Compost Site Assessment for Food Waste Processing

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02223021.00 - Task 4 | August 21, 2024

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1 BACKGROUND

The Borough of West Chester (Borough) is a Pennsylvania Municipal Waste Planning, Recycling and Waste Reduction Act (Act 101) mandated recycling community. To comply with the requirements of Act 101 and to facilitate a more sustainable community, the Borough provides weekly curbside trash and recycling collection services to approximately 5,000 households. Residents are required to purchase a Borough-issued recycling container or use their own clearly labeled recycling container for the placement and collection of recyclable materials. The Borough maintains a list of acceptable and unacceptable materials on its recycling webpage. There are no limits to the quantity of recyclable materials residents can place curbside weekly. The Borough has established programs for the management of the following special materials:

- Electronics – Residents may bring electronics to the Public Works Department (205 Lacey Street) for a small fee for recycling.

- Household Hazardous Waste – The Borough participates in Chester County-hosted household hazardous waste collection events that are open to all residents in the Borough.

The Borough has also established programs for the management and recycling of organic materials. The following provides descriptions of these programs and services available to residents:

- Yard Waste – Yard waste is collected weekly curbside, following the same schedule of trash and recycling collection. Materials must be placed in paper bags or bundled with twine or rope.

- Leaves – The Borough operates a curbside vacuum leaf waste collection program that runs for six (6) weeks from late October to early December. The Borough is divided into four sections and each section receives collection service three times throughout the six (6) - week collection period.

- Christmas Trees – The Borough provides collection of Christmas trees for two weeks in early January.

The Borough operates a yard waste processing facility located near the wastewater treatment plant at 351 Snyder Avenue. Organic materials collected through the three programs discussed above are transported to the Borough's processing facility. In the past, the facility was open to the public for the drop-off of yard waste but this is not currently available. The Borough is interested in expanding their organic material management program to include the recycling of food waste.

2 PROJECT DESCRIPTION

To assist the Borough in exploring the feasibility of a food waste recycling program, this project included the following four (4) tasks.

Task 1 – Site Visit and Project Kick-Off

The site visit and project kick-off meeting was conducted in late 2023. SCS staff met with a Borough representative to review the scope of work and discuss work activities. As part of the site visit, SCS staff completed a walking tour of the property to observe existing operations and assess the site's suitability for managing food waste. Throughout the site visit and walking tour, SCS conducted

interviews with the Borough staff to understand the full scope of services envisioned for the site. Additionally, SCS staff observed the immediate neighborhood surrounding the site to understand the proximity of the Borough to neighboring communities and businesses.

Task 2 – Potential Barriers to Development

Based on the observations and discussions completed under Task 1, SCS staff identified potential barriers to establishing a food waste composting facility at the site. Items identified under this task may be challenging for permitting, design, and operations.

Task 3 – Site Improvements and Equipment Needs

In addition to identifying the obstacles to establishing a food waste composting facility, the SCS team identified a list of site improvements that may be needed to prepare the property for processing food waste.

Task 4 – Final Report

This final report includes descriptions of the project and observations, potential barriers, and steps identified as part of Tasks 1-3.

3 SITE OBSERVATIONS

EXISTING CONDITIONS

For this discussion, the site is divided into three (3) zones: North, South, and East (**Figure 1**). The site is accessible from Snyder Avenue. The neighboring Goose Creek/West Chester Borough Water Treatment Plant has an anaerobic digester that processes wastewater sludge.

The northwest corner of the North Zone (right) is used for storage of incoming materials, including bagged yard waste and bulk wood material. This area is also used for leaf windrow and ground wood stockpiles. On occasion, the Borough hires a private contractor to grind the wood material and the bagged yard waste.

The surface is compacted soil, which may include some asphalt millings. This zone slopes from south to north. Other portions of the North Zone are used for storage of asphalt millings or are open areas with a similar surface.

On the west side of the South Zone (right), there are five (5) bunkers with jersey barriers for walls and an asphalt surface. One bunker was observed to be containing ground wood during the site visit. Other bunkers are located on the north side and the east side of the South Zone. These bunkers were used for ground wood, stone aggregate, and drainage pipe. Most of the South Zone included a compacted soil surface which is generally flat.

The East Zone (right) was being used for storage of miscellaneous materials, including soil stockpiles and yard debris. Most of the East Zone included a generally compacted soil surface.

Figure 1. Site Map of 351 Snyder Avenue

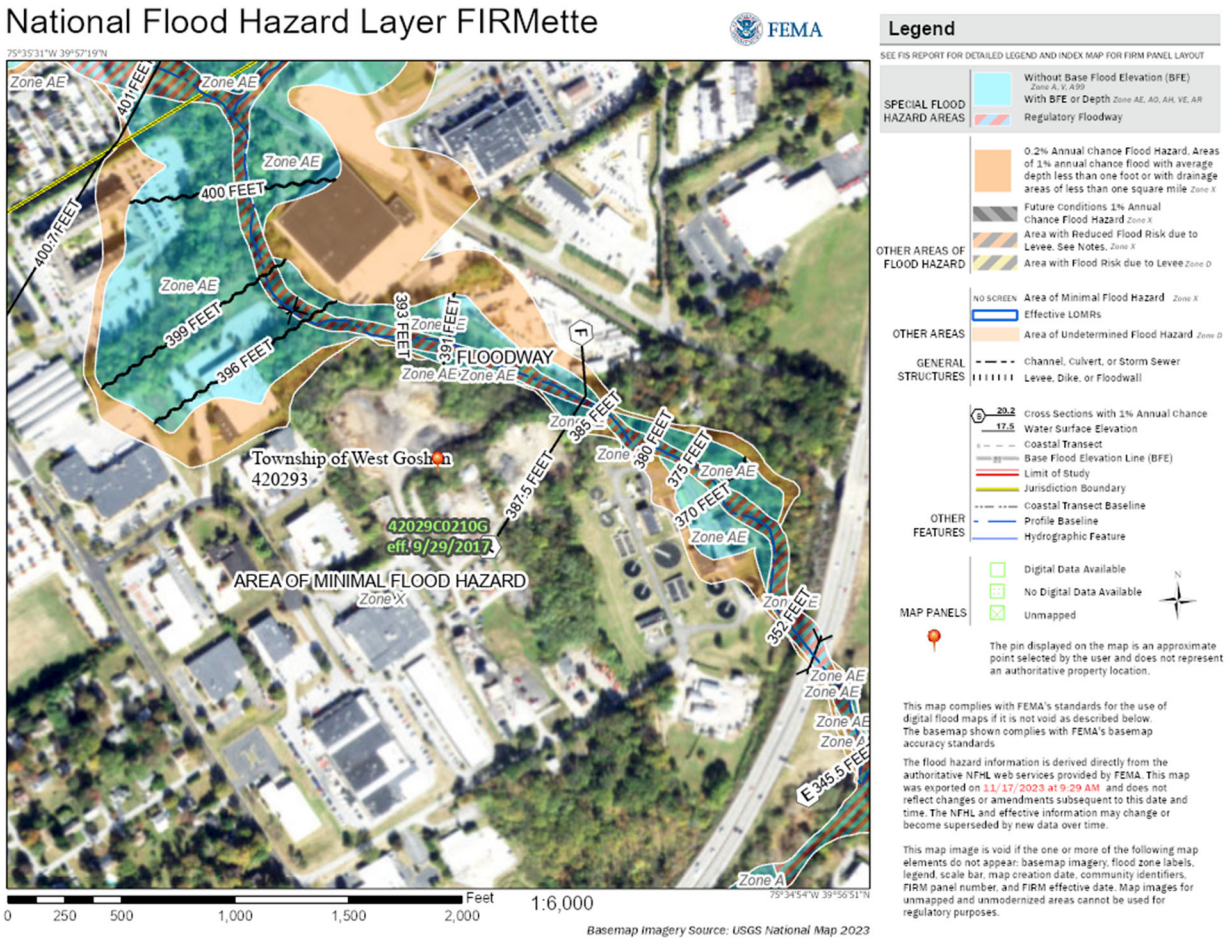
ASSESSMENT

The site at 351 Snyder Avenue has many attributes which would allow the acceptance, management, and composting of food waste. Key site features that facilitate usage of this site to manage food waste include:

- Three zones with sufficient space that may be used individually or in combination to support food compost operations,
- All-weather surfaces in all three zones,
- Existing features that have the potential for expansion in composting operations, such as the west-side bunkers on the asphalt surface,
- Restricted access,
- Co-location with the wastewater treatment plant; and
- Surrounded by commercial/industrial properties.

Goose Creek runs along the northern perimeter of the property, but the site is not within a flood zone. **Figure 2** displays a property flood map from the Federal Emergency Management Agency (FEMA). Portions of the North Zone may not be usable after consideration of setback requirements, but this is expected to be a minor item.

Figure 2. 351 Snyder Avenue Flood Map



4 REGULATORY REQUIREMENTS

Under Commonwealth of Pennsylvania law, the existing yard waste facility operates with a permit-by-rule under Chapter 271.103(h). Facilities that fall under Chapter 271.103(h) include those for backyard composting and yard waste composting. If the facility begins accepting food waste feedstock, the facility would be considered a general composting facility (as opposed to a yard waste facility). As a general composting facility, the facility is subject to the permitting and operating requirements of Chapter 281, which are included in **Appendix A**.

This composing facility would likely fall under the General Permit WMGM017, Source Separated Composting for non-farm small scale facilities two (2) acres or less. An application must be submitted to the Department of Environmental Protection (DEP) for permitting. **Appendix B** includes the DEP's detailed registration, operating, recordkeeping, and reporting requirements for General Permit WMGM017.

5 SITE IMPROVEMENTS, EQUIPMENT NEEDS, AND RECOMMENDATIONS

OVERVIEW

It is recommended the Borough use aerated static pile technology to compost food waste. Aerated Static Pile (ASP) composting is a controlled aerobic decomposition process. The process entails placing organic materials in piles and maintaining high oxygen levels by continually blowing air through the piles. An ASP composting system should provide the right technology to balance the speed of the composting process with the need to maintain space for feedstocks. ASP system are also not as capital intensive as other composting technologies that provide for quicker composting times. The benefits of a food waste compost system include:

- Establishes compost infrastructure
- Reduces greenhouse gas emissions by preventing disposal and, in many cases, reducing transportation requirements
- Sequesters carbon in the natural process of composting
- Provides a local source of soil amendment/fertilizer alternative
- Reduces quantities of waste sent to incinerators and landfills
- Educates the community about organics recycling and compost; and
- Saves money by lowering waste disposal costs.

The best way to implement a food waste collection and composting program is to conduct a pilot test program to collect data to evaluate and refine what a full scale composting program may look like.

PILOT TEST

To understand the complexities and opportunities for full scale food waste composting, it is recommended the Borough consider a food waste composting pilot test program. The test may be conducted in the South Zone on the existing asphalt pad. The test would allow the Borough to implement, educate, and evaluate the receipt and composting of food waste using ASP technology as proposed in this section. Compost pilot projects are short-term test programs that evaluate the organic waste streams and assess whether composting is a viable solution. Insights gained from these programs result in systems tailored to the Borough's goals and appropriate for the waste streams. Pilot projects provides the ability to:

- Assess the feasibility of collecting/sourcing organic materials – Pilot programs identify types and quantities of collected materials and the partnerships/support needed to make the program effective. It provides clarifying information on key program aspects such as material generators, participation levels, container types, collection frequencies, and other operational considerations. Developing a full scale program without first confirming these details may result in an inefficient or ineffective program.

- Evaluate the characteristics and handling requirements for different organic materials – Characteristics of organic materials differ, and understanding materials helps establish proper handling of the feedstock materials for an effective program and reduces or eliminates nuisance issues (i.e. odors). Additionally, understanding the material's moisture level, carbon-nitrogen content, physical size, and contamination levels impact how to manage materials.

- **Assess different mix recipes and residence times** – A pilot composting program allows the Borough to assess the amount of time, known as residence time, needed to properly process the collected organic materials into compost products. The residence time impacts space requirements and system costs. Additionally, a pilot program will give the Borough some flexibility to test different compost "recipes" in order to produce the highest quality compost to minimize or eliminate nuisance issues.

- **Understand environmental impacts** – Potential impacts of compost systems include odors, noise, water runoff, and vectors. Designing and testing the system to minimize these impacts lowers the risk of neighbors who may be unhappy with the facility. Planning for these impacts ahead of time avoids the added cost of managing them once the permanent system is operational and reduces the risk of program cancellation.

- **Provide staff training** – A pilot composting program provides Borough staff with the opportunity for hands-on management and operation of the complete compost process. Training for a tailored program during the pilot facilitates a smoother launch of the full program. The team will gain experience to address issues quickly and effectively as they arise.

- **Produce a finished compost product for lab testing** – Testing the finished compost product provides insight into the quality of the product and identifies who may be interested in buying it. Knowing who the downstream partners could be ahead of time allows one to set goals and anticipate a return on an investment.

- **Explain and exhibit the process to decision-makers, regulators, and neighbors** – Stakeholder support is critical to any compost program. Whether participation is needed in sourcing organic waste materials or partnership buying the end product – including them in the process clears a path to success.

PROCESS OVERVIEW

In general, the composting process involves the following steps:

- **Receiving and pre-processing of feedstocks:** Organic materials may be weighed or measured, upon receipt, and then stockpiled prior to processing (e.g., wood chips). The receiving area can be an open area, partially enclosed area or fully enclosed area, such as a building. Some organic materials, such as food waste, are generally not stockpiled for any length of time. Food waste must be incorporated into the compost process within 24-hours of receipt at the facility per permit requirements. Organic materials are mixed to create a compost recipe that meets the system's feedstock requirements. The types of organic materials and mixtures, and the amount of processing required, will depend on the process or technology used.

- **Processing**: Pre-processed organic materials are placed in elongated piles for processing into compost products.

- **Post-processing and storage**: Processed organic materials are screened to remove non-organic materials and large particles (e.g., sticks, rocks, wood chips) to create fine-grade compost for distribution or sale.

Key concepts, applicable to most compost technologies, are defined as follows:

- **Composting Pad**: Ground on which composting activities take place. An "all weather composting pad" is one of sufficient construction, firmness and grading so that composting equipment can manage the process during normal inclement weather, including rain, snow, and freezing temperatures.

- **Contact Water:** Water that has made contact with raw feedstocks or active composting piles. It does not include water from curing piles, finished compost or product storage piles.

- **Curing:** A continuation of the composting process after the high heat stage during which stability and maturity continues to increase.

- **Stormwater:** Precipitation that has not made contact with raw feedstocks or active composting piles.

Potential environmental issues associated with composting, which require active management include the following:

- **Odors:** Odor is the primary concern when handling organic materials. Odors can be an issue during the receiving/pre-processing step and during the active composting phase of the process. A nuisance minimization and control plan is required by DEP for composting facilities with General Permit WMGM017 to address odors and other nuisances.

- **Water:** Stormwater and contact water must be managed. Contact water is typically directed to an appropriately sized containment, recycling, or treatment system.

SITE PREPARATION AND MANAGEMENT

It is recommended to use the South Zone for site preparation and management. The specific area may need to be compacted and graded to prevent ponding of stormwater. The grading, if any is needed, should generally match the existing grading and stormwater flow patterns.

The existing asphalt pad in the South Zone can be used for receiving and mixing. A new concrete pad is needed for the ASP process. Areas for curing and stockpiles can use the existing compacted surfaces.

Depending on the facility size, stormwater may need to be directed into a new detention basin (and then reused in the process to the extent possible). Contact water from the ASP process needs to be contained and collected in a sump. Contact water would be pumped from the sump to a small above-ground tank and recycled back into the process.

SITE EQUIPMENT AND STRUCTURES

In preparation of a composting facility, this section lists the necessary equipment and structures needed for operation. Major equipment that is needed along with select cost estimates is as follows:

- Skid-steer - ~$50,000
- Aeration blower (will be powered by an electric motor) - ~$10,000

- Weigh scale
- Rental of a grinder and a trommel screen on occasion

It is difficult to estimate the capital and operating costs of a composting facility without quantifying the amount of material to be processed at the facility, which was not part of the scope of work. In 2022, BioCycle published an article titled "*Compost Facility Planning: Compost Facility Cost Estimates*.[1]" The article details the capital and operating costs of a 40,000 ton per year ASP composting facility. This article is provided in **Appendix C**.

Structures for the composting facility may include the following:

- Scalehouse, including bathroom
- Receiving and mixing building

The scalehouse is expected to be a modular building/office trailer. The receiving building is likely not needed initially. As quantities increase, a building may be warranted.

Staffing required to operate the facility is also dependent on size. We expect the Borough's composting facility to be initially less than 1,000 tons annually. A facility of this size would likely require up to a half full time equivalent (FTE) position to manage operations, incorporate food waste into the system, and complete compliance monitoring. As the facility grows in size, the Borough can expect an increase in the FTE positions required.

ACCEPTABLE FEEDSTOCKS AND RECEIVING GUIDELINES

Acceptable Feedstocks

The feedstocks should be sourced locally. The Borough has an abundance of yard trimmings and wood waste, which can be ground for use in the compost facility. The Borough could source food waste from residents as well as local businesses, schools, hospitals etc.

Receiving Guidelines

The following recommendations are provided for receiving organic materials at the composting facility:

- Food scrap loads should be weighed on the facility scale.

- Borough personnel will direct food scrap vehicles to the receiving pad.

- Incoming material will be dumped on to a bed of wood chips, as taken from the wood chip stockpile. The amount of wood chips for the bed will be equal to 1.5 times the volume of the incoming vehicle (e.g., 15 cubic yards of wood chips for a 10 cubic yard food scrap load).

[1] *Compost Faciltiy Planning: Composting Facility Cost Estimates*, September 27, 2022, accessed from www.biocycle.net

- A visual inspection of incoming food waste will be made for unacceptable materials. Any incoming contamination will be recorded and categorized as to type and amount. Contaminated or unacceptable feedstock will be separated and disposed as MSW.

Operating Hours

During the first year, the facility will likely be manned for less than 40 hours per week, as it will take time to secure a steady supply of food waste. Food waste deliveries may be limited to certain days of the week.

The aeration blower will operate 24 hours per day, 7 days per week, via an automated control system. The blower will operate with a variable frequency drive motor, which will greatly reduce the noise.

MIXING AND LOADING OF COMPOST BATCHES

General Guidelines

Initially, the food waste will be mixed with ground wood at a volumetric ratio of 4:1. This will result in a conservatively high ratio of carbon to nitrogen to minimize the potential for odors.

Loading of ASP Bays

After unloading each food scrap load on to the bed of wood chips, additional wood chips will be added to each load per the mix recipe. An appropriately sized front-end loader will then mix and blend the materials together. Blended material will be used to load one of the Phase 1 ASP bays, as described below.

Each Phase 1 ASP bunker is delineated by moveable concrete building blocks, with a height of 6 feet, a width of 25 feet, and a length of 50 feet. The pile is static, and as such does not need to be turned. It is aerated via a blower system, which blows ambient air through two trenches installed below each bay. This process provides oxygen, enabling the microorganisms responsible for breaking down the material to thrive. It also cools the pile to acceptable temperatures.

After 2-4 weeks, the material is moved to a curing windrow with the front-end loader. The curing phase allows the temperature to drop as the composting process slows and the product becomes more stable.

After curing, the product will be screened through a trommel. The screen separates out larger wood particles from the finer compost that can be sold. The fine product that makes it through the screening process will be stored.

6 CONCLUSION

West Chester Borough has a unique opportunity to establish a program whereby food waste are diverted from disposal. Such a program aligns with the Borough's desire to provide sustainable solid waste management solutions and services to residents. The Borough is unique in that the existing yard waste management facility located at 351 Snyder Avenue appears sufficient to support a food waste composting program. Site features including space, all-weather surfaces, location, and access all contribute to the potential use of the site to manage food waste. If the Borough were to implement a food waste collection program and the facility begins accepting food waste feedstock,

the site would be considered a general composting facility. As a general composting facility, the facility is subject to the permitting and operating requirements of Chapter 281 (Appendix A). SCS recommends the Borough begin with a pilot test for food waste composting to understand the quantities and characteristics of food waste and the best recipe for producing compost products that are desirable for Borough use with the potential to make available to residents for use at home. Should the Borough wish to pursue food waste composting further, SCS recommends evaluating different food waste collection program types and estimating potential quantities of food waste that may be recovered through the program. It is also recommended the Borough retain an engineer to begin the permitting process and site preparations in anticipation of receiving and processing food waste.

Appendix A
Chapter 281 Compost Facility Regulations

CHAPTER 281. COMPOSTING FACILITIES

Subchap.		Sec.
A.	GENERAL	281.1
B.	APPLICATION REQUIREMENTS FOR GENERAL COMPOSTING FACILITIES	281.101
C.	OPERATING REQUIREMENTS FOR GENERAL COMPOSTING FACILITIES	281.201

Authority

The provisions of this Chapter 281 issued under section 105(a) of the Solid Waste Management Act (35 P. S. § 6018.105(a)); sections 5(a), 304 and 402 of The Clean Streams Law (35 P. S. §§ 691.5(a), 691.304 and 691.402); and sections 1905-A, 1917-A and 1920-A of The Administrative Code of 1929 (71 P. S. §§ 510-5, 510-17 and 510-20); amended under section 105(a) of the Solid Waste Management Act (35 P. S. § 6018.105(a); sections 5(b) and 402 of The Clean Streams Law (35 P. S. §§ 691.5(b) and 691.402); section 302 of the Municipal Waste Planning, Recycling and Waste Reduction Act (53 P. S. § 4000.302); section 104(a) of the Land Recycling and Environmental Remediation Standards Act (35 P. S. § 6026.104(a)); sections 2(b) and 4(b) of the Infectious and Chemotherapeutic Wastes Law (35 P. S. §§ 6019.2(b) and 6019.4(b)); sections 1905-A, 1917-A, 1920-A and 1937-A of The Administrative Code of 1929 (71 P. S. §§ 510-5, 510-17, 510-20 and 510-37); section 207 of the Small Business and Household Pollution Prevention Program Act (35 P. S. § 6029.207); section 15(a) of the act of November 26, 1997 (P. L. 530, No. 57); Environmental Stewardship and Watershed Protection Act, 27 Pa.C.S. § 6105(g); and sections 301 and 302 of the Radiation Protection Act (35 P. S. §§ 7110.301 and 7110.302), unless otherwise noted.

Source

The provisions of this Chapter 281 adopted April 8, 1988, effective April 9, 1988, 18 Pa.B. 1681, unless otherwise noted.

Cross References

This chapter cited in 25 Pa. Code § 252.3 (relating to scope); 25 Pa. Code § 266b.11 (relating to waste management for universal waste mercury-containing devices); 25 Pa. Code § 271.2 (relating to scope); 25 Pa. Code § 271.101 (relating to permit requirement); 25 Pa. Code § 271.121 (relating to application contents); 25 Pa. Code § 271.504 (relating to operating requirements); and 25 Pa. Code § 271.801 (relating to scope).

Subchapter A. GENERAL

Sec.
281.1. Scope.
281.2. [Reserved].

§ 281.1. Scope.

(a) This chapter sets forth application and operating requirements for composting facilities. The requirements in this chapter are in addition to the applicable requirements in Chapter 271 (relating to municipal waste management—general provisions).

(b) Subchapters B and C (relating to application requirements for general composting facilities; and operating requirements for general composting facilities) set forth application and operating requirements for a person or municipality that operates or proposes to operate a general composting facility.

§ 281.2. [Reserved].

Source

The provisions of this § 281.2 adopted April 8, 1988, effective April 9, 1988, 18 Pa.B. 1681; amended October 9, 1992, effective October 10, 1992, 22 Pa.B. 5105; reserved January 24, 1997, effective January 25, 1997, 27 Pa.B. 521. Immediately preceding text appears at serial pages (173916) to (173917).

Subchapter B. APPLICATION REQUIREMENTS FOR GENERAL COMPOSTING FACILITIES

GENERAL PROVISIONS

Sec.
281.101. General requirements.

PLANS

281.111. Operating plan.
281.112. Maps and related information.
281.113. Design and related information.
281.114. Description of geology, soils and groundwater.
281.115. Plan for access roads.
281.116. Access control plan.
281.117. Nuisance control plan.
281.118. Litter control plan.
281.119. Radiation protection action plan.

COMPOSTING

281.121. Composting pad and vessel design.
281.122. Chemical analysis of sludge.
281.123. Daily volume.

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SOIL AND WATER

281.131. Revegetation plan.
281.132. Soil erosion and sedimentation control plan.
281.133. Leachate treatment plan.
281.134. Soil and groundwater monitoring plan.

CONTINGENCIES AND CLOSURE

281.141. Contingency plan.
281.142. Postclosure land use plan.

Cross References

This subchapter cited in 25 Pa. Code § 281.1 (relating to scope).

GENERAL PROVISIONS

§ 281.101. General requirements.

(a) An application to operate a general composting facility shall:

(1) Comply with this subchapter.

(2) Comply with the applicable requirements of Chapter 271 (relating to municipal waste management—general provisions).

(b) Maps, plans and cross sections submitted to comply with this subchapter shall be on a scale in which 1 inch equals no more than 50 feet with 2-foot maximum contour intervals, unless otherwise approved by the Department.

Source

The provisions of this § 281.101 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226349).

PLANS

§ 281.111. Operating plan.

An application to operate a general composting facility shall contain the following:

(1) A narrative description of the general operating plan for the proposed facility, including the origin, composition and weight or volume of solid waste that is proposed to be composted at the facility, the suitability of the waste for composting, the composting process to be used at the facility, the daily operational methodology of the proposed process, the proposed processing and storage capacity of the facility and the expected life of the facility.

(2) A plan for an alternative waste handling or disposal system during periods when the proposed facility is not in operation, including procedures to be followed in case of equipment breakdown. Procedures may include the use of standby equipment, extension of operating hours or contractual agreements for diversion of municipal waste to other facilities.

(3) A plan for sampling and analyzing the compost.

(4) A description of the anticipated quality of the compost.

(5) A plan for the anticipated recovery rate of compost from the process, and plans for the reuse, sale or marketing of the compost.

(6) A plan for managing compost should markets for the sale or reuse of compost become unavailable.

(7) A plan for the proposed location and method for disposal or processing of residue produced by operation of the facility.

(8) A plan for assuring that solid waste received at the facility is consistent with § 281.201 (relating to basic limitations).

(9) A plan for training equipment operators and other personnel concerning the operation and approved design of the facility.

(10) The proposed operating hours of the proposed facility.

(11) A narrative describing the procedures for inspection and monitoring of incoming waste.

Source

The provisions of this § 281.111 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (226349) to (226350).

§ 281.112. Maps and related information.

(a) An application shall contain a topographic map, including necessary narrative descriptions, which shows the following:

(1) The boundaries and names of present owners of record of land, both surface and subsurface, and including easements, rights-of-way and other property interests, for the proposed permit area and adjacent area; the boundaries of the land within the proposed permit area; and a description of title, deed or usage restrictions affecting the proposed permit area.

(2) The boundaries of land to be affected over the estimated total life of the proposed operation.

(3) The location and name of surface water bodies, such as springs, streams, lakes, ponds, wetlands, constructed or natural drains and irrigation ditches located on the proposed permit area and adjacent area.

(4) The location and name of public and private water sources that are located on the proposed permit area and adjacent area.

(5) The location of rights-of-way for high-tension power lines, pipelines, railroads and public and private roads within 300 feet of the proposed facility.

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(6) The location of buildings currently in use within 300 feet of the proposed facility.

(7) The anticipated location of water quality monitoring points.

(8) The boundaries of land within the proposed permit area or adjacent area identified in § 281.202 (relating to areas where general composting facilities are prohibited).

(9) The location of underground mine shafts on the proposed permit area and adjacent areas.

(10) The municipalities in which the permit area is proposed to be located.

(11) The location of the 100-year floodplain boundaries in the permit area and adjacent area.

(12) The location of barriers, fences and similar structures required by § 281.213 (relating to access control).

(13) The water diversion, collection, conveyance, sedimentation and erosion control, treatment, storage and discharge facilities to be used.

(14) The composting pads, tipping areas, storage areas, windrows and loading/unloading areas.

(15) The areas of land for which a bond will be posted under Chapter 271, Subchapter D (relating to financial assurances requirements).

(16) The location, size and use of buildings and related facilities which will be used in the operation, including the horizontal and vertical dimensions.

(17) The location of scales and weigh stations to be used in the operation.

(18) The utilities to be installed at the facility.

(19) The location of access loads to the site, including slopes, grades and lengths of the roads.

(20) For a commercial composting facility that will receive sewage sludge or unseparated municipal waste, or both, a designated area for vehicles for use in the event of the detection of waste containing radioactive material. The designated area shall, by location or shielding, protect the environment, facility staff and public from radiation originating in the vehicle. The Department's "*Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities*," Document Number 250-3100-001, describes various factors to consider in determining an appropriate designated area.

(b) The applicant shall also submit a grid coordinate system for the entire proposed permit area. The horizontal control system shall consist of a grid not to exceed 200-foot-square sections. A permanent benchmark for horizontal and vertical control shall be shown. The grid system shall be tied to the benchmark and the baseline.

Source

The provisions of this § 281.112 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (226350) to (226351).

§ 281.113. Design and related information.

The application shall contain a narrative description of the following:

(1) Site preparation procedures.

(2) The sources, types and volumes of solid waste to be composted on a daily basis.

(3) The methods to be used to control the flow of waste to the facility, including a flow chart depicting the processing of solid waste and mechanical components of the processing system.

(4) The size, type, capacity and general specifications of equipment for the handling, processing and storage of the solid waste.

(5) For composting processes that are not totally enclosed, the frequency schedule for turning, agitation or aeration of the compost; and for totally enclosed composting processes, the design, composting method and operational procedure.

(6) The windrow dimensions, design and construction methods.

(7) The maximum and minimum length of time necessary to complete the composting process.

(8) The method for separation, storage and ultimate disposal of noncompostable materials, including bulky waste.

(9) The physical and chemical composition of compost residue produced by the process.

(10) The minimum and maximum volume or weight of compost or residue to be stored prior to sale, reuse or disposal, and the minimum and maximum time that material or waste is to be stored.

(11) Plans for utilities to be installed at the facility, including onsite or offsite point-of-service connections and points of usage.

(12) The flooding frequency of the proposed permit area.

§ 281.114. Description of geology, soils and groundwater.

The application shall contain a description of the geology, soils and groundwater of the proposed permit area, based on a sufficient number of excavations and borings or wells to enable the Department to evaluate whether the proposed activities will be able to comply with the operating requirements in Subchapter C (relating to operating requirements for general composting facilities).

§ 281.115. Plan for access roads.

The application shall contain designs, cross sections and specifications for access roads, including load limits, to demonstrate compliance with § 281.212 (relating to access roads).

Cross References

This section cited in 25 Pa. Code § 281.212 (relating to access roads).

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§ 281.116. Access control plan.

The application shall contain plans sufficient to demonstrate compliance with § 281.213 (relating to access control), including plans showing fencing and barriers to be constructed at the facility in full elevation, fully dimensioned and with the type of construction materials specified.

§ 281.117. Nuisance control plan.

The application shall contain a plan under § 281.218 (relating to nuisance control) to prevent and control hazards or nuisances from vectors, odors, noise, dust and other nuisances not otherwise provided for in the permit application. The plan shall provide for the routine assessment of vector infestation and shall also provide for countermeasures. The plan may include a control program involving a contractual arrangement for services with an exterminator.

§ 281.118. Litter control plan.

The application shall contain a plan under § 281.220 (relating to litter) to control litter.

§ 281.119. Radiation protection action plan.

(a) An application for a commercial composting facility that will receive sewage sludge or unseparated municipal waste, or both, shall contain an action plan specifying procedures for monitoring for and responding to radioactive material entering the facility, as well as related procedures for training, notification, recordkeeping and reporting.

(b) The action plan shall be prepared in accordance with the Department's "*Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities*," Document Number 250-3100-001, or in a manner at least as protective of the environment, facility staff and public health and safety and which meets all statutory and regulatory requirements.

(c) The action plan shall be incorporated into the facility's approved waste analysis plan under § 271.613 (relating to waste analysis plan).

Source

The provisions of this § 281.119 adopted December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685.

Cross References

This section cited in 25 Pa. Code § 281.221 (relating to radiation monitoring and response).

COMPOSTING

§ 281.121. Composting pad and vessel design.

(a) An application shall contain plans and specifications for the design, construction and maintenance of composting pads and vessels that will be required for the proposed facility.

(b) The application shall also contain a plan for inspection of composting pads and vessels to ensure their integrity.

(c) Composting pad and vessel plans and designs shall be consistent with § 281.231 (relating to composting pad or vessel).

Source

The provisions of this § 281.121 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226352).

§ 281.122. Chemical analysis of sludge.

(a) If the application proposes that sewage sludge be composted at the facility, the applicant shall submit to the Department, on forms provided by the Department, a detailed analysis that fully characterizes the chemical and physical properties of the sludge.

(b) The applicant shall also provide the following information for each individual source of sludge:

(1) Identify the type of treatment carried out at the sewage treatment plant prior to dewatering.

(2) Identify the dewatering processes utilized, including a description of the equipment or technique used, the chemical reagents employed and a determination of the percent solids achieved.

(3) Identify the maximum, minimum and average delivery rates anticipated. Quantities shall be expressed on a dry weight basis and the percent solids delivered to the facility.

Cross References

This section cited in 25 Pa. Code § 281.232 (relating to continuing analysis of sludge).

§ 281.123. Daily volume.

The application shall contain a proposed maximum daily volume for the facility, and a detailed justification for volume, under §§ 271.126 and 271.127 (relating to requirement for environmental assessment; and environmental assessment).

Source

The provisions of this § 281.123 adopted December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685.

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SOIL AND WATER

§ 281.131. Revegetation plan.

An application shall contain a plan for revegetation of all or part of the site under §§ 281.241 and 281.242 (relating to general requirements; and standards for successful revegetation). The plan shall identify the species that are proposed to be planted, seeding rates and method of revegetation.

Cross References

This section cited in 25 Pa. Code § 281.142 (relating to postclosure land use plan).

§ 281.132. Soil erosion and sedimentation control plan.

(a) The applicant shall submit a plan to manage surface water and control erosion during all phases of construction and operation at the facility. The plan shall be based on the requirements of Chapter 102 (relating to erosion control), § 281.252 (relating to soil erosion and sedimentation control) and other applicable State and Federal requirements. Calculations indicating water quantities shall be based on the 24-hour precipitation event in inches to be expected once in 25 years. More stringent design standards may be required by the Department based on the most recent edition of the United States Department of Agriculture Soil Conservation Services' *Engineering Field Manual for Conservation Practices*.

(b) The plan shall include fully dimensioned diversion ditches, indicating length, gradient and cross section for configuration by reach, and capacities for ditch volume by reach. Calculations which are necessary to support design and siting shall be included in the plan.

Source

The provisions of this § 281.132 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (266317).

§ 281.133. Leachate treatment plan.

An application shall contain a plan for collection, storage and treatment of leachate and wastewater from the facility in a manner that complies with The Clean Streams Law (35 P. S. §§ 691.1—691.1001) and regulations thereunder.

§ 281.134. Soil and groundwater monitoring plan.

(a) If required by the Department, the applicant shall submit a groundwater monitoring plan to detect groundwater degradation from the facility.

(b) If required by the Department, the applicant shall submit a soil monitoring plan capable of detecting the contamination from the facility.

Source

The provisions of this § 281.134 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (266318).

CONTINGENCIES AND CLOSURE

§ 281.141. Contingency plan.

An application shall contain a contingency plan consistent with §§ 281.261—281.263 (relating to emergency procedures). The plan shall include a Preparedness, Prevention, and Contingency (PPC) Plan that is consistent with the Department's most recent guidelines for the development and implementation of PPC plans.

§ 281.142. Postclosure land use plan.

An application shall contain a detailed description of the proposed use following closure of the proposed facility, including a discussion of the utility and capacity of the revegetated land to support a variety of alternative uses, and the relationship of the use to existing land use policies and plans. The description shall explain the following:

(1) How the proposed postclosure land use is to be achieved and the necessary support activities which may be needed to achieve the proposed land use.

(2) The consideration which has been given to making the proposed postclosure land use consistent with landowner plans and applicable State and local land use plans and programs.

(3) The specific postclosure land use of areas that are not proposed to be revegetated under § 281.131 (relating to revegetation plan).

Cross References

This section cited in 25 Pa. Code § 281.241 (relating to general requirements).

Subchapter C. OPERATING REQUIREMENTS FOR GENERAL COMPOSTING FACILITIES

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Cross References

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GENERAL PROVISIONS

§ 281.201. Basic limitations.

(a) A person or municipality may not own or operate a general composting facility unless the Department has first issued a permit to the person or municipality for the facility under this chapter.

(b) A person or municipality that operates a general composting facility shall comply with the following:

(1) The operating requirements of the act, this subchapter and the applicable requirements of Chapter 271 (relating to municipal waste management—general provisions).

(2) The plans and specifications in the permit, the terms and conditions of the permit, the environmental protection acts, this title and orders issued by the Department.

(c) A person or municipality that operates a general composting facility may not allow residual waste or special handling waste to be handled at the facility unless the Department has specifically approved special measures for managing the waste as part of the permit.

(d) A person or municipality that operates a general composting facility may not:

(1) Mix solid waste with, or store solid waste in close proximity to, other solid waste to create a risk of fire or explosion, or a risk of the accumulation of poisonous or otherwise harmful vapors or gases.

(2) Allow explosive waste to be processed at the facility.

(e) Hazardous waste subject to Article VII (relating to hazardous waste management) may not be disposed, processed or stored where general composting facilities are operated.

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(f) The approved mitigation measures identified in the permit application shall be completed before a facility may accept waste, unless a later date is authorized in writing by the Department for technical reasons.

(g) The following radioactive material controlled under specific or general license or order authorized by any Federal, State or other government agency may not be processed at the facility, unless specifically exempted from disposal restrictions by an applicable Pennsylvania or Federal statute or regulation:

(1) Naturally-occurring and accelerator-produced radioactive material.

(2) Byproduct material.

(3) Source material.

(4) Special nuclear material.

(5) Transuranic radioactive material.

(6) Low-level radioactive waste.

(h) The following radioactive material may not be processed at the facility, unless approved in writing by the Department and the processing does not endanger the environment, facility staff or public health and safety:

(1) Short-lived radioactive material from a patient having undergone a medical procedure.

(2) TENORM.

(3) Consumer products containing radioactive material.

(i) The limitations in subsections (g) and (h) do not apply to radioactive material as found in the undisturbed natural environment of this Commonwealth.

Source

The provisions of this § 281.201 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (226356) and (255081).

Cross References

This section cited in 25 Pa. Code § 281.111 (relating to operating plan).

§ 281.202. Areas where general composting facilities are prohibited.

(a) Except for areas that were permitted prior to April 9, 1988, a general composting facility may not be operated as follows:

(1) *Floodplain*. In the 100-year floodplain of waters of this Commonwealth unless demonstrated that the compost facility can be protected during flooding.

(2) *Wetland*.

(i) In or within 300 feet of an exceptional value wetland, as defined in § 105.17 (relating to wetlands).

(ii) For a general composting facility permitted on or after December 23, 2000, other than an expansion of a general composting facility that was permitted prior to December 23, 2000, in or within 100 feet of a wetland other than an exceptional value wetland, unless storage and processing will

not occur within that distance or storage and processing take place in an enclosed facility and one of the following is true:

(A) If the operation is in or along the wetland, the operator has received a permit from the Department under Chapter 105 (relating to dam safety and waterway management).

(B) If the operation is not in or along the wetland, no adverse hydrologic or water quality impacts will result.

(3) *Occupied dwelling*. Within 300 feet measured horizontally from an occupied dwelling, unless the owner of the dwelling has provided a written waiver consenting to the facility being closer than 300 feet. The waiver shall be knowingly made and separate from a lease or deed unless the lease or deed contains an explicit waiver from the owner.

(4) *Perennial stream*. Within 100 feet of a perennial stream, unless one of the following applies:

(i) Storage and processing will not occur within 100 feet of a perennial stream and no adverse impacts to the perennial stream will result.

(ii) Storage and processing take place in an enclosed facility and no adverse hydrologic or water quality impacts will result.

(5) *Property line*. Within 50 feet of a property line unless the operator demonstrates one of the following:

(i) That actual processing of waste is not occurring within 50 feet of a property line.

(ii) That storage and processing ocurring within 50 feet of a property line take place in an enclosed facility.

(iii) That the owner of the adjacent property has provided a written waiver consenting to the facility being closer than 50 feet. The waiver shall be knowingly made and separate from a lease or deed unless the lease or deed contains an explicit waiver from the owner.

(6) *Water source*. Within 1/4 mile upgradient and within 300 feet downgradient of a private or public water source.

(7) *Water table*. In an area where the pad or vessel will be in contact with the seasonal high water table or perched water table.

(8) *School, park or playground*.

(i) For a municipal waste transfer facility permit issued on or after December 23, 2000, except an expansion of a municipal waste transfer facility permitted prior to December 23, 2000, within 300 yards of the following:

(A) A building which is owned by a school district or school and used for instructional purposes.

(B) A park.

(C) A playground.

(ii) The current property owner of a school building, park or playground may waive the 300-yard prohibition by signing a written waiver. Upon

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receipt of the waiver, the Department will waive the 300-yard prohibition and will not use the prohibition as the basis for the denial of a new permit.

(b) Except as provided in subsection (c), this section does not apply to a feature that may come into existence after the date of the first newspaper notice under § 271.141 (relating to public notice by applicant).

(c) This section does not apply to a feature that may come into existence after the date of the first newspaper notice under this subsection if the following apply:

(1) The person or municipality publishes a notice of intent to file an application for a general composting facility permit. The notice, which is separate from the newspaper notice required by § 271.141, shall be published once a week for 3 consecutive weeks in a newspaper of general circulation in the area where the facility is proposed to be located. The notice shall include a brief description of the location and proposed operation of the facility.

(2) The person or municipality files an administratively complete application with the Department within 1 year from the date of the first newspaper notice under this subsection.

Source

The provisions of this § 281.202 amended January 24, 1997, effective January 25, 1997, 27 Pa.B. 521; amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (255081) to (255082).

Cross References

This section cited in 25 Pa. Code § 281.112 (relating to maps and related information).

DAILY OPERATIONS

§ 281.211. Signs and markers.

(a) A person or municipality that operates a general composting facility shall identify the facility for the duration of operations by posting and maintaining a sign which will be clearly visible and can be easily seen and read at the junction of each access road and public road unless otherwise approved by the Department. The sign shall be constructed of a durable, weather resistant material. The sign shall show the name, business address and telephone number of the person or municipality operating the facility, the operating hours of the facility and the number of the current permit authorizing operations at the facility.

(b) Permanent physical markers for the grid coordinate system and permit area markers shall be:

(1) Posted and maintained during the duration of the operations to which they pertain.

(2) Clearly visible, readable and uniform throughout the operation.

(3) Permanently fixed and made of a durable material.

(c) The perimeter of the site shall be clearly marked before the beginning of operations.

(d) The permanent physical markers for the grid coordinate system shall be installed at the locations set forth in the permit, prior to the beginning of operations. The base line of the grid system shall be marked with two permanent monuments that show elevation.

Source

The provisions of this § 281.211 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (255082).

§ 281.212. Access roads.

(a) An access road shall be designed, constructed and maintained to prevent erosion to the maximum extent possible and to prevent contributions of sediment to streams or runoff outside the permit area.

(b) A crossing of a perennial or intermittent stream or a wetland shall be made using bridges, culverts or similar structures. Bridges, culverts or other encroachments or water obstructions shall meet the requirements of Chapter 105 (relating to dam safety and waterway management).

(c) An access road shall have a drainage system that is compatible with the natural drainage system, structurally stable and which will pass safely the peak flow from a 25-year, 24-hour precipitation event. The drainage system shall comply with Chapter 102 (relating to erosion control and sediment control).

(d) An access road shall be paved or surfaced with asphalt, gravel, cinders or other equivalent material approved by the Department in the permit. An access road shall be capable of withstanding the load limits projected by the applicant under § 281.115 (relating to plan for access roads). The maximum sustained grade of an access road may not exceed 12%.

(e) An access road negotiable by loaded collection vehicles shall be provided from the entrance gate of the area to each unloading area, treatment facility or impoundment. An access road shall also be provided to surface and groundwater monitoring points approved by the Department under § 281.254 (relating to soil and groundwater monitoring).

(f) Roads shall be constructed on a base that is capable of withstanding anticipated loads.

(g) Prior to the construction of a road, topsoil shall be removed, stored on a stable site and protected against erosion and compaction until restoration of the road.

(h) The disturbed areas adjacent to a road shall be vegetated or otherwise stabilized to prevent erosion.

(i) Access roads shall be designed, constructed and maintained to allow the orderly egress and ingress of vehicular traffic when the facility is in operation, including during inclement weather.

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Source

The provisions of this § 281.212 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226359).

Cross References

This section cited in 25 Pa. Code § 281.115 (relating to plan for access roads).

§ 281.213. Access control.

(a) A gate or other barrier shall be maintained at potential vehicular access points to block unauthorized access to the site when an attendant is not on duty.

(b) The operator shall construct and maintain a fence or other suitable barrier around the area sufficient to prevent unauthorized access.

(c) Access to the site shall be limited to times when an attendant is on duty.

Cross References

This section cited in 25 Pa. Code § 281.112 (relating to maps and related information); and 25 Pa. Code § 281.116 (relating to access control plan).

§ 281.214. Measurement and inspection of waste.

(a) An operator of a general composting facility that has received, is receiving or will receive 30,000 or more cubic yards of solid waste in a calendar year shall weigh solid waste when it is received. The scale used to weigh solid waste shall conform to 3 Pa.C.S. Chapter 41 (relating to the Consolidated Weights and Measures Act) and 70 Pa. Code Part I (relating to weighmasters). The operator of the scale shall be a licensed public weighmaster under 3 Pa.C.S. Chapter 41 and 70 Pa. Code Part I.

(b) The operator of a facility that is not required by subsection (a) to weigh waste when it is received shall accurately measure waste by volume or weight prior to unloading.

(c) The operator of a general composting facility shall inspect and monitor incoming waste to ensure that the receipt of waste is consistent with this article and the permit.

Source

The provisions of this § 281.214 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226360).

§ 281.215. Equipment.

(a) The operator shall maintain on the site equipment necessary for operation of the facility in accordance with the permit. The equipment shall be maintained in an operable condition.

(b) If a breakdown of the operator's equipment occurs, the operator shall utilize standby equipment as necessary to comply with the act, the environmental protection acts, this subchapter and its permit conditions.

(c) Equipment shall be operated and maintained to prevent solid waste from being unintentionally removed from the site.

(d) Equipment shall be cleaned at frequencies specified in the permit based on scheduled or emergency maintenance periods.

(e) Provision shall be made for the routine operational maintenance of the facility.

Source

The provisions of this § 281.215 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226360).

§ 281.216. Operations.

(a) The approach and unloading area shall be adequate in size and design to facilitate the rapid unloading of solid waste from collection vehicles and the unobstructed maneuvering of the vehicles and other equipment.

(b) The unloading and storage areas shall be constructed of impervious material which is capable of being cleaned by high pressure water spray and shall be equipped with drains or sumps connected to a sanitary sewer system or treatment facility to facilitate the removal of water.

(c) An attendant or clearly marked signs shall direct vehicles to the unloading area.

(d) The operator shall ensure that collection vehicles unload waste promptly in unloading areas.

(e) Solid waste shall be confined to the unloading area or a storage area approved as part of the operator's permit.

(f) If bulky waste is handled or processed at the facility, the operator shall remove the waste daily or take other action sufficient to prevent nuisances or unsightliness.

(g) The operator shall maintain sufficient distance between windrows or piles to allow the proper use of equipment during the deposit, removal and turning of the compost.

(h) The operator shall inspect the facility daily to detect hot spots in a storage or composting area, dust accumulation, vectors, litter and other problems, and promptly take necessary corrective actions.

§ 281.217. Air resources protection.

(a) The operator shall control fugitive air contaminants and otherwise prevent and control air pollution under the Air Pollution Control Act (35 P. S. §§ 4001—4014), Article III (relating to air resources) and § 281.218 (relating to nuisance minimization and control).

(b) A person or municipality may not cause or allow open burning at the facility.

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Source

The provisions of this § 281.217 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226361).

§ 281.218. Nuisance minimization and control.

(a) The operator shall control and minimize the attraction, harborage or breeding of vectors.

(b) The operator shall control and minimize conditions not otherwise prohibited by this subchapter that are harmful to the environment or public health, or which create safety hazards, odors, dust, noise, unsightliness and other public nuisances.

Source

The provisions of this § 281.218 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226361).

Cross References

This section cited in 25 Pa. Code § 281.117 (relating to air resources protection).

§ 281.219. Salvaging.

(a) Salvaging of materials may not be allowed or conducted unless salvaging is controlled by the operator to prevent interference with prompt and sanitary operations and is conducted to prevent a health hazard or nuisance.

(b) Salvaged materials shall be promptly removed from the unloading area and either stored in an approved area under Chapter 285 (relating to storage, collection and transportation of municipal waste) or transported offsite.

§ 281.220. Litter.

(a) The operator may not allow solid waste, compost or other materials to be blown or otherwise deposited offsite.

(b) Fences or other barriers sufficient to control blowing litter shall be located in the area immediately downwind from the composting and storage areas unless operations are conducted within an enclosed building or the solid waste or compost being stored cannot create blowing litter.

(c) At least weekly, blown off and intercepted litter shall be collected from fences, roadways, tree-lined barriers and other barriers, and disposed or stored in accordance with the act and regulations thereunder, unless a greater frequency is set forth in the permit.

Source

The provisions of this § 281.220 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (226361) to (226362).

Cross References

This section cited in 25 Pa. Code § 281.118 (relating to litter control plan).

§ 281.221. Radiation monitoring and response.

(a) An operator of a commercial composting facility that will receive sewage sludge or unseparated municipal waste, or both, shall implement the action plan approved under § 281.119 (relating to radiation protection action plan).

(b) An operator of a commercial composting facility that will receive sewage sludge or unseparated municipal waste, or both, shall monitor incoming waste in accordance with the Department's "*Guidance Document on Radioactivity Monitoring at Solid Waste Processing and Disposal Facilities*," Document Number 250-3100-001 or in a manner at least as protective of the environment, facility staff and public health and safety. Monitoring shall meet the requirements of this section and the facility's approved radiation protection action plan.

(c) Radiation detector elements shall be as close as practical to the waste load and in an appropriate geometry to monitor the waste. The radiation monitoring system shall be set to alarm at a level no higher than 10 microroentgen per hour (μR/hr) above the average background at the facility when any of the radiation detector elements is exposed to a Cesium-137 gamma radiation field. Radiation detector elements shall be shielded to maintain the average background below 10 μR/hr. If capable of energy discrimination, the radiation monitoring system shall be set to detect gamma rays of a 50 kiloelectron volt (keV) energy and higher.

(d) An operator shall have portable radiation monitors capable of determining the radiation dose rate and presence of contamination on a vehicle that has caused an alarm. Upon a confirmed exceedance of the alarm level in subsection (c), a radiological survey of the vehicle shall be performed.

(e) An operator shall notify the Department immediately and isolate the vehicle when radiation dose rates of 20 μSv/hr (2 mrem/hr) or greater are detected in the cab of a vehicle, 500 μSv/hr (50 mrem/hr) or greater are detected from any other surface, or contamination is detected on the outside of the vehicle.

(f) Monitoring equipment shall be calibrated at a frequency specified by the manufacturer, but not less than once a year.

(g) If radioactive material is detected at a composting facility, the vehicle containing the radioactive material may not leave the facility without written Department approval and an authorized United States Department of Transportation exemption form.

Source

The provisions of this § 281.221 adopted December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685.

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§ 281.222. Daily volume.

A person or municipality operating a composting facility may not receive solid waste at the facility in excess of the maximum daily volume approved in the permit.

Source

The provisions of this § 281.222 adopted December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685.

COMPOSTING PROVISIONS

§ 281.231. Composting pad or vessel.

(a) Solid waste may not be composted, loaded, unloaded or stored, except on a composting pad or vessel that meets the requirements of this section.

(b) The composting pad or vessel shall be adequate in size and capacity to manage the projected solid waste, compost and residue volumes.

(c) A composting pad or vessel shall be:

(1) For a pad, capable of preventing the migration of waste and leachate generated from the composting process through the pad.

(2) Designed, constructed and maintained to protect the integrity of the pad or vessel during the projected life of the facility.

(3) Designed to collect leachate.

(4) For a pad, constructed of nonearthen material.

(5) Inspected for uniformity, damage and imperfections during construction and installation.

(6) Designed and operated so that the physical and chemical characteristics of the composting pad or vessel and its ability to restrict the flow of solid waste, solid waste constituents or leachate is not adversely affected by the leachate.

(d) The operator shall inspect the composting pad or vessel in a manner and frequency approved by the Department in the permit.

(e) Upon completion of the construction of a composting pad or vessel, the operator shall:

(1) Submit a certification by a registered professional engineer on forms provided by the Department. The certification shall describe the composting pad or vessel being certified, using drawings and plans if appropriate and shall state that the actual construction was observed by the engineer or persons under his direct supervision, and that the construction was carried out in a manner that is consistent with the permit.

(2) Notify the Department that the facility is ready for inspection. Solid waste may not be composted, and no solid waste or compost may be stored, loaded or unloaded on the composting pad or in the composting vessel, until

the Department has conducted an inspection and has transmitted its written approval to the permittee indicating that the construction was done according to the permit.

Source

The provisions of this § 281.231 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (226362) to (226363).

Cross References

This section cited in 25 Pa. Code § 281.121 (relating to composting pad design).

§ 281.232. Continuing analysis of sludge.

If sewage sludge is composted at the facility:

(1) The operator shall submit to the Department a chemical analysis of the sludge under § 281.122 (relating to chemical analysis of sludge), every 4 months following the date of permit issuance, unless the Department approves a different schedule in the permit.

(2) The operator shall perform and submit to the Department additional analyses if there is a significant change in the quality of sludge.

§ 281.233. Disposal of residue.

Residue from processing of solid waste at general composting facilities shall be disposed or processed at a permitted facility for municipal or residual waste.

§ 281.234. Sale or utilization of compost.

Prior to sale or utilization of compost, the operator shall obtain a general permit from the Department under Chapter 271, Subchapters I or J (relating to beneficial use of municipal waste; and beneficial use of sewage sludge by land application).

Source

The provisions of this § 281.234 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226363).

§ 281.235. Availability of plans and designs.

The operator shall maintain a copy of engineering plans and designs for the facility on the site.

REVEGETATION

§ 281.241. General requirements.

(a) Except to the extent authorized in the postclosure plan approved under § 281.142 (relating to postclosure land use plan), vegetation shall be established on land affected by a general composting facility.

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(b) Revegetation shall provide for a diverse, effective and permanent vegetative cover of the same seasonal variety native to the area of land to be affected and capable of self-regeneration and plant succession. Introduced species may be used when desirable and necessary to achieve the approved postclosure land use. Vegetative cover shall be considered of the same seasonal variety when it consists of a mixture of species that is equal or superior to native vegetation during each season of the year.

(c) Revegetation shall provide a quick germinating, fast-growing vegetative cover capable of stabilizing the soil surface from erosion.

(d) Disturbed areas shall be seeded and planted when weather and planting conditions permit, but the seeding and planting of disturbed areas shall be performed no later than the first normal period for favorable planting after final grading.

(e) Fertilizer and lime shall be applied to disturbed areas as necessary to maintain plant growth.

(f) Mulch shall be applied to regraded areas at rates adequate to control erosion, promote germination of seeds and increase the moisture retention of the soil.

Cross References

This section cited in 25 Pa. Code § 281.131 (relating to revegetation plan); and 25 Pa. Code § 281.282 (relating to cessation of operations).

§ 281.242. Standards for successful revegetation.

(a) The standard for successful revegetation shall be the percent of groundcover of the vegetation which exists on the area affected by the facility. The Department will not approve less than a 70% groundcover of permanent plant species in the approved plan.

(b) No more than 1% of the total area may have less than 30% groundcover. No single or contiguous area exceeding 3,000 square feet may have less than 30% groundcover.

Cross References

This section cited in 25 Pa. Code § 281.131 (relating to revegetation plan); and 25 Pa. Code § 281.282 (relating to cessation of operations).

SOIL AND WATER PROTECTION

§ 281.251. General requirements.

(a) The operator may not cause or allow a point or nonpoint source discharge of pollution from or on the facility to surface waters of this Commonwealth.

(b) A general composting facility shall be operated to prevent and control water pollution. An operator shall operate and maintain necessary surface and groundwater treatment facilities until surface or groundwater pollution from or on the facility has been permanently abated.

(c) Neither compost nor municipal waste may be stored where continuous or intermittent contact could occur between the compost or waste and groundwater.

(d) The operator may not cause or allow water pollution within or outside of the site.

Source

The provisions of this § 281.251 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (226364).

Cross References

This section cited in 25 Pa. Code § 281.253 (relating to sedimentation ponds).

§ 281.252. Soil erosion and sedimentation control.

The operator shall manage surface water and control erosion and sedimentation to:

(1) Divert surface water away from the storage and composting areas with measures and structures necessary to handle surface water flows based on a 25-year, 24-hour precipitation event, and supported by written calculations.

(2) Meet the requirements of Chapters 102 and 105 (relating to erosion and sediment control; and dam safety and waterway management).

(3) Prevent erosion to the maximum extent possible, including where possible, using revegetation.

Cross References

This section cited in 25 Pa. Code § 281.132 (relating to soil erosion and sedimentation control plan).

§ 281.253. Sedimentation ponds.

(a) Surface drainage from the disturbed area shall be passed through a sedimentation pond or a series of sedimentation ponds before leaving the site. The Department may waive the required use of sedimentation ponds when a person demonstrates to the Department that sedimentation ponds are not necessary to meet the requirements of § 281.251 (relating to general requirements).

(b) Sedimentation ponds shall be constructed, operated and maintained under this section, Chapters 102 and 105 (relating to erosion and sediment control; and dam safety and waterway management) and the minimum design criteria contained in the United States Soil Conservation Service's Engineering Standard 378, 'Pond' Pa., as amended.

(c) Sedimentation ponds and other treatment facilities shall be maintained until removal of the ponds and facilities is approved by the Department.

(d) A pond shall include a nonclogging, dewatering device approved by the Department that will allow the draining of the water from the inflow. The dewatering device may not be located at a lower elevation than the maximum elevation of the sedimentation storage volume.

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(e) The ponds shall be designed, constructed and maintained to prevent short circuiting to the maximum extent possible.

(f) The design, construction and maintenance of a sediment pond under this section does not relieve the operator of the responsibility for complying with the applicable treatment requirements and effluent limitations established under § 281.251.

(g) At a minimum, sedimentation ponds shall be capable of treating the runoff resulting from a 25-year, 24-hour precipitation event.

(h) A sedimentation pond shall be designed and inspected during construction under the supervision of a registered professional engineer, who shall certify to the Department upon completion of construction that the pond was constructed as approved in the permit.

Source

The provisions of this § 281.253 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (266319).

§ 281.254. Soil and groundwater monitoring.

(a) If required by the Department as part of the permit, the operator shall conduct soil or groundwater monitoring, or both. The monitoring shall be in accordance with §§ 273.282—273.288, as required by the Department, and the terms and conditions of the permit, and shall continue for the period specified in § 281.282 (relating to cessation of operations).

(b) For purposes of interfacing with §§ 273.282—273.288, the following terms apply:

(1) The term "disposal area" shall be substituted with "area where storage and processing occur."

(2) The term "municipal waste landfill" shall be substituted with "composting facility."

(3) The term "disposed" shall be substituted with "stored or processed."

Source

The provisions of this § 281.254 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (266320).

Cross References

This section cited in 25 Pa. Code § 281.212 (relating to access roads); and 25 Pa. Code § 281.282 (relating to cessation of operations).

§ 281.255. Water supply replacement.

(a) A person or municipality operating a composting facility which adversely affects a water supply by degradation, pollution or other means shall restore or replace the affected water supply with an alternative source that is of like quantity and quality to the original supply at no additional cost to the owner.

(b) A temporary water supply shall be provided as soon as practicable but not later than 48 hours after receipt of one of the following:

(1) Information showing that the operator is responsible for adversely affecting the water supply.

(2) Notice from the Department that the operator is responsible for adversely affecting the water supply.

(c) A permanent water supply shall be provided as soon as practicable but not later than 90 days after the receipt of one of the following:

(1) Information showing that the operator is responsible for adversely affecting the water supply.

(2) Notice from the Department that the operator is responsible for adversely affecting the water supply.

(d) Permanent water supplies include development of a new well with a distribution system, interconnection with a public water supply or extension of a private water supply, but do not include provision of bottled water or a water tank supplied by a bulk water hauling system, which are temporary water supplies.

Source

The provisions of this § 281.255 adopted December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685.

EMERGENCY PROCEDURES

§ 281.261. Hazard prevention.

A composting facility shall be designed, constructed, maintained and operated to prevent and minimize the potential for fire, explosion or release of solid waste constituents to the air, water or soil of this Commonwealth that could threaten public health or safety, public welfare or the environment.

Cross References

This section cited in 25 Pa. Code § 281.141 (relating to contingency plan).

§ 281.262. Emergency equipment.

(a) Except as provided in subsection (b), a person or municipality operating a general composting facility shall have available in proper working condition the following equipment at the immediate operating area of the facility:

(1) An internal communications or alarm system capable of providing immediate emergency instruction by voice or signal to facility personnel.

(2) A communications system capable of summoning emergency assistance from local police, fire departments, emergency medical services and from State and local emergency response agencies.

(3) Portable fire extinguishers, fire control equipment, spill control equipment, decontamination equipment and self-contained breathing apparatus. For

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fire control equipment requiring water, the facility shall have a water supply of adequate quantity and pressure to supply the equipment.

(b) The Department may waive or modify the requirements of subsection (a) in the permit if the operator demonstrates to the Department's satisfaction that the requirements are not necessary to protect public health and safety, public welfare or the environment.

(c) Equipment and material required by this section shall be tested and maintained so that it is operable in time of emergency.

(d) Adequate space shall be maintained to allow the unobstructed movement of emergency personnel and equipment to an operating area of the facility.

Cross References

This section cited in 25 Pa. Code § 281.141 (relating to contingency plan).

§ 281.263. Implementation of contingency plan.

(a) The operator of the facility shall immediately implement the applicable provisions of the approved contingency plan when there is an emergency. For purposes of this section, an emergency shall include a fire, spill or other hazard, that threatens public health and safety, public welfare or the environment and personal injury.

(b) During an emergency, the operator shall:

(1) Assess actual or potential hazards to public health and safety, public welfare and the environment that are occurring or may occur.

(2) Ensure that fires, spills or other hazards do not occur, reoccur or spread to other solid waste at the facility.

(3) Immediately telephone the Department and county emergency management agency, and report the following information:

(i) The name of the person reporting the incident and telephone number where that person can be reached.

(ii) The name, address and permit number of the facility.

(iii) The date, time and location of the emergency.

(iv) A brief description of the nature of the emergency, the type and quantity of the solid waste involved and what dangers to public health and safety, public welfare and the environment exist or may occur.

(v) The nature of injuries.

(vi) The parts of the emergency plan being implemented to alleviate the emergency.

(c) After an emergency, the operator of the facility shall do the following:

(1) Clean up the area affected by the emergency and treat, store or dispose of recovered solid waste, contaminated soil, contaminated water or other material in a manner approved by the Department.

(2) Prevent processing or storage of solid waste in the area affected by the emergency until the operator has cleaned up the area, and the Department has inspected and approved the cleanup.

Source

The provisions of this § 281.263 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (238995).

Cross References

This section cited in 25 Pa. Code § 281.141 (relating to contingency plan).

RECORDKEEPING AND REPORTING

§ 281.271. Daily operational records.

(a) A person or municipality that operates a general composting facility shall make and maintain an operational record for each day that municipal waste is received, processed or transported offsite.

(b) The daily operational record shall include the following:

(1) The type and weight or volume of the solid waste received.

(2) The county in which the solid waste originated, or if the waste originated outside of this Commonwealth, the state.

(3) The transporters of the solid waste.

(4) The weight or volume of each material recycled, marketed or disposed of as a result of the process.

(5) A record of deviations from the approved design or operational plans.

(6) A record of activities for which entries are needed to comply with the annual operation report required in § 281.272 (relating to annual operation report).

(7) A record of actions taken to correct violations of the act, the environmental protection acts and this title.

(8) A description of waste handling problems or emergency disposal activities.

(9) A record of each incident in which radioactive material is detected in waste loads. The record shall include:

(i) The date, time and location of the occurrence.

(ii) A brief narrative description of the occurrence.

(iii) Specific information on the origin of the material, if known.

(iv) A description of the radioactive material involved, if known.

(v) The name, address and telephone numbers of the supplier or handler of the radioactive material and the name of the driver.

(vi) The final disposition of the material.

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(c) The operator shall maintain accurate operational records sufficient to determine whether municipal waste is being stored in compliance with Chapter 285, Subchapter A (relating to storage of municipal waste).

(d) Daily operational records shall be retained for the life of the facility bond, or longer if determined by the Department to be necessary to meet the standards of the environmental protection acts. These records shall be made available to the Department upon request.

Source

The provisions of this § 281.271 amended November 28, 1997, effective November 29, 1997, 27 Pa.B. 6190; amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (238995) to (238996).

§ 281.272. Annual operation report.

(a) A person or municipality that operates a general composting facility shall submit to the Department an annual operation report on or before June 30 of each year.

(b) The annual operation report, which shall be submitted on a form supplied by the Department, shall include the following:

(1) The county in which the waste originated, or if the waste originated outside of this Commonwealth, the state.

(2) The weight or volume of each type of waste received.

(3) The weight or volume of each material recycled, marketed or disposed of as a result of the process.

(4) A current certificate of insurance, as specified in § 271.374(a) (relating to proof of insurance coverage), evidencing continuous coverage for public liability insurance as required by § 271.371 (relating to insurance requirement).

(5) Changes in the previous year concerning the information required by §§ 271.124 and 271.125 (relating to identification of interests; and compliance information). The report shall state if no changes have occurred.

(6) A change in the ownership of the land upon which the facility is located or a change in a lease agreement for the use of the land that may affect or alter the operator's rights upon the lands.

(7) A written update of the total bond liability for the facility under § 271.331 (relating to bond and trust amount determination). If additional bond is determined to be necessary, it shall be submitted to the Department within 90 days after the annual report is due.

(8) Certification that the operator has received all analyses required by § 287.54 (relating to chemical analysis of waste) for each type of residual waste or special handling waste received at the facility during the calendar year.

(9) A record of detected radioactive materials.

(c) The annual operation report shall be accompanied by a nonrefundable annual permit administration fee of $700 in the form of a check payable to the ''Commonwealth of Pennsylvania.''

Source

The provisions of this § 281.272 adopted April 8, 1988, effective April 9, 1988, 18 Pa. B. 1681; amended July 2, 1992, effective July 4, 1992, 22 Pa. B. 3389; amended November 28, 1997, effective November 29, 1997, 27 Pa.B. 6190; amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial pages (238996) to (238997).

Cross References

This section cited in 25 Pa. Code § 281.271 (relating to daily operational records).

CESSATION AND CLOSURE

§ 281.281. Temporary shutdown.

(a) An alternate permitted solid waste processing or disposal facility shall be available for use if the facility is shut down.

(b) If the composting facility is out-of-service for a longer period than the storage capacity of the site will allow, no additional solid waste may be received at the facility.

§ 281.282. Cessation of operations.

(a) Upon cessation of composting operations at the facility, the operator shall remove solid waste and structures or other materials which contain or are contaminated with solid waste, and shall provide for the processing or disposal of the waste or material under the act, the environmental protection acts and this title.

(b) Areas requiring vegetation shall be revegetated under §§ 281.241 and 281.242 (relating to general requirements; and standards for successful revegetation).

(c) An operator required under § 281.254 (relating to soil and groundwater monitoring) to conduct soil monitoring may discontinue soil monitoring upon cessation of composting operations with the Department's approval. In deciding whether to allow the discontinuance of monitoring, the Department will consider the operational history of the facility, the likelihood that groundwater degradation will manifest itself in the future and other relevant factors.

(d) An operator required under § 281.254 to conduct groundwater monitoring may discontinue groundwater monitoring after cessation of composting operations and cleanup only upon written approval by the Department. In deciding whether to allow discontinuance of monitoring, the Department will consider the operational history of the facility, the likelihood that groundwater contamination will manifest itself in the future, whether the remediation standards in § 271.342(b)(4) (relating to final closure recertification) are met and maintained and other relevant factors.

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Source

The provisions of this § 281.282 amended December 22, 2000, effective December 23, 2000, 30 Pa.B. 6685. Immediately preceding text appears at serial page (238998).

Cross References

This section cited in 25 Pa. Code § 281.254 (relating to soil and groundwater monitoring).

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Appendix B
DEP WMGM017 General Permit Requirements

pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

BUREAU OF WASTE MANAGEMENT

DIVISION of MUNICIPAL and RESIDUAL WASTE

GENERAL PERMIT WMGM017

SOURCE SEPARATED COMPOSTING

Issued: September 20, 2022

Expires: September 20, 2032

A. Description:

1. This general permit authorizes the composting, vermicomposting and hermetiacomposting of wastes identified in this section and beneficial use of the processed compost, vermicompost and hermetiacompost produced per the terms and conditions of this permit.

2. The waste streams accepted for on-farm composting shall be non-liquid waste[1] and limited to the following categories of wastes: manure, yard waste, source separated food waste from food markets, grocery stores, restaurants, food banks, food distribution centers, recreation centers, community centers, libraries, meal sites, residential households and municipal, school cafeterias and institutions, source-separated newspaper, and source-separated corrugated paper (cardboard).

3. The waste streams accepted for non-farm, small scale composting facilities shall be non-liquid waste as defined in Section B (relating to definitions) and limited to the following categories of wastes: yard waste, and source separated pre- and post-consumer food waste.

4. The waste(s) accepted for composting may not be mixed with other garbage or wastes, including hazardous waste, municipal waste, special handling waste, or other residual waste, as the terms are defined in 25 Pa. Code § 271.1. The beneficial uses of finished compost, vermicompost and hermetiacompost approved in this permit are for the marketing or distribution as soil substitute, soil conditioner, soil amendment, fertilizer, or mulch.

B. Definitions:

The following terms, when used in this permit, have the following meanings:

Composting – The process by which organic solid waste is biologically decomposed under a controlled anaerobic or aerobic environment to yield a humus-like product.

Composting Facility – A facility for processing solid waste by composting.

Composting Pad – An area within a composting facility where compost or solid waste is processed, stored, loaded, or unloaded.

Curing – The final stage of the composting process in which stabilization of the compost continues but the rate of decomposition has slowed to a point where turning or forced aeration is no longer necessary.

Frass – Debris or excrement produced by insect larvae.

General Permit – Except as provided in Subchapter J (relating to beneficial use of sewage sludge by land application), a regional or Statewide permit issued by the Department of Environmental Protection (DEP) for a specified category of beneficial use or processing of solid waste, the terms and conditions of which allow an original applicant, a registrant and a person or municipality that obtains a determination of applicability or registration, to operate under the permit if the terms and conditions of the permit and certain requirements of this article are met.

Hermetiacomposting – Composting by using larvae of the black soldier fly, *Hermetia illucens*, to convert organic material into a humus-like product.

Hermetiacomposting Facility – A facility for processing solid waste by hermetiacomposting.

Institutional establishment – An establishment engaged in service, including, but not limited to, hospitals, nursing homes, orphanages, schools, and universities.

Landowner – The person or municipality in whom legal title to the surface of the land is vested.

Leaf Waste – Leaves, garden residues, shrubbery and tree trimmings, and similar material, but not including grass clippings.

Manure – Waste that is produced by animals on a farm.

Non-Liquid Waste – Wastes that do not contain free liquids, as determined using the paint filter liquid test (EPA Method 9095) as described in the EPA Publication No. SW-846.

Normal Farming Operations – The customary and generally accepted activities, practices and procedures that farms adopt, use or engage in year after year in the production and preparation for market of poultry, livestock and their products; and in the production, harvesting and preparation for market of agricultural, agronomic, horticultural, silvicultural and aquacultural crops and commodities, if the operations are conducted in compliance with applicable laws, and if the use or disposal of these materials will not pollute the air, water or other natural resources of this Commonwealth. The term includes the storage and utilization of agricultural and food processing wastes, screenings, and sludges on land where the materials will improve the condition of soil, the growth of crops or in the restoration of the land for the same purposes.

Permit Area – The area of land and water within the boundaries of the permit which is designated on the permit application maps as approved by DEP. The term includes areas which are or will be used or affected by the waste processing or disposal facility.

Small-scale Composting Facilities – Non-farm composting facilities that are no larger than two (2) acres in size.

Source Separated Recyclable Materials – Materials that are separated from municipal waste at the point of origin for the purpose of recycling. The term is limited to clear glass, colored glass, aluminum, steel and bimetallic cans, high-grade office paper, newsprint, corrugated paper (cardboard), plastics and other marketable grades of paper.

Source Separated Food Scraps – Pre and postconsumer food wastes that are separated from municipal waste at the point of origin for the purpose of recycling and composting.

Storage – The containment of waste and derivatives on a temporary basis in a manner that does not constitute disposal of the waste. It shall be presumed that containment of waste in excess of 1 year constitutes disposal. This presumption can be overcome by clear and convincing evidence to the contrary.

Vermicomposting – Composting by using *Eisenia fetida* or other approved worm to convert organic material into a humus-like product

Vermicomposting Facility – A facility for processing solid waste by vermicomposting.

Yard Waste – Leaves, grass clippings, garden residue, tree trimmings, chipped shrubbery, and other vegetative material.

Yard Waste Composting Facility – A facility that is used to compost leaf waste, or leaf waste and grass clippings, garden residue, tree trimmings, chipped shrubbery, and other vegetative material. The term includes land affected during the lifetime of the operation, including, but not limited to, areas where compost actually occurs, support facilities, borrow areas, offices, access roads, associated onsite or contiguous collection and transportation activities, and other activities in which the annual surface has been disturbed as a result of or incidental to operation of the facility.

C. Application Requirements:

1. Application Requirements for On-Farm Source Separated Composting, Vermicomposting or Hermetiacomposting Operations:

A person or municipality that proposes to compost**,** vermicompost or hermetiacompost under the terms and conditions of this general permit after the date of permit issuance must obtain a “Determination of Applicability” (“DOA”) from the appropriate DEP Regional Office (see attached list) prior to commencing authorized activities under this general permit. A completed application on forms provided by DEP along with the

application fee for a DOA must be submitted to the appropriate DEP Regional Office. Checks shall be made payable to the "Commonwealth of Pennsylvania". No activities shall commence unless approved, in writing, by DEP.

2. **Application Requirements for Non-Farm, Small Scale Composting Operations, Vermicomposting or Hermetiacomposting Operations:**

   A person or municipality that proposes to operate a small-scale composting facility under the terms and conditions of this general permit after the date of permit issuance must obtain a registration from the appropriate Department Regional Office (see attached list) prior to commencing authorized activities under this general permit. A completed application on forms provided by the Department along with the application fee for a Registration must be submitted to the appropriate Department Regional Office. Checks shall be made payable to the "Commonwealth of Pennsylvania". No activities shall commence unless approved, in writing, by the Department.

D. Operating Conditions for All Permittees:

1. The compost, vermicompost or hermetiacompost facility (which shall include all raw material and waste storage areas, the processing, composting and curing areas, and the finished material storage areas) shall be operated in a manner which results in the active biological decomposition or consumption of the organic materials received.

2. Approval to operate under this general permit is limited to facilities which meet all three of the following criteria:

   a. Does not exceed five (5) acres for on-farm composting, or two (2) acres for non-farm, small scale composting.

   b. Does not store more than 500 tons or 1,000 cubic yards per year of source separated food scraps.

   c. Does not store more than 3,000 cubic yards per acre of total materials at any one time.

3. Incoming food waste must be incorporated into the composting process, such as in windrows, aerated static piles, or in vessels, including worm or larvae feeding vessels, within 24 hours of receipt of the food waste at the facility. Incorporation of all other materials must occur within one week of receipt, unless otherwise approved by DEP in the approved plans provided as part of the application.

4. This permit requires the use of windrows, aerated static piles, or in-vessel methods for composting. The temperature of the compost during the composting phase of the operation shall be maintained at a minimum of 55 degree Celsius (131°F) or greater for at least 15 days for the windrow method and for at least 72 consecutive hours for the static aerated pile or in-vessel method. For the windrow method, turning shall be

consistent with currently accepted science-based composting technology. In addition, the compost shall be cured for a minimum of 30 days.

5. Putrescible waste, other than manure, must be stored in closed, leak-proof containers. Putrescible waste may not be held in closed containers for more than 24 hours prior to being incorporated into the composting, vermicompost or hermetiacompost process. In addition, non-putrescible waste and compost may not be stored for more than one (1) year at the permitted facility unless authorized by the DEP in writing. Manure must be stored in accordance with DEP's "Manure Management Manual".

6. The composting area shall be constructed in a well-drained area with a workable surface and slope of 2-4 percent to prevent ponding and control surface water. All storm water runoff should be diverted away from the composting area. The working surface should be firm, uniformly graded, and dry. Compost pad options include:

   a. A compacted mixture of select granular material with adequate fine-grained particles to bind it together and reduce permeability,

   b. Using lime stabilized soil blends, and

   c. Paving with concrete, asphalt or geosynthetics.

7. Adequate space shall be maintained between windrows and at the site to allow the un-obstructed movement of emergency personnel and equipment.

8. Use of food processing sludge, spent mushroom substrate and materials other than the wastes specified in Section A. (Description) of this general permit are prohibited.

9. The finished compost, vermicompost or hermetiacompost produced under the terms and conditions of this general permit shall cease to be a waste when the compost, vermicompost or hermetiacompost:

   a. Is used, sold, or distributed as soil substitute, soil conditioner, soil amendment, fertilizer, or mulch;

   b. Does not present a greater harm or threat of harm than the use of wastes which the compost, vermicompost and hermetiacompost is replacing; and

   c. Is not abandoned or disposed.

10. Unless authorized by DEP in writing, the maximum amount of the finished compost material shall not be stored for more than one (1) year.

11. Non-compostable materials, prohibited materials or wastes otherwise rejected by the receiving facility shall be segregated from the acceptable incoming wastes and shall be managed properly at a permitted disposal facility or recycled with sufficient frequency to prevent a nuisance.

12. An operational plan must be developed and implemented at the facility. The operational plan must include the following information:

    a. A general site plan which contains the following information:

        i. Access road,

        ii. Tipping area,

        iii. Surface water and storm water controls for all compost related areas located outdoors,

        iv. Water tank or water source location and size.

    b. An operational narrative that includes the operational hours for receiving waste.

    c. The volume of waste processed during the previous year or expected to be processed during the first year of operation.

    d. A detailed description of the compost, vermicompost or hermetiacompost system(s).

13. The operator of the facility shall not cause or allow conditions that are harmful to the environment or public health, or which create safety hazards, odors, noise, or other public nuisances cause or allow the attraction, harborage, or breeding of vectors.

14. Areas at the permitted facility where incoming materials or waste and finished compost materials are stored, processed, composted, or cured shall not be located:

    a. In the 100-year floodplain of waters of this Commonwealth;

    b. In, or within 300 feet of, an exceptional value wetland;

    c. In, or within 100 feet of, a wetland other than an exceptional value wetland;

    d. Within 100 feet of a sinkhole or area draining into a sinkhole;

    e. Within 300 feet measured horizontally from an occupied dwelling unless the owner has provided a written waiver consenting to the facility being closer than 300 feet;

    f. Within 50 feet of a property line unless the owner has provided a written waiver consenting to the facility being closer than 50 feet;

    g. Within 100 feet of a perennial stream;

    h. Within 300 feet of a water source unless the owner has provided a written waiver consenting to the facility being closer than 300 feet.

    i. Within 3.3 feet of a perched, seasonal, or regional ground water table.

Waivers to required setbacks may be approved by DEP, in writing, if the storage and processing activities occur within an enclosed building and there is adequate protection from operational activities that may be harmful to the environment and public health or safety.

15. The beneficial use(s) of the compost, vermicompost and hermetiacompost as listed in Section A. (Description), is contingent upon compliance with this permit and if sold, the Pennsylvania Fertilizer Act, and the Pennsylvania Soil and Plant Amendment Act of the Pennsylvania Department of Agriculture. (Information relating to this law may be obtained from the Department of Agriculture by writing the Bureau of Plant Industry, Division of Agronomic Services, 2301 North Cameron Street, Harrisburg, PA 17110-9408.)

16. Upon cessation of operations at the composting facilities, the operator shall remove any wastes and structures or other materials which contain or have been contaminated with waste and shall provide for the processing and disposal of the waste or material in accordance with the Solid Waste Management Act (SWMA), 35 P.S. §§ 6018.101—6018.1001; the environmental protection acts and the regulations promulgated thereunder.

17. Any waste generated from the composting process shall be managed in accordance with the Solid Waste Management Act (SWMA), 35 P.S. §§ 6018.101—6018.1001; the environmental protection acts, and the regulations promulgated thereunder.

18. The activities authorized by this permit shall not cause or allow conditions that are harmful to the environment, public health or safety, including but not limited to, odors, noise, or other public nuisances. The permittee shall not cause or allow the attraction, harborage, or breeding of vectors. Storage of the active compost, curing materials, and finished compost shall be covered to prevent dispersal by wind or water erosion and in a manner that prevents fire or explosion. The active compost, curing materials and finished compost may not be stored in a manner that causes ground or surface water contamination.

19. The activities authorized by this general permit shall not harm or present a threat of harm to the health, safety, or welfare of the people or environment of this Commonwealth. DEP may modify, suspend, revoke, and reissue the authorization granted in this general permit if it deems necessary to prevent harm or the threat of harm to the public health, and the environment or if they cannot be adequately regulated under the conditions of this general permit.

20. The local police, fire department, or other appropriate state or local emergency response agencies shall be contacted immediately in the event of a fire, spill, or other hazard arising from the storage and curing of produced compost that threatens

public health, safety, and welfare, or the environment, and whenever necessary in the event of personal injury related to such storage.

21. The permittee shall develop and implement a Preparedness, Prevention and Contingency Plan (PPC) that is consistent with the DEP's most recent guidelines.

22. All activities conducted under the authorization granted in this permit shall be conducted in accordance with the permittee's application. Except to the extent the permit states otherwise, the permittee shall utilize materials as described in the permit application.

23. The permittee shall comply with the fugitive emissions regulations under 25 Pa. Code, Chapter 123 (relating to standards for contaminants) issued under the Air Pollution Control Act, the Act of January 8, 1960, P.L. 2119, 35 P.S. §4005, and shall comply with all the applicable provisions of 25 Pa. Code §§123.1 and 123.2 (relating to prohibition of certain fugitive emissions and fugitive particulate matter).

24. Nothing in this permit shall be construed to supersede, amend, or authorize a violation of any of the provisions of any valid and applicable local law, ordinance, or regulation, providing that said local law, ordinance, or regulation is not preempted by the Solid Waste Management Act (SWMA), 35 P.S. §§ 6018.101—6018.1001; and the Municipal Waste Planning, Recycling and Waste Reduction Act of 1988, 53 P.S. §§4000.101, et seq.

25. As a condition of this general permit and of the permittee's authority to conduct the activities authorized by this general permit, the permittee hereby authorizes and consents to allow authorized employees or agents of the DEP, without advance notice or search warrant, upon presentation of appropriate credentials and without delay, to have access to and inspect all areas on which solid waste management activities are being, will be, or have been conducted. This authorization and consent shall include consent to collect samples of waste, compost, soils, water, or gases; take photographs; perform measurements, surveys, and other tests; inspect any monitoring equipment; inspect the methods of operation and inspect and/or copy documents, books, and papers required by DEP to be maintained. This permit condition is referenced in accordance with Sections 6018.608 and 6018.610(7) of the SWMA, 35 P.S. §§ 6018.608 and 6018.610(7). This condition in no way limits any other powers granted under the SWMA.

26. Any independent contractors or agents retained by the permittee in the completion of activities authorized under this general permit shall be subject to compliance history review by DEP prior to performance of any activities, as specified by the SWMA.

27. Failure of measures herein approved to perform as intended, or as designed, or in compliance with the applicable laws, rules, and regulations and terms and conditions of this permit, for any reason, shall be grounds for the revocation or suspension of the permittee's approval to operate under this permit.

28. The permittee shall comply with the terms and conditions of this general permit and with the environmental protection acts to the same extent as if the activities were covered by an individual permit. DEP may require an individual permit be obtained if the permittee cannot comply with the conditions of this general permit or is conducting an activity that harms or presents a threat of harm to the health, safety, or welfare of the public or the environment of this Commonwealth.

29. This permit does not authorize and shall not be construed as an approval to discharge any waste, wastewater, or runoff from the processing areas, waste storage areas, composting windrows, curing areas, or enclosed vessels to the land or waters of the Commonwealth.

30. Best Management Practices shall be implemented to divert storm water run-on from the processing areas, curing areas, and finished product storage area(s). Storm water runoff shall be managed in accordance with The Clean Streams Law and regulations promulgated thereunder. Prior to beginning operations at the facility, the operator must obtain all necessary storm water management permits.

31. The permittee shall maintain in force and affect a general liability insurance policy in accordance with 25 Pa. Code, Chapter 271, Subchapter D (relating to Financial Assurances Requirements) to provide continuous coverage during operation of the facility and until DEP issues a final closure certification.

32. Equipment used for the composting, vermicomposting, or hermetiacomposting process, storage, and transportation of the finished materials shall be maintained in good operating condition to prevent the finished materials from being unintentionally conveyed out of the storage area(s). Weekly inspections of each storage area and their surrounding environs are to be conducted to determine compliance of the terms and conditions of this general permit, and for evidence of failure.

33. Storage of finished materials by the permittee shall be in a manner that complies with the requirements set forth in 25 Pa. Code, Chapter 285 (relating to storage, collection and transportation of municipal waste).

34. Wastes authorized for composting under this general permit shall not be mixed with, stored with, or beneficially used with other types of solid wastes, including hazardous waste, municipal waste, special handling waste, or other residual waste, as the terms are defined in 25 Pa. Code § 271.1.

35. Wastes that are not authorized under this general permit are not allowed to be received, mixed, stored or beneficially used with the raw materials for composting.

36. Analytical testing required by this general permit shall be performed by a laboratory accredited under the Pennsylvania Environmental Laboratory Accreditation Act, Act of 2002, 27 Pa. C.S.A. §§ 4101-4113.

E. Operating Conditions Specific to On-Farm Composting Operations (not Including Vermicomposting or Hermetiacomposting Operations)

1. The approval herein allows for composting activities to be conducted at sites that meet the definition of a normal farming operation.

2. An operational plan must be developed and implemented at the facility. The operational plan must include the following information:

    a. A general site plan which contains the following information for on farm composting sites:

        i. Access road,

        ii. Tipping area,

        iii. Surface water and storm water controls for all compost related areas located outdoors,

        iv. Farm Soil Conservation Plan, and

        v. Nutrient Management Plan if available

    b. An operational narrative that includes the operational hours for receiving waste.

    c. The volume of waste processed during the previous year or expected to be processed during the first year of operation.

    d. A detailed description of the compost system(s).

3. A copy of an approved soil conservation plan by the County Conservation District must be maintained at the facility at all times. The soil conservation plan must be implemented during all phases of operation of the facility. A copy of the approved soil conservation plan must be provided to DEP with the application.

F. Operating Conditions Specific to Vermicomposting and Hermetiacomposting Operations

1. This permit requires the area designated as the active vermicomposting or hermetiacomposting portion of the operation to occur in an enclosed structure(s) or vessel(s). Sufficient insulation, heating, cooling, ventilation and/or irrigation systems shall be provided as necessary to maintain optimal conditions for the proper husbandry of worm or black soldier fly lifecycles.

2. Quantities and loading rates of incoming food wastes and other feedstocks shall be limited to the capacity that the worms or black soldier fly larvae can effectively process so that the operation does not create excessive odors, leachate, wastewater or unprocessed material. Seasonal variations that may cause processing capacity

fluctuations shall also be taken into consideration when determining proper feedstock quantities and loading rates.

3. Vermicomposting and hermetiacomposting facilities that accept food scraps or manure shall include a composting pad constructed to meet the specifications listed in Condition D.6. The composting pad shall be utilized to:

   a. Incorporate an optional pre-composting step in the vermicomposting or hermetiacomposting process, or

   b. Provide a contingency in the event that the worm or black soldier fly larvae population is unable to effectively process incoming quantities of waste materials. The time and temperature requirements listed in Section D.4. shall be adhered to. The 30-day curing period is not required for the pre-composting processing step.

G. Operating Conditions Specific to Small Scale Composting Operations (not On-Farm Composting)

1. Applications for coverage under this general permit for small composting facilities must include a facility design and operation plan that provides the following information:

   a. A detailed description of the source(s), quality, and quantity of waste(s) the permittee anticipates receiving for composting, including any seasonal variations that may impact the waste type(s) and quantity;

   b. A detailed description of the methods and equipment that will be utilized prior to, during, and after processing to ensure removal of other wastes and incidental materials that cannot be, or are not authorized to be, processed by the permittee.

   c. The anticipated tonnage and volume of waste for each stage of the facility flow schematic. See Section E.5 on the Department's Form 20 for detailed information requirements of this schematic.

   d. The anticipated processing duration, from the time waste is received by the facility to through the completion of composting, and up to the distribution of the final product;

   e. The proposed length, width, and height of windrows if windrows will be used at the facility;

   f. A description of the method used to control surface water run-on and run-off, and to manage generated leachate, including the method for treatment or disposal of leachate generated.

   g. A description of how the permittee will control unauthorized access to the site through use of a fence, gate or other barrier, and how the permittee will ensure

integrity of this access control when an attendant is not on duty. This description should include the proposed height of the fence, gate, or other barrier.

h. A nuisance minimization and control plan that includes the following:

i. A detailed description of how the operator will control and minimize the attraction, harborage or breeding of vectors that are harmful to the environment or public heath, or which create safety hazards, odors, dust, unsightliness and other public nuisances;

ii. A litter control plan that ensures the operator will not deposit or allow for the dispersal of solid waste, compost or other waste materials offsite.

iii. An odor control and response plan that describes how odors will be monitored and how any odor problems will be addressed.

i. A description of the proposed beneficial use for the finished compost, including the approximate quantity of finished compost, the frequency of distribution, and the method for removing finished compost from the facility.

2. For small-scale composting facilities that accept for processing a total volume greater than 3,000 cubic yards per year, the permittee shall maintain a bond in sufficient guarantees in accordance with 25 Pa. Code, Chapter 271, Subchapter D (relating to financial assurances requirements) to provide continuous coverage during operation the facility and until the Department issues a final closure certification.

H. Recordkeeping:

1. The permittee shall maintain records of all analytical evaluations conducted in accordance with this permit, and records shall be made available to DEP upon request. Required records shall be retained for a minimum of 5 years. Records of analytical evaluations must include, at a minimum, the following for each sample: the dates of sampling and testing, sampling procedures utilized, name of the individual who collected the sample, the volume or weight of the sample, each parameter tested, the analytical results, the name of the analytical laboratory used, and the analytical methodologies employed.

2. The permittee shall maintain records of all waste accepted by the facility, and records shall be made available to DEP upon request. Required records shall be retained for a minimum of 5 years. Records of each source of incoming waste must include, at a minimum, the following: the name, address, and phone number of each source of incoming waste; the date of receipt; the quantity of waste received; the results of visual observations; and the name, address, and phone number of the destination of each outgoing shipment of waste. The permittee shall also maintain records of spills or releases that include, at a minimum, the following: the location,

date, time, identification, and quantity of spilled or released material, and a description of how the material was cleaned up. The permittee shall also maintain records of all reports submitted to DEP or to the U.S. Environmental Protection Agency.

I. Reporting:

1. Any person that operates under the provisions of this permit shall immediately notify DEP via certified mail of any changes in: the company name, address, owners, operators, and/or responsible officials of the company, compliance status, and the status of any permit issued by DEP or federal government under the environmental protection acts.

2. Persons operating under the provision of this general permit shall submit to the appropriate DEP Regional Office (see attached list), an annual report on the beneficial use activities conducted under this permit by March 1 for the preceding calendar year. This report shall include: records of each source of incoming waste including the name of each source; the date of receipt; the quantity of waste received; the results of visual observations; the quantity compost sent for beneficial use; the quantity of each outgoing shipment of waste, the name of the destination of each outgoing shipment of waste, and updated bond calculation worksheets, if applicable.

3. The permittee shall immediately notify DEP's Emergency Hotline by telephone at 800-541-2050 and the waste management program in the appropriate DEP regional office (see attached list) of any accidental spills and shall take appropriate immediate action to protect the health and safety of the public and the environment.

J. Renewal:

A generator or supplier that plans to continue the operations authorized under this general permit, after the expiration date indicated on the approval for coverage page, shall file a complete application for permit renewal at least 180 days before the expiration date of this general permit unless permission has been granted by DEP for submission at a later date. The renewal applications shall be submitted to the appropriate DEP Regional Office (see attached list) and include, at a minimum, the following:

1. General Information Form (Authorization Application for a Residual or Municipal Waste General Permit Application),

2. Form B (Professional Certification),

3. Form 20 (Application for a Municipal or Residual Waste General Permit),

4. Form 27M (Acceptance of General Permit Conditions), and

5. Updated Bond Calculation Worksheets, if applicable,

6. DOA or Registration application fee (whichever is applicable) in the amount identified in Section A (General Information) of the Form 20. A check shall be made payable to the "Commonwealth of Pennsylvania."

A copy of the renewal application shall also be sent to DEP's Bureau of Waste Management, Division of Municipal and Residual Waste, Rachel Carson State Office Building, 400 Market Street, P.O. Box 69170, Harrisburg, PA 17106-9170.

In the event that a timely and complete application for renewal has been submitted and DEP is unable, through no fault of the permittee, to reissue the general permit or approval for coverage before its current coverage expiration date, the terms and conditions of the approved coverage will automatically continue and will remain fully effective and enforceable pending the issuance or denial of the renewal for permit coverage, provided the permittee is, and has been, operating in compliance with the terms and conditions of the general permit.

Department of Environmental Protection
Regional Offices
(and Counties Served)

I. Bucks, Chester, Delaware, Montgomery, Philadelphia.

Southeast Regional Office
2 East Main Street
Norristown, PA 19401
Phone: (484) 250 - 5900

II. Carbon, Lackawanna, Lehigh, Luzerne, Monroe, Northampton, Pike, Schuylkill, Susquehanna, Wayne, Wyoming.

Northeast Regional Office
2 Public Square
Wilkes-Barre, PA 18711-0790
Phone: (570) 826 – 2516

III. Adams, Bedford, Berks, Blair, Cumberland, Dauphin, Franklin, Fulton, Huntingdon, Juniata, Lancaster, Lebanon, Mifflin, Perry, York.

Southcentral Regional Office
909 Elmerton Avenue
Harrisburg, PA 17110-8200
Phone: (717) 705 – 4706

IV. Bradford, Cameron, Centre, Clearfield, Clinton, Columbia, Lycoming, Montour, Northumberland, Potter, Snyder, Sullivan, Tioga, Union.

Northcentral Regional Office
208 West 3rd Street - Suite 101
Williamsport, PA 17701
Phone: (570) 327 – 3653

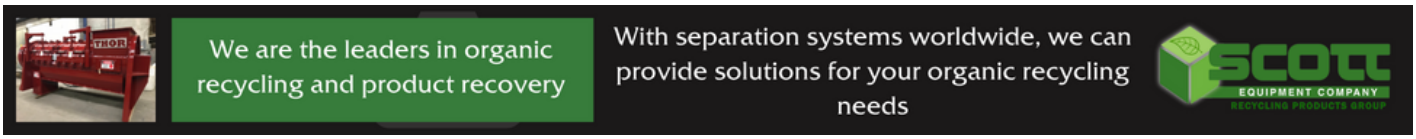
V. Allegheny, Beaver, Cambria, Fayette, Greene, Somerset, Washington, Westmoreland.

Southwest Regional Office
400 Waterfront Drive
Pittsburgh, PA 15222-4745
Phone: (412) 442 – 4000

VI. Armstrong, Butler, Clarion, Crawford, Elk, Erie, Forest, Indiana, Jefferson, Lawrence, McKean, Mercer, Venango, Warren.

Northwest Regional Office
230 Chestnut Street
Meadville, PA 16335-3481
Phone: 814-332-6848

Appendix C
BioCycle Article
Compost Facility Cost Estimates



BIOCYCLE

THE ORGANICS RECYCLING AUTHORITY

SINCE 1960

SEPTEMBER 27, 2022 | BUSINESS+FINANCE, COMPOSTING, FACILITIES, OPERATIONS

Compost Facility Planning: Composting Facility Cost Estimates

Guidance on how to estimate costs and revenues, evaluate alternatives on the basis of their long-term costs, and assess the impacts of costs on cash flows and budgets. Part VII

Craig Coker

Seventh of a series of articles on issues to consider when planning a new composting facility in the U.S.

Privacy - Terms

Planning a new merchant organics recycling facility requires considerable thought and investigation. As the old adage goes, “Proper prior planning prevents poor performance.” This facility planning series is oriented to helping you think through the aspects of proper prior planning. Part I dealt with how to develop a Waste Capture Plan. Part II covered methods to assess the markets’ potential to absorb your compost and/or soils products. Part III looked at how to figure out how much room you would need for your new composting facility. Part IV explored how to evaluate different composting approaches or methodologies. Part V examined issues to consider when looking at possible sites for a composting facility. Part VI discussed the various local and state-level approvals and permits that will likely be needed. Part VII covers how to estimate capital and operating costs for your new facility.

Part I

Waste Capture Plans

Part II

Product Market Assessments

Part III

Compost Process Design

Part IV

Composting Technology Evaluation

Part V

Composting Site Selection

Part VI

Composting Facility Approvals And Permits

Developing sound cost estimates is critical in securing financing for any business enterprise or funding for any municipal operation. While composting is certainly a more environmentally conscious means of handling biodegradable materials than landfilling, the simple reality is that everything revolves around costs. It is necessary to learn how to estimate costs and revenues, evaluate different alternatives on the basis of their long-term costs, and assess the impacts of costs on cash flows and budgets.

Capital Cost Estimating

Capital cost estimating for building, expanding or upgrading a composting facility varies in precision as a function of the extent of detailed design and construction bids. The main categories of capital costs to be estimated include site development, processing equipment (both stationary and mobile), and process monitoring equipment. In early facility planning, site development estimates will have an accuracy of +50%/-30%; following detailed design, accuracy will improve to +25%/-15%; after bid receipts, accuracy improves to +10%/-5%. To accommodate that varying accuracy, you should budget for contingency funds to cover any unforeseen expenses.

Site development costs are, obviously, very site-specific. Wooded sites will need more clearing; hilly sites will need more grading. Ultimately, what you want to end up with is a gently graded site (≈ 2-3%), with no cross-slope, that is cleared, graded and compacted. The facility’s working surface will be defined, partly, by regulation, partly by operator preference (I have yet to meet a composter who

prefers a bare earth site in rainy or wintry weather), and mostly by budgetary realities. Figure 1 illustrates the relative capital costs of different types of working surfaces.

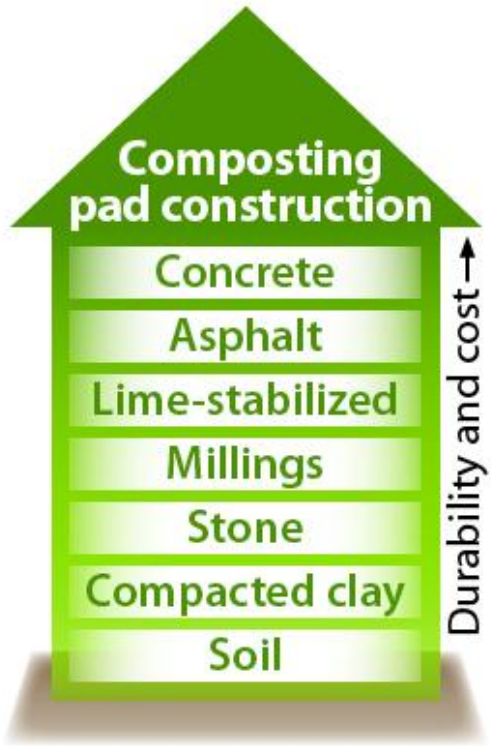


Figure 1. Composting pad options

Newly built sparger type floor for the positive aeration mass bed used for curing (foreground). Active composting bunkers and preprocessing building (on far right) are in the background. Photo courtesy of Freestate Farms and Engineered Compost Systems

Utilities are part and parcel of any site development costs. If you are planning on aerated static pile (ASP) composting, you will need three-phase power. Extending three-phase power can be expensive if you are considering a farm-based or rural site for composting. Water and sanitation services will also be needed, which will mean a water well and septic system if your site lies beyond a water and sewer-serviced envelope. Data communication and internet service are increasingly important in any new facility development, along with adequate cell phone coverage, so plan for those costs (e.g., satellite dish) as well if needed. Storm water runoff management is another necessity, so plan for on-site runoff treatment using vegetated Best Management Practices — even if you can connect your site to a municipal separate storm sewer system (often called a MS4).

Site development costs can be estimated with construction estimating software. Because those software programs are intended to be used by construction contractors preparing bids from detailed design drawings and specifications, they can be quite detailed. Programs I have used include Craftsman Cost Estimating Software and R.S. Means. Table 1 shows the projected site development costs for a conceptual 40,000 tons/year municipal composting facility using ASP for industrial food processing residuals in the upper Midwest.

Table 1. Site development costs

	A	B	C	D	E	F	G
1		Site Development Cost Estimates - Industrial Residuals Composting					
2		Item	Unit Price	Units	Quantity	Costs	Notes
3		**Permits and Approvals**					
4		Composting Permit		Ea	Allowance	$10,000	Application preparation and submittal
5		Air Permit		Ea	Allowance	$10,000	For biofilter (may not be needed)
6		Stormwater Permit: Individual Stormwater		Ea	Allowance	$5,000	
8		**Clearing and Grading**					
9		Clearing	$ 4,094	Ac	20	$81,880	nominal cost - farmland - no major clearing required
10		Stone tracking pad	$ 2,154	Ea	1	$2,154	24' x 50' x 12"
11		Fine grading of site for drainage	$ 1,037	Ac	20	$20,740	Final grading plan might require less grading
13		**Hardscape construction**					
14		Geotechnical (8 - 12 soil borings)		Ea	Allowance	$15,000	Under equipment maintenance bldg, waste receipt bldg, mixing pits
15		Silt fence	$ 1.45	LF	5,000	$7,250	6-mil poly, stakes 8' O.C., buried 9" deep
16		Geotextile fabric - Mirafi 500X - under receiving and equipment maintenance buildings, mixing pits	$ 1.29	SY	2,900	$3,741	keep gravel base from migrating into subsoil
17		Concrete slabs (8" th.) - bunkers, mix pits	$ 8.00	SF	26,900	$215,200	Incl. excavation, gravel fill, rebar, forms, vapor barrier, wire mesh, 4000 psi concrete
18		Concrete slabs (6" th.) - Receipt & EM bldgs, scalehouse & scales	$ 5.62	SF	22,864	$128,496	Incl. excavation, gravel fill, rebar, forms, vapor barrier, wire mesh, 3000 psi concrete
19		Concrete wall foundations	$ 94.15	LF	1,070	$100,741	Assume 42" frost depth, footers 30" W x 12" D
20		Concrete bunker walls (8" th.) - ASP bunkers, mix pits	$ 4.78	SF	13,800	$65,964	assume pumped concrete, walls 8' high, 2.5' below grade
21		Concrete back walls (8" th.) - ASP bunkers, mixing pits	$ 4.78	SF	3,465	$16,563	assume pumped concrete, walls 8' high, 2.5' below grade
22		Asphalt working surface (6" paving over 6" aggregate base)	$ 6.89	SF	82,250	$566,710	Entrance drive, perimeter road: 25 foot wide road, 3,290 ft of road
23		Crushed aggregate working surface (8" thick)	$ 1.25	SF	657,014	$821,268	All areas not concrete slab or asphalt roads
24		Excavation and backfill for leachate tank (10' W x 50' L x 10' D)	$ 2.02	CY	185	$374	Backhoe excavation, 2 CY bucket, 77 CY/hour excavation rate
25		Waste Receipt & Mixing Building	$ 45.00	SF	14,400	$648,000	Agricultural hoop building on 6" concrete slab
26		Equipment Maintenance building	$ 45.00	SF	7,200	$324,000	Agricultural hoop building on 6" concrete slab
27		Scalehouse building	$ 75.00	SF	320	$24,000	10' x 32' construction trailer
29		**Water management**					
30		Vegetative buffer around perimeter (50' W)				$586,700	See details below
31		Run-on berm (8" high compacted earth)	$ 2.00	LF	1,000	$2,000	Width of site only
32		Runoff swales (24" W x 24" D)	$ 3.00	LF	1,000	$3,000	Width plus half of length
33		Solids separator	$ 25,000	Ea	Allowance	$15,000	Prevents fines from washing into the detention pond
34		Wet detention pond	$ 2.00	ft3	202,917	$405,834	
36		**Utilities**					
37		Small utility shed	$ 1,500	Ea	1	$1,500	
38		Extension of 3 phase power & data line from WWTF	$ 55.00	LF	1,500	$82,500	Bring 3-phase over from WWTF
39		Extension of sewer from WWTF	$ 35.00	LF	1,500	$52,500	4" PVC, includes excavation, installation, backfill, road patching
40		Extension of water from WWTF	$ 30.00	LF	1,500	$45,000	1.25" copper pipe, includes excavation, installation, backfill, road pat
42		**Subtotal**				$4,163,613	
44		Design Fee	5.0%	Ea		$208,181	
45		Contingency	25%	Ea		$1,040,903	
46		**TOTAL**				**$5,412,697**	
47		**Notes**					
48		Cost factors from National Construction Cost Estimator software (Craftsman, 2022) based on Zip Code 56007 (mat'ls 0%, labor -5%, equipment 0%) & Research					
49		Vegetative buffer planting guide (source: Town of Wellesley, MA)					
50		Assume 50' W X 4,000' L		SF	# plants	Unit cost	Cost
51		1 tree sapling (6' - 8' tall) per 100 square feet		200,000	2,000	$221.07	$442,140
52		4 shrubs (24") tall per 100 square feet		200,000	8,000	$17.97	$143,760
53		10 herbaceous plants per 100 square feet		200,000	20,000	$0.04	$800
54							$586,700
55		Storm water pond					
56		Assume capture of 24-hr, 10-yr storm	4.3	inches			
57		V = runoff volume = 6.3" x 65% runoff rato x area (SF)	202,917	ft3			
58		Assumed depth	6	ft			
59		Pond footprint	33,820	SF			

Click image to enlarge

The other big capital cost estimating element to consider is equipment. Processing equipment includes front-end loaders, grinders, turners, mixers, depackagers, blowers and piping, screens, contaminant removal and bagging. Multiple companies in the U.S. offer various types of equipment and most exhibit their wares at composting and solid waste trade shows around the country. Equipment costs vary by size, capacity and technological sophistication. Equipment can be purchased, or, in many cases, leased for several years. If leased, those costs get reflected in your

operating costs, not your capital costs. Table 2 shows the projected equipment costs for the conceptual composting facility noted above.

Table 2. Equipment costs

	B	C	D	E	F	G	H	I	J
1	**Equipment Cost Estimates**								
2	*All equipment is priced new. Some items may be purchased used and/or financed. Asset depreciation with residual values & finance options to be prepared.*								
3							**Schedule**		
4	**Item**	**Specifications**	**Unit Price**	**Units**	**Quantity**	**Costs**	**Year 1**	**Year 2**	**Notes**
5	Vendor-supplied equipment	Covered Aerated Static Pile Technology				$ 1,500,000	$ 1,500,000		Equipment, Installation & Consulting Support
6	Electrical (total installed)					$ 20,000	$ 20,000		Estimate
7	Weather station		$ 2,200.00	1	1	$ 2,200	$ 2,200		Estimate
8	Trash pump for water/leachate	2.5 hp pump, 1.5" outlets	$ 200	Ea	1	$ 200	$ 200		
9	Leachate tank	25,000 gal double-walled fiberglass tank	$ 75,000	Ea	1	$ 75,000	$ 75,000		Estimate from National Storage Tank
10	Suction/discharge hoses	1.5" hoses	$ 1.00	LF	100	$ 100	$ 100		to connect to WWTF sewer extension
11	Trommel screen	Vermeer TR53000 electric trommel	$ 305,000	Ea	1	$ 305,000	$ 305,000		Estimate including $5k for shipping & installation
12	Front end loaders	180 hp front end loader	$ 250,000	Ea	4	$ 1,000,000	$ 500,000	$ 500,000	
13	Grinder	Rotochopper B66	$ 550,000	Ea	1	$ 550,000	$ 550,000		Estimate
14	Mixer	Rotamix 920-18	$ 200,000	Ea	1	$ 200,000	$ 200,000		
15	Weigh scale	Cardinal Scale	$ 125,000	Ea	1	$ 125,000	$ 125,000		
16	Water truck	Northstar 200-gal skid sprayer	$ 4,000	Ea	1	$ 4,000	$ 4,000		Estimate
17	Pressure washer	Northstar gas cold water 4200 psi, 3.5 gpm	$ 2,000	Ea	1	$ 2,000	$ 2,000		Estimate
18						$3,783,500	$3,283,500	$ 500,000	
19						**TOTAL**	**Y1**	**Y2**	

Click image to enlarge

Most of this equipment is available in the used equipment market where capital costs are much less. However operating costs are higher, with larger expenditures due to wear in components.

Process monitoring equipment will include the basic essentials such as a 36-inch dial-face temperature probe ($150-$200) and a tablet ($750-$1,000). More sophisticated monitoring systems nclude wireless temperature probes ($2,000+) and Supervisory Control and Data Acquisition (SCADA) computer interfaces. Many composting facilities have a weather station to record wind speed and direction and rainfall amounts ($700–$2,000) and a small on-site laboratory for measuring bulk density and free air space, microwave measurement of moisture content, pH tests, and similar process monitoring measurements.

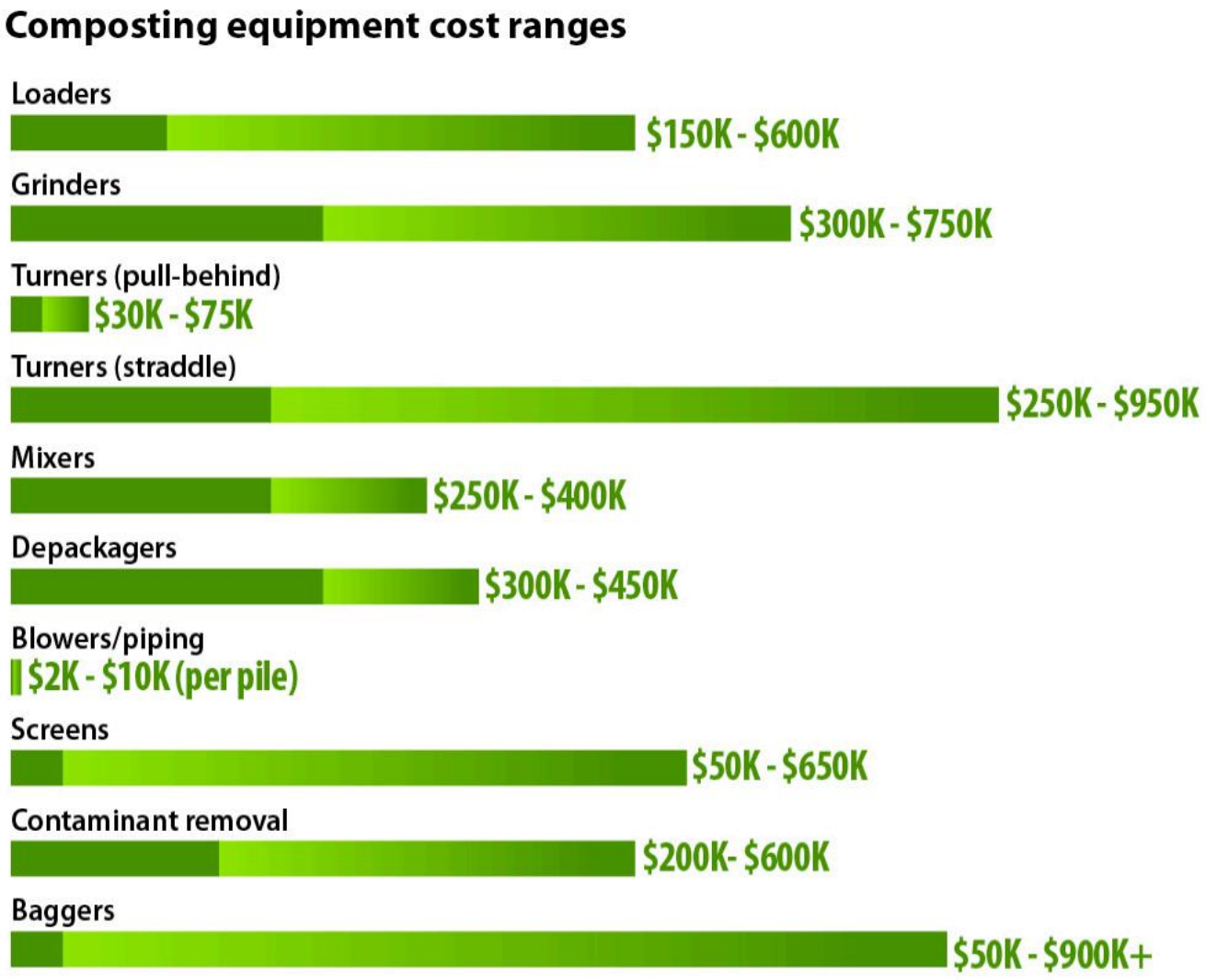


Figure 2. Composting equipment cost ranges

Vermeer trommel screen (top) and Rotochopper horizontal grinder (above) are examples of equipment purchased or leased for compost manufacturing.

Operating Cost Estimating

Composting is essentially a materials handling exercise. It takes a certain amount of time, at a certain cost, to perform each task in the compost manufacturing process. For new facilities, those costs can be estimated with a time-and-motion projection. For existing facilities, operating expenses can be measured in a similar manner along with detailed cost accounting of equipment costs.

An example of performing a costing exercise is shown in Table 3. This estimates the total annual cost of operating the proposed 40,000 tons/year industrial residuals composting facility noted above.

Table 3. Operating cost estimate

	A	B	C	D	E	F	G	H	I
1	**Composting Operating Cost Estimate**								
3	Assumptions								
4	Blended Labor rate (loaded) per hour							$35.00	per hour
5	Loader, screen machine rate (fuel + insurance + maintenance)							$55.00	per hour
6	Grinder machine rate							$110.00	per hour
7	Mixer machine rate							$65.00	per hour
8	Facility is open 5 days/week, 52 weeks/yr							260	days/yr
9	Neglects any overlap of labor functions between tasks								
10									
11	**Processing Volumes**								
12				**Avg Annual Vol.**		**Average Daily Volume**			
13	Carbon Amendments			57,475	CY/yr	221.1	CY/day		
14	Nitrogenous wastes - solid			19,257		74.1			
17	Nitrogenous wastes - liquids			2,288		8.8			
18	Overs from screen			18,517		71.2			
19			Totals	97,536	CY/yr	375.1	CY/day		
21	**Materials Handling Assumptions**								
22		Assume wastes & products handled by loader with separate buckets							
23			Bucket capacity of loaders					6	CY
24		Grinding done by horizontal grinder							
25		Mixing done by mechanical mixer							
26		Materials moved to composting and curing with loaders							
27		Materials moved to storage (overs and compost) by loaders							
29	**Scalehouse operations**								
30		Assume scalehouse open 8 hrs/day, 5 days/week							
31		Time spent managing scalehouse						8	hrs/day
32						Labor cost/year		$ 72,800	

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These types of costing exercises can be used to help make equipment decisions, e.g., one composting facility used this approach to decide whether to keep moving compost into the curing area with loaders, or to invest in a dump truck to move the compost. This calculation step is repeated for each task in the compost manufacturing process, then summarized to provide a projection of the entire facility's annual operating cost.

For operating facilities, this same time-and-motion approach can be used to pin down your actual operating costs. As with projections, the actual cost analysis is based on your actual loaded labor rates plus your measured machine costs. Loaded labor rates include the pay actually paid to the worker, plus amounts needed for employer Federal taxes and State Unemployment Insurance, plus any fringe benefits you pay your workers. The machine rate is the cost of owning or leasing and operating a particular piece of equipment. The machine rate is a compilation of fixed costs, operating

costs and labor costs that are expressed over a particular unit factor, usually dollars per hour. The machine rate multiplied by the actual or estimated hours of use in a budget year gives the annual projected cost for that piece of equipment.

Net Present Value Analysis

One method of comparing alternatives such as site development costs for one site versus another, or for one model of specific equipment versus another, is to compute the Net Present Value (NPV) of each alternative over the expected life of the alternatives. To keep the math simpler, I normally use a 10-year economic life. These analyses are relatively simple with an Excel spreadsheet.

NPV analyses are often used in financial investment analyses as they model cash flows in and out over the anticipated life of the investment. In engineered facility projects, they can be used to model only the outgoing cash flow of several alternatives, provided all alternatives have the same economic life and produce the same quantities of outputs. The calculation includes initial capital cost, capital costs of replacements during the modeled economic life, operating costs inflated by the Congressional Budget Office inflation forecast, and avoided costs (if any).

These costs are then expressed in current dollar terms using a discount factor equal to the average weighted cost of equity vs. debt capital (for municipal projects, the bond rate for the municipality can be used). If these assumptions hold true, then the alternative with the least NPV is the best financial alternative. Alternatives with less than a 10% difference between them are considered financially equal at this level of analysis.

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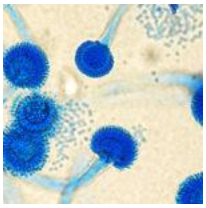
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