

A MANUAL FOR IMPLEMENTING SCHOOL RECYCLING PROGRAMS

1998
Updated 2002

funded by

Commonwealth of Massachusetts

Executive Office of Environmental Affairs

Department of Environmental Protection

research and text by

MassRecycle (The Massachusetts Recycling Coalition)

and its affiliates

Earthworm, Inc.
Center for Ecological Technology (CET)
Fundamental Action to Conserve Energy (FACE)

TABLE OF CONTENTS

ACKNOWLEDGMENTS	1
1. INTRODUCTION	2
How This Manual Can Help You	2
2. MATERIALS COMMONLY RECYCLED IN SCHOOLS	2
Paper	2
White paper	3
Colored paper	3
Mixed Paper	4
Newspaper and Magazines	4
Corrugated Cardboard	5
Mixed Containers	5
Aseptic Packaging (Drink Boxes)	6
Expanded Polystyrene (Polystyrene)	6
Food Waste	7
3. TYPES OF SCHOOL RECYCLING PROGRAMS	7
Delivery to a Local Drop-Off Center	8
Collection by a Waste Hauler	8
Collection by a Separate, Private Recycler	8
Collection by a Non-Profit Organization	9
Collection Through a Town's Contracted Recycler	9
Recycling on a School District Basis	10
On-Site Composting of Food Waste	10
Collection of Food Waste by a Farmer or Other Composter	10
4. WHAT DO I DO FIRST?	11
Build Administrative Support	11
Identify a Goal	11
Collect Information About Your School	12
Check With Your Current Trash Hauler	13
Look for Recyclers in Your Area	14
5. WHAT IS NEXT?	15
Target Materials	15
Choose Your Recycler	15
Identify a Coordinator for Your Program	16

6. PLANNING CHECKLIST	16
Materials Targeted	17
Preparation of Materials	17
Minimum Collection Requirements	17
Internal Collection Method	17
Internal Collection Equipment	17
Storage Site(s)	17
Hauling	18
Promotion	18
Classroom Tie-In	18
Evaluation and Monitoring	18
Costs	19
Benefits	19
7. TIPS FOR RURAL SCHOOLS	19
Pool Your Recyclables	19
Collect High Value Materials	20
Try On-Site Composting	20
8. TIPS FOR URBAN SCHOOLS	20
Link With Your City's Curbside Program	21
Ask a Local Recycler to Adopt Your School	21
9. CASE STUDIES	21
Case Study #1, Delivering Materials to a Local Drop-Off Center	22
Case Study #2, Collection by a Waste Hauler	24
Case Study #3, Collection by a Private Recycler	26
Case Study #4, Collection by a Non-Profit Organization	28
Case Study #5, Collection Through a Town's Contracted Recycler	30
Case Study #6, On-Site Composting of Food Waste	32
Case Study #7, Collection of Food Waste by a Farmer or Other Composter	34
APPENDICES	36
A. Other Helpful Resources	36
B. Overview of Recycling Benefits	41
C. Glossary	44
D. Planning Checklist by Material	48

ACKNOWLEDGMENTS

This manual represents the combined experience of government, non-profit organizations and industry. Many administrators, teachers and volunteers are to be credited for their accomplishments in establishing school recycling programs across the Commonwealth. The following agencies and groups should, however, be singled out for their faithful support of this project and for their hard work in making this publication a living and working document.

Massachusetts Executive Office of Environmental Affairs (EOEA)

Massachusetts Department of Environmental Protection (DEP)

MassRecycle and its Regional Affiliates:

Earthworm, Inc.

Center for Ecological Technology (CET)

Fundamental Action to Conserve Energy (FACE)

Additional Cooperators:

Franklin County Solid Waste Management District

Greater New Bedford Solid Waste Management District

Hilltown Resource Management Cooperative

Waste Management of Massachusetts, Inc.

INTRODUCTION

How This Manual Can Help You

The primary goal of this document is to outline the key elements in establishing waste diversion programs in schools since schools and their recycling programs come in all shapes and sizes. This manual will help you find the recycling system that is right for your school. Sections 2 and 3 will provide you with an overview of materials commonly recycled and the range of recycling possibilities available to schools in the state. Sections 4, 5, and 6 of this manual will guide you through planning and implementation. Case studies of school recycling efforts can be found in Section 9; these profiles provide a frame of reference and a potential model for designing a program at your school.

Both recycling and composting share many of the same planning techniques and they are addressed by this guide. Although a complete discussion of composting is beyond the scope of this manual, case studies number 6 and 7 on pages 33 through 36 illustrate two types of school composting programs. The educational materials referenced in the Appendix section titled *Other Helpful Resources* provide additional assistance in establishing a composting program.

2. MATERIALS COMMONLY RECYCLED IN SCHOOLS

The waste materials that are most commonly recycled in schools are, **paper, cardboard, bottles and cans, aseptic packaging** (juice or drink boxes), and to a lesser extent, **expanded polystyrene** (Styrofoam) and food wastes.

The following overviews are aimed at giving you a snap shot of each material you may want to target at your school.

Paper

There are several different types of paper that can be recycled. Each of these types of paper are used in the manufacture of different products at specialized mills. For example, white paper is usually converted into tissue and toweling at what are called "tissue mills", while newspaper and magazines are reprocessed at "boxboard mills" into paperboard products like shoe boxes and pizza boxes. The mills that perform this reprocessing rely almost entirely upon private recycling firms to supply them with the material they need. Recycling firms, or more appropriately, "collectors", collect paper waste from businesses, schools and residences and then bale the material for economical shipment to these mills. Over 30 million tons of scrap paper were collected for recycling in the U.S. last year.

The various paper grades have different market values. The value of the material is what helps a recycler determine if a material is "worth" collecting. If a material, such as used pizza boxes, has no dollar value to a recycler, there will be little economic incentive to collect it. If on the other hand, a material has a higher dollar value, like white paper for example, the more likely it will be that you will find an interested collector.

The following is a list of the most common grades of paper in order of their market value, beginning with the most valuable and ending with the least valuable.

White Paper

Definition: "White paper" simply refers to any non-glossy paper that is white. The color or amount of ink on the sheet is irrelevant. Examples of white paper that you may find at your school are:

copier paper
mimeograph paper
letterhead
windowless envelopes
laser printer paper
computer paper
plain paper faxes

Each collector of white paper may have slightly varying specifications, but usually staples, paper clips, and rubber bands are acceptable in small amounts. Large clips, brads and binders usually are not. Any unacceptable "contamination" of white paper by, say colored paper or peanut butter and jelly sandwiches, may cause a recycler to decline picking up the entire load.

Key Points: *White Paper*

- ✓ Usually equals about 20% of your school's total solid waste by volume
- ✓ Has a high economic value relative to other paper wastes and is therefore desired by collectors
- ✓ Has stable markets and numerous collectors
- ✓ Most white paper collected in New England is made into toilet tissue, toweling and market pulp (a material purchased by mills that do not have pulping equipment)

Colored Paper

Definition: Colored paper, sometimes called *sorted colored ledger*, refers to the actual color of the sheet and includes any color. Like white paper, what is printed on the sheet is irrelevant. Glossy magazines or newsprint are usually not acceptable as colored paper.

Key Points: *Colored Paper*

- ✓ Mixed with white paper, it can equal about 35% of your school's total solid waste by volume
- ✓ Has a medium to low economic value relative to other paper wastes

Mixed Paper

Definition: Mixed paper is a catch-all term and has many "definitions". In most cases it refers to just about any kind of paper, including white paper, colored paper, newspaper, magazines, telephone books, note pads, cardboard, paperboard, paper bags etc. Some collectors, however, do not allow newspapers or magazines to be included in their "mixed paper". Make certain that you are clear on your collector's definition. Markets for mixed paper are limited and notoriously fickle so setting up mixed paper recycling programs is riskier than setting up white paper programs. Mixed paper programs, however, reduce the waste stream more significantly.

Key Points: *Mixed Paper*

- ✓ Can equal up to 70% of your school's total solid waste by volume
- ✓ Has historically had erratic markets though new paper mills are experimenting with this grade of paper
- ✓ Much of this material is sorted by workers at paper processing facilities prior to being shipped to paper mills for reprocessing
- ✓ Mixed paper programs are convenient and require little thought about what is acceptable, but these programs are prone to "contamination" by unwanted trash

Newspaper and Magazines

Definition: Newspaper and magazines are well known materials and are easily recognizable. Most programs or collectors that accept this grade will allow glossy Sunday inserts but not "junk mail". Other acceptable sources of newspaper are circulars and advertisements printed on newsprint. Glue-bound magazines and telephone books are usually acceptable, but certain to check with your local collector.

Key Points: *Newspapers and Magazines*

- ✓ Between 25% and 35% of all old newspapers are collected for recycling in the state
- ✓ Newspapers can be recycled into new newspapers, but most of the newspapers collected in Massachusetts are made into paperboard products such as shoe and pizza boxes
- ✓ The State-owned recycling facility in Springfield, MA handles 150 tons per day of newspaper and magazines from western Massachusetts communities

Corrugated Cardboard

Corrugated cardboard boxes are one of the most recycled materials in the country. Studies estimate that approximately 60% to 70% of the nation's cardboard is collected for recycling. The reason for this high "recovery rate" is that, although cardboard recycling costs money, it costs less than trash disposal. Supermarkets and other large generators of cardboard therefore recycle because it saves money and it is the right thing to do.

At schools, corrugated cardboard boxes are commonly generated in the cafeteria and custodial areas. Schools that do not have a cafeteria may not generate enough cardboard to make a separate collection program worthwhile.

Definition: The term cardboard is a simplified term for corrugated cardboard. You will notice that, when viewed on edge, there is a wavy or corrugated inner section that is sandwiched between two outer layers. This inner layer gives this packaging material its strength. A colored outer layer is usually acceptable, but cardboard that is waxed or yellowish is unacceptable. Paperboard products such as cereal boxes, pizza boxes and shoe boxes are not considered to be cardboard.

Key Points: *Corrugated Cardboard*

- ✓ As much as 70% of the nation's corrugated cardboard waste is recycled
- ✓ Recycling is a huge cost saver when cardboard is available in large amounts
- ✓ Recommended for schools with large cafeterias or other significant sources
- ✓ Up to 30% of the corrugated cardboard collected in New England is shipped overseas; waste paper in general is one of the largest export items, by volume, from the ports of Boston and New York City

Mixed Containers

With advances in mechanical sorting, containers of all different types of materials are able to be collected together. This is referred to as "co-mingled". School cafeterias and teacher's lounges are the biggest sources of these materials. School lunchrooms are the next largest source of glass bottles, aluminum cans and plastic bottles and containers. The recycling of these materials requires preparation such as rinsing as well as more attention to safety and storage issues such as handling, odor and pest control.

Definition: Once again, definitions and specifications may vary from region to region, but the category of mixed or mixed containers usually includes: glass bottles (all colors), plastic containers, aluminum cans, steel or bi-metal cans, and aluminum foil/pie plates. Some collectors may accept a wider range of plastic resin types (designated by their code number on the bottom) than others in their definition of mixed containers. Jar lids, bottle caps, bottle-neck rings, etc. may be unacceptable; be sure to check on these details.

Key Points: *Mixed Containers*

- ✓ Redeemable bottles and cans (with a 5 cent deposit) can be a source of cash or a donation to a non-profit organization
- ✓ Each year, Americans use over 32 billion aluminum cans
- ✓ In 1996, the United States glass industry produced 36 billion glass containers and the recycling rate for these containers is approximately 37%
- ✓ Twelve percent of the 13 billion plastic bottles used each year in the U.S.A. are collected for recycling

Aseptic Packaging (*Drink Boxes and Milk Cartons*)

Drink box or juice box recycling programs were launched in 1990 by the aseptic packaging industry following public outcry about "throw-away" packaging. Since then, recycling programs for this material have steadily improved and now include collection in some residential curbside programs as well as in hundreds of schools nationwide. Like other food or beverage containers that are being stored for recycling, drink boxes should be rinsed first and then stored in a suitable location.

Definition: Aseptic packaging, more commonly known as drink boxes, refers to plastic coated paper cartons that are lined with foil. Plastic coated cartons without a foil lining, such as milk cartons, are also acceptable in this category.

Key Points: *Aseptic Packaging*

- ✓ Schools produce between 3 and 6 pounds of milk cartons and drink boxes per student per school year
- ✓ Discarded aseptic packaging from public schools in Massachusetts currently accounts for almost 2,000 tons per year of solid waste
- ✓ The three components of an aseptic package (drink box), paper, polyethylene and aluminum foil are mechanically separated and then recycled into new products

Expanded Polystyrene (*Styrofoam*)

Schools that do not use reusable cafeteria ware sometimes choose "Styrofoam" for use as lunch trays, serving containers and, in its rigid form, utensils. There are very few collectors of this material in the Commonwealth and collection costs can be significant. However, polystyrene is less costly to purchase than other non-recyclable, disposable food service products, paper cups and plates for example, and do not require the additional expense of washing, etc.

Definition: Expanded polystyrene is often referred to by the brand name "Styrofoam" and is usually designated with a number 6 Society for the Plastics Industry (SPI) recycling code on its' bottom side. This is an inexpensive and lightweight material used in packaging and as disposable food service ware.

Key Points: *Expanded Polystyrene*

- ✓ Polystyrene is less costly to purchase than other disposable food service products
- ✓ Over 25 billion "Styrofoam" cups are used in the U.S. each year
- ✓ The collection options for "Styrofoam" are limited and relatively expensive

Food Waste

A growing number of suburban and rural schools recycle their food and lawn waste by composting it. There is no substitute for cleaning your plate, but the educational opportunities associated with composting are exciting. Most schools limit their programs to food waste generated in the food prep areas of the cafeteria, although other schools include leftovers collected from the lunchroom. Dairy products, meat and fish are typically excluded from composting programs because of odor and pest problems. Food scraps can be either composted on the school grounds or picked up by local pig farmers or composting farms.

Key Points: *Food Waste*

- ✓ Depending on the school, food discards can represent from 20% to 50% of the total solid waste by weight
- ✓ Diversion of food waste through composting or pig farmers (*not all pig farmers collect food waste*) can provide a platform for a valuable learning experience for students

3. TYPES OF SCHOOL RECYCLING PROGRAMS

There are six main options for collecting recyclables in schools. They are:

- | | |
|-----------|---|
| Recycling | <ul style="list-style-type: none">✓ Delivery of materials to a local, recycling drop-off center✓ Collection by the school's current trash hauler✓ Collection by a separate, private recycler✓ Collection by a non-profit organization✓ Collection by the town's contracted recycler✓ Collection as part of a school district recycling program |
|-----------|---|

There are two common methods of diverting food waste. They are:

- | | |
|------------|--|
| Composting | <ul style="list-style-type: none">✓ Onsite composting of food and yard waste✓ Collection of food waste by farmers for pig feed or off-site composting |
|------------|--|

To help you evaluate which collection method most suits your school, each option is described. Case studies of schools that have already established similar programs can be found in Section 9.

Delivery to Local, Recycling Drop-off Center (Case Study #1)

- Ideal for:**
- ✓ Schools whose current waste hauler cannot provide recycling services
 - ✓ Schools that cannot meet minimum collection requirements due to lack of storage space or other reasons
 - ✓ Schools in towns with a user friendly drop-off center

In many rural and some suburban areas that are considered "out of the way" by collectors of recyclables, bringing recyclables to the town's drop-off center may be the best choice available to you. Schools that recycle in this manner usually make use of town or school owned vehicles and/or private vehicles to bring the materials to the recycling center. Programs that use a drop-off site are limited to the materials that the center accepts. Make sure to check with the drop-off manager before starting a collection program at your school. See Section 4 under "Municipal Recycling Coordinator" to find how to reach your coordinator. The program at the Lanesboro Elementary School in Lanesboro, MA (*Case Study #1 is a good example of this recycling option and can be found in Section 9 of this guide.*)

Collection by the Current Waste Hauler (Case Study #2)

- Ideal for:**
- ✓ Any school with a waste hauler that offers recycling services

Many trash haulers also offer recycling services. A good first step in organizing a recycling program for your school is to find out what recycling services your current trash hauler offers. A recycling program that uses a contracted hauler enjoys several advantages. Since they are already visiting your school it is logical and efficient to work with them. A second advantage is financial. In the interest of retaining your school's trash business, a trash hauler can offer a better deal to your school. (*See Case Study #2 in Section 9 for an example of this type of recycling program.*)

Collection by a Private Recycler (Case Study #3)

- Ideal for:**
- ✓ Large urban schools
 - ✓ Large suburban schools

There are companies that collect and process recyclables as their chief source of business. Each of these firms has a specific set of materials that they will accept and a specific method to collect them. Many of these companies have been in the business for generations, though school recycling programs are relatively new ground for them. The best place to find a listing of these recyclers is the local Yellow Pages under "Recycling", or the Massachusetts Department of Environmental Protection's "Recycling Services Directory". To order a copy

of this directory call the DEP Infoline at 617-338-2255 or, 1-800-462-0444 if you are in the 508, 413, 978 or 781 area code. In Section 5 we will discuss how to select a company to collect your recyclables. (*Case study #3 in Section 9 is an example of a school program that uses a private recycling company for collection.*)

Collection by a Non-Profit Organization (Case Study #4)

- Ideal for:**
- ✓ Small schools that private, commercial recyclers will not serve
 - ✓ Schools that need special assistance in setting up programs
 - ✓ Schools that want to contribute to a charitable cause

There are a number of non-profit organizations in the state that have a long history of providing recycling services as part of their mission. Non-profit organizations are known for their fundraising collection drives (programs that occur on a scheduled basis), but some offer on-going collection services. Non-profit organizations promote causes like recycling, environmental education or cancer research, while others seek to support groups like veterans and the physically or mentally challenged. In all cases, working with a non-profit can multiply the positive impact of recycling by also supporting a worthy cause. (*Case Study #4 outlines a program served by a non-profit organization.*)

Non-profits are very easy to work with and often "go the extra mile", but they do not blanket the state so there are geographic gaps in service. There is no comprehensive listing of non-profits that offer recycling collection services, but most are listed in the Department of Environmental Protection's "Recycling Services Directory". For a copy call 617-338-2255 or from 413 and 508 area codes dial 1-800-462-0444.

Other sources of information on non-profit recyclers, such as Boston Can or Cans for Cancer, are available through MassRecycle at 617-338-0244 or WasteCap at 617-236-7715.

Collection Through a Town's Contracted Recycler (Case Study #5)

- Ideal for:**
- ✓ Towns with curbside collection of recyclables through a contracted hauler

Some towns in Massachusetts that have curbside collection programs for residences have extended their programs to include collection from municipal offices and schools. Piggy-backing school recycling on a municipal solid waste and recycling program has been very successful. Waltham, Cambridge and Saugus have each taken this approach and our **Case Study #5** features Newton's program from the vantage point of one of its twenty public schools. If you are a teacher or administrator in a town with a contracted, residential recycler, you should explore this option. Having your school recycling program linked to the town's program offers consistency and stability. To investigate this possibility, contact your Municipal Recycling Coordinator. For information on your town's curbside program or help in finding your coordinator's number, consult the "Statewide Municipal Recycling and Composting Guide" available through MassRecycle at 617-338-0244. Another good source of information is Earth's 911 at 1-800 CLEANUP or visit www.CLEANUP.org.

Recycling on School District Basis

Ideal for: ✓ Schools whose services, like trash removal, are arranged on a district level

Many schools in the state are organized into school districts where services, such as trash removal, are arranged on a district wide basis. In these cases it would be expedient to organize a recycling program along the same lines. This is especially true if the district's waste hauler is the best bet for recycling services. If you are working within a school district you should contact the district's business manager's office or your school superintendent's office.

On-Site Composting of Food Waste (Case Study #6)

Ideal for: ✓ Rural or suburban schools
✓ Schools with kitchens and cafeterias
✓ Schools interested in merging composting with the science curriculum

Composting food waste is quickly becoming a popular topic among school teachers because it is hands-on, exciting, and ecological. School composting programs are often connected in some fashion to the science curricula. Composting food waste on school grounds is the most difficult diversion program to establish because of the ongoing maintenance that is required, but it is also the most rewarding. (*The composting program at the Pelham Elementary School, Case Study #6 in Section 9, is an excellent prototype.*)

Collection of Food Waste by Farmers for Pig Feed or Composting (Case Study #7)

Ideal for: ✓ Rural or suburban schools near farms
✓ Schools with kitchens and cafeterias
✓ Schools that lack the ability to compost on site

Not every school has the time and energy that is required for on-site composting. Rural schools that are near farms can sometimes take advantage of a local farmer's experience by simply setting aside food waste to be picked up. In Whately, Amherst and Sudbury for example, pig farmers collect food waste that has been diverted in the kitchens and cafeterias of the towns' elementary schools. (*Case study #7 in Section 9 outlines this type of program.*)

4. WHAT DO I DO FIRST?

Whether your goal is to establish a modest paper recycling program or an elaborate program to divert multi-materials, your initial steps will be identical. These steps are:

- ✓ Build administrative support
- ✓ Identify a goal
- ✓ Collect information about your school
- ✓ Check with your current trash hauler
- ✓ Look for collectors of recyclables in your area

Build Administrative Support

Even the smallest recycling program requires cooperation among the administration, faculty, custodians, parents groups and students. Programs that are successful have garnered the support and commitment from each of these groups early in the planning process. School principals have an over-arching interest and understanding of their school's functions. Teachers have a keen understanding of student abilities and educational opportunities. Custodians are expert in their awareness of the building, the flow and composition of its wastes and possible sites to store materials. Students have fun suggestions for promotion and they are willing recyclers.

It is also important to build support outside of your school(s). Many towns have Municipal Recycling Coordinators who oversee their town's residential recycling program. These individuals are an important source of information on local recycling options and they can be a valuable ally as you build your school recycling program. To find the Recycling Coordinator in your town, call Earth's 911 at 1-800 CLEANUP or visit www.CLEANUP.org.

Identify a Goal

In the introduction of this guide we discussed the various reasons schools implement recycling programs. Some of the goals most schools set for their programs are:

- ✓ To use recycling as an educational tool
- ✓ To save trees and other natural resources
- ✓ To save money by diverting waste to cheaper forms of disposal (recycling)
- ✓ All of the above

It is important for you and your cadre of supporters to agree on a goal. This does not mean that you cannot change your plans as you move through this planning process, but it will be a smoother ride if there is a shared destination.

Collect Information on Your School

Think of your school as a living organism that has a function, takes in nutrients and expels waste products. For you to be able to successfully make changes in the habits of this organism, you will need to study it carefully. Seek answers to the following questions:

What waste material does my school produce?

The resident experts on waste material at your school are the custodians. Every day of every week of every school year the custodians collect and transport the waste materials to trash containers. Ask them what the school throws away and encourage them to make an "off the top of the head" guess about the relative composition of the school's waste. To supplement this information, take several walks around the school and look in the waste receptacles and note the relative amounts of what you find. Check your dumpster too; you are certain to find surprises. *(Conducting a simple audit of your school's solid wastes can be a useful and interesting class project. For information on how to conduct a waste audit, see the "Trash Can Scan" activity in the Massachusetts Department of Environmental Protection's "Solid Waste Management Resource Guide". For a copy, call DEP at 1-800-462-0444 if you are in area codes 413, 508, 978 or 781 In area code 617, dial 617-338-2255.*

How are these wastes currently handled?

Make a note of how trash is moved from its point of generation to its point of disposal. Some schools build their recycling programs around the current movement of waste materials. Other schools devise separate but complimentary procedures for getting recyclables to a collection point. Note how much time is currently being devoted to waste handling. Check with an administrator to see if the custodial contract is flexible enough to allow a change in procedure.

What does it cost my school to handle and dispose of waste materials?

If you are aiming to save the school money through recycling, you will need to know how much is being spent on trash removal each year. Your head custodian, principal, business manager or superintendent should have these figures. Along with your estimates of waste composition, use this data to estimate cost savings. For example, if white paper is 20% of the total trash by volume, then a white paper recycling program could conceivably save your school twenty percent of the trash budget. Make sure to check the contract to see if reducing the waste stream's volume will in fact reduce your disposal costs. Some trash removal contracts charge a per pick-up fee and not on the actual volume of waste in the dumpster. In these cases, recycling may not result in a reduction in disposal costs unless the number of times the trash collector picks up is reduced. If recycling would not affect the school's expenditure, consider re-negotiating the contract with the waste hauler. You can also wait until the contract ends and amend the next contract to reflect a reduced number of trash pick ups.

Time is money too. Custodians are paid employees. The more time spent on handling the trash, the less custodians are free to accomplish their other tasks. Schools that include the custodians in the recycling program find that they end up spending less time overall on trash removal. This is especially true with paper recycling programs since recycling containers may not need to be emptied every day as compared to trash barrels. If twenty percent of the trash does not need to be collected every day, the custodians may see this reflected in the time they spend handling the school's waste stream. Make a projection about the potential savings.

What are the possible storage sites for recyclables until collection?

With the exception of some pig farmers, no recycling service will visit your school on a daily basis. You will, therefore, need to store materials until a sufficient quantity is available to make collection economical for the collector. Finding an adequate storage area is sometimes difficult since most buildings are not designed with these recycling needs in mind. The layout of your building, the minimum amount of material you will need to store, and other important considerations like fire codes, student health, and safety will be limiting factors in finding a suitable site. Start by consulting with the head custodian and investigate areas near where trash is currently kept. Check with the local fire marshal about codes and storage rules. Keep in mind that the site needs to be convenient for all involved. Some schools partially side step storage snags by aggregating material on the day of collection.

Check with the Current Trash Hauler

As is described in (**Case Study # 2**) in Section 9, many waste haulers also offer recycling services. Check with your current trash hauler on recycling options. Your hauler is a good place to start since some trash removal contracts contain language that gives the contracted hauler first choice on any recyclables in the waste stream. As is evident from the variety of school recycling programs, waste haulers are not always the only, or best, option.

Approach your hauler the same way you would approach any other business whose services you are interested in and be sure to get answers to the following questions:

- ✓ What materials do you collect?
- ✓ How must materials be prepared in order to be picked up?
- ✓ How much do we need to store before you will make a pick up?
- ✓ Do you provide any storage equipment such as large bins (hampers or toters)?
- ✓ If you do not provide equipment, what containers will you service?
- ✓ Are there any charges for your services or containers?
- ✓ Do you work with any other schools?
- ✓ Will you be able to help us through the set up process?
- ✓ Do you have any promotional materials, such as posters or signs, that we can use?
- ✓ Will your service be likely to change in the future?
- ✓ Do you require a service contract?

Look for Recyclers in Your Area

If your current hauler is unable to provide recycling services, or if you prefer not to use them, shop around for other recycling options. Use the above set of questions for querying other service providers. (*The next chapter of this guide will discuss tips for choosing a recycler.*) The best places to find recycling services are:

Municipal Recycling Coordinator or Solid Waste Management District

Your local Recycling Coordinator or District Manager is familiar with area recyclers. To find your coordinator check the state's "Statewide Municipal Recycling and Composting Guide" or Earth's 911. You can also call your town's Public Works or Health Departments to find the coordinator. Regional Solid Waste Districts are listed in this Appendix under "Other *Helpful Resources*".

Earth's 911: 1-800- CLEANUP or visit www.CLEANUP.org

Yellow Pages

Most recycling services are listed in the Yellow Pages under "recycling services", "recycling centers" or "recycling equipment".

DEP's "Recycling Services Directory" (617-338-2255 or 1-800-462-0444) or www.state.ma.us/dep/recycle.

This is a statewide listing of recycling services.

MassRecycle (617-338-0244)

Call MassRecycle if you need further assistance in finding recycling services.

WasteCap (617-236-7715)

WasteCap is a non-profit organization that promotes recycling among businesses and institutions, but it can also be helpful to you in contacting recycling services.

5. WHAT IS NEXT?

Until now, you have been doing simple reconnaissance. Now you will begin to make some decisions based on the information that you have collected. If you have not run into any snags with capturing administrative support or finding recycling services, the next steps are:

- ✓ Target Materials
- ✓ Choose a Recycler
- ✓ Identify a Coordinator for Your Program

Target Materials to Recycle

You have had an overview of commonly recycled materials in schools and you have looked around your school and spoken with the custodians about your school's waste products. You have also collected information on recycling services in your area. You are now ready to make a decision. Target the waste materials for which you have the following:

- ✓ Significant amounts in your school's waste stream
- ✓ A sound, affordable and available recycling option
- ✓ A suitable storage space

Choose Your Recycler

In cases where there are more than one option, consider the following qualities in selecting a collector:

- ✓ Service: Choose a firm that most suits your school's needs. Remember that good service is invaluable.
- ✓ Price: Some recyclers charge for their service, some collect recyclables for free, some charge a rental fee for their containers. Balance price with service.
- ✓ Willingness: Find a company that wants to serve you. An under enthusiastic recycler will be a headache.
- ✓ Equipment: Not all vendors offer the same equipment. Choose the recycler that has the equipment that works for you.
- ✓ Educational Materials: A recycler that provides signs, posters, curriculum, etc. will save you time in promoting your program.

Identify a Coordinator for Your Program

A committee works well during the planning phase because it spreads the work load and involves different points of view. Be certain that your committee includes custodians, administrators, teachers and parents (and students if possible). Once the program begins, however, there should be one person designated as the Recycling Coordinator to oversee operations. The coordinator position should be filled by a teacher, custodian or an administrator. The coordinator is usually responsible for delegating or carrying out the following tasks:

- ✓ Arranging to have the chosen vendor deliver any necessary equipment
- ✓ Making sure the program is adequately announced and promoted
- ✓ Making sure containers get placed in all the appropriate areas
- ✓ Making sure that everyone at the school is educated about the collection process
- ✓ Arranging for pick ups as needed
- ✓ Monitoring the program's success
- ✓ Letting everyone know how much has been diverted
- ✓ Contacting the local fire chief or marshal about fire codes and storage issues

6. PLANNING CHECKLIST

A good recycling or diversion program is the result of good planning. Use the checklist below as a guide to help you cover all of the key program elements.

- ___ **Materials Targeted:** *What will be recycled?*
- ___ **Preparation of Materials:** *How must they be prepared or sorted?*
- ___ **Minimum Collection Requirements:** *How much must be stored?*
- ___ **Internal Collection Method:** *Who collects the materials and how?*
- ___ **Internal Collection Equipment:** *What equipment will be necessary?*
- ___ **Storage Site(s):** *Where can you store recyclables until they are picked up?*
- ___ **Hauling:** *Who will be responsible for what?*
- ___ **Promotion:** *How will the recycling program be communicated and explained?*
- ___ **Evaluation and Monitoring:** *How will the program be managed?*
- ___ **Educational Tie-In:** *How will the teachers support recycling in their lessons?*
- ___ **Costs:** *What will be the cost of the program?*

___ **Benefits:** *What are the savings? What are the indirect benefits?*

Materials Targeted

By this point you have already determined which recyclable waste materials are being discarded. You also have determined which materials have collection options. For each of these materials identified, plan for the following elements.

Preparation and Handling

Whether you are collecting bottles and cans or white paper, the recycler you have chosen will have certain specifications for material preparation. For example, bottles and cans usually must be at least emptied, white paper cannot have "contaminants" such as newspapers, crayons or Mighty Monkeys lunch boxes mixed in. Be certain about what is accepted and what is not accepted.

Minimum Collection Requirement

A paper recycling company will not come to your school to collect just one piece of paper and a company that collects polystyrene will not visit your school to collect just one Styrofoam coffee cup. For all companies that collect recyclables, there is a minimum amount of material that must be accumulated before it becomes cost effective to send out a truck and a driver. Be sure to note how much material you will need to store.

Internal Collection Method

Consider the flow of recyclables from their point of generation to their point of collection. Who will handle and transport these materials? Some schools rely exclusively upon custodians (recycling is incorporated into their job description), while other schools have designated students, or a club that collects materials on a schedule. A collaborative collection effort between staff and students works very well.

Internal Collection Equipment

Most schools that have instituted paper recycling have a separate container for recyclable paper in each classroom. These containers can be as simple as cardboard boxes or as standard as a municipal curbside recycling container. These smaller containers must then be emptied into a larger container. *Most recyclers will supply this larger barrel type container.* Food diversion programs usually require, among other items, buckets and 30 to 40 gallon barrels with wheels. Make a list of all of the equipment that you will need.

Storage Site(s)

This is often the place where school recycling programs get derailed. If you cannot find a suitable site, consider a program where wheeled recycling containers are rolled from all corners of the school to the pick up point on the day of collection. Vocational schools or high

schools with shop classes have the opportunity to build outdoor storage sheds for recyclables. Remember to check with the custodians about local fire or health codes; be certain that your planned storage site is safe and acceptable to local inspectors such as the fire marshall.

Hauling

Make certain that you and the recycler agree on all of the terms of the arrangement. If you agree to be serviced on an as needed basis (as opposed to regularly scheduled pick-ups), check to see how far in advance you will have to call for a pick up. It should also be clear to what extent the hauler will go to pick up material. Will they enter the building? How will they handle contaminated loads? Will the hauler simply leave the material? Will you be charged an extra fee for such loads, or will the hauler leave the material and charge you an extra fee as well?

Promotion

Do not skimp on communication. Posters, public address announcements, classroom announcements, and kick-off assembly programs are important tools in getting the word out. Sending information home with students is also effective. You want to motivate students and staff to participate *and* you want them to know exactly what is expected of them. Poor participation or improper participation can ruin even the best made plans.

After the program has been started, plan to let the school know how well it is doing. Many schools have had good motivational success with bulletin board murals that display the number of trees saved, pounds of food diverted, etc. Consider identifying a "Recycler of the Month" and celebrating their accomplishments.

Evaluation and Monitoring

Very few recycling programs run by themselves. It should be the job of the school recycling coordinator, or the coordinating committee, to check the program's progress on a periodic basis. Tonnage totals, participation rates, resources saved, dollars earned or saved are each useful tools for evaluating the impact and progress of the program.

Classroom Support and Educational Tie Ins

Schools with successful diversion programs often support these programs with classroom discussion. At a minimum, teachers should support the program through announcements, reminders and, of course, participation. More importantly though, the concepts of resource conservation and ecology will flourish and have extra meaning if teachers use the recycling program as a vehicle for discussion. The "Solid Waste Management Resource Guide: 1996 Update for Massachusetts Schools" is published by the Department of Environmental Protection and is designed to aid teachers who are interested in an educational tie in. It is available at the Massachusetts Statehouse Bookstore (617-727-2834). *See the Appendix for a listing of additional resources available to teachers.*

Costs

There can be an initial cost to starting a waste diversion or recycling program. There may also be ongoing costs. Examples of initial costs are barrels, buckets or other recycling containers, and promotional materials like paper for posters. And then, of course, there is the value of staff time. Ongoing expenses may consist of collection fees, rental fees or the replacement of damaged or lost containers. From the outset you should know what your expenditures will be and how they will be paid.

Benefits

Some benefits from recycling or composting are measurable and others are not. Throwing away less solid waste can almost always translate into direct savings for the school. Work closely with the administration to measure these savings and lobby to have the amount of the savings added to the school budget if possible. Recycling also conserves natural resources, provides jobs and reduces the impact of manufacturing processes on our air and water. (*See the Appendix for additional information on the benefits of recycling.*) These tangible benefits can be calculated and put into the perspective of one school's impact, but the hardest and perhaps greatest benefit of all to measure is the future impact of students who learn to use natural resources wisely and efficiently.

7. TIPS FOR RURAL SCHOOLS

Schools in rural sections of the Commonwealth face a special set of obstacles when setting up recycling programs. Often these schools are small and too far from potential collectors of recyclables to make collecting from them economical. If you find your school to be in this situation, please consider the following tips:

- ✓ Cooperate with municipal agencies, businesses or other schools to pool materials
- ✓ Collect only the highest value recyclables, such as aluminum or white paper and plan for a larger storage space than is required of most suburban or urban schools
- ✓ Try on-site composting

Pool Your Recyclables

If you are having trouble enticing a collector to visit your school because of distance or the amount of recyclable materials available, consider cooperating with the municipal public works or health departments, or a local business to pool your recyclables.

Municipal Agencies

Check to see if town offices have a recycling program and seek to join their effort. If they do not, see if they would like to collaborate. By increasing the amount of materials collected and aggregating them at some common storage site, you may be able to capture the interest of a distant collector. Check with your Municipal Recycling Coordinator or Regional Solid Waste Management District.

If your town has a drop-off center that accepts paper, but your school cannot get it to the site, ask the Public Works Department if they will pick it up and deliver it to the site. If your DPW agrees to collect your school's recyclables, be sure to agree on how materials will be stored and how often they will be picked up.

Local Businesses

If your school cannot recycle because it does not qualify for a free pick up from a collector, consider asking a local business to "donate" the cost of the pick ups. Again, check with your Municipal Recycling Coordinator or the local Chamber of Commerce for suggestions of potential business partners.

Collect the Highest Value Material and Plan to Store More

If distance is discouraging a recycler from visiting your school, give serious thought to collecting only the highest value materials like white paper or aluminum cans. At some point, some definable amount of paper will become "worth it" for a recycler to make a long journey. Find out what that amount is and be creative in finding ways to store it. (Be sure to check with the local fire marshal about storage guidelines.) As was mentioned earlier, getting a high school shop class, Jaycees, Elk's Club etc. to build and/or finance an outdoor storage shed for recyclables is a valuable community project.

Try On-Site Composting

This is a diversion program that does not necessarily require a private waste management company. You can do this right at your school. Check the Appendix of this manual for resources on establishing a composting program at your school.

8. TIPS FOR URBAN SCHOOLS

Ironically, urban schools can face some of the same barriers to recycling that rural schools face, such as lack of storage space or vendor disinterest. In these cases, some of the cooperative relationships described under *Tips for Rural Schools* may be helpful. There are, however, barriers that are specific to urban recycling programs. Some helpful tips are:

- ✓ Try to link up with your city's curbside recycling program
- ✓ Ask a Local Recycler or Business to Adopt Your School

Link up With Your City's Curbside Program

If your city has a residential, curbside collection program for recyclables, contact the Recycling Coordinator to inquire about the possibility of teaming up. As was described in Section 3, Item E., many urban (and suburban) schools have had success with recycling by piggy-backing their program on the town program. Curbside recyclers normally pass through neighborhoods where schools are located, while many commercial recyclers (companies that collect primarily from businesses) have no established routes in these residential areas. The lack of established trucking routes in residential neighborhoods often discourages commercial recyclers from offering service to schools.

Ask a Local Recycler to Adopt Your School

If your school has been deemed "unsuitable" by local recyclers because of storage problems or distance from established trucking routes, ask these same recyclers if they would "adopt" your school program. In adopting the program, the recycler would forego its normal pick up requirements simply to support school recycling. News of this relationship could be publicized in neighborhood papers and through other media outlets.

9. CASE STUDIES

The following case studies are real world examples of the types of school recycling and composting programs that were outlined in Section 3 of this guide. These profiles are intended to provide you with a quick overview of some of the key features in successful, school recycling and composting programs. These case studies also show the wide variety of approaches that exist in solid waste diversion programs. As you would guess, each diversion program is a dynamic outgrowth of "conditions" (such as staff interest, space, materials available, local markets, etc.) that exist at each school. As you read about the accomplishments at the following schools, keep in mind the planning process that preceded each successful program.

Planning elements that each of the following programs hold in common are:

- ✓ A Designated Recycling Coordinator or Committee
- ✓ Approval and Support of the Administration
- ✓ An Inclusive Planning Process
- ✓ A Reliable, Local Outlet or Collection Service for Recyclables
- ✓ Adequate and Suitable Storage Space
- ✓ Classroom Support and Educational Tie-In by Teachers
- ✓ Effective Communication of Program Guidelines and Achievements

Case Study #1

Delivering Materials to a Local Drop-Off Center

School:	Lanesboro Elementary Lanesboro, Massachusetts	Contact:	Mr. Aherne Head custodian 188 Summer Street Lanesboro, MA 01237 413-443-0027
Grades:	K - 6, 350 students		

RECYCLING AT A GLANCE

Materials Collected:

- ✓ Paper & cardboard

Collection Method:

- ✓ Bins in each room
- ✓ Each class responsible for weekly internal collection
- ✓ Custodian brings to transfer station

Equipment Used:

- ✓ Paper bags,
- ✓ Plastic toter
- ✓ Plastic bins,
- ✓ Pick up truck

Storage:

- ✓ No storage, recyclables brought to transfer station weekly

Areas Serviced:

- ✓ All classrooms and offices

Tonnage Diverted:

- ✓ .5 - .75 ton per month

Successes:

- ✓ Local supermarket donated paper bags for use in collection

Obstacles:

- ✓ Needed more promotion and training at start up; participation rate was low at first

Initial Investment:

- ✓ Approx. \$300 for plastic bins

Promotion:

- ✓ Announcements in each class by teachers

Classroom Tie-In:

- ✓ Presentations in several classes

Case Study # 1 (continued)

Recycling History: This program began in 1994. Paper and cardboard are collected in all classrooms and offices. The recycling program got off to a slow start due to poor participation, but participation has improved and the school is now recycling approximately 50%-60% of the total paper and cardboard available.

Collection Method: Originally, each class had paper bags inside their plastic recycling bins. For the sake of neatness and ease of handling, scrap paper was put into the bags instead of being dumped directly into the bins. Each class then brought the bags to the cafeteria once each week and put them in a large, wheeled barrel or toter. The bags have been shown to be unnecessary and the students now dump the paper from the plastic bins into the toter. From here, the custodian brings the toter to the town's transfer station in his pick up truck and dumps it out.

Equipment Used: Paper bags donated from a local grocer, plastic bins, plastic toter and a pick up truck.

Storage: No storage is necessary, weekly trips to the transfer station are made. The school has had no difficulty handling the amounts of paper generated.

Obstacles: Program is running smoothly. Occasional retraining and oversight is necessary especially with the K-3 grades to make sure proper separation of recyclables is happening.

Successes: School is pleased with current recycling rate. The donated paper bags showed that local businesses were willing to support school recycling efforts. The amount of paper being recycled has been constantly growing.

Initial Investment: \$300 was spent on plastic bins for all classrooms and offices. No-cost alternatives such as plastic pails could have been used. The Center for Ecological Technology (CET) assisted in the recycling project through a grant from the United States Department of Agriculture (USDA) Rural Development Project.

Promotion: Parent volunteers and teachers did demonstration presentations in each classroom to show the students what, and how, to recycle.

Educational Tie-In: The school had classroom presentations and several of the teachers have incorporated environmental and recycling topics into their lesson plans.

Case Study #2 Collection by a Waste Hauler

School:	Brockton High School Brockton, Massachusetts	Contacts:	Robert Tilly Science Office Brockton High School Brockton MA, 02401 508-580-7626
Grades:	9 - 12, 3,100 students		Pat Murphy Waste Management 800-287-6683

RECYCLING AT A GLANCE

Materials Collected:

- ✓ White Paper
- ✓ Computer paper
- ✓ Newspaper
- ✓ Old text books

Collection Method:

- ✓ Student volunteers and Ecology Club Members collect the paper and bring it to containers stored at the school's loading dock

Equipment Used:

- ✓ Wheeled Hampers
- ✓ Toters

Storage:

- ✓ Hampers and toters are stored indoors near the loading dock

Areas Serviced:

- ✓ All classrooms
- ✓ Most administrative areas

Tonnage Diverted:

- ✓ Year 1: 9000 lbs. Year 2: 12,000 lbs. Year 3: 25,000 lbs

Successes:

- ✓ Students raised money for the school, tee shirts
- ✓ Students earn community service credits

Obstacles:

- ✓ Contamination due to lack of education about what can be recycled

Initial Investment:

- ✓ None as long as school meets minimum requirement of 600 lbs./ month

Promotion:

None Known

Classroom Tie-In:

- ✓ None, but there is an after school club (The Ecology Club)

Case Study #2 (continued)

Recycling History: In 1992, Bob Tilly, a teacher in the science department, was also on a town solid waste committee and convinced the high school's principal to let him start a school recycling program. He was also given the go ahead to start an after school club called The Ecology Club. This group, which now has 12 members as well as a number of other student volunteers comprises the "BHS Recycling Team", which is primarily responsible for the operation of the school's recycling program. Mr. Tilly was also assisted in the early stages of program development by representatives from the school's waste hauler, Waste Management, Incorporated.

Collection Method: Each classroom is equipped with a specially marked, box-sized container for waste paper. Students and staff place their waste paper in these containers as is necessary. On a regular basis, students on the "BHS Recycling Team" go to each classroom to collect paper from these small "curbside" type containers. This material is transported to the loading dock area and dumped into toters. The toters are then emptied by Waste Management on an as needed basis. Mr. Tilly and his students also have cleaned out storage areas of old and out-dated text books. The students strip the covers and place the remaining scrap paper in hampers provided by the hauler.

Equipment Used: Since Brockton High School is able to meet their hauler's minimum collection requirement of 600 pounds per month, all of the equipment necessary for the recycling program is provided for free by the hauler. Currently the school uses 96 gallon toters and 18 bushel hampers in their storage area. Cardboard box sized containers are used in the classrooms.

Storage: An area inside the school, near the school's loading dock, has been set aside for use in the recycling program.

Obstacles: The biggest obstacle for the school to overcome has been proper compliance. Due to a general lack of understanding about the recycling program guidelines, the classroom containers have at times been contaminated with unwanted material. The undesirable task of sorting out these items so that the paper is acceptable to the hauler then falls to the recycling team's students.

Successes: As with many endeavors, success is measured in dollars. The high school is able to sell its waste paper to its hauler. The money earned from the program is returned to the school. For example, the students involved in the program have purchased tee shirts that identify them as the BHS Recycling Team"

Case Study #3

Collection by a Private Recycler

School:	Marblehead School System Marblehead, Massachusetts	Contacts:	Wayne Attridge Marblehead Board of Health 781-631-0212
Grades:	K - 12 (7 schools, 2700 students)		Kathy Whalen North Shore Recycled Fibers 978-744-4330

RECYCLING AT A GLANCE

Materials Collected:

- ✓ Sorted, mixed office waste
 - white paper
 - colored paper
 - glossy paper
 - manila folders
 - computer paper
- ✓ Newspapers, magazines

Collection Method:

- ✓ Students and staff place paper in desk-side containers
- ✓ Special needs students collect paper in poly-propylene bags
- ✓ Special needs students sort and separate paper
- ✓ Janitors dump sorted paper in outside storage container

Equipment Used:

- ✓ 14 quart desk-side containers
- ✓ Polypropylene collection bags
- ✓ 8 cubic yard dumpsters (1 at each school)

Storage:

- ✓ Half of the special needs classroom is devoted to accepting and separating paper
- ✓ Paper is stored for collection outside in 8 cubic yard dumpsters
- ✓ The dumpsters are locked and are placed near the rubbish dumpsters

Successes:

- ✓ Program provides skills to special needs students
- ✓ Program enjoys a high participation rate.
- ✓ Marblehead Board of Health was fully supportive

Obstacles:

- ✓ Training the special needs students to sort materials
- ✓ Finding space for indoor sorting

Initial Investment:

- ✓ Small investment in collection bags.

Promotion:

- ✓ Kick-off presentation in school auditorium
- ✓ Training session for special needs students
- ✓ Poster and flyers announcing the program

Classroom Tie-In:

- ✓ Recycling is supported by the curriculum

Tonnage Diverted: ✓ 2 - 3 tons per month

Case Study # 3 (continued)

Recycling History: Early attempts at recycling in the Marblehead School System were unsuccessful. Originally the schools brought scrap paper to a nearby waste paper recycling facility (North Shore Recycled Fibers in Salem). Unfortunately, the recycling program was under-promoted and participation lagged. Shortly thereafter the program was scrapped. In 1995, when the paper market strengthened, North Shore approached the school system with a new plan for recycling. This new plan featured the use of special needs students within the schools as collectors and sorters of mixed waste paper. Both the Marblehead School System and the Board of Health approved the new plan and North Shore now collects 2 to 3 tons per month of paper from the 5 schools.

Collection Method: Each classroom and administrative office in the Marblehead schools has at least one 14 quart desk-side container for scrap paper. Students and staff place their waste paper in the containers as it is generated. Students in each school's special needs class collect the paper from the classrooms and offices by emptying the desk-side containers into a polypropylene collection bag. The bags are carried back to the special needs classroom where the contents are dumped onto the floor for sorting. The students sort out contaminants and place the clean paper into large cardboard boxes. The janitorial staff then bring these boxes to the dumpster outside. The outdoor dumpsters are emptied on an as needed basis.

Equipment Used: The 14 quart desk-side containers used in the schools were supplied by North Shore Recycled Fibers. The polypropylene collection bags were purchased from North Shore by the school system. The 8 cubic yard dumpsters used at each of the schools were provided by North Shore.

Storage: Finding a place to sort and store paper was not easy. Eventually, it was agreed that half of the special needs classrooms at the 5 schools in the district would be used for this purpose. Once the paper is separated, the paper is stored outside in locked dumpsters until it is collected by the vendor.

Obstacles: Locating and agreeing on a suitable storage and sorting area was a difficult hurdle for this program. Once other program pieces were in place, the task of training the special needs students on the particulars of what was acceptable and unacceptable for recycling was challenging, but successful.

Successes: The Marblehead School System recycling program enjoys a high level of participation. This is the result of top down support for the program, the creative use of school resources (i.e. special needs classes), and promotion of the project at a school wide assembly. The program also offers the special needs students a chance to interact with the student body and an opportunity to learn life skills, such as responsibility, following directions, and being organized. It has been noted that there is also a degree of empathy for the special needs students; teachers and students alike therefore go out of their way to make things as easy as possible for the students doing the collecting and sorting.

Initial Investment: The dollar amount of the school system's investment in collection bags was not obtained, but was described as being "small". The rest of the equipment was donated by the recycling vendor as were the training session with the collection teams, the school wide assemblies and posters.

Promotion: The promotion of this recycling program is one of the keys to its success. The recycling vendor provided staff to conduct a training session for the student collectors as well as personnel to conduct a school-wide assembly where the recycling program was introduced and explained. The vendor also supplied posters for bulletin boards and hallways that gave the program a high degree of visibility.

Case Study # 4

Collection by a Non-Profit Organization

School:	Kennedy Middle School Woburn, MA	Contacts:	Joseph Ricardelli Kennedy Middle School 10 Middle Street Woburn, MA 01801 781-937-8230
Grades:	6 - 8, 600 students		Georgann Funke Earthworm, Inc. 617-628-1844

RECYCLING AT A GLANCE

Materials Collected:

- ✓ White paper
- ✓ Mixed paper
- ✓ Newspaper

Collection Method:

- ✓ Students and staff place scrap paper in boxes
- ✓ Students in the "Builders Club" collect the boxes weekly and dump the contents into barrels.
- ✓ Barrels are brought to school lobby on day of collection by the coordinator

Equipment Used:

- ✓ Cardboard boxes in each classroom
- ✓ Seven, 34 gallon barrels

Storage:

- ✓ Barrels are stored in copy rooms and some classrooms

Areas Serviced:

- ✓ All classrooms
- ✓ All administrative areas

Tonnage Diverted:

- ✓ 3,000 lbs./year

Successes:

- ✓ Participation has increased significantly in the year old program
- ✓ Growing awareness of the importance of recycling

Obstacles:

- ✓ Informing staff and students
- ✓ Keeping other materials out of the paper

Initial Investment:

- ✓ None

Promotion:

- ✓ Faculty meeting presentations
- ✓ P.A. announcements by principal
- ✓ Statement prepared by hauler detailing resources saved by the program are posted around the school

Classroom Tie-In:

- ✓ Worm bin in science class supports the general concept of recycling

Case Study #4 (continued)

Recycling History: In 1994, Dennis Donoghue, a special needs teacher at Kennedy Middle School, decided to initiate a white paper recycling program simply to do the right thing. A local non-profit recycling company, Earthworm, Inc., was contacted to give assistance in setting up and implementing the program. Mr. Donoghue utilized an existing group of students known as the "Builders Club" to run the recycling program. The Builders Club has approximately 25 members that are responsible for various tasks that crop up around the school. This program is maintained entirely by students and one teacher with no custodial involvement. In 1996 Mr. Joseph Ricardelli, the geography teacher, took on the leadership role for the program.

Equipment Used: Empty, cardboard copy paper boxes are free and provide a convenient way of collecting paper in rooms throughout the school. Seven, 34 gallon wheeled barrels are loaned to the school by Earthworm.

Collection Method: The cardboard boxes are located in all classrooms and administrative offices. It is the responsibility of the students and staff to sort their paper and put only white paper into the boxes. On a set schedule (approximately every week), the Builders Club goes from room to room collecting the boxes. These boxes are then emptied into the larger more centrally located 34 gallon barrels. As they dump the contents of each box, the students get one final chance to check for contamination by unwanted materials. Once the barrels are full, the contact at the school telephones Earthworm. Because there is no loading dock, on the morning of the pick-up the barrels are brought to the front lobby by the students.

Storage: Since there is no designated recycling room or storage area, the 34 gallon barrels are kept in several locations. One is near the copy machine and the other six are divided between two classrooms. Fortunately, there is ample room in the lobby area for all the barrels to be gathered on the day of the pick-up.

Obstacles: The main obstacle for the program to overcome was the ongoing problem of contamination. It takes a lot of effort on the part of the coordinator and the "Club" to keep out undesirable items.

Successes: Participation is gradually increasing. Mr. Ricardelli says that while participation is not 100%, they are definitely reaching the majority of people in the school with the recycling program. He says the kids are learning to think before they throw something away. Also, he has noticed that when the barrels are gathered in the lobby waiting to be collected, everyone is impressed by the amount of material they have accumulated. Some weeks Mr. Ricardelli has found that his trash bin is empty just because they have diverted so much material through reduction.

Initial Investment: None. The cardboard copy paper boxes are readily available and reusable. The wheeled barrels are on loan from the hauler. There is no collection fee since only white paper is recycled.

Promotion: When students do their weekly locker cleanout, the principal makes announcements over the P.A. system, reminding them to recycling.

Educational Tie In: There is not a structured educational tie-in for the recycling program. Mr. Ricardelli believes, however, that the students are really learning about the impact of their actions. The worm bin in his classroom has, on the other hand, become a definite educational tool. It was brought to their school three years ago by Josh Nelson of Beaver River Associates in Kingston Rhode Island. Mr. Nelson was invited to do a presentation on worms and the bin has been thriving ever since. Because all the students have to go through Mr. Ricardelli's class at some point, no one misses an opportunity to learn about the worm bin. In the next year, the school is looking to start a larger composting project that will tie in with plans to refurbish the school grounds.

Case Study #5

Collection Through a Town's Contracted Recycler

School:	Bowen Elementary School Newton, Massachusetts	Contacts:	Barbara Herson Recycling Coordinator, DPW 124 Plainfield St. Newton MA, 02401 617-796-1016
Grades:	K - 5, 400 students		Patricia Kelly, Principal Bowen Elementary School 280 Cypress Street Newton Center, MA 02159 617-552-7361

RECYCLING AT A GLANCE

Materials Collected:

- ✓ Mixed paper
- ✓ Commingled containers (glass, plastic, metal)
- ✓ Aseptic packaging

Collection Method:

- ✓ 5th grade students bring materials from classrooms to centrally located bins
- ✓ Custodians bring bins to outside dumpsters for collection by the hauler

Equipment Used:

- ✓ One, 4 wheeled dolly to pick up boxes
- ✓ Two 96 gallon toters
- ✓ Curbside bins in the classrooms
- ✓ One 6 yard dumpster

Storage:

- ✓ Curbside boxes are stored by the teacher's desk
- ✓ Toters are stored in one custodial area

Areas Serviced:

- ✓ All classrooms
- ✓ Most administrative areas

Successes:

- ✓ Program builds upon recycling in the home
- ✓ Diversion of waste

Obstacles:

- ✓ Rules were unclear at first
- ✓ Loss of parking spaces
- ✓ Keeping mix clean

Initial Investment:

- ✓ None by school

Promotion:

- ✓ Announcements by teachers
- ✓ Posters on bulletin boards
- ✓ School assembly with the city sponsored message by the coordinator

Classroom Tie-In:

- ✓ DPW Recycling Coordinator is available to schools for logistical assistance

Tonnage Diverted: ✓ 15 tons per year

Case Study #5 (continued)

Recycling History: Recycling was new to the Bowen school although there had been some individual efforts by teachers to collect scrap paper in their classrooms. Establishing an official recycling program was not a difficult stretch since the school has a tradition of high environmental awareness. The Bowen School has developed a unique nature trail with the cooperation of neighbors, students and parents.

Collection Method: Curbside collection bins are placed in every classroom. Students empty these bins into centrally located 96 gallon toters. Custodians then empty the toters into a 6 cubic yard dumpster in the rear parking lot. The hauler, chosen through a bid process to service the town's recycling needs hauls the paper to a nearby processing facility.

Equipment Used: The city, through its contract with a hauler, supplies 16 gallon plastic curbside collection boxes for classrooms and office areas, two, 96 gallon toters, and 1 six cubic yard dumpster.

Storage: One toter is placed on each floor of the building. A six cubic yard dumpster is in an adjacent parking lot.

Obstacles: There is very little space to store the six cubic yard container. In fact, two parking spaces have been "re-allocated" so that they can be used for this large outdoor container. The neighborhood has also had some vandalism problems.

Successes: There is enthusiasm for expanding the program to include composting with several small backyard bins, and interest in institutionalizing aluminum can collection.

Initial Investment: All expenses associated with the recycling program are assumed by the City of Newton DPW. The school assumes any costs associated with any extra custodial labor in handling the materials.

Promotion: Teacher workshop, classroom presentations, an Earth Day event, and on-site consultation were offered as support. The kick-off of the program was publicized with posters and media attention at the city level.

Educational Tie-In: Several teachers in the Newton Public School System have participated in classroom presentations and teacher workshops. The classroom materials demonstrated in these activities are now used and support the school's recycling program.

Case Study #6

On-Site Composting of Food Waste

School:	Pelham Elementary School Pelham, Massachusetts	Contacts:	Rena Moore, Principal Amherst Road Pelham, MA 01002 413-253-3595
Grades:	K - 6, 250 students		

COMPOSTING AT A GLANCE

Materials Composted:

- ✓ Food waste from lunch room
- ✓ Leaves from Town

Compost Technique:

- ✓ Multi-bin system with weekly bin turning by adult volunteers.

Equipment Used:

- ✓ Backyard compost bins
- ✓ Pitch fork
- ✓ 20 gallon plastic barrel
- ✓ Child size mixing tools
- ✓ Use of school tools

Areas Serviced:

- ✓ School cafeteria

Collection:

- ✓ All students divert their food scraps
- ✓ Two students bring scraps outside, mix them with leaves and put them into the compost bin

Pile Maintenance:

- ✓ Turned weekly by 2 adult volunteers

End-Use:

- ✓ School grounds and classroom planting experiments

Successes:

- ✓ Community service
- ✓ Science projects
- ✓ Solid waste diversion

Obstacles:

- ✓ Initial odor problems

Promotion:

- ✓ School-wide training
- ✓ Posters, announcements
- ✓ Local newspaper
- ✓ Recognition ceremony

Educational Tie-In:

- ✓ Composting covered in classroom coursework

Initial Investment:

- ✓ \$50 plus donations for compost equipment

Start Date:

- ✓ December 1994

Tonnage Diverted:

- ✓ 5 to 6 cubic yards/year

Case Study #6 (continued)

Composting Technique: Each day, 2 students assist in separation of lunchroom food waste for approximately 125 students and staff. These 2 students record daily the amount of food waste collected in their 20 gallon barrel by using gallon calibrations on the side of the barrel. At the end of the lunch period, the 2 students, known as the "composting crew", mix leaves and food waste in a 2:1 ratio. Once the food waste and leaves are thoroughly mixed in a barrel, they are emptied into the compost bin. While at the compost bin, the crew records the temperature of the pile with a probe thermometer. The 2 students return to the school building, remove their protective clothing (rubber gloves and aprons), record the data they have collected and catch the tail end of recess.

Equipment Used: Three to four, 1 cubic yard backyard compost bins, 1 pitch fork, one 20 gallon barrel, child size turning/mixing tools (i.e., long handled hoe or pitch fork), rubber gloves, aprons, plastic trash bags, compost screen.

Areas Serviced: School cafeteria

Collection: Each student brings his or her lunch tray to a station in the lunchroom where 2 students separate the food waste from the trash. The Amherst DPW delivers leaves to the school for use in the program.

Maintenance: Students perform daily mixing of food waste and leaves; adult volunteers turn piles weekly; custodian shovels out paths to bins and around bins in winter; students, teacher, adult volunteers and DPW staff perform compost screening

Successes: Students are actively involved in a fun and useful project, food waste and leaves are composted, compost is used in landscaping projects on school grounds and in school-wide science projects.

Obstacles: The main problems are odors if the pile is not maintained properly and the turning of the piles is dependent on adult volunteers.

Promotion: Posters, assembly, and announcements in school, article in Amherst Bulletin (local newspaper), recognition ceremony.

Educational Tie-In: Students in Jean Miller's 5th grade class took the leadership of this project as a "U.S. Contemporary Problems Unit" and have been commended by the school and town for their community service effort.

Initial Investment: An outlay of \$50 covered the cost of the necessary equipment (a shovel and a pitch fork were loaned by the school and a teacher) The school was the beneficiary of staff time from the Amherst DPW and the Center for Ecological Technology (CET). CET's work in the school was funded by a grant from the United States Department of Agriculture.

End Use: Finished compost is used in school-wide science and landscaping projects.

Case Study #7

Collection of Food Waste by a Farmer or Other Composter

School:	Mark's Meadow School Amherst, Massachusetts	Contacts:	Ms. Lenore Carlisle Ms. Susan Vegiard Mark's Meadow School North Pleasant Street Amherst, MA 01002 413-549-1507
Grades:	K - 6, 200 Students		

RECYCLING/COMPOSTING AT A GLANCE

Materials Collected:

- ✓ Paper
- ✓ Corrugated cardboard
- ✓ Mixed containers
- ✓ Food waste
- ✓ Milk and juice cartons

Collection Method:

- ✓ Students and staff separate materials into appropriate containers
- ✓ Custodians bring containers to central collection site

Equipment Used:

- ✓ Color coded collection boxes in classrooms and offices are provided by the vendor
- ✓ 30 gallon barrels in cafeteria area provided by vendor
- ✓ Curbside totes and dumpsters provided by vendor

Storage:

- ✓ Color coded boxes in classrooms and offices for paper
- ✓ Mixed containers collected in totes in the hallways
- ✓ Food waste and cartons from cafeteria collected daily in barrels

Areas Serviced:

- ✓ Classrooms, offices, kitchen and cafeteria

Successes:

- ✓ Increased awareness
- ✓ School wide participation
- ✓ Hauling services improved
- ✓ Hauling costs reduced

Obstacles:

- ✓ Custodial responsibilities increased

Initial Investment:

- ✓ Classroom time to prepare presentation for school wide instruction
- ✓ Videotape

Promotion:

- ✓ In school announcements
- ✓ Student's posters
- ✓ Video tape showing new system
- ✓ Banner and signs in collection areas
- ✓ Article in local area paper
- ✓ Memo sent home
- ✓ Parade

Classroom Tie-In:

- ✓ Ms. Vegiard's class studied solid waste and recycling issues and prepared information for school-wide training

Case Study #7 (continued)

Recycling History: In November, 1994 a student teacher for Ms. Vegiard's second grade class requested recycling information from the Town of Amherst Recycling/Solid Waste Coordinator with an intent to prepare a two week recycling unit. Meanwhile, a School-Waste Management And Recycling Team (S.M.A.R.T.) program was operating at Amherst Regional High School as a pilot project for diverting food waste from the school cafeteria's waste stream. An intern from the high school S.M.A.R.T. program worked with Ms. Vegiard's class on a study of recycling and helped the class get the concept started at Mark's Meadow.

Collection Method: Recyclables from Mark's Meadow School are brought by a private hauler to the University of Massachusetts Waste Management site. The program collects materials in accordance with the university's recycling center policies. Paper is placed by students, teachers and staff into blue and green boxes placed in classrooms and offices throughout the building. Cardboard is recycled along with the paper. Commingled containers (glass, plastic, metal) are deposited in red barrels in the hallways. Food waste and milk/juice cartons are placed in separate barrels by the students as they return their trays and silverware after eating. These barrels are located in the hallway that services the kitchen. Custodians empty the blue and green classroom boxes into wheeled toters. All of the wheeled containers are then rolled to a central pick up site for collection.

Food waste that is collected in the cafeteria is picked-up on a daily basis by a local farmer who composts the material. The school was introduced to the farmer by the S.M.A.R.T. intern and the Municipal Recycling Coordinator. The farmer also uses some of the school's empty milk cartons as pots for starting seedlings that he later sells locally.

Equipment Used: Blue, green, and red boxes were provided by the Office of Waste Management at the University of Massachusetts. Barrels for collecting food waste and cartons are provided by the farmer who picks up daily.

Storage: The central storage area for paper, commingled containers and food waste is outside of the building near the trash containers. This spot is accessible by the university collection truck.

Obstacles : Teachers and students rely entirely upon custodial staff to move materials to the central collection area. Ongoing education of students and staff is required to maintain proper separation of materials. Despite good promotion efforts there is a fluctuation in participation rates.

Successes: Students actively participate in efforts to divert recyclables and food waste from the waste stream. Kitchen staff are very supportive and willingly participate in the recycling program. Trash hauling costs for the school are reported to have been reduced as a result of the waste diversion program.

Initial Investment: Blue, green, and red boxes were necessary to participate in the University of Massachusetts Recycling Program. Through grant funding and matching funds from the University Maintenance and Operations Department, an intern was hired to coordinate the set up and implementation of the S.M.A.R.T. program.

Promotion: The intern coordinated distribution of announcements throughout the school community, and recruited students to create posters and other displays. Students prepared instructional programs for the school population. The intern provided town-wide publicity for the start up of the program.

Educational Tie-In: Teachers were provided with solid waste/recycling and S.M.A.R.T. program information, and it was suggested that the information be incorporated into class lessons. Posters were displayed near and around the main office and kitchen hallway to provide students with specific recycling information. A "University of Massachusetts Office Recycling Guidelines" poster was provided for each classroom and office.

APPENDIX A.
OTHER HELPFUL RESOURCES

A. OTHER HELPFUL RESOURCES

Environmental Organizations

Regional (West)

Center for Ecological Technology (CET)
112 Elm Street
Pittsfield, MA 01201
413-445-4556

Center for Ecological Technology (CET)
26 Market Street
Northampton, MA 01060
413-586-7350

or

Marie Jose Iken (individual)
School Composting Consultant
P.O. Box 291
Conway, MA 01341
413-369-4902

Regional (Central)

Fundamental Action to Conserve Energy (FACE)
75 Day Street
Fitchburg, MA 01420
978-345-5385

Regional Environmental Council
Box 255
Worcester, MA 01613
508-799-9139

Regional (East)

Earthworm, Inc.
35 Medford Street
Somerville, MA 02143
617-628-1844

Statewide

MassRecycle
25 West Street
Boston, MA 02111
617-338-0244

WasteCap of Massachusetts
376 Boylston Street
Boston, MA 02117
617-236-7715

Earth's 911
1-800-CLEANUP
www.cleanup.org

Applied Proactive Technologies, Inc. (APT)
1242 Main St.
Springfield, MA 01103-1954
1-800-278-7661
413-731-6546

Massachusetts Public Interest Research Group
(MassPIRG)
29 Temple Place
Boston, MA 02111
617-292-4800

Regional Solid Waste Districts

Carver-Marion-Wareham Regional Refuse District

Town Hall, 2 Spring Street, Marion, MA 02738
508-748-3550

Eastern Hampshire Refuse District

c/o Amherst Town Hall, Amherst, MA 01002
413-256-4050

Franklin County Solid Waste Management District

50 Miles Street, First Floor, Greenfield, MA 01301
413-772-2438

Greater New Bedford Regional Refuse Management District

Dartmouth Town Hall, Room 214, 400 Slocum Road, North Dartmouth, MA 02747
508-910-1800

Hilltown Resource Management Cooperative

P.O. Box 630, Williamsburg, MA 01096
413-268-3845

Martha's Vineyard Regional Refuse Disposal District

P.O. Box 2067, Edgartown, MA 02539
508-627-4501

Northern Berkshire Solid Waste Management District

18 East Street, Adams, MA 01220
413-743-8208

Southern Berkshire Solid Waste Management District

P.O. Box 235, Sheffield, MA 01257
413-229-3353

Regional Recycling Associations

Cape Cod Commission

Solid Waste Management Coordinator
3225 Main Street
Barnstable, MA 02630
508-362-3828

Central Massachusetts Resource Recovery Committee (CMRRC) Marketing Collective

Worcester DPW
20 East Worcester Street
Worcester, MA 01064
508-799-1430

Millis Consortium
Town Hall
135 School Street
Walpole, MA 02081
508-660-7320

North East Solid Waste Committee (NESWC)
530 Atlantic Avenue
Boston, MA 02210
617-443-1309

South Central Recycling Association of Massachusetts (SCRAM)
Regional Coordinator
27 Ashley Road
North Brookfield, MA 01535
508-867-9491

South Shore Regional Refuse Disposal Board Marketing Collective
Claire Sullivan
70 Tisdale Drive
Dover, MA 02030
(508) 785-8318
fax: (508) 785-2296

Western & Central Massachusetts Materials Recycling Facility Marketing Collective
DEP
436 Dwight Street
Springfield, MA 01103
413-784-1100 x 239

State Agencies

Department of Environmental Protection (DEP)
Consumer Programs – Residential and Commercial Waste Reduction Branches
One Winter Street – 9th Floor
Boston, MA 02108
617-556-1021
www.state.ma.us

Massachusetts Executive Office of Environmental Affairs (EOEA)
Regina McCarthy – Director of Waste Policy
251 Causeway Street
Boston, MA 02114
617-626-1040

Educational Materials

Recycling

Solid Waste Management Resource Guide: 1996 Update for Massachusetts Schools, 1996,
Massachusetts Department of Environmental Protection,
One Winter Street, Boston, MA 02108

An Educator's Resource Guide: Recycling and Solid Waste, 1990,
Earthworm, Inc., 35 Medford Street, Somerville, MA 02143

AVR Teachers Resource Guide for Solid Waste and Recycling Education,
Association of Vermont Recyclers, P.O. Box 1244, Montpelier, VT 05602

Pathways to a Sustainable Future: A Curriculum Guide for Maine Schools Exploring Waste Management Issues, Office of Waste Reduction and Recycling, Augusta, ME 04333

Composting

Bottle Biology, An Idea Book for Exploring the World Through Plastic Bottles and Other Recyclable Materials, 1993
The Bottle Biology Project, Department of Plant Pathology, University of Wisconsin
Kendall/Hunt, Dubuque Iowa

Composting Across the Curriculum, A Teacher's Guide to Composting, 1993,
Marin County Office of Waste Management,
10 North San Pedro Road, San Rafael, CA 94903

Composting Goes to School, Teacher's Guide, 1995,
Composting Council of Canada, 200 rue MacLaren St., Bureau 300
Ottawa, Ontario K2P 0L6

School Food Scrap Composting, Operations Manual, 1995,
Woods End Research Laboratory, Box 1850, Mt. Vernon, Maine 04352

Scraps to Soil, A How-To Guide for School Composting, 1995,
Association of Vermont Recyclers, P.O. Box 1244, Montpelier, VT 05601

Worm Composting

The Wonderful World of Red Wigglers (A Common Roots Guidebook),
Food Works Publication, 64 Main Street, Montpelier, VT 05062

Worms Eat My Garbage, 1982,
by Mary Appelhof, Flower Press, 10332 Shaver Road Kalamazoo, MI 49002

APPENDIX B.
OVERVIEW OF RECYCLING BENEFITS

B. OVERVIEW OF RECYCLING BENEFITS

The following information is excerpted from the "Solid Waste Management Resource Guide; 1996 Update for Massachusetts Schools" which is published by the Massachusetts Department of Environmental Protection and is available at the Statehouse Bookstore (617-727-2834).

A. Paper

Where does all of our paper come from?

Paper is produced from wood. About 35% of the world's annual wood harvest is used to produce paper and this share is expected to grow to 50% by the year 2000. It takes approximately 17 trees (roughly 3,700 pounds of wood) to make 1 ton (2,000 pounds) of paper. Fortunately, trees are a renewable resource; however, we are currently harvesting our trees faster than we are replacing them.

What are the benefits of recycling paper?

If we recycled half of the paper used in the world today, we would meet almost three-quarters of the demand for new paper and save millions of acres of forest at the same time. When left standing, forests help purify the air, provide essential wildlife habitat, and offer recreational opportunities to humans. Using waste paper instead of trees to manufacture new paper products also reduces water consumption by 60 percent and the generation of environmental pollutants by 70 percent. Recycling a ton of newsprint is equal to saving four 42 gallon barrels of oil. In addition, recycling paper extends the life of landfills by conserving valuable space.

B. Glass

Where does glass come from?

Glass is produced from minerals. Silica, more commonly known as sand, is the primary ingredient used in its production. Silica is the most common substance in the earth's crust, and although it is a nonrenewable resource, there is quite a large supply of it. It takes 1,330 pounds of sand, 433 pounds of soda ash, 433 pounds of limestone, 151 pounds of feldspar, and 15.2 million BTUs of energy to produce 1 ton of glass. Different colors of glass are produced by adding small amounts of other substances such as iron, copper and cobalt. Green glass, for example, is made by adding iron.

What are the benefits from reusing and recycling glass?

Using 1 ton of recycled glass will save 1.2 of raw materials and reduce mining wastes and other harmful by-products of glass production. It has been estimated that using 50 percent recycled glass in the manufacturing of new glass can reduce mining wastes by 79 percent, water consumption by 50 percent and air emissions by 14 percent.

C. Metal

What are the benefits of recycling metal products?

Pure aluminum cans are 100 percent recyclable. Using them to make new aluminum products can reduce energy consumption and air and water pollution by approximately 95 percent.

Compared with manufacturing steel from virgin materials, recycling steel can reduce energy consumption by 74 percent, air pollution by 86 percent, water use by 40 percent, water pollutants by 76 percent and mining wastes by 97 percent. For every ton of steel recycled, 2,500 pounds of iron ore, 1,000 pounds of coal, and 40 pounds of limestone are saved. Each year in the United States,

enough energy is saved through steel recycling to meet the electrical power needs of Los Angeles for 8 years.

The recycling of metals has increased dramatically in the past two decades. In 1970, only 3 percent of all metals in the United States were recycled. By 1990, 21 percent were being recycled.

D. Plastic

What are plastics made from?

Plastics are synthetic materials derived from petroleum and natural gas. At current consumption rates, world-wide reserves of accessible petroleum and natural gas are only expected to last for another 30 to 60 years.

What are the benefits of recycling plastics?

Manufacturing new plastic goods with recycled feed stock requires less energy than using virgin raw materials for the process. Making containers from recycled PET (Polyethylene Terephthalate) conserves approximately 76 million BTUs. Recycled PET is commonly used as fiberfill in pillows, jackets, sleeping bags, and automobile seats. Other uses include insulation, shower stalls, floor tiles, automobile bumpers, taillight covers and power tool housings.

What are the disadvantages of using plastic?

The production of plastic requires large quantities of crude oil and natural gas, and generates a significant amount of solid waste. In 1992, plastics accounted for approximately 528,000 tons of municipal solid waste in Massachusetts. Each day, millions of plastic products are discarded, and the potential energy embodied in them is wasted. Disposal of plastics can generate air pollution when burned in combustion facilities. For example, burning PVC (Polyvinyl Chloride) releases chlorine into the atmosphere, which can threaten human health. Plastic litter also threatens the health of many species of wildlife. It is estimated that plastic garbage (e.g. six pack rings, fishing lines and nets, plastic bags and utensils) commonly found in U.S. waters accounts for the death of thousands of marine mammals each year, including endangered turtles and whales.

APPENDIX C

GLOSSARY

C. GLOSSARY

aluminum: a light silvery-white metal made from bauxite ore that can be easily bent or crushed, but is highly resistant to oxidation (rust)

collector: an individual or company that picks up recyclable materials that have been set aside for recycling; also can refer to an individual or company that collects trash for disposal

commingled containers: glass, metal, bi-metal, and plastic containers mixed together

compost: decayed organic waste that has changed into humus

composting: the conversion of organic materials to humus by microorganisms; an effective solid waste management method for reducing the volume of the organic portion of the waste, including lawn clippings, leaves, kitchen scraps and manure

conservation: the planned management and wise use of natural resources to minimize their loss, exploitation, neglect and waste

consumer: a person who buys goods or services

contamination: an industry term used to refer to the sullyng, soiling and ruination of one material by another; when one recyclable material is mixed with another undesirable material, the recyclable material is thus considered contaminated

container: a vessel used to hold, protect, advertise or convey consumer products such as food, liquid or other loose materials, for example, jelly jars, aluminum cans, yogurt cups; a temporary storage bucket, bin or barrel used for the accumulation of recyclables prior to collection

decompose: to break down into constituent parts or basic elements; decomposition of organic waste materials by bacteria is an essential life process because it makes essential nutrients available for use by plants and animals

dumpster: a large, outdoor metal container that is designed to hold trash or recyclables until they can be collected; dumpsters are designed to be emptied into a garbage type truck through the use of a winch system

ecology: the scientific study of the relations of living things to one another and to their environment

ecosystem: a system made up of a community of living things and the physical and chemical environment in which they interact

environment: all of the conditions, circumstances, and influences surrounding and affecting the development or existence of living things

garbage: spoiled or waste food that is thrown away; generally defined as wet food waste and excludes dry material (trash); this term is often used interchangeably with the word trash

glass: a transparent, inorganic, non-porous, impermeable material produced by melting silica sand with limestone, with the addition of soda ash for strength and chemical durability

hauler: an individual or company that collects and hauls materials from one place to another

humus: organic material consisting of decayed vegetative matter; provides nutrients for plants and increases the ability of the soil to retain water

landfill: a large outdoor site for the controlled burial of solid waste by spreading it in layers and covering it with soil; new regulations for landfills call for special engineering techniques to reduce hazards to public health and safety

manufacture: to make new products from raw materials, especially on a large scale with machines

materials recycling facility (MRF): a facility where recyclables are sorted and processed for sale; The state's first MRF, serving four western counties, opened in Springfield in January 1990

natural resources: valuable, naturally-occurring items such as plants, animals, minerals, water, and air which are used by people to help make things such as energy, food, clothes, buildings, etc.

packaging: the wrappings, container, or sealing used to protect, identify and advertise a product

paperboard: a lightweight packaging or backing material that is made from various low-grade paper fibers such as newsprint; this material is used in the manufacture of cereal boxes, shoe boxes, pizza boxes, note pad backing, etc.

paper mill: a large, commercial facility that manufactures paper products from pulp; paper mills either buy pulp or make it themselves from wood, waste paper (recyclables) or other sources of cellular fiber

paper processing facility: a commercial, state or municipally run enterprise that accepts loose paper from collectors and bales it in preparation for shipment to paper mills

plastic: any one of many human-made materials consisting of carbon in combination with hydrogen, oxygen, nitrogen, and other organic and inorganic elements which are produced by polymerization, and which can be molded, extruded, or cast into various shapes and films

polyethylene: a common plastic used to make plastic bags (low density) and milk bottles (high density)

polystyrene: a common plastic used to make utensils, and in its expanded form, the packaging and serving material sometime referred to as "Styrofoam"

pulp: a soft, moist, sticky mass of fibers made of wood, straw, etc., and used to make paper and paperboard; the act of reducing fibers to a soft, moist, sticky mass.

recovery rate: the rate at which recyclable materials are recovered for reprocessing; is usually expressed in terms of a percentage of the total recyclable material available

recycler: an individual who sets materials aside for eventual recycling; an individual or company that collects materials that have been set aside for recycling; a company that remanufactures recyclables into similar or new products

recycling: using something over again; the collection and reprocessing of a manufactured material or waste product for reuse either in the same form or in the manufacture of the same or a different item

recycling center: a site where manufactured materials are collected and sold for reprocessing

recycling coordinator: a volunteer or paid staff person hired or appointed by a school, municipality, waste district or company to coordinate and oversee various recycling functions including educating, promoting, planning, monitoring, evaluating, and refining

refuse: a general term for solid waste materials or trash

repulp: to return previously manufactured paper products to a pulp form, usually for the purpose of manufacturing recyclable waste paper into new paper products

reuse: to extend the life of an item by repairing or modifying it, or by creating new uses for it

solid waste: all solid and semi-solid wastes, including garbage, rubbish, ashes, industrial wastes, demolition and construction debris, and household discards (appliances, furniture, equipment)

solid waste management: the controlling, handling, and disposal of all solid waste; one goal is to reduce waste to a minimum

specifications: the rules, guidelines, or requirements that manufacturers and recyclers use to guarantee a standard quality in the materials they accept

Styrofoam: a rigid polystyrene plastic that uses petroleum as a resource base (see polystyrene)

tipping fee: a charge to deposit waste in a landfill or transfer station, or to dump recyclables at a recycling facility

toter: a two wheeled, lidded, plastic container of either 64 or 96 gallons in size that is used to store recyclables or trash until collection

transfer station: an intermediate location used to collect and consolidate solid waste or recyclables, which are then taken elsewhere (for example, a distant landfill or market)

trash: material considered worthless, unnecessary, or offensive that has been discarded; generally defined as dry waste material, excluding food waste (garbage) and ash; this term is often used interchangeably with the word garbage

waste: anything that is discarded or not considered useful; the wanton act of discarding materials without regard to their value, reuse, or recycling

waxed cardboard: regular cardboard that has a waxy outer layer applied so that it can safely and easily be used to package and transport produce, fish or other non-dry items

yellow cardboard: an industry term referring to low quality cardboard that is identified by its yellowish tint; this material is usually originates in Asia

APPENDIX D
PLANNING CHECKLIST BY MATERIAL

D. Collection and Storage Options

Equipment

- ✓ Boxes, wastebaskets or curbside type containers in classrooms
- ✓ Deskside boxes or containers in administrative areas
- ✓ Barrels or totes (34, 65 or 98 gal wheeled containers) in areas of high generation like near copy machines
- ✓ Larger containers such as hampers, totes, and barrels are used to hold the paper until pick up
- ✓ Most of the equipment can be provided by the recycler for either for free or on a rental basis

Internal collection

- ✓ Students and staff recycle into nearest container
- ✓ Designated students or staff empty classroom containers into storage containers
- ✓ Storage containers, if spread about the school, are brought to central storage by custodians or students

Storage

- ✓ A site within the building that is large enough to handle the minimum amount the recycler will ask you store is required
- ✓ Central storage site should be near a loading dock or other area convenient for the recyclers and custodians
- ✓ Storage site should not block egress or violate other fire and safety codes.

Minimums

- ✓ None if you are bringing this paper to a local drop-off center
- ✓ Recyclers will specify the amount of paper they need you store before they will come to pick it up
- ✓ The minimums may vary depending upon the grade of paper you are recycling
- ✓ Expect to store at least 1,000 lbs. of white paper for a free pick up

Hauling

- ✓ Volunteers bring paper to local drop-off
- ✓ School department brings paper to local drop-off
- ✓ Trash hauler collects recyclables as part of rubbish contract
- ✓ Separate, private recycler picks up materials for recycling
- ✓ Non-profit organization picks up materials as a way of supporting their cause

Costs

- ✓ Volunteer time and energy
- ✓ White paper can be picked up for free if minimums are met
- ✓ Colored or mixed paper may have a pick up fee
- ✓ Toters or other equipment may carry a rental charge
- ✓ Payment for paper is possible, though unusual, if minimums are met

Benefits

- ✓ 17 trees are spared for every ton of paper recycled
- ✓ Making paper from scrap paper is a cleaner process than making paper from wood pulp
- ✓ The waste paper business in Massachusetts supports 12,000 jobs
- ✓ Recycling can save your school money through avoided disposal costs
- ✓ Students see practical application of resource conservation

CARDBOARD

Equipment

- ✓ Wheeled dollies or carts to bring cardboard to storage container
- ✓ Outside dumpster or compactor to store cardboard
- ✓ Hampers for cases where internal storage of cardboard makes sense
- ✓ Wooden pallets for instances where strapping flattened cardboard to a pallet makes sense

Internal collection

- ✓ Cafeteria workers set aside cardboard for pick up by custodians
- ✓ Custodians flatten cardboard
- ✓ Cardboard is placed in or on storage container

Storage

- ✓ A central storage site must be identified
- ✓ Cardboard is usually stored outside in a dumpster until pick up by a recycler
- ✓ If storing the cardboard in hampers or strapped to pallets, find an indoor storage site that is large enough to handle the minimum amount the recycler will ask you store
- ✓ Central storage site should be near a loading dock or other area convenient to custodians and recyclers
- ✓ Storage site should not block egress or violate other fire and safety codes

Minimums

- ✓ None, if you are bringing this material to a drop off site yourself
- ✓ Recyclers will specify the amount of cardboard they need you store before they will come to pick it up
- ✓ The minimums may vary depending upon the hauler, but usually are around 3 cubic yards

Hauling

- ✓ Volunteers bring cardboard to local drop-off
- ✓ School department brings cardboard to local drop-off
- ✓ Trash hauler collects cardboard as part of rubbish contract
- ✓ Private recycler picks up cardboard

Costs

- ✓ Pick up charges are to be expected for cardboard
- ✓ Rental fees for dumpsters, compactors are the norm
- ✓ Flattening requires time and energy

Benefits

- ✓ Recycling cardboard saves trees.
- ✓ Recycling cardboard can save your school money

COMMINGLED CONTAINERS

Equipment

- ✓ 65 or 98 gallon totes are usually supplied by the recycler
- ✓ Other suitable containers if you are bringing this material to a local drop-off center

Internal collection

- ✓ Containers are collected in food prep areas
- ✓ Containers are collected in the lunch and staff rooms
- ✓ Containers are rinsed and de-lidded
- ✓ Custodian or students brings containers to central storage

Storage

- ✓ A central storage site must be identified
- ✓ If using a recycler, find a site that is large enough to handle the minimum amount the recycler will ask you store
- ✓ Central storage site should be near a loading dock or other area convenient to custodians and recyclers
- ✓ Storage of commingled bottles and cans is best if outside

Minimums

- ✓ None if you are bringing this material to a drop off site yourself
- ✓ Recyclers will specify the amount they need you store before they will come to pick it up
- ✓ The minimums may vary depending upon the hauler, but three 90 eight gallon totes is a good estimate

Hauling

- ✓ Volunteers bring cardboard to local drop-off
- ✓ School department brings cardboard to local drop-off
- ✓ Trash hauler collects cardboard as part of rubbish contract
- ✓ Private recycler picks up cardboard
- ✓ Non-profit organizations collect redeemables as a fund-raiser

Costs

- ✓ Pick up charges are to be expected for commingled containers
- ✓ Rental fees for totes are not uncommon
- ✓ Staff time in rinsing and preparing bottles and cans

Benefits

- ✓ Recovered glass, aluminum, tin and plastic are important feed stocks for manufacturers
- ✓ Recycling metals and glass reduces the impact of mining operations
- ✓ Recycling in the school compliments recycling in the home
- ✓ Recycling bottles and cans saves your school money

EXPANDED POLYSTYRENE (Styrofoam)

Equipment

- ✓ Heavy duty bags for collecting plastic utensils
- ✓ Suitable containers for stacking used polystyrene food trays
- ✓ Some equipment may be provided by the recycler

Internal collection

- ✓ Materials are sorted in the lunch and staff rooms as they are discarded
- ✓ Styrofoam products are rinsed
- ✓ Custodian or students brings containers to central storage

Storage

- ✓ A central storage site must be identified
- ✓ Find a site that is large enough to handle the minimum amount the recycler will ask you store
- ✓ Central storage site should be near a loading dock or other area convenient to custodians and recyclers
- ✓ Outdoor storage of used polystyrene is best

Minimums

- ✓ Recyclers will specify the amount they need you to store before pick it up is possible

Hauling

- ✓ Separate, private recycler picks up polystyrene

Costs

- ✓ Pick up charges for polystyrene are high relative to other recyclables
- ✓ Staff time in rinsing and handling
- ✓ If not compacted, the material is voluminous and takes up space

Benefits

- ✓ Recovery of polystyrene extends the life span of petroleum based material
- ✓ Recovered polystyrene is easily recycled into new disposable products
- ✓ Recycling polystyrene is environmentally superior to landfilling

FOOD WASTES (This overview combines both on-site composting and collection by farmers.)

Equipment

- ✓ Thirty four gallon wheeled barrels lined with plastic bags for use in food prep areas
- ✓ Five or ten gallon plastic tubs for lunch rooms
- ✓ Wheeled cart for transporting food waste to outdoor compost site
- ✓ Outdoor "backyard type" composting vessel (available through DEP) or,
- ✓ Self made compost bin
- ✓ Pitchfork or spade
- ✓ Heavy duty thermometer
- ✓ Wheel barrow

Internal collection

- ✓ Food waste is placed in containers as it is generated in the food prep areas
- ✓ Food waste can be collected as it is generated in the lunchrooms
- ✓ Student monitors oversee lunchroom food waste diversion
- ✓ Custodian or students brings food waste to outdoor compost site or pick up spot by composter

Storage

- ✓ An outdoor compost site away from the building must be identified
- ✓ If you are having your food scraps collected by a farmer or other composter, a suitable outdoor storage area that is large enough to hold the minimum amount required for pick up, must be identified

Maintenance

- ✓ Compost piles need to be maintained in order to be successful
- ✓ Maintenance includes checking and turning the pile
- ✓ Finished compost should be removed from the composter, as it is ready, for use on the school grounds

Hauling

- ✓ Local farmer or other composter collects food waste from the school at an agreed upon interval

Costs

- ✓ The school will have to purchase the necessary equipment to compost or set aside food for farmers or other composters
- ✓ Staff time in coordinating and maintaining compost site

Benefits

- ✓ Educational opportunities surrounding composting are enormous
- ✓ Schools that generate a significant amount of food waste can save money through composting
- ✓ Compost can be used on the school grounds or in gardening projects