

Conducting a Contamination Audit



2 - 4 hours



Program design



Contamination reduction



Composting site operators
Composting program staff

Supplies

- 30-gallon (or 32-gallon) container to collect the composite sample*
- 12 x 5-gallon buckets to collect materials (with straight sides, not tapered)*
- Bucket ruler (or the above buckets with volume markers)
- Personal protective equipment (PPE) for each participant: gloves, N95 mask, and safety glasses.
- Tools for handling materials (e.g., hand spade or rake)
- Camera
- Kitchen scale able to weigh in ounces
- Large scale for weighing up to 250 pounds
- Gallon size bag or small container for weighing contaminants
- Record log (paper or electronic)
- Clipboards and pencils or tablets
- Tarps and a platform or tables
- Cleaning supplies

**The bucket of a front-end loader or skid steer can also be used to pull a sample, but requires a different method for measuring weight or volume than what is outlined here.*

Objectives

1. To determine the level of macro physical contamination in the composting material being sampled.
2. To determine which contaminants in the collection stream need specific attention in outreach efforts.
3. To create a reference for visual estimation of different contamination levels in composting materials.

Note: This activity is designed to accompany ILSR's Reducing Contamination at Community Composting Sites course.

Background

Contamination audits can be used for estimating the level of macro physical contaminants in a given material. Macro means visible to the naked eye. The process involves pulling a representative sample from the material being audited. Contaminants are then removed by hand and separated into categories that can be measured and compared to the total volume or weight of the sample.

Audits can be performed for individual composting ingredients (feedstocks), feedstocks that have been mixed for composting, or for composting overs. The goal is a 200- to 400-pound final sample that is as representative of the material being audited as possible. This can be accomplished by collecting a number of smaller subsamples from the material being audited to build a final composite sample.

This process can be used for establishing a baseline contamination level or for observing the impact of contamination reduction actions or interventions over time. Contamination audits provide data that can inform program management and target outreach efforts. Performing audits can also train staff or volunteers to visually estimate contamination levels.

In regulations, limits for physical contaminants are often based on dry weight, but measuring contamination by volume may be more practical for composting sites and collection programs. This activity guides you through collecting both weight-based and volumetric measurements. A **Compost Contamination Audit Form** is provided on pages 6 through 9.

Before you begin

1. Decide who will audit and where.

- Designate at least two individuals to participate. Read through all of the steps in this activity to determine what adjustments need to be made to accommodate the physical needs of the auditors.
- Designate an audit work area. This area should be near the material you will be pulling the sample from, with ample space for spreading out the sample for sorting. Tarps can be laid directly on the ground, but an elevated platform or a table covered with a tarp can provide a more ergonomic work surface.
- Regardless of where the audit will take place, coordination with the site manager is essential. Sites with heavy machinery require particular coordination to ensure safety.

2. Decide when you will audit.

- To establish a baseline contamination level, audit at the beginning of a program, before an intervention is implemented, or whenever a baseline needs to be set.
- If feasible, sample multiple times over multiple days to provide the most accurate picture (e.g., once daily for five days).
- Audit again after an intervention to measure its impact (e.g., three to six months after the intervention is implemented).
- For ongoing monitoring: pick a day and do it weekly, monthly, seasonally, or annually.

Consider:

- Timing to reduce disturbances to site operations
- Seasonal variations in materials being sampled
- Staff or participant capacity

3. Decide what contaminants you want to measure.

Possible contaminant categories:

- Hard plastic (such as coffee pods and cutlery)
- Film or flexible plastic (such as bags and food wrappers)
- Plastic coated paper (such as coffee cups and milk cartons)
- Glass
- Metals
- Rocks or bricks
- Manufactured or treated wood
- Glossy or waxed cardboard*
- Clean paper products (such as newspaper and office paper)*
- Soiled paper products (such as paper towels and napkins)*
- Certified compostable products*
- Other noncompostables / trash

* What is considered a "contaminant" will differ from site to site and program to program.

Some composting sites will accept cardboard, paper, or compostable products, some will not.

Each composting initiative should tailor the list of contaminants to their needs. Some initiatives may also want to track the amounts of edible food or recyclables in the composting stream. If more than 12 categories are chosen, additional 5-gallon buckets will be needed.

Create a simple sign for each designated contaminant category or add labels to the buckets acquired. (Note: these buckets will also be used to collect the sample, before contaminants are sorted out. See Step 2 below.)

4. Decide what material you will audit.

For a composting site, an audit can be done for:

- Incoming feedstocks
- Mixed feedstocks that are ready for composting (ideally before being size-reduced or ground)
- Composting overs (hard materials that remain and can be recomposted)

For ongoing monitoring, you may choose to audit materials that have already been decontaminated as a way of confirming that you are achieving a target contamination limit.

For a collection program: decide what neighborhoods, routes, or loads will you focus your efforts on.



Incoming composting feedstocks at Dirt Hugger in Portland, OR. A sample can be pulled from this material for auditing. Photo: Dirt Hugger

Instructions

1. Collect audit supplies and the material that will be audited.

- Make any arrangements necessary to have a pile of the material that will be audited available on the day of the audit. Ideally the pile should have at least 200 pounds of material in it.
- Collect the supplies outlined on page 1 and bring them to the audit work area.
- Provide a printed copy of this activity for each participant. Complete the Contamination Audit Overview section of the **Composting Contamination Audit Form** on page 6.
- Distribute PPE to each participant. Tarp the audit work area and set up the scales.
- Photograph the material that is being audited to create a visual representation of the contamination level that will be measured by the audit.

2. Collect and measure the composite sample.

This activity provides three methods for collecting a composite sample. Method 1 involves collecting subsamples to fill a 30-gallon bin. The 30-gallon bin is then weighed and emptied onto the audit work area. Depending on the material being audited, this could weigh 200 pounds or more. This method is intended for two people who are comfortably able to lift this weight! Method 2 avoids this heavy lifting by instead weighing subsamples in 5-gallon buckets, though slightly more time is spent weighing material in buckets. Method 3 is for those using bucket loaders.

Method 1: Using a 30-gallon bin

- Place the 30-gallon bin on the large scale and tare the weight (or record the weight in the **Audit Form** on page 6 and account for it when calculating the weight of the composite sample).
- Use the 5-gallon buckets to collect subsamples of equal volume from various locations around the pile and at different heights (e.g., the top, middle, and bottom of the pile) and fill the 30-gallon bin. (Note: if you are using a 32-gallon bin, it will not be full).
- Record the weight of the 30-gallon sample in the **Audit Form**.
- Empty the sample onto the audit work area.
- Repeat this process until you have a final composite sample that weighs at least 200 pounds.
- Record the total weight and total volume of the composite sample in the **Audit Form**.

Method 2: Using 5-gallon buckets

- Place an empty 5-gallon bucket on the large scale and tare the weight (or record the weight in the **Audit Form** on page 6 and account for it when calculating the weight of the composite sample).
- Use the 5-gallon buckets to collect subsamples of equal volume from various locations around the pile and at different heights (e.g., the top, middle, and bottom of the pile) and weigh the individual subsamples.
- Record the weight and volume of each of the subsamples in the **Audit Form**.
- Empty the subsamples onto the audit work area.
- Repeat this process until you have a final composite sample that weighs at least 200 pounds.
- Record the total weight and volume of the composite sample in the **Audit Form**.

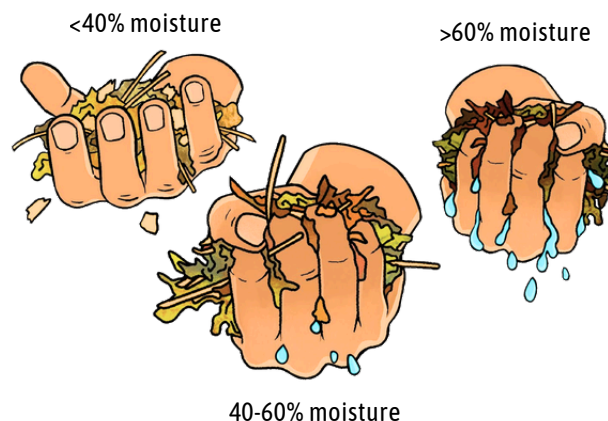
Method 3: Using a loader bucket

- Mix the pile to homogenize the material.
- Pull 1 or 2 bucket loads until you have at least a 200-pound composite sample.
- Empty the material in the audit work area. This is your composite sample.
- Record the total weight and volume of the composite sample in the **Audit Form**.

3. Estimate the dry weight of the composite sample.

To account for variability caused by moisture in the composite sample:

- Grab a handful of the composite sample and squeeze!
- Use the guide on the right to roughly estimate the moisture content ratio of the sample.
- Use the formula provided in the **Audit Form** to calculate and record the estimated dry weight of the composite sample.



4. Separate contaminants from the composite sample.

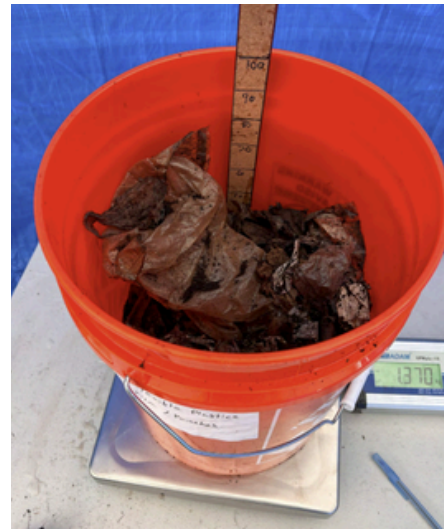
- Set out the 5-gallon buckets with labels or examples representing the predetermined contaminant categories.
- Spread out the composite sample on the tarps, using the hand spade or rake as needed.
- Separate the easily visible physical contaminants by hand and using the hand tools as needed.
- Sort contaminants into buckets until all visible contaminants are removed.



Contaminants being sorted from a sample during a contamination study at a composting site. Photo: Closed Loop Partners' Center for the Circular Economy.

5. Measure the contaminants.

- Record the volume of the sorted contaminants in the buckets in the table of the **Audit Form** on pages 7 and 8.
- Weigh the buckets with contaminants and record the weights in the **Audit Form**, accounting for the weight of the bucket if needed.
- For lighter materials, such as film plastic:
 - Place a small container or bag on the small scale and tare the weight or account for it in the final weight of the material.
 - Place the contaminants collected into the small container or bag.
 - Using the kitchen scale, weigh the bag or container and record the weight of physical contaminants in the **Audit Form**.



Contaminants being measured during a contamination study at a composting site. Photo: Closed Loop Partners' Center for the Circular Economy.

6. Estimate the contamination level of the composite sample.

Use the weights and volumes measured in Step 5 to estimate the level of physical contaminants in the composite sample by weight and by volume by using the following formulas provided in the Audit Form. This can be done for each contaminant category and for the total physical contamination (using the formulas on page 6).

References

This activity is informed by presentations given during ILSR's [2025 Reducing Contamination in Composting Webinar Series](#). The steps for the audit are adapted from CalRecycle's [Field Method for Estimated the Level of Physical Contamination in Compostable Material](#). The list of suggested contaminants on page 2 is based on audits performed by City of Hutchinson, MN staff in 2022, in collaboration with Coker Composting & Consulting and Amplify For Change, as well as a national contamination study performed by Closed Loop Partners' Center for the Circular Economy in 2023. These resources and more are listed below.

For composting sites:

- [Tackling Contamination at Composting Sites | ILSR Webinar](#)
- [A Field Method for Estimating the Level of Physical Contamination in Compostable Material | CalRecycle](#)
- [Don't Spoil the Soil Report | Closed Loop Partners' Center for the Circular Economy](#)

For collection programs:

- [Turning The Tide On Contamination | BioCycle](#)
- [Measuring Contamination in Composting Programs | ILSR Webinar](#)

For schools:

- [Conducting a Waste Audit at a School | Eco-Cycle](#)

Compost Contamination Audit Form

1. CONTAMINATION AUDIT OVERVIEW

DATE:

AUDITORS:

LOCATION:

SAMPLE SOURCE:

CONTAMINANTS BEING AUDITED:

2. MEASURE THE COMPOSITE SAMPLE

EMPTY BIN OR BUCKET WEIGHT:

SUBSAMPLE WEIGHTS:

SUBSAMPLE VOLUMES:

FINAL COMPOSITE SAMPLE WEIGHT:

FINAL COMPOSITE SAMPLE VOLUME:

3. ESTIMATE THE DRY WEIGHT OF THE COMPOSITE SAMPLE

ESTIMATED COMPOSITE SAMPLE DRY WEIGHT IN POUNDS:

Wet weight of composite sample X Estimated moisture content ratio = Composite sample by dry weight in pounds

Example: 200 pounds wet weight x 0.40 = 80 pounds by dry weight

ESTIMATED COMPOSITE SAMPLE DRY WEIGHT IN OUNCES:

Composite sample by dry weight in pounds x 16 ounces per pound = Composite sample by dry weight in ounces

Example: 80 pounds dry weight x 16 = 1,280 ounces by dry weight

Compost Contamination Audit Form - Contaminant Table

Contaminants	Weight	Volume
Example Category: <i>Plastic-lined paper</i> Items collected: <i>coffee cups, non-certified "compostable" food packaging</i>	8 ounces	0.5 gallons
Category 1: Items collected:		
Category 2: Items collected:		
Category 3: Items collected:		
Category 4: Items collected:		
Category 5: Items collected:		
Category 6: Items collected:		
Subtotals		

Compost Contamination Audit Form - Contaminant Table

Contaminants	Weight	Volume
Category 7: Items collected:		
Category 8: Items collected:		
Category 9: Items collected:		
Category 10: Items collected:		
Category 11: Items collected:		
Category 12: Items collected:		
Subtotals		

NOTES:

Compost Contamination Audit Form

6. ESTIMATE THE CONTAMINATION LEVEL

TOTAL CONTAMINATION LEVEL BY WEIGHT:

(Total weight of physical contaminants in ounces / Total dry weight of the composite sample in ounces) X 100 = Level of physical contamination in the composite sample by weight

Example: (64 ounces / 1,280 ounces) x 100 = 5% contamination by weight

CONTAMINANT CATEGORY CONTRIBUTION TO TOTAL CONTAMINATION LEVEL BY WEIGHT:

(Weight of contaminant category in ounces / Total weight of physical contaminants in ounces) X 100 = Level of contamination of the contaminant category by weight

Example: (8 ounces / 64 ounces) X 100% = 12.5% contamination by weight

CATEGORY 1:

CATEGORY 7:

CATEGORY 2:

CATEGORY 8:

CATEGORY 3:

CATEGORY 9:

CATEGORY 4:

CATEGORY 10:

CATEGORY 5:

CATEGORY 11:

CATEGORY 6:

CATEGORY 12:

TOTAL CONTAMINATION LEVEL BY VOLUME:

(Total volume of contaminant category in gallons / Total volume of composite sample in gallons) = Level of contamination of the contaminant category by volume

Example: (5 gallons / 50 gallons) x 100 = 10% contamination by volume

CONTAMINANT CATEGORY CONTRIBUTION TO TOTAL CONTAMINATION LEVEL BY VOLUME:

(Volume of contaminant category in gallons / (Total volume of contaminants in gallons) = Level of contamination of the contaminant category by volume

Example: (0.5 gallon / 5 gallons) X 100% = 10% contamination by volume

CATEGORY 1:

CATEGORY 7:

CATEGORY 2:

CATEGORY 8:

CATEGORY 3:

CATEGORY 9:

CATEGORY 4:

CATEGORY 10:

CATEGORY 5:

CATEGORY 11:

CATEGORY 6:

CATEGORY 12: