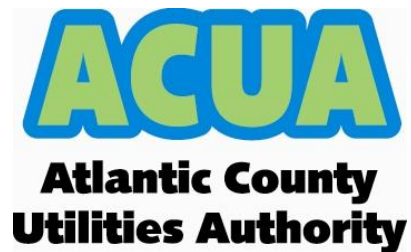


William Davies Middle School

Waste Audit



April 5, 2019

Prepared by:

**Rebecca Turygan, Alexis Demitroff,
& Gary Conover**

On December, 17th, 2018, Gary Conover, ACUA Solid Waste Director/Atlantic County Recycling Coordinator, Alexis Demitroff, ACUA Education and Public Outreach Assistant, Ryan Mahoney, ACUA Communications Assistant, and Ingrid Perez, Hamilton Township Recycling Coordinator visited William Davies Middle School in Hamilton Township, NJ to assist with the school's Waste Audit. The walk-through inspection of the Primary School occurred on February 1st, 2019. ACUA staff members met with Travis Davis and Megan Jackson, both teachers at William Davies Middle School to perform a walk-through recycling inspection of the school's current recycling efforts and procedures. Data was collected during the first visit to analyze what was actually thrown away in the trash can compared with what was correctly classified during disposal. Ultimately, recommendations and improvements to increase the school's rate of recycling will be listed, if necessary.

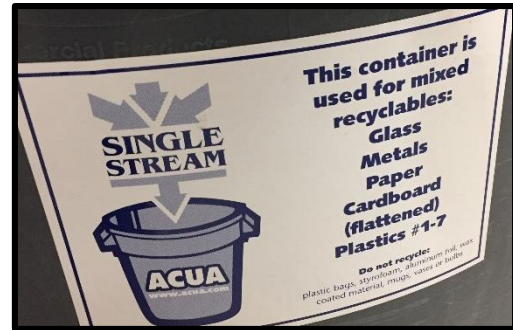
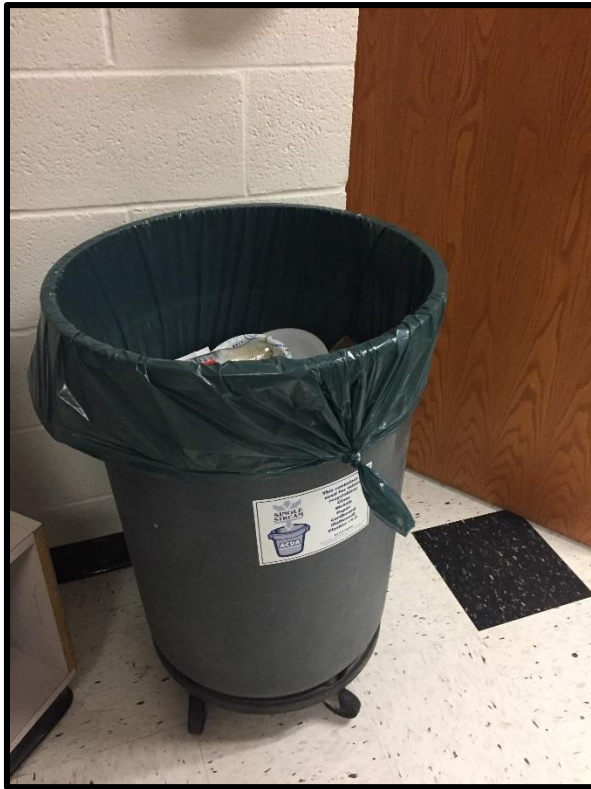
Both Travis Davis and Megan Jackson escorted ACUA representatives throughout the different departments and sections of the school to show recycling procedures inside the facility. The visit focused on a few areas: Main office, Faculty Room, Nurse's Office, cafeteria, classrooms, the gym, art room, and hallway. Recommendations for each of these areas are stated below.

Main Office/Copy Room



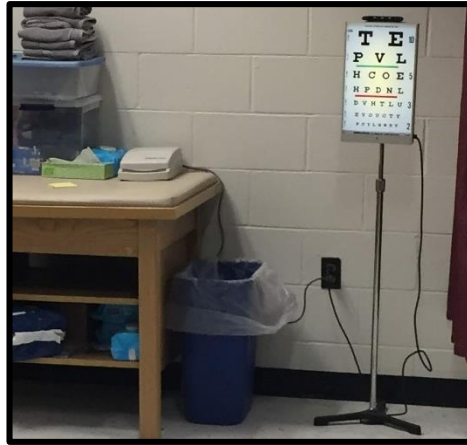
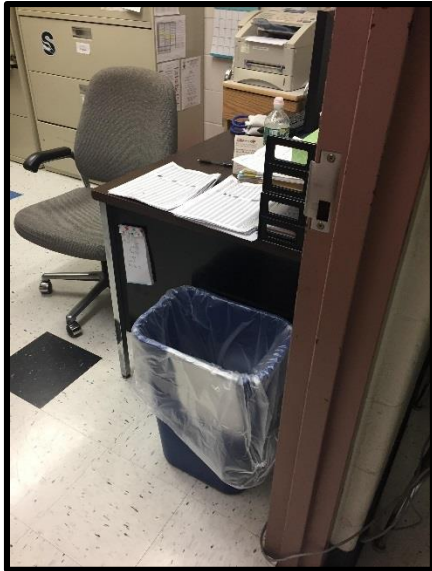
Observations	Recommendations
Recycling and trash containers are both present, but not beside one another.	Pair trash and recycling containers beside one another for best recycling participation.
One container is labeled both as trash and recycling.	Keep signs consistent for lower contamination.
Outdated recycling rules are posted.	Great idea to post accepted items above the recycling container. Please post the updated rules in a more visible location.

Faculty Room



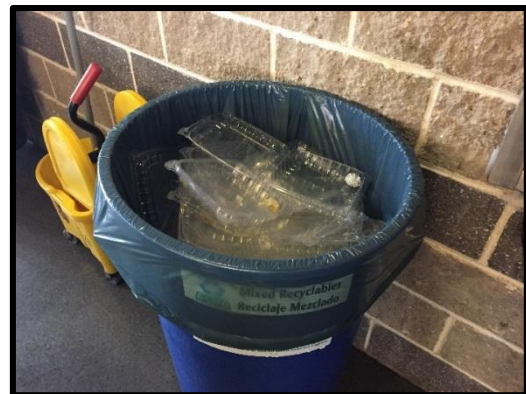
Observations	Recommendations
Staff area has access to one recycling container. This container has both trash and recyclable material inside.	Pair trash and recycling containers beside one another for best recycling participation.
Outdated recycling rules are posted on container.	Please post the updated recycling rules to reduce contamination in the bin.

Nurse's Office



Observations	Recommendations
Recycling and trash containers are both present, but not beside one another.	Pair trash and recycling containers beside one another for best recycling participation.
Medical sharp materials have special designated disposal container.	Great work! This reduces hazards to students and workers.

School Cafeteria



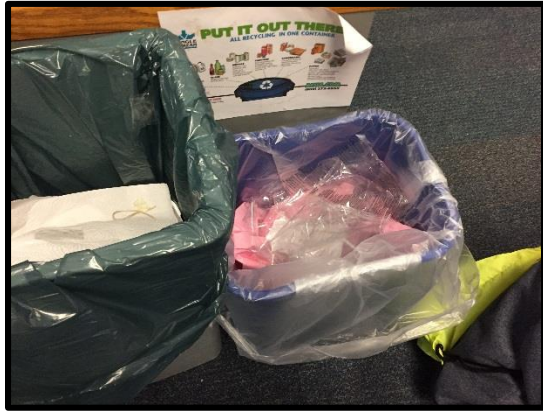
Observations	Recommendations
Outdated recycling rules are posted.	Great idea to post accepted items above the recycling container. Great prominent location! Please post the updated rules.
Contamination in the recycling container is present.	Plastic “clam shell” containers are no longer accepted for single stream recycling collection. Please place this material in the trash.
Staff members are present and willing to assist students with proper disposal.	Great work. Please be sure to communicate the newest rules for appropriate material for trash and recycling.
Foam trays are present during lunchtime.	See Appendix A for foam options.
Food waste present during lunch time.	Consider compostable food waste options. See Appendix B.
Uneaten food is collected as a donation.	Great work diverting material from the waste stream and putting it to good use!

Outside Dumpster Area



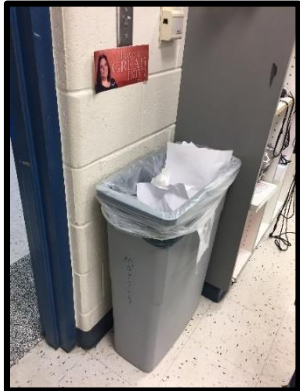
Observations	Recommendations
It is somewhat unclear which large dumpsters are designated for trash or recycling	ACUA stopped by in March with new labels!
Recyclables are bagged.	Please remove bags when possible.

Typical Classrooms



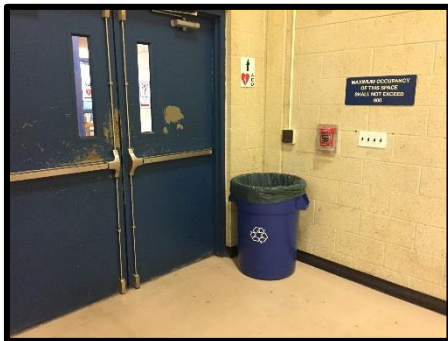
Observations	Recommendations
Recycling containers are often paired beside trash cans in classrooms.	Excellent work.
Sometimes recyclable material is present in the trash can.	Signs displaying accepted material can be posted above the container as a reminder.
Outdated recycling rules are posted.	Great idea to post accepted items above the recycling container. Please post the updated rules.

Art Room



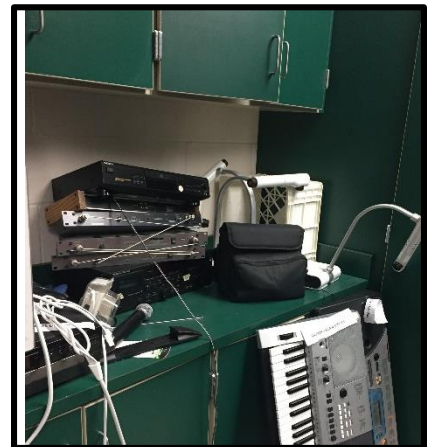
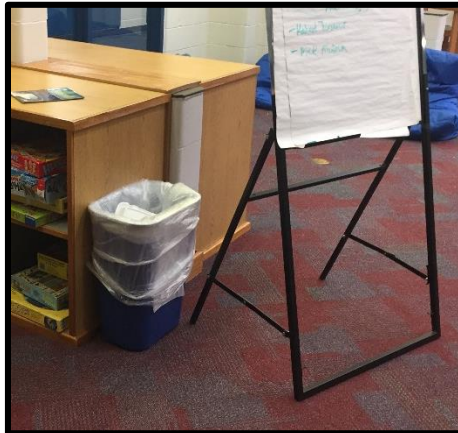
Observations	Recommendations
Recycling containers are often paired with trash cans in classrooms.	Excellent work.
Sometimes recycling is present in the trash can.	Signs displaying accepted material can be posted above the container.
Items destined for disposal were put to good use with thoughtful recycled art projects.	Great work!

Music Room / Gymnasium



Observations	Recommendations
Recycling containers are not paired beside a trash can.	Please place a recycling container beside a trash container for minimal contamination in the recycling container.
Sometimes recycling is present in the trash can.	Signs displaying accepted material can be posted above the container.
Outdated recycling rules are posted.	Great idea to post accepted items above the recycling container. Please post the updated rules.

Library/Storage



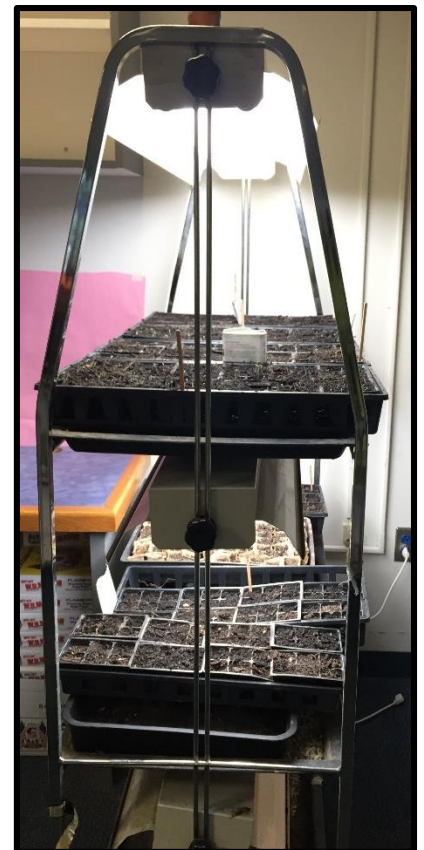
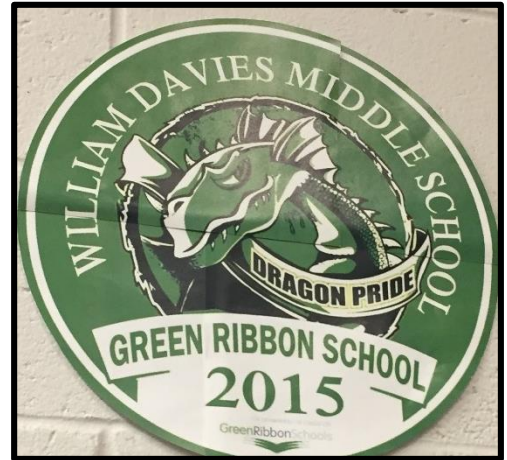
Observations	Recommendations
It is somewhat unclear which disposal bins are trash or recycling. No signs are present.	Please label unmarked bins to minimize confusion.
Many outdated electronics were collected in a storage area and will be sent for recycling at Atlantic County's 4H e-waste recycling program.	Great work!

Hallway

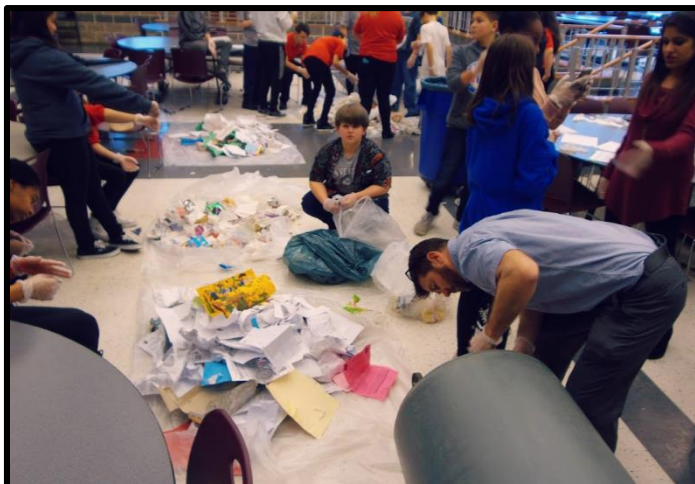


Observations	Recommendations
Large recycling containers are present in the hallway.	Recycling is accessible and convenient.
Some signage is present, but not always.	Please clearly mark containers.
Contamination was present in the recycling container.	Pair trash and recycling containers side by side.

Highlights----KEEP UP THE GOOD WORK!



Waste Audit Pictures





School Waste Audit Worksheet



Name William Davies Middle School

Date 12 - 17 -2018

Supplies:

- Empty plastic trash bags
- Bagged trash sample (not the nurse's trash!)
- Gloves
- Large empty trash container
- Scale

What does your trash sample represent? (Which room is your trash from and from how many class periods or days?)

6 bags total. Students took a sample of 3 bags, so results are doubled.

Step 1. Weigh your trash can. Be sure to subtract this weight from each waste total.

Trash Can Weight

12 lbs.

Step 2. Weigh your initial amount of trash.

Total lbs. of trash

288 lbs.

Step 3. Divide your trash into compost, recycling, trash, and polystyrene, and then weigh each pile!

Compost

32 lbs.

Recycling

41 lbs.

Trash

116 lbs.

Polystyrene (trays)

35 lbs.

Step 4. Think about your results!

- How many pounds of trash can actually be recycled?
- Why is it important to recycle?
- Where does your trash go after you throw it away?
- Can you calculate waste generated per student?



Results and Conclusions

The Waste Audit conducted on December 17th, 2018, determined that about 40% of the sample was correctly classified as trash. 14 % of the trash sample contained recyclable material. Correct classification of recycled material would decrease the weight of the trash and ultimately keep material out of the landfill. 11% of the sample was compostable material and an additional 22% consisted of moist liquid content. 12% of the material consisted of polystyrene trays. Implementing a composting program or a reusable lunch tray option would certainly decrease weight and volume of the total trash. Please see attached appendices.

Overall, William Davies Middle School is doing a fantastic job with correct disposal, but there are some areas that could improve. Classrooms should always pair the recycling containers beside the trash containers and label some items appropriate for the recycling container. The consistency and repetition of recycling containers in classrooms reinforces the concept of recycling and familiarizes students with proper disposal. Eventually, recycling will be routine and not guess work. Practicing less trash creation in the classroom and lunch room is a good idea too. For example, making use of scrap paper, using both sides of paper, and taking an appropriate amount of food in the cafeteria, not too much, will help the school have a smaller ecological footprint.

School staff are doing a great job repurposing material otherwise destined for disposal. During the walk-through, ACUA staff saw numerous classrooms that put a creative spin on recycled art projects and thoughtful ways to spread the message about proper recycling throughout the school. Additionally, staff members located a nearby electronic waste recycling operation, as a disposal option for the school's outdated electronics.

On April, 16th 2019, 50 students have the opportunity to visit the Atlantic County Utilities Authority to get a firsthand look at Atlantic County's Recycling Center. They will learn why recycling the right way is so important. Then, they will learn what happens when material isn't recycled. Atlantic County's landfill is one of the highest points in the county. Scheduling this follow-up field trip is a good way to really emphasize why it's so important to be mindful of the waste we all generate. Great job to the students and staff at William Davies Middle School!

Recycling facts about Schools

- People, Businesses, **Schools** and other organizations generate, on average, 4.7 pounds of waste per person every day.
- **Schools** and other Educational facilities often are among the largest waste generators in any City, County, or State.
- At least 40% of the typical **Schools** waste is paper (the largest single component of all school waste).

Contacts

**Gary Conover - ACUA Solid Waste Director/
Atlantic County Recycling Coordinator**

Phone: 609-272-6913

Email: gconover@acua.com

**Alexis Demitroff- ACUA Public Education
and Outreach Assistant**

Phone: 609-272-6937

Email: ademitroff@acua.com

Ryan Mahoney – ACUA Communications Assistant

Phone: 609-272-6921

Email: sverrillo@acua.com

Rebecca Turygan – Environmental Research Assistant

Phone: 609-272-6962

Email: rturygan@acua.com

Travis Davis – 8th Grade Science Teacher, William Davies Middle School

Phone: 609-476-6241

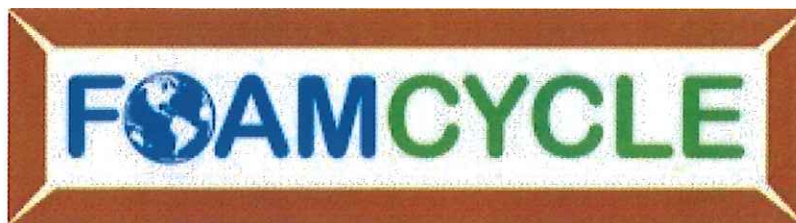
Email: davist@hamiltonschools.org

Ingrid Perez – Hamilton Township Recycling Coordinator

Phone: 609-625-1511

Email: IngridP@townshipofhamilton.com





Recycling Program

Solid waste reduction through Expanded
Polystyrene #6 recycling





Introduction

Foam Cycle LLC was founded in 2015 with a focus on helping counties, municipalities, colleges, schools and business **Reduce, Recycle, and Repurpose** foam packaging materials incorrectly known by its Dow Chemical trade name “Styrofoam” and correctly called Expanded Polystyrene (EPS), #6 plastic or simply Foam.

Our first Foam Cycle collection and recycling system is currently operating at the Sussex County Municipal Utilities Authority (SCMUA) residential recycling drop off center located at the foot of the counties 250 acre landfill in Lafayette, New Jersey.

According to SCMUA, over a six month period the county has successfully removed and recycled over 2.5 tons of EPS from their landfill (2 tons of condensed foam = 1 full tractor trailer full of loose foam packaging). This reduction of foam has saved SCMUA over \$10,000 worth of valuable landfill space based on their tipping fees. This saving is in addition to the \$300 a ton market value the EPS foam ingots have when sold as feedstock to a New Jersey based picture frame and moldings manufacturing company.

Focus

Landfill capacities are decreasing with population and industrial growth. The sale of foam packaged goods like appliances and televisions are on the rise. More people are internet shopping resulting in a buildup of packaging materials included in their trash and roadside dumping increases when there are no recycling options available.

High trucking costs and focus on a reduced carbon footprint make the collection and transportation of loose light weight EPS foam unfeasible. The challenge of recycling a non-biodegradable product which is made up of 95% air and takes up 20-30% of the world's landfill space needs to be reduced through implementing new technology and an innovative approach.





Solution

Municipal and county recycling drop-off centers provide residents with on-site options to recycle glass bottles, newspapers, cardboard, plastic bottles, metal cans, electronics and a long list of other materials but no option was available for recycling one of the most environmentally damaging yet 100% recyclable materials, EPS foam packaging.

Through proper planning and education on the use of the Foam Cycle self-contained recycling process, the foam densifier unit repurposes EPS #6 into a quality material called ingots and sold as feedstock to picture frame and building material manufacturers.

The Foam Cycle recycling program supplies the proper tools, education and training in order for your county or municipal recycling drop-off site to operate a seamless daily EPS foam collection and processing operation. Once implemented, this program will certainly be met with cheers from the ever growing environmentally aware and engaged recycling community.

Visit us at: www.FoamCycle.com or **call us** toll free at 1-844-FoamCyc (844-362-6292)

Email: Beth Coleman, Foam Cycle Sales Coordinator at Beth@FoamCycle.com

Mailing address: PO Box 181, Augusta, New Jersey 07822

Our innovative and patent-pending Foam Cycle container recycling system allows counties, municipalities, schools, colleges and businesses to collect, recycle, process and market Expanded Polystyrene (EPS #6) – also known as EPS, Styrofoam or simply Foam.

Reduce - Recycle - Repurpose



Testimonial:

"The Foam Cycle recycling system has provided a tool for managing a difficult material at the Sussex County MUA Landfill. Collection and processing of the EPS was seamlessly integrated into the daily operations. County residents and businesses are excited to finally have a location they can bring their foam to be recycled!"

*- Reenee Casapulla
Recycling Coordinator
Sussex County MUA*

XT70

Multiple Foam Densifier



Think small... & Versatile.

Densify all the foam waste you have... and save.

The Compact, Versatile **XT70 Multiple Foam Densifier** by **RecycleTech** is designed to be installed in smaller places, and to process **EPS, EPP, EPE, & PSP** wastes including food trays* and foam cups & containers.

Our clients are not only saving thousands of dollars daily on their waste hauling cost, but also **generating income** with our foam densifiers!

RecycleTech will buy back 100% of your densified foam waste.

• Applications

- Schools, hospitals, and organizations with cafeterias
- Small-sized warehouses/retail stores
- Grocery markets

• Why XT70

- Processes Multiple Materials - i.e. **Food trays***, **containers**, and **EPE packaging blocks**
- Compact size fits smaller spaces
- Competitively priced / Cost effective
- Easy to move around (Can be mounted on a truck to form a *Mobile Foam Recycling Station*)

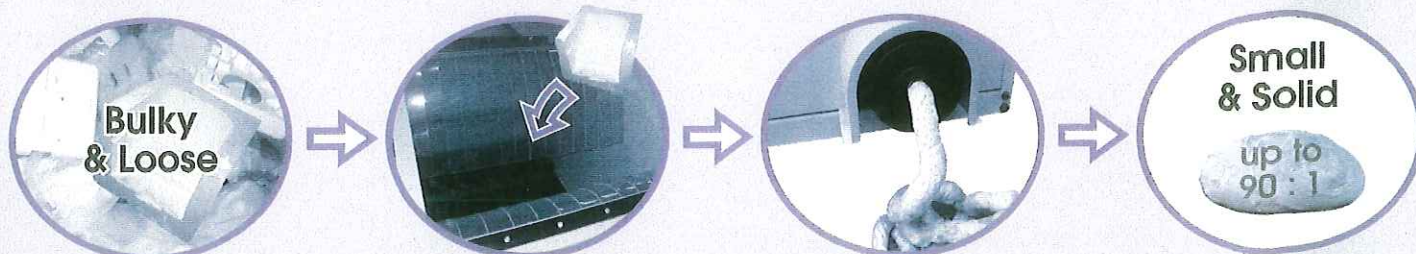
*Food containers need to be free of food waste



Patent Pending

How it Works

- Volume Reduction Ratio of up to 90 to 1.



Densifies up to 50 lbs of foam per hour.

PLASTICS

RECYCLING UPDATE

A Resource Recycling, Inc. Publication

Equipment spotlight: Complete setup for a foam-collection program

Posted on **March 31, 2017**

by [Jared Paben](#)

A package of equipment from New Jersey-based Foam Cycle aims to help organizations, including municipalities, with their expanded polystyrene (EPS) recycling efforts.

The new company is offering what it calls the [Foam Cycle container recycling system](#), a public collection bin, portable building and densifier. Its focus is to help local governments, schools, universities or businesses kickstart efficient EPS collections.

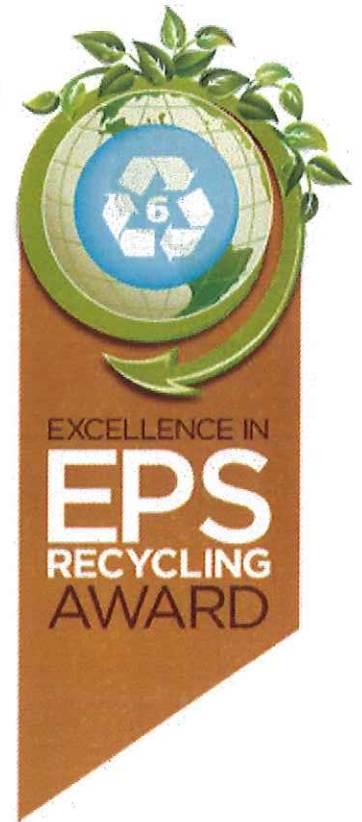
The “building” is a specially designed shipping container, complete with electrical hookups, interior lighting and exhaust fan. Inside of it is a densifier from RecycleTech capable of processing, depending on the model, 50 pounds to 200 pounds per hour of foam. It yields a 90-to-1 reduction in volume, allowing for economical transportation to a reclaimer.

The shipping containers allows for storage and processing of foam, regardless of weather conditions. It also allows staff to lock up and secure equipment when not in use.

Also included in the package is a public collection bin from RecyclingBin. Foam deposited into it falls into a super sack for carrying to storage or to the densifier.

About six months ago a unit was installed at a landfill in Sussex County, N.J. The Sussex County Municipal Utilities Authority (SCMUA) is using it to offer an EPS recycling option for their residents. It lets the county collect protective packaging for durable goods, but SCMUA doesn’t accept packaging peanuts, foodservice packaging, colored EPS or materials with tape or labels.

“The Foam Cycle recycling has provided a tool for managing a difficult material at the Sussex County MUA Landfill,” said Reenee Casapulla, SCMUA recycling coordinator. “Collection and processing of the EPS was seamlessly integrated into the daily operations. County residents and businesses are excited to finally have a location they can bring their foam to be recycled.”



ABOUT THE AWARD

The Excellence in EPS Recycling Award was created to recognize outstanding achievements and best practices in foam recycling, including special initiatives, innovation and technology advancement. The award also heightens EPS recycling awareness and serves as a model for others to improve their programs.

EPS-IA welcomes entries from businesses, schools, government and non-profit agencies, civic or volunteer organizations and individuals.

AWARD CRITERIA

Each individual company or entity is judged on achievement(s) in one of the following categories:

SPECIAL PROGRAMS & INITIATIVES

New program developments or existing program improvements that significantly increase EPS recycling.

RECYCLING ADVANCEMENTS

Innovations in recycling that show exemplary results in material processing efficiencies.

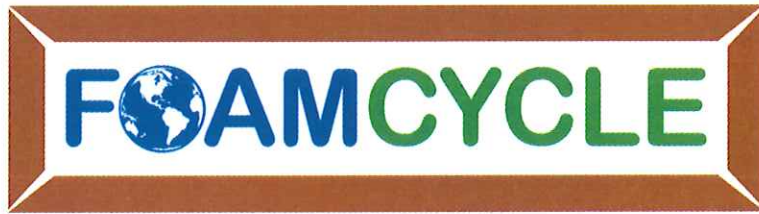
TECHNOLOGY INNOVATIONS

Improvements to existing technology or developments of new technology that expand EPS recycling efforts.

2016 AWARD WINNER

Foam Cycle LLC – Augusta, NJ

The winner of the 2016 Excellence in EPS Recycling Award is Foam Cycle, LLC who created an innovative and patent-pending container recycling system that allows counties, municipalities, schools, colleges and businesses to collect, recycle, process and market EPS foam. Their first one-stop EPS foam education, collection, processing and transportation system was recently installed at the Sussex County MUA Landfill that has been seamlessly integrated into daily operations. Over 2 tons of EPS foam was collected and processed in its first four months.



Complete Foam Cycle Recycling System Quote

Customer Name:

Address:

Phone:

Email:

Amount	Item Description	Included	Additional Cost
1	20" x 8" Foam Cycle steel container with 2-8' wide metal roll up doors	X	
1	Exterior mounted signage	X	
1	XT-70 Recycle Tech brand densifier	X	
1	32" x 36" 2000 lbs. Fairbanks brand dollie with 5" x 2" two lockable wheels	X	
1	RecyclingBin brand steel outdoor foam collection bin with 3 reusable polybags	X	
1	Interior mounted 3 phase power electrical disconnect box	X	
1	16" Interior mounted exhaust fan	X	
1	5' interior LED light	X	
1	Interior electrical switches and wiring	X	
1	Delivery to your site FAS Hillsborough NJ		To be determined
Total			\$48,500.00

- All equipment is delivered in new condition including the 20" x10" steel container.
- 100% no money down financing is available through Marlin Equipment Finance

Foam Cycle LLC / PO Box 181, August New Jersey 07822 / Tel: 1-844-Foam-Cyc

Email: Beth@FoamCycle.com / **Web Site:** www.FoamCycle.com

Cafeteria Composting in Schools

Strategies, Systems and Resources for Lane County Schools



CAFETERIA COMPOSTING IN SCHOOLS

By Rachel Elise
Sanders with input
from the original
SGP Compost Manual
by Rosie Sweetman,
2013

The School Garden Project of Lane County

(541) 284-1001
info@schoolgardenproject.org

Who is this manual designed for?

This manual is for
anyone who is in-
terested in helping
schools implement
composting pro-
grams: students,
teachers, commu-
nity members, food
service staff, custo-
dians, volunteers,
parents and anyone
else with an interest
in composting.

Contents

Why Compost at Schools? (p. 1)

Building Support (p. 1)

Ideas for Involving Community and
School Support (p. 2)

Conducting a Waste Audit (p. 3)

On-site Composting (p. 4-5)

City of Eugene's Commercial Compost
Program: Love Food Not Waste (p. 6)

Combination of On-Site and Com-
mercial Composting (p. 7)

Choosing an Appropriate System and
Site (p. 8)

Implementing Your Program (p. 8-9)

Appendix: Resource Guide (p. 10-11)

- a. Local Resources
- b. Business Contacts
- c. Useful School Composting Contacts
- d. Carbon/Nitrogen Sources and Ratio Chart
- e. Troubleshooting Guide
- f. MASCOT Checklist
- g. FAQ: Compost Safety

Why Compost at Schools?

On average, a school of 200 students generates 75 pounds of compostable waste each week, or over 3,000 pounds per year. Here in Eugene, over 50% of the waste sent to landfills is compostable.

These wasted resources are also a lost opportunity to teach our youth lifelong sustainable practices. By establishing composting programs at schools, we can reduce landfill waste, educate students about the relevance of resource conservation and composting, and generate a useful amendment to boost the health of school vegetable and habitat gardens.

Successful programs are fundamentally student-driven, with support provided by volunteers and school staff. Numerous local schools, such as Edison, Edgewood, Adams, and Cesar Chavez, have implemented low-cost, sustainable cafeteria composting programs that represent a sound educational, economic, and environmental choice.

Building Support

While the enthusiasm and energy to start a composting program might start with one person, the best way to create a functional, thriving school composting program is to engage a broad group of stakeholders in the effort: students, parents, teachers, administrators, community members, and (most importantly!) cafeteria and maintenance staff. ***This is an important first step.*** By energizing students, developing a group of key volunteers, and gathering input from school staff from the beginning of your program, your efforts are much more likely to succeed.



Many schools find it useful to create a “Compost Committee” that might or might not overlap with a Green School or Garden Committee. Responsibilities can be divided among committee members depending on their available time and interest. For example, students and custodial staff might be most involved in the daily transfer of food waste to the compost bin, while a parent or community member would take responsibility for turning the pile every two weeks, or delivering coffee grounds or sawdust to amend the pile.



Ideas for Involving Community and School Staff

1 Present the idea of a composting program at a PTO or school board meeting. Have your facts ready about how much money the school spends on waste disposal, what volume of compostable waste a typical school sends to the landfill in a year, and how you see a composting program fitting with the school's mission.

2 *Solicit parent or community volunteers to help by doing a very straightforward job on the compost team, e.g. ordering leaves from the City in the fall, or helping with bin construction. Consider ways to move volunteers from the "outer circle" of one-time jobs to an "inner circle" of consistent caretaking responsibilities.*

3 Talk with cafeteria and maintenance staff about your ideas for the program. Ask them how a program could be set up so that it wouldn't create extra work for them.

4 *Highlight the benefits of implementing a composting program with your school principal, or at a staff meeting. Becoming a certified Oregon Green School gives the school prestige and access to grant funds and conference participation.*

5 Ask teachers whether they can think of students who would like to be part of a "Green Team" to train other students to sort compost, and to help with daily tasks.

6 *Partner with other groups and organizations for assistance such as Lane County Extension Service Compost Specialists, the Oregon Green Schools Association, your local Neighborhood Association or Grange, the City of Eugene, and the School Garden Project.*

7 Keep in mind that it's fine to start small. If cafeteria staff is reluctant to jump into post-consumer composting, consider starting by composting leftovers from the salad bar once a week, and build on your small successes. A typical building process looks like this. Some schools start by composting everything at once without realizing that the compost process is part science and part art. A learning curve is involved.

- Compost salad bar material once a week
- Compost salad bar materials every day
- Compost food scraps from lunches on a voluntary basis
- Compost all bread products as well
- Compost classroom snacks
- Compost breakfast foods as well
- Compost after-school program snacks

Conducting a Waste Audit

Conducting a waste audit is a fun, hands-on step in implementing a school compost program. It not only helps to identify how much volume of compostable material is generated by the cafeteria, it also gets students, teachers and staff thinking about the waste stream and what comprises it. Not all food material can be composted on-site, and during the waste audit process participants learn how to appropriately separate based on the type of compost program you are starting



(on-site, commercial composting or a combination of the two). The audit will identify the weekly volume of compost and thus help determine what size of operation and system will work best.

When conducting a waste audit, try to involve students, faculty and cafeteria staff. While a two-week time frame is ideal, the audit can be done over a one-week or even one-day period. ***In Eugene, Oregon Green School Coordinators and/or OSU Extension Compost Specialists are often available to assist with or lead waste audits.***

To conduct a waste audit:

- 1 Choose an appropriate day ahead of time to perform the audit, making sure to notify kitchen staff.

Have materials available.

- 2 Place bucket in kitchen to collect preparation waste (this is the waste produced before the meal is served including fruit peels, lettuce cores, veggie scraps, etc.).

Have materials available.

- 3 Place bucket in kitchen to collect preparation waste (this is the waste produced before the meal is served including fruit peels, lettuce cores, veggie scraps, etc.).

- 3 Decide how you want to sort your compost for the audit. Do you want to sort out all possible compostable materials or only the things that could be composted on-site? Once you've decided, place two or three clearly labeled bins or trashcans in the cafeteria wherever the trash cans usually stand. Using five gallon buckets makes measurement easier. Label one bin "Fruits, Vegetables and Napkins" or "Food Scraps" and another "Waste" or "Plastic and wrappers." Have plastic gloves and spatulas available to help sort the food waste.

- 4 As students approach the sorting station, help them to scrape their food waste and trash into the appropriate bin. This is a good place to involve student helpers as "compost monitors."

- 5 Record the volume (and weight) of the compostable food at the end of the lunch period.

The following chart will help with converting the gallons collected to the cubic feet volume necessary for determining an appropriate composting system. A 3'x 3'x 3' bin equals 27 cubic feet.

7 1/2 gallons.....	1 cubic foot
45 gallons divided by 7.5	6 cubic feet
202 gallons.....	27 cubic feet

Overview of Compost Programs

Now that you have a good estimate of the volume of compost generated in a week, you may now determine what type of program will work best. Options for your compost program include:

- On-site bin system (or alternate on-site system, see appendix)
- Commercial compost program Love Food Not Waste
- A combination of both an on-site bin system and commercial compost program

When choosing what type of compost program to start, there are many factors to consider besides volume. These include availability of volunteers, cost, labor, amount/type of food and yard waste, available land or site, and the age of the students.

On-Site Bin System

Bin systems range from backyard black plastic domes to a three-bin wooden structure.

The bin needs to be at least large enough for a 3x 3x 3 foot pile to sustain the high temperatures necessary for good composting. Food waste is added to the bin along with a carbon source such as leaves or sawdust. The active compost pile should be turned intermittently to incorporate air and eventually set to rest until it is fully decomposed (a process called “finishing” or “curing”).

It is important to make sure the bin is rodent proof. This can be accomplished by installing $\frac{1}{4}$ inch hardware cloth on the ground and around the sides of the bin if rodents are a concern on site. Installing a lid will help with pests, odor, and moisture levels. If plastic domes are used, it is recommended to have multiple vessels because they tend to fill up quickly and will need 6-12 months to fully decompose.

If space allows, preference should be given to the three-bin structures because they are easier to turn, and can hold more material than the black plastic domes. Thus, composting efforts can be expanded in the future as needed. The non-active bins can hold carbon materials (leaves, sawdust) or finishing compost. The bin structure also allows students and others to see the compost process and observe it more thoroughly than if it is contained under black plastic domes.





Some other ideas for on-site composting:

Vermicomposting- Composting using worms can be done utilizing a variety of technologies and is an especially good small-scale way to introduce the idea of composting. Small worm bins can be placed in classrooms and monitored by the students.

Compost Tumbler- This system, which consists of a mounted barrel which is spun by a handle on the end, operates on the principle of consistent turning, or 'tumbling' of the compost. Many models are advertised as needing no source of carbon.

Metal Barrel Composting- This system is a simplified, low-cost version of the compost tumbler, comprised of metal barrels with holes manually drilled into the bottom and sides of the barrel for aeration.

Sheet Mulching- This is an option if the school has an area they would like to convert into a garden bed. First lay down newspaper and cardboard over the area. Then layer food scraps, leaves, manure and straw into a garden bed shape. Let the pile rest and over 4-6 months it will break down into a rich garden bed. Be sure to keep the pile moist as you would a compost pile.

On-Site Bin System Breakdown:

Costs: \$0-\$1,000 (materials can be donated and construction done in school). A functional three-bin system can be constructed for less than \$400 (cost of materials).

Labor necessary: 5-10 hours a week, which can be done by students K-12. Younger students will obviously require supervision and assistance.

Materials that can be composted: Fruit, vegetable and grain food scraps from the cafeteria, vegetative waste, grass clippings and yard waste, sawdust and leaves.

Advantages: Relatively easy to maintain, low cost. On-site composting allows students to see and participate in the full compost process from cafeteria until it gets back into the garden.

Disadvantages: On-site composting is slow, it will take between 3 months to a year or more for a finished product. Requires regular maintenance and labor. Often the compost produced by on-site composting is overly woody from the quantity of sawdust that needs to be added to keep fruit flies down.

Costs: Ideally starting commercial compost collection will decrease the amount of trash collection needed by the school, so the cost of the additional bin will be compensated for by that decrease. However, to start out with a 65 gallon bin that receives one collection a week, schools should expect to pay around \$30/month.

Labor necessary: Startup labor of 5-20 hours to educate the faculty, kitchen staff and students about how to sort their compostable materials. After the initial setup, the commercial composting program shouldn't require much additional labor.

Materials that can be composted: Meat, bones, fish, dairy, baked goods, fruits and vegetables, food-soiled paper, paper towels, napkins, yard debris, waxed cardboard, and plant trimmings.

Advantages: No compost area or on-site labor needed. Can handle a much wider range of compostables than an on-site system could such as meat, bones, dairy and waxed and regular paper. Provides the school with an assured quality of finished compost that can be used in their school garden.

Disadvantages: Takes the process off-site and away from the students. Does not provide the school with an on-site source of free compost for use in their school garden.

City of Eugene's Commercial Compost Program: Love Food Not Waste

In the fall of 2011 the City of Eugene launched a new commercial composting program called Love Food Not Waste.



The program connects haulers with businesses, schools and other commercial institutions that produce large quantities of compost so meat, bones, fish, dairy, baked goods, fruits and vegetables, food-soiled paper, yard debris, waxed card-

board, and plant trimmings can be diverted from the landfill and taken to Rexius to be composted. The compost Rexius makes from the Love Food Not Waste program will be available for sale for schools and homeowners alike.

The steps to getting started with Love Food Not Waste (LFNW) are:

- 1** Contact your garbage hauler to sign up for service.
- 2** Schedule a session with your hauler to provide free technical training.
- 3** Raise awareness among your staff and students. Here you can find an educational poster from LFNW: <http://www.eugene-or.gov/DocumentCenter/View/8786>
- 4** Start composting!

For more information about LFNW, visit their page on the City of Eugene's website! <http://www.eugene-or.gov/index.aspx?NID=759>

Combination of On-Site and Commercial Composting

If your school is producing more compost than you can handle in an on-site system, but you still want your students to have the experience of producing their own compost, you could choose a hybrid method of on-site and commercial composting. This way your school can easily compost your fruits, vegetables, grains and garden debris while sending the meat, dairy, bones and paper to the hauler for commercial composting.

We've found that schools that choose this method only require a 35-gallon bin from the hauler, so their monthly fee is about half of what it would be for the larger, 65-gallon bin.



Costs: As with the commercial composting program, the combination of on-site and commercial composting will decrease the amount of trash collection needed by the school, so the cost of the additional bin should be off-set by the reduction in the garbage bin. To start out with a 35-gallon bin that receives one collection a week, schools should expect to pay around \$15/month.

Labor necessary: Startup labor of 5-20 hours to educate the faculty, kitchen staff and students about how to sort their compostable materials. Expect between 5-10 hours of work every week for your on-site composting.

Materials that can be composted: Meat, bones, fish, dairy, baked goods, fruits and vegetables, food-soiled paper, paper towels, napkins, yard debris, waxed cardboard, and plant trimmings.

Advantages: The school can both compost 100% of their compostable materials while also maintaining the educational opportunities of the on-site compost program. The school can continue to make their own compost on-site, which can be used in their school garden.

Disadvantages: It does still require all of the work of an on-site composting program.

Choosing an Appropriate Program

Before deciding on a system for your school, evaluate the strength of your compost committee or volunteer team. Is there a teacher that would be willing to have his/her classroom take on the composting maintenance? Are there parents or community members who will be willing to volunteer with turning the compost? Is there a custodian or food service employee that will help set up the cafeteria sorting system before breakfast and lunch, and tell a teacher if something has gone wrong?

If you do have an active group, a helpful step in choosing which compost system will work at your school is to visit other schools of a comparable size that have are doing cafeteria composting and discuss how their program works for them.

Implementing Your Compost Program

Once you have your system in place and your compost team is ready to get going, it will be time to train the student body to sort their waste. In the cafeteria it is important to have clear signs and waste collection station(s). Place the compost collection bucket next to the garbage/tray collection area. Signs should be posted for both compost and garbage and making the distinction between the two. If you are doing a combination of on-site and commercial composting, make sure students know which foods can be composted on-site, and which foods such as meat and dairy should be sorted into the off-site compost bin. All of these signs should have clear pictures as well as words so young students can follow along too.

- *During the first two weeks of the compost program it is important to have a compost monitor helping students sort out their compost but the monitor is not needed after the students have become used to the new sorting system. The monitor simply stands by the compost and trash and helps students sort their food scraps correctly.*

- Have someone, preferably a student or two, scheduled to empty compost at the end of the lunch period. A system that has proven to work well at Edison Elementary is assigning two students a day to empty the compost, with one student's duties rolling over to the next day. At Irving Elementary, two students are on duty for one week and it is always a job of the 5th grade.

- *If you are doing on-site composting have students or volunteers record the volume/weight of the compost and empty it into the active compost bin. There they can also record the temperature of the pile and make any observations such as site and smell (or a parent volunteer can do this part). Students then add a layer of carbon material to the pile (leaves or sawdust).*



- If you are doing on-site composting it is very important to have clear signage and directions at the compost bins. The signage should include a step-by-step list on how to empty the food scraps and layer the carbon material.



NOTE: Keeping tabs on volume/weight and temperature are not absolutely necessary, though it's recommended for gauging the success of your compost and gathering data to support the program. The City of Eugene requires schools seeking grants to keep this information.

It is also important to have signage for the adult volunteer who comes to turn the pile and add coffee grounds or alfalfa to heat up the pile if needed. Having a troubleshooting sheet on hand for how to deal with any problem situations (e.g. odor, low heat, flies) can be very helpful for novices. See pages 10-12 of this manual for this information. You may find it useful to detach these sheets and laminate them to keep near the compost site.

- *When the school is about to launch their compost program, let the whole school know. Have an act in the upcoming school assembly. One local school had an act at an assembly in which the principal hid in a garbage can as Oscar the Grouch and when another teacher tried to put compostable waste in the garbage he jumped out. Let all the teachers and students know through posters, announcements, newsletters, etc. Encourage parents, community, and students to visit the compost, use it in their classrooms as a learning tool, and sign up to help out with it.*

- When setting up the on-site compost bin area, make sure that there is a place to store carbon material such as leaves or sawdust. Most often the carbon is stored in a large covered bin such as a 35 gallon container (see Resource Guide) or it can be stored under an existing covered shed. Having a bucket of coffee grounds and/or baled alfalfa (nitrogen sources) on hand will be helpful for heating up the pile as needed and can be added once a week and turned in well.

Involving the Classroom

A local resource for classroom use is "One Rotten Curriculum," from the School Garden Project Lending Library.

Biology: Fungi, bacteria, actinomycetes and other organisms are found in the compost pile and digest a variety of materials.

Water, Air and Soil Quality: Discuss methane and leachate released from landfills which negatively impacts environmental quality.

Math: Volume, Weight, Temperatures and other calculations can be made from the pile and recordings.

Economics/Marketing: Compare costs of buying bags of compost with making compost. Discuss upfront investment and return costs.

Appendix: Local Resource Guide

Bins: There are 55 gallon plastic containers available for \$10 at Emerald Valley Kitchen. There are also 55 gallon metal drums available at Glory Bee for \$10.

Buckets: There are buckets available for free at Emerald Valley Kitchen, and occasionally at Dairy Girl. Check other local food processors.

Leaves: Often the district grounds crew can provide access to leaves collected on school grounds. If there are no leaves available, free leaves are available from the City of Eugene. For most compost systems, one will not need the 7 yard delivery they offer so it is best to get a load from one of the community garden sites:
Amazon and Alton Baker are best. (See City of Eugene Website: www.eugene-or.gov for directions to gardens)

Coffee Grounds: Coffee Grounds are great source of nitrogen. It may be easiest to go to a local coffee shop and ask for coffee grounds when you need them but there are some sites in Eugene with existing grounds distribution programs. Sweet Life Patisserie has coffee grounds accessible at all times in the parking lot under the cover of a plastic cabinet, be sure to return the buckets back to the cabinet after emptying the coffee grounds. Other locations include, but are not limited to: Starbucks, Market of Choice, Supreme Bean, One Cup, Full City Coffee, Dutch Bros at 13th and Garfield and Allan Bros. Be sure to bring containers and wear gloves.

Sawdust: 4J District schools can place a work order to the district and receive sawdust for free. Sawdust and woodchips are generally available from school wood shops, local arborists, wood workers or craftsmen. Try to avoid sawdust that has been made from wood with glue; the glue can be toxic.

Other odds and ends: For other odds and ends such as nails and screws, hardware cloth, wood, and posts there are a number of good places to check out. BRING Recycling is always a good first place to go before heading to other hardware stores.

Business Contacts

BRING Recycling.....	4446 Franklin Blvd. Eugene.....	541-746-3023
True Value.....	2825 Willamette St. Eugene.....	541-726-0950
	3041 Main St. Springfield.....	541-367-2221
Jerry's Home Improvement.....	2600 Hwy. 99 North Eugene.....	541-689-1911
	2525 Olympic St. Springfield.....	541-736-7000
Coastal Farm & Home Supply.....	2200 W. 6th St. Eugene.....	541-349-0556
Glory Bee, Inc.....	120 N. Seneca, Eugene.....	541-689-0913
Sweet Life Patisserie.....	755 Monroe, Eugene.....	541-683-5676
Emerald Valley Kitchen.....	90472 Woodruff, Eugene.....	800-588-7782

Useful School Composting Contacts

Anne Donahue...City of Eugene Compost & Urban Agriculture Coordinator...541-682-5542 anne.c.donahue@ci.eugene.or.us

- General support for implementing school compost programs

Josh Frankel...Oregon Green Schools & Partners for Sustainable Schools...541-636-0096 greenschools@live.com

- Information on Oregon Green School certification
- Information on OSGA grant opportunities

Patti Driscoll...OSU Compost Specialist.....patti.driscoll@juno.com

- Resource for expert volunteers
- Technical expertise on compost systems

Jenny Laxton...School Garden Project...541-284-1001...jenny@schoolgardenproject.org

- Educational resources and presentations
- Support for establishing school gardens

Stephanie Scafa...City of Eugene Love Food Not Waste Coordinator
stephanie.scafa@ci.eugene.or.us

Brett Jacobs...BRING Education Coordinator...541-746-3023...brettj@bringrecycling.org

- Presentations and resources on vermicomposting

City of Eugene Leaf Program...541-682-5383.....www.eugene-or.gov/leaf

- If you mention that you are requesting the leaves for a school, your order will be given priority.



Helpful Websites

Mansfield Compost Program: http://www.ct.gov/deep/cwp/view.asp?a=2718&q=325392&deepNav_GID=1645#Download

- *Comprehensive guide to school composting*

Oregon State Extension Service Compost Specialists: <http://extension.oregonstate.edu/lane/gardens/compost>

- *In-depth technical information on composting*

City of Eugene Leaf Program: <http://www.eugene-or.gov/leaf>

- *Downloadable PDF of Leaf Delivery Form (fill out and mail in)*
- *Information on how to use leaves as mulch or compost material*

Appendix II: FAQ & Troubleshooting

Carbon to Nitrogen Ratio Guide

HIGH CARBON	C:N
Straw (slow to break down but great for aeration)	75:1
Leaves	60:1
Newspaper	175:1
Sawdust	325:1
Wood Chips (slow to break down but offer good aeration)	400:1
Cardboard, Shredded	350:1
HIGH NITROGEN	
Fruit Scraps	35:1
Weeds (use only young annual weeds, not invasive weeds)	30:1
Vegetable Scraps	25:1
Grass Clippings	20:1
Coffee Grounds	20:1
Baled/dried alfalfa from a feed store	15:1

Green Mountain Technology Compost Calculator free download

<http://compostingtechnology.com/resources/compost-calculator-tool/>

This is a fun and easy to use calculator to help you determine the best materials to add to your compost pile.



Troubleshooting

Getting your compost pile “cooking” properly will take some fine tuning: this guide will give you some tips on how to address common issues. Refer to monitoring records when problems arise, as they may be helpful in determining the cause.

Problem	Solution
Smells like rotten eggs (sulfur)	Aerate Pile. Add more air to mixture by turning it and adding more bulking material like leaves.
Smells sour (like ammonia)	Add more carbon (leaves or sawdust) to the mix.
Mixture is dry	Add water and turn.
Mixture is too wet	Aerate pile daily until pile returns to proper moisture level.
Mixture is cold (not heating up)	Add more nitrogen (food waste, coffee grounds, Baled alfalfa, or green grass.)
Mixture attracts animals	Enclose the compost. Install ¼ inch hardware cloth on the ground under compost bin.
Mixture attracts flies	Keep compost covered, spread a layer of leaves or sawdust on top of pile leaving no visible food scraps (see fruit fly trap instructions on pg. 15)

MASCOT Checklist

MASCOT is a checklist to gauge the progress and success of a compost pile. Whether experimenting with different compost systems or starting your first pile, use these six points to measure the efficiency of your efforts.

Moisture: Content should be like that of a wrung-out sponge. No water should drip from a sample squeezed in the hand, yet the compost should never be dry. Add water or cover as needed.

Air: A good compost pile should have plenty of aeration. A pile with insufficient aeration will turn anarobic and smell bad! Carbon sources such as straw, woodchips or garden scraps such as sunflower stalks, corn stalks, etc, will add structure the pile that will allow for better aeration and keep the pile from going anarobic.

Structure: The pile should be medium loose and crumbly. Tight, packed, or lumpy consistencies will slow down the process. Think light and fluffy.

Color: The ideal color is a dark black-brown. Pure black, especially is soggy and smelly, indicates anaerobic fermentation with too much moisture and a lack of air. Grayish, yellowish colors denote waterlogged conditions.

Odor: The smell should be earthlike, like forest soil or humus. Bad smells can mean a few things: bacteriological breakdown is still happening, molds are present (indicated by a musty smell), moisture levels are off, or there is a lack of carbon sources. Always remember to apply a carbon layer (sawdust or leaves work well) to the top of a pile after adding fresh materials.

Turning and mixing: The proper proportion and mixture of raw materials is crucial to a successful compost pile. A carbon-to-nitrogen ratio of 25-30:1 is ideal for compost, although every pile is slightly different. If needed, use the guide on the other side to add materials to your pile. Use a pitchfork or shovel to turn your pile once a week, or place perforated pipe at intervals within the heaps interior. This ensures the pile stays functioning and breathing, keeping the beneficial bacteria and microorganisms active within.

Compost Safety: Frequently Asked Questions

How hot does our pile need to get to eliminate pathogens?

- A properly tended hot compost pile will reach temperatures between 110-160°F. Pathogens and weed seeds die off around 130-140°F. Note that temperatures 150°F and above kill helpful bacteria that could suppress disease in soil once integrated into a garden bed. Hotter is not always better.
- Earthworms die at 130°F, and will usually not stick around if the temperature nears that level.
- Use a compost thermometer if you have one. If not, insert a long metal rod into the center of the pile for several minutes, then pull out and feel to gauge temperature.
 - General Tip: for effective decomposition, a pile must be at least 55°F.

If it's a 'passive' (not hot) pile, how long does it need to cure before we use it?

- Passive or cold compost piles take anywhere from five months to a year to fully decompose, depending on volume and materials used. Here are several natural activation ingredients you can add to a cold (or hot) compost pile to speed decomposition:
 - Various meals: Alfalfa, blood, bone, cottonseed, fish, hoof, and horn
- Finished compost (adds an inoculation of bacteria, but must also add a high nitrogen ingredient)
 - Bagged composted chicken manure
- A flake of baled alfalfa, mixed in well, sprinkled with water. (Caution, this will get very hot!)
- Also, shredding materials before adding to a compost pile helps with efficiency. Lawn-mowers, industrial shredders, pitchforks, and hands are useful tools for this.

Does vermicomposting eliminate pathogens?

- One study suggest that it does if every part of the compost has been digested through a worm, but without testing it is hard to say. It is best to keep manures out of school worm bins. Temperatures for vermicomposting should remain between 50-80°F in order to keep the worms active. For this reason, vermicomposting is more appropriate for just food waste (as opposed to yard debris).

Is it safe for kids to handle compost/worm castings?

- Yes, although anybody with especially weak immune systems (regardless of age) should avoid direct contact with compost and use gloves. Finished compost is generally safe to handle, though compost in the midst of decomposition can contain bacteria and molds that may cause harm.
 - When handling worm castings, gloves are a good idea.

Is it safe to apply compost tea to our plants?

- Absolutely, aerated compost tea can be purchased at local nurseries and it is recommended if you have the time and resources to do so. One gallon of tea diluted with five gallons of water is usually enough to cover any school garden.

- The most troublesome pest is fruit flies. Make a vinegar trap by securing a 12 oz water bottle to the inside of the bin. Add ½ cup of apple cider vinegar to the empty bottle. Add one or two drops of dish soap. The fruit flies will fly in, attracted to the smell, and drown in the vinegar. This method works best when a thick layer of sawdust is covering the food scraps at all times, because flies can't dig!

Is it safe to use manure in our compost program?

- It is best not to add raw manure of any kind because school compost piles are not managed in a way that will ensure that salmonella and fecal coliforms are all killed off. We don't want to spread those pathogens around our school vegetables. People with weakened immune systems are especially vulnerable to pathogens, and should wear gloves when handling school compost and vermicompost.
- The 4J School District food provider has a guideline that suggests manure should not be used in the garden or in the compost. Why use manure when there are so many other great sources of nitrogen to use like coffee grounds or fresh grass clippings? For a quick nitrogen boost that will heat up compost fast, bales of dried alfalfa work very well, smell great, and store easily next to the compost area. High nitrogen alfalfa means more nutrient rich compost when used in the garden.

Will rodents and other pests get into the bins?

- It is important to remember that we live in an urban environment and urban critters will be attracted to school compost areas for warmth, food, and habitat.
- To prevent rodents and other critters from showing up, use ¼ inch hardware cloth to line the bottom and sides of the bin, especially if using a simple open air or palette bin system. A fitted lid is also necessary.
- If properly maintained, a compost pile usually won't attract dogs or raccoons, both of which are more interested in garbage cans and cat food left on front porches.
- Odor, above all else, will attract animals, so always remember to finish with a layer of carbon (dry browns) on top when adding material to a pile. This acts as an odor-trapping blanket.
- If rodents persist in your compost, it could be due to high rodent activity in your neighborhood and you could consider switching to the City's new Love Food Not Waste commercial composting program. Contact Stephanie Scafa with the City of Eugene for more information: stephanie.scafa@ci.eugene.or.us.
- Sawdust and dried leaves are excellent materials for a carbon layer to deter all manner of pests!

Always remember to wash hands well after working in the compost site and garden!

This manual was created by The School Garden Project of Lane County with financial support and technical assistance from The City of Eugene.



www.schoolgardenproject.org