



What's in the Trash? Waste Audit

Chicago Conservation Corps (C3) Student Clubs

City of Chicago Department of Environment (DOE)



By participating in this Waste Audit, Club members will:

1. Calculate how much waste their school generates.
2. Determine the school's waste composition.
3. Consider ways in which the school's waste could be diverted from the waste stream (e.g., by substituting, recycling, reducing, reusing, donating, composting, etc.).
4. Collect valuable data to brainstorm for their follow-up Land & Waste Project.

Overview

For the Waste Audit, your Club is going to work with the school administration, other teachers, and the student body to determine how much waste is generated in one day from 5-10 designated areas of your school. The Club will then analyze the waste produced, and use the results from the analysis to design the follow up Land & Waste project.

PLEASE NOTE: If you have chosen to do *Reduce, Reuse, Recycle, Re-think!* as your follow up project, you should be aware that ordering recycling bins for your school from CPS can take **up to a month**. You should try to order these bins as soon as possible if you think that your school might need them. See the *Reduce, Reuse, Recycle, Rethink!* Project Guide for more information.

Materials:

To be provided by DOE at the Land & Waste Workshop:

- Plastic garbage bags (for garbage)
- Plastic blue bags (for recycling)
- Plastic tarp
- Plastic gloves (if needed)
- Parent/guardian permission slip (attached)
- Sample memos for administration, teachers and custodians

To be provided by the Club:

- A bathroom scale for weighing the materials collected
- Old shoes / a change of clothes to wear during the audit
- Cloth or re-usable work or garden gloves to use in place of plastic gloves (optional)
- Materials for making and hanging posters
- For the "comprehensive" audit: additional receptacle for wet waste for each audit area. Note: DOE will provide plastic garbage bags, so the receptacle can be an old cardboard box or a re-usable container, lined with a bag.
- OR for the "walk-through" audit: yardsticks for measuring the amount of trash in the cans

The online report for this audit is due:

Friday, November 21st

To submit your report, log-in at
www.chicagoconservationcorps.org
(click on "C3 Teachers")

Note: Teacher stipend check is contingent on the timely completion of this report.

For questions or concerns, contact:

Jeff Walter
Chicago Department of Environment
312-743-9283
conservation@cityofchicago.org

Chicago Public Schools Recycle!

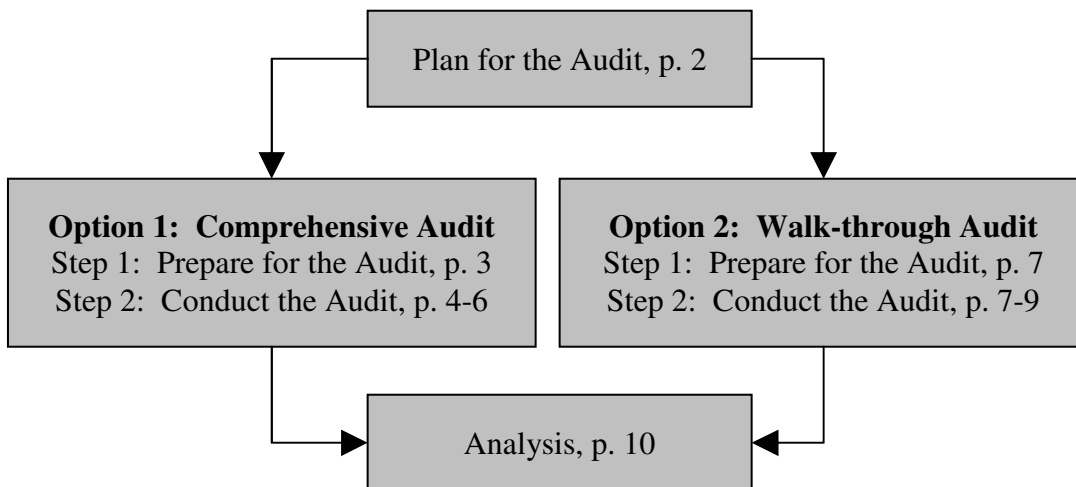
Every Chicago Public School (CPS) office and classroom can recycle paper, cardboard, metal, cans, plastic bottles, textbooks, and even batteries and computers. Your building should have the following recycling and trash bins:

- Recycling bins for paper in each classroom
- Trash bins in each classroom
- Bottle and can recycling with blue bags in hallways and lunchrooms
- Battery collection container in your Main Office, collected by the mail carrier every week
- Toner cartridge recycling in Main Office



Plan for the Audit (2-3 weeks before audit)

1. After reading through this guide, describe the procedure to the appropriate members of your administration, and *also* to your school's custodian and/or building manager.
 - Feel free to modify DOE's sample memo to help explain the audit to the administration.
 - Explain that on the day of the audit, students will either be a.) collecting and disposing of trash and recyclables or b.) looking through the trash for 30 minutes after school ends (depending on which option your school administration approves).
 - NOTE: Be sure to meet with both your administration *and* your school's building manager, as both play an important role in the process.
2. Choose a date and location for the audit.
 - The audit is best performed immediately after school ends.
 - A parking lot is a recommended site because waste can be easily spread out on a plastic tarp.
 - Ensure that students can post signs at predetermined locations the day before the audit will take place.
3. Decide which areas of the school will participate in the audit.
 - Sampling 5-10 rooms, including a variety of high-use areas (classrooms, a teachers' lounge, the main office, etc.), should be sufficient.
 - ***Do not select areas that generate potentially unsanitary waste, such as restrooms and labs.***
 - The food *preparation* areas may generate too much waste to handle, but, if possible, audit the lunchroom waste that students generate, even if just for one lunch period. Note: It is possible that your school administration will not approve of the students conducting the comprehensive audit in which students sort and weigh trash. If this is the case, you will complete the walk-through audit, in which students use yardsticks to visually estimate how much trash and recycling is generated. Based on your administration's response, decide whether you should follow the directions for the comprehensive audit (Option 1) or the walk-through audit (Option 2). The planning and analysis sections of this activity are the same no matter which procedure your club decides to follow (see chart below).



Option 1: Comprehensive Audit

Overview

In the **Comprehensive Waste Audit**, your Club will ask teachers, students, administration and staff to save the garbage from designated classrooms, offices and other areas (between 5-10 areas is a good goal) for one day, dividing it into “wet” and “dry” trash, and recycling normally if they do so. Then, you will be examining the composition of the waste.

Step 1: Prepare for the Audit (2-3 meetings)

1. Discuss the Comprehensive Audit with the Club.
 - Go through every step in this guide with your students. Have *them* make sure the Club is prepared for the audit. What steps does the Club need to complete before the audit?
 - Discuss why the audit is important (see the facts and game suggestions on the next page).
2. Send home and collect the permission slips attached to this guide.
3. Make sure that the teachers and staff who use the designated areas understand and approve of the project and will help monitor the waste stations on the day of the audit.
 - Feel free to modify DOE’s sample memo to help explain the audit to teachers and administrators.
4. Prepare to explain your audit to the school.
 - Make signs for each Audit Station to remind people to sort their waste on the day of the audit (see sample signs).
 - Include the purpose, date, and definitions of dry and wet waste.
 - Make labels for each receptacle. Include the name of the Audit Station and the type of waste.
 - Ex: “Library – Dry Waste.”
 - There should be two bins at each station (one for wet waste and one for dry waste).
 - If your school recycles, you should ask people to use the recycling bins as they normally would. You will measure these items as well.
5. Collect the supplies that you will need.
 - Make sure you have enough receptacles for each audit station.
 - Ask someone to bring in a bathroom scale for weighing the trash. (Trash will not touch the scale - see box at right.)
 - Make sure students bring in a change of clothes and have access to gloves the day of the audit.

Examples of dry waste: All types of wrappers, empty potato chip bags, lunch bags, bakery containers, empty soda or water bottles, any type of paper, catalogs, magazines, cardboard, etc. *(This is stuff you would feel comfortable touching. You will sort these items.)*

Examples of wet waste: Leftover lunch items, fruits, contaminated paper trays or pizza boxes, used paper towels and tissues, etc. *(This is stuff you would NOT feel comfortable touching. YOU WILL ONLY WEIGH THE WET WASTE COLLECTIVELY.)*

How to Weigh Trash

weight of student while holding trash bag

– weight of student without trash bag

= weight of trash



Waste Wisdom Game

Rules:

- Read...each statement below
- Move...to the sides of the room based on whether you agree or disagree with the statement.
- Discuss...these questions after each move.
 - Why are you on the side you're on?
 - Did you guess or have prior knowledge?
 - Give your reaction to the waste wisdom statement.

Statements:

1. **Each U.S. citizen produces 4.5 pounds of trash daily.** (True)
2. **Recycling is the most important 'R' out of Reduce, Reuse, Recycle.** (False) - They are all important, reuse and reduce are often used less. Rethink is almost never included, and maybe should be.
3. **The energy it saves to recycle plastic is greater than the energy saved by recycling paper.**
(True) Energy savings from plastic recycling = 75%
Energy savings from paper recycling = 40%
4. **Reducing waste from our homes, businesses, and factories does not impact global climate conditions.**
(False) Methane (a greenhouse gas) produced from landfills and incinerators that process waste are the largest producers of methane in the U.S.

Continued on Page 7...

Step 2: Conduct the Audit (1-2 meetings)

The morning of the audit (or the day before):

1. Remind teachers and engineers that this is the day of the waste audit.
2. Set up the Audit Stations.
 - Put up the signs and put out the labeled receptacles.
3. If you are auditing the lunchroom, make sure students are stationed there at lunch hour to help direct sorting.

After school:

4. Bring all of the receptacles from around the school to the site of the audit *immediately* after school so the trash is not thrown away accidentally.
5. Split into groups to conduct the audit.
 - If you have a large group, separate groups can be responsible for sorting, weighing, recording, etc.
 - Remember not to touch the wet waste and to wear your spare clothes and gloves during the audit.
6. Spread out the plastic tarp in the parking lot.
 - Designate a place near the plastic tarp for: 1. recycling bins, 2. wet waste containers, and 3. dry waste containers around the plastic tarp.
7. Tie the bags of **wet waste** closed.
 - Weigh each bag and record on **Worksheet 1** how much wet waste each Audit Station generated.
 - When you are done, throw the bags of wet waste in the dumpster.
8. Leave the bags from the **dry waste bins** open.
 - Weigh each bag and record on **Worksheet 1** how much dry waste each Audit Station generated.
 - Sort the dry waste by category (defined on **Worksheet 2**), then weigh the *total* amount of each type (from all of the stations added together). For example, what is the total weight of all paper that was put into the dry waste?
 - Record the results on **Worksheet 2**.
9. Leave the bags from the **recycling bins** open.
 - Weigh each bag and record on **Worksheet 1** how much material each Audit Station recycled.
 - Sort the materials that were recycled by type, then weigh the *total* amount of each type (from all of the stations added together). For example, what is the total weight of all paper that was put into the recycling bins?
 - Record the results on **Worksheet 2**.
 - When you are done, dispose of the recyclables in your school's recycling dumpsters.
10. When you are done, recycle everything you can and put the rest of the dry waste in the dumpster.



Complete Waste Audit, Worksheet 1:
Amount of Waste from Each Audit Station

This worksheet helps students calculate how much waste of the three types (wet, dry, and recyclable) was collected at each station.

Audit Station (Name)	Weight of Material Collected in Wet Bin (lbs.)	Weight of Material Collected in Dry Bin (lbs.)	Weight of Material Collected in Recycling Bin (if applicable) (lbs)
1.			
2.			
3.			
4.			
5.			
6.			
7.			
8.			
9.			
10.			
TOTAL: (sum of each column)	Total Wet:	Total Dry:	Total Recyclables:



Comprehensive Waste Audit, Worksheet 2:
Types of Materials Found in Recycling and Dry Waste Bins

This worksheet helps students calculate how much of each type of recyclable material was collected in total (all of the Audit Stations combined). It also helps students calculate how much of each type of material was thrown away (and NOT recycled).

Type of Material	Weight of Types of Materials from All <u>Dry Waste Bins</u> (<i>not Recycled</i>) (lbs.)	Weight of Types of Materials from All <u>Recycling Bins</u> (if applicable) (lbs.)
Paper (e.g., office, newspaper)		
Cardboard		
Plastic Bottles		
Glass Bottles and Jars		
Aluminum Cans		
Batteries		
Actual Trash (non-recyclables)		
Other:		
Other:		
Other:		
Other:		
TOTAL (in pounds)		



Option 2: Walk-through Audit

Overview

If you or your school's administration would prefer that your Club not separate the wet and dry waste to be weighed and sorted, you can still conduct a walk-through waste audit. Students will visually estimate how much trash each designated area generates.

Step 1: Prepare for the Audit (1-2 meetings)

1. Discuss the Walk-through Audit with the Club.
 - Go through every step in this guide with your students. Have *them* make sure the Club is prepared for the audit. What steps does the Club need to complete before the audit?
 - Emphasize that students will not be touching trash, only estimating how much is there. Discuss how they can create an estimate and practice measuring one trash receptacle as a group (see **Worksheet 3** and **4**).
 - Discuss why the waste audit is important (see the facts and game suggestions on this page and on page 4).
2. Prepare to explain your audit to the school.
 - Make signs letting people know that the audit will be going on (see sample signs).
 - Make signs reminding the custodial staff to leave the garbage and recycling bins until after you have finished your audit (see sample signs).
3. Collect the supplies that you will need.
 - Yardsticks are needed to estimate the amount of garbage in cubic feet.
 - Gloves are needed for sanitary purposes.

Step 2: Conduct the Audit (1-2 meetings)

The morning of the audit (or the day before):

1. Put up signs at the Audit Stations.
2. Work with building manager and/or custodians to ensure that , on the day of the audit, trash and recycling will not be picked up in designated areas for 30 minutes to an hour after school. This will allow students enough time to conduct the audit.
3. Assign pairs or small groups to cover each area designated as an Audit Station.

After school:

4. Hand out gloves, yardsticks, and worksheets to each student .
5. Visit every Audit Station to estimate the waste generated there (in cubic feet).
 - Record data on the Walk-through Audit, **Worksheet 3**.
 - Calculate volume with walk-through audit, **Worksheet 4**.

Waste Wisdom Game

Continued from page 4

5. **Composting organic waste makes a small difference on greenhouse gas emissions from landfills.**
(False) Organic waste decomposition in landfills contributes to methane production. It traps heat 23x more effectively than carbon dioxide.
6. **About 30% of household waste can be recycled or composted.**
(False) About 60% of household waste can be recycled or composted.
7. **It takes less energy to make a recycled aluminum can than it does to make a brand new one.**
(True) Making a new aluminum can from a used can takes 95% less energy than making a new can from mined aluminum ore. Recycling one aluminum can saves enough energy to power your TV for 3 hours!
8. **Increasing recycling rates by 2.5% would have the same effect on greenhouse gas emissions as taking 1 million cars off the road.**
(True)
9. **All paper can be recycled.**
(False) Some paper cups, wrappers, and containers (such as milk cartons) are coated in wax so that they can hold liquids without the liquids soaking through. These paper items cannot be recycled.
10. **Illinois' Livingston County Landfill is large enough to cover 100 Chicago city blocks.**
(True) The population producing this waste is around 40,000.



Walk-through Waste Audit, Worksheet 3:

Collecting Information to Calculate Estimates of Volume of Waste at Each Audit Station

This worksheet helps students collect the necessary information at the Audit Stations. They should carry this with them when they do the Walk-through Audit and fill in all of the fields that they can. Note: They will have to determine whether each bin has a circular top or rectangular top before they decide which column to fill in.

They will use this information later to calculate the estimated volume of the materials they find in the bins.

Audit Station (Name)		FOR ALL BINS:	If bin has a circular top:	If bin has a rectangular top:	
		Height of waste from bottom of bin (in feet) <i>Note: measure the height of the <u>waste only</u>, not of the entire bin)</i> (H)	Diameter of top of bin (in feet) <i>Note: This is the distance from one side of the circle to the other at its widest point.</i> (D)	Width of top of bin (in feet) (W)	Length of top of bin (in feet) (L)
1.	Trash:				
	Recycling:				
2.	Trash:				
	Recycling:				
3.	Trash:				
	Recycling:				
4.	Trash:				
	Recycling:				
5.	Trash:				
	Recycling:				
6.	Trash:				
	Recycling:				
7.	Trash:				
	Recycling:				
8.	Trash:				
	Recycling:				
9.	Trash:				
	Recycling:				
10.	Trash:				
	Recycling:				



Walk-through Waste Audit, Worksheet 4:
Estimates of Volume of Garbage at Each Audit Station

This worksheet helps students calculate the estimated volume of the materials they find in the trash and recycling bins. The data for these calculations can be found on **Worksheet 3**. Students should use the following equations to make their estimates:

For circular trash cans:

1. Divide the diameter (**D**) by two to get the *radius*. This is the distance from the center of the circle to the edge of the circle.
2. Multiply the radius by itself (for example, 1.3 ft x 1.3 ft), then multiply that number by 3.14 (*pi*).

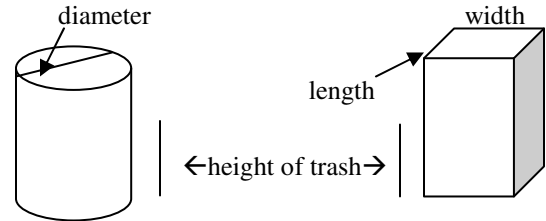
$$\left(\frac{D}{2}\right)^2 \times 3.14 = A$$

This will give you the area of the top of the bin (**A** below). Enter this value into the appropriate column, based on whether it is a bin for trash or recyclables.

3. Enter the height (**H**) from **Worksheet 3** into the table below.
4. Multiply **A** (the area) by **H** (the height). The result is the estimated volume (**V** below) of your recyclables or trash.

For rectangular trash cans:

1. Multiply the length (**L**) by the width (**W**) from **Worksheet 3**. This will give you the area of the top of the bin (**A** below). Enter this value into the appropriate column, based on whether it is a bin for trash or recyclables.
2. Enter the height (**H**) from **Worksheet 3** into the table below.
3. Multiply **A** (the area) by **H** (the height). The result is the estimated volume (**V** below) of your recyclables or trash.



Audit Station (Name)	TRASH BINS: Estimated Volume (A x H = V) of Materials (in cubic feet)			RECYCLING BINS: Estimated Volume (A x H = V) of Materials (in cubic feet)		
	Area (A) of top of bin	Height (H) of trash	Volume (V) in cubic feet	Area (A) of top of bin	Height (H) of recyclables	Volume (V) in cubic feet
Ex: Library	2 ft ²	x 3 ft	= 6 ft ³			
1.						
2.						
3.						
4.						
5.						
6.						
7.						
8.						
9.						
10.						
Total Volume	Volume of all trash:			Volume of all recyclables:		



Analysis (1-2 meetings)

1. Compile the results of your audit.
 - The easiest way to do this is to compile all the results on one copy of each worksheet.
2. Use your data to estimate the amount of trash produced in the school for a day, week, and school year (see Analysis, **Worksheet 5**).
3. Discuss the results with the Club. Here are some questions you might think about:
 - What were the five most common materials you found in the trash?
 - Are recyclables disposed of properly at your school, or were a lot mixed in with the trash? Was trash mixed in with your recyclables?
 - Why does it matter how we dispose of waste? What did you learn from this activity?
 - What are some alternative methods for disposing of the materials that you found in the trash (see Analysis, **Worksheet 6**)?
 - How can we work some of these methods into a recycling project?
 - What were some of our challenges?
 - What were some of our greatest successes?
 - How can we plan our project keeping our challenges and successes in mind?
4. Fill out the online report for this audit, due on **Friday, November 21st** (see page 1 for instructions).

More Information on Waste-related School Initiatives:

Zero Waste Grant Initiative from the Illinois Department of Commerce and Economic Opportunity

<http://www.illinoisrecycles.com> and <http://www.istep.org>.

Illinois schools can apply to DCEO for grants to implement or expand recycling and waste reduction programs and strive to achieve zero waste status. Public school districts submit one application for all the schools participating in the project. The grant application is available on-line

Earth Flag's Waste Audit Manual

http://www.ijams.org/template_assets/pdf/Waste%20Audit%20Manual.PDF

This resource gives detailed instructions for conducting a waste audit. It was created for schools in Tennessee, but it might give you some different ideas on how to approach our Waste Audit. Remember that you can adapt our programs to suit the needs and interests of your school!

Oregon Green Schools Guide

www.oregongreenschools.org/waste_audits.cfm

Oregon Green Schools is a non-profit that works to reduce waste in Oregon public schools. They also give detailed instructions for waste audits – look here for more ideas!.



Waste Audit, Worksheet 5:
Analyzing the Results

This worksheet helps students calculate an estimate of the total amount of trash and recyclables generated in their school **per year**. If you conducted the Comprehensive Audit, see the bottom of **Worksheet 1**. If you conducted the Walk-through Audit, see the bottom of Worksheet 4.

Type of waste	Amount per day for all Audit Stations (in lbs or ft ³) (T)	Number of Audit Stations (N)	T / N = Average amount of waste per bin (R)	Appx. Number of receptacle bins in the whole school (B)	R x B = Average amount of waste per day in the whole school (S)	S x 175 days = Average amount of waste per school year
Trash	Total weight/volume of all trash (wet + dry) =					
Recyclables	Total weight/volume of all recyclables =					

For comparison's sake, if you measured the **weight** of your waste, the average school bus weighs about 23,000 lbs – how many school buses would it take to equal the number of pounds of trash your school generated in a year? If you measured the **volume** of your waste, the average school bus has a volume of about 1700 ft³. How many school buses could you fill with your school's trash in a year? Do you think that's a lot of waste?

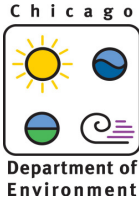


Waste Audit, Worksheet 6:
Analyzing the Results

What could be done to make the amount of waste your school generates per year *smaller*? Remembering what you saw in your audit (and referencing **Worksheet 2** if you completed it and **Worksheet 5**), use the table below to make a list of ways your school could produce less waste.

Method	What types of waste at your school could be eliminated by doing these things? List as many as you can!
Compost	
Reduce	
Reuse	
Recycle	
Donate or exchange	





What's in the Trash? Waste Audit

Chicago Conservation Corps (C3) Student Clubs
City of Chicago Department of Environment (DOE)



Permission Slip

Our school hosts a Chicago Conservation Corps (C3) Student Club. As a part of our Club's activities, we will be conducting a waste audit at the school. The goal of the waste audit is to help our Club members gain a better understanding of the amount of waste and recyclables generated at the school. Then, based on our findings from the audit, we will choose a course of action to help our school be a more environmentally-friendly place. We might decide to improve recycling at the school, limit some of our sources of waste, start a worm composting program to dispose of food waste, or any number of other things – we will be true environmental leaders! In order to determine how we can reduce waste at our school, however, we need to find out about the school's current practices.

As a part of our audit, students will be handling garbage, but under very sanitary (and supervised) conditions. All students will be provided with gloves and coached in safe ways to handle the garbage. We need your permission for your child to participate in this activity. If this meets your approval, please sign the statement below.

If you have any questions, please contact _____
at school.

My child, _____, has permission to participate in the
C3 Student Club's Waste Audit at the school.

Parent signature: _____ Date: _____

Please return this permission slip by _____, 20____.

