- Identify the primary function(s) of a building
- Conduct multiple walkthroughs during normal business/school hours to observe actions
- Prepare a preliminary estimate of composition and quantity of waste disposed based on visual observation, and discussion with building personnel and janitorial staff
- Document abnormalities in refuse disposal (e.g., periodic excessive amounts) and oversizing/undersizing of building refuse dumpsters based on discussions regarding waste disposal with building residents and janitorial staff
- Follow the life cycle of materials, from when they enter a building to when they become waste products in a refuse container

Forms 1 and 2 are provided in Appendix D at the end of this report to assist in conducting the inventory. Although Form 2 (courtesy U.S. Postal Service, 1991) contains information regarding total number of cubic yards generated from each building surveyed, it is intended to be used as a relative indication of generator size. A method of accurately determining generation rates on campuses using limited sample sizes is provided in section 2.3. Attention should be paid to examining waste quantities present in building dumpsters (Form 2) prior to a waste pull (container emptying). This indicates potential sites where frequency of collection/dumpster size may be downgraded in conjunction with recycling. Forms 1 and 2 should identify: large and small waste generators on campus; what locations are appropriate targets for recycling; and areas where unique waste must be handled separate from the typical municipal solid waste stream.

2.3 Determination of Waste Generation

The quantity of waste generated on campus may be determined using the following methods:

- volume/tonnage records of haulers, landfill operators, recyclers or campus staff which continuously record waste quantities as a matter of policy/contract obligation
- waste measurements using limited weighings
- per capita estimates of waste disposal

While estimating volume/tonnage utilizing existing records of haulers, landfill operators, recyclers or campus staff appears as an obvious method, there are a number of associated problems. First, haulers generally charge for building waste disposal on a per stop basis, regardless of the waste quantity within a dumpster. This can provide an extremely high estimate of campus waste generation. Second, campus staff or haulers rarely record waste quantities present in dumpsters (% full), which is the reason for the

waste disposal inventory in Section 2.2. Third, landfills generally charge on a volume basis (by the compacted truckload), and therefore the actual quantity of weight or original volume generated is unknown. Fourth, only fees for waste disposal are often recorded, with no indication of price per unit volume/mass. Fifth, college campuses seldom posses a truck scale for weighing quantities generated. Sixth, haulers which are contracted for campus waste disposal may understandably stop at other businesses before or after campus refuse pickup.

Unless refuse quantities are continuously weighed using criteria which avoids the above stated problems, the most economical and accurate method for determining refuse generation is using limited weighings. Tonnage estimation using limited weighings is straightforward to use, requires the minimum of effort to collect data, and is adaptable to waste management operations of varying complexity (Rushbrook and Ball, 1988). The number of weighings are determined based on the statistical confidence desired and the maximum allowable error. The suggested procedure for determining the waste generation from limited samples, based on Rushbrook and Ball, is shown in Appendix B at the end of this report. It requires temporary use of a truck scale for weighing differing refuse collection vehicles, e.g., roll-off type refuse containers, rear load packers, building dumpsters, or lugger boxes. This method is also suitable for tracking on a personal computer.

Per capita estimates of waste disposal, especially for educational settings, are poorly documented and have high variability. They will therefore provide inaccurate generation estimates.

2.4 Determination of Waste Characterization

The composition of solid waste from community colleges and universities is different from that of typical municipal solid waste. For example, quantities of paper are significantly higher. Unfortunately, there is little college waste stream composition data available, and of the data which is available, there is significant variability. Additionally, the waste stream components and/or sampling methodologies for the college waste characterizations are seldom similar. Data and examples of available university waste characterizations are shown in Chapter 3.

A college waste characterization may be performed on a per building basis or en masse. While examining waste on a per building basis may be useful in targeting recycling quantities from specific areas, accurate waste characterizations from each type of building would require significant expense and time. It is therefore recommended that an aggregate waste characterization be performed.

There are two methods for determining aggregate waste compositions: truckload sampling and spot sampling. Truckload sampling consists of sorting large (3-4 ton) MSW loads on approximately 5 separate occasions for statistical accuracy. In using spot sampling, literature has shown that waste compositions using sample sizes as small as 200-300 lb are statistically acceptable (Carruth and Klee, 1969). This has since become the minimum amount characterized for use in spot sampling. The "cone-and-quarter" technique has traditionally been used for obtaining representative spot samples: mix into an inverted cone shape an amount of waste which is at least four times the desired sample size, quarter the pile, and then remove one-quarter for analysis. Only one random sample should be taken from a refuse container/truck.

Shown in Appendix C is the suggested procedure for determining waste characterization. It is adapted from a draft method developed by American Society for Testing and Materials (ASTM) committee D34.01.02-Waste Sampling. The procedure requires a minimum number of samples (different from the minimum number of samples above for waste generation) based on the statistical confidence and precision desired. In general, 20 samples should be expected to be taken. Form 3 is provided in Appendix D to assist in logging characterization data, and calculating the volume % and weight % of the waste components (courtesy ASTM, 1991; U.S. Postal Service, 1991). To perform a weight to volume conversion, an appropriate density (based on the type of waste and its compactness) must be chosen. Appendix E shows typical conversion values for refuse, yard waste and recyclables.

It should be noted that care should be taken in performing the actual waste sort. Municipal waste can contain a variety of unsafe materials. It should not be unusual to expect such items as needles, broken glass, acids, liquid and solid chemicals, and animal carcasses. Appropriate personnel protection should be established and safety guidelines developed prior to sorting.

If a waste stream characterization is determined to be too involved an effort, limited college waste data is shown in Chapter 3. However, this data could be quite different from the waste stream of a specific Illinois college.

2.5 Determination of Recyclable Component Quantities

To assist in targeting the recovery amounts of waste stream recyclables, Form 4 in Appendix D is provided (courtesy U.S. Postal Service, 1991). The total quantities of components in municipal waste generated on campus (recyclable or otherwise) are

identified after the waste generation and waste composition is determined. When combined with the collection amounts of components already being recycled, the total generation of a component can be determined. Estimated recovery efficiencies from the waste stream (termed the capture efficiency) can then be used to target the recovery rate of a recyclable.

4. Assessing Available Markets for Recyclables

It is extremely important to consider the markets for recyclables to be collected when planning a recycling program. The collection, processing, and education activities must be designed to meet the requirements of the markets. For example, don't collect high grade white office paper mixed with colored paper if the available markets prefer the two separated. On the other hand, some markets would prefer newsprint mixed with magazines. Programs must assess the market for recyclables in the planning stages and must also be flexible enough to meet changing market requirements.

4.1 Finding the Right Recyclable Materials Dealers

As a foremost consideration, it is necessary to establish a commitment from a recycled materials dealer who will provide consistent, quality service for the college's recyclable materials. Price paid for recyclable materials should be a secondary consideration to service when evaluating recycling companies/brokers. There are three different ways in which to obtain outlets for recyclables collected: i) a contract with a broker or dealer, who often works with a number of end-use buyers and may/may not perform intermediate processing services; ii) a contract with the end-user (such as a paper mill); or iii) open trading, whereby the producer sells to the highest bidder and there is no contract. While each has its own advantages and disadvantages, the last option (item iii) is generally not recommended because of price volatility, market gluts, and specification changes. A fourth option, the forming of a marketing cooperative followed by contract development of item i or ii above, is another intermediate variation possible. Example agreements for marketing waste paper are shown in Appendix G. Additional insight on this is available from the EPA's Marketing Waste Paper Handbook (USEPA, 1991a).

Prior to issuing a formal solicitation to bid on recycling broker/collection services, a survey of potential buyers should be conducted. The questions below will assist in conducting the survey and making an informed decision about choosing a recyclable materials dealer. While the questions specifically apply to paper, they may be utilized for collection of any recyclable. Such specifics should also be included in the final contract agreement as necessary:

1. What grades of paper are accepted and what is the minimum amount required for pickup ?

2. What levels of contractor processing are available ?

3. Is the dealer willing to sign a long-term contract (minimum 1 year contract recommended) ?

4. What are the allowable contamination levels for non-specified paper and non-paper materials ?

5. Will the dealer collect paper from each building or is it necessary to establish a central receiving area ?

6. Will the dealer provide scheduled pickups, on-call pickups, or both ?

7. Are destruction services available for confidential documents ? Does the service meet the legal requirements required by the college ?

8. Will the dealer pay for paper collected by grade classification and what is the payment frequency ?

9. What pricing structure is used ? For example:

    a. Floating point price tied to a paper industry market index, with a minimum floor price (most often used method because it ensures the best deal for the client and the dealer).

    b. Fixed price set for the term of the contract.

    c. Periodic review with negotiated adjustment of prices.

10. Will the dealer help organize and promote the program ?

11. Is it possible to supply central recycling containers, dumpsters, and main storage bins?

12. Does the dealer require a loading dock ?

13. What are the specifications for delivery of recyclable materials (e.g., baled, loose in barrels, non-shredded) ?

Potential buyers of aluminum, steel, and bi-metal cans, glass containers, batteries, used oil, paper and paperboard, tires and plastics are listed in the following publications:

Illinois Recycled Materials Market Directory	ILENR/RR-87/01	84 pp.
Directory of Illinois Recycling Centers	ILENR/RR-87/03	2 Volumes
Technologies for Recycling Post-Consumer Mixed Plastics	OTT-8	115 pp.
Used Oil Management in Illinois	OTT-10	107 pp.

ENR publications may be requested by phone at (800) 252-8955 (in Illinois) or by writing to ENR, Office of Recycling and Waste Reduction, 325 W. Adams St., Springfield, IL, 62704. University of Illinois OTT publications are available from the address shown in the front of this report.

4.2 Dealers and Mill Consumers of Waste Paper

Successful marketing of waste paper is likely to be the largest single contributor toward meeting the recycling goals for Illinois colleges and universities. Tables 4.1, 4.2, and 4.3 at the end of this chapter present a directory of paper mills consuming waste paper, producers of cellulose insulation, and paper dealers, respectively. The tables are a combined list available from the American Paper Institute and the USEPA. It should be noted that because of the volatility of the waste paper market, the list may change frequently. There are many more possible outlets listed in the tables than can be contacted in a market survey and therefore it would be prudent to survey local individuals involved in recycling for input.

4.3 Rural Area Markets

Distances to markets from rural areas of Illinois is a difficult problem. This is particularly true for community colleges which are located in such areas, have smaller operating budgets than universities, and generate recyclables at a lower rate than large schools. Because buyers for recyclables may be hundreds of miles away, cost-cutting measures should be attempted. One method could be to develop a multi-school cooperative in the same locality which would arrange for marketing of bulk recyclables. Implicit in this method is the collection of the same materials at all schools to increase overall quantity and marketability. Another method is backhauling recyclables to market in metropolitan centers such as St. Louis, Indianapolis or Chicago after receiving a shipment from such an area.

Table 4.1 Markets for Waste Paper in Illinois and Neighboring States (API,1990; EPA,1991a)

State/Company	City	Telephone	Grades of Waste Paper Purchased				
			Mixed	ONP	OCC	OMG	High
Illinois							
FSC Paper Company	Alsip	(708) 389-8520	•	•		•	•
Jefferson Smurfit Corporation	Alton	(618) 463-6212	•	•	•		•
The Davey Company	Aurora	(708) 898-4231	•		•		
Chicago Paperboard Corp.	Chicago	(312) 997-3131	•	•	•		
Ivex Corporation	Joliet	(815) 740-3838	•		•		
Manville Sales Corporation	Joliet	(815) 744-2013		•			
Ivex Corporation	Peoria	(309) 686-3830		•			
Quaker Oats Company	Pekin	(309) 346-4118	•	•	•	•	•
Celotex Corporation	Quincy	(217) 224-3800		•	•		•
Sonoco Products Company	Rockton	(815) 624-8891	•		•		
Sealed Air Corporation	Salem	(618) 548-3370		•			
Indiana							
Kieffer Paper Mills, Inc.	Brownstown	(812) 358-4150	•	•	•	•	
Jefferson Smurfit Corp. (CCA)	Carthage	(317) 565-6111			•		
Rock-Tenn Company	Eaton	(317) 396-9243	•	•	•		
Georgia-Pacific Corporation	Gary	(219) 882-1640			•		•
Packaging Corp. of America	Griffith	(219) 924-4105		•			
Keyes Fibre Company	Hammond	(219) 844-8950		•	•		
Visy Recycle	Hartford City	(317) 348-0880	•	•	•		
Beveridge Paper Company	Indianapolis	(317) 635-4391		•	•		
Jefferson Smurfit Corporation	Lafayette	(317) 423-5631	•	•	•		
Inland Container Corporation	Newport	(317) 492-3341			•		
The Weston Paper & Mfg. Co	Terre Haute	(812) 234-6688			•		
Globe Building Materials	Whiting	(312) 374-5011		•	•		
Michigan							
Michigan Paperboard	Battle Creek	(616) 963-4004	•	•	•		•
Waldorf Simplex Products Group	Battle Creek	(616) 963-5511	•	•	•		•
Waldorf-Simplex Products	Constantine	(616) 435-2425	•	•	•		
Packaging Corp. of America	Filer City	(616) 723-9951			•		
Nuwool Insulation	Hudsonville	(616) 669-0100		•			
Georgia-Pacific Corporation	Kalamazoo	(616) 382-2890				•	•
James River Corporation	Kalamazoo	(616) 383-5000	•	•	•		•
Celotex Corporation	L'Anse	(906) 524-6101	•	•			•
Manistique Papers	Manistique	(906) 341-2175		•		•	
Menominee Paper Co. Inc.	Menominee	(906) 863-5595			•		
Jefferson Smurfit Corporation	Monroe	(313) 241-7776	•		•		
Monroe Paper Company	Monroe	(313) 241-7700	•	•	•		•
French Paper Company	Niles	(616) 683-3025					•
Simplicity Pattern Company Inc.	Niles	(616) 683-4100	•				
Applegate Insulation	Okemos	(517) 349-9200	•	•			•
Stone Container Corporation	Ontonagon	(906) 884-2021			•		
Menasha Corporation	Otsego	(616) 692-6141			•		
Rock-Tenn Company	Otsego	(616) 692-6211	•		•	•	
Big M Paperboard Inc.	Palmyria	(517) 263-5160	•	•	•	•	•
James River Corporation	Rochester	(313) 651-8121			•		
Midwest Folding Carton	Rockford	(616) 866-3421		•	•		•

5. Strategies for Implementing College Waste Reduction

Reducing waste generated and recycling are the two primary strategies available for minimizing the amount of municipal waste subject to ultimate disposal. This chapter addresses approaches to reduction and recycling in general and for specific college functions.

The type of waste handled within the university dictate the different educational, collection and processing methods used. While academic area waste may expected to be mainly paper, food service waste can be expected to be food waste and container materials. Similarly, dormitory or fraternity/sorority waste would more closely parallel standard "municipal waste," albeit with increased quantities of disposable packaging. The waste from each of these examples would be handled in different fashion, and as such the differing considerations shown in this chapter should be made.

5.1 Source Reduction

Modification of work activities and procurement modifications are two primary methods of source reduction. The number of source reduction efforts which can be implemented are as numerous as there are work activities. The benefits of each reduction method must be evaluated against change in cost or services provided. Methods for source reduction which have succeeded at college campuses are shown in Table 5.1.

Procurement modification entails purchasing effectively such that total waste generated per product purchased is minimized, recyclability is maximized and/or life cycle is optimized. The following recommendations will assist in properly selecting/procuring products (UBC, 1991):

- Conduct a review of environmental impacts of products purchased.
- Adopt and promote three criteria for purchasing decision making: performance, product durability, and life cycle cost of the product.
- If life cycle cost is not feasible, procurement preference will be given to products that contribute to durability, even if cost is greater.
- Collaborate with sources of environmental purchasing information.
- Add a standard tender clause to all requests for bids requiring vendors and suppliers to provide information on the environmental qualities of their products.
- Monitor on an annual basis the progress in evaluating and selecting sustainable products.

Table 5.1 Methods of Campus Source Reduction and Reuse (RIS, 1991)

Method	Description
Purchase durable, standardized, repairable and reusable products	Waste generation can be avoided if a college considers the life cycle and reusability of products purchased. Consideration should be given to durable design, ease of repair (in terms of simplicity and replacement parts), and reusability. Additionally, products should be easily recycled once once their useful life ends.
Reduce food waste generation	Food waste can be a significant portion of a university waste stream. Methods of purchasing food can be modified to minimize waste. For example, a per pound or per item assessment can be utilized at some food service establishments rather than an all-you-can-eat dining hall meal ticket.
Reduce and reuse landscape waste	Leaving landscape waste in place-particularly grass-is a very effective method of waste reduction which is already commonly practiced on campuses throughout Illinois. Additionally, woody materials can be ground and used as cover in landscaping.
Promote duplex document copying	Modify copy machine procurement guidelines to obtain duplex capable copying machines, and develop campus policy of duplexing for documents of multiple pages. Charge less per copy at public photocopiers when the duplexing option is chosen.
Reduce the junk mail sent to campus	Junk mail-mail that is mass distributed at reduced postal rates and includes catalogs, advertisements, and solicitations-is often never read and can burden the university postal system. Removing one's name from the mailing list is often as simple as writing to an address and indicating such. Write to: Direct Marketing Association, Mail Preference Services, 11 West 42nd Street, PO Box 3861, New York, NY 10163.
Reduce junk mail generated on campus	On colleges there are large volume of campus communications. Methods to avoid paper redundancy (e.g., kiosks) can impact waste generation on campus.
Increase e-mail and voice mail use	Colleges can lessen paper generation by using campus computer and telephone systems for electronic mail (e-mail) and voice mail. Initiating training sessions for staff and faculty on such use is an essential step.
Avoid purchase of disposables in kitchens, cafeterias, and offices	If used, disposable beverage containers and dinnerware represent a sizable portion of the waste stream from food service operations. Replacing disposables with flatware, china, and glassware can reduce waste stream amounts.

Table 5.1 (cont.)

Method	Description
Provide incentives to use reusables	Offer cash discounts on food and beverages purchased with reusable flatware, china, and glassware. Provide reusable glasses for purchase by student, staff and faculty, and offer cash discounts on refills.
Operate an on-campus waste exchange	One department's waste may be another's needed products. A waste exchange is a listing of products or an actual storage area for products which may be reused. Items can include used furniture, office supplies, computer equipment, scientific equipment, boxes, packaging materials, or surplus equipment.
Reuse or remanufacture wooden shipping pallets	Wood pallets used for regular truckload product delivery to college campuses create a bulky waste stream item, making their disposal awkward. Instead, pallets may be reused for storage on campus, remanufactured into new pallets, or burned as boiler fuel.
Reuse student furniture and dorm room loft wood	Sleeping lofts, sofas, upholstered chairs, and other furniture not owned by the university are often found in student rooms. At the end of the academic year, students often have little opportunity to save or sell these materials and may leave it behind. A sales and storage program which offers a place to store such materials over summer break is one way to bridge the gap to reuse.
Sponsor collection of clothing, books and appliances for reuse	Students frequently have clothing, appliances, and other items which they choose not to take home when the term ends. These items can be collected as part of a standard charity/recycling program for reuse elsewhere.
Reuse/remanufacture laserwriter toner cartridges	Toner cartridges can be reinked or remanufactured for a longer useful life. A convenient method of reusing cartridges would be for the primary procurement agency on campus to offer cartridge recycling service and offer a discount with old cartridges returned.
Reuse boxes, envelopes and packing materials	Packing materials can be saved for reuse. Reuse campus mail envelopes for circulation.
Use food service buckets as collection containers	5 gallon plastic buckets used in bulk food and other services are appropriate for use as recycling containers and can defray capital costs of purchasing recycling containers.

- Adopt a model purchasing policy for sustainable development that incorporates the above recommendations, as well as standards and implementation activities

5.2 Recycling

Regardless of the location or material type, there are three fundamental components to recycling: collection, processing, and marketing. Buyers/market sources of recyclable materials for Illinois and surrounding states are discussed in Chapter 4. Collection and/or processing are activities performed by a college staff or contractor. Two methods are typically used for collection and processing of recyclables: i) Collection of recyclables separated from the normal refuse stream at the source (termed source separation recycling), followed by minimal processing (i.e., contaminant removal and subsequent material categorization); ii) Collection of recyclables with the normal refuse stream followed by more extensive processing (i.e., manual and/or automated sorting of recyclables from mixed waste).

As shown in Chapter 3 and Table 5.2, waste stream components recycled at colleges typically are generated according to specific functions within the college. As such, a college recycling program should be designed with this in mind. General areas (e.g., student unions) and housing facilities generate recyclables which most closely resembles that of a typical municipal recycling program; office and academic areas are almost entirely

Table 5.2 Materials Recycled at Colleges Based on Facility Type

Recyclable Material	General Areas	Office/ Academic	Food Service	Dormitory/ Housing	Central Stores
Aluminum/metal beverage containers	•	•		•	
Food waste			•		
Glass food and beverage containers	•		•	•	
HDPE beverage and food containers			•	•	
Paper Products					
Corrugated cardboard/paperboard	•	•	•	•	•
High grade office paper					
Computer printout paper	•	•		•	•
White bond/ledger paper	•	•		•	•
Assorted colored bond/ledger paper		•			
Low grade office paper (mixed paper)	•	•		•	•
Newsprint	•			•	
PET beverage containers				•	
Tin (steel) beverage and food containers	•		•		

7. Recycled Content Product Procurement

The College Recycling Law requires identification of frequently purchased products with recycled content and a policy dictum that recycled content materials be preferred over "virgin" content materials, assuming specifications are satisfied. A college procurement system affects solid waste disposal in two ways: i) the quantity and/or types of products procured are a direct input to college waste generation; ii) the recycled material composition of products procured can lessen demand of similar "virgin" material products and increase demand for materials recovered in a recycling program. Methods to modify procurement in order to reduce waste generation (Item i) are discussed in Chapter 4. The purpose of this chapter is to provide guidance on purchasing products with recycled content.

7.1 Procurement Policy Elements

Implicit in this aspect of the college recycling law is the necessary commitment that colleges will purchase products with recycled material content when such products compare favorably in terms of conformance to specifications, cost, and availability to products with non-recycled content (virgin products).

A number of steps may be performed to encourage procurement of recycled content products. First, inventory the type and consumption rate of goods on-campus for which recycled content materials are available, and identify producers of such recycled content goods. For colleges, paper products and their recycled content would naturally comprise a majority of this evaluation. Next, a cost analysis of purchasing virgin versus recycled products should be performed and weighed against normal purchasing requirements (i.e., conformance to specifications, availability, shipping, recycled content, and durability). Third, it is recommended that new products be tested with major campus users for acceptability. Fourth, the evaluation of a different pricing structure for recycled content versus virgin products should be investigated. A price preference to support the purchase of recycled content products may be possible. Lastly, a system to monitor the progress of recycled product procurement should be developed. Such monitoring should be included in annual recycling/waste management reports.

Once acceptable recycled content products are identified, purchasing departments can communicate their recycling policy to other school departments and encourage it as standard policy. Campus media services may be utilized to regularly update the campus community on the availability and performance of recycled content products. Proven products should be used in highly visible applications. For example, department letterhead

can be printed on recycled content paper and recycled content copier paper used at copy machines. Also, special advertising of stocked recycled content products can be conducted.

7.2 Design for Recycling

It is also important to consider a college's recycling activities during procurement modification. Purchase and produce (e.g., publish) products which are acceptable in the university's recycling programs. For example, if a department is involved in producing publications, design the publications such that when obsolete, they may be recycled in the college's paper recycling program. The following recyclability criteria for publications have been developed at the University of Michigan (Marks, 1990):

- Use stapled or water soluble bindings over hot-melt bindings.
- Select white ledger or other paper amenable to recycling over groundwood paper.
- Use non-glossy covers for publications rather than glossy covers.
- Do not use polymer coated papers.
- Avoid heavy inking in bold colors.

7.3 Specifications for Recycled Content Products

Federal and state specifications for recycled content levels in various products have been established. The specifications address only those materials procured by federal or state agencies, respectively, and are implemented when economically and practically feasible. U.S. federal procurement guidelines are given in 40CFR Parts 247 through 253 and Illinois content requirements are given in Public Act 87-95. Recycled content levels for paper products, which have the largest effect on procurement, are shown in Table 7.1. As can be seen, Illinois has taken an aggressive stand in purchasing recycled content paper products for its state agencies.

Current State of Illinois specifications for procurement of recycled content xerographic paper are as follows (ILCMS, 1991):

- 20# basis weight white recycled xerographic bond paper to meet all requirements and specifications of a super premium No. 4 xerographic bond except for the following:
- The paper shall contain at least 50% recovered paper material. Such recovered material shall consist of at least 20% deinked or post-consumer material.
- The paper shall have a minimum brightness of 80.

Table 7.1 Recommended Minimum Recycled Content Standards for Paper and Paper Products, % by weight

Paper Product Type	Federal		State of Illinois	
	Waste Paper [a]	Post-Consumer	Waste Paper [a]	Post-Consumer[b]
Fine Paper [c]	50	-	50	20-50[d]
Newsprint	-	40	-	40-80
Tissue and Toweling				
Toilet Tissue	-	20	-	25-45
Paper Towels	-	40	-	25-45
Paper Napkins	-	30	-	25-45
Facial Tissue	-	5	-	25-45
Doilies	-	40	-	25-45
Boxes				
Corrugated Boxes	-	35	-	35-55
Fiber Boxes	-	35	-	35-55
Brown papers (e.g., bags)	-	5	-	35-55
Paperboard				
Paperboard products	-	80	-	80-95
Pad Backing	-	90	-	80-95
Source	40CFR250		PA87-95	

a. 'Waste Paper' content includes 'Post-Consumer' content requirements. Waste paper refers to paper waste which is created following completion of the papermaking process. Examples included post-consumer paper, envelope cuttings, bindery trimmings, printing waste, obsolete inventories and unused stock.

b. Range shown is amount required by 7/1/94 (low end) and that required after 7/1/2000 (high end).

c. 'Fine Paper' generally refers to high grade bleached printing and writing papers and includes the following specific paper types. offset printing, xerographic, mimeo and duplicator, writing, stationary, office paper (e.g., note pads), paper for high speed copiers, envelopes, form bond (including computer and carbonless), book papers, bond papers, ledger, cover stock, and cotton fiber papers. Cotton fiber paper must contain 25% recovered cotton fiber or linen and 50% waste paper.

d. Either post-consumer materials or deinked stock. Phased in from 20% (min.) deinked stock or post-consumer materials by 7/1/94 to 50% (min.) after 7/1/2000.

7.4 Joint Purchasing

In order to obtain lower rates than may be achieved on their own and to simplify procurement, public community colleges and universities in Illinois may voluntarily purchase recycled content products through the state under a Joint Purchasing Agreement. It is necessary to be a 'governmental unit' in order to participate in the Joint Purchasing Program (a 'governmental unit' is any public authority which has the power to tax or any other public entity created by statute). Each governmental unit must obtain legal authority to participate in the Joint Purchasing Program from its governing board through the passage of a resolution. The joint purchasing agreement allows colleges (and cities and counties also) to piggyback on the State of Illinois Central Management Services (CMS) contract and the unit prices established under it. Following approval by the college board and approval by CMS, a college would directly contact contracted vendors, issue purchase orders, and arrange for delivery at the price set with the state's larger volume purchases without further involvement of CMS. Further assistance regarding the joint purchasing program through CMS can be obtained from the State of Illinois Joint Purchasing Manual at: T. Wurth, Joint Purchasing Program, Procurement Services Division, 801 Stratton Building, Springfield, IL, 62706, (217) 785-3900.

7.5 Sources of Recycled Content Products

The following publication summarize sources of recycled content products that are available for procurement:

Recycled Products Guide
PO Box 577
Ogdensburg, NY 13669
(800) 267-0707

It also publishes a monthly newsletter, "Recycled Products Guide Reporter," available from the same address. A number of waste and paper related publications regularly contain information regarding recycling and recycled content products (i.e., Recycled Paper News, Pulp & Paper Magazine, Fibre Market News, Resource Recycling, Recycling Today, Biocycle, Waste Age). Additional sources of information are given in the reference lists at the end of this report.

Appendix E Weight / Volume Conversions for Recyclables and Waste Stream Components

Table E.1 Waste and True Material Densities

Material	Densitiy (lb/yd^3)
Municipal Waste:	100-200
After dumping from compactor truck	350-400
In compactor truck	500-700
In landfill	500-900
Shredded Waste	600-900
Baled in paper baler	800-1200
Bulk Densities:	
Cardboard	1.87
Aluminum	2.36
Plastics	2.37
Miscellaneous paper	3.81
Garden waste	4.45
Newspaper	6.19
Rubber	14.90
Glass	18.45
Food	23.04
True Densities:	
Wood	37
Cardboard	43
Paper	44-72
Glass	156
Aluminum	168
Steel	480
Polypropylene	56
Polyethylene	59
Polystyrene	65
ABS	64
Acrylic	74
Polyvinylchloride (PVC)	78

Table E.2 Recyclable Materials

Material	Volume	Weight (lbs)	Weight (tons)
Aluminum cans	1 full grocery bag	1.5	0.00075
Aluminum cans	55 gallon plastic bag	13-20	0.0065-0.01
Aluminum cans, flattened	1 cubic yard	250	0.125
Aluminum cans, whole	1 cubic yard	50-74	0.025-0.037
Corrugated Cardboard, loose	1 cubic yard	300	0.15
Corruagted Cardboard, baled	1 cubic yard	1,000-1,200	0.5-0.6
Ferrous cans, whole	1 cubic yard	150	0.075
Ferrous cans, flattened	1 cubic yard	850	0.425
Glass, whole bottles	1 cubic yard	600-1,000	0.3-0.5
Glass, semicrushed	1 cubic yard	1,000-1,800	0.5-0.9
Glass, crushed mechanically	1 cubic yard	800-2,700	0.4-1.35
Glass, whole bottles	1 full grocery bag	16	0.008
Glass, uncrushed-manually broken	55 gallon drum	125-500	0.0652-0.25
Grass clippings	1 cubic yard	400	0.2
Leaves, compacted	1 cubic yard	450	0.225
Leaves, uncompacted	1 cubic yard	250	0.125
Leaves, vacuumed	1 cubic yard	350	0.175
Newsprint	12" stack	35	0.0175
Newsprint, loose	1 cubic yard	360-800	0.18-0.4
Newsprint, compacted	1 cubic yard	720-1,000	0.36-0.5
PET bottles, whole, loose	1 cubic yard	30-40	0.15-0.02
PET bottles, whole, loose	1 gaylord [a]	40-53	0.02-0.0265
PET bottles, baled	30" by 48" by 62" bale	500	0.25
PET bottles, granulated	1 gaylord	700-750	0.35 -0.375
PET bottles, granulated	tractor trailer load	30,000	15.0
Film, baled	30" by 42" by 48" bale	1,100	0.55
Film, baled	trailor load	44,000	22.0
HDPE dairy, whole, loose	1 cubic yard	24	0.012
HDPE dairy, baled	30" by 48" by 60" bale	500-800	0.25 -0.4
HDPE mixed, baled	30" by 48" by 60" bale	600 -900	0.3-0.45
HDPE mixed, granulated	gaylord	800-1,000	0.4-0.4
HDPE mixed, granulated	tractor trailer load	42,000	21
Mixed PET & dairy, whole, loose	cubic yard	average 32	0.016
Mixed PET, dairy & rigid, whole, loose	1 cubic yard	average 38	0.019
Used motor oil	1 gallon	7	0.0035
Tire, passenger car	one	12	0.006
Tire, truck	one	60	0.03
Food waste, solid & liquid fats	55 gallon drum	412	0.206
Wood chips	1 cubic yard	500	0.25

a. Gaylord (container) size most commonly used: 40" by 48" by 36"