

06-096

Department of Environmental Protection

Maine Solid Waste Management Rules:

CHAPTER 410

COMPOSTING FACILITIES

Last Amended:
June 30, 2018

TABLE OF CONTENTS

	Page
1. Applicability	1
A. Facilities Subject to the Requirements of This Chapter	1
B. Facilities Not Subject to the Requirements of This Chapter	1
C. Transition and Relationship to Other Solid Waste Rules	2
2. General Licensing Requirements	3
A. Composting Facility General Siting Standards	3
B. Composting Facility General Design Standards	4
3. Application Requirements	4
A. General Information	4
B. Site Design Characteristics	5
C. Composting Facility Design Characteristics	5
D. Compost Distribution and Use Plan	6
E. Operations Manual	6
F. Environmental Monitoring Plan	6
G. Odor Control	6
H. Site Investigation	8
4. Operating Requirements	8
A. Operations Manual	8
B. General Operations	8
C. Access to Facilities	9
D. Acceptance and Distribution of Solid Waste	10
E. Odor Control	10
F. Record Keeping	12
G. Periodic Reporting	13
H. Annual Report	13
I. Facility Closure	13
5. Permit-By-Rule Composting of Wood, Leaf and Yard Wastes	14
A. Applicability	14
B. Standards and Operating Requirements	14
C. Notification Requirements	17
6. Reduced Procedure for Select Compost Facilities	18
A. Applicability	18
B. Reduced Procedure Siting and Design Standards	18
C. Operating Requirements	19
D. Application Requirements	21
APPENDIX A: Carbon To Nitrogen Ratios (C:N)	23
APPENDIX B: Preparation of Odor Intensity Referencing Scale	24

Chapter 410:-COMPOSTING FACILITIES

SUMMARY: This Chapter establishes the rules of the Department for the siting, design, operation and closure of solid waste composting facilities.

- 1. Applicability.** This Chapter applies to solid waste composting facilities including certain Agricultural Composting Operations. A solid waste composting facility license under the *Maine Solid Waste Management Rules: General Provisions*, 06-096 C.M.R. ch. 400 and this Chapter is required to locate, establish, construct or operate any new composting facility or to alter an existing composting facility, unless that facility is exempt from licensing under these rules. Agricultural Composting Operations which are not exempt from licensing under the provisions of section 1(B) of this Chapter are subject to the requirements of sections 2 through 4 or section 6 of this Chapter.
 - A. Facilities Subject to the Requirements of this Chapter.** A composting facility is any land area, structure, equipment, machine, device, system, or combination thereof that is operated to biologically decompose organic residuals under predominantly aerobic conditions and controlled temperatures between 110° and 160° F.
 - B. Facilities Not Subject to the Requirements of this Chapter.** In addition to the facilities listed in 06-096 C.M.R. ch. 400(2)(I), the following facilities conducting only the specified activities listed are exempt from the requirements of this Chapter:

NOTE: See 06-096 C.M.R. ch. 400(1) for a full definition of residual types. Type IA residuals are leaf, vegetative and other residuals with a C:N ratio of greater than 25:1. Type IB residuals are food and other residuals with a C:N ratio of between 25:1 to 15:1. Type IC residuals are fish and other residuals with a C:N ratio of less than 15:1. C:N refers to the ratio of available carbon to nitrogen of the raw residual prior to composting. See Appendix A of this Chapter for a list of typical C:N ratios for various residuals. The lower the initial C:N the higher the potential for generation of nuisance odors and leachate generation. Type II residuals are sewage sludge, septage, and other residuals that may contain human pathogens. Type III residuals are petroleum contaminated soils and other residuals that may contain hazardous substances above risk based standards in 06-096 C.M.R. ch. 418, Appendix A.

- (1) Facilities that, in any thirty (30) consecutive day period, receive for composting less than:
 - (a) Ten (10) cubic yards of Type IA residuals; and/or
 - (b) Five (5) cubic yards of either Type IB or IC residuals;
- (2) Facilities that compost domestic animal and poultry carcasses from routine events pursuant to the *Maine Department of Agriculture, Conservation and Forestry Rules and Regulations Relating to Disease Control of Domestic Animals and Poultry*, 01-001 C.M.R. ch. 211;
- (3) Facilities that compost 10,000 cubic yards or less of animal manure per year;

NOTE: The facilities listed in section 1(B)(1) through (3) above should comply with the Department of Agriculture, Conservation and Forestry's Best Management Practices.

- (4) Agricultural Composting Operations that, in any thirty (30) consecutive day period, compost a total of between five (5) and sixty (60) cubic yards of Type IB and IC residuals, and are operated in accordance with a Compost Management Plan approved by the Maine Department of Agriculture, Conservation and Forestry;
- (5) Agricultural Composting Operations that compost any volume of Type IA, Type IB or Type IC waste provided that at least 70% of the finished compost product is used at appropriate agronomic rates on the farm that produced the compost within two (2) years after it is produced, and provided that the facility is operated in accordance with a Compost Management Plan approved by the Maine Department of Agriculture, Conservation and Forestry-;
- (6) Agricultural Composting Operations that use leaves as an amendment to compost manure provided that the facility is operated in accordance a Compost Management Plan approved by the Maine Department of Agriculture, Conservation and Forestry-;
- (7) Agricultural Composting Operations that compost offal provided that the facility is operated in accordance with a Compost Management Plan approved by the Maine Department of Agriculture, Conservation and Forestry-;
- (8) The composting of solid waste during a Department-supervised remediation, emergency response, or research project; and

Composting toilets as defined in the *Maine Subsurface Wastewater Disposal Rules*, 10-144 C.M.R. ch. 241(4)(N).

C. Transition and Relationship to Other Solid Waste Rules

(1) Existing Licensed Composting Facilities

- (a) Licenses held by existing composting facilities that are now exempt from these rules in accordance with section 1(B) of this Chapter will lapse provided that the licensee has surrendered its composting facility license and has a Compost Management Plan approved by the Department of Agriculture, Conservation and Forestry-;
 - (b) Composting facilities previously licensed pursuant to the *Maine Solid Waste Management Rules: Processing Facilities*, 06-096 C.M.R. ch. 409 remain in effect, subject to the conditions specified in 06-096 C.M.R. ch. 400(3)(E).
- (2) **Relationship to 06-096 C.M.R. ch. 409:** This rule replaces those provisions of 06-096 C.M.R. ch. 409 that previously addressed composting facilities.
 - (3) **Beneficial Use of Solid Waste:** The beneficial use, other than agronomic utilization, of a secondary material produced by a composting facility is subject to the *Maine Solid Waste Management Rules: Beneficial Use of Solid Wastes*, 06-096 C.M.R. ch. 418.

- (4) **Agronomic Utilization of Residuals:** The agronomic utilization of a residual produced by a composting facility is subject to the *Maine Solid Waste Management Rules: Agronomic Utilization of Residuals*, 06-096 C.M.R. ch. 419.
- (5) **Storage:** Residuals produced at composting facilities and stored at other locations in Maine prior to agronomic utilization must meet the applicable standards of 06-096 C.M.R. ch. 419.
- (6) **Analysis:** Characterization of waste and secondary materials required by this Chapter must be done in accordance with the applicable provisions of the *Maine Solid Waste Management Rules: Water Quality Monitoring, Leachate Monitoring, and Waste Characterization*, 06-096 C.M.R. ch. 405.

2. General Licensing Requirements. Except for facilities which are exempt from licensing pursuant to section 1-(B) of this Chapter or licensed under sections 5 and 6 of this Chapter, any person proposing to establish a new solid waste composting facility or alter an existing solid waste composting facility must obtain a license pursuant to 06-096 C.M.R. ch. 400(4) and sections 2 through 4 of this Chapter.

A. Composting Facility General Siting Standards. At the time the application is filed with the Department, the waste handling area at a proposed composting facility may not be located:

- (1) Closer than 100 feet to the solid waste boundary of an active, inactive or closed solid waste landfill;
- (2) Within a 100 year flood plain;
- (3) Within 100 feet of a protected natural resource;
- (4) In, on or over a protected natural resource, or on land adjacent to the following areas, without first obtaining a permit pursuant to the *Natural Resources Protection Act*, 38 M.R.S. §§480-A to 480-BB:
 - (a) A coastal wetland, great pond, river, stream or brook, or significant wildlife habitat contained within a freshwater wetland; or
 - (b) Freshwater wetlands consisting of or containing:
 - (i) Under normal circumstances, at least 20,000 square feet of aquatic vegetation, emergent marsh vegetation or open water, except for artificial ponds or impoundments; or
 - (ii) Peatlands dominated by shrubs, sedges and sphagnum moss;
- (5) Closer than 300 feet to off-site water supply wells or water supply springs;
- (6) Closer than 100 feet to public roads and property boundaries;
- (7) Closer than 10,000 feet to any airport runway used by turbojet aircraft, or within 5,000 feet of any airport runway used by only piston-type aircraft, when putrescible waste is to be handled outdoors in an uncovered or exposed condition.

B. Composting Facility General Design Standards

- (1) The facility process must be designed to produce a product meeting the specifications needed to distribute the product and must meet the applicable standards in 06-096 C.M.R. ch. 419.
 - (2) **Design Capacity:** The facility design must include composting systems and storage areas of sufficient capacity to accommodate all materials that are delivered to and generated by the facility.
 - (3) **Environmental Monitoring Program Design:** A composting facility which has been determined by the Department to pose a potential threat to public health or safety or the environment because of the nature and volume of feedstocks handled at the solid waste facility and/or the location, design and operation of the facility, must have a monitoring program designed and implemented in accordance with the applicable requirements of the 06-096 C.M.R. ch. 405.
 - (4) **Leachate Control:** The facility design must include provisions to contain, collect and treat all leachate and wash waters generated at the facility.
 - (5) **Odor Control**
 - (a) For facilities other than those that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage, the facility design must include provisions for the control of nuisance odor consistent with the provisions of Section 4(E)(1) of this Chapter.
 - (b) For facilities that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage, the facility design must include provisions for the control of nuisance odor consistent with the provisions of Section 4(E)(2) of this Chapter.
 - (6) **Clean-up:** The facility design must include provisions for the regular wash down or dry clean-up of the facility.
 - (7) **Access:** The facility design must include suitable barriers or fencing and gates to prevent unauthorized persons access to the site.
- 3. Application Requirements.** Any person seeking to establish a solid waste composting facility under sections 2 through 4 of this Chapter must provide information sufficient to meet the standards and submission requirements of 06-096 C.M.R. ch. 400. The applicant must submit to the Department, on forms developed by the Department, the following information:

A. General Information

- (1) **Description:** A brief description of the proposed composting facility.
- (2) **Topographic Map:** The most recent full size U.S. Geological Survey topographic map (7 1/2 minute series, if available) of the area, showing the location of the proposed facility, the property boundary, and, if handling putrescible materials, airports within 10,000 feet of the

site, all clearly and accurately delineated. The map must include all surrounding areas within one mile of the proposed site.

- (3) **Aquifer Map:** A legible copy of the most recent Maine Geological Survey Significant Aquifer Map or Sand and Gravel Aquifer map with the facility site, property boundary and waste handling area clearly and accurately delineated on the map.
- (4) **Tax Map:** A legible copy of the local tax map(s) marked with the facility site and the names and addresses of abutters on the appropriate lots. For a person proposing outdoor composting or storage, the map must indicate all residences within 1,000 feet of the waste handling area.
- (5) **Flood Plain Map:** If the proposed site is within 1/4 mile of a 100 year floodplain, a legible copy of the most recent Federal Emergency Management Agency (FEMA) flood insurance rate maps of the 100-year frequency floodplain, with the location of the facility and property boundary clearly and accurately delineated

B. Site Design Characteristics. An engineering design must be submitted as part of an application. The sophistication of engineering design required to develop a site for a composting facility varies according to the physical characteristics of the site, the size and complexity of the facility, and the nature of the wastes to be composted. The following components must be included in any engineering design:

- (1) **Site Plan:-** A detailed plan of the area within 500 feet of the waste handling area, with a scale of 1 inch = 100 feet or a larger scale, clearly showing, if applicable: all structures; protected natural resources; roads; property boundaries; receiving, composting, curing and storage areas; residences; erosion and sedimentation control features; odor control structures; water supply wells and springs; water quality monitoring points; and barriers or fencing and gates to prevent unauthorized persons access to the site. For facilities involving outdoor handling of putrescible wastes in an uncovered or exposed condition, this plan must also note the direction and distance of airports within 10,000 feet of the waste and waste handling area.
- (2) **Plan Views of the Structures and Utilities:** A large scale construction plan view drawing, with a minimum scale of 1 inch = 40 feet, clearly showing any building(s) with foundations; processing unit(s); utilities; leachate, storm water, and erosion and sedimentation control details; and, if applicable, odor control system.

C. Composting Facility Design Characteristics

- (1) **Process Design:** A general description of the facility's waste composting system must be submitted. The complexity and degree of detail of the description will vary depending on the magnitude and complexity of the process. The description must include, if applicable, process flow diagram(s), the source, volume, and characteristics of wastes to be received, the products and wastes to be generated; the methods to be utilized to mix, process and store wastes and products; the processing equipment to be used on site; provisions for characterization, including analytical information demonstrating that the incoming wastes meet the classification proposed to be handled at the facility; an identification of applicable standards for the product that the facility will produce, including, residual standards from 06-096 C.M.R. ch. 419, or other applicable standards from these rules, and a description of how these standards will be met.

- (2) Type of composting method used at the facility (i.e. static pile, aerated static pile, windrow, passive aerated windrow system, in vessel, agitated bin, etc.);
- (3) Methods used in mixing, constructing compost piles or windrows, curing and storage;
- (4) Mixing, windrow construction, screening, turning, and aeration equipment;
- (5) Ratio of residuals and other ingredients that will be mixed together taking into account the intended use of the composted residual; and based on a recipe that balances the mixture's:
 - (a) Ratio of available carbon to nitrogen;
 - (b) Moisture content throughout the process;
 - (c) Bulk density throughout the pile;
 - (d) Volatile solids content; and
 - (e) pH;
- (6) Proposed dimensions of compost piles or windrows;
- (7) Method and frequency of aeration, including turning frequency or mechanical aeration equipment;
- (8) Duration of composting process, including curing or storage time; and
- (9) When applicable, the standards in 06-096 C.M.R. ch. 419 that the residual is being processed to meet, and provisions to monitor residual temperature, oxygen and moisture or other parameters to demonstrate that the standard is met.

D. Compost Distribution and Use Plan. The applicant must submit the application information required for licensing a utilization program under 06-096 C.M.R. ch. 419. The applicant must describe the disposition of other materials, including residue, generated at the facility that are not covered under a beneficial use or agronomic utilization program. The Department may require financial assurance in the form of a letter of credit, escrow account, or other approved financial security to finance the cost of potential remediation or disposal of waste, residue, including compost screenings, or secondary materials.

E. Operations Manual. The applicant must submit an operations manual, containing the information required in section 4 of this Chapter.

F. Environmental Monitoring Plan. The applicant must submit an environmental monitoring plan pursuant to section 2(B)(3) of this Chapter, including a waste characterization analytical work plan, if required by the Department.

G. Odor Control

- (1) For facilities other than those that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage: Based upon the location, design, and

operational procedures of the proposed facility, the applicant must demonstrate that the facility will not cause an odor nuisance. The facility may not cause more than a one hour average odor impact of 2 dilutions to threshold (2D/T), in any calendar year at any occupied buildings.

NOTE: D/T is defined by ASTM Method E679-91 (1997), "Standard Practice for Determination of Odor and Taste Thresholds By a Forced-Choice Ascending Concentration Series Method of Limits". The applicant may wish to demonstrate that it will meet this standard at the processing facility's property boundary, to ensure that nuisance odors at occupied buildings will not occur if the areas near the facility are subsequently developed.

- (2) For facilities that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage: An odor management plan must be submitted that includes provisions for the prevention and control of nuisance odor during routine operations and construction activities based upon the location, design, and operational procedures of the proposed facility. The odor management plan must include the following information:
- (a) An evaluation of potential process odor and potential off-site influences;
 - (b) Proposed methods to prevent nuisance odor which may include systems for the enclosure of nuisance odor-producing materials and processes;
 - (c) Proposed methods to control, reduce or eliminate nuisance odor; and proposed uses of technology and an evaluation of the effectiveness of the technology to control, reduce or eliminate nuisance odor;
 - (d) Provisions to monitor and formally document facility nuisance odor if identified at the property boundary;
 - (e) A procedure to formally record and respond to odor complaints in a timely manner;
 - (f) Odor response procedures that include response actions to be implemented after the occurrence of an odor event or the determination of nuisance odor is made. The procedures must outline the responsibilities of facility personnel, notification provisions to the Department and the community, and include potential actions that may be taken along with associated timeframes for implementation;
 - (g) Provisions to maintain and store back-up equipment or obtain replacement equipment in a timely manner during shutdown and malfunction events that is critical to the function of the odor control system; and
 - (h) Provisions to record odor related information, including monitoring data and any exceedances which may occur.

NOTE: The scope and detail required in this plan will be determined by facility-specific conditions including the complexity of the facility and waste type(s). Existing plans may be used to demonstrate compliance provided that they meet, or are modified to meet, the requirements of this section.

H. -Site Investigation. A subsurface investigation must be conducted whenever the proposed composting facility includes the use of *in situ* soils as any part of a soil base pad for handling solid wastes, includes structures requiring foundations, or includes subsurface wastewater holding or disposal systems. The data must consist of soil test data in the proposed handling areas from a certified professional describing and evaluating the surficial geology and/or the subsurface soils. This information must demonstrate that the facility design is compatible with the site's soil characteristics, as determined by applicable engineering standards of practice.

4. Operating Requirements. Each composting facility subject to licensing under sections 2 and 3 or section 6 of this Chapter must comply with the following operating requirements. The composting facility must be operated and maintained in a manner that assures it will meet the approved design requirements; will not contaminate ground or surface water; will not contaminate the ambient air; will not constitute a hazard to health or welfare; will not create a nuisance; and will meet the standards in 06-096 C.M.R. ch. 400(4). Facilities with an existing solid waste composting license are required to operate in compliance with the provisions of this section.

A. Operations Manual. All composting facilities must be operated in accordance with a Department-approved operations manual that incorporates the operating requirements of its license and these rules. This manual must be available for inspection by Department staff during normal business hours. The facility's operations manual must be updated to keep current with revisions at the composting facility.

The operations manual must include the information that would enable supervisory and operating personnel, and persons evaluating the operation of the facility, to determine the sequence of operation, policies, procedures, monitoring, maintenance, inspection, and legal requirements that must be followed for safe and environmentally sound operation on a daily and yearly basis. The composting facility must be operated and maintained in a manner that assures it will meet the approved design requirements, will not contaminate ground or surface water, contaminate the ambient air, constitute a hazard to health or welfare, create a nuisance, and will meet the standards in 06-096 C.M.R. ch. 400(4). The manual must address all items contained in this section including the environmental monitoring plan, if required by the Department, and the odor control plan. The manual must also include a copy of the facility license, any amendments and revisions to that license, and a copy of the applicable sections of the most recent Solid Waste Management Regulations.

B. General Operations

(1) **Personnel:** The operation of the composting facility must be under the overall supervision and direction of a person qualified and experienced in the operation of that type of facility or, in the case of an innovative design, be adequately trained by responsible personnel in the operation of the facility. The facility operator must take whatever measures are necessary to familiarize all personnel responsible for operation of the facility with relevant sections of the operations manual.

(2) **Equipment:** Equipment must be sufficient to meet the requirements, and the operator must provide for the routine maintenance of equipment.

(3) **Environmental Monitoring:** If required by the Department, the operator must implement the approved environmental monitoring program, including any required waste characterization.

- (4) **Fire Protection:** The operator shall prevent and control fires at the composting facility by complying with at least the following:
- (a) Arrange for a nearby fire department to provide emergency service whenever called;
 - (b) Develop and implement a plan to prevent spontaneous combustion in wood waste, residual and compost piles, as applicable; and
 - (c) Provide and maintain sufficient on-site equipment, such as detachable fire extinguishers, for minor fires.

NOTE: Facilities should develop a fire and rescue plan in conjunction with the local fire department.

- (5) **Vector Control:** The on-site population of disease vectors must be minimized to protect public health.
- (6) **Dust Control:** The operator must control dust generated by the facility.
- (7) **Storage**
- (a) Raw materials, wastes, secondary materials, residue, including compost screenings, and finished compost, must be stored on the site such that they remain suitable for the intended use and may not be stored at the facility for more than 2 years-;
 - (b) Materials with a carbon to nitrogen ratio (C:N) of less than 20:1 or that may contain constituents that may leach into groundwater may not be stored on *in situ* soils-; and
 - (c) Wastes, secondary materials and residue, including non-compostable compost screenings, may not be stored at the site for more than 2 years.
- (8) **Facility Maintenance and Litter Control:** The operator must provide for routine maintenance and general cleanliness of the entire facility site, including control of windblown litter.
- (9) **Leachate Control:** The facility must contain, collect and treat all leachate and stormwater runoff mixed with leachate.
- (10) **Sedimentation and Erosion Control:** The facility must control sedimentation and erosion during construction and operation of the facility.
- (11) **Residue Disposal:** The facility must provide for the routine disposal of residue, including non-compostable compost screenings, from the composting operation.

C. Access to Facility

- (1) The operator must maintain suitable barriers or fencing and gates to prevent unauthorized persons access to the site. The facility gate may be unlocked or open only when an authorized person is on duty. The operator must prominently post limitations and conditions of access at each entrance to the facility, including, if applicable, the hours of operation.

- (2) The operator must provide and maintain in good repair access roads at the facility site.
- (3) The operator must post appropriate signs and/or other means necessary to indicate clearly where waste is to be unloaded and where the separate storage areas within the facility are located.
- (4) Adequate space must be maintained to allow the unobstructed movement of emergency personnel and equipment throughout operating areas of the facility.

D. Acceptance and Distribution of Solid Waste

- (1) The composting facility may only accept wastes for which it has been specifically designed and permitted by the Department. Incoming wastes must undergo a visual inspection and, if appropriate, analysis to ensure that only wastes allowed by the facility license are accepted at the facility. All other wastes must be removed and handled at an approved facility.
- (2) **Waste Disposal:** The operator must have procedures in place, prior to the start of operation, for disposal of residue, bypass and other solid waste, including non-compostable compost screenings, generated by the composting facility, including contingency procedures for implementation during emergencies and shutdown periods. The operator must also maintain a valid contract with a solid waste facility which has Department approval to accept the waste.
- (3) The facility may not incorporate painted wood, treated wood, plywood, chipboard, plastic, wood with fasteners, nails, glue, adhesives, resins, paint or coatings, or wood that is otherwise contaminated into the composting process. All such wood, if received at the facility, must be stored separately from wood used as amendment in the composting process and disposed in an approved solid waste disposal facility.

E. Odor Control

- (1) For facilities other than those that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage:
 - (a) The facility must be operated to prevent nuisance odors at occupied buildings.
 - (b) Facility personnel must immediately contact the Department's Solid Waste Management Division to report odor complaints received by the facility. The Department, after investigation, will determine whether the facility has caused a nuisance odor at an occupied building. Facility personnel must, within 30 days of a Department determination of an off-site odor nuisance, report to the Department's Solid Waste Management Division, in writing, causes of odor generation and completed or planned follow-up action to minimize, control, and/or treat the odors from the facility.
- (2) For facilities that compost wastewater treatment sludge from publicly owned treatment works and facilities that compost septage:
 - (a) **Standards.** The facility may not create nuisance odor, as defined in this subsection, at or beyond the property boundary. The Department may determine that an odor attributable to

the facility constitutes a nuisance if present at such frequency, intensity, duration, and offensiveness to unreasonably interfere with the enjoyment of property or the environment. The Department may also reasonably determine that an odor event as defined by a single occurrence of odor warrants further evaluation in accordance with paragraph b(i). Additionally, the Department may determine that further evaluation of an odor event is warranted in accordance with paragraph b(i) based upon multiple odor complaints verifiable by a combination of the following: meteorological conditions such as wind direction at the time of complaint, knowledge of waste storage and placement practices at the time of complaint, previous facility inspections, and other site-specific information.

NOTE: The Department's standards with respect to nuisance odor as set forth in this rule are not intended to define the criteria for a civil action for private nuisance as defined by statute or common law.

- (i) The following standards apply to a facility upon the detection of an odor based on the modified 5-point odor intensity referencing scale, as determined by Department staff trained in odor evaluation, or other trained persons approved by the Department:
 - a. Odor shall constitute a nuisance if the Department determines the presence of an odor at an intensity of 4 or greater for any period of time; or
 - b. Odor may constitute a nuisance based upon the Department's review of an odor event consisting of the following:
 - i. An intensity greater than or equal to 3 for a duration of 15 minutes or more. At least 2 odor assessments must be made within the 15-minute period. An odor assessment means a single evaluation of odor; or
 - ii. An intensity greater than 2 for a duration of 60 minutes or more. At least 3 odor assessments must be made within the 60-minute period.

NOTE: Preparation of the modified 5-point odor intensity referencing scale is described in Appendix C.

- (ii) **Alternative Odor Measurement Technology.** The Department may allow the use of an alternative odor measurement technology based upon a successful demonstration that the proposed alternative will provide equal or superior performance to the modified n-butanol odor intensity referencing scale. If previously approved in an odor management plan, the Department may also allow a facility to demonstrate compliance with the intent of paragraph a(i)(b) based upon the measurements of a site-specific odorant of concern.
- (iii) **Allowances.** The Department may allow temporary exceedances of the standard of paragraph a(i)(b) during short-term shutdown and malfunction events of the odor control systems and, with prior authorization, during short-term construction activities provided that all of the following conditions are met:
 - a. Reasonable methods are used to control, reduce or eliminate odor;
 - b. The odor management plan is being implemented;
 - c. Procedures are established to notify the Department and the affected community; and

d. Shutdown and malfunction events are corrected as soon as practicable.

(b) **Odor Response Procedures.** Odor response procedures must include the elements of this paragraph.

(i) **Odor Event Evaluation.** The owner/operator of a facility identified by the Department as potentially responsible for a nuisance odor must investigate the odor event and report the results of the investigation to the Department. The investigation must include an evaluation of:

a. Facility operations at the time of the exceedance including waste handling and management activities;

b. Meteorological conditions such as wind direction, temperature, and humidity at the time of the exceedance;

c. Odor monitoring data;

d. Potential response actions and/or a summary of response actions performed; and

e. Other pertinent site-specific information.

(ii) **Review of Odor Event(s).** The Department shall review the information related to the odor event(s) and may determine that the facility is creating nuisance odor and that an odor management plan, including a specific proposal which addresses the odor event, must be submitted for Department review and approval and implemented in accordance with Section 3(G)(2) of this Chapter.

F. Record Keeping. The facility operator must maintain the following records and make the records available for Departmental inspection and copying for the duration of the facility operation and a minimum of two (2) years after facility closure:

(1) When applicable, as-built engineering drawings of the facility;

(2) Results of analyses required by this Chapter and/or facility license;

(3) The Department-approved operations manual meeting the requirements of this section;

(4) Records of odor monitoring data, exceedances, response actions and complaints, if any;

(5) Copies of periodic and annual reports submitted to the Department; and

(6) **Operations Log:** An operations log must be kept at any composting facility that is operated to reduce the pathogen content, reduce vector attraction properties, reduce putrescibility, reduce the carbon to nitrogen ratio, or otherwise stabilize a residual. The operations log must contain the source and volume of residuals received on a daily basis; the mixture of residuals composted at the facility; composting monitoring data; date, time and type of samples obtained from the facility; and volume and type of residuals and finished compost distributed from the facility on a daily basis, including to whom the residuals and finished compost are distributed.

G. Periodic Reporting. Licensees must submit periodic reports to the Department containing the results of environmental monitoring, including waste characterization, and any other information required in accordance with the facility license. Reporting periods will be identified in the individual facility license.

H. Annual Report. By February 28th of each year, the facility operator must pay the annual facility reporting fee established in Maine law, and submit an annual report to the Department for review. The annual report must include a summary of activity at the composting facility during the previous calendar year. The annual report must summarize the facility's activities, and at a minimum include the following:

- (1) Volume, source and type of wastes received by the facility;
- (2) Volume of compost produced;
- (3) Volume of compost, raw feedstocks, waste and residue, including non-compostable compost screenings, distributed off-site, and the locations to which any such items were distributed;
- (4) Volume of compost, raw feedstocks, waste, secondary material, and residue, including non-compostable compost screenings, stored on site as of December 31st;
- (5) A general summary of the composting operation including problems encountered and follow-up actions, changes to the facility operation, and a summary of odor or other complaints received by the facility during the previous year;
- (6) A discussion of any odor problems, and a discussion of any factors, either at the facility or elsewhere, which affected the operation, design, or environmental monitoring program of the facility.
- (7) A summary of odor monitoring data, exceedances, response actions and complaints, if any;
- (8) -Other alterations to the facility site not requiring Departmental approval that have occurred during the reporting year. Minor aspects of the facility site proposed to be changed in the current year may be described in the annual report. Changes handled in this manner are those that do not require licensing under minor revision or amendment provisions of 06-096 C.M.R. ch. 400; and
- (9) A summary and evaluation of the past year's environmental monitoring program results, if required by the Department.

I. Facility Closure

- (1) **Closure Performance Standard:** The facility must be closed in a manner that minimizes the need for further maintenance; and so that the closed facility will not pollute any waters of the state, contaminate the ambient air, constitute a hazard to health or welfare, or create a nuisance. At a minimum, the applicant must remove all compost, wastes, secondary materials, leachate and leachate-contaminated sediment, and residue, including compost screenings, from the facility. The applicant must stabilize all site soils in accordance with

Maine erosion and sediment control best management practices. The applicant must broom clean the facility structures and equipment.

- (2) **Closure Plan:** The operator of a composting facility shall submit a closure plan to the Department, for review and approval, a minimum of ninety (90) days prior to the proposed date of the closure of a solid waste composting facility. The plan must include:
 - (a) A-description of the proposed closing operation;
 - (b) A schedule for the removal of all stored compost, wastes, secondary material, leachate and leachate-contaminated sediment, and residue, including compost screenings; and

The intended destination of all stored compost, wastes, secondary material, leachate and leachate-contaminated sediment, and residue, including compost screenings.

5. Permit-By-Rule Composting of Wood, Leaf and Yard Wastes

A. Applicability

- (1) **New Facilities:** The permit-by-rule licensing provisions of this section shall apply to owners or operators of facilities that compost Type IA residuals and grass clippings and that meet all of the standards of this section. Failure to meet any of these standards will require formal application to the Department for a license to develop and operate the solid waste composting facility under sections 2 through 4 or section 6 of this Chapter. By adopting these provisions, the Department finds that the composting of Type IA residuals and grass clippings in strict conformity with these permit-by-rule provisions will meet the standards of 06-096 C.M.R. ch. 400(4). Facilities licensed under this section are exempt from the requirements of 06-096 C.M.R. ch. 400(9). No variances to the requirements of this section may be granted.

NOTE: See 06-096 C.M.R. ch. 400(1) for a full definition of residual types. Type IA residuals are leaf, vegetative and other residuals with a C:N ratio of greater than 25:1 See Appendix A of this Chapter for a list of typical C:N ratios for various residuals.

- (2) **Existing Licensed Facilities:** Composting facilities previously licensed pursuant to 06-096 C.M.R. ch. 409(8) remain in effect, subject to the conditions specified in 06-096 C.M.R. ch. 400(3)(E).

B. Standards and Operating Requirements

- (1) The composting facility may only receive Type IA residuals and grass clippings. It may not accept painted wood, treated wood, plywood, chipboard, plastic, wood with fasteners, nails, glue, adhesives, resins, paint or coatings, or wood that is otherwise contaminated.
- (2) The total waste handling area may not exceed three (3) acres and total on-site storage areas may not exceed one (1) acre. Individual storage piles may not exceed 10,000 square feet.
- (3) **Setback Distances:** At the time a complete permit-by-rule notification is submitted to the Department, proposed storage, processing, composting, or curing of any regulated residual may not lie within:

- (a) 500 feet of any water supply spring;
 - (b) 500 feet of any water supply well and any residence, unless owned by the site operator or owner;
 - (c) 100 feet of any protected natural resource;
 - (d) In, on or over a protected natural resource, or on land adjacent to the following areas, without first obtaining a permit pursuant to the *Natural Resources Protection Act*, 38 M.R.S. §§480-A to 480-HH-:
 - (i) A coastal wetland, great pond, river, stream or brook, or significant wildlife habitat contained within a freshwater wetland; or
 - (ii) Freshwater wetlands consisting of or containing:
 - a. Under normal circumstances, at least 20,000 square feet of aquatic vegetation, emergent marsh vegetation or open water, except for artificial ponds or impoundments; or
 - b. Peatlands dominated by shrubs, sedges and sphagnum moss;
 - (e) 100 feet of any property boundary;
 - (f) 100 feet of the solid waste boundary of an active, inactive, or closed solid waste landfill; and
 - (g) A 100-year flood plain.
- (4) **Soils:** The applicant may only compost, cure and store residuals on:
- (a) Soils that a Maine Certified Soil Scientist has determined are moderately well drained to well drained, as classified by the Natural Resources Conservation Service, and that are at least 24 inches above the seasonal high water table, bedrock, and sand or gravel lenses;
 - (b) A pad constructed with the surface at least two (2) feet above the seasonal high water table and is either composed of:
 - (i) Two (2) feet of glacial till (having between 15 and 35% fines) covered with a six (6)-inch drainage layer of gravel; or
 - (ii) Soil covered with asphalt or concrete;
 - (c) A surface determined by a Maine Certified Soil Scientist, soil engineer or other qualified individual as being suitable for the proposed activity, taking into account the other aspects of the facility design; or
 - (d) On a land area under a permanent, roofed structure.

- (5) **Drainage:** Surface water drainage must be diverted away from processing, composting curing, and storage areas.
- (6) **Slopes:** Compost windrows must be constructed on a pad or surface with a maximum slope of 6%. Where necessary, the working surface for windrows must be constructed to prevent ponding.
- (7) The facility must be operated so that it does not contaminate water, land or air from the handling, storage or composting of wood, leaf, and yard wastes.
- (8) **Inspection and Access Control:** The operator must control unauthorized access to the site and visually inspect incoming residuals so that only Type IA residuals and grass clippings are accepted at the facility.
- (9) **Pile Construction:** Incoming Type IA residuals must, within one week of delivery to the site, be formed into windrow piles 10 feet high by 15 to 20 feet wide at the base, or other configuration that provides for the proper conditions under which aerobic composting will occur. Windrows must run with the slope of the pad such that runoff is not trapped by the windrows.
- (10) **Grass:** Grass clippings must be incorporated, and thoroughly mixed into established windrows at a ratio of no more than one part grass to three parts Type IA residuals (1 grass:3 carbonaceous-material) by volume within 24 hours of receipt at the facility. The composting facility must not accept grass clippings unless there is a sufficient volume of Type IA residuals available to meet this ratio.
- (11) **Windrow Turning:** The windrow must be turned at least four (4) times per year. There must be no more than six (6) months between any two (2) turnings.
- (12) **Distribution:** Compost must be distributed for use within one (1) year of completion of the compost process, and within three (3) years of receipt of the raw materials for composting.
- (13) **Fire Control:** The operator must develop and implement a plan to prevent spontaneous combustion in residual and compost piles at the site.
- (14) **Annual Report:** By February 28th of each year, the operator must submit an annual report covering the previous calendar year. The annual report must contain:
 - (a) The estimated volume of residuals received at the facility;
 - (b) An estimated volume of compost produced at the facility;
 - (c) The estimated volume of compost distributed from the facility;
 - (d) The estimated volume of compost and residue, including compost screenings, stored on site as of December 31st; and
 - (e) A description of any problems in operations encountered during the year, and steps taken to correct those problems.

- (15) **Closure:** The facility must be closed in a manner that minimizes the need for further maintenance; and so that the closed facility will not pollute any waters of the state, contaminate the ambient air, constitute a hazard to health or welfare, or create a nuisance. At a minimum, the applicant must remove all compost, wastes, secondary materials, and residue, including compost screenings, from the facility; and broom clean the facility structures and equipment.

C. Notification Requirements. At least 15 working days prior to acceptance of Type IA residual or grass clippings at the facility for composting, the applicant shall submit to the Department a permit-by-rule notification on a form developed by the Department. This notification must include:

- (1) The applicant's name, address, telephone number and contact person.
- (2) The appropriate application fee.
- (3) **Description:** A brief description of the proposed project including a description of the residual to be processed.
- (4) **Title, Right, or Interest:** A demonstration of sufficient title, right or interest to the property proposed for development, as specified in 06-096 C.M.R. ch. 2(-11)(D).
- (5) **Topographic Map:** A legible copy of the most recent full size U.S. Geological Survey topographic map (7 1/2 minute series, if available) of the area, showing the location of the proposed facility, and the property boundary clearly and accurately delineated.
- (6) **Flood Plain Map:** If the proposed site is within 1/4 mile of a 100 year floodplain, a legible copy of the most recent Federal Emergency Management Agency (FEMA) flood insurance rate maps of the 100-year frequency floodplain, with the location of the facility and property boundary clearly and accurately delineated.
- (7) **Tax Map:** A legible copy of the local tax map marked with the facility location and the names and addresses of abutters marked on it. The map must indicate all residences within 500 feet of the waste handling area.
- (8) **Soil and Pad Design:** One of the following:
 - (a) A certification from a Maine Certified Soil Scientist that the soils where residuals will be composted and cured are moderately well-drained to well-drained, as classified by the Natural Resources Conservation Service, and that are at least 24 inches above the seasonal high water table, bedrock, and sand or gravel lenses; or
 - (b) A description of the pad or other surface that the residual will be composted and cured on, and which of the standards in section 5(B)(4) of this Chapter that surface meets; or
 - (c) A certification from a Maine Certified Soil Scientist, soil engineer or other qualified individual that the surface is suitable for the proposed activity, taking into account the other aspects of the facility design; or

- (d) A certification that all composting and curing will be conducted under a permanent, roofed structure.
- (9) A fire control plan to prevent spontaneous combustion in residual and compost piles.
- (10) **Public Notice:** A copy of the public notice and other information to demonstrate that the applicant is fulfilling the requirements of 06-096 C.M.R. ch. 400(3).
- (11) **Certification:** A statement signed by the facility landowner and the person responsible for the facility stating that all standards and requirements of this section will be met throughout operation and closure of the facility.

6. Reduced Procedure For Select Compost Facilities

A. Applicability. This section applies to compost facilities that choose to follow the siting, design and operational standards in this section and compost the following residuals:

- (1) Any amount of Type IA residuals; and/or
- (2) Up to 400 cubic yards monthly of Type IB residuals; and/or
- (3) Up to 200 cubic yards monthly of Type IC residuals or up to 200 cubic yards monthly of Type II residuals.

If the conditions of this section will not be met, or if the applicant chooses to site, design or operate the facility in a manner that would not meet the standards of this section, then the applicant must submit an application to the Department for a license to develop and operate the compost facility under sections 2 through 4 of this Chapter. Facilities licensed under this section are subject to the operating standards in section 4 of this Chapter.

B. Reduced Procedure Siting and Design Standards. In addition to the general siting and design standards contained in section 2 of this Chapter, a compost facility licensed under this section must comply with the following standards:

- (1) **Working surface:** Mixing, composting, curing, storing or otherwise handling residuals, and compost at the facility must be on surfaces meeting one of the following standards:
 - (a) On soils that a Maine Certified Soil Scientist has determined are moderately well-drained to well-drained, as classified by the Natural Resources Conservation Service, and that are at least 24 inches above the seasonal high water table, bedrock, and sand or gravel deposits.
 - (b) On a pad that is constructed a minimum of two (2) feet above the seasonal high water table and is either composed of:
 - (i) a minimum of eighteen (18) inches of soil material having between 15 and 35% fines, covered with a minimal six (6)- inch drainage layer of compacted gravel; or
 - (ii) soil covered with asphalt or concrete.

- (c) **Alternative Surface:** On a surface determined by a Maine Certified Soil Scientist, soil engineer or other qualified individual as being suitable for the proposed activity, taking into account the other aspects of the facility design, such as a roofed structure or in-vessel system. An applicant must arrange a pre-application meeting with the Department if proposing an alternative surface under this section.
 - (2) **Pad:** At a facility handling Type IC residuals, the receiving and mixing pad must be constructed with asphalt, concrete, or other similar material. At a facility handling any amount of Type II residuals, or more than 750 cubic yards of Type IC residuals annually, the entire waste handling area must consist of a pad constructed of asphalt, concrete, or other similar material for the entire waste handling area, excluding the storage area for compost meeting the requirements of section 6(C)(5) of this Chapter.
 - (3) **Runoff, Storm Water, and Leachate Control:** Surface water drainage must be diverted away from receiving, processing, composting, curing, and storage areas. The facility must also be designed to manage runoff and collect all leachate to prevent contamination of groundwater or surface water. Water falling on the facility during a storm of an intensity up to a 25-year, 24-hour storm event must infiltrate or be detained such that the storm water rate of flow from the facility after construction does not exceed the rate prior to construction. The facility design must include provisions to contain, collect and treat any leachate and contaminated stormwater or runoff generated at the facility; and
 - (4) **Slopes:** Surfaces on which composting takes place must slope between 2% and 6%, and where necessary, be graded to prevent ponding of water.
- C. Operating Requirements.** In addition to the operating requirements of section 4 of this Chapter, a compost facility licensed under this section is subject to the following additional operating requirements. Facilities licensed pursuant to 06-096 C.M.R. ch. 409(9) are subject to the operating requirements of section 4 of this Chapter, and the following additional operating requirements:
- (1) **Pad Inspection:** All soil surfaces used for residuals mixing and composting must annually be graded clean and re-compacted. All concrete and asphalt pads must annually be scraped clean and inspected for cracks or other deformities, and repaired as needed. The operator must maintain the minimum two (2)-foot separation to bedrock, groundwater and sand or gravel deposits.
 - (2) **Odor Control:** The facility must be operated to prevent nuisance odors. The facility must:
 - (a) Operate and maintain the odor control system approved by the Department;
 - (b) Receive incoming putrescible residuals on a pile of sawdust or other sorbent, high carbon compost amendment;
 - (c) Contain and treat process air or cover odorous piles with a layer of finished compost or other suitable compost amendment;
 - (d) Properly aerate piles such that composting is aerobic throughout the pile;
 - (e) Blend materials to achieve a homogenous mix throughout the pile; and

- (f) Alter the compost recipe as needed to alleviate odorous emissions-
- (3) **Pathogen treatment and vector attraction reduction:** Type IC residuals with the potential to contain human pathogens and Type II residuals must be composted to achieve a Class A Pathogen Reduction and Class A Vector Attraction Reduction in accordance with 06-096 C.M.R. ch. 419, Appendix B, unless otherwise approved in the facility's utilization license issued under 06-096 C.M.R. ch. 419. To attain these standards by composting, all of the following standards must be met:
- (a) **Pathogen Reduction:** Each particle of residual is maintained at 55 degrees Celsius or higher for at least three (3) consecutive days. For windrow systems, this standard is presumed to be met if the residual is maintained at operating conditions of 55 degrees Celsius or higher for 15 days or longer, and during the period when the compost is maintained at 55 degrees or higher, there is a minimum of five turnings of the compost pile;
 - (b) **Vector Attraction Reduction:** Residual must be treated by an aerobic composting process for 14 days or longer. During that time, the temperature of the residual must be higher than 40 degrees Celsius and the average temperature of the residual must be higher than 45 degrees Celsius; and
 - (c) **Analytical Standard:** The density of *Salmonella sp.* bacteria in the finished compost must be less than three (3) Most Probable Number per four (4) grams of total solids (dry weight basis) or the density of fecal coliform in the finished compost is shown to be less than 1000 Most Probable Number per gram of total solids (dry weight basis). This analytical standard must be met at the time the compost is distributed for utilization.
- (4) **Static Pile Composting:** The following additional standards apply to composting Type IC or Type II residuals using the static pile method:
- (a) The static piles must be aerated during the active composting stage;
 - (b) Detention time in the static aerated pile must be at least 21 days;
 - (c) If an auger, tub grinder hammer mill, or other Department-approved mixer is not used to mix the initial ingredients for the pile, the pile must be broken down half way through the active composting process and re-formed; and
 - (d) To maintain temperatures throughout the pile and control odors, the pile must be fully covered with an insulating blanket of at least 12 inches of finished compost, sawdust, or other material as approved by the Department during the active compost phase.
- (5) **Stability/Maturity:** Residuals that have completed the active composting phase and are only destined for bulk distribution for direct agricultural uses or blending with other residuals must also be cured until the equivalent of a Dewar's stability class of III or greater is achieved and the final C:N ratio of the finished compost is less than 25:1. Additionally, compost that is destined for bagging or high-end horticultural purposes must be cured until the equivalent of a Dewar's stability class of IV or greater is achieved, the final C:N ratio is less than 25:1 and the total NH₃-N is less than 800 parts per million.

NOTE: Compost facility operators may opt to use other industry standard tests to achieve this standard, provided that they receive written approval from the Department.

- (6) An operations log must be kept at the facility and made available for Department review during normal business hours. The operations log must contain the following:
 - (a) Source and volume of residual received on a daily basis;
 - (b) Date of individual pile construction and breakdown;
 - (c) Pile composition (mixture recipe);
 - (d) Date and time of turning or otherwise aerating;
 - (e) Process monitoring data;
 - (f) Date the pile is put into curing and the date it is taken out of curing;
 - (g) Date, time, volume, and type of samples obtained from the facility; and
 - (h) Name of the person collecting samples at the facility.
- (7) The facility may not receive more than the volumes in section 6(A) of this Chapter.
- (8) Residuals must be handled on approved surfaces. Type IC and Type II residuals must be offloaded and mixed on a receiving pad meeting the standards in section 6(B)(2) of this Chapter.

D. Application Requirements. The applicant shall submit to the Department, on forms developed by the Department, information sufficient to meet the standards and submissions requirements of 06-096 C.M.R. ch. 400(4) and the application requirements of section 3 of this Chapter. For outdoor compost facilities, instead of the site investigation information required by section 3(H) of this Chapter, the applicant may submit a report from a Maine Certified Soil Scientist or other qualified individual that either:

- (1) Verifies that the waste handling areas for the proposed facility are on soils that are moderately well-drained to well-drained, as classified by the Natural Resources Conservation Service, and are at least 24 inches above the water table, bedrock, and sand or gravel deposits; or
- (2) Identifies all major limitations to the proposed development presented by the soil characteristics and describes the techniques to be used to overcome the soil limitations identified in the soil survey.

STATUTORY AUTHORITY: 38 M.R.S. §§ 341--H and 1304(1 & 1-B)

EFFECTIVE DATE:

February 18, 2009 – filing 2009-73

AMENDED:

December 20, 2011 – filing 2011-435

July 27, 2014 – filing 2014-151

April 12, 2015 – filing 2015-070; corrected and re-posted May 26, 2015

June 30, 2018 – filing 2018-113

**APPENDIX A: CARBON TO NITROGEN RATIOS (C:N)
FOR RAW RESIDUALS COMMONLY COMPOSTED IN THE STATE OF MAINE**

The following table is provided for guidance and includes many of the raw residuals that, to date, have been composted within the State of Maine. In addition to carbon to nitrogen ratio (C:N) values, percent nitrogen (% N) has been included to better characterize each residual. As a general rule, the lower the C:N the higher the putrescibility of the residual and the greater the chance of producing nuisance odors. All of the following information was obtained from:

Rynk, R, ed. 1992. On-farm composting handbook. Northeast Regional Agricultural Engineering Service, Ithaca, New York. NRAES-54:106-113.

Residual	C:N	Range	%N	Range	Type
Mussel	2.2	--	3.6	--	IC
Blood	3.3	(3-3.5)	13.5	(13-14)	IC
Shrimp	3.4	--	9.5	--	IC
Fish	3.6	(2.6-5.0))	10.6	(6.5-14.2)	IC
Crab/Lobster	4.9	(4.0-5.4)	6.1	(4.6-8.2)	IC
Poultry Carcasses	5	--	2.4	--	IC
Hen Manure	6	(3-10)	8	(4-10)	N/A
Sewage Sludge	11	(5-16)	4.5	(2-6.9)	II
Food By-product	15	(14-16)	2.4	(1.9-2.9)	IB
Sea weed	17	(5-27)	1.9	(1.2-3.0)	IC/IB
Grass Clippings	17	(9-25)	3.4	(2.0-6.0)	IC/IB
Cull Potatoes	18	--	--	--	IB
Vegetable Produce	19	--	3.3	--	IB
Cow Manure	19	11-30	2.4	1.5-4.2	N/A
Hay	24	(15-32)	2.1	(0.7-3.6)	IB/IA
Horse Bedding	36	(22-50)	1.4	(1.4-2.3)	IB/IA
Fruit By-product	40	(20-49)	1.4	(0.9-2.6)	IB/IA
Corn Silage	41	(38-43)	1.3	(1.2-1.4)	IA
Apple Pomace	48	--	1.1	--	IA
Leaves	54	(40-80)	0.9	(0.5-1.3)	IA
Sawdust	442	(200-750)	0.24	(0.06-0.14)	IA
Newsprint	--	398-852	--	(0.06-0.14)	IA
Corrugated Cardboard	563	--	0.01	--	IA
Wood Chips	600	(451-1,313)		(0.06-0.23)	IA

APPENDIX B

PREPARATION OF ODOR INTENSITY REFERENCING SCALE¹

This document describes the preparation of a 5-point odor intensity referencing scale in general conformance with the static-scale method outlined in ASTM Standard E544 – 10 “Standard Practices for Referencing Suprathreshold Odor Intensity,” ASTM International, West Conshohocken, PA, 2010, DOI: 10.1520/E0544-10, www.astm.org. This document is not intended to address user health and safety practices associated with the preparation of the odor intensity referencing scale. The appropriate health and safety resources should be consulted, and recommended guidelines followed, during scale preparation.

The scale is prepared with the reference odorant n-butanol (n-BuOH) in accordance with the concentrations specified in Table 1. Supporting rationale for the selection of n-butanol as the reference odorant is summarized in Appendix X1 of ASTM E544.

Table 1: 5-Point Odor Intensity Referencing Scale

Level	n-butanol Concentration in Water (ppm)
1	150
2	300
3	600
4	1200
5	2400

The scale ranges from 1 to 5. Level 1 consists of 150 parts per million (ppm) of n-butanol in distilled water. Subsequent levels (Levels 2 through 5) increase by a factor of 2 based on a volume to volume basis.

Level 1 - Jar 1: 150 ppm n-BuOH

Using a 1 milliliter (mL) pipet, measure 150 microliters (μL) of n-BuOH and add to 1,000 milliliter (mL) volumetric flask. Add distilled water to the 1,000 mL mark. Replace top and shake to mix. Use approximately 200 mL of the solution for Jar 1.

Level 2 - Jar 2: 300 ppm n-BuOH

Using a 1 mL pipet, measure 300 μL of n-BuOH and add to 1,000 mL volumetric flask. Add distilled water to the 1,000 mL mark. Replace top and shake to mix. Use approximately 200 mL of the solution for Jar 2.

Level 3 - Jar 3: 600 ppm n-BuOH

Using a 1 mL pipet, measure 600 μL of n-BuOH and add to 1,000 mL volumetric flask. Add distilled water to the 1,000 mL mark. Replace top and shake to mix. Use approximately 200 mL of the solution for Jar 3.

Level 4 - Jar 4: 1200 ppm n-BuOH

Using a 1 mL pipet measure 1 mL of n-BuOH and add to 1,000 mL volumetric flask; next using a 1 mL pipet measure 200 μL of n-BuOH and add to the 1,000 mL volumetric flask for a total of 1200 μL of n-BuOH. Add distilled water to the 1,000 mL mark. Replace top and shake to mix. Use approximately 200 mL of the solution for Jar 4.

Level 5 - Jar 5: 2400 ppm n-BuOH

Using a 2 mL pipet measure 2 mL of n-BuOH and add to 1,000 mL volumetric flask; next using a 1 mL pipet measure 400 μ L of n-BuOH and add to the 1,000 mL volumetric flask for a total of 2400 μ L of n-BuOH. Add distilled water to the 1,000 mL mark. Replace top and shake to mix. Use approximately 200 mL of the solution for Jar 5.