



**NC Department of Environmental Quality  
Division of Waste Management  
Solid Waste Section**

# **Compost Pilots and Demos**

**Guidelines for the Application Process**

**October 2017**

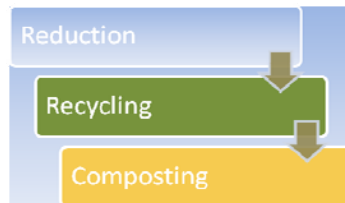


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<https://deq.nc.gov/about/divisions/waste-management/solid-waste-section>

## Compost Pilots & Demos: Guidelines for the Application Process

North Carolina's solid waste policy reflects the state's desire to reduce, reuse and recycle before turning to disposal as a management option for solid waste. To that end, the NC Legislature established a hierarchy of preferred alternatives to using landfills. The first option, after reduction, reuse and recycling, is composting.



The Solid Waste Section (Section) wants to encourage people and organizations to try composting. Our staff is committed to assisting applicants and we have streamlined the permit application process for pilot and demonstration projects. In some cases, construction and siting requirements can be relaxed.

Pilot and demonstration projects help us all learn more about the different ways composting can be used to reduce the amount of solid waste in our landfills.

### What Is Composting?

Composting is a managed aerobic (oxygen requiring) process that uses naturally occurring bacteria and fungi at thermophillic temperatures to break down raw organic materials. Temperatures above 110° F are usually referred to as thermophillic and temperatures below 110° F are usually referred to as mesophillic. For most facilities, the temperature of the compost being processed must reach and maintain minimum 131° F for a certain time in accordance with state rules. The result is a relatively stable, humus-like product that can be used as mulch, to improve soil conditions, or to provide plant nutrients.

### What Can be Composted?

Some of the more common wastes that can be composted include:

- Yard waste and other clean wood waste
- Mixed paper
- Food wastes
- Agricultural processing wastes
- Animal manure

### The Application – General Info

Demonstration applications are considered for the following:

- First time compost facility operators
- Type 2 and 3 facility operations, that can receive waste as listed above
- Compost area size of 2 acres or less. This is the combined areas for feedstock storage, mixing, composting, and curing

Demonstration approvals normally last six months to a year, depending on the wastes managed, the composting methods used, and the location. Extensions may be granted in some cases. Approvals can be revoked if projects are managed poorly or if the operation requirements are not followed. Poor management can cause odors, vectors, and potential ground or surface water quality problems.

Applicants must supply the Section with certain basic information about the proposed project to receive pilot or demonstration approval. Staff members are available to assist you with completing your application. A Section staff member will also visit the proposed site to determine if the area meets the Compost Rules' siting requirements.

Other waste management methods that are similar to composting, such as proposals for anaerobic digestion and vermicomposting, will also be considered for approval. The information required in an application and the monitoring requirements may vary depending on the method or methods you choose.

Application requirements for pilot or demonstration projects are found in Section .1409(b) of the Compost Rules. The composting rules can be viewed and downloaded online at:

<https://deq.nc.gov/about/divisions/waste-management/solid-waste-section/composting>.

After completing the demonstration project, an application for a compost permit must be submitted to continue the composting operation. If you have questions, the Section can be reached at 919-707-8200.

## **CONTENTS OF THE COMPOST DEMO APPLICATION**

### **Purpose of the Demonstration**

The application should include your reasons for wanting to conduct the project. Your reasons may be broad, such as wanting to reduce the amount of waste being land filled, to avoid tipping fees for certain wastes, or to explore the economics of composting. Producing compost for use in agricultural or horticultural operations could also be a reason.

### **Who Is Involved**

Each application must include the name, address and phone number of the owner and, when different, the operator of the proposed facility. The facility operators are responsible for facility operations and serve as record keepers for project data. They also serve as the Section's primary contact.

When the property owner is different than the facility owner or facility operator, the application must include the landowner's name, address and phone number. The landowner must also sign and have notarized a statement approving the proposed project on their land.

### **Location**

The site location for the proposed facility must be provided, along with driving directions from the nearest obvious landmark or intersection. You must include a county road map with the site marked and an aerial photograph of the proposed site. In some cases, a Federal Emergency Management Act (FEMA) map showing the 100-year flood hazard area will be required.

Aerial photographs must have a scale of 1 inch = 400 feet or less and must show the area around the proposed facility for a distance of at least 1/4 mile (approximately 4 inches on a 1 inch = 400 feet scale photograph). Aerial photographs are available from most county tax or planning offices.

Section staff will visit the site to determine if the proposed location is acceptable.

## **Ingredients**

Each proposed waste to be managed must be listed. The list should include all materials considered, including bulking materials such as wood chips. Any other materials being considered, either for the compost blend or as an addition to the final product, such as gypsum or ash, must also be listed. For each waste listed, estimate the volume you anticipate working with over the life of the project. Carbon sources are known as “brown ingredients” and nitrogen sources are known as “green ingredients.” There should be a higher ratio of carbon (brown) to nitrogen (green) in the compost mixture.

## **Feedstock Testing**

Testing is recommended on the materials you propose to manage before you start composting, to determine the ratio of carbon to nitrogen (C: N) in the wastes. The C:N ratio is used to determine the percentages of specific materials that are blended together to be composted.

An NC Department of Agriculture and Consumer Services (NCDA&CS) waste analysis can test for C:N ratio, and other nutrients. Call 919.733.2655 or visit the NCDA&CS web site at <http://www.ncagr.gov/agronomi/uyrwaste.htm> for information. Your county’s NC Cooperative Extension Service office should be able to help you complete the forms and submit the samples.

There are also online resources for generalized C:N ratios, and compost recipe calculators.

## **The Schedule**

You must propose a length of time for your project. If you request more than 12 months, provide a detailed explanation of why this amount of time is needed. After you begin your project, initial time periods can be extended up to an additional 12 months if adequate justification is provided. The anticipated length of time for the compost process must also be given. The clock begins when the materials are blended and stops when the compost has reached the desired maturity level.

## **Methodology**

Explain in detail the specific compost process you plan to use. Windrows or aerated bins are some examples. If you want to try more than one composting method, discuss each method in detail. If you plan to use different methods in a sequence, explain every method in the order in which it will be used.

Construction information for each method is also required. For windrow systems, include the surface area to be used for windrows and the dimensions of the individual windrows. Windrow dimensions would include height, length and width at the base of the windrow. For bins, include the number you propose to use, bin dimensions and construction materials. If you plan to use any self-contained or pre-constructed units, include the manufacturers’ specifications.

## **Aeration**

Describe the method you will use to aerate for each composting method. For windrows, describe the size of front-end loader or your other turning equipment. For aerated bins, describe the type of air distribution system you plan to use and the size of the system’s components. Also include the dimensions of the aeration holes and the distance between them. For pipes, include the number proposed for use and the dimensions for each different size. If fans are used, include the capacity for each in cubic feet per second or per minute.

## **Blending**

Describe the blending methods you plan to use. Include the initial proportions of the wastes you plan to compost (these figures can be estimates). For example, if you plan to compost food waste and mixed paper with ground yard waste, explain how you plan to blend the materials to avoid:

- 1) Mixed paper on windrow exteriors that could blow away;
- 2) Food waste on windrow exteriors that would create odors and attracts flies or other animals;
- 3) Food wastes and paper matting in such a way as to restrict airflow.

If any of the materials you plan to manage will be or could be wet, give a detailed explanation of the steps you will take to contain the liquid. For composting purposes, “wet” is defined as the state where your composting material contains unabsorbed water. Please see the section on Leachate if this is a problem.

## **Monitoring**

Monitoring must include temperatures to determine if vector and pathogen reduction requirements are met and should include moisture content data. Depending on the composting method and the equipment available, you may want to monitor oxygen or carbon dioxide levels as well.

Compost temperatures must be maintained at elevated levels for a minimum number of days dependent upon the composting system in place. The specific temperature requirements for each system are given in .1406(10), (11), and (12) of the Compost Rules.

The rules require you to record every temperature taken, without using averages, to demonstrate that you are meeting temperature requirements. The application should explain the methods used to measure and record each temperature taken. Details should include the thermometer (type and size) and the time period between readings. Include the physical distance between readings and the depth at which they are taken.

The standards vary for bins and windrows, so be sure the data collection system you plan complies with your system’s requirements. Windrows, for example, typically require temperatures be taken approximately every 25 feet, and, ideally, at varying depths. Temperatures should not be taken at depths less than six to eight inches.

If moisture content, oxygen or carbon dioxide levels are monitored, explain the method you will use for each. Moisture measurement can be taken quite simply by squeezing a handful of the compost-in-progress. When unabsorbed water can be squeezed out, for example, there is too much moisture. If the handful of compost refuses to form a ball, it is too dry. If the compost forms a ball in your hand with no water escaping through your fingers, it is within the acceptable moisture levels. For optimal composting rates, moisture, oxygen, and carbon dioxide must be maintained at proper levels. See image below as an example:

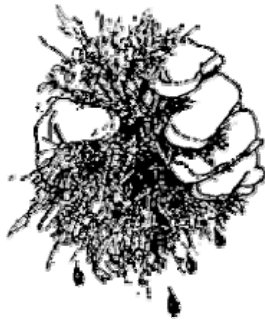


Photo courtesy of Arizona Co-operative Extension and The University of Arizona  
<http://ag.arizona.edu/pubs/garden/mg/soils/improving.html>

## **Leachate**

Leachate is not always a significant problem. However, composting wet materials or heavy rain can create a problem quickly. To avoid leachate problems, your compost materials should be mixed or layered in proper proportions of wet and dry materials. The optimum moisture content should be 55 to 60 percent. Windrows should be laid out along a slope, to prevent water from standing between them.

Some proposed compost operations may be required to submit plans for leachate management. Plans for soil erosion and runoff control may also be required, or you may need to apply for a discharge permit. The project's size and facility design, the type of waste you manage, your handling methods and your composting system will determine if these plans are necessary.

## **On-Site Storage**

You may need to store waste materials on-site before they are composted. Storage is usually an issue only if large quantities of material are involved or if the materials have a potentially foul smell or high moisture content. The primary concern is that adequate space is available and that your stockpiles are stored in such a manner that they do not start to compost, attract insects or other animals, create odors or result in leachate formation.

## **End Product Testing**

A representative sample of the compost must be collected and tested before distributing the finished product. After the first batch is complete, you will need to run additional tests every 6 months or 20,000 tons. Describe the tests you plan to perform in your application, following Rules .1407 and .1408.

Testing for fecal coliform is usually the most affordable test for pathogens. There are several labs in North Carolina that can run the tests for you. When collecting your samples, clean equipment should be used for every sample, the samples should be kept cool, and they should be delivered to the lab quickly to ensure accurate results.

You can determine foreign matter content on site. This is a measure of how much trash -- such as plastic, metal, and glass --exists in the final compost product. Manual separation is the method used to determine the percentage of foreign matter. For specific information, refer to section .1408(a) (5) in the compost rules.

A list of labs that can analyze for required metals and pathogens is on our website.

## **Record Keeping**

In the application, provide an outline of the records you plan to keep. Record keeping requirements are outlined in Section .1408 (b) of the Compost Rules and reporting requirements are in Section .1408 (c).

All compost operations should keep detailed records, but pilot or demonstration projects should be especially diligent. Without detailed records of blends and monitoring, it is almost impossible to keep up with what worked, what worked better and what did not work at all. Facility operators may also want to track composting time and man-hours to help determine the project's cost effectiveness.

## **Product Use and Distribution**

Compost can be used in a variety of ways, and it is important that the Section knows how your final product will be used. In some cases, the final planned use can affect what levels of pathogens or contaminants will be allowed. This section of your application must show that you have given careful consideration to how the compost is used. Your final product must be marketed or disposed of appropriately. Compost is not allowed to pile up indefinitely while operators continue to accept waste.

The Section's Compost Rules require that compost distributed to the public, or used in areas where there may be public contact, meet EPA's "Process to Further Reduce Pathogens" (PFRP) standard. That standard for fecal coliform is less than 1,000 most probable number (mpn) per gram.

## **End of Project Report**

The final element of your application is an outline of your end of project report. This report must be submitted to the Section with the following details:

- 1) The amount and type of materials received in tons;
- 2) The amount of compost produced in tons;
- 3) The amount of compost distributed in tons;
- 4) Copies of all test results;
- 5) Monitoring records; and
- 6) A narrative explanation of why the project was a success or failure.

The Section recognizes that some of the information required for your application will be estimates. Report data, however, must be quite specific. One of the project's purposes is for the applicant to have time to experiment with composting methods, blending methods or recipes. The process is intended to be a learning experience for each pilot operator.

# Demo Application Checklist

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\*Disclaimer: This is a condensed outline of the items needed to complete an application, and is not intended to be an all-inclusive list as each application may require additional documents.

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## **Application Must Include:**

### **Purpose of the Demonstration**

- ☐ Reason for requesting the demo approval

### **Who is Involved:**

- ☐ Name, address, phone number, and email address of the compost facility owner
- ☐ The operation's contact person - same information as above
- ☐ If the land owner is different than the owner/operator, include:
  - ☐ Landowners name, address, phone number, and email address.
  - ☐ Notarized statement from the landowner approving the facility

### **Location:**

- ☐ Site location for the proposed facility
- ☐ Driving directions listed from the nearest obvious landmark or intersection
- ☐ County roadmap with the site marked
- ☐ Aerial photograph of the proposed site
  - ☐ Must have a scale of 1inch=400 feet or less
  - ☐ Composting areas drawn onto the map
  - ☐ Composting areas combined must be 2 acres or less
  - ☐ Must show the area around the proposed facility for at least 1/4 mile
- ☐ If the property potentially contains floodplains, a FEMA map showing the 100-year flood hazard area.

**Note:** Section staff will visit the site to determine if the proposed location is acceptable.

### **Ingredients:**

- ☐ Each proposed waste to be managed
- ☐ For each waste listed, estimated volume for the life of the project

### **Schedule:**

- ☐ Propose a length of time for your project. If you request more than 12 months, include a detailed explanation of why this amount of time is needed
- ☐ Anticipated length of time for the compost process

**Note:** The compost process begins when the materials are blended and stops when the compost has reached desired maturity level

### **Methodology:**

- ☐ Explain in detail the specific compost method you plan to use
- ☐ If using more than one method, discuss each in detail. If you are using different methods in sequence, explain the methods in the order in which it will be used.
- ☐ Include construction information.

### **Aeration:**

- ☐ Describe the aeration method, and dimensions, as applicable
- ☐ For forced aeration, include the dimensions of the aeration holes and the distance between them.



**Blending:**

- ☐ Describe blending methods you plan to use
- ☐ Include initial proportions of the wastes, and any testing or recipe calculations
- ☐ For wet materials, explain how liquid will be contained

**Monitoring:**

- ☐ Describe temperature monitoring to meet rule requirements
  - ☐ Windrow Method
    - ☐ A temperature of 131°F or greater shall be maintained in the windrow for at least 15 days.
    - ☐ During the high temperature period (131°F +), the windrows must be turned at least 5 times.
    - ☐ This process meets the requirements for pathogen and vector attraction reduction.
  - ☐ Static Aerated Pile
    - ☐ The temperature of the compost pile shall be maintained at 131 °F or greater for at least three days.
    - ☐ To meet the criteria for vector attraction reduction, the compost shall be maintained at a temperature of above 104 °F for 14 days or longer with an average temperature of 113°F.
  - ☐ Within Vessel Composting Method
    - ☐ The temperature in the compost pile should be maintained at a minimum of 131°F for at least 3 days.
    - ☐ To meet the criteria for vector attraction reduction, the compost shall be maintained at a temperature of above 104 °F for 14 days or longer with an average temperature of 113°F.
- ☐ Explain methods used to measure and record each temperature taken.
  - ☐ Type and size of thermometer
  - ☐ Time period between readings
  - ☐ Physical distance between readings
  - ☐ Depth at which they are taken
- ☐ Moisture Content Data

**Note:** For vermicomposting, there are no time and temperature requirements

**Leachate:**

- ☐ For sites that receive liquid waste, or wet waste,
  - ☐ Address how the compost will be mixed/layered
  - ☐ Submit plans for leachate management.
  - ☐ Submit plans for soil erosion and runoff control.

**On-Site Storage:**

- ☐ Address plans to store feedstocks before composting

**Product Testing:**

- ☐ Describe sample collection for testing
- ☐ Describe how and where the samples will be submitted for testing, and the testing methods (metals and pathogens)
- ☐ Describe submitting results to the Section before distributing final compost
- ☐ Describe additional testing every 6 months or 20,000 tons
- ☐ Determine testing for foreign matter content

**Record Keeping:**

- ☐ Discuss the records you plan to keep

**End of Year Project Report:**

- ☐ Describe the report that will be submitted at the end of the project, to include:
  - ☐ Amount and type of materials received in tons
  - ☐ Amount of compost produced in tons
  - ☐ Amount of compost distributed in tons
  - ☐ Copies of all test results
  - ☐ Monitoring records
  - ☐ Narrative explanation of why the project was a success/failure

**Contact List**

NC DEQ-Solid Waste Section	<b>919-707-8200</b>
North Carolina Department of Agriculture & Consumer Services	<b>919-733-2655</b>