NCDENR

North Carolina Department of Environment and Natural Resources

Dexter R. Matthews, Director | Division of Waste Management | Michael F. Easley, Governor
William G. Ross Jr., Secretary

August 6, 2004

Mr. Dean Brooks
1195 Beal Road
Goldston, North Carolina 27252

Re: Brooks Farm Compost Facility – SWC-19-05
Chatham County

Dear Mr. Brooks:

Enclosed is your permit to operate a Large Type 3 Solid Waste Compost Facility in Chatham County. Please carefully read all permit conditions. Your Operation and Maintenance Manual has been incorporated into the permit conditions.

Mr. Flint Worrell, Waste Management Specialist, Fayetteville Regional Office will be responsible for facility inspections. Mr. Worrell can be contacted at 919-486-1541. If you have questions, please feel free to contact me at 919-733-0692, extension 253.

Sincerely,

Ted Lyon

Ted Lyon, Supervisor
Composting & Land Application Branch

cc: Flint Worrell
Mark Taylor, Ecologic Engineering/Contruction
Solid Waste-Central Files

h:cla/compost/permits/19-chatham/SWC-19-05-2004.cl

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
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ECOLOGIC
Engineering/Construction

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July 19, 2004

Ted Lyon, Solid Waste Section
NCDENR, Div. of Waste Management
401 Oberlin Rd., Suite 150
Raleigh, NC 27605

RE: Brooks Farm Composting Facility, Goldston, NC

Dear Ted:

On behalf of Brooks Farm, we are submitting four (4) copies of the permit renewal package (Operations & Maintenance Manual) for your review and approval.

If you have any comments or questions concerning the enclosures, please call or e-mail (mark@ecologic-nc.com) at your earliest convenience.

Cordially,

EcoLogic Associates, P.C.

Mark A. Taylor, PE, CPESC
Project Manager

Enclosures Operations & Maintenance Manual

C: Dean Brooks (with enclosure)

Permit No. 19-05
Chatham County

OPERATIONS & MAINTENANCE MANUAL

BROOKS FARM COMPOST FACILITY

1195 Beal Rd.
Goldston, NC 27252

PERMIT NO. SWC-19-05

Revised July 2004

APPROVED
DIVISION OF WASTE MANAGEMENT
SOLID WASTE SECTION
DATE 8/2/04 BY

Prepared by

EcoLogic Engineering/Construction
4321-A S. Elm-Eugene St.
Greensboro, NC 27406
(336) 335- 1108

I. Facility Overview

FACILITY: Brooks Farm Compost Facility

1195 Beal Road

Goldston, NC 27252

Phone: (919) 837-5914 – Office/Home

Fax: (919) 837-5097

PERMIT NUMBER: SWC-19-05 Solid Waste Compost Permit

OWNER/OPERATOR: Dean Brooks (919) 842-0006 - Mobile

EMERGENCY CONTACTS:

Primary:	Dean Brooks	(see numbers above)
First Alternate:	Judy Brooks	(919) 837-5914 – Home
		(919) 842-0014 - Mobile
Second Alternate:	Alan Brooks	(919) 837-2850 – Home
		(919) 842-0010 - Mobile

Emergency Services: 911

SITE PERSONNEL:

Facility Operator/Site Manager - Manages all operations and directs work efforts

Truck Drivers - Haul feedstocks and finished products

Loader Operator - Constructs windrows, loads finished product, operates trommel screen

Compost Turner Operator - Turns windrows, monitors compost piles

Equipment Operator – Operates heavy equipment and off-road trucks

II. Operations Overview

Brooks Farm Compost Facility is a Large Type 3 Solid Waste Compost Facility located on a 375-acre farm in Goldston, Chatham County, North Carolina. The area used for composting is approximately 25 acres in size (see Drawing D-2 - Compost Site Plan in Appendix A). Trucking and sales are handled through Brooks Contractor, a separate business owned and operated by Judy and Dean Brooks. The facility recycles over 38,000 tons of organic materials per year, materials that would otherwise consume a considerable volume of North Carolina's limited landfill capacity. Gardeners and landscapers throughout the state and in neighboring states use Brooks' products.

A. Hours of Operation

The facility maintains scheduled hours of operation as follows:

Monday through Friday	7:30 am - 5:00 pm
Saturday	7:30 am - 1:00 pm
Sunday	Closed

Extended operating hours are occasionally offered as needed if no neighbor concerns are likely.

B. Receiving

Many of the feedstock haulers are under contract and access the facility with limited supervision. Before they are authorized for unsupervised unloading, these contract haulers are instructed in site operations, site safety, emergency procedures, and the location of unloading stations and/or areas designated for their feedstock. Brooks Contractor also hauls a significant amount of the materials processed at the site. All unknown vehicles entering the facility are stopped and identified, with the hauler name, vehicle type and size, and type of waste materials noted. The driver is then directed to the appropriate off-loading area (i.e. bulking material storage area, feedstock storage area, etc.). For new customers, a facility employee inspects materials as they are being off-loaded. The visual inspection ensures that received materials are compatible with the intent and goals of the facility and

the solid waste permit (see "Acceptable Materials", Section III. A). Those materials not acceptable at the facility are handled as outlined in Section III. B.

C. High Rate Decomposition

The first stage of composting is accomplished in open, aerated windrows. The construction and maintenance of the windrows shall be as described in Section III. C. The windrows are constructed in the designated areas (see Drawing D-2). The windrows are constructed with varied feedstocks (variable C:N ratios) in combinations designed to assure a high quality, marketable compost product. Temperature and percent moisture are monitored and turning is employed as needed to maintain aerobic conditions and suitable elevated temperatures to expedite composting (thermophilic decomposition), reduce odors, and reduce pathogens. This stage should take about 4 to 6 weeks.

D. Stabilization

The stabilizing of fresh compost to produce mature compost will be provided for as dictated by market demands. Stabilization is the gradual reduction of microbial activity in the presence of moisture and aeration, and is accomplished by continuing the aerated windrow composting process under the same controlled conditions as in the first stage. Thus, stabilization will be performed in the original windrows. The degree of stabilization achieved may also depend on demand versus production rates. The stabilization stage should take at least an additional 8 to 10 weeks.

E. Refining, Curing, and Quality Control

The compost will be refined by screening to remove oversize particles and foreign material and improve the consistency and quality of the final product. Screening is normally done near the finished product processing area as the compost is transferred from the windrows to the final storage area (see Drawing D-2). Oversize material ("overs") is stored in piles, then run back through the composting process. Foreign matter is disposed of in an appropriate permitted off-site facility. Curing is accomplished in the final storage area as needed to satisfy market demands. Quality control will consist of regular measurement of temperature and periodic manual/visual inspection for particle size,

percent moisture and the presence of foreign material. Compost samples are taken every six months or every 20,000 tons (whichever comes first) as outlined in Section III.F. These samples are used to verify that the product meets the requirements listed in Table 3-1.

F. Storage and Load-Out

In the storage and load-out area, market-ready compost will be stockpiled until sale. The storage and load-out area shall be maintained to facilitate stormwater drainage and allow easy access and movement of equipment for loading.

The finished product is marketed in bulk for landscaping projects. Additionally, the compost is blended with other materials to produce custom topsoil blends and marketed in bulk form. These blending materials include items such as clay, pine bark, permatil, sand, and coarse sandrock. An example information sheet as shown in Appendix D is given to each person who purchases a load.

If material fails to meet regulatory requirements or is unmarketable, it may be applied to pasture or farmland, but only if it meets Grade B compost standards. Otherwise, it may be composted again to meet pathogen requirements, or disposed of in a properly permitted landfill.

G. Product Use and Marketability

It is the intent of the facility to develop products that have the attributes desired for use as a soil amendment in landscaping projects, parks, golf courses, highway right-of-ways and beautification projects. In addition, commercial landscapers and private citizens are able to purchase the compost directly. The established market contacts of Brooks Contractor., a landscape materials supplier owned by the facility's owners, are instrumental in developing and sustaining markets for the finished products.

III. Operating Procedures

The purpose of this section is to establish the standard operating procedures for managing materials and producing compost at the facility. These procedures may be refined or modified as experience is gained with the facility and the process.

A. Acceptable Materials

The facility is designed as a Type 3 Solid Waste Compost Facility. Acceptable materials include the following listed wastes and other biodegradable organic wastes determined to be suitable for the composting process and acceptable to NC DENR.

- Eggshells/hatchery waste
- Food processing waste (chicken batter, liquid dairy wastes)
- Food waste, produce (pre- and post-consumer)
- Yard waste/leaves (shredded or unshredded) and ground land-clearing debris
- Sawmill/wood waste (including engineered wood product waste)
- Cotton gin and mill waste (domestic origin only unless tested and approved)
- Pharmaceutical waste (e.g., corn cell cream, filter sludge and carbon filter material)
- Shredded mixed paper
- Waxed and unwaxed cardboard
- Animal manures/bedding
- Wallboard paper/drywall (new construction only)
- Cornstarch and/or cornstarch glue
- Tobacco dust (domestic origin only)
- Drinking water plant residue
- Grease trap pumpings
- Untreated, unpainted wood waste and pallets
- Silviculture waste
- Wine production waste

- Ash approved by the Division for reuse

When new feedstocks are proposed for receipt at the facility, or when variants of approved feedstocks are proposed, the following procedures will be followed to gain NC DENR approval:

New Feedstocks

1. The origin (source or sources), description, anticipated quantity and duration, and physical/chemical characteristics (e.g., C:N ratio, volatile solids, ammonia, nutrients, pH, total metals, viscosity if liquid, etc. and other as required by the Division on a case-by-case basis) of the feedstock will be documented in a 'New Feedstock Notification and Request for Approval' letter to the Solid Waste Section at least 45 days before receiving the new material.
2. Test reports of physical and chemical analyses, if available, will be supplied with the notification/request.
3. New feedstocks will be evaluated to determine beneficial reuse potential in cases where the feedstock is not obviously compatible with the acceptable materials list and/or paragraph .1402 (f)(3) of the NC Solid Waste Management Rules. The assessment of new feedstocks will be performed by Dr. A.R. Rubin or other qualified NCSU faculty, by faculty from a Community College agriculture program, by a representative from NCDA-Agronomic Services, or by another individual or private laboratory with demonstrated competence in the assessment of feedstocks for use in agriculture, silviculture, or horticulture. A report describing the results of the assessment will accompany the notification/request.
4. The notification/request will state whether the feedstock is proposed for "permanent" (long-term) use in compost production or "temporary" (short-term) use in either compost production or in a demonstration/research trial.

Variants of Existing Feedstocks

With the exception of generic feedstocks, such as untreated wood wastes, yard wastes, mixed

paper, manures, pre- and post-consumer food wastes, and carbon-based bulking materials, variants of existing feedstocks will be proposed for use and approval in a like manner to new feedstocks as outlined above. The notification/request in such cases will be referred to as a 'Feedstock Variant Notification and Request for Approval' letter.

It is anticipated that the Solid Waste Section will notify the facility operator if additional information is needed, and will rule on the request within 30 days from said receipt. This will allow the operator to enter into a contract with the feedstock supplier and make the necessary arrangements for the commencement of feedstock shipment and receipt.

B. Receipt and Preparation of Materials

For all unknown vehicles entering the facility, site personnel will make a visual check of incoming loads prior to receipt. Any non-conforming/unauthorized materials shall not be allowed to off-load. The Site Manager will be knowledgeable of approved disposal options for various non-conforming/unauthorized materials, and drivers with such materials will be directed to an appropriate disposal location.

Upon receipt, the materials shall be off-loaded at the appropriate storage or processing area. Whenever possible, loads will be examined for contaminants, nonconforming and/or unauthorized materials as they are dumped. Any nonconforming and/or unauthorized materials found during off-loading shall be reloaded into the delivery vehicle.

In the event non-conforming/unauthorized wastes are discovered in the storage/processing areas, those materials shall be separated by the facility staff. A roll-off container shall be established for the temporary storage of those materials that cannot be legally or practically managed on site. Facility personnel shall be responsible for the loading and transporting of such materials to an appropriate and properly permitted disposal facility.

All liquid and semi-liquid wastes, and any other wastes with noticeable running liquid, are unloaded in the solidification basin or onto the adjacent concrete pad. The preparation of incoming liquid wastes

consists of mixing with absorbent bulking material in the solidification basin, using an excavator (track hoe) bucket, until the mixture exhibits little or no free liquid to the equipment operator. Examples of absorbent bulking materials are bulk cotton, cardboard, sawdust, and shredded paper. The fresh mix is then placed on an adjacent concrete pad to allow any remaining or heat-released free liquid to drain until the seepage and runoff ceases or becomes negligible. Then, the solidified mix is placed on the appropriate windrow.

The concrete pad is designed to direct all runoff to the basin (mixing pit) or to one of two grated inlets in the pad that carry it by pipe to two (2) 3500-gallon concrete vaults in series. In the vaults, the liquid runoff passes through a series of baffles to allow settling of solids, then is held for reintroduction to the pit or for pumping into a water truck for application to new windrows. A manually activated bypass pipe allows for the runoff to bypass the vaults in the event of large or long duration stormwater runoff events.

The concrete pad, mixing pit and vaults are installed above the site's clay subsoil that retards infiltration in lieu of a concrete pad, and directly on a 6-inch layer of washed stone that conveys any spills or leaks into an underdrain system that daylights into the adjacent grassed swales. Refer to Drawing D-3 - Liquid Waste Solidification Basin in Appendix A for a schematic of the basin layout, and to photos of the installed system in Appendix E.

Odorous wastes such as eggshells, manures and some food waste are normally incorporated into a windrow immediately upon arrival on site, or sometimes covered and stored up to one (1) week (see Drawing D-2). Food waste is normally stored in a static pile for softening and conditioning one (1) to two (2) weeks prior to placement in windrows. These wastes are segregated on site to prevent pathogen cross-contamination. Temporarily stored materials are then incorporated into windrows prior to beginning to compost, produce odors, or attract insects.

Other wastes are stockpiled in various bulk storage areas until utilized in the windrows. In cases of short-term surges in individual feedstocks, temporary storage times may exceed one week, but only until the first available opportunity to incorporate the feedstock into the windrows. An exception is leaves, which are segregated and stored in a leaf windrow for up to one (1) year before being used as a

bulking material. Leaves and other thermally unstable organic feedstocks will be stored in windrows not exceeding 15 feet high by 30 feet wide in order to avoid conditions conducive to spontaneous combustion.

C. Windrow Composting

The windrows will be constructed in the designated areas (see Drawing D-2). The windrows are constructed with varied feedstocks (variable C:N ratios) in combinations designed to assure a high quality, marketable compost product and control odors. Some windrows are constructed from selected feedstocks using "recipes" to meet specific market needs. Temperature and percent moisture are monitored and turning is employed as needed to maintain aerobic conditions and suitable elevated temperatures to expedite composting (thermophilic decomposition), reduce odors, and reduce pathogens. This stage should take about 4 to 6 weeks.

1. Feedstock Properties

The carbon: nitrogen ratio (C:N) of the feedstocks is a critical factor affecting the rate of decomposition. Different feedstocks will contain different amounts of decomposable carbon and nitrogen. High carbon waste such as wood is sometimes called "brown waste", while high nitrogen waste such as manure is sometimes called "green waste." During windrow construction, the layering of feedstocks shall be designed to result in a mixture having a suitable carbon:nitrogen ratio. The C:N ratio should ideally be in the 30:1 to 40:1 range.

The initial carbon: nitrogen ratio of the feedstocks shall be adjusted to a maximum of about 40:1 to provide sufficient nitrogen nutrients for vigorous composting, and a minimum of about 25:1 to minimize ammonia formation and other odors. The target ratio is in the range of 30:1 to 35:1. As compost matures, reductions in C:N to 10-15:1 may result as carbon is released during the humification process. The use of partially composted materials as a layered feedstock is permissible. Such material would have a lower C:N ratio and thus would act as an inoculate of nitrogen to reduce the C:N ratio of brown waste feedstocks.

The chemical property pH is the measure of acidity/alkalinity. The correct pH balance plays an important role in the composting process. The pH balance affects the quantity of nutrients available to support the microbial activity. The closer the compost mixture is to neutral (pH = 7), the more efficient the composting process will be, thus a pH in the range of 6 to 8 is desired. If pH falls outside this range (typically below), a liming agent is added to raise the pH, or the mix recipe is adjusted.

The particle size of feedstocks also affects the rate of decomposition. Small particle sizes provide more surface area for microbial activity that results in a rapid decomposition rate. Particle size reduction also results in feedstock volume reduction. Small particle sizes must be balanced by the need to have voids between particles (air space) for oxygen to access the microorganisms. Thus, blending of feedstocks to ensure a good distribution (gradation) of particle sizes is needed to promote oxygen availability and microbial activity.

2. Placement

Three composting methods are used at this facility: open windrows, static piles followed by placement into windrows, and yard waste windrows. Windrow composting is accomplished by placing the mix in long piles that are approximately 14 to 20 feet wide and six (6) feet high. Prior to constructing a windrow, dry sorbent bulking material or finished, unscreened compost is placed in an 8- to 10-inch layer to form a base layer beneath the windrow to absorb excess moisture.

Mixing is conducted on the compost pad adjacent to the newest windrow. A front-end loader is used to measure the volume of bulking agent (carbon source) and nitrogen sources to be added. The front end loader adds bulking agent at a ratio of approximately two parts bulking agent to one part nitrogen source by volume with a target C:N ratio of 30:1 to 35:1. The operator visually examines and manually tests the mix by squeezing it in his hands. If free water drains off, then the mix is too wet and additional bulking agent is added. If the mix crumbles and does not form a ball when squeezed, it is too dry, and additional wet material is added. If the mix forms a ball and is wet to the touch, then the mix is adequate for placing in the windrows.

Mixing is accomplished by either of two methods. In Method No. 1, the material is repeatedly turned

using the front-end loader and then placed in the windrow. In Method No. 2, the material is placed in the windrow and then mixed using the windrow turner. After mixing, the front-end loader or turner will create the desired windrow size and shape. Care must be taken not to compact the feedstocks during placement and/or shaping in order to maintain a porous, fluffed pile. After mixing, if any putrescible wastes are exposed on the pile surface, they shall be covered the same day with mature compost or fresh bulking material. If feedstocks are odorous, they are normally allowed to go through one complete heat cycle (temperature rise and drop) prior to turning to encourage absorption of odorous gases.

3. Moisture Modification

Control of the amount of water in the composting material is a critical element in achieving optimum aerobic composting results. The microbes (bacteria) responsible for the aerobic decomposition process need appropriate quantities of water, oxygen and nutrients to accomplish humification. The amount of moisture in the windrow (percent moisture) should be maintained between 45 and 60 percent. (Percent moisture = weight of water in moist compost ÷ moist (total) weight of compost) Percents moisture outside these limits will cause a reduction in microbial activity, slowing the composting process. During the initial layering of the feedstocks, it is important to know the relative moisture of the various feedstocks. This enables the proper moisture level to be attained throughout the windrow during its construction. Water plant residue or grease trap pumpings can be added to increase moisture, but only before the pathogen destruction phase begins. Moisture levels are determined using the hand-squeeze method described above (Section 2 – Placement).

If material begins to dry significantly, thereby inhibiting microbial activity and dusty conditions are prevalent, clean water is added to the top of the windrows through the use of a portable water tank equipped with a pump and hose. A VEE shape is cut in the top of the windrow to enhance capture of rainwater as well as capture of water from the water tank. The pile is turned after adding water to thoroughly distribute the moisture. Only clean water, normally taken from a nearby, off-site farm pond, is added to other than new windrows. No leachate from the solidification basin/pad, or drinking water plant residue, or water from the stormwater pond, or any other moisture source known or likely to contain pathogens is added to the windrows after PFRP starts (see Section 4 – Aeration). Typically,

no water is added during the final five (5) weeks of composting (stabilization).

The exposed windrows will allow some rain to infiltrate the compost and increase the percent moisture. The facility staff must be aware of current moisture conditions and forecasted weather when determining the need for moisture modification of the windrows. Maintaining a triangular cross-sectional shape of the windrow will help reduce rainfall infiltration when moisture conditions are high or excessive. More frequent turning may be required in such cases to promote drying.

The grade of the composting area must be maintained to promote rapid drainage of stormwater runoff. Ponding of water in the composting area shall not be allowed to occur.

4. Aeration (Turning)

Aeration of the composting materials is necessary for aerobic biological processes. Aeration provides compost oxygenation, helps ensure process stability, and enables temperature control. Insufficient aeration can result in elevated temperatures that retard microbiological activity (slow the decomposition process). In addition, the compost may go anaerobic (lack of oxygen), a condition that causes noxious odors and can produce plant toxins. Excessive aeration, on the other hand, accelerates heat removal and increases evaporation, which can also result in a reduced rate of decomposition. Thus, the proper frequency and extent of aeration (turning) is critical to an efficient composting process, in terms of both temperature control and oxygenation. The physical mixing during turning also breaks up air channels and clumps, blends materials from top to bottom in the windrow, and provides for uniform microbial activity. Compost temperature can also be controlled by reducing windrow size to lower temperature, or by increasing windrow size to raise temperature.

The windrows are periodically turned to break up clumps to expose more surface area to active microorganisms and to expose all materials to temperatures to ensure pathogen destruction and vector attraction reduction. To ensure pathogen destruction and vector attraction reduction and to qualify the composting process as a "process to further reduce pathogens" (PFRP), the windrow temperatures must be maintained at or above 131°F for at least 15 days. Additionally, during the period that the temperature is above 131°F, the windrow must be turned a minimum of five times. The windrows

must also be turned at least once per week during the summer to break the fly reproductive cycle.

Windrows are turned periodically based on temperature measurements. If temperatures are measured in excess of 155 °F, the windrow requires turning to cool the composting material. If temperatures during the first three (3) weeks of composting are less than 110°F, the windrow requires turning or adjustment. Low temperatures may indicate a lack of oxygen, C:N ratio or moisture content outside the desired range, or some other external factor. Pile turning will provide the needed oxygen to the microorganisms. Adjusting the mix components or ratios may create the right proportions to initiate or accelerate microbiological activity and decomposition. The temperatures used to determine when the compost pile requires turning are guides and may be adjusted based on long-term pile temperature trends and/or length of time the material is composted.

Caution should also be exercised to not allow mixing of compost materials that have undergone pathogen and weed seed destruction with those that haven't, either in the windrows or in equipment or vehicles used to process or transport the compost.

D. Compost Stabilization

The stabilizing of fresh compost to produce mature compost will be provided for as dictated by market demands. Stabilization is the gradual reduction of microbial activity in the presence of moisture and aeration, and is accomplished by continuing the aerated windrow composting process under the same controlled conditions as in the first stage. Thus, stabilization will be performed in the original windrows. The degree of stabilization achieved may also depend on demand versus production rates. The stabilization stage may take up to an additional 6 to 8 weeks.

E. Refining and Curing

Material is stored in a static pile for at least two months, preferably longer (12 months) for final curing. Final curing and storage is typically performed together on site. Curing and storage occurs in areas adjacent to the compost pad as shown on the site plan. Curing is accomplished in the final storage area as needed to satisfy market demands.

The compost will be refined by screening to remove oversize particles and foreign material and improve the consistency and quality of the final product. Screening is normally done near the finished product processing area (see Drawing D-2). Screening is conducted after the curing period and just prior to sale. The screen size is 1/2 inch or as required by the market. The compost (<1/2 inch) is stored on site in static piles until marketed. Oversize material ("overs") is stored in piles, then run back through the composting process (see Drawing D-2). Foreign matter is disposed of in an appropriate permitted off-site facility.

F. Quality Control

Temperatures are taken in each windrow at 50-foot intervals down the length of the windrow using a 3-foot long, dial-type thermometer. Temperatures are recorded on the Windrow Data Sheet shown in Appendix C. Temperatures are taken no less frequently than every two days during the time the PFRP requirements are being met, and then no less frequently than weekly.

Sampling and testing at the composting facility is necessary to:

- Monitor the process efficiency
- Provide data for regulatory agencies
- Provide data for trouble-shooting when problems develop

It is extremely important that all sampling and testing be done at representative points in the process in a consistent manner. The data that results from any sampling and testing program is only as good as the sample that is taken. Sampling should be done in a consistent manner, on a regular basis, and using specific techniques. This section will outline the sampling schedule to be used and the sampling procedures required for a successful sampling and testing program. The operator should make every effort to perform sampling in a consistent routine, according to these guidelines.

1. Sampling And Testing Schedule

Final product sampling is conducted every six months or every 20,000 tons, whichever comes first. The test results shall be reported in the facility's annual report (see Section K.4). The following sections outline sampling types and procedures. Sampling for testing of pathogens is performed with sterile gloves, sterile scoops, and sterile containers.

2. Grab Sample Definition

Grab samples are samples that are collected at one particular time, in one particular location of a certain composting process. Analysis from this type of sample will provide results from a random portion of the process stream being sampled. In order to achieve a more representative analysis of a given process stream, many grab samples can be collected at various times and analyzed individually or these grab samples can be combined into one large sample for a composite sample analysis.

3. Grab Sampling Procedure

Grab samples are collected using a clean, dry sampling jar (one pint glass or plastic bag). The sample is collected at a point in the material that is between two and six feet into the pile from the outside surface and representative of the compost pile that is being sampled. Each grab sample is approximately the same volume as previous grab samples. Sterile scoops and sterile gloves should be used when taking grab samples to be analyzed for pathogens.

4. Composite Sample Definition

Composite samples are a mixture of grab samples that are collected individually at various times at the same location in a certain process or a mixture of samples that are collected individually at various locations in a certain process. Grab samples are immediately transferred to a composite sample container for storage. These types of samples generally provide a more representative sample for analysis than does a grab type sample because it will reflect variations in the process.

A five-gallon bucket can be utilized to mix all of the grab samples together and take the final composite sample for analysis. This composite sample shall be analyzed for the parameters shown in Table 3-1 and any other specific constituents designated for specific wastes by NC DENR.

5. Composite Sampling Procedure

Composite samples are stored in a clean, dry sampling jar (one gallon or larger) with an airtight, screw-on lid. The sampling container is appropriately marked and stored in a cool, dry place, out of direct sunlight, preferably a refrigerator. At the end of the sampling period, after the last grab sample is added to the composite jar, the composite sample is mixed well and a representative portion placed in a one-pint sampling jar for analysis. The sampling jar is airtight and stored in a refrigerator until it is delivered to the laboratory analysis. Analysis should be performed as quickly as possible, preferably within 24 hours after collection. The sample jar is adequately labeled with sample name, date of collection, and the operator's name.

G. Odor, Dust, Noise and Vector Control

The facility shall be operated utilizing procedures that will minimize odor, dust, noise and vectors.

Dust will be controlled by the application of water spray, both on the compost in the windrows and on the facility roads during hot, dry weather. The application of make-up water to the compost during turning, to modify (increase) the percent moisture, should alleviate most problems with dust in the active composting area. In the refining process, a water mist may be needed on the screen and/or conveyor to control dust from the finer fraction during agitation. Waste screening and windrow turning may be postponed during periods of high wind to reduce the creation of dust.

Noise is not expected to be a problem given the nature of the proposed operation and the relative isolation of the site.

Regarding vectors, the facility staff shall maintain proper drainage and minimize standing water to reduce the potential for mosquito breeding. Odorous and/or putrescible wastes will be incorporated

into windrows as soon as practicable in order to reduce the attraction of flies.

H. Operations in Inclement Weather

Windrow construction and turning may be postponed during prolonged periods of wet and/or very cold weather to avoid disruptions to the composting process. Similarly, waste screening and windrow construction and turning may be postponed during periods of high wind to reduce dusting and maintain site orderliness.

I. Stormwater Management and Sediment Control

Brooks Farm operates under NC General Permit No. NCS000371 for stormwater discharge, having an effective date of July 1, 1999 and scheduled to renew on or about May 31, 2004. A letter from the NC Division of Water Quality addressing the current status of the permit is enclosed in Appendix F. The permit requires semi-annual stormwater sampling from the site outfall, and records of those events are kept on file in the facility office. Refer to the Stormwater Pollution Prevention Plan (Revision 2) for Brooks Farm Composting Facility dated December 2003. The plan is periodically updated to include new stormwater and sediment controls as they are developed at the site. Stormwater conveyances and controls are inspected and maintained at least once per month and after every significant storm runoff event. A copy of the current SP3 plan is kept on site at all times.

J. Leachate Control

The compost windrows are constructed parallel to the existing slope (perpendicular to contours) to allow water to drain between windrows. Runoff drains southward from the facility into an on-site pond via three (3) swales. To monitor the water quality of runoff from the site, runoff samples are collected semi-annually from an outfall location below the pond as shown on the site plan, Drawing D-2. In storm events where there is no discharge from the pond, runoff samples are collected from one or more ditches above the pond. The samples are tested for the parameters indicated in the facility stormwater permit. The results of the analysis are submitted to the Division of Water Quality in accordance with the stormwater permit.

K. Record Keeping and Reporting

Keeping accurate records is an important part of the operation of any composting facility. Proper records are necessary to monitor the performance of the facility and to make operational decisions. Of great importance is the establishment of a reliable continuing record for proof of performance, thus justifying operational decisions, expenditures, and recommendations. Daily operational records also provide information useful in process adjustments required due to climatic or seasonal changes or other recurring problems of a specific nature. Accurate records also provide the basis for planning future expansion, planning future modifications, establishing and adjusting operating budgets, and providing evidence of performance in compliance with regulatory agencies.

NCDENR Division of Waste Management requires record keeping on a continuing basis, which allows them to determine the facility efficiency and the effectiveness of the treatment in achieving the desired standards. Personnel from the NC DENR Division of Waste Management will make periodic visits to the facility. During these inspections, a review of operational and other records may be requested. Records must be retained for five years. The following sections outline data to be maintained at the facility.

1. Compost Windrow Data Sheet

The facility operator maintains a compost windrow data sheet for each windrow built at the facility. Each windrow is defined as the mix placed on the composting pad that is contained in one windrow. This log sheet will contain information as to the day the pile was built, the contents of the windrow, and all monitoring information until the pile is torn down. A sample Windrow Data Sheet is attached in Appendix C. The PI, P2 . . . P10 indicates relatively the same location in the windrow. Each point is located approximately 50 feet from the next point. Temperatures are measured daily at each point until the requirements outlined in Section C.4 are met. The day a pile is turned or sampled is also annotated in the appropriate column. The date construction began and date completed is when material is first placed in the windrow and when the last material is placed in .the windrow, respectively. The windrow number starts with 1 and continues to increase throughout the year, followed by the year. For

example, the first windrow constructed in 2002 will be Windrow No. 1-02. An additional sheet can be utilized to record performance of a windrow for longer than 30 days shown on the windrow data sheet, if required. This sheet can be modified for use as required to facilitate maintaining data required by NCDENR and to monitor the process.

2. Monthly Data Sheet

One Monthly Data Sheet should be used to summarize the overall materials processing operation on a monthly basis. This data is used to evaluate the overall operation and for ease of tracking materials quantities on site. Data should be recorded on this sheet on a daily basis, as it is available, to maintain current records. A sample Monthly Data Sheet is included in Appendix C. In addition, if any material does not meet the temperature requirements, fails pathogen or metal testing, or is unmarketable, it is identified on the monthly data sheet and appropriately segregated on the site. This sheet can be modified for use as required to facilitate maintaining data required by the NCDENR and to monitor the process.

3. Laboratory Sheets

Laboratory sheets are filed with monthly data sheets and indicate bacteriological, heavy metal, and nutrient concentrations. Compost samples are taken every six months or every 20,000 tons (whichever comes first) as outlined in Section 3.1. These samples are used to verify that the product meets the requirements listed in Table 3-1.

Table 3-1

Brooks Farm Compost Facility

Semi-Annual Monitoring for Grade A Compost Requirements*

Parameter	Unit	Limit
Foreign Matter	%	< 6%
Cadmium	Mg/kg dry wt.	39
Copper	Mg/kg dry wt	1500
Lead	Mg/kg dry wt	300
Nickel	Mg/kg dry wt	420
Zinc	Mg/kg dry wt.	2800
Fecal Coliform	MPN/g dry wt.	1000
Total N	%	None
Phosphorus	%	None
Potassium	%	None
Calcium	%	None

*NC DENR Solid Waste Compost Rules

4. Annual Report

An annual report will be prepared and submitted to the Division of Waste Management for the period July 1 to June 30 each year, on or before August 1. The report will document the total quantity and types of waste received, including waste received from local governments, and the quantities of compost produced and sold. It will also document temperature monitoring results to demonstrate compliance with pathogen destruction criteria. For reporting on a weight basis, processed volumes will be converted using a factor of 500 pounds per cubic yard (0.25 tons/CY). Incoming feedstocks

will be reported based on scale tickets (e.g., food waste, iron humus), weights provided by the source (e.g., eggshells), and waste-specific volume: weight conversion factors. Conversion factors and formulae for deriving the reported quantities will be kept on file at the facility office. Yearly totals of solid waste received and composted shall be reported back to the local government of origin for annual recycling reporting.

The annual report will follow the following general outline:

(1) Facility name, address, and permit number;
(2) Total quantity, in tons, and type(s) of waste received at the facility, including waste received from local governments;
(3) Total quantity, in tons, and type(s) of waste processed into compost;
(4) Total quantity, in tons, and type(s) of compost produced at the facility, by product classification;
(5) Total quantity, in tons, and type(s) of compost removed for use or disposal from the facility, by product classification, along with a general description of the market;
(6) Summary of temperature monitoring, by month; and
(7) Results of any analytical tests performed.

IV. Equipment

Equipment used on site is as follows: two rubber-tired loaders (Volvo 120D and 90C), off-road dump trucks, a compost turner (Scarab Model 20BA), a trommel screen (Retek Eliminator III) with stacking conveyors, an excavator (Volvo 210) with separate buckets for mixing and loading, and a bulldozer. One loader is designated for mixing manure, food waste, etc. to avoid cross-contamination of finished products. Separate buckets for mixing and loading are sometimes used to minimize cross-contamination, backed by cleaning the buckets as needed.

Regular equipment maintenance is required to ensure a marketable product is produced. Petroleum products and other hazardous material such as diesel fuel, used and new motor oil, hydraulic fluid, lubricants, and antifreeze are stored and used on site. Refer to specific equipment O&M Manuals for equipment maintenance schedules.

V. Security, Safety and Fire

A. Security

Uncontrolled public access is not allowed. An operator is on duty at the site while the facility is open for public use. The road to the site is maintained to allow all-weather access. A sign stating, "No hazardous waste, asbestos containing waste, or medical waste is allowed on site" is posted at the site entrance. The same sign or other signs posted at the site entrance provide information on wastes that are acceptable, hours of operation, and emergency contact information. An example of the sign content is included in Appendix B.

B. Safety

The safety of personnel and users of the facility shall be a high priority. Site personnel are required to attend all scheduled safety meetings. Safety practices shall encompass all people working, delivering materials, or receiving finished product at the facility. The operation shall be conducted in compliance with all applicable state and federal OSHA standards. Telephone numbers of emergency agencies shall be prominently displayed, and all staff shall be familiar with those numbers and the location of telephones. In the event of injury, OSHA guidelines shall be followed to ensure the proper response and reporting of incidents.

Equipment shall be used in the manner described in the owner's manual, with special attention to safety features and safe operating guidelines. The facility staff shall maintain equipment in safe operating condition. The staff will be familiar with and follow the equipment manufacturers' recommendations for the safe use and maintenance of the equipment.

C. Fire

The aerobic composting process is exothermic, i.e., heat is generated by the high-rate decomposition process. If excessive heat develops in the presence of flammable feedstocks during the active

composting phase, the potential exists for occasional fires from spontaneous combustion. This potential can be reduced by maintaining pile sizes at or below the limits outlined in Section III.C.2. The facility personnel shall be trained in basic on-site fire response procedures and shall have access to heavy equipment (see Section IV above), water and extinguishers to aid in the early suppression of fire. Emergency (911) and fire station telephone numbers shall be posted by all on-site telephones. Fire suppression may include isolating and spreading burning material, application of water or chemical suppressant, and/or covering with soil.

VI. Health and Safety

The following are some general recommendations for the health and safety of workers at Brooks Farm Composting Facility.

1. Personal Hygiene

The following personal hygiene recommendations should be stressed as common practices to all operators.

- Wash hands before eating, drinking, or smoking.
- If heavily contacted with manures, spoiled food, or pathogenic or putrescible wastes, immediately take a hot shower and put on clean clothing.
- Wash, disinfect, and bandage any cut, no matter how small. Any break in the skin can become a source of infection. Change bandages frequently and wear protective clothing or equipment over the wound.
- Keep fingernails closely trimmed and clean (dirty nails can harbor pathogens).

Individuals who are highly debilitated or have severe allergies or asthma should not be employed to work around compost equipment.

2. Personal Protective Equipment

Personal Protective Equipment (PPE) must be evaluated as to the level of protection necessary for

particular operating conditions and then made available to facility employees. The list below includes the PPE typically used and/or required in a compost facility workplace:

- Safety shoes with steel toes;
- Hearing protection, used in areas where extended exposure to continuous high decibel levels is expected;
- Disposable rubber, latex or chemical resistant gloves for handling and/or sampling waste materials; and
- Dust filter masks.

Following use, PPE's should be disposed of or adequately cleaned, dried, and readied for reuse.

3. Mechanical Equipment Hazard Prevention

The loaders and windrow turner should be operated with care and caution. All safety equipment such as horns and lights should be functional.

4. Employee Health And Safety

Some general safety rules are:

- Use the safest method to get a job done, including using the proper equipment and tools. Review equipment O&M manuals prior to attempting repairs/changes.
- Use the buddy system in case of repairs to mechanical equipment (have a co-worker stand guard).
- Keep a diligent attitude towards safety. Lack of awareness or a careless attitude can lead to accidents.
- Know where first aid kits and fire extinguishers are located. If unsure, get training in their proper use. In emergencies, dial 911 to activate EMS.
- Equipment operators and truck drivers are required to submit to random drug screening tests.

4.1 Fire Extinguisher

Potential fire hazards at a compost facility are created from the build-up of fine dry dust particles on and around operational motors and control panels. The presence of these build-ups can cause overheating and potential fire if periodic equipment cleaning and maintenance are not practiced. Portable fire extinguishers should be maintained in a state of readiness at the screen location and on each piece of moving equipment.

4.2 Physical Exposure

Facility personnel who may come in contact with physical exposures on the job should be kept aware of the health aspects associated with the fluids, solids, and airborne constituents found at composting facilities. Training concerning safe work practices around these potential exposures should use equipment and proper disposal procedures.

4.2.1 Bioaerosols

Like physical contact with pathogen-containing wastes, bioaerosols are airborne microorganisms that can enter the body in similar locations. Bioaerosols can become airborne during mixing, turning, and screening of composted materials. Once airborne, bioaerosols may be inhaled or contact the eyes or other mucous membranes. Dirty hands may also result in inadvertent transmission to the mouth or eyes. Refer to Sections VI.1 Personal Hygiene and VI.2 Personal Protective Equipment for reminder information on personal health and safety.

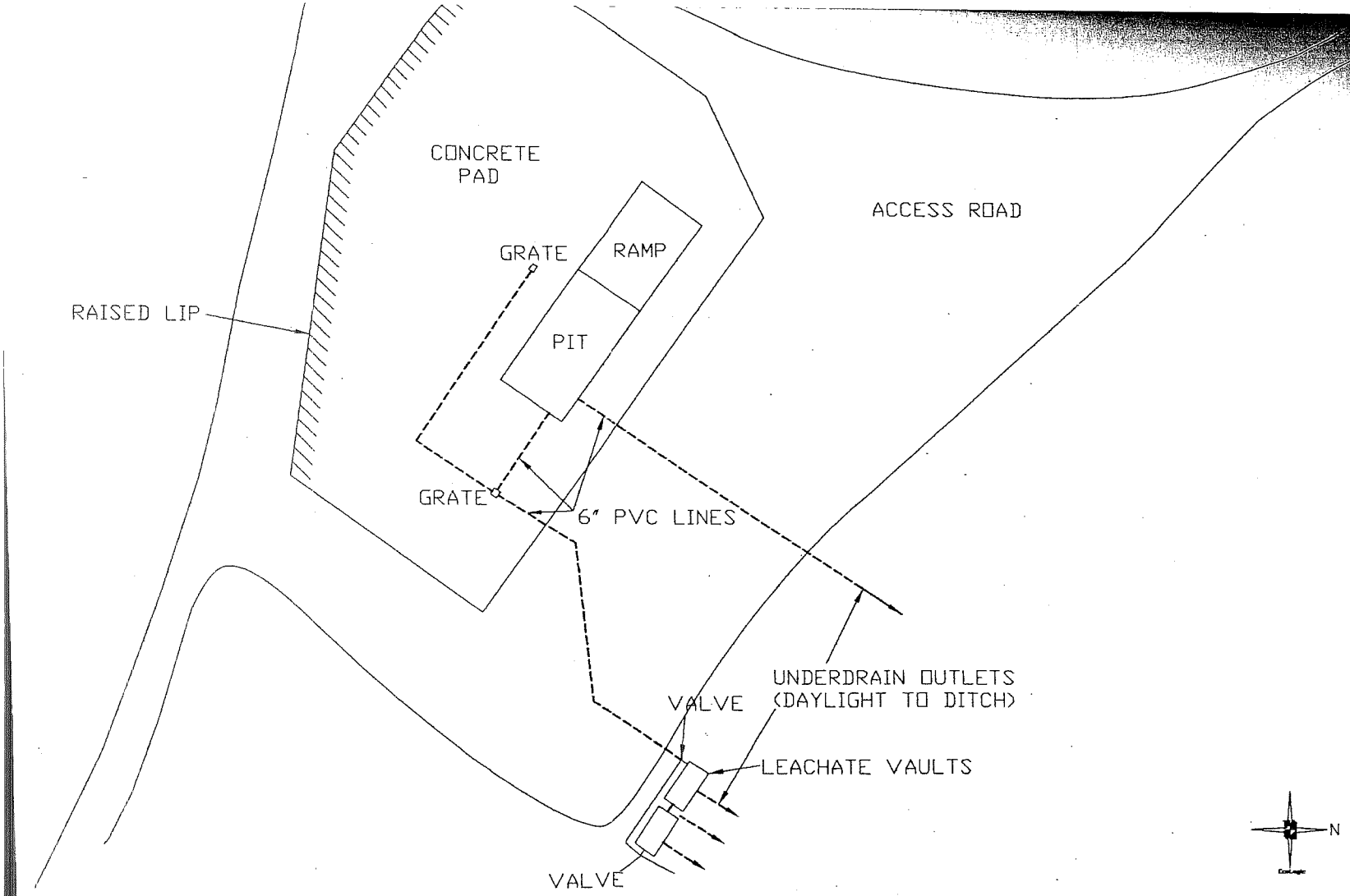
4.2.2 Dust

Excessive dust can be a health hazard as a result of its irritating effect on eyes and mucous membranes if proper PPE, such as protective goggles and dust filter masks, are not worn by all personnel in the affected areas. During periods of dry weather, excessive dust can be controlled by sprinkling water in the screening area and on access roads. Goggles and dust

masks should be worn regardless in "dusty" conditions.

APPENDIX A

SITE PLANS



PROJECT: BROOKS FARM COMPOST FACILITY

PREPARED FOR: DEAN AND JUDY BROOKS
BROOKS FARM
GOLDSTON, NC

NO. | DESCRIPTION | DATE
REVISIONS

LIQUID WASTE SOLIDIFICATION BASIN

SCALE: 1" = 30'
DATE: 6/15/04
DRN. BY: KDH
CHECKED BY:

PROJECT NO: —

SHEET 1 OF 1
DRAWING

APPENDIX B

EXAMPLE SIGN

EXAMPLE OF SIGN(S) AT ENTRANCE

BROOKS FARM COMPOST FACILITY

Dean Brooks, Owner/Operator (919) 842-0006

Emergency Contact (24 Hours) (919) 837-5914

Hours of Operation:

Monday - Friday	7:30 am - 5:00 pm
Saturday	7:30 am - 1:00 pm
Sunday	Closed

NO HAZARDOUS WASTE, ASBESTOS CONTAINING WASTE, OR MEDICAL WASTE IS ALLOWED ON SITE

YES Acceptable Wastes (with prior approval):

Pre-ground land clearing debris
Agriculture waste and manures
Food waste and food processing byproducts
Grease trap pumpings
Shredded mixed paper, cardboard
Untreated, unpainted wood and pallets
Yard and garden waste (leaves, grass, etc.)
Silviculture waste

NO Unacceptable Wastes:

Municipal solid waste (household garbage)
Industrial solid waste
Construction and demolition debris
Hazardous waste
Asbestos-containing waste
Medical waste
Treated or painted wood
Anything else we don't want

Permit # SWC-19-05

Issued by the NC Dept. of Environment and Natural Resources, Div. of Waste Management, Raleigh, NC (919) 733-0692

APPENDIX C

WINDROW DATA SHEETS

BROOKS FARM COMPOST FACILITY MONTHLY DATA SHEET

DATE_____

DATE	EGGSHELL WASTE		MANURE			BULKING AGENT				SCREENED	TONS TO STORAGE	COMPOST OUT	
	NUMBER OF LOADS	TOTAL TONS	TYPE	#OF LOADS	TOTAL TONS	TYPE	# OF LOADS	TOTAL TONS	ORIGIN	TOTAL TONS		# OF LOADS OUT	TOTAL TONS OUT
01													
02													
03													
04													
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Brooks Farm Windrow Data Sheet

Windrow No. _____

Date Construction Began: _____ Date Construction Completed: _____

Quantity/Type of Material: _____

Mix Ratio: _____

Date	Day	Temperature °F										Turned/Sampled
		P1	P2	P3	P4	P5	P6	P7	P8	P9	P10	
	00											
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APPENDIX D

COMPOST INFORMATION SHEET (EXAMPLE)

BROOKS FARM COMPOST FACILITY

COMPOST PRODUCT INFORMATION SHEET

GRADE: The compost you have purchased is **GRADE A COMPOST** derived from *recycled* yard waste, land-clearing debris (trees, brush and stumps), and other biodegradable organic wastes approved by the North Carolina Department of the Environment and Natural Resources, Division of Waste Management.

RECOMMENDED USES: Use as a *SOIL AMENDMENT* to add humic (organic) matter, improve soil texture and drainage, increase rainfall infiltration and water retention, increase biological activity, and encourage seedling emergence and root growth. Can also be used as a *MULCH* to reduce soil erosion and moisture evaporation, moderate soil temperatures, encourage seed germination, and suppress weed growth.

APPLICATION RATES: As a soil amendment, spread to no more than 3 inches depth at a time prior to mixing and repeat until the desired organic content is attained. As mulch, spread to desired thickness (3 inches minimum recommended); secure if necessary with netting, roving or pegs and twine.

THERE ARE NO RESTRICTIONS ON THE USE OF THIS PRODUCT.

Brooks Farm Compost Facility
1195 Beal Road
Goldston, NC 27252

APPENDIX E

PHOTOS

APPENDIX F

DWQ PERMIT STATUS LETTER

Michael F. Easley, Governor
William G. Ross Jr., Secretary
North Carolina Department of Environment and Natural Resources

Alan W. Klimek, P.E. Director
Division of Water Quality

June 29, 2004

Mr. Mark Taylor
EcoLogic Associates
4321-A S. Elm-Eugene St.
Greensboro, NC 27406

Subject: Permit Renewal Submittal
Brook Farm Compost
NPDES NCS000371

Dear Mr. Taylor:

This will acknowledge receipt of the application for permit renewal for the subject permit. This material was received by our Division on December 29, 2003. The application materials appear to be complete.

Unfortunately, we do not have sufficient staff available to work on the renewal permit at the present time. We will be processing a renewal permit sometime in the next six months however. Your current permit stays in effect until the agency acts on the renewal. As per General Statutes 150B-3, since you have made a timely and complete application for renewal of the permit, the current permit does not expire but continues in effect until the Division has complete work needed to issue a renewal permit.

Please let me know if I can be of further assistance

Sincerely,

Bill Mills
Environmental Engineer
Stormwater and General Permits Unit
bill.mills@ncmail.net
919-733-5083, ext 548