

# Temperature Monitoring at Licensed Compost Facilities

PUB WA 1585 2012



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## INTRODUCTION

When done properly, the composting process significantly reduces the incidence of harmful pathogens in the finished product. Wisconsin's new composting regulations (NR 502.12, Wis. Adm. Code), effective June 1, 2012, require operators of licensed compost facilities to **monitor temperatures** during the composting process, and to **keep records of temperatures and turning events**. Turning piles and windrows and maintaining correct temperatures will ensure that any disease-causing bacteria, viruses and other pathogens are minimized, and enable the operator to demonstrate that the compost was made properly.

## BACKGROUND

The raw materials used in composting can contain harmful microorganisms, and other pathogens can be introduced during composting by birds and other wild animals. To protect the ultimate users of the compost you produce, it is necessary to take steps to reduce this risk. Properly functioning compost accomplishes this through the self-heating mechanism that compost undergoes as it decomposes. The heating is enhanced by optimal moisture conditions and distributed through the entire batch by periodic mixing, or "turning."

Over the years, the compost industry has determined the amount and duration of heating that is needed to minimize pathogens in the final product. These guidelines are different for different composting methods:

- For the most common method of composting, **windrows and static piles**, attain a minimum temperature of 55°C (131°F) on a minimum of 15 days (not necessarily consecutive) and turn the windrows or piles at least 5 times during the high-temperature periods.
- For **in-vessel or mechanically aerated static piles** (i.e., using a blower to force air through the pile), maintain a continuous minimum temperature of 55°C (131°F) for 3 consecutive days (72 hours).

## METHODS

To measure compost temperatures, you will need a long-probe thermometer (generally 4 feet in length) to obtain readings from the core of the windrow or static pile. It is important to establish consistent technique and locations for taking temperature measurements from an active windrow or static pile. **Make every effort to obtain temperature measurements representative of the entire batch of compost.**

Location: Ideally, two temperatures should be taken at each location: a near surface temperature about 12 inches below the surface, and a core temperature taken 4 feet or more into the compost pile. Typically, these routine temperature readings are taken about 4 feet off the ground. To obtain a more complete sense of the conditions in the compost, temperature readings should be obtained from both the "cool" (typically north) and "warm" (typically south) sides of the windrow.

Number of measurements: Taking temperatures every 150 linear feet of windrow (about every 50 paces) or every 200 cubic yards will provide a very complete indication of temperature conditions. However, not every facility can afford to take this many readings. A minimum of 6 evenly spaced measurements taken per pile, windrow, or vessel provides basic data on temperatures for management purposes.

Frequency: Temperature readings provide a quick assessment of the status of the biological processes in an active compost windrow. Initially, temperature readings fluctuate as optimal moisture and oxygen conditions are established. At a minimum, weekly temperature readings should be used to track and adjust these conditions. Temperatures taken daily during the period when pathogen reduction temperatures are being achieved (when temperatures have attained 55°C or 131°F) are the best way to verify that pathogen reduction is taking place.

Recordkeeping: Temperatures and turning events should be logged on a spreadsheet. An example field log (please feel free to adapt this for the specifics of your facility) is attached to this fact sheet.

Records Retention: Temperature and turning records should be maintained at the compost facility for one year.

## **A NOTE ON MOISTURE**

Moisture content is an easily monitored condition that, when incorrect, may lead to the loss of oxygen within the compost, reduced compost temperatures and the development of odors. The ideal moisture level for an active compost pile is 50%. This is most easily monitored by the “squeeze test”. Squeeze test means to dig into the compost pile, grab a handful, and squeeze. If the pile is too wet, you will squeeze water out. If the pile is too dry, the clump will break apart when you open your hand and release the pressure.

**Contact [DNRWasteMaterials@wisconsin.gov](mailto:DNRWasteMaterials@wisconsin.gov) for further information.**

***Disclaimer:** This document is intended solely as guidance and does not contain any mandatory requirements except where requirements found in statute or administrative rule are referenced. Any regulatory decisions made by the Department of Natural Resources in any matter addressed by this guidance will be made by applying the governing statutes and administrative rules to the relevant facts.*

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**Compost Facility Field Monitoring Form**  
 Pile or Windrow ID: \_\_\_\_\_

Point A: \_\_\_\_\_  
 Point B: \_\_\_\_\_

Point C: \_\_\_\_\_  
 Point D: \_\_\_\_\_

Point E: \_\_\_\_\_  
 Point F: \_\_\_\_\_

Date	Process Day	ID (initials)	Outside Temp.	Time	Depth	Compost Temperatures						Notes (turning events, moisture conditions/adjustments or odors)
						A	B	C	D	E	F	
					12"							
					48"							
					12"							
					48"							
					12"							
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## WISCONSIN DEPARTMENT OF NATURAL RESOURCES NOTICE OF FINAL GUIDANCE & CERTIFICATION

Pursuant to ch. 227, Wis. Stats., the Wisconsin Department of Natural Resources has finalized and hereby certifies the following guidance document.

### DOCUMENT ID

WA-19-1585-C

### DOCUMENT TITLE

Temperature Monitoring at Licensed Compost Facilities

### PROGRAM/BUREAU

Waste and Materials Management

### STATUTORY AUTHORITY OR LEGAL CITATION

Ch. 289, Wis. Stats., NR 502, Wis. Adm. Code

### DATE SENT TO LEGISLATIVE REFERENCE BUREAU (FOR PUBLIC COMMENTS)

November 4, 2019

### DATE FINALIZED

December 2, 2019

### DNR CERTIFICATION

*I have reviewed this guidance document or proposed guidance document and I certify that it complies with sections 227.10 and 227.11 of the Wisconsin Statutes. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is not explicitly required or explicitly permitted by a statute or a rule that has been lawfully promulgated. I further certify that the guidance document or proposed guidance document contains no standard, requirement, or threshold that is more restrictive than a standard, requirement, or threshold contained in the Wisconsin Statutes.*

A handwritten signature in black ink, appearing to read 'Joseph P. Van Rossum'.

December 2, 2019

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Signature

Date