

WASTE REDUCTION ASSISTANCE PROGRAM
COMMERCIAL FOOD WASTE COMPOSTING
OPERATIONS PLAN

May 2012

Prepared for:

Town of New Paltz

Recycling and Solid Waste Program

3 Clearwater Road

New Paltz, New York 12561

Prepared by:

Laura Petit, Recycling Coordinator

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1. Introduction

The purpose of this document is to provide a comprehensive operating plan for this composting pilot program.

1.1 Operations Plan Scope and Purpose

During the course of the pilot program this document will provide guidance in specific operating procedures. In general this document will explain when and why a particular task is to be performed.

1.2 Project Objectives

The overall goals of the project are as follows:

1. Evaluate the effectiveness of the limited turn windrow (1 turn per week) and passive aerated windrow static pile (PAWS) methods for composting commercial food waste. The primary objective of the evaluation is to provide documentation of the capability of these low technology composting processes to reduce pathogens in a manner consistent with the regulatory approach as outlined under NYSDEC Part 360.5-3(1)(ii) – Composting Facilities.

This will be accomplished by completing the following tasks:

- a) Complete collection and compost testing.
 - b) Document composting systems performance.
 - c) Document the test protocol for use as the basis for regulatory determination of sufficient and effective decomposition for these systems.
 - d) Document leachate and runoff characteristics for these systems to determine if further collection measures are necessary.
2. Complete composting tests with each of the two systems during two distinct weather operating periods, the first period beginning in June (Period 1) and the second period beginning in November (Period 2).
 3. Provide a discussion of alternatives and recommendations for operational guidance and optimal composting of food waste.
 4. Include a procedure for pathogen reduction requirements and Vector Attraction Reduction.

1.3 Project Responsibilities

The successful completion of the project requires clear delineation of roles and responsibilities among the different participants. Contact information regarding the project participants is provided in Appendix A.

The responsibilities of the participating parties are as follows:

1.3.1 State of New York Department of Environmental Conservation (DEC)

1. Staff is available for procedural and regulatory input on composting operations.
2. Permitting and reports to be provided to both NYSDEC headquarters and Region III division.

1.3.2 Town Engineer (David Clouser and Associates)

The consultant will be available to confer with Municipal Recycling Drop Off Staff in the event there are unresolved operational issues, and for future expansion of the composting site. Phase I of the composting program is low tech, and will require no technical advise.

1.3.3 Municipal Recycling Drop Off Staff (Recycling Staff)

Phase 1. Construct a composting pile specified as a limited turn windrow. The pile will be constructed at a registered composting facility in New Paltz, New York by the Recycling staff with equipment and bulking agent provided by Town Recycling Center. The first pile will be constructed in late May and the second pile in November. The second pile will be a passive aerated static pile with perforated pipe placed under the pile.

2. Develop initial mix for the piles using front loaders to mix food waste and the bulking material in 3-5 cubic yard batches.
3. Continue processing each pile for approximately 14 weeks for Period 1 and approximately 14 weeks for Period 2 following NYSDEC recommendations of 1:3 ratio for bulking agent.
4. Provide an additional layer of fine textured wood chips as an insulation layer (mulch) over the exposed exterior of the passive aerated static piles and limited turned piles after two weeks to continue the decomposition process.
5. Provide all equipment for turning piles and measuring temperature and oxygen.
6. Provide documentation of daily food waste intake and ratio/type of bulking agent.
7. Construct a runoff/leachate collection system using perforated pipe, plastic liner, and collection bucket should this material become an issue.
8. Read and record pile temperatures on forms created by Recycling Staff supervisor on all days of operation. Record pile temperatures before turning.
9. Turn the limited turned windrow piles once per week and passive aerated pile once every two week period. Sterilize the bucket and wheels of the loader after each turning event. See section 4.5 for sterilization procedures.
10. Protect the piles from contamination from any other activities at the site and limit public

access.

11. Provide access to the piles for sampling and monitoring by personnel Tuesday through Saturday during regular business hours.
12. Respond to and act on requests from NYSDEC for modifications to the composting operations.
13. After piles are constructed, insert flags in the four “routine monitoring” locations.
14. Maintain records in the field notebook located in the Recycling office concerning all operational activities for piles including turning, addition of water, covering with geotextile tarps, changes from the established protocol, etc.

1.3.4 SUNY New Paltz

1. Arrange and pay for food waste collection and for all costs related for delivery of SUNY dining hall food waste to the New Paltz recycling Center.
2. Educate food service contractor on proper collection and acceptable food waste and coordinate collection.
3. Arrange for delivery of food waste to the composting facility.

1.4 Pilot Study Overview

The composting program will seek to establish the ability of both the limited turned windrow and passive aerated windrow composting methods to destroy pathogens that might be present in commercial food waste.

1.4.1 Pilot Study Design

A set of two piles will be constructed and monitored over a fourteen-week period in May and November, which will be followed by a duplication of the study protocol the following year. These two periods were selected to represent hot/dry and cool/wet periods when it would be most difficult to achieve desired temperature for a duration sufficient to reduce pathogens and create a viable end product.

1.4.2 Monitoring and Analysis Program

The composting pilot program incorporates a comprehensive monitoring and analysis program. The purpose of this program is to perform an accurate evaluation of the various processes and technologies to determine which system works the most effectively. The monitoring and analysis program is divided into the following categories:

- Initial mix characterization
- Process monitoring

- Temperature profiles
- Moisture levels
- Compost stability
- Pathogen and indicator organism testing
- Leachate quality testing (if necessary)
- Product characterization
- Soil characterization

1.4.3 Monitoring and Operations Review

On the first day of the composting program, the monitoring and operations plans will be reviewed with the Recycling staff. This meeting will focus on reviewing how monitoring and composting operations are to be conducted. Weekly follow up meetings will provide a forum to discuss operation issues, changes in operations and/or prepare the staff and facility to accept additional waste.

2. Composting Study Evaluation Criteria

The following criteria will be used to assess the two composting technologies being evaluated Passive Turning Pile and Passive Aerated Pile to determine which method is more effective in creating a viable end product.

2.1 Achievement of Class A Criteria

A primary objective of the composting process is the achievement of high thermophilic (>140°F) temperatures for the destruction of disease-causing microorganisms that could potentially be present in the commercial food waste. Temperature profiles will be developed for each compost pile to evaluate the impact of the various process parameters.

2.2 Decomposition and Compost Stability

Compost stability will be determined at weeks 4, 6, 8, 10, 12, and 14 for the primary purpose of assessing the effect of compost stability on the potential re-growth plants and bacteria. Stability testing data to be collected includes visual inspection for residual organic matter and possible carbon dioxide testing. Data will be collected on the type and condition of residual organic matter.

2.3 Leachate Generation and Characteristics

Initially, a berm constructed of mulch will be used to control leachate. If run-off issues merit installation of a collection system, leachate quality will be assessed through the collection of samples and subsequent determination of Salmonella and fecal coliform.

2.4 Processing Period (Secondary Objective)

The achievement of optimum degradation rates is significant as it reduces the amount of space required for composting. The following parameters will be used to compare the processing efficiency of the various process parameters:

- Heat generation
- Odor issues
- Organic carbon reduction (Breakdown of bulking agent)
- Leachate generation

2.5 Final Product Quality (Secondary Objective)

The quality of the compost product will be important for end-use applications and marketing. In general, a higher quality product will have a wide range of end uses, be readily marketed, and will generate more revenue on a volume basis than lower grades. The following parameters will be used to evaluate the quality of each compost product and determine the relative impact of the two compost processes, if any, on compost quality:

- Time to Maturity
- Foreign matter/inert contaminant content
- Nutrient content
- Texture, color, and visual appearance
- Stability
- Salmonella and fecal coliform test results

2.6 Odor Generation (Secondary Objective)

The following parameters will be evaluated to establish which of the low technology processes being assessed have the lowest potential for producing nuisance odor conditions:

- Qualitative observations
- Temperatures

3. Composting Site Description

This section of the Operations Plan provides a description of the pilot scale composting facility. More specifically, the site layout, infrastructure requirements, and equipment and supply needs are described.

3.1 Composting Area

The composting area will be located at the south end of the Recycling Center, between the closed landfill and entrance to the Recycling area. This area is readily accessed from Clearwater Road. The composting area is a solid shale bank which will control containment problems and

has ample material to provide a buffer to divert any runoff. The site was chosen, inspected and approved by NYSDEC staff.

3.2 Leachate Collection

In the event of exceptional wet periods if leachate becomes a problem, leachate collection will be accomplished utilizing a polyethylene liner on a sloped surface with a perforated collection pipe, and collection bucket. The liner for each pile will be approximately 25 feet in width and about 24 feet in length. The liner will accommodate approximately a 12-foot length of each pile; about half of the pile length will be lined. This will allow the pile to be turned without the front-end loader driving on the liner, which would likely damage it. The 12-foot portion of liner that extends from the pile on the downgradient end will allow for the collection of leachate. The collection pipe will divert leachate collected on the liner into a 5-gallon bucket designated for leachate storage. The 5-gallon bucket will be located in a hole such that the bucket lip will be slightly above ground level. The bucket will also be covered so that leachate can flow into the bucket, but rainwater doesn't enter it.

Leachate shall not be placed back onto the pile and permission will be sought to put it into the Ulster County Resource Recovery Agency leachate collection system after testing.

3.3 Equipment

Equipment currently available is: a John Deere 110 loader with grappler and thumb attachment; Mighty Max tub grinder; a Ford F350 Dump Truck; hand shovels and rakes; five (5) gallon plastic buckets.

4. Composting Study Operations

4.1 Food Waste Collection & Storage

New Paltz site is registered for to accept up to 1,000 cubic yards of food waste per year. Food waste will be delivered and deposited on the composting site and covered daily with a bulking agent. NYSDEC quantifies materials collected by the yard, however, there is the option to weigh the delivery vehicles in over a scale located on site and managed by the UCRRRA.

Food waste will be accepted by licensed haulers. Initially, during the pilot program, loads will be accepted by Royal Carting dba Welsh Sanitation located in Wappinger Falls, NY and under contract with SUNY New Paltz to remove their dining hall food waste. Another licensed hauler has been in contact regarding food waste collection and is interested in utilizing the facility once it has mastered operations. There is also the potential to create several green jobs for local individuals interested in offering to collect food waste on a regular schedule from local restaurants. Minimal licensing is required through the Ulster County Department of Health. The food waste will be sorted by the generators into organic and non-organic fractions. The organic fraction including paper products such as napkins and towels will be collected by the haulers for this program.

4.2 Initial Mix

It is anticipated that an average daily delivery of four (4) 35-gallon biodegradable bags of food waste will be delivered during the two month pilot period up to five days per week. A bucket load (one yard) of mulch will be mixed in with the 1/3 yard food waste, and monitored for two weeks before mixing and adding an insulation layer.

4.2.1 Initial Mix Ratio

A bulking ratio of three parts yard debris to one part food waste is proposed. However, as the following discussion indicates, a higher bulking ratio may be required to produce a suitable initial mix depending on the moisture content of the organic material received. The physical and chemical characteristics of the initial mix are crucial to the achievement of optimum process conditions. In particular, a finer mulch may have to be added to a very wet load of material to limit leachate whereas a drier load may need more nitrogen such as grass clippings.

Of particular significance is creating an initial mix with a moisture content between 55 and 60 percent. If this target is reached, the other mix characteristics are typically within an acceptable range. After a suitable initial mix has been prepared, the piles will be constructed on the compost pad using a front-end loader. The piles will be built in a windrow formation no more than 10 feet wide and 6 feet high. These pile dimensions will allow the pile to be constructed without the loader operator driving on top of the pile. A conscious effort will be made to make the piles as uniform as possible and the sides as steep as possible to reduce the amount of water absorbed when it is raining.

4.3 Target Mix and Construction

Each pile will have a one-foot insulative cover included in the 1:3 ratio that will be comprised of mulch. The purpose of the insulative cover is to reduce nuisance pest access, and to hold in heat and odors generated. This is a typical practice for the passive aerated windrow, but atypical for turned windrow. However, in order to reduce nuisance pest access, an insulative cover will be used when the turned windrow piles are constructed. Observations regarding nuisance pest access potential will be made at this point and recommendations regarding the use of an insulative cover.

4.4 Process Control

The primary objective of process control is to maintain optimum composting conditions. By using the low technology limited turn (once per week) and passive aerated windrow processes, the operator has a limited ability to control the process. Therefore the key to a successful program and quality end-product will be in the monitoring and adjustment, if necessary, of ongoing operations.

Process control will rely on:

The development of an initial mix as defined in Section 4.2 and limited moisture controls. Given the climate during the composting trials, the need for water addition is a likely possibility if it's a dry summer. Should rainfall be heavy making the piles excessively wet, the operator will seek to reduce the opportunity for water absorption by building high steep sided piles. In the event

high rainfall is predicted during the project, the use of tarps to protect the piles may be considered.

4.5 Pile Turning

The limited turn windrow pile will be turned weekly and the passive aerated windrow pile will be turned once after four weeks of composting with a front-end loader.

Table 3: Pile Turning Schedule	
Limited Turn Windrow	Passive Aerated Windrow
1 Tuesday during Period 1: None	Period 1 through Period 3
2 None	Period 4 (Day 28): Turn
3 None	
4 None	
5 None	
6 None	
7 None	
Tuesday during Period 2 (Day 8): Turn	

Pile turning will entail breaking down the pile and rebuilding it on a second, adjacent compost/leachate collection pad. The bucket is filled with material taken from beneath the insulative cover. Next, the bucket is dropped three times from a height of six to eight inches onto a hard surface. The pile is construction back into a windrow and a layer of insulative cover is applied.

The unused leachate collection pad, if constructed, will be protected from contamination when not in use by restricting traffic in the area.

The front-end loader bucket and front wheels will be sanitized using the following procedure prior to turning each pile:

- Remove material from the loader bucket and wheels using cold water and a shovel, broom or other hand tool.
- Make up approximately 10-gallons of a 10 percent household bleach solution.
- Apply the solution to the loader bucket and wheels using a manual-spraying device similar to that used for the application of fertilizer and pesticides.
- Rinse the bucket and wheels with potable water.

- Repeat process for any hand tools that were used.

The loader sanitation process will be conducted directly on the compost pad in order to control the resulting runoff. The primary purpose of the sanitation procedure is to limit any contamination of fecal coliform and Salmonella bacteria.

4.6 Screening

The purpose of screening is to produce a product desired by the potential users. Generally, screening removes the large, oversized (>1/2”) woody fraction of the product. Final product samples will be collected for analysis prior to screening the material. The product can then be screened to achieve the desired characteristics for marketing. Bulky residual material will be added back to a newer compost pile.

4.7 Site Health and Safety

There are some health and safety risks associated with the composting operations. People entering the site should be limited to staff and commercial haulers. The general public should not be entering the site without staff supervision.

5. Process Monitoring and Data Recording

Process monitoring is a crucial component of the commercial food waste composting pilot project. Staff will review the process monitoring data at weekly meetings. Process monitoring data, which includes field measurements, sampling and visual analysis, will be used to:

- Determine appropriate process adjustments;
- Provide the operators with a quantitative means of assessing the composting conditions and any operation adjustments;
- Characterize the quantity and quality of leachate generated;
- Determine the value of the product as a soil amendment using parameters in Section 2.5

5.1 Process Monitoring/Sampling Schedule and Responsibilities

Staff shall routinely inspect compost piles for progress of decomposition and any disruption of the pile (i.e. vectors, collapse). It is the responsibility of staff to adjust the mix ratio to facilitate optimal results, and to document any and all operational issues for discussion at weekly meetings. In the event of a catastrophic failure such as collapse or vectors, the supervisor should be immediately informed and mitigation begun.

Table 2: Sampling Schedule	
Limited Turn Windrow	Passive Aerated Windrow
FLAGGED AREA 1. weekly	FLAGGED AREA 1. Bi-monthly
FLAGGED AREA 2. weekly	FLAGGED AREA 2. Bi-monthly

FLAGGED AREA 3. weekly	FLAGGED AREA 3. Bi-monthly
FLAGGED AREA 4. weekly	FLAGGED AREA 4. Bi-monthly

5.2 Equipment and Supplies

All equipment and supplies needed for the project will be stored on site in the Recycling Center garage. If equipment is damaged or inoperable or additional supplies are needed, please contact Laura Petit, Recycling Coordinator at (845) 255-8456 so arrangements can be made for replacing the equipment or restocking supplies. The garage shall be kept neat and any trash removed on a daily basis.

5.3 Field Monitoring Methodology

The purpose of field monitoring is to collect data used to monitor the composting process. This information will primarily be used to document the temperature and substrate availability. This information will also be used to manage day-to-day composting activities. Four parameters will be measured in the field according to the schedule defined in the Operations Plan. The parameters include:

Temperature: daily

Visual inspection: periodic

Bulk Density: initial mix and final product

Pile Volume: initial mix and final product

Field methodology and monitoring equipment required are described in the following sections.

5.3.1 Pile Temperature

Temperature monitoring will be conducted daily ("routine monitoring). Each compost pile will be monitored for temperature by inserting temperature probes into four "flagged routine monitoring " locations in each pile. The four "routine monitoring locations are as follows (NOTE: same as sample collection points):

- Five feet from end
- Middle of pile
- Five feet from opposite end of pile
- End of pile

Each of the four temperature monitoring points is at a height of three feet. At each temperature monitoring point, the probe is inserted at a 45-degree angle from the horizon. The probe should remain at each depth for at least five minutes to provide uniform temperature stabilization. Temperature monitoring will be performed with dial type gages provided by the recycling center.

5.3.2 Bulk Density

Bulk density is a basic measurement used for developing an input/output mass balance. The bulk density of the food waste, initial mixes, and final products will be determined. Bulk density is determined by field weighing a container of a known volume that has been filled with compost. Bulk density measurements will be taken from flagged points.

5.3.3 Pile Dimensions and Volume

Pile dimensions should be a consistent 10' X 6' X 30'. The volume will be determined at the beginning and end of the composting process by calculating the amount in incoming food waste and bulking agent applied to the final end-product. The weight of each pile can be estimated using a universal conversion chart that converts yards to tonnages for reporting purposes. For retail, the product will be sold by the yard.

A spreadsheet formula will be maintained for pile volume to determine the amount of waste diverted and volume reduction value.

5.4 Qualitative Observations

Project participants involved with daily monitoring are encouraged to record any observations made on the monitoring form (see Appendix B) during their visit that they deem to be noteworthy. These observations might include:

- Relative odor of both piles, especially during turning and sampling
- Presence or evidence of insects or nuisance pests
- Relative amount of un-decomposed food waste on pile exterior
- Evidence of heat or visible

5.5 Leachate Sample Collection Protocol

If leachate is not manageable by use of a berm it shall be collected, and a sample shipment, a 200 ml leachate subsample will be collected from each pile by immersing a sanitized measuring cup into the five gallon plastic bucket and transferring it into the labeled leachate sampling container. Samples should be collected such that material floating on the surface is excluded. Only pre-sanitized containers and collection equipment should be allowed to contact the liquid being sampled. The Sample collection bottles need to be labeled with the project ID , pile ID (TW/PAW), and date. Immediately after the samples are collected, they need to be delivered to the test laboratory.

APPENDIX A

Emergency Contact List

Teresa Laibach, NYSDEC Region III
NYSDEC, Division of Materials Management
Bureau of Waste Reduction & Recycling
21 S. Putt Corners Road, New Paltz, NY 12561
Tel: (845)256-3141 Fax (845) 255-
E-mail: tllaibac@gw.dec.state.ny.us

David Clouser, Town Engineer
David Clouser and Associates
1 Paradise Lane, Suite 200, New Paltz, NY 12561
Tel: (845) 256-9600 Fax: (845) 256-9700
E-mail: info@dcaengrs.com

Susan Zimet, Town Supervisor
Town of New Paltz
1 Veteran Drive, New Paltz, NY 12561
Tel: (845) 255-0604 x 1 Fax (845) 255-4084
E-mail: supervisorzimet@townofnewpaltz.org or assistant@townofnewpaltz.org

Laura Petit, Recycling Coordinator
Town of New Paltz
3 Clearwater Road, New Paltz, NY 12561
Tel: (845) 255-8456 Fax (845) 255-4153
E-mail: recycling@townofnewpaltz.org

Joseph Snyder, Chief of Police
Town of New Paltz
S Putt Corners Road, New Paltz, NY 12561
Tel: (845) 255-1313
E-mail: chief@newpaltzny.org

Fire Department
N Putt Corners Road, New Paltz, NY 12561
Tel: (845) 255-8878

Emergency: 911

Appendix "C"

Laboratory Contact List

Hudson Valley Water Resources
11 North Ohioville Road, New Paltz, NY 12561
Tel: (845) 255-4050
hudsonvalleywaterresources.com

Ulster County Health Department
300 Flatbush Road, Kingston, NY 12401
Tel: (845) 340-3045
www.ulstercountyny.gov/health

DRAFT