

July 7, 1999

Mr. Warren Hughes  
Director, Solid Waste Department  
Fayette County  
61 E. Main Street  
Uniontown, PA 15401

**Subject:** Nicholson Township Composting Facility

Dear Warren:

This letter is to provide Fayette County/Nicholson Township with the results of R.W. Beck's efforts to prepare materials to assist the Authority in developing, implementing and promoting yard waste composting facility. This report will also provide you with the information that is necessary to prepare the Yard Waste Composting Facility Application form required by the Pennsylvania Department of Environmental Protection (DEP) to demonstrate the Township's adherence to DEP's composting guidelines.

Along with this report is the vendor's list that was used for your Section 902 grant application.

## **PLANNING AND IMPLEMENTING A YARD WASTE COMPOSTING SITE IN NICHOLSON TOWNSHIP, FAYETTE COUNTY**

Nicholson Township plans to build and operate a yard waste composting facility to be located behind the municipal building. Although the primary service area will be Nicholson Township, all residents of Fayette County will be able to drop-off materials—leaves, brush, and possibly grass--free-of charge and will also be able to obtain finished compost at no charge. Additionally, Smithfield Borough plans to deliver yard waste collected from homeowners to the site. Springhill Township and Georges Township, as well as Nicholson Township, will be delivering storm and ravine debris to the facility.

The following technical report outlines the steps that need to be taken to design, construct, operate, promote and fund the facility.

### **PREDEVELOPMENT**

#### **SITE SIZE**

The composting facility will be located in Nicholson Township, and will initially receive yard waste collected from Smithfield Borough. The facility will be available

to all Fayette County residents. However, the majority of yard waste will come from Nicholson Township and Smithfield Borough, which means the immediate service area population is approximately 3,000. Based on a yard waste generation rate of 200 lbs. per capita per year, it is estimated that the compost site could potentially receive approximately 600,000 pounds of yard waste annually. For a variety of reasons, however, it is unlikely that the total amount of yard waste annually generated in this service area will be delivered to the compost site. In light of the potential for additional municipalities to come on line and for significant growth in population over the next few years, R.W. Beck recommends that the Township design the site to receive this quantity to assure that there is adequate capacity.

Because the composition of yard waste to be received at the compost site includes leaves, grass, storm debris and ravine debris, it is estimated that the average bulk weight will be 500 pounds per cubic yard. Using this pound per cubic yard ratio, it is estimated that this facility could annually receive 1,200 cubic yards of material.

To minimize odor and comply with Section 271 of Pennsylvania's municipal waste regulations, "no more than 3,000 cubic yards of yard waste shall be placed, stored, or processed on any acre of a facility where composting activity occurs or is planned to occur." Subsequently, the Nicholson Township facility should only require **one acre** of land both to control odors and comply with Section 271.

## **SITE TOPOGRAPHY/HYDROLOGY**

To comply with Pennsylvania regulations and optimize performance of the operation, the topography and hydrology of the compost site should meet the relevant requirements specified in the DEP Guidelines for Yard Waste Composting Facilities. This includes specifications concerning drainage that might affect wetlands, surface, public water sources or wells, as well as pooling of water on site.

The site, which is essentially flat, should meet the slope requirements in the Guidelines. The Township will need to determine whether or not the surface can be easily penetrated by water, such as a sandy-type soil to control stormwater run-off. If the surface cannot be penetrated by water—for example, if it is made up of clay type soils--the site might have to include surface, run -off control measures. These measures may include catch basins or holding ponds.

## **WINDROW CONFIGURATION**

Based on 1,200 cubic yards of yard waste, it is estimated that this site will require approximately two windrows that are six feet high, 12 feet wide and 200 feet long. If the windrows are not these dimensions, the windrows should be designed to assure that their volume does not exceed eight feet in height by 16 feet in width to remain in compliance with the Guidelines.

Space between the windrows should be between one to five feet. An additional 30 to 50 feet of space should be left around the perimeter for equipment movement.

## STORAGE SPACE

Storage space is also required for finished compost. As a rule-of-thumb, approximately 10 to 20 percent of the area needed for processing should be allocated for storage space. Storage space needs can be calculated using the assumption that the yard waste will undergo at least a 50 percent volume reduction during the composting process.

## BUFFER ZONE

A buffer zone of at least 50 feet must be added to the perimeter of the processing site to minimize potential nuisances such as odor, noise and dust. The most critical consideration, however, is the distance of the composting area from a single family home on the adjoining property. The Guidelines require that there must be at least 300 feet measured horizontally from an occupied dwelling unless the owner has provided a written waiver to this distance requirement.

## GATES AND SIGNAGE

Due to the natural geographic barriers at the composting site, fencing the entire site is unnecessary; however, it is recommended that a gate be installed to limit vehicular access.

A facility identification sign should also be posted at the entrance showing the name of the facility, the nature of the project, and operating hours. The business address and phone number of the operator should also be included. This sign should be sized so that it is clearly visible and readable. A sample sign might read as follows:

Operated by:	Nicholson Township	
	Address	
	(724) xxx-xxxx	
Operated for:	Municipalities and residents of Fayette County	
Hours of Operation:		
This site accepts:	Leaves	Brush
	Grass	Chipped yard waste

In addition, it is recommended that a sign be posted that lists the rules for using the site and notifies the public of penalties associated with open dumping.

## **OPERATIONS**

### **WINDROW AND TURN SYSTEM**

R.W. Beck is recommending that the Nicholson Township composting facility be operated using a windrow-and-turn system. The windrow-and-turn technology involves placing yard waste into moderate-sized windrows and regularly turning materials, allowing more air to penetrate the interior of the piles. It is possible to produce finished compost in 16 to 18 months with this method. Adjusting moisture content, turning piles more frequently, and/or shredding the yard waste prior to composting can further accelerate the composting rate. Windrows should be combined as necessary to maintain sufficient volume to guarantee microbial activity that generates decomposition throughout the composting process. Slight odors may be produced early in the windrow-and-turn composting cycle, but are usually not detectable more than a few yards away from the windrows.

In a windrow-and-turn system, composting begins in the fall with the influx of leaves. After 10 to 11 months of active composting, the material can be moved to form large piles in designated storage areas, freeing the processing area to accept new loads of collected leaves for composting. In these larger piles, sometimes referred to as “curing” piles, the compost will further stabilize until decomposition is complete.

If grass and leaves will be composted together, this mid-level technology is most successfully initiated with a fall program start-up so that a sufficient supply of high-carbon leaves are available to mix with nitrogen-rich grass clippings collected in the spring and summer months. The ratio of grass to leaves cannot exceed one part grass to three parts leaves, which helps to avoid problems resulting from too much nitrogen.

### **RECEIVING**

Incoming loads, unless they are exceptionally clean, should be directed to receiving or staging area to be de-bagged, shredded, and/or inspected and screened for obvious contaminants. It is critical that yard waste be debagged before it is incorporated into the windrow. Therefore, R.W. Beck recommends that the facility include signage that instructs residents to de-bag the yard waste and that receptacles be provided for residents to discard bags.

### **STAGING**

Because leaves and yard waste will be delivered in a variety of collection vehicles, size and compaction will not be uniform. Windrows formed from compacted leaves may need to be fluffed to ensure airflow in the piles. Leaves and grass clippings that will be composted together should be combined in a rate of three parts leaves to one part grass, and formed into windrows. The mixing should be done within one day of receiving the grass clippings at the site.

If yard waste is received is mixed with brush, it is recommended that the material be chipped or shredded prior to windrow application. For some applications, the resulting coarse compost mixed with wood waste may be acceptable. For other applications, however, it may be necessary to screen out wood chips. Mixed loads of grass and leaves should not be shredded prior to windrow formation, as grass clippings may clog screens in the shredding equipment.

## **WINDROW FORMATION AND MANAGEMENT**

### Moisture

Sufficient moisture is critical for efficient composting, and water levels should be adjusted in the windrows throughout the composting process. Leaf waste should be wetted prior to or during the windrow formation to ensure moisture levels of about 50 percent. Moisture content of the windrow can be monitored by: (1) the squeeze test; (2) by weighing a half-cup sample of the material as it is taken from the windrow, then oven-drying it at 220°F for eight hours and weighing it again. The difference between the wet and dry weights yields the moisture content; or (3) using a forage moisture meter.

To correct for moisture imbalances during composting, windrows can be turned on rainy days or watered during the turning process. Adding moisture during the turning process allows material from the windrow center, as well as exterior, to be moistened. Adding water to only the outside of the pile can result in run-off, a dry windrow center, and uneven decomposition.

Windrows can be shaped to maximize or minimize water absorption. Scooping out a trough on the top of the windrow creates a concave shape that helps retain precipitation during dry conditions. The windrow can also be shaped in a peak, which helps the pile shed excess water during periods of prolonged rainfall.

### Windrow Turning

Windrows must be turned so that materials in the center of the pile are exchanged with those outside to fluff yard wastes and promote airflow through the windrows. In addition, turning windrows releases heat from the center of the pile, which can help control the temperature of the composting material.

For efficient composting, the first turning should take place one to two weeks after the initial windrow formation. In about 1-month, the windrows will be reduced to about half their original size. At this point, two windrows can be combined to form a single windrow. Windrows formed entirely of leaves may be left alone until spring after the initial turning. Turning windrows during severe cold may decrease the decomposition rate. During the spring, a more frequent turning schedule should be resumed since the addition of grass clippings into leaf windrows will require more frequent turning of piles to prevent odors.

To turn the windrows using a front-end loader, windrows should be turned with a scoop-by-scoop method. In this method, the loader bucket scoops up yard waste, is raised as high as possible, and tilts so that the material drops through the air.

This action incorporates air, breaks up clumps of material, and insures that the interior and exterior parts of the windrow are adequately mixed.

### Temperature

Windrow temperature can be monitored with a long-stemmed (three- to four-foot), dial-type thermometer. The thermometer should have a range of 0 to 200°F, a three- to five-inch diameter dial, and an adjustable calibration screw. Ideally, temperature readings should be taken along every 75-foot section of the windrow at least once to twice a week. Temperatures should be kept in the 100 – 140°F ranges. Higher temperatures may kill off necessary microbial activity, “sanitizing” the pile. The pile will consequently cool off, delaying the decomposition process. Lower readings signal a decrease in microbial activity due to either a lack of oxygen or a moisture imbalance. In either case, turning is required to provide oxygen or reduce moisture.

### pH

Because decomposition takes place most efficiently in a neutral pH range (pH 6-8), the pH of the compost should be monitored periodically. Excessive acidity can slow decomposition, but usually can be rectified by turning. In more extreme cases, it may be necessary to add lime to the pile. Conversely, excess alkalinity can cause the release of offensive odors, such as ammonia gas. Testing pH can be done on-site with a soil pH testing kit.

### **FINISHING/STORAGE**

As the composting process proceeds, windrows will decrease in size and the yard wastes will begin to resemble soil, indicating that the composting process is nearing completion. To confirm that the process is complete, the pile can be turned and the internal temperature monitored. If the pile re-heats, the materials are not stable enough to use as finished compost. An alternative method involves sealing a sample of compost in a plastic bag for 24 to 48 hours. If significant odors are noted when the bag is opened, the product is not stable.

When the material appears to have ceased composting, it can be moved into curing piles in the storage area, creating space for incoming yard wastes. Composted materials should remain in the curing piles for at least 45 days to allow for final stabilization. Screening of finished material is optional, but the Township may want to consider screening to remove brush fragments and improve the quality of the product.

### **MATERIAL DISTRIBUTION**

The Township intends to use the finished compost for its own applications, return it to participating municipalities for their own uses, and make it available to County residents. R.W. Beck recommends that, at least initially, the Township not sell the compost because of Pennsylvania’s regulations that any products sold in the Commonwealth as fertilizers or soil conditioners must be registered with the Pennsylvania Department of Agriculture, and operators must obtain a license to

produce these products. The Department of Agriculture has requirements for chemical/nutrient composition, and the Township would have to allocate additional funding and labor to meet to produce compost that meets these standards.

It is also recommended that the Township develop a plan for distributing compost that addresses issues such as:

- Determining if the compost will be made available to both residents and business;
- How restrictions on who can receive the compost, if instituted, will be enforced;
- Limits on how much compost a single resident can receive at one time;
- Limits on the total amount of compost a single resident can receive throughout the year;
- How limits, if established, will be monitored and enforced; and,
- Language to assure that the Township is not liable for compost that causes damage to plants and/trees.

## EQUIPMENT

Based on an assessment of the equipment Fayette County already possesses and R.W. Beck's recommendation for the facility to be operated using a windrow-and-turn technology, the Township will most likely need to purchase the following equipment. A brief description of the type of equipment that will be required, as well as approximate prices, is included. Specific equipment vendors are provided in Attachment A.

## COLLECTION

It is not the intention of Fayette County to purchase equipment to collect residential yard waste at the curb. However, a significant amount of leaves, grass and brush accumulates in the roadside ravines located throughout the Township, which impairs stormwater management. To address this situation, R.W. Beck recommends that the Township purchase a Catch Basin cleaner to collect this debris and deliver it to the facility.

<b>Equipment</b>	<b>Cost Range</b>	<b>Capacity</b>	<b>Labor Requirements</b>	<b>Comments</b>
Catch Basin Cleaner	\$100,000 - \$130,000	8 yd <sup>3</sup> – 16 yd <sup>3</sup>	1 Driver 1 Vacuumer 1 Raker	Storage unit does not allow for airflow exit making storage capacity minimal. High capacity and operating

				costs.
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## OPERATIONS

A front-end loader is available for turning the windrows. However, it is recommended that the equipment indicated on the chart on the following page be purchased to optimize the facility operations, as well as and improve the composting process and product.

## EDUCATION

Another component of the yard waste composting facility is an education program that includes the following components:

- Raising awareness of the composting site;
- Educating residents on how to use the site; and
- Promoting home composting and “Grasscycling.”

Equipment	Cost Range	Capacity Range	Comments
Chippers and Shredders	\$15,000 - \$100,000	20 yd <sup>3</sup> – 200 yd <sup>3</sup> /hr	Includes both Shear Shredders and Hammermills.  Loader may be needed to feed hopper.
Tub Grinders	\$50,000 - \$150,000	10 tons – 50 tons/hr	Loader and/or knuckle boom may be needed to feed hopper.
Screens	\$60,000 - \$150,000	10 tons – 50 tons/hr	Loader and/or knuckle boom may be needed to feed hopper
Thermometers			
<ul style="list-style-type: none"> <li>• Analog</li> <li>• Digital</li> </ul>	\$50 - \$150  \$300 - \$750		Stem needs to be 3 to 4 feet long. Temperature range should be 0 <sup>o</sup> to 200 <sup>o</sup> F

## PUBLIC AWARENESS

At least two months prior to the opening of the site, the Township should begin informing the municipalities and residents of its imminent opening. It is recommended that the Township schedule presentations at various public meetings and community organizations.

At least one month prior to the opening of the facility, the Township should distribute a press release to all local media and civic newsletters announcing the opening of the site, site hours, and rules for using the site. The Township may



want to include a map to the site and a photograph of a compost site to educate residents about the location of the compost site and its appearance.

Finally, the Township may want to have a kick-off day when the site is opened. This kick-off day may include a ribbon cutting ceremony with elected officials and possible classes on home composting. If the Township opts to have a kick-off day, information about the day should be included in the above-mentioned press release.

## **SITE USAGE**

Residents become extremely agitated if they bring material to a composting site but are turned away because it is too large or does not meet the definition of yard waste. Therefore, it is recommended that the Township use the funding that is available for Section 902 recycling grant to produce appropriate materials that list the rules for using the site, as well as hours of operation. Materials that are permanent and that can be easily posted at home are preferred. The materials could be distributed with bills or other mailings that go to County residents, such as utility or tax inserts, or at public events, such as the Township fair.

The materials could also be distributed through cooperation with the following:

- Local businesses
- Schools
- 4-H Clubs
- Garden Clubs
- League of Women Voters
- Libraries
- Other Environmental organizations.

Additionally, the Township may want to purchase an advertisement in the newspaper that promotes the yard waste composting facility, and lists the hours of operation. Finally, the Township may want to establish a yard waste hotline that is answered by a prerecorded message. The hotline would provide information on the site, and provide an opportunity for residents to leave a message if they have a question.

## **HOME COMPOSTING AND “GRASSCYCLING”**

Although delivering yard waste to compost site is preferable to landfill disposal, home composting and “grasscycling” are still the preferred methods of managing yard waste. Therefore, the composting facility should be used to continually educate residents about these two methods of yard waste management. To accomplish this, materials on home composting and “grasscycling” could be distributed to site users. Additionally, the Township could partner with the Cooperative Extension to offer Master Composting training classes at the site,

possibly with a component for distributing composting bins to participants. Home composting containers are eligible for funding under Section 902 recycling program grants. Finally the Township should consider tours to students/schools, and possibly other groups.

It is also recommended that the Township develop a logo and/or slogan for the composting program that gives the program a publicly recognizable identity. This could involve public participation by making it a contest for either students or for all County residents.

## **BUDGET AND FINANCE**

The budget for the Fayette County Composting Facility should be kept separate. This is necessary for the Township to know and understand the actual costs and revenues associated with this part of its operations. The Municipal Yard Waste Composting manual contains budget worksheets that provide a basis for the Township's budgeting.

While the Township is using Section 902 recycling program grant funds for site development and equipment, it should consider options for funding operating and future equipment needs. Operational costs must be borne by the Authority because they are not eligible for grant funding, and there are uncertainties as to the future of grant funding for site modifications and equipment replacement. The easiest funding mechanism to administer is a tipping fee for materials deposited at the site. It is recommended that this be set by weight, and limited to commercial users since a fee would most likely discourage residential users. If the Township implements a weight-based fee, scales would need to be purchased. If a fee did need to be assessed on residential users, the Township may want to conduct a survey to identify a publicly acceptable fee.

## **CONCLUSIONS**

- The site currently under consideration for use as a compost site is of adequate size to manage the amount of material estimated to be delivered to the site.
- The site appears to meet the specifications contained in the DEP Guidelines for Yard Waste Composting Facilities.
- The proximity to an occupied dwelling will probably require a waiver from the occupant, and the site will need to be managed to avoid offensive odors or other problems that might affect the occupants of this dwelling.
- The Township/County has significant accumulations of leaves and brush in roadside ravines and catch basins that impairs stormwater runoff.
- Materials delivered to the composting site can easily be managed with a windrow-and-turn technology, using a front end loader for turning.

- Time required to manage the composting process and the potential for offensive odors will be greater if grass is included in the mix, though grass will speed the composting process and improve the quality of the finished product.
- The Township/County will need to purchase additional equipment to manage the site properly.
- Public education will be an important tool in helping to ensure proper use of the site by county residents.
- A separate budget should be developed to ensure the Township/County understands the costs associated with starting up and operating the site.

## RECOMMENDATIONS

- The Township should approach the occupants of the dwelling on the adjoining property to inform them of the Township's plans and request that a waiver on the 300-foot horizontal distance between the operation and the dwelling be granted.
- The Township should have a DEP regional representative visit the site if this has not been done. If the initial response is positive, the Township should submit the completed Yard Waste Facility Application Form and a Section 902 grant application for site development and purchase of equipment.
- Assuming the Section 902 grant is approved, the Township should develop the site as described in this report and on the application form and proceed to advertise for and purchase the necessary equipment, including a chipper, shredder or tub grinder, screens, and thermometer.
- The Township should include a catch basin cleaner in its grant application to address the problems associated with accumulation of leaves and brush along roadsides throughout the Township.
- The Township/County should develop a comprehensive public education program that makes County residents aware of the site and rules for its use, and educates residents about home composting and grasscycling as preferred methods of managing yard waste.
- The Township/County should develop a budget that clearly delineates actual costs and revenues associated with the site. A tipping fee should be established for deposit of all materials with the exception of material delivered by individuals.

Implementing the recommendations above would ensure the site's compliance with DEP guidelines and should help the Township to operate a more efficient and fiscally sound site.

Sincerely,

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Karen Luken  
Ohio Office Director

cc: Kathleen Kilbane, SWANA  
Carl Hursh, DEP  
Debbie Miller, R.W. Beck

**ATTACHMENT A  
YARDWASTE COLLECTION AND PROCESSING  
EQUIPMENT VENDOR LIST**

**LEAF VACUUMS**

Old Dominion Brush Company  
5118 Glen Alden Drive  
Richmond, VA 23231  
1-800-446-9823  
Contact: Tim Brizzolara  
Notes: Will be sending you a catalogue

American Road Machinery  
401 Bridge Street  
Minerva, Ohio 44657  
1-330-868-7724  
Contact: Bill Davidson  
Notes: Will be sending you information and also the name of a local dealer, A&H  
Equipment in Bridgeville.

**CATCH BASIN CLEANERS**

American Road Machinery  
401 Bridge Street  
Minerva, Ohio 44657  
1-330-868-7724  
Contact: Bill Davidson  
Notes: Will be sending you information and also the name of a local dealer, A&H  
Equipment, in Bridgeville.

**TUB GRINDERS/CHIPPERS**

Diamond Z Mfg.  
1102 Franklin Blvd.  
Nampa, ID 83687  
1-208-467-6229  
Contact: Paul Sintaron  
Notes: Will be sending you information.

Arasmith Machinery Corp.  
P.O. Box 2458  
Rome, GA 30747-2458  
1-706-235-8576  
Contact: Mr. Dana Leguin  
Notes: Will be sending you information

## **DURATECH**

P.O. Box 1940  
Jamestown, N.D. 58402-1940  
701-252-4601  
Contact: Keith Hermanson  
Notes: Will send you information, a video and the name of a local dealer

## **SCREEENS**

Diamond Z Mfg.  
1102 Franklin Blvd.  
Nampa, ID 83687  
1-208-467-6229  
Contact: Paul Sintaron  
Notes: Will be sending you information.

## **DURATECH**

P.O. Box 1940  
Jamestown, N.D. 58402-1940  
701-252-4601  
Contact: Keith Hermanson  
Notes: Will send you information, a video and the name of a local dealer

Powerscreen of America  
11001 Electron Drive  
Louisville, KY 40299  
1-412-531-5647  
Contact: Ed McCrakin

## **THERMOMETERS**

Reotemp Instrument  
11568 Sorrento Valley Road # 10  
San Diego, CA 92121  
1-800-648-7737  
Notes: Will be sending you information

## **MOISTURE METERS**

Reotemp Instrument  
11568 Sorrento Valley Road # 10  
San Diego, CA 92121  
1-800-648-7737  
Notes: Will be sending you information