

PRINCIPLES AND PRACTICE:

COMPOST SAMPLING FOR LAB ANALYSIS

Prepared by:



**Woods End[®]
Research Laboratory**
INCORPORATED



About this Document

This document has been prepared for purposes of providing practical, scientific guidelines for proper sampling of composts and compost products for all forms of analysis as provided by Woods End Research Laboratory, Inc.

What you need to Sample any Compost:

- Long-Handled spading shovel
- Container in which sub-samples are mixed: a 5-gal plastic pail is ideal
- 1 or 2-gal ziplock plastic bags
- Sharpie marker to identify bags
- Small cooler and gel-ice-paks (no ice)

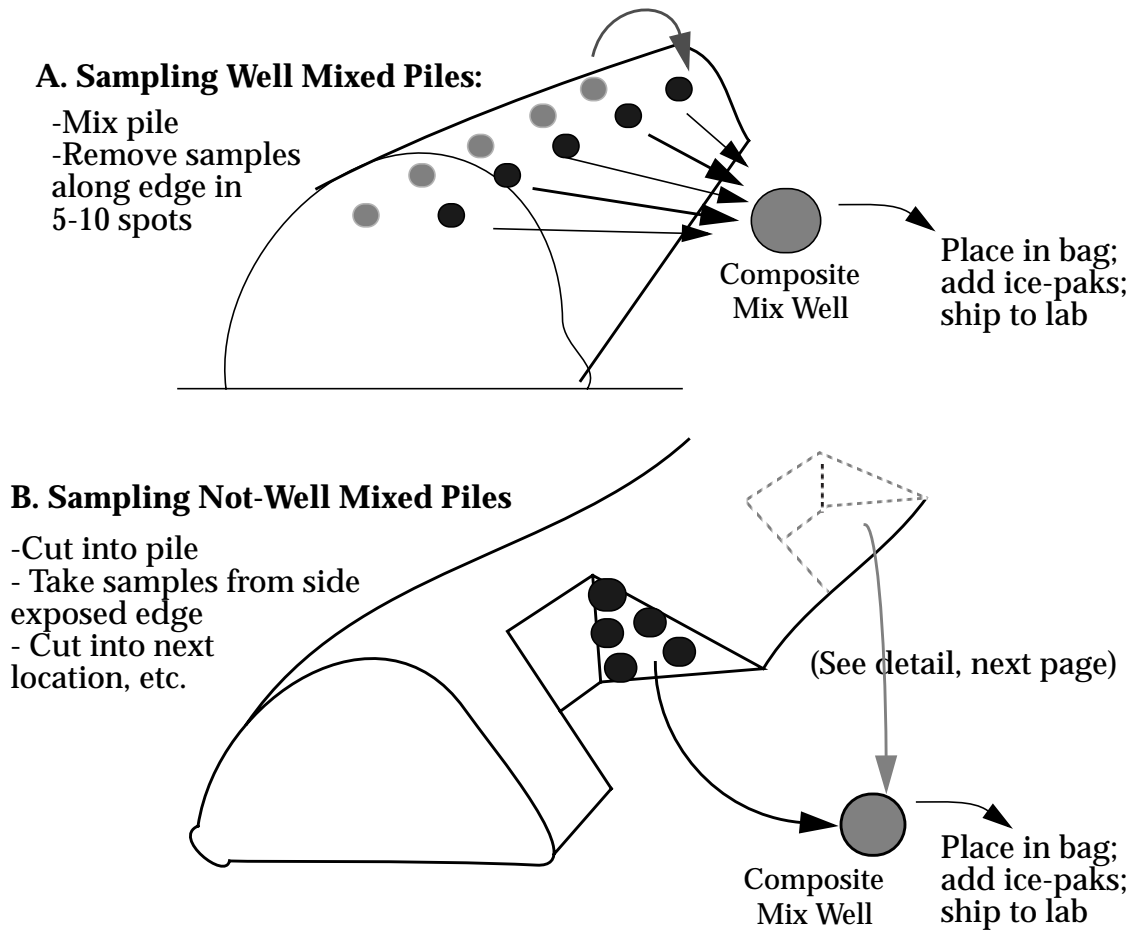
About “Composite” Sampling

There are two basic types of sampling; *composite* sampling to obtain a material which is “representative” of the general mass, and *grab* sampling, for a specific region of a mass. In almost all cases, composite-sampling is the correct approach. Grab sampling should not be used unless a special reason calls for it.

The following diagram illustrates four different sampling techniques comprising compositing and/or grab sampling.



THE COMPOST SAMPLING SCHEMATIC



A. Well Mixed Piles (turned within 4 hours): Take 5 sub-samples each from each side of pile; mix-well in bucket and remove 1-gallon and ship to lab with ice-paks.

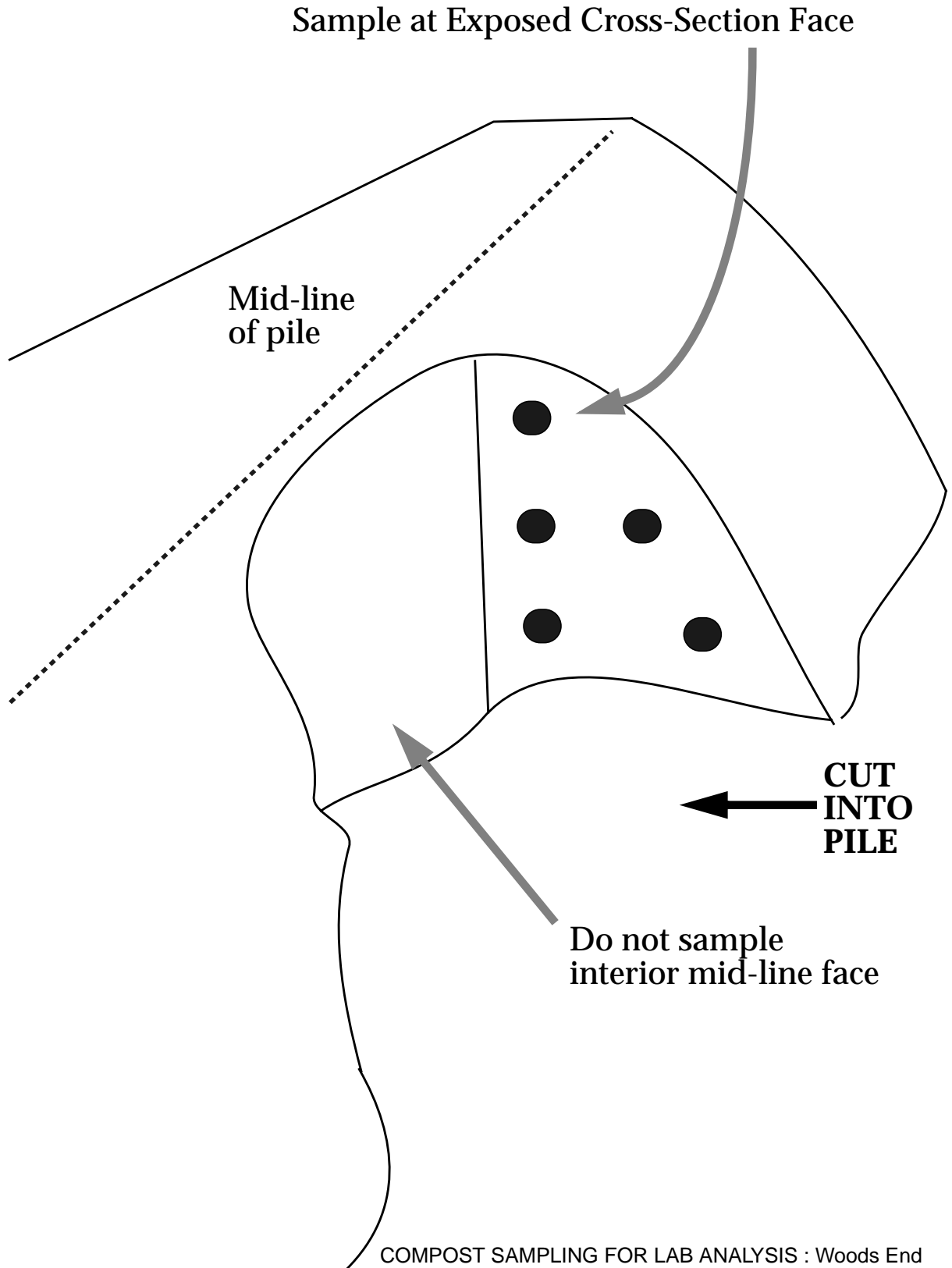
B: Not Well-Mixed piles: Cut cross-section with loader; take 5-sub-samples each from side-wall of cut; repeat operation at 3-5 other locations; remove 1-gallon and ship to lab with ice-paks.

For Lab Analysis: Send Sample Fedex or Next-Day UPS To:

Woods End Research Laboratory
1850 Old Rome Road
Mt Vernon ME 04352



SAMPLING SCHEME FOR NOT WELL-MIXED PILES



Preferred Sampling Method: **Well-Mixed Windrows and Piles**

1. Thoroughly mix the pile or windrow with loader or turning machine same day as sampling.
2. Take sub-samples from 5 locations evenly spaced on each side of windrow. Each sub-samples should be about 1 quart, taken from 1-2 feet depth below pile surface.
3. Thoroughly mix sub-samples in 5-gal bucket by tumbling the bucket or stirring with trowel.
4. Fill a 1-gallon plastic zip-lock bag with the mixed sample. Label the bag with felt marker, seal, place in cooler with frozen ice packs on top. Fill out Chain of Custody sheet provided with lab forms.

Alternate Sampling Method: Not Well-Mixed **Windrows and Piles**

(If a pile CAN NOT be mixed shortly before sampling):

1. Cut into windrow or pile at 6-10 locations spaced on both sides of windrow. These cuts should expose the entire pile cross-section at least to the vertical mid-line.
2. At each of the cuts, take quart-sized subsamples from at least five evenly spaced locations on the exposed cross-section face, but not the inner face (see Figure).
3. At each of the cuts, thoroughly mix the sub-samples in the 5-



gal collection bucket, then transfer one quart to a second 5-gal bucket.

4. Proceed to each of the subsequent cuts, collecting, then mixing the sub-samples, then transferring one quart to the second bucket.

5. Thoroughly mix all the samples in the second bucket by tumbling or stirring action.

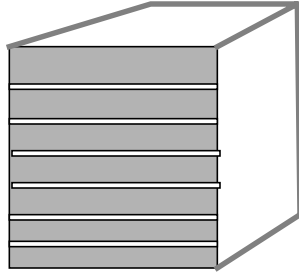
6. Fill a 1-gallon plastic zip-lock bag with the mixed sample, label the bag with indelible marker. Fill out Chain of Custody sheet provided with lab forms.

For Lab Analysis: Send Sample Fedex or Next-Day UPS To:

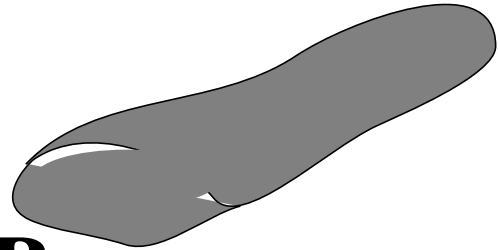
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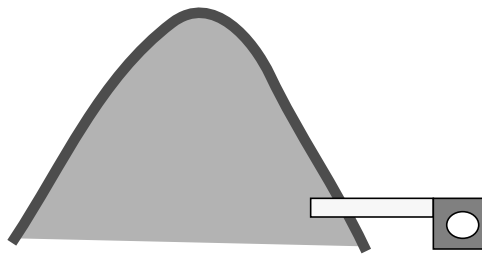
Choose Sampling Based on Technology



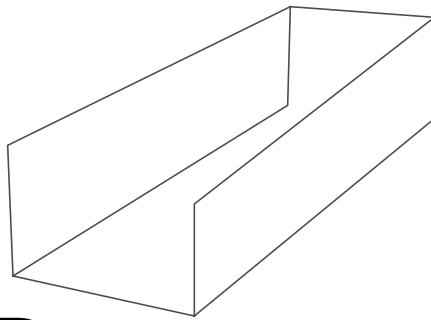
A Home Bin



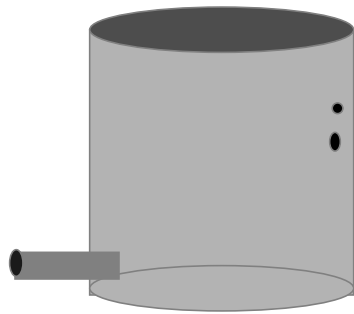
B Turned Windrow



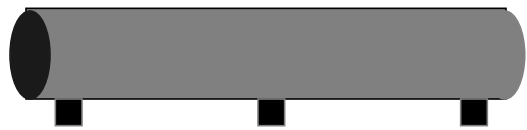
C Static Piles



D Agitated Bin



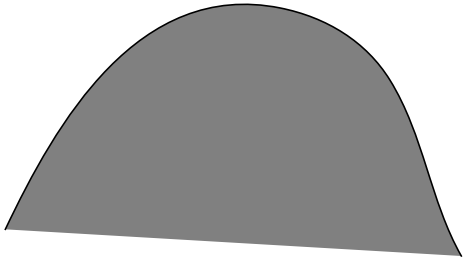
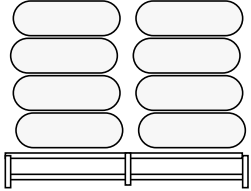
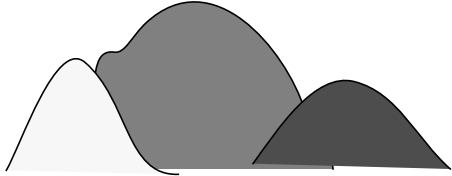
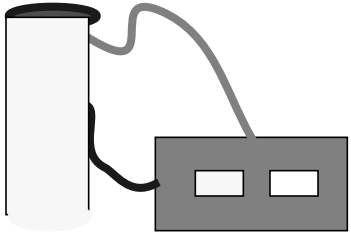
E Enclosed Vessel



F Rotating Vessel



Selecting Sampling by Technology, continued

 <p><u>G</u> <u>Cure-Pile</u></p>	 <p><u>H</u> <u>Bagged Product</u></p>
 <p><u>I</u> <u>Fresh Debris</u></p>	 <p><u>K</u> <u>Bench- Lab Unit</u></p>

Select type, then consult the next table to find out best sampling procedure and possible drawbacks.



Summary of Sampling Based on Type of System

TYPE (see Fig1)	How to Sample	Cautions	Best Tools
A	Open bin, remove cover and sides, mix by hand or with fork	Not homogenous, may be difficult to open; layered	Pail and spading fork
B	Turn with machine; sample from edges of pile; dig into pile 1-2ft or dig cross-sections	Pile varies by length and depth, turning machine may not homogenize in one pass	5-gal pail, spading shovel
C	Remove chip cover, and dig into depth, may require bucket loader and multiple depth sampling	Extreme non-uniformity, layering and clumping, inadvertent mixing with cover or surface residues; may be sealed inside tube	5-gal pail, spading shovel or post-hole auger, bucket loader
D	Sample after turning or agitation event, or sample discharge	Difficult access except at discharge, piles vary along length with age of source	5-gal pail, spading shovel,
E	Sample from side doors or top port after agitation	Very difficult or impossible access; potential layering	5-gal pail, spading shovel, corer, auger
F	Sample from discharge/output end	Difficult or impossible to sample except at discharge; output varies with time	5-gal pail, shovel



TYPE (see Fig1)	How to Sample	Cautions	Best Tools
G	Remove chip cover, and dig into depth, may require bucket loader and multiple depth sampling	Very large piles, non-uniformity, difficult access, compaction and layering; surface cover mixing	5-gal pail, spading shovel, corer, auger, bucket loader
H	Sample multiple bags, cores drawn	Bag damage, difficult access	5-gal pail, trowel or soil-corer
I	Composite from each pile separately, remove surface	Non-uniformity may be great, poorly mixed, difficult access	Large pail, shovel; bucket loader
K	Open system and remove with core sampler	Small scale, difficult access	Pail, spatula, trowel, soil-corer



Containers, Post-Sample Handling Methods

Plastic is suitable as a sample container for most types of analysis except organic hydrocarbons. Please observe holding times based on parameter to be tested.

Table 1: Sampling Containers and Conditions for Compost and Source Ingredient Testing

Parameter	Container	Conditions	Maximum Holding Time
Fecal Coliform, Salmonella	P, G, HDPE ^a	Cool, 4°C, (Ice Pack)	24 hrs
Helminth Ova	P, G, HDPE	Cool, 4°C	1 month
Enteric Virus	P, G, HDPE	Cool, 4C or freeze	24 hrs/ 2 weeks
Respiration & Maturity (see also §)	P, G	Cool to room temperature for on-site; Cool, 4°C to ship	48 hrs
Inorganic Tests			
Acidity, Alkalinity, pH	P, G	Cool, 4°C	14 days
Ammonia (NH ₃), Nitrate, Nitrite, Total-Nitrogen	P, G	Cool, 4°C	48 hrs
Oxygen Demand, Total Carbon, Volatile Solids, Weed Seeds §	P, G	Cool, 4°C	48 hrs
Chloride, Sulfate	P, G	Cool, 4°C	28 days
Metals			
Chromium VI	P, G	Cool, 4°C	24 hours
Mercury	P, G	Cool, 4°C	3 days
All other Metals	P, G	Cool, 4°C	48 hours



**Table 1: Sampling Containers and Conditions
for Compost and Source Ingredient Testing**

Organic Tests			
Purgeable aromatic hydrocarbons	G, Teflon lined septum(40 ml Glass V)	Cool, 4°C	14 days before lab testing begins
Oil and Grease/TPH	G (2 L. CWM)	Cool, 4°C	28 days
Phthalate esters	G, Teflon lined cap	Cool, 4°C	7 days until extraction
PCBs	G, Teflon lined cap (2-1/2 L. A. J.)	Cool, 4°C	7 days until extraction
Polycyclic Aromatic Hydrocarbons (PAH)	G, Teflon lined cap (2-1/2 L. A. J.)	Cool, 4°C, store in dark	7 days until extraction
Chlorinated Hydrocarbons, Herbicides, Pesticides	G, Teflon lined cap (2-1/2 L. A. J.)	Cool, 4°C	7 days until extraction
Dioxins & Furans	G, Teflon lined cap (2-1/2 L. A. J.)	Cool, 4°C, store in dark	7 days until extraction
Volatile Organics	G, Teflon lined septum(40 ml Glass V)	Cool, 4°C	14 Days
Semi-Volatile Organics	2-1/2 L. Jug	Cool, 4°C	7 Days
TCLP Sample	2-1/2 L. Jug	Cool, 4°C	7 days until extraction

a. P = plastic; G = Glass; HDPE = high-density polyethylene; L= liter



About Sampling Frequency

There are no fixed formulas for when to sample compost or source ingredients. As a rule, incoming residues should be sampled every two weeks, or when composition changes, whichever is sooner.

For finished compost, Woods End applies the batch rule for sampling: One batch constitutes up to 10,000 yards -OR- 3-months of product, whichever is sooner. Sampling at different intervals may not accurately represent the material.

For bio-solids, frequency may be fixed by regulations. It is advisable to consult local or state guidelines.

Example: Sampling raw source ingredients

Samples shall be taken from incoming material that has been shredded, blended or otherwise reduced in particle size. From the material exiting the shredder/mixer, one grab sample shall be obtained every 2 hours, over an operational period of six-eight hours, for a total of four (4) samples. Sample size should be approximately 1 quart per sample. The four samples shall then be thoroughly mixed (composited), and a portion removed taken for analysis. If grab sampling directly from the shredder or mixing mill is not possible then the incoming material shall be sampled no more than 24 hours after being passed through the shredding equipment.

