Recommendations of contract language between DPW-Commercial compost producers concerning compost: feedstock, sampling frequency, strategy, what to test for

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Understanding the inputs used to create compost ("feedstock"), is necessary to control for potential sources of undesired hazards (physical, chemical and biological) as well as to generate a final product that provides suitable growing media for plants. It is permissible to use some materials for feedstock, though other materials are non-permissible. Controlling feedstock is important for the health and safety of finished compost.

Permissible feedstock for compost – two categories of organics:

1) Leaf and yard residential waste pick-up from residential curbside, and leaf and yard waste produced by Boston Parks Department.
2) Residential food waste pick-up from curbside.
   Currently, food waste will be accepted from Boston residents through Project Oscar. This website shows the guidelines for what are accepted for pick-up: https://www.boston.gov/departments/public-works/project-oscar. However, we recommend that "cardboard take-out containers" and "compostable bags and plastics" are removed from this list, as they are a source of persistent and toxic chemicals (per and poly-fluoroalkyl substances – PFAS). These items should not be used as compost inputs.

Non-permissible feedstock for compost:

1) Biosolids from wastewater treatment facilities
2) Unsorted food waste from composting facilities that contain plates/utensils
3) "Compostable" food packaging or plates/utensils
4) Zoo waste
5) Street sweepings

Compost sampling frequency (minimum): annually or once per 5,000 tons of compost produced (whichever comes first). Sampling and analysis must be completed before compost will be accepted for distribution to gardeners. DPW and organizations receiving the finished compost should have at least one month to review sampling results before compost is to be delivered.

Compost sampling strategy: Each sample analyzed should be representative of the total compost being produced and delivered. Therefore, composite samples should be sent for analysis. We recommend sending two-four (2-4) composite samples per compost pile. A composite sample should use between 5-12 individual grab samples (we recommend 8 samples),

taken from throughout the compost piles and at various depths within the pile. See Figure 1 below for an example of how to collect a composite sample. If possible, open the compost pile with a loader and take grab samples from inside and outside the pile, at different depths. Sample collection should be as accurate as possible, with a clean collection receptacle (i.e. bucket) and collection tool (i.e. trowel) cleaned between grabs. The bucket should be used to mix the grabs that make one composite sample. Coordination with the analytical laboratory before sampling is important, as they will provide further direction and sample collection jars.

A certified analytical laboratory must be used to characterize the growing parameters (eg. bulk density, pH, conductivity, phosphorus, potassiums, nitrogens and minerals) and hazards (organics and metals) of health concern listed below in Table 1. Some examples of approved analytical labs that can be used to test collected samples are:

Compost characterization

- Analytical Lab and Maine Soil Testing Service, University of Maine
- Agricultural Analytical Services Lab at PennState – such as Compost 3A

Hazard characterization

- Alpha Analytical Laboratories
- Other MA NELAC Certified Laboratories

(Of note, UMass Soil and Plant Nutrient Testing Laboratory is no longer providing compost-sampling and analysis services, though they do still test soil.)

Given an absence of Massachusetts State standards for chemicals and metals in compost, the MassDEP S-1 Soil Standards are recommended maximum allowable concentrations for compost. S-1 Standards for compounds of interest are assembled below in Table 1. All samples taken from one pile can be averaged together to understand the concentrations of chemicals and metals in the compost pile.

Due to the recognition of the presence of per and poly-fluoroalkyl substances (PFAS) in some composted materials,[1,2] it is important to limit the inclusion of feedstock materials that are known sources of PFAS (such as biosolids and compostable plates/utensils). This is an area of current and future research. Therefore, we recommend that this current contract be reviewed with regard to feedstock and testing strategies in two years.

Limiting compost feedstock will begin to helps address the issue of PFAS contamination, as it has been well documented that some materials (like biosolids), may be contaminated with PFAS ubiquitously.[2]

Along with the specified tests, compost producers should be mandated to report the compost inputs and sources of those inputs. Full and complete reports must be presented to Boston DPW and must include the following: sample collection times, days, and strategy used; chain of custody forms; entire analytical results reported from the laboratory. This information should be available for access by any Boston residents, especially those interested in accessing the finished compost.

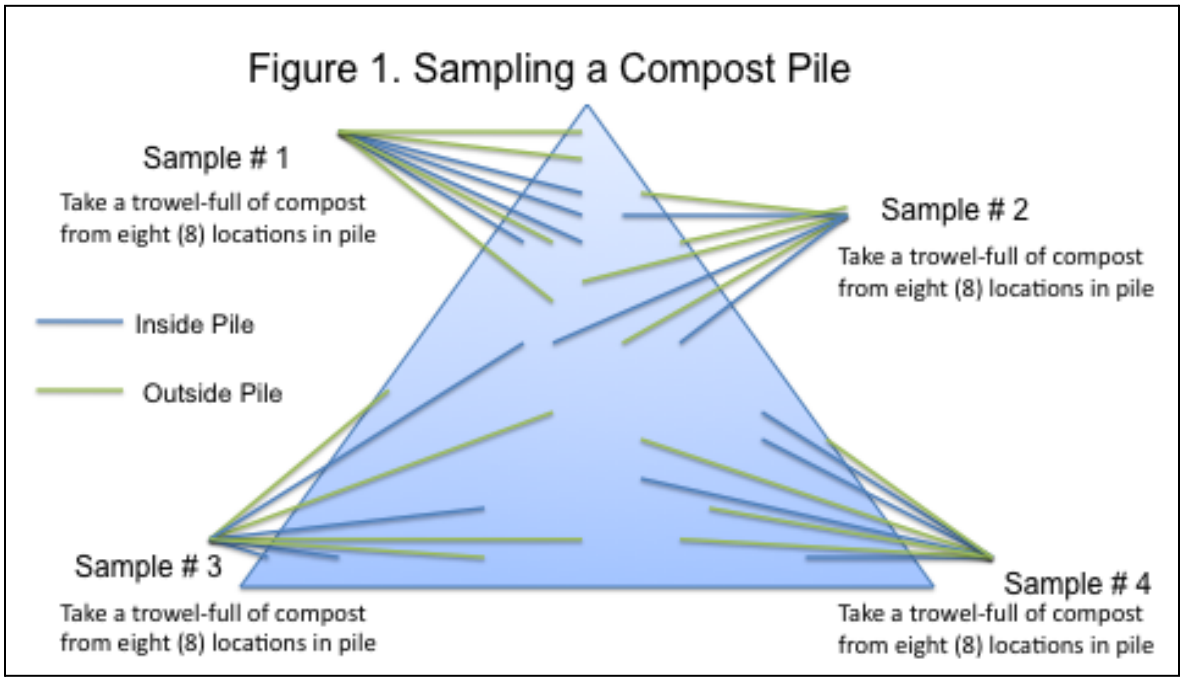

Figure taken from report by Heiger-Bernays, 2009.[3]

Table 1. PAHs and Metal MassDEP S1 Soil Standards	
Chemical Analytes	**S1 Standard** (ug/g) - ppm
Polycyclic Aromatic Hydrocarbons	
Acenaphthene	4
Acenaphthylene	1
Anthracene	1000
Benzo(a)anthracene	7
Benzo(a)pyrene	2
Benzo(b)fluoranthene	7
Benzo(g,h,i)perylene	1000
Benzo(k)fluoranthene	70
Chrysene	70
Dibenzo(a,h)anthracene	0.7
Indeno(1,2,3-cd)pyrene	7
Fluoranthene	1000
Fluorene	1000
Napthalene	4
Phenanthrene	10
Pyrene	1000
Metals	
Arsenic	20
Cadmium	70
Chromium(total)	100
Copper	N/A
Lead	200
Mercury	20
Nickel	600
Thallium	8
Zinc	1000

Values sourced from 310 Mass Reg 40.0975[4]

Works Cited

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2. De Silva AO, Armitage JM, Bruton TA, et al. PFAS Exposure Pathways for Humans and Wildlife: A Synthesis of Current Knowledge and Key Gaps in Understanding. *Environ Toxicol Chem*. 2021;40(3):631-657. doi:10.1002/etc.4935

3. Heiger-Bernays W. Memo: Testing for Chemicals in Compost Prior to Distribution to Community Gardens. Published online June 1, 2009.

4. MassDEP. 310 Massachusetts Register Section 40.0975 - Identification of Applicable Soil Standards in Method 1. State of Massachusetts: Massachusetts Department of Environmental Protection. Published June 24, 2022. Accessed July 6, 2022. https://casetext.com/regulation/code-of-massachusetts-regulations/department-310-cmr-department-of-environmental-protection/title-310-cmr-4000-massachusetts-contingency-plan/subpart-i-risk-characterization/section-400975-identification-of-applicable-soil-standards-in-method-1