

Compost Pilots and Demos

Guidelines for the Application Process

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**Division of Waste Management
Solid Waste Section
Composting and Land Application Branch
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<http://portal.ncdenr.org/web/wm/sw/compost>

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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 Division of Waste Management wants to encourage people and organizations to try composting. Our staff is committed to working closely with 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. So read on to learn more about the process and give us a call. We stand ready to assist you in getting your project started.

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 110⁰ F are usually referred to as thermophillic and temperatures below 110⁰ F are usually referred to as mesophillic. For most facilities, the temperature of the compost being processed must reach and maintain 131⁰ F+ for a certain time period in accordance with state rules. The end result is a relatively stable, humus-like product that can be used as mulch, to improve soil conditions, or to provide plant nutrients. NC Solid Waste Management Rules require a permit from the Solid Waste Section to operate a facility that composts solid wastes. The Solid Waste Section is part of the North Carolina Division of Waste Management. To obtain your permit, contact the Solid Waste Section at 919-707-8200.

What Can be Composted?

Solid wastes that can be composted include:

- Yard waste
- Mixed paper
- Food wastes
- Agricultural processing wastes
- Wastewater treatment plant residuals and animal manure are not considered solid wastes, but may be managed at a solid waste compost facility.

The Application

Application requirements for pilot or demonstration projects are found in Section .1409(b) of the Solid Waste Compost Rules. For a copy of the rules, call 919-707-8200. The composting rules may also be found at <http://portal.ncdenr.org/web/wm/sw/rules/rulelist> under SECTION .1400.

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.

Getting Approval

Applicants must supply the Solid Waste 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 must also visit the proposed site to determine if the area meets the Solid Waste Compost Rules' siting requirements.

Be sure to 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. Demonstration projects may also qualify as tests of whether specific compost systems qualify for alternate setbacks.

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. The application must include the following information:

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. Be sure to include all the information needed to stay in touch with this individual.

When the property owner is a different person 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 ¼th mile (approximately 4 inches on a 1 inch = 400 feet scale photograph). Aerial photographs are available from most county tax or planning offices.

Solid Waste 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.

Testing

Testing may be required on the materials you propose to manage before you start composting. Most materials should be tested to determine the ratio of carbon to nitrogen (C: N) in the waste. 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 is usually sufficient. Be sure to request every test the NCDA&CS lab can run, including heavy metals and foreign matter. The forms you will need for these tests are available at your county's NC Cooperative Extension Service office. Extension staff can help you complete the forms and submit the samples. Call 919.733.2655 or visit the NCDA&CS web site at <http://www.ncagr.gov/agronomi/uyrwaste.htm> for more information on the lab tests they run.

The Section decides, on a case-by-case basis, which wastes should be further tested to rule out the presence of regulated metals and potentially harmful chemicals. Normally, these tests are not required unless the Section has reason to suspect their presence or if the chemical origin of the material is unknown. If you test before you compost, you may reduce or eliminate the need for some tests that might be required for the final compost product.

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 windrow turner. For aerated bins, describe the type of air distribution system you plan to use and the size of the system's components. Be sure to 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. Be sure to 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 Solid Waste 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. Be sure to 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 and gases must be maintained at proper levels. See image below as an example:

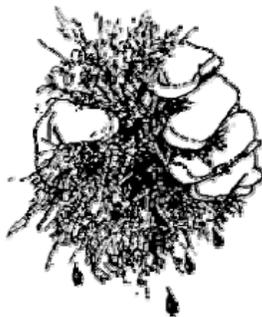


Photo courtesy of Arizona Co-operative Extension and The University of Arizona
<http://ag.arizona.edu/pubs/garden/mg/soils/improving.html>

Leachate

Leachate is not always a significant problem. However, composting wet materials or heavy rain can create a problem quickly. To avoid leachate problems, be sure to mix or layer your compost materials in proper proportions of wet and dry materials. The optimum moisture content should be 55 to

60 percent. Windrows should be laid out to prevent water from standing between them, which can cause excessive wetness.

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

Before you distribute your product, you must test it. Tests are usually required before the first batch can be used. A representative sample of the compost should 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. If process time, aeration, and temperature requirements are not met, more frequent testing may be required. Describe the tests you plan to perform in your application. Usually, an NCDA&CS waste analysis, an analysis for pathogens, and a test for foreign matter is sufficient.

Testing for fecal coliform is the simplest and usually most affordable test for pathogens. There are a number of labs in North Carolina that can run the tests for you. When you collect your samples, be sure to use clean equipment for every sample, keep the samples cool and deliver them to the lab quickly to ensure accurate results. If unusual pathogens are suspected, however, additional tests for that specific pathogen could be required.

You can usually 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 more specific information, you may reference section .1408(a) (5) in your copy of the compost rules.

Usually, the NCDA&CS waste analysis will provide the required chemical analysis of your compost. Remember to ask for all the parameters that the lab can provide. In addition to being required for the final product approval, the tests can provide valuable information about the best use for your compost.

The materials you choose to compost will determine if any additional tests are needed. Typically, these are cases where a waste analysis test has shown significant levels of regulated metals or something about the process generating the waste indicates that potentially harmful chemicals may be present. NCDA&CS labs cannot run these tests, so you will need to hire a private lab. If you plan to manage wastewater treatment plant residuals (also known as sludge or biosolids), you must report the total metal level numbers for all regulated metals and meet the requirements of federal regulations (40 CFR 503). The acceptable metal concentrations can be found in .1407(a)(b) Tables 1 and 2.

Record Keeping

Provide an outline of the records you plan to keep in your application. At the very least, you must satisfy reporting requirements, but you may want to go further. Record keeping requirements are outlined in Section .1408(b) of the Solid Waste Compost Rules and reporting requirements are covered later in the document.

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

Compost can be used in a variety of ways, so 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.

EPA Standards

The Section's Compost Rules require that compost 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. If your method is not EPA approved, you must test each batch of compost to demonstrate to the Section that your final product meets EPA standards. An alternative to repeated testing is to contact the EPA directly to gain approval for your process. The EPA Pathogen Equivalency Committee in Cincinnati, Ohio handles these requests. They can be reached at 513-569-731 or pec@epa.gov.

Finishing the Application

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 have to 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. By adding the data you collect to other pilots' results, the Section continually updates a source of information that is useful to everyone interested in learning more about composting.

New **Application Checklist**

*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.

Application Must Include:

Who is Involved:

- Name of Proposed Facility Owner
- Address of Proposed Facility Owner
- Phone Number of Proposed Facility Owner
- Operator of Proposed Facility
 - If the Operator is different than the owner of the proposed facility, then the contact information for the Operator needs to be included.
- If the property owner is different than the owner/operator, please include:
 - Landowners Name
 - Landowners Address
 - Landowners Phone Number
 - 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
 - Must show the area around the proposed facility for at least 1/4th mile
 - Photographs are available from most county tax or planning offices
- Some applications may need to include a FEMA map showing the 100-year flood hazard area.

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

Ingredients:

- Each proposed waste to be managed must be listed.
- For each waste listed, estimate the volume you anticipate working with over the life of the project.

Testing:

- May be required on the materials you propose to manage before you start composting
- Determine the ratio of C:N in the waste
- Run a waste analysis test
 - For NC, the NCDA &CS waste analysis is usually sufficient, but be sure to request every test that the lab can run.
 - Papers to submit the test can be picked up at your county's NC Cooperative Extension Service Office.

Schedule:

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

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

Aeration:

- Describe the method you will use to aerate for each composting method.
- 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 you plan to compost.
- If the materials you use could be wet, explain how to contain the liquid

Monitoring:

- Include temperature data to determine if pathogen reduction methods are met
Please Note: The rules require you to record every temperature taken.
- Temperature Requirements
 - Windrow Method
 - A temperature of 131⁰F or greater shall be maintained in the windrow for at least 15 days.
 - During the high temperature period (131⁰ 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 131⁰F 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 104⁰F for 14 days or longer with an average temperature of 113⁰F.
 - Within Vessel Composting Method
 - The temperature in the compost pile should be maintained at a minimum of 131⁰F for at least 3 days.
 - To meet the criteria for vector attraction reduction, the compost shall be maintained at a temperature of above 104⁰F for 14 days or longer with an average temperature of 113⁰F.
 - Vermicomposting
 - There are no temperature requirements for this type of composting, but additional or more frequent testing may be required.
- 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

- May want to monitor Oxygen or Carbon Dioxide levels

Leachate:

- IF this is a problem
 - Mix/layer your compost materials in proper proportions of wet/dry materials
 - Submit plans for leachate management.
 - Submit plans for soil erosion and runoff control.

On-Site Storage:

- Make sure adequate space is available for waste materials before they are composted, if needed.

Product Testing:

- Test your product and submit results to the solid waste section before distributing.
- Run additional tests every 6 months or 20,000 tons.
- Test for fecal coliform or salmonella.
- Determine foreign matter content.
- Tests can provide valuable information about the best use for your compost.
- Waste analysis with heavy metals (NC Dept of Agriculture).

Record Keeping:

- Outline of the records you plan to keep.
- Track composting time and man-hours to determine the project's cost effectiveness.

EPA Standards:

- Compost used in areas where there may be public contact must meet EPA PFRP standard.

Finishing the application:

- Outline of your end of project report
 - 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.

NEW Contact List

NC DENR-Solid Waste Section	919.707.8200
North Carolina Department of Agriculture & Consumer Services	919.733.2655
Environmental Protection Agency-Pathogen Equivalent Committee	513.569.7311