

# A Field Method for Estimating the Level of Physical Contamination in Compostable Material

*This guidance is intended as one method of estimating the physical contamination requirements of Title 14 CCR Sections 17862.1, 17868.3.1, and 17896.61. This method is not a regulatory requirement and other methods that meet the requirements of the aforementioned sections may be used.*

## **Introduction**

This guidance provides a method for estimating the level of physical contaminants in a composite sample of large particle size compostable material (chip and grind material, mulch, compost overs). For purposes of this guide, physical contaminant means any human-made inert material, primarily glass, metal, and plastic (including film plastic).

The method uses a 30-gallon (six 5-gallon buckets) composite sample of material being sampled. The measurement method is designed to be conducted in the field and can be used to assess if:

- The material needs additional processing
- The samples should be sent to a laboratory for analysis
- The material can be allowed to leave the site without further analysis
- The material, after reprocessing and sampling continues to fail, may not be allowed to leave the site unless it will be disposed or used in compliance with appropriate requirements

This method is used to estimate the potential amount of physical contaminants in chip and grind material, mulch, and “compost overs,” and is consistent with the requirements found in Title 14, California Code of Regulations, Sections 17862.1(d) and 17868.3.1(c).

## **Step 1: Gather Your Supplies.**

Below is a list of the recommended supplies to be used for this method:

- 5-gallon bins or buckets to collect material
- 30-gallon container or bucket to collect the composite sample
- Tools for handling material, such as a hand spade and a rake
- Personal protective equipment (gloves, dust masks, and safety glasses)

- Small digital scale that is capable of recording weight less than an ounce
- Large digital scale for recording the weight of the composite material
- Gallon size bag or small container for weighing physical contaminants

## **Step 2: Collect and Weigh the Composite Sample.**

Collect a 30-gallon (six 5-gallon buckets) composite sample that is representative and random and may be obtained by taking twelve samples of equal volume from various locations around the pile and at different heights as follows:

1. Take one sample from four to six inches within the pile and collect enough to fill a 5-gallon bucket halfway.
2. Choose a second location and collect the second sample from four to six inches within the pile and fill the rest of the bucket.
3. Repeat steps one and two for the remaining five buckets. Once completed, you will have a total of six 5-gallon buckets of material.
4. Place the 30-gallon bin or container on the large scale and tare the weight.
5. Combine all six 5-gallon buckets into the bin or container.
6. Place the bin or container on the large scale and record the weight of the 30-gallon composite sample.

## **Step 3. Estimate the Dry Weight of the Composite Sample.**

The level of physical contaminants in the composite sample is to be estimated by dry weight. It is suggested that a “squeeze test” be performed on the composite sample to verify the moisture content. A squeeze test is performed by taking a sample of the material in your hand and squeezing tightly. If a light, watery sheen is visible or if the material stays in the form of a ball after squeezing, then the moisture content is approximately 40 to 60 percent. If water drips out of your hand after squeezing, then the moisture content is approximately 60 percent or higher. If the material does not remain in a ball after squeezing, then the moisture content is approximately 40 percent or lower.

To adjust for the wet material, use the following formula with the estimated moisture content ratio:

(Weight of composite sample) X (Moisture content ratio) = Composite sample by dry weight

Example: 60 pounds (wet weight) X (0.50) = 30 pounds by dry weight

Below is another method to find the moisture content ratio:

1. Weigh a portion of the wet composite sample (suggested 1-gallon sample).
2. Dry the portion overnight.
3. Weigh the portion again using the same scale.
4. Subtract the wet weight by the dry weight and record the difference in weight.
5. Divide the difference by the wet weight to estimate the moisture content ratio.

Example: 80 pounds (wet weight) – 48 pounds (dry weight) = 32 pounds (difference)

32 pounds (difference) / 80 pounds (wet weight) = 0.40 moisture content ratio

#### **Step 4: Separate and Weigh Physical Contaminants.**

Taking the 30-gallon (six 5-gallon buckets) composite sample collected in Step 2, empty the contents in an area that will allow easy spreading of the material. It is recommended that this be done on a raised and tarped platform/table to provide an ergonomic and effective work surface. Tools such as a hand spade and rake can be used to spread out the material.

Take the following steps for determining the weight of the physical contaminants:

1. Separate the easily visible physical contaminants that are distinguishable from organic material by hand and with tools.
2. Place a small container or bag on the small scale and tare the weight.
3. Place the physical contaminants collected in (1) into the small container or bag.
4. Using the same small digital scale, weigh the bag or container and record the weight of physical contaminants.

#### **Step 5: Estimate the Level of Physical Contamination.**

Use the weights recorded in Steps 3 and 4 to estimate the level of physical contaminants in the sample by using the following formula:

##### **Formula:**

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

For example: (2.5 oz. / 500 oz) X 100% = 0.5%

#### **Step 6: Interpret the Results.**

##### **Physical Contamination**

Pass	Caution	Fail
Range: equal to or less than 0.61%	Range: 0.62 to 0.75%	Range: greater than 0.75%

**PASS:** Measurements that fall at or below approximately 0.61 percent could be determined with confidence that the sampled material is within an acceptable range and, if collected appropriately, the sample indicates that the material may have a high probability of being below the 0.5 percent physical contamination limit.

**CAUTION:** Measurements that fall approximately between 0.62 percent and 0.75 percent indicates that the material may not be below the 0.5 percent physical contamination limit, and CalRecycle staff suggests that additional sampling be conducted. If additional measurements continue to estimate the material is approximately 0.62 percent and 0.75 percent, CalRecycle staff suggests the material be reprocessed to remove contaminants. If new samples are found to be in the “Pass” range, then the material may have a low probability that the contamination levels are above the threshold limits.

**FAIL:** Measurements greater than 0.75 percent would be in the statistically significant range, and thus indicate the material may have a high probability that it has contaminant levels above the threshold limits. It is recommended that the material be further processed to remove contaminants and re-sampled to verify compliance with the 0.5 percent physical contamination limit or new samples could be sent for further analysis at a certified lab. The facility operator should receive the results of the lab analysis and verify that the material is below the allowed contamination threshold before the material is allowed to leave the site.

### **Film Plastics:**

If upon visible observation it is found that film plastics represent more than half of the physical contaminants collected, the following steps can be used to estimate the level of film plastics in the sample.

1. Separate any film plastics from the physical contaminants that were collected in step 4.
2. Place a small container or bag on the small digital scale and tare the weight.
3. Place the film plastics in the same bag or container.
4. Using the same digital scale, weigh the bag or container and record the weight of film plastics.

## Estimate the level of film plastics in the sample.

### Formula:

$(\text{Weight of film plastics} / \text{Total weight of physical contaminants}) \times 100 = \underline{\text{Level of film plastic}}$

For example:  $(.5 \text{ oz.} / 2.5 \text{ oz.}) \times 100\% = \underline{20\%}$

## Film Plastic Range

Pass	Fail
Equal to or less than 20% of the total weight of physical contaminants	Greater than 20% of the total weight of physical contaminants

**FAIL:** Material greater than 20 percent of physical contamination level could indicate that the material contains a high amount of film plastic. It is recommended that material be further processed and re-sampled to verify compliance with the film plastic contamination limit.

**PASS:** Measurements that fall equal to or less than 20 percent of the estimated physical contamination passing level could indicate that the material is within an acceptable range, and if collected appropriately, could indicate that the material may have a high probability of being below the film plastic limit.

Compostable materials that contain physical contaminants in excess of either one or both of these limits shall be designated for additional processing, disposal, or other uses approved by local, state, or federal agencies having appropriate jurisdiction. In other words, if the measurement taken estimates that the sample has passed the physical contamination limit, but has failed the film plastics limit, then the material must be re-processed or a new sample should be sent for further analysis at a certified lab. The facility operator should receive the results of the lab analysis and verify that the material is below limits before the material is allowed to leave the site.

### Resources

- [LEA Central](#)
- [Proposed Regulations](#)
- [Rulemaking Archives](#)
- [Current Regulations](#)

- [Regulations Implementation](#)
- [Legislation and Regulations](#)
- [Legislation Implementation](#)
- [Solid Waste Facilities Home](#)