CENTRAL CAMPUS COMPOSTER PROJECT

Sustainability Projects Fund Final Report

Written by: David Morris

November 15, 2011

Project Group

David Morris, Project Coordinator
David.Morris2@mail.mcgill.ca

Michal Bonar, Composter Coordinator
Michal.Bonar@mail.mcgill.ca

David Gray-Donald, SSMU Sustainability Coordinator, former Project Coordinator
Sustainability.Coord@mail.mcgill.ca

Chuck Adler, Director, McGill University Services,
Chuck.Adler@mcgill.ca

Kathleen Ng, Environmental Officer, McGill University Services
Kathleen.Ng@mcgill.ca

Mathieu Laperle, Director, Food and Dining Services
Mathieu.Laperle@mcgill.ca

Oliver de Volpi, Executive Chef, Food and Dining Services
Oliver.deVolpi@mcgill.ca

Aviva Belhassen, Sustainability Manager, ARAMARK Higher Education
Aviva_Belhassen@aramark.com

http://gorilla.mcgill.ca

Table of Contents

Acknowledgements

Special thanks to David Gray-Donald who led the project to fruition, starting in 2008. David composed and refined the project proposal over a number of years after consultation with staff and students. The immeasurable amount of effort that he put into the project ensured its success.

Many thanks to Dennis Fortune, former Director of Sustainability, McGill University, for his commitment towards the project. Dennis spent countless hours on maintenance, operations and management of the project. Without his support, the project would not have succeeded.

Thanks to Bill Mersereau for his involvement in the Gorilla Composting operations and for his assistance with consulting during the initial stages of the project.

Thanks to Michał Bonar for his commendable dedication for the project in his capacity as the Composter Coordinator since January 2011.

Thanks to Chuck Adler and Kathleen Ng for their assistance in the management of the project.

Thanks to Lilith Wyatt for her continued support and guidance.

Thanks to Ana Vadeanu, the Composter Coordinator for Fall 2010, and to Emily Kogan-Young and Alexa Garrey, the Communications Coordinators for Fall 2010 and Spring 2011, respectively.

Daniel Spitzberg and Kealan Gell are the co-founders of Gorilla Composting. They are the researchers and authors of the original proposal for a campus-wide composting program.

The following people have also been significantly involved with Gorilla Composting: Benoit Auclair (PR Coordinator 07-08), Vanessa Campisi, (PR Coordinator 06-07), Lauren Pochereva (PR Coordinator, 07-09), Pamela Fillion (PR and Corporate Relations, 07-09), Chessi Miltner (Operations, 08-09), Graeme Lamb (Group Coordinator, 07-08) and Danielle Carrie, (PR team founder and former leader, 05-06).

1. Introduction

Organic waste accounts for about 40% of the waste generated by residents of the city of Montreal (Ville de Montreal, 2011) and about 35% at McGill University (Gorilla Composting, 2008). Unlike many major Canadian cities, such as Toronto, Ottawa and Edmonton, the city of Montreal does not have a city-wide organic waste recycling program. In Montreal, organic waste, such as food scraps or garden waste, is usually transported to the Lachenaie landfill. Similarly, the organic waste generated at McGill University is sent to landfill.

In the landfill, organic waste decomposes in the absence of oxygen. The major product of this kind of decomposition is methane, a potent greenhouse gas (GHG). The release of potent greenhouse gases in the landfill can be circumvented by allowing the organic waste to decompose in the presence of oxygen. This process is known as composting: the product of which is carbon dioxide, a much less potent GHG.

The Central Campus Composter (CCC) system involves the collection and processing of organic waste generated at several food service areas across the McGill University downtown campus. An in-vessel composter located on campus processes the organic waste. For that reason, the system is an example of at-source waste processing, i.e., a system wherein waste is generated and treated in the same vicinity. By contrast, many urban organic waste recycling systems use a distant processing facility to treat the waste.

Through diversion of compostable material from the landfill, the CCC system reduces GHG emissions. The process also boasts a biological air filter (biofilter) for continuous odour and noxious emission control measures. Finally, the process produces a valuable soil aggregate – compost – for use in the community.

This student-initiated and -coordinated project offers practical learning opportunities for the McGill community and beyond. The project demonstrates the efficacy and reliability of an at-source, organic waste management program in an urban environment. Finally, the project strives to alter the perception of food waste and to illustrate the simplicity of composting at-source in an urban environment. This report describes the aspects related to operations, communications, finances and management of the project.

2. Vision

Gorilla Composting was founded in 2005 by Daniel Spitzberg (B.Sc. '06) and Kealan Gell (B.Eng. '06). Their goal was to divert organic waste from the kitchens at McGill University and process it in an on-campus composting facility. After the efforts of the former coordinator, David Gray-Donald, Gorilla Composting's goal was accomplished on May 26, 2010, when the Big Hanna composter was installed at McGill University.

Over the course of five years of Gorilla Composting operations (2005-2010), about eight tonnes of compost had been processed. The Gorilla Composting service was offered to students and those who participated were already aware of the benefits of composting. The CCC project extends the old service by offering composting to the major food vendors on campus. In doing so, the CCC project has seen the treatment of over 15 tonnes of organic waste – about double the amount from the five years prior.

Moreover, the distance required to transport the organic waste in the CCC system is less than a tenth of that of the old system. Effectively reducing about one-half tonne of GHG emissions per trip. The CCC project is an exemplary at-source organic waste processing system insofar that a large amount of a wide variety of organic waste can be composted in a small area.

Gorilla Composting's future goals include: extension of the project scope to include post-consumer waste, increasing the capacity of the current system, expansion of the number of collection sites, and increased garden and wood waste processing. These goals are discussed at length in Section 9.

3. Timeline and Objectives

3.1. Timeline

An overview of the major milestones is presented below. A detailed account of objectives of this project is provided in Section 3.2.

May 2010

Full approval of the site given by McGill and Quebec ministries.

May 26, 2010

Big Hanna T240 in-vessel composting equipment fully installed under the Wong building overhang and operational. First load of food waste added to the machine.

June – August 2010

Normal summer operations continued with detailed notes taken by the coordinator (David Morris). Experimentation with different feedstock for the composter was executed.

September – November 2010

Normal fall operations continued with detailed notes being made by coordinator (Ana Vadeanu) and continuous publicity activities. Students will be encouraged to help volunteer with the operations and publicity of the project to learn about composting.

October 20, 2010

The Grand Opening Event for the CCC project was held as a part of Canadian Waste Reduction Week 2010. Several media outlets were present. Jim Nicell, AVP, and David Gray-Donald gave speeches.

December 2010 – April 2011

Normal wintertime operations ongoing with detailed notes taken by the coordinator (Michal Bonar). The system was shut down for the winter holidays. The heat blanket was turned on and operational adjustments were made and recorded.

May 26, 2011

The first year mark of the project.

May 2011-August 2011

A discussion amongst the stakeholders concluded that the system would be closed for the summer due to low organic waste generation.

3.2. Objectives

Install an industrial bioreactor at the McGill University downtown campus

The Susteco AB Big Hanna T240 was installed on May 26, 2010 underneath the Wong Chemical Engineering Building overhang, located at 3610 University Street, Montréal, Québec.

Aside from approval from the McGill University Architectural Advisory Board, the project was given approval by: McGill University Services; the City of Montreal, the Ministère de la Culture, des Conditions et la condition feminine; the Ministère du Développement durable, de l'Environnement et des Parcs.

Reduce greenhouse gas emissions from organic waste disposal practices at the downtown campus of McGill University

As of May 31, 2011 – one year after the installation of the machine – 15 tonnes of organic waste has been processed by the composter. As a result, about 21 tonnes of carbon dioxide equivalents (CO_2e) have been reduced.

Realize an event for the opening ceremony of the CCC project

The Grand Opening Event for the CCC project was held as a part of Canadian Waste Reduction Week 2010. Several media outlets were present. Jim Nicell, AVP, and David Gray-Donald gave speeches.

Connect various departments and events at McGill University with the project

Students groups such as Campus Crops, Midnight Kitchen, the Plate Club and the Farmers' Market have been involved in the project extensively. Gardening-related groups such as Campus Crops and Edible Campus use the compost generated by the composting process in their gardens.

The Farmers' Market and Midnight Kitchen, among other groups, use and have used the compost collection service. Groups like the Plate Club promote composting and have realized post-consumer organic waste collection projects in the SSMU building.

Foster a culture of sustainability at McGill University

Before the project, a miniscule percentage of food waste generated on-campus entered a separate organic waste stream from normal refuse. This organic waste was transported to a distant farm to be composted. The service was only offered to select members and most of the waste originated from students' personal residences.

The CCC project allows campus-wide composting at a much larger scale and creates a much larger impact. The project broadens the scope from providing a service to compost enthusiasts to the entire McGill community. Through awareness and education campaigns, the CCC project has demonstrated the feasibility and efficacy of processing food waste at-source in an urban environment.

Associate academic projects with composting at McGill

Below are selected student research projects and papers about the CCC project.

Geography: Environmental Management (GEOG 302)

A report concerning the feasibility of in-vessel composting at McGill University was composed.

Environmental Studies: Independent Study (ENVR 490)

An independent study was composed concerning student views regarding sustainability. In-vessel composting at McGill University was considered.

Chemical Engineering: Technical Paper I (CHEE 360)

A technical paper focused on various types of organic waste bioreactors, both aerobic and anaerobic, suitable for installation at McGill University.

4. Operations

Included in this section are an operations overview and a description of daily operations at the time of writing. The CCC-specific operations manual is included in Appendix C.

4.1. Operations Overview

A. Organic waste is collected in recycled containers in the following selected areas:
    a. Royal Victoria College Dining Hall
    b. New Residence Hall Dining Hall
    c. Faculty Club
    d. SSMU Building
    e. Bishop Mountain Hall
B. Organic waste is mixed with wood pellets and used coffee grounds and added into the composter vessel.
    a. Coffee is collected from administrative buildings across campus and transported by the vendor, Kelvin Low.
C. Inside the vessel, the organic waste reaches temperatures above 55 ºC and decomposes aerobically:
    a. Four temperature sensors inside the composter allow for an accurate process analysis.
        i. During the winter, a heat blanket at the front of the machine keeps the contents warm.
    b. Aeration of the vessel contents is controlled by the composter parameters (rotation duration, frequency of rotation and fan speed).
    c. The coordinator ensures that the moisture level inside the composter is adequate.
D. The organic waste exits the machine after 50 days as compost.
E. The compost is left to dry and mature in a maturation bay before being used in gardens and planters across campus.
F. Air in the ullage of the vessel passes exits through a biological filter (biofilter) system to remove malodourous compounds. The water vapour in the air exiting the composter condenses in the biofilter.
    a. The biofilter is filled with spruce bark and a soil fertilizer (BIOSA) is added to the biofilter contents every three months.

b. The bark inside the biofilter is checked for moisture and stirred weekly.
c. The condensate outlet on the biofilter is opened daily.

4.2. Daily Operations

The Operator (driver) transports organic waste from collection locations to the composter and maintains the composter. Duties related to transportation include: recording the number of pails collected from each location; assessing the relative moisture of the organic waste; and adding the appropriate amount of wood pellets to each load of organic waste added to the composter. The maximum amount of organic waste collected per day is 200 kg or 30 pails. Depending on the moisture content of the organic waste, a percentage of the feedstock is added in the form of wood pellets (maximum 40 kg per day). The route takes 1.25 hours to complete per day. Loading the machine takes 0.5 hours to complete per day.

Maintenance duties include: ensuring no alarms have been tripped; verifying that the biofilter is functioning (checking the ambient odour); keeping the composter and general area clean; and emptying the compost storage bin into the maturation bay (maximum 20 kg of compost per day). Maintenance of the machine takes 0.25 hours to complete.

The total labour requirement of the driver is two hours per day. Collection occurs five days per week, so the total is ten hours per week. The Operator must have a driver's license. ARAMARK Higher Education (Aramark) previously employed the Operator at $ 16.00 per hour using funds provided by Gorilla Composting.

Currently, the composter Coordinator supervises the operation and maintenance of the composter. In addition to the maintenance duties described above, the Coordinator must also record temperatures daily and tabulate the amount of organic waste processed by the composter using values provided by the operator. The Coordinator also assesses the moisture level inside the vessel and changes operational settings when necessary. The labour requirement is generally 0.25 – 0.5 hours per day. The composter coordinator is currently employed by Gorilla Composting at $ 17.00 per hour.

It would be ideal to employ one individual with the responsibilities of both the Operator and Coordinator, with external supervision from Gorilla Composting volunteers. The total estimated labour requirement is 2.5 hours per day, five days per week (12.5 hours per week).

5. Communications Strategy

The CCC project is and has been publicized through a variety of different sources: the website, posters, events, print and web media, and television. Throughout the first year (September 2010 – May 2011) of the pilot project, a Communications Coordinator managed the communications for the CCC project. The coordinator diffused information about the project by tabling at events, attending meetings, and delivering presentations. The sections below provide brief overviews of the publicity campaigns in the respective media formats.

5.1. Media

5.1.1. Newspapers and Television

Media outlets were present at the Grand Opening Event of the composter on October 19, 2010, which was held as a part of Canadian Waste Reduction Week 2010. They include:

- Global Montreal, October 20, 2010 (video)
- The Gazette, October 20, 2010
- métro, October 20, 2010 (page 9)

The CCC project has also been covered by three McGill papers, The Reporter, The Daily and Le Délit:

- McGill Reporter, October, 2009
- McGill Daily April 12, 2010
- Le Délit, March, 2011

A list of news articles is available on the Gorilla Composting news page.

5.1.2. Web

The Gorilla Composting website continuously provides information about the CCC project.

The Sustainability Projects Fund Gorilla Composting video is available on YouTube.

5.2. Publicity at Events

Events that compost food waste are asked to publicize the project with Gorilla Composting signage. Among the materials to be displayed is an informational poster about the CCC project (found in the Appendix B).

5.3. Tours

Tours of the machine are regularly provided to members of the community and to representatives from other institutions upon request. The tours are primarily given by the Composter Coordinator and the Project Coordinator, but tours are also given by Vertal Inc.
A list of selected tour attendees:

- Pierre Arcand, Minister of Sustainable Development, Environment and Parks for Quebec
- Cecilia Ek, President, SUSTECO AB (Gothenburg, Sweden)
- Sarah Harding, Environmental Analyst, Public Works and Government Services
- AtSource Recycling Systems Corp. (Coquitlam, BC)

5.4. Collaboration with Aramark

More recently, a collaboration between Gorilla Composting and Aramark has improved publicity and outreach significantly, particularly in the New Residence Hall (NRH) and Carrefour Sherbrooke dining halls. Aviva Belhassen, the first Sustainability Manager for Aramark, organized the Aramark *Green Thread* campaign in the above-mentioned areas. Promotion of composting organic waste and the CCC project is facilitated by the *Eco-Station* in NRH: one of the few post-consumer collection areas for organic waste on campus.

5.5. Other Communication

The Gorilla Composting general email addresses, gorilla.compost@gmail.com and gorilla.compost.pr@gmail.com, receive a great deal of emails, particularly from people specifically interested in the project.

6. Deliverables

6.1. Operations Manual

A 13-page manual that describes the operations of the project in detail is included in the Appendix C. It was written by Michal Bonar, Dennis Fortune, David Morris and David Gray-Donald.

6.2. Organic Waste Data

A table of the amount of organic waste composted is included in the Appendix A. The total amount to date – 16 tonnes – has prevented 23 tonnes of CO_2 equivalents from being emitted into the atmosphere.

6.3. Media

News about Gorilla Composting is continuously updated on the website, http://gorilla.mcgill.ca/news.php. Other publicity efforts are described in Section 5.

6.4. Video

A video about the project was produced by David Loach for the Sustainability Projects Fund and Gorilla Composting. The video is available on YouTube: http://www.youtube.com/watch?v=G9NV4KQ_tJY

7. Stakeholders

The official major partners of the project are Gorilla Composting, the Office of Sustainability and McGill Food and Dining Services. Below is list of stakeholders in the project and their respective capacities.

7.1. McGill University

University Services, McGill University

Chuck Adler, Director

Lilith Wyatt, Sustainability Projects Fund Administrator

Kathleen Ng, Environmental Officer

Chuck Adler is the director of the project. Kathleen Ng currently oversees the project portfolio and regularly consults with Gorilla Composting executive members. Lilith Wyatt is the SPF administrator; the SPF is a major source of funding for the CCC project.

Food and Dining Services, McGill University

Mathieu Laperle, Director

Oliver de Volpi, Executive Chef

MFDS is a committed partner with the CCC project. Food waste generated at several MFDS sites is collected for processing.

Grounds, Buildings and Special Events, McGill University

Marc Dozois, Director

Eric Champagne, Horticulturalist

Compost is used by Grounds Services on McGill grounds and in planters across campus.

Students' Society of McGill University (SSMU)

Provided initial funding and expect some service for food waste generated in the SSMU building. SSMU clubs and services depend on the Big Hanna project for organic waste recycling.

7.2. Funding Bodies

Environment Canada

Jerome Desrosiers, EcoAction Project Officer

Funding body providing a portion of the equipment purchase and funding for raising the awareness of large scale composting. A detailed report was sent to Environment Canada on May 31, 2011.

Pacte des générations of the Fonds d'action québécois de développement durable (FAQDD)

Pascale Geoffroy, Coordinator

The Pacte des generations provided funds for the equipment purchase. A detailed report was sent to the Pacte on September 29, 2010.

8. Challenges & Lessons Learned

8.1. Initial Challenges

The initial challenge of gaining acceptance for an on-campus composting facility was difficult. Past disagreements between Gorilla Composting and Grounds Services caused some tension with regards to the CCC project. Several sites were proposed and deliberation regarding the site took some time.

8.2. Installation Challenges

The Big Hanna T240 composter arrived in Canada in September 2009 but was kept in storage by Vertal Inc. until May 2010 while the project team awaited approval of the installation. Many permits – from the municipal, provincial, and university levels – were required for installation.

8.3. Operational Challenges

Our unit was the first Big Hanna T240 to be installed in North America. For both parties, operation of the machine was a learning exercise. This entailed some operational challenges on our part as well as with the distributor, Vertal Inc. For instance, many of the drivers and motors in the machine were not C.S.A.-compliant and had to be changed: when problems arose, officials from Vertal would occasionally be unable to fix the error. Support from Susteco AB was often required.

During the three-month start-up phase between June and August 2010, the Montreal Alouettes used the Big Hanna composter to process organic waste generated at their games. The majority of the food waste was comprised of animal products, which in large quantities negatively impacts the biological process.

A leak of leachate from the vessel was discovered in August 2010: the incident is often described as a triple-failure wherein the biological process was not functioning properly, a window on the vessel was not properly sealed, and the vessel had stopped its rotation with the window pointing downwards. These three factors caused a rancid smell around the composter. Although an isolated event, the composter project received a great deal of negative feedback from staff and students who frequent the Wong Building well into the summer. In addition to the complaints, an article was published in the McGill Daily with negative statements made by staff members who work in the Wong Building.

In addition to the isolated events, the biofilter used to remove malodours from the air exiting the composter was not appropriately sealed. The biofilter was a custom unit designed and constructed by Vertal Inc. For several months, the biofilter had not been functioning adequately and many odour complaints were received. Thankfully as of the time of writing this document no complaints have been received since September 23, 2010.

8.4. Institutionalization

The owner of the machine has not been decided and it remains a contentious issue: the project is managed jointly by the Office of Sustainability (University Services) and Gorilla Composting. However, neither party can claim full responsibility and ownership for the project.

In the September 2010 SPF Action Plan, the following was stated:

> Institutionalization of the machine will be deliberated before the end of pilot project duration. The decision will ultimately be the result of a discussion between the Office of Sustainability and other partners of the project, including McGill Food and Dining Services and McGill Grounds, Buildings and Special Events.

At the time of writing, this remains true, although the above mentioned discussion has been delayed.

9. Recommendations

Recommendations towards operations that involve long-term commitment and planning are outlined in Section 9.1. Further technological improvements could also improve the quality and range of the composting service. Recommendations concerning technology are described in Section 9.2.

9.1. Operational Recommendations

The main objective going forward is to institutionalize the project. The challenges associated with this are outlined in Section 8.4. With institutionalization, further goals of the project can be realized. Such goals include: extension of existing services to other buildings, a disposable coffee cup composting service, and post-consumer organic waste collection.

9.1.1. Service Extension

The main hindrance to extending services is the lack of large refrigerated areas wherein food waste can be stored. In some cases, the complication arises from unwillingness of staff to transport food waste to a refrigerated location. For instance, SSMU is a collection point with a large refrigerated area, where neighbouring food service providers could transport their waste. Nonetheless, service cannot be easily extended to many dining halls and food service locations because of the lack of refrigerated space and accessibility. Examples of these areas include: the McGill Deli in the Trottier Building, the McConnell cafeteria, the Redpath Cafeteria, the Bronfman Cafeteria (Sinfully Asian), AUS Snax, and the Law Building cafeteria.

9.1.2. Compostable Containers

Many environmental student groups have performed waste audits in buildings across campus, e.g., SSMU Environment Committee, Science Undergraduate Society (SUS) Environment Council. A major component of the waste is coffee cups. Some coffee cups distributed on campus are compostable, such as those manufactured by EcoTainer®. Other products such as soup containers are also compostable and have been shown to decompose in the Big Hanna. A novel compostable container collection system could be implemented across campus.

9.1.3. Post-Consumer Organic Waste Collection

The major obstacle preventing post-consumer organic waste collection is contamination. Material that is not compostable is often found in post-consumer receptacles, such as the EcoStation in New Residence Hall. Such material includes utensils, condiment packets, and rubber bands. In 2009-2010, the SSMU Green Buildings Coordinator carried out a pilot project focused on post-consumer organic waste composting in the SSMU Cafeteria. The coordinator informed patrons of the cafeteria about the Gorilla Composting service and provided a receptacle for food waste. Signs about acceptable organic waste were posted.

Such education and awareness efforts would have to be completed before post-consumer collection could be offered. Food service areas such as the SSMU cafeteria and Midnight Kitchen are ideal locations for post-consumer collection because of the strong presence of student volunteers, e.g., the Plate Club, and Midnight Kitchen volunteers, that could provide information about the service. A post-consumer food waste collection pilot project has been discussed with both groups.

9.2. Technological Recommendations

Some technological recommendations for the composter would improve the decomposition process and increase the amount of organic waste acceptable. Two of these technologies are outlined below: food waste macerator and wood chipper.

9.2.1. Food waste macerators

The main project that connects with the campus composter is that of installing food waste macerators across dining halls at McGill University's downtown campus. At the time of writing, three food waste macerators have been purchased and installed. Each would reduce the amount of water in their respective organic waste streams by up to 60%, allowing a three-fold increase in the capacity of organic waste that can be composted. This, in turn, further reduces GHG emissions. Additionally, the composter processes macerated food waste more efficiently, due to: uniform particle size, increased surface area, and consistent moisture level. At the time of writing, the

macerators have been installed but operational challenges have occurred and the future of the project is uncertain.

9.2.2. Wood chipper

Wood waste, such as hedge and branch clippings, is a major component of compostable yard waste produced on campus. A wood chipper would be used to cut up wood waste into pieces to render it compostable. The processed matter would replace the need for purchased wood pellets and reduce waste. The wood waste is currently disposed of in the garbage.

10. Sources of Funds

Fundraising for the unit was spearheaded by David Gray-Donald and involved donations from several partners. Their contributions are outlined below and summarized in Table 10.1.

Table 10.1: Sources and amounts of funds for the CCC project

Revenue Source	**Amount**
Sustainability Projects Fund	$104,317
Generations Pact	$25,000
Environment Cada	$16,466
SSMU	$17,050
TD Frinaends of the Environment Foundation	$5,000
TOTAL	$167,308

Gorilla Composting, McGill Food and Dining Services and Aramark have made significant in-kind donations.

11. Expenditures

The expenditures are comprised of the capital expenditures for the machine purchase and operational expenditures, which followed the installation.

Table 11.1 Capital and operational expenditures of the CCC project

Expense Description	**Cost**
Capital Expenditures	
Big Hanna T240 in-vessel composter (including shipping, delivery, storage and taxes)	$73,234
Maturation Bays	$16,700
Asphalting of approved site	$8,000
Electrical connection for Big Hanna T240	$5,300
Project management for site preparation and installation of equipment	$2,000
Professional fees for external consultants (architectural, mechanical, and structural)	$6,000
Construction permit and work-orders	$1,407
Architectural screen in front of composter	$7,800
Parking and security guard charges	$1,500
Site preparation project contingency	$5,091
Taxes on site preparation work	$2,201
Operational Expenditures	
Composter Coordinator wage until December 2011	$12,500
Composter Volunteer Coordinator stipend	$1,800
Vehicle rental through May 2011	$1,000
Food & Dining Services contractor until December 2011	$21,500
Start-up equipment (kitchen bins and rack, clean-up tools)	$1,000
Wood pellets	$400
Signage around campus	$400
TOTAL	$167,833

12. Conclusion

The Central Campus Composter project is a truly visible, tangible, student–led and –coordinated project. It was a large-scale undertaking that involved many partners and required a large capital expenditure. Despite several challenges, the composter project has been and continues to be a success. After the initial year of the project, virtually all operational aspects are known and the composting process and overall procedure is efficient and reliable.

The CCC project provides an excellent composting service and learning opportunity to the McGill University community. The project demonstrates the effectiveness, relevance and necessity of at-source organic waste recycling, particularly in urban environments, and continues to expand. Finally, the Gorilla Composting team strives to transform the current perception of organic waste as a nuisance to a resource: the Big Hanna helps in this effort by illustrating the commitment of the McGill administration and the dedication of students towards such an important issue.

13. References

Gorilla Composting. “Food Waste Audit.” Private communication with Dennis Fortune. 2008.

Ville de Montréal. “Le plan de développement durable de la colectivité montréalaise 2010 – 2015.” 2011. <http://ville.montreal.qc.ca/pls/portal/docs/PAGE/PES_PUBLICATIONS_FR/PUBLICATIONS/PLAN_2010_2015.PDF>

Big Hanna – Material Added June 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday	May 31, 2010	70	50		
Tuesday	June 1, 2010	70	15		
Wednesday	June 2, 2010	70	15		
Thursday	June 3, 2010	70	15		
Friday	June 4, 2010	70	15		
Saturday	June 5, 2010	50	10		
Monday	June 7, 2010	0			
Tuesday	June 8, 2010	100	20		
Wednesday	June 9, 2010	20	4		
Thursday	June 10, 2010	0			
Friday	June 11, 2010	70	15		
Monday	June 14, 2010	0.0			
Tuesday	June 15, 2010	80.0	16		
Wednesday	June 16, 2010	80.0	16		
Thursday	June 17, 2010	80.0	12		
Friday	June 18, 2010	0.0			
Monday	June 21, 2010	115.0	25		
Tuesday	June 22, 2010	70.0	10		
Wednesday	June 23, 2010	119.0	16		
Thursday	June 24, 2010	0.0			
Friday	June 25, 2010	0.0			
Monday	June 28, 2010	120.0	8		
Tuesday	June 29, 2010	100.0	10		
	Totals	1354	272	0	0
		1354		272	0

Total Waste Added This Month **1354**

Big Hanna – Material Added July 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)	
Monday						
Tuesday						
Wednesday						
Thursday	July 1, 2010	0				
Friday	July 2, 2010	0				
Monday	July 5, 2010	0				
Tuesday	July 6, 2010	70	7			
Wednesday	July 7, 2010	147	13			
Thursday	July 8, 2010	150	15			
Friday	July 9, 2010	0				
Monday	July 12, 2010	0.0				
Tuesday	July 13, 2010	100.0	20			
Wednesday	July 14, 2010	0.0		20		
Thursday	July 15, 2010	130.0	20	20		
Friday	July 16, 2010	100.0				
Monday	July 19, 2010					
Tuesday	July 20, 2010	110.0				
Wednesday	July 21, 2010					
Thursday	July 22, 2010	110.0				**Alouettes**
Friday	July 23, 2010					
Monday	July 26, 2010					
Tuesday	July 27, 2010	110.0				
Wednesday	July 28, 2010					
Thursday	July 29, 2010	80.0	20			**Alouettes**
Friday	July 30, 2010	0.0				
	Totals	1107	95	40	0	
		1107		135	0	

estimate **Total Waste Added This Month** **1107**

Big Hanna – Material Added August 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday	August 2, 2010	0			
Tuesday	August 3, 2010	110			
Wednesday	August 4, 2010	0			
Thursday	August 5, 2010	110			
Friday	August 6, 2010	0			
Monday	August 9, 2010				
Tuesday	August 10, 2010	110			
Wednesday	August 11, 2010				
Thursday	August 12, 2010	110			
Friday	August 13, 2010	0			
Monday	August 16, 2010	0.0			
Tuesday	August 17, 2010	80.0	16		
Wednesday	August 18, 2010	0.0			
Thursday	August 19, 2010	108.0	22		
Friday	August 20, 2010	150.0	35		
Monday	August 23, 2010				
Tuesday	August 24, 2010	110.0			
Wednesday	August 25, 2010				
Thursday	August 26, 2010	110.0			
Friday	August 27, 2010				
Monday	August 30, 2010	0.0			
Tuesday	August 31, 2010	220.0	50		
	Totals	1218	123	0	0
		1218		123	0

estimate

Total Waste Added This Month 1218

Big Hanna – Material Added September 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Wednesday	September 1, 2010	125	30		50
Thursday	September 2, 2010				
Friday	September 3, 2010	75			
Monday	September 6, 2010				
Tuesday	September 7, 2010	98	15		
Wednesday	September 8, 2010				
Thursday	September 9, 2010	75			
Friday	September 10, 2010				
Monday	September 13, 2010				
Tuesday	September 14, 2010	75.0			
Wednesday	September 15, 2010				
Thursday	September 16, 2010				
Friday	September 17, 2010	168.0	30		
Monday	September 20, 2010				
Tuesday	September 21, 2010	75.0			
Wednesday	September 22, 2010				
Thursday	September 23, 2010	75.0			
Friday	September 24, 2010				
Monday	September 27, 2010				
Tuesday	September 28, 2010	109.0	21		
Wednesday	September 29, 2010	161.0	30		
Thursday	September 30, 2010				
	Totals	1036	126	0	50
		1036		126	50

Total Waste Added This Month 1086

Big Hanna – Material Added October 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Friday	October 1, 2010	34	10		
Monday	October 4, 2010				
Tuesday	October 5, 2010	75			
Wednesday	October 6, 2010				
Thursday	October 7, 2010				
Friday	October 8, 2010	75			
Saturday	October 9, 2010	35	7.5		
Sunday	October 10, 2010	20	5		
Monday	October 11, 2010				
Tuesday	October 12, 2010	75.0			
Wednesday	October 13, 2010				
Thursday	October 14, 2010	75.0			
Friday	October 15, 2010	87.0	18		
Monday	October 18, 2010				
Tuesday	October 19, 2010	75.0			
Wednesday	October 20, 2010				
Thursday	October 21, 2010				
Friday	October 22, 2010	100.0	15		
Sunday	October 24, 2010	111.0	20		
Monday	October 25, 2010				
Tuesday	October 26, 2010				
Wednesday	October 27, 2010				
Thursday	October 28, 2010				
Friday	October 29, 2010	157.0	25		
Sunday	October 31, 2010				
	Totals	919	100.5	0	0
		919		100.5	0

estimate Total Food Added This Month 919

Big Hanna – Material Added November 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday	November 1, 2010	178			
Tuesday	November 2, 2010	100			
Wednesday	November 3, 2010	100			
Thursday	November 4, 2010	100			
Friday	November 5, 2010	100			
Monday	November 8, 2010	100			
Tuesday	November 9, 2010	100			
Wednesday	November 10, 2010	100			
Thursday	November 11, 2010	100			
Friday	November 12, 2010	100			
Monday	November 15, 2010	131.0	26		
Tuesday	November 16, 2010	113.0	23		
Wednesday	November 17, 2010	221.0	44		
Thursday	November 18, 2010	144.0	29		
Friday	November 19, 2010	232.0	54	18	
Monday	November 22, 2010	0.0	0	18	
Tuesday	November 23, 2010	16.5	18	36	33
Wednesday	November 24, 2010	109.0	26		
Thursday	November 25, 2010	76.0	14	7	
Friday	November 26, 2010	122.0	25		
Monday	November 29, 2010	105.0	21		
Tuesday	November 30, 2010	0.0		22	
	Totals	2347.5	280	101	33
		2347.5		381	33

estimate

Total Food Added This Month 2380.5

Big Hanna – Material Added December 2010

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday					615
Tuesday					
Wednesday	December 1, 2010	153	30		
Thursday	December 2, 2010	97	20	23	
Friday	December 3, 2010	60	12		
Monday	December 6, 2010	78	15.5		
Tuesday	December 7, 2010	47	9.5		
Wednesday	December 8, 2010	0	0		
Thursday	December 9, 2010	46	9.5	11	
Friday	December 10, 2010	54	11		
Monday	December 13, 2010	0	0		
Tuesday	December 14, 2010	62	12.5		
Wednesday	December 15, 2010	18	3.5		
Thursday	December 16, 2010				
Friday	December 17, 2010				
Monday	December 20, 2010	0	0		
Tuesday	December 21, 2010	0	0		
Wednesday	December 22, 2010	0	0		
Thursday	December 23, 2010	0	0		
Friday	December 24, 2010	0	0		
	Totals	615	123.5	34	
		615		157.5	0

Total Food Added This Month 615

Big Hanna – Material Added January 2011

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday	January 3, 2011	0	0		
Tuesday	January 4, 2011	64	13		
Wednesday	January 5, 2011	30	6		
Thursday	January 6, 2011	10	2		20
Friday	January 7, 2011	41	8.5		8
Monday	January 10, 2011	72	14		
Tuesday	January 11, 2011	69	12		12
Wednesday	January 12, 2011	24	6		
Thursday	January 13, 2011	14	2		
Friday	January 14, 2011	24	5		
Monday	January 17, 2011	52	10		
Tuesday	January 18, 2011	107	22		
Wednesday	January 19, 2011	0	0		
Thursday	January 20, 2011	67	13.5		
Friday	January 21, 2011	52	10.5		
Monday	January 24, 2011	57	11.5		
Tuesday	January 25, 2011	80	16		
Wednesday	January 26, 2011	60	12		
Thursday	January 27, 2011	32	6.5		
Friday	January 28, 2011	96	19		
Monday	January 31, 2011	60	12		
	Totals	1011	201.5	0	40
		1011		201.5	40

Total Food Added This Month 1051

Big Hanna – Material Added February 2011

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday					
Tuesday	February 1, 2011	270	54	0	54
Wednesday	February 2, 2011	40	8	0	8
Thursday	February 3, 2011	153	30.6	0	30.6
Friday	February 4, 2011	0	0	0	0
Monday	February 7, 2011	143	28.6	0	28.6
Tuesday	February 8, 2011	208	45	0	10
Wednesday	February 9, 2011	63	12.6	0	12.6
Thursday	February 10, 2011	96	19	0	19
Friday	February 11, 2011	35	7	0	7
Monday	February 14, 2011	40	31	0	13
Tuesday	February 15, 2011	49	9.8	0	9.8
Wednesday	February 16, 2011	62	12.4	0	12.4
Thursday	February 17, 2011	70	14	0	14
Friday	February 18, 2011	0	0	0	0
Monday	February 21, 2011	48	9.6	0	9.6
Tuesday	February 22, 2011	63	12.6	0	12.6
Wednesday	February 23, 2011	32	6.4	0	6.4
Thursday	February 24, 2011	19	0	0	0
Friday	February 25, 2011	14	2.8	0	0
Monday	February 28, 2011	55	11	0	11
	Totals	1460	314.4	0	258.6
		1460		314.4	258.6

Total Food Added This Month 1718.6

Big Hanna – Material Added March 2011

	Date	Food (kg)	Pellets (kg)	Additional Pellets (kg)	Coffee (kg)
Monday					
Tuesday	March 1, 2011	76	15.2		15.2
Wednesday	March 2, 2011	60.2	12.04		12.04
Thursday	March 3, 2011	70	14		14
Friday	March 4, 2011	44	8		0
Monday	March 7, 2011	115	24		24
Tuesday	March 8, 2011	57	12		10
Wednesday	March 9, 2011	41	18		8.2
Thursday	March 10, 2011	0	0		0
Friday	March 11, 2011	0	0		0
Monday	March 14, 2011	0	0		0
Tuesday	March 15, 2011	98	20		5
Wednesday	March 16, 2011	0	0		0
Thursday	March 17, 2011	0	0		0
Friday	March 18, 2011	0	0		13
Monday	March 21, 2011	82	18		18
Tuesday	March 22, 2011	12	5		5
Wednesday	March 23, 2011	64	15		15
Thursday	March 24, 2011	50	10		10
Friday	March 25, 2011	0	0		0
Monday	March 28, 2011	55	20		10
Tuesday	March 29, 2011	26	12		6
Wednesday	March 30, 2011	17	0		0
Thursday	March 31, 2011	88	18		18
	Totals	955.2	221.24	0	183.44
		955.2		221.24	183.44

Total Food Added This Month **1138.64**

Big Hanna – Material Added April 2011

	Date	Food (kg)	Coffee (kg)	Pellets (kg)	Additional Pellets (kg)
Friday	April 1, 2011	38	10	25.6	
Saturday	April 2, 2011		0	0	
Sunday	April 3, 2011		0	0	
Monday	April 4, 2011	75	10	18	
Tuesday	April 5, 2011	98	18	18	
Wednesday	April 6, 2011	34	8	26	
Thursday	April 7, 2011	75	15	15	
Friday	April 8, 2011	75	19	19	
Saturday	April 9, 2011		0	0	
Sunday	April 10, 2011		0	0	
Monday	April 11, 2011	55	10	10	
Tuesday	April 12, 2011	55	10	12	
Wednesday	April 13, 2011	50	10	10	
Thursday	April 14, 2011	33	6	12	
Friday	April 15, 2011	51	10	10	
Saturday	April 16, 2011		0	0	
Sunday	April 17, 2011		0	0	
Monday	April 18, 2011	22	5	18	
Tuesday	April 19, 2011	25	7	7	
Wednesday	April 20, 2011	89	14	14	
Thursday	April 21, 2011	30	6	6	
Friday	April 22, 2011	0	0	0	
Saturday	April 23, 2011		0	0	
Sunday	April 24, 2011		0	0	
Monday	April 25, 2011	0	0	0	
Tuesday	April 26, 2011	20	5	5	
Wednesday	April 27, 2011	35	10	10	
Thursday	April 28, 2011	17	5	3	
Friday	April 29, 2011	0	6	4	
Saturday	April 30, 2011		0	0	
	Totals	877	168	238.6	0
		1045		238.6	

Total Food Added This Month **1045**

Big Hanna – Material Added May 2011

	Date	Food (kg)	Coffee (kg)	Pellets (kg)	Additional Pellets (kg)
Friday	May 1, 2011	0			
Saturday	May 2, 2011	0			
Sunday	May 3, 2011	0			
Monday	May 4, 2011	0			
Tuesday	May 5, 2011	0			
Wednesday	May 6, 2011	0			
Thursday	May 7, 2011	0			
Friday	May 8, 2011	0			
Saturday	May 9, 2011	6	1.2	1.2	
Sunday	May 10, 2011	0			
Monday	May 11, 2011	0			
Tuesday	May 12, 2011	0			
Wednesday	May 13, 2011	0			
Thursday	May 14, 2011	0			
Friday	May 15, 2011	0			
Saturday	May 16, 2011	0			
Sunday	May 17, 2011	0			
Monday	May 18, 2011	0			
Tuesday	May 19, 2011	0			
Wednesday	May 20, 2011	0			
Thursday	May 21, 2011	0			
Friday	May 22, 2011	0			
Saturday	May 23, 2011	0	303		
Sunday	May 24, 2011	0			
Monday	May 25, 2011	0			
Tuesday	May 26, 2011	0			
Wednesday	May 27, 2011	0			
Thursday	May 28, 2011	0			
Friday	May 29, 2011	0			
Saturday	May 30, 2011	0			
	Totals	6	304.2	1.2	0
		310.2		1.2	

Total Food Added This Month

310 May
1045 April
1139 March
1719 February
1051 January

5263 Total 2011 to date
5263 Total 2010-11 to date

Big Hanna – Material Added September 2011

	Date	Food (kg)	Coffee (kg)	Pellets (kg)	Additional Pellets (kg)
Thursday	September 1, 2011	157.5			
Friday	September 2, 2011	0			
Saturday	September 3, 2011	0			
Sunday	September 4, 2011	0			
Monday	September 5, 2011	0			
Tuesday	September 6, 2011	0			
Wednesda	September 7, 2011	138		27	
Thursday	September 8, 2011	85		17	
Friday	September 9, 2011				
Saturday	September 10, 2011				
Sunday	September 11, 2011				
Monday	September 12, 2011				
Tuesday	September 13, 2011	200		36	
Wednesda	September 14, 2011				
Thursday	September 15, 2011	107		18	
Friday	September 16, 2011	0		36	
Saturday	September 17, 2011				
Sunday	September 18, 2011				
Monday	September 19, 2011				
Tuesday	September 20, 2011	204		36	
Wednesda	September 21, 2011				
Thursday	September 22, 2011	184	33	36	
Friday	September 23, 2011				
Saturday	September 24, 2011				
Sunday	September 25, 2011				
Monday	September 26, 2011				
Tuesday	September 27, 2011	167		36	
Wednesda	September 28, 2011	127		26	
Thursday	September 29, 2011	77		18	
Friday	September 30, 2011	94		18	
	Totals	1540.5	33	304	0
		1573.5		304	

Total Food Added This Month **1574**

Big Hanna – Material Added October 2011

	Date	Food (kg)	Coffee (kg)	Pellets (kg)	Additional Pellets (kg)
Saturday	October 1, 2011				
Sunday	October 2, 2011				
Monday	October 3, 2011	97		18	
Tuesday	October 4, 2011	67		18	
Wednesday	October 5, 2011	96		18	
Thursday	October 6, 2011	69		27	
Friday	October 7, 2011	68		18	
Saturday	October 8, 2011				
Sunday	October 9, 2011				
Monday	October 10, 2011				
Tuesday	October 11, 2011	240		48	
Wednesday	October 12, 2011	48		9	
Thursday	October 13, 2011	93		18	
Friday	October 14, 2011	82		18	
Saturday	October 15, 2011				
Sunday	October 16, 2011				
Monday	October 17, 2011				
Tuesday	October 18, 2011				
Wednesday	October 19, 2011				
Thursday	October 20, 2011				
Friday	October 21, 2011				
Saturday	October 22, 2011				
Sunday	October 23, 2011				
Monday	October 24, 2011				
Tuesday	October 25, 2011				
Wednesday	October 26, 2011				
Thursday	October 27, 2011				
Friday	October 28, 2011				
Saturday	October 29, 2011				
Sunday	October 30, 2011				
Monday	October 31, 2011				
	Totals	860	0	192	0
		860		192	

Total Food Added This Month **860**

BIG HANNA

http://gorilla.mcgill.ca

WHAT?

The Big Hanna in-vessel composter processes up to **200 tonnes of organic waste** per year (the waste generated by 4000 Canadians).

The Big Hanna composter was installed in May 2010. The Central Campus Composter Project was a joint effort between Gorilla Composting and McGill University.

WHY?

Composting is a natural, biological process that involves the decomposition of organic material (like food waste): it occurs when organic material decomposes in the presence of oxygen and produces compost (a natural fertilizer).

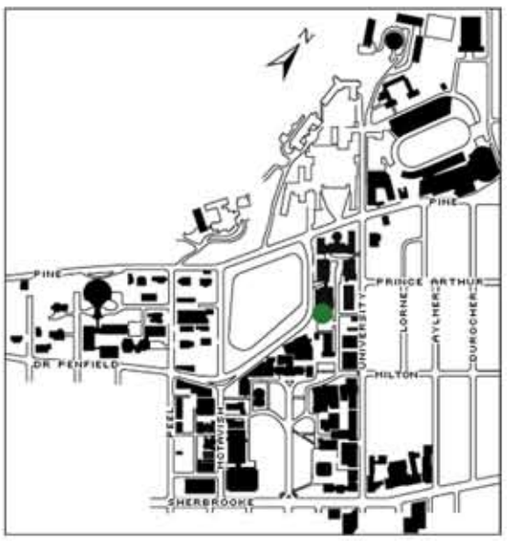
When food waste goes to the landfill, the organic material is buried and decomposes without oxygen, producing methane (a greenhouse gas 21 times more potent than carbon dioxide).

By composting at-source, we avoid releasing methane to the atmosphere, reduce the need of dumptrucks and produce a valuable fertilizer.

WHERE?

The Big Hanna is located underneath the Wong Building overhang, behind James Admin.

Food waste is collected from various cafeterias across campus, including: SSMU, RVC, BMH, New Res, Carrefour Sherbrooke, and the Faculty Club.



PARTNERS

McGill SPF

McGill Central Campus Composter Operations Manual

Revision: November 15, 2011

Contacts

Michał Bonar, Composter Coordinator
David Morris, Gorilla Composting Coordinator
David Gray-Donald, SSMU Sustainability Coordinator

Table of Contents

1. Composter Operations Overview

The Operator will collect organic waste from designated kitchen locations for on-site processing in an in-vessel composter. The composter is a rotating cylinder encased in a stainless steel housing. No moving parts are publicly accessible and the rotation is controlled by a computer integrated into the unit. The initial settings of the composter have been optimized for the type and quantity of organic waste received from McGill food outlets. The optimization phase occurred from July 2010 until June 2011. However, depending on the type and quantity of food waste actually being received the settings may need to be adjusted by the Operator as required.

The Operator will use a designated vehicle to collect organic material from and deliver clean pails to the various collection points.

The Operator is responsible for operating the in-vessel composter and to monitor the surrounding environment to ensure that there are no impacts from odour, spilled material or debris collecting around the composter. The Operator will wipe down the exterior surfaces of the composter on a routine basis and will perform daily clean-up associated with the in-vessel composter and the area around the equipment (see Section 3.0 for details).

1.1. **Type of Material Handled** - Organic waste consists primarily of food preparation materials such as the skins and peelings of raw fruit or vegetable, egg shells, coffee grounds, bread etc. Because of the high internal temperatures that are generated inside

this rotating vessel composter we are able to include a portion of meat in the mix of organic waste (10%) For a list of non-compostable matter, see Appendix A.

1.2. **Collection points** - Organic waste is collected from designated collection points (Appendix B () and placed directly into the composter by the Operator. The Operator will bring clean pails to each collection point to replace the full pails collected.

1.3. **Composter Location** - The Big Hanna composter and Maturation Bays are located outside the Wong Building (under the overhang on the south-east side of the building). This orientation allows some protection from rain and snow.

1.4. **Protective clothing** - The Operator of the composter does not require any specialized protective equipment to be worn. The following equipment is required:

- Clothing suitable for outdoor work consistent with the season is required.
- Vinyl cloves should be used when handling the organic material or the unfinished compost.

1.5. **Lifting requirements** – The Operator will be required to lift and carry the small pails of organic waste from the cold rooms at collection points to the vehicle for transport. The Operator will also be required to unload the pails from the vehicle and to deposit the contents into the hopper of the composter. Wood pellets are added by the Operator to the mix to ensure proper carbon to nitrogen (C:N) ratio for the composting process to occur. Wood pellets are added every time organic material is added. Finished compost is collected in a rolling bin ("Discharge bin") that is rolled over to the Maturation Bays by the Operator and tipped over or shovelled to empty. Four times per year the Operator will be required to add to or change the cedar wood bark in the bio-filter. All lifts associated with all tasks are maximum chest height. No lifting over your head is required. The weights of objects that must be lifted are listed below:

- Each pail of organic material typically weighs around 6 kg when loaded
- Bags of wood pellets weigh 18 kg
- Bags of cedar wood bark weigh 25 kg

1.6. **Vehicle** - Food safety rules do not allow organic material from a Food Service location to be transported in the same vehicle that transports prepared food. For this reason we have entered into an agreement with Printing Services that allows the Operator to use a designated vehicle to collect organic material from and deliver clean pails to the various collection points. The Operator will be responsible for operating the vehicle in a safe manner and must report any damage to the vehicle to their supervisor immediately. (See Section 6.5 and 6.6.)

1.7. **Normal Operating Parameters**

August to April – The cylinder turns automatically every 1½ hours and will continue turning for 2½ minutes in the clockwise direction (CW). The cylinder takes 110 seconds to complete one full rotation. For every 7 rotations in the clockwise direction the unit will turn once in the counter clockwise direct allowing compost to discharge into the collection bin. Our operating conditions **(1.5 hours wait time with 2.5 minutes run time)** vary slightly from those outlined in the Big Hanna Operating Manual supplied with the unit. We have found these settings optimal for situations where we add less than 100kg of food per day on average, and where the compost has a medium to high moisture content (>50%).

Rotating the cylinder allows moisture to leave the mass and air to enter. The total minutes of aeration should not dip below 32 minutes/24hrs for our operations. The fan is set at 25% during normal operations (fall, winter, spring) and is set to 20% during the months when no food is added.

The biological activity and efficiency of the process inside the composter is a balance between the oxygen, moisture level and carbon added. The biological activity of the mass will increase after rotating causing the temperature to rise in the middle of the mass. During normal operating conditions the temperatures recorded on the first three sensors should all be between 50^{o}C-60^{o}C. The temperature recorded on the last sensor should be lower as the biological activity is decreasing as the compost finishes and nutrients are depleted.

Note: The bio-reactor is in **trouble if the temperatures fall below 50^{o}C** in the first three sensors.

2. Daily Operations

The Operator is responsible for the on-site processing of the organic material and for the operation of the in-vessel composter.

2.1. **Daily Inspections** – Upon arriving at the Wong Building these actions must be taken prior to adding organic waste.

2.1.1. Open **control panel cover** and inspect for any alarms. (see Appendix x for actions to take)

2.1.2. **Bio-filter drain valve** must be opened for condensed water vapour to drain out.

Note: Do not leave the valve unattended. Leaving the valve open will result in air flow by-passing the bio-filter which may release odours to the surrounding area. The valve must be closed as soon as the condensate has drained.

2.1.3. **Air vent port over auger chamber** must be cleared of any accumulated organic material. Use the half-moon tool to push any accumulated material into the composter. If moisture has accumulated in the pipe, push a paper towel through the pipe and into the composter.

Note: Each turn of the vessel causes a small amount of organic material to collect on the lip of the pipe that exhausts the humid air from the composter. If this is not cleared daily the air flow through the composter could be reduced or stopped entirely caused moisture level in the composter to rise. If the moisture levels are too high the mass bio-reaction may turn anaerobic causing odours.

2.1.4. **Air vent port in cage** must be opened and screen removed to remove any accumulated material.

Note: Air must pass freely through the screen for moisture to leave the composter.

2.1.5. Open **Cylinder Inspection Door 1** (nearest to Control Panel) and inspect compost for odour and moisture content.

a) On Control Panel press "**Go to Insp. Door**" button. You will be asked to enter the 4-didgit security code. Enter code and wait for vessel to stop rotating before opening the Inspection Door.

b) During winter take care not to leave the door open for a long time as heat will escape.

c) There will be an alarm on the panel as long as any Cylinder Inspection Door is open.

d) Test compost for moisture content and add pellets if required. (See Moisture Test)

e) The compost should not smell bad. Sulphur or ammonia smell means there is too much moisture, and pellets should be added.

2.1.6. Open **Cylinder Inspection Door 2** (near composter discharge) and inspect compost for odour and moisture content.

a) Test compost for moisture content and add pellets if required. (See Moisture Test, 2.1.7)

b) See notes above regarding open inspection door, 2.1.5.

2.1.7. **Moisture Test -** Take a handful of compost in your gloved hand and squeeze. Compost should fall apart loosely in your hand when moisture level is correct.

a) If material forms a ball in your hand there is too much moisture and additional pellets need to be added. Add ½ bag of pellets (approximately 10 kg).

b) If you can squeeze water from the material the mass will be lacking oxygen and will probably smell like ammonia (or will soon be). Add full bag (approximately 18 kg).

c) If the mass is too moist it may take a couple of days for moisture level to return to optimum so monitor and record all actions taken especially the amount of additional pellets added each day (if required).

2.2. **Adding Organic Material**

2.2.1. **Wood Pellets required** – Based on the weight of organic material collected, an extra 20% is added as wood pellets. For example, if 100 kg of organic waste was added, 20 kg of wood pellets need to be added to the composter. Wood pellets maintain the proper absorb moisture and maintain the proper C:N ratio. Wood pellets are available at the composter site. They are packaged in 20-kg bags. We also add an amount of coffee grounds equal to the wood pellets added each day. Coffee is dropped off at the composter site by Kelvin Low. He collects the coffee from administrative buildings and drops it off in clear plastic bags at the site.

a) Standard pail - Based on weighing every pail each day from November 2010 to April 2011 our average pail weighs 6 kg. This number can be used for all pails of non-macerated organic waste. Do not worry what is in the pails as it averages out for the whole load. Count the number of pails and multiple by 6kg to get total for the day and add **20% wood pellets and 20% coffee grounds.**

b) Macerated organic waste - Weigh the buckets using the "bathroom style" scale located in the cage on top of the composter. Record the collective weight, as well as the number of buckets picked up from each collection point using the Operator's Checklist. For **macerated organic waste add 10% wood pellets and 20% coffee grounds.**

c) Record the weight of organic waste collected plus pellet and coffee weights in the Operator's Checklist

2.2.2. **Loading the composter -** Complete all inspections Daily Inspections first. The List of Daily Inspections is found in Section 2.1.

a) Open the in-feed hopper lid to add food, wood pellets and coffee pods or loose grounds. Opening the lid will disengage a contact switch (on the side of the lid) and the composter will not automatically turn while the lid is open.

b) Wood pellets should be added each time the hopper is loaded with organic material. If the process is slow, a scoop of mature compost should also be added. Mature compost can be found in the wheeled bin at the end of the composter. It is also best to add **some** pellets to the empty hopper at the end of each day to absorb and liquids that may have collected in the pail.

c) Do not fill the hopper so full that the material touches the inside of the hopper lid when closed.

Note: Coffee grounds on long tapes from coffee machines need to be added through Inspection Door 1. They will jam the auger if added via the hopper.

d) When the lid is fully closed the auger will push the material into the composter as the composter turns. The cycle will take approximately 2 minutes for the composter to come to a stop.

e) Once the rotation has stopped the hopper lid can be opened and more material added.

Note: If the hopper lid is opened before the rotation stops an alarm will show on the screen. Should you need to inspect the hopper at any time press the **red Stop Button** and then open the lid. To restart the automatic cycle disengage the red Stop Button and then close the lid.

f) Repeat this process until all food is loaded.

g) After all food has been added, **the inside of the auger chamber** will need to be inspected to ensure all food has moved into the composter and no food is left in the hopper and the hopper needs to be wiped down with paper towels. (See Section 3 Daily Cleanup for detailed procedure.)

h) **Do not leave the site** until you make sure that no food remains in the in-feed hopper.

i) Allow approximately 5 minutes after closing the hopper lid or inspection doors for the last time to see if any alarms show on the Control Panel.

j) Closing the cover over the Control Panel should be the last thing you do before leaving the composter site.

2.2.3. **Auger Jam** - Occasionally material jams between the auger and side walls of the feed leading to the composter causing an over-ride switch to stop the auger and composter from rotating.

a) The composter will automatically try to reverse the auger to free the jam. An alarm will show on the control panel after the unit tries three times to reverse the auger.
b) The auger can also be reversed using manual controls via the control screen. For detailed instructions, see **Section 9: Alarms and Troubleshooting**.
c) If a manual reverse does not work, turn off the machine by switching the power off. Once you have ensured that the machine is off, you can attempt to remove the obstruction manually.

Note: The operator will notify the Composter Project Coordinator of any alarms on the display screen or other non-normal operations of the composter.

2.3. **Finished Compost -** The Operator needs to empty the "finished" compost that is collecting in the discharge bin into the Maturation Bay for storage. The material may require screening to remove any un-composted items.

a) Use the half moon tool to clear any compost sticking to the sides of the discharge tube.

b) If required place the sieve (1cmx1cm) provided on the top of a collection bin and sift the compost to remove any un-composted material.

   Note: Any non-compostable items (rubber bands, cutlery, plastic, etc) or un-composted material (waxy vegetables etc.) needs to be disposed of properly into the bin opposite the Ferrier Garage. (No waste materials can be stored at the composer site).

c) Roll the bin to the Maturation Bay and dump the contents onto the concrete pad and shovel the contents onto the top of the pile.

   Note: The compost coming out of the unit may require some additional moisture in order to finish. If the material is very dry the pile can be sprayed with water from the hose connection or add a couple of shovels of snow (weather depending).

d) The tarp covering the compost collection discharge bin must be re-positioned and tightly secured after emptying, so that **air does not enter the composter through the back**. The tarp should be secured after the bin is empited.

3. Daily Cleanup

The Operator is responsible for ensuring that the processing of material leaves no food residue at the composer site and for the routine maintenance of the in-vessel composter.

3.1. Auger chamber

3.1.1. **Exterior surface at the auger chamber** needs to be wiped down each day using paper towels and window cleaner (spray bottle provided) to remove any food waste residue.

3.1.2. **Interior of auger chamber** needs to be inspected to ensure all food has moved into the composter and no food left in chamber and then wiped down with paper towels.

a) Use the wood stir stick to clear any food material from auger or impeller blades.

b) Sprinkle saw dust into auger chamber and wipe down all food residues using a paper towel.

Note: Only sawdust from cutting un-treated wood can be used. Gorilla Compost obtains and supplies sawdust for free. If you notice that the sawdust is running low, contact Gorilla Composting or the Composter Coordinator.

3.1.3. **Interior surface of the lid** and interior sides of the auger chamber should be sprayed clean and must be wiped down with paper towel after each use. The paper towel can be left in the composter and will be augured into the composter when lid is closed.

Note: Wipe dry the rim of the auger chamber or the lid will freeze to the edges during the winter months.

3.2. Exterior of Composter

3.2.1. The surface area around the **Cylinder Inspection Doors** needs to be sprayed with window cleaner and wiped with paper towels to remove and food residue. This should be completed every two weeks.

3.3. **Asphalt surface** immediately around the composter (all sides) needs to be swept each day of any compost or pellets and put in the discharge bin at the end of the composter. Organic material from the screening process or material falling from the discharge shoot can go into the composter.

3.3.1. Litter, garbage or material that can not be composted must be removed from the area and placed in the exterior bins opposite the Ferrier Garage.

Note: No food residue or garbage is allowed to accumulate at the Big Hanna. All waste must be removed each time you leave the composter area.

4. Weekly cleanup

4.1. The **exterior horizontal surface and face** of the composter can be sprayed with water from the hose connect on the wall of the Wong Building. (During the months when the water will note freeze).

Note: Do not spray water near the control panel or electronic controls.

4.2. The exterior horizontal surface of the **bio-filter** can be sprayed with water and wiped with paper towels. Do not spray electrical connect.

4.3. After sweeping the **asphalt area** around the composter hose the entire area with water including the area under the composter. Push any accumulated material onto the grass area in front.

5. Bio-filter Operation

5.1. Inspect the cedar wood chips **weekly** by digging part way down to ensure they are moist through the whole mass. (Do not disturb chips on the supporting screen.)

Note: In the winter when the bio-filter heater is turned on the cedar chips should be checked daily to ensure the chips at the bottom have not dried out.

5.2. The amount of cedar chips in the Bio-filter should reach to a level just below the opening of the upper exhaust pipe. (The wood chips break down over time and decrease in volume.)

5.3. When the air temperature falls below **minus 10© C** turn on the heating element.

5.4. **Every three months**, the bacterial culture on the cedar chips needs to be replenished with "Terra Biosa" produced by Thornton Laboratories. The Terra Biosa product is ordered by the Composter Coordinator and is delivered by Vertal Inc.

5.4.1. Mix with a bottle (1.15 litres) of the solution with 4 litres of warm water (follow direction on the package).

5.4.2. Add enough new cedar chips to bring the level up to the just below the opening of the upper exhaust pipe.

5.4.3. Remove about ¾ of the cedar chips from the bio-filter and place in a large clear plastic bag (drum liner size).

5.4.4. Add Terra Biosa solution to cedar chips in the plastic bag and turn until the chips are thoroughly coated.

5.4.5. Return coated cedar chips to the bio-filter.

6. Use of Vehicle

Food safety rules do not allow organic material from a Food Service location to be transported in the same vehicle that transports prepared food. For this reason we have entered into an agreement with Printing Services that allows the Operator to use a designated vehicle to collect organic material from and deliver clean pails to the various collection points.

6.1. The designated vehicle will be a Ford Transit Connect, license plate FGM1301. The vehicle is borrowed from Printing Services during their off-hours. The vehicle cannot be used for other purposes than transporting dry organic material.

6.2. Printing Services has provided Aramark with a duplicate set of keys of the vehicle. The Operator is fully responsible in case of a loss or damage to the key set.

6.3. The vehicle will be picked up by the Operator after 4 pm, Monday to Thursday, in the parking lot located behind the 3465 Durocher and brought back inside the McIntyre Garage before 6AM the next business day. On Friday, the vehicle will be picked up by Aramark after 4PM in the parking lot located behind the 3465 Durocher and brought back inside the McIntyre Garage before 11pm the same day. The same restriction applies for any pickup preceding a holiday.

6.4. When returned to the McIntyre Garage, the vehicle must be clean and ready to use by Printing Services. The Operator must ensure that vehicle is clean.

6.5. Prior to leaving with the vehicle from the parking lot behind the 3465 Durocher, the Operator will inspect the vehicle and fill an inspection form. If any damage is noted, the Operator must immediately contact their Aramark supervisor. Aramark will contact Daniel Poce, Manager, Mail Services at 514-398-4602, leaving him a voice message, or by email at daniel.poce@mcgill.ca.

6.6. Prior to leaving with the vehicle from the McIntyre Garage, Printing Services personnel will inspect the vehicle. If damaged is noted, the employee will contact Security Services to report the damage and contact his supervisor, Daniel Poce.

6.7. If Aramark is aware that they have damaged the vehicle, they will report the incident to Security Services and advise Daniel Poce by phone or by email.

6.8. Aramark will maintain a daily log of the mileage done each time it is using the vehicle. Copy of this log will be submitted to the Office of Sustainability the day following the last use (?) of the month. Once approved by the Office of Sustainability, the logs will be sent on a monthly basis to the attention of Daniel Poce. (how does billing work?)

7. Collecting the Organic Waste

7.1. The operator can pick up truck keys from Dining Services office at New Rez, and he opens doors with his magnetic McGill card.

7.2. The vehicle will be picked up by the Operator after 4 pm, Monday to Thursday, in the parking lot located behind the 3465 Durocher.

7.3. Food waste is collected in 14-L pails. These pails should be placed into the back of the truck. They do not need lids. Bring clean pails from New Residence Hall. They will be dropped off at locations that do not have a constant supply of clean pails (the SSMU building). The number of clean pails that should be picked up from New Res

7.4. The collection site of New Residence is in the loading dock, which is accessed by driving down to the "garage" area.

7.5. The collection sites for the Faculty Club and for the SSMU building are accessed through the laneway behind the buildings which is accessed by driving up McTavish Street from Sherbrooke Street West and taking a left at the traffic barrier.

7.5.1. The Faculty Club collection site is accessed from the basement at the back of the building.

7.5.2. The collection location at SSMU is in the cold room in the sub-basement.

Note: Before 6 PM, the cold room can be accessed directly via the garage with a fob otherwise; the cold room can be accessed through a staircase or by elevator to S2.

7.6. The cold room at Bishop Mountain Hall has to be opened by the staff; go in through the back door.

7.7. Record the amount of food accepted by noting number of bins at each pickup location on "Operator's Checklist."

8. Summer Operations

We have contacted Susteco the Big Hanna manufacturer to help us set the composter for the summer time. Here are the recommendations:

8.1. Food Deliveries Twice Per Week (up to 200 kg per week)

- Run time = 1.5 minutes
- Waiting time = 4 hours
- Filling level = 8

- Heating blanket = off

The Big Hanna will empty for 1.5 min every 32nd hour.

Inside cylinder the material will shrink together due to the composting process so in a couple of weeks it will be less material inside cylinder (if you do not recycle material or add much). The temperatures will drop even more since the composting process is finished (nothing left for the bacteria to eat by the end of the cylinder). The maturation phase takes place in a bigger part of cylinder. The compost coming out is finished and can be sent to the maturation bay.

8.2. **No Food Deliveries**

- Run time = 1.5 minutes
- Waiting time = **8 hours**
- Filling level = 8
- Heating blanket = off

8.3. **Late Summer Start Up**

Reset the settings to **(1.5 hours wait time with 2.5 minutes run time)** when food collection resumes. We need to wait one whole week before the process adjusts. During this week, temperatures and moisture levels will readjust to normal.

9. **Alarms and Troubleshooting –** Operator will notify Composter Project Coordinator of any alarms on the display screen or other non-normal operations of the composter and record the alarm.

9.1. **Open door alarm:** This alarm occurs when a door is open or not securely shut, or when emergency button is engaged.
Alarm text: “Emergency trip or door open. Release emergency button, or close inspection door.”

Steps to take:

1. If you have engaged the emergency button, release it by turning it slightly clockwise until it pops out. If you have not, the alarm was likely tripped by a door sensor.

2. Close any open doors.

3. If all doors seem closed, go to the last door opened (most likely the in-feed chamber or inspection point).

4. Open the door.

5. Close the door securely. The alarm should now clear from the screen. If not, notify the Composter Coordinator or Vertal Inc.

9.2. **In-feed conveyor alarm**: This alarm typically occurs when something "pinches" between the auger and the auger in-feed tube. The composter is programmed to reverse the auger automatically to try and free the pinched material. After three attempts to reverse and proceed normally an alarm will register on the screen. It will also come on if the in-feed chamber door is opened and closed too fast (less than 10 seconds).

Alarm text: "**Frequency inverter cylinder fault"**. Open electrical cabinet, examine frequency inverter, and follow instructions in frequency inverter manual."

Steps to take:

1. Open the in-feed chamber door. Wait ten seconds. Close the door.

2. If the alarm didn't go away, something must be stuck in the auger. Go to "Settings". Type in the password 5697.

3. Go to "Manual mode"

4. Select "Inverse" and press and hold the "Enter" key for a few seconds.

5. Check the in-feed chamber. The auger should have reversed, and the blocking material can be removed (sometimes coffee tapes cause this problem. They, along with other long material that can get wrapped around mechanical parts, need to be put in through the first inspection door rather than in the in-feed chamber).