Salt Lot Compost Facility

Operations Plan

December 5, 2017

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Table of Contents

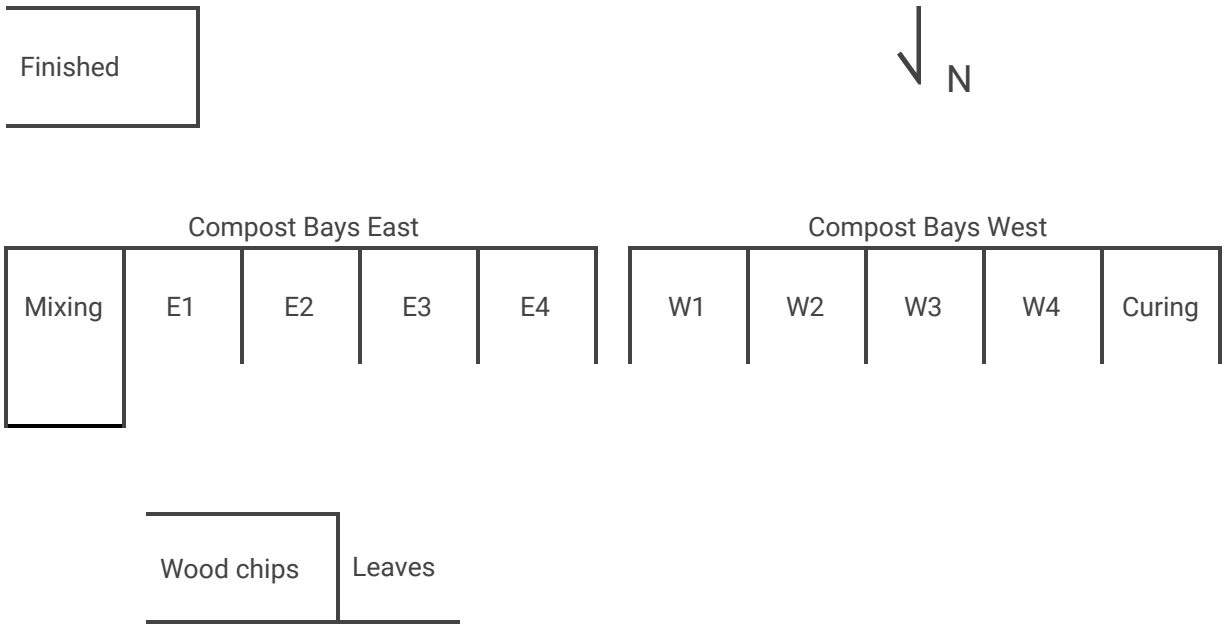
Operator and Site Information

Big Reuse is a non-profit organization founded in 2015 with the mission to protect the environment, reduce the impact of climate change, and conserve natural resources by diverting materials from landfills. As a host site of The NYC Compost Project, Big Reuse is part of a community-scale composting network that works to rebuild City soils by providing New Yorkers with the knowledge, skills, and opportunities they need to produce and use compost locally.

The NYC Compost Project Hosted by Big Reuse will operate and maintain a community composting site on the DSNY Salt Lot in Gowanus, Brooklyn. To facilitate the composting of residential food scraps, DSNY has installed a compost system on the site. It consists of the following:

- A dedicated interior site access road and driving area with gravel surface,
- A covered mixing bay with a small cement apron for receiving materials,
- A covered concrete ASP composting system of eight bays, each of which has two gravel filled trenches and a blower for air distribution,
- A photovoltaic, grid-interconnected system for powering the blowers and other devices used in the composting process,
- A covered curing bay,
- A covered finished compost bay, and
- A vegetated swale and other green infrastructure practices for improved stormwater management.

The Salt Lot site abuts the Gowanus Canal next to a Combined Sewage Overflow point. Due to this proximity to water, DEP requires that no more than 20% of the surface of the site may be impermeable. To accord with this, the working surface surrounding the compost system is crushed gravel.



Processing methodology

Recipe

The compost mix will consist primarily of wood chips and residential food scraps in a 2:1 ratio by volume. Other materials that will be composted on a less regular basis include leaves delivered from NYC Parks on a seasonal basis, yard waste collected from the area during Gowanus Canal Conservancy stewardship events, and wood shavings from local woodworkers.

Feedstock procurement

Material	Source	Frequency	Details
Food scraps	GrowNYC	3-5 times per week	Delivered in 64-gallon Toters by box trucks.
Woodchips	Greenwood Cemetery DSNY Parks department	Every 3 weeks	Delivered by 20 yd dump trucks
Leaves	Parks department	Seasonally every other day	Delivered in paper yard bags by pick-up trucks
Yard waste	GCC	Weekly	Gathered from site and surrounding area during stewardship events.
Wood shavings	Local woodworkers	Every 2 weeks	Delivered in plastic bags by pick-up trucks

Procedure

One bay handles **one week** worth of material during Phase 1.[1]

1. A bed of wood chips is spread over the floor of the mixing bay, and food scraps are dumped onto the bed in a **2:1 ratio of wood chips to food scraps**.
2. The **bucket of the skid steer** is used to mix the material in the mixing bay. Large pieces of food scraps are broken up by hand and moisture is added from a hose as needed.
3. Mixed material is transported from the mixing bay to an empty Phase 1 bay, taking care not to spill raw material on the site's gravel working surface.
4. Back half build
    a. A **1' plenum of woodchips** is laid over the **rear half** of the Phase 1 bay.
    b. **Half of the mixed material** is dumped onto the back half plenum, and it is raked flat from wall to wall.[2]
    c. A **1' cover of finished compost** is dumped onto the back half material. This will be spread evenly after the bay is filled.
5. Front half build

[1] The aeration mechanism for each bay also allows for a half-capacity operating mode where the pile is built over a single trench in the bay and air to the second trench is cut off.
[2] By building the pile out from the rear of the bay forward, the skid steer can be used to do most of the spreading of material, but final shaping of the pile will need to be done by hand with staff climbing onto the pile and spreading material with rakes.

    a. A **1' plenum of woodchips** is laid over the **front half** of the bay.
    b. **The remainder of the mixed material** is dumped onto the front half plenum, and it is raked flat from wall to wall.
    c. A **1' cover of finished compost** is dumped onto the back half material.
6. The **finished compost cover** is spread evenly over the pile at a **1' thickness**, producing a bio-filter to control odor and discourage vectors.

Material flow

Outline of how materials move through the process before distribution.

Time Per Phase

Phase	Time	Notes
Phase 1	4 weeks	Four aerated bays. One week per bay.
Phase 2.1	3 to 4 weeks	Two aerated bays. Two weeks per bay, added sequentially.
Phase 2.2	4 weeks	Two aerated bays. Two weeks per bay, added at once.
Curing	2 to 4 weeks	One bay. Four weeks of material, added in two stages.
Finished	6 to 8 weeks	One large bay. Screened material added every four weeks.
Total	**19 to 24 weeks**	

Pile Build and Move Process

A description of the method for moving material through the process from raw feedstock to finished compost follows. A visual representation of the materials flow is included as Appendix A. An HTML based visual rotation tool is also available at bigreuse.org/salt-lot-flow/.

Phase 1 Build

One week of feedstock is mixed in the Mixing Bay in accordance with the Processing Method outlined above. This material is piled in an empty Phase 1 bay.

Phase 2.1 and 2.2 Moves

When all Phase 1 bays are full, material from the oldest Phase 1 pile is moved to a Phase 2 bay. Two Phase 1 bays are combined into each Phase 2 bay. Phase 2 is divided into two parts. After four weeks in Phase 2.1, the material is moved to another aerated bay for Phase 2.2. The transition from Phase 2.1 to Phase 2.2 involves moving material from one bay to another, which provides an additional opportunity to turn the pile and incorporate moisture if necessary.

Curing Move

When both Phase 2.2 bays are full, material from the older of these is moved to the Curing bay. Both Phase 2.2 bays are combined into the Curing bay in two moves separated by two weeks.

Finished Move

Material from the Curing Bay is screened every 4 weeks and transported to the Finished Bay. Material from different screening periods is kept separate within the Finished bay, so that the age of the compost can be tracked. Compost is distributed from the Finished bay in a first-in first-out process.

Capacity

The capacity or amount of organic waste accepted depends on the available impermeable space along with the location of the site in a dense urban setting. Capacity is an important factor in ensuring food scraps are processed in a way that does not create pest or odor issues and demonstrates the value of community composting to the surrounding neighborhood.

Initially, GrowNYC will deliver **7000 lbs per week** (3.5 tons/week). After approximately 20-24 weeks at this capacity, the site will be full. The operator will have had an opportunity to test and develop new systems, adjust to new equipment and partnerships, fine tune operations, and consequently effectively evaluate capacity. A number of other factors are relevant, including the ratio of browns to greens, the shape of the pile, the nature of the plenum covering the bay surface, the thickness of the cap used to cover the pile, the bulk density of the ingredients, and the material flow plan. A calculator for determining the height of compost piles within the specifics of the Salt Lot system design is provided in Appendix D. The estimated pile heights for each phase are as follows:

- Phase 1: **4.5 ft high** including the plenum and cover
- Phase 2: **6.25 ft high**
- Curing: **10.62 ft high**

Pile height variables

Factor	Value	Notes
Quantity of food scraps	7000 lbs	Initial quantity accepted from GrowNYC. An individual Toter holds ~ 275 pounds of food scraps. The initial intake equates to approximately 5 yd3 of food scraps from 24 Toters/week
Ratio of browns to greens	2:1 by volume	The recipe calls for food scraps and wood chips. This ratio ensures proper aeration and moisture content.
Pile shape	Trapezoid 	The pile will extend from wall to wall and be flat across the top like a block. However, because there is no front wall on the bays, the pile will by necessity slope down toward the front.
Plenum shape and thickness	Full surface, 1ft	This is in contrast to merely covering the trenches. The plenum will span from wall to wall at 1 foot thickness.
Cap thickness	1 foot	Finished compost is added to the pile to act as a biofilter.
Bulk density of greens	1500 lb/yd3	This is an estimated value for mixed residential food waste.
Bulk density of browns	500 lb/yd3	This is an estimate for double grind woodchips.
Volume Reduction	15% per phase	Two Phase 1 piles will be combined into one Phase 2 bay, and two Phase 2 bays will be combined into the Curing bay.

Maintaining healthy decomposition

A healthy aerobic compost pile should maintain an oxygen level of greater that 10% and moisture content of around 65%. If the oxygen level drops too low or the moisture content is too high, the pile will begin to go anaerobic, which results in the production of noxious odors. If the moisture content is too low, decomposition will slow, and capacity will be greatly reduced. There are a number of factors that go into maintaining these healthy levels. The first step is thus continual monitoring and testing of piles, which is outlined in the Monitoring and Record Keeping section. Techniques for maintaining healthy compost piles include:

Aeration

The forced aeration system consists of separate blowers for each Phase 1 and Phase 2 bay. Each blower has its own digital timer for regulating the air flow cycle. Phase 1 material will begin with a blower cycle of 5 min on/20 min off. This cycle can be adjusted based on temperature and moisture content monitoring.

Each bay has two trenches that house PVC pipes connected to the blower. The area around the pipe is filled with gravel. It is important to ensure that the trenches are free of raw feedstock and leachate before filling the bay with material.

The compost recipe is designed to provide sufficient bulking to allow oxygen to flow to all areas of the pile. It is also possible to control the way oxygen flows through the pile by altering the ratio of greens to bulking browns.

Moisture control

The best time to add water in order to achieve an even distribution of the recommended moisture content is during the initial mix. A garden hose connected to a street hydrant will be used to add water in the mixing bay. Moisture can also be added with the hose when turning material.

If the moisture content is too high, excess leachate may be produced. The aeration trenches also serve as a leachate catchment system. Each trench has a drain valve from which leachate can be harvested into 5-gallon buckets. Harvested leachate can be recombined into new piles. Excess leachate can also result from too low of a carbon to nitrogen ratio in the mix. Adding a source of fine browns (wood shavings, leaves, etc) to the recipe is a good way to increase available carbon without increasing the volume excessively.

Odor and vector control

When a new compost pile is built, it is capped with a one foot cover of finished compost. This biofilter serves the dual purpose of holding in moisture, heat, and odors and discouraging vectors from disturbing the pile.

Turning

Even with aerated static piles, turning is useful for redistributing air channels and anaerobic pockets and incorporating material from the outside of the pile to the inside. Piles will be turned three times before being screened, every four weeks when moving from Phase 1 to Phase 2.1, Phase 2.1 to Phase 2.2, and Phase 2.2 to Curing.

Preparing Finished Compost for Distribution

Some finished compost will be retained on site to cap new piles, assist stormwater diversion, and amend soil on site. The rest of the compost produced on site will be distributed for community greening projects in the area around the Salt Lot. Distributed compost is of two varieties: **unscreened** and **screened**. Unscreened compost (also referred to as compost mulch) is bulky and works well for application in street tree beds. Screened compost has the bulking material that has not decomposed removed; it is excellent for mulching trees and perennial beds..

In addition to providing a different application for compost, screening has the added benefit of reducing the volume of the finished compost pile. The bulky material that is screened out (the **overs**) can be reused as bulking agent in additional batches of compost mix.

A _____ compost screener equipped with _____ size screen openings is parked permanently on the site. Upon moving compost from the Curing Bay to the Finished bay, approximately once monthly, the screener will be set up to discharge fine compost directly into the Finished Bay. Due to the limited impermeable surface on site, there is not a dedicated area for screening. Instead, the screener must be moved into position for screening and then stowed away when finished.

Monitoring and Record Keeping

This section outlines the processes, schedules, and techniques that the NYC Compost Project Hosted by Big Reuse utilizes to ensure that the compost site is maintained as a positive addition to the neighborhood and that high quality compost is produced.

Processes and schedule

Test	Frequency	Function/Method
Visual/Olfactory Monitoring	4 times per week	Assess conditions regarding odor, vector reduction, leachate accumulation, and contamination
Temperature readings	3 times per week	Determine PFRP success and adjust blower cycle
Bulk density and free air space	Once per build/move	Assess aptness for aerobic conditions
Solvita	Once per month during curing	Assess compost maturity

Techniques

- All data that is collected on site is logged using Google Forms (Appendix C) and recorded in a Google Sheet.
- Each pile is named and tracked over the course of its movement through the system. Details, including build and move dates, most recent temperature measurements, blower cycle, and

modifications from the standard recipe, are posted on signage for each pile for easy reference. (Appendix E)

- Temperature readings are taken within 6 zones (Front: left, right, middle, and back: left, right, middle) and various depths in the bays using ReoTemp thermometers with 3' probes.[3]

Potential Amendments to the Compost System

- Install removable front walls on the Phase 1 and 2 bays to increase capacity.
- Add another location for storing finished, screened compost in order to store compost on site longer before distribution.

Schedule and Staffing

Schedule of activities for a normal week

Monday	● Moving material to clear out a Phase 1 bay in preparation for processing. ● Mixing of browns bay for vector control and ensuring first-in first-out. ● Temperature measurements
Tuesday	● No site activity. The full compost team is in Queens on Tuesdays.
Wednesday	● Equipment check, refuel, and maintenance. ● Arranging food scrap Toters in preparation for processing ● Pile monitoring and troubleshooting
Thursday	● Processing ● Site clean up ● Temperature measurements
Friday	● Half-day site activity. Half-day at GCC office for record keeping. ● Pile monitoring ● Site clean up check ● Preparation for GCC weekend events
Weekend	● GCC stewardship events

Staff on site

Erik Hoversten Operations Coordinator 4-5 days/wk	Primary operations management. Processing, feedstock management, site visit coordination, equipment maintenance, site monitoring, coordination with GCC.
Leah Retherford Project Manager 1 day/wk	Additional operations management. Processing, deliveries and collection scheduling, coordination with DSNY.

[3] The bay structure prevents us from getting to the lower back regions of the pile when the bay is full, as it will be in Phase 2.

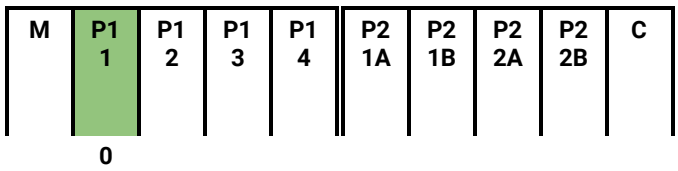
Charles Lynch Operations Coordinator 1 day/4wks	Processing assistance
Devin Reitsma Project Coordinator 1 day/3wks	Processing assistance
Shakara Petteway Organics Recovery Coordinator 1 day/2wks	Processing assistance
Jimena Gracia Field Assistant 1 day/2wks	Processing assistance
NY CSC Members 1 day/2wks	Programming assistance

Appendix A: Materials Flow Graphic

This graphic represents the flow of material through the compost system from the beginning of processing through full capacity. Numbers below each bay correspond to the number of weeks the material in that bay has been closed off to new material.

Pile built/moved **Pile already in bay**

Week 1



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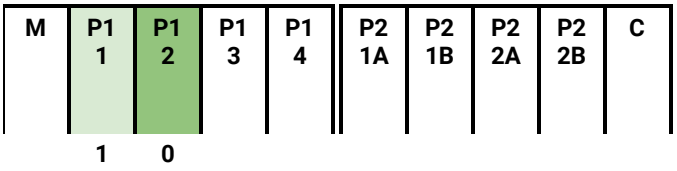

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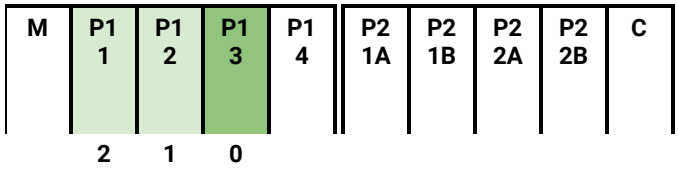

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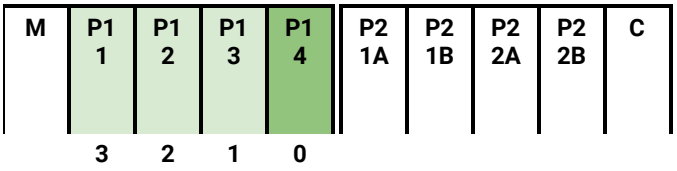

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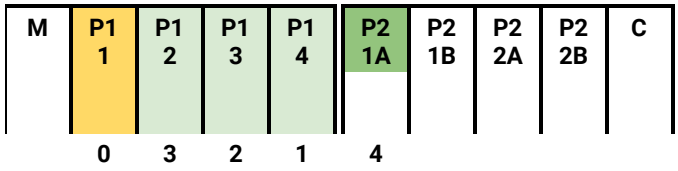

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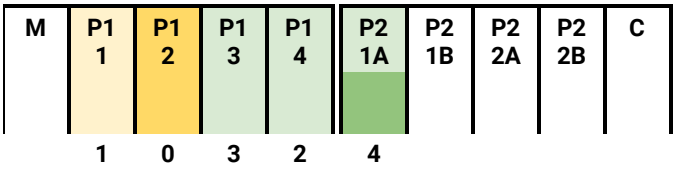

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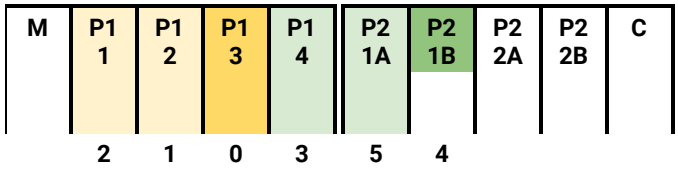

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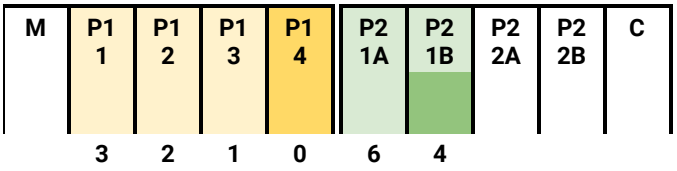

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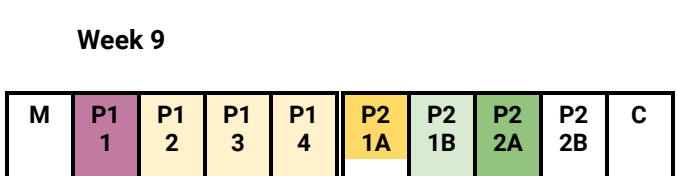

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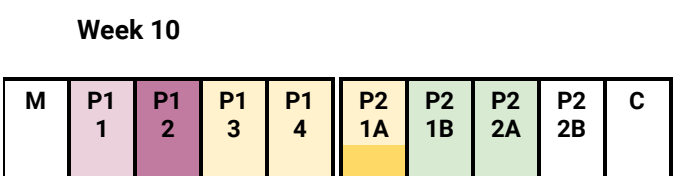

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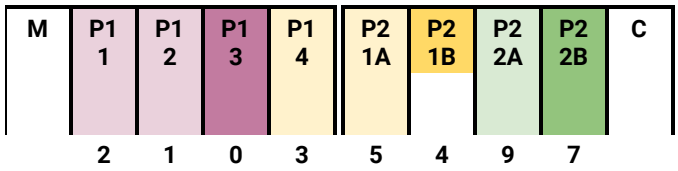

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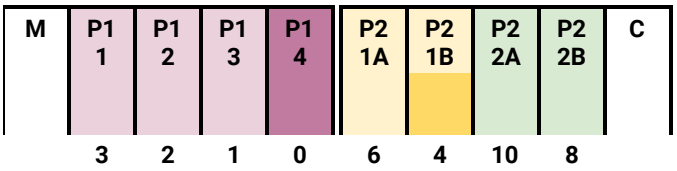

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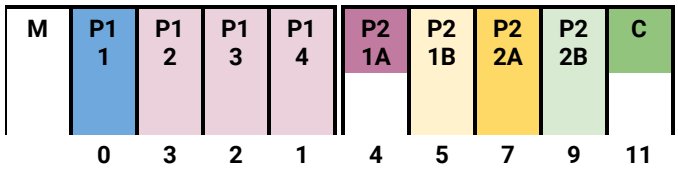

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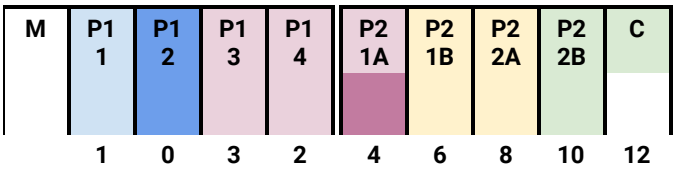

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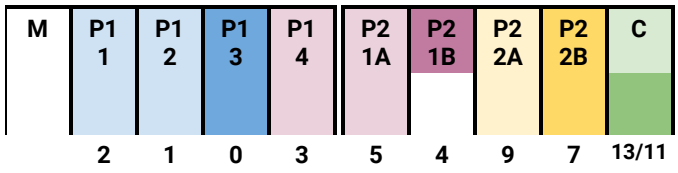

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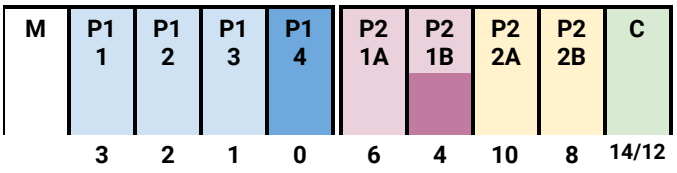

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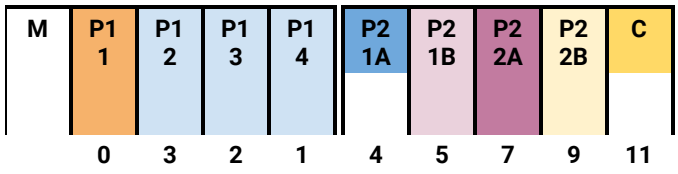

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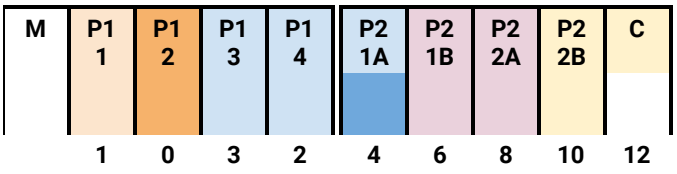

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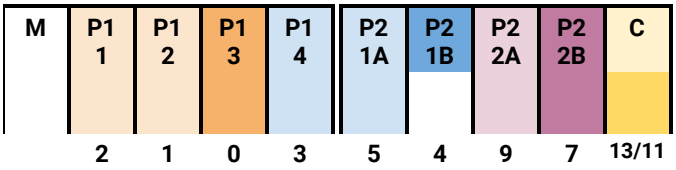

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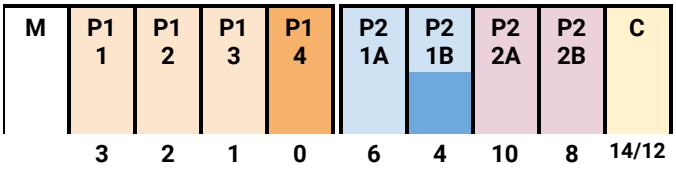

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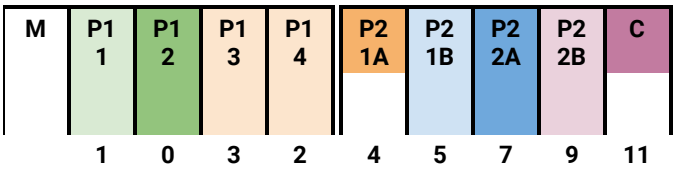

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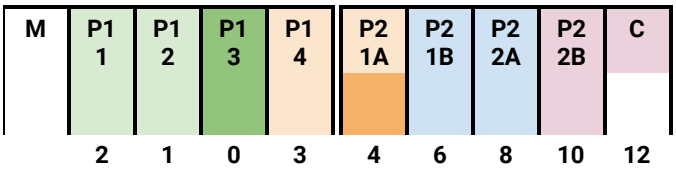

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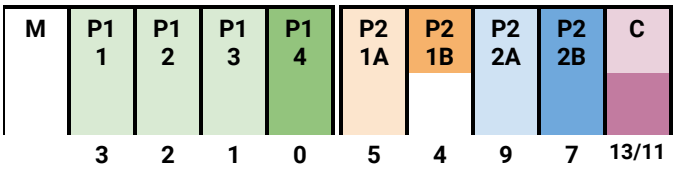

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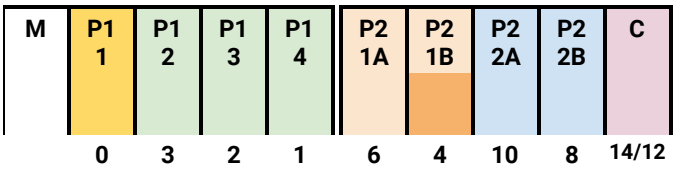

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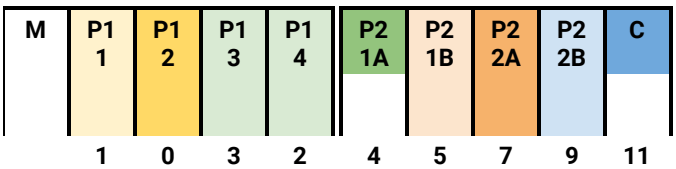
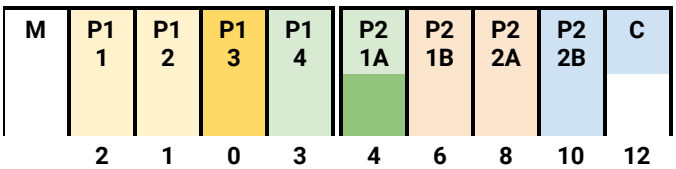


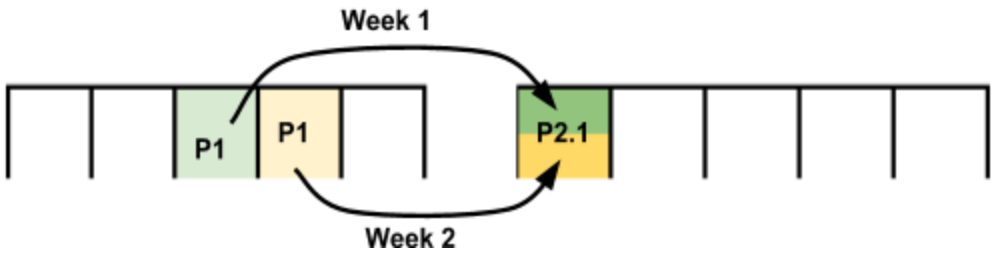
Week 26

F 14/18/22



Appendix B: Pile Movement Graphic

Phase 1 to Phase 2.1



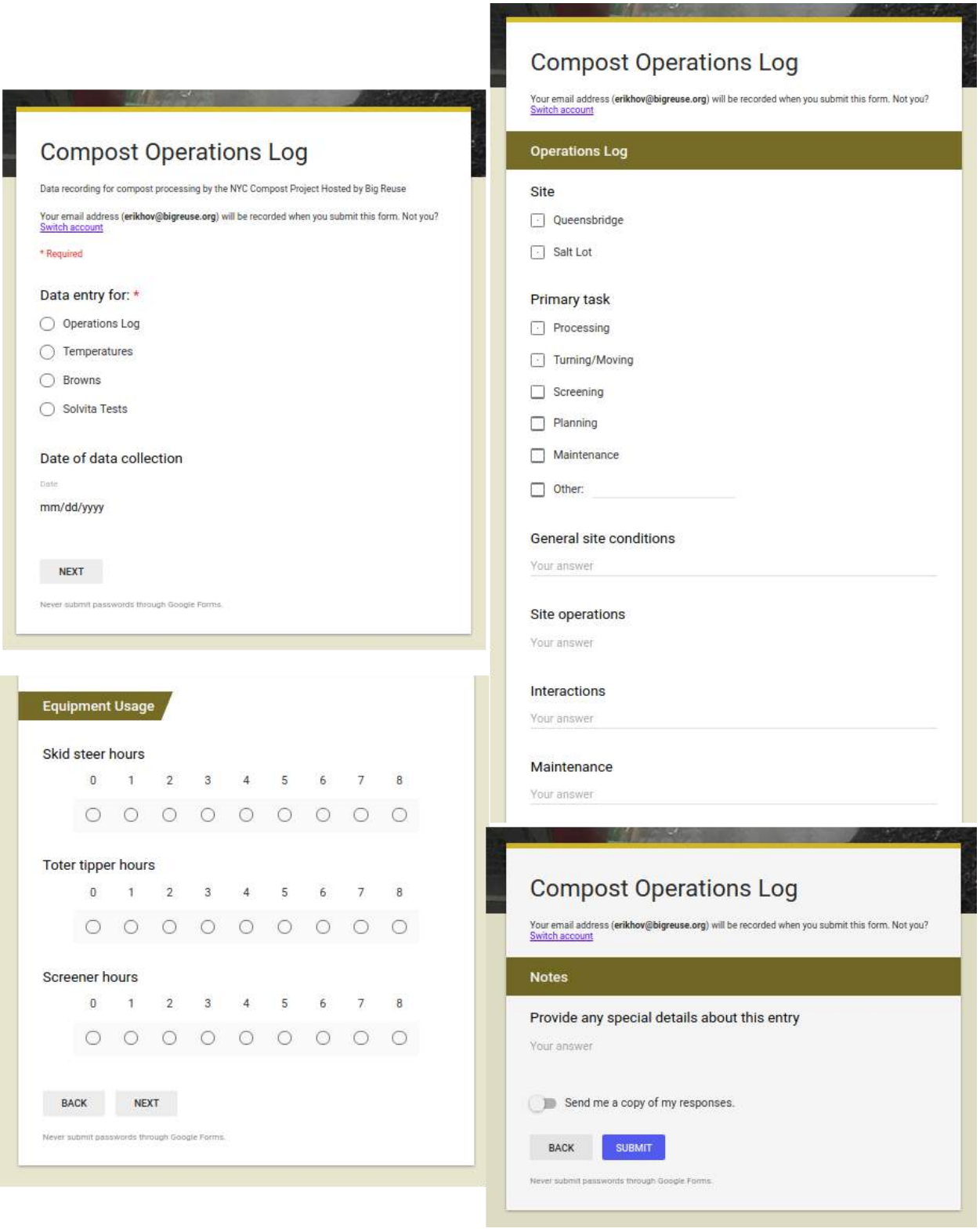
Phase 2.1 to Phase 2.2

Phase 2.2 to Curing

Curing to Finished

Appendix C: Data Log

Operations Log



Compost Operations Log

Data recording for compost processing by the NYC Compost Project Hosted by Big Reuse

Your email address (erikhov@bigreuse.org) will be recorded when you submit this form. Not you? Switch account

* Required

Data entry for: *

- Operations Log
- Temperatures
- Browns
- Solvita Tests

Date of data collection

Date

mm/dd/yyyy

NEXT

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Compost Operations Log

Your email address (erikhov@bigreuse.org) will be recorded when you submit this form. Not you? Switch account

Operations Log

Site

- Queensbridge
- Salt Lot

Primary task

- Processing
- Turning/Moving
- Screening
- Planning
- Maintenance
- Other:

General site conditions

Your answer

Site operations

Your answer

Interactions

Your answer

Maintenance

Your answer

Equipment Usage

Skid steer hours

0 1 2 3 4 5 6 7 8

Toter tipper hours

0 1 2 3 4 5 6 7 8

Screener hours

0 1 2 3 4 5 6 7 8

BACK NEXT

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Compost Operations Log

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Notes

Provide any special details about this entry

Your answer

Send me a copy of my responses.

BACK SUBMIT

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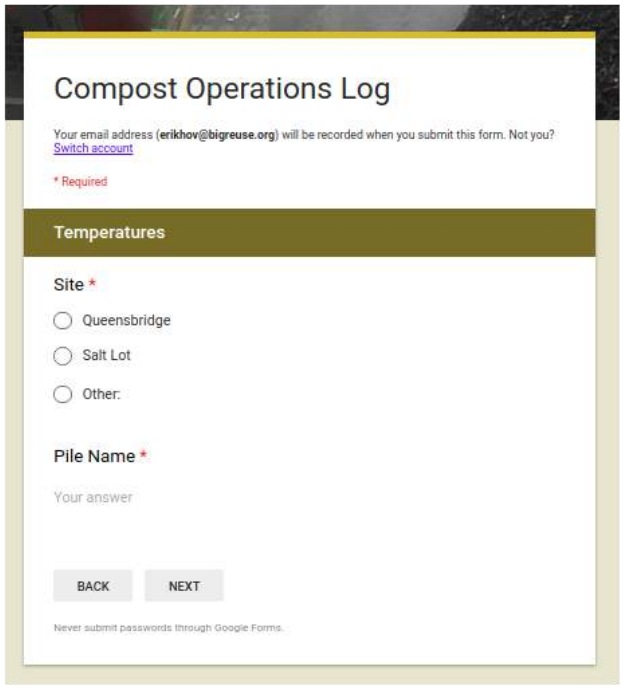
Temperatures



Compost Operations Log

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* Required

Temperatures

Site *

- ◯ Queensbridge
- ◯ Salt Lot
- ◯ Other:

Pile Name *

Your answer

BACK NEXT

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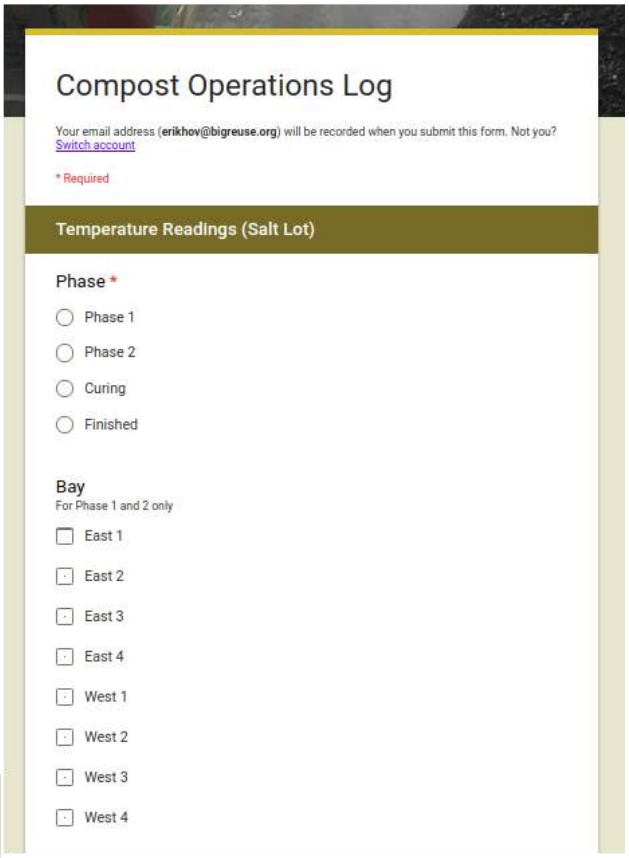

Compost Operations Log

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* Required

Temperature Readings (Salt Lot)

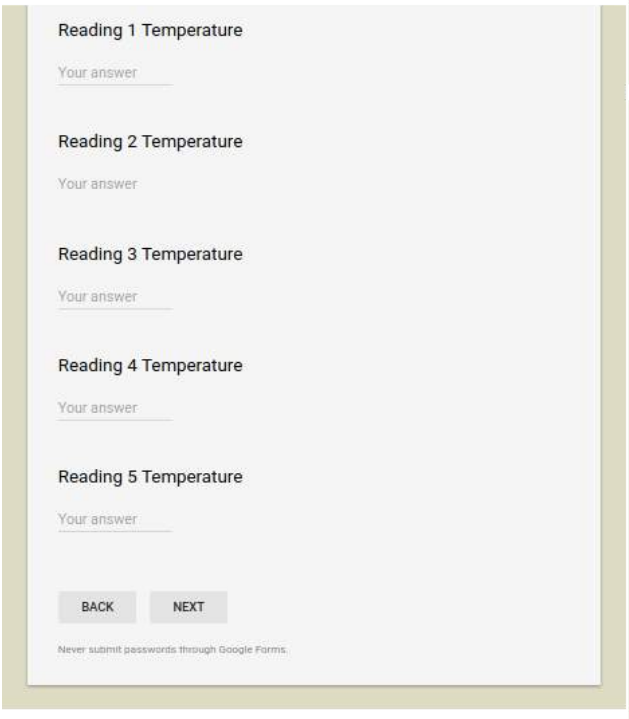
Phase *

- ◯ Phase 1
- ◯ Phase 2
- ◯ Curing
- ◯ Finished

Bay

For Phase 1 and 2 only

- ☐ East 1
- ☐ East 2
- ☐ East 3
- ☐ East 4
- ☐ West 1
- ☐ West 2
- ☐ West 3
- ☐ West 4



Reading 1 Temperature

Your answer

Reading 2 Temperature

Your answer

Reading 3 Temperature

Your answer

Reading 4 Temperature

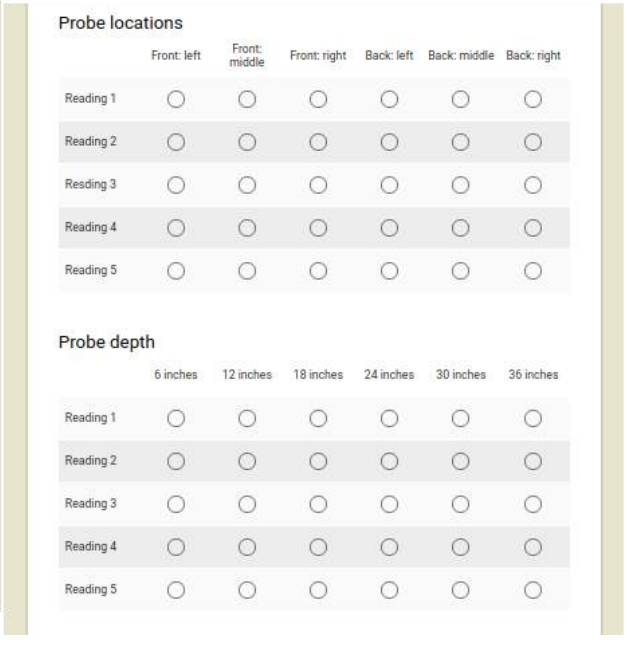
Your answer

Reading 5 Temperature

Your answer

BACK NEXT

Never submit passwords through Google Forms.



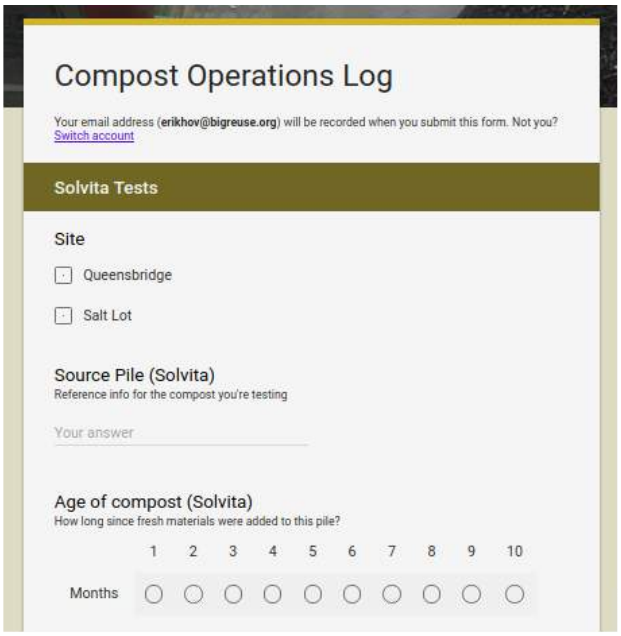
Probe locations

	Front: left	Front: middle	Front: right	Back: left	Back: middle	Back: right
Reading 1	◯	◯	◯	◯	◯	◯
Reading 2	◯	◯	◯	◯	◯	◯
Resding 3	◯	◯	◯	◯	◯	◯
Reading 4	◯	◯	◯	◯	◯	◯
Reading 5	◯	◯	◯	◯	◯	◯

Probe depth

	6 inches	12 inches	18 inches	24 inches	30 inches	36 inches
Reading 1	◯	◯	◯	◯	◯	◯
Reading 2	◯	◯	◯	◯	◯	◯
Reading 3	◯	◯	◯	◯	◯	◯
Reading 4	◯	◯	◯	◯	◯	◯
Reading 5	◯	◯	◯	◯	◯	◯

Browns and Solvita Tests



Compost Operations Log

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Solvita Tests

Site

- [ ] Queensbridge
- [ ] Salt Lot

Source Pile (Solvita)

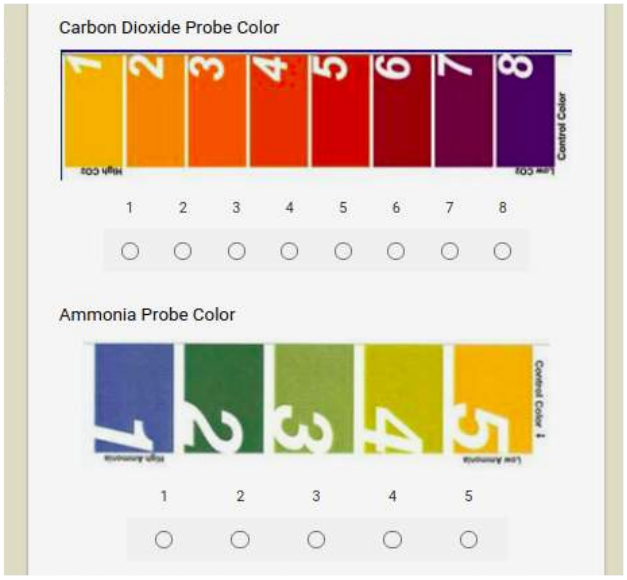
Reference info for the compost you're testing

Your answer

Age of compost (Solvita)

How long since fresh materials were added to this pile?

	1	2	3	4	5	6	7	8	9	10
Months	○	○	○	○	○	○	○	○	○	○

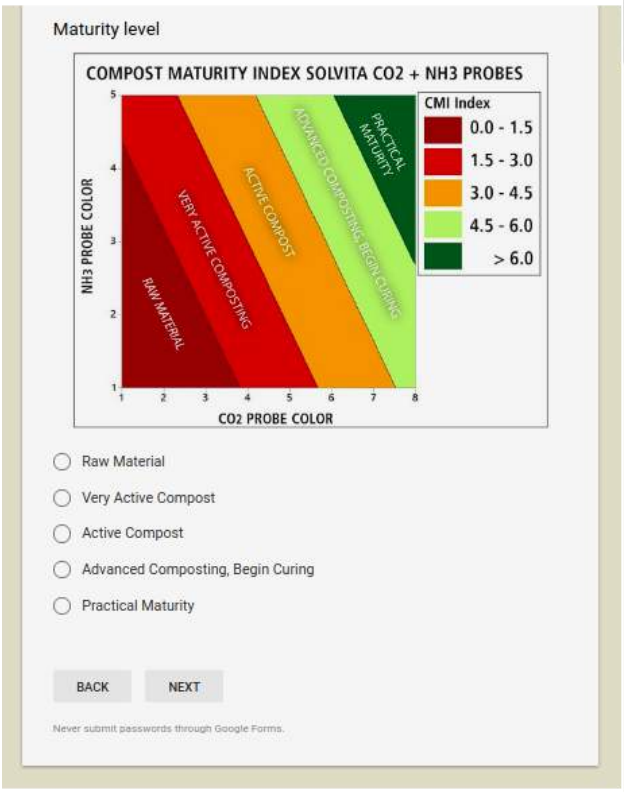


Carbon Dioxide Probe Color

	1	2	3	4	5	6	7	8
	○	○	○	○	○	○	○	○

Ammonia Probe Color

	1	2	3	4	5
	○	○	○	○	○



Maturity level

- ○ Raw Material
- ○ Very Active Compost
- ○ Active Compost
- ○ Advanced Composting, Begin Curing
- ○ Practical Maturity

BACK NEXT

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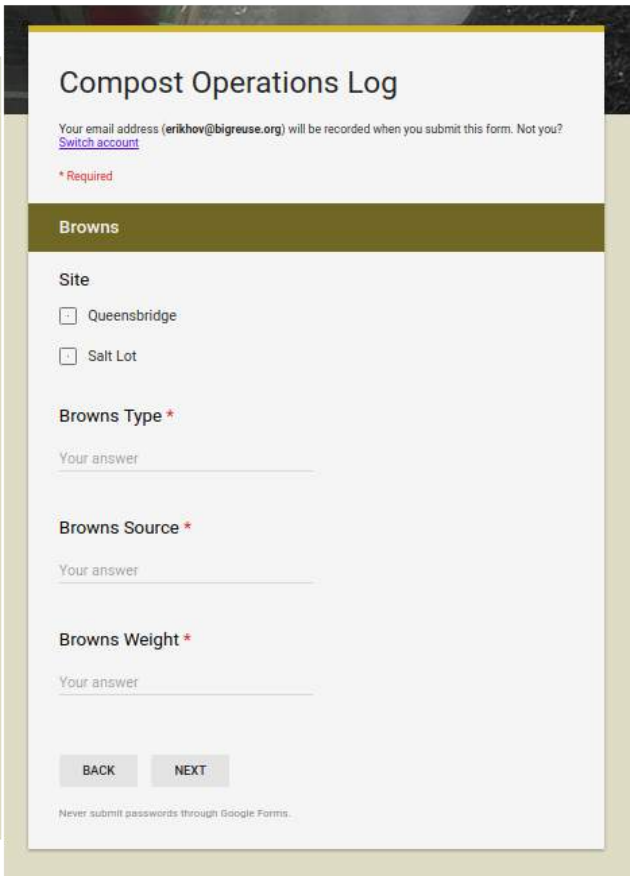

Compost Operations Log

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* Required

Browns

Site

- [ ] Queensbridge
- [ ] Salt Lot

Browns Type *

Your answer

Browns Source *

Your answer

Browns Weight *

Your answer

BACK NEXT

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Appendix D: Pile Size Calculator

Input values		
Weight of food scraps	**7000**	lb
Bulk density of food scraps	**1500**	lb/cu.yd
Bulk density of wood chips	**500**	lb/cu.yd
Ratio of browns to greens	**2**	volume
Shape of pile	--	block
Width of pile	**11**	ft
Length of pile	**11**	ft
Thickness of plenum	**1**	ft
Thickness of cover	**1**	ft

Phase 1		
Weight of mix	**11667**	lb
Bulk density of mix	**833**	lb/cu.yd
Volume of food scraps	**4.67**	cu.yd
Volume of wood chips	**9.33**	cu.yd
Volume of mix	**11.20**	cu.yd
Pile height	**2.50**	ft
Overall height	**4.50**	ft

Phase 2		
Volume reduction	**15**	%
Rounds of Phase 1 material	**2**	--
Pile volume	**28.00**	cu.yd
Pile height	**6.25**	ft

Curing		
Volume reduction	**15**	%
Rounds of Phase 2 material	**2**	--
Pile volume	**47.61**	cu.yd
Pile height	**10.62**	ft

Appendix E: Pile Reference Signage