DIN 24736

Approved 7-22-2015

Brooks Compost Facility

Operations & Maintenance Manual

Goldston, North Carolina

Permit No.: SWC 19-05

Date: January 21, 2015

Documents Prepared By:

A.R. Rubin and Associates
192 Fearington Post
Pittsboro, NC 27312
Phone: (919) 545-3066

MacConnell & Associates, P.C.
P.O. Box 129
Morrisville, NC 27560
Phone: (919) 467-1239

Brooks Compost Facility
1195 Beal Road
Goldston, NC 27252
Phone: (919) 837-5914

Brooks Compost Facility

Operations & Maintenance Manual

Goldston, North Carolina

Permit No.: SWC 19-05

Date: January 21, 2015

Documents Prepared By:

A.R. Rubin and Associates
192 Fearington Post
Pittsboro, NC 27312
Phone: (919) 545-3066

MacConnell & Associates, P.C.
P.O. Box 129
Morrisville, NC 27560
Phone: (919) 467-1239

Brooks Compost Facility
1195 Beal Road
Goldston, NC 27252
Phone: (919) 837-5914

TABLE OF CONTENTS

I. Facility Overview 1
II. Operations Overview 2
A. Hours of Operation 2
B. Receiving 2
C. High Rate Decomposition 3
D. Stabilization 3
E. Refining, Curing, and Quality Control 4
F. Storage and Load-Out 4
G. Product Use and Marketability 5
III. Operating Procedures 5
A. Acceptable Materials 5
B. Receipt and Preparation of Materials 9
C. Windrow Composting 11
1. Feedstock Properties 12
2. Placement 13
3. Moisture Modification 14
4. Aeration (Turning) 15
D. Compost Stabilization 17
E. Refining and Curing 17
F. Quality Control 18
1. Sampling and Testing Schedule 18
2. Grab Sample Definition 19
3. Grab Sampling Procedure 19
4. Composite Sample Definition 19
5. Composite Sampling Procedure 20
G. Odor, Dust, Noise and Vector Control 20
H. Operations in Inclement Weather 22
I. On-site Water Usage 22
J. Leachate Control 23
K. Record Keeping and Reporting 24
1. Monthly Data Reports 25
2. Laboratory Sheets 25
3. Annual Report 27
IV. Equipment 28
V. Security, Safety and Fire 30
A. Security 30
B. Safety 30
C. Fire 31
VI. Health and Safety 31
A. Personal Hygiene 31
B. Personal Protective Equipment 32
C. Mechanical Equipment Hazard Prevention 32
D. Employee Health and Safety 32
1. Fire Extinguisher 33
2. Physical Exposure 33

I. Facility Overview

FACILITY: Brooks Farm Compost Facility

1195 Beal Road

Goldston, NC 27252

Phone: (919) 837-5914 - Office/Scale House Fax: (919) 837-5097

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

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

EMERGENCY CONTACTS:

Primary:	Alan Brooks (919) 842-0010 - Mobile
First Alternate:	Judy Brooks (919) 837-5261 - Home
	(919) 842-0014 - Mobile
Second Alternate:	Dean Brooks (919) 842-0006 - Mobile
Emergency Services:	911

SITE PERSONNEL:

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

Scale Operator- Weighs incoming waste materials/ outgoing materials

Truck Drivers - Haul feedstocks and finished products

Loader Operator - Constructs windrows, loads finished product, operates 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 Appendix A for maps and drawings. Drawing 1 shows an aerial view of the facility site, Drawing 2 (Original Drawing D-2 by EcoLogic) shows the compost facility as originally permitted which essentially has not changed, and Drawing 3 (Original Drawing C-102 by MacConnell & Associates P.C.) shows the facility irrigation system. Trucking and sales are handled through Brooks Contractor, a separate business owned and operated by Judy and Dean Brooks. The facility recycles about 70,000 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	7:00 am - 5:00 pm
Saturday	8:00 am - 12:00 pm
Sunday	Closed

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

B. Receiving

All incoming materials for composting must have prior consent to unload. Each incoming truck must cross scales, weighing in and out. Any vehicle entering the facility that does not do so will be immediately stopped and will not be allowed to unload its contents. Before haulers are authorized for unloading, they 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 that enter the facility and cross the scales 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 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 curing piles (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 curing piles 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 which is in the form of a brochure (see Appendix D) is given to each person who purchases a load.

If the finished material fails to meet regulatory standards or is unmarketable, it may be applied to pasture or farmland, but only if it meets Grade B compost standards and only with approval of the NC Division of Waste Management. 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. Area Farmers also utilize the compost for nutrient and organic matter, additions that assist in building productive farmland.

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. Refer to the attached process flow diagram Drawing 5 in Appendix A.

A. Acceptable Materials

We have received and successfully composted these materials. They may not be present today, however they may be added as additional feedstocks as market conditions allow.

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 waste, cannery waste, sweet potato slurry)
- Food waste, produce (pre- and post-consumer)
- Spoiled animal feed and processing waste
- 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, gelatin from capsules)
- Shredded mixed paper
- Waxed and/or food-soiled cardboard
- Animal manures/bedding
- Wallboard paper/drywall (new construction only)
- Cornstarch and/or cornstarch glue
- Drinking water plant residue
- Grease trap waste
- Oils, fats, and greases
- Untreated, unpainted wood waste and pallets
- Silviculture waste
- Wine production waste
- Polyethylene glycol (PEG) wastewater

- Sugar water food processing waste
- Engineered wood products

Approximate annual tonnages for each current incoming feedstock are as follows:

Eggshells	16,000 T
Food waste (pre and post-consumer)	10,000 T
Sawdust	1,000 T
Leaves & yard waste	7,000 T
Animal bedding	7,000 T
Grease trap waste	16,000 T
Feed waste	500 T

All averages are HIGH. With the exception of leaves, seasonal variations in incoming feedstocks cannot be predicted. Leaves are predicted as an incoming feedstock between late November and February. 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 of Rubin and Associates, by 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 nonconforming/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 liquids bulking and mixing pit or onto the adjacent concrete pad. The preparation of incoming liquid wastes consists of mixing with absorbent bulking material in the mixing pit, using a loader or an excavator (track hoe) bucket, until the mixture exhibits little or no free liquid to the equipment operator.

Examples of absorbent bulking materials are cardboard, sawdust, mulch, and animal bedding. 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. Depending on incoming

volumes and weather conditions, these "wet-mixed feedstocks" are allowed to drain and heat, in which much of the excess liquid is evaporated. Some of the wet-mixed material is re-used within the mixing pit. Ultimately, the bulked and drained wet-mixed feedstocks are placed in 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, and 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 4 (original Drawing D-3 - Liquid Waste Solidification Basin as presented in the initial application by EcoLogic) in Appendix A for a schematic of the basin layout. In addition, a 20,000 gallon tank was added for storage to prevent overflow during excess rainfall events. Photos of this tank or vault are contained in Appendix G.

Odorous wastes such as eggshells, manures and some food waste are normally incorporated into a windrow immediately upon arrival on site, or sometimes covered with leaves or finished compost and stored up to one (1) week (see Drawing 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. This stage is completed in the mixing area, so that any free liquid is allowed to drain back into the solidification basin. Finished compost is applied to static piles of food waste at a rate of 6 to 8 inches, or to fully cover the material and prevent vector attraction. 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.

Typical mixing recipes for each 25 yard windrow section:

• Eggshell-containing windrows: 13 CY eggshells, 8 CY food waste/bulking material, 4 CY wet-mixed feedstocks

• Non-eggshell windrows are comprised of approximately 21 CY of food waste/ bulking materials and

4 CY wet-mixed feedstocks

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 seven (7) 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 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 windrows that have already met PFRP. 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. We utilize three mechanical thermometers. All three are checked monthly to see if ambient and pile temperature reads the same.

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 fmal 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 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. A large, open-side storage building, approximately 120 feet by 50 feet, is available to protect screened blends from heavy rainfall events. 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.

F. Quality Control

Temperatures are taken in each windrow at 50-foot intervals down the length of the windrow using a probe and Windrow Manager 2.0 software developed by Green Mountain Technologies. This system allows for accurate record keeping and feedstock data storage. However, there are many recording systems available and the software used may fluctuate as needed. Temperatures are taken within 24 hours of turning the windrow during the time that PFRP requirements are being met, and otherwise no more frequently than every two days. A sample of a print out of one windrow's cycle is found in Appendix C. There is one report produced for each windrow that is processed.

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). A sample of the Lab Report is found in Appendix I. 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.

Off-site odor is alleviated utilizing the following strategies:

• Incoming nitrogenous feedstocks are immediately incorporated into windrows, or are covered with finished compost until they can be incorporated

• Windrows that contain eggshells are allowed to decompose on their own for the first 3-4 weeks before the first turning, and optimal conditions for turning are sought for these windrows, namely:

- Dry, sunny weather predicted for long periods of time after turning encourages a "crust" to form on the outside of the windrow, keeping odors sealed
- Wind direction coming from the North or West to allow any foul odors to travel into large wooded and scarcely populated areas to the East and Southeast of the site.

Optimal conditions for the first three turnings of the eggshell windrows are attempted, as this is when strong offensive odors are most likely to occur. However, there are times that the weather is not cooperative with our efforts, and we strive to decrease odor as much as possible in these situations.

Weather is monitored daily. If an offensive odor is detected, the suspect windrow is covered immediately with finished compost. If an offensive odor crosses the property boundary, it is noted and investigated to determine the potential suspects. All efforts are made to properly identify the odor source and halt further odor emissions.

However, it is more important to make sure that conditions are not favorable for strong offensive odors. When a windrow is turned in unfavorable weather, the odor is immediately emitted during the process and little can be done to correct or cover up the problem. The odor will continue to linger in cloudy or damp conditions, and will not cease in the absence of sunny or dry conditions. With our facility, weather conditions are the most important factor in daily operations, and determine the favorable or unfavorable conditions for odor travel and strength. This in turn determines daily activities, among other monitoring efforts.

Neighbors are encouraged to utilize the finished product, and are often recipients of free compost in exchange for dealing with the hindrances of a commercial compost facility. The majority of neighbors are very understanding, as the compost site is located near several poultry farms that produce offensive

odors on a regular basis. Furthermore, no housing developments are located within a 5-mile radius, and the majority of surrounding land is utilized in farm operations.

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 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. On-site Water Usage

All windrows are turned an average of once per week. Non-eggshell windrows can be turned twice per week, as they are recipients of increasing moisture originating from the pond prior to meeting PFRP.

These windrows can easily handle double the amount of pond water during the first 2 months. On average, moisture is applied at least twice/week, more or less depending on the weather. During this time, we are not trying to meet pathogen requirements; we are trying to utilize on-site water. These windrows can handle extra irrigation (applied with a spray truck) due to the feedstocks used. Grease trap waste, and others provide excess energy for microbes. This allows the windrows to heat quickly for extended periods of time. Within these windrows, it is necessary to add extra water in order to keep temperatures at an effective level for composting.

J. Leachate Control

The compost windrows are constructed parallel to the existing slope (transverse to contours) to allow water to drain between windrows. Runoff drains southward from the facility into an on-site retention pond via three (3) swales. There is no engineering design documentation or as-built drawing for the facility's stormwater retention pond. The following description of pond planning and construction is provided by the Owner.

Chatham County Soil and Water authorities determined that the pond location was ideal for our purpose, as it was a natural low spot on the site. Therefore, upon a preliminary soil investigation, Chatham County Soil and Water approved the site as suitable for building a containment pond. Little excavation was needed to remove existing topsoil and other unsuitable soil. The dam was installed as well as a clay liner. All labor and equipment was provided by Judy D. Brooks Contractor, Inc. An erosion permit was issued by the State of North Carolina, and an on-site inspection was performed. Dam construction began in 2001. Suitable packing clay was located about 1/3 mile from the permitted area on Brooks' farm, and was suitable for the dam construction. A pan was used to bring the clay soil to the designated site, and a bulldozer was used to grade the clay to 6" layers. A vibratory sheepsfoot roller. was used to compact the layers (see pictures). The clay was installed with the proper moisture content.

The bottom and sides of the containment pond were also lined with two (2) 6-8" lifts of properly compacted clay. All steep slopes were covered with a layer of 4" or larger flat rock for erosion control. The natural clay soils that cover the facility site serve as the base, or "pad", on which feedstock mixing, active composting, and curing occur. Heavy traffic routes, such as on-site access roads, receive a "paved" surface consisting of crushed aggregate to improve trafficability and protect the base from disturbance. Process areas are alternately covered with organic materials and exposed as windrows or stockpiles are removed. Upon removal of an organic layer, the exposed clay is visually inspected for defects such as large cracks (> 1/2"), gouges, or other obvious damage. If no damages are observed, the clay surface is scraped lightly and flat and recompacted with rubber-tired vehicles to maintain a smooth, water-shedding surface. Large cracks, gouges and the like are documented and scheduled to be repaired immediately as time permits. Repair of damaged clay consists of filling the defect with granular sodium bentonite.

Excess water, that is water not recycled back into the windrows is treated in a DWR permitted slow rate spray irrigation system. The permit is attached in Appendix F. To monitor the water quality of runoff from the site, runoff samples are collected frequently from the retention pond and analyzed in a certified lab. Retention pond water is analyzed approximately once per month for routine monitoring. Ammonia nitrogen, nitrate and nitrite nitrogen, total Kjeldahl nitrogen, biological oxygen demand, total phosphorous, total suspended solids, and arsenic are analyzed regularly.

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 onsite

1. Monthly Data Reports

Monthly data reports are produced using Windrow Manager 2.0 software developed by Green Mountain Technologies. This software is used to evaluate the overall operation and for ease of tracking materials quantities on site. 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 report and appropriately segregated on the site. This report can be modified for use as required to facilitate maintaining data required by the NCDENR and to monitor the process.

2. Laboratory Sheets

Laboratory sheets are filed with monthly data reports 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. A sample report is included in Appendix I.

Table 3-1

Brooks Farm Compost Facility

Semi-Annual Monitoring for Grade A Compost Requirements*

Parameter	Unit	Limit [put in table]
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

NOTE: Receipt of engineered wood products will require baseline monitoring for formaldehyde.

3. 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 1200 pounds per cubic yard (0.6 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:

- Scarab BD-600-RTBA windrow turner
- Rice Lake Survivor Scales
- Deere 644K rubber-tired loader
- Volvo 110E rubber-tired loader
- Volvo 120D rubber-tired loader
- One (1) finished product loader bucket
- Two (2) buckets for mixing/ screening of finished product
- Two (2) raw material loader buckets
- One (1) Allu grinder bucket for coarse wood materials
- Powerscreen Warrior 1800 screen with stacking conveyors
- Airlift Separator (screen attachment)
- Deere 450CLC Excavator
- Volvo 240C Excavator
- Bell large capacity off-road truck
- Spray truck for windrows

- Spray truck for roadways
- Kuhn 8132 Spreader
- Kubota RTV
- Green Mountain Technologies (or equivalent) software and thermometers for recordkeeping

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. Maintenance on all diesel powered equipment is conducted every 250 hours. Major overhaul is conducted as the specific equipment manual requires. Typical length of time that such an overhaul takes is 2-3 days. The windrow turner requires hammer (flail) replacement approximately every 200 hours, and will be out of service for a period of 1-3 days. Maintenance takes on average about an hour. Hired mechanics or equipment dealer service departments perform all services. All waste oil and fluids from maintenance and repairs are stored in a 1,000 gallon self-contained dike tank. When close to full, a local recycler is called to handle the transport and recycling or reuse. Noble Oil in Sanford is the local waste oil recycler, however when possible a local greenhouse comes to collect the oil for heating purposes. All Equipment operators inspect equipment at the start of each work day, and all concerns are noted and addressed. All equipment is lubricated daily. 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.

The facility maintains a good relationship with local equipment mechanics and dealers. If an unanticipated occurrence threatens the daily operations of the facility, Brooks Farm has the ability to quickly obtain rental or demo equipment to use until equipment is repaired. Protocol is as follows:

If a piece of equipment necessary for daily operations and well-being of the facility shall need repairs and be out of commission for more than (1) day, and Brooks does not have another fully operating piece

of equipment that can perform the required task, Brooks shall lease a comparable piece of equipment for as long as necessary to fully repair Brooks' existing equipment.

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 Compost Facility.

A. 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.

B. 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.

C. 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.

D. 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 properuse.

  In emergencies, dial 911 to activate EMS.

- Equipment operators and truck drivers are required to submit to random drug screening tests.

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.

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.

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 V.I. 1 Personal Hygiene and VI.2 Personal Protective Equipment for reminder information on personal health and safety.

2.2 Dust

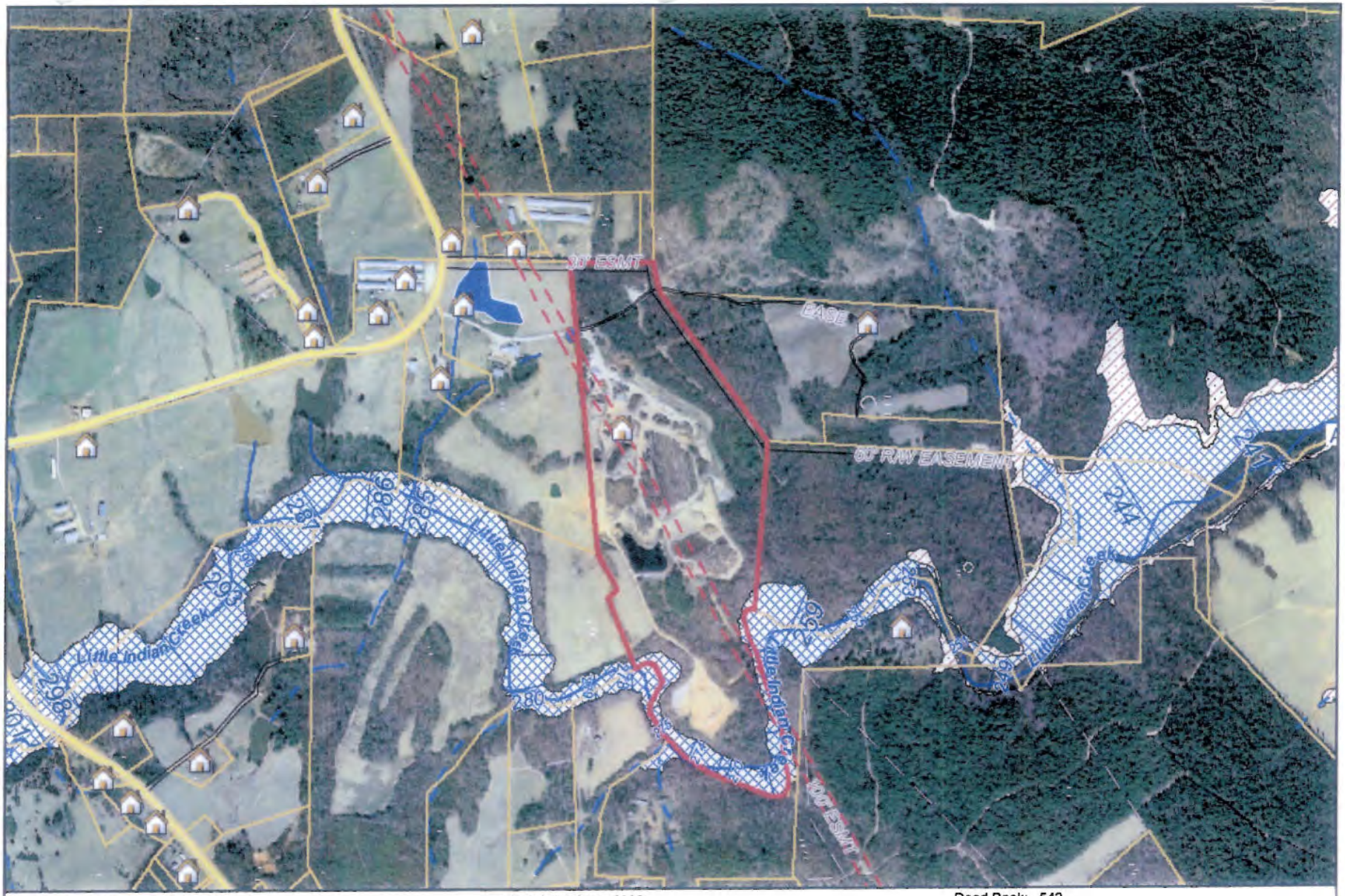
Excessive dust can be a health hazard as a result of its irritating effect on eyes and mucous membranes if proper PPE, such as protective goggles and dust filter masks, are not worn by all personnel in the affected areas. During periods of dry weather, excessive dust can be controlled by sprinkling water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

Brooks Compost Facility

Operations & Maintenance Manual

Appendix A

Maps & Drawings



CHATHAM COUNTY, NC

Property Map

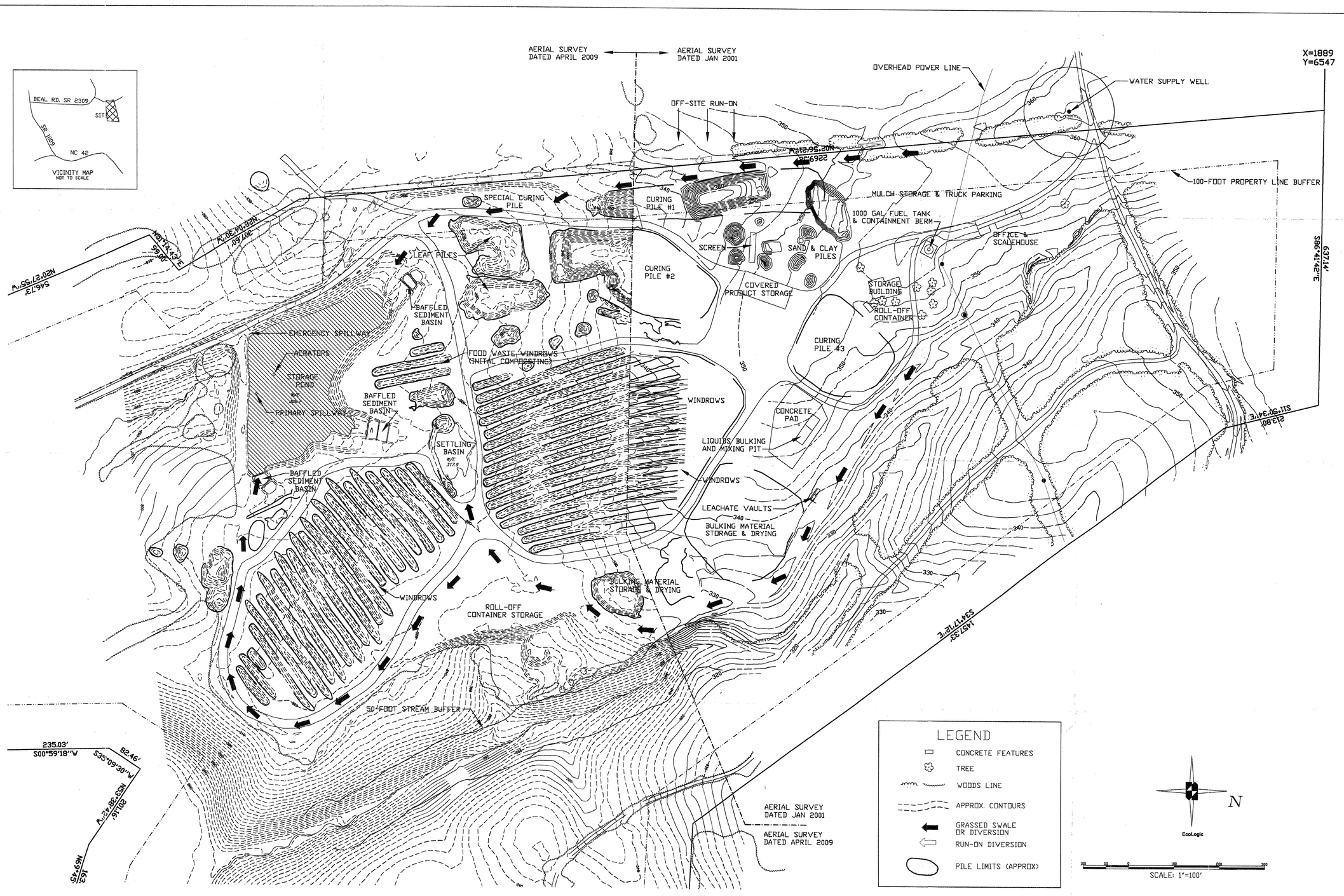
Disclaimer:
The data provided on this map are prepared for the inventory of real property found within Chatham County, NC and are compiled from recorded plats, deeds, and other public records and data. This data is for informational purposes only and should not be substituted for a true title search, property appraisal, survey, or for zoning verification.

Parcel Number:	8668
Map Number:	8695-12-2720.000
Owner Name:	BROOKS WILLIAM DEAN & JUDY D
Owner Address:	1195 BEAL RD
Owner City:	GOLDSTON
Owner Address:	BROOKS JUDY D
Owner State:	NC
Owner Zip:	27252
Description:	F10-16

Deed Book:	542
Deed Page:	0906
Plat Book::	31
Plat Page:	0061
Deed Acres:	91.79
Physical Address:	BEAL RD
Improvement Value:	16524
Land Value:	209606
Fire District:	104
Township Code:	6

One Inch = 1000 Feet

Drawing 1



EcoLogic
ECOLOGIC ASSOCIATES, P.C.
3808 CLIFTON ROAD
GREENSBORO, NC 27407
PHONE: 336/632-4441
FAX: 336/632-4445
www.ecologic-nc.com
COPYRIGHT © 2009 ECOLOGIC ASSOCIATES, P.C.

PROJECT:
BROOKS FARM
COMPOST FACILITY

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

NO.	DESCRIPTION	DATE
3	DWM COMMENTS	9/1/09
2	PERMIT RENEWAL	7/9/09
1	PERMIT RENEWAL	7/9/04

REVISIONS

NORTH CAROLINA PROFESSIONAL SEAL 10975 ENGINEER MARK A. TAYLOR

COMPOST SITE PLAN

SCALE: 1"=100'
DATE: 12/10/03
DRN. BY: MAT
CHECKED BY: MAT

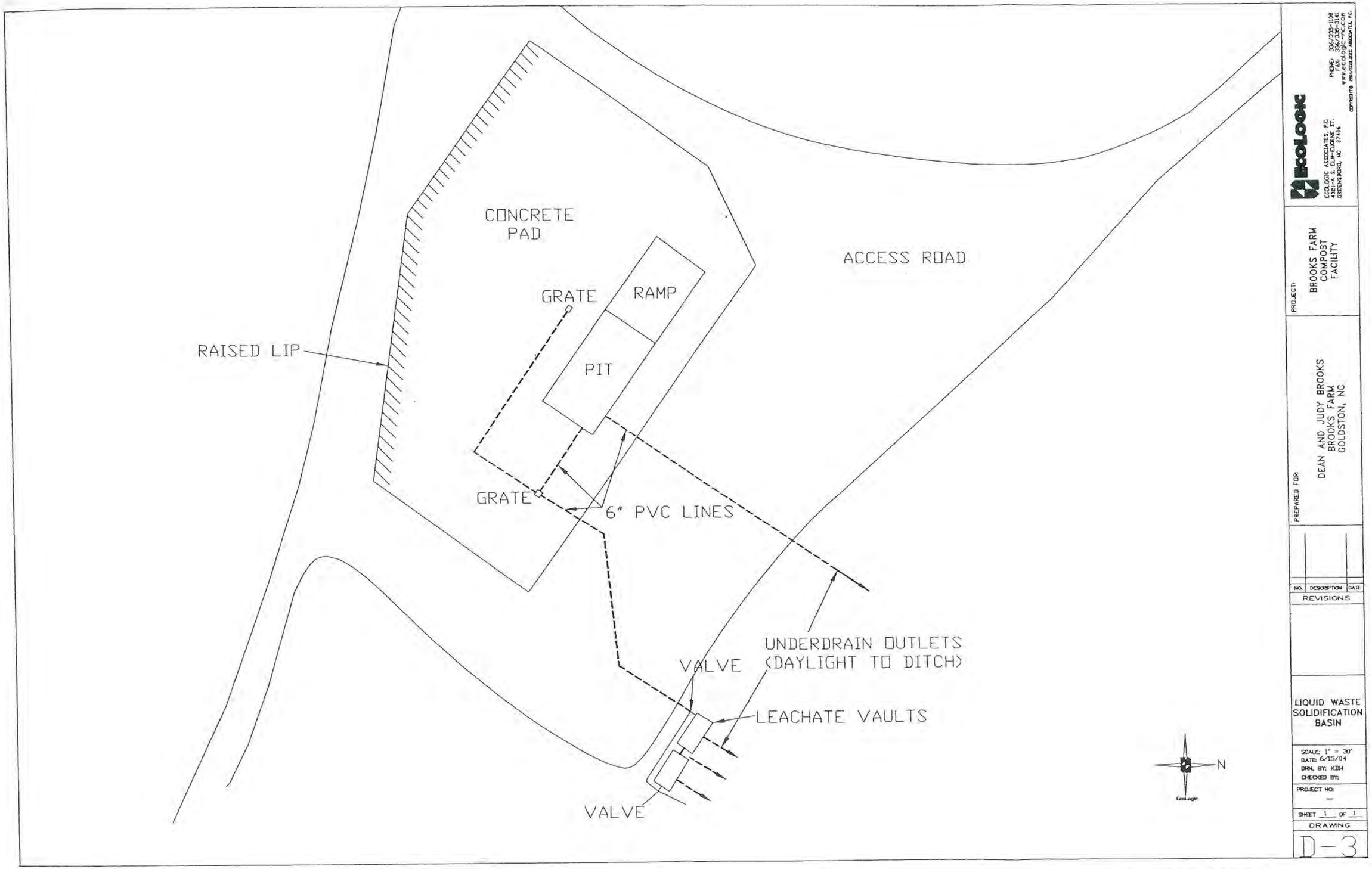
PROJECT NO:
—

SHEET ____ OF ____

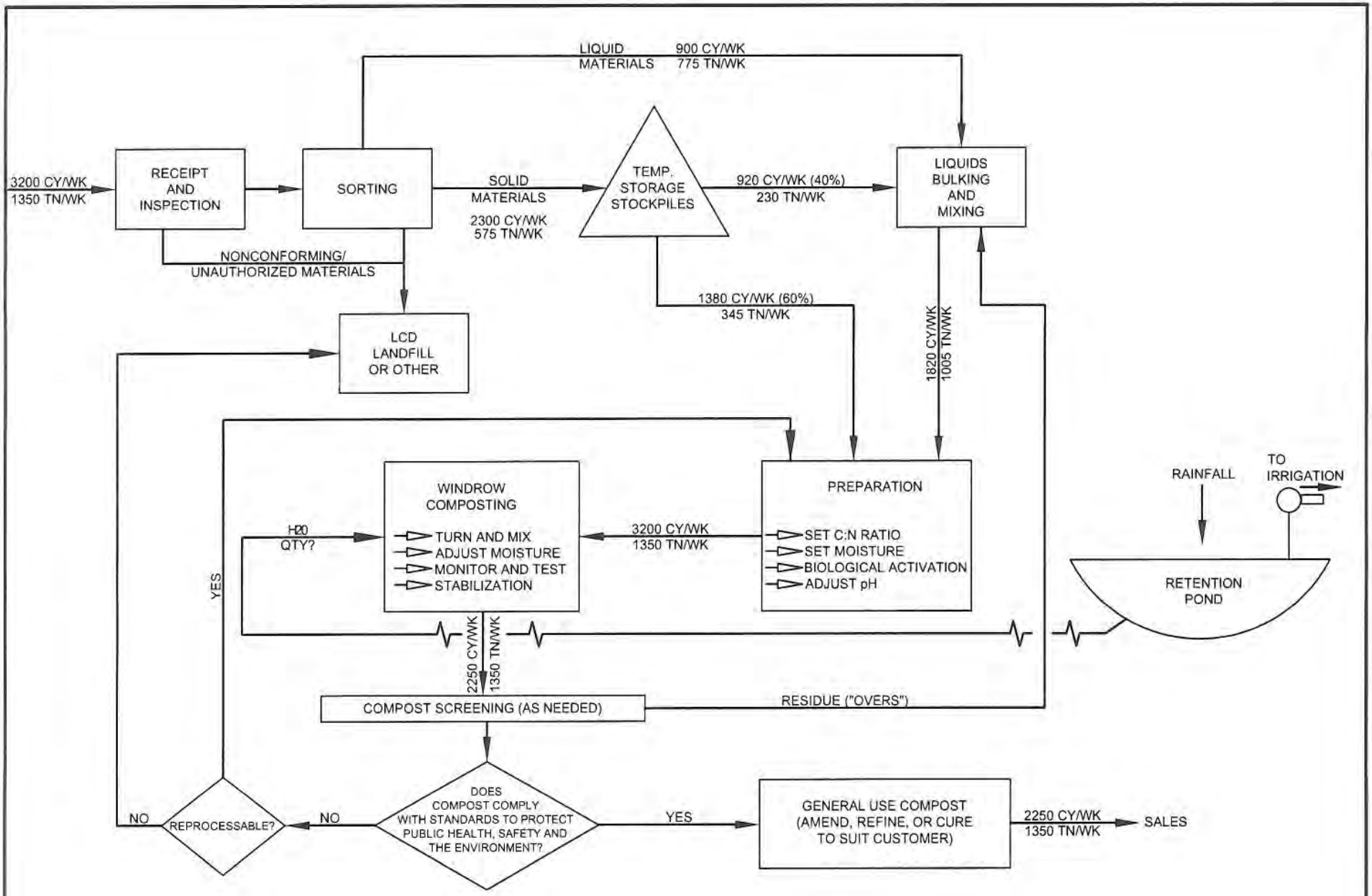
DRAWING

D-2

Drawing 2


CONCRETE PAD
ACCESS ROAD
GRATE
RAMP
PIT
RAISED LIP
GRATE
6" PVC LINES
UNDERDRAIN OUTLETS (DAYLIGHT TO DITCH)
VALVE
LEACHATE VAULTS
VALVE
N
EcoLogic
ECOLOGIC
ECOLOGIC ASSOCIATES, P.C.
4321-A S. ELM-EUGENE ST.
GREENSBORO, NC 27406
PHONE: 336/335-1108
FAX: 336/335-3141
www.ecologic-pc.com
COPYRIGHT © 2004 ECOLOGIC ASSOCIATES, P.C.
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
D-3

Drawing 4



BROOKS FARM COMPOST FACILITY
PROCESS FLOW DIAGRAM

SEPTEMBER 2015

MacCONNELL AND ASSOCIATES, PC

- DRAWING 5 -

Brooks Compost Facility

Operations & Maintenance Manual

Appendix B

Facility Signage

Brooks Contractor

Brooks Compost Facility

Permit No. SWC-19-05

Hours of Operation:

Monday-Friday 7AM-5PM

Saturday 8AM-12 NOON

Sunday CLOSED

Office 919-837-5914

24-HOUR ASSISTANCE ALAN BROOKS 919-842-0010

Please dial 911 for emergencies

ABSOLUTELY NO UNAUTHORIZED ACCESS AFTER HOURS

NO HAZARDOUS WASTES, ASBESTOS CONTAINING WASTE, BIOSOLIDS, OR MEDICAL WASTE ALLOWED ON PREMISES

www.brookscontractor.com

Brooks Contractor

BROOKS COMPOST FACILITY

ACCEPTABLE WASTES (WITH PRIOR APPROVAL):

- Pre-ground land clearing debris
- Eggshells/hatchery wastes
- Agriculture waste & animal manures
- Grease trap waste
- Food waste and food processing byproducts

UNACCEPTABLE WASTES:

- Municipal solid waste (household garbage)
- Industrial solid waste
- Construction & demolition debris
- Hazardous waste
- Medical waste
- Treated or painted wood

WE HAVE THE AUTHORITY TO REJECT ANY WASTE PRODUCT AT ANY TIME

ALL Incoming Waste **MUST** Cross Scales

Scales House & Loaders on **CHANNEL17**

Enter & Exit Scales **VERY SLOWLY**

Wait For

To EXIT
Scales

Brooks Compost Facility

Operations & Maintenance Manual

Appendix C

Example of Computer Tracking of Compost Processing (By Windrow)

Windrow Bay #11 - H. Eggshells
Batch started: 8/26/2014 9:25:33 AM

#	Date/Time	Initials	Channel	Ambient	Sample #1	Sample #2	Sample #3
1	8/28/2014	JN	Temperature		132.1 F	126.0 F	129.9 F
2	8/29/2014	JN	Temperature		129.9 F	129.9 F	127.9 F
3	8/30/2014	JN	Temperature		131.0 F	135.0 F	136.0 F
	9/1/2014		Turn Windrow				
5	9/1/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
4	9/1/2014	JN	Temperature		136.0 F	129.0 F	133.0 F
6	9/2/2014	JN	Temperature		133.0 F	136.0 F	138.0 F
7	9/3/2014	JN	Temperature		136.0 F	138.9 F	140.0 F
8	9/5/2014	JN	Temperature		136.9 F	133.0 F	138.9 F
9	9/6/2014	JN	Temperature		138.0 F	129.9 F	136.0 F
	9/8/2014		Turn Windrow				
11	9/8/2014	JN	Temperature		136.0 F	138.0 F	141.1 F
10	9/8/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
12	9/9/2014	JN	Temperature		138.0 F	140.0 F	136.0 F
13	9/10/2014	JN	Temperature		136.9 F	141.1 F	138.9 F
14	9/11/2014	JN	Temperature		136.0 F	140.0 F	133.0 F
15	9/13/2014	JN	Temperature		138.9 F	142.0 F	140.0 F
	9/15/2014		Turn Windrow				
16	9/15/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
17	9/15/2014	MT	Temperature		136.9 F	144.0 F	140.0 F
18	9/17/2014	JN	Temperature		134.1 F	134.1 F	154.0 F
	9/18/2014		Turn Windrow				
19	9/18/2014	JN	Temperature		138.0 F	136.0 F	150.1 F
20	9/20/2014	JN	Temperature		138.9 F	138.9 F	151.0 F
	9/22/2014		Turn Windrow				
21	9/22/2014	JN	Temperature		140.0 F	138.0 F	152.1 F
22	9/23/2014	JN	Temperature		140.0 F	145.9 F	142.0 F
23	9/24/2014	JN	Temperature		142.0 F	140.0 F	136.0 F
	9/25/2014		Turn Windrow				
24	9/26/2014	JN	Temperature		140.0 F	151.0 F	147.9 F
25	9/27/2014	JN	Temperature		142.0 F	150.1 F	151.0 F
	9/29/2014		Turn Windrow				
27	9/29/2014	JN	Moisture		50.0 %	50.0 %	50.0 %

This report issued for Brooks Contractor using Windrow Manager software. (C)2006 Green Mountain Technologies, Inc.

Windrow Bay #11 - H. Eggshells
Batch started: 8/26/2014 9:25:33 AM

#	Date/Time	Initials	Channel	Ambient	Sample #1	Sample #2	Sample #3
26	9/29/2014	JN	Temperature		156.0 F	138.0 F	142.0 F
28	9/30/2014	JN	Temperature		150.1 F	142.0 F	151.0 F
	10/1/2014		Turn Windrow				
29	10/1/2014	JN	Temperature		147.9 F	145.9 F	149.0 F
30	10/3/2014	JN	Temperature		144.0 F	150.1 F	156.0 F
31	10/4/2014	JN	Temperature		147.9 F	153.0 F	145.9 F
	10/6/2014		Turn Windrow				
32	10/6/2014	JN	Temperature		147.0 F	150.1 F	151.0 F
33	10/7/2014	JN	Temperature		149.9 F	146.0 F	152.1 F
34	10/7/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
35	10/9/2014	JN	Temperature		145.9 F	150.1 F	147.9 F
36	10/11/2014	JN	Temperature		145.0 F	145.9 F	150.1 F
	10/13/2014		Turn Windrow				
38	10/13/2014	JN	Temperature		147.9 F	150.1 F	145.9 F
37	10/13/2014	JN	Moisture		50.0 %	20.0 %	50.0 %
39	10/15/2014	JN	Temperature		145.9 F	151.0 F	147.9 F
40	10/17/2014	JN	Temperature		150.1 F	154.9 F	149.0 F
41	10/18/2014	JN	Temperature		154.9 F	158.0 F	159.1 F
	10/20/2014		Turn Windrow				
	10/20/2014		Irrigate Windrow				
42	10/20/2014	JN	Moisture		20.0 %	20.0 %	50.0 %
43	10/21/2014	JN	Temperature		150.1 F	147.9 F	145.9 F
44	10/23/2014	JN	Temperature		151.0 F	158.0 F	147.9 F
45	10/25/2014	JN	Temperature		150.1 F	156.0 F	151.0 F
	10/27/2014		Turn Windrow				
	10/27/2014		Irrigate Windrow				
46	10/27/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
47	10/27/2014	JN	Temperature		150.1 F	154.9 F	153.0 F
48	10/29/2014	JN	Temperature		147.9 F	149.0 F	145.9 F
49	10/31/2014	JN	Temperature		149.0 F	150.1 F	149.0 F
	11/3/2014		Turn Windrow				
51	11/3/2014	JN	Temperature		145.9 F	151.0 F	145.9 F
50	11/3/2014	JN	Moisture		50.0 %	50.0 %	50.0 %

Windrow Bay #11 - H. Eggshells
Batch started: 8/26/2014 9:25:33 AM

#	Date/Time	Initials	Channel	Ambient	Sample #1	Sample #2	Sample #3
52	11/4/2014	JN	Temperature		147.9 F	150.1 F	142.0 F
	11/6/2014		Turn Windrow				
53	11/6/2014	JN	Temperature		145.9 F	151.0 F	147.0 F
54	11/7/2014	JN	Temperature		147.0 F	150.1 F	149.0 F
55	11/8/2014	JN	Temperature		150.1 F	147.9 F	151.0 F
	11/10/2014		Turn Windrow				
56	11/10/2014	JN	Temperature		147.9 F	143.1 F	150.1 F
57	11/12/2014	JN	Temperature		143.1 F	150.1 F	147.0 F
	11/13/2014		Turn Windrow				
58	11/14/2014	JN	Temperature		140.0 F	156.0 F	147.9 F
59	11/15/2014	JN	Temperature		144.0 F	149.0 F	150.1 F
	11/17/2014		Turn Windrow				
60	11/17/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
61	11/17/2014	JN	Temperature		147.9 F	150.1 F	147.0 F
62	11/19/2014	JN	Temperature		142.0 F	145.9 F	150.1 F
63	11/21/2014	JN	Temperature		144.0 F	143.1 F	147.9 F
64	11/22/2014	JN	Temperature		145.9 F	144.0 F	150.1 F
	11/24/2014		Turn Windrow				
65	11/24/2014	JN	Temperature		142.0 F	140.0 F	147.9 F
66	11/26/2014	JN	Temperature		150.1 F	154.9 F	143.1 F
67	11/27/2014	JN	Temperature		147.9 F	150.1 F	140.0 F
68	11/29/2014	JN	Temperature		145.9 F	147.9 F	144.0 F
	12/1/2014		Turn Windrow				
69	12/1/2014	JN	Temperature		140.0 F	142.0 F	145.9 F
70	12/1/2014	JN	Moisture		50.0 %	50.0 %	50.0 %
71	12/2/2014	JN	Temperature		141.1 F	143.1 F	150.1 F
72	12/4/2014	JN	Temperature		138.0 F	150.1 F	147.9 F
73	12/6/2014	JN	Temperature		140.0 F	147.9 F	144.0 F
	12/8/2014		Turn Windrow				
74	12/8/2014	JN	Temperature		144.0 F	142.0 F	145.9 F
75	12/10/2014	JN	Temperature		140.0 F	145.9 F	143.1 F
76	12/12/2014	JN	Temperature		143.1 F	147.9 F	144.0 F
77	12/13/2014	JN	Temperature		140.0 F	143.1 F	141.1 F

Brooks Compost Facility

Operations & Maintenance Manual

Appendix D

Product Use Guide (Information Sheet)

I[illegible]ST IN YOUR LAND

Keep in mind that soil productivity is a life-long process that involves giving back what has been taken away from the soil. Compost meets this demand through utilizing organic matter waste streams to create a stabilized soil amendment that can restore decades of soil deterioration. We urge land owners to invest in their soil to enhance the beauty and productivity of their surrounding landscape, not only for their own health but for the sustained health of their communities for generations to come.

Brooks Contractor is a proud member of North Carolina Composting Council, US Composting Council and Carolina Farm Stewardship Association. We fully support other organizations that build bridges on the path to healthy lives and successful businesses in their communities.

Are you involved in a community garden project?
Those that focus on education and donating produce can in turn receive a donation of compost to help get their garden off to a great start. Contact Amy Brooks for more information about community enrichment through gardening.

1193 Beal Road
Goldston, NC 27252
info@brookscontractor.com
www.brookscontractor.com
(919) 837-5914

Brooks Contractor

PRODUCTS OFFERED BY:

Brooks COMPOST

Made in NC

Grow. Eat. Repeat.

PRODUCT USE GUIDE

"Brooks Compost is always free of Biosolids and anything else we wouldn't grow our own food in."

Brooks Compost Facility

Operations & Maintenance Manual

Appendix E

Compost Permit

North Carolina Department of Environment and Natural Resources
Division of Waste Management

Beverly Eaves Perdue
Governor

Dexter R. Matthews
Director

Dee Freeman
Secretary

January 22, 2010

Mr. Dean Brooks
Brooks Compost Facility
1195 Beal Rd
Goldston, NC 27252

Re: Solid Waste Compost Permit SWC-19-05

Dear Mr. Brooks:

Enclosed is your permit to operate a Large, Type 3 Solid Waste Compost Facility in Goldston, North Carolina. Please carefully read all permit conditions. The operation manual submitted with your application has been incorporated into your permit. Your permit number is SWC-19-05. The permit expiration date is January 22, 2015.

Mr. Robert Hearn, Environmental Senior Specialist, will be responsible for facility inspections. Mr. Hearn can be contacted at 919-508-8533. If you have any questions please feel free to contact our staff engineer Mr. Zi-Qiang Chen, Ph.D. at 919-508-8523, or myself at 919-508-8508.

Sincerely,

Michael E. Scott, Supervisor
Composting & Land Application Branch

cc: Robert Hearn, Environmental Senior Specialist, DWM
Zi-Qiang Chen, Ph.D., Composting & Land Application Branch
Central File, Solid Waste Section, Division of Waste Management

1646 Mail Service Center, Raleigh, North Carolina 27699-1646
Phone: 919-508-8400 \ FAX: 919-733-4810 \ Internet: www.wastenotnc.org

An Equal Opportunity \ Affirmative Action Employer

One NorthCarolina Naturally

STATE OF NORTH CAROLINA
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WASTE MANAGEMENT
1646 MAIL SERVICE CENTER
RALEIGH, N.C. 27699

Brooks Compost Facility

is hereby issued a permit to operate a

LARGE, TYPE 3 SOLID WASTE COMPOST FACILITY

at 1195 Beal Road in Chatham County

Permit Number: SWC-19-05

in accordance with Article 9, Chapter 130A, of the General Statutes of North Carolina and all rules promulgated thereunder and subject to the conditions set forth in this permit.

1/22/10
Date

Michael E. Scott, Branch Head
Solid Waste Section

Permit Conditions:

1. Operation and maintenance of this facility shall be in accordance with the Solid Waste Compost Rules (15A NCAC 13B, Section .1400), the Permit Application and the Operation and Maintenance Manual submitted with the permit application, and these permit conditions. Failure to comply may result in compliance actions or permit revocation by the Division of Waste Management.

2. This facility shall be operated in such a manner that erosion and runoff from the site shall be controlled. Any leachate generated at the facility and any runoff from the facility shall be managed in such a manner that ground or surface water quality will not be adversely affected. The facility shall be maintained to prevent the accumulation of stormwater or leachate on travel areas or active composting sites.

3. An appropriate Division of Water Quality permit for managing any stormwater or wastewater on the facility shall be maintained.

4. Only materials specifically listed in the permit application may be managed at this facility. Before additional materials may be added, there must be adequate testing and prior approval by the Division of Waste Management in writing.

5. All compost produced at the facility shall meet the requirements of Rule .1407 of the Solid Waste Compost Rules and the permit application.

6. Testing and reporting shall be conducted in accordance with the requirements of Rule .1408 and the permit application. An annual report of facility activities for the fiscal year July 1 to June 30 shall be submitted to the Division by August 1 of each year on forms provided by the Division. This report shall include the amount of materials composted in tons.

7. The compost operation and the compost pad shall be operated and maintained with sufficient dust control measures to minimize airborne emissions and to prevent dust from becoming a nuisance or safety hazard.

8. Windrow data shall be maintained in writing as required to document temperatures, moisture levels and turning intervals. Bulk density and C:N calculations shall be reviewed no less than every 14 days.

9. Brooks Compost Facility shall ensure that windrow moisture levels in the compost windrows are maintained in the 40-60% range for newly created windrows and compost windrows within PFRP.

10. Windrow dimensions for active composting shall be limited to a maximum of 7' high x 20' wide unless otherwise approved by the Division.

11. Windrow turning shall not occur without consulting weather forecasts for favorable conditions including temperature, wind direction, temperature inversions, and precipitation.

12. The odor management plan shall be followed to minimize odors at the facility boundary. Upon receipt of a facility complaint the facility operator shall investigate and take action as necessary to minimize the cause of the complaint. A copy of all complaints regarding this facility shall be maintained for two years including the operator's actions taken to resolve the complaints.

13. Feedstocks shall not be received that are in an anaerobic state.

14. The facility shall be operated in a manner that reduces the potential for vector attraction.

15. Stockpiling of finished product shall be limited to a height of 60'.

16. The facility operational capacity for this permit shall be limited to 75,000 tons of feedstocks per year received for composting.

17. This permit shall expire on January 22, 2015. Changes in ownership, increase in facility capacity, or receiving feed stocks not identified in the permit application shall require a permit modification.

Brooks Compost Facility

Operations & Maintenance Manual

Appendix F

Spray Irrigation Permit

NCDENR
North Carolina Department of Environment and Natural Resources

Pat McCrory
Governor

John E. Skvarla, III
Secretary

November 17, 2014

Judy D. Brooks – President
Brooks Contractor
1195 Beal Road
Goldston, North Carolina 27252

Subject: Permit No. WQ0036333
Brooks Compost Facility
Irrigation of Compost Leachate
and Stormwater Runoff
Chatham County

Dear Ms. Brooks:

In accordance with your permit minor modification request received July 11, 2014, and subsequent additional information received September 19, 2014 and October 13, 2014, we are forwarding herewith Permit No. WQ0036333 dated November 17, 2014, to Brooks Contractor for the modification of the leachate irrigation design and continued operation of the subject residuals management program.

Modifications to the subject permit are as follows:

- This permit modification approves the proposed change to irrigation forcemain diameter from 6-inche to 4-inch pipe.
- Irrigation areas for all three fields are reduced as proposed.

This permit shall be effective from the date of issuance until September 30, 2018, shall void Permit No. WQ0036333 issued October 29, 2013, and shall be subject to the conditions and limitations as specified therein. Please pay particular attention to the monitoring requirements listed in Attachments A and C for they may differ from the previous permit issuance. Failure to establish an adequate system for collecting and maintaining the required operational information shall result in future compliance problems.

Please note in order to accurately capture the irrigation activity of leachate and stormwater runoff at this facility, the following permit conditions are added to the permit:

- The permit description is updated to include details of the irrigation system.
- Condition II.5 – Application rates, whether hydraulic, nutrient or other pollutant, shall not exceed those specified in Attachment B.
- Condition III.16 & 17 – Regarding irrigation equipment calibration and restriction of automobiles or machinery on the irrigation areas.

- Condition IV.10 (o to q) – Adding a few irrigation items for records tracking.
- Condition IV.11 – Regarding submission of records tracking land application events.
- Condition IV.12 (f) – Adding noncompliance notification of ponding in or runoff from the irrigation sites.

If any parts, requirements or limitations contained in this permit are unacceptable, the Permittee has the right to request an adjudicatory hearing upon written request within 30 days following receipt of this permit. This request shall be in the form of a written petition, conforming to Chapter 150B of the North Carolina General Statutes, and filed with the Office of Administrative Hearings at 6714 Mail Service Center, Raleigh, NC 27699-6714. Unless such demands are made, this permit shall be final and binding.

One set of approved plans and specifications is being forwarded to you. If you need additional information concerning this matter, please contact Chonticha McDaniel at (919) 807-6337 or chonticha.mcdaniel@ncdenr.gov.

Sincerely,

for Thomas A. Reeder, Director
Division of Water Resources

cc: Chatham County Health Department (Electronic Copy)
Raleigh Regional Office, Water Quality Regional Operations Section (Electronic Copy)
Zachary L. Fuller, PE – MacConnell & Associates, P.C. (Electronic Copy)
Digital Permit Archive (Electronic Copy)
Central Files

NORTH CAROLINA

ENVIRONMENTAL MANAGEMENT COMMISSION

DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

RALEIGH

LAND APPLICATION (IRRIGATION) OF INDUSTRIAL BY PRODUCT COMPOST LEACHATE AND STORMWATER RUNOFF PERMIT

In accordance with the provisions of Article 21 of Chapter 143, General Statutes of North Carolina as amended, and other applicable Laws, Rules, and Regulations

PERMISSION IS HEREBY GRANTED TO

Brooks Contractor

Chatham County

FOR THE

construction and operation of a residuals (leachate) management program for Brooks Contractor and consisting of the irrigation of industrial by product compost leachate and stormwater runoff generated by the approved facilities listed in Attachment A to the approved sites listed in Attachment B including approximately 2,240 linear feet of 4-inch force main, 110-hp irrigation pump, traveling irrigation units (with big gun series 100, 224-gpm), flow meter, valves and associated appurtenances, with no discharge of wastes to surface waters, pursuant to the application received July 11, 2014, and subsequent additional information received by the Division of Water Resources, and in conformity with the project plans, specifications, and other supporting data subsequently filed and approved by the Department of Environment and Natural Resources and considered a part of this permit.

This permit shall be effective from the date of issuance until September 30, 2018, shall void Permit No. WQ0036333 issued October 29, 2013, and shall be subject to the following specified conditions and limitations:

I. SCHEDULES

1. **In accordance with 15A NCAC 02T .0116, upon completion of construction and prior to operation of this permitted facility, a certification (attached) shall be submitted from a licensed North Carolina Professional Engineer certifying that the permitted facility has been installed in accordance with this permit, Division approved plans and specifications, and other supporting documentation, including the location of all monitoring wells as applicable. If this project is to be completed in phases and partially certified, the Permittee shall retain the responsibility to track further construction approved under the same permit, and shall provide a final certificate of completion once the entire project has been completed. Mail the Certification to the Division of Water Resources, Water Quality Permitting Section, Non-Discharge Permitting Unit, 1617 Mail Service Center, Raleigh, NC 27699-1617.**

2. **The Raleigh Regional Office, telephone number (919) 791-4200, shall be notified at least 48 hours in advance (excluding weekends and holidays) of operation of the installed facilities such that an in-place inspection can be made. Notification to the regional supervisor shall be made from 8:00 a.m. until 5:00 p.m. on Monday through Friday, excluding State Holidays.**

3. The Raleigh Regional Office, telephone number (919) 791-4200, shall approve monitoring wells MW-1, MW-2, and MW-3 prior to installation, and the monitoring wells shall be installed prior to beginning waste disposal operations. The regional office shall be notified at least 48 hours prior to the construction of any monitoring well, and such notification to the regional supervisor shall be made from 8:00 a.m. until 5:00 p.m. on Monday through Friday, excluding State Holidays. The monitoring wells shall be constructed such that the water level in the well is never above or below the screened (open) portion of the well at any time during the year, and in accordance with 15A NCAC 02C .0108. The general location and name for each monitoring well is marked on Figure A.

4. Within 60 days of monitoring well completion, the Permittee shall submit two original copies of a site map with a scale no greater than 1-inch equals 100 feet; however, special provisions may be granted upon prior approval for large properties. At a minimum, the map shall include the following information:

   a. The location and identity of each monitoring well.
   b. The location of major components of the waste disposal system.
   c. The location of property boundaries within 500 feet of the disposal areas.
   d. The latitude and longitude of the established horizontal control monument.
   e. The elevation of the top of the well casing (i.e., measuring point) relative to a common datum.
   f. The depth of water below the measuring point at the time the measuring point is established.
   g. The location of compliance and review boundaries.
   h. The date the map is prepared and/or revised.

   Control monuments shall be installed in such a manner and made of such materials that the monument will not be destroyed due to activities taking place on the property. The map and any supporting documentation shall be sent to the Division of Water Resources, Water Quality Permitting Section, Non-Discharge Permitting Unit, 1617 Mail Service Center, Raleigh, NC 27699-1617.

5. No later than six months prior to the expiration of this permit, the Permittee shall request renewal of this permit on official Division forms. Upon receipt of the request, the Division will review the adequacy of the facilities described therein, and if warranted, will renew the permit for such period of time and under such conditions and limitations as it may deem appropriate. Please note Rule 15A NCAC 02T .0105(d) requires an updated site map to be submitted with the permit renewal application.

II. PERFORMANCE STANDARDS

1. The subject residuals management program shall be effectively maintained and operated at all times so there is no discharge to surface waters, nor any contravention of groundwater or surface water standards. In the event the facilities fail to perform satisfactorily, including the creation of nuisance conditions due to improper operation and maintenance, the Permittee shall immediately cease land applying residuals to the site, contact the Raleigh regional office supervisor, and take any immediate corrective actions.

2. This permit shall not relieve the Permittee of their responsibility for damages to groundwater or surface water resulting from the operation of this residuals management program.

3. All wells constructed for purposes of groundwater monitoring shall be constructed in accordance with 15A NCAC 02C .0108 (Standards of Construction for Wells Other than Water Supply), and any other jurisdictional laws and regulations pertaining to well construction.

4. Only residuals generated by the facilities listed in Attachment A are approved for land application in accordance with this permit.

5. Only the sites listed in Attachment B are approved for residuals land application. Application rates, whether hydraulic, nutrient or other pollutant, shall not exceed those specified in Attachment B.

6. Pollutant concentrations in residuals applied to land application sites listed in Attachment B shall not exceed the following **Ceiling Concentrations** (i.e., dry weight basis) or **Cumulative Pollutant Loading Rates (CPLRs):**

Parameter	Ceiling Concentration *(milligrams per kilogram)*	CPLR *(pounds per acre)*
Arsenic	75	36
Cadmium	85	34
Copper	4,300	1,338
Lead	840	267
Mercury	57	15
Molybdenum	75	n/a
Nickel	420	374
Selenium	100	89
Zinc	7,500	2,498

The Permittee shall determine compliance with the CPLRs using one of the following methods:

a. By calculating the existing cumulative level of pollutants using actual analytical data from all historical land application events of residuals, or

b. For land where residuals application have not occurred or for which the required data is incomplete, by determining background concentrations through representative soil sampling.

7. Residuals that are land applied shall meet Class B pathogen reduction requirements in 15A NCAC 02T .1106 (a) and (c). Exceptions to this requirement shall be specified in Attachment A.

8. Setbacks for treatment and storage facilities shall be as follows:

Setback Description	Setback (feet)
Habitable residence or place of public assembly under separate ownership or not to be maintained as part of the project site	100
Property lines	50
Private or public water supply	100
Surface waters (streams – intermittent and perennial, perennial waterbodies, and wetlands)	50
Wells with exception to monitoring wells	100

9. Setbacks for Class B land application sites shall be as follows:

Setback Description	Setback by application type (feet)		
	Vehicular Surface Application	Irrigation Surface Application	Injection / Incorporation
Habitable residence or place of public assembly under separate ownership or not to be maintained as part of the project site	400	400	200
Habitable residence or places of public assembly owned by the Permittee, the owner of the land, or the lessee/operator of the land to be maintained as part of the project site	0	200	0
Property lines	50	150	50
Public right of way	50	50	50
Private or public water supply	100	100	100
Surface waters (streams – intermittent and perennial, perennial waterbodies, and wetlands)	100	100	50
Surface water diversions (ephemeral streams, waterways, ditches)	25	100	25
Groundwater lowering ditches (where the bottom of the ditch intersects the SHWT)	25	100	25
Subsurface groundwater lowering system	0	100	0
Wells with exception to monitoring wells	100	100	100
Bedrock outcrops	25	25	25
Top of slope of embankments or cuts of two feet or more in vertical height	15	15	15
Building foundations or basements	0	15	0
Water lines	0	10	0
Swimming pools	100	100	100
Nitrification fields	0	20	0

10. Land application areas shall be clearly marked on each site prior to and during any residuals application event.

11. Bulk residuals and other sources of Plant Available Nitrogen (PAN) shall not be applied in exceedance of agronomic rates. Appropriate agronomic rates shall be calculated using expected nitrogen requirements based on the determined Realistic Yield Expectations (RYE) using any of the following methods:

    a. Division's pre-approved site specific historical data for specific crop or soil types by calculating the mean of the best three yields of the last five consecutive crop harvests for each field.

    b. North Carolina Historical Data for specific crop and soil types as provided by North Carolina State University Department of Soil Science (http://nutrients.soil.ncsu.edu/yields/index.php). A copy shall be kept on file and reprinted every five years in accordance with Condition IV.10.

c. If the RYE cannot be determined using methods (a) or (b) above, the Permittee may use the RYE and appropriate nutrient application rates reported in any of the following documents:

i. **Crop management plan** as outlined by the local Cooperative Extension Office, the North Carolina Department of Agriculture and Consumer Services, the Natural Resource Conservation Service, or other agronomist.

ii. **Waste Utilization Plan** as outlined by the Senate Bill 1217 Interagency Group - Guidance Document: Chapter 1 (http://www.ncagr.gov/SWC/tech/documents/9th_Guidance_Doc_100109.pdf).

iii. **Certified Nutrient Management Plan** as outlined by the Natural Resources Conservation Services (NRCS). These plans must meet the USDA-NRCS 590 Nutrient Management Standards (ftp://ftp-fc.sc.egov.usda.gov/NHQ/practice-standards/standards/590.pdf).

d. If the RYE and appropriate nutrient application rates cannot be determined, the Permittee shall contact the Division to determine necessary action.

12. When residuals are land applied to grazed pasture, hay crop realistic nitrogen rate shall be reduced by 25% in accordance with the USDA-NRCS 590 Nutrient Management Standards.

13. If land application sites are to be over-seeded or double-cropped (e.g., bermuda grass in the summer and rye grass in the winter with both crops to receive residuals), then the second crop can receive an application of PAN at a rate not to exceed 50 pounds per acre per year (lbs/ac/yr). This practice may be allowed as long as the second crop is to be harvested or grazed. If the second crop is to be planted for erosion control only and is to be tilled into the soil, then no additional PAN shall be applied.

14. Prior to land application of residuals containing a sodium adsorption ratio (SAR) of 10 or higher, the Permittee shall obtain and implement recommendations from at least one of the following: the local Cooperative Extension Office; the Department of Agriculture and Consumer Services; the Natural Resource Conservation Service; a North Carolina Licensed Soil Scientist; or an agronomist. The recommendations shall address the sodium application rate, soil amendments (e.g., gypsum, etc.), or a mechanism for maintaining site integrity and conditions conducive to crop growth. The Permittee shall maintain written records of these recommendations and details of their implementation.

15. The compliance boundary for residual land application sites shall be specified in accordance with 15A NCAC 02L .0107(b). These sites were individually permitted on or after December 30, 1983; therefore, the compliance boundary is established at either 250 feet from the residual land application area, or 50 feet within the property boundary, whichever is closest to the residual land application area. An exceedance of groundwater standards at or beyond the compliance boundary is subject to remediation action according to 15A NCAC 02L .0106(d)(2) as well as enforcement actions in accordance with North Carolina General Statute 143-215.6A through 143-215.6C. Any approved relocation of the COMPLIANCE BOUNDARY will be noted in Attachment B.

16. In accordance with 15A NCAC 02L .0108, the review boundary shall be established midway between the compliance boundary and the residual land application area. Any exceedance of groundwater standards at the review boundary shall require action in accordance with 15A NCAC 02L .0106.

III. OPERATION AND MAINTENANCE REQUIREMENTS

1. The residuals management program shall be properly maintained and operated at all times. The program shall be effectively maintained and operated as a non-discharge system to prevent any contravention of surface water or groundwater standards.

2. The Raleigh Regional Office, telephone number (919) 791-4200, and the appropriate local government official (i.e., county manager, city manager, or health director) shall be notified at least 48 hours prior to the initial residuals land application to any new land application site. Notification to the regional supervisor shall be made from 8:00 a.m. until 5:00 p.m. on Monday through Friday, excluding State Holidays.

3. The Raleigh Regional Office shall be notified via email or telephone, (919) 791-4200, at least 24 hours prior to conducting any land application activity. Such notification shall indicate, at a minimum, the anticipated application times, field IDs, and location of land application activities. If it becomes necessary to apply to additional fields due to unforeseen events, the Regional Office shall be notified prior to commencing the application to those fields.

4. The Permittee shall maintain an approved Operation and Maintenance Plan (O&M Plan) pursuant to 15A NCAC 02T .1110. Modifications to the O&M Plan shall be approved by the Division prior to utilization of the new plan. The O&M Plan, at the minimum, shall include:

   a) Operational functions;

   b) Maintenance schedules;

   c) Safety measures;

   d) Spill response plan;

   e) Inspection plan including the following information:
      i. Names and/or titles of personnel responsible for conducting the inspections;
      ii. Frequency and location of inspections, including those to be conducted by the ORC, and procedures to assure that the selected location(s) and inspection frequency are representative of the residuals management program;
      iii. Detailed description of inspection procedures including record keeping and actions to be taken by the inspector in the event that noncompliance is observed pursuant to the noncompliance notification requirements under the monitoring and reporting section of the permit;

   f) Sampling and monitoring plan including the following information:
      i. Names and/or titles of personnel responsible for conducting the sampling and monitoring;
      ii. Detailed description of monitoring procedures including parameters to be monitored;
      iii. Sampling frequency and procedures to assure that representative samples are being collected. Fluctuation in temperature, flow, and other operating conditions can affect the quality of the residuals gathered during a particular sampling event. The sampling plan shall account for any foreseen fluctuations in residuals quality and indicate the most limiting times for residuals to meet pathogen reduction requirements (e.g. facilities that land apply multiple times per year but have an annual sampling frequency, may need to sample during winter months when pathogen reduction is most likely to be negatively affected by cold temperatures).

5. Upon the Water Pollution Control System Operators Certification Commission's (WPCSOCC) classification of the facility, the Permittee shall designate and employ a certified operator in responsible charge (ORC) and one or more certified operators as back-up ORCs in accordance with 15A NCAC 08G .0201. The ORC or their back-up shall visit the facilities in accordance with 15A NCAC 08G. 0204, or as specified in the most recently approved O&M plan (i.e., see Condition III. 4), and shall comply with all other conditions of 15A NCAC 08G. 0204. For more information regarding classification and designation requirements, please contact the Division of Water Resources' Technical Assistance & Certification Unit at (919) 733-0026.

6. A copy of this permit and a copy of O&M Plan shall be maintained at the land application sites during land application activities.

7. The spill control provisions shall be maintained in all residuals transport and application vehicles.

8. Residuals shall not be stored at any land application site, unless written approval has been requested and received from the Division.

9. Adequate measures shall be taken to prevent wind erosion and surface runoff from conveying residuals from the land application sites onto adjacent properties or into surface waters.

10. A suitable vegetative cover shall be maintained on land application sites onto which residuals are applied, or application shall be in accordance with the crop management plan outlined by the local Cooperative Extension Office, the Department of Agriculture and Consumer Services, the Natural Resource Conservation Service, or an agronomist and as approved by the Division.

11. Residuals shall not be land applied under the following conditions:

    a. If the residuals are likely to adversely affect a threatened or endangered species listed under section 4 of the Endangered Species Act or its designated critical habitat;

    b. If the application causes prolonged nuisance conditions;

    c. If the land fails to assimilate the bulk residuals or the application causes the contravention of surface water or groundwater standards;

    d. If the land is flooded, frozen or snow-covered, or is otherwise in a condition such that runoff of the residuals would occur;

    e. Within the 100-year flood elevation, unless the bulk residuals are injected or incorporated within a 24-hour period following a residuals land application event;

    f. During a measurable precipitation event (i.e., greater than 0.01 inch per hour), or within 24 hours following a rainfall event of 0.5 inches or greater in a 24-hour period;

    g. If the slope is greater than 10% for surface applied liquid residuals, or if the slope is greater than 18% for injected or incorporated bulk liquid residuals;

    h. If the soil pH is not maintained at 6.0 or greater, unless sufficient amounts of lime are applied to achieve a final soil pH of at least 6.0, or if an agronomist provides information indicating that the pH of the soil, residuals and lime mixture is suitable for the specified crop. Any approved variations to the acceptable soil pH (6.0) will be noted in this permit;

    i. If the land does not have an established vegetative cover unless the residuals are incorporated or injected within a 24-hour period following a residuals land application event. Any field that is in a USDA no-till program shall be exempted from meeting this vegetative cover requirement;

    j. If the vertical separation between the seasonal high water table and the depth of residuals application is less than one foot;

    k. If the vertical separation of bedrock and the depth of residuals application is less than one foot;

    l. Application exceeds agronomic rates.

12. The following **public access** restrictions apply to residual land application sites:

    a. Public access to public contact sites (e.g., golf courses, parks, ball fields, etc.) shall be restricted for 365 days after a residuals land application event;

    b. Public access to non-public contact sites shall be restricted for 30 days after a residuals land application event.

13. Public access controls shall include the posting of signs with a minimum area of 3 square feet (e.g., 1.5' x 2'). Each sign shall indicate the activities conducted at each site, permit number, and name and contact information, including the Permittee or applicator's telephone number. Signs shall be posted in a clearly visible and conspicuous manner at the entrance to each land application site during a land application event, and for as long as the public access restrictions required under III.12 apply.

14. The following **harvesting and grazing** restrictions apply to residual land application sites after each land application event:

Harvesting and Grazing Description	Restricted Duration
Animals shall not be allowed to graze during land application activities and restricted period. Sites that are to be used for grazing shall have fencing to prevent access after each land application event.	30 days
Food crops, feed crops and fiber crops shall not be harvested for:	30 days
Turf grown on land where residuals have been applied shall not be harvested for:	12 months
Food crops with harvested parts that touch the residual/soil mixture and are totally above the land surface (e.g., tobacco, melons, cucumbers, squash, etc.) shall not be harvested for:	14 months
When the residuals remain on the land surface for four months or longer prior to incorporation into the soil, food crops with harvested parts below the land surface (e.g., root crops such as potatoes, carrots, radishes, etc.) shall not be harvested for:	20 months
When the residuals remain on the land surface for less than four months prior to incorporation into the soil, food crops with harvested parts below the land surface shall not be harvested for:	38 months

15. The Permittee shall acquire from each landowner or lessee/operator a statement detailing the volume of other nutrient sources (i.e., manufactured fertilizers, manures, or other animal waste products) that have been applied to the site, and a copy of the most recent Nutrient Management Plan (NMP) for those operations where a NMP is required by the US Department of Agriculture – National Resources Conservation Service (NRCS) or other State Agencies. The Permittee shall calculate allowable nutrient loading rates based on the provided information and use appropriate reductions.

    For the purpose of this permit condition, a Crop Management Plan (CMP), Waste Utilization Plan (WUP) or Certified Nutrient Management Plan (CNMP) shall also be considered a Nutrient Management Plan.

16. All irrigation equipment shall be tested and calibrated at least once per permit cycle. Calibration records shall be maintained at the facility for a period of no less than five years, and shall be made available to the Division upon request.

17. No automobiles or machinery shall be allowed on the irrigation sites except during equipment installation, routine maintenance, or agricultural operations.

IV. MONITORING AND REPORTING REQUIREMENTS

1. Any Division required monitoring (including groundwater, plant tissue, soil and surface water analyses) necessary to ensure groundwater and surface water protection shall be established, and an acceptable sample reporting schedule shall be followed.

2. Residuals shall be analyzed to demonstrate they are non-hazardous under the Resource Conservation and Recovery Act (RCRA). The analyses [**corrosivity, ignitability, reactivity, and toxicity characteristic leaching procedure (TCLP)**] shall be performed at the frequency specified in Attachment A, and the Permittee shall maintain these results for a minimum of five years. Any exceptions from the requirements in this condition shall be specified in Attachment A.

The TCLP analysis shall include the following parameters (the regulatory level in milligrams per liter is in parentheses):

Arsenic (5.0)	1,4-Dichlorobenzene (7.5)	Nitrobenzene (2.0)
Barium (100.0)	1,2-Dichloroethane (0.5)	Pentachlorophenol (100.0)
Benzene (0.5)	1,1-Dichloroethylene (0.7)	Pyridine (5.0)
Cadmium (1.0)	2,4-Dinitrotoluene (0.13)	Selenium (1.0)
Carbon tetrachloride (0.5)	Endrin (0.02)	Silver (5.0)
Chlordane (0.03)	Hexachlorobenzene (0.13)	Tetrachloroethylene (0.7)
Chlorobenzene (100.0)	Heptachlor (and its hydroxide) (0.008)	Toxaphene (0.5)
Chloroform (6.0)	Hexachloro-1,3-butadiene (0.5)	Trichloroethylene (0.5)
Chromium (5.0)	Hexachloroethane (3.0)	2,4,5-Trichlorophenol (400.0)
m-Cresol (200.0)	Lead (5.0)	2,4,6-Trichlorophenol (2.0)
o-Cresol (200.0)	Lindane (0.4)	2,4,5-TP (Silvex) (1.0)
p-Cresol (200.0)	Mercury (0.2)	Vinyl chloride (0.2)
Cresol (200.0)	Methoxychlor (10.0)	
2,4-D (10.0)	Methyl ethyl ketone (200.0)	

3. An analysis shall be conducted on residuals from each source generating facility at the frequency specified in Attachment A, and the Permittee shall maintain the results for a minimum of five years. The analysis shall include the following parameters:

Aluminum	Mercury	Potassium
Ammonia-Nitrogen	Molybdenum	Selenium
Arsenic	Nickel	Sodium
Cadmium	Nitrate-Nitrite Nitrogen	Sodium Adsorption Ratio (SAR)
Calcium	Percent Total Solids	TKN
Copper	pH	Zinc
Lead	Phosphorus	
Magnesium	Plant Available Nitrogen (by calculation)	

4. Residuals shall be monitored for compliance with pathogen reduction requirements at the frequency specified in Attachment A, and at the time indicated in the sampling and monitoring sections of the approved O&M plan. The required data shall be specific to the stabilization process utilized, and sufficient to demonstrate compliance with the Class B pathogen reduction requirements in 15A NCAC 02T .1106 (a) and (c) shall be met. Any exceptions from the requirements in this condition shall be specified in Attachment A.

5. An annual representative soils analysis (i.e., Standard Soil Fertility Analysis) shall be conducted on each land application site listed in Attachment B on which a residuals land application event will occur in the respective calendar year. This analysis shall be in accordance with the "Guidance on Soil Sampling" located in the Sampling Instructions section of the NC Department of Agriculture & Consumer Services' website (http://www.ncagr.gov/agronomi/pubs.htm). The Permittee shall maintain these results and a description of the sampling methodologies used to determine soil fertility for a period of no less than five years, and shall be made available to the Division upon request. At a minimum, the Standard Soil Fertility Analysis shall include the following parameters:

Acidity	Exchangeable Sodium Percentage	Phosphorus
Base Saturation (by calculation)	Magnesium	Potassium
Calcium	Manganese	Sodium
Cation Exchange Capacity	Percent Humic Matter	Zinc
Copper	pH	

6. Laboratory parameter analyses shall be performed on the residuals as they are land applied, and shall be in accordance with the monitoring requirements in 15A NCAC 02B .0505.

7. Monitor wells shall be sampled after construction and within three months prior to initiating residual application operations. Monitoring wells shall be sampled thereafter at the frequencies and for the parameters specified in Attachment C. All mapping, well construction forms, well abandonment forms and monitoring data shall refer to the permit number and the well nomenclature as provided in Attachment C and Figure A.

8. For initial sampling of monitoring wells, the Permittee shall submit a Compliance Monitoring Form (GW-59) and a Well Construction Record Form (GW-1) listing this permit number and the appropriate monitoring well identification number. Initial Compliance Monitoring Forms (GW-59) without copies of the Well Construction Record Forms (GW-1) are deemed incomplete, and may be returned to the Permittee without being processed.

9. Two copies of the monitoring well sampling and analysis results shall be submitted on a Compliance Monitoring Form (GW-59), along with attached copies of laboratory analyses, on or before the last working day of the month following the sampling month. The Compliance Monitoring Form (GW-59) shall include this permit number, the appropriate well identification number, and one GW-59a certification form shall be submitted with each set of sampling results. All information shall be submitted to the following address:

Division of Water Resources
Information Processing Unit
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

10. The Permittee shall maintain records tracking all residual land application events. At a minimum, these records shall include the following:
    a. Source of residuals;
    b. Date of land application;
    c. Location of land application (i.e., site, field, or zone number as listed in Attachment B);
    d. Approximate areas applied to (acres);
    e. Method of land application;
    f. Weather conditions (e.g., sunny, cloudy, raining, etc.);
    g. Predominant Soil Mapping Unit (e.g., CbB2);

h. Soil conditions (e.g., dry, wet, frozen, etc.);

i. Type of crop or crops to be grown on field;

j. Nitrogen Application Rate based on RYEs (if using data obtained from the North Carolina State University Department of Soil Science Website, the printout page shall be kept on file and reprinted every five years);

k. Volume of residuals land applied in gallons per acre, cubic yard per acre, dry tons per acre, or wet ton per acre;

l. Volume of animal waste or other nutrient source applied in gallons per acre, dry ton per acre, or wet tons per acre;

m. Volume of soil amendments (e.g., lime, gypsum, etc.) applied in gallons per acre, dry ton per acre, or wet tons per acre;

n. Annual and cumulative totals in dry tons per acre of residuals as well as animal waste and other sources of nutrients (e.g., if applicable), annual and cumulative pounds per acre of each heavy metal (e.g., shall include, but shall not be limited to, arsenic, cadmium, copper, lead, mercury, molybdenum, nickel, selenium, and zinc), annual pounds per acre of PAN, and annual pounds per acre of phosphorus applied to each field;

o. Length of time site is irrigated;

p. Continuous weekly, monthly, and year-to-date hydraulic (inches) loadings; and

q. Maintenance of cover crops.

11. Three copies of an annual report along with records of land application events as required in Condition IV.10 shall be submitted on or before March 1st. The annual report shall meet the requirements described in the Instructions for Residuals Application Annual Reporting Forms. Instructions for reporting and annual report forms are available at http://portal.ncdenr.org/web/wq/aps/lau/reporting, or can be obtained by contacting the Land Application Unit directly. The annual report shall be submitted to the following address:

Division of Water Resources
Information Processing Unit
1617 Mail Service Center
Raleigh, North Carolina 27699-1617

12. **Noncompliance Notification**

The Permittee shall report by telephone to the Raleigh Regional Office, telephone number (919) 791-4200, as soon as possible, but in no case more than 24 hours or on the next working day following the occurrence or first knowledge of the occurrence of any of the following:

a. Any occurrence with the land application program resulting in the land application of significant amounts of wastes that are abnormal in quantity or characteristic.

b. Any failure of the land application program resulting in a release of material to surface waters.

c. Any time self-monitoring indicates the facility has gone out of compliance with its permit limitations.

d. Any process unit failure, due to known or unknown reasons, rendering the facility incapable of adequate residual treatment.

e. Any spill or discharge from a vehicle or piping system during residuals transportation.

f. Ponding in or runoff from the irrigation sites.

Any emergency requiring immediate reporting (e.g., discharges to surface waters, imminent failure of a storage structure, etc.) outside normal business hours shall be reported to the Division's Emergency Response personnel at telephone number (800) 662-7956, (800) 858-0368, or (919) 733-3300.Persons reporting such occurrences by telephone shall also file a written report in letter form within five days following first knowledge of the occurrence. This report shall outline the actions taken or proposed to be taken to ensure that the problem does not recur.

V. INSPECTIONS

1. The Permittee shall provide adequate inspection and maintenance to ensure proper operation of the subject facilities and shall be in accordance with the approved O&M Plan.

2. Prior to each bulk residuals land application event, the Permittee or his designee shall inspect the residuals storage, transport and application facilities to prevent malfunctions, facility deterioration and operator errors resulting in discharges, which may cause the release of wastes to the environment, a threat to human health or a public nuisance. The Permittee shall maintain an inspection log that includes, at a minimum, the date and time of inspection, observations made, and any maintenance, repairs, or corrective actions taken. The Permittee shall maintain this inspection log for a period of five years from the date of inspection, and this log shall be made available to the Division upon request.

3. Any duly authorized Division representative may, upon presentation of credentials, enter and inspect any property, premises or place on or related to the land application sites or facilities permitted herein at any reasonable time for the purpose of determining compliance with this permit; may inspect or copy any records required to be maintained under the terms and conditions of this permit; and may collect groundwater, surface water or leachate samples.

VI. GENERAL CONDITIONS

1. Failure to comply with the conditions and limitations contained herein may subject the Permittee to an enforcement action by the Division in accordance with North Carolina General Statutes 143-215.6A to 143-215.6C.

2. This permit shall become voidable if the residuals land application events are not carried out in accordance with the conditions of this permit.

3. This permit is effective only with respect to the nature and volume of residuals described in the permit application and other supporting documentation.

4. The issuance of this permit does not exempt the Permittee from complying with any and all statutes, rules, regulations, or ordinances, which may be imposed by other jurisdictional government agencies (e.g., local, state, and federal). Of particular concern to the Division are applicable river buffer rules in 15A NCAC 02B .0200; erosion and sedimentation control requirements in 15A NCAC Chapter 4 and under the Division's General Permit NCG010000; any requirements pertaining to wetlands under 15A NCAC 02B .0200 and 02H .0500; and documentation of compliance with Article 21 Part 6 of Chapter 143 of the General Statutes.

5. In the event the residuals program changes ownership or the Permittee changes their name, a formal permit modification request shall be submitted to the Division. This request shall be made on official Division forms, and shall include appropriate documentation from the parties involved and other supporting documentation as necessary. The Permittee of record shall remain fully responsible for maintaining and operating the residuals program permitted herein until a permit is issued to the new owner.

6. The Permittee shall retain a set of Division approved plans and specifications for the life of the facilities permitted herein.

7. The Permittee shall maintain this permit until all permitted facilities herein are properly closed or permitted under another permit issued by the appropriate permitting authority pursuant to 15A NCAC 02T .0105(j).

8. This permit is subject to revocation or unilateral modification upon 60 days notice from the Division Director, in whole or part for the requirements listed in 15A NCAC 02T .0110.

9. Unless the Division Director grants a variance, expansion of the permitted residuals program contained herein shall not be granted if the Permittee exemplifies any of the criteria in 15A NCAC 02T .0120(b).

10. The Permittee shall pay the annual fee within 30 days after being billed by the Division. Failure to pay the annual fee accordingly shall be cause for the Division to revoke this permit pursuant to 15A NCAC 02T .0105(e)(3).

Permit issued this the 17th day of November 2014

NORTH CAROLINA ENVIRONMENTAL MANAGEMENT COMMISSION

Thomas A. Reeder, Director
Division of Water Resources
By Authority of the Environmental Management Commission

Permit Number WQ0036333

ENGINEERING CERTIFICATION

☐ Partial ☐ Final

In accordance with 15A NCAC 02T .0116, I, _____, as a duly registered Professional Engineer in the State of North Carolina, having the Permittee's authorization to ☐ periodically ☐ weekly ☐ fully observe the construction of the permitted facility, hereby state to the best of my abilities that due care and diligence was used in the observation of the construction, such that the facility was built within substantial compliance and intent of this permit, the Division approved plans and specifications, and other supporting documentation.

☐ Any variation to this permit, the Division approved plans and specifications, and other supporting documentation has been documented in the attached as-built drawings, and shall serve as the Permittee's minor modification request to amend the permit accordingly.

Provide a brief narrative description of any variations: _____

_____

_____

_____

_____
Professional Engineer's Name

_____
Engineering Firm

_____
Mailing Address

_____ _____ _____
City State Zip

_____ _____
Telephone E-mail NC PE Seal, Signature & Date

THE COMPLETED ENGINEERING CERTIFICATION, INCLUDING ALL SUPPORTING INFORMATION AND MATERIALS, SHALL BE SENT TO THE FOLLOWING ADDRESS:

NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
DIVISION OF WATER RESOURCES
WATER QUALITY PERMITTING SECTION
NON-DISCHARGE PERMITTING UNIT

By U.S. Postal Service:
1617 MAIL SERVICE CENTER
RALEIGH, NORTH CAROLINA 27699-1617

By Courier/Special Delivery:
512 N. SALISBURY STREET
RALEIGH, NORTH CAROLINA 27604

ATTACHMENT A - Approved Residual Sources

Certification Date: November 17, 2014

Brooks Contractor

Permit Number: WQ0036333 Version: 1.1

Owner	Facility Name	County	Permit Number	Biological Residuals	Monitoring Frequency for Non-hazardous Characteristics [1]	Monitoring Frequency for Metals and Nutrients [2]	Monitoring Frequency for Pathogen and Vector Reductions [3,4]
Brooks Contractor	Brooks Compost Facility	Chatham	WQ0036333	No	Once per permit cycle	Annually	As needed
Total							

1. Analyses to demonstrate that residuals are non-hazardous (i.e., TCLP, ignitability, reactivity, and corrosivity) as stipulated under permit Condition IV.2.
2. Testing of metals and nutrients as stipulated under permit Condition IV.3.
3. Analyses of pathogen and vector attraction reductions as stipulated under permit Condition IV.4 shall only be required in the event nuisance conditions occur.
4. Industrial By Product residuals are exempt from meeting the pathogen and vector attraction reduction requirements in Condition IV.4, provided they are not mixed with residuals that have been generated during the treatment of domestic wastewater, the treatment of animal processing wastewater, or the biological treatment of industrial wastewater. The Industrial By Product residuals must be treated and processed in a manner as to not meet the definition of "Biological Residuals" as defined in 15A NCAC 02T .1102(6).

If no land application events occur during a required sampling period (e.g. no land application occur during an entire year when annual monitoring is required), then no sampling data is required during the period of inactivity. The annual report shall include an explanation for missing sampling data.

ATTACHMENT B - Approved Land Application Sites

Brooks Contractor

Certification Date: November 17, 2014

Permit Number: WQ0036333 Version: 1.1

IRRIGATION AREA INFORMATION							APPLICATION LIMITATIONS [1]			
Field	Owner	County	Latitude	Longitude	Net Acreage	Dominant Soil Series	Parameter	Hourly Rate	Yearly Max	Units
1	Brooks Contractor	Chatham	35° 32' 38"	79° 21' 48"	5.54	Goldston-Badin	01284 - Application Surface Irrigation	0.5	20.26	inches
2	Brooks Contractor	Chatham	35° 32' 37"	79° 21' 43"	4.01	Goldston-Badin	01284 - Application Surface Irrigation	0.5	20.26	inches
3	Brooks Contractor	Chatham	35° 32' 38"	79° 21' 39"	2.34	Goldston-Badin	01284 - Application Surface Irrigation	0.5	20.26	inches
Total					11.89					

1. According to the agronomist report the maximum hydraulic loadings will not support the agronomic needs of the cover crops; therefore, additional nutrients may be needed. There may be a need to adjust soil fertility with lime and nutrients based on current soil tests, proposed nitrogen and phosphorus loadings from wastewater and other recommended nutrients based on soil tests.

ATTACHMENT C – Groundwater Monitoring and Limitations **Permit Number: WQ0036333 Version: 1.1**

Brooks Compost Facility

Monitoring wells: MW-1, MW-2, and MW-3

GROUNDWATER CHARACTERISTICS		GROUNDWATER STANDARDS		MONITORING REQUIREMENTS		
PCS Code	Parameter Description	Daily Maximum		Frequency Measurement	Sample Type	Footnotes
00400	pH	6.5 – 8.5	su	3 X year	Grab	1,2
00610	Nitrogen, Ammonia Total (as N)	1.5	mg/l	3 X year	Grab	1
00620	Nitrogen, Nitrate Total (as N)	10	mg/l	3 X year	Grab	1
00680	Carbon, Tot Organic (TOC)		mg/l	3 X year	Grab	1,6
00940	Chloride (as Cl)	250	mg/l	3 X year	Grab	1
31616	Coliform, Fecal MF, M-FC Broth, 44.5C		#/100ml	3 X year	Grab	1
70300	Solids, Total Dissolved -180 Deg.C	500	mg/l	3 X year	Grab	1
82546	Water Level, distance from measuring point		feet	3 X year	Calculated	1,2,3
GWVOC	Volatile Compounds GC/MS		mg/l	Annually	Grab	1,4,5
00945	Sulfate, Total (as SO_4)	250	mg/l	3 X year	Grab	1

1. 3 x Year monitoring shall be conducted in March, July & November; Annual monitoring shall be conducted every November.
2. The measurement of water levels shall be made prior to purging the wells. The depth to water in each well shall be measured from the surveyed point on the top of the casing. The measurement of pH shall be made after purging and prior to sampling for the remaining parameters.
3. The measuring points (top of well casing) of all monitoring wells shall be surveyed to provide the relative elevation of the measuring point for each monitoring well. The measuring points (top of casing) of all monitoring wells shall be surveyed relative to a common datum.
4. Volatile Organic Compounds (VOC) - In November only, analyze by one of the following methods:
   a. Standard Method 6230D, PQL at 0.5 µg/L or less
   b. Standard Method 6210D, PQL at 0.5 µg/L or less
   c. EPA Method 8021, Low Concentration, PQL at 0.5 µg/L or less
   d. EPA Method 8260, Low Concentration, PQL at 0.5 µg/L or less
   e. Another method with prior approval by the Water Quality Permitting Section Chief

   Any method used must meet the following qualifications:
   a. A laboratory must be DWQ certified to run any method used.
   b. The method used must, at a minimum, include all the constituents listed in Table VIII of Standard Method 6230D.
   c. The method used must provide a PQL of 0.5 µg/L or less that must be supported by laboratory proficiency studies as required by the DWQ Laboratory Certification Unit. Any constituents detected above the MDL but below the PQL of 0.5 µg/L must be qualified (estimated) and reported.
5. If any volatile organic compounds (VOC) are detected as a result of monitoring as provided in Attachment C, then the Raleigh Regional Office supervisor, telephone number (919) 791-4200, must be contacted immediately for further instructions regarding any additional follow-up analyses required.
6. If TOC concentrations greater than 10 mg/l are detected in any downgradient monitoring well, additional sampling and analysis must be conducted to identify the individual constituents comprising this TOC concentration. If the TOC concentration as measured in the background monitor well exceeds 10 mg/l, this concentration will be taken to represent the naturally occurring TOC concentration. Any exceedances of this naturally occurring TOC concentration in the downgradient wells shall be subject to the additional sampling and analysis as described above.
7. Monitoring wells shall be reported consistent with the nomenclature and location information provided in Figure A and this attachment.

Figure A

WQ0036333 - Brooks Compost Facility

NOTES

1. SEE SHEET C-101 FOR GENERAL NOTES.

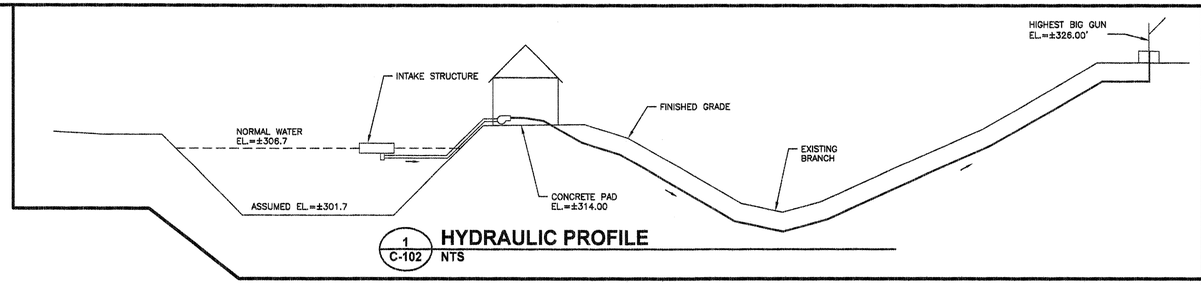
ALL FIELDS ARE DESIGNED FOR USE WITH A NELSON 100 SERIES BIG GUN SPRINKLER OPERATING AT 60 PSI WITH A 1.0" NOZZLE (224 GPM @ 316' DIAMETER).

2. IRRIGATION COVER CROP SHALL BE IN ACCORDANCE WITH AGRONOMIST REPORT.

3. PLANT VEGETATED BUFFER AREAS WITH TALL FESCUE OR COMMON BERMUDA AND OVERSEED WITH WINTER RYE.

4. GROUNDWATER MONITORING WELLS SHALL BE INSTALLED IN ACCORDANCE WITH 15A NCAC 02C AND OTHER APPLICABLE DWQ REQUIREMENTS.

5. THE EXISTING ROAD THROUGH THE SPRAY FIELDS SHALL BE REMOVED AND THE SOIL RENOVATED FOR IRRIGATION.



1 / C-102 **HYDRAULIC PROFILE**
NTS

LEGEND

- 110 — EXISTING INDEX CONTOUR
- 108 — EXISTING INTERMEDIATE CONTOUR
- EXISTING EASEMENT
- x x EXISTING FENCE
- EXISTING ROAD/PATH
- EXISTING CREEK
- EXISTING DITCH
- RIGHT OF WAY
- TRAVELING REEL UNIT PATH
- FM PROPOSED FORCEMAIN
- ADJOINING PROPERTY
- EXISTING TREELINE

COPYRIGHT © 2012

NAD 83
N:653,390.65
E:1,691,467.10

ROBERT L. GAINES
D.B. 98E, PG 116
PIN# 8695-00-32-9715

FAYE P. MITCHELL
D.B. 1095, PG 0015
PIN# 8695-00-23-7401

EXISTING 60' PRIVATE ACCESS EASEMENT

PROPOSED 4" PVC OR HDPE FORCEMAIN

20' MIN. SETBACK FROM PROPERTY LINE

APPROXIMATE LOCATION OF PROPOSED UP GRADIENT GROUNDWATER MONITORING WELL

APPROXIMATE LOCATION OF EXISTING FARM ROAD TAKEN FROM BING MAPS.

MW-1

EXISTING FARM ROAD/PATH (TYP.)

±20' OF 8" D.I. PIPE SLEEVE @ ROAD

IRRIGATION (HYDRANT) TYP. OF 3

150'

MIN. 150' SETBACK FROM PROPERTY LINE TO WETTED AREA OF IRRIGATION FIELD

PROPOSED TRAVELING REEL UNIT PATH

SPRAY LINE

FIELD #3
101,966 ft²

R158'

COMPOST WINDROWS

PROPOSED VEGETATIVE BUFFER

COMPOST IRRIGATION HYDRANT

ELECTROMAGNETIC FLOW METER LOCATED ON PUMP DISCHARGE (SEE "IRRIGATION PUMP" DETAIL.)

M.J. 45° D.I. OR HDPE ELBOW (TYP.)

PROPERTY LINE

PROPOSED TRAVELING REEL UNIT PATH

FIELD #1
241,269 ft²

MIN. 100' SETBACK FROM SURFACE WATERS TO WETTED AREA OF IRRIGATION FIELD

SPRAY LINE

FIELD #2
174,723 ft²

SOILS AREA #2

R158'

INTAKE STRUCTURE (FLOATING OR CORRUGATED ALUMINUM)

EXISTING FLOATING AERATION

WATER LEVEL INDICATOR

EXISTING STORMWATER POND EL.=306.7

PROPOSED 18'X12' CONC. PAD AND SHELTER FOR PUMP

6" SUCTION PIPE

PROPOSED VEGETATIVE BUFFER

HALE 50FB-M CENTRIFUGAL IRRIGATION PUMP WITH 100 HP DIESEL ENGINE OR EQUAL (LOCATED IN SHELTER)

MW-3

APPROXIMATE LOCATION OF PROPOSED DOWN GRADIENT GROUNDWATER MONITORING WELL. WELL TO BE LOCATED BETWEEN 100' AND 150' FROM SPRAY FIELD AS DETERMINED BY THE RALEIGH REGIONAL OFFICE.

MW-2

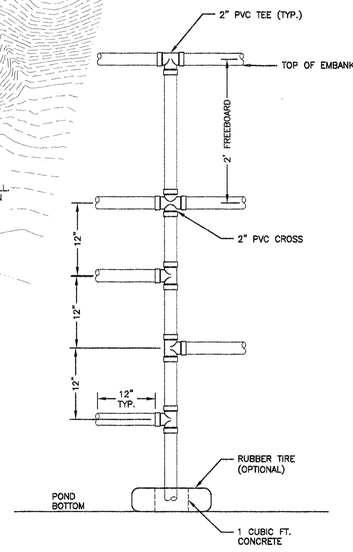
APPROXIMATE LOCATION OF PROPOSED DOWN GRADIENT GROUNDWATER MONITORING WELL. WELL TO BE LOCATED BETWEEN 100' AND 150' FROM SPRAY FIELD AS DETERMINED BY THE RALEIGH REGIONAL OFFICE.

MIN. 100' SETBACK FROM SURFACE WATERS TO WETTED AREA OF IRRIGATION FIELD

EXISTING BRANCH

CHARLES R. HANLINE
D.B. 1291, PG 0313
PIN# 8695-00-00-0000

INDIAN CREEK



1 / C-102 **POND WATER LEVEL INDICATOR**
NTS

A. R. Rubin, Ed.D.
President

A. R. Rubin and Associates
sustainable environmental solutions

192 fearrington post
pittsboro, nc, 27312

919 545 3066
919 270 0344

GRAPHIC SCALE: 1" = 100'
0 50 100 200 300

REVISIONS		
NO.	DATE	DESCRIPTION
1	05/02/13	PER DWQ
2	07/26/13	PER DWQ
3	07/08/14	PER OWNER
4	08/22/14	PER OWNER

PROJECT MANAGER:	PROJECT ENGINEER:
GSM	ZLF
DRAWN BY:	CHECKED BY:
MAE	GSM

DATE:
NOVEMBER 26, 2012

NORTH CAROLINA PROFESSIONAL SEAL 17069 ENGINEER GARY S. MacCONNELL
8/24/14

MacCONNELL & Associates, P. C.
1903 NORTH HARRISON AVE., SUITE 102
CARY, NORTH CAROLINA 27513
P. O. BOX 129
MORRISVILLE, NORTH CAROLINA 27560
TEL: (919) 467-1239 FAX: (919) 319-6510

BROOKS FARM

LAND APPLICATION IRRIGATION SYSTEM

CHATHAM COUNTY, NC

PROPOSED IRRIGATION SYSTEM

PROJECT NUMBER	DRAWING NUMBER
A45202.00	C-102

A45202.00 – BROOKS FARM – LAND APPLICATION IRRIGATION SYSTEM

Brooks Compost Facility

Operations & Maintenance Manual

Appendix G

Photos

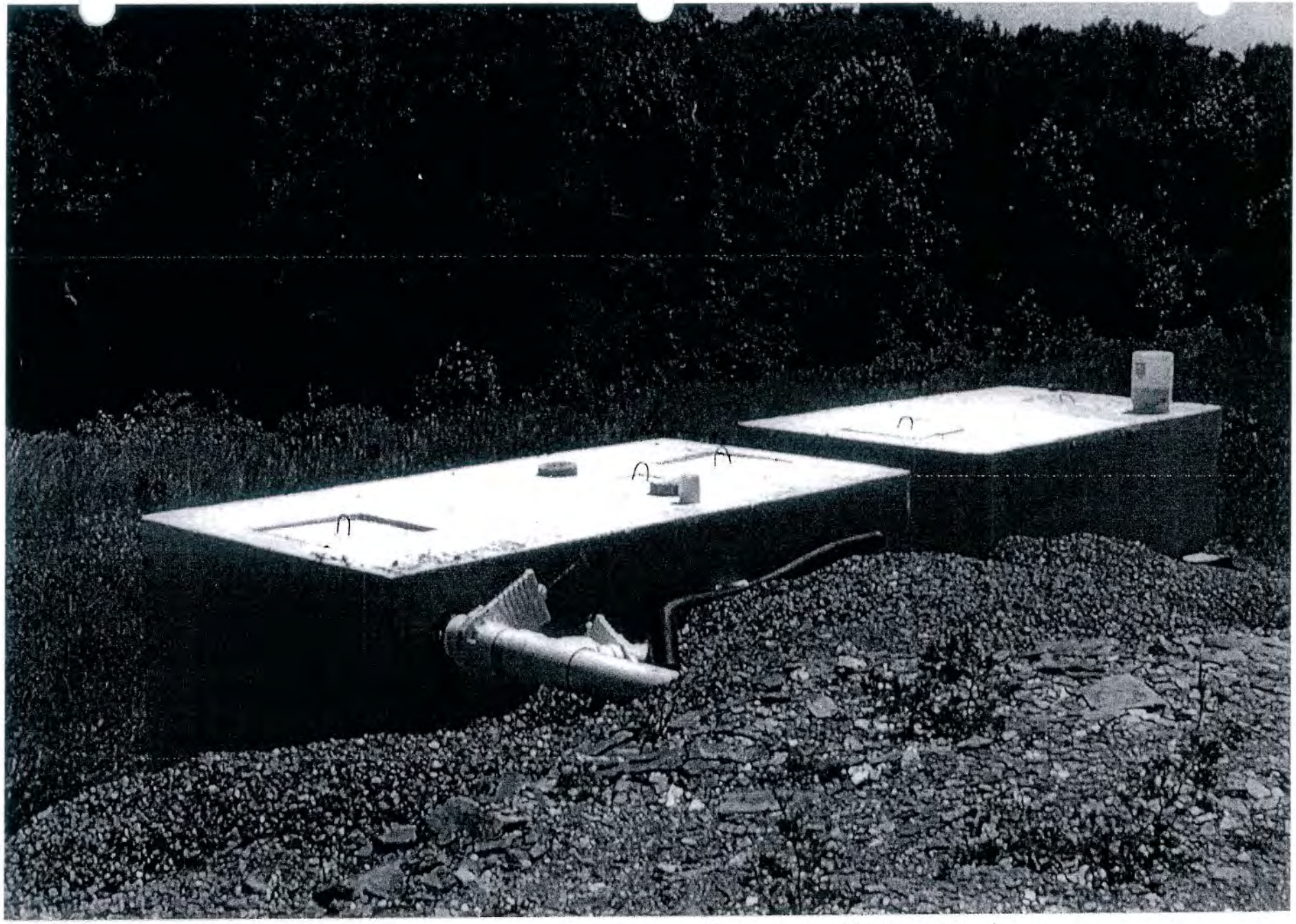


Photo 1: Liquid Storage Vaults

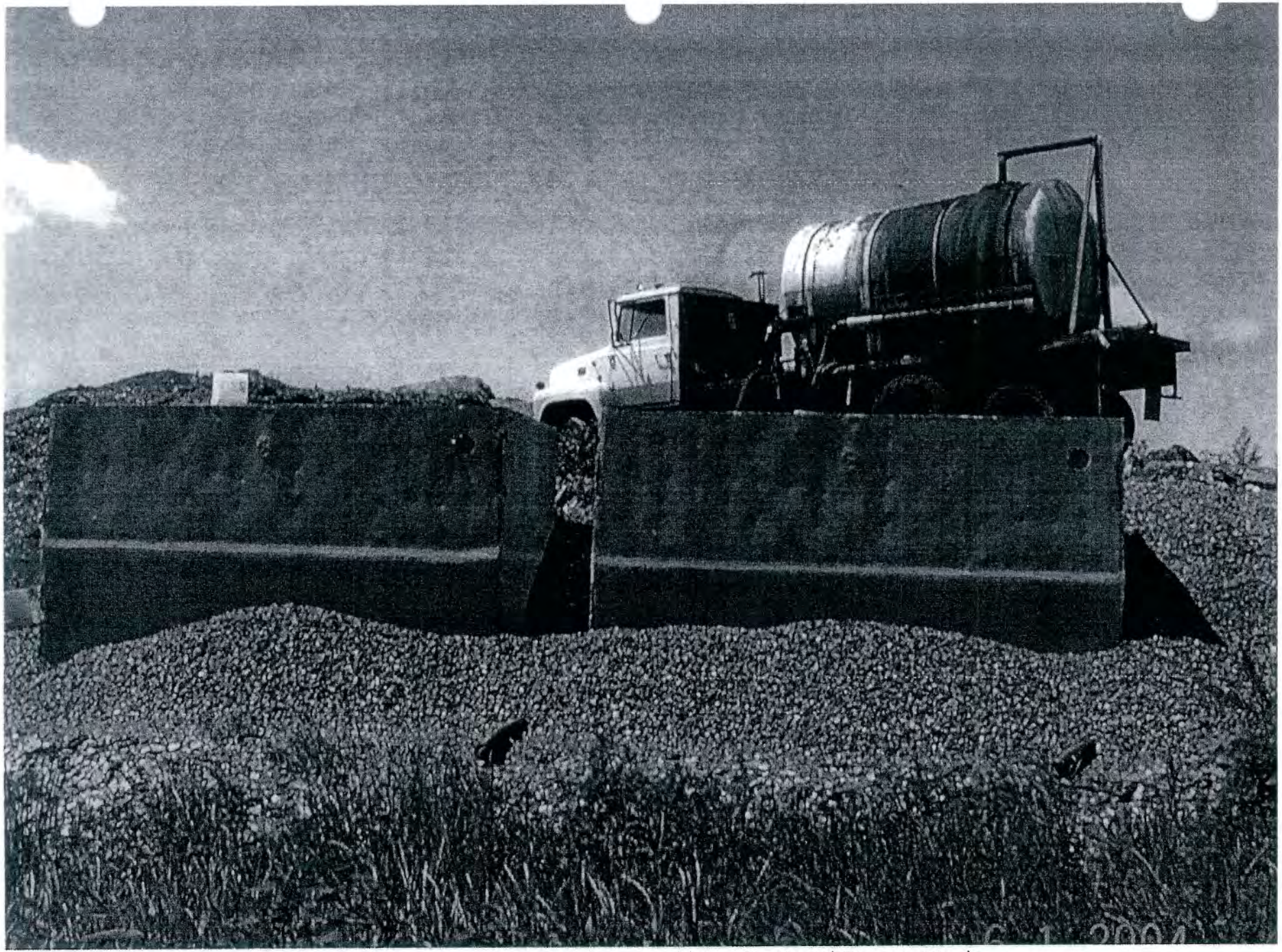


Photo 2: Liquid Storage Vaults

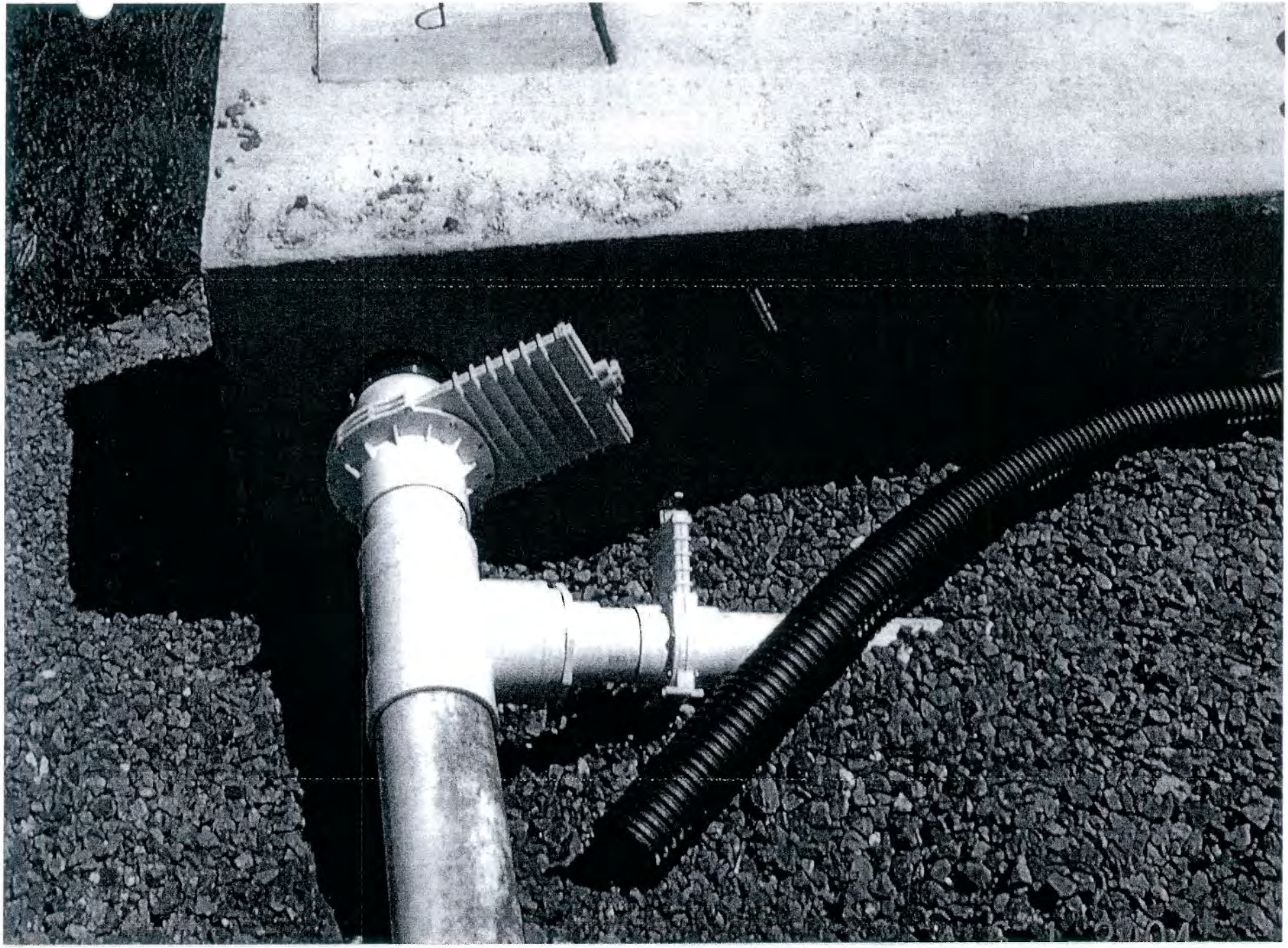


Photo 3: Isolation Valve on Vault

Brooks Compost Facility

Operations & Maintenance Manual

Appendix H

Zoning Letter

Sustainable Communities Development Department
Planning Division
Post Office Box 54
80-A East Street – Dunlap Building
Pittsboro, NC 27312-0054

CHATHAM COUNTY
NORTH CAROLINA

Phone: 919-542-8204
Fax: 919-542-2698
www.chathamnc.org/planning

January 20, 2015

Brooks Construction
1195 Beal Rd.
Goldston, NC 27252

Attn: Judy Brooks

RE: Chatham County Zoning Regulations

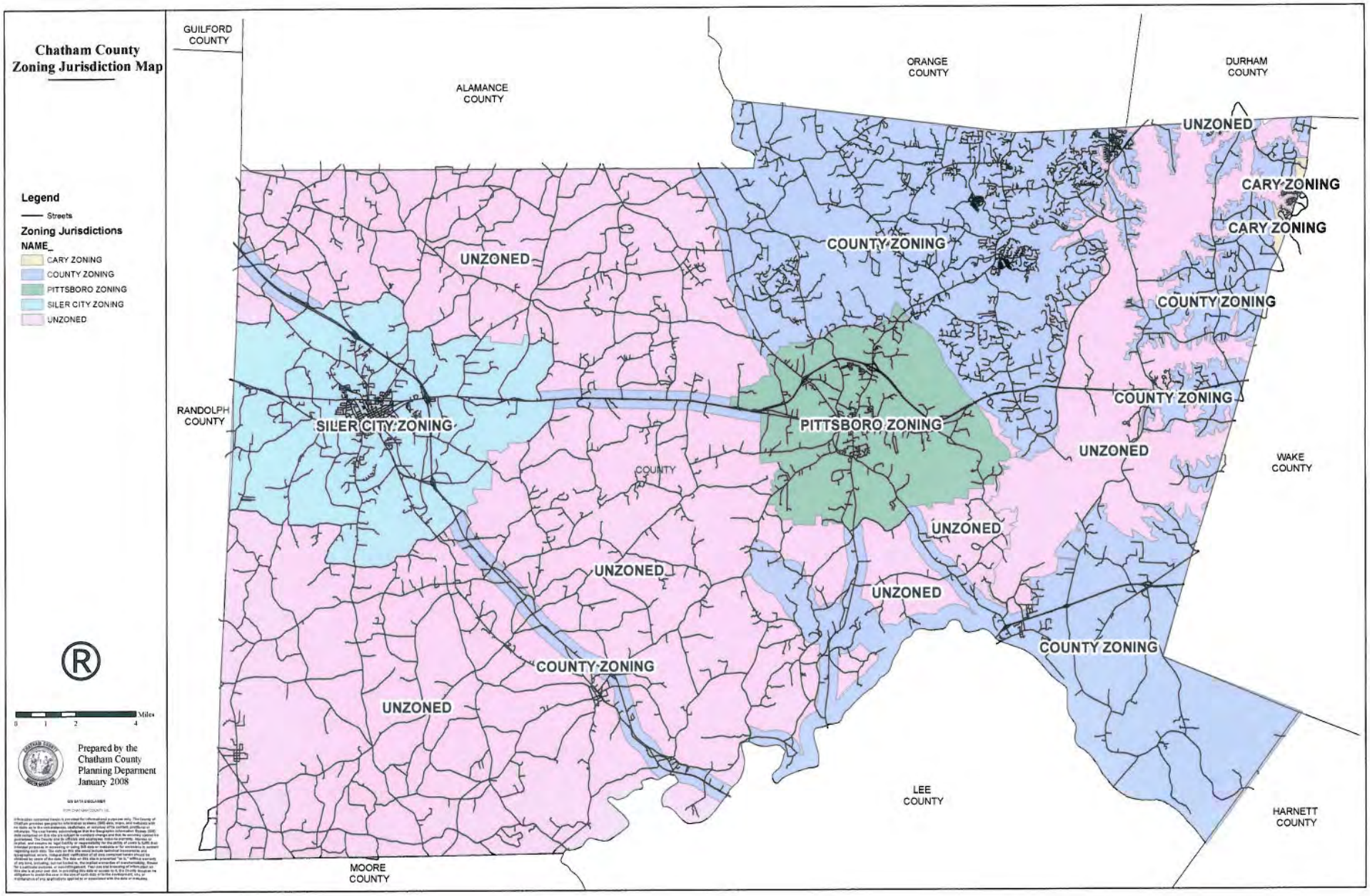
Dear Mrs. Brooks,

A request has been made by Mr. A. R. Rubin for the zoning classification and compliance status of your compost/landfill business located on Parcel No. 8668 and Parcel No. 8477. This property remains in an unzoned portion of the county where zoning regulations do not apply. There may be, at times, other county or state regulations that may apply to this site should you ever need information on expansions of the existing areas or subdividing of these properties.

At this time we find these properties are in compliance with county regulations. Please feel free to contact us with any questions or concerns you may have.

Respectfully,
Angela Birchett
Angela Birchett, CZO
Zoning Administrator

Cc: file
A. R. Rubin, 192 Fearrington Post, Pittsboro, NC, 27312 via email


Chatham County
Zoning Jurisdiction Map
Legend
Streets
Zoning Jurisdictions
NAME_
CARY ZONING
COUNTY ZONING
PITTSBORO ZONING
SILER CITY ZONING
UNZONED
Miles
0 1 2 4
Prepared by the
Chatham County
Planning Deparment
January 2008
GUILFORD COUNTY
ALAMANCE COUNTY
ORANGE COUNTY
DURHAM COUNTY
RANDOLPH COUNTY
WAKE COUNTY
LEE COUNTY
HARNETT COUNTY
MOORE COUNTY
COUNTY
UNZONED
CARY ZONING
CARY ZONING
COUNTY ZONING
COUNTY ZONING
COUNTY ZONING
SILER CITY ZONING
PITTSBORO ZONING
UNZONED
UNZONED
UNZONED
UNZONED
COUNTY ZONING
COUNTY ZONING
UNZONED

Brooks Compost Facility

Operations & Maintenance Manual

Appendix I

Laboratory Analysis

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

12 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 4080815-2/2-7372
Group: Aug.14 E #27
Reporting Date: September 12, 2014

Brooks Contractor
1195 Beal Rd.
Goldston, NC 27252
Attn: Amy Brooks

Date Received: 28 Aug. 14
Sample Identification: BR-1F
Sample ID #: 4080815 - 2/2

Nutrients	Dry wt.	As Rcvd.	units
Total Nitrogen:	1.1	0.67	%
Ammonia (NH_4-N):	34	21	mg/kg
Nitrate (NO_3-N):	200	130	mg/kg
Org. Nitrogen (Org.-N):	1.1	0.68	%
Phosphorus (as P_2O_5):	0.54	0.33	%
Phosphorus (P):	2400	1500	mg/kg
Potassium (as K_2O):	0.26	0.16	%
Potassium (K):	2100	1300	mg/kg
Calcium (Ca):	15	9.0	%
Magnesium (Mg):	0.28	0.17	%
Sulfate (SO_4-S):	110	66	mg/kg
Boron (Total B):	7.0	4.3	mg/kg
Moisture:	0	38.1	%
Sodium (Na):	0.11	0.065	%
Chloride (Cl):	0.073	0.045	%
pH Value:	NA	7.46	unit
Bulk Density :	31	51	lb/cu ft
Carbonates ($CaCO_3$):	340	210	lb/ton
Conductivity (EC5):	1.3	NA	mmhos/cm
Organic Matter:	31.0	19.2	%
Organic Carbon:	17.0	10.0	%
Ash:	69.0	42.7	%
C/N Ratio	16	16	ratio
AgIndex	> 10	> 10	ratio

Stability Indicator:		Biologically
CO2 Evolution	Respirometery	Available C
mg CO_2-C/g OM/day	2.2	2.2
mg CO_2-C/g TS/day	0.68	0.69
Stability Rating	*stable*	*stable*

Maturity Indicator: Cucumber Bioassay		
Compost:Vermiculite(v:v)	1:1	1:3
Emergence (%)	100	100
Seedling Vigor (%)	100	100
Description of Plants	*healthy*	*healthy*

Pathogens	Results	Units	Rating
Fecal Coliform	400	MPN/g	*pass*
Salmonella	< 3	MPN/4g	*pass*

Date Tested: 28 Aug. 14

Inerts	% by weight
Plastic	< 0.5
Glass	< 0.5
Metal	< 0.5
Sharps	ND

Metals	Dry wt.	EPA Limit	units
Aluminum (Al):	4600	-	mg/kg
Arsenic (As):	2.6	41	mg/kg
Cadmium (Cd):	< 1.0	39	mg/kg
Chromium (Cr):	19	1200	mg/kg
Cobalt (Co)	2.8	-	mg/kg
Copper (Cu):	23	1500	mg/kg
Iron (Fe):	8100	-	mg/kg
Lead (Pb):	13	300	mg/kg
Manganese (Mn):	320	-	mg/kg
Mercury (Hg):	< 1.0	17	mg/kg
Molybdenum (Mo):	< 1.0	75	mg/kg
Nickel (Ni):	5.5	420	mg/kg
Selenium (Se):	< 1.0	36	mg/kg
Zinc (Zn):	110	2800	mg/kg

Size & Volume Distribution

MM	% by weight	% by volume	BD g/cc
> 50	0.0	0.0	0.00
25 to 50	0.0	0.0	0.00
16 to 25	0.0	0.0	0.00
9.5 to 16	0.0	0.0	0.00
6.3 to 9.5	0.0	0.0	0.00
4.0 to 6.3	0.9	0.9	0.73
2.0 to 4.0	13.5	19.0	0.52
< 2.0	85.6	80.2	0.77

Bulk Density Description:<.35 Light Materials, .35-.60 medium weight materials, >.60 Heavy Materials

Analyst: Assaf Sadeh

*Sample was received and handled in accordance with TMECC procedures.

Account No.:		Date Received	28 Aug. 14	
4080815 - 2/2 - 7372		Sample i.d.	BR-1F	
Group:	Aug.14 E No. 27	Sample I.d. No.	2/2	4080815

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate — Biodegradation Rate of Your Pile
2.2 mg CO2-C/ g OM/day
++++++++
< Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Biologically Available Carbon (BAC) — Optimum Degradation Rate
2.2 mg CO2-C/ g OM/day
++++++++
<Stable >|<Moderately Unstable>|< Unstable >|< High For Mulch

Is Your Compost Mature?

AmmoniaN/NitrateN ratio
0.17 Ratio
+++
VeryMature>|< Mature >|< Immature

Ammonia N ppm
34 mg/kg dry wt.
+++
VeryMature>|< Mature >|< Immature

Nitrate N ppm
200 mg/kg dry wt.
++
< Immature >|< Mature

pH value
7.46 units
++
< Immature >|< Mature >|< Immature

Cucumber Emergence
100.0 percent
++
< Immature >|< Mature

Is Your Compost Safe Regarding Health?

Fecal Coliform
< 1000 MPN/g dry wt.
+++++++
< Safe >|< High Fecal Coliform

Salmonella
Less than 3 /4g dry wt.
+++++++
<Safe (none detected) >|< High Salmonella Count(> 3 per 4 grams)

Metals US EPA 503
Pass dry wt.
+++++++++
<All Metals Pass >|< One or more Metals Fail

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)
1.9 Percent dry wt.
++++++++++++++
<Low >|< Average >|< High Nutrient Content

AgIndex (Nutrients / Sodium and Chloride Salts) ((N+P2O5+K2O) / (Na + Cl))
10 Ratio
+++
Na & Cl >|< Nutrient and Sodium and Chloride Provider >|< Nutrient Provider

Plant Available Nitrogen (PAN) — Estimated release for first season
3 lbs/ton wet wt.
+++++++++++
Low Nitrogen Provider>|< Average Nitrogen Provider >|<High Nitrogen Provider

C/N Ratio
16 Ratio
+++++++++++++++++++++++++++++++
< Nitrogen Release >|< N-Neutral >|< N-Demand>|< High Nitrogen Demand

Soluble Available Nutrients & Salts (EC5 w/w dw)
1.3 mmhos/cm dry wt.
++++++
SloRelease>|< Average Nutrient Release Rate >|<High Available Nutrients

Lime Content (CaCO3)
340 Lbs/ton dry wt.
++
< Low >|< Average >|< High Lime Content (as CaCO3)

What are the physical properties of your compost?

Percent Ash
69.0 Percent dry wt.
+++
< High Organic Matter >|< Average >|< High Ash Content

Sieve Size % > 6.3 MM (0.25")
0.0 Percent dry wt.
+
All Uses >|< Size May Restrict Uses for Potting mix and Golf Courses

Account No.:		Date Received	28 Aug. 14
4080815 - 2/2 - 7372		Sample i.d.	BR-1F
Group:	Aug.14 E No. 27	Sample I.d. No.	2/2 4080815

INTERPRETATION:

Is Your Compost Stable?

Respiration Rate

2.2 Low: Good for all uses mg CO2-C/g OM/day

The respiration rate is a measurement of the biodegradation rate of the organic matter in the sample (as received). The respiration rate is determined by measuring the rate at which CO2 is released under optimized moisture and temperature conditions.

Biologically Available Carbon

2.2 Low: Good for all uses mg CO2-C/g OM/day

Biologically Available Carbon (BAC) is a measurement of the rate at which CO2 is released under optimized moisture, temperature, porosity, nutrients, pH and microbial conditions. If both the RR and the BAC test values are close to the same value, the pile is optimized for composting. If both values are high the compost pile just needs more time. If both values are low the compost has stabilized and should be moved to curing. BAC test values that are higher than RR indicate that the compost pile has stalled. This could be due to anaerobic conditions, lack of available nitrogen due to excessive air converting ammonia to the unavailable nitrate form, lack of nitrogen or other nutrients due to poor choice of feedstock, pH value out of range, or microbes rendered non-active.

Is Your Compost Mature?

AmmoniaN:NitrateN ratio

0.17 very mature

Ammonia N ppm	
34	very mature
Nitrate N ppm	
200	mature
pH value	
7.46	mature

Composting to stabilize carbon can occur at such a rapid rate that sometimes phytotoxins remain in the compost and must be neutralized before using in high concentrations or in high-end uses. This step is called curing. Typically ammonia is in excess with the break-down of organic materials resulting in an increase in pH. This combination results in a loss of volatile ammonia (it smells). Once this toxic ammonia has been reduced and the pH drops, the microbes convert the ammonia to nitrates. A low ammonia + high nitrate score is indicative of a mature compost, however there are many exceptions. For example, a compost with a low pH (<7) will retain ammonia, while a compost with high lime content can lose ammonia before the organic fraction becomes stable. Composts must first be stable before curing indicators apply.

Cucumber Bioassay

100.0 Percent

Cucumbers are chosen for this test because they are salt tolerant and very sensitive to ammonia and organic acid toxicity. Therefore, we can germinate seeds in high concentrations of compost to measure phytotoxic effects without soluble salts being the limiting factor. Values above 80% for both percent emergence and vigor are indicative of a well-cured compost. Exceptions include very high salts that affect the cucumbers, excessive concentrations of nitrates and other nutrients that will be in range when formulated to make a growing media. In addition to testing a 1:1 compost: vermiculite blend, we also test a diluted 1:3 blend to indicate a more sensitive toxicity level.

Is Your Compost Safe Regarding Health?

Fecal Coliform

< 1000 / g dry wt.

Fecal coliforms can survive in both aerobic and anaerobic conditions and is common in all initial compost piles. Most human pathogens occur from fecal matter and all fecal matter is loaded in fecal coliforms. Therefore fecal coliforms are used as an indicator to determine if the chosen method for pathogen reduction (heat for compost) has met the requirements of sufficient temperature, time and mixing. If the fecal coliforms are reduced to below 1000 per gram dry wt. it is assumed all others pathogens are eliminated. Potential problems are that fecal coliform can regrow during the curing phase or during shipping. This is because the conditions are now more favorable for growth than during the composting process.

Salmonella Bacteria

Less than 3 3 / 4g dry wt.

Salmonella is not only another indicator organism but also a toxic microbe. It has been used in the case of biosolids industry to determine adequate pathogen reduction.

Metals

Pass

The ten heavy metals listed in the EPA 503 regulations are chosen to determine if compost can be applied to ag land and handled without toxic effects. Most high concentrations of heavy metals are derived from woodwaste feedstock such as chrome-arsenic treated or lead painted demolition wood. Biosolids are rarely a problem.

Does Your Compost Provide Nutrients or Organic Matter?

Nutrients (N+P2O5+K2O)

1.9 low nutrient content

This value is the sum of the primary nutrients Nitrogen, Phosphorus and Potassium. Reported units are consistent with those found on fertilizer formulations. A sum greater than 5 is indicative of a compost with high nutrient content, and best used to supply nutrients to a receiving soil. A sum below 2 indicates low nutrient content, and is best-used to improve soil structure via the addition of organic matter. Most compost falls between 2 and 5.

Account No.:		Date Received	28 Aug. 14
4080815 - 2/2 - 7372		Sample I.d.	BR-1F
Group:	Aug.14 E No. 27	Sample I.d. No.	2/2 4080815

INTERPRETATION:

AgIndex (Nutrients/Na+Cl)

10 High nutrient ratio Composts with low AgIndex values have high concentrations of sodium and/or chloride compared to nutrients. Repeated use of a compost with a low AgIndex (< 2) may result in sodium and/or chloride acting as the limiting factor compared to nutrients, governing application rates. These composts may be used on well-draining soils and/or with salt-tolerant plants. Additional nutrients form another source may be needed if the application rate is limited by sodium or chloride. If the AgIndex is above 10, nutrients optimal for plant growth will be available without concern of sodium and/or chloride toxicity. Composts with an AgIndex of above 10 are good for increasing nutrient levels for all soils. Most composts score between 2 and 10. Concentrations of nutrients, sodium, and chloride in the receiving soil should be considered when determining compost application rates. The AgIndex is a product of feedstock quality. Feedstock from dairy manure, marine waste, industrial wastes, and halophytic plants are likely to produce a finished compost with a low AgIndex.

Plant Available Nitrogen (lbs/ton)

3 Low N Provider Plant Available Nitrogen (PAN) is calculated by estimating the release rate of Nitrogen from the organic fraction of the compost. This estimate is based on information gathered from the BAC test and measured ammonia and nitrate values. Despite the PAN value of the compost, additional sources of Nitrogen may be needed during he growing season to off-set the Nitrogen demand of the microbes present in the compost. With ample nutrients these microbes can further breakdown organic matter in the compost and release bound Nitrogen. Nitrogen demand based on a high C/N ratio is not considered in the PAN calculation because additional Nitrogen should always be supplemented to the receiving soil when composts with a high C/N ratio are applied.

C/N Ratio

16 Indicates immaturity As a guiding principal, a C/N ratio below 14 indicates maturity and above 14 indicates immaturity, however, there are many exceptions. Large woodchips (>6.3mm), bark, and redwood are slow to breakdown and therefore can result in a relatively stable product while the C/N ratio value is high. Additionally, some composts with chicken manure and/or green grass feedstocks can start with a C/N ratio below 15 and are very unstable. A C/N ratio below 10 supplies Nitrogen, while a ratio above 20 can deplete Nitrogen from the soil. The rate at which Nitrogen will be released or used by the microbes is indicated by the respiration rate (BAC). If the respiration rate is too high the transfer of Nitrogen will not be controlable.

Soluble Nutrients & Salts (EC5 w/w dw - mmhos/cm)

1.3 Average salts This value refers to all soluble ions including nutrients, sodium, chloride and some soluble organic compounds. The concentration of salts will change due to the release of salts from the organic matter as it degrades, volatilization of ammonia, decomposition of soluble organics, and conversion of molecular structure. High salts + high AgIndex is indicative of a compost high in readily available nutrients. The application rate of these composts should be limited by the optimum nutrient value based on soil analysis of the receiving soil. High Salts + low AgIndex is indicative of a compost low in nutrients with high concentrations of sodium and/or chloride. Limit the application rate according to the toxicity level of thesodium and/or chloride. Low salts indicates that the compost can be applied without risking salt toxicity, is likely a good source of organic matter, and that nutrients will release slowly over time.

Lime Content (lbs. per ton)

340 High lime content Compost high in lime or carbonates are often those produced from chicken manure (layers) ash materials, and lime products. These are excellent products to use on a receiving soil where lime has been recommended by soil analysis to raise the pH. Composts with a high lime content should be closely considered for pH requirements when formulating potting mixes.

Physical Properties

Percent Ash

69.0 High ash content Ash is the non-organic fraction of a compost. Most composts contain approximately 50% ash (dry weight basis). Compost can be high in ash content for many reasons including: excess mineriIzation(old compost), contamination with soil base material during turning, poor quality feedstock, and soil or mineral products added. Finding the source and reducing high ash content is often the fastest means to increasing nutrient quality of a compost.

Particle Size % > 6.3 MM (0.25")

0.0 Suitable for all uses Large particles may restrict use for potting soils, golf course topdressings, seed-starter mixes, and where a fine size distribution is required. Composts with large particles can still be used as excellent additions to field soils, shrub mixes and mulches.

Particle Size Distribution

Each size fraction is measured by weight, volume and bulk density. These results are particularly relevent with decisions to screen or not, and if screening, which size screen to use. The bulk density indicates if the fraction screened is made of light weight organic material or heavy mineral material. Removing large mineral material can greatly improve compost quality by increasing nutrient and organic concentrations.

Appendix:

Plant Available Nitrogen (PAN) calculations:
PAN = (X * (organic N)) + ((NH4-N) + (NO3-N))
X value = If BAC < 2 then X = 0.1
If BAC =2.1 to 5 then X = 0.2
If BAC =5.1 to 10 then X = 0.3
If BAC > 10 then X = 0.4
Note: If C/N ratio > 15 additional N should be applied.

Estimated available nutrients for use when calculating application rates

	lbs/ton (As Rcvd.)
Plant Available Nitrogen (PAN)	2.9
Ammonia (NH4-N)	0.04
Nitrate (NO3-N)	0.26
Available Phosphorus (P2O5*0.64)	4.4
Available Potassium (K2O)	3.1

ANALYTICAL CHEMISTS
and
BACTERIOLOGISTS
Approved by State of California

SOIL CONTROL LAB

42 HANGAR WAY
WATSONVILLE
CALIFORNIA
95076
USA

TEL: 831-724-5422
FAX: 831-724-3188
www.compostlab.com

Account #: 4080815-2/2-7372
Group: Aug.14 E #27
Reporting Date: September 12, 2014

Brooks Contractor
1195 Beal Rd.
Goldston, NC 27252
Attn: Amy Brooks

Date Received: 28 Aug. 14
Sample Identification: BR-1F
Sample ID #: 4080815 - 2/2

Metals & Bacteria

Metals		Results	Units	MDL	% Recovery	Date Tested
Arsenic (As):		2.6	mg/kg dw	1.0	107.2	05 Sep. 14
Cadmium (Cd):	Less than	1.0	mg/kg dw	1.0	96.2	05 Sep. 14
Chromium (Cr):		19	mg/kg dw	1.0	101.9	05 Sep. 14
Copper (Cu):		23	mg/kg dw	1.0	89.1	05 Sep. 14
Lead (Pb):		13	mg/kg dw	1.0	101.7	05 Sep. 14
Mercury (Hg):	Less than	1.0	mg/kg dw	1.0	120.9	05 Sep. 14
Molybdenum (Mo):	Less than	1.0	mg/kg dw	1.0	101.2	05 Sep. 14
Nickel (Ni):		5.5	mg/kg dw	1.0	95.9	05 Sep. 14
Selenium (Se):	Less than	1.0	mg/kg dw	1.0	110.7	05 Sep. 14
Zinc (Zn):		110	mg/kg dw	1.0	94.6	05 Sep. 14
Cobalt (Co)		2.8	mg/kg dw	0.50	99.7	05 Sep. 14
Total Solids (TMECC 03.09)		62	%	0.05	NA	29 Aug. 14

Bacteria		Results	Units	MDL	Date Tested
Fecal Coliform		400	MPN/g dw		28 Aug. 14
Salmonella	Less than	3	MPN/4g dw	3	28 Aug. 14

Pollutant Loading Rate:
Multiply mg/kg dry weight values times 0.0561 to give you kilograms pollutant per 100 metric ton compost as-received based on a moisture content of 38.1 percent.

Method (metals): EPA 3050B / EPA 6010
Method (metals): TMECC 04.12-B / 04.14-A
Method (Mercury Hg) TMECC 04.06 / EPA 7471
Method (Fecal Coliform): Standard Methods 9221E
Method (Salmonella): TMECC 07.02-A

Analyst: Assaf Sadeh

Brooks Compost Facility

Operations & Maintenance Manual

Appendix J

Facility Compliance Audit Report

FACILITY COMPLIANCE INSPECTION REPORT
Division of Waste Management
Solid Waste Section

UNIT TYPE:												
Lined MSWLF		LCID		YW		Transfer		Compost	X	SLAS		COUNTY: **Chatham**
Closed MSWLF		HHW		White goods		Incin		T&P		FIRM		PERMIT NO.: **19-05**
CDLF		Tire T&P / Collection		Tire Monofill		Industrial Landfill		DEMO		SDTF		FILE TYPE: COMPLIANCE

Date of Site Inspection: January 12, 2015 **Date of Last Inspection:** February 20, 2014

FACILITY NAME AND ADDRESS:
Brooks Compost Facility – Large, Type 3 Solid Waste Compost Facility
1195 Beal Road
Goldston, NC 27252

GPS COORDINATES: N: 35.54431 E: -79.36780

FACILITY CONTACT NAME AND PHONE NUMBER:
Amy Brooks, Assistant Site Manager - Brooks Contractor
w. 919-837-5914
f. 919-837-5097
c. 919-842-6063
amy@brookscontractor.com
www.brookscontractor.com

FACILITY CONTACT ADDRESS:
Brooks Contractor
Amy Brooks, Assistant Site Manager
1195 Beal Road
Goldston, NC 27252

PARTICIPANTS
John Patrone, Environmental Senior Specialist - Solid Waste Section (SWS)
Amy Brooks, Assistant Site Manager - Brooks Contractor
Alan Brooks, Site Manager - Brooks Contractor

STATUS OF PERMIT:
Permit To Operate (PTO) issued January 22, 2010
PTO expiration date January 22, 2015

PURPOSE OF SITE VISIT:
Comprehensive Inspection

STATUS OF PAST NOTED VIOLATIONS
None

OBSERVED VIOLATIONS

None

The item(s) listed above were observed by Section staff and require action on behalf of the facility in order to come into or maintain compliance with the Statutes, Rules, and/or other regulatory requirements applicable to this facility. Be advised that pursuant to N.C.G.S. 130A-22, an administrative penalty of up to $15,000 per day may be assessed for each violation of the Solid Waste Laws, Regulations, Conditions of a Permit, or Order under Article 9 of Chapter 130A of the N.C. General Statutes. Further, the facility and/or all responsible parties may also be subject to enforcement actions including penalties, injunction from operation of a solid waste management facility or a solid waste collection service and any such further relief as may be necessary to achieve compliance with the North Carolina Solid Waste Management Act and Rules.

ADDITIONAL COMMENTS

On January 12, 2015, John Patrone met with Amy Brooks and Alan Brooks to conduct a comprehensive inspection of the Brooks Compost Facility – Large, Type 3 Solid Waste Compost Facility on Beal Road in Goldston, Chatham County.

1. The facility is a Large, Type 3 Solid Waste Compost (SWC) Facility. It produces compost from eggshell/hatchery waste, food waste (pre-consumer and post-consumer), yard waste (primarily leaves), wood mulch, animal bedding, grease trap waste, etc. (as listed on page 5 of the current Facility Operations & Maintenance Manual) and additional materials approved by the Solid Waste Section (SWS).
2. Material is received from numerous counties within North Carolina.
3. The facility permit, site map, and operations plan were discussed.
4. The facility is in operation Monday through Friday 7:00 am to 5:00 pm and Saturday 8:00 am to 12:00 pm (March through November).
5. The compost produced is primarily sold to construction and landscape contractors, farmers, and landscape supply businesses.
6. Compost may be mixed with sand, pine bark fines, PermaTill, or per custom blend formula.
7. Liquid material is dumped into a bulking and mixing pit. Solids with a high concentration of liquid are placed on an adjacent concrete pad.
8. Liquid material is mixed with absorbent bulking material and placed on the concrete pad.
9. The concrete pad contains drain grates. The leachate is directed to the bulking and mixing pit or to two 3,500 gallon concrete storage tanks.
10. The concrete storage tanks are used to settle-out sludge and particulate material. A 10,000 gallon steel storage tank is used to store the leachate drained from the concrete tanks. The leachate is pumped-out and used on the active windrows.
11. Upon receipt, food waste is placed on the concrete pad. It is mixed with bulking material and placed in windrows.
12. Upon receipt eggshell/hatchery waste is placed in windrows. A layer of uncured compost is placed atop the windrow.
13. Active windrows are generally organized into separate operational areas: eggshell/hatchery waste and food waste.
14. The facility commonly uses leaves, cardboard, mulch, and yard waste as bulking material.
15. During the fall and winter months, the facility receives leaves from the town of Cary and Siler City.
16. Active windrows appeared to be within required dimensions. Eggshell/hatchery waste windrows are commonly 350 feet long and food waste windrows 200 feet.
17. During the inspection the facility had 40 active windrows (including "test" windrows).
18. The facility uses a windrow-turning machine to turn the active windrows. Windrows are constructed with a front end loader.
19. Active windrows are commonly maintained for 2 to 5 months during which time process to further reduce pathogens (PFRP) is met. The windrows meeting PFRP are combined into a curing pile. Material is generally cured for an additional 4 to 12 months.
20. During the inspection the facility had three curing piles/areas.

21. Cured compost is screened prior to sale. Generally, compost is screened as needed.
22. Stockpiled finished product is limited to a height of 60 feet.
23. A vehicle scale test was conducted by NC Department of Agriculture & Consumer Services on September 25, 2014. The scale was approved.
24. A vehicle scale test was conducted by Central Carolina Scale, Inc. on October 22, 2014. Documentation stated the scale was good.
25. The facility annual report (FAR) dated July 29, 2014 was received by the SWS. Material received for July 2013 through June 2014 is 52,824.08 tons. The amount of compost created is 29,011.2 tons, the amount sold/give-away is 27,141.54 tons, and the amount stockpiled on site is 1,869.66 tons.
26. The facility maintains records of the quantity, type, and source of material received for processing. The amount of material received from July 1, 2014 through January 10, 2015 is 29,669.4 tons. The amount of compost sold from July 1, 2014 through January 9, 2015 is 10,475.7 tons. The amount of cured compost on site as of January 12, 2015 is 48,533.3 tons. The amount of leaves stockpiled on site as of January 12, 2015 is 3,913 tons (leaf tonnage is included with material received records).
27. The facility produces Grade A compost and offers an information pamphlet for customers and maintains a website.
28. The facility has three temperature probes. Temperature probe calibration records for 2014 were verified.
29. Windrow records were verified. The facility maintains records for temperature, moisture level, turning intervals, bulk density, and C:N calculation. The records observed were for windrows formed on 03/08/14 through windrows taken up on 01/02/15.
30. The windrow records document that the facility turns windrows at least five times during the high temperature period.
31. Windrow moisture level is measured by hand per the method outlined in the current Facility Operations & Maintenance Manual, pg 12.
32. The facility currently uses Green Mountain Technologies, Inc. windrow manager software. The program allows the facility to electronically maintain active windrow data, calculate windrow bulk density and C:N ratio, and record and graph data.
33. Compost shall be analyzed at intervals of every 20,000 tons or every six months, whichever comes first.
34. Compost analysis records were verified for nutrients, concentration of metals, manmade inerts, fecal coliform, and salmonella for samples taken August 14, 2014, identified as: BR-1 and BR-1F. The samples were analyzed by Soil Control Lab, Watsonville, CA. Ms. Brooks stated that additional compost analysis will be conducted in the coming weeks.
35. Ms. Brooks stated that additional nutrient sample analysis is routinely conducted by the North Carolina Department of Agriculture & Consumer Services – Agronomic Services Division. Nutrient sample analysis records were observed for July, October, and December 2014.
36. The facility has a dedicated water truck for dust control and one for irrigation.
37. There was no odor detected at the facility boundary.
38. The facility has not received an odor complaint. Mr. Brooks stated that eggshell/hatchery waste is incorporated into windrows upon receipt and commonly turned when winds are favorable.
39. Erosion and sedimentation controls appeared to function accordingly.
40. The facility has a clay-lined stormwater pond. Stormwater is pumped-out to be used in the active windrow process. The facility does not discharge stormwater from the containment pond.
41. Mr. Brooks stated that a stormwater discharge permit is not required because stormwater remains onsite.
42. Mr. Brooks stated that the stormwater pond freeboard is currently 4.5 feet.
43. The facility has received a permit to construct a containment pond irrigation system from the Division of Water Resources (DWR). A pipe extending from the stormwater containment pond will be buried underneath a portion of the active compost area to an adjacent field. When sufficient stormwater is available, the facility will have the capability to irrigate three fields with a portable irrigation sprinkler. Ms. Brooks stated that SWS – Composting & Land Application Branch has been informed about the intended project.
44. An emergency at the facility can be addressed by the Goldston Fire Department.

45. Fire lanes are maintained.
46. The facility is secured by locked metal gate (the Brooks' residence is located at the entrance drive to the facility). Facility personnel are on site during operating hours.
47. Access roads are of all weather construction.
48. The facility has proper signage.
49. The PTO expiration date is January 22, 2015.
50. Ensure the PTO renewal application is submitted to the SWS by the expiration date. The SWS – Composting & Land Application Branch is expecting the PTO renewal application by the expiration date.

Please contact me if you have any questions or concerns regarding this inspection report.

John Patrone

Digitally signed by John Patrone
DN: cn=John Patrone, o=Division of Waste Management, ou=Solid Waste Section, email=john.patrone@ncdenr.gov, c=US
Date: 2015.01.14 15:27:53 -05'00'

Phone: 336-776-9673

John Patrone, Environmental Senior Specialist
Division of Waste Management, NCDENR

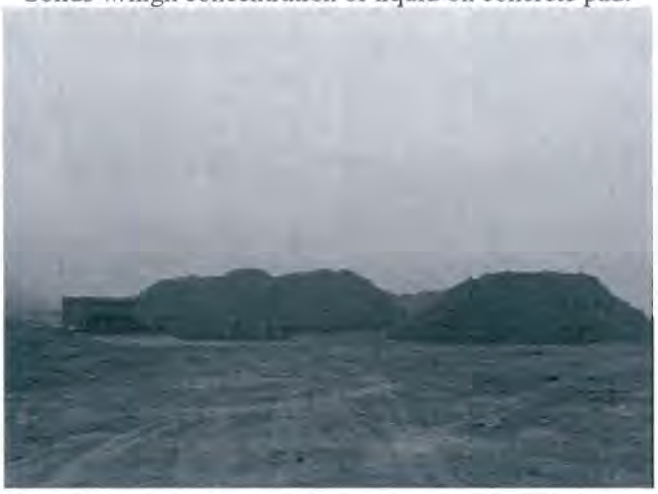
Sent on: January 14, 2015	X	Email		Hand delivery		US Mail		Certified No. [ ]

Electronic Copies: Deb Aja, Western District Supervisor - SWS
Sarah Rice, Compliance Officer - SWS
Tony Gallagher, Composting & Land Application Branch Head - SWS
Donna Wilson, Permitting Engineer - SWS
Liz Patterson, Environmental Technician - SWS
Alan Brooks, Brooks Contractor (alan@brookscontractor.com)

Digital pictures taken January 12, 2015
by John Patrone, DWM-SWS

Bulking and mixing pit

Solids w/high concentration of liquid on concrete pad.



Active windrow construction

Active windrows – representative view

Stormwater retention pond and sedimentation basin

Compost curing pile No. 3

Compost curing pile/area No. 2 (left side of pic)

Compost screener