K:)
- Bioassay testing
Bioassay Testing
COMPOSTING

Finished Product End Use
Brattle grow Compost
Windham Solid Waste Management District's All Purpose Compost
Call to order 802-257-0272
OCCRA
Bagger
## COMPOST MARKETS

- Erosion Control/Reclamation
- Agricultural applications
- Topsoil
- Nurseries/Silviculture
- Sod production
- Turf grass
- Public Works
- Construction sites
- Landfill cover
- Marginal soils

- Direct marketing
- Retail sales
- Landscapers and Lawn Care Companies
- Golf Courses
- Greenhouses
- Rainwater filters
- Roof top gardens
- Compost socks
- Biofiltering
Major Factors Affecting Compost Demand and Sales

- Compost quality
- Product consistency
- Product availability (meeting demand)
- Economics of transportation
- Economics & challenges associated with compost application
- Industry standards & specifications
Grow Ulster Green Compost

- $30 Per Ton
- ✓ Sold In BULK Only
- Screened To 3/8 Inch Minus
- Certified By USCC

NORTHEAST RECYCLING COUNCIL, INC.  WWW.NERC.ORG
On-Farm Composting

- Provides opportunity to divert organics
  - Without public investment in space, equipment, & staffing
  - Farm operations may have more flexibility in permitting requirements
- Helps farms diversify their operation
  - Manufacturing a valued added product
  - Soil amendment for farm fields
  - Sold to bring in additional revenues
Private Sector Composting

- Partnerships to promote resident & commercial customers
  - Reduced tipping fees
  - Flexibility in accepting loads (resident drop-off)
- Economies of scale—multiple community, county or solid waste district jurisdictions—more economically appealing for larger scale private composting operations
- May profit from locating in rural, agricultural areas & servicing more populated area
Private Sector Cont.

- Publicly owned & Privately operated
  - Typically land would be public
  - Equipment & staffing private
    - Landfill, MRF
  - Private haulers to provide collection services
Opportunities and Action

- Explore potential with private-sector businesses or farms
- Promote to & train residents
- Find haulers
- Promote compost product sales
Quasar Food Scrap AD Facility Collinwood, Ohio

Photo Cr.: Bob Spenser, WSWMD
Harvest Power

Photo Cr.: Wayne Davis, Harvest Power
Vanguard Renewables Anaerobic Digester
Power Generation
COMPOSTING WORKSHOP: SUCCESSFUL MUNICIPAL AND INSTITUTIONAL DESIGN

AUGUST 9 -10, 2017 (WED-THURS)

DAY 1: BASICS OF COMPOSTING WITH HANDS-ON EXERCISES
DAY 2: MORE HANDS-ON AND SITE VISIT TO FARM COMPOST

ALWAYS SOMETHING FARM, 407 ROUTE 10, CROYDON

Presenters:
Mark Hutchinson, Extension Professor, Instructor at the Maine Composting School
Athena Bradley, Northeast Recycling Council
Tara Albert, NH Department of Environmental Services
NERC Can Help

We’re experts in
- Waste reduction & recycling
- Recycling program design & implementation
- Organics management
- Green procurement
- C&D reuse & recycling
- Electronics recycling
- School reuse, recycling & composting
- Textile recycling programs
- Multi-stakeholder dialogues & negotiations
- & More!

Fee for service program makes NERC’s sustainable materials management expertise available at a reasonable price with outstanding results

Athena Lee Bradley
athena@nerc.org
802.254.3636
www.nerc.org
Composting at Winnacunnet High School

Caroline Anastasia and Grace Cushing
What is Composting?

“Composting is a natural process that turns organic material into a dark rich substance”
The Idea Behind it All

Mr. Magnusson’s 8th Grade Science Class - vermiculture

St. Paul’s Advanced Studies Program

WHS Senior Seminar
Essential Questions

❖ Is composting a reality at Winnacunnet High School?
❖ If so, how can it be implemented?
❖ What else can be done to make WHS a more sustainable campus?
❖ What laws or regulations would we have to comply with in order to make composting a reality at Winnacunnet?
The Original Plan

- On-site composting
- Only fruit and vegetable scraps and paper products
Refined Plan

Mr. Fox Composting Video
Grant

Friends of Winnacunnet Foundation

Mission

The primary focus of the Friends of Winnacunnet Foundation is to provide supplemental funding to enhance a program of excellence in education at WHS.

Since the Friends of Winnacunnet Foundation formed in 2005 as a non-profit to benefit innovative learning initiatives at WHS, it has raised over $100,000 toward an endowment and dispersed over $36,000 in grants. Grants are awarded in the fall/winter and spring. The deadlines for grants are determined during the first meeting of the school year. To apply for a grant, please fill out the above application and send it to libby@winnacunnet.org.

Below are the details of grants awarded...

Fall 2014:

- **Grace Cushing/Caroline Anastasia:** School-wide Composting Project, $2,200.
- **Diana Weidenbacher, Decisions Program:** Disc Golf (Frisbee golf), $3,099. Similar to golf, the object of disc golf is to complete each hole in as few throws—or strokes—as possible. Instead of using golf clubs and a golf ball, disc golfers use a flying golf disc to traverse the hole. Each hole starts with a teeing area and is completed once the disc lands in the “hole”, which is a disc-catching target.
Grant

Ten question application with three letters of support from our principal William McGowan, facilities director Karl Ingoldsby, and science teacher John Croteau.

1. What are the specific goals and objectives of the project?

We plan to implement a composting program within Winnacunnet High School to increase student and faculty awareness of sustainability as well as present students with the opportunity to be directly and actively involved with sustainability in their personal community.

4. How many students, staff and teachers will be involved in the project?

Part of Mr. Fox’s school program is to hold a school-wide assembly to educate all students and staff on what composting is and how to do it. This would educate each student in the school on the Composting Project, and therefore give all Winnacunnet students and faculty the opportunity to participate. The kitchen staff would be especially involved, since they would oversee the disposal process in the dining hall. We have spoken several times to Ryan Costigan, the food service director, and he is willing to help us in any way possible to make this project successful.

7. Itemized Budget

For this grant, we are requesting $2,200. Of that, $1,680 would go towards paying Mr. Fox’s Composting Company for weekly pick ups from the beginning of December until the end of the school year in June. It is estimated that Winnacunnet High School will require five sixty-four gallon toter compost bins to be picked up weekly. At $12 per toter for the twenty-seven week trial period we propose, this will cost $1,680. $320 will then go to purchasing compostable liners for the trash cans, and the remaining $200 will go towards the vermiculture kits.
Before and After
Waste Deferred

14,000 pounds (7 tons) in 14 weeks
3-5 64 gallon toters/week
## Costs

<table>
<thead>
<tr>
<th>Item</th>
<th>Cost</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mr. Fox Composting:</td>
<td></td>
</tr>
<tr>
<td>$12/64 gallon toter</td>
<td>$1,277.10</td>
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<tr>
<td>$182.44/ton</td>
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<tr>
<td>Compostable Bags:</td>
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<tr>
<td>Clean-O-Rama</td>
<td>$468.84</td>
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<tr>
<td>Anticipated only $320 needed</td>
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</tbody>
</table>
Costs

Winnacunnet Trash Pick Up with G. Mello:
Pay $375 for each trash dumpster
The school pays for the number of times the trash is picked up, not the weight
It costs $495/month to recycle at WHS ($170/month for the dumpsters and $325/month for the many, smaller green containers)
Costs

Hampton Transfer Station Rate:
$78.00/ton + $300.00 hauling fee
Publication

School newspaper
Hampton Union newspaper article
2015 EcoMaine Eco-Excellence Award
2015 Aquarion Environmental Champion Award
Thanks To...

Karl Ingoldsby
WHS Facilities Director

John Croteau
WHS Biology Teacher

Ryan Costigan
WHS Food Service Director

Rian Bedard
Mr. Fox Composting

Mark Richardson
Hampton Transfer Station Coordinator

Linda Libbey
Vice President, Friends of Winnacunnet Foundation