



WasteWise Update

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**RECOVERING ORGANIC
WASTES—GIVING BACK
TO MOTHER NATURE**



Preserving Resources,
Preventing Waste

Recovering Organic Wastes

Every day, Americans fill their trash bins with grass clippings, coffee grounds, and many other types of organic wastes. Organic materials—e.g., paper, wood, yard trimmings, food scraps—constitute 67 percent of the weight of America's municipal solid waste (MSW) stream, or more than 140 million tons in 1996. A significant portion of these materials, including newspaper, office paper, and corrugated cardboard, are recovered through reuse or recycling. Yard trimmings and food scraps, however, which account for 25 percent of MSW, or 50 million tons per year, are often not recovered. As a WasteWise partner, you can take the lead in giving your organic wastes back to the Earth.

Composting Methods

Composting takes many shapes and forms and varies as much in its complexity as in the range of organic materials recovered. The four most standard composting methods are:

Static Pile Composting

Organic waste is piled and mixed together. Composting under these conditions is slow and suited for small operations. This method requires 12 to 18 inches of loosely piled bulking agents such that air blows from the bottom to the top of the pile.

Aerated Windrow/Pile Composting

Organic waste is formed into rows of long piles (windrows) and aerated either by embedding pipes in the pile or by turning the pile periodically. This method can accommodate large volumes of waste, including animal products or grease, but only with frequent turning and careful monitoring during the thermophilic stage (when the pile reaches 130 to 150 degrees Fahrenheit).

In-vessel Composting

Organic materials are stored in enclosed equipment with controlled temperature, moisture, and aeration. This type of system can process large quantities of waste with fewer odor problems in a small area and can accommodate animal products.

Vermicomposting

Worms break down organic materials into high-value compost called castings. Vermicomposting bins can function indoors or outdoors, but cannot process animal products or grease.

For more comprehensive details on composting methods, processes, and technologies, see *Composting Yard Trimmings and Municipal Solid Waste* and *Compost: New Applications for an Age-Old Technology* in the Resources section.

In 1997, WasteWise partners reported recovering more than 300,000 tons of food scraps and yard trimmings. Taking advantage of the reduction potential of organic waste, partners have achieved significant cost savings and environmental benefits. Some partners have targeted yard trimmings, others have focused on food scraps, while still others have found unique ways to divert less common organic wastes. Most organizations close the recycling loop by using or selling the products resulting from their waste reduction, including compost, mulch, and wood chips. This issue of the *Update* highlights a number of organic waste diversion and recovery options implemented by WasteWise partners.

Yard Trimmings: Worth Weeding Out

- **Grasscycling.** By simply leaving grass clippings on the lawn after cutting, rather than bagging them, **Kalamazoo County, Michigan**, reduced staff hours for grounds-keeping and saved a bundle.
- **Mulching and chipping.** For more than a decade, **Eastern Illinois University** has provided its own soil amendments for landscaping by chipping and mulching its yard waste on campus.
- **Composting.** For organizations that have waste streams with substantial quantities of both carbon- and nitrogen-rich material, composting might be the best option. **Anheuser-Busch Companies, Inc.**, composts thousands of tons of agricultural byproducts, beechwood chips, yard trimmings, and animal stable waste every year. Anheuser-Busch then reuses the finished compost for landscaping projects.

Food Scraps: Feed the Earth

- **Donation.** One of the easiest ways for an organization to divert its organic waste stream is to give away its food or food scraps to food banks, shelters, orphanages, or other charitable groups.

DaimlerChrysler Corporation has found that its charitable donation of nearly 150 tons of food each year pays off in annual cost savings of more than \$5,000. Some organizations, like **Stonyfield Farm Yogurt**, donate food waste for use as animal feed.

- **Composting.** Onsite food composting operations, such as the windrow systems at the **Tennessee Department of Correction**, the **Eastern Band of Cherokee Indians Reservation**, and **UTC Carrier Corporation**, have proven highly effective in diverting large volumes of food waste.
- **Vermicomposting.** A less conventional tactic is to feed food scraps to worms. **Sligo Adventist School** recovered 500 pounds of cafeteria food waste in 1998 with its vermicomposting program.

Innovative Approaches and Unusual Materials

Recent studies have shown that compost can help prevent environmental problems in ways beyond its well-known use as a soil amendment. Putting these findings into action, **King County, Washington**, recently investigated using compost to help restore salmon populations. In addition, organizations that find themselves with compostable waste streams less typical than yard trimmings and food scraps would do well to follow the example of **Johnston Industries'** successful and highly profitable windrow composting operation for cotton fiber.

Breaking Down the Composting Process

Composting, in nature or in backyards, is defined as the controlled decomposition of organic material. Municipal and commercial composting is defined as the thermophilic (heat-based) decomposition of organic material by microorganisms. In either case, composting is both a science and a balancing act. You have to find the right mix of inputs to allow microorganisms within the pile to decompose matter into compost containing the proper nutrient and moisture content. The following diagram describes some of the major inputs and outputs of the basic composting process.

INPUTS

Organic Matter

The first step is to find the proper balance of carbon and nitrogen by mixing various amounts of 'green' and 'brown' organic feedstock into a pile. Greens, which include food scraps and grass clippings, are high in nitrogen. Browns, which include leaves, wood chips, and sawdust, are high in carbon. For most methods, adding animal products or grease into the pile is not recommended.

Water

Moisture, which is inherent in organic materials, makes nutrients available to the microorganisms. If a pile is too wet, however, nutrients leach out and become inaccessible to the organisms. Adding sawdust or paper can help reduce the moisture content of the pile.

Micro- and Macroorganisms

Once you've created a composting pile by mixing layers of greens and browns, naturally occurring microorganisms (e.g., bacteria and fungi), and macroorganisms (e.g., beetles and earthworms) start consuming and breaking down the organic matter.

Oxygen

Microorganisms require oxygen in order to consume and break down the organic matter, which is why compost piles are turned frequently. Another way to allow oxygen to flow through the pile is by adding materials of larger particle size, such as wood chips, which would result in a pile with more pores through which oxygen can enter. Larger particle sizes, however, reduce the surface area with which the organisms can work.

OUTPUTS

Odor

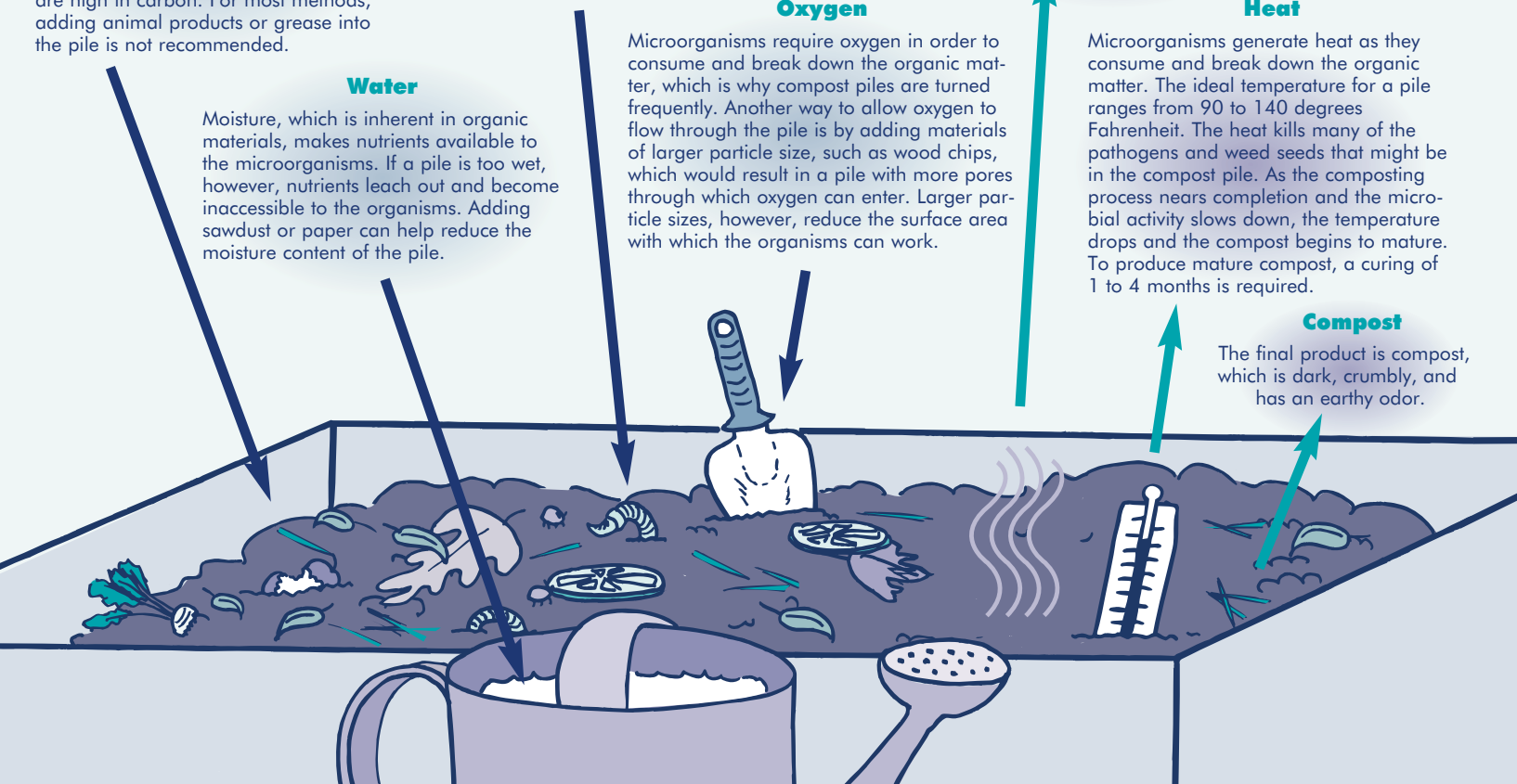
A smell emanating from the compost pile means the microorganisms are not getting enough oxygen. To deal with odor problems, adjust the inputs, especially oxygen.


Heat

Microorganisms generate heat as they consume and break down the organic matter. The ideal temperature for a pile ranges from 90 to 140 degrees Fahrenheit. The heat kills many of the pathogens and weed seeds that might be in the compost pile. As the composting process nears completion and the microbial activity slows down, the temperature drops and the compost begins to mature. To produce mature compost, a curing of 1 to 4 months is required.

Compost

The final product is compost, which is dark, crumbly, and has an earthy odor.





Yard Trimmings: Worth Weeding Out

Yard trimmings—including grass, leaves, and tree and brush trimmings—accounted for nearly 28 million tons of waste generation in 1996. Activities such as grasscycling, mulching, and composting can help divert these materials from the waste stream. In fact, 14 million tons of the national organic waste stream is grass, which could be completely diverted through grasscycling.

Kalamazoo County Cuts Waste While Cutting Grass

Looking for an easy way to save time and money while reducing waste? Then stop bagging those grass clippings! By making the simple switch to grasscycling in 1993, WasteWise partner Kalamazoo County, Michigan, realizes savings of approximately \$5,000 per year and recovers 140 hours of staff time per week during the growing season. “Eliminating bags of grass clippings helped the county save money by downsizing trash dumpsters and ordering less frequent trash pickup,” according to Steve Leuty, Kalamazoo County’s recycling coordinator.

To serve as a community role model, Kalamazoo County adopted a waste reduction policy in 1991, committing the

county to minimizing landfill disposal of yard waste. Two years later, the state of Michigan passed a law prohibiting landfilling of yard waste generated on government property. Motivated both by state law and its own goals, therefore, Kalamazoo studied reports on turf management and determined that grasscycling would require less effort than other options such as composting. The potential benefits of grasscycling, including reductions in lawn watering, fertilizer application, and labor demand, convinced the county to make the switch on its 51 mowed acres of county parks and lawns.

According to Leuty, “Making the switch to grasscycling was easy. Since any mulching mower can grasscycle, we simply converted older conventional mowers by removing the bags.” The county provided lawn mower operators with brief instructions including when to mow and what height to leave the grass. Instead of spending time removing and emptying full bags of grass clippings, groundskeepers can now focus on other tasks and let nature do its work. Grass clippings left on the turf filter down between blades of grass and decompose, returning vital nutrients to the soil while maintaining soil moisture and moderating temperature extremes.

Overcoming Mulching Mower Misconceptions

Although Kalamazoo County required only minor operational changes to accommodate its grasscycling program, it did need to overcome the general misconception that mulching mowers would litter clippings on downtown sidewalks and dampen the appearance of the county’s grounds. The county found, however, that following a few basic rules of thumb, such as mowing grass when it is dry to prevent clippings from sticking to walkways, helped ensure success. Once management and employees were informed of the benefits of grasscycling, such as reduced costs, reduced mowing time, and improved turf health, any initial resistance turned into support. Next, Kalamazoo plans to reduce mowing needs and enhance property aesthetics by increasing the use of low-water, low-maintenance native plantings, a practice known as “xeriscaping.”

For more information about Kalamazoo County’s grasscycling program, contact Steve Leuty at 616 384-8110 or via e-mail at <sleuty@kalcounty.com>.

Grasscycling Tips:

- Mow when grass is dry and keep mower blades sharp.
- Mow more frequently—mowing time will be 40 percent less, on average.
- Never remove more than one-third of the grass height.
- Keep most varieties of grass at least 3 inches high to help control weeds and reduce water demand and plant stress.

(Source: Maryland Department of Public Works and Transportation.)

Mulch Doesn't Fall Far From the Tree At Eastern Illinois University

Eastern Illinois University's (EIU's) campus has a familiar feeling from the ground up: the mulch that covers the landscaped flowerbeds and trees is made from remnants of the trees' own limbs and leaves. While keeping its trees healthy, EIU's onsite mulching program also diverts 12.5 tons of yard trimmings and 82 tons of wood waste annually. The program also saves the university the expense of purchasing mulch from an outside source.

A Process for All Seasons

"The university decided to start onsite mulching and composting because it was expedient," explains Jon Collins, EIU's superintendent of grounds. When the program began, EIU had excess land to store composted leaves, and it made sense to start using the mulch and soil mixture in the university's greenhouse. From there, the program expanded to include landscaping for the entire campus. According to Allan Rathe, EIU's recycling coordinator, the onsite composting and mulching program is simple to operate. As the trees shed their leaves, EIU's grounds crew rakes and grinds them up with other yard trimmings using a mulching mower. The crew tills some of the newly created mulch into the flowerbeds to help prevent erosion over the winter. The rest is taken to an out-of-sight spot on the campus grounds, where it is stockpiled for composting. In the spring, once the leaves have decomposed, the compost is spread in the flowerbeds as a soil amendment. Tree branches stay even closer to their origins: EIU chips them up and spreads the chips around the trees' bases. EIU cuts the larger, unchip-pable sections of dead trees into logs for sale as firewood and uses the profits to purchase and plant new trees.

One factor other organizations planning this type of program should keep in mind is that mulched yard waste is somewhat unsightly while it composts throughout the winter and early spring. Prior to initiating a program, Rathe advises facilities to find an out-of-the-way place where employees, students, faculty, and visitors will not see the pile.

While Rathe and Collins cannot estimate exactly how much money EIU has saved with the program, they do believe it is a clear winner. "It has been a successfully operating program for more than 16 years," Rathe says proudly. He credits simplicity and common sense as the main reasons it has lasted so long. To learn more about EIU's onsite mulching program, contact Allan Rathe at 217 581-6038 or via e-mail at <csalr@eiu.edu>.

Composting Advice From Anheuser-Busch

When senior management at WasteWise partner Anheuser-Busch Companies, Inc., challenged its breweries to reduce their impact on the environment, the breweries began by forming teams and examining waste streams. This led to the composting of the beechwood chips used in the brewing process—7,000 tons of which were composted in 1998. Beechwood chip composting was a difficult process, but the breweries eventually overcame logistical obstacles such as handling, storage, and protecting the chips against contaminants.

Reducing environmental impacts was not the only benefit the company considered when it decided to start composting beechwood chips. "We're a business that believes in protecting the environment, but we're also a business that must ensure that our activities—including environmental initiatives—are cost effective," explains Bert Share, pollution prevention manager at Anheuser-Busch's corporate headquarters. The company's composting activities, for instance, help reduce waste disposal costs and the need to purchase fertilizers. In total, Anheuser-Busch's solid waste management program, including composting activities, has saved the company more than \$13 million since 1991 and at least \$2.5 million in 1998 alone.

Whether it's beechwood chips from its breweries, yard and animal stable waste from its theme parks, or agricultural byproducts from its rice and malting operation, Anheuser-Busch has experience with the recovery of organic materials. If your organization is considering composting, Share offers these general guidelines:

- **Start easy and be patient.** Before you investigate composting options, master simple programs, such as recycling, that guarantee success and build credibility with management. Once you have companywide goals, it still takes time to figure out the program logistics, so work on manageable pieces and take one step at a time. Wait to implement the more challenging activities that involve complicated manufacturing processes. While your organization might experience higher returns, it also encounters a much greater challenge and risk of failure.
- **Measure outcomes.** The success of your program depends on being able to measure the amount of waste reduced and the dollars saved due to environmental activities.

For more information on Anheuser-Busch's composting activities, contact Bert Share at 314 984-4564 or via e-mail at <hugh.share@anheuser-busch.com>.

In 1998, Anheuser-Busch composted:

- 291,000 tons of agricultural byproducts
- 7,000 tons of beechwood chips
- 2,350 tons of animal stable waste
- 2,300 tons of yard waste

Food Scraps: Feed The Earth

Food scraps accounted for nearly 22 million tons of waste generation in 1996. Activities such as donation, composting, and rendering can help divert these materials from the waste stream. In addition to the WasteWise partners featured in this Update, EPA has developed case studies on food scrap recovery programs (see Don't Throw Away That Food: Strategies for Record Setting Waste Reduction in the Resources section).



DaimlerChrysler Helps Drive Out Hunger

Food waste recovery can be both easy and rewarding. Just ask WasteWise partner **DaimlerChrysler Corporation** who donated nearly 150 tons of surplus food in 1998 through Forgotten Harvest, a nonprofit organization that collects and distributes donated food to shelters and soup kitchens in the metropolitan Detroit, Michigan, area. According to DaimlerChrysler pollution prevention specialist Doug Orf, "All it took was a desire to reduce waste, some extra space in the refrigerator, and one phone call to locate the nearest donation program." Through this donation program, DaimlerChrysler saved more than \$5,000 in avoided disposal costs in 1998.

Partnering Makes it Easy

At DaimlerChrysler's headquarters, sources of leftover food include five cafeterias. It's difficult to anticipate how many of DaimlerChrysler's 11,000 employees will use the

cafeterias each day, so DaimlerChrysler's food suppliers prepare food for 8,000 employees each day. This process often results in leftover food; therefore, DaimlerChrysler sought an outlet for the unsold prepared food. It found a helping hand by calling Foodchain, a national food-rescue network comprised of 140 food donation programs throughout the country. Foodchain connected DaimlerChrysler with the local organization Forgotten Harvest, and this partnership made donating surplus food simple and affordable. According to Orf, "Not only does Forgotten Harvest pick up our surplus food when there are at least 40 servings, which is usually once a week—there are no pickup fees involved! All we have to do is keep the prepared food refrigerated, which is not a problem since we have adequate refrigerator space."

Forgotten Harvest even provided training for DaimlerChrysler's food suppliers on the purpose and benefits of the donation program. The suppliers were initially concerned with liability issues; however, Forgotten Harvest assured them that donors who prepare and store food in good faith are protected from civil and criminal liability by the Federal Good Samaritan Food Donation Act. With that knowledge, the food suppliers quickly supported the program. Now DaimlerChrysler's food suppliers even box the surplus food for donation.

Orf strongly encourages other organizations to pursue food donation programs, and adds, "Partnering with a food donation program is a great opportunity that benefits the environment and saves a valued resource needed by others." The ongoing success of the program inspired the CEO, of then Chrysler Corporation, to produce a video on it. For more information on DaimlerChrysler's food donation program, contact Doug Orf at 248 576-7361 or via e-mail at <djo6@chrysler.com>.

To find a food donation program near you, or for liability information, contact:

Foodchain at 800 845-3008
or visit its Web site at <www.foodchain.org>.

Second Harvest at 312 263-2303
or visit its Web site at
<www.secondharvest.org>.

To find out about events and programs that fight hunger, contact:

Share Our Strength at 800 969-4767
or visit its Web site at
<www.strength.org>.

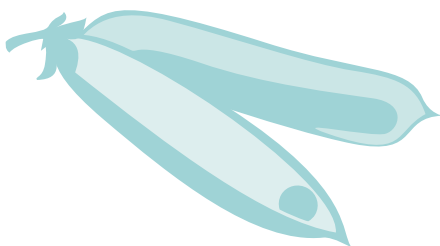
Pigs Diet on Stonyfield Farm's Excess Yogurt

Ever wonder what flavor of yogurt pigs prefer? Turns out they're not particular at all. In 1998, **Stonyfield Farm Yogurt** donated more than 200 tons of excess yogurt—in a variety of flavors—to hog farmers in New Hampshire. Excess or inedible yogurt is left over from the company's stringent quality control testing process and from products with expired code dates. According to Nancy Hirshberg, director of natural resources at Stonyfield Farm, "Stonyfield Farm's motivation for initiating the program was twofold—it supports local farmers and reduces costs associated with the disposal of waste products." Stonyfield Farm also donated more than 100 tons of edible but unsaleable product to food banks and nonprofit organizations in the community.

Hirshberg credits Stonyfield Farm's successful donation program to its dedicated investment of time and labor. According to Hirshberg, "Directing staff time to waste prevention really pays off even for small companies." In fact, the combined programs saved Stonyfield Farm and its 150 employees more than \$20,000 in avoided disposal costs in 1998.

To get the program up and running, employees networked extensively with farmers in the community, designated storage space, set up a waste tracking system, developed a method for contacting the farmers, and learned how to prepare donated materials. Stonyfield Farm is building a farmer database to track the 10 or so farmers who pick up yogurt on a routine basis as well as the farmers who pick up less regularly. To make the donation program less labor intensive, Stonyfield Farm also is planning a new process to transfer yogurt from the production area to a storage trailer where farmers can pick up and load the yogurt themselves.

Stonyfield Farm's employees get an additional perk from the donation program. In exchange for the company's yogurt, farmers sometimes bring farm fresh ham and bacon for the employees to show their appreciation. For more information about Stonyfield Farm's donation program, contact the WasteWise Helpline at 800 EPA-WISE (372-9473).



Cherokees Hit the Jackpot with Casino Food Waste Composting

Looking for advice on how to start a food composting program? "Quit talking about it and do it," recommends Calvin Murphy, executive director of tribal utilities for WasteWise partner the **Eastern Band of Cherokee Indians**. What began as a pilot composting program for the Tribe has grown into a successful full-scale composting operation. So successful, in fact, that nurseries, landscapers, and individual homeowners that want to purchase the Tribe's compost are placed on a waiting list. The Tribe also has enjoyed significant cost savings from avoided tipping fees and landfill disposal charges.

Despite the economic benefits, cost savings weren't the Tribe's main motivations for implementing the pilot composting program. Located near the Great Smoky Mountains National Park in Cherokee, North Carolina, the Eastern Band of Cherokee Indian reservation attracts 5 million tourists each year. Its casino alone draws 1 million visitors. The casino's opening in 1997, along with the closure of the reservation's MSW landfill, prompted the Tribe to explore composting as a method of diverting its food waste. The Tribe collects an average of 20 tons of food waste each month from the casino's steakhouse, fast food restaurant, and open food market.

According to Murphy, one key factor contributing to the success of the pilot program has been the integration of the composting process into employee training and routine procedures at the casino. The Tribe hired an additional employee to handle some of the composting responsibilities. Each morning, the collection containers are loaded onto a truck at the casino and transported to the reservation's composting site, located at the reservation's closed landfill. The containers are emptied, washed, and returned to the casino. The food waste is added to a composting windrow, which ranges in length from 50 to 125 feet and is approximately 8-feet wide and 5-feet high. After the compost meets temperature, turning, and processing time guidelines, it is transferred to a covered storage curing area for drying and screening.

While the Tribe experienced no problems with procedural changes, it did have initial problems with odor. The Tribe found, however, that turning the composting pile every day allows the pile to aerate properly and alleviates any foul odors. The Tribe's composting program has been so successful that, if odors continue to be effectively controlled, it plans to expand its composting activities and collect food waste from the other restaurants on the reservation. Three restaurants have already expressed strong interest in participating in the program.

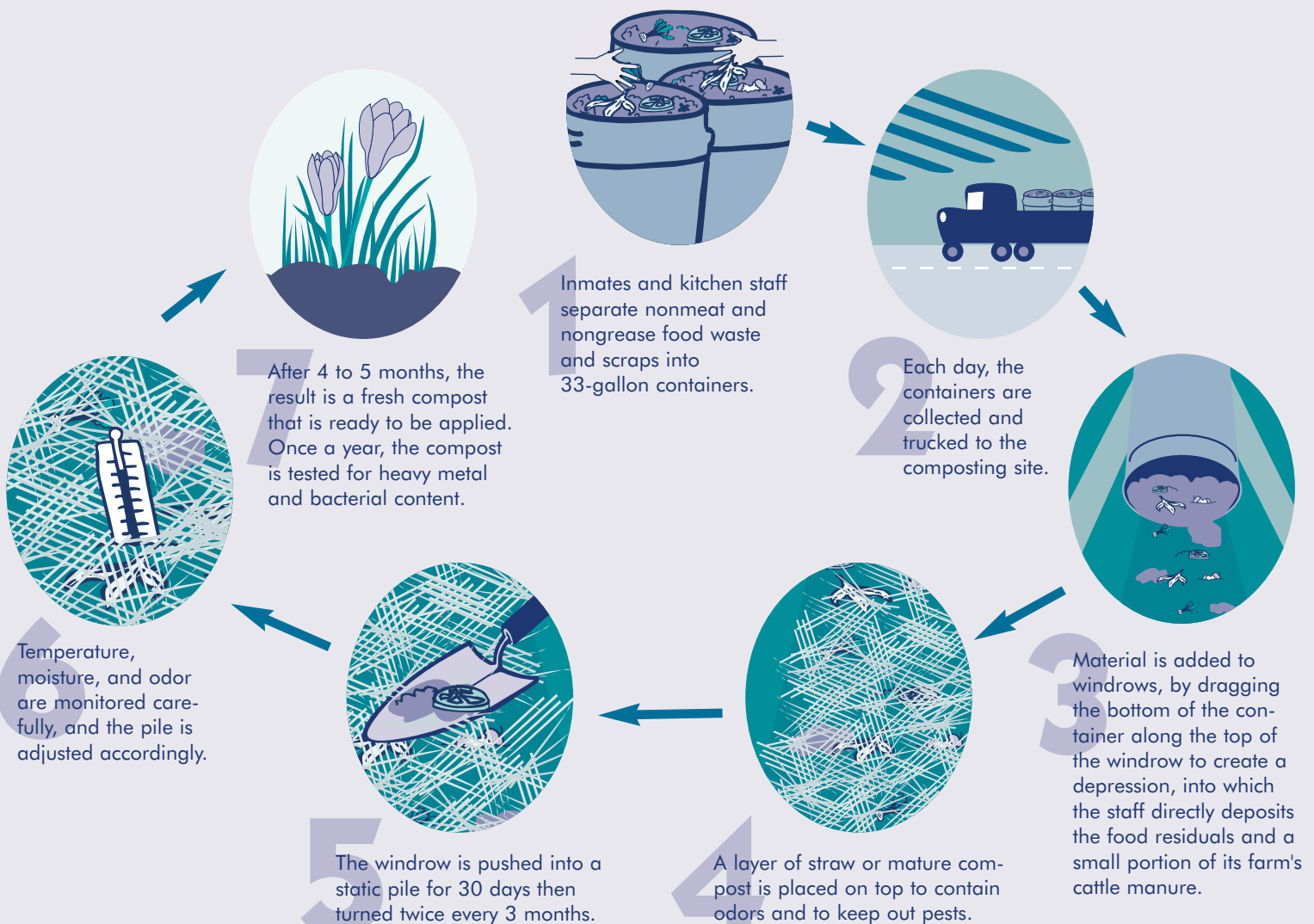
For more information, contact Calvin Murphy at 828 497-6977 or John D. Long, sanitation recycling manager, at 828 497-3908.

Tennessee Correctional Facility Arrests Organic Waste

Facing state waste reduction mandates, skyrocketing disposal costs, and a challenge from the governor to reduce its solid waste by 75 percent, the Brushy Mountain Correctional Complex/Morgan County Regional Site in Wartburg, Tennessee, responded by reassessing its waste management practices. By aiming common sense and trial and error at their ample food wastes, the facility exceeded the state's waste reduction targets and thwarted a potential \$17,000 hike in annual disposal costs through onsite composting. The facility now serves as a model for institutions throughout the state. Along with various recycling activities, composting has helped push the facility's waste diversion rate as high as 77 percent—with more than 500 tons of food waste composted each year!

For years, the correctional facility disposed of its waste at an onsite county landfill for a mere \$0.85 per ton. As the landfill began to reach its capacity in the early 1990s, the correctional facility faced \$40 per ton disposal fees at an alternate landfill—a cost too steep for WasteWise partner **Tennessee Department of Correction (TNDOC)** to accept. Facility officials examined their waste stream and determined that the best option for waste recovery—and for reducing the burden on the county landfill—lay in composting the facility's organic waste. They found that with more than 1,500 inmates eating three meals a day, 60 percent of the facility's waste stream consisted entirely of food residuals. Since then, the facility's composting operation has become so successful that it attracts facility managers from across Tennessee—and other states—to learn how to compost at their own facilities.

How the Prison Composts Organic Waste



Selecting the Right Method

Facility unit manager Bob Walls shares some simple advice with those who want to start a composting operation, “It requires nothing more than a basic understanding of the composting process and some experience through trial and error.” Walls learned the basics of composting from a bin he set up in his own backyard. He got additional help in the planning stages of the facility’s operation from local university professors. The professors visited the facility and recommended constructing 10- by 10-foot aerated bins and alternating layers of sawdust, food waste, and cattle manure.

After a few trials with the bins, however, facility officials realized air was not circulating properly, causing the pile to rot, or decay without the presence of oxygen. To address this problem, the facility redesigned the piles into 4- by 100-foot windrows. The windrow method worked; however, it required mechanical turners and chippers. Facility officials drafted a proposal to the state, which lends out equipment such as chippers and turners to government institutions. The state accepted the proposal. Armed with a tractor, a turner, an industrial chipper, and plenty of inmate labor, the facility launched its composting operation (see page 8). The finished process yields a dark compost that is applied as a soil amendment on the facility grounds, which include a fully operational farm.

The Benefits

Besides reduced disposal costs, Walls noted several other benefits of the facility’s composting operation:

- **Improves soil.** The compost helps soil retain moisture and nutrients.
- **Prevents fertilizer runoff.** Using compost releases nutrients slowly into the soil and helps soil hold water better so that close to 100 percent of the fertilizer is used instead of a portion of it being washed away. This reduces the amount of fertilizer TNDOC must purchase.
- **Reduces costs for the community.** The facility helps reduce disposal costs for the county and other institutions. It accepts food residuals from a nursing home and occasionally the county will haul in yard waste, which is sent through the industrial chipper and placed on the windrows to help aerate the pile and provide a source of carbon.

Walls maintains that a good way for partners to learn about composting is simply to talk with someone who has done it before. Correctional facilities across Tennessee have done just that, and eight other facilities now run composting operations of their own thanks to TNDOC’s help. If you’d like to learn more about Morgan County Regional Correctional Facility’s composting operation, contact Bob Walls at 423 346-6641.

Worming Through Waste at Sligo Adventist

For some worms, an apple a day just isn’t enough. In fact, students at WasteWise partner **Sligo Adventist School** in Takoma Park, Maryland, find that the red-worms they use in their compost bin will eat just about any food material from the cafeteria except meat. What started as two students’ vermicomposting science fair project 4 years ago has turned into an entire school affair. At peak production, Sligo’s worms turn more than 1,000 pounds of food waste a year into vermicompost. More importantly, though, the project offers a great educational experience for the students.

Vermicomposting is a fairly easy project to implement explains Ken Gair, Sligo’s plant manager and supervisor of the project, “All you need is a bin, bedding, worms, and food waste.” Sligo constructed its own bin in the school greenhouse using plywood and ordered 1 pound of red-worms from a grower in Wisconsin for \$18. Using a paper shredder donated by the **National Aeronautics and Space Administration (NASA)**, another WasteWise partner, the school shreds used office paper for bedding. Sligo prepares the bedding for the worms by wetting 1 pound of shredded paper with 3 pounds (equal to 3 pints) of water. The worms thrive in this moist environment and will eat through the food waste and bedding, producing a rich organic vermicompost. Sligo changes the bedding every 3 to 6 months and uses the vermicompost on the flowerbeds around the school grounds. In addition, Sligo found that the excess water, which builds up in the bin, is another great source of nutrients for plants.

Overcoming Challenges

To make the project a success, the school had to address three specific challenges. First, to help younger students who needed more supervision and assistance changing the bedding, a teacher oversees the project. Sligo also encountered space limitations. The greenhouse only holds a moderate-sized bin, so only 15 to 20 percent of the school’s food waste can be vermicomposted at this point. Finally, when school is out during the summer months and no food waste is available, the worms tend to crawl out of the bin and dry up. As a result, Sligo must purchase new worms each academic year. Nonetheless, vermicomposting has been a great success for Sligo. “Even though we face special challenges at our school,” Gair notes, “I highly recommend vermicomposting to any organization looking for an efficient and cost-effective way to reduce food waste.” For more information on vermicomposting, see the Resources section of this *Update* or contact Ken Gair at 301 434-1417 or via e-mail at <klgair@aol.com>.

Composting Heats up at UTC Carrier Corporation

Temperature matters to WasteWise partner UTC Carrier Corporation, a manufacturer of heating and air-conditioning systems. The same is true for composting, where the quality of the finished product depends on maintaining heat within the compost pile. Perhaps the company's long experience in temperature control is one reason Carrier was able to implement a highly effective windrow composting operation at its Syracuse, New York, facility, diverting 100 tons of diverse organic wastes from the landfill and saving the company \$40,000 in disposal costs in 1998.

Carrier operates a closed-loop system. Four thousand employees in 18 buildings, three large cafeterias, and two carpentry shops provide the food scraps, sawdust, and wood chips that supply the composting operation year-round. Grounds maintenance generates grass clippings, leaves, and yard trimmings for composting during the fall and summer months. The finished compost goes to meet Carrier's extensive landscaping requirements at its 3.4-million-square-foot facility.

Carrier's recycling coordinator, Angie Scafidi, attributes the company's composting success to management support and employee education, both of which were cultivated as carefully as their compost.

Carrier's Simple but Effective Process

Carrier's composting process has four stages:

- **Separation.** Carrier collects preconsumer food scraps in 90 gallon wheeled bins located near the food preparation areas of the cafeteria. Employees know that blue collection containers are for vegetable scraps only; no grease or meat products are allowed.
- **Collection and Mixing.** The buildings and grounds crew transport the bins to the compost site each day, using a front-end loader. At the site, on a concrete pad, the food scraps are mixed with sawdust, wood chips ground from clean delivery pallets, and yard waste (when available).
- **Pile maintenance.** The grounds crew uses shovels and thermometers to combine, turn, and monitor the windrows. The temperature of the piles is taken several times a week and generally runs between 105 and 140 degrees Fahrenheit. When the piles start to cool, the grounds crew turns them to ensure the middle of the pile has adequate air, moisture, and nutrients to rekindle bacterial activity.
- **Curing.** When the temperature of the windrows no longer increases after turning, the curing stage begins. Curing takes about 30 days, after which the compost is ready for spreading on Carrier grounds.

Starting With a Plan

Carrier did its homework before jumping into composting. The company formed a research team, which visited several local correctional facilities to learn about their institutional composting programs. The team then applied what they had learned to Carrier's facilities. They studied where the company generated food scraps, where source separation should occur, and who would be responsible for collecting and emptying the containers. They also collected cafeteria food waste for several weeks to determine the amount of compostable material generated each week.

To keep the procedures simple, the team limited roles in the project to cafeteria workers and grounds crew. The group also chose the composting method that required the least labor of all the options they considered—turned windrow composting.

Armed with solid research and well-thought-out procedures, the team sold Carrier management on the program by demonstrating how composting would save the company money, enhance Carrier's corporate image, and begin a new phase of waste reduction at the facility.

Implementing Through Employee Education

To smoothly roll out the new program, Carrier conducted training classes for the grounds crew and food service workers involved. The company also distributed an informational pamphlet explaining the program to all other employees.

Carrier employees were very receptive to the program. In fact, the grounds crew was so excited about it, they posted little signs indicating where they had used the first batch of compost for tree and shrub planting. The signs read, "Compost Home Grown By Carrier."

Evaluating the Program

Adding composting to the company's reuse and recycling programs demonstrated to employees that waste reduction was a high priority for the organization. "Aside from economic savings and environmental concerns," Scafidi noted, "we wanted to show our employees that we were serious about the whole concept of waste prevention." Carrier also showed employees that composting is a waste reduction method they can take home. In celebration of Earth Day 1998, Carrier offered employees home composting equipment and classes on composting techniques. For Earth Day 1999, Carrier offered its employees free compost, and employees took home 10 tons of it to use in their home gardens.

Carrier's program emphasizes low-cost simplicity and a sense of pride in contributing to the company's waste reduction program and wider environmental goals. With these elements in place, composting at the company shows no signs of cooling off. For more information about Carrier's composting program, contact Angie Scafidi at 315 432-6791.

Compost Innovations

Compost can provide a healthy boost for farmers seeking hearty corn crops or for homeowners tending prize-winning roses. Beyond its well-known uses as a soil amendment, however, compost can play a much larger role—as a cost-effective solution to and safeguard against environmental problems.



The microbial activity within mature compost, as well as its physical and chemical properties, can be used for a number of beneficial activities such as pollution prevention and pollution remediation.

Pollution Prevention

As topsoil erodes, it allows rainwater to flow directly into streams and lakes rather than being absorbed and filtered by the soil. This runoff brings with it harmful fertilizers and pesticides. Compost can reduce the need for fertilizers and pesticides by at least 50 percent by adding organic bulk and humus to poor soils and by suppressing certain plant diseases and parasites. Compost also helps soil better retain water. This property makes compost useful in projects involving wetlands

restoration, soil erosion prevention, and storm-water runoff prevention.

Pollution Remediation

Compost can provide cost-effective remediation of contaminated soils and water from areas such as Brownfields or Superfund sites. The microorganisms in mature, cured compost can sequester or break down contaminants in water or soil, transforming them into humus and harmless byproducts such as water, carbon dioxide, and salts.

For more information on beneficial uses of compost, order *Compost—New Applications For an Age-Old Technology* (EPA530-F-97-047) by calling EPA's publications center at 800 490-9198.

King County Explores Using Compost to Aid Salmon Recovery

WasteWise partner King County, Washington, is playing a key role in a regional effort to protect and restore salmon populations, now listed as a threatened species under the Endangered Species Act. Local



water quality and wetland habitats are threatened by urban development and landscaping practices that remove or compact native soils and vegetation cover, thereby damaging their capacity to retain water and filter out pollutants. Rainwater that runs off of impervious surfaces can carry sediment,

pesticides, and fertilizers into water bodies, posing a threat to aquatic life such as salmon.

According to King County organics program manager Josh Marx, the county is looking closely at using compost as another tool in its wide array of salmon recovery efforts. "The combination of a rainy climate and the quick pace of development has led to excessive runoff. When compost is added to the soil," Marx explains, "it improves the soil's water absorption and retention capabilities as well as pollutant binding properties. What's good for the soil, is good for water resources, which in turn supports fish." He added that the county plans to replenish soils with compost—especially on urban land—through best management practices and site development standards.

In the meantime, the King County Department of Natural Resources has formed an organics team, incorporating representatives from different divisions to examine opportunities to integrate various organic programs. A study is now under way to determine how best to increase the capacity of organic materials being composted. The study also will analyze different facility options for handling organic feedstocks such as yard debris, soiled paper, food and wood waste, biosolids, and agricultural waste.

Composting Cotton at Johnston Industries

As companies experiment with composting, some are finding ways to recover organic wastes other than food scraps and yard trimmings. In fact, some manufacturers have discovered vast quantities of compostable materials in their own manufacturing byproducts. This discovery paid off for WasteWise partner **Johnston Industries**, a diversified fabrics manufacturer based in Columbus, Georgia, that composts more than 5,000 tons of cotton fiber and saves more than \$200,000 in waste hauling and disposal costs each year.

How It All Got Started

When waste fiber output increased dramatically in 1994, Johnston began to consider composting as an alternative to spending hundreds of thousands of dollars in hauling and disposal fees. Johnston hired a consultant to research composting options and then forwarded the consultant's report and a request for a feasibility study to the Alabama Department of Environmental Management. The request was approved expeditiously and Johnston has been composting ever since.

Fiber as Food for Compost

Johnston composts fiber from a Valley, Alabama, division that buys fiber byproduct from other textile manufacturing plants and cleans it for reuse in absorbent products such as cotton swabs and personal hygiene products. Only the high-quality portion of the fiber is reclaimed; therefore, this process generates 10 to 15 tons per day of waste fiber, which Johnston diverts from the waste stream into its composting program. According to Johnston's environmental manager Hal Wood,

"Measuring the amount of fiber composted is straightforward." The difference between the amount of fiber byproduct that enters the plant for processing and the amount of cleaned fiber that exits the plant to be sold is the amount of waste fiber sent for composting.

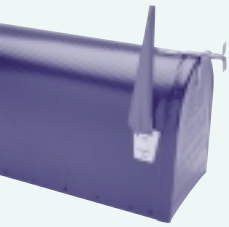
Johnston uses windrow composting to break down the fiber. Employees form piles using front-end loaders and aerate the mixture with a Wildcat compost turner. With adequate rainfall and aeration, the composting process takes 90 to 120 days.

According to Wood, "Composting at Johnston Industries is a simple process—Mother Nature takes over, but she is not very forgiving without the right moisture and oxygen content." Johnston can add moisture to the operation during dry periods in the summer, but the composting process operates more naturally and efficiently in spring, fall, and winter, when the area receives adequate rainfall.

Marketing Composted Fiber

Five years after its inception, the program is still going strong. The company sells or gives away finished compost to local gardeners and hobby farmers. Not surprisingly, the company experiences a surge in demand in the springtime, although the compost is available year-round.

As gardeners around Valley, Alabama, can attest, Johnston has turned a mountain of waste disposal costs into piles of a useful commodity. For more information about Johnston Industries' fiber composting program, contact Hal Wood at 706 641-3190.



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R e s o u r c e s



EPA Composting Resources (available at <www.epa.gov/compost>)

▼ **Compost—New Applications For an Age-Old Technology (EPA530-F-97-047).**

This packet is intended for those interested in applying compost to a number of innovative, cost saving uses including contaminated soil remediation and pollution prevention. Case studies illustrate these uses.

▼ **Composting of Yard Trimmings and Municipal Solid Waste (EPA530-R-94-003).**

Geared toward municipal planners, this publication helps decision-makers develop composting programs in their communities. It describes composting processes and examines how to plan a composting operation from collection through marketing finished compost.

▼ **Organic Materials Management Strategies (EPA530-R-97-003).**

This report describes seven composting strategies for common organic materials and presents an analysis of the benefits and costs of each strategy.

Other Composting Resources

▼ **City Farmer.**

This Web site describes vermicomposting and the steps involved in creating and maintaining a worm bin in your home or office. <www.cityfarmer.org/wormcomp61.html#wormcompost>.

▼ **A Guide to Commercial Food Composting.**

This publication provides food service businesses with tools to evaluate the benefits of composting, strategies for determining whether a composting program is feasible, and steps to establish such a program. Available for \$30. To order, contact the U.S. Composting Council Research and Education Foundation. Phone: 301 913-2885. Or visit <www.compostingcouncil.org>.

▼ **BioCycle, Journal of Composting and Recycling.**

This monthly magazine is one of the leading publications on composting and recycling. It showcases examples of how to launch and expand composting and organics recycling programs involving everything from biosolids to yard trimmings. To subscribe, call 610 967-4135 or visit their Web site at <www.jgpress.com>.

▼ **Cornell Waste Management Institute/Cooperative Extension.**

These institutions offer extensive resources on composting for businesses and institutions, including a number of tool kits, manuals, tip sheets, and videos. One kit includes a manual with case studies and two videos. Available for \$35. For more information, contact the Institute at 607 255-1187. To view case studies online, visit <www.cfe.cornell.edu/WMI/Compost/CaseStudies.html>.

▼ **Don't Bag It—Compost It!**

This Web site is an excellent resource for those interested in small-scale composting projects. It includes a slide show that illustrates composting step by step. <aggie-horticulture.tamu.edu/earthknd/compost/compost.html>.

▼ **The Compost Resource Page.**

This Web site serves as a hub of information on composting. It provides an extensive list of links to composting resources on the Web. <www.oldgrowth.org/compost>.

▼ **University of Maine Cooperative Extension (UMCE).**

In conjunction with the university's composting school, the cooperative extension offers a set of videotapes demonstrating the feasibility of composting organic wastes. A complete set of the videos is available for \$75; single copies are \$10 each. To order, contact the UMCE Waste Management Office. Phone: 207 581-2722. Or visit <www.composting.org/VIDEOS.htm>.

▼ **U.S. Composting Council.**

This organization is involved in research, public education, composting and compost standards, expansion of compost markets, and gaining public support for composting. Phone: 440 989-2748. Or visit <www.compostingcouncil.org>.



▼ **Maryland Department of Public Works & Transportation.**

The solid waste services section of the department's Web site provides extensive advice on grasscycling, from fertilizer application and mowing methods to lawnmower and watering options. <www.dpwt.com/SolWstSvcDiv/solid/grass~1.htm>.

All EPA publications are available through EPA's National Service Center for Environmental Publications (NSCEP): Phone: 800 490-9198. Web site: www.epa.gov/ncepihom.



EPA Food Recovery Resources



Don't Throw Away That Food: Strategies for Record-Setting Waste Reduction (EPA530-F-98-023).

This publication features nine case studies of successful food waste recovery programs. The case studies include detailed information on types of materials collected, methods used, and associated costs and savings.



Donating Surplus Food to the Needy (EPA530-F-96-038).

This tip sheet examines issues involved in donating food and highlights WasteWise partners who have had success with this activity.



Managing Food Scraps as Animal Feed (EPA530-F-96-037).

This tip sheet examines issues involved in sending food scraps to farmers and highlights WasteWise partners who have had success with this activity.

Questions to Consider

Before Getting Started With Composting



ONSITE COMPOSTING

OFFSITE COMPOSTING



1. Assess the resources available

- Do you have the capital, equipment, and space available to initiate and maintain a site?
- What types of organics will you compost? If food is your primary type, will you have access to bulking agents such as paper, wood chips, and sawdust?
- How will you use the finished compost? On site, or is there a market to sell the compost?

2. Select a composting method

- What composting method will best suit the resources available? Static piles? Aerated windrows? In vessel? Vermicomposting?
- Are there any regulatory issues or permitting requirements involved in storing and composting organic waste using the method you choose?

3. Determine how the organics will be collected, stored, and transported within the facility

- Who will supervise the operation?
- Will you need to purchase additional containers?
- Who will be responsible for separating the compostable materials?
- How often will the containers need to be emptied? Who will be responsible for this?

4. Educate your employees

- Have you clearly communicated composting expectations and responsibilities to your employees?
- Who will be responsible for educating and training the employees?

5. Monitor and assess the program

- Are the organics being separated properly?
- Are you having problems with odors from containers?
- Have you asked your employees for feedback?
- Can the frequency of waste collection be reduced as a result of the organics diversion?

1. Locate a composting facility

- What types of organics does the facility accept?
- How much organic material can the facility accommodate from your organization every week?
- What is the tipping fee at the facility?

2. Arrange for transport of the organics

- Will organics collection require another hauler?
- Or, can you arrange for collection and off-site transport under your current hauler?
- Does the composter provide hauling service?