

Waste Prevention Tools at Work



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Volume I

- A Method for Conducting Business Waste Assessments*
- Results of Waste Assessments in Three Business Sectors*

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This manual contains the methodologies developed and tested by the Tompkins County Solid Waste Management Division, during the implementation of its comprehensive business waste reduction project. Many of the forms and data sheets included in this manual were used in the project, and may be adapted by others to fit individual needs. It is the intent of this manual, and accompanying video, to provide solid waste planners and recycling coordinators with one method of assessing the composition of the business sector waste stream, and to use this information to design effective waste reduction programs for businesses in their communities.

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Section I. Introduction

This manual has been developed to assist businesses in the retail, hospitality, and small office sectors reduce the amount of waste they dispose of through the use of waste assessments. The techniques presented here may also apply to institutions and industry. The goal is to help businesses, municipalities, and the State enjoy the benefits of waste reduction.



This document provides guidance in the following areas:

- 1) Conducting a waste assessment
- 2) Working with businesses in the retail, hospitality, and small office sectors to identify the types of waste generated
- 3) Assisting specific businesses in the development and implementation of waste reduction programs.

Using waste assessments to help businesses target materials for reduction can have a significant effect on waste generation. Decreased waste generation, improved efficiency, the thoughtful use of resources, and the resulting energy savings can be cost effective on many levels.



Waste assessment interview.



Section II. The Waste Assessment

A. Overview

The waste assessment is a method for learning what materials comprise a business' waste stream, from what sources, and resulting from what activities. This information can serve as the foundation for planning and implementing waste reduction and recycling programs. Waste assessments, or audits, are patterned after energy audits, though the final results are, of course, different. The waste assessor looks for wasted resources—materials that could either be reused, recycled, or eliminated altogether. The end result of a waste assessment is to propose steps that would save on purchasing and disposal costs, resource use, and ultimately energy use.

A waste assessment can be done by someone within the business itself, or the business may be assisted by someone from the outside, such as a municipal recycling coordinator, Cooperative Extension staff person, or a consultant. The assessment should be conducted during business hours, at a time when a knowledgeable employee can meet with the assessors and accompany them through the facility to see all pertinent operations. A full assessment, which includes a preliminary interview and a facility tour (referred to as the walk-through), may take anywhere from 1 to 3 hours. This assessment should yield a broad range of information about the company, its operations; waste generation and costs; waste reduction and recycling efforts; solid waste difficulties; physical infrastructure; company attitudes; and other relevant data. This information becomes the basis for a final written report, detailing what was observed at the site, and suggesting techniques for waste reduction and recycling.

B. Advantages and Limitations of the Waste Assessment Process

A waste assessment is a valuable process, but it does have limitations. Some of the advantages

and disadvantages of waste assessments are listed below.

Advantages:

- The waste assessment clearly shows the types of waste being generated, how they are being generated, and the resulting costs.
- Tracking the waste from the point of generation to the trash bin can reveal unnecessary, inefficient—and therefore costly—business and materials handling practices.
- Information is gathered on purchasing practices, manufacturing processes, waste handling systems, equipment, and storage space in order to design and implement waste reduction, reuse and recycling programs.
- The assessment gives insight as to the types of employee education that may be needed, and what type of waste reduction systems could work from the employee's standpoint.
- The interview and walk-through provide opportunities for the assessors to convey large amounts of detailed information about waste reduction and recycling options.
- Frank discussion and feedback can be helpful both to the business and to local municipal solid waste and waste reduction planning efforts.

Disadvantages:

- The waste assessment can provide a wide variety of valuable information but not hard data.
- Yearly tonnage figures for a given material cannot be accurately extrapolated from the percentages

of materials observed during the waste assessment.

- Information from a waste assessment cannot be used to predict the average generation of waste per unit, for that business.
- A waste assessment cannot guarantee that a business will change its waste handling practices.

C. Pre-Assessment Tasks

1. Identifying and Contacting Businesses

Most municipalities already have some type of program that actively involves the business sector in solid waste issues, such as chambers of commerce, business councils, and economic and industrial development agencies. Start by contacting these groups, making a list of potential businesses, and gathering as much information on them as possible, such as number of employees and the type of business.

Next, obtain business listings by Standard Industrial Classification (SIC) Code. (SIC codes can be helpful, but may need to be adapted for use in the solid waste field. If the list of potential businesses is being developed by generator-type, several SIC code classifications may fall in one category.) Further business listings can be obtained by looking in the yellow pages of the telephone directory.

Criteria by which to choose businesses may also be developed. For example, small to medium businesses are a good target group since these businesses often have few resources available to them, unlike the larger chain stores and industries. (Small to medium businesses are classified as having between five to 99 employees.)

Once a list of businesses has been developed, the businesses should be contacted. One way to do so is with a letter or sign-up sheet. Samples of each of these are included on the following pages (Figures 1 and 2). A letter should include:

- A brief description of the purpose, method, and benefits of a waste assessment.
- A form for the business to fill out and return which requests preliminary business and waste disposal information.

Follow up the letter with a phone call to locate a contact person for the business, to generate interest, and to answer any questions. If the business is interested, takes the time to return the form, and generates enough waste to make the process worthwhile, it may be a good candidate for a waste assessment. Bear in mind the importance of making the waste assessment process as convenient as possible for the business to ensure their full cooperation. The business will have limited patience with a time-consuming, cumbersome process.

2. Scheduling the Site Visit

Timely scheduling of the site visit can be one of the most important aspects of collecting useful information and accomplishing a successful waste assessment. Schedule the waste assessment on a day and at a time when the maximum amount of trash will be seen in the internal waste receptacles and/or in the dumpster. Inquire about internal waste collection practices because it is also beneficial to observe waste at the point of internal disposal. For example, in hotel and motel sites, it will be important to schedule the waste assessment at a time when the waste is coming out of the guest rooms.

To schedule a site visit, refer to the *Pre-Site Visit Telephone Questions* form (Figure 3). This form allows the assessor to gather preliminary information on: type of business, size and type of facility, the contact person for the site visit, when internal and external waste collection occurs, the time of peak business operations, and directions to the facility.



Figure 1. Sample Solicitation Letter To Businesses

Business Name
Address

Date

Dear Business,

Would you like a free opportunity to learn how to streamline your solid waste costs, implement waste abatement programs, and show your customers you care about environmental issues? This offer is part of a municipally-sponsored program to cut down on waste, reduce costs, and minimize pollution.

(Your municipality or organization) is offering professional consultation on waste cutting strategies that can maximize available resources and cut the costs of waste management. If you would like to know how to develop waste reduction and recycling programs for your business, we would like to help you.

If you are interested, your business will receive an assessment of your waste stream. This will be followed by a written report that will include waste abatement strategies designed specifically for your business.

The waste assessment involves a visit by two assessors who will meet with a representative of your business to discuss waste handling practices, costs, recycling activities, etc. With your representative, assessors will walk through the business, note waste types and amounts, where and how waste is generated, and look for waste reduction and recycling opportunities. The waste assessment will take 1 to 3 hours, depending on the size of your business. A written report will then be sent to you.

The information obtained from your waste assessment will be kept strictly confidential and will be used only to assist you in your waste reduction efforts. Information concerning your business will not be shared with other businesses, organizations, or regulatory agencies.

If you are interested, please fill out the enclosed form and send it back. Please call if you would like any more information. We look forward to helping you reduce your waste, cut waste disposal costs, and implement waste reduction strategies.

Sincerely,

Figure 2. Assessment Sign-up Sheet

_____ *Yes, I am interested in being considered
as a possible participant in the
commercial waste reduction program.*

_____ *No, I am not interested in participating at this time.*

_____ *I would be interested in receiving waste
reduction information for businesses in
lieu of a waste assessment.*

Business Name _____

Address _____ Zip _____

Phone _____

Name/title of contact person _____

Business description:

Type of business _____ No. of employees (including part time) _____

No. and location(s) of buildings used by business _____

Total occupied sq. ft. _____ SIC Code (if known) _____

Solid Waste Information:

Do you use a dumpster for your trash? _____ Yes _____ No

If yes, indicate size _____ 2 cu. yd. _____ 3 cu. yd. _____ 4 cu. yd. _____ 6 cu. yd. _____ 8 cu. yd.

Other size (please describe): _____

Frequency of collection (times per week) _____

Do you share a dumpster service with another business? _____ Yes _____ No

Are there any other kind(s) of containers you use for trash? Please describe below:

_____ Trash bag (size and number per week) _____

_____ Trash can (size and number per week) _____

_____ Compactor (size and times collected per week) _____

_____ Other (please describe) _____

Name of trash hauler _____

Figure 3. Pre-Site Visit Telephone Questions

Name of scheduler _____ Date _____

Business name _____

Contact person _____ Title _____

Address _____ Phone # _____

Date & time of appointment _____

Business description:

1. Briefly describe your business and main activities:

☐ Retail Sales	☐ Financial / Insurance Services
☐ Food Service	☐ Manufacturing
☐ Lodging	☐ Repair
☐ Professional Services	☐ Other

2. How many buildings or facilities do you have? _____ Location(s)? _____
3. Who oversees operations for your facility(s)? Manager or supervisor _____
4. Who will be the contact person for the waste assessment? _____
Will she/he be available for the waste assessment? ☐ Yes ☐ No

5. *[Briefly describe waste assessment]*

I will be sending a survey for you to fill out before we visit your site. We will go over the information together so please have it on hand when we arrive. Please also have on hand any background documents such as waste haulers bills, and maintenance schedules. If appropriate, please schedule maintenance or other personnel to be available for questions during our visit.

6. What time of day and day(s) of the week does your trash get collected from the outside trash containers or dumpsters?

How many times per day is it collected from the inside wastebaskets? What time of day is it collected?

Will the appointment time allow us to see the facility at its peak of operations and/or waste generation? ☐ Yes ☐ No. If not, when is the peak?

7. Directions to the facility:

If the contact person cannot answer a question, ask for a referral to someone who may know. The contact person should be someone who has a good knowledge of the facility operations and who is familiar with the waste handling systems and costs. Let him or her know you will be sending a *Waste Assessment Questionnaire*, and explain it. A copy of this questionnaire is included in Appendix A. The *Questionnaire* asks for information on:

- Business operations
- Specific internal and external waste handling systems, practices, personnel, equipment, haulers, and costs
- Types of waste generated and the processes that generate the waste
- Purchasing practices
- Current waste reduction and recycling efforts, equipment, and markets.

Explain that the *Waste Assessment Questionnaire* will save time during the visit and then allow the company time to retrieve the requested information if it is not readily accessible. Filling out the questionnaire ahead of time will help the business think about its waste issues and will help guide the assessment team during the actual interview.

Briefly describe the waste assessment process, and be sure to ask if they have any questions. Mail a copy of the *Waste Assessment Questionnaire* along with a confirmation of the waste assessment site visit date and time.

D. Interview Methodology

On the day of the site visit, the assessors should meet the business representative at the facility. The total interview should take less than 1 hour, since business people have limited time they can spend away from their daily tasks.

During the interview and walk-through one assessor does the interviewing and the other acts as the recorder. This works best because the interview and the walk-through can move very quickly and it is difficult for one person to take accurate notes, ask questions, and point out source reduction opportunities all at the same time. The recorder may also ask questions or make observations in an area the interviewer has missed.

Throughout the interview, the assessment team should be aware of sensitive issues, such as confidentiality and proprietary information. Businesses need to be reassured that information from the waste assessment may be used to make generalizations about commercial waste but will not be linked to a specific business without prior approval.

The assessment team will sit down with the contact person(s) and review the *Waste Assessment Questionnaire*. The team will ask questions about the business and its activities that might not be seen during the walk-through. The team should be prepared to provide as much information as possible about implementing waste reduction and recycling programs. Some issues and items may require the assessors to do further research after the site visit. This information can then be presented in the written follow-up report to the business.

When the interview is finished, information on all or part of the following should be complete:

- Business or institutional operations and activity levels, measured by a variety of parameters: facility square footage, number of employees, meals served, number of beds, annual product output, customers served, student population, and the like
- Waste handling practices and systems (including space requirements and restrictions)

personnel, costs, logistics, and equipment

- Waste handling problems or “headaches” the business may be experiencing
- Existing and planned recycling and composting programs, equipment, and personnel
- Purchasing policies and procedures
- Recycling outlets

E. Walk-Through

1. Observe Business Activities



Prior to conducting the walk-through check and assemble the walk-through forms included at the end of this section (Figure 4). (It is always a good idea to have extra copies on hand as more may be needed than originally anticipated). The assessor in the recorder role should always put his or her name on each page of the forms to provide a source for clarification if any questions arise.

The assessment team tours the facility, accompanied by either the person who participated in the interview or another designated employee, to see the physical layout and all operational areas. The team needs to see all areas where waste is generated, by what activities, in what amounts, and how it is handled, stored, and collected.

While the waste assessment is not an efficiency study *per se*, it can indicate inefficient use of resources. For example, a large quantity of paper waste could suggest poor or nonexistent source reduction and recycling habits, and the lack of a clear policy on paper use. Large amounts of manufacturing by-product waste in a dumpster could lead to reuse or waste exchange opportunities. Thus, the assessment can help

improve overall efficiency, with the added possible outcome of reduced waste handling costs.

The assessment team and contact person will walk through the facility and observe all areas of business activity. The walk-through includes, but is not limited to:

- | | |
|--|---|
| • Offices | • Parts assembly areas |
| • Storage facilities | • Laundry rooms |
| • Data processing areas | • Break rooms |
| • Rest rooms | • Lounges |
| • Service departments | • Recreational areas |
| • Mail rooms | • Work stations |
| • Copy & printing areas | • Manufacture & production areas |
| • Stockrooms | • Food prep & service areas |
| • Classrooms | • Shipping/receiving rooms and docks |
| • Public waiting areas | • Janitorial & maintenance areas & activities |
| • Conference & training rooms | • Guest rooms (in hotels or motels, observe 2 or 3) |
| • Garages or other machine service areas | |
| • Inside & outside materials storage areas | |

The recorder will note not only waste types and amounts, but any relevant observations about the business activities and physical set-up that relate to waste disposal, recycling and materials handling.

Figure 4. Waste Assessment Walk-through Form

Establishment:

Date/time:

Interviewer:

Recorder:

LOCATION		MATERIALS	%
Container:			
Size:	Type:		
How full (%):			
LOCATION		MATERIALS	%
Container:			
Size:	Type:		
How full (%)			
LOCATION		MATERIALS	%
Container:			
Size:	Type:		
How full (%)			

Suggested Container Abbreviations:

WB = waste basket (3, 5, 7 gallons, etc.)

TC = trash can (24, 30, 40 gallons, etc.)

D = dumpster (2, 4, 6 cubic yards, etc.)

B = barrel

2. Check Waste Receptacles



Look into each waste receptacle in each area, noting the size, type, and approximate percentages of waste items on the walk-through forms. The assessors will note the obvious types and approximate amounts of material. Find out if waste

materials are stored where they may not have been observed. For instance, cardboard or other bulky wastes may be stored in a closet or spare room.

The assessors should look in the dumpster, noting its size, degree of fullness, and contents in a general way. Internally and externally, the assessors will look for:

- Materials that have waste-reduction potential:
 - Copier paper
 - Toner cartridges
 - Plastic coffee cups
 - Other single use items
- Recyclable materials:
 - Metals
 - Plastics and plastic film
 - Glass
 - Paper
- Compostable materials:
 - Food waste
 - Yard waste
- Excess waste from packaging, shipping, or manufacturing processes.

Note whether materials are segregated or mixed and contaminated by other waste materials.

F. Data Management

1. Data Management Protocol

During the waste assessment, a wide variety of information is collected and noted on the data forms. In order for the information, and therefore the report, to be useful, careful data management is important. Much of the written report submitted to the businesses will be based on the data gathered during the waste assessment. With a few easy steps, a waste assessment summary can be generated when data entry is complete.



Data management starts with recording accurate information on all forms. The first two forms, the *Commercial Waste Reduction Program Sign-up Sheet* and the *Pre-Site Visit Telephone Questionnaire*, are used only to set-up the site visit. The *Waste Assessment Questionnaire*, however becomes the primary information gathering tool, and fields in the database should correspond directly to the information obtained through the waste assessment. To maximize the accurate recounting of the data always enter the data into the computer program as soon as possible after completing a data form. To the same end, the assessor in the recorder role should always enter his or her own data.

2. Data Entry and Report Generation Software

The software used for this project was Lotus 1-2-3. Whatever program is used, it should be a user-friendly and an adaptable piece of software. The data screens developed should be easy to understand and guide one logically through the data entry process. If quantitative data are entered, the software should also have the ability to create charts and summary tables.

The spreadsheet into which data is entered should provide a central location for all of the information

to be accumulated. For each waste assessment a new spreadsheet should be started and saved as a separate file on the computer. As information is gathered on a business it can be entered into the individual spreadsheet until all of the data has been gathered and entered. Each section can be printed to provide a hard copy record of the data on the assessment.

In developing software for a project of this type, a second function should also be included that turns your spreadsheet into a database. This would be a macro driven spreadsheet that will automatically update a main database with information from each waste assessment. With the combined information from the waste assessments a valuable body of data can be compiled.

A copy of the program developed for this project may be obtained by special request through the Cornell Waste Management Institute.

G. The Follow-Up Report

The interview, the waste assessment walk-through, and waste characterization, if performed, form the basis for the follow-up report that will be provided to the business.

The waste assessment report should be to the point, yet provide enough detail for a business to be able to make necessary changes. Some of what should be included in the report will be generated by the database. If a waste characterization is performed pie charts should be included as well. To streamline report writing, develop a series of "stock" paragraphs on waste reduction, recycling, and/or specific materials targeted for reduction and recycling that will apply to any business. An example of a written report which incorporates all essential information is provided in Appendix B.

H. Community Resources

Through contact with the business, there will be several opportunities to convey important

information to assist implementing successful reduction and recycling programs. Often, businesses are simply unaware of an opportunity to recycle a material, or a way to eliminate a material from the waste stream. As part of the waste assessment process, the following information should be made available to the business:

- Local solid waste infrastructure, including: municipal and private recycling efforts; composting; transfer and disposal facilities; as well as information regarding the responsible waste management administrative body
- Local recycling and solid waste regulations and laws
- Local, regional and state information for technical assistance
- Local businesses with successful reduction and recycling programs who are willing to share their experiences
- Local haulers and the services they provide
- Regional market information for non-traditional materials
- Guidelines and sources for purchasing recycled products.

For this project, the above information was tailored specifically to the Tompkins County region, and presented to each business in a packet format. A listing of solid waste resources in New York State that are available to businesses is presented in Appendix C.

I. Waste Assessment Evaluation

After the report has been sent to a business, it is important to make a follow-up contact with a twofold purpose. First, it is valuable to gather feedback on the effectiveness of the waste assessment and the technique of the assessors.

Second, the follow-up process allows the assessor to offer further assistance and answer any additional questions about program implementation.

A copy of the *Waste Assessment Evaluation Form* used for this project is included as Figure 5. The first section of the form asks general questions about the effectiveness of the waste assessment process; the second section asks whether the suggestions for waste abatement for that individual business were effective. The specificity of the questions in the second section allows for a discussion of the effectiveness of the waste abatement suggestions. Find out if the business is using the information presented in the report. Was it clear enough so they could implement the suggestions? Do they need more assistance in order to do this? Help them solve any unexpected problems, and provide any information they need. This procedure can be an important aspect of showing concrete results from the waste assessment.

writing and project evaluation elements. Table 1 presents a breakdown of the cost to conduct a waste assessment.

This table presents the cost per business which includes: recruiting businesses; scheduling the site visit, travel to and from the business; conducting the interview and walk-through, entering data from the site visit; and writing and sending the report. The times to perform these tasks are averaged and assumed that in the beginning, waste assessment technicians will take longer to perform the various tasks due to the learning curve, which will flatten out with increased proficiency. The above costs do not include time spent developing the project protocol, methodologies, database, report formats, and training.

J. Waste Assessment Cost

Implementing a waste assessment program for the business sector is not without cost. For the project conducted in Tompkins County, a team of four assessors was trained to conduct waste assessments and was responsible for all report

Table 1. Waste Assessment Cost (per business)

TASK	NUMBER OF STAFF	TOTAL PERSON HOURS	HOURLY RATE	TOTAL
Scheduling	1	1.0	\$11.87	\$11.87
Interview/Walk Through (including travel)	2	8.0	\$11.87	\$94.96
Data Entry	1	1.0	\$11.87	\$11.87
Reporting	1	3.0	\$11.87	\$35.61
Overhead*				\$350.94
Total		13.5		\$505.25

*Overhead costs include supervision, clerical support, bookkeeping, benefits, supplies, and utilities.

Figure 5. Waste Assessment Evaluation Form

Dear *(insert name)*,

You may recall receiving a waste assessment from a representative from *(agency)* on *(insert date)*. To assist us in evaluating the effectiveness of our waste assessment program, we would appreciate your answers to the following questions.

1. Did you receive the written report? ____ Yes ____ No
 - a. Was it helpful, readable? ____ Yes ____ No
2. In what way was the waste assessment itself helpful?
3. Do you have any suggestions for improving the process?
4. Briefly describe employee/management attitudes towards the waste assessment process and the report.
5. Would you recommend the waste assessment to other businesses?
6. Did you implement, or do you plan to implement, any of the following suggestions contained in the report?
(Tailor this list to the specific business)

	<u>Yes</u>	<u>No</u>	<u>but plan to</u> <i>(How can we Help?)</i>
--	------------	-----------	---

Let us know if we can be of any assistance in implementing your waste reduction programs or if you need any more information. We would be happy to help.

Thank you again for your cooperation,



Section III. A Look at Three Sectors

A. Overview

Businesses in New York State contribute approximately one-third of the total municipal waste stream. According to the publication, "County Business Patterns," (US. Department of Commerce, Bureau of Census, 1991), Tompkins County mirrors the distribution pattern of commercial sector activity on a statewide basis (see Table 2). It is likely then, that waste stream data obtained from businesses in Tompkins County would closely parallel those that might be found in similar businesses throughout the State.



According to Table 2, among the largest business sectors (by number) are: services, retail trade, and financial/insurance firms. Since these sectors comprise a large percentage of the overall business community, both in Tompkins County and in New York State, these sectors could account for a large

percentage of the overall waste stream as well. Accurate assessment of the quantity and composition of waste generated by each of these sectors requires that an intensive waste assessment program be initiated.

In 1993, Tompkins County targeted 44 businesses in the retail, hospitality service (hotels and eating establishments) and small office sectors (financial/insurance/real estate/law) to receive waste assessments and waste stream characterizations. These 44 businesses represented approximately 4-5% of the total number of businesses in each of the three sectors. Using two-digit SIC code information, businesses were first grouped by generator type into the three sectors. Specific businesses were then identified using several sources, including full SIC identification, Chamber of Commerce listings, Tompkins County Area Development agency listings, "County Business Patterns", and telephone books. In addition to being within one of the three chosen sectors, other criteria used for business selection included:

- The business must be small to medium in size, and have a total number of employees not exceeding 99

Table 2. Tompkins County and New York State Business Patterns

SECTOR	# OF BUSINESSES IN TOMPKINS COUNTY	# OF BUSINESSES IN NEW YORK STATE	% OF TOTAL TOMPKINS COUNTY	% OF TOTAL NEW YORK STATE
Agriculture	21	4,420	0.01	0.01
Mining	5	469	0.00	0.00
Construction	174	37,574	0.08	0.08
Manufacturing	105	28,567	0.05	0.06
Trans./Utilities	61	16,511	0.03	0.04
Wholesale	79	40,964	0.04	0.09
Retail Trade	608	108,302	0.29	0.23
Finance/Insur.	159	48,031	0.07	0.10
Services	703	148,184	0.03	0.32
Unclassified	160	30,155	0.08	0.07
Total	2,075	463,177	1.00	1.00

- The business must generate at least 1 cubic yard of garbage per week
- The business could not share dumpster service with another business (unless special arrangements were made to separate waste for a 1 week period).

Targeted businesses were solicited first by letter, and if they responded positively, they were then contacted by telephone. A full description of the program was provided to them and a site visit was scheduled. Each participating business was then sent a questionnaire asking for detailed information about their waste management practices. During the site visit, teams of two assessors reviewed the questionnaire with facility personnel to obtain as accurate information as possible regarding the business and its waste management practices. A walk-through of the facility was then conducted with facility personnel to review current practices and identify waste reduction opportunities.

Following the site visit, a characterization of the business' waste stream was conducted at the Tompkins County Transfer Station, using the methodology described in the companion manual to this document entitled, *Waste Prevention Tools at Work - Volume II. A Method for Conducting Waste Characterizations*.

All information regarding each business was then entered into a database and summarized. Each participating business received a waste assessment report on its current waste practices, emphasizing the steps it had already undertaken to reduce, reuse and recycle waste; a chart of data from the waste characterization; and suggestions for improving the waste handling system.

A follow-up survey was sent to participating businesses to determine the usefulness of the waste assessment.

B. Project Results

The results of the waste assessments and characterizations conducted as part of this project are detailed below.

Much of the information obtained from the waste assessments was qualitative in nature and included information on waste handling practices, shipping and receipt of inventory, and current waste reduction and recycling efforts. (Due to the large number of businesses participating in this part of the project, detailed information regarding their purchasing practices could not be incorporated. However, purchasing practices will be a focus of the Demonstration Businesses, described in Section IV of this manual.)

The data obtained from the waste characterizations are quantitative and presented by sub-sector. For each sector, material weights for all businesses within a sub-sector were totaled by material type. Each material falls within one of six major material categories: paper, plastic, glass, metal, organics, and miscellaneous. Weights for each material type were subtotaled by category and the subtotaes were totaled to show the total for each sub-sector. Each material weight and category subtotal was then divided into the total weight to show what percentage of the total each material type represents. This was done for each sub-sector. For example: the sample size of the Service Station sub-sector was 4. Weights for each of the four businesses were combined. The table shows that of the total weight, 7.5% was OCC/Kraft Bags. This represents 7.5 pounds for every 100 pounds sampled. The waste composition of each of the sub-sectors is presented in pie chart found in the text.

Finally, using the qualitative information gleaned from the waste assessments and the quantitative data obtained from the waste characterizations, a listing of problems and opportunities for waste reduction is presented for each of the three sectors. A more comprehensive listing of waste prevention

ideas applicable to each of the three sectors is presented in Appendix E.

1. Retail Sector

a. Overview

In 1993 there were an estimated 608 retail trade establishments in Tompkins County. Twenty-eight of these were selected to receive an assessment and characterization of the waste stream (note, one business did not receive a waste characterization). Because of the diversity of the Retail sector, it was further broken down into the seven sub-sectors of: service stations, grocery stores, furniture and appliance stores, electronic and computer stores, drug stores, hardware and building supply stores, and shoe and apparel stores.



Many of the small retail businesses that participated in this project were receiving waste collection several times weekly, regardless of whether the dumpster was full at the time of collection. Twice weekly (or more) garbage collection is costly and often unnecessary. Scaling back to weekly collection could result in reduced hauling costs. In some cases, businesses may not need a dumpster at all, and could rely instead on trash bags or cans, thereby putting them in better control of their waste disposal costs. Businesses need to periodically review their hauling contracts to ensure that the level of service they receive fits their needs.

b. Existing Conditions

The businesses sampled in the Retail sector were small to medium in size, employing from 2-30 full time staff. Many contracted for dumpster service with a private hauler. The level of collection service provided to these businesses ranged from weekly to three times per week. In general, food stores and other retail operations with putrescible waste contracted for more frequent collection. In all cases where dumpsters were used, businesses

were paying a flat rate for garbage collection and disposal service. A few small retail businesses were receiving municipal collection and were therefore using trash tags. (Note: in Tompkins County, businesses may opt to contract with a private hauler for waste collection and disposal services, or haul it themselves. In some areas, the business may be serviced by the municipality. Businesses may also elect to rent a dumpster or pay for trash tags which are affixed to individual garbage bags, either 20 or 35 pound sizes. Therefore, waste hauling and disposal costs for businesses participating in this project varied greatly).

Almost all businesses in this sector have suppliers deliver goods. Packaging that accompanies these goods included: cardboard, stretch wrap, shrink wrap, pallets, drums, buckets, strapping, and plastic totes.

c. Source Reduction and Reuse

Many businesses in the Retail sector had already implemented source reduction and reuse programs, many of which are standard, but some of which are quite innovative. They included the following:

Reduction:

- Electronic mail systems
- Compact fluorescent bulbs
- Bulk purchasing of cleaning supplies, motor oil
- Electric hand dryers
- Cloth toweling systems
- Two-sided copying
- On-site composting of food waste, brush, and dead nursery stock
- Refillable soap dispensers.

Reuse:

- Reuse of electronic components from broken equipment
- Making grading stakes from lumber rejects
- Backhauling drywall spacers

- Repair of shopping carts and second-hand appliances
- Using bruised fruit in baked goods and desserts
- Refillable drink containers
- Reuse of polystyrene peanuts and other packing materials
- Reuse of hangers
- Giveaway programs for lumber, pallets, damaged inventory, and polystyrene peanuts
- Reusing plastic greenhouse covers as tarps
- Reusable shipping containers
- Reusing plastic bags to cover root balls
- Reusable rags
- Reusable employee coffee mugs
- Recharging laser printer cartridges
- Scrap paper reuse.



One store reported a savings of 30,000 sheets of paper a year, equal to \$225, as a result of implementing an electronic mail system. Items such as corporate memos and price updates are transferred electronically. Another store reported that future plans include accepting used rechargeable batteries.

d. Recycling

In addition to the traditional materials of newspaper, office paper, corrugated cardboard, glass, metal, and PET and HDPE plastic containers, retail businesses were also recycling:

- | | |
|---------------|-------------------|
| • Mixed paper | • Cooking oil |
| • Motor oil | • Scrap metal |
| • Antifreeze | • Metal strapping |

A few of the businesses in the Retail sector reported routinely purchasing recycled products, including: office paper, toilet tissue, paper towels, motor oil, plastic trash bags, rebuilt equipment, gift boxes, carpet, and compost.

e. Waste Composition

Table 3 presents the composition data from the waste characterization, for all sub-sectors within the Retail sector, given in percentages of the total.

Giveaway pallets for reuse.

Table 3. Retail Waste Composition Data (percent by weight)

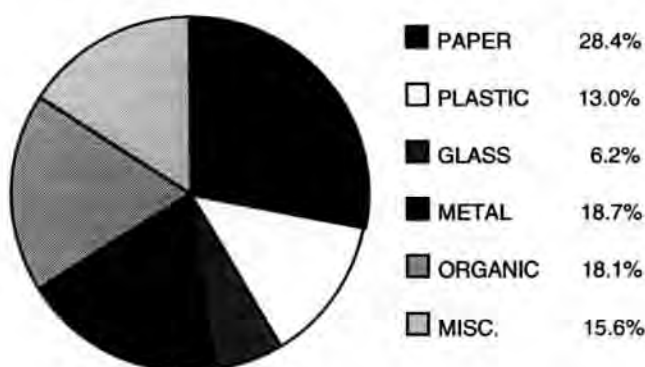
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1. Service Stations (SIC Code 5541-01)



Despite reports of cardboard recycling, this material comprised 7.5% of the total weight sorted for the Service Station sub-sector. Also found in relative abundance were other metals (17.3%) and food waste (17.3%). Most of the HDPE containers found were from motor oil, and much of the metal was scrap metal from auto repairs. Food waste was quite high, and may be due to the sale and on-site consumption of "fast food."

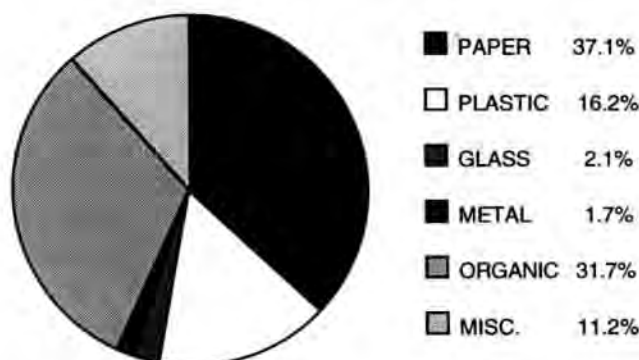
Service Stations



2. Grocery Stores (SIC Codes 5411-01, 5411-03, 5411-05, 5421-07, 5499-01)

The waste characterization of the selected grocery stores identified several areas where management of certain types of waste is warranted. Two of the larger waste categories were LDPE film (9.7%) and food waste (24.9%). As with many of the retail

Grocery Stores

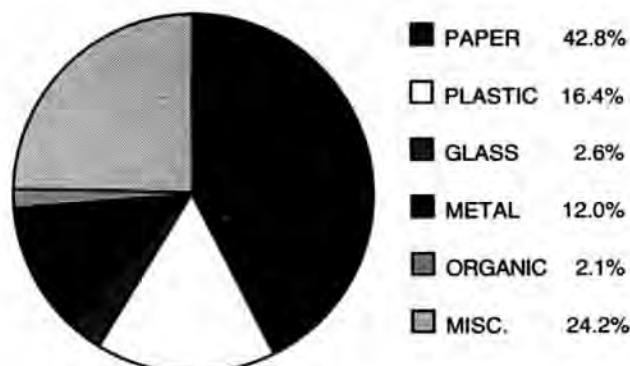


stores sampled, non-recyclable paper (20.7%) continues to be a problem waste for the Grocery Store sub-sector. On the other hand, the relatively low percentage of cardboard seen in the waste stream (5.7%) indicates that the Grocery Store sub-sector is already doing a good job of recovering this material.

3. Furniture and Furnishing Stores (SIC Codes 5712-16, 5722-02)

Despite existing opportunities to recycle cardboard, this material still comprised 20.7% of the total weight sorted for this sub-sector. Other categories that could be reduced included: LDPE film (7.1%); all other metals (11.3%); inert materials (8.9%), and textiles/footwear (3.4%).

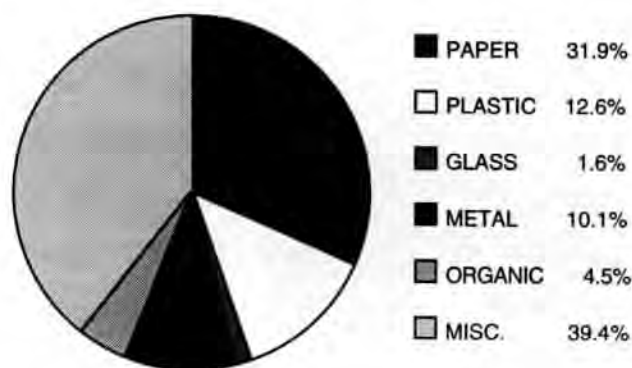
Furniture & Furnishings



4. Electronic and Computer Stores (SIC Codes 5731-05, 5734-07)

Due to a scheduling problem, waste from one of the businesses in the Electronic and Computer Store sub-sector was never sorted. Data therefore reflect weights from three, not four businesses. Despite reports of recycling mixed paper, this category comprised an average of 11.8% of the total weight for this sub-sector. The "all other plastics" category comprised 7.3%, and was made up primarily of electronic component chassis and cabinets. Also, several nickel-cadmium batteries were found in the waste stream of one of the businesses.

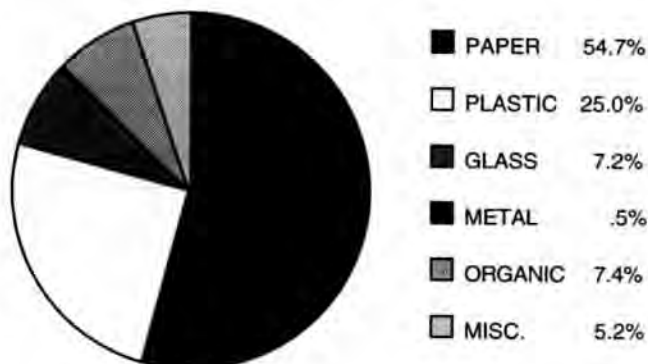
Electronic & Computer Stores



5. Drug Stores (SIC Code 5912-05)

For the Drug Store sub-sector, 54.6% of the total weight was paper. Of that, much of it was recoverable, including cardboard (9.7%) and mixed paper (11.2%). An additional 20.6% was paper and paperboard packaging, indicating a need to discuss alternative packaging types with suppliers. Styrofoam coffee cups were also present in the waste streams of all three drug stores sampled.

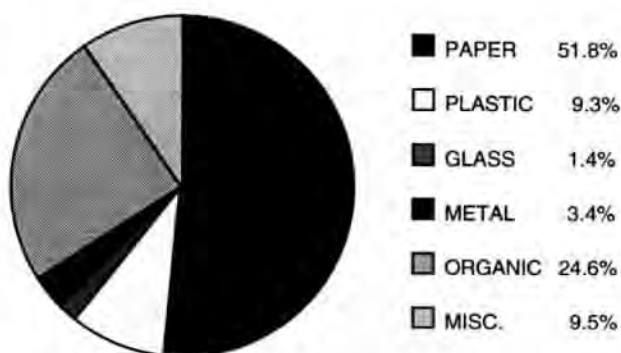
Drug Stores



6. Hardware and Building Supply Stores (SIC Codes 5261-04, 5211-26)

The largest category of waste for the Hardware and Building Supply Store sub-sector was paper (51.7% of the total). Of that, 30% was cardboard and 11.5% was mixed paper, both of which are readily recyclable. Sod and miscellaneous plants (13.9%) could be diverted from the dumpster if on-site composting opportunities were available. Wood waste (10.3%) could perhaps be diverted through giveaway programs.

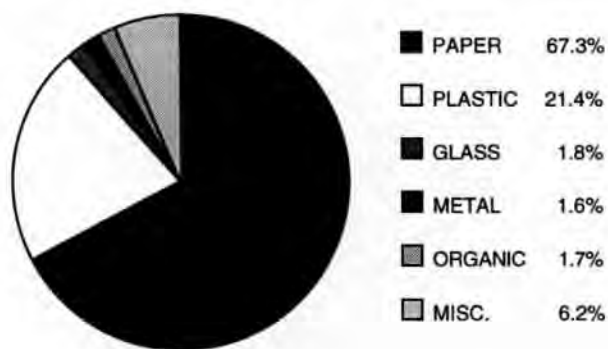
Hardware & Building Supply



7. Shoe and Apparel Stores (SIC Codes 5621-01, 5651-01, 5661-01)

An astounding 67.3% of the total waste sampled in the Shoe and Apparel Store sub-sector was in the paper category. Of that total, 15.7% was recyclable mixed paper. Other waste types that could be targeted for reduction included: paper and paperboard packaging (34.8%), polystyrene packaging (13.5%), LDPE film (5.0%), and textiles/footwear (4.8%).

Shoe & Apparel Stores



f. Problems and Opportunities

Through working with businesses during the waste assessment and characterization process, a number of issues were raised regarding the Retail sector's waste. Table 4 presents some of the problems identified, with possible solutions or opportunities for overcoming these problems. In some cases, opportunities do not exist currently, but may develop with time.

2. Hospitality Sector

a. Overview

The Hospitality sector includes the categories of Hotels, Motels, and Inns as well as Eating and Drinking Places. For this study, Eating and Drinking Places were divided into two separate sub-sectors, Full-Service Restaurants and Deli/Take-Out



Establishments, to segregate those establishments typically labeled as fast food from other restaurants. The types and quantities of waste generated by fast food establishments were likely to differ significantly from that generated by full-service restaurants.

In 1993, there were an estimated 200 hotels/motels and eating establishments in Tompkins County. Five percent of these, or 10 of the total, were selected to receive an assessment and characterization of the waste stream.

Restaurant using nondisposable items.



Table 4. Problems and Opportunities in the Retail Sector

PROBLEM	OPPORTUNITY
Service stations tend to accumulate and dispose of large quantities of HDPE containers from oil sold to "do-it-yourself" customers.	Reduce the volume of waste HDPE containers from motor oil by purchasing oil destined for in-house use in bulk rather than by the quart.
Many retail stores still use carbon paper for printing receipts and in administrative areas.	Where possible, carbon paper should be replaced with carbonless forms.
Large quantities of styrofoam cups were observed in the retail sector waste stream.	Employees and guests can use durable reusable mugs.
Businesses in the retail sector receive large amounts of junk mail.	Businesses should develop a system to have themselves removed from mailing lists; what cannot be eliminated should be recycled.
Almost 21% of the drug store sector waste stream was paper and paperboard packaging.	Businesses in this sector should encourage suppliers to use reusable totes for all products.
Packaging makes up a large percentage of the retail sector's waste stream.	Large retailers can significantly influence manufacturers to initiate packaging changes. If businesses cannot convince suppliers to switch to lower waste packaging types, they should try to recycle these materials.
Some produce is still delivered in non-recyclable packaging such as waxed cardboard.	These boxes can be reused several times. Businesses should also promote the use of reusable totes from suppliers.
The retail electronic store waste stream has a large percentage of discarded component parts (the "all other plastics" category.)	Increasingly, electronic and computer stores are reusing parts of old electronic equipment in repairs, thus reducing the generation of this type of waste.
Nickel-cadmium batteries were present in the waste stream of the retail electronic stores.	The use of rechargeable batteries is increasing; also opportunities exist for recycling of nickel-cadmium batteries.
Suppliers to many electronic retail stores continue to package goods in styrofoam peanuts.	Styrofoam peanuts used as packaging by suppliers can be reused and/or recycled. Suppliers can be encouraged to substitute degradable peanuts or various types of paper packaging for styrofoam.
The waste characterization of retail drug stores revealed an abundance of small non-recyclable PET and HDPE plastic containers used for prescription drugs.	Bulk purchasing of products could help reduce the amount of small plastic medication containers. Pharmacies can also work with suppliers to implement a return program for medicine bottles.
Damaged goods and defective lumber are common in the waste stream of the retail home and garden sector.	Give away programs can be established for damaged merchandise.
Hangers are used to ship clothing to many retail apparel stores.	Reuse opportunities are increasing for plastic and wire hangers.

Table 4. Problems and Opportunities in the Retail Sector (cont'd)

PROBLEM	OPPORTUNITY
Paperboard shoe boxes are a problem waste for the retail shoe store sector.	Shoe boxes can be reused in craft projects by many day care centers and schools.
Non-recyclable label backing paper left over from filling prescriptions in drug stores comprise a significant portion of the non-recyclable paper category.	There are few opportunities for managing non-recyclable paper.
A large fraction of the home/garden store waste was sod and plant waste.	Sod and plant waste can be composted on-site, or diverted to a municipal composting program.
Many retail stores receive goods packaged in plastic film wrap.	Recycling opportunities for plastic film are increasing, particularly for large generators.
A percentage of the metal found in service station waste streams is used oil filters.	If properly drained and crushed, used oil filters can be recycled as scrap metal and are not considered hazardous waste.
Storage space for reusables and recyclables is a problem.	Careful planning can result in successful reuse and recycling programs, even for the smallest of businesses.
Little knowledge of local recycling requirements make program implementation difficult.	The presence of recyclables in the waste stream of businesses in the retail sector suggests the need for a better sorting system and more employee education. Businesses also need to know where to turn for assistance.
Businesses in the retail sector purchase few products made with recycled content.	Retail businesses can contribute to "closing the loop" by purchasing recycled products such as toweling, motor oil, and office paper. Chain stores, in particular, can buy in large quantities through central purchasing.

b. Existing Conditions

The selected businesses in the Hospitality sector were all small to medium in size, and employed from 2-35 full-time staff. Only two of the 10 businesses sampled used trash tags for garbage; all others leased dumpsters and paid for trash disposal on a flat rate basis. Many businesses in this sector have waste collected three times per week. As with the retail sector, businesses in the Hospitality sector were receiving trash collection more frequently than needed.

Goods for the Hospitality sector are delivered by suppliers, with common packaging types being cardboard, stretch wrap, plastic buckets and jugs, and paper bags.

c. Source Reduction and Reuse

Many businesses in the Hospitality sector had already implemented source reduction and reuse programs, many of which are standard, but some of which are quite innovative. They included the following:

Reduction:

- Bulk purchasing
- Linen services
- Paperless cash registers
- Electric hand dryers
- Reusable glassware in guest rooms
- Liquid shampoo/soap dispensers in guest room showers
- Pre-ordering of meals
- Two-sided copying
- Compact fluorescent bulbs
- Refillable creamers and condiment containers
- Employee coffee mugs
- Cloth toweling systems.

Reuse:

- Reusable container systems
- Reuse of stale bread for bread crumbs
- Refilling customer's take-out containers

- Reuse of potato sacks for recycling program
- Giveaway program for large plastic containers
- Scrap paper reuse
- Reuse of cardboard drums for storage
- Reuse of paper menus as grease blotters
- Toner cartridge recharging.

d. Recycling

In addition to the traditional materials of newspaper, office paper, corrugated cardboard, glass, metal, and PET and HDPE plastic containers, businesses in the Hospitality sector were also recycling cooking oil (which is picked up by a renderer) and motor oil.

Recycled products routinely purchased by the Hospitality sector included: office paper, toilet tissue, brown paper towels, cardboard boxes, and paperboard drink carriers.

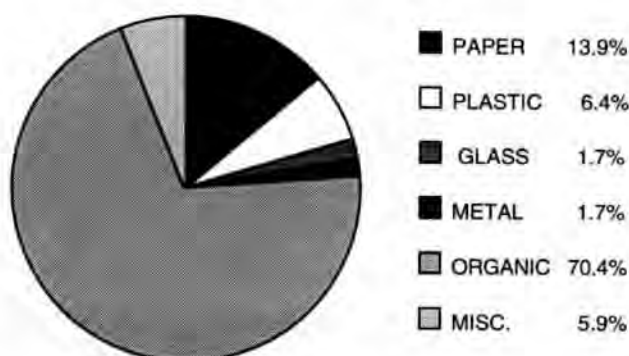
e. Waste Composition

Table 5 presents the composition data for all sub-sectors within the Hospitality sector.

1. Full-Service Restaurants (SIC Code 5812-08)

Almost 70% of the total material weight generated by the Full-Service Restaurant sub-sector was food

Full Service Restaurants

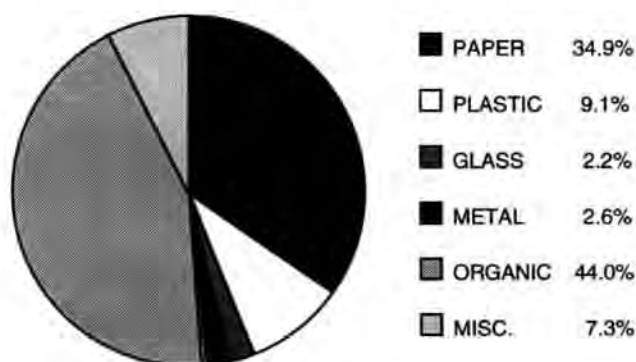


waste, the highest among the three sub-sectors. This may be attributed to a number of factors including: large portions, several course meals, all-you-can-eat food bars, and minimal use of pre-packaged food. LDPE film (4.0%) comprised the second largest waste category.

2. Deli/Take Out Restaurants (SIC Code 5812-06)

Food waste generated by the Deli/Take-Out Restaurant sub-sector (43.9%) was somewhat less than what is generated by full-service restaurants. This may be due to more use of pre-packaged food resulting in less preparation waste, meals taken out of the restaurant, and a la carte ordering. However this sub-sector did have a lot of other non-recyclable paper waste (22.0%), likely due to napkin and food wrapping waste. Again, LDPE film (4.3%) was a large waste category.

Deli/Take Out Restaurants

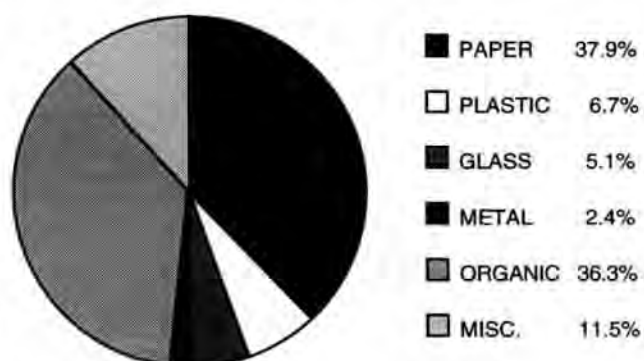


3. Hotels/Motels/Inns (SIC Code 7011-01)

Because all but one of these facilities serves meals, food waste comprised 35.4% of the total weight sorted in the Hotel sub-sector waste stream. Paper and paperboard packaging made up 11.8%, possibly due to packaging received with supplies used in guest rooms. While only comprising 0.7% of the hotel waste stream, soap bars generated from guest rooms indicate that this waste type could be targeted for reduction through the use of alternatives such as liquid soap and shampoos.

The presence of cardboard, newspaper and glass in the waste stream suggests better separation programs are needed in this sub-sector.

Hotels/Motels/Inns



f. Problems and Opportunities

Presented in Table 6 are some of the waste management issues identified in the Hospitality sector.

3. Small Office Sector

a. Overview



For the purposes of this study, the three sectors of banks, insurance/real estate and law offices were grouped into one sector, even though each have different SIC codes. This was based on the assumption that their waste streams would likely be similar in composition and that source reduction strategies would be common for all three sectors.

In 1993, there were an estimated 159 Financial/Insurance and Real Estate establishments in Tompkins County as well as several small law offices. Six were selected to receive an assessment and characterization of the waste stream.

Table 5. Hospitality Sector Waste Composition Data (percent by weight)

BUSINESS TYPE	Restaurant n=3	Hotel/Motel n=4	Take Out/Deli n=3
MATERIAL			
OCC/Kraft Bags	1.4%	5.4%	4.7%
ONP	3.5%	7.8%	2.1%
High Grade	0.0%	0.4%	0.0%
Mixed Paper	0.3%	3.6%	0.1%
OMG, Catalogs, Junk Mail	0.2%	0.3%	0.0%
Paper/Paperboard Packaging	3.5%	11.8%	6.1%
Other Non-Recyclable Paper	5.0%	8.6%	22.0%
Total Paper	13.9%	37.9%	34.9%
HDPE Containers	0.2%	0.5%	0.8%
PET Containers	0.0%	0.5%	0.0%
LPDE Film/Sacks	4.0%	3.0%	4.3%
PS Packing	0.2%	0.8%	1.3%
Other Plastic Packaging	1.8%	1.2%	2.6%
All Other Plastics	0.2%	0.5%	0.1%
Total Plastic	6.4%	6.7%	9.1%
Recyclable Glass	1.7%	5.0%	2.2%
Non-Recyclable Glass	0.1%	0.1%	0.0%
Total Glass	1.7%	5.1%	2.2%
Food & Beverage Cans	1.6%	1.3%	2.6%
Other Aluminum	0.0%	0.0%	0.0%
All Other Metals	0.2%	1.1%	0.0%
Total Metal	1.7%	2.4%	2.6%
Food Waste	69.9%	35.4%	43.9%
Soap	0.0%	0.7%	0.0%
Leaves/Grass	0.0%	0.0%	0.0%
Brush	0.4%	0.0%	0.0%
Sod/Misc. Plants	0.0%	0.1%	0.0%
Manure/Animal Waste	0.0%	0.0%	0.0%
Wood Waste	0.0%	0.1%	0.0%
Total Organics	70.3%	36.3%	44.0%
Inert Materials	0.1%	0.3%	0.0%
Bulky Items	0.0%	0.0%	0.0%
Textiles/Footware	1.3%	1.9%	1.5%
Disposable Diapers	2.0%	0.8%	1.5%
Tires	0.0%	0.0%	0.0%
Residue	2.5%	3.1%	4.1%
Other	0.0%	5.5%	0.2%
Total Miscellaneous	5.9%	11.5%	7.3%
(Numbers may not add to 100% due to rounding.)			
TOTAL	100.0%	100.0%	100.0%

Table 6. Problems and Opportunities in the Hospitality Sector

PROBLEM	OPPORTUNITY
Customer expectations of fast service may make the use of excess packaging necessary.	Ask take-out customers if they need items such as drink carriers and extra condiments. Ask eat in customers if they mind not receiving certain items such as tray slips, cup lids or extra condiments.
Large quantities of paper and polystyrene take-out cups were present in the waste stream of the Deli/Take-Out sub-sector.	Fast food businesses could minimize the use of disposable cups by offering a discount to customers using reusable mugs.
Businesses in the Hospitality sector, particularly full-service restaurants, generate large quantities of food waste.	Food banks are available to accept donations from restaurants. Also, businesses should encourage municipal food waste composting.
Plastic cups generated from guest rooms were present in the Hotel sub-sector.	Durable water glasses in guest rooms can eliminate purchasing and disposal of plastic cups.
Other, non-recyclable paper, such as napkins, made up over 30% of the Hospitality sector's waste stream.	Using a linen service can minimize non-recyclable paper waste.
Hotels may have the perception that guests expect personal size soaps and shampoos as giveaway items. These in fact are being disposed of and were seen in waste streams of all the hotels.	Hotels should consider replacing giveaway soaps and shampoos with other items such as postcards or mugs, and installing bulk soap and shampoo dispensers instead.
Paper and plastic packaging made up a significant portion of the Hospitality sector's waste stream.	Reusable cream pitchers and other "on the table" containers can minimize the purchase and disposal of single-serving containers.
Furniture wears out or is replaced frequently in the Hotel sub-sector.	Furniture can either be refinished or donated to charity.
Plastic trash can liners (film sacks) were present in the Hotel sub-sector.	Hotels should consider reusing guest room trash can liners for stay-over guests, or eliminating them altogether.
LDPE film was present in the Hospitality sub-sector waste stream.	Opportunities for recycling LDPE film are increasing.
Larger corporate chains change slowly, with changes often initiated from a central office.	Corporate policies can result in source reduction and recyclability of discards through purchasing power leverage.
Few businesses in the Hospitality sector were purchasing recycled content products.	Businesses in this sector can help "close the loop" by purchasing recycled products.
High turnover of employees make waste reduction and recycling programs difficult.	Source reduction and recycling program education should be part of new-employee orientation.
Many recyclables were found in the Hospitality sector's waste stream, suggesting that better separation and quality control systems may be needed.	There are many sources of information and technical assistance available to businesses in this sector. Also, businesses in this sector should advertise their reduction and recycling efforts to their patrons.

b. Existing Conditions

The participating businesses in the Small Office sector ranged in size from 2,300 to 18,500 square feet, and employed 5-45 full-time staff. Trash collection varied for each business: some used trash tags, others used various sizes of dumpsters. Businesses with trash collection received either once or twice per week collection.

Goods are delivered to this sector via suppliers, UPS, common carrier, and self-haul. The types of packaging received include: cardboard, envelopes, and stretch wrap.

c. Source Reduction and Reuse

Many source reduction initiatives have already been put into place by businesses in this sector. These include:

Reduction:

- Two-sided copying
- Cloth toweling systems
- Bulk purchasing

Avoid using disposable items.



- "If you bring it in, bring it out" policies
- Compact fluorescent bulbs.

Reuse:

- Refillable products
- Scrap paper reuse
- Used book exchanges
- Reusable coffee mugs and table service in employee break areas
- Toner cartridge recharging.

d. Recycling

Most businesses in this sector reported recycling at least some of the traditional materials, including: cardboard; mixed paper; high-grade office paper; newspaper; and plastic, glass, and metal containers. One business contracts for pickup of high-grade office paper and another gives a local farmer shredded office paper for animal bedding. While recycling mixed paper is an option, only two of the six businesses were separating this material.

Three of the businesses reported purchasing the following recycled products: office paper, toilet tissue, and paper towels. In addition, one business routinely purchases rebuilt computer equipment.

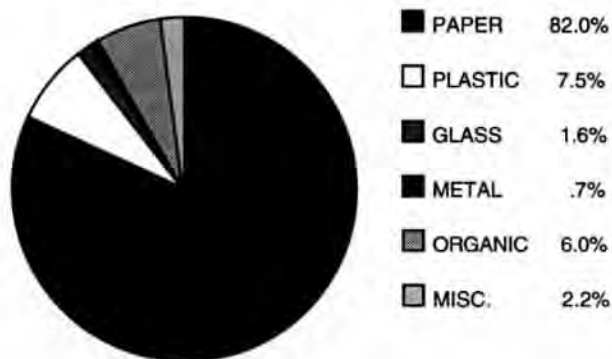
e. Waste Composition

1. Real Estate/Law/Bank/Insurance (SIC Code 6411-12, 8111-03, 6061-01, 6021-01, 6531-18)

The waste composition data for the Small Office sector are presented in Table 7. Not surprisingly, the largest waste category by weight was paper (82.1%). Of that, 45.3% was mixed paper, a readily recyclable material. Other

recoverable paper categories included cardboard (2.2%), newsprint (1.2%), high-grade paper (5.6%), and magazines/junk mail (1.7%). Other significant categories included: LDPE film (3.1%) used to package supplies and food waste (6.0%) generated from employee lunch areas.

Real Estate/Law/Bank/Insurance



f. Problems and Opportunities

Presented in Table 8 are some of the problems identified in the Small Office sector, with possible solutions or opportunities for overcoming these problems. In some cases, opportunities do not exist currently, but may develop with time.

C. Conclusions

In general, the waste assessment and characterization program found that most of the participating businesses were already engaged in some type of waste reduction activity. Some have implemented electronic mail systems and use carbonless paper forms; others have switched to reusable coffee mugs and table service for employees;

others have opted for alternatives to paper towels in rest rooms. What became evident through this study however, is that reduction of a business' waste stream is greatly affected by suppliers, shippers, and regulatory agencies. The project found few areas where businesses could eliminate significant amounts of waste without cooperation from external entities.

In terms of reuse, 85% of the businesses were already taking steps to reuse materials (e.g., using scrap paper for notes and reusing containers, packaging materials such as polystyrene peanuts and paper shopping bags). Regulations and market factors limit the reuse options for businesses. For example, the New York State Department of Agriculture and Markets prohibits grocery stores from reusing grocery bags. Customers may, however, use their own bags.

The arena of recycling proved to be most promising for improvement. In general, businesses were already doing a good job of recovering cardboard, but most were not recycling mixed paper, which comprised one of the largest recyclable fractions of the waste stream.

Use two-sided copying.



Table 7. Small Office Waste Composition Data (percent by weight)

MATERIAL	Real Estate/Insurance/ Banks/Law Offices n=6
OCC/Kraft Bags	2.2%
ONP	1.2%
High Grade	5.6%
Mixed Paper	45.3%
OMG, Catalogs, Junk Mail	1.7%
Paper/Paperboard Packaging	6.0%
Other Non-Recyclable Paper	20.1%
Total Paper	82.1%
HDPE Containers	0.1%
PET Containers	0.0%
LPDE Film/Sacks	3.1%
PS Packaging	1.3%
Other Plastic Packaging	1.6%
All Other Plastics	1.4%
Total Plastic	7.5%
Recyclable Glass	1.6%
Non-Recyclable Glass	0.0%
Total Glass	1.6%
Food & Beverage Cans	0.5%
Other Aluminum	0.0%
All Other Metals	0.2%
Total Metal	0.7%
Food Waste	6.0%
Soap	0.0%
Leaves/Grass	0.0%
Brush	0.0%
Sod/Misc. Plants	0.0%
Manure/Animal Waste	0.0%
Wood Waste	0.0%
Total Organics	6.0%
Inert Materials	1.6%
Bulky Items	0.0%
Textiles/Footware	0.4%
Disposable Diapers	0.0%
Tires	0.0%
Residue	0.2%
Other	0.0%
Total Miscellaneous	2.2%
(Numbers may not add to 100% due to rounding.)	
TOTAL	100.0%

Table 8. Problems and Opportunities in the Small Office Sector

PROBLEMS	OPPORTUNITIES
A tremendous amount of paper is generated by this sector.	Paper generation can be greatly reduced in this sector through storing information on CD, fiche, computer disks instead of paper. Paper can be further minimized with electronic mail systems, two-sided copying, carbonless forms, and one memo routing.
Offices use many computer diskettes.	Diskettes can be erased and used many times.
Offices depend on laser printers.	Toner cartridges can be recharged.
Offices generate a large amount of mixed paper.	Mixed paper recycling is increasing.
Recyclables were present in the waste stream.	Information and employee education can result in successful recycling programs for this sector, which has a highly recyclable, relatively contaminant-free, waste stream.
Businesses do not want the hassle of bringing waste office paper to recycling markets.	Large amounts of high-grade paper are generated at a single location making it an attractive situation for pickup.
Little recycled product purchasing is done by the Small Office sector.	This sector has the opportunity to purchase many types of recycled office paper.

A follow-up survey sent to all participating businesses yielded a 42% response rate. Approximately 66% of the suggestions made to businesses have been implemented and another 28% are planned for future implementation. Less than 7% of the suggestions will not be implemented.

Many of participating businesses share a common problem: hauling services are based on flat, rather than variable rates, and the level of service often does not correspond to need. As businesses reduce the amount of waste in the dumpster through source reduction and recycling programs, storage and hauling needs change. Many businesses had not yet requested smaller dumpsters or reduced collection frequency. Businesses should review their hauling contracts with respect to their current need. In cases where businesses pay per bag, most bags were found to be well below the allowable trash tag weight limit (20 lb. and 35 lb.), thus raising the overall cost of trash disposal. A copy of a sample hauling contract has been included in Appendix F.

Another issue that has become evident as a result of this project is the large amount of food waste generated by almost every sector sampled. If possible, businesses can attempt to manage this waste on-site; in general, however, space and resource constraints do not allow for widespread on-site composting by businesses. Clearly, a facilitated organics management program would greatly reduce the amount of waste destined for disposal in the three business sectors.

In summary, it appears that the burden is on individual businesses to initiate change, because they are the

consumers of products and services. Municipalities should work to ensure that businesses have the information and the technical assistance they need to implement source reduction programs, but the final decision to reduce waste rests with the business.

Encourage businesses to buy recycled content products.





Section IV. Demonstration Sites

A. Overview

It is not always enough to provide a business with information on waste reduction strategies; often times corporate policy, suppliers, and customer expectations dictate business practices that run counter to the commonly accepted waste reduction measures. Acknowledging that there are hurdles to overcome when initiating a waste reduction program, five businesses in Tompkins County were willing to become demonstration sites for this project. The participating businesses first reviewed waste reduction measures that were applicable to their particular situation, and agreed to implement at least one. In addition, the project coordinators carried out a "theoretical" analysis of various other measures appropriate for each business, for their future consideration and possible implementation.

The following types of small businesses from each of the three sectors were selected:

Retail

- Hardware and Building Supply Store (part of a regional chain)
- Grocery Store (part of a grocery cooperative)

Hospitality

- Hotel (part of a national franchise system)
- Deli/Take-Out Restaurant (part of a national franchise system)

Small Office

- Bank/Financial Institution (local bank with several area branches)

Through a series of meetings between County Solid Waste staff and the business representatives, source reduction goals for each of the businesses were set and tracking measures were initiated. The basic tasks involved for the demonstration program were:

Step 1 - Identification of Key Personnel

The Solid Waste staff met with business representatives to identify the individuals who would be directly involved in the business' waste reduction program, including possibly: the owner, manager, purchasing personnel and/or custodial staff.

Step 2 - Identify Waste Reduction Options

Based on the information obtained from the waste assessment and waste characterization, the team identified waste reduction options that would have the greatest impact for that specific business. Despite this, most businesses chose measures which would likely have little effect on the waste stream, yet could be readily implemented and were cost-free.

At this point, a minimum of one waste reduction option was identified for implementation by each business.

Step 3 - Purchasing Guidelines

Solid Waste staff, along with the business' purchasing manager reviewed the purchasing lists from recent months to identify items that could be replaced with other, less waste-generating items. This discussion included such questions as:

- Does the company really need to purchase items that are being thrown away?
- Can any of these items be reused?
- Are the items available with less packaging?
- Are they available in bulk quantity?
- Is it possible to adopt preferred packaging guidelines?
- Can the company increase its efforts to purchase recycled products?

Step 4 - Educate Staff

Depending on the size and type of the business, Solid Waste staff worked with business representatives to identify the types and level of staff education efforts necessary. If necessary, businesses were provided with educational materials to assist them in their educational efforts.

Step 5 - Record Keeping

To evaluate the effectiveness of the source reduction measures implemented, a record keeping system was developed for each of the selected measures. Baseline logs were completed prior to program implementation, to enable later comparison of cost and other savings.

Step 6 - Implement Selected Options

The County Solid Waste staff met frequently with business representatives to implement the selected waste reduction options, track progress, and collect waste savings data.

B. Demonstration Businesses

1. Hardware and Building Supply Store

a. Theoretical Measures Evaluated

The hardware and building supply store selected to participate as a demonstration business is part of a chain, with stores located throughout the Northeast. As of 1993, many of the stores were being linked to a satellite system, which according to company officials, will increase inventory reporting accuracy; allow more efficient customer servicing; and eliminate some types of paper record keeping, thereby reducing waste paper generation. It was originally thought that the new system would be initiated in the Ithaca store during the project period, but that has been delayed. Instead of measuring the results of the new system, the amount of paper currently being generated was assessed, in order to determine what is likely to be eliminated once the new system is implemented.

The primary changes to be made by this hardware and building supply store which have the greatest potential for waste reduction are:

- Electronic filing of customer transactions that will eliminate paper copies of customer receipts. Currently these large, multi-part forms are filed for several years and then discarded. Under the new system, transactions will be electronically filed and available on microfiche if needed. Customers will now receive only the register receipt.
- Computer paper for record keeping will be virtually eliminated through the use of an electronic scanner for inventory.

The waste characterization of this business revealed that 6.8% of the total sample was mixed paper. On the other hand, the sort did not find any computer paper; this is likely due to the fact that these records are stored for a certain period of time, and then disposed of all at once. It is therefore difficult to predict by what percentage the proposed initiative will reduce the total waste generated by this business.

b. Results (Table 1)

Table 1. Savings of Electronic Record Keeping

	TWO-PART CUSTOMER RECEIPTS	COMPUTER PAPER FOR RECORD KEEPING
Unit	Case	Case
Units Used per Month	4	4
Net Weight per Unit	9.8 lbs.	27.8 lbs.
Net Weight per Year	470.4 lbs.	1334.4 lbs.
Annual Disposal Cost (@\$.0525/lb.)	\$24.70	\$70.06
Volume per Unit	540 cu. in.	1207.5 cu. in.
Volume per Year	.55 cu. yds.	1.24 cu. yds.
Purchasing Cost per Unit	\$25.25	\$22.00
Annual Purchasing Cost	\$1,212	\$1,056
Summary		
Annual Disposal Cost	\$24.70	\$70.06
Annual Purchasing Cost	\$1,212	\$1,056
Total Savings	\$1,236.70	\$1,126.06

While certain types of paper will inevitably continue to be generated by this hardware and building supply store, two major paper types will be virtually eliminated using the electronic system. The total annual cost savings from these two measures is estimated to be \$2362. What is important to recognize however, is the substantial capital cost incurred for hardware and software to implement the electronic system. Additionally, employees will have to be trained to use the new system. These costs were not made available to project coordinators for propriety reasons and therefore are not reflected in this analysis.

Until the electronic system is on line in this store, management has agreed to begin recycling old paper records once the retention period has expired. Previously, stacks of transaction records were bound with large rubber bands, making it time-consuming to remove them prior to recycling.

According to store management, they will discontinue this practice to facilitate recycling efforts until the satellite system is instituted, at which time, it is hoped that the amount of paper destined for the recycling bin will be drastically reduced.

2. Grocery Store

a. Measures Implemented

Register ribbons, previously used one time and disposed of, are now re-inked up to three times for this grocery store. This measure was implemented in 1993, required no change in equipment and was incorporated right into "business as usual." It is not known what percentage of the business' waste stream register ribbons comprise, since none were noted during the waste characterization. However, a total of 88 ribbons per year were used prior to the re-inking initiative.

b. Theoretical Measures Evaluated

The grocery store has an eat-in deli area at which coffee and snacks are sold. In an attempt to reduce the number of disposable coffee cups purchased by the store, and sold with take-out coffee, the store is considering offering a discount to customers who purchase and use store logo refillable coffee mugs. To assist them in their evaluation of this measure, the number of disposable polystyrene cups currently sold with take-out coffee was tracked, in order to estimate the savings potential once the refillable mug program is implemented.

The waste characterization revealed that polystyrene packaging made up 1.6% of the total waste sorted for this business. Since as much as 80% of the take-out coffee is taken and consumed off-premises, it is not known what impact the sale of reusable mugs might have on the grocery store's waste stream.

c. Results

1. Register Ribbons

The comparison between one-use register ribbons and re-inked ribbons is presented in Table 2.

Table 2. Register Ribbon Cost Comparison

	ONE USE RIBBONS	RE-INKING RIBBONS
Quantity Used per Year	88	29
Purchasing Cost	\$9.25/ribbon	\$9.25/ribbon
Annual Purchasing Cost	\$814	\$268
Re-inking Cost per Item	\$0	\$3.00
Annual Re-inking Cost	\$0	\$87
Weight per Item	.91 pounds	.91 pounds
Weight per Year	80.1 pounds	26.4 pounds
Annual Disposal Cost (@\$.0525/lb.)	\$4.20	\$1.39
Total Annual System Cost	\$818.20	\$356.39

Despite the fact that it costs the store \$3 to re-ink each register ribbon, this is an extremely cost-effective management strategy. The resultant total cost is less than half of what was previously spent to purchase and dispose of the ribbons. Additionally, this measure had no impact on staff productivity nor did it require any additional equipment for its implementation, since the service is provided by the grocery store cooperative of which it is a member.

While this measure is to be commended, it will have only a small effect on the total waste stream of this business.

2. Coffee Cups

The results of tracking the sale of coffee in disposable cups for a four month period is presented below in Table 3.

Table 3. Cost for Disposable Cups

MARCH 29, 1994 THROUGH AUGUST 8, 1994	12-OUNCE CUPS	16-OUNCE CUPS
Number of Cups for Period	3150	1050
Cups per Sleeve	100	50
Number of Sleeves for Period	31.5	21
Weight per Sleeve	.95 lbs.	.46 lbs.
Total Weight for Period	29.93 lbs.	9.6 lbs.
Potential Avoided Disposal Cost	\$1.57	\$.51
Sleeves per Case	10	20
Number of Cases Used for Period	3.15	1.05
Purchasing Cost per Case	\$30.86/case	\$30.86/case
Total Purchasing Cost for Period	\$97.21	\$32.40

In just over four months, a total of 4,200 coffee cups (3.15 cases of 12-ounce cups and 1.05 cases of 16-ounce cups) were sold to take-out coffee customers. Since the new reusable "lug-a mug" program has not yet been initiated, it is difficult to estimate the potential reduction of the waste stream the new program will have. Also, since the majority of the take-out coffee cups are disposed of away from the store, the avoided disposal costs are likely to be small. On the other hand, savings will be realized in the form of reduced purchasing costs. The store expects to implement the program in the fall of 1994.

3. Hotel

a. Measures Implemented

The hotel/motel industry is bombarded with product and service solicitation, most of it by mail, most of it ending up as waste paper. While mixed paper recycling is an option in Tompkins County, it is preferable to minimize the amount of junk mail received. To that end, officials at the hotel agreed to separate junk mail, and to make a concerted effort to be removed from mailing lists.

The characterization of this business' waste stream revealed that mixed paper made up 2.9% of the total waste sorted, and catalogs and other bound types of mailings made up 1.6%. If the receipt of junk mail can be curbed, and what is left is recycled, this waste reduction measure has the potential to eliminate 4.5% of this hotel's waste stream.

b. Theoretical Measures Evaluated

Some time ago, the hotel installed liquid soap/shampoo dispensers in each of the 94 guest room showers. The particular model used is equipped with a cartridge system for refills. Hotel guests have their choice of either bar soap or the bulk soap in the shower area. Bar soap is still the only option in the basin area. Despite the availability of the liquid soap in the shower, bar soap made up 5.2 pounds (1.6%) of the 335.3 pound sample. The hotel management agreed to evaluate the cost-effectiveness of replacing the .75 ounce bar of soap in the basin area and installing liquid soap dispensing units for hand-washing purposes. This analysis evaluated the current bar soap and cartridge systems, as well as a bulk liquid soap dispensing system.

c. Results

1. Junk Mail Measurement

Junk mail was tracked for a three-month period. See Table 4 for the results.

Table 4. Cost of Junk Mail Disposal

	PERIOD 12/93-1/94	PERIOD 2/94-4/94	PERIOD 5/94-7/94	TOTAL ALL PERIODS
Total Weight	9 lbs.	22.6 lbs.	14.8 lbs.	45.8 lbs.
Total Volume	N/A	654.5 cu. in.	561.0 cu. in.	N/A
Disposal Cost (@ \$.0525 lbs.)	\$0.47	\$1.19	\$0.75	\$2.41

Although they have not been able to keep up with this sometimes overwhelming task, staff at the hotel will continue their efforts to be removed from mailing lists. While it may take some time, the hotel's goal is to reduce the amount of junk mail received in the future.

2. Soap Comparison

The results of the three-way soap comparison are found on Table 5.

Despite the fact that the cartridge system results in the generation of non-recyclable packaging waste as well as residual soap, it is by far the most cost-effective system of the three. The bulk system fairs marginally better cost-wise than the bar soap system and results in no solid waste being generated. If, however, dispensers need to be filled more frequently, the purchasing cost of the bulk system would quickly exceed that of the equivalent amount of bar soap.

Labor costs of each of these three systems have not been factored into this analysis but should be acknowledged. It is likely that labor costs will be highest for the liquid bulk soap system because of the need to frequently clean and fill the dispensing units. Labor costs for the cartridge system will

Table 5. Three-way Soap Cost Comparison

	.75 OZ. BAR SOAP	BULK LIQUID SOAP	CARTRIDGE LIQUID SOAP
Quantity per Unit	1000 bars/case	1 gallon liquid soap would fill 5.33 24 oz. dispensers. And, 17.6 gallons would fill 94 dispensers	12 cartridges/case
Units per Year	12 cases/year	Dispensers would be filled 2X/yr. Therefore, 35.2 gallons or 8.8 cases/year ¹	72 cartridges or 6 cases/year
Purchasing Cost per Unit	\$66.37/case	\$46.99/case	\$66.36/case
Annual Purchasing Cost	\$796.44	\$413.51	\$398.16/year
Net Weight per Unit	18.75 lb.	None ³	.4 ⁴
Annual Weight	225 lbs./year ²	None	28.8 lbs./year
Annual Disposal Cost (@ \$.0525/lb.)	\$11.81/year	\$0/year	\$1.51/year
Dispensing System	None	Yes	Yes
Cost per Dispensing Units	\$0	\$17.99; estimated life expectancy - 5 years	No direct cost for unit; price included in purchase of cartridges
# of Dispensing Units	None	94	94
Total Dispensing System Cost	\$0	$\$17.99 \times 94 = \$1,691 / 5 \text{ years} = \$338/\text{year}$	\$0
Annual Cost Summary			
Purchasing	\$796.44	\$413.51	\$398.16
Disposal	\$11.81	\$0	\$1.51
Dispensing	\$0	\$338	\$0
Total	\$808.25	\$751.51	\$399.67

¹From information provided by the liquid soap industry, the bulk dispensers in each room would be completely refilled the equivalent of twice per year.

²Bar soap waste consists of residual soap and paper wrapping. According to industry studies approximately 40% of every bar ends up unused and is disposed of. The weight of 1000 bars (the equivalent of 1 case) is 46.87 pounds. Forty percent of this is 18.75 pounds. Therefore 12 cases multiplied by 18.75 pounds per case is 225 pounds. It is assumed that the corrugated box containing the bars would be recycled.

³Waste associated with the bulk liquid soap consists of a corrugated box and HDPE jugs, both of which are recyclable.

⁴Waste generated by the cartridge liquid soap system consists of a plastic pouch inside of a paperboard box, and approximately 1/2 cup of irretrievable soap per cartridge.

likely be less since the cartridges are relatively easy to replace, and are currently only replaced at a rate of twice per year in the shower area of guest rooms. Finally, labor costs for the bar soaps will likely be negligible since other amenities such as shampoos and lotions are still being provided in guest rooms by the housekeeping staff.

Perhaps the most problematic aspect of the soap comparison is the issue of amenities. As a part of a corporate franchise, there are regulations regarding the types and amounts of amenities offered to hotel guests, of which soap is one. Elimination of bar soap as an amenity puts individual hotels in the awkward position of either having to defend such actions to corporate officials, or pay penalties in terms of reduced quality ratings, which could jeopardize their status as an affiliate hotel. Many managers are not willing to pay such a price for the sake of waste reduction.

4. Restaurant, Deli/Take-Out type

a. Measures Implemented

This large fast-food chain has been a leader in the implementation of waste reduction strategies for the corporate world. Because this restaurant has many source reduction measures already in place, it was a challenge to identify further areas of potential. However, the manager of the restaurant agreed to implement two pilot projects:

- 1) Eliminating the paper liners normally placed on eat-in customer trays, unless customers requested otherwise. Non-recyclable paper, such as tray liners, made up 29.9% by weight of the total waste sorted for this business.

- 2) Establishing a give-away program for 5-gallon HDPE jugs formerly containing cooking oil. The "HDPE container" category made up 1.0% by weight of this business' waste stream.

b. Theoretical Measures Evaluated

In 1993, several of the restaurants, including the store targeted for this project, switched from packet ketchup to a bulk ketchup dispensing system for eat-in customers. Even though this measure had already been implemented, the project coordinators wanted to evaluate the cost-effective and waste generating aspects of this switch.

Since the pouches used in the new bulk ketchup dispensing system are a multi-plastic type of material, they would have been categorized as "other plastic packaging" during the waste characterization. This category made up 2.6% of the total by weight. It is not possible however, to determine what percentage of the "other plastic packaging" was pouches, and therefore what the potential impact the pouches might be having on the overall waste generated by this business.

c. Results

1. Tray Liners

The results of tracking the tray liner reduction program are presented in Table 6.

Table 6. Cost Comparison with and without Tray Liners

PAPER TRAY LINERS	BEFORE PROGRAM (PER MONTH)	MAY 1994	JUNE 1994	JULY 1994	TOTAL: 3 MONTH PERIOD
# Used Per Month	Approx. 13,000 or 4.3 cases	1338 or .45 Case	1265 or .42 Case	1108 or .37 Case	3711
Net Weight per Case	39.8 lbs.	39.8 lbs.	39.8 lbs.	39.8 lbs.	39.8 lbs.
Weight per Month	171.14 lbs.	17.91 lbs.	16.71 lbs.	14.70 lbs.	49.32 lbs.
Monthly Disposal Cost (@\$.0525/lb.)	\$8.98	\$.94	\$.88	\$.77	\$2.59
Purchasing Cost per Case	\$12.60	\$12.60	\$12.60	\$12.60	\$12.60
Purchasing Cost per Month	\$54.18	\$5.67	\$5.29	\$4.66	\$15.62

The new optional tray liner program has reduced purchasing and disposal costs by more than 90%. Since its implementation, the restaurant is spending only a fraction to purchase tray liners as compared with previously: approximately \$5/month vs. \$54.18/month. As the restaurant's customers become more familiar with the optional tray liner program, it is expected that fewer customers will request liners, further reducing the number used and disposed of. In addition, staff will no longer need to spend time opening cartons and equipping each tray with a liner, resulting in decreased labor costs.

The optional tray liner program has not been without problems, however. Prior to program implementation, signs explaining the program to customers were displayed throughout the store. Despite this effort, management reports that trays themselves are now soiled more frequently than when the liners were used. This is mostly due to ketchup from the bulk dispensing system which is dispensed in many cases directly onto the tray. Since the restaurant is not equipped with dishwashing facilities, it is incumbent on employees to continually wipe trays clean, thereby diverting employees time from their regular duties. This has resulted in increased labor costs, and although it is not known exactly how much additional time is being spent, restaurant management has noted it to be a problem for staff. It is hoped that continued targeted customer education will reduce this problem in the future. If not, the entire program stands to be eliminated.

2. HDPE Jug Give-Away Program

The results of the jug give-away program are seen in Table 7.

This innovative jug give-away program is successfully diverting 140.4 pounds of solid waste per year. In the Ithaca region the demand for the jugs is great; people are finding use for them as water jugs, boat moorings, and boat bumpers. In fact according to the store manager, they can hardly keep up with customers' requests for the jugs. It is expected that this program will continue indefinitely.

Table 7. Avoided Cost of Jug Disposal

Total Jugs per Year	156
Volume per Jug	1093 cu. in.
Volume per Year	3.65 cu. yds.
Weight per Jug	.9 lbs.
Weight per Year	140.4 lbs.
Annual Avoided Disposal Cost (@ \$.0525/lb.)	\$7.37

3. Ketchup Comparison

The results of the ketchup comparison are found in Table 8.

Table 8. Cost Comparison of Ketchup in Bulk vs Single Serve Packages

	PACKETS	BULK KETCHUP
Quantity	117 cases per year (1500 packets/case)	273 cases/year (12 pouches/case)
Purchasing Cost	\$19.80/case	\$9.61/case
Annual Purchasing Cost	\$2,316.60	\$2,623.53
Weight of Non-Recyclable Packaging ¹	3.58 lbs./case	.2 lbs/case
Annual Non-Recyclable Packaging Weight	418.86 lbs.	54.6 lbs.
Annual Disposal Cost (@ \$.0525/lb.)	\$21.99	\$2.87
Dispensing System ²	none	Condiment Cups
Quantity		24 cases/year (3000 cups/case)
Purchasing Cost		\$11.70/case or \$280.80/year
Weight of Non-Recyclable Packaging		7.2 lbs./case or 172.80 lbs./year
Annual Disposal Cost		\$9.07
Annual Dispensing System Cost		\$290.13
Total System Cost	\$2,335.45	\$2,916.12

¹Non-recyclable packaging for the packet ketchup system consists of the multi-plastic packets. Non-recyclable packaging for the bulk system consists of plastic polyethylene pouches. In both cases, corrugated boxes are recycled, and the ketchup product is consumed.

²Since this measure has been in place for some time, the capital cost of the dispensers themselves was not incorporated into this analysis, but should be recognized as an additional cost.

The packet ketchup system results in more non-recyclable waste being generated: 418.86 pounds versus 54.6 pounds annually. However, once the dispensing system costs are factored in, the purchasing cost of the bulk ketchup is higher than the equivalent amount of ketchup in packets: \$2,623.53 versus \$2,316.60.

Labor costs for filling, cleaning, and maintaining the bulk ketchup dispensers have not been incorporated into this analysis, but there is increased labor necessary for this system when compared to the former system where ketchup packets were simply made available to the customer.

Additionally, restaurant management reports that it is common for bulk ketchup to be wasted, as customers frequently fill several condiment cups, each of which is the equivalent of three packets of ketchup. Better customer education efforts could help eliminate this problem.

5. Bank

a. Measures Implemented

As a large financial institution with several departments, the junk mail received by the facility is abundant. In fact, the waste characterization indicated that of the 58.3 pound sample, 35.4 pounds or 60.7% of it was mixed paper. For that reason, the bank opted to try minimizing the amount of junk mail it was receiving through a program of having employees ask to have their names removed from mailing lists. Further, employees were asked to save the mail they received for measurement purposes.

b. Theoretical Measures Evaluated

Although it is not known exactly what percentage of this business' waste stream paper towels comprise, 7.2% of the total waste sorted for the bank was non-recyclable paper, of which paper towels are part. For this reason, the bank agreed to evaluate the feasibility and cost-effectiveness of replacing the current paper towel system in the four rest rooms with cloth cabinet toweling systems.

c. Results

1. Junk Mail

The results of tracking junk mail received by the bank over a six-month period are as follows in Table 9.

Table 9. Cost of Junk Mail Disposal

JUNK MAIL	PERIOD 1/18/94 - 2/2/94	PERIOD 2/3/94 - 3/14/94	PERIOD 3/14/94 - 4/5/94	PERIOD 4/6/94 - 5/19/94	PERIOD 5/20/94 - 6/22/94	PERIOD 6/23/94 - 7/28/94	TOTAL ALL PERIODS
Net Weight (lbs.)	17.5	13.3	15.5	13.7	14.1	18.1	92.2 lbs.
Disposal Cost (@\$.0525/lb.)	\$0.92	\$0.70	\$0.81	\$0.78	\$0.74	\$0.95	\$4.90
Volume (cu. in.)	1350	1025	864.5 (compacted)	1375	855 (compacted)	810 (compacted)	6279.5

This measure has the potential to eliminate almost 200 pounds of waste per year, if staff are diligent in continuing their efforts to be removed from mailing lists, and to recycle any remaining junk mail.

2. Paper Towels vs. Cabinet Toweling

The comparison of the current paper towel system with a cloth cabinet toweling system is presented in Table 10.

Table 10. Cost Comparison of Paper Towels vs Cabinet Toweling

	PAPER TOWELS	CABINET TOWELING
Quantity per Unit	4,000 towels/case	1 roll
Units per Year	12 cases/year	123 rolls/year (based current paper towel usage. 4000 paper towels equals 10.25 cloth towel rolls)
Purchasing Cost per Unit	\$19.52/case	\$5.00/roll
Annual Purchasing Cost	\$234.24/year	\$615/year
Volume per Unit	.8 cu. yd.	N/A
Volume per Year	9.6 cu. yd./year	N/A
Hauling and Disposal Cost	\$10/cu. yd. Therefore \$96/year	None
Other Associated Costs	\$.50 for plastic disposal bags per case of paper towels. Therefore, \$6/year.	None
Total Cost (Purchasing, Disposal and Other Costs)	\$336.24/year	\$615/year

Despite the fact that the cloth cabinet toweling system uses no plastic disposal bags and generates no waste, the cost of this system is almost twice that of a paper towel system. It is unlikely therefore, on the basis of cost, that the bank will choose cloth cabinet toweling as an alternative to the current paper towel system.

C. Conclusions

Each of the measures the demonstration businesses implemented did have some level of impact on the waste stream. The reality however, is that the types of source reduction measures that a typical small business is prepared to undertake, are often not going to have a noticeable affect on the amount of solid waste generated. This is due primarily to:

- the costs involved in major changes;
- the time involved to implement major changes;
- and simply a reluctance to change business practices which may have been employed for many years.

How can we then, as solid waste professionals, reach the small business community?

It is not feasible to work with each business, and even if it were, it is questionable whether solid waste professionals have the ability to institute change from this side of the fence. It would appear that businesses respond best to other businesses. In cases where small businesses are part of a corporate franchise or chain, corporations need to take the lead in initiating waste reduction measures. Better communication between solid waste managers and the business community would result in a better understanding of how source reduction goals can be met. Information could perhaps be disseminated more effectively through organizations and trade associations to which businesses belong, and whom they respect. Ideally, having members of the business community carry the waste reduction message to their own business colleagues, such as is done through the WasteCap program in New England, increases the likelihood that businesses will follow the waste reduction examples.

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APPENDIX A

WASTE ASSESSMENT QUESTIONNAIRE

Name of business _____ Assessor's name _____
Contact name _____ Date _____
Title _____ Phone _____

Business Description

1. Occupied square footage _____ Business hours _____
2. Total number of employees _____ Full time _____ Part time _____
3. Number of labor shifts _____

If more than one, please describe:

Waste Handling—Internal

4. Which staff collects waste inside the facility? _____
5. Do you have a maintenance contractor? Yes _____ No _____
Name _____
6. Do you have a cleaning contractor? Yes _____ No _____
Name _____

Waste Handling—External

To answer these questions you may need to examine a recent bill from your waste hauler. Have the bill on hand for the assessor's site visit in order to analyze the costs of waste disposal.

7. Name of hauler who collects your waste _____
8. Collection frequency
Times per day _____ Times per week _____
9. Time of day of collection _____
10. Container size _____
11. Cost of dumpster rental
\$ per week _____ \$ per month _____ \$ per year _____
12. Cost of hauling
\$ per week _____ \$ per month _____ \$ per year _____
13. Cost of disposal
\$ per week _____ \$ per month _____ \$ per year _____

14. Waste cost basis

- a.) _____ flat rate
- b.) _____ flexible rate
- c.) _____ tag/bag _____ cost per tag/bag
_____ # tags/bags/week

15. Is the dumpster full at the time it is emptied? _____ Yes _____ No

If not, how full is it? _____ 1/2 _____ 3/4 _____ Other

Is it ever overflowing? _____ If so, how often? _____

If so, why? Please describe:

16. Are there seasonal fluctuations in your waste generation? If so, please describe:

17. Please characterize the materials that represent the largest portion of your waste stream. Pick the 4 or 5 items that represent the bulk of your waste stream and prioritize them by number.

- _____ corrugated cardboard
- _____ newspaper
- _____ office paper (computer, copier, ledger, stationery)
- _____ mixed paper (glossy inserts, junk mail, etc.)
- _____ other paper (tissues, towels, wrappers, etc.)
- _____ glass containers
- _____ other glass (window, laboratory, light bulbs, etc.)
- _____ metal food and beverage cans
- _____ scrap metal (ferrous and non-ferrous)
- _____ plastic containers (#1-#7 type bottles and jugs)
- _____ other plastic (stretch wrap, strapping, etc.)
- _____ yard waste (leaves, grass clippings, brush)
- _____ food waste
- _____ other _____
- _____ other _____
- _____ other _____

Shipping/Receiving

18. Do you ship/receive goods in permanent, reusable crating systems?

_____ Yes _____ No

If yes, please indicate:

- ☐ milk crates
- ☐ bread crates
- ☐ plastic totes for personal products, hardware, etc.
- ☐ other

19. How are goods delivered to your site?

- | | |
|------------------------------------|---|
| ☐ supplier | ☐ delivery service (UPS, Fed. Ex.) |
| ☐ self-haul | ☐ U.S. Postal Service |

20. How are the goods you receive packaged?

- | | |
|---|------------------------------------|
| ☐ cardboard carton | ☐ drum |
| ☐ stretch wrap | ☐ bucket |
| ☐ pallet | ☐ strapping |
| ☐ other _____ | |
| ☐ other _____ | |

Purchasing

21. Are you presently purchasing recycled or re-manufactured products?

- ☐ Yes ☐ No

If yes, please indicate:

- | | |
|--|---|
| ☐ office paper | ☐ plastic containers |
| ☐ tissue/toweling | ☐ compost |
| ☐ re-refined motor/engine oil | ☐ equipment |
| ☐ other _____ | ☐ other _____ |

Waste Reduction

22. Is your business currently involved in any waste reduction effort?

- | | |
|---|--|
| ☐ 2-sided copying | ☐ coffee mugs |
| ☐ cloth towels | ☐ refillable products |
| ☐ scrap paper reuse | ☐ bulk purchasing |
| ☐ toner cartridge recharge | ☐ other _____ |
| ☐ on-site composting | ☐ other _____ |

23. Do you have any future plans for recycling or waste reduction?

- ☐ Yes ☐ No If yes, please describe:

24. Do you have a recycling program, either formal or informal? _____ Yes _____ No

If yes, please indicate which materials you separate for recycling:

_____ office paper
_____ yard or kitchen waste
_____ corrugated cardboard
_____ newspaper
_____ plastics
_____ metal cans
_____ other _____

_____ metal
_____ used oil
_____ antifreeze
_____ pallets
_____ glass containers
_____ mixed paper
_____ other _____

Equipment and Resources

25. Do you have any of the following equipment or resources that could be used for a recycling program?

_____ vehicle (car, van, truck)
_____ baler
_____ shredder

_____ loading dock
_____ extra storage space
_____ large storage containers

Recycling Outlets

26. Where do your recyclables go?

_____ drop-off center
_____ scrap dealer collects
_____ recycling market collects
 name of market _____
_____ deliver to recycling market
 name of market _____
_____ other _____

_____ hauler collects
_____ give them away

General

27. What is your biggest waste management "headache" i.e., problem materials, large volume materials, staffing difficulties, equipment problems, etc.?

28. Is there anything else we should know about your waste management or recycling systems or plans? Is there anything else we can provide you with to assist you in your waste reduction efforts?

APPENDIX B

SAMPLE REPORT

Waste Assessment for Dollar Bank (a fictitious name)

PARAMETER	INFORMATION	COMMENTS
Business name	Dollar Bank	
Contact	John Deposit; Fred Finance	Records; Maintenance
Location	Ithaca	branches in Tompkins Co.
Phone	273-SAVE	
Sales volume	50,000-60,000 accounts	
Waste hauler & destination	Cosmic Disposal Systems	TC Transfer Station
Waste system	8 cu yd dumpster	Emptied 5x/week; share with neighboring bank; usually full
Cost of waste	\$450 per month	Increasing to \$700/mo. in '92. Cost shared with other bank
Waste cost basis	Flat fee for dumpster+haul	Est. \$4,200 per year

Business Profile

Dollar Bank is a full service bank located in Ithaca, with several branches in Tompkins County and neighboring counties. Dollar Bank employs approximately 250 people, including part-time and full-time staff.

Waste Handling

Dollar Bank shares an 8-cubic yard dumpster with a neighboring bank, which presently costs \$450 per month for 5-day pick-up. The cost is estimated to increase to \$700 per month, or \$1,400 total for both banks. According to Mr. Deposit, Maintenance Director, the bank's biggest waste headaches are 1) the cost of waste disposal, which together with confidentiality service costs, amounts to about \$8,400 per year; and 2) adequate storage space for trash and recyclables.

The bank contracts with a local sheltered workshop for cleaning service at the main facility and the branches. Cleaners collect waste from each work station every morning using rolling hampers, transferring it to a trash holding area in the basement. Bank staff then move the trash bags outside to the dumpster.

Waste Characterization

The waste assessors observed the following materials in trash receptacles in the bank during their visit and assume that these are typical of the bank's waste stream:

- color ledger
- computer print-out
- food wrappers & boxes
- manila & other envelopes
- paper towels
- sugar packets
- Styrofoam® cups
- coffee grounds, filters & stirrers
- junk mail
- tissue
- copier paper
- paper napkins
- plastic film
- fluorescent tubes

Existing Recycling Efforts

Dollar Bank is doing an excellent job of recycling office paper and other materials. Corrugated cardboard and non-deposit glass containers are set out for curbside collection. Some recyclables are brought in from the branches to the main bank. Copier, letterhead and computer print-out are deposited by employees into red recycling bins located throughout the bank. Paper is then collected by cleaning staff and stored in large wheeled bins in the basement.

A confidentiality/recycling service collects 1.5 tons of recyclable paper every 2.5 weeks, around 30 tons per year, a service for which the bank pays \$800 per month. The service also collects colored ledger and junk mail. Mr. Finance, Records Retention and Microfilm Manager, reported that virtually all computer paper that is purchased each year (estimated at 100 tons) eventually goes out for recycling after being stored in the record retention area. The bank used to shred all its own

confidential papers, which took a staff person 4 days per week. Now the bank shreds only a small fraction of its paper. The bank also recently sent several tons of non-confidential journals to a local scrap processor for recycling.

A bank staff member sends updates and reminders—"Dollar Alert"—to bank employees to update them on the recycling program, its progress and problems.

Existing Waste Reduction and Reuse Efforts

To its credit, Dollar Bank has greatly reduced paper use by switching to an optical disk system for information storage, thus eliminating most of the computer paper used in the bank. The pay-back time for implementing this switch was estimated at nine months. The bank sells its used laser printer cartridges to a local office equipment firm. Mr. Finance reported that the bank eliminated 16 newspaper subscriptions and now receives only one per day. File folders are saved for reuse in the bank, as are zip-lock plastic bags, and rubber bands. Couriers reuse brown paper shopping bags for shuttling materials to the branches.

Maintenance staff have switched from incandescent ceiling lights in the basement to compact fluorescent bulbs and have installed electronic ballasts in existing fluorescent fixtures throughout the building. Staff purchase cleaning supplies in bulk barrels and use them to refill smaller containers. Bank department heads can buy ceramic bank logo mugs from the purchasing department to give to new staff members—a nice waste reduction touch. Most employees appear to be using reusable mugs, although there could be more consistent use, judging from the number of styrofoam cups seen in the waste baskets. One memo is sent out to each department to save paper. Carpeting is purchased and installed in squares, thus reducing waste when replacing damaged or soiled sections.

Recycling Opportunities

Most of the bank's high quality paper is already being captured in the existing recycling program.

However, quite a bit of recyclable paper was observed in the wastebaskets. The program could be made more visible by using bright stickers on the red bins, providing every work station with a clearly-marked recycling bin or basket, and putting explanatory posters up near the paper bins. If bank employees are responsible for emptying their own recycling bins, then more red bins or even larger storage bins could be placed in several strategic locations. Recycling would be streamlined if cleaning staff were to empty the bins into divided hampers, with one section for trash and the other for recyclable paper, as they make their rounds.

Purchasing NCR (no carbon required) forms would keep carbon paper out of the waste stream. Though carbon paper was not present in large quantities, it is a contaminant in high quality paper.

Mixed Paper

In addition to office paper, the bank could designate some bins for mixed paper, which includes envelopes (both manila and those with windows), junk mail, magazines, glossy paper, file folders, fax paper, non-metallic wrapping paper and gift cards, card stock, and catalogs. Materials that are not acceptable include blueprint paper, paperbacks, waxed paper, backing from peel-off labels, and Tyvek® envelopes (used by express mail services). Mixed paper may be taken to the recycling drop-off center.

Composting Food Wastes

While coffee grounds and filters do not represent a large portion of the waste stream, nevertheless they could be saved in small, covered containers located near each of the numerous coffee stations around the bank and taken home by willing staff for home composting or for raising earthworms for fishing. The same is true of fruit and vegetable waste from the kitchen area. Meat, cheese and fats should not be added to compost piles or worm farm bins.

Waste Reduction Opportunities

The more that source reduction measures are implemented in the bank's everyday operations, the less that waste materials will present handling, storage and cost headaches. Setting up a mixed paper program and delivering the material to the Drop-off Center would save a substantial amount of money currently going to the confidentiality service.

Staff could be encouraged to bring "litterless" lunches in reusable bags or boxes, keeping take-out trash to a minimum, and to use blank sides of printed paper for notes and messages. These ideas could be conveyed through the bank's "Dollar Alert" memos. Employees could be encouraged to submit their own waste reduction suggestions, with rewards to those whose ideas are put into practice.

Reducing Unwanted Mail

To reduce the volume of unwanted mail, first, determine whether or not all issues of journals and other mailings are wanted by the recipients. Reduce duplicate mailings by combining subscriptions and circulate journals and newsletters. Second, ask to be taken off mailing lists, by returning your request in the postage-paid, business reply envelope that is usually provided by the sender. If there is no envelope, print up some postcards with a "please remove me from your mailing list" message and send them out. Third, write to the following direct marketing/credit bureau services and ask to have the bank's name removed from mailing lists. Be sure to include all spellings and versions of names and addresses:

Mail Preference Service
Direct Marketing Association
PO Box 9008
Farmingdale NY 10163-3861

Director of List Maintenance
ADVO-Systems, Inc.
239 West Service Road
Hartford CT 06147-1280

Equifax Options
POB 740123
Atlanta GA 30374-0123

Mail Preference Service
TRW: Target Marketing Services Div.
901 N. International Pkwy, Suite 191
Richardson TX 75081

Fourth, call the 1-800 numbers that many direct mail companies have and ask to be taken off mailing lists. When you do order by mail, be sure to remind the company that you do not want your name rented or sold to other direct marketers. These techniques can take up to six months before the mail stops coming.

Double-Sided Copying and Memos

Copying on both sides of the page is an important waste reduction technique, especially for financial institutions. A concerted effort at duplex copying could significantly reduce paper use, as well as reducing the actual number of copies made. Newer model copiers make duplex copies by default or at the push of a button. While there is a cost to purchase new or upgrade old equipment, the investment in a streamlined duplexing system should pay for itself over time. Save paper with electronic mail and routing or posting memos.

Cloth Cabinet Towels

Most of the trash generated in the bank's rest rooms consists of paper towels. Consider switching to a cloth cabinet towelling service, which can be more cost-effective than paper, considering rising disposal costs. A 40-yard roll of cloth towel can provide the same drying capacity as 30,000 C-fold paper towels. Modern cloth towel systems are also sanitary and convenient. Towelling and cabinets may be purchased or leased from local linen services. Check the Yellow Pages for local laundries and linen supply services.

Closing the Loop—Buying Recycled

An important aspect of any waste reduction and recycling program is purchasing recycled products. Buying products in large quantities can

reduce the price. Dollar Bank could purchase the following recycled paper products: adding machine and register tape, copier paper, letterhead, envelopes, file folders, note pads, napkins, towels, and facial and bathroom tissue. Some of the bank's paper products may already be recycled, such as paper towel and tissue. Check with your suppliers for information on these products. *If they do not carry recycled products, encourage them to do so.*

There are many other products containing recycled materials, such as plastic waste and recycling containers; cleaning equipment, such as mop and broom handles; rubber floor and fatigue mats; retread tires; building and insulating materials; carpeting; panelling; parking lot bumpers; and desk accessories, to name a few. For information on recycled products, check with your equipment suppliers, consult the Yellow Pages or the Business Waste Reduction packet which was given to you at the time of the waste assessment.

Distribution Packaging

Packaging from shipped supplies often creates large quantities of unnecessary waste. To reduce waste, some product distributors are beginning to use collapsible, reusable crates, tubs, trays and other containers that can be stored and returned at the time of the next delivery. *If your distributors do not offer totes, encourage them to do so.*

Recycling Containers

There is a wide variety of recycling, storage and collection containers currently available from manufacturers, ranging from small corrugated cardboard or plastic trays, baskets or bins for use next to desks in office paper programs, to larger containers for indoor storage of materials, to very large dumpster-like outdoor collection containers. Many manufacturers will customize the bins with printed logos, labels or instructions as part of the container cost or for an additional fee. Some large containers have special lids to help exclude inappropriate materials from the bins. Besides specialized recycling containers, there are many other trash-type containers that work equally well

for recycling, which can usually be purchased from local hardware or department stores. Refer to the Business Waste Reduction Resource packet for names of recycling equipment suppliers.

Fluorescent Light Tubes

Dollar Bank goes through a large quantity of fluorescent light tubes in a year. It is now possible to recycle both the tubes and ballasts through Mercury Refining Corporation (Merco) in the Albany area. Contact Barbara Sauer at 1-800-833-3505 for shipping requirements and possible costs.

Two-Way Envelopes

Businesses that frequently do large mailings could benefit from the use of two-way envelopes. Not only do they save paper because less paper is used overall, compared to a two-envelope system, but they can contribute to postage savings. The Tension Envelope Corporation makes a variety of two-way envelopes for business use. For more information about their products, contact Len Perrelli, Sales Administrator at: 19 Wesley St., South Hackensack, NJ 07606-1592. Telephone: 201-487-1880. Fax: 201-587-0527.

We hope the waste assessment process was helpful to you in identifying the types of waste, the quantity and potentials for recycling and waste reduction for your bank. Please feel free to call us if there is anything further we can do to assist you in reducing your waste.

Note: The above information does not constitute an endorsement of those businesses by the Tompkins County Solid Waste Management Division, and is provided as a service only.

APPENDIX C

SOLID WASTE RESOURCES IN NEW YORK STATE

New York State Department of Environmental Conservation
Division of Solid Waste, Bureau of Waste Reduction and Recycling
50 Wolf Road
Albany, New York 12233-4010
(518) 457-6603

New York State Department of Economic Development
Office of Recycling Market Development
One Commerce Plaza
Albany, New York 12245
(518) 486-6291

New York State Energy Research and Development Authority
Two Rockefeller Plaza
Albany, New York 12223-9998
(518) 456-6251

Cornell Waste Management Institute
Cornell Center for the Environment
466 Hollister Hall
Cornell University
Ithaca, New York 14853-3501
(607) 255-1187

New York State Association for Reduction, Reuse, and Recycling (NYSAR3)
c/o GLOW
26 Harvester Avenue
Batavia, New York 14020
(716) 344-4035

Northeast Industrial Waste Exchange
90 Presidential Plaza, Suite 122
Syracuse, New York 13202
(315) 422-6572

APPENDIX D

WASTE PREVENTION IDEAS FOR THE RETAIL, HOSPITALITY, AND SMALL OFFICE SECTORS

Waste Prevention Ideas for the Retail Sector

- Use vendor hangers if available instead of rehangng items on store hangers
- Ask vendors to use less packaging
- Let customers know about store efforts and encourage them to participate
- Offer polystyrene reuse program
- Reuse bags containing customer returns for employee purchases
- Reconsider size and frequency of advertising
- Convert from boxed products to hangers
- Find a reuse for unsellable items
- Reuse and recycle pallets
- Cut down on the number of reports generated
- Reuse packaging
- Reduce/reuse construction waste

Waste Prevention Ideas for the Hospitality Sector

- Reuse food containers; minimize packaging accompanying amenities provided to guests
- Use cream and sugar dispensers, not packets
- Use least-waste milk containers
- Return extra packaging to the supplier for reuse
- Give packing to other users

- Purchase products in bulk
- Offer customers linen napkins
- Use reusable coffee filters
- Print daily specialty items on chalkboard or dry-erase board
- Provide an incentive for customers to use reusables
- Work with suppliers to reduce packaging and avoid unrecyclable packaging (use plastic liner bags in corrugated boxes for produce)
- Avoid toxic cleaning products
- Avoid food waste; make and freeze soup stock from food preparation waste
- Contribute to a food bank; donate left-over food to charity
- Compost on-site
- Recycle grease, oil
- Replace food-related disposable products with durable products
- Request that deliveries be made in reusable containers; use carbonated beverages in refillable tanks
- Minimize packaging for food products used in hotel kitchens
- Recover kitchen property left by guests in room
- Donate salvageable guest room items to local charities
- Replace disposable products in guest rooms with durable products

- Develop purchasing specifications that favor or mandate the purchase of products with recyclable content
- Donate or sell outdated equipment
- Buy recycled tissue and towels
- Use table linen service instead of disposable place mats and napkins
- Maintain accurate inventories to reduce spoilage and waste; order carefully
- Minimize use of waxed cardboard cartons

Waste Prevention Ideas for the Small Office Sector

- Make double-sided copies
- Reuse single-side copies for memos and scratch paper
- Reuse file folders and manila envelopes
- Use electronic mail
- Use a central filing system
- Store documents on floppy disks or microfilm
- Donate magazines to doctors' offices or senior centers
- Donate or sell outmoded equipment, furniture
- Recharge toner cartridges
- Reduce unwanted mail, update mailing lists
- Use two-way envelopes
- Circulate or post memos
- Use removable stickers instead of cover sheet for faxing
- Use hot air dryers or cabinet cloth toweling instead of paper towels
- Encourage employees to bring their own coffee mugs or supply company mugs
- Use solar-powered calculators and battery rechargers
- Use rechargeable batteries
- Buy durable equipment, and maintain and repair it
- Buy supplies in bulk
- Use bulletin and display boards and non-toxic wash off markers
- Re-ink nylon ribbons
- For single or short-term use, it may be more practical to rent a piece of equipment than to purchase it
- Use refillable pens, pencils, and tape dispensers
- Offer an incentive to employees for waste reduction ideas put into use at an office

APPENDIX E

SAMPLE HAULER CONTRACT

Adapted from: Request for Proposal for Garbage and Refuse Removal -
New York State Department of Corrections

Request for Proposal for
Garbage and Refuse Removal

Bid Proposal Form

Agency Address:

Time:
Place:

Returnable to:
Attention of:

on or before the date specified at the public bid opening above.

The undersigned bidder hereby agrees to furnish the labor and materials and perform the work in accordance with the attached detailed specifications at the price stated below and agrees and certifies in accordance with Appendix A. Schedule of wages which obligates the undersigned to pay not less than the wages specified, schedules, and building index and road map appended hereto.

Name & Address of bidder:

Date: _____

Firm:

Per:
(signature of authorized person)

Title

Bids will be considered on a total price basis which will be derived by the following combination of figures:

A:

Monthly rental per dumpster: \$ _____
(not to exceed \$300.00)

Per ton dumping fee: \$ _____
(not to exceed per ton fee charged by receiving waste management entity)

Hauling fee per dumpster: \$ _____

35 Yard dumpster x \$ _____ x 2 dumpsters = \$ _____
monthly rental fee
x 12 months = \$ _____ (A)
total rental

B:

Dumpster x \$ _____ x 2 dumpsters = \$ _____ x 52 weeks = \$ _____ (B)
per haul total hauling

C:

Dumpster x \$ _____ x 2 dumpsters = \$ _____ x _____
per ton dumping fee est. weight when full
x 52 weeks = \$ _____ (C)
tipping fee

Total:

Award to be based on A + B + C = \$ _____
Estimated annual cost Total

Note: Each bidder shall furnish the information required by the bid proposal forms. Erasures or other changes may automatically disqualify the bid proposal. Corporations shall affix corporate seal and are required to notarize bid proposal. Bid proposal should be typewritten.

Waste Prevention Tools at Work

Volume II

- A Method for Conducting Waste Characterizations

- Results of Waste Characterizations in Three Business Sectors

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Section I. Introduction

To better understand the commercial waste stream, waste characterizations were conducted for 44 selected businesses in the Retail, Hospitality, and Small Office sectors in Tompkins County, New York. The waste characterizations were intended to complement the information obtained during the waste assessment process. This manual provides an overview of the methodology developed for and used in the Tompkins County project, as well as the statistical results from the actual characterizations. Parts of the methodology have been drawn from other off-site waste characterization studies and parts have been developed specifically to meet the needs of this particular project. This methodology is not intended to set standards for any other project of this type. Its sole purpose is to provide one example of a waste characterization.



Waste from grocery/bakeshop.





Section II. Waste Characterization Overview

There are several different ways to conduct a waste characterization study. For this project, a source sample type of waste characterization was used. This type of waste characterization provides detail on the composition of a specific business' waste stream that can be added to the data gathered in the waste assessment. This differs from other commercial waste characterization studies in that wastes from individual businesses were sampled for this project, as opposed to sampling a hauler's load of mixed commercial waste that may have been generated by several sources.



Finally, the data resulting from source sampling is an important aspect of the follow-up report to the business. When the composition of the waste stream is detailed in graph form for example, it allows the business to identify exactly where its waste disposal dollars are going, and therefore begin to make informed decisions regarding purchasing and other source reduction ideas.

If however, the goal of a project is simply to assist businesses in targeting materials for reduction, the waste characterization may not be necessary. On the other hand, if the goal of a project is to generate hard, quantitative data on commercial waste generation, then the waste characterization can be very useful.

The source sampling type of waste characterization provides a snapshot in time of what the business disposes of. To obtain a truly accurate picture of the business' waste stream, numerous samplings over several seasons would be required. Time and resource constraints made such a level of effort impossible for this particular study. However, the information gleaned from a one-time sort is useful for supplementing the information gathered in the waste assessment. In addition, the information can be used in a broader sense to extrapolate generalizations about wastes in different business sectors.

Container of mixed waste to be sorted.





Section III. Methodology

A. Pre-Sort Tasks

1. Sort Location

In developing the methodology for a waste characterization study, first determine whether the sort will be conducted on- or off-site. Each type has its own advantages and disadvantages. If waste is sorted on-site, there is no need to transport waste, thus saving time and money. On the other hand, on-site sorts may cause traffic and/or parking disruptions for the business, may be impossible in bad weather, and may be difficult as well as dangerous if waste is removed by hand from dumpsters.

For the project conducted in Tompkins County, it was decided to transport waste samples off-site and to conduct the sorts at the transfer facility. The hauler servicing the selected businesses agreed to transport the samples to the transfer station for a small fee. If possible, the haulers that normally service the accounts in the study area should be used to collect the samples. For businesses that do not use dumpsters, the sort team can often pick up and transport the bagged waste sample using personal vehicles. In both cases, samples should be collected as close to the regular pick-up schedule as possible to ensure representative amounts of trash for a given period.

One-half of a day (4 hours) was budgeted to conduct each sort. Therefore, only one sort was scheduled on any given day. The

remaining time was used for travel and data management.

2. Waste Categories

The specific number and type of waste categories must be determined next. This may vary with business type, geographic region, market conditions, and local recycling mandates. In general however, the number of waste categories ranges from 20-40. Figure 1 presents the 32 waste categories used in the Tompkins County project.

B. Gathering the Sample

On the day of the waste characterization one staff person should plan to meet the hauler (if one is used) at the scheduled business to eliminate the possibility of any mix-ups.

If the business has more than one dumpster or trash container, one container should be selected that appears to be representative of waste disposed of at that location. The size of the container selected, as well as the size of any other

Figure 1. Waste Categories Used in Tompkins County Project

Paper	Glass
Old corrugated cardboard (OCC)/kraft bags	Recyclable glass
Old newsprint (ONP)	Non-recyclable glass
High grade office paper	
Mixed paper	Organics
Old magazines (OMG), catalogs, junk mail	Food waste
Paper/ paperboard packaging	Soap
Other non-recyclable paper	Leaves/grass
	Brush
Plastic	Sod/misc. plants
High-density polyethylene (HDPE) containers	Manure/ animals wastes
Polyethylene terephthalate (PET) containers	Wood waste
Low-density polyethylene (LDPE) film/sacks	
Polystyrene (PS) packaging	Miscellaneous
Other plastic packaging	Inert materials
All other plastics	Bulky items
Metal	Textiles/footwear
Food and beverage cans	Disposable diapers
Other aluminum	Tires
All other metals	Residue
	Other

containers on site, should be recorded. The volume of waste in the other bins should also be noted and recorded (i.e., full, half full, almost empty, etc.) on the field waste characterization data sheet, an example of which is provided in Appendix A.

C. Sample Delivery

The designated load should be delivered to the sort location per the schedule. If there are scales at the sort location, the permit number of the vehicle, as well as the gross weight, tare weight, and net weight of the load should be recorded by the scale master. Following each day of sampling, this information should be obtained from the scalehouse attendant.

D. Sample Preparation

The hauler will back up to the sort area, where the sample is dumped onto the floor and spread out as evenly as possible across a pre-determined area of the floor.

When the contents of a dumpster are less than 2 cubic yards, the sample should be sorted in its entirety. For larger loads, at least half of the sample should be sorted, with an attempt made to sort and weigh as much of the load as possible (refer to Section IV of this manual for information on using a sampling grid).

E. Sort Area

Each day the crew will set up and take down the sort area, to minimize the disruption to general operations at the facility being used (i.e. transfer station, landfill, etc.). Traffic cones should be placed around the entire sorting

area each day and remain in place throughout the sorting operation. A sample list of equipment necessary for the sorting operation is presented as Appendix B.

The containers used for categorizing materials should be separated each day and checked for residue that would alter their tare weights. Containers should be kept as free from extraneous debris, mud, ice, and snow as possible to avoid changes in the tare weight. If warranted, containers should be cleaned and re-weighed, and tare weights adjusted accordingly. Each container should be assigned a category and number, and this information, along with the tare weight, should be displayed on each container.

A 4' x 8' sorting table, with a mesh screen, should be placed on top of a large plastic tarp. Containers for more frequently observed categories should be close to the sort table; those for less used categories may be further away. Rare-occurrence categories can be planned for by having extra containers stacked at the sort site. Containers for "wet" categories such as food waste should always have a plastic liner to minimize soiling of the container and for ease of waste removal when

Sort and weigh sorting table.



the container is full. A specific layout scheme for the containers should be established and consistently followed to facilitate more efficient sorting as crew members become accustomed to the procedure. A separate area for bulky items such as cardboard should also be designated. Scales should be set up out of the way of general operations, allowing enough room to maneuver containers during weighing and data collection.

For more frequently occurring materials it is advisable to allocate more than one container to those categories, in order to avoid interrupting the sorting process each time a container fills. This may be true of food waste, film plastics, and some of the paper categories.

F. Sort Crew

The sorting crew generally consists of two or more crew members and a supervisor. The crew supervisor is responsible for all aspects of the procedure, including ultimate decision-making authority on material classification. Each crew member should be responsible for her or his own safety equipment and will be expected to wear it at all times during the sort operation. A copy of the safety guidelines used for the Tompkins County project is included as Appendix C.

G. Sort Operation

Sorters will take repeated "grabs" of waste from the cell area until at least half the sample has been sorted. Again, for samples smaller than 2 cubic yards, the *entire* sample should be always sorted and weighed.

The refuse should be taken from the area by shovel, wheelbarrow, or by hand and placed on the sort table. Materials are sorted and then placed into the appropriate containers. The supervisor assists with and oversees the operation, checking each container for separation quality and clarifying categories on questionable items. An example of the Product Category Key Sheet used in the Tompkins County project is presented as

Appendix D. A key such as this should assist sorters in properly coding materials. In the case of composite materials, the item should be categorized according to the most predominant material. For example, juice drink boxes are predominantly paperboard, not plastic or aluminum. Likewise, a coffee cake box is primarily paperboard, not plastic.

Even experienced waste management personnel often have difficulty in classifying materials. For this reason, it is important that the same line of reasoning be used throughout the project. For example, if a full, unopened container of food is present in the waste stream, it could be classified either as food waste, or as the container type. Neither is necessarily right or wrong, but whichever method is used, it should be consistent in every case, to justify methodology and data.

Once the entire sample has been sorted, the residue on the sort table and the residue that has collected on the tarp under the table should be placed into the designated residue container and the container weighed. Note that residue may consist of small pieces of any non-sortable waste, wet paper, food pieces, or any other nondescript items.

H. Data Collection

When the sample is completely sorted, each container should be weighed, and the gross weight recorded to .10 pounds. If a container is empty, then a zero should be recorded. Tare weights of each container should be noted on the container sign and recorded on the data sheet as well.

The data should be recorded with no adjustments for moisture, characteristics, etc. Waste samples are to represent solid waste as it would have been received at the disposal site.

Prior to each sort, one crew member should be designated as data recorder. This will enhance



crew efficiency, as well as provide one source for clarification of information for any given sort.

When the sorting and weighing of the sample is complete, comments on the visual characteristics of the material can be recorded. For example, the sample may have contained a large appliance, which although categorized under "Other metals," should be detailed in the comment section as well. The same holds true for all the "Other" categories. Because these are catch-all categories, it is imperative that details be provided in the comment section whenever an "Other" category is used. Other information such as a higher than normal moisture content in a certain category or pertinent weather conditions should be noted as well. In general, many comments are preferable to a few. While this information may not be quantifiable, the sorter's observations and impressions are extremely valuable in the overall analysis of the waste patterns of a particular business.

Each day, data should be brought back to the office and entered into the database. Any modifications

or changes to the data should be done as soon as possible following the sort to maximize accurate recounting of information.

I. Wrap-Up

At the end of each day, containers should be checked for residue, cleaned if necessary, then stored in a designated storage area. Safety equipment should also be wiped down and then stored along with the scales, blank data sheets, and other equipment.

Trash weighing equipment.





Section IV. Characterization Results

A. Summary Tables

The results of sampling the waste from 43 businesses are presented in Tables 1, 2 and 3. (Note: one of the 44 businesses sampled did not have any waste on the scheduled sort day; therefore data represent only 43 sorts). These tables have been summarized by sector, to increase the total sample number (n). To derive the mean percent, material weights for each sector were totaled by material and category type. Weights were then divided into the total to determine what percent of the total weight each represents. To derive the mean pounds, the total weight of each material and category was divided by the number of samples within the sector. The data were statistically analyzed to derive the standard deviation and 90-percent confidence interval for each material category in each of the three sectors.



B. Comparison of Data

A literature search was conducted to obtain comparative data on waste composition from other jurisdictions and within similar business types. To date, there have been relatively few studies that have used the source sampling type of waste characterization, and of those, many calculated unit generation rates and diversion rates. Also, the methods of calculating mean percentages varies for different studies, as do the number and types of waste categories used.

Tables 4, 5 and 6 compare the composition data from studies conducted by the City of Los Angeles and the City of Long Beach, California, with that generated in Tompkins County. For all three sectors, data from each study are extremely similar. Where deviations occur, they can be attributed to businesses having different recycling programs, different purchasing habits, availability

of organics management programs, and varying local solid waste regulations.

C. Discussion

1. Usefulness of a Waste Characterization

The waste characterization serves several purposes. First, the data support the information collected through the waste assessment, thereby presenting a fuller picture of a business' waste stream. Second, in cases where large amounts of recyclable materials are seen in the waste stream, the sort identifies areas where recycling programs need to be tightened up. This information is important to facility managers and business owners who may be under the impression their recycling program is running smoothly. Finally, by characterizing the waste streams of several businesses in a given sector, one is able to generate composition data that can be used for planning purposes in similar businesses in the region. This type of source sampling also enables the generation of custom reports such as waste characterization by stores, hotels, or offices.

2. Limitations of the Data

There were several limitations to the data generated by the study in Tompkins County that should be noted for others who may be contemplating a source sampling type of waste characterization.

An important part of a waste characterization study is being able to convert waste generation into common units. The most useful units are those that are readily obtainable and those that correlate with the production of waste. Many studies use either pounds per employee per day or pounds per 1,000 square feet per day. To compute unit generation rates, the following pieces of information must be obtained: collection frequency in days, number of employees and/or square feet, and the fraction of the total sample sorted and weighed. A total annual waste generation must then be calculated.

The study in Tompkins County did not include measures of disposal rates by sector for several reasons. First, no attempt was made to account for diversion of waste due to recycling. This would have required measurement of recycling set-outs, recycling activity at drop-off centers, and private hauler collection activities. While this may have been feasible, the thrust of this project was essentially to assess what is left in the waste stream after recycling, and of that, which materials could be further targeted for reduction.

Second, as previously mentioned, several sorts over several seasons would need to be conducted in order to obtain more accurate information regarding a business' disposal habits. Without more data, it is not possible to extrapolate accurately the business' annual waste generation. Time and resource constraints did not allow for a four-season sort to be incorporated into this project.

Further, to be statistically significant, larger sample sizes are required. A generally accepted sample size is 30 or larger; again, time and resource constraints did not allow for large sample sizes in this project. However, small sample sizes may still yield useful information within narrowly defined SIC Code groups.

Also, the number of employees per business varies from part- to full-time, from temporary to permanent. Therefore, calculating unit generation rates expressed in pounds per employee per day, for example, has the potential for a large margin of error.

Given the above line of reasoning, the calculation of unit generation rates would require several assumptions to be made, and further extrapolations of already extrapolated data. It was the consensus of this project team that it was more valuable to provide the business with a general idea of what materials make up the waste stream (by mean percent) and what strategies might be considered to further reduce those materials.

Finally, throughout the waste characterization portion of the project, there were large weight discrepancies between the incoming scale weights and the sum of the weights of each category.

3. Using a Sampling Grid

Originally, it was the intent for this project to use a sampling grid when sorting loads from 3-cubic yard and larger bins. The grid identifies the sampling location on the pile and prevents crew members from selecting biased or less objectionable samples. The sampling grid is formed by tying ropes together into 18 3' x 3' squares or cells. The grid is then placed over the sample, and the waste within randomly selected cells is sorted. One approach for the cells to be sorted is to randomly select a number. The selected number must be returned to the number pool before another can be drawn. Ideally, 50-75% (9-12 cells) should be sampled for each large load.

Once the sampling grid had been field tested however, a major issue arose. While the grid did eliminate the tendency to select less desirable grabs of waste, another type of bias became evident. Businesses generally bag trash generated from individual work stations, such as from an office area, staff lounge, or guest room, resulting in waste being spread out over the sampling area that is already pre-sorted by generating area. Outside of actually emptying individual bags and mixing up their contents, this type of bias could not be prevented and the grid system was therefore not used in the Tompkins County study. It appears that the sampling grid technique may work better during mixed load characterization studies conducted at disposal areas.

Table 1. Retail Sector Statistics

n=27

MATERIAL	MEAN PERCENT	MEAN POUNDS	STANDARD DEVIATION	CONFIDENCE INTERVAL (90%)
OCC/Kraft Bags	17.6%	34.2	107	34
ONP	2.6%	5	7	2
High Grade	0.0%	0.1	0	0
Mixed Paper	7.5%	14.6	34	11
OMG, Catalogs, Junk Mail	0.9%	1.7	5	2
Paper/Paperboard Packaging	5.0%	9.7	8	3
Other Non-Recyclable Paper	10.5%	20.4	29	9
Total Paper	44.1%	85.6	133	42
HDPE Containers	0.8%	1.6	3	1
PET Containers	0.1%	0.2	0	0
LPDE Film/Sacks	6.2%	12.0	14	4
PS Packaging	1.0%	2.0	3	1
Other Plastic Packaging	1.7%	3.4	5	1
All Other Plastics	3.3%	6.4	8	3
Total Plastic	13.2%	25.6	19	6
Recyclable Glass	2.1%	4.0	4	1
Non-Recyclable Glass	0.5%	0.9	3	1
Total Glass	2.5%	4.9	5	2
Food & Beverage Cans	0.6%	1.1	1	0
Other Aluminum	0.0%	0.0	0	0
All Other Metals	5.2%	10.0	15	5
Total Metal	5.7%	11.1	15	5
Food Waste	8.3%	16.1	32	10
Soap	0.2%	0.3	2	1
Leaves/Grass	0.3%	0.6	2	1
Brush	0.2%	0.4	2	1
Sod/Misc. Plants	6.3%	12.2	51	16
Manure/Animal Waste	0.0%	0	0	0
Wood Waste	5.9%	11.4	37	12
Total Organics	21.1%	41.0	68	22
Inert Materials	5.5%	10.7	25	8
Bulky Items	0.5%	0.9	3	1
Textiles/Footware	1.6%	3.2	4	1
Disposable Diapers	0.7%	1.4	4	1
Tires	0.0%	0.0	0	0
Residue	3.4%	6.5	9	3
Other	1.8%	3.5	8	3
Total Miscellaneous	13.5%	26.1	33	10
TOTAL	100%	194.4	191	60

Table 2. Hospitality Sector Statistics

n= 10

MATERIAL	MEAN PERCENT	MEAN POUNDS	STANDARD DEVIATION	CONFIDENCE INTERVAL (90%)
OCC/Kraft Bags	4.1%	14.4	13	7
ONP	4.9%	17.5	18	9
High Grade	0.2%	0.7	2	1
Mixed Paper	1.7%	5.9	10	5
OMG, Catalogs, Junk Mail	0.2%	0.6	1	1
Paper/Paperboard Packaging	7.8%	27.7	41	22
Other Non-Recyclable Paper	11.4%	40.2	44	23
Total Paper	30.3%	106.9	91	47
HDPE Containers	0.5%	1.7	2	1
PET Containers	0.2%	0.9	1	1
LPDE Film/Sacks	3.7%	13.0	4	2
PS Packaging	0.8%	2.7	3	1
Other Plastic Packaging	1.8%	6.3	5	3
All Other Plastics	0.3%	1.2	1	1
Total Plastic	7.3%	25.7	12	6
Recyclable Glass	3.3%	11.6	9	5
Non-Recyclable Glass	0.1%	0.2	0	0
Total Glass	3.3%	11.8	9	5
Food & Beverage Cans	1.7%	6.2	5	3
Other Aluminum	0.0%	0.0	0	0
All Other Metals	0.5%	1.9	2	1
Total Metal	2.3%	8.0	5	3
Food Waste	47.5%	168.0	101	53
Soap	0.3%	1.2	2	1
Leaves/Grass	0.0%	0.1	0	0
Brush	0.1%	0.4	1	1
Sod/Misc. Plants	0.1%	0.2	0	0
Manure/Animal Waste	0.0%	0.0	0	0
Wood Waste	0.1%	0.3	0	0
Total Organics	48.1%	170.0	101	53
Inert Materials	0.2%	0.6	1	1
Bulky Items	0.0%	0.0	0	0
Textiles/Footware	1.6%	5.6	9	5
Disposable Diapers	1.3%	4.7	7	4
Tires	0.0%	0.0	0	0
Residue	3.2%	11.3	8	4
Other	2.4%	8.6	24	13
Total Miscellaneous	8.7%	30.9	41	21
TOTAL	100.0%	353.3	164	85

Table 3. Small Office Sector Statistics

n= 6

MATERIAL	MEAN PERCENT	MEAN POUNDS	STANDARD DEVIATION	CONFIDENCE INTERVAL (90%)
OCC/Kraft Bags	2.2%	0.9	1	1
ONP	1.2%	0.5	1	0
High Grade	5.6%	2.3	3	2
Mixed Paper	45.3%	18.8	14	9
OMG, Catalogs, Junk Mail	1.7%	0.7	2	1
Paper/Paperboard Packaging	6.0%	2.5	2	1
Other Non-Recyclable Paper	20.1%	8.4	8	5
Total Paper	82.1%	34.1	23	15
HDPE Containers	0.1%	0.1	0	0
PET Containers	0.0%	0	0	0
LPDE Film/Sacks	3.1%	1.3	1	1
PS Packaging	1.3%	0.5	0	0
Other Plastic Packaging	1.6%	0.7	0	0
All Other Plastics	1.4%	0.6	0	0
Total Plastic	7.5%	3.1	2	1
Recyclable Glass	1.6%	0.7	1	0
Non-Recyclable Glass	0.0%	0	0	0
Total Glass	1.6%	0.7	1	0
Food & Beverage Cans	0.5%	0.2	0	0
Other Aluminum	0.0%	0	0	0
All Other Metals	0.2%	0.1	0	0
Total Metal	0.7%	0.3	0	0
Food Waste	6.0%	2.5	3	2
Soap	0.0%	0	0	0
Leaves/Grass	0.0%	0	0	0
Brush	0.0%	0	0	0
Sod/Misc. Plants	0.0%	0	0	0
Manure/Animal Waste	0.0%	0	0	0
Wood Waste	0.0%	0	0	0
Total Organics	6.0%	2.5	3	2
Inert Materials	1.6%	0.7	1	1
Bulky Items	0.0%	0	0	0
Textiles/Footware	0.4%	0.2	0	0
Disposable Diapers	0.0%	0	0	0
Tires	0.0%	0	0	0
Residue	0.2%	0.1	0	0
Other	0.0%	0	0	0
Total Miscellaneous	2.2%	0.9	2	1
TOTAL	100%	41.5	26	18

Table 4. Retail Sector Comparison Data (percent by weight)(1)

Waste Category	Tompkins County	Los Angeles (2)	Long Beach (3)
OCC/Kraft Bags	17.60	19.90	19.10
ONP	2.60	3.90	3.00
High Grade	0.00	1.70	0.50
Mixed Paper	7.50	1.10	4.90
OMG, Catalogs, Junk Mail	0.90	0.90	N/A
Paper/Paperboard Packaging	5.00	N/A	N/A
Other Non-Recyclable Paper	10.50	22.40	9.20
TOTAL PAPER	44.10	49.90	36.70
HDPE Containers	0.80	0.70	0.10
PET Containers	0.10	0.10	0.00
LDPE Film/Sacks	6.20	7.40	6.60
PS Packaging	1.00	2.80	1.40
Other Plastic Packaging	1.70	0.20	0.80
All Other Plastics	3.30	2.80	1.90
TOTAL PLASTICS	13.20	14.00	10.80
Recyclable Glass	2.10	2.80	2.00
Non-Recyclable Glass	0.50	4.30	0.00
TOTAL GLASS	2.50	7.10	2.00
Food and Beverage Cans	0.60	1.20	0.50
Other Aluminum	0.00	0.20	0.00
All Other Metals	5.20	3.20	1.50
TOTAL METALS	5.70	4.60	2.00
Food Waste	8.30	6.10	20.90
Soap	0.20	N/A	N/A
Leaves/Grass	0.30	0.00	0.00
Brush	0.20	0.00	1.10
Sod/Misc. Plants	6.30	N/A	N/A
Manure/Animal Waste	0.00	0.00	0.00
Wood Waste	5.90	9.00	4.10
Misc. Organics	N/A	5.80	3.50
TOTAL ORGANICS	21.10	20.90	29.60
Inert Materials	5.50	0.00	1.40
Bulky Items	0.50	0.00	3.30
Textiles/Footwear	1.60	0.80	7.50
Disposable Diapers	0.70	1.60	0.00
Tires	0.00	0.00	0.00
Residue	3.40	N/A	5.30
Other	1.80	1.00	1.30
TOTAL MISCELLANEOUS	13.50	3.40	18.80

(1) Numbers may not add due to rounding

(2) Study did not include retail grocers

(3) Study included wholesale and retail businesses

Table 5. Hospitality Sector Comparison Data (percent by weight) (1)

Waste Category	Tompkins County	Los Angeles (2)	Long Beach (3)
OCC/Kraft Bags	4.10	16.30	10.50
ONP	4.90	4.80	4.90
High Grade	0.20	0.00	3.60
Mixed Paper	1.70	0.00	8.90
OMG, Catalogs, Junk Mail	0.20	0.30	N/A
Paper/Paperboard Packaging	7.80	0.00	N/A
Other Non-Recyclable Paper	11.40	11.20	13.20
TOTAL PAPER	30.30	32.60	41.10
HDPE Containers	0.50	3.60	0.20
PET Containers	0.20	0.00	0.00
LDPE Film/Sacks	3.70	2.70	3.60
PS Packaging	0.80	0.30	0.40
Other Plastic Packaging	1.80	0.10	1.30
All Other Plastics	0.30	0.40	0.10
TOTAL PLASTICS	7.30	7.10	5.60
Recyclable Glass	3.30	4.40	4.10
Non-Recyclable Glass	0.10	0.10	0.00
TOTAL GLASS	3.30	4.50	4.10
Food and Beverage Cans	1.70	0.90	0.80
Other Aluminum	0.00	1.00	0.00
All Other Metals	0.50	0.80	1.70
TOTAL METALS	2.30	2.70	2.50
Food Waste	47.50	45.40	38.10
Soap	0.30	N/A	N/A
Leaves/Grass	0.00	0.00	0.20
Brush	0.10	0.60	1.10
Sod/Misc. Plants	0.10	N/A	N/A
Manure/Animal Waste	0.00	0.00	0.00
Wood Waste	0.10	0.20	1.40
Misc. Organics	N/A	6.80	1.50
TOTAL ORGANICS	48.10	53.00	42.30
Inert Materials	0.20	0.20	0.10
Bulky Items	0.00	N/A	N/A
Textiles/Footwear	1.60	0.00	0.00
Disposable Diapers	1.30	0.00	0.50
Tires	0.00	0.00	0.70
Residue	3.20	0.00	2.40
Other	2.40	0.30	0.50
TOTAL MISCELLANEOUS	8.70	0.50	4.20

(1) Numbers may not add due to rounding

(2) Study included only full-service restaurants

(3) Study included both eating establishments and other entertainment venues

Table 6. Small Office Sector Comparison Data (percent by weight) (1)

Waste Category	Tompkins County	Los Angeles (2)	Long Beach
OCC/Kraft Bags	2.20	3.90	8.30
ONP	1.20	10.00	6.80
High Grade	5.60	25.80	3.20
Mixed Paper	45.30		26.70
OMG, Catalogs, Junk Mail	1.70	3.30	N/A
Paper/Paperboard Packaging	6.00	2.60	N/A
Other Non-Recyclable Paper	20.10	29.20	13.00
TOTAL PAPER	82.10	74.80	58.00
HDPE Containers	0.10	0.40	0.20
PET Containers	0.00	0.10	0.00
LDPE Film/Sacks	3.10	2.30	2.50
PS Packaging	1.30	1.90	1.80
Other Plastic Packaging	1.60	0.00	0
All Other Plastics	1.40	1.90	2.10
TOTAL PLASTICS	7.50	6.60	6.60
Recyclable Glass	1.60	2.20	2.70
Non-Recyclable Glass	0.00	0.20	0.20
TOTAL GLASS	1.60	2.40	2.90
Food and Beverage Cans	0.50	1.10	0.70
Other Aluminum	0.00	0.30	0.00
All Other Metals	0.20	0.90	2.70
TOTAL METALS	0.70	2.30	3.40
Food Waste	6.00	10.60	3.00
Soap	0.00	N/A	N/A
Leaves/Grass	0.00	1.30	2.70
Brush	0.00	0.00	0.00
Sod/Misc. Plants	0.00	0.00	N/A
Manure/Animal Waste	0.00	0.00	0.00
Wood Waste	0.00	0.00	6.60
Misc. Organics	0.00	1.40	1.50
TOTAL ORGANICS	6.00	13.30	13.80
Inert Materials	1.60	0.00	1.50
Bulky Items	0.00	0.00	0.00
Textiles/Footwear	0.40	0.20	4.20
Disposable Diapers	0.00	0.10	0.40
Tires	0.00	0.00	0.20
Residue	0.20	N/A	6.90
Other	0.00	0.00	2.10
TOTAL MISCELLANEOUS	2.20	0.30	15.30

(1) Numbers may not add due to rounding

(2) Study included large and small offices

4. Cost of a Waste Characterization

The cost of a source sampling type of waste characterization will vary with site specific conditions and project magnitude. For the Tompkins County project, the cost to conduct a waste characterization per business is presented in Table 7.



Scheduling and sort-and-weigh costs include: scheduling waste delivery to sorting area, travel time, setting up sort area, sorting and weighing sample, and cleaning up. Data entry costs include entering data and report generation. Overhead costs include supervision, clerical support, bookkeeping, benefits, suppliers, and utilities. The following costs are not included: hauler contract, protective clothing, sort equipment, and the cost of training sorters.

Table 7. Waste Characterization cost (per Business)

TASK	NUMBER OF STAFF	TOTAL PERSON HOURS	HOURLY RATE	TOTAL
Scheduling	1	1.0	\$11.87	\$11.87
Sort and Weigh	4	16.0	\$11.87	\$189.92
Data Entry	1	1.0	\$11.87	\$11.87
Overhead				\$291.59
Total		18.0		\$505.25

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APPENDIX A

WASTE CHARACTERIZATION DATA SHEET				
Business Name:				
Address:				
Date:				
Recorder:				
Incoming Gross Weight:				
Incoming Tare Weight:				
Incoming Net Weight:				
Component	Gross Wt. (lb)	Tare Wt. (lb)	Net Wt. (lb)	% of Total
1) OCC/Kraft Bags				
2) ONP				
3) High Grade				
4) Mixed Paper				
5) OMG, Catalogs, Junk Mail				
6) Paper/Paperboard Pack.				
7) Other Non-Recycl. Paper				
Total Paper				
8) HDPE Containers				
9) PET Containers				
10) LDPE Film/Sacks				
11) PS Packaging				
12) Other Plastic Packaging.				
13) All Other Plastics				
Total Plastics				
14) Recyclable Glass				
15) Non-Recyclable Glass				
Total Glass				
16) Food & Beverage Cans				
17) Other Aluminum				
18) All Other Metals				
Total Metals				
19) Food Waste				
20) Soap				
21) Leaves/Grass				
22) Brush				
23) Sod/Misc. Plants				
24) Manure/Animal Waste				
25) Wood Waste				
Total Organics				

[illegible]

APPENDIX B

WASTE CHARACTERIZATION EQUIPMENT LIST

Required Equipment:

- (15-20) 30-gallon plastic refuse containers
- (100) Plastic garbage bags (for lining selected containers)
- (15) Smaller containers
- Clipboards, data forms
- Product category key board
- (1) Sweep broom
- (1) Rake
- (2) Wide-mouth shovels
- (1) Hand-held calculator
- (1) Magnet (to distinguish ferrous and non-ferrous metals)
- (1) First-aid kit
- (1) Sort table, approx. 3' x 8'
- (1) Tarp
- Various rags for wiping/cleaning
- (1) Scales calibrated to 0.1 pounds

Optional Equipment (obtain as needed):

- (1) Wheelbarrow
- (1) Pair of side cutters
- (1) Bolt cutter (heavy duty)
- (1) Hacksaw (plus 10 blades)
- (1) Claw hammer
- (1) Adjustable wrench
- (1) Screwdriver set
- (1) Linoleum knife
- (1) Ax

Mandatory Staff Equipment:

- (1) Safety helmet
- (1) Pair of goggles
- (1) Pair of thick rubber gloves
- (1) Set of ear plugs
- (1) Work suit (jacket and pants or coveralls)
- (1) Pair of steel-toed, rubberized boots
- (1) Dust respirator or better
- (1) Copy of waste sort protocol
- Additional supply of replacement safety items, such as goggles, gloves, ear plugs, surgical masks, and coveralls
- Tetanus and polio vaccinations required for each crew member; hepatitis vaccinations optional
- Baseline hearing test required for each crew member

APPENDIX C

WASTE CHARACTERIZATION SAFETY GUIDELINES

Work Area

Setting Up: The waste characterization activities will take place inside the Transfer Station building. After the waste has been delivered by the hauler and spread out either by staff, using the bucket loader, or by the sorters, using rakes and shovels, the area must be cordoned off with traffic cones before setting up the sort table and containers.

Daily Operations: Keep in mind that there are going to be extremely busy periods inside the building when several haulers come in to unload trash at one time. It is very important to watch out for heavy equipment while sorting waste. Do not go outside the traffic cones unless Transfer Station staff have been alerted.

Protective Equipment: All persons working in the sort zone are required to wear a hard hat, safety glasses, orange or reflective vest, ear plugs, steel-toed boots with steel shanks, protective suit, and safety glasses. At a minimum, dust respirators should be used, but organic vapor respirators are recommended.

Sorting Procedures

General: At no time should sorters thrust hands into waste piles or containers looking for items. Instead, waste samples should be gathered either by using a rake or shovel or by grabbing a trash bag by the neck. Individual items may be removed from the waste pile after first checking to see that it is safe to do so, and the material is handled accordingly.

Hazardous Materials: While sorting waste, hazardous materials may be encountered. Such materials might include sharp objects, such as metal, broken glass, needles, or chemicals. Watching for hazardous materials is of the utmost importance. Do not weigh or handle the item, simply record its occurrence. Hazardous items should be left in the waste pile and will be removed by loader at the end of the sort. It is not expected that hazardous materials will be encountered often, but it is important to always follow the necessary safety precautions.

Needles: Since many people self-inject drugs at their workplace, it is conceivable that an occasional hypodermic will be seen in the waste pile, either loose or enclosed in some sort of container. Extreme caution should be taken if a needle is observed, and it should not be handled or weighed. Rubber gloves are puncture resistant but still could be pierced.

Hearing Protection: OSHA (Occupational Health and Safety Administration) regulations require the use of hearing protection in areas that exceed certain noise levels. The noise level inside the Transfer Station where heavy equipment is in operation exceeds the set limits. It is therefore mandatory that hearing protection be used. When equipment is shut down, it is permissible to remove hearing protectors. The hearing protectors will make voice communication somewhat difficult, especially during the weighing and recording of data. The situation will call for creativity and directness when communicating with one another.

First Aid: There are first aid and eye wash kits and potable water at the Transfer Station. For minor injuries, such as scrapes and cuts that require no surgery, first aid can be self-administered. For serious injuries or other emergencies that cannot be treated on-site, the Transfer Station supervisor should be immediately notified to take further action and an injury form should be filled out.

APPENDIX D

PRODUCT/CATEGORY KEY

CATEGORY	PRODUCTS
1) OCC/Kraft Paper	Corrugated cardboard containers, brown paper bags
2) ONP	Non-glossy newsprint
3) High-Grade Paper	Office papers, including: computer paper, copier paper, stationery
4) Mixed Paper	Glossy inserts, flyers, posters, fax paper, school paper, ledger/lined paper, envelopes
5) OMG, Catalogs, Junk Mail	Magazines and other mailings
6) Paper/Paperboard Packaging	Non-corrugated packaging, including: milk/juice cartons, juice drink boxes, cereal boxes, tissue boxes, frozen food boxes, department store boxes, many food boxes, health and beauty aid packaging, white paper bags
7) All Other Non-Recyclable Paper	Paper towels, tissues, napkins, paper plates, cups, bowls, carbon paper, books, ribbons
8) HDPE Containers	#2 containers with necks, including: beverage jugs, cleaning products, health and beauty products
9) PET Containers	All #1 containers, including: soda bottles, condiment bottles, cleaning products, health and beauty products
10) LDPE Film/Sacks	Bread bags, plastic grocery bags, plastic wrap for dairy, meat, and produce, dry cleaner bags, shrink wrap, stretch wrap
11) PS	All #6 plastics, including: clam shells, hot drink cups, disposable plates, egg cartons, meat trays, packing peanuts, rigid tumblers, tableware, some dairy containers, clear packaging such as deli take-out containers, cookie/baked goods divider packaging
12) Other Plastic Packaging	All other #1, #2, #3, #4, #5, and #7 plastic containers, tubs, jugs, and packaging, including yogurt containers, margarine tubs, composite packages such as plastic toothpaste tubes, snack food bags, pouches, blister paks, Tyvek envelopes
13) All Other Plastics	Non-packaging plastics, including rigid, durable plastics such as electronics, toys, housewares, tubing, plumbing fixtures, all non-rigid, as well as non-packaging plastics such as food prep gloves
14) Recyclable Glass Containers	All deposit containers, as well as all food and other beverage containers
15) Non-Recyclable Glass	Light bulbs, Pyrex and other clear cookware, drinking glasses, automotive glass, plate glass, health and beauty aid containers
16) Food and Beverage Cans	All aluminum and tin/steel cans

1 Please note the following correction to Volume II Waste Characterizations, Appendix D:
Category #5 - OMG, Catalogs and Junk Mail refers to all magazines, catalogs, and other bound types of junk mail. All other junk mail was categorized as #4 - Mixed Paper.

CATEGORY	PRODUCTS
17) Other Aluminum	Durable goods such as lawn furniture, cookware, doors and window frames, gutters, siding
18) All Other Metals	Sterno cans, aerosol cans, paint cans, metals contained in packaging such as metal toothpaste tubes, plumbing fixtures, major appliances such as washers, dryers, dishwashers, hot water heaters, refrigerators
19) Food Waste	Uneaten food and food prep wastes
20) Soap	Bars from hotels, rest rooms
21) Leaves/Grass	Lawn material
22) Brush	Branches, cuttings
23) Sod/Misc. Plants	Peat and other potting material, house plants
24) Manure/Animal Waste	Pet litter, bird sweepings, domestic animal waste
25) Wood Waste	Pallets, crates
26) Inert Materials	Concrete, ceramics, asphalt, rock, brick, drywall, soil
27) Bulky Items	Furniture and furnishings such as carpet
28) Textiles/Footwear	Clothing, remnants, shoes
29) Disposable Diapers	-----
30) Tires	-----
31) Residue	Non-descript residue and fines generated from each sort

A note about medical, hazardous, and special wastes: The following categories are to be noted for their occurrence and material type only: medical, asbestos, special, and hazardous/radioactive wastes. Technicians are not to handle or weigh this material. These categories are to be defined as follows:

Medical Waste: Any needles, disposable covering, masks, gloves, other surgical wear, etc.

Asbestos Waste: Insulation from renovation projects, asbestos dust from auto brake repair, etc.

Special Waste: Used oil, latex paints.

Hazardous/Radioactive Waste: Household and vehicle batteries and any substantial residues of household hazardous waste including: solvents, non-latex paints, pesticides, thinners, automotive products, photo chemicals, hobby supplies, acids, pool chemicals, damaged smoke alarms, radioactive mantles from gas lanterns, etc.

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