

SECTION. 1400 SOLID WASTE COMPOST FACILITIES

.1401 Requirements for permit

The following is a statement of intent to continue a food waste composting facility [REDACTED] and a request for permit to operate said facility.

.1402 General provisions for solid waste compost facilities

- (a) [REDACTED] intends to compost solid waste functioning as a nutrient source.
- (b) Sludge and municipal solid waste will not be processed.
- (c) The facility does not presently have a permit.
- (d) Solid waste compost produced outside the state of NC will not be imported.
- (e) Compost that is disposed will not count toward waste reduction goals.
- (f) Facility Classification:
 - (1) Small Type 2 facility
 - (2) Will Receive:
 - Pre-consumer meat-free food processing waste.
 - Vegetative agricultural waste.
 - Source separated paper.
 - Yard and garden waste.
 - Silvicultural waste.
 - Untreated and unpainted wood waste. **Engineered wood is strictly prohibited.**
 - Will receive <1000 cu. yds. of material for composting per quarter.
 - Will occupy <(2) acres.

.1404 Siting/Design requirements for solid waste compost facilities

- (a) Requirements at time of initial permitting.
 - (1) The site is not located in a floodplain.
 - (2) The site is well within the 100 ft. minimum buffer between property lines.
 - (3) Location of facility exceeds the 500 ft. minimum buffer between compost area and residence or dwellings not owned or occupied by the University.
 - (4) There are no wells on campus.
 - (5) The site exceeds the minimum buffer between perennial streams and the compost area.
 - (6) The site is approximately 675 linear feet to Glens Creek. The sanitary drain on the pad empties into a grease trap and ultimately into the sewer.
 - (7) The facility is not located over a closed out disposal area.
 - (8) Compost area is totally accessible to fire fighting equipment.
 - (9) The site meets surface water requirements:
 - (A) The site is located on a paved area with a sanitary drain and the vessel is enclosed.

- (B) The sanitary drain discharges into a grease trap and ultimately the sewer system.
- (10) The site meets ground water requirements.
 - (A) Composting will take place in an enclosed vessel with a leachate collection system.
 - (B) The site is located on a paved surface.
 - (C) The facility is not a Type 4.
 - (D) The finished product is to be stored on an elevated area where water will not collect around the base at the [REDACTED] LOCATION**
 - (E) The site is located on a raised pad on an asphalt covered service area.
- (b) Minimum buffer is exceeded and a pad and paved surface are present.
- (c) Design requirements:
 - (1) No uncontrolled public accesses. Locks on infeed and discharge doors.
 - (2) No land will be disturbed requiring a sedimentation and erosion control permit.
 - (3) Compost will not be screened on windy days.
 - (4) The vessel is equipped with a biofilter.

.1405 Application requirements for solid compost facilities

- (a) (1) Aerial photograph included.
- (2) Site is on state property – it is zoned institutional.
- (3) See .1404
- (4) (A) Feedstock will primarily consist of pre-consumer food waste, generated by Chartwell. Initial estimate of one (1) 55 gallon container per day ≈ 200 lbs. Source of bulking agent would be a combination of shredded confidential papers, leaves, and woodchips from chipped grounds waste. Some of the finished product may be added back to inoculate the mass. Seasonal variations in solid waste would occur during school breaks and summer sessions when the quantity of food waste would be reduced. During this time, grounds waste would probably make up the shortage. Other sources of carbon to be considered are: paper towels, napkins, cardboard, paper plates and cups.

Storage of feed stocks: Bulking agents such as grounds wood waste is stock piled in a brush area off Campus Drive, shredded paper is stored in plastic bags, leaves are stored at the brush area. The bulking agent is transported to the compost site as needed. It is not stored at the compost site. The pre-consumer food waste from the Dining Hall is transported from the kitchen in covered five gallon buckets prior to loading into the Earth Tub. This feedstock is not stored, but placed into the composter daily.

- (B)The compost site consists of a concrete pad on an asphalt surface.
- (5) Site plan included.

(6) Person responsible for the operation of the facility:

(A) Name: [REDACTED]

Address: [REDACTED]

(B) List of personnel required and responsibilities of each position.

1. Main Operator [REDACTED] responsible for:
 - a. Daily operation.
 - Maintenance – daily and weekly.
 - Adding feedstock.
 - Turning compost.
 - Monitoring temperature.
 - Monthly reports.
 - Unloading compost.
 - Sending samples to be tested.
 - Providing information to the public.
 - b. Overseeing Assistant Operator.
 - c. Overseeing food waste collection.
2. Assistant operator: None at this time.
 - a. Student worker.
 - b. Transportation of food waste from loading dock to Earth Tub™.
 - c. Assist in daily operations.
3. Food waste collectors.
 - a. Kitchen Staff.
 - b. Responsible for proper preparation and collection of food waste.
 - c. Transportation of full containers from prep area to loading dock.

(C) Operation plan for the facility.

1. Educate food service workers.
 - (a) Description of Earth Tub™.
 - (b) Purpose: composting operation.
 - (c) Initial organic source targeted.
 - (d) Proper collection.
 - Size.
 - Contaminants.
 - (e) They are not responsible for loading or operating the Earth Tub™.
2. Start feeding Earth Tub™ and mixing contents.
3. Monitor daily.
4. Discharge compost after tub is full and optimum temperature achieved and maintained.
5. Analysis every six (6) months
 - NC Dept of Agriculture Waste Analysis

- Pace Analytical Services Inc. Asheville N.C., will test for pathogens

(6) Annual Report

(D) Special precautions or procedures for operation during:

- WIND – composts will not be unloaded or screened during high winds.
- HEAVY RAIN – The vessel is enclosed.
- SNOW – Tub is insulated. Vessel is enclosed.
- FREEZING CONDITIONS – Vessel is insulated.
 - Periodic checks that liquid is not freezing in pipes.
 - Monitor temperature more frequently – keep mass above freezing.
 - Auger will not be operated if material appears frozen.
 - During severe weather, system will be shut down.

(E) Description of actions to be taken to minimize:

- Noise – the auger and blower motors are equipped with mufflers.
- Vectors – the vessel is enclosed. **Note:** [REDACTED] uses only pre-consumer food waste, however, because wood waste bulking agents are stored in an open area it is possible that vectors could be introduced.

The EPA vector attraction reduction (VAR) standard of 14 days over 104F is simplified using an insulated in-vessel composter such as the Earth Tub. During active composting the temperature within the vessel is 131-149 F, which meets the EPA standard. Further research has indicated that for an in-vessel composter, temperatures greater than 131F for three days is sufficient for pathogen destruction.

The Earth Tub will be filled for two –three weeks with a mixture of food scraps and screened wood waste, shredded leaves, or shredded paper to reach a combined weight close to the maximum capacity of 3200 pounds. Temperatures will be recorded daily until the maximum capacity is reached. At this point, no additional food scraps will be added and the “cooking” phase will begin. During this phase, a temperature of 104 F will be maintained for at least 14 days or 131 degrees for 3 days, with an average temperature of 113 F.

- Air borne particulates – mixing takes place within the vessel.
- No loading, unloading or screening will take place on extremely windy days.
- Odors – minimized by supplying sufficient air to maintain an aerobic environment in the compost. Achieved through the use of an electric blower. Exhaust gasses are drawn through the tub center post and piped to the biofilter.

(F) Description of the ultimate use for finished compost.

- To be used on campus perennial/shrub beds and turf areas.
- To be used as a soil amendment.

Method of removal from site.

- The mature compost will be discharged into the bed of a gas powered utility vehicle and transported to the curing site. The curing site is located at the Sam Millar Facilities Management Complex.

In the event of a poor quality product, the material will be re-composted or discarded in the landfill.

(7) Report on the design of the facility.

(A) Capacity – 100-200 lbs per day of organic material per unit.

- 3200 lbs. biomass capacity when full.

- 3.5 cubic yards.

(B) Process flow diagram.

Major equipment: The Earth Tub™ by Green Mountain Technologies.

SYSTEM COMPONENTS

The Modular design of the Earth Tub™ allows the system to be adapted to a variety of applications and configurations. The primary components are described in detail below.

Composting Vessel

The Earth Tub™ has a 3.5 cubic yard capacity and is made of durable XDPE plastic. The container, doors and cover are custom-molded, double-walled and fully insulated with polyurethane foam. Each unit is equipped with two removable side doors for discharge of the compost product. The walls are sloped to aid in the unloading of the compost. The cover of the Earth Tub™ spins to allow rotation of the auger assembly described in the next section.

Mixing Auger

The Earth Tub™ contains a vertical stainless steel auger attached to the rotating cover. The auger is powered by a 2.5 hp electric gear motor. The operator, pushing on the handles rotates the cover, which rotates the auger around the inside of the Earth Tub™. The motor and auger are attached to a slide assembly that moves radially across the top of the cover. The slide can be positioned to mix the center or outer areas of the container by turning the hand crank on the cover. Two full rotations of the cover are required to mix the entire contents of the Earth Tub™.

Aeration System

The forced aeration system, developed by Green Mountain Technologies, is used to optimize the composting process. The effects are: minimized odor, maximized throughput, reduced operator time, and increased stability of the final product. Odors are minimized by supplying sufficient air to maintain an aerobic environment in the compost. This is achieved through the use of an electric blower. Exhaust gasses are drawn through the tub center post and are piped to the biofilter. As the exhaust gasses are drawn off to the biofilter unit, fresh air is pulled into the compost to provide the bacteria with the oxygen they require. The floor of the container is perforated to allow recirculated air to be blown into the bottom of the Earth Tub™. Using a temperature reading from the compost mass, the operator may adjust a ball valve in the aeration lines to alter the flow of air accordingly. The blower will not operate 24/7. The blower is used to keep the compost from overheating and to provide enough air circulation to maintain an aerobic environment in the compost. The amount of blower air can be adjusted (a ball valve in the aeration line) by the operator according to the temperature of the compost.

If the compost is too hot (above 150°F), the valve may be opened fully to recycle exhaust air and fresh air back into the bottom of the unit. In general, the valve should remain opened slightly.

Biofilter

Biofilters are absorbent beds of porous organic materials containing microorganisms that break down odorous compounds. Smells generated in the Earth Tub™ compost unit are blown through the biofilter, which absorbs and degrades the odorous compounds. Biofilters are a popular odor control mechanism because: 1) they remove a broad spectrum of chemicals at various concentrations; 2) they tolerate neglect; 3) their media components, such as mature leaf compost, brush compost, and wood chips, are readily available; and 4) they are resilient in various environmental conditions, such as snow and rain. Their effectiveness quickly diminishes with drying out, however, under average to best management, the filters are highly effective at removing odors and are fairly effective even under the worst management. The Earth Tub™ biofilter has been designed to require minimal maintenance, as described in the operations section. According to the Earth Tub Operators Manual (page 15) “The useful life of biofilter medium is generally expected to be one to two years... Worn out biofilter material can be screened and used as mature compost”. However, UNCA will place the worn out biofilter material into the Earth Tub as part of the bulking agent for future batches.

- Food waste is collected in prep area of Chartwell’s kitchen in 5 gallon lined containers.
- Full buckets carried to loading dock by kitchen staff.
- Once a day, operator or assistant operator will transport buckets to the Earth Tub™.
- Once the feedstock is added it is to be mixed into the compost as soon as possible.
- Food waste not picked up within 24 hrs will be placed in dumpster.

Estimated quantity of materials:

- Wet weight 200 lbs. food waste/day.
- Volume maximum 8-10, 5 gallon containers.
- Bulking agents to be added as needed.

(C) Means for measuring, shredding, mixing and proportioning input materials.

- Buckets of food waste and bulking agents will be weighed on scales.
- Kitchen staff will be instructed to chop hard foods such as pineapples, corncobs and whole loaves of bread into pieces 2” or smaller.
- Bulking agents (mix ratios to be determined by vendor and DEHNR reps.)
 - Paper-shredded.
 - Yard waste-prepared similar to food waste.
 - Wood chips-2” or less.
 - Paper towels and napkins-as is.
 - Old corrugated cardboard (ex pizza boxes) – chopped.
- Mixing is accomplished by rotating a 2.5 hp-3 phase auger each time feedstock is added and at least once a day if not additional material is added.

- Proportioning.
 - Bulking agents are added to make a porous compost mix with food scraps.
 - Optimum moisture content 40-65%.
 - C:N 30:1.
 - Proportions are dependent on moisture content of food scraps.

(D) Anticipated process duration.

- Before any food waste is added, a 24" layer of bulking agent is added to the base of the Earth Tub. The tub is filled to approximately 2/3 of its capacity with bulking agent (Green Mountain Tech. Inc. Earth Tub O & M Manual p 11). Additional bulking agent is added as required to balance moisture and porosity of the mix. As the feedstocks breakdown during the composting process the volume compresses to allow continued addition of waste materials. Although, the Earth Tub operators manual states a possible 16 day turn around for composting, our experience in the past shows a reduction rate that allows continual addition of materials for a semester. This allows the removal of the compost from the vessel during the semester break

- Compost will cure thirty (30) days at the [REDACTED] ^{LOCATION} to form stabilized product under industry recommended curing procedures.
- The finished product will be stored, covered at the Sam Millar Facilities Management Complex, until needed for use on campus.

(E) Monitoring points – location and frequency.

- Temperature – checked 5 days per week.
 - Use stem thermometer – provided.
 - Choose at least three (3) points.
- Drain line and Biofilter – check weekly
 - Should be clear of any obstruction that might cause back up of liquid in base of biofilter.
- Check hoses and pipes around the tub and biofilter.
 - Connections should be secure and clear for passage of air.
 - Check operation of blower.
 - Check biofilter for dampness.

(F) The temperature of the compost will be monitored once a day Monday through Friday, using a stem thermometer. Green Mountain Technologies provided a compost thermometer with a 20" stem. Temperatures are taken at the full depth of the stem.

- The process will be maintained at a temperature $\geq 131^{\circ}\text{F}$ for three (3) days.
- The process shall also be maintained at a temperature $\geq 104^{\circ}\text{F}$ for 14 days or longer with the average temperature $> 113^{\circ}\text{F}$.
- Temperature is controlled through the blower aeration system.

- The blower operates at a continuous speed to maintain oxygen levels in the compost. If the compost is too hot (>150°F), the ball valve in the aeration line may be opened fully to recycle exhaust air and fresh air back to the bottom of the unit. In general, the valve should remain opened slightly.

Inadequate temperature.

- Turn blower off for 24 hours. Check temperature.
- Check moisture content (by squeeze test- The Earth Tub Operator Manual refers to the “squeeze test” as the “wrung out sponge” test. In this case a handful of compost is taken from the vessel and is squeezed. If moisture comes out, the mix is too wet. If so, bulking agent must then be added to balance the moisture levels. If the mix is too dry, no bulking agent is added until additional food waste is added or water from a nearby faucet could be added to balance the moisture levels.– adjust accordingly.
- Compost may have finished its cycle.
 - Empty tub.
 - Start new cycle.

Excessive Temperature.

Average temperature no more than 140°F.

- Check ducts for blockage by condensate or compost.
- Check and clean aeration floor on a regular maintenance schedule.
 - Empty Earth Tub™ every six (6) months (or as needed.)
 - Check floor for blinding or clogging of channels.
 - Clean as required
- Check blower operation

(G)Aeration –Method and capacity.

- Accomplished by blower air feed and daily operation of the auger.
 - Particle size of the feedstock and bulking agent is an important factor in good aeration.
 - Particle size may be adjusted as needed in the future.
- Air moves through free air space by two forces.
 - Convection.
 - Pressure from aeration blower.
- See Aeration system page 7 in O&M manual.

(H) The site of the Earth Tub™ is on an existing pad previously occupied by a solid waste dumpster.

- There is an existing sanitary sewer.
- The vessel is enclosed therefore surface water run-on and run-off will not be a problem.
 - The leachate will drain through a valve on the discharge line into a 5 gallon bucket.
 - Excessive leachate should not be a problem and will be controlled by the addition of bulking agents.
 - It is expected that the leachate that does collect will be added back to the mix or disposed of in the sanitary sewer on the site.

(8) Finished compost will be used on campus only and will not be available for distribution to the public.

(9) Plans and specifications: See assembly instructions supplement.

(10) Green Mountain Operations & Maintenance Manual – included.

(A) Incoming material will be visually inspected on addition to the Earth Tub™ with random examinations of entire contents.

- Visual monitoring daily.
- Initially temperature will be recorded three times daily.
- Record keeping requirements:
 - Temperature.
 - Volume.
 - Odor.
 - General Appearance.
 - Quantity and quality of feedstock.

(B) In the event of equipment breakdown:

- Appropriate maintenance department will be contacted.
- Green Mountain Technologies will be contacted.
- Non-conforming waste will be placed in the dumpster.
- Spills will be scooped up with a shovel and area affected will be rinsed with hose and water down the sanitary drain.
- Fires, if not able to be contained by campus staff, will be directed to the local fire department.
- The vessel, which rules out vectors and odors, are eliminated by aeration and biofilter.

(C)(1) A copy of the permit and plans shall be maintained on site at all times.

(2) Erosion controls exist in the form of a concrete pad surrounded by asphalt.

(3) Surface water will not be a problem at the operational area due to sanitary drains and shall be diverted from curing and storage areas.

(4) Leachate will be collected as it accumulates in a 5 gallon bucket and added back into vessel as needed.

(5) Access and Security

(A) Access ports to the vessel shall be locked when operator is not on site.

(B) The facility will not be open to public use.

(C) The access road to the site is paved.

(6) The site will only accept:

- Food waste.
- Shredded paper.
- Yard waste.
- Paper towels and napkins.
- Corrugated cardboard.

(7) Safety Requirements:

(A) No burning will occur.

(B) A fire extinguisher will be located near by. The fire department is located <3 miles away.

(C) Personnel will be trained in safety and corrective action procedures.

(8) Sign Requirements:

- (A) Facility will not be open to public use.
- (B) No parking-Loading Zone” signs will be installed adjacent to the vessel.
- (C) Only authorized personnel will have access to vessel.

(9) Monitoring Requirements:

(A) Specific monitoring requirements shall consist of:

- Temperature.
- Weight/volume of feedstock and bulking agent.
- Presence of leachate.
- Presence of odor.
- Maintenance procedures performed.
- Notation of feedstock quality.
 - Size.
 - Moisture content (visual inspection).
 - Contaminants.

(B) Temperatures will be monitored once a day, Monday-Friday.

(10) Temperatures will be maintained at $\geq 131^{\circ}\text{F}$ for 3 days and compost will be aerated to maintain this temperature.

(11) Temperatures will be maintained at $\geq 104^{\circ}\text{F}$ for 14 days or longer with average temperatures of $\geq 113^{\circ}\text{F}$.

(12) The facility is a Type 2.

(13) Nitrogen bearing wastes, will be incorporated daily.

- (a) Construction will not be a large Type 2, 3, or 4.
- (b) Operation will not be a Type 4 or large Type 2 or 3
- (c) In the event of facility capacity increase or the addition of new feed stock material, an application for a permit modification will be submitted.

.1406 Classification/distribution of solid waste compost products.

See.1405 (C)

.1407 Classification/distribution of solid waste compost products.

- (a) Finished compost will be tested every 6 months by the Department of Agriculture - Waste Analysis for concentration of metals.
- (b) Finished compost will be tested every 6 months by the Department of Agriculture Waste Analysis and Pace Analytical Services Inc, Asheville N.C. will test for pathogens.
- (c) Man-made inerts will not exceed 6% by weight.
- (d) Finished compost is to be used on campus only.
- (e) Finished compost will not be distributed or marketed.
- (f) Finished compost will not be distributed.

.1408 Methods for testing and reporting requirements:

1. Finished compost will be sampled and analyzed as follows:
 1. A composite sample will be analyzed every 6 months for the following parameters:
 - Manmade inerts tested by operator.

- Cadmium.
- Copper.
- Lead.
- Nickel.
- Zinc
- Salts

2. Grab Samples:

Pathogens. Samples are taken by the operator using sterile gloves. Samples will be placed in a sterile container and sent to the laboratory within 24 hours to limit re-growth problems.

2. Three individual samples (of equal volume) will be taken from each batch produced.
 - Samples analyzed for metals will be composited and accumulated over a 6 month period.
 - Samples collected for testing for pathogens and nutrients will be a representative composite sample.
- (3) No sewage sludge will be composted.
- (4) It is understood that the parameters and frequency of analysis may change based on monitoring data, changes in waste stream or processing.
- (5) Foreign matter content is represented as % dry weight- not to exceed 6% by weight.
- (b) Record Keeping:
 - Records will be kept and maintained for a minimum of 5 years.
 - Records will be available for inspection during normal business hours.
 - Records will include:
 1. Daily operational records:
 - Temperature data.
 - Quantity of material processed.
 2. Analytical results on compost testing.
 3. Quantity, type and source of waste received.
 4. Quantity and type of waste processed.
 5. Quantity and type of compost produced.
 6. Quantity and type of compost removed for use or disposal.
- (c) Annual reporting:
 - An annual report for the period of July 1-June 30 will be submitted by August 1.
 - Reports will contain:
 - (1) Facility name, address and permit number.
 - (2) Total quantity in tons and type of waste received.
 - (3) Total quantity in tons and type of waste processed.
 - (4) Total quantity in tons and type of compost produced.

- (5) Total quantity in tons and type of compost removed for use or disposal.
 - (6) Monthly temperature monitoring showing at least 3 days of $\geq 131^{\circ}\text{F}$, and 14 days or more at $\geq 104^{\circ}\text{F}$ with average temperature of $> 113^{\circ}\text{F}$.
 - (7) Results of parameter test.
- (d) Yearly totals of solid waste received and composted will be included in Annual Recycling Report.

.1409 Approval of alternative procedures and requirements

- Notice of changes in procedure will be submitted in writing for approval.

