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Recreation Site Recycling Guide



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San Dimas, California**

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Figure 1. Throwing it all away!

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1. INTRODUCTION

Purpose

The purpose of this guide is to provide outdoor recreation managers with a “how to” information guide to assist in the planning, design and implementation of a successful recycling program.

The diverse and specialized nature of outdoor recreation activities requires a clearly focused vision to carry out a recycling program. Collecting and handling solid waste over large and often difficult to manage lands with few personnel and diminishing resources over long distances is a difficult job at best. By adding recycling to the task of collecting garbage the job becomes a more difficult challenge. The project will require feasibility assessments, planning and design, and aggressive implementation. Monitoring and program reviews will determine what changes may be needed at present and in the future.

Background

In these times of expanding populations and decreasing resources, solid waste management has become a serious issue in the United States. We are running out of places for our waste to go. Today, waste reduction, recycling, and re-use of our resources are important components of solid waste management.

Federal Agencies have been directed by Congress and the President through the Resource Conservation and Recovery Act (1976), and Executive Order 12873: Federal Acquisition, Recycling, and Waste Prevention Law (1993) to reduce waste, recycle, and buy products made with recycled materials.

In October 1990 Congress passed the Pollution Prevention Act, which established a national policy: “That pollution should be prevented or reduced at the source whenever feasible; pollution that cannot be prevented should be recycled in an environmentally safe manner whenever feasible; and disposal or other release into the environment should be employed only as a last resort?”

In addition, in 1995, the Department of Agriculture established department-wide guidance for recycling, waste prevention and acquisition of products with recycled content. Although these laws and directives provide official direction, the Forest Service is dedicated to waste reduction, recycling and buying recycled products because such actions are inherently part of the Forest Service mission: “Caring for the Land and Serving People”.

Forest Service customers expect no less than excellence in the service we provide and that includes providing a carefully orchestrated recycling program including waste management and recovery system that addresses the issue of good land stewardship.

Goals

1. Recover the maximum amount of waste that is introduced into the forest environment by all and convert it to a recyclable material resource rather than landfill stuffing.
2. Provide alternative recycling programs that can provide a resource recovery vehicle for all recyclable, reusable, and compostable materials.

3. Choose reusable, recyclable and recycled products and equipment for use on the forest.
4. Reduce the amount of waste brought into the forest by all that is harmful to the environment.
5. Encourage the use of earth friendly products instead that do not have a polluting effect on the environment.

Objectives

1. Establish a nationwide recycling program in all Forest Service recreation facilities where feasible.
2. Transfer technologies that will help in the planning and implementation of forest recycling programs.
3. Provide the best information, education and assistance to Forest Service customers to help implement recycling goals.



Figure 2. Recycling and trash four-in-one container, Chattahoochee NF, Georgia. **Photo by Rachel Schneider**

2. BACKGROUND

Is a Recycling Program Feasible?

Before any recycling program attempted, the first step should be to determine if recycling is possible.

A quick check of the local phone book should provide the names of commercial recyclers or service organizations that may be interested in handling the recyclables. The area generating the recyclables may be in such a remote location that the nearest recycler could be very far away. It is best not to attempt to establish a recycling program until a market for the recyclables has been determined. Remote areas may not be conducive to establishing a recycling program.



Figure 3. Typical materials recovery facility where recycled resources are sorted and recovered.

Who, What, Where, When, Why and How of Recycling

Who

Environmental Protection Agency (EPA) statistics show that on the average a person can generate up to four pounds of waste per day. This amount may vary depending on a person's activity but the fact still remains that in an average week, a family of four could generate 112 pounds of garbage.

With this statistic, it is easy to understand why every person who introduces solid waste into the forest environment needs to think about recycling. A recycling program should involve everyone who uses the National Forests. The local recycling coordinator is the person responsible for organizing



Figure 4. Recycling center at Chattahoochee NF, Georgia R-8.

and carrying out the recycling functions involving employees, visitors, partners, volunteers and concessionaires and other varied groups.

What

Today much of the garbage brought into National Forests can be recycled if the proper program is in place to assist visitors with a clearly visible, easy-to-use recycling system.

All waste resource materials have a certain amount of recycled value. Resource materials such as cardboard, paper, plastics, and glass and metal containers (especially aluminum) are generally the most sought after products for profit. In most states drink containers of all types have a deposit value added to them to encourage the public to return the items back to the stores or to a local recycling center. Visitors to National Forest facilities bring with them a wide variety of recyclable products that are often hauled to a landfill. These items may include food packaging products and containers, cardboard boxes and other miscellaneous manufactured items. These items often contain a mixture of cardboard, paper, metal, glass, plastics and varied organic materials.

Where

Once the determination has been made that recycling is feasible on a local level and you have a market for the waste resources, you can review sites where a recycling program can be implemented.

Recycling can be successful at several locations including administrative sites, field offices, and at any recreation site, especially sites that currently have waste containers and regular garbage collection.



Figure 5. Steel cans can be remanufactured into many new products.



Figure 6. Plastics and aluminum cans are sorted and recycled into new products.



Figure 7. Glass jars can be reused or recycled.



Figure 8. Labeling is all that was required to convert this four-in-one container at the Chattahoochee NF, Georgia R-8.

When

The Forest Service and all other federal agencies have been mandated to recycle by Executive Order 12873. All regions within the Forest Service currently have regional recycling coordinators and recycling, in some regions, has been in place for many years. Campground and other types of recycling are newer concepts but more programs are being implemented everyday. Each Ranger District is different and unique in what it takes to carry out a recycling program; therefore each unit should implement a recycling program if it has been determined that a program is feasible and that a recyclables market is in place locally.

Why

The garbage being generated in the United States is increasing with the growth in the nations population. The most important impact that can be made in the solid waste life-cycle is to reduce and recycle the garbage that is generated by ourselves and our customers. The "throw-away" life-style has contributed greatly to the tremendous increase of solid waste. A lunch trip to any fast-food business can yield a full bag of paper, plastic, and cardboard wrapping materials. Food preservation, storage, and marketing strategies are some of the key reasons for the amount of packaging materials.

One of the most important reasons to recycle solid waste materials is pollution reduction. Recovered recycled materials save energy in the remanufacture of new recycled content products. Aluminum can be recycled many times at a much lower energy cost than the cost of processing raw aluminum. Cardboard can be remanufactured into many new products at a lower cost than using virgin pulp. Glass containers that are refilled a minimum of eight times can save three times the cost of energy to produce new throw-away bottles. Other benefits of recycling include reductions in water pollution, air pollution and lands pollution. The leachate, gaseous emissions and effluents are by-products of landfills. Also of concern are organic compounds and heavy metals like lead, mercury, cadmium some of these enter the waste stream in the form of batteries, solvents, paints, cleaners, vehicle fluids etc.

Simply put; we are running out of places to put our trash in this country, landfills across the US are closing up at an ever increasing rate with few alternatives for future landfill sites. With the reduction of places to landfill solid waste come increases in landfill tipping fees, in some places prices have gone up to ten times; this scenario basically follows the law of supply and demand. The ever increasing volumes of solid waste and

the reduction in landfill sites to put our garbage in guarantees an ever increasing rise in the cost of waste disposal.

How

After taking a critical look at the first two steps listed below a determination must be made to either abandon or proceed with implementation of a recycling program. If the decision is to proceed with the program, then regardless of the scope of the intended program the remaining five steps are needed.

Identifying markets for recycled products. The market is where you take your recyclable materials like; aluminum, steel, glass, paper, plastics etc.

Analyzing waste materials. This step will tell you what you have in recyclable materials and what you will ultimately decide you want to recycle based on what the markets will buy.

Planning a recycling program. This step will help to identify the hurdles you need to jump over to make the program fly; like collection, storage, transportation, processing, costs, time-frames etc.

Designing a recycling program. This step will define the planning details into a working model, location, size and type of container, color etc.

Implementing a recycling program. This step leads you to the actual building or placement of the container system you have designed into your program.

Maintaining a recycling program. This step is the caring for and cleaning of the recycling program

Monitoring a recycling program. This step will tell you how successful your program is working and how you will want to manage your program in the future.

Recycling can be a team effort partnering with private industry or other governmental agencies. **Remember: Safety is paramount and should always be a part of a recycling program.**



Figure 9. A simple but effective recycling system, Alpine RD, Apache-Sitgreaves NF, R-3 Arizona.



Figure 10. Alpine RD, Apache-Sitgreaves NF, R-3,Arizona.

3. PLANNING A RECYCLING PROGRAM

Solid Waste Management - Yesterday

Humans have had to deal with their waste since people began living in settlements. The first municipal dumps were established in Athens about 500 BC. “The council of Athens began requiring scavengers to dispose of wastes no less than a mile from the city walls.” About 1400 AD a regulation was enacted in Paris which stated that anyone who brought a cart of sand or gravel had to haul out of Paris a load of mud or a load of garbage. Today we have the same problems with waste that needs to be hauled off-site to a landfill or to an incinerator. With the advent of a variety of transportation systems we have other choices today.

solid waste primarily from households and not including industrial sources (MSW) was 195 million tons, of which 83% was disposed of in landfills or incinerators and the remainder was recovered or composted.

An integrated solid waste management program may include the following choices in order of desirability of a linear approach of options. Obviously reduction and reuse are first on the list, followed by recycling, composting and least desirable is incineration and landfilling. The list is arranged in order of least environmental impact to the landscape the last item being the most harmful to people and the environment.



Figure 11. Typical landfill scene, throwing it all away!

Solid Waste Management - Today

Typically solid waste management includes landfilling, incinerating, recycling and composting. Each process presents a certain degree of health risks to people and to the environment. A common scenario today would be that waste is generated at a site, the waste is picked up and transported to a landfill or to an incinerator, in some cases the waste may be recycled or composted. EPA estimates that in 1990 the quantity of municipal

- Reducing the quantity and toxicity of waste.
- Reusing materials
- Recycling
- Composting
- Incinerating with energy recovery
- Landfilling
- Incinerating without energy recovery

Recycling Program Options

Drop Off/Buy Back Centers

A centralized location where recyclable materials are collected and some items are purchased by the recycling drop off center. In other cases the drop off centers may be unattended in which case recyclable materials are dropped off for a scheduled pick-up with no buy back option. This type of center is usually a volunteer effort by a community group. These centers are common in small communities with low volume recycling programs. Collection pick-up may be done only when the bins are filled to capacity.

Consider the tasks identified to develop the collection of recyclables at a drop-off center.

Task 1: Determine location of drop-off centers.

Task 2: Coordinate drop-off program

Task 3: Purchase drop-off containers.

Task 4: Arrange for pickup of materials and delivery to processing facility.

Task 5: Develop promotional materials and signage.

Task 6: Publicize drop-off program.

Task 7: Conduct pilot program

Commingled Waste

A program that allows the user to place a variety of recyclables into the same collection container. Acceptable waste may be listed on a sign to minimize contamination of items not accepted. Commingled items can be as varied as the materials they are made of, including steel and aluminum cans, paper items, cardboard, plastics and glass. These items will go to a material recovery facility for separation and further processing. The nice thing about this system is only two containers are necessary, one for all recyclables and one for garbage.



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Figure 12. Commingled waste at a material recovery facility.

Material Recovery Facility

A material recovery facility (MRF) supports commingled programs and are traditionally located near urban centers where a combination of commercial and residential waste are sorted for recyclables. MRF centers contain a storage area for receiving recyclables. The recyclables are loaded onto conveyer belts that allow workers to separate different recyclables into separate bins. Once separated the materials are shipped to processing centers specifically for aluminum, steel, cardboard, paper, plastics, etc.



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Figure 13. Typical MRF. Materials are sorted and shipped out boxed, baled, and trucked for reprocessing.

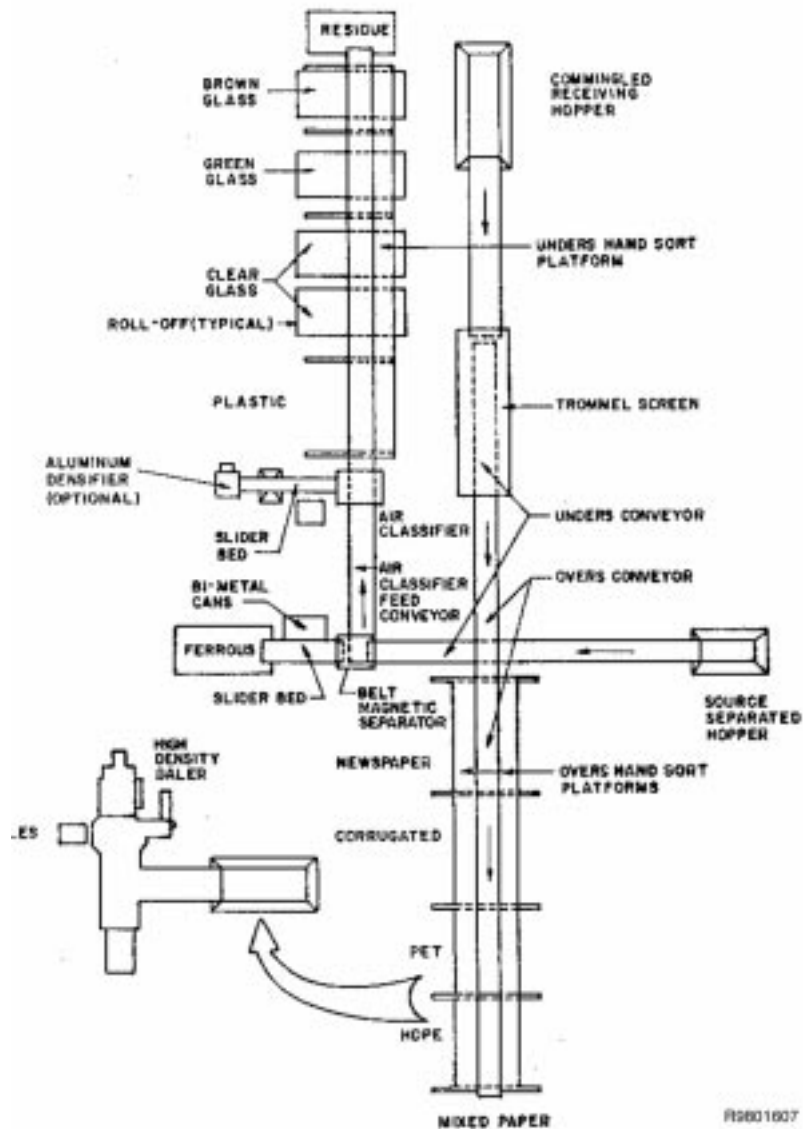


Figure 14. A typical MRF processing plant layout.

Waste to Energy Facilities

Waste to energy facilities recover valuable ferrous and non-ferrous metals from unsorted waste sources. The metals can be recovered by a front-end-separation system which separates the metals from organic waste which is converted to energy. The other method of metals extraction is called a back-end-system in which the metals are recovered after all the waste is burned at once with no pre-separation.

Contractor Collection Program

This program is a contracted service to pick up recyclable materials on-site at specific collection points. The contracted services can be tailored to the specific site requirements depending on the volume and type of recyclable material and, available budget.



Figure 15. Contracted collection service, rear load service vehicle.



Figure 16. Side load contractor collection service.

Composting

Unsorted composting has been tried as an alternative to landfilling with limited success. Fears of heavy metal content in composted municipal solid waste has made it difficult to sell. Most organics break down while things like plastic packaging, aluminum, and other non steel heavy metals remain in the compost along with anything else that may not break down. Sorted composting removes compostable materials from recyclable materials and other hazardous materials that do not belong in a compost pile. The sorting of the compostable materials will yield a more marketable non contaminated composting media for landscape use.

Unlike composted municipal solid waste, clean composted green waste has been and will continue to be a success. Green waste is mostly generated by home and commercial landscape sources. Typically composted mixtures can also include green waste, wood waste from construction materials, and other compostable organics like paper, and cow manure. These sources make a good soil amendment additive for gardening and landscaping use. Clean composted green waste does have a strong market ready to buy up all available supplies, thus eliminating green waste from having to be land-filled. Chapter 5 contains more information on composting processes and implementation.



Figure 17. An indoor solid waste composting facility.



R9801611

Figure 18. Green and wood waste composting.

Facilities Waste Stream Review

The purpose of a waste stream review is to make informed decisions about recycling. A waste stream review assesses the **source** of the flow of garbage entering the forest from visitors, employees, concessionaires, permittees, contractors, and other internal and external sources, and finally where the garbage ends up for disposal. The review entails collecting data on the **composition, quantities and frequency** of waste generated at each facility.

These key elements in the investigation of a waste stream review will provide important data to determine how to handle the recycled materials available and how to plan for their collection and delivery to a recycling center.

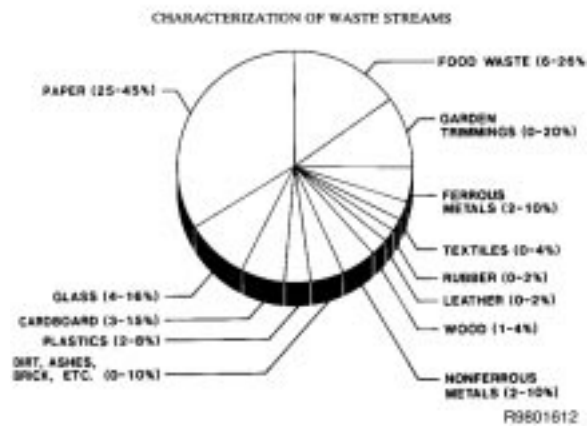


Figure 19. Typical landfill waste stream composition.

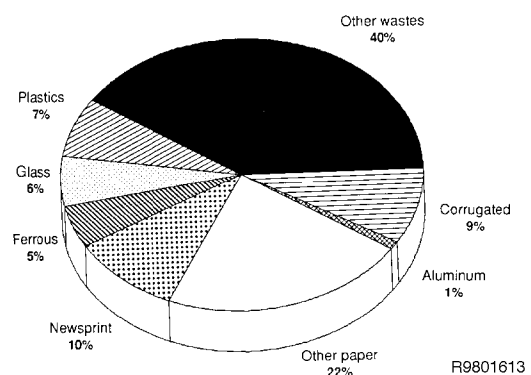


Figure 20. Typical residential waste stream composition.

Waste Composition

How is a determination made on what type of waste is being collected at individual recreation sites? The best way is to empty out the garbage container and sort out the contents of the garbage container, dumpster or any full garbage receptacle. The evidence will be clear once the waste is sorted out.

Remember: use puncture proof gloves, protective eyewear with splash-proof lenses, an organic vapors and full spectrum chemical full face respirator that can protect against strong odors and a heavy apron or other protective wear to do your investigation. Have plenty of water and alcohol and germicidal soap to disinfect ones hands and other gear used in the waste composition investigation.

Count items from full bag to an empty bag and list; paper goods, aluminum cans, glass bottles, steel cans, plastic containers, and other miscellaneous materials found. The different percentages of recyclable material will provide the information needed to estimate the volume of recyclable products.

Once the types of waste resources being generated are determined, the recycling team can determine how and what waste resources can be collected and ultimately recycled.

The information collected will be important in determining potential volumes. Volumetric information will help the recycling team estimate how many containers and what type of transportation will be required to adequately service the recycling program.

Recyclable Materials

- Paper
- Cardboard
- Mixed paper
- Newspapers
- Ledger



Figure 21. Mixed waste paper is a resource!



Figure 22. Mixed paper can be converted into many products: Kraft paper, towels etc.



Figure 23. Molded products from mixed paper.

Glass

Clear glass (flint), green glass (emerald), brown glass (amber)



Figure 24. Different types and colors of recyclable glass bottles.



Figure 25. Mixed glass at a processing plant, 100% recyclable.

Plastics

High-density polyethylene (HDPE) natural (clear milk jugs)

HDPE mixed color (can include resins 3-7)

Polyethylene terephthalate (PET) clear/loose



Figure 26. Co-mingled plastic soda bottles and milk jugs.

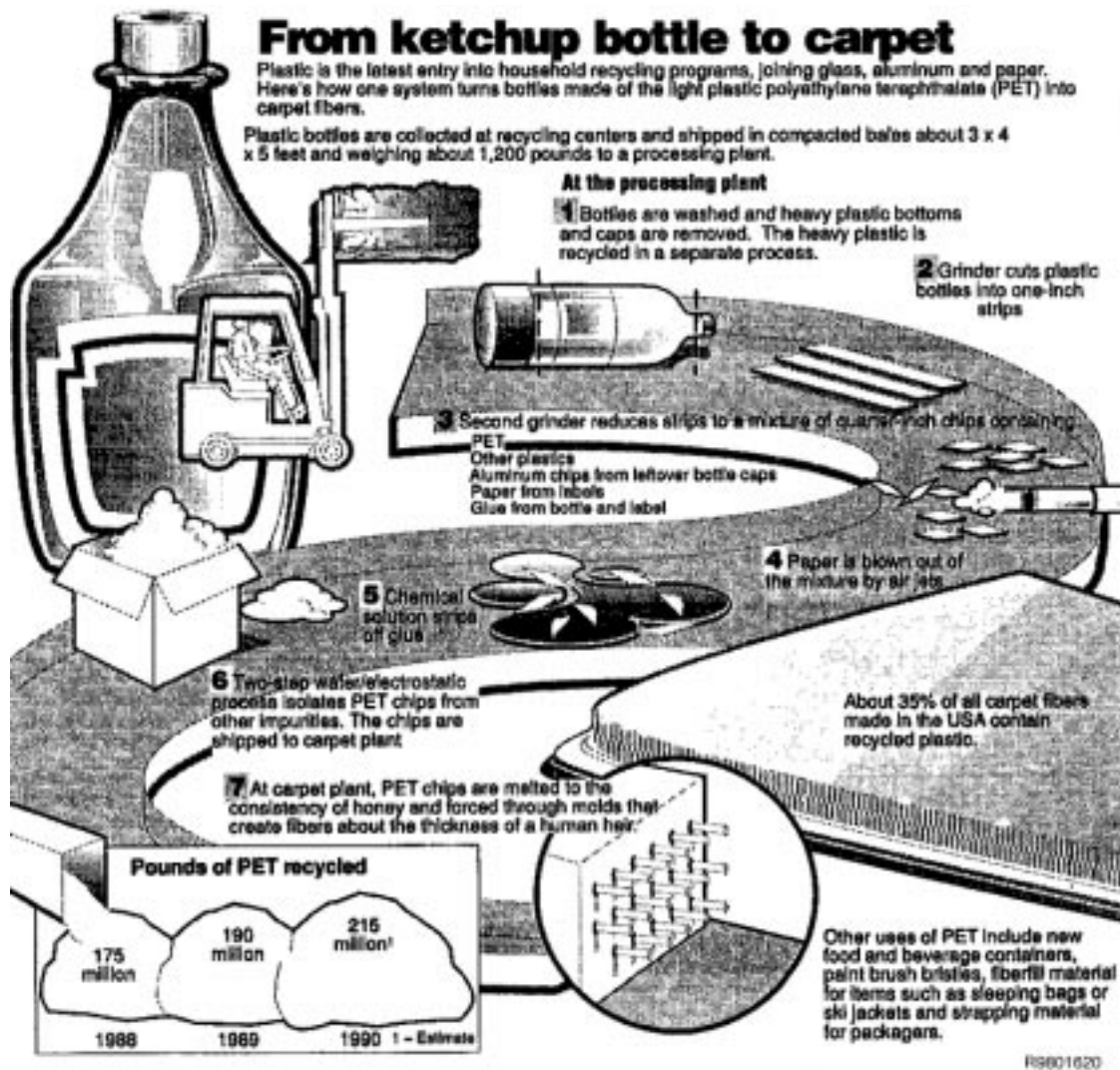


Figure 27. From the collected recycled plastics to the remanufactured end product.

Aluminum Cans



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Figure 28. Commingled aluminum, steel and glass containers.

Clean Steel Cans



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Figure 29. Various recyclable steel containers: aerosol cans, food cans, and glass jar lids.



R9801623

Figure 30. Steel is able to be recycled over and over into many different end products.



RECYCLE. AGAIN.

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Figure 31. Steel products can continue to have a new life in future products while kept in the recycling loop.

Green Waste / Wood Waste



R9801625

Figure 32. A tub grinder can convert green waste into a compostable mulch mix.

Tires/Rubber



Figure 33. Used tire chipper facility.



Figure 34. Products from used rubber tire crumb.

Evaluate Current Collection Methods

The evaluation of current methods of waste collection and disposal means finding out how the waste is currently being removed from the source of waste generation through the waste disposal process.

The most common way to collect garbage from forest recreation facilities is the hand pick-up of plastic garbage bags by district personnel. These bags are taken straight to a landfill or to an interim storage location, usually a dumpster. A front-end or a back-end loader trash truck then picks up the dumpster load and hauls it to a landfill.

Another method of waste collection is by a contractor pick-up service to one or more recreation facilities and taken to the landfill by using front end, side loaders and rear-load dumpster trucks.

The ultimate alternative is to have a contractor pick-up service that can also handle a commingled waste load that would eventually end up in a MRF. Garbage dump-trucks unload the waste inside a large building on to a large conveyer belt. The recyclable products are sorted out by hand. Typically the more valuable items aluminum, steel, plastic containers, cardboard etc. are especially sought after.

Value of Recyclable Resources

Knowing what items can be recycled, where the markets are located, and values can mean the difference between recycling glass versus plastic versus aluminum. The value of the resource translates into dollars and dollars creates incentive to recycle. Money generated by a recycling program can be reinvested into the recycling program for materials, supplies, equipment, maintenance and other program related expenses.

The value of different recycled resources can be obtained by calling the nearest community or commercial recycling facility. Prices for recycled products may vary by day due to supply and demand for the recycled product.

The recycler markets available locally can provide current information about the value of different materials such as cardboard, steel cans, aluminum cans, glass, and plastics. The value of recycled resources follows the market prices of recyclable commodities. Clearly establish where recycled materials can be taken to the recyclers. Determine distances and types of materials that are accepted since this may vary with the supply and demands of the recycling markets. Some recyclers may offer roll-off containers to sites close to the recycling plant, others may lease containers for a low price. In both cases the cost savings in transportation of the recycled materials may pay for the rental or lease of the container.

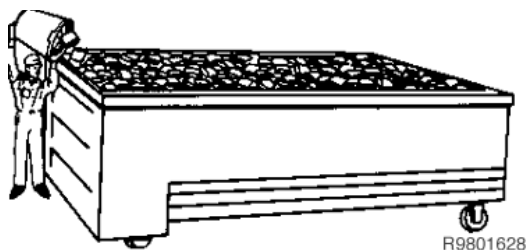


Figure 35. Roll-off container.



Figure 36. Commercial service vehicle.

Costs of a Recycling Program

What is the budget; what can the program afford; what would make the most impact and attain the most benefits? Developing a plan to figure out what a recycling program will cost requires some basic homework on how the program is envisioned to work. What kinds of help and funding are available or can be attained in the future.

What is the waste resource base and where is it located in relationship to a recycling center. Some basic elements to consider include personnel, equipment, transportation and maintenance costs. Some cost analysis has been done for collection systems to assess the overall costs of doing business in the commercial sector and ranges of costs include \$115.00 to \$150.00 per ton costs for a one person crew on a 31 cubic yard truck.

Crew costs

Cost item	One Person Crew
Labor and benefits	
Administration (12% time)	\$ 3,000.00
Driver	25,000.00
Backup	3,000.00
Overtime	3,000.00
Total Labor / year	34,000.00
Other consideration costs:	
Vehicle operation and Maintenance	
Mechanics wages and benefits	7,400.00
Parts	5,000.00
Fuel and fluids	9,400.00
Backup vehicles	2,500.00
Building and Utilities(for the recycling- program team, heat, electric, telephone)	10,000.00
Miscellaneous Expenses	
Training	1,000.00
Public Education	3,000.00
General vehicle cleaning maintenance	1,000.00

Note: These are general estimates used for a commercial type operation where additional expenses are included. This list of costs is only for information to point out some of the expenses to consider when planning a recycling program.

Personnel

Personnel costs are generally measured in time costs which eventually translate to dollars per hour.

Determining how much time is spent on collecting garbage from a facility helps in forecasting how much time will be needed to collect recyclables along with the non recyclables. Personnel can collect garbage and process recyclables generally in the same trip to a site. Therefore the additional time required to process recyclables needs to be considered including working with different containers, separating the resource and additional loading time should be included in the garbage collection and disposal budget.

Contracting is an alternative if you do not have the manpower. Some waste disposal companies routinely pick-up collectibles like aluminum, glass and plastics, cardboard etc. In some cases recyclables may be picked up for the value of the recyclables and with little or no cost to the program manager. This may be done by using roll-off containers at the site that are picked up when full. Generally the recycling manager will alert the contractor that the container is full to minimize hauling trips. The collection container can be a free loaner depending on the profits generated from the recycled resources. Most of the time there is little or no revenue generated by using this option but the labor to the program is minimized and the cost of landfill tipping fees are reduced due to the reduction in overall waste volume.

Shared cost is another option that can help reduce the cost of doing business. Sharing costs may be done with other units, other local agencies, groups etc. as long as all legal requirements are met.

Volunteer labor can also help if time supervising the volunteers can be minimized; self directed groups can increase the efficiency and cost savings in a recycling program. Planning for backup help to pick up when a group decides to end their volunteer efforts is also important, remember that this type of help is usually temporary or seasonal.

Avoid situations that can increase program work load and lead to double or triple work. Storing recyclables can mean a more labor intensive system, requiring the recycled resources to be handled more than once. The ideal situation is to handle the recyclables as little as possible, this means a cost savings in the long run.

Who does what? Planning who will do the tasks envisioned will be necessary to help carry out the duties needed in implementing the recycling program.

The following tasks will need to be carried out by the team personnel members of your program. These can be accomplished by one person or several depending on the size of your program.

- Recycling coordination
- Collection and Sorting
- Transportation / Hauling
- Maintenance
- Information
- Monitoring

Safety

Safety is quintessential to the overall success of a recycling program in the field and should be a part of planning, design, implementation and maintenance phases of the recycling program.

The use of safety equipment and supplies should become a standard practice in the performance of the recycling program. Safety should be considered when handling recycling containers, the recycled resource and during any kind of transportation of the materials to either a storage facility or to a recycling center.

Health risks to workers associated with the collection of recyclables can include the same type of dangers associated with solid waste collection. All appropriate preventive vaccinations are

recommended like Tetanus, Hepatitis B. Please contact your local Health Dept. for more information on vaccinations and preventive care.

All employees involved in collection and separation of recyclables should wear appropriate safety gear. Chapter 6 contains more information on specific items to use.

Hand protection

The critical factor for hand protection is cut and puncture resistance and chemical protection. A gauntlet type glove with split leather all around hand protection, the gauntlet can be canvas type. For added chemical protection use a disposable synthetic non-allergenic material.

Foot protection

Use comfortable work boots or boot type safety shoes with puncture resistant soles. Slip resistance is highly recommended to reduce slips and falls. All other types of casual shoe wear are not recommended.

Head protection

Hard hats with chin straps are recommended especially in wooded areas, where falling branches are a common occurrence.

Body protection

Long heavy work pants and heavy duty work shirts are recommended. For back protection a lifting belt is highly recommended to prevent back injuries. For chest and stomach area protection use a heavy duty puncture proof apron made of vinyl or latex.

Eye protection

Safety splash-proof face shield or splash-proof safety glasses are highly recommended for any kind of sorting or separating work.

Hearing protection

Ear plugs or ear muffs must be worn where operations exceed OSHA approved action level of over 85 decibels over an 8 hour period.



R9901630

Figure 37. Splash-proof safety eyewear.



R9901631

Figure 38. Faceshield protection.



R9901632

Figure 39. Lumbar support back-belt.



R9901633

Figure 40. Protective leather gloves.

Collection Equipment and Supplies

Collection equipment and supplies required include: recycling containers; signs; cleaning equipment including high pressure spray washers, generators, hand and power tools to facilitate the installation and repair of equipment used in the field. A set of handyman tools to install, adjust, repair equipment. Some of this equipment may already exist as part of the districts assemblage of tools and maintenance equipment.

Determine the amount of recycled product that will be generated at each site and try to fit the right size container for the job. The market is full of container systems that can work for you, but the limitations in your time and budget will narrow what will be the most practicable for your district needs. The best rule of thumb is: Buy what you use and use what you buy. If a bucket is needed to collect aluminum cans, use a bucket; but if a roll-off is needed, don't use 2000 buckets. Plan how much recycled product there is to collect and how it will be transported. This will be key in determining the



Figure 41. Recyclable recycling bag.



Figure 42. Plastic tote container on wheels.

type of containers to use combined with the transportation equipment available. Do not forget to coordinate the containers used for garbage and recyclables collection; they go hand in hand. Additional information on containers is provided in Appendix A.



Figure 43. Commercial collection vehicle, multi-container side loader.



Figure 44. Commercial collection vehicle, single rear loader.

Transportation

Transportation costs can include the following:

- Initial vehicle cost
- Cost of auxiliary vehicles, trailers etc.
- Cost per mile to operate vehicle
- Estimated repair costs / life of vehicle
- Replacement cost of vehicle

For the small program in a remote area; a do-it-yourself pick up service may be the best alternative. The transportation costs can be combined with other work being carried out in recreation areas such as routine recreation site maintenance and waste collection.

The following is a list of transportation items to consider when costing out a recycling program.

Motorized Transportation	(Operation) /	Replacement Cost/ Frequency
Pick-Up 1/2 ton capacity - Cost / mile	_____ /	_____ / _____
Pick-Up 3/4 ton capacity - Cost / mile	_____ /	_____ / _____
Pick-Up 1 ton capacity - Cost / mile	_____ /	_____ / _____
Stake-side 1 + ton capacity - Cost / mile	_____ /	_____ / _____
Truck- 3 ton capacity - Cost / mile	_____ /	_____ / _____
Totals		

Non-Motorized Hauling Trailers

Cost per Lb. / mile _____ (4x6) (6x6) (6x8) (6X10) (6x12) _____

Cost Per Cu. Yd / Ton mile _____

Recycling Contractor Collection Services

A contractor may be willing to accommodate one of several alternatives including complete pick-up by using their own containers or a partial service of picking up a unit owned container system. The frequency of pick-up may be left open for negotiation until a better feel for how often pick-up will be needed or a contract can be arranged on a call as needed basis. Transportation costs can also include the costs a contractor will charge for the pick-up and drop of one of several types of containers including roll-offs and hauling the waste resource to the recycling center. A contractor may be willing to accommodate one of several alternatives.

Contracted Hauling Cost Form

Hauling costs round per trip/lb _____

Hauling costs per round trip/ton _____

Hauling costs-round trip -
vol. cubic ft./yd. _____

Hauling costs per container;

32 gallon container _____

55 gallon container _____

Dumpster (maximum weight
limit / tonnage) _____

Roll-Off (maximum
weight limit) _____

Trailer (maximum weight limit) _____

Other sizes _____

Totals _____

Planning for Maintenance

The maintenance of a recycling program includes not only maintaining the planning details of the recycling program, schedules, costs, but also maintaining all field equipment used in the process of carrying out a successful recycling program.

collected and where the highest volume is located, as well as the distance and transportation costs or the cost of using a contractor. The recycling program needs to be fluid enough to be able to change and maximize the effort being expended in all phases of the program.

Program Maintenance

Maintaining the recycling program will require support of records of the waste stream flow and what quantities are being collected, what is being

Equipment Maintenance

Equipment maintenance includes maintaining motorized and non motorized equipment used to carry out the recycling program. Also included is

maintaining collection containers, all signage, and other types of outdoor furnishings used in the process of recycling including storage facilities.

Maintaining the maintenance equipment is also necessary to maintain a clean and neat appearance of the recycling facilities.

Equipment maintenance includes replacing worn parts; cleaning of dirt and grime; and keeping every piece of equipment in near new condition. The success of the recycling program will depend heavily on the overall appearance of the equipment being used. A neat, clean, and freshly painted facility will give a positive successful look to the program. A poorly maintained program and collection site will encourage less participation by the customers.

Planning a Simple Recycling Program

Working with the existing methods of waste collection and existing waste collection equipment, a quick and easy program can be as simple as starting out by adding a container labeled "Aluminum Cans Only". By placing recycling containers in visible well labeled locations a simple program has begun.



Figure 45. Turn painted and converted garbage cans into recycling containers. This is a simple and effective program.

Recycling Management Time

Time required to run the recycling program

Person hours per day	_____	x cost/hr. =	_____
Person hours per week	_____	x cost/hr. =	_____
Person hours per month	_____	x cost/hr. =	_____
Person hours per year	_____	x cost/hr. =	_____
Totals	_____		_____

Vehicle Replacement Parts

Tires
Tune-ups
Miscellaneous parts

Costs

Month/Year
_____/_____
_____/_____
_____/_____

Facility Repair and Cleaning Supplies

Cleaning equipment and supplies
Miscellaneous hardware, nuts, bolts, nails etc.
Paint/Stain supplies
Construction supplies, concrete, wood, metals etc.

_____/_____
_____/_____
_____/_____
_____/_____

Facility Equipment and Supplies

Containers, lids, locks, parts etc.
Signs, posts and other structural materials

_____/_____
_____/_____

4. DESIGNING A RECYCLING PROGRAM

Designing a recycling program requires the information gathered in the planning process.

Recycling Program Budget

The most critical aspect of designing a recycling program is establishing a budget. Once the budget has been determined then the budget amount will help determine what can be accomplished with the dollars available. In some cases the existing waste collection system may be used by adding extra recycling containers and providing appropriate signs.

Site Layout

When siting a recycling facility the following items need to be considered: location of existing waste containers; access to the containers; and visibility.

Locating a recycling facility will require a smooth operation of waste collection with collection of recyclable materials. It is important to provide a one stop service facility that can handle both waste and recyclables. Depending on the size of the recycling program an existing location may work; if the facility needs more space find a location that can accommodate a larger facility.

When considering a location for collection of recyclables look for a place that has easy access for customers and easy access for the collection of the recyclables without disturbing the normal operation of the site. This may mean a pull-off site or a pull-through facility or just an extra widening of the road inside the facility away from traffic. Visibility is critical for ease of customer use along with well placed signing.

Pedestrian Access

Pedestrian access is critical and Universal Access is a must. Walks and trails must use hard surfacing such as asphaltic concrete (AC), concrete, or concrete pavers for wheelchair access. Universal Access is discussed on the following pages.



Figure 46. Pedestrian-vehicular access to the recycling containers. Popcorn Overlook- Chattahoochee NF, Georgia.

Vehicular Access

Access by vehicle must also be considered when determining the type of vehicle that will be used for the collection of recyclables. Each type of equipment is different and the dimensions are important when considering the length, width, and overall height of the vehicle while loading. Low tree branches can affect a front loading vehicle that loads vertically and may require a high clearance to operate. The turn-around radius of different vehicles also needs to be considered for ease of access and egress of the collection vehicles. For typical pick-up and stakeside trucks access is not a big problem, small trucks can maneuver more easily and overhead clearance is not a problem.

A recycling facility must be visible to the customer, provide easy access for ease of use, and be well signed to eliminate any confusion as to where the recyclable materials should be deposited. Information about a recycling facility can also be added to site information signs at the entry of all facilities.



Figure 47. Both vehicular and pedestrian access are provided at this facility. Popcorn Overlook, Chattahoochee NF, Georgia.

Universal Access Design (Accessibility)

All facilities establishing a recycling program must meet Americans with Disabilities Act Accessibility Guidelines (ADAAG). Universal Access must be considered in new and existing facilities and amenities used to carry out the recycling program. Recycling containers must be safe and functional for all who use them as well as meet the minimum standards set forth by the Universal Access Design Guide 1993 adopted by the Forest Service.

The program shall meet minimum height and reach standards to allow customers to use recycling containers unobstructed. Site design considerations for proper access and egress to the recycling facilities will be required. Consider appropriate slopes and proper surfacing materials for different environmental conditions such as rain, snow, ice, and moist foggy air. Consider hand rails and other types of structural accessibility aids as needed to provide a quality universally accessible site. Provide properly sized and placed legible informational and interpretive signing to allow for universal use. Recycling containers must be located along accessible routes as defined by the ADAAG (4.3) and *Universal Access to Outdoor Recreation: A Design Guide*, Chapter IV, (3.3). Containers should be functionally accessible by persons with disabilities. The following functional limitations must be considered when selecting and locating recycling containers.



Figure 48. Universally accessible recycling container system, Romtec Inc. Oregon.



Figure 49. Vehicular and pedestrian accessible facility, LaCroix RD, Superior NF, Minnesota.

Height and Reach Limits

ADAAG lists reach limits for wheelchair users as 48 inches (1.2m) forward and 54 inches (1.4m) to the side. These are maximum limits for depositing items into recycling containers. The Design Guide sets height limits from 15 inches (0.38m) to 36 inches (0.9m).



Figure 50. Reach access limits.

Operating Mechanisms

There are no specific standards for the weight of garbage can lids. However, ADAAG Standards on Controls (4.27.4) and the Design Guide Chapter IV (3.3) state that the force required to open the lid should not exceed five pounds force (22.2N).

Spatial Clearance

The Universal Design Guide specifies a minimum clear ground space of 68 inches (1.7m) in front of the recycling container including 32 inches (0.8m) for a person to pass, by 48 inches (1.2m) perpendicular to the container for wheelchair access. Walks leading to the recycling containers should be a minimum of 36 inches (0.9m) in width with a maximum slope of 8.33 percent. For walks adjacent to roadways provide an extra buffer of space for pedestrian protection or a physical barrier like curbing, planters or mounding.

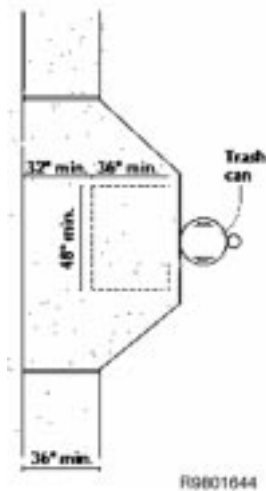


Figure 51. Spatial clearance guidelines

Recycling Dumpster Containers

There are no specific guidelines provided by ADAAG or the *Design Guide* for dumpster containers. Managers should select and locate dumpsters to facilitate access. Many recycling dumpsters are modified with openings that do not require the user to open a latch or mechanism and can meet access requirement if placed on a level

accessible surface. For dumpster containers with heavy lids that a person in a wheelchair would clearly not be able to open provide a smaller container alongside your dumpster and clearly mark the container for wheelchair access. Access to dumpsters can also be provided by designing a ramp to a level area adjacent to the dumpster, this can also facilitate use by children and persons of short stature.

Recreation Opportunity Spectrum

Working the Recreation Opportunity Spectrum (ROS) guidelines into the recycling program can provide help on the appropriate types of containers to consider. Aesthetic considerations for container selection can include choosing the appropriate texture, color, and materials used. In some cases it may be possible to customize the containers with the appropriate color and texture to suit the particular ROS setting. Contact the Forest Landscape Architect/ROS manager for assistance in this area.

Signing

Signing is a crucial part of developing a successful recycling program. Signing informs, directs and interprets the high points of a recycling program. Signing materials can include paper, wood, steel, aluminum, plastic, fiberglass and composite. When considering sign materials contact the local sign coordinator for recommendations on what materials work best for the local area. The visitor information and fee board is a perfect place to inform the customer that the facility recycles certain resources like aluminum, glass, plastics etc. Be specific with information; try to use international graphic symbolism to provide a visual image for the customer. This will provide better service for the world traveler with a limited understanding of the English language. Signing also considers children. Children are also heavy recyclers; a recycling facility with a logo, a picture, a diagram or a graphic symbol is easier for non-reading children to identify. Children are the biggest recycling supporters and enthusiasts and they usually end up teaching the parents how to recycle if they can interpret the signs provided.



Figure 52. Typical informational signs.



Figure 53. Recycling sign.

Informational Signs

Informational signs refer to signing used to inform the visiting customers of the opportunities that are available for recreational activities. Some informational signing carries a message about the rules and regulations as they are enforced in a particular site or area.



Figure 54. Graphic information signs.



Figure 55. Official federal agencies recycling logo.

Directional Signs

Directional signs inform visitors where certain facilities are and in which direction they can be found. Generally street signs fall under this category and are used commonly in vehicular and pedestrian corridors.



Figure 56. Directional signs.



Figure 57. Recycling facility directional sign.

Interpretive Signs

Interpretive signs provide information about particular subject matter that may be of interest to visitors. The format for interpretive signing may vary from a very simply written sign describing a point of interest to a very complicated piece of artwork that may tell in words and pictures or diagrams about a particular subject of interest.

Recycling Signs

The universal federal recycling logo is an eagle graphic symbol with three chasing arrows. This logo must be used where ever recycling signing is needed.



Figure 60. Typical recycle area sign.

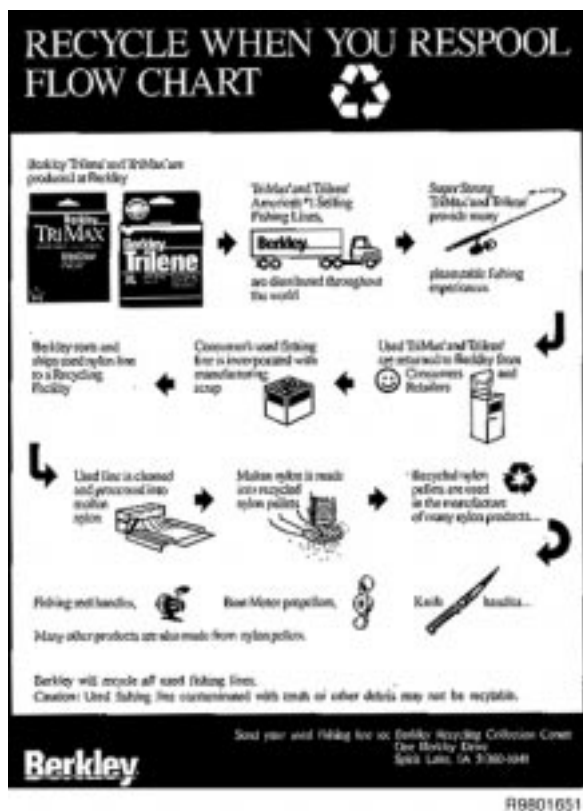


Figure 58. Fishing line recycling interpretive sign.



Figure 61. Recycling information sign



Figure 59. Recycling information sign.

Waste Container Equipment

Waste container equipment includes different sizes of containers made of a variety of materials like wood, steel, fiberglass, concrete, plastics, and composites of different materials. Waste containers are manufactured in a wide variety of shapes and sizes from the standard 32 gal. container to large roll-off containers capable of transporting several tons of waste and recyclable materials. Choosing containers for a recycling program can vary with budget constraints, volume requirements, collection vehicle constraints, and aesthetic considerations. See Appendix A for a comprehensive list of containers.

Small Individual and Multiple Containers

Small individual and multiple containers, typically 32 to 100 gallon size, are available in steel and in plastic models. Animal-proof units would be preferred. Shapes may include round and square models with or without wheels, ground secured or unsecured, universally accessible. Vendors of small and multiple containers are listed in Appendix A.



Figure 62. Accessible small container system (3 units on a pedestal, with less than 3 pounds of force required to open the lid).

Dumpsters and Hybrid Containers

Dumpster and hybrid containers are available in sizes from 1/2 cubic yard to over 8 cubic yards; for large volume recycling and for central collection storage roll-offs are available. Appendix A contains a listing of vendors that sell dumpsters and hybrids.



Figure 63. Rear and front loading dumpster containers by Capital Industries.

Roll-Offs and Other Large Containers

Appendix A contains a comprehensive listing of roll-offs and other large containers.

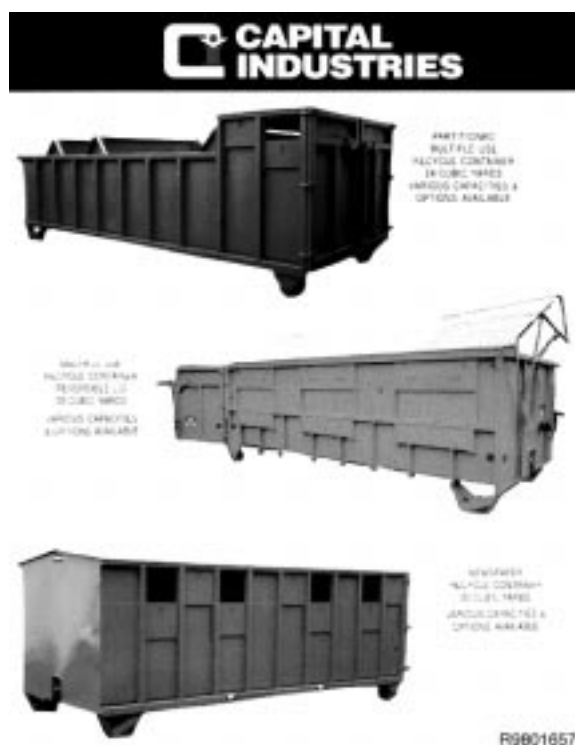


Figure 64. Roll-Off recycling containers by Capital.

Trucks, Trailers and Hauling Equipment

Pick-up trucks and trailers are a necessary part of a small recycling program when only small amounts of recyclables are collected at a time. Covered and lockable trailers can be used to collect and store materials for a longer period of time thereby reducing the frequency of hauling recyclables to a recycling center.

Other types of trucks (stake-side) may be equipped for special pick-up of either co-mingled or presorted recyclables. In large programs that may require larger storage of recyclables, a roll-off type container may be the best solution to handle the volume that may be generated by a large and busy site.



Figure 65. Hyd-A-Ways 4 cubic yard container and hauling truck combination by Haul-All waste container manufacturing company, Canada.

Again, the cost of purchasing, operating, renting or contracting the equipment needs to be carefully analyzed to arrive at the most cost effective method of transporting recyclables to the local markets. Appendix A contains a comprehensive list of trucks, trailers and hauling equipment.

Composters

Composting equipment can vary in size and material depending on the needs of the composting program. Composters are available in a wide range of materials including plastics, steel, wire fabrics, wood and composites of materials.



Figure 67. Composting container by Schaefer Systems International.



Figure 66. Depot containers for glass, paper, and other recyclables by Schaefer Systems International.



R9801660

Figure 68. Composter by Schaefer Systems International.

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Figure 70. Composter by Soilsaver.



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Figure 69. Composter by Schaefer Systems International.

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Dr., Rexdale,
Ontario
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Fax: (416)
745-1874.

R9801664

Figure 71. Composter—The Earth Machine—by
Norseman Plastics.

5. IMPLEMENTING A RECYCLING PROGRAM

Assembling a Recycling Team

A recycling team requires the following responsibilities. A recycling coordinator that can lead the recycling effort; provide information to the rest of the team and to the customers; and monitor the program for changes. A collection and sorting staff and staff to store the recyclable materials and eventually to transport the materials to the local market. Maintaining the program will occur at two levels, maintenance of the managerial aspects of the program and maintaining the facilities, containers, and transportation equipment.

Partnerships

An excellent way to leverage available funds to set up a recycling program is to look for partners. This can save money overall if an agreement can be worked out with a solid partner. First look within the forest or local community. Are there other interested people, groups, other agencies that are interested in recycling? Look at the businesses in the private sector, sometimes they have vehicles that make deliveries and back-haul partially empty. This may be an excellent way to partner-up and get the program moving. Supermarkets, schools, local public agencies also have a mandate to recycle. Combine resources; think creatively; do more with less. Sometimes there are other groups of people, agencies, and local businesses that may find it is too costly or they do not have enough resources to develop a fully successful program. Combining the small quantities of waste resource materials into a larger supply may interest a recycler in an adjacent community to pick the materials at no cost. Or, at least at a reduced rate if there is enough valuable resource that the recycler can make a small profit from the proceeds. The desired alternative is to have the materials recycled and unless something is worked out to get the materials to market there may not be an opportunity to recycle, especially smaller quantities.

Shared Services

Sharing the burden of labor can in many ways help the program save money in the long run by working with other units to accomplish the desired end result. Sharing equipment, materials, supplies, labor, and expertise can make life easier, save resources and reduce double work for the participants. Organization, communication and timing are the key to coordinating a successful program through shared services.

Volunteer Groups

Volunteers are a gold mine of talent and effort and there is an endless supply of help, both within the forest service and outside from individuals and groups. Communities are filled with people and groups that would like to take recyclable deposit type containers, and other types of recyclables if there is any money to be made. Many volunteer groups such as the girl scouts and the boy scouts are excellent groups to contact to help collect and transport waste resource products to the recycling facilities. This type of help may be offered on a one time or a regular basis, if an agreement can be arranged. Churches, business clubs, and other community groups may be available from time to time to help. Remember that many of these groups will help for the opportunity to help their community and to make a little profit for their group activities. Any help received will save the budget in the long run. Remember to acknowledge any efforts that may have helped the recycling program. A news release or a recreation news story is a great way to thank groups for their efforts. This can also help to let other people, or groups know that you welcome the help from the community to make the program work for your Forest.



Figure 72. Recycling team at the Alpine RD, Apache Sitgreaves NF, Arizona.

Marketing a Recycling Program

Information

Provide information that tells the customer about the recycling program and where to deposit items to be recycled. Information about what types of recyclables are acceptable i.e. plastics, steel cans, aluminum, glass should also be provided. Equally important is telling customers what cannot be accepted or cannot be recycled locally and what things must be placed in the garbage cans.

It is also important to let people know what condition is acceptable for the items. Must the items be washed before they are placed in the bins. Explain the need to wash items when water is available to keep the bins from drawing pests, flies, wasps, mice etc. Remind customers that lakes, streams and rivers are not an option for direct washing of containers. Provide graphic and written information for customers of all ages to understand. Use universal symbols if possible to transmit the message.

Provide positive information at all times; involve participation and keep it simple. Information about conserving natural resources and tying in a direct relationship of what man made products consume in energy to produce a product can help reduce the amount of waste being generated in the field. Information about the cost of generating waste and of throwing it all away can help people become more conscientious about what they bring on recreation outings.

Tell customers how much it costs to dispose of one ton of garbage. By telling the same customer the cost benefits of recycling will also make an impact and help to increase participation in recycling.

Education

Education can be fun and informative. Use questions and answers to increase awareness, educate, and gain participation from customers. Use history, science, mathematics, and other subject facts to educate and involve customers of

all ages to participate in the recycling program. Questions like "How many trees does it take for one edition of the New York Times?", "How many products are made with recycled pop bottles?", facts like "Did you know that enough aluminum is saved each year to rebuild our entire air fleet".

Interpretation

Interpretation can also be a powerful tool to convey the message. Explain how many trees and gallons of water are saved by recycling paper and how much energy is saved by recycling aluminum cans and manufacturing new products with the recycled aluminum. Interpretive signs can also discuss reasons why it is important to keep the forest clean and how recycling is helping to get the job done.

A visitor center is also a great place to provide interpretive information and disseminate literature about recycling; how it works; and how it helps. This is also a place where you can provide fun recycling interpretive information:

- Q. How long does it take for glass to decompose?
- A. 1,000,000 years
- Q. How long does it take for an aluminum can to decompose?
- A. 1000 years

Show how nature recycles a fallen tree!
Show nature's recycling organisms, worms, beetles, fungi!



Figure 73. Children learning about vermiculture and how worms compost organic waste in the classroom.



Figure 74. Education about giving new life to used containers by EPA.

Public Information

Public information is clearly a powerful tool to get the message out to the forest customer. Publishing a clear description of the program and where the recycling facilities can be found in each location will go a long way to help the overall effectiveness.

Recreation activities news handouts can include not only the information needed for your customers to recycle but also provide information on the successes the program has achieved.

People like to know they are contributing to a good cause. If the supporters are able to see the quantities of recycled products grow then the program will snowball and more and more people will want to participate. Signs need to be posted at entrances to the forests to let people know they are entering an active recycling area. The reminder is reinforced with additional signs and notices at campgrounds, picnic areas, and other recreation facilities. Use signs to tell the customer they are approaching a recycling area, how far, which way? Use the local radio for public service announcements on the forest and include information about recycling on the forest and where the recycling containers are located. Use local newspapers to get the word out about recycling on the forest, include some facts about the successes.

Provide information on the effects of litter and how it affects the forest ecosystem and all the life that exists there. This tactic can be a powerful tool to use to inform visitors and forest employees alike.



Figure 75a. Campground recycling flyer, Apache-Sitgreaves NF.



Figure 75b. Campground recycling flyer, Apache-Sitgreaves NF

Waste Reduction

Only purchase equipment and supplies that are needed and can be used or re-used within a short period of time. Encourage the forest visitors to do the same thing by leading by example and providing appropriate environmental information in the form of handouts and interpretive signs telling about our involvement and participation in a national forest recycling efforts.

Ways of reducing what we consume can directly translate into a reduction in operating costs thereby saving money. Lower overhead costs may mean more money for recreation facilities and other high priority activities.

Waste reduction also means reducing the amount of electricity, gas and other energy utility products. Saving water may reduce costs to the agency and help the environment. There is a cost for everything we do— both to us and to our planet. Organizing and planning daily activities can reduce energy and waste in our daily management of recreation facilities.



Figure 76. Tips for reducing solid waste by EPA.

Other Waste Handling Methods

Composting

Composting is a tried and true method of recovering organic waste and converting the recycled resource to a rich, productive soil humus. Composting is a biological process where the active agents are microorganisms, like bacteria, fungi and protozoa. The composting process depends on a healthy mix of these biological decomposers to carry out the process of breaking down organic matter. The micro-bacterial action of several groups of bacteria working in synergy is referred to in microbiology as syntrophy. Different types of organisms working together and benefitting from each others activities develops a symbiotic relationship called mutualism resulting from activities where one type of bacteria may produce a food for another in a occurrence known as cross feeding. Nutritional balance of elements in the composting process is critical for culture performance especially carbon and nitrogen. Carbon is the major energy source for microorganism with nitrogen from organic sources like grasses, manure etc. The carbon/ nitrogen (C/ N) balance of 30 to 1 is optimum for most types of waste. A poor balance of C/N can result in an environment that will not support micro-bacterial activity in which case an attempt must be made to bring the compost activity into a balance that would provide an optimum condition for bacterial activity.

Two methods of composting (aerobic and anaerobic) are commonly practiced today. Aerobic composting is characterized by high temperatures, no foul odor, and works faster and can be complete in weeks. The anaerobic process is slower, low temperature, and can take up to a year to complete. Moisture content will vary with the type of materials being composted, bacterial action will cease if moisture content is below 12-15 percent. As a rule of thumb moisture can become a limiting factor if it drops below 45-50 percent. Careful monitoring and maintenance of a compost pile will maximize the effects of bacterial action and yield well decomposed rich organic humus. The simple act of composting can divert up to 30 percent of the waste that is generated at an average site. Simply diverting a rich compostable resource versus burying or burning the waste can reduce

frequency of collection and transportation of a valuable organic resource. Composting can be accomplished in an area as small as a 4 foot by 4 foot space or as large as space allows and depending on the source and amount of the compostable waste. There are two methods of composting, hot composting and cold composting. Hot composting can act much faster in breaking down of organic waste and in a few short weeks compost is ready for use, but has less nutrients than cold composting which can take up to a year to break down, but is ultimately richer in carbon and other nutrients.

Worms

Worm use (vermiculture) in composting is becoming more popular everyday. Worms are excellent composters working tirelessly to convert organic materials into very rich worm castings that can be used in landscaped areas around offices and recreational facilities. Worms can increase the speed of decomposition in a compost pile and also



Figure 77. Turning over compost piles at a compost operation.



Figure 79. Volunteers passing out compost bins to initiate a local composting program.

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Figure 78. Recycled plastic composter by Scepter - 11-cubic foot capacity.

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- * finished compost in just weeks

Patented air tube system provides a uniform supply of oxygen throughout the composting cycle to keep it aerobic and odor free.



TEST THE BEST FOR FREE!

1-800-486-9699

Gardner Equipment Co.
MUNICIPAL SALES OFFICE
P.O. Box 7521

Werner Robins, GA 31096-7521

* to qualified municipalities for testing purposes only

R0801674

Figure 80. Aerobic composter 10- and 14-cubic foot capacity by Gardner Equipment.

help with soil aeration if transplanted to landscaped beds. Worms can process organic matter up to 50 percent of their weight in a single day. This statistic adds up quickly with lots of worms. Worms prefer clean organic compostable waste, free of harsh chemicals including chemically derived fertilizers. Worms will migrate and reproduce quickly to the the organically rich parts of the garden once introduced to continue their invaluable work in the composting process.

A COMPOSTER TOO GOOD TO REFUSE



Backyard composting programs will work — in the cities that offer the Biostack® Composter.

The unique three-tiered design of the Biostack® makes light of the hardest part of the composting job — turning the pile. Because it makes composting so easy, the Biostack ensures a successful municipal composting program. And it's fabricated of 60% recycled polyethylene.



For more information, contact our Municipal Sales Dept. at (415) 383-4415 ext. 7661

Selected by the following cities and counties for their backyard composting programs: Alameda Co., CA, San Mateo Co., CA, King Co., WA, Los Angeles, Burbank, Santa Cruz, Denver, Olympia and many more.

Smith & Hawken

R9801675

Figure 81. The Biostack composter by Smith & Hawken.

SOILSAVER® CLASSIC COMPOSTER

Over
1 MILLION
Classic
Composters
have been
sold
worldwide.



Find out
why the
SOILSAVER
Classic is
#1

To receive further
information on
our municipal
programs and
products, call our
North America
Toll Free Hotline

1-800-668-8430

R9801676

Figure 82. The SOILSAVER composter.

THE EARTH MACHINE.

The City of Miami is
one of more than 625
government
agencies to
choose THE
EARTH
MACHINE
Backyard
Composting
program.



Find out why.
In the U.S., call
1-800-267-4391
or write
Norseman
Plastics, 2296
Kermore Ave.,
Buffalo, N.Y.
14207.

In Canada call
(416)
745-6980
or write
Norseman
Plastics, 39
Westmore
Dr., Rexdale,
Ontario
M9V 3Y6.
Fax: (416)
745-1874.

R9801677

Figure 83. The Earth Machine composter.



R9801678

Figure 84. Red worms, *Eisenia fetida* used in commercial operations nationwide.



R9801679

Figure 85. Small worm composter; worms are fed greens and shredded paper.



Figure 86. Oregon Soil Corporation worm composting operation near Portland, Oregon. Manures and other organic wastes are composted with worms for the rich worm castings.



Figure 87. Environmental Recycling Systems with a mechanical harvester separating breeders and cocoons from worm castings at a facility east of San Diego, California. The worm castings will be sold.

Green Waste

In addition to manufactured products, there is also value in natural products that can be recycled for compost. Examples of green waste include wood debris, green clippings, leaves and other compostable organic materials. These items once composted can become valuable mulches and organic soil additives which can be used to enrich local soils deficient in organic matter.

Other sources of green waste are hazard tree removal from recreation sites. These can be chipped for mulch or composted in piles. To speed up the production of composted material, branches and limbs need to be chipped to small pieces to allow decomposition to work faster. By adding the proper moisture content and nitrogen will increase the effectiveness of bacterial action. Chipped

green wood can also be used for surface mulches to provide a surfacing material around recreation areas. Mulches can prevent soil erosion and help stabilize and recover sites that have had heavy use.

Landscape maintenance products—grass clippings, pruning waste, leaf litter—can all be composted and converted to rich humus. A more current method of maintaining turf areas is by grass-cycling. The grass clippings are cut to a smaller size by a grass-cycling mower and the clippings do not have to be raked and collected. Grass clippings that are cut to very small pieces will compost within the blades of grass and will help feed the turf. This method of recycling grass clippings saves time by not having to empty lawn mower bags and not having to dispose of the clippings.



Figure 88. Tub grinder processing green waste materials.



Figure 89. Tub grinder processing green waste into a compost product.



Figure 90. A mixing and screening compost facility preparing the processed materials for market.

6. MAINTAINING THE PROGRAM

Safety

The following list of safety equipment is strongly recommended as part of a safety kit for the safe operation of a recycling program. This list should be considered a minimum of items to be considered. Other safety items should be considered and added to customize a kit for the individual user based on the geographic location. Comfort should be strongly considered to accommodate the user, since these items may be worn for long periods of time. See MTDC publication 9623-2846 September 1996 *Proper Handling Procedures for Refuse Collection* for more information on handling waste in recreation sites.

- Safety helmet (plastic)
- Safety goggles, anti-fog, liquid protection type
- Fine particle dust/odor resistant mask
- Heavy duty leather and disposable synthetic gloves
- Puncture resistant latex or vinyl apron (like glass, metal etc.)
- Flashlight with extra batteries (no mercury type)
- First Aid Kit with a disinfectant and eyewash
- A bottle of distilled water (1- to 5-gallon)
- A supply of antiseptic/anti-microbial towelettes (individual packs)
- A supply of anti-bacterial soap/hand cleaner
- Mechanical litter picker
- Long pants and long sleeve shirts
- Work boots
- Heavy duty trash bags
- Ear plugs



Figure 91. Plastic safety caps for head protection.



Figure 92. Eye protection from liquids and other hazards.



Figure 93. Dust and strong odor protection.



Figure 94. Hand protection with gauntlet type leather gloves for rough and sharp objects.



Figure 97. Nitrile gloves 6 mil thickness complies with OSHA's standard for occupational exposure to blood-borne pathogens, hypoallergenic, by Best.



Figure 95. Hy-car rubber apron, chemical and abrasion resistant by Ansell Edmont Industrial.



Figure 98. First Aid kit in dust and moisture proof case for field use.



Figure 96. Ear plug protection for operating loud machinery and equipment.



Figure 99. Vionex anti-microbial liquid soap and skin wipe towelettes for cleaning hands.



Figure 100. Envirocide disinfectant/decontaminant cleaner kills pathogens of concern to OSHA and Center for Disease Control (CDC). EPA registered.

Note: Safety equipment available at Direct Safety Company (DSC) Tempe, Arizona (800) 528-7405 or (602) 968-7009

Facility Maintenance

Facility maintenance involves the cleaning, painting, repair, and upkeep of recycling facilities and equipment. Keeping the facilities clean and freshly painted will encourage use of the facility. Maintaining a clean facility will also discourage pests of all types; disinfecting containers will reduce odors and reduce health risks; using heavy duty bags will contain liquids. When possible use biodegradable and other green products instead of caustic materials. This will prevent injuries to the person doing the maintenance and will keep toxic substances from entering into the environment. Signing on posts or boards must also be maintained and kept looking new. The signs should be free of dust and graffiti. These little things help to project a well maintained recycling program.

Reader's Digest *New Complete Do-It-Yourself Manual* is an excellent do-it-yourself facility repair manual.

For more information on cleaning methods for recreation sites see *Cleaning Recreation Sites* 9523-1206-SDTDC December 1995.

Recycling Containers Maintenance

Recycling containers must be cleaned every time recyclables are collected. A quick look at the containers should determine how often to do a complete cleaning. Clean and wash the containers before strong odors develop. Use biodegradable detergents with non toxic properties to clean and sanitize containers on a regular schedule. Use heavy duty bags that are leak-proof. Maintain recycling containers in a freshly painted and repaired condition. Replace damaged containers. Keep all information signs on containers fresh and new looking. Keep the area around the containers well sweep or raked, depending on the surfacing materials used.

Transportation Equipment Maintenance

Transportation equipment maintenance is critical to safety and to prolong equipment life. All transportation equipment must be placed on a maintenance schedule for regular cleaning, painting, oiling and lubrication needs. Equipment with tires and brakes must be carefully inspected by qualified mechanics. Forests with auto maintenance shops should be notified about the equipment the recycling center plans to use. Request information or help from the forest fleet manager about requirements for maintaining different types of vehicles needed for the program.

Maintenance Tools and Equipment

The maintenance required for a recycling program can be accomplished with all the same tools and supplies readily available for general maintenance. Tools and equipment are available in the GSA catalog. For open market power/hand tools and supplies check your local hardware store, Sears, and other home building supply stores in your local area.

Maintenance Supplies

The GSA Catalog has cleaning, painting and other miscellaneous supplies needed to carry out a proper maintenance program.

7. MONITORING THE PROGRAM

Post Implementation Review

Set up a program review schedule that allows monitoring of the programs progress. How much is being collected; are changes needed? Is additional equipment needed? Is there adequate help to carry out the program? Are all the aspects of the program working smoothly (collection, storage, sorting, transportation)? Are the prices for recyclables up, down, or stable? How is the information from the program helping education? Consider all aspects of the program and analyze the current state and continue to review on a regular basis to maintain the program in top shape.

Operations Review

A careful review of the operations of the program can include the collection, transportation and delivery of the products. Whether the operation is done in-house or by contract a thorough review of the program must be conducted. Is the waste being picked up regularly, not often enough or too often? The recycling program is dynamic and must be changed if necessary to meet customer demand.

Maintenance Review

Maintenance is a critical part of the post implementation process and must be looked at on a regular basis. Facilities must be kept clean and neat; freshly painted; and odor and pest free. Maintenance reviews also allow better estimates on future needs of equipment replacement.

Cost Review

Analyzing expenditures versus the budget is the most important aspect of a program review. Costs must be kept within budget to run a successful program and to project future needs of the program. The maintenance costs will continue well beyond the initial capital investment of setting up an initial program. The other costs to track are the savings from lowered tipping fees compared to the costs of recycling.

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APPENDICES

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APPENDIX A

SMALL INDIVIDUAL AND MULTIPLE CONTAINERS

Plastic Containers



Figure A1. Plastic mobile cart system of 32-, 64-, and 95-gallon capacity by "Otto Industries Inc.". "Otto" products available at: Otto Industries Inc. Charlotte, NC (800) 227-5885 (704) 588-9191.



Figure A2. Plastic recycling containers labeled for separate materials in 24-, 32-, 64-, or 95-gallon sizes and color coded for ease of customer use.



Figure A3. Large mobile plastic containers easy to move for pick-up service like this 95-gallon capacity unit on wheels, by Otto Inc.



Figure A4. Plastic boxes in capacities of 12-, and 14-gallon are available for smaller quantity collection in offices and other activity rooms by "Otto Inc.".



Figure A5. Romtec cross-linked polyethylene molded universally accessible 32-gallon container system, multi-configuration design of one or several mountable on a pedestal or on any building surface, lockable, designed for "Easy-Lift Tilt Action" for ease of unloading waste and recyclables. Romtec, Roseburg, OR (503)496-3541 Fax: (503) 496-0803



Figure A6. Plastic rolling cart recycling containers, color coded and available in 32-,38-,64-,and 96-gallon sizes. Schaefer Systems International (SSI), Charlotte, NC (704) 588-2150 Fax: (704) 588-1862 and in Canada at (905) 458-5399



Figure A9. Semi-automated plastic containers for front load, truck dumper and front load work bucket collection vehicles.



Figure A7. Assorted plastic waste, recycling, composter, and other small containers to suit a variety of needs by Schaefer Systems International (SSI).



Figure A10. Multi-compartment mobile "Quad Pod" containers for ease of recycling in a work office or a public use area by Zarn Inc. Reidsville NC (800) 349-678-2278 fax: (910) 342-7013



Figure A8. Plastic recycling and waste containers for rear-load and side-load collection equipment options by Toter Inc. Statesville, NC (800) 772-0071



Figure A11. Varied plastic recycling containers in sizes 14-, 18-, 22-, 32-, and 40-gallon sizes for diverse collection needs by Zarn Inc.



Figure A12. "Roll-A-Waste" containers in 40-, 65-, 90-, and 95-gallon size for semi-automatic collection by Zarn Inc.



Figure A15. Recycling with a reusable collection draw-string bag system by The Bag Connection Inc. Newberg, OR (800) 622-2448 (503) 538-8180 Fax: 503:538-0418



Figure A13. Small recycling containers in 7-, 14-, 21- and 26-gallon capacity for indoor collection by Shamrock Industries, Inc. Minneapolis, MN (612) 332-2100 (800) 822-2342; in MN (800) 822-2343



Figure A16. Pre-printed color coded recycling bag system supported by a steel rack by The Bag Connection Inc.



Figure A14. Varied office size recycling containers from SAFCO Products Co. Minneapolis, MN (612) 536-6777 Fax: (612) 536-6777



Figure A17. Assorted waste and recycling bins manufactured in plastic, metal and aluminum and in varied sizes to accommodate every indoor and outdoor need from Schaefer.



Figure A18. Various assorted rotationally molded plastic and composites collection systems for wet and dry materials collection in sizes 20- to 450-gallon capacity by Vital Visions Freeport, FL (904) 835-2121 (904) 835-3131 Fax: (904) 835-4768.



Figure A21. Recycled plastic collection system that can accommodate from one to four units. A drawstring re-usable bag or a rigid plastic liner is available. Center post is made of recycled sawdust and plastic. By Windsor Barrel Works Kempton, PA (800) 527-7848 (215) 756-4344.

Steel Containers



Figure A19. Six 32-gallon compartment fiberglass labeled recycling container by Fibrex Inc. Chesapeake, Virginia (800) 346-4458.



Figure A22. Round 18 gauge steel recycling 55-gallon capacity container with a lid for cans with a plastic reusable liner by Wilkinson Company Inc. Stow, Ohio (800) 686-6726 (216) 686-9922.



Figure A20. Fibrex container with six 32-gallon containers shown in open position.



Figure A23. Wilkinson square 18 gauge steel 55-gallon capacity recycling container. Has a round rigid liner.



Figure A24. Three 30-gallon capacity steel recycling bin system for aluminum, glass and plastic by Wilkinson.



Figure A27. Single and double unit Hyd-A-Bag Mini units with 32-gallon single and 60-gallon double capacity, labeled and color coded for recycling. Animal-proof, accessible units from Haul-All Equipment Systems.



Figure A25. Hid-A-Bag Mini double 30-gallon bag (60-gallon) capacity animal proof accessible waste and recycling container by Haul-All Equipment Systems, available at: McClintock Metal Fabricators Inc. Woodland, CA (800) 350-3588 (916) 666-6007 Fax (916) 666-7071.



Figure A28. "The Recycler system" linear steel enclosure with five 35-gallon container plastic liners. By Patterson-William Company Santa Clara, CA (408) 988-3066 Fax: 408: 727-8361.



Figure A26. Hyd-A-Bag Recycler units color coded for collection of various materials 70-gallon single; 130-gallon double unit capacity. By Haul-All Equipment Systems.



Figure A29. Square "Recycler System" with four 35-gallon capacity plastic containers from Patterson-Williams.



Figure A30. Round 18 gauge steel 55-gallon capacity drum recycling container color coded for aluminum cans and waste. Post attachment can accommodate one to four units. By Patterson-Williams.



Figure A31. Canables recycling steel containers. Varied labeling includes Cans, Glass, Plastic, Cans & Glass, Newspaper and Trash; by Windsor Barrel Works Kempton, PA (800) 527-7848.



Figure A32. Canables recycling container system available with extras like a woven plastic liner and ring, flat ABS plastic top or a dome top.

DUMPSTERS AND HYBRID CONTAINERS

Steel Containers



Figure A33. Front load animal-proof container with self closing small access lid and self locking overall lid. Four- and six-cubic yard capacity, constructed with 12 gauge steel and painted with high solids long lasting enamel paint for low maintenance and long life. Photo shows lid in normal locked position. Capital Industries Seattle WA (206) 762-8585
Fax: (206) 762-5455.



Figure A34. Front load container in open position. The tilted position of the container allows the locking mechanism to unlock; by Capital.



Figure A35. New recycling collection bins allows for easy collection only when full rather than being picked up partially empty. Containers can be used for varied collectable materials; by Capital.



Figure A36. Assorted recycling containers from a small bin size to recycling roll-off systems for varied uses, by Capital.



Figure A37. Front and rear-load recycling animal-proof dumpsters from one-cubic yard to six-cubic yard capacity, by Capital.

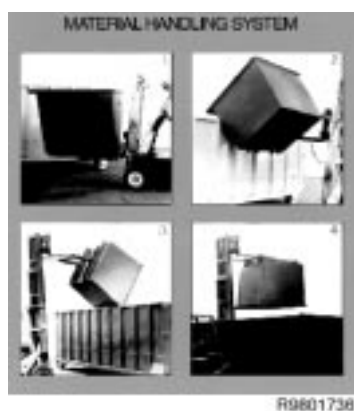


Figure A38. Material handling Tippler Bin can be emptied with any forklift into larger storage or hauling trailer, available in one to four cubic yard capacity, by Capital.



Figure A39. Tote bins for material storage and handling model shown is 36 inches by 53 inches by 21 inches high, by Capital.



Figure A40. Rear load dumpsters with metal and plastic lids ranging from one-cubic yard to three-cubic yard capacity, by Capital.



Figure A41. Standard slant top front load containers ranging from two-to four-cubic yard containers. Cathedral style containers range from six-to eight-cubic yards in capacity with plastic lids for ease of use, by Capital.



Figure A44. Galvanized containers with capacities ranging from 0.77, 1.1 cbm for the lower container on the left to 2.5 to 5.0 cbm capacity by Schaefer.



Figure A42. Front load six-and eight-cubic yard capacity dumpsters by Capital.



Figure A43. Side load containers in one-and-one-half and three-cubic yard capacity manufactured with 12 gauge steel and steel or plastic lids by Capital.

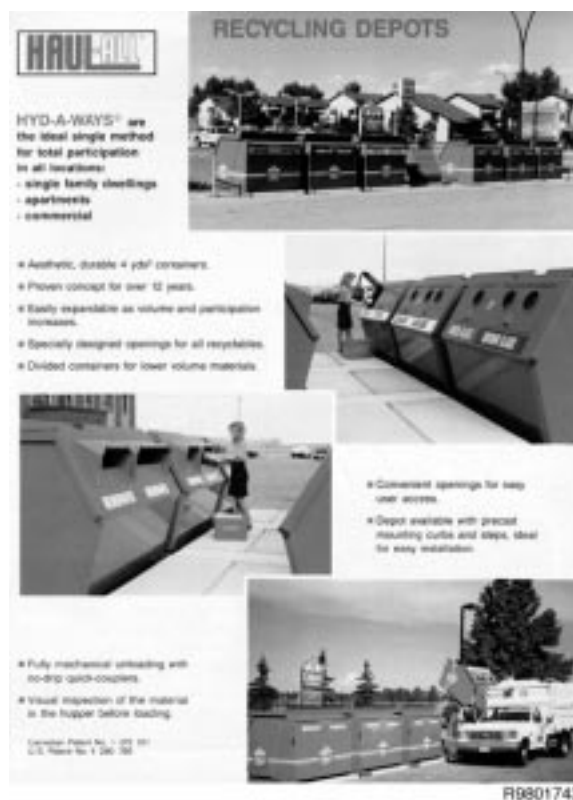


Figure A45. Recycling containers four cubic yards in size fully mechanically unloaded into a recycling truck by Haul-All.



Figure A46. "Paper and Bottle Bank" containers in 1.7-, 3.5-, and 5.5-cubic meter capacity. Made of painted or galvanized steel. Glass container is soundproofed. By Schaefer.



Figure A47. Loading and unloading gear for the Paper and Bottle Bank by Schaefer.



Figure A48. Unloading Paper and Bottle Bank onto a hauling truck by Schaefer.

Aluminum Container



Figure A49. Aluminum front load dumpster with a plastic top, available in sizes two-, four-, six-, eight- and ten-cubic yard capacity; lightweight requires no painting; by Vital Visions Freeport FL (904) 835-3131.

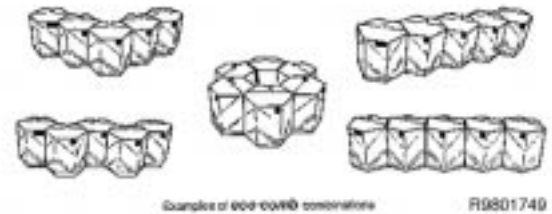


Figure A51. Various modular configurations that can be used with the Eco-Comb. Resistant to high and low temperatures, weatherproof, impact resistant, low noise benefits. From C.F. Maier Composites, Inc. Lamar CO (719) 336-8745 Fax: (719) 336-3091.

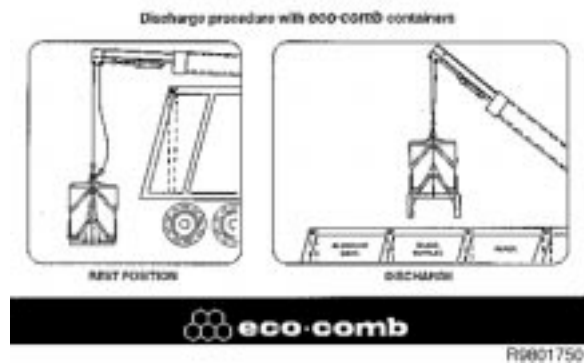


Figure A52. Loading and unloading the Eco-Comb by C.F.Maier.

Fiberglass Containers



Figure A50. Eco-Comb fiberglass recycling containers with a 420-gallon capacity, 3000 pound weight capacity.

Plastic Containers



Figure A53. Plastic dumpster containers in 0.66 cbm and 1.1 cbm sizes. UV stabilized, high grade polyethylene design. On wheels with parking brakes and drainage outlets by Schaefer.

ROLL-OFFS AND OTHER LARGE CONTAINERS

Roll-Off Containers



Figure A54. Roll-Off dumpsters in 24- and 30-cubic yard capacity, top two containers are for multiple use and the third is for newspaper collection. By Capital.



Figure A55. Multiple use and multi-bin recycling container with 24 cubic yard capacity by Capital.

Compactors



Figure A56. Ramjet dual recycling compactors for wet or dry recycling waste, available in 16 and 22 foot lengths with 20 and 30 cubic yard capacities. Double compartment design completely separate for two types of material (cardboard and aluminum etc.). By Marathon Equipment Company Vernon AL (205) 695-9105 Yerington NV (702) 463-4030

Storage Units



Figure A57. Storage units, hauling carts, loading and dumping containers by Capital.

MATERIALS RECOVERY FACILITY (MRF)



Figure A58. MRF recycling two line system that can process up to 200 tons-per-day with automatic aluminum, steel, ferrous metals, stainless brass and non ferrous, compost and paper separation. By Lundell Manufacturing Company Cherokee, Iowa (712) 225-5181 Fax: (712) 225-5185

TRUCKS, TRAILERS AND HAULING EQUIPMENT



Figure A59. Collection and hauling vehicles by Haul-All, various models and sizes for different functions in waste and recycling collection. McClintock Fabricators (800) 350-3588 or (916) 666-6007

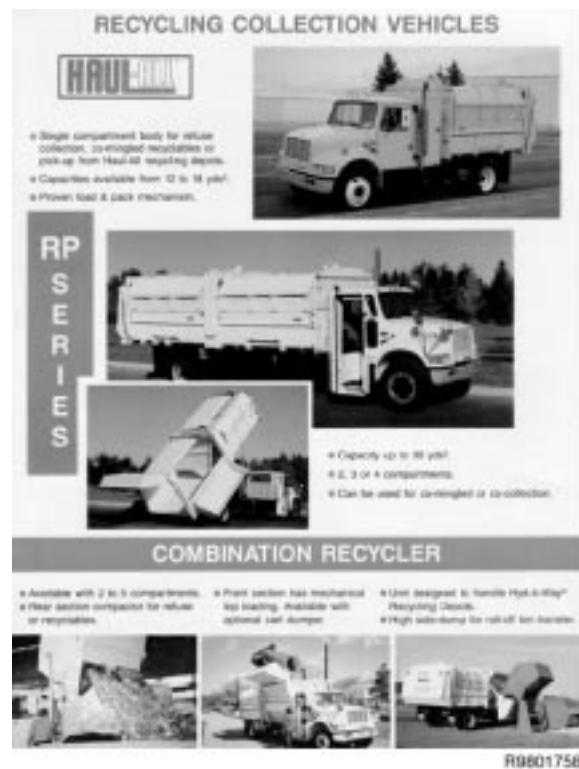


Figure A60. Various collection trucks and capacity capabilities by Haul-All.

Trailers



Figure A61. "Curb Runner" Recycling trailer with multi compartment capability of up to 6 bins. Hydraulic lift for depositing collectibles in to a roll-off or straight to the recycler. Onboard compactor for plastic milk jugs. All steel construction, by Brothers Industries Inc. Morris MN (800) 833-6045 (612) 589-1974 Fax: (612) 589-1974.

RECYCLING HAULING EQUIP. ADVANTAGES/DISADVANTAGES



Figure A63. Recycling trailer, advantages and disadvantages.



Figure A62. Transfer trailer with 115-cubic yard capacity. Truck mount with bin sizes from 4- to 8-cubic yards and 14-cubic yard trailer Curb Runner by Brothers.



Figure A64. Open-body recycling truck, advantages and disadvantages.



Figure A65. Closed-body recycling trucks, advantages and disadvantages.



Figure A67. Hydraulic side-loading trucks, advantages and disadvantages.



Figure A66. Low-profile closed-body truck, advantages and disadvantages.



Figure A68. Flat-bed trucks, advantages and disadvantages.



Figure A69. Step vans and cube vans, advantages and disadvantages.



Figure A71. Crane trucks, advantages and disadvantages.



Figure A70. Packer trucks, advantages and disadvantages.

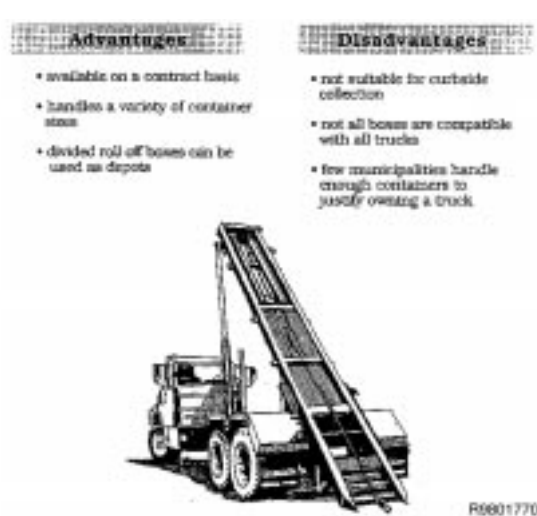


Figure A72. Roll-off trucks, advantages and disadvantages.

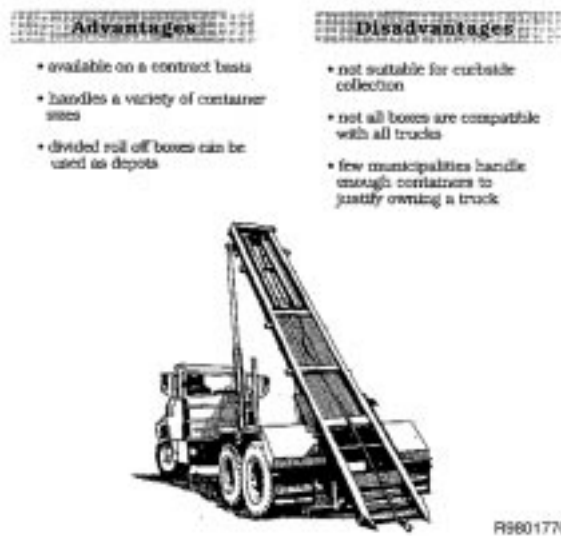


Figure A73. Hook-lift truck, advantages and disadvantages.

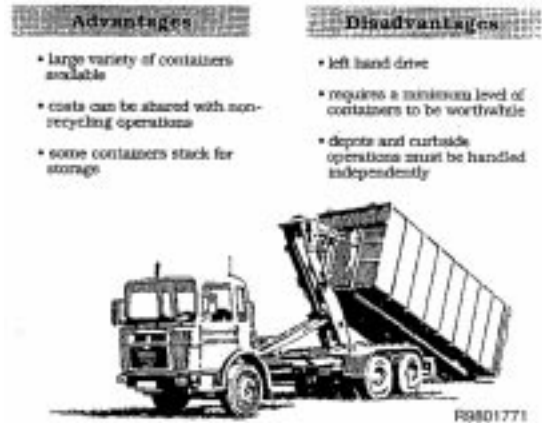


Figure A74. Dual-compartment collection truck, advantages and disadvantages.

MISCELLANEOUS EQUIPMENT

Balers

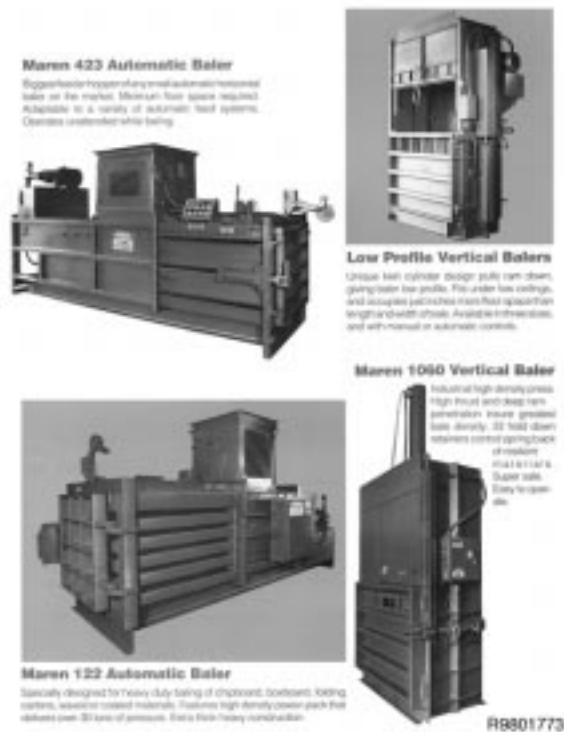


Figure A75. Balers for all sorts of compressible lightweight recycled materials by Maren Engineering South Holland, IL (708) 333-6250 Fax: (708) 333-7507



Figure A76. Recycler vertical baler, small footprint heavy duty, sizes 48 inches by 80 inches and 68 inches by 48 inches. By Marathon Equipment Company Vernon, Alabama (205) 695-9105 Clearfield Pennsylvania (814) 765-0200 Yerington, Nevada (702) 463-4030

Chippers



Figure A77. Brush and wood debris chipper powered by 177 hp Cummings turbo-charged diesel or 125 hp Seiman electric motor. Feed opening is 12 inches by 64 inches. The unit will process brush, limbs, wood debris, 5-foot wide pallets and railroad ties. By Olathe Manufacturing Inc. Airport, Kansas (913) 782-4396 Fax: (913) 764-1473. Also available through William Tole Company El Paso, Texas (915) 532-6527.



Figure A78. Rear view of Olathe brush and wood debris chipper.



Figure A79. Leaf collection systems the ODB company (800) 446-9823 (804) 226-4433.

Grinders



Figure A80. Large tubgrinder, 14 foot diameter tub for large volume grinding. Options include tub magnets, remote control, air compressor, grapple loader, electric models. The Super 14 by EarthSaver Equipment Company Midland, Texas (915) 694-9988.

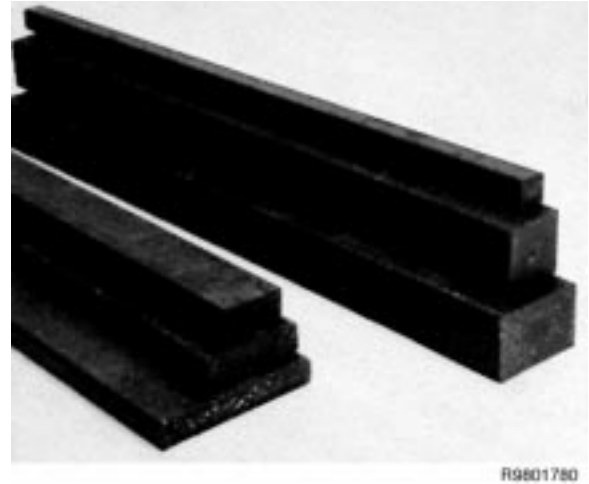


Figure A82. Dimensional recycled plastic lumber in various sizes by Hammer's.

RECYCLED PLASTIC LUMBER

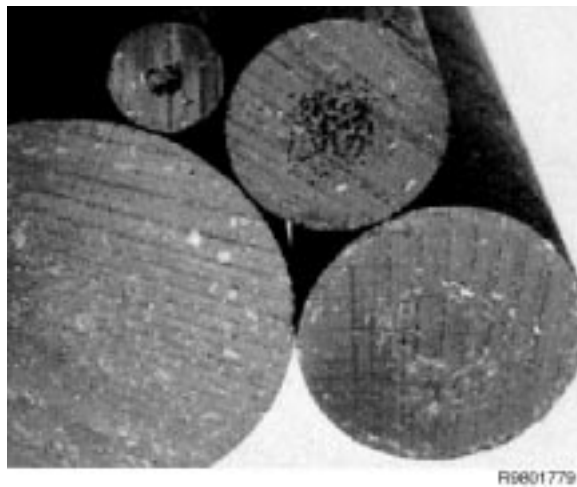


Figure A81. Plastic lumber in round poles for recycling facility construction by Hammer's Plastic recycling Iowa Falls, Iowa (515) 648-5073 and Mulberry, Florida (813) 425-5553.

PLASTIC FURNISHINGS

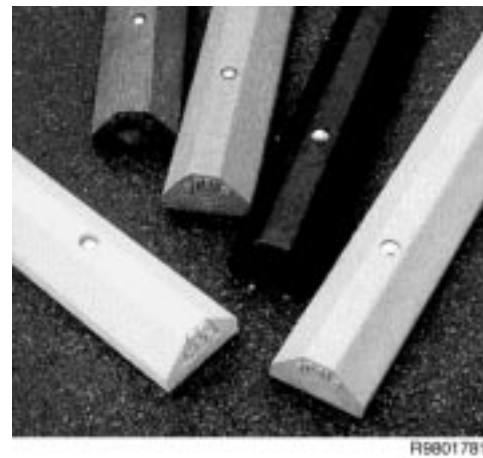


Figure A83. Recycled plastic facility products like car stops by Hammer's.



Figure A84. Recycling containers and other recycled plastic furnishings by The Plastic Lumber Company (800) 886-8990.



Figure A87. Recycling information signs by The Plastic Lumber Company.

PLASTIC SIGNS



Figure A85. Recycled plastic routed and relief information accessibility signs by The Plastic Lumber Company.



Figure A88. Park symbols and prohibitive signs by The Plastic Lumber Company.



Figure A86. Various shapes, colors and size recycled plastic signs by The Plastic Lumber Company.



Figure A89. Trail and entry recycled plastic signs by The Plastic Lumber Company.

LIST OF CONTAINER COMPANIES

Best Litter Receptacles, Inc.
Hwy. 301 South
P.O. Box 5038
Florence, SC 29502
(803) 667-8188
(800) 526-1322

C.A.H. Industries, Inc.
860 Greenleaf
Elk Grove, IL 60007
(847) 593-0727

Capital Industries, Inc.
5801 3rd Avenue, South
P.O. Box 80983
Seattle, WA 98108
(206) 762-8585

Contico International, Inc.
123 Byassee
Hazelwood, MO 63042
(314) 731-0302

Dawn Enterprises, Inc.
712 Bread and Milk Street
Coventry, CT 06238
(860) 742-5990
(800) 262-3296

DeWaid Northwest Co.
33710 Oakville Road
Albany, OR 97321
(800) 645-7106

Document Destructors, Inc.
7370-C Lockport Place
Lorton, VA 22079
(703) 550-7734

Fellowes
1789 Norwood
Itasca, IL 60143
(630) 893-1600

Franklin Wire Works Inc.
P.O. Box 127
910 East Lincoln Avenue
Belvidere, IL 61008
(800) 383-9473

Gametime, Inc.
P.O. Box 121
Fort Payne, AL 35967
(205) 845-5610

Haul-All Equipment Systems
c/o McClintock Metal Fabricators, Inc.
455 Harter Ave.
Woodland, CA 95776
(916) 666-6007
(800) 350-3588

James Systems, Inc.
c/o Promark, Inc.
5344 Woodbury Woods Place
Fairfax, VA 22032-3729
(703) 250-6700

Justrite Manufacturing Co.
2454 Dempster Street
Des Plaines, IL 60016
(847) 298-9250

Lodi Metal Tech., Inc
c/o Paul R. Minich III
1513 Wisconsin Avenue NW, Unit 2
Washington, DC 20007
(202) 338-3598

Mayo Company Inc.
5010 Flint Hill Rd.
P.O. Box 708
Austell, GA 30106
(770) 944-1574

Microphor Inc.
452 East Hill Road
Willits, CA 95490
(707) 459-5563

McClure, Ind.
9051 S.E. 55th Avenue
Portland, OR 97206
(503) 777-2821

Meese, Inc.
c/o Paul R. Minich
1513 Wisconsin Avenue NW, Unit 2
Washington, DC 20007
(202) 338-3598

Metal-Made Manufacturing Corp.,
1003 South Virginia Street
Reno, NV 89502
(702) 786-3250

The John P. Smith Co.
P.O. Box 840
20 Baldwin Drive
Branford, CT 06405
(203) 488-7225

RCS/Boxmaster
17000 Sierra Highway
Canyon Country, CA 91351
(805) 298-2666
(805) 298-3733 fax

Rubbermaid Commercial Prod.
2166 Wisconsin Avenue NW
Washington, DC 20007
(202) 265-0246

Team Recycling Systems
2166 Wisconsin Avenue, NW
Washington, DC 20007
(202) 265-0246

Toter, Inc.
2166 Wisconsin Avenue, NW
Washington, DC 20007
(202) 265-0246

United Metal Receptacle Corporation
P.O. Box 870
14th and Laurel Streets
Pottsville, PA 17901-0870
(717) 622-7715

APPENDIX B

GLOSSARY

Acute toxicity. The ability of a substance to cause poisonous effects resulting in severe biological harm or death soon after a single exposure or dose. Also, any severe poisonous effect resulting from a single short-term exposure to a toxic substance.

Air contaminant. Any particulate matter, gas, or combination thereof, other than water vapor or natural air.

Ash. The residue that remains, after burning.

Bauxite. The principle source of aluminum, containing alumina and impurities.

Biodegradables. Materials that will decay over a short period of time. They can be broken down by microorganisms into simple, stable compounds such as carbon dioxide and water.

Bleached Paper. Paper made of pulp that has been treated with bleach.

Bleaching. The process of chemically treating pulp to alter its color so that the pulp has a higher brightness. This is usually accompanied by partial removal of noncellulosic materials.

Bond Paper. A generic category of paper used in a variety of end use applications such as forms, offset printing, copy paper, stationary, etc. In the paper industry, this term was very specific but is now general.

Brightness. The reflectivity of pulp, paper, or paperboard for specified bluelight measured under standardized conditions.

Brown Papers. Papers usually made from unbleached kraft pulp and used for bags, sacks, wrapping paper and so forth.

Building Insulation. A material, primarily designed to resist heat flow, which is installed between the conditioned volume of a building and adjacent unconditioned volumes or the outside. This term includes but is not limited to insulation products such as blanket, board, spray-in-place, and loose fill that are used as ceiling, floor, foundation, and wall insulation.

Buy Back Programs. Programs for purchasing recyclable materials from the public.

Buy Back Center. A facility where individuals bring recyclable materials in exchange for payment.

Bottom ash. Larger residue pieces that fall through the bottom of the boiler grate after burning is completed.

Bypass waste. Waste that cannot be recycled, reused, or burned but must be buried at the landfill.

Chlorophyll. A green material in leaves and in other green parts of plants that is used to carry on photo-synthesis.

Composting. Mixing food scraps, grass clippings, and leaves in an optimal environment for decomposition to form a rich soil conditioner.

Chip and Fiber Board. Recycled paperboard manufactured as a filler for solid fiber boxes and other container chipboard.

Collection. The act of picking up and moving solid waste from its location of generation to a disposal area, such as a transfer station, resource recovery facility or landfill.

Collector. The person(s) or agency which receives or gathers recyclables for processing and subsequent sale to a recycler or exporter.

Commercial Waste. Material which originates in wholesale, retail or service establishments such as office buildings, stores, markets, theaters, hotels, and warehouses.

Commingled Recyclables. A mixture of different types (e.g. cans, paper, etc.) of recyclable materials into one container.

Cotton Fiber Content Papers. Paper that contains a minimum of 25% and up to 100% cellulose fibers derived from lint cotton, cotton liners, cotton or linen cloth cuttings. It is also known as rag content paper or rag paper. It is used for stationary, currency, ledgers, wedding invitations, maps and other specialty paper.

Characteristic waste. A waste classified as hazardous because it is ignitable, corrosive, reactive, or toxic as determined by the toxicity characteristic leaching procedure. Each of these four characteristics is defined in 40 CFR 261.20 Subpart C.

Chlorinated solvent. An organic solvent containing chlorine atoms, for example, methylene chloride and 1,1,1-trichloromethane that is used in aerosol spray containers and in traffic paints.

Code of Federal Regulations (CFR). The detailed regulations, written by federal agencies, to implement the provisions of laws passed by Congress. Regulations in the CFR have the force of federal law.

Conditionally exempt small quantity generator (CESQG). A hazardous waste generator that meets the following criteria: (a) in every single month of the year, the site generates no more than 100 kg (220 lbs) of hazardous waste, no more than 1 kg (2.2 lbs) of acute hazardous waste, and no more than 100 kg (220 lbs) of material from the cleanup of spillage of acute hazardous waste; (b) the site accumulates at any time during the year no more than 1,000 kg (2,200 lbs) of hazardous waste, no more than 1 kg (2.2 lbs) of acute hazardous waste, and no more than 100 kg (220 lbs) of material from the cleanup of a spillage of acute hazardous waste; and (c) the site treats or disposes of the hazardous waste in a manner consistent with regulatory provisions.

Contaminant. Any physical, chemical, biological, or radiological substance or matter that has an adverse effect on water, or soil.

Conventional pollutants. Statutorily listed pollutants that are understood well by scientists. These may be in the form of organic waste, sediment, acid, bacteria and viruses, nutrients, oil and grease, or heat.

Cycle. To circle, occur again, over and over.

Decay. The destruction or decomposition of organic matter as a result of bacterial or fungal action.

Decompose. To break down into basic elements; to rot.

Decomposer. A plant or animal that feeds on dead material and causes it to break down. Examples include fungi, earthworms, and bacteria. These are nature's recyclers.

De-inking. A process in which most of the ink, filler, and other extraneous materials are removed from paper.

Dump. An open and unmanaged disposal site used prior to sanitary landfills.

Emissions. Gases and particulates (minute particles that reach the air from the burning process).

Energy recovery. The generation of power in the form of steam or electricity from the burning of garbage.

Enforcement. Efforts made by official agencies to ensure agreement with environmental laws and regulations.

Environment. The sum of all external conditions affecting the life, development, and survival of an organism.

EPA identification number. A 12-character number assigned by either EPA or the authorized state to each hazardous waste generator, transporter, and treatment, disposal, or storage facility. Facilities that are not generators but anticipate generation activity may also apply for and receive an EPA ID number. The first two characters are alphabetical and stand for the state in which the site is physically located. The third character can be either alphabetical or numeric. The remaining nine characters are always numeric.

Extremely hazardous substances. Any of 406 chemicals identified by EPA on the basis of toxicity and listed under SARA Title III. The list is subject to revision.

Fungi. (singular = fungus) Simple plants that cannot use the sun's energy to make food because they do not have chlorophyll.

Fly ash. Very small solid particles of ash and soot generated by burning and carried in gases that fly up into the environmental control equipment.

Generator. A person, company, site, or mobile source that produces solid or liquid waste.

Generator notification form. Every site that generates, treats, stores, or disposes of hazardous waste must inform EPA of its hazardous waste activity by filing EPA Form 8700-12, Notification of Hazardous Waste Activity (Hazardous Waste Activity Notification Form). After receiving the notification form, EPA assigns an identification number (EPA ID) to the site.

Grade. A term applied to recyclables which are ranked on the basis of use, appearance, quality, manufacturing history, raw materials, performance, or a combination of these.

Habitat. The area where an animal or plant lives and finds nutrients, water, shelter, and living space.

Halon. Bromine-containing compounds with long atmospheric lifetimes whose breakdown in the stratosphere cause depletion of ozone. Halons are used in fire-fighting.

Hazardous waste. By-products of society that can pose a substantial or potential hazard to human health or the environment when improperly managed. Possesses at least one of four characteristics (ignitability, corrosivity, reactivity, or toxicity) or appears on special EPA lists.

Incinerator. A facility designed to reduce waste volume by burning. It can be equipped to generate energy.

Ingots. A mass of metal shaped for convenience in storage or transportation.

Impact analysis. A quantitative or qualitative analysis of potential effects related to the use of energy and material resources and releases to the environment

Improvement analysis. A systematic analysis of the needs and opportunities for environmental improvements in a product, process, or activity.

Inorganic Waste. Waste composed of matter other than plant or animal.

Integrated solid waste management The practice of using several alternative waste management techniques to manage and dispose of specific components of the waste stream. Waste management alternatives include source reduction, recycling, composting, energy recovery, and land-filling.

Landfill. A huge basin ranging in size from 20 to 70 acres wide scooped out of the earth. The sides and bottom are lined with layers of clay and geotextiles. Inside are also 12 to 14-inch layers of sand in which is buried a piping system that collects the leachate that runs through the garbage.

Large quantity generator (LQG). A generator of hazardous waste that meets any of the following criteria: (a) the site generates in one or more months during a year 2,200 pounds or more of RCRA hazardous waste; (b) the site generates in one or more months during the year, or accumulates at any time, 2.2 pounds of RCRA acute hazardous waste; or (c) the site generates or accumulates at any time more than 220 pounds of spill cleanup material contaminated with RCRA acute hazardous waste.

Leachate. The liquid formed as moisture and rainfall pass through garbage in landfills.

Leaf litter. Slightly decayed leaves lying on the forest floor.

Lichen. A plant composed of fungi and algae living together in a partnership.

Litter. Waste material discarded in an inappropriate place. Littering is illegal in Wisconsin.

Life Cycle Analysis. Analyzing the total environmental impacts for a specific product or product category, including mining, manufacturing, transporting, use, and recycling and/or disposal.

Life-cycle inventory. A quantitative inventory of raw materials and energy requirements and of environmental releases to air, water, and land from all stages of life of a product, process, or activity.

Listed wastes. Wastes specifically named in 40 CFR 261.3. These wastes are listed as hazardous under RCRA but have not been subjected to the toxic characteristics listing process because the dangers they present are considered self-evident. They bear EPA Waste Codes beginning with the letters F, P, U, or K.

Microbe. Very small plants and animals that aid in decomposition.

Mold. A type of fungus that grows on decaying materials.

Manual Separation. The separation of recyclable or compostable materials from waste by hand sorting.

Manufacturing Waste. Material produced by a manufacturer, such as a paper mill, steel or aluminum mill, glass factory, or plastic resin manufacturer. Most manufacturing waste is returned to the manufacturing process as a matter of course.

Minimum Content Law. A law which requires that a specific product or packaging category contain a minimum amount of recycled and/or post-consumer material in order to be legally sold within the jurisdiction of the law.

Municipal Solid Waste (MSW). Includes non-hazardous waste generated in households, commercial and business establishments and institutions.

Material recovery facility (MRF). A type of solid waste recycling facility that separates out all usable products and usable parts from individual products.

Material safety data sheet (MSDS). A compilation of information required under the OSHA Communication Standard on the identity of hazardous chemicals, health and physical hazards, exposure limits, and precautions. Section 311 of SARA requires facilities to submit MSDSs under certain circumstances.

Natural Resources. Valuable, naturally occurring materials such as soil, wood, air, water or minerals.

Non-Biodegradables. Materials that will not decay and cannot be recycled.

Non-recyclables. Items which are made of materials that cannot be recycled.

Non-renewable resource. A natural resource that is considered finite in amount because of its scarcity, the great length of time it takes to form, or its rapid depletion (e.g., coal, copper, petroleum).

Nutrients. A substance with nutritive value that is necessary for growth.

National Pollutant Discharge Elimination System (NPDES). A provision of the Clean Water Act that prohibits discharge of pollutants into waters of the United States unless a special permit is issued by EPA, a state, or (where delegated) a tribal government on an Indian reservation.

Off-site facility. A hazardous waste treatment, storage, or disposal area that is located at a place away from the generating site.

On-site facility. A hazardous waste treatment, storage, or disposal area that is located on the generating site.

Operator. Person or organization responsible for the overall operation of the site.

Office Paper. Secondary fibers produced by office workers, including ledger, computer, and bond papers.

Original Resources. Natural resources, often called "virgin" resources, such as minerals, trees, oil, and water.

Packaging. A product container or product cushion or wrapping around the product or container. Packaging may also refer to pre-consumer shipping and storage containers as well as packaging on the shell.

PET (polyethylene terephthalate). A plastic resin used to make packaging, particularly soft drink bottles.

Photosynthesis. The process by which green plants use the sun to change carbon dioxide and water into sugar.

Post-consumer Material. A finished material which would normally be disposed of as a solid waste, having completed its intended final use as a consumer item.

Pre-consumer Material. Waste produced before the product reaches the consumer, for example in converting industries.

Pesticide. Substance or mixture of substances intended for preventing, destroying, repelling, or mitigating any pest. Also, any substance or mixture of substances intended for use as a plant regulator, defoliant, or desiccant. A pesticide can accumulate in the food chain or contaminate the environment (or both) if misused.

Primary packaging. Packaging that comes into direct contact with the product; also known as unit packaging.

Recycle. To collect and reprocess manufactured materials for reuse either in the same form or as part of a different product.

Reduce. To lessen in extent, amount, number or other quantity.

Renewable resource. A natural resource derived from an endless or cyclical source. With proper management and wise use, replacement of these resources by natural or human assisted systems can be approximately equal to their consumption.

Recyclables. Materials that have useful physical or chemical properties after serving their original purpose and can be reused or manufactured into additional products.

Re-refined Motor Oil. Reclaimed lubrication oil processed for reuse.

Reuse. The use of a product more than once in its same form; e.g., a soft drink bottle is reused when it is returned to the bottling company for refilling. To extend the life of an item by using it again, repairing it, modifying it, or creating new uses for it.

Resource Stream. A new perspective on what we have commonly considered to be garbage, trash, or waste. Recognizes the inherent economic and environmental value of resource materials that we have been land-filling or incinerating.

Recovered materials. Waste material and by-products that have been recovered or diverted from solid waste, excluding materials and by-products generated from, and commonly used within, an original manufacturing process.

Recycled materials. Materials, which otherwise would have been destined for disposal, that have been collected, reprocessed or remanufactured, and made available for reuse.

Refuse reclamation. Conversion of solid waste into useful products for example, composting organic wastes to make soil conditions or separating aluminum and other metals for melting and recycling.

Resource Conservation and Recovery Act (RCRA). The federal statute that regulates the generation, treatment, storage, disposal, or recycling of solid and hazardous waste.

Resource recovery facility. Any place, equipment, or facility designed and/or operated to separate or process solid waste into usable materials or to incinerate solid waste to create heat and energy.

Sanitary landfill. A specially engineered site for the disposing of solid waste on land.

Secondary packaging. Wrapping that is around the primary packaging or that may serve to join two or more packages together for sale as a joint entity; also known as intermediate packaging.

Sewer. A channel or conduit that carries wastewater and storm water runoff from the source to a treatment plant or receiving stream. Sanitary sewers carry household, industrial, and commercial wastes. Storm sewers carry runoff from rain or snow. Combined sewers are used for both purposes.

Sludge. A semi-solid residue from any number of air or water treatment processes. Sludge can be a hazardous waste.

Small quantity generator (SQG). A hazardous waste generator that meets all the following criteria: (a) in one or more months of the year the site generates more than 220 pounds of hazardous waste, but in no month (1) generates 2200 pounds or more of acute hazardous waste, (2) generates 2.2 pounds or more of acute hazardous waste, or (3) generates 220 pounds or more of material from a cleanup of a spillage of acute hazardous waste; (b) the site accumulates at any time during the year no more than 2.2 pounds of acute hazardous waste and no more than 220 pounds of material from the cleanup of a spillage or acute hazardous waste; and (c) the site stores its waste in tanks or containers in a manner consistent with regulatory provisions. Alternatively, the site is a SQG during the year it meets all other criteria for a Conditionally Exempt SQG, but accumulates 2200 pounds or more of hazardous waste.

Solid waste. Non-liquid, non-soluble materials ranging from municipal garbage to industrial wastes that contain complex, and sometimes hazardous, substances. Solid wastes also include sewage sludge, agricultural refuse, construction and demolition wastes, and mining residues. Technically, solid waste also refers to liquids and gases in containers.

Solid Waste Management. The systematic administration of activities which provide for the collection, source separation, storage, transportation, transfer, processing, treatment and disposal of solid waste.

Source Separation. The segregation of various materials from the waste stream at the point of generation.

Source Reduction. The design, manufacture, acquisition and reuse of materials so as to minimize the quantity and/or toxicity of waste produced. Source reduction prevents waste either by redesigning products or by otherwise changing societal patterns of consumption, use, and waste generation.

Subtitle D. The non-hazardous solid waste section of the Resource Conservation and Recovery Act.

Solvent. Substance (usually liquid) capable of dissolving or dispersing one or more other substances. Solvents include, but are not limited to, the non-spent materials listed in EPA Waste Codes F001 through F605.

Standard Industrial Classification (SIC) Code. A four-digit coding system, developed by the Census Bureau and OMB, that categorizes the principal product or group of products produced or distributed, or services rendered, at a site's physical location.

Storage. Temporary holding of waste pending treatment or disposal. Storage methods include containers, tanks, waste piles, and surface impoundments.

Substrate. Any material upon which ink is impressed, such as paper, plastic, wood, or metal.

TDR. Treatment, disposal, or recycling.

Tertiary packaging. Shipping boxes or other packaging materials used for product transport to and from a retail center (for example, master cartons); also known as shipping containers.

Tipping Fee. A fee for the unloading or dumping of a waste at a landfill, transfer station or waste-to-energy facility, usually stated in dollars per ton.

Toxic. Harmful to living organisms.

Toxic Chemical Release Form. Information form required to be submitted by facilities that manufacture, process, or use (in quantities above a specific amount) chemicals listed under SARA Title III.

Transporter. A person engaged in the off-site transportation of hazardous waste by air, rail, road, or water.

Trash. Materials considered worthless, unnecessary, or offensive that are usually thrown away.

Treatment. Any method, technique, or process, including neutralization, designed to change the physical, chemical, or biological character of composition of any hazardous waste so as to neutralize such wastes, to recover energy or material resources from the waste, or to render such waste non-hazardous or less hazardous; safer to transport, store, or dispose; or amenable to recovery, storage, or reduction in volume.

Treatment, storage, and disposal facility (TSD). Site where a hazardous substance is treated, stored, or disposed. TSD facilities are regulated by EPA and states under RCRA.

Uniform Hazardous Waste Manifest. The shipping document (EPA Form 8700-22 or 8700-22a) that pertains to hazardous waste and is duly signed by the generator.

Virgin material. Any basic material for industrial processes which has not previously been used (e.g., wood/pulp trees, iron ore, silica, crude oil, bauxite.)

Volume reduction. The processing of waste materials so as to decrease the amount of space the materials occupy, usually by compacting or shredding (mechanical), incineration (thermal), or composting.

Waste. Any material discarded as worthless, defective, or of no further use that, when disposed of, may pose a threat to human health or the environment

Waste Exchange. Typically, a computer or catalog network that redirects waste back into manufacturing or reuse processes. This is done by matching companies generating specific wastes with companies that use those wastes as manufacturing inputs.

Waste Stream. The total flow of solid waste from a particular area. Some examples include homes, businesses, institutions, and manufacturing plants, or any segment thereof, such as the residential waste stream or the recyclable waste stream.

Waste management costs. The costs to procure, handle, treat, and dispose of wastes; a key factor in deciding to introduce source-reduction techniques.

Waste minimization. The reduction, to the extent feasible, of hazardous waste that is generated or subsequently treated, stored, or disposed. It includes any source-reduction or recycling activity undertaken by a generator that results in: (1) the reduction of total volume or quantity of hazardous waste; (2) the reduction of toxicity of hazardous waste; or (3) both, as long as the reduction is consistent with the goal of minimizing present and future threats to human health and the environmental

Yard waste. Organic wastes generated in the yard including leaves, grass clippings, sticks, etc.

APPENDIX C

RECYCLING INFORMATION AND SOURCES

Conversion Figures

Item	Weight in Pounds
Glass (average weights per unit)	
10-oz single-serving juice container	0.19
12-oz container	0.23
20-oz container	0.38
75-gal caddy filled with glass (uncrushed)	174
46-gal bin filled with glass (uncrushed)	107
40-yd roll-off filled with glass	24000
1 cu. yd glass	
Aluminum (average weights per unit)	
10-oz single-serving container	0.06
90-gal caddy filled with aluminum cans	23
46-gal bin filled with aluminum cans	12
40-yd roll-off filled with steel cans	8000
1 cu. yd aluminum	200
10-oz food or beverage can	0.20
12-oz food or beverage can	0.07
18-oz food or beverage can	0.11
75-gal caddy filled with steel cans	54
46-gal caddy filled with steel cans	33
40-yd roll-off filled with steel cans	8000
1 cu. yd tinplate steel	200
Fine paper-newspaper-old corrugated cardboard (OCC) (average weights per unit)	
75-gal caddy filled with fine paper or newspaper	212
1 school newspaper	0.05
1 daily newspaper	0.7
1 cu. yd fine pape	500
40-yd container filled with flattened OCC	6000
1 cu. yd flattened OCC	150
1 cu. yd newspaper	500

CONVERSION FACTORS FOR RECYCLABLES

Item	Size	Weight /lbs
PET soda bottles-whole-loose	1 cu.yd.	30-40
PET soda bottles-whole-loose	Gaylord*	40-53
PET soda bottles-baled	30" x 48" x 60"	500
PET soda bottles-granulated	Gaylord*	700-750
PET soda bottles-granulated	Semi-Load	30000
Film-baled	30" x 42" x 48"	1100
Film-baled	Semi-Load	44000
HPDE (dairy only)-whole-loose	1 cu.yd.	24
HPDE (dairy only)-baled	30" x 48" x 60"	500-800
HPDE (mixed)-baled	30" x 48" x 60"	600-900
HPDE (mixed)-granulated	Gaylord*	800-1000
HPDE (mixed) granulated	Semi-Load	42000
Mixed PET & dairy-whole-loose	1 cu.yd.	Average 32
Mixed PET-dairy-rigid-whole	1 cu.yd.	Average 38
Mixed rigid-no film/dairy-whole	Gaylord*	500-1000
Mixed rigid & film	1 cu.yd.	Average 60
Aluminum cans-whole	1 cu.yd.	50-74
Aluminum cans-whole	1 full kraft/grocery bag	Average 1.5
Aluminum cans	55 gal. plastic bag	13-20
Ferrous cans-whole	1 cu.yd.	150
Ferrous cans-flattened	1 cu.yd.	850
Leaves-uncompacted	1 cu.yd.	250-500
Leaves-compacted	1 cu.yd.	320-450
Leaves-vacuumed	1 cu.yd.	350
Wood chips	1 cu.yd.	500
Mulch	1 cu.yd.	200-300
Grass clippings	1 cu.yd.	400-1500
Used motor oil	1 gal.	7
Tire-passenger car	1	12
Tire-truck	1	60
Food waste-solid and liquid fats	55 gal. drum	412

*Gaylord size most commonly used 40" x 48" x 36"

Source. National Recycling Coalition, Washington, DC

VOLUME TO WEIGHT CONVERSIONS

The conversion factors below will allow the calculation of gross weight from gross volume. Figures may vary depending on specific processing and handling circumstances and on how tightly the loads are packed. Changes in container material or design may also vary the amount of material per container. Weights for paper can be affected by moisture or humidity.

Materials	Volume	Weight in Pounds	Weight in Tons
Newsprint- loose	1 cubic yard	360-800	0.18-0.4
Newsprint-compacted	1 cubic yard	720-1000	0.36-0.5
Newsprint	12-inch stack	35	0.0175
Corrugated cardboard-loose	cubic yard	300	0.15
Corrugated cardboard-baled	1 cubic yard	1000-1200	0.5-0.6
Glass-whole bottles	1 cubic yard	600-1000	0.3-0.5
Glass-semicrushed	1 cubic yard	1000-1800	0.5-0.9
Glass-crushed (mechanically)	1 cubic yard	800-2700	0.4-1.35
Glass-whole bottles	one full grocery bag	16	0.008
Glass-uncrushed to manually broken	55-ga Ron drum	125-500	0.0652-0.25
Aluminum cans- whole	1 cubic yard	50-74	0.025-0.037
Aluminum cans- flattened	1 cubic yard	250	0.125
Aluminum cans	one full grocery bag	1.5	0.00075
Aluminum cans	one 55-gallon plastic bag	13-20	0.0065-0.01
Ferrous cans-whole	1 cubic yard	150	0.075
Ferrous cans- flattened	1 cubic yard	850	0.425
PET* soda bottles-whole-loose	1 cubic yard	30-40	0.15-0.02
PET soda bottles-whole-loose	1 gaylord***	40-53	0.02-0.0265
PET soda bottles-baled	30"x48"x62" bale	500	0.25
PET soda bottles-granulated	gaylord***	700-750	0.35-0.375
PET soda bottles-granulated	tractor trailer load	30000	15.0
Film baled	30"x42"x48" bale	1100	0.55
Film baled	tractor trailer load	44000	99.0
HDPE** (dairy only) whole-loose	1 cubic yard	24	0.012

HDPE (dairy only) baled	30"x48"x60" bale	500-800	0.25-0.4
HDPE (mixed) baled	30"x48"x60" bale	600-900	0.3-0.45
HDPE (mixed) granulated	gaylord***	800-1000	0.4-0.5
HPDE (mixed) granulated	tractor trailer load	42000	21
Mixed PET and dairy- whole- loose	1 cubic yard average	32	0.016
MixedPET dairy and other rigid- whole-loose	1 cubic yard	38	0.019
Mixed rigid no film or dairy- whole- loose	1 cubic yard	49	0.0245
Mixed rigid no film granulated	gaylord***	500-1000	0.25-0.5
Mixed rigid and film-densified by mixed plastic mold technology	1 cubic foot	60	0.03
Used motor oil	1 gallon	7	0.0035
Tire-passenger car	one	12	0.006
Tire-truck	one	60	0.03
Food waste-solid and liquid fats	55 gallon drum	412	0.206

*PET is polyethylene terephthalate.

**HDPE is high-density polyethylene.

***Gaylord size most commonly used: 40"x48"x36"

VOLUME TO VOLUME (LIQUID) CONVERSION

1 liter = 0.26 gallons

1 gallon = 3.8 liters

1 cubic yard = 202 gallons

1 cubic yard = 764 liters

1 gallon = 0.0049 cubic yards

1 liter = 0.0013 cubic yards

ESTABLISHING RECYCLING CONTRACTS

Most federal agencies have two alternatives for establishing contracts for the sale of recyclables: They can use existing GSA recycling contracts (if available) or they can establish their own independent recycling contracts. For military agencies, the Defense Logistics Agency provides this service in lieu of GSA.

GSA CONTRACTS

There are several advantages to using a GSA contract. GSA establishes and administers the contract; provides assistance and training for agency personnel; performs record keeping; and provides feedback. To inquire about participation in a GSA recycling contract, contact the Regional Recycling Coordinator at (415) 744-5215.

INDEPENDENT CONTRACTS

Not all agencies are able to use a GSA contract. If the decision is made to establish a separate contract, the contracting officer should work with the GSA Regional Recycling Coordinator at (415) 744-5215. GSA can provide assistance in developing and implementing a recycling contract or incorporating recycling provisions into an existing custodial or waste hauling contract.

The major steps for developing an independent contract are:

1. Contact management if office space is leased from a non-government source
2. Collect detailed waste stream and market information
3. Develop the contract
4. Invite bids
5. Oversee the contract

Major elements of an Invitation for Bid (IFB) should include:

1. A description of types and grades of recyclable materials to be collected and sold.
2. An estimate of generation rates.
3. The location of material pickups.
4. The minimum pickup quantity and a schedule of pickups.
5. Type of containers and equipment the contractor is expected to provide.
6. Confidential document handling or destruction procedures, if applicable.
7. A description of nonperformance penalties.
8. The pricing structure.
9. The term of the contract.
10. The date bids close.

For high grade paper see 40 CFR Part 246 (Source Separation Guidelines).

RECYCLING SOLID WASTE PUBLICATIONS

Periodicals

American City & County

Communication Channel, Inc.
255 Barfield Road
Atlanta, GA 30328

COPPE Quarterly

Council on Plastics and Packaging
in the Environment
1275 K Street, NW
Washington, DC 20005

Environment Week

King Communication Group, Inc.
627 National Press Building
Washington, DC 20045
(202) 638-4260

Environmental Protection

Stevens Publishing Corporation
255 N. New Road
Waco TX 76710

Fibre Market News

G.I.E. Inc. Publishers
4012 Bridge Avenue
Cleveland, OH 44113
(800) 456-0707

Solid Waste Report

Business Publishers, Inc.
951 Pershing Drive
Silver Spring, MD 20910-4464
(301) 587-6300

Scrap Tire News

Recycling Research, Inc.
Suffield, CT 06078
(203) 668-5422

ISWA Times

International Solid Waste Association
ISWA General Secretariat Vester Farminagsgade
29 DK-1780 Copenhagen V
Phone: +45 33 15 65 65
North American Office (301) 585-5105

Phoenix Quarterly

Institute of Scrap Recycling Industries, Inc.
1627 K St. NW, Suite 700
Washington, DC 20036

PIMA Magazine

Paper Industry Management Association
2400 Oakton Street
Arlington Heights, IL 60005
(708) 956-0250

Pollution Prevention News

United States Environmental Protection Agency
Office of Pollution Prevention
401 M Street, SW (PM-222B)
Washington, DC 20460

The Recycling Magnet Steel Can Recycling Institute

608 Anderson Drive
Pittsburgh, PA 15220

Refuse News

12724 Whittier Blvd., Suite A-6
Whittier, CA 90602

Reuse/Recycle

Box 3535
Lancaster, PA 17604

RCR, 4 Review

4444 W. Alexis Road
Toledo, OH 43623

Recycling Today

GIE, Inc.
4012 Bridge Ave.
Cleveland, OH 44113-3320
(800) 456-0707
(216) 961-4130

Resource Recovery FOCUS

National Solid Wastes Management Association
1730 Rhode Island Ave., NW Suite 1000
Washington, DC 20036

Resource Recovery Report

5313 38th Street, NW
Washington, DC 20015
(202) 362-6034

Resources

The Environmental Resources Management Inc.
855 Springdale Drive
Exton PA 19341
(800) 544-3117

Resource Recycling

Resource Recycling, Inc.
1206 NW 21st Ave.
Portland, OR 97209
(503) 227-1319

Reusable News

United States Environmental Protection Agency
Solid Waste and Emergency Response
401 M Street, SW
Washington, DC 20460

Recycling Manager

Capital Cities/ABC Inc.
Diversified Publishing Group
350 Hudson Street, 4th Floor
New York, NY 10014
(212) 519-7550

Scrap Processing & Recycling

Institute of Scrap Recycling Industries
1325 G St., NW Suite 1000
Washington, DC 20005

Scrap Age

3605-111 Woodhead Drive
Northbrook, IL 60062

Scrap Tire News

133 Mountain Road
Suffield, CT 06078
(203) 668-5422

Solid Waste Management Newsletter

Office of Technology Transfer
University of Illinois at Chicago
Box 6998
Chicago, IL 60680

The Soft Drink Recycler

National Soft Drink Association
1101 16th Street, NW
Washington, DC 20036
(202) 463-6700

The Paper Stock Report

The weekly update on the paper recycling market
13727 Holland Road
Cleveland, OH 44142-3920
(216) 362-7979

U.S. FEDERAL AGENCIES (Recycling Information)**EPA Administrator**

U.S. Environmental Protection Agency
401 M Street, SW
Washington, DC 20460
(202) 260-4700

EPA REGIONAL OFFICE HOTLINES**Region 1**

Connecticut, Massachusetts, Maine,
Vermont, New Hampshire, Rhode Island).
General Number (617) 565-3715
Hazardous Waste Ombudsman (617) 223-1461

Region 2

New Jersey, New York,
Puerto Rico, Virgin Islands)
General Number (212) 264-2515
Superfund Hot Line (NY) (800) 722-1223
(NJ) (800) 346-5009
RCRA Hot Line (800) 732-1223

Region 3

Delaware, Maryland, Pennsylvania, Virginia,
West Virginia, District of Columbia
General Number (800) 438-2474
Waste Minimization Hot Line (800) 334-2467 (PA);
(800) 826-5320

Region 4

Alabama, Florida, Georgia, Kentucky, Mississippi,
North Carolina, South Carolina, Tennessee
General Number (800) 282-0239 (GA)
(800) 241-1754 other states
Hazardous Waste Ombudsman (404) 347-7109

Region 5

Illinois, Indiana, Michigan, Minnesota, Ohio,
Wisconsin
General Number (800) 572-2515 x111
(800) 621-8431 other states
Hazardous Waste Ombudsman (312) 353-5821

Region 6

Arkansas, Louisiana, New Mexico, Oklahoma,
Texas
General Number (214) 655-2200
Hazardous Waste Ombudsman (214) 655-6765

Region 7

Iowa, Kansas, Missouri, Nebraska)
General Number (913) 236-2803
Hazardous Waste Ombudsman (913) 236-2800

Region 8

Colorado, Montana, N.Dakota, S. Dakota,
Utah, Wyoming)
General number (800) 759-4372
Hazardous Waste Ombudsman (303) 294-7036

Region 9

Arizona, California, Hawaii, Nevada, American
Samoa,
Guam, Commonwealth of the Northern Marianna
Islands, Republic of Palau,
Federated States of Micronesia, The Republic of
the Marshall Islands
General Number (415) 744-1500

Region 10

Alaska, Idaho, Oregon, Washington
General Number (206) 422-5810
Hazardous Waste Ombudsman (206) 442-4280



EDUCATIONAL RESOURCES

A-Way with Waste (teacher guide) 1989
Washington State Department of Ecology
Waste Reduction, Recycling, and Litter Control Program
Eikenberry Building, Mailstop PV-11
Olympia, WA 98504

Bottle Biology Resources Network
(A Project of the Center for Resources Education)
University of Wisconsin
B-37 Russell Laboratories
1630 Linden Dr.
Madison, WI 53706

"Buried Alive, The Garbage Glut:
An Environmental Crisis Reaches Our Doorstep."
Newsweek
November 27, 1989

Earthkeepers -
Four keys for helping young people live
in harmony with the earth. 1987.
Steve Van Matre, and Bruce Johnson
The Institute for Earth Education
Box 288
Warrenville, IL 60555

Everything Goes Somewhere (Study Guide).
1989.
University of WI Extension
College of Natural Resources
UW-Stevens Point
Stevens Point, WI 54481

**The Fourth "R" - An Action Booklet for
Recycling in the Classroom and School.** 1990
Wisconsin Department of Natural Resources
PO Box 7921
Madison, WI 53707

Golden Guides - Nature Series.
Golden Press, New York.
Western Publishing Co., Inc.,
Racine, WI.

The Great Glass Caper
(Activity guide, ditto master, poster and filmstrip).
1987
The Glass Container Industry
c/o Box 1400K
Dayton, OH 45414

Hands-On Nature:
Information and Activities for
Exploring the Environment with Children
Lenepher Lingelbach
Vermont Institute of Natural Science
Woodstock, VT 05091

The Lorax, 1988
Dr. Seuss
Random House, New York

Nature Scope Series.
National Wildlife Federation
1412 16th St. NW
Washington, DC 20036-2266

The Nature Specialist -
A Complete Guide to Program and Activities
Lenore Hendler Miller
American Camping Association
Martinsville, IN

OBIS
(Outdoor Biology Instructional Strategies). 1982
Delta Education
Box M
Nashua, NH 03061

Oscar's Option
Ocean State Clean Up and Recycling
Dept. of Environment Management
Providence, RI 02908

Peterson Field Guide Series
Houghton Mifflin Company
Boston
Riverside Press, Cambridge

Project Learning Tree

American Forest Council
1250 Connecticut Ave. NW
Washington DC 20036

Project Pride

Quality Forward
PO Box 22
Asheville, NC 28802

Recycle Alaska: Activities Handbook. 1982.

Dept. of Environment
Conservation, Pouch 0
Juneau, AK 99811

Recycle For Reuse:

4-H Leader-Member-Family Guide
Publ. No. 362. 1985.
4-H Programs
University of WI Extension
Madison, WI 53706

Recycling Education - A Workbook for Teachers
1988

Keep America Beautiful
Mill River Plaza
9 West Broad Street
Stamford, CT 06902

Recycling Study Guide (booklet) 1988

Wisconsin Department of Natural Resources
PO Box 7921
Madison, WI 53707

Sharing Nature With Children -**A Parents and Teachers Nature-Awareness Guidebook.** 1979

Joseph Bharat Cornell
Ananda Publications

Sunship Earth:**An Acclimatization Program for Outdoor Learning.** 1979

Steve Van Matre
Acclimatization Experiences Institute
Box 288
Warrenville, IL 60555

Teacher's Resource Guide for Solid Waste and Recycling Education

Association of Vermont Recyclers
PO Box 1244
Montpelier, VT 05602

STATE RECYCLING INFORMATION AND SOURCES

Alabama

Chief, Land Division
Department of Environmental Management
1751 Congresssman W. L. Dickinson Drive
Montgomery, AL 36130
(205) 271-7730

Alaska

Chief, Solid and Hazardous Waste Management
Section
Division of Environmental Quality
Department of Environmental Conservation
3200 Hospital Drive
Juneau, AK 99811-1800
(907) 465-2671

Arizona

Assistant Director, Office of Waste Management
Programs
Arizona Department of Environmental Quality
2005 North Central Avenue, Room 202-A
Phoenix, AZ 85004

Arkansas

Chief, Solid Waste Division
Department of Pollution Control and Ecology
8001 National Drive
PO Box 8913
Little Rock, AR 72219

Colorado

Director, Hazardous Materials and Waste
Management Division
Department of Health
4210 East 11th Avenue - Room 351
Denver, CO 80220
(303) 331-4830

Delaware

Director, Division of Air and Waste Management
Department of Natural Resources and
Environmental Control
89 Kings Highway
Dover, DE 19901
(302) 739-4764

District of Columbia

Department of Public Works
Office of the Director
65 K St. NE, Lower Level
Washington, DC 20002
(202) 727-4600

Florida

Director, Division of Waste Management
Department of Environmental Regulation
2600 Blair Stone Road
Tallahassee, FL 32399-2400
(850) 488-0190

Georgia

Chief, Environmental Protection Division
Georgia Department of Natural Resources
205 Butler Street, SE, Room 1154
Atlanta, GA 30334
(404) 656-2833

Hawaii

Chief, Solid and Hazardous Waste Branch
Department of Health Environmental Management
Division
Five Waterfront Plaza
500 Ala Moana Boulevard, Suite 250
Honolulu, HI 96813

Idaho

Department of Health and Welfare
Division of Environmental Quality
Hazardous Materials Bureau
1410 North Hilton Street
Boise, ID 83706

Illinois

Chief, Illinois Environmental Protection Agency
1021 North Grand Avenue, E.
Springfield, IL 62792-9276
(217) 782-6760

Indiana

Branch Chief, Solid Waste
Department of Environmental Mgmt
Office of Solid and Hazardous Waste Mgmt
105 South Meridian Street
Indianapolis, IN 46225

Iowa

Chief, Air Quality and SW Protection Bureau
Department of Natural Resources
900 East Grand Avenue
Henry A. Wallace Building
Des Moines, IA 50319-0034
(515) 281-8852
(515) 281-3319

Kansas

Division Director Department of Health and Environment
Division of Environment Forbes Field
Building 740
Topeka, KS 66620
(913) 296-1535

Kentucky

Manager, Solid Waste Branch
Department for Environmental Protection
Division of Waste Management
Frankfort Office Park
14 Reilly Road
Frankfort, KY 40601
(502) 564-6716

Louisiana

Administrator, Solid Waste Division
Department of Environmental Quality
Office of Solid and Hazardous Waste
PO Box 44307
Baton Rouge, LA 70804-4307
(504) 342-1216

Maine

Bureau Director
Department of Environmental Protection
Bureau of Solid Waste Management
State House Station 17
Augusta, ME 04333

Maryland

Department of Environment
Hazardous and Solid Waste Management Administration
2500 C Highway
Baltimore, MD 21224

Massachusetts

Director, Division of Solid Waste
Department of Environmental Protection
One Winter Street, 4th Floor
Boston, MA 02108
(617) 292-5961

Michigan

Chief, Waste Management Division
Department of Natural Resources
608 W. Allegan
PO Box 30241
Lansing, MI 48933
(517) 373-2730

Minnesota

Metro District, Manager's Office
Minnesota Pollution Control Agency
520 Lafayette Road, North
St. Paul, MN 55155
(612) 296-7777

Mississippi

Department of Natural Resources
Bureau of Pollution Control
2380 Highway 80 West
Jackson, Mississippi 39289
(601) 961-5171

Missouri

Chief, Solid Waste Section
Solid Waste Management Program
P.O. Box 176
Jefferson City, MO 65102-1076
(314) 751-5401

Montana

Manager, Solid Waste Program
Department of Health and Environmental Sciences
Solid and Waste Bureau
Cogswell Building
Helena, MT 59620
(406) 444-1430

Nebraska

Nebraska Department of Environmental Quality
Suite 400, Atrium 1200 N Street
P.O. Box 98922
Lincoln, NE 68509-8922
(402) 471-4210

Nevada

Division of Environmental Protection
Bureau of Waste Management
333 West Nye Lane
Carson City, NV 89710
(702) 687-5872

New Hampshire

Department of Environmental Services
Waste Management Division
6 Hazen Drive
Concord, NH 03301-6509
(603) 271-2905

New Mexico

Chief, Special Waste Bureau
Environmental Improvement Division
Health and Environment Department
Harold Runnels Building
1190 St. Francis Drive
Santa Fe, NM 87503
(505) 827-2775

New York

Director, Division of Solid Waste
Department of Environmental
Conservation
50 Wolf Road
Albany, NY 12233-4010
(518) 457-6603

North Carolina

Director, Division of Solid Waste Management
NC Department of Environment,
Health & Natural Resources
401 Oberlin Road, Ste 150
Raleigh, NC 27605
(919) 733-4996

Ohio

Chief, Division of Solid and Hazardous Waste
Management
Ohio Environmental Protection Agency
1800 Watermark Drive
P.O. Box 1049
Columbus, OH 43216-0149
(614) 644-2956

Oregon

Administrator, Hazardous and Solid Waste Division
Department of Environmental Quality
2146 NE 4th Street, Suite 104
Bend, OR 97701
(541) 388-6146

Pennsylvania

Director, Bureau of Waste Management
Department of Environmental Resources
Rachael Carson State Office Building
400 Market Street
Harrisburg, PA 17101-8471
(717) 787-9870

Rhode Island

Division Chief, Waste Management Branch
Department of Environmental Management
Division of Air and Hazardous Materials
235 Promenade Street
Providence, RI 02908
(401) 222-2797

South Carolina

Chief, Bureau of Solid and Hazardous Waste
Management
Department of Health and Environmental Control
2600 Bull Street
Columbia, SC 29201
(803) 734-5200

South Dakota

Division Director
Department of Water and Natural Resources
Division of Environmental Regulation
Joe Foss Building
523 East Capitol
Pierre, SD 57501-3181
(605) 773-3153

Tennessee

Chief Solid Waste Management Unit
Department of Health and Environment
Division of Solid Waste Management
401 Church Street, 5th Floor, A1 & C Tower
Nashville, TN 37243-1535
(615) 532-0780

Texas

Director Plans & Programs
Division of Solid Waste Management
Department of Health
1100 West 49th Street
Austin, TX 78756-3199

Utah

Executive Director, Bureau of Solid and Hazardous
Waste
Division of Environmental Health
288 North 1460 West
Salt Lake City, UT 84116-0690
(801) 538-6170

Vermont

Solid Waste Management Division
103 South Main Street
Waterbury, VT 05676
(802) 244-7831

West Virginia

Assistant Chief,
Solid Waste Department of Commerce,
Labor and Environmental Resources
Division of Natural Resources
Waste Management Section
1356 Hansford Street
Charleston, WV 25301
(304) 348-5929

Wisconsin

Chief, Solid Waste Management Section
Department of Natural Resources
Division of Environmental Quality
Bureau of Solid and Hazardous Waste
Management
101 S. Webster Street
Madison, WI 53707
(608) 266-2111

Wyoming

Manager, Solid Waste Program
Department of Environmental Quality
Division of Solid Waste
122 West 25th Street
Cheyenne, WY 82002
(307) 777-7752

REGIONAL ORGANIZATIONS WORKING ON SOLID WASTE ISSUES

Arizona Clean and Beautiful

4350 E. Camelback, Suite 100F
Phoenix, AZ 85018

Californians Against Waste Foundation

926 J Street, Suite 606
Sacramento, CA 95814
(916) 443-5422

California Refuse Removal Council

1121 L Street, Suite 410
Sacramento, CA 95814

California Resource Recovery Association

4395 Gold Trail Way
Loomis, CA 95650

Center for the Development of Recycling

San Jose State University
One Washington Square
San Jose, CA 95192-0204
(408) 924-5453

Ecology Center

2530 San Pablo Ave.
Berkeley, CA 94702
(510) 548-2220

Global Cities Project

2962 Fillmore Street
San Francisco, CA 94123
(415) 775-0791

Independent Recyclers Association

3401 Wood Street
Oakland, CA 94608

Local Government Commission

1414 'K' Street, Suite 250
Sacramento, CA 95814
(916) 448-1198

Northern California Recycling Association

P.O. Box 5581
Berkeley, CA 94705
(510) 547-1074

RACORSE Network (Hospital Recycling)

385 Jayne Avenue, #401
Oakland, CA 94610
(510) 832-2868

Rural Community Assistance Corp.

2125 19th Street, Suite 203
Sacramento, CA 95818
(916) 447-2854

Santa Fe Beautiful

P.O. Box 909
Santa Fe, NM 87501
(505) 473-7220

Southwest Public Recycling Association

P.O. Box 27210
Tucson, AZ 85726
(602) 791-4069

Western States Glass Recycling Program

678 13th Street, Suite 202
Oakland, CA 94612
(510) 832-0130

**NATIONAL ORGANIZATIONS WORKING
ON SOLID WASTE ISSUES**

**Association of State and Territorial Solid
Waste Management Officials**

444 North Capitol St. NW, Suite 388
Washington, DC 20001
P.O. Box 7219
(202) 624-5828

Citizens for a Better Environment

407 S. Dearborn, Suite 1775
Chicago, IL 60605
(312) 939-1530

Earthworm

186 South Street
Boston, MA 02111

Environmental Action

1526 New Hampshire Ave. NW
Washington, DC 200036
(202) 745-4870

Environmental Defense Fund

1875 Connecticut Ave, NW, Suite 10016
Washington, DC 20009
(202) 387-3500

Environmental Institute

331 Madison Ave., 6th Floor
New York, NY 10017

Government Purchasing Project

P.O. Box 19367
Washington D.C. 20036
(202) 387-8030

**Government Refuse Collection
and Disposal Association**

P.O. Box 7219
Silver Spring, MD 20910
(301) 585-2898

Institute for Local Self-Reliance

2425 18th Street NW
Washington, DC 20009
(202) 232-4108

Keep America Beautiful, Inc.

1010 Washington Blvd.
Stamford, CT 06901
(203) 323-8987

National Consumers League

815 15th St NW, Suite 730
Washington, DC 20005

National Institute of Government Purchasing

115 Fellwood Avenue, Suite 201
Falls Church, VA 22046
(703) 533-7300

National League of Cities

1301 Pennsylvania Avenue NW, Suite 550
Washington, DC 20004
(202) 626-3000

National Recycling Coalition

1101 30th Street NW, Suite 305
Washington, DC 20007
(202) 625-6406

Natural Resources Defense Council

1350 New York Avenue NW
Washington, DC 20005

Plastics Recycling Foundation

1275 K Street NW, Suite 400
Washington, DC 20005

Renew America

1200 18th Street NW, Suite 1100
Washington, DC 20036
(202) 721-1545

Sierra Club

P.O. Box 7959
San Francisco, CA 94120-9943
(415) 776-2211

Solid Waste Association of North America

P.O. Box 7219
Silver Spring, MD 20910
(301) 585-2898

Tire Retread Information Bureau

900 Weldon Grove
Pacific Grove, CA 93950
(408) 372-1917

U.S. Conference of Mayors

1620 I Street NW
Washington, DC 20006
(202) 293-7330

Worldwatch Institute

1776 Massachusetts Avenue NW
Washington, DC 20036
(202) 452-1999

BUY RECYCLED FROM GENERAL SERVICES ADMINISTRATION (GSA)

There are many ways to find out about recycled products available from GSA. GSA offers hundreds of recycled items through its Recycled Products Guide. To get a copy of the Recycled Products Guide, complete GSA Form 457, Publications Mailing List application. Applications are available from GSA, Central Mailing Service, Box 6477, Fort Worth, TX 76115 or call (817) 334-5215.

The guide is also available on the Federal Supply System's on-line Multi-Use File For Interagency News (MUFFIN) System. A reference guide for users of MUFFIN is available from GSA's Centralized Mailing List Service (CMLS), mailing code OMUFOOOI.

To access by computer modem, set up the following communication parameters: 7 data-bits, 1 stop bit, even parity. Then call (703) 305-6229. When a colon appears (you may need to press <enter> to get one), type in "Hello GSA Muffin." At the master menu, select B. "Marketips." If you need additional information, please contact the Customer Support Center, (415) 744-5408.

There are also other recycled product publications available from GSA if you need additional help and information. The GSA New Item Introductory Schedule (NIS) contains newly offered products (both recycled and non-recycled) that have not yet been included in the guide. Two other brochures, Marketips and Customer Grain, also keep agencies up-to-date on new products.

Like the Recycled Products Guide, these publications can be ordered through the GSA Central Mailing Service (information above). Call (212) 264-8725 for further recycled product information.

ASSOCIATIONS

Aluminum Association
900 19th St. NW, Suite 300
Washington, DC 20006
(202) 862-5100

American Paper Institute
260 Madison Ave.
New York, NY 10016
(800) 878-8878

Aseptic Packaging Council
2111 Wilson Blvd., Suite 700
Arlington, VA 22201
(800) 277-8088

Association of State and Territorial
Solid Waste Management Officials
444 North Capitol Street NW
Suite 388
Washington, DC 20001
(202) 624-5828

Coalition of Northeastern Governors
400 North Capitol Street NW, Suite 382
Washington, DC 20001
(202) 624-8450

Compost Council
4424 Montgomery Avenue, Suite 102
Bethesda, MD 20814
(301) 913-2885

Council on Plastic Packaging and the
Environment
1001 Connecticut Ave. NW
Suite 401
Washington, DC 20036

Environmental Defense Fund
257 Park Ave. South
New York, NY 10010
(212) 505-2100

Foodservice and Packaging Institute
1550 Wilson, Suite 701
Arlington, VA 22209
(703) 527-7505

Glass Packaging Institute
1627 K Street NW Suite 800
Washington, DC 20006
(202) 887-4850

Institute for Local Self Reliance
2425 18th St. NW
Washington, DC 20009

Institute for Scrap Recycling Industries
1325 G Street NW
Suite 1000
Washington, DC 20005
(202) 466-4050

Local Government Commission
1414 'K' Street, Suite 250
Sacramento, CA 95814
(916) 448-1198

National Association for Plastic Container
Recovery
4928 Parkway Plaza Blvd. Suite 260
Charlotte, NC 28217

National Association of Counties
440 First St. NW
Washington, DC 20001
(202) 393-6226

National Association of Towns and Townships
1522 K Street NW
Suite 600
Washington, DC 20005

National League of Cities
1301 Pennsylvania Ave. NW, Suite 550
Washington, DC 20004-1763
(202) 626-3000

National Oil Recyclers Association
c/o Thelen, Marrin, Johnson and Bridges
1101 Pennsylvania Ave.
Suite 800
Washington, DC 20036

National Recycling Coalition
1101 30th St. NW
Suite 305
Washington, DC 20005

National Resource Recovery Association
The U.S. Conference of Mayors
1620 I Street NW, Suite 400
Washington, DC 20006
(202) 293-7330

National Soft Drink Association
Solid Waste Management Department
1101 16th St. NW
Washington, DC 20036
(202) 463-6700

National Solid Waste Institute
P.O. Box 16171
Tampa, FL 33687-9933
(813) 985-3208

National Solid Waste Management Association
1730 Rhode Island Ave. NW
Suite 1000
Washington, DC 20036

Partnership for Plastics Progress
(formerly: Council for Solid Waste Solutions)
1801 K Street NW, Suite 701-L
Washington, DC 20006
(800) 243-5790

Plastics Recycling Foundation
1275 K Street NW
Washington, DC 20005
(202) 371-5200

Executive Director
PO Box 189
Kennett Square, PA 19348
(215) 444-0659

Polystyrene Packaging Council Inc.
1025 Connecticut Ave. NW
Suite 515
Washington, DC 20036
(202) 822-6424

Scrap Tire Management Council
1400 K Street NW
Washington, DC 20005
(202) 408-7781

Steel Can Recycling Institute
Foster Plaza Bldg 10
680 Andersen Drive
Pittsburgh, PA 15220-2700
(800) 876-7274

Tire Association of Northern America
11921 Freedom Drive, Suite 550
Reston, VA 20190
(703) 736-8082

U.S. Conference of Mayors
1620 Eye Street NW, Suite 400
Washington, DC 20006
(202) 293-7330

Vinyl Environmental Resource Center
1 Cascade Plaza, 19th Floor
Akron, OH 44308
(800) 969-8469

LIST OF INDUSTRY CONTACTS

Aluminum Association
900 19th Street NW, Suite 300
Washington, DC 20006
(202) 862-5100

American Iron and Steel Institute
1101 17th Street NW, Suite 1300
Washington, DC 20036
(202) 452-7100

American Newspaper Publishers Association
P.O. Box 17407 Dulles Airport
Washington, DC 20041

American Plastics Council
1275 K Street NW, Suite 400
Washington, DC 20005
(800) 243-5790

American Recycling Market
P.O. Box 577
Ogdensburg, NY 13669
(800) 267-0707

American Re-treaders Association
P.O. Box 172203
Louisville, KY 40217

Aseptic Packaging Council
1000 Potomac Street NW, Suite 401
Washington, DC 20007
(202) 785-4020

Alliance of Foam Packaging Recyclers
1025 Connecticut Avenue NW, Suite 515
Washington, DC 20036
(800) 944-8448

Association of Petroleum Re-Refiners
2025 Pennsylvania Avenue NW
Washington, DC 20006
(202) 833-2694

Can Manufacturers Institute
1625 Massachusetts Avenue NW
Washington, DC 20036

Council on Plastics and Packaging
in the Environment
1001 Connecticut Avenue NW,
Suite 401
Washington, DC 20036

Council for Textile Recycling
7910 Woodmont Avenue,
Suite 1130
Bethesda, MD 20814
(301) 656-1077

Glass Packaging Institute
1627 K Street NW, Suite 800
Washington, DC 20006
(202) 887-4850

Institute of Scrap Recycling Industries
1627 K Street NW, Suite 700
Washington, DC 20006
(202) 466-4050

National Association for Plastic Container
Recovery
5024 Parkway Plaza Boulevard, Suite 200
Charlotte, NC 28217

National Association of Solvent Recyclers
1333 New Hampshire Avenue NW,
Suite 1100
Washington, DC 20036

National Oil Recycler's Association
1101 Pennsylvania Avenue NW, Suite 800
Washington, DC 20004

National Polystyrene Recycling Co.
1676 N. California Blvd.
Walnut Creek, CA 94596

National Soft Drink Association
1101 Sixteenth Street NW
Washington, DC 20036
(202) 463-6732

National Solid Wastes Management Assoc.
1730 Rhode Island Avenue NW, Suite 1000
Washington, DC 20036

National Tire Dealers and Retreaders Assoc.
11921 Freedom Dr., Suite 550
Reston, VA 20190
(703) 736-8082

Plastic Institute of America
277 Fairfield Road, Suite 100
Fairfield, NJ 07004-1932
(973) 808-5950

Plastic Loose-Fill Council
P.O. Box 601
Grand Rapids, MI 49516-0601

Polystyrene Packaging Council, Inc.
1025 Connecticut Avenue NW,
Washington, DC 20036

Scrap Tire Management Council
1400 K Street NW, Suite 900
Washington, DC 20005

Steel Can Recycling Institute
5150 East Pacific Coast Highway, Suite 200
Long Beach, CA 90804
(562) 597-1545

Technical Association of the Pulp and
Paper Industry
15 Technology Parkway South
Norcross, GA 30092
(800) 332-8686

REFERENCE MATERIALS

AIA Guide to Marketing Recycled Paper in
North America; 1991, 1993 and 1995
25 Cherry Street
Danvers, MA 01923
(978) 777-6888

CERMA's Recycled Paper Handbook (CERMA)
5528 Hempstead Way
Springfield, VA 22151
(703) 941-4452

Getting at the Source: Strategies for Reducing
Municipal Solid Waste
WWF Publications

P.O. Box 4866
Hampden Station
Baltimore, MD 21211
(410) 516-6951

Guide to Commercial & Industrial Recycling
Northeast Maryland Waste Disposal Authority
25 South Charles St. #2105
Baltimore, MD 21201-3330
(410) 333-2730

National Buy Recycled Campaign Materials
The U.S. Conference of Mayors
1620 I Street NW, 4th Floor
Washington, DC 20006
(202) 293-7330

Office Paper Recycling Guide
Buy Recycled Paper Products Guide
National Office Paper Recycling Project
The U.S. Conference of Mayors
1620 I Street NW, 4th Floor
Washington, DC 20006
(202) 293-7330

National Recycling Coalition Buy Recycled
Campaign Materials
1101 30th St. NW
Washington, DC 20007
(202) 625-6406

Official Recycled Products Guide
P.O. Box 577
Ogdensburg, NY 13669
(800) 267-0707

Recycled Papers, The Essential Guide
MIT Press
5 Cambridge Center
Cambridge, MA 02142
(800) 356-0343

Recycled Products Information Clearinghouse
Center for Earth Resources Management
Application
5528 Hempstead Way
Springfield, VA 22151
(703) 941-4452

PaperMatcher
MSW Resource Center American Paper Institute,
Inc.
1250 Connecticut Avenue NW Suite 210
Washington, DC 20036
(800) 878-8878

WASTE EXCHANGES

Alberta Waste Materials Exchange
Industrial Development Department
Alberta Research Council
PO Box 8330, Postal Station F
Edmonton, Alberta
Canada T6H 5X2
(403) 450-5400

California Waste Exchange
Toxic Substances Control Division
400 P Street, P.O. 806
Sacramento, CA 95812-0806
(916) 322-0476

Canadian Waste Materials Exchange
Ortech International
Sheridan Park Research Community
Mississauga, Ontario
Canada L5K 1B3

Industrial Material Exchange Service
PO Box 19276
2200 Churchill Rd., #31
Springfield, IL 62794-9276
(217) 782-0450

Montana Chamber of Commerce
Montana Industrial Waste Exchange
PO Box 1730
Helena, MT 59624
(406) 442-2405

Southeast Waste Exchange
UNC Charlotte Urban Institute
9201 University City Blvd
Charlotte, NC 28223-0001
(704) 547-2307

Southern Waste Information Exchange
PO Box 960
Tallahassee, FL 32302
(800) 441-7949

APPENDIX D

WASTE REDUCTION TECHNICAL ASSISTANCE PROGRAM

The following states have programs that offer technical assistance in waste minimization recycling and treatment. For technical assistance in developing a recycling program in your state, contact the appropriate agency.

Alabama

Hazardous Material Management and Resources
Recovery Program
University of Alabama
PO Box 870207
Tuscaloosa AL 35487-0207
(205) 348-8401

Alaska

Alaska Health Project
Waste Reduction Assistance Program
218 E. 4th Avenue
Anchorage AK 99501
(907) 276-2864

Arkansas

Arkansas Economic Development Commission
One State Capitol Mall
Little Rock AR 72201
(501) 682-1121

California

Alternative Technology Section
Toxic Substances Control Division
California State Department of Health Service
P.O. Box 806
Sacramento CA 95812-0806
(916) 324-1807

Georgia

Georgia Institute of Technology
Georgia Technical Research Institute
Safety, Health, & Environmental Technology
Division
151 6th Street, O'Keefe Building
Atlanta GA 30332
(404) 894-3806

Illinois

Hazardous Waste Research and Information
Center
Illinois Department of Energy and Natural
Resources
1 East Hazelwood Drive
Champaign, IL 61820
(217) 333-8940

Indiana

Indiana Department of Environmental
Management
OCCA
PO Box 6015
100 North Senate Avenue
Indianapolis IN 46206-6015
(317) 232-8172

Iowa

Iowa Department of Natural Resources
Air Quality and Solid Waste Protection Bureau
Wallace State Office Building
900 East Grand Avenue
Des Moines IA 50319-0034
(515) 281-8690

Kansas

Bureau of Waste Management
Forbes Field Building 740
Topeka KS 66620-0001
(785) 296-6171

Kentucky

Division of Waste Management
Natural Resources and Environmental Protection
Cabinet
14 Reilly Road
Frankfort KY 40601-1139
(502) 564-6716

Louisiana

Department of Environmental Quality
Office of Solid and Hazardous Waste
PO Box 82178
Baton Rouge LA 70884-2178
(504) 765-0355

Maryland

Maryland Hazardous Waste Facilities Siting Board
60 West Street Suite 200a
Annapolis MD 21401-2434

Massachusetts

EOEA Office of Technical Assistance
100 Cambridge Street Room 2109
Boston MA 02202
(617) 727-3260

Michigan

Resource Recovery Section
Department of Natural Resources
PO Box 30028
Lansing MI 48909-7528
(517) 373-0540

Minnesota

Minnesota Pollution Control Agency
Solid and Hazardous Waste Division
520 Lafayette Road
St Paul MN 55155-3898
(612) 296-6300

Missouri

State Environmental Improvement and Energy
Resources Agency
PO Box 744
Jefferson City MO 65102-0744
(573) 751-4919

New Jersey

New Jersey Hazardous Waste Facilities Siting
Commission
Room 514
28 West State Street
Trenton NJ 08625-0406
(609) 292-1459
(609) 292-1026

New York

Department of Environmental Conservation
50 Wolf Road
Albany NY 12233-7253
(518) 457-3273

North Carolina

Governor's Waste Management Board
PO Box 27687
Raleigh NC 27687-7687
(919) 733-9020

Ohio

Ohio Technology Transfer Organization
77 South High Street, 26th Floor
Columbus OH 43266-0330
(614) 466-4286

Oklahoma

Oklahoma State Department of Environmental
Quality
707 North Robinson
Oklahoma City OK 73102-1677
(405) 271-7353

Oregon

Hazardous and Waste Division
Department of Environmental Quality
811 Southwest Sixth Avenue
Portland OR 97204-1390
(503) 229-5913

Pennsylvania

Pennsylvania Technical Assistance Program
248 Calder Way, Ste. 306
University Park PA 16801-4700
(814) 865-0427

Rhode Island

Ocean State Cleanup and Recycling Program
Rhode Island Department of Environmental
Management
235 Promenade Street, Suite 330
Providence RI 02908
(401) 222-3434
(800) 253-2674 (In Rhode Island)

Tennessee

Environmental Health and Safety
2110 Terrace Avenue
Knoxville TN 37996-0612
(615) 974-2456

Virginia

Office of Policy and Planning
Virginia Department of Waste Management
11th Floor Monroe Building
101 North 14th Street
Richmond VA 23219-3603

Washington

Washington Department of Ecology
Hazardous Waste Section
4224 Sixth Avenue, S.E.
Row 6, Building 4
Mail Stop Pv- I 1
Olympia WA 98504-8711

Wisconsin

Solid and Hazardous Waste Management, Sw3
Wisconsin Department of Natural Resources
PO Box 7921
Madison WI 53707-7921
(608) 267-3763

Wyoming

Solid Waste Management Program
Wyoming Department of Environmental Quality
Herchler Building 4th Floor West Wing
122 West 25th Street
Cheyenne WY 82002
(307) 777-7752

APPENDIX E

LITERATURE CITED

EPA Recycling in Federal Offices Resource Materials - Office of solid waste 401 M Street, SW, Washington, DC, 1991.

Lund, Herbert F., The McGraw-Hill "Recycling Handbook",1993.

Aquino, John T., Waste Age /Recycling Times' "Recycling Handbook", 1995.

Diaz , Luis F., Savage, George M., Eggerth, Linda L., Golueke, Clarence G., Composting and Recycling Municipal Solid Waste. Cal Recovery Inc. Hercules CA. Lewis Publishers,CRC Press, 2000 Corporate Blvd., N.W. Boca Raton, Florida,1993.

Rhyner, Charles R., Schwartz, Leander J., Wenger, Robert B., Waste Management and Resource Recovery, Lewis Publishers, CRC Press, 2000 Corporate Blvd., N.W. Boca Raton, Florida, 1995.

Haug, Roger T., The Practical Handbook of Compost Engineering, Lewis Publishers, CRC Press, 2000 Corporate Blvd., N.W. Boca Raton, Florida,1993.

The Biocycle Guide to Maximum Recycling, The JG Press, Inc., Emmaus, Pennsylvania, 1993.

Composting Source Separated Organics, Biocycle Journal of composting and Recycling, Emmaus, Pennsylvania JG Press, Inc., 1994.

The Recycler's Handbook, The Earth-Works Group, The Earth-Works Press,1400 Shattuck Ave.,#25 Berkeley, CA 94709, 1990.

15 Simple Things Californians Can Do to Recycle, The Earth-Works Group & The California Department of Conservation's Division of Recycling, Earth-Works Press, 1400 Shattuck Ave.,#25 Berkeley, CA 94709, 1991.

APPENDIX-F

RECYCLING PLANNING AND IMPLEMENTATION FORMS

Checklist for Environmentally Sound Ordering

Use this checklist to find ways to make more environmentally sound purchasing decisions.

[illegible][illegible]

Checklist for Environmentally Sound Ordering

Solid Waste Reduction Record of Progress (Tons)				
Material			Reduction Amount	Percent Reduction
Newspaper				
High-grade paper				
Cardboard				
Packing material				
Toner cartridges				
Aluminum cans				
Glass				
Iron & steel				
Plastics				
Wood waste				
Batteries				
TOTALS				

Statement Of Program Goals	Priority		
	High	Low	None
1. Reduce waste disposal costs			
2. Achieve the highest revenues for recyclables			
3. Achieve greater efficiency			
4. Keep staff involvement to a minimum			
5. Maintain in-house control of recycling program			
6. Increase awareness of maintenance staff			
7. Produce products for in-house use			
8. Conserve space and keep recyclables out of sight			
9. Reduce risk from higher future disposal costs			
10. Reduce waste volume			
11. Always know materials can be marketed			
12. Transport nonhazardous recyclable materials with existing service vehicles (paper, cardboard, pallets)			
13. Avoid any capital investment in the recycling program			
14. Maintain flexibility in choosing private hauler			
15. Improve handling of secure and confidential materials			
16. Improve safety			
17. Improve or enhance environmental quality			
18. Be a good corporate citizen			
19. Cooperate with regulations			
20. Break new ground in recycling			
21. Other:			

Clarification of Recycling Program Goals

Recycling Team Roster					
Function	Name	Location/ Telephone No.	Duties		
			Lead	Support	Review
Leader					
Site Coordinator					
Operations					
Engineering					
Maintenance					
Scheduling					
Procurement					
Environmental					
Human Resources					
Management					
Safety					
Materials Control					
Vehicle Maintenance					
Other					

Recycling Team Roster

List all external collection containers by location.

A	B	C	D	E	F	G	H	I	J	K
Location (Waste Generating Station) Notes	Size/ Type of Container	No. of Containers	List of Materials	% of Each Material Typically Disposed (estimate)	No. of Times Empties per Day	No. of Days Emptied per Week	Where Emptied & by Whom	Total Volume per Location per Week (BxCxFxG)	Volume of Each Material per Week (IxE)	Conversion to Cubic Yards*
<i>Example:</i>										
Second floor copy room (next to copier)	20 gal. plastic	1	office paper	80%	1	5	Outside dumpster by eveing custodian	100 gal.	80 gal.	0.4 cu. yd.
			disposable cups	20%					20 gal.	0.1 cu. yd.

Assessing Waste: Internal Collection

List only the recyclables. Copy this page to accommodate additional materials. Note that different amounts of materials may be generated in different seasons, particularly if your assessment is being conducted in a low or peak volume period.

A	B	C	D
Material	Locations Where Material is Generated	Total Quantity Generated per Week Cu. Yds.	Volume Total per Year (column C x 52 weeks per year of operation - quantity per year) Cu. Yds.
	1.		
	2.		
	3.		
	4.		
	Subtotals		
	1.		
	2.		
	3.		
	4.		
	Subtotals		
	1.		
	2.		
	3.		
	4.		
	Subtotals		
Subtotals			
Total of All Subtotals			

Qualification of Recyclables

List all external collection containers by location.

A	B	C	D	E	F	G	H
Location	Name of Hauler (or self-hauled)	Type and Size in Cubic Yards*	Number of Containers	Number of Pulls per Week	% Full When Pulled	Total Volume of Waste per Wk. in Cu. Yds.* (Cx Dx Ex F)	Ownership
Total							
			Total				

Volume-Weight Conversion

A	B	C	D	E
Material	Subtotal by Material Cu. Yd. per Year	Specifications	Volume to Weight Conversion Factor	Total Quantity in Tons per Year
Cardboard		Loose		
		Flattened		
		Compacted		
		Baled		
Office Paper		Loose		
		Baled		
Plastic				
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
Other:				
Total		Total		

Available Markets	Material(s) Accepted	Minimum Required	Special Conditions				
			Baled	Loose	Crushed	Strapped	Contamination Specifications

Material	Price Basis (pegged, by indicator, etc.)	Current Pricing	Freight (transportation)	Comments
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				
12.				
13.				
14.				
15.				
16.				
17.				
18.				

Material Pricing

After gathering information from the markets, make a summary list by material.

Material	Cu. Yds./Wk.	Markets	Price Ranges	Hauling Costs
Total				

Marketing Plan Summary

Assemble the information from your interviews on to this page.

In-house contract manager or procurement officer: _____

Phone no.: _____

Hauling Contractors

(If there is more than one hauling contractor, list each hauling company separately.)

Waste Company, Contact Person & Phone No.	Type of Service (container, compactor or bag pick-up)	Cost per Year	Charge Basis	
			Container Rental	Per Pull
1.				
2.				
3.				
4.				
5.				
6.				
7.				
8.				
9.				
10.				
11.				

Type of Equipment	Location/ Department	Hours of Operation	Hrs./Wk. Available for Recycling	Contact Name	Phone No.
Balers					
Storage Containers					
Compactors					
Chippers, Hoggers					
Tractors					
Yard Equipment					
Shredders					
Other:					
Other:					
Other:					
Other:					

Equipment Resources

List only space that can be made available to the recycling program.

Type of Storage	Access to Equipment (list equipment)	Indoor (sq. ft.)	Outdoor Covered (sq. ft.)	Outdoor Open (sq. ft.)	Contact Name	Phone No.
Docks						
Bays						
Storage Rooms						
Closets						
Equipment Areas						
Storage Tanks						
Maintenance Shops						
VMFs						
Parking Lots						
Compartmentalized Dumpsters						
Igloos						

Bulk Storage Resources

