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Response to Comments on
Proposed Composting Facility Regulations

COMAR 26.04.11

December 12, 2014



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Background

On January 10, 2014, Maryland Department of the Environment (“the Department” or “MDE”) proposed composting facility regulations as required under Environment Article, § 9-1725, Annotated Code of Maryland.¹ The public comment period ended February 20, 2014. The Department received comments from 16 individuals and organizations. The following combines and summarizes the comments by topic, along with the Department’s responses.

Process Monitoring and Pathogen Reduction

1. COMMENT: The requirement for a plan to measure temperature at least three times per operating day is excessive, unnecessary, and would increase costs for additional staff time or to install remote monitoring systems. “Operating day” is not defined and could be interpreted to include Sundays and holidays, when staff is not typically available to take temperature measurements. One commenter stated that monitoring frequency should take into account differences in facility tier or method of composting, while others stated that monitoring once per day when staff is on site would be sufficient.

RESPONSE: The Department’s intent in including the 3-times-per-day temperature monitoring plan requirement was to ensure there would be representative temperature data available to assess compliance with the pathogen reduction requirements. Specifically, the Department sought to clarify a method of proving compliance that would not require a continuous monitoring system (the concern was that to show the material *never* dropped below 55° C during the 3 or 15-day period could be interpreted to require continuous monitoring, which was not the Department’s intent). However, MDE acknowledges that taking three measurements per operating day may create unnecessary financial or operational burdens for composting facilities. Temperatures typically change rapidly only over the first several days of active composting, before leveling out at thermophilic temperatures and eventually cooling gradually at the end of the active phase.² For windrows, temperatures also dip temporarily in the period immediately following each turning. EPA has therefore recommended temperature measurements for sewage sludge windrows once per day at roughly the same time of day.³ MDE’s general Sewage Sludge Utilization and Natural

¹ 41:1 Md. R. 47 — 59 (January 10, 2014).

² Richard, Tom, Illinois Cooperative Extension, Operators Fact Sheet #5, “Temperature,” <http://compost.css.cornell.edu/Factsheets/FS5.html>; Cooperband, Leslie, University of Wisconsin-Madison, *The Art and Science of Composting* (2002) p. 2, <http://www.cias.wisc.edu/wp-content/uploads/2008/07/artofcompost.pdf>

³ EPA, *Environmental Regulations and Technology: Control of Vector Attraction and Pathogens in Sewage Sludge* (2003) p.52, <http://www.epa.gov/nrmrl/pubs/625r92013/625R92013chap7.pdf>

Wood Waste (NWW) Recycling Facility permits both require temperature monitoring only once per day.

The exact timing and frequency of monitoring may vary based on staffing levels and shifts, facility operating schedules, feedstock types, and composting method. The Department will therefore eliminate the reference to the particular number and timing of measurements. However, the monitoring plan would still need to be included in the composting facility operations plan (CFOP) and would need to be sufficient to ensure that the pathogen reduction requirements are met. In most circumstances, the Department believes that monitoring once per day is appropriate and this baseline will be stated in guidance.

2. **COMMENT:** Proposed Regulation .09B(1)(a)(x) requires, as part of the CFOP, “a plan and procedure for monitoring oxygen ...to demonstrate that aerobic conditions are maintained and the pathogen reduction requirements of §B(10) of this regulation are met.”

Oxygen monitoring would be incapable of demonstrating that pathogen reduction requirements are met. In addition, it is unclear what oxygen level would demonstrate “aerobic conditions.” Oxygen monitoring is of limited usefulness as a regulatory requirement because of high variability (from day to day and at various places within a pile) and the difficulty of obtaining accurate readings in high moisture, high temperature conditions.

RESPONSE: The Department agrees with the comment that the oxygen monitoring provision should not reference the pathogen reduction requirements, which deal only with processing time and temperature.

The oxygen monitoring requirement was intended to ensure that operators are equipped with adequate information to prevent nuisance odors and produce marketable compost (thus avoiding excessive stockpiling). Ensuring aerobic conditions are maintained is a crucial aspect of the composting process; the definition of “composting” requires “controlled aerobic” conditions. The requirement to monitor oxygen is also not unprecedented – the NWW Recycling General Permit requires weekly oxygen monitoring and requires piles to be turned when oxygen levels drop below 10%. However, oxygen monitoring tends to be more variable and more difficult to interpret than other forms of monitoring and requires additional equipment. Temperature, moisture, and odor monitoring can be done cheaply and are usually sufficient to indicate problems, including lack of

oxygen.⁴ In addition, the composting regulations would cover a wider variety of feedstocks and composting methods than the NWW permit, making it less useful to prescribe a specific oxygen level. As a result, the Department will remove the requirement for oxygen monitoring.

3. **COMMENT:** The requirement that processing time and temperature be sufficient to kill weed seeds and produce stabilized compost is unclear. The temperatures needed to destroy weed seeds vary by the type of weed and may exceed the proposed requirements for pathogen destruction. Time and temperature are not the only determinates to whether compost is stabilized. It is unclear how a composter would demonstrate compliance with these two requirements.

RESPONSE: In developing the proposed regulations, the stakeholder group relied in part on an effort by the U.S. Composting Council and others to create a model composting rule. The language regarding weed seeds and production of stabilized compost came from that model rule⁵ and was intended to ensure that compost would be marketable and would not create nuisances upon use. However, MDA regulates the quality of finished compost distributed in the State and already requires that general or limited use compost be stabilized. As discussed in the comments, processing time alone does not necessarily ensure stabilization. The MDA definition of “stabilized” provides a clear method of determining when material has become stable.⁶ The MDA definition of “compost” also specifies that it must be able to be used without “adversely affecting plant growth.”⁷ To avoid confusion and duplication of MDA requirements, the Department will remove the weed seed and stabilization provisions in proposed Regulation .09B(10)(a).

⁴ Cooperband, Leslie, University of Wisconsin – Madison, *The Art and Science of Composting* (2002), p.5 <http://www.cias.wisc.edu/wp-content/uploads/2008/07/artofcompost.pdf> (“Oxygen monitoring equipment is available, but it is expensive. Temperature, odors, and moisture are easy to measure and provide a good indication of active decomposition and adequate aeration.”); Rynk, et al, *On-Farm Composting Handbook*, Ithaca, NY: Plant and Life Sciences Publishing, 1992, p.57 (“Oxygen-sensing equipment is occasionally used to monitor and troubleshoot composting operations...Oxygen-sensing instruments are more expensive and complex than temperature-measuring devices. In almost all situations, temperature provides an adequate indication of the process conditions, and oxygen monitoring is not necessary.”)

⁵ U.S. Composting Council, Model Compost Rule Template, Version 1.1 (2013) <http://compostingcouncil.org/state-compost-regulations-map/>

⁶ COMAR 15.18.04.01B(28). The temperature of a 4-foot-high, 6-foot-diameter pile of stabilized compost does not rise more than 20°C above ambient temperature when the pile is left undisturbed for 72 hours.

⁷ COMAR 15.18.04.05; COMAR 15.08.04.01.

4. **COMMENT:** Clarify or remove the language about reducing vector attraction. It is unclear whether the requirement that processing time and temperature be “sufficient to [...] reduce vector attraction” would require the Vector Attraction Reduction (VAR) process specified in federal regulations for sewage sludge.⁸

RESPONSE: The vector attraction reduction language was also adopted from the U.S. Composting Council model rule. MDE believes that reducing vector attraction is especially important for Type 2 materials and is not adequately addressed by MDA regulations. Vectors attracted to compost can spread pathogens from the composting materials and any other pathogen sources they previously contacted. The Department has experienced issues with vector attraction (particularly flies) at facilities accepting Type 2 materials in which inadequate process controls existed. Compost used in landscaping may be placed in heavily populated areas and around sensitive populations. Reducing the likelihood that vectors will be attracted to compost protects public health and prevents negative perceptions of compost. Because risk of vector attraction may vary by feedstock and composting method, however, the Department sought to avoid inflexibly mandating the federal VAR requirements for sewage sludge to all composting facilities. To clarify this intent, the Department will limit the VAR provision to Tier 2 facilities and allow for either the federal VAR process or an alternative specified in the CFOP.

5. **COMMENT:** The time and temperature requirement for pathogen reduction is inconsistent with MDA requirements. MDA regulations require that general or limited use compost meet the Process to Further Reduce Pathogens (PFRP) only when the compost is made from manure or municipal solid waste (MSW). In the MDA regulations, MSW is undefined, but solid waste is defined as “any garbage, refuse, sludge, or liquid from industrial, commercial, mining, or agricultural operations or from community activities.”⁹ The commenter interpreted this to include source-separated food scraps but not yard waste. In contrast, the proposed regulations would require pathogen reduction for all Tier 1 and 2 facilities, which would include yard waste.

In other respects, the proposed regulations are less stringent than the MDA regulations. In the MDA regulations, PFRP is equivalent to the procedure specified in federal sewage sludge regulations.¹⁰ The proposed regulations differ from the PFRP by (1) allowing use of an average

⁸ That process requires at least 14 days at a temperature greater than 40 C, with an average temperature greater than 45 C. 40 C.F.R. §503.33(b)(5).

⁹ COMAR 15.18.04.01B(27).

¹⁰ The MDA regulations reference MDE’s sewage sludge regulations, which match the federal PFRP. COMAR 15.18.04.01B(21); COMAR 26.04.06.08C(1).

temperature for each day; and (2) allowing the 15-day period for windrow composting to be comprised of non-consecutive days.

RESPONSE: The pathogen reduction requirements included in the proposal are similar to those set forth in the model rule developed by the U.S. Composting Council and therefore vary somewhat from MDA regulations and the MDE requirements for sewage sludge. Because sewage sludge composting is not affected by these regulations¹¹ and involves unique pathogen issues, MDE did not believe it was essential for the new requirements to be identical to those for sewage sludge. However, MDE agrees that it is desirable for the MDE and MDA compost regulations to be consistent to the extent possible because they would apply to many of the same facilities.¹²

Application to Type 1 materials: The Department consulted MDA to determine the correct interpretation of the MDA PFRP requirement. According to MDA, the PFRP requirement applies to all components of MSW, which would include yard waste and food scraps, even if those materials are source-separated. As a result, Type 1 and Type 2 materials would both be required to undergo PFRP under MDA regulations if the compost is to be distributed in Maryland. The proposed MDE requirement for pathogen reduction for Type 1 and Type 2 materials is therefore already consistent with MDA regulations.

Daily average temperatures: The provision allowing for use of daily averages is no longer necessary since multiple measurements per day will no longer be required (See response to comment 1). For consistency with MDA regulations, this will be removed.

Non-consecutive days: As discussed above, the Department agrees that the proposed regulations should be consistent with MDA regulations to the extent possible. Because MDA regulations do not allow for nonconsecutive days in calculating the 15- or 3-day PFRP period, the non-consecutive day provision will be removed from the proposed regulations. To reduce confusion and minimize the number of times the reader is redirected, the proposed regulations will refer directly to the federal PFRP at 40 C.F.R. pt. 503 app B, §(B)(1).

Permit Exemptions

¹¹ Sewage sludge composting facilities are classed as Tier 3 facilities under the proposed regulations, and would be handled under the existing Sewage Sludge Utilization Permit and regulations.

¹² MDA requirements apply to compost that is sold or distributed, while MDE's proposed pathogen reduction requirements would apply to all Tier 1 and 2 facilities required to obtain a CF Permit. Facilities that are too large to qualify for an exemption from the CF Permit yet do not distribute compost would be subject to MDE but not MDA PFRP requirements, but these are expected to be relatively few.

6. COMMENT: Expand and clarify the on-farm exemptions from the Composting Facility Permit (CF Permit). The application of the exemptions (particularly to farms) is confusing and should be clarified. The exemptions for on-farm composting facilities should be expanded to include:

- (1) A larger size exemption for on-farm composting facilities (variously 40,000 square feet, 1 acre, or a size that is relative to the size of the farm);
- (2) An on-farm exemption that allows for importing of feedstocks, especially carbon sources, manure, or yard waste, from offsite without a registration; and/or
- (3) An on-farm exemption that allows for distribution of finished compost.

Existing on-farm activities would be burdened by the requirements to submit a registration or obtain a permit. Many nurseries (at least 6 known businesses) import manure from off-site to compost, with all finished compost used on site. Under the proposal, this would require a registration if over 5,000 square feet. The registration would discourage composting because the Department retains the ability to require a permit of the registered facilities. Horse farms tend to present the opposite situation, composting only manure and other materials generated on site, but distributing the finished compost. This activity would require a permit under the proposed regulations if over 5,000 square feet. The horse industry commenter estimated that farms with 24 or more stalled horses would require more than 5,000 square feet for composting.

According to MDA, there should be a blanket exemption for on-farm facilities up to 1 acre, with facilities larger than 1 acre requiring only a registration. A registered facility should be assured that no CF Permit will be required as long as it has a Soil Conservation and Water Quality Plan. Since MDA regulates the quality of all distributed compost, it is unnecessary for MDE to impose additional requirements on facilities based on the fact that they distribute.

RESPONSE:

During the stakeholder group, the members extensively discussed the on-farm exemptions. Members sought to balance competing goals: on one hand, the regulations should encourage continuation of existing beneficial practices; on the other hand, facilities of similar sizes and feedstock types should be treated similarly, regardless of whether they are on farms, to achieve a consistent level of environmental protection.

Several factors weighed in favor of additional exemptions for farms. Farms face challenges to manage manure in ways that comply with nutrient management regulations and protect water quality. Composting is in some cases the best available option – it generates a product with a

stable source of organic material that releases nutrients slowly over time.¹³ It also increases the marketability of manure, perhaps leading to a better distribution of manure away from areas with a glut of nutrient-rich material.¹⁴ Compost use on farms can also reduce the need for commercial fertilizers and irrigation.¹⁵ These facts were the basis for the additional registration category that would allow most farms to avoid the CF Permit requirement as long as the compost is not distributed. It was MDE's intent that only unusual circumstances would trigger the permit requirement for a registration tier facility. However, MDE understands that because this was an area of Department discretion under the proposed regulations, some farmers were wary of registration.

The Department did not include an exemption for farms that distribute compost because it was concerned that these facilities would tend to involve more risk. Their size would not be limited by the need to apply all the resulting compost on site within the confines of a nutrient management plan. There was also concern that large commercial composting businesses could attempt to claim the exemption by engaging in minimal farming activities. Removing the possibility of distribution would exclude these businesses from the exemption (though, as stated in the comments, it would also have the effect of excluding some legitimate farms that currently distribute compost).

Based on the comments received, MDE acknowledges that existing composting practices on farms may be more widespread and more likely to involve import and export of materials than was previously understood. While MDE attempted to obtain farm-related input during stakeholder discussions, the formal comments provided additional information on a broader range of agricultural activities. MDE recognizes the concern that some current activities may be excessively burdened under the proposed permit requirements. The Department reviewed examples of soil conservation and water quality plans and agricultural waste management system plans, which can be obtained voluntarily from the local soil conservation districts. The Department believes these plans can provide some additional safeguards to ensure that the general performance standards in the regulations will be met at an on-farm facility in the absence of a CF permit. Soil conservation districts have extensive experience working with farmers to develop individualized

¹³ Composting Council Research and Education Foundation, *Compost Use on State Highway Applications*, p.3 , <http://www.epa.gov/compost/highway/highwy2.pdf>

¹⁴ Oregon State University Extension Service, *Composting: An Alternative for Livestock Manure Management and Disposal of Dead Animals* (May 2012) p. 5, <http://ir.library.oregonstate.edu/xmlui/bitstream/handle/1957/29173/em8825.pdf>

¹⁵ U.S. EPA, "Environmental Benefits," <http://www.epa.gov/composting/benefits.htm>

plans to address the environmental impacts of various on-farm activities. The Department therefore proposes the following revised exemptions to respond to these comments:

Unlimited size exemption (unchanged)

- Composts only materials generated on site.
- Uses all compost on site.

40,000 square foot exemption (new)

- Composts only: feedstocks generated on site; manure and bedding from off-site; and Type 1 materials from off-site.
- Operates in accordance with a nutrient management plan (if required under MDA regulations) and one of the following:
 - A soil conservation and water quality plan; or
 - An agricultural waste management system plan.
- The soil conservation and water quality plan or agricultural waste management system plan addresses the facility components and design, schedule for storage and utilization of the materials, system maintenance, and operational procedures to ensure that the performance standards in Regulation .04B of this chapter are met.
- May distribute compost.

5,000 square foot exemption (unchanged)

- Composts any Type 1 or 2 materials, regardless of where they are generated.
- Meets pile height restrictions (see Comment 7 below).
- May distribute compost.

The registration concept will be eliminated – facilities are either exempt or require a CF Permit. The definition of “farm” will also be revised to better tailor the exemptions to sites that are primarily used for farming rather than commercial compost production. The 40,000 square foot exemption is included in lieu of the registration for farms that import feedstocks but do not distribute compost.

7. **COMMENT:** The maximum pile height of 9 feet is too restrictive. Farm tractors and backhoes are commonly used for composting on farms and can easily stack piles higher than 9 feet.

RESPONSE: To clarify, the 9 foot pile height applied only to facilities operating under the 5,000 square foot exemption from the CF Permit,¹⁶ not to all farms. The main purpose of the height limit was to prevent operators from attempting to fit too much material within a small area in an effort to remain within the exemption. Piles that are too large can result in compaction, anaerobic conditions and excessive temperatures.¹⁷ If a large pile is too dry, it may be subject to spontaneous combustion. The *On-Farm Composting Handbook* recommends active pile heights of 3 – 12 feet for windrows; 3 – 4 feet for passively aerated piles; and 5 – 8 feet for aerated static piles.¹⁸ Raw feedstocks often have higher moisture content than active composting materials, making them particularly susceptible to anaerobic conditions and odors if they are stored in large piles. As a result, MDE will retain the 9 foot height limit for storage of raw feedstocks but will increase the height limit to 12 feet for active, curing, or finished piles. Any local restrictions, including local fire codes, must also be observed.

8. **COMMENT:** Exempt farms should be required to comply with the general restrictions in proposed Regulation .04. This would allow the on-farm exemptions to be expanded while still allowing for an exemption to be revoked for farms with “problematic practices.”

RESPONSE: Proposed Regulation .04 applies to all composting facilities, regardless of whether they are exempt from the CF Permit. This will be further clarified in the revised proposal to eliminate any confusion.

9. **COMMENT:** It is unclear whether animal bedding (straw, wood shavings, etc.) that is purchased from off site, used on a farm, and then composted on that farm would be considered to have been “generated” at the farm.

RESPONSE: Regardless of where it was originally purchased, animal bedding is considered to be generated at the farm where it is used prior to composting. Waste and recyclables, including feedstocks, are considered to be generated at the point at which the material stops being used for its original purpose and would become solid waste, but for recycling or composting.¹⁹ For example, household food scraps are

¹⁶ Proposed Regulation .05B(4)(c).

¹⁷ Rynk et al, supra note 4 at 25, 148.

¹⁸ Id at 25 – 31.

¹⁹ U.S. EPA, *Measuring Recycling: A Guide for State and Local Governments* (1997), Appendix A, http://www.epa.gov/waste/conserve/tools/recmeas/docs/guide_a.pdf (“Waste Generation: refers to the amount (weight or volume) of materials and products that enter the waste stream before recycling, composting, landfilling, or combustion takes place.”) Maryland’s definition of “solid waste stream” includes “refuse that would, unless recycled, be disposed of in a refuse disposal system.” Environment Article, §9-1701(q), Annotated Code of Maryland.

considered to be generated at the residence rather than at the store where the food was purchased. While MDE believes this is clear in the regulations, it will be further reiterated in guidance.

Composting of Animal Mortalities

10. COMMENT: Address and/or exempt composting of animal mortalities. Animal mortalities should be specifically included in one of the defined feedstock types. The most prevalent methods of mortality composting are usually conducted on less than 5,000 square feet. It should be clarified that these activities would be exempt under the 5,000 square foot exemption.

RESPONSE:. Composting is a preferred approach for managing routine animal mortalities on farms and is a standard practice in nutrient management and soil conservation and water quality plans. Animal mortality composters are frequently installed at poultry farms through cost-share with MDA; those composters follow a NRCS standard and cost-share recipients must be trained in dead bird composting.²⁰

The Department had anticipated that most animal mortality composting would be exempt under the existing exemptions. First, it would be exempt regardless of size where on-site mortalities are composted and the resulting compost is used on site. Second, it would be exempt up to 5,000 square feet if only Types 1 and 2 materials are composted, regardless of origin of feedstocks or place where compost is used. While animal mortalities were not specifically named, Type 2 feedstocks include “other materials that the Department determines pose a low level of risk from hazardous substances and a higher level of risk from physical contaminants and human pathogens, compared to Type 1 feedstocks.” The Department believes that animal mortalities generated during the normal course of farming operations fit appropriately within Type 2. To increase clarity, animal mortalities will be explicitly listed under Type 2.

While not directly mentioned in the comments, there may be instances in which a farm needs to manage larger quantities of animal mortalities that cannot be composted within 5,000 square feet. This may arise as a result of catastrophic death from disease or weather. Composting is a recommended method for dealing with these situations.²¹ To address these cases, the proposal will

²⁰ MDA, MACS Manual, Dead Bird Composting Facility (Code 318), http://mda.maryland.gov/resource_conservation/documents/macs_manual/2/318_dead_bird_compost.pdf

²¹ See University of Maryland Cooperative Extension, Fact Sheet 723: Composting Catastrophic Event Poultry Mortalities, http://www.enst.umd.edu/sites/default/files/_docs/FS723.pdf

also be amended to exempt larger-scale mortality composting in the event of a catastrophic die-off, where the activity is authorized by MDA.

Forms, Procedures, and Timeline

11. COMMENT: Specify a timeframe and/or deadline for Department acknowledgement of the CFOP and NOI. If the NOI, CFOP, or annual report is not acknowledged by the Department within 60 days, it should be deemed approved.

RESPONSE: For a facility to operate under the general permit, the operator must submit an NOI and CFOP. Under proposed Regulation .11G, the Department will review the documents to ensure that they “demonstrate compliance with the requirements of [the regulations] and the terms of the general permit” and, if so, acknowledge receipt of the complying documents. Permit coverage would begin upon the Department’s acknowledgement. The Department expects that NOI review and acknowledgement can be completed relatively quickly. (For example, the published turnaround time for acknowledgement of a NWW Recycling Facility NOI is 30 days.) However, the Department declines to set a deadline in the regulations. In the event that unusual circumstances delay the Department’s ability to act on a submission, the Department does not believe it is appropriate to automatically allow operation of the facility. This is consistent with the NWW general permit regulations, which do not set such a deadline.

12. COMMENT: Allow the operator to create its own forms if the Department fails to make the NOI, existing facility notification (EFN), or annual report form available in time for the operator to submit them. Extend the deadline to submit the EFN if the Department fails to post the form on the website within 60 days of the effective date of the regulations.

RESPONSE: The Department intends to provide the EFN, individual CF Permit application form, and annual report forms online concurrent with the effective date of the regulations. The NOI form will be provided online concurrent with the issuance of the general permit. The proposed language regarding provision of forms by the Department is standard among a number of other permits and reporting mandates.²² It ensures that the submissions are complete and in a format that is easily reviewable. It saves time for both the Department and the applicant/operator by avoiding the need

²² See, e.g. COMAR 26.04.06.13 (“Each sewage sludge generator...shall submit an annual generator’s report on a form provided by the Department”); COMAR 26.04.08.08 (“An applicant for a scrap tire collection facility license...shall submit an application form provided by the Department”); COMAR 26.04.07.12 (an applicant for a permit to construct a landclearing debris landfill shall submit “a completed and signed application on a form provided by the Department.”)

for the Department to clarify or request additional information. MDE disagrees that this provision should be revised.

- 13. COMMENT:** Eliminate public participation for permit modifications since there is no similar opportunity for variances.

RESPONSE: Separate notice and comment procedures were not included for variances because a variance would typically take place at the same time as either a permit application or a permit modification, both of which already have notice and comment procedures.

A variance relating to facility siting or design requirements in the regulations is likely to be sought at the same time as the initial permit, before the facility begins operations. Also, because the need for a variance is the primary reason a facility would opt for an individual permit, it is likely that the variance and individual permit would be sought at the same time. There may be unusual circumstances during the 5-year permit term in which the facility seeks a new variance that it had not requested at the time of the permit application. To the extent the proposed variance would constitute a significant change to the CF Permit, the facility would need to obtain a permit modification (with notice and comment) to accommodate the variance.²³

Public participation is important for modifications for the same reason it is important for the initial permit. The process helps the Department and the applicant become aware of any nuisance or other environmental concerns with the proposed facility. Facilities are likely to be more successful if public concerns are heard and addressed before the start of operations. Public participation would be meaningless if it could be avoided by proposing controversial aspects of the operation as permit modifications rather than during the initial permitting process. For these reasons, the Department will not eliminate public participation for modifications.

- 14. COMMENT:** Require a certification in lieu of resubmission of an unchanged CFOP. The CFOP should not need to be resubmitted annually with the annual report unless it has changed. If it has not changed, the operator should be permitted to instead certify that the CFOP has not changed.

RESPONSE: It is unclear based on the comment why it would be preferable from an operator's perspective to submit a certification rather than to resubmit the unchanged CFOP. The comment stated that it would "reduce paperwork," but resubmitting an unchanged CFOP does not require completion of any new paperwork. The Department intends to accept submission of annual reports

²³ In the proposed regulations, the term "variance" is used to refer to an authorized deviation from one or more provisions of the regulations. This is different from a modification, which is a change to a permit. See Proposed Regulation .14.

and CFOPs electronically, so even the minimal printing and mailing costs would be avoidable. The facility must have a current copy of the CFOP on site at all times and must review the CFOP annually to determine whether updates are needed. Since resubmitting the CFOP will impose no cost and almost no additional effort, the Department does not think the requested change is necessary.

15. COMMENT: Who would prepare, review, and approve the CFOP?

RESPONSE: The facility operator would prepare the CFOP and submit it to the Department with the individual permit application or the general permit NOI. (No particular training or certification is required to write a CFOP.) The Department would review and approve the CFOP by either issuance of the individual permit or through acknowledgement of the NOI in the case of the general permit. MDE believes this is sufficiently clear in the regulations as proposed, but this process will be reiterated in guidance.

Recordkeeping and Reporting

16. COMMENT: Reporting of quantities in volume should not be required for any item except the quantity of compost produced (since this is the only factor measured in volume that could potentially affect facility tier).

RESPONSE: Tier 2 facilities are required under the proposed regulations to submit quantities of feedstocks, compost, and residues in both weight and volume. This issue was discussed extensively during stakeholder meetings. Volume and weight measurements are both useful for different reasons. Besides the threshold between Tier 2 Small and Tier 2 Large being measured in volume, volume is easier to verify during an inspection. Weight measurements are valuable because the Department uses recycling and waste tonnages to calculate county recycling rates annually under the Maryland Recycling Act. As discussed in Comment 17 below, weight may be easily converted to volume using a simple calculation, so MDE does not believe reporting all quantities in volume imposes a burden on the operator. For these reasons, the Department believes it is appropriate to require both volume and weight reporting for Tier 2 facilities.

17. COMMENT: Allow for use of weight-to-volume conversions for reporting. For facilities with scales, using a conversion factor for weight-to-volume is easier than calculating volume based on the estimated dimensions of each windrow or pile.

RESPONSE: The proposed regulations specify that a formula for volume-to-weight conversion may be used. This was included because some facilities, especially smaller ones, do not have truck

scales to measure weight directly. To allow equal flexibility for facilities that do have large scales, the regulations will be revised to allow for use of a conversion factor in either direction (volume-to-weight or weight-to-volume).

- 18. COMMENT:** Do not penalize existing facilities for not having 5 years' worth of records when the regulations first become effective.

RESPONSE: The regulations as proposed would not have penalized existing facilities for having less than 5 years of past records upon the regulations' effective date or upon the end of the "grace period,"²⁴ but this will be further clarified to eliminate any remaining confusion.

- 19. COMMENT:** The annual report due date (January 31 for the preceding calendar year) should be made at least one month later to allow enough time to prepare the report after the close of the calendar year.

RESPONSE: This issue was discussed during stakeholder meetings. Originally, the Department suggested a due date of March 31, which is the same due date for the counties' annual Maryland Recycling Act reports. The date was changed to January 31 after some of the county stakeholders requested that the composting facility report be due earlier to avoid having multiple reports due at once. A private composter also mentioned that due to the seasonal nature of the composting business, the end of January is generally less busy than the end of March. Either date was acceptable to the Department. Because it appears that the majority of stakeholders prefer January 31, the Department declines to make this change.

Setbacks

- 20. COMMENT:** The setback distance from drinking water supply wells should be decreased from 300 feet to 100 feet for Tier 1 and 2 facilities and should remain at 300 feet for Tier 3 facilities.

RESPONSE: The Department and the stakeholder group considered the composting regulations of a number of other states in evaluating potential standards. As with many aspects of the regulations, there is considerable variation across states for the setback distance to drinking water supply wells. While 300 feet is within the range of setbacks established in other states, several of the states studied have smaller setbacks, particularly for yard waste composting (see Table 1). In addition,

²⁴ Proposed Regulation .12 requires a composting facility to "keep records for a minimum of 5 years from the date of each record." The regulation applies only to facilities required to obtain a CF Permit, so the obligation to start keeping records would begin when the facility is required to obtain a CF Permit (July 1, 2016 for existing facilities). Five years' worth of records would not be accumulated until July 2021.

COMAR 26.04.02.04 requires a setback of only 100 feet between a septic system and a well. For Tier 1 and 2 facilities, the Department will reduce the setback to 100 feet, consistent with the septic system setback.

The proposed setback distances do not apply to Tier 3 composting facilities,²⁵ which are addressed through separate regulations and permitting schemes, so the commenter's statement that the 300 foot setback should continue to apply to those facilities is not applicable.

Table 1: Setbacks from Drinking Water Supply Wells in Other States

State	Setback from drinking water supply well	Notes
Ohio ²⁶	300 ft	50 ft if controlled by the owner
Massachusetts ²⁷	250 ft	For permit-by-rule facilities only
Maine ²⁸	300 ft	Off-site water supply wells
Vermont ²⁹	300 ft	Water supplies not owned by the operator.
Florida ³⁰	500 ft/100 ft	Offsite potable water wells; 100 ft is for yard waste only
North Carolina ³¹	100 ft	All wells
Wisconsin ³²	250 ft / 1200 ft	250 ft is for private well; 1200 ft is for public
Iowa ³³	100 ft/ 200 ft	100 ft is for private well; 200 ft is for public
California (proposed) ³⁴	100 ft	Any drinking water supply well

21. COMMENT: The 50 foot setback from the property line should be revised to allow for a composting facility that spans two parcels of land owned by the same operator. One of the county facilities is situated so that the property line between two county-owned parcels runs through the composting area.

RESPONSE: The purpose of the setback was to prevent potential impacts to neighboring sites that are not part of the composting facility. MDE agrees that this concern does not apply where both parcels are owned by a single operator. The regulations will be revised to clarify this.

Contact Water Collection and Use

²⁵ Tier 3 facilities are required to obtain a RDP or sewage sludge utilization permit and are not required to obtain a CF Permit (Proposed Regulation .05C). The setbacks only apply to facilities required to obtain a CF Permit.

²⁶ OAC 3745-560-100 .

²⁷ 310 CMR 16.04(3)(a)3.

²⁸ 06-096 CMR 410(2)(A)(5).

²⁹ Vermont Solid Waste Management Rule §§ 6-1104(C)(1)(a); 6-1107(a)(1).

³⁰ F.A.C. 62-701.300.

³¹ 15 NCAC 13B.1404.

³² Wisconsin NR 502.12(8).

³³ I.A.C. 567—105.3.

³⁴ California Water Board, General Waste Discharge Requirements for Composting Operations, (August, 2013), http://www.waterboards.ca.gov/water_issues/programs/compost/docs/draft_composting_go_req.pdf

22. COMMENT: Is rainwater that contacts finished compost considered “contact water” that must be collected for Tier 2 Large facilities?

RESPONSE: No. This is addressed in the definition of “contact water” in proposed Regulation .02B(12). Contact water includes water that has contacted raw feedstocks and active compost (material that has not yet undergone pathogen reduction). Water that has contacted curing or finished compost is not contact water.

23. COMMENT: It should be clarified that contact water from Tier 2 Large facilities may be used on feedstock storage piles in addition to active composting piles.

RESPONSE: The Department agrees that contact water should be permitted to be reused up until the pathogen reduction requirements are met. This change will be made in proposed Regulations .08F(2)(b)(i), .08F(3)(d)(i), and .09D(4)(a).

24. COMMENT: The containment system used to collect contact water for a Tier 2 Large facility should be sized to handle a 10-year storm event (rather than a 25-year storm event). Given the cost, sizing for a 25-year storm event is excessive. MDE should explain its selection of the 25-year event as opposed to other options.

RESPONSE: At a typical outdoor composting facility, precipitation falls on or near feedstock and active piles and either contacts the materials directly or mixes with liquid that has contacted the piles, creating contact water in quantities that vary based on the amount of precipitation. MDE examined a number of studies of contact water runoff from other states.³⁵ Based on this information and past experience, MDE believes that water that has contacted certain raw or in-process materials must be collected and contained to avoid adverse impacts to water quality. This contact water potentially contains harmful levels of nutrients, total suspended solids, pH, biological oxygen demand/chemical oxygen demand, and bacteria. This risk is greater for contact water from Type 2 materials such as food scraps.³⁶ MDE believes that discharges of

³⁵ North Carolina Division of Water Quality, DWQ Report to the Compost Operation Stakeholder Advisory Group (Feb 2010), http://portal.ncdenr.org/c/document_library/get_file?uuid=498f9620-4d13-43cf-ab45-45607b3ca5e0&groupId=38361 ; Carver County Organics Composting Demonstration Site, Presentation by Marcus Zbinden, Carver County, to MDE Composting Workgroup Technical Subgroup, (May 8, 2013); California Water Boards, Leachate and Runoff Analysis Synopsis, http://www.waterboards.ca.gov/water_issues/programs/compost/docs/leachate_runoff.pdf ; CH2MHill, Commercial Composting Water Quality Permit Development (prepared for Oregon DEQ) (2004) http://portal.ncdenr.org/c/document_library/get_file?uuid=6c5d6037-e253-4507-8b2b-0dc0eb18098c&groupId=38361 ; Kennedy/Jenks Consulting, Compost/Leachate Research (prepared for Oregon DEQ) (2007), <http://www.deq.state.or.us/lq/pubs/docs/sw/compost/rulemaking/CompostLeachateReport.pdf>

³⁶ See Coker, Craig, “Managing Storm Water,” BioCycle (Feb 2008), available at http://portal.ncdenr.org/c/document_library/get_file?uuid=8b0afbfe-5b77-44bd-9700-8461859c04f3&groupId=38361 (“Animal manure, biosolids, and food scraps composting facility runoff will likely have higher levels of nutrients, organic

contact water from higher-risk composting facilities are not appropriately addressed under existing permits and controls for stormwater. The General Permit for Stormwater Discharges Associated with Industrial Activity explicitly states that “stormwater discharges that are mixed with non-stormwater,” are not eligible for coverage. The proposed regulations therefore require collection and containment of contact water from the higher risk facilities prior to proper reuse or treatment. In balancing environmental need with potential economic impacts, MDE sought to apply the requirements narrowly by:

- (1) Requiring contact water collection only for Tier 2 Large facilities;
- (2) Providing a mechanism for facilities to reduce the quantity of contact water that must be collected (and thus the size of containment) by covering feedstocks and active piles; and
- (3) Accommodating other means of achieving equal environmental protection through a variance process.

The requirement for contact water containment sized for a 25-year storm event was partly adapted from the U.S. Composting Council Model rules. For Tier 1 facilities (yard waste), the model rules require the facility to direct contact water to “a containment, recycling, and/or treatment system sized to handle at a minimum a 24-hr 25-yr storm event.” For Tier 2, the USCC model requires segregation of stormwater from contact water. The stormwater control features must be “designed, constructed, and maintained to...control and collect the runoff stormwater volume resulting from a 25-year, 24-hour storm event.” Segregated contact water must be directed to a containment, recycling and/or treatment system.³⁷

Wisconsin’s composting regulations, updated in 2012, also use the 25-year storm event to establish the size of contact water storage.³⁸ MDE’s General Discharge Permit for Animal Feeding Operations uses the 25-year storm event for the sizing of animal waste impoundments and prohibits discharges to surface waters except when they result from a storm event greater than the 25-year, 24 hour storm event.

Under the proposed regulations, a facility may choose to segregate contact water from stormwater by covering the feedstock and active piles with a low-permeability cover or roof and separately

acids produced during decomposition, and fecal coliform bacteria...Potential impacts of [nutrients, soluble salts, BOD/COD, tannins and phenols, herbicides, pesticides, fungicides and fecal coliform] on stream and river water quality are the same as, and in some cases more severe than, untreated discharges of sanitary wastewater.”)

³⁷ U.S. Composting Council, Model Compost Rule Template, Version 1.1 (2013) <http://compostingcouncil.org/state-compost-regulations-map/>

³⁸ Wisconsin N.R. §502.12(12) (“All run-off that contacts materials being composted or raw materials staged for composting shall be managed as leachate and shall be directed to either a collection basin or a tank...At a minimum, the leachate collection capacity shall be designed for a 25 year, 24 hour storm event.”)

collecting the contact water from underneath the cover. In this case, the containment system would be based on the much smaller quantity of contact water generated rather than on the 25-year storm event. To provide flexibility, the Department allowed for this possibility in the proposed regulations but did not require it.

MDE believes the 25-year, 24-hour storm event standard is necessary for Tier 2 Large facilities to minimize the frequency of discharges of contact water from containment structures.

- 25. COMMENT:** The construction standard for a tank used to collect contact water should be clarified. Proposed Regulation .08F states that the “collection basin, tank, or other containment system used to collect contact water shall...have a synthetic or compacted clay liner.” A tank would not have a synthetic or compacted clay liner.

RESPONSE: The Department will revise this language to make it clear that the synthetic or clay liner requirement applies to collection basins. A tank or other containment system must be constructed of an impermeable material acceptable to the Department.

Groundwater Monitoring

- 26. COMMENT:** A facility that already has an approved groundwater monitoring network and plan should be exempt from the requirement in proposed Regulation .08G. (Regulation .08G would allow the Department to require a composting facility to install groundwater monitoring wells and conduct groundwater monitoring if warranted for one of several reasons.)

RESPONSE: The Department declines to add the requested exemption. An existing groundwater monitoring network may have been installed as a result of a different activity (such as a landfill located at the same site) and may not be configured or located in such a way that is useful to monitor for impacts from the composting facility. However, where the Department determines groundwater monitoring is necessary, it will consider whether an existing network and monitoring plan is sufficient before requiring any additional installations.

- 27. COMMENT:** How would the authority for the Department to require groundwater monitoring work for a facility seeking to operate under the general CF Permit?

RESPONSE: Proposed Regulation .08G states that groundwater monitoring may be required if the facility is located in karst terrain or a wellhead protection area, or if the Department otherwise considers monitoring necessary to adequately protect groundwater because of particular characteristics of the site.

A general permit typically does not contain site-specific conditions. Groundwater monitoring requirements would be site-specific and therefore could not be included in a general permit. The general permit itself will specify in detail the types of facilities that are eligible to operate under it. It will lay out specific site characteristics which, due to the likely need for groundwater monitoring, would preclude coverage under the general permit. As a result, facilities requiring groundwater monitoring would not operate under the general permit.

Other Comments

28. COMMENT: Clarify whether a CF Permit would be required for an existing facility that currently holds a Refuse Disposal Permit (RD Permit). Specifically, is the CF Permit required where a facility conducts both natural wood waste (NWW) recycling and yard waste composting on site at a landfill, but the facility's current RD permit covers only the NWW and landfill activities?

RESPONSE: The statute defines "composting facility" to exclude a facility that is required to obtain a RDP under COMAR 26.04.06. The proposed regulations clarify that this exclusion applies only to areas of a site for which a RD Permit is required. Where NWW recycling is conducted on-site at a refuse disposal facility such as a landfill, provisions governing the NWW recycling area are typically included within the RDP.

MDE wishes to avoid duplicative permit coverage in situations where a composting activity could potentially be regulated under either a RD Permit or a CF Permit. However, there should be a similar level of environmental protection for composting activities whether or not they are conducted at refuse disposal facilities. As a result, the Department intended that a facility conducting composting at a site with a RD Permit would either:

- (1) Apply to have the RD Permit modified to include the composting activity, if not already included; or
- (2) Obtain a separate CF Permit to cover the composting activity.³⁹

Addition of composting-specific conditions to an existing RD Permit would likely require reissuance of the permit. The RD Permit is an individual permit and for landfills and incinerators requires certain public participation requirements. In contrast, the CF Permit would be available as

³⁹ For existing facilities that submit a timely Existing Facility Notification, the facility would be required to fulfill one of these permit options by the end of the "grace period," which was July 1, 2016 in the proposed regulations (but has been extended to January 1, 2017 for the re-proposal).

a general permit. As a result, the Department anticipates that some operators would prefer to obtain a separate CF Permit instead of modifying the existing RD Permit.

If a facility opts to include composting in the RD Permit the requirements in the proposed regulations would be incorporated into the RD Permit. If the facility opts to obtain a separate CF Permit, it would be subject to the terms of the CF Permit as well as the composting facility regulations. MDE will add language clarifying this intent.

29. COMMENT: Delete the provision allowing the Department to rescind a variance “for other good cause.”

RESPONSE: Similar language is included in Regulation .16A, which allows the Department to suspend, revoke, or modify the CF Permit if it finds that “any other good cause exists for suspending, revoking, or modifying” the permit.

This language is also used elsewhere in COMAR, allowing the Department to rescind or deny various permits and approvals for “other good cause.”⁴⁰ This avoids the need to identify and list in the regulation every potential reason for these actions, at the risk of omitting a reason and limiting the Department’s ability to stop or avoid environmental harm. In the context of the variance, “other good cause” may include new facts that come to light after issuance of the variance, such as inaccuracies in the variance application, that cast doubt on the permittee’s ability or willingness to use the variance in a manner that is equally protective of the environment. For these reasons the Department declines to make the requested change.

30. COMMENT: Require, rather than allow, the Department to reinstate a suspended permit after the permittee returns to compliance.

RESPONSE: Under the proposed regulations, the Department has the authority to suspend a permit for a variety of reasons other than noncompliance with the regulations or CF Permit.⁴¹

Where a permit was suspended due to one of these other reasons, a return to compliance with the regulations and CF Permit would not necessarily address the original problem that lead to suspension. For these reasons the Department declines to make this change.

31. COMMENT: Certain general restrictions in proposed Regulation .04 should be eliminated because they are too “vague and subjective,” particularly the prohibitions on engaging in composting in a manner likely to

⁴⁰ COMAR 26.04.06.14 (sewage sludge permits); COMAR 26.04.08.25 (scrap tire licenses); 26.08.04.10-1 (discharge permits).

⁴¹ Proposed Regulation .16A(1).

“create a nuisance” or “create other hazards to public health, safety, or comfort as may be determined by the Department.”

RESPONSE: Identical prohibitions are included in a number of MDE regulations.⁴² They give the Department broad authority to address and prevent adverse impacts. The Department is unable to predict and name in the regulations every potential operational or design failure that would lead to a negative impact on people or the environment. Attempting to do so would be undesirable for the composting industry, as it would require tremendously detailed, prescriptive standards. As discussed during stakeholder meetings, prescriptive requirements limit composters’ ability to identify the best and most efficient ways of running their operations. Performance-based requirements allow more flexibility, but necessarily involve more Department discretion in determining whether they have been met.

Including these general prohibitions is necessary to cover potential problems that were not addressed more specifically due to a desire to avoid being overly prescriptive. They are also important because unlike the rest of the regulations, they apply even to exempt facilities, establishing a baseline level of protection even when a CF Permit is not required.

MDE also disagrees that these provisions are too vague. In terms of the general meaning of the provisions, nuisances from composting operations could potentially include excessive odors, dust, noise, and other conditions that interfere with enjoyment of surrounding properties. Hazards to public health and safety could potentially include, for example, hazards from pathogens, vectors, fires, and inadequate security or maintenance of the site or equipment. For the reasons above, the Department declines to make the requested change.

32. COMMENT: Add a definition for “seasonal high water table.”

RESPONSE: A definition will be added.

33. COMMENT: Tier 2 facilities should not be required to include in the CFOP a plan for determining when the material is ready for placement on the curing or compost storage area. This requirement is “inequitable as Tier 1 facilities are not required to make similar determinations.”

RESPONSE: This distinction was made because Tier 2 facilities have certain design and operational requirements that are triggered based on the stage of the composting process (i.e. active

⁴² COMAR 26.04.07.03 (solid waste); COMAR 26.04.09.03 (natural wood waste); 26.04.10.03 (coal combustion byproducts).

composting vs. curing), while Tier 1 facilities do not.⁴³ As a result, a Tier 2 facility must be able to accurately determine when the material goes from being “active” to “curing” in order to determine when the additional safeguards are no longer required. This is less important for Tier 1 facilities because active and curing material is subject to the same basic requirements. For these reasons, the Department declines to make the requested change.

- 34. COMMENT:** Eliminate the requirement for Tier 2 Small facilities to place 6 inches of carbon-rich material under the active piles and 6 inches of compost or carbon-rich material over the piles. When windrows are turned there is “no way to prevent the carbon rich material from mixing with the active compost.” The introduction of this additional carbon after each turning would upset the mix and slow the composting process. Finally, it is “not practical” for a composting operation to lay the 6-inch layer over the piles by the end of the operating day on which they are formed.

RESPONSE: The two requirements mentioned above were included for Tier 2 Small facilities as a compromise that allows those facilities to avoid the pad and contact water collection requirements of Tier 2 Large facilities in exchange for added operational safeguards to reduce contact water generation and runoff.

The 6-inch base layer is already a common practice for aerated static pile (ASP) composting because it enhances air flow between the aeration source and the rest of the pile.⁴⁴ Unlike ASP, windrow composting requires repeated turning of the material, which could result in incorporation of some or all of the 6-inch base layer. The proposed regulations will be revised to clarify that the 6-inch layer of carbon-rich material needs to be placed only once prior to the initial formation of the pile and not upon each turning. The Department does not believe that the quantity of additional carbon likely to be introduced from this one-time incorporation of the 6-inch layer would significantly affect the speed of composting (See Appendix A). To some extent, the composter could also adjust the beginning feedstock mixture to account for any impacts of incorporating the layer upon turning. Finally, a Tier 2 Small facility could opt for a low permeability pad and contact water collection in lieu of the 6-inch base layer under Proposed Regulation .08E(3)(b)(ii).

⁴³ Tier 2 Small facilities must place a layer of carbon-rich material below active piles and a layer of compost or carbon-rich material on the top of active piles. These requirements do not apply to curing or finished piles. Tier 2 Large facilities must place active piles on a low-permeability pad, while curing or finished piles may be placed on a less stringent “all-weather pad.” Tier 2 Large facilities must collect contact water, which is generated from feedstock and active composting areas, but not from curing material.

⁴⁴ Rynk, et al, supra note 4 at p.30 (“With the aerated static pile technique, the raw material mixture is piled over a base of wood chips, chopped straw, or other very porous material.”)

With respect to the layer on top of the piles, the commenter did not specify why this would be infeasible. This practice is used voluntarily among some composters to prevent odors, reduce vector attraction, and insulate the pile.⁴⁵ Finished compost would typically be available at the facility, so cost is not expected to be an issue. The Department does not agree that these requirements should be removed.

35. COMMENT: The following general comments were made. The proposed regulations affect too many facilities and are too costly for composters. The proposal would regulate too broadly, affecting on-farm and small facilities that are unlikely to continue composting if regulated. According to several local governments, the proposed regulations would have significant financial impacts. “Literal application of regulations” would create a “disproportionate burden on the operators with lower risk feedstock[s] that would have a chilling effect on the composting community.” Moreover, “additional requirements, with indeterminable economic impact [to the county,] may jeopardize [the county’s] ability to recycle yard waste material.” Finally, according to one county, the contact water requirements for a proposed Tier 2 Large facility would add \$1 – 1.4 million to the cost of the project. The regulations may result in more mulching of yard waste to avoid composting requirements. The proposed regulations would not promote composting. (Under Chapter 363, Acts of 2011, the Department hosted a Composting Workgroup to identify ways to promote composting in the State.)

RESPONSE: The Department believes that clarifying the permitting pathway for composting facilities will support the purpose of promoting composting when combined with the education, outreach, and compost use recommendations made by the Composting Workgroup. In developing the regulations, MDE sought to carry out the intent of the Workgroup – this is evident in the tiered approach that preserves the Workgroup’s basic hierarchy of feedstock risks and the inclusion of many provisions from the U.S. Composting Council’s model rules.⁴⁶ In addition to the eight Workgroup meetings, MDE met with a stakeholder subgroup 11 times over a period of one year during development of the regulations and sought and incorporated feedback on numerous drafts. However, the Department also has obligations beyond the initial Workgroup goal of promoting composting. MDE is required by law to set “design and operational conditions for composting

⁴⁵ U.S. Composting Council, Best Management Practices for Incorporating Food Residuals into Existing Yard Waste Composting Operations (2009), pp. 12 – 13, http://www.epa.gov/reg3wcmd/pdf/FR2YW_BMP.pdf

⁴⁶ MDE, Composting Workgroup Final Report (2013), [http://mde.maryland.gov/programs/Land/RecyclingandOperationsprogram/Publications/Documents/composting_workgroup_final_report_1-2013000%20\(1\).pdf](http://mde.maryland.gov/programs/Land/RecyclingandOperationsprogram/Publications/Documents/composting_workgroup_final_report_1-2013000%20(1).pdf)

facilities to protect public health and the environment and to minimize nuisances.”⁴⁷ The Department’s experience and research indicates that composting can cause water pollution and nuisance odors if conducted with insufficient design and operational controls. Along with this experience, the Department relied extensively on information from other states, many of which had recently or were in the process of revising their composting regulations.

Some design and operational conditions necessary to protect public health and the environment will result in costs. To lessen these impacts, the Department sought to tailor requirements to the relative risk of the facility tier and to introduce flexibility wherever possible, such as through the opportunity for variances and for alternative requirements for covered composting activities. In addition to input incorporated during stakeholder discussions, the Department is accepting a number of suggestions here that will further reduce burdens to some facilities. MDE believes the revised proposal strikes an appropriate balance between its duty to protect public health and the environment and the desire to minimize economic barriers to composting.

⁴⁷ Environment Article, §9-1725(b)(2), Annotated Code of Maryland.

Appendix A

Sample C:N Calculation for Addition of a 6-Inch Carbon-Rich Base Layer to a Windrow

Assumptions:

- The windrow is sized 15 feet wide, 9 feet high, and 100 feet long.
- The estimated volume of the windrow is 9,000 cubic feet ((2/3) x 15 feet x 9 feet x 100 feet).
- The table below shows the composition of the windrow:⁴⁸

Material	Quantity (cubic feet)	Bulk Density (pounds/cubic foot)	Quantity (Pounds)	Nitrogen (%)	Carbon (%)	C:N	Moisture (%)
Leaves (compacted, moist)	6,000	16.67	100,020	0.9	48.6	54:1	38
Food Scraps	3,000	58.70	176,100	2.4	36	15:1	69

In the example above, the C:N ratio of the feedstock mixture is approximately **27:1**.⁴⁹

A 6-inch base layer would require approximately 750 cubic feet of carbon-rich material (15 feet x 0.5 feet x 100 feet). The following table shows the characteristics of wood chips, which may be used to create the base layer.

Material	Quantity (cubic feet)	Bulk Density (pounds/cubic foot)	Quantity (Pounds)	Nitrogen (%)	Carbon (%)	C:N	Moisture (%)
Softwood chips	750	19.72	14,790	0.1	50.4	641:1	0

Mixing 750 cubic feet of the above carbon-rich material into the initial feedstock mixture would bring the C:N ratio to approximately **30:1**.⁵⁰ The recommended initial C:N ratio is 25 – 30:1.⁵¹

The exact impact of the 6-inch base layer would vary depending on the height and shape of the windrow, the initial feedstock mixture, and the type of material used for the base layer. Note that “carbon-rich” is defined as having a C:N of at least 60:1, allowing for a base layer constructed of materials with C:N significantly lower than that of wood chips.

⁴⁸ The feedstock characteristics in this example are taken from Cornell Waste Management Institute, Compost Mixture Calculation Spreadsheets, <http://compost.css.cornell.edu/download.html>

⁴⁹ $(100,020 \times 48.6 \times (100-38) + 176,100 \times 36 \times (100-69)) \div (100,020 \times 0.9 \times (100 - 38) + (176,100 \times 2.4 \times (100-69))) = 26.65$. See Cornell Waste Management Institute, C:N Ratio, http://compost.css.cornell.edu/calc/cn_ratio.html

⁵⁰ $(100,020 \times 48.6 \times (100-38) + 176,100 \times 36 \times (100-69) + 14,790 \times 50.4 \times 100) \div (100,020 \times 0.9 \times (100 - 38) + (176,100 \times 2.4 \times (100-69) + 14,790 \times 0.1 \times 100)) = 30.40$.

⁵¹ Rynk et al, supra note 4, at p. 7.