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Guide for the Recovery of High Grade Waste Paper from Federal Office Buildings Through At-Source Separation

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GUIDE
for the
RECOVERY OF HIGH GRADE WASTE PAPER
FROM FEDERAL OFFICE BUILDINGS
THROUGH
AT-SOURCE SEPARATION

Waste Management Branch
Environmental Impact Control Directorate
Environmental Protection Service
Environment Canada
Ottawa, Ontario

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ABSTRACT

Analysis of office waste stream shows that a high percentage of it is valuable waste paper. By preventing this material from being mixed with the rest of refuse it produces a more profitable and environmentally beneficial category of waste paper to be sold for recycling. The key to successful recovery of recyclable materials is to set them aside at the point of generation (the desk or work station) by the generator.

This Guide explains how to organize and successfully manage an office waste paper recovery program in a federal office building (Crown owned or leased).

RÉSUMÉ

A l'analyse, il appert que le papier de rebut réutilisable représente un fort pourcentage des déchets de bureau. En ne le mélangeant pas au reste des déchets, on peut tirer meilleur profit de cette classe de papier recyclable et en faire bénéficier l'environnement. Pour récupérer efficacement les matériaux de cette catégorie, il vaut mieux que l'utilisateur les mette lui-même de côté, à la source (à son bureau ou lieu de travail).

Le présent manuel explique comment organiser et gérer efficacement un programme de récupération du papier de rebut d'un immeuble à bureau fédéral (appartenant à la Couronne ou loué pour elle).

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1 GLOSSARY OF TERMS

BALER	a machine used to compress solid wastes, primary materials, or recoverable materials, with or without binding, to a density or form which will support handling and transportation as a material unit rather than requiring a disposable or reuseable container. This specifically excludes briquetters and stationary compaction equipment which is used to compact materials into disposable or reuseable containers.
COLOURED LEDGER	a general grade of paper composed of white or coloured printing or writing paper but excluding newspaper, telephone books or other paper containing newsprint-type material; two specific grades of coloured ledger are manifold and No. 1 sorted (see below).
CONTAMINANTS	any material which reduces the value of the grade of waste paper.
DE-INKING	a process used in the paper industry to remove ink from printed paper.
FULL-SERVICE CONTRACT	an agreement whereby a company sets up and maintains a desk top separation program and purchases the resulting waste paper from an office building.
HIGH GRADE PAPER	paper containing long, strong fibres originally produced by the chemical pulping of wood.
GARBAGE	includes all kitchen and table waste of animal or vegetable origin, resulting from the preparation of food in a dwelling, or place of business.
LOW GRADE PAPER	paper containing short, weak fibres originally produced by the mechanical pulping of wood.

MANIFOLD COLOURED LEDGER	a specific grade of waste paper which includes the high-grade coloured waste paper from paper converters, unprinted paper and computer print-out.
MIXED PAPER No. 1	consists of a baled mixture of various qualities of paper containing less than 25% of groundwood stock, coated or uncoated. Prohibitive materials may not exceed: 1% Total outthrows may not exceed: 5%
MIXED PAPER No. 2	consists of a mixture of various qualities of paper not limited as to type of packing or fibre content. Prohibitive materials may not exceed: 2% Total outthrows may not exceed: 10%
OUTTHROWS	all papers that are so manufactured or treated or are in such a form as to be unsuitable for consumption as the grade specified.
POST CONSUMER	any product that has gone through its useful life, served the purpose for which it was intended, and been discarded by the user. Waste or scrap created in a manufacturing or converting operation is not considered post-consumer waste but pre-consumer waste. However, post consumer waste is generated in homes, commercial establishments, industrial plants, institutions and government offices.
PROHIBITIVE MATERIALS	any materials which, by their presence in a packaging of paper stock in excess of the amount allowed, will make the packing unusable as the grade specified, or any materials that may be damaging to equipment.
RECOVERY/RECLAMATION	the separation of usable materials from mixed refuse for recycling.
RECYCLING	the utilization of recovered/reclaimed materials in the production of a product.

REFUSE OR SOLID WASTE	includes ashes, garbage, rubbish, discarded materials, clothing, waste paper, broken crockery and glassware, bottles, cans, and such other articles as would normally accumulate, but shall not include weighty or bulky articles such as stoves, furnaces, bed springs, mattresses, furniture, boxes, barrels, trees and water or fuel tanks.
SHREDDER	a machine used to reduce in size bulk solid wastes, primary materials, or recoverable materials to a form which can be easily baled or handled. It is also used for destruction of classified materials.
SOURCE SEPARATION	means the setting aside of recyclable materials at their point of generation by the generator.
NO. 1 SORTED COLOURED LEDGER	a specific grade of waste paper which includes the coloured high grade waste paper discarded from offices.
STORAGE AREA	location used to store recovered waste paper before it is picked up by a waste paper dealer.
SUPER MIXED PAPER	consists of a baled clean sorted mixture of various qualities of paper containing less than 10% of groundwood stock, coated or uncoated. Prohibitive materials may not exceed: 1/2 of 1% Total outthrows may not exceed: 3%
WASTE	As an adjective in the secondary materials industry used to differentiate between virgin materials and secondary materials, as in the phrase waste paper. The word is used in this sense as a substitute for words like secondary, scrap, or junk. Some people apply the term waste to materials in the process of being made acceptable for industrial comsumption. Thus, paper may be waste paper as recovered but becomes paper stock when it has been graded and baled for shipment to a paper mill.

WASTE PAPER	Any paper or paper product which has lost its value for its original purpose and has been discarded. The term is most commonly used to designate paper suitable for recycling, as paper stock. Paper waste generated in the paper manufacturing process itself is excluded, however any source outside a paper mill is included in the definition.
WASTE PAPER DEALER	company that purchases waste paper from generators and sells it to paper mills.
WASTE PAPER ROOM	A 1-hour fire separated, sprinkled room used to store recovered waste paper, in jute bags or containers, before it is picked up by a waste paper dealer.

2 INTRODUCTION

2.1 Preface

Recovery of high-grade paper from office buildings is one of the fastest growing forms of resource recovery in the United States today. Over 500 office buildings in private industry and a growing number of federal, state and local government offices are converting from 30 to 70% of their waste paper into the more profitable and environmentally beneficial category of "surplus property" through the at-source separation system.

Each year, millions of pounds of valuable waste paper are discarded from office buildings across Canada. This paper could, instead, be separated from the rest of the refuse and sold to manufacturers to produce a wide range of paper products.

The Canadian Government has an important role to play in the development of successful waste paper recovery systems. Since over 10% of all office employees in Canada work for the federal government, there is a tremendous potential saving.

Equally important, however, is the multiplier effect. If the federal government initiates successful recovery programs, private organizations across Canada can be expected to follow its lead.

Waste paper generated in office buildings is of particular interest because it contains large amounts of the higher grades of waste paper, such as good quality writing paper, which are quite valuable and have been among the most sought after by paper mills. The key to successful recovery of high grades of waste paper is to keep them separate from the waste paper which is less valuable (i.e. newspaper, phone books) as well as the other non-paper materials which are discarded (plastic packaging, glass bottles, food scraps, etc.). Note that classified materials are not to be included in this program; these should be handled as outlined in the Departmental Security Manuals.

2.2 Purpose of Guide

The purpose of this Guide is to explain how to organize and successfully manage an office waste paper recovery program in a federal office building (Crown owned or leased). In line with Federal Government Cabinet Decision of May 31, 1973, entitled "Solid Waste Management", the Government is providing a consistent and exemplary waste paper recovery program by considering the overall conservation objectives in terms of ecological, economic and social impacts.

2.3 Application of Guide

This Guide shall apply to Federal facilities (Crown owned or leased) under the jurisdiction of the Federal Government of Canada.

The Environmental Protection Service (EPS) of Environment Canada will provide advice to individual departments on all aspects of implementing this Guide. Regional or District Offices of EPS are listed in Appendix I.

This Guide will be revised and appended from time to time to reflect developments in technology and/or changing circumstances.

2.4 The Benefits of Recycling Waste Paper

The separation and collection of high grades of waste paper from federal office buildings provides the government with an excellent opportunity to conserve our country's resources. It is a way of promoting the "Conserver Ethic" - a concept that simply means doing more with less.

Conserve Energy

Escalating prices, long-term availability of traditional energy resources, and the prospect of a serious balance of payments deficit if we import more energy, have all combined to make energy one of Canada's most urgent problems. Energy conservation has become a national priority. Waste paper separation programs can mean significant savings in terms of Canadian energy resources.

Research shows that recycling high grades of waste paper produces significant energy savings compared to making the same paper from forest resources and burning the waste paper for energy. In the National Capital Area if all the federal public servants separated their high grade paper in their offices, it can save the energy equivalent of approximately 500,000 gallons of gasoline per year.

Reduce Solid Waste

Many of the urban areas in Canada are quickly filling their land-fill sites and the opening of new ones is meeting increased opposition. Recovery programs have enabled many buildings to reduce their waste by 50%. Some have achieved reductions as high as 78%.

Conserve Forest Resources

While Canada has the largest forest resources in the world, they can only support a limited yield per year. A report for the federal government concluded that expansion beyond 1990 of the pulp and paper industry in Canada appeared to be severely limited, with wood supplies acting as the major constraint.

Reduce Pollution

Studies show that the recycling process produces less air, water and land pollution than does production from virgin sources.

Saving Money

The decision to start an office waste paper separation program should not be based primarily on economics, although most of the programs developed to date have, in fact, been able to make money on a long term basis. In the United States, over five hundred offices - many of them private companies - are now separating their waste paper for recycling.

2.5 The Recommended Separation Method

In general office buildings the grade of paper recommended for collection is coloured ledger. This grade is composed basically of coloured and white fine paper (letters, envelopes, reports, scratch paper, computer print-outs, etc.) (see Figure 1). Other separation methods are outlined in the Supplement to the Guide which is available, upon request, from the Waste Management Branch of Environment Canada (see Section 4).

The method which is recommended for the separation of paper from administrative office buildings involves the following basic steps:

Separation of Waste Paper at Each Desk

Each employee separates the waste paper which can be classed as No. 1 sorted coloured ledger and places it into a small desk-top holder which sits on his/her desk.

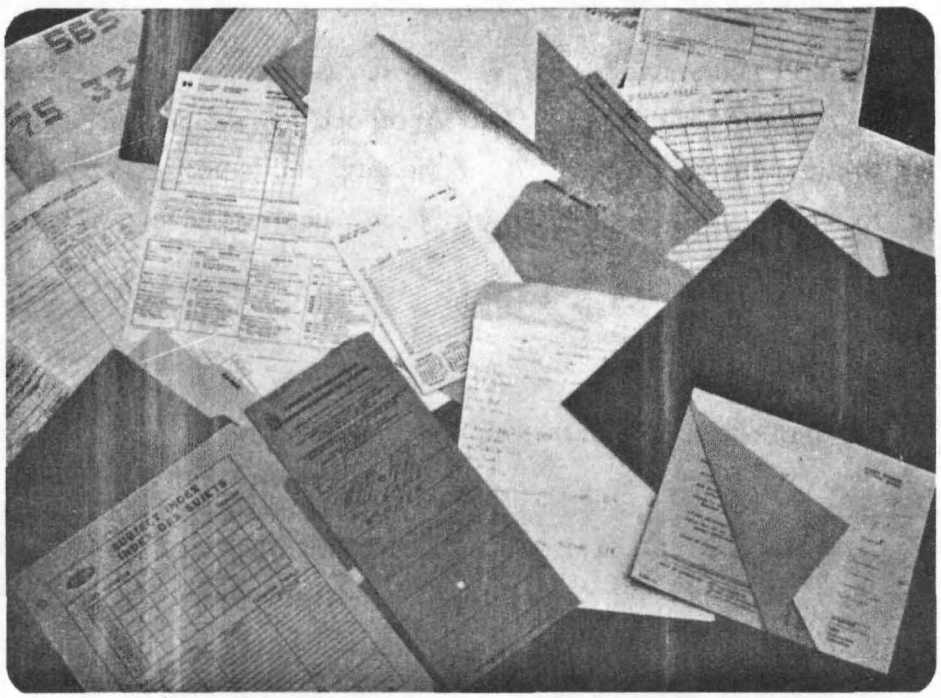

FIGURE I COLOURED LEDGER GRADE

Transfer of Waste Paper from Desk to Central Container

When convenient, employees empty the paper from their desk-top holders into central containers which are located throughout the office building. Each container can be lined with a removable jute bag. Employees in areas that generate occasional large quantities of waste paper (old redundant files, reports, obsolete stock) could fill cardboard boxes and mark them "Recyclable Material" rather than fill up the central containers.

Transfer of Waste Paper from Central Container to Storage Area

When the central containers are full, the cleaning staff will replace the jute bags with empty ones and take the full bags to a paper storage area which is usually located in the basement. Alternatively, some departments or agencies may decide to utilize existing mail distribution or general service personnel to collect recovered paper since the handling requirements for recovered paper are similar to those associated with distribution of photocopy papers, stockroom supplies or telephone directories.

Pick-up of Waste Paper from Office Building

A contract will be arranged by Crown Assets Disposal Corporation (CADC) with a waste paper dealer to pick up the waste paper on a regular basis and pay a predetermined price for each ton collected. The dealer then bales the paper and ships it to a paper mill for use in making a variety of paper products.

This recovery method (Figure 2) is designed for the separation of high grade paper discarded at employees' desks in general administrative office buildings. Once this program is established and operating smoothly, additional programs for the recovery of newspapers or telephone directories could be investigated.

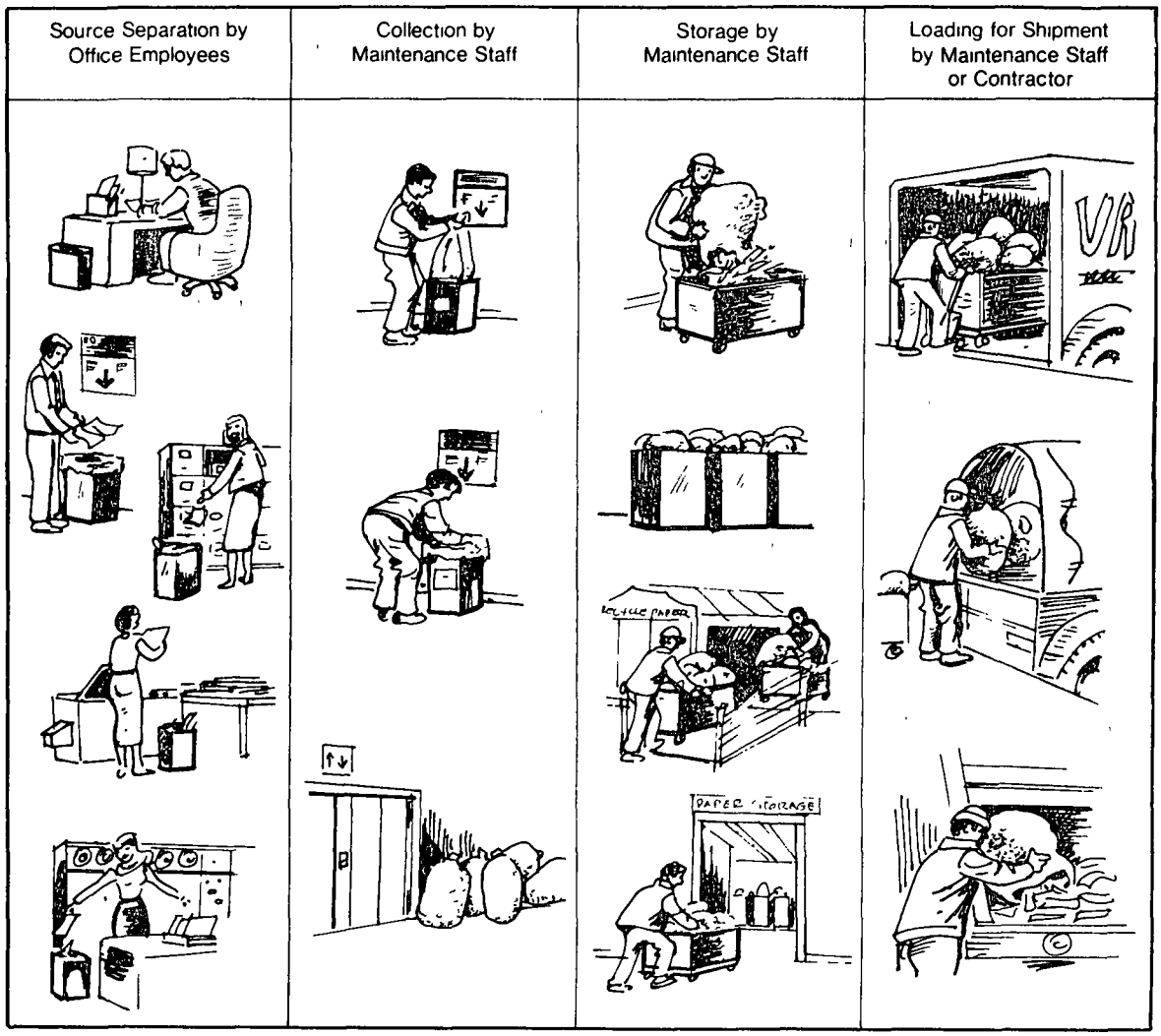

FIGURE 2 RECOVERY OPERATION

Similarly, certain special areas of the office which generate large amounts of particularly high grades of waste paper, such as large computer or in-house printing operations, may warrant a separate recovery program.

Note that this Guide is specifically designed for the setting up of paper recovery programs in federal office buildings (Crown owned or leased). Although other types of buildings may find it useful, some of the procedures outlined (such as arranging all sales through the Crown Assets Disposal Corporation) apply only to the federal government.

3 ORGANIZING AND MANAGING THE RECOVERY SYSTEM

This chapter describes the twelve basic steps needed to organize and manage the recommended desk-top separation system in general administrative federal buildings. If an economic evaluation is not required omit steps 5 and 11.

STEP 1: Appoint a Program Co-ordinator

No program is possible without someone who can co-ordinate all the activities. The job of the program co-ordinator is an important one and should be given to someone who has planning and organizational talents, an ability to communicate effectively as well as having an enthusiasm for the waste paper program.

The co-ordinator will often work with a steering committee composed of representatives from the Department of Public Works (DPW) and Crown Assets Disposal Corporation (CADC) as well as from other tenants in the building participating in the program. In a multi-tenant building the co-ordinator from the largest tenant acts as a chairman of a steering committee with other clients represented.

The basic tasks of the co-ordinator and the steering committee are listed below. They should be used by the co-ordinator as a program check list:

(a) Gather basic information about the building which will be needed to plan the system (described in Step 2).

(b) Estimate the amount of paper to be generated from the building (described in Step 3).

(c) Familiarize himself/herself with the local waste paper markets (Step 4).

(d) If required by the management, prepare a rough economic evaluation of the proposed system (described in Step 5).

(e) Prepare a "Report on Surplus" form for the Crown Assets Disposal Corporation (described in Step 6).

(f) Arrange for the purchase and distribution of necessary materials and make arrangements for storage of the separated waste paper (described in Step 7).

(g) Develop and implement an employee awareness program (described in Step 8).

(h) Implement the program (described in Step 9).

(i) Monitor and streamline the program (described in Step 10).

(j) Carry out a re-evaluation of the program one year after start up (described in Step 11).

(k) Make recommendations for expansion of the program into other types of paper (newspapers, magazines, telephone directories, etc.) (described in Step 12).

(l) Resolve the day to day problems raised by employees as well as by cleaning staff (through the Department of Public Works) and waste paper dealers (through Crown Assets Disposal Corporation).

Based on previous programs, it will usually require four weeks of the co-ordinator's time to organize the program and 5% of his/her time to monitor it.

Although the program co-ordinator may decide to do all of these tasks, the organization of the program and the conducting of an educational program could be contracted out to a private company of specialists (these services can be provided on a straight fee basis) upon consultation with Environment Canada.

STEP 2: Prepare a Facility Record

Before organizing an office waste paper recovery program, basic information about the building should be gathered by the program co-ordinator and the steering committee. This information will be needed to estimate the viability of the program. Some information will be available from the DPW building manager.

(a) Occupancy status. Is the building Crown owned or leased? In leased buildings, special procedures might have to be followed to introduce the paper recovery program.

(b) Status of building cleaning. Is the cleaning service provided by a private cleaning firm under contract to the Department of Public Works or under contract to the building owner, or by staff employed by the Department of Public Works.

In all cases DPW's building manager will have to obtain an agreement from the lessor for leased buildings or the cleaning staff for the Crown owned buildings to participate in the program.

(c) Number of federal employees in the building.

(d) Number of federal employees per floor.

(e) Available storage space. Adequate storage space is important. Ideally, recycled paper should be stored in a special area with access to loading docks or freight elevators. The area should be for recycled paper only to avoid any confusion with handling the remaining waste from the building. See if there is an unused storage room. If not, one could be specially constructed by DPW. Special containers located in or outside the building could also be used. Generally the maximum amount of storage space should be used since this reduces the number of times the waste paper dealer must pick up paper from the building.

(f) Loading facilities. Inspect possible loading areas to determine which is best for easy transfer of paper from the storage area to the dealer's truck.

(g) Potential location for central containers. Check each floor for heavy traffic areas such as: outside washrooms, near drinking fountains, elevators, photocopy machines, etc.

(h) Identify existing paper recovery programs. Other recovery programs are important because the paper recovered may be part of an existing contract and thus unavailable for your program. Determine from DPW and CADC whether or not any paper recovery program exists in your building.

(i) Special waste generation areas. Become familiar with the special areas of your building which generate large amounts of high grade waste paper - computer or keypunch facilities, in-house printing rooms, stock rooms, record centres and filing areas. These areas will require more central containers than other parts of the building or other arrangements for collecting and pick-up of waste paper.

STEP 3: Estimate Waste Paper Quantities Recoverable and Storage Capacity Required

As mentioned in the introduction, this Guide applies only to general administrative office buildings. Although these buildings may have a small computer centre and a small in-house printing operation this Guide excludes those buildings that are primarily laboratories, warehouses, record centres, large printing plants or computer centres. Special buildings, such as post offices (mail processing), are also excluded in this Guide but are covered in the Supplement.

Based on experience with other recovery programs, it is recommended that all "coloured ledger" paper be collected for recovery. This grade includes white as well as coloured fine paper. There are three reasons for recommending recovery of coloured ledger grade instead of white ledger.

(a) Although coloured ledger is not as valuable as white ledger (paper mill price of $90/ton versus $130/ton in Central Canada in September 1977), the amount of non-white ledger in an office can be significant, ranging from 3% to 23% of the waste generated.

(b) Programs designed to recover only white ledger often require further sorting to remove coloured ledger and other contaminants.

(c) Some dealers appear to be prepared to allow more contaminants in coloured ledger than in white ledger.

Waste Paper Quantities

The per employee amount and composition of coloured ledger grade waste paper recoverable from an office building will vary considerably depending on the size and nature of the functions performed. However experience to date indicates that about 0.3 kg/employee/day (0.6 lb/employee/day) of coloured ledger can be recovered from a typical office building with a small computer and in-house printing operation. To calculate the amount of coloured ledger recoverable per year, use the following equation:

no. of metric tonnes of coloured ledger/year = no. of employees x 0.065

no. of tons of coloured ledger/year = no. of employees x 0.072

One of the most significant variables affecting the amount of coloured ledger recovered from each employee is whether or not the building has a computer and/or in-house printing room and whether it occasionally discards obsolete files. Table 1 provides a rough guide to the amount of coloured ledger available from these operations on the basis of the total number of employees in the entire building.

TABLE 1 AMOUNT OF COLOURED LEDGER FROM SPECIFIC OPERATIONS IN AN OFFICE BUILDING

Facility	Metric Tonnes/Employee/ Year Recoverable	Tons/Employee/ Year Recoverable
Computer Room	0.007	0.008
Printing Room	0.006	0.007
Obsolete Files	0.009	0.010
TOTAL:	0.022	0.025

Thus, as much as 0.022 of the 0.065 tonnes/employee/year (0.025 of the 0.072 tons/employee/year) of recoverable coloured ledger will not be available in those buildings without computer and printing operations and without file rooms that occasionally discard waste paper. The previous equation for calculating the total tons of coloured ledger recoverable per year in a building using the 0.065 tonnes/employee/year (0.072 tons/employee/year) should be adjusted by subtracting one, two or all three of the above figures if the building doesn't have a computer, in-house printing or a file room.

Storage Capacity

For storage of the waste paper recovered, the ideal system is an existing room. If a suitable storage room isn't available, it will be necessary to construct one or store the paper in mobile containers. In all cases the storage area should be for recovered paper only. It should be in a secure area where contamination or wetting is unlikely and where fire safety can be maintained. It should be as large as possible to reduce the number of trips dealers must make to collect the waste paper. Although dealers usually require a minimum pick-up of 450 to 900 kgs., (1000 to 2000 lbs) this minimum amount may be facilitated by having dealers pick up paper from more than one source, using a milk-run pick-up.

In computing storage space requirements and capacity, the factors in Table 2 can be used.

TABLE 2 FACTORS FOR COMPUTING STORAGE SPACE

Form of Material Stored	Density kg/m^3	Density lb/yd^3	Floor Area Required m^2/metric tonne	Floor Area Required ft^2/ton
Loose (as in bags)	89	150	13.6	133
Baled	238	400	5.1	50
Tightly Packed Flat Ledger (Pallets)	298	500	4.1	40
Tightly Packed Flat Ledger (Bulk Container)	298	500	3.1	30

Thus the space required to store loose coloured ledger for a week from an office building can be computed using the following formula:

$$A/e = M/e/d \times Fa \times Cf \times Dw$$

where A/e denotes Area per employee

M/e/d denotes Mass per employee per day

Fa denotes Floor area required

Cf denotes Conversion factor (kgs to tonne or lbs to ton)

Dw denotes Days of the week.

For an office building with recovery rate of 0.3 kg/employee/day (0.6 lbs/employee/day) the required storage space is computed as follows:

$$0.02 \text{ m}^2\text{/employee} = 0.3 \text{ kg/emp./day} \times 13.6 \text{ m}^2\text{/tonne} \times 0.001 \text{ tonne/kg} \times 5 \text{ days}$$

$$(0.2 \text{ ft}^2\text{/employee} = 0.6 \text{ lb/emp./day} \times 133 \text{ ft}^2\text{/ton} \times 0.0005 \text{ ton/lb} \times 5 \text{ days})$$

Note that as a result of the waste paper recovery program, less space will be required for storage of refuse. DPW will have to make the necessary adjustments with the refuse contractor for any changes resulting from the waste paper program.

Also determine whether or not shredding and/or baling equipment is necessary.

STEP 4: Marketability of Recovered Paper

In Canada, the sale of surplus materials from federal facilities must be arranged through the Crown Assets Disposal Corporation (CADC). Since the Department of Public Works (DPW) is responsible for arranging with the custodial staff to remove wastes, they too will be involved in preparation of the contract to sell waste paper.

The price at which the recovered coloured ledger is sold to waste paper dealers is extremely important to the economic viability of a recovery program. This price varies considerably across Canada, depending upon the quality of grade, the size of the shipment, and the type and location of the consuming paper mill. Information on the regional market price for coloured ledger may be obtained from Crown Assets Disposal Corporation (450 Rideau Street, Ottawa, Ontario, K1N 5Z4, Telephone: (613) 995-3238) or from the Regional Offices of Environment Canada in Halifax, Montreal, Ottawa, Toronto, Edmonton and Vancouver (Appendix I).

In addition to information on the local price of waste paper, each dealer may have slightly different specifications for waste paper depending upon the mill that uses his waste. The American Paper Stock Institute of America has established definitions for two coloured ledger grades (see Glossary of Terms).

These definitions should only be used as guidelines because practice varies from dealer to dealer. For example, some dealers classify post-consumer coloured ledger that contains a large amount of white ledger as manifold coloured ledger. The prices paid by paper mills to dealers for baled No. 1 sorted and manifold coloured ledger are $90 and $110/ton respectively (in Central Canada, September 1977). Paper mills usually buy their waste paper from waste paper dealers because they can supply them with all the different grades they need in a baled form with the specifications they require. The price dealers pay the generators for coloured ledger is less than the mill price due to the costs of collecting, handling, processing and transporting the paper to the paper mills.

Generally, coloured ledger grade includes the following:

Bond stock (all forms)
Reports (stapled)
Writing paper
Note paper
Scratch paper (excluding backing or newsprint)
Envelopes (white)

Binder dividers or index sheets
Index cards (3" x 5", 4" x 6")
Padded sheets (excluding backing or newsprint)
Manila folders (light brown)
Computer printout (without carbon or groundwood content)
All drawings on paper (excluding blueprint)
Computer cards
Reproduction paper (from dry copiers: Xerox, IBM, etc.)

The following are the most common contaminants which must be kept separate from coloured ledger (see Figure 3):

Newspapers, telephone books and groundwood (newspaper like computer printout)
Corrugated cardboard or boxboard
Unbleached paper (e.g. brown envelopes)
Plastic binders, cups, or windows in envelopes
Poly-coated or waxed paper (e.g. paper cups and magazines)
Glued edge reports
Carbon paper, typewriter ribbons
Glass
Rubber bands
Gummed labels
Cigarettes, cigars, ashes
Tobacco packaging
Candy and gum wrappers
All cups and plates
Facial tissue
Paper towels
Lunch bags and contents
Metal binders and fasteners
Contaminated textiles
Red-brown covers and folders
Blueprint Paper

FIGURE 3 CONTAMINANTS

STEP 5: Prepare a Preliminary Economic Evaluation (if required)

The introduction to this Guide reviewed the environmental benefits (energy and resource conservation and reduced solid waste generation) of increased waste paper recycling. It is also of interest to know whether the program will make or lose money by estimating the projected costs and revenues. It should be stressed, however, that even if a recovery program is not viable on an economic basis it may still be justified on environmental and resource conservation grounds.

Tables 3 and 4 are a guide to evaluating the economics of a program in the first year and in subsequent years. The two variables are the number of employees and the price that dealers will pay for the recovered coloured ledger (ascertained in the previous three steps). The amount of paper recoverable/employee/year may also vary as discussed earlier. Cost figures are based on the experience of previous programs and are rough approximations which may vary from program to program. It is to be expected that fixed start-up costs paid at the beginning of the program will mean a net loss in the first year. Although these costs are paid in the first year, they can also be amortized over the life of the program. This approach to assessing the net cost of a program is further discussed in Step 11.

TABLE 3 PRELIMINARY ECONOMIC EVALUATION - FIRST YEAR

Items	Calculation	Total	Example Using: 1000 Employees $44/tonne ($40/ton)
Costs			
Start-Up Equipment	No. employees x $3.50/emp	= $___(1)	$3500
Start-Up Management & Admin.	1 man-month time	= $1200(2)	$1200
On-going Management & Admin.	5% co-ordinators salary	= $ 750(3)	$ 750
Total	(1) + (2) = (3)	= $___(4)	$5450
Revenue			
Sale of Recovered Paper	0.065* metric tonnes/ emp/yr x No. emp x price ($/tonne) col ledger	= $___(5)	$2860
Net Profit (or Loss)	(5) - (4)	= $___(6)	($2590)

*See next page

TABLE 4 PRELIMINARY ECONOMIC EVALUATION - SUBSEQUENT YEARS

Items	Calculation	Total	Example Using: 1000 Employees $44/tonne($40/ton)
Costs			
Equipment Replacement	No. employees x $.10/emp	= $___(1)	$ 100
Management and Admin.	5% of co-ordinators salary	= $ 750(2)	$ 750
Total	(1) + (2)	= $___(3)	$ 850
Revenue			
Sale of Recovered Paper	0.065* metric tonnes/ emp/yr x No. emp x price ($/tonne) col ledger	= $___(4)	$2860
Net Profit (or Loss)	(4) - (3)	= $___(5)	$2010

* The 0.065 metric tonnes/emp/yr figure is appropriate for an average office building that has a small computer, in-house printing and filing operation. If one or more of these facilities does not exist, deduct the appropriate quantity from 0.065 metric tonnes/emp/yr, as discussed in Step 3.

Neither of these calculations takes into account the money saved through reduced solid waste collection and disposal. These tables also exclude any additional costs associated with the storage and cleaning of the building or the cost of the time taken by employees to become familiar with the system since these costs are not normally incurred by most programs.

The majority of office waste paper recovery programs now in operation are profitable. Calculations indicate that, depending on the quantity of paper generated per employee and the price the dealer is willing to pay, 150-200 employees are required to economically justify the recovery of coloured ledger from a general administrative office building with a small computer and printing room. If, however, a number of smaller buildings were co-operating together in having the paper picked up, the program may become economic for buildings with less than 150 employees.

STEP 6: Prepare a Report of Surplus and Finalize Collection Arrangements

Segregated waste paper is surplus Crown asset and as mentioned earlier, all federal surplus Crown assets must be sold through CADC. Once the potential viability of the program has been established, and once the annual quantity of paper to be recovered has been estimated and the type and size of the storage area determined, a CADC "Report of Surplus" form (CADC-1 1971) should be filled out. In a multi-tenant building, the coordinator or DPW should submit one Report of Surplus covering the whole facility. If a number of small buildings, in a same geographic area, were planning the at-source separation program, the coordinators responsible for those facilities should consider grouping them into one Report of Surplus. The form, reproduced in Figure 4, is available from the Departmental Material Management Groups or from CADC directly. The original and six carbon copies should be returned to CADC; a copy of the form should also be sent to the DPW Building Manager.

TO CROWN ASSETS DISPOSAL CORPORATION,
P O BOX 8451, OTTAWA, ONT K1G 3J8

A LA CORPORATION DE DISPOSITION DES
BIENS DE LA COURONNE
C P 8451 OTTAWA, ONT K1G 3J8

REPORT OF SURPLUS
- MATERIEL AND EQUIPMENT -

RAPPORT DE SURPLUS
- MATERIEL ET EQUIPEMENT -

DATE

1 DEPARTMENT OR AGENCY MINISTERE OU ORGANISME	2 DEPT FILE NO DOSSIER	3 ORIGINATOR'S REPORT NO RAPPORT D'ORIGINE NO
	4 LOCATION OF ASSETS EMPLACEMENT DES BIENS	
5 CUSTODIAN OFFICER & PHONE NO NOM ET NO DE TELEPHONE DU GARDIEN		
6	7 CADC CODE CODE DE CDBC	8 FOR CADC USE A L'USAGE DE CDBC
DATE AUTHORIZED SIGNATURE SIGNATURE AUTORISÉE		CADC SERIAL NO NO DE SERIE DE LA CDBC

9 ITEM NO	10 QUANTITY QUANTITE	11 UNIT UNITE	12 DESCRIPTION OF ITEMS DÉSIGNATION DES ARTICLES	13 COST CODES OS & SS COUT CODES OS & SS

FIGURE 4 "REPORT OF SURPLUS" FORM

Be sure to indicate on the form:

- the location of the building
- the grade of paper to be recovered (i.e. coloured ledger)
- the annual quantity of paper to be recovered (from Step 3)
- type, size, capacity and means of access to the storage area (from Step 3)
- requirement for a receipt indicating the number of bales, bags, boxes or weight of waste paper removed by the dealer
- frequency of collection required
- provision of specialized equipment (shredders, balers, weight scales, etc.)
- date the program starts
- co-ordinator's name and telephone number.

CADC will then arrange for the sale of the paper. This usually involves tendering and bidding, perhaps on a city-wide basis.

Note, that prior to the tendering process, the steering committee should review all clauses in the tender document that relate to the internal operation of the program.

In addition to preparing the "Report of Surplus", the agreement regarding transfer of recovered paper from central containers to the storage area by the cleaning staff should be confirmed through DPW.

- If the building is Crown owned, the contractor's agreement to collect the paper from central containers should be obtained.
- If the building is leased, the owner's permission to undertake the program in the building should be obtained.

In many established programs, less time is required to clean the building since about half the refuse (high grade paper) has already been taken to central containers by the office employees. In buildings where refuse is being collected in plastic bags, the program has also reduced the number of bags that must be purchased to collect the remaining refuse in the building.

STEP 7: Order Equipment and Materials

Orders for equipment needed should be placed well before the program is implemented (2-3 months).

In all cases, except for the construction of a new paper room, a requisition to purchase necessary materials should be sent to the Department of Supply and

Services (DSS) for their tendering process. To construct a new paper room, the tenant service request for work, form DPW/MTP 337, should be directed to DPW.

Desk-top Holders

Approximately 1.1 holders should be purchased for every employee in the building to make up for breakages, loss, etc. The holders commonly referred to as file mates, may be obtained through DSS. The most suitable holders, because of their stability and capacity are solid plastic holders which are 15-20 cm long, 15-20 cm high and 10 cm wide (6-8" x 6-8" x 4"w) (Figure 5). These cost from $1 to $2 depending on quality, style and stability. Other types of holders may be considered.

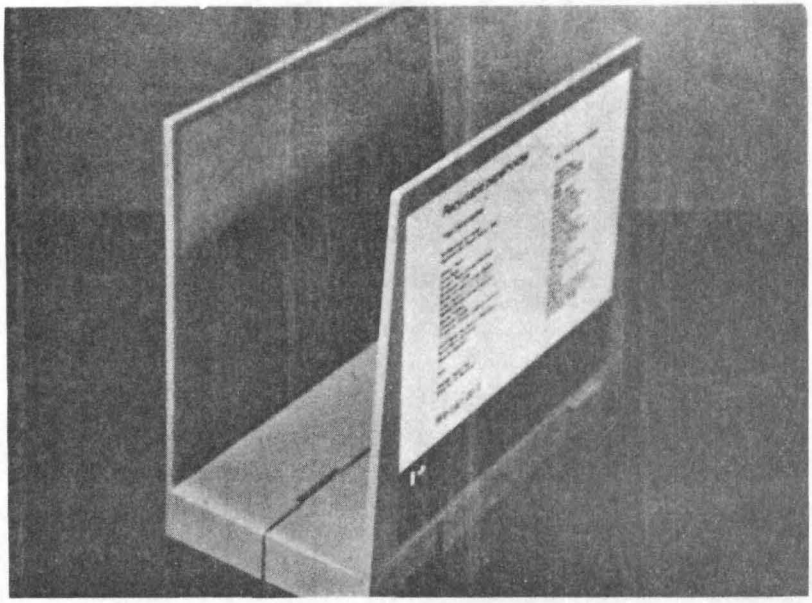

FIGURE 5 DESK-TOP HOLDER

Central Containers

One central container should be purchased for every 20 employees in most parts of the building. High paper generation areas such as computer rooms and in-house printing rooms will require considerably more than one for every 20 employees. Various types of containers may be used, but, according to the Dominion Fire Commissioner, they must be constructed of metal and preferably have a metal cover. The suggested container (Figure 6) is a square type whose dimensions are 406 mm x 406 mm (±10 mm) x 660 (±10 mm) high (16" x 16"

(±1/2") x 26" (±1/2") high) with a loose fitting square type lid, 419 mm x 419 mm (±10 mm) x 267 mm (±10 mm) high at centre (16 1/2" x 16 1/2" (±1/2") x 10 1/2" (±1/2") high at centre); 0.87 mm (22) gauge steel, white enamelled finish; removable top with double swing a type lids, flat or concave flanged bottom not less than 25.4 mm (1") high, no perforation, or holes in bottom, no liner or hooks in the inside; all metal edges folded back to provide safe rounded contours free from sharp edge, burrs and other safety hazards.

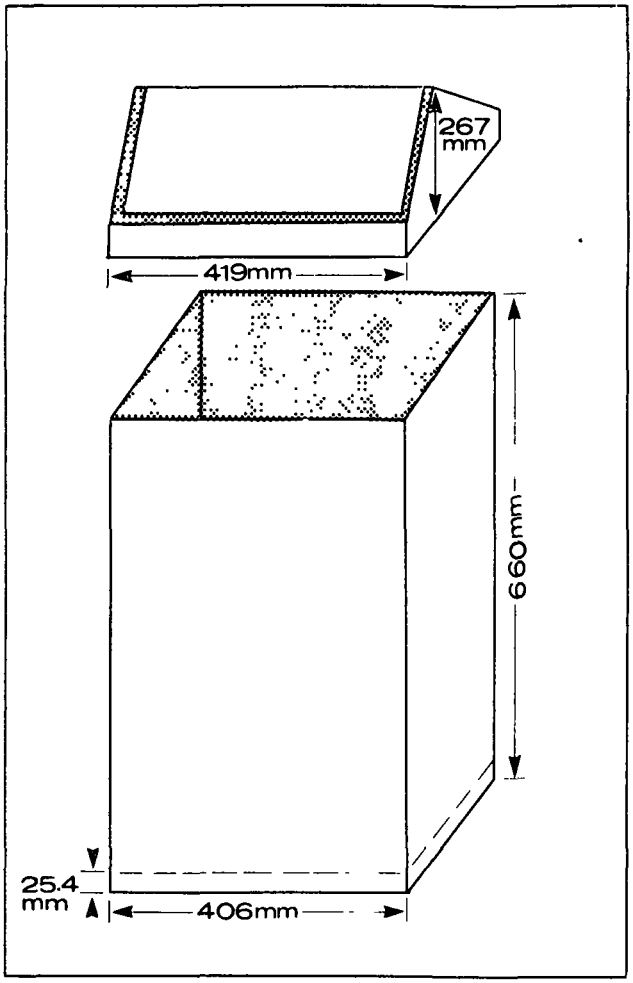

FIGURE 6 CENTRAL CONTAINER WITH JUTE BAG

These cost any where from $20 to $40 depending on quality, style and capacity. In buildings where paper generation is low, smaller containers could be considered.

Jute Bags

The jute bags used to line the central containers can greatly facilitate movement. These bags can be reused 40 to 50 times. As a general rule, the number required per year will equal: No. of employees x 0.2 bags/year/emp.

The bags should be purchased through DSS. The bags should be made of 7.5 ounce new jute stock (colour-neutral) with dimensions appropriate for the size of central containers chosen (i.e. 91 cm high x 84 cm wide or 36" x 33"w for the above mentioned containers). The plastic bags should not be considered because they tear easily and can not be re-used.

Publicity Materials

Arrangement should be made for the production of the required publicity materials (further described in step 8) well before the program is to begin. Camera-ready art for posters and labels as well as a slide show and a 16 mm film may be borrowed from the Waste Management Branch of Environment Canada (Section 4 for address and telephone number). Requisition (Figure 7) for printing of posters and labels should be sent to DSS a month or two prior to the program starting date.

Environment Canada Environnement Canada

DSS REQ'N NO. OR DEPT L.P.O. NO

DEMANDE N° (M A S) OU COM D AGN N° (MIN)

REQUISITION FOR SUPPLIES OR SERVICES
MATERIEL MANAGEMENT

DEMANDE DE FOURNITURES OU DE SERVICES
GESTION DU MATÉRIEL

FROM De	BRANCH OR SERVICE / Direction ou service		
DELIVER TO / DESTINATAIRE		LOCAL REQ NO / N° de la demande	DATE
		DELIVERY REQUIRED BY / Livraison requise le	
		VIA	
		REQUIRED FOR / Demande faite aux fins de	TEL NO / Tél n°

ITEM NO / Art No	CATALOGUE NUMBER / N° de catalogue	DESCRIPTION	U/I / U/E	QUANT / Quantité	UNIT COST / Prix unitaire	EXTENDED COST / Prix global

FIGURE 7 "REQUISITION FOR SUPPLIES OR SERVICES" FORM

Storage Area

If an unused room is available, obtain permission and approval from DPW to use the room exclusively for storage of waste paper. Depending upon proximity to the loading area, equipment may be required to move the jute bags filled with paper from the storage room to the dealer's truck.

If a proper empty room is not available for waste paper storage, the paper can be stored on an interim basis in various types of large containers (Figure 8) in an empty area (such as freight lobby) which is equipped with water sprinklers. Various type of containers may be used, ranging from 1.3 m^3 (15 yd^3) wooden or metal ones on wheels, up to 15 to 30 m^3 (20-40 yd^3) roll-off bins with covers. Large sealed cardboard boxes on pallets may be used and moved by fork-lift or pallet jack which can be rented as required, or borrowed from other operations in the building.

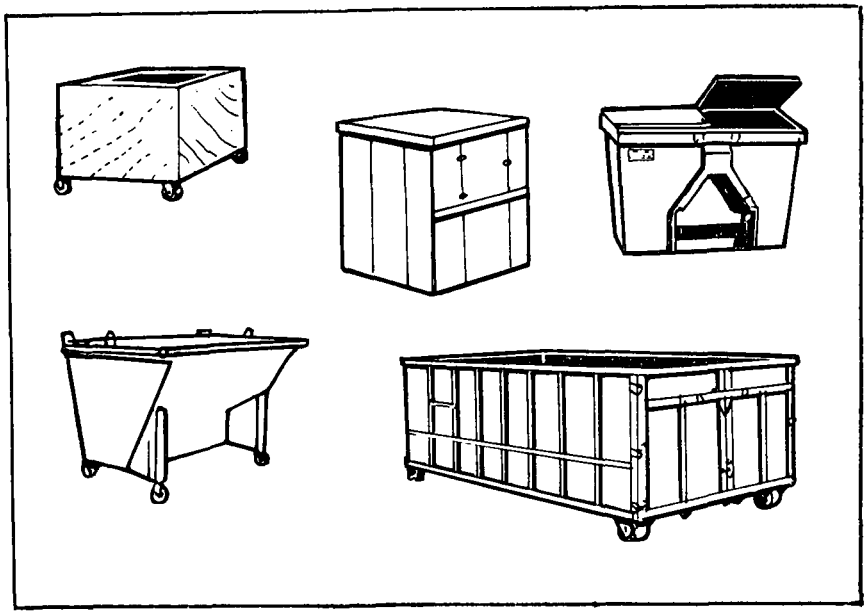

FIGURE 8 STORAGE CONTAINERS

Individual cardboard boxes are recommended for storage only where access is poor, or where very small quantities are generated.

If containers are required, the "Report of Surplus" submitted to CADC should specify the type and the size of containers (recommended and approved by DPW) to be supplied by the waste paper dealer. If, however, the selected dealer will not supply the necessary containers, then they may be purchased from suppliers through DSS.

If a waste paper room is essential then a work approval form (DPW/MTP 337) should be submitted to DPW for construction of a fire-separated, sprinkled waste paper room, meeting the Dominion Fire Commissioner's (DFC) requirements. In some buildings it may be possible to partition the existing refuse room to segregate an area for waste paper storage.

It is recommended that only the cleaning staff and the assigned volume (or weight) control officer should have access to the secure waste paper storage area.

Balers and Shredders

Depending on types and amounts of waste paper available, the waste paper dealer may supply a baler and/or shredder. If so, then a work approval form (DPW/MTP 337) should be submitted to DPW to install equipment and to provide electrical power.

Weigh Scale

Certain locations may warrant an installation of weigh scales, adjacent to waste paper storage, to control the quantity of outgoing waste papers or on-site scales may be used.

The responsibility for weighing the outgoing waste paper could be that of the departmental material management group.

STEP 8: Develop an Employee Awareness Program

If a paper separation program is to be successful, it must have the co-operation of all those involved. This calls for a carefully planned and executed educational campaign. The basic goals of this campaign are to:

- change attitudes towards what many view as nothing more than refuse
- create an understanding of paper as a valuable resource that can be separated and sold for recycling
- explain precisely how the system works, and what is expected.

The three key elements in an effective educational program are described below.

The "Executive Support" Memo

One of the best ways to initiate an office waste separation program is to arrange for a letter from a top-level administrator to all employees

(Figure 9). This gives official sanction to the project, outlines advantages (reduced waste, energy savings, income, etc.), explains how the system will work and what is expected of employees. It should be distributed approximately three weeks prior to the program starting date.

Environment Canada Environnement Canada

MEMORANDUM NOTE DE SERVICE

DATE September 1, 1976
Le 1er septembre, 1976

FROM / DE: Sous-Ministre
Deputy Minister

4526-1

TO / A: Tous les Employés à Place Vincent Massey
All Employees at Place Vincent Massey

SUBJECT / SUJET: PROJECT CONSERVATION

All Canadians are aware of the problems posed by depleting energy resources and understand that steps must be taken to curb our rising energy demands. The increasing generation of solid waste, although not of the same level of concern as the energy crisis, is causing serious difficulties in terms of environmental impact and resource and energy consumption. As employees of Environment Canada we have a special interest in these areas for it is our responsibility to seek solutions to such environment-related problems.

I am pleased to announce that we are taking action to resolve such problems. An initial step in this direction is "Project Conservation", an Environment Canada demonstration of the environmental, economic and energy conservation benefits of recycling office waste paper.

The project will commence on September 7, 1976 in the Place Vincent Massey Building and continue for a period of six months. Futher details of the project are attached to this memorandum. I would ask that you read it thoroughly and retain it for reference.

Project Conservation has been researched very carefully and there is every indication that it will be an outstanding success and a positive example to others. The one very important ingredient in the recipe for success, however, is your individual participation and cooperation. I ask, therefore, that you give "Project Conservation" your support and make this operation successful.

I am confident that we can do it!

J.B. Seaborn

FIGURE 9 "EXECUTIVE SUPPORT" MEMO

Even before this memo goes out, talk informally to as many of the employees as possible about the program and encourage their active participation.

The "Executive Support" memo should be followed by publicity. This can include posters, cards, brochures, news articles, special newsletters, slide shows and even films (Figure 10).

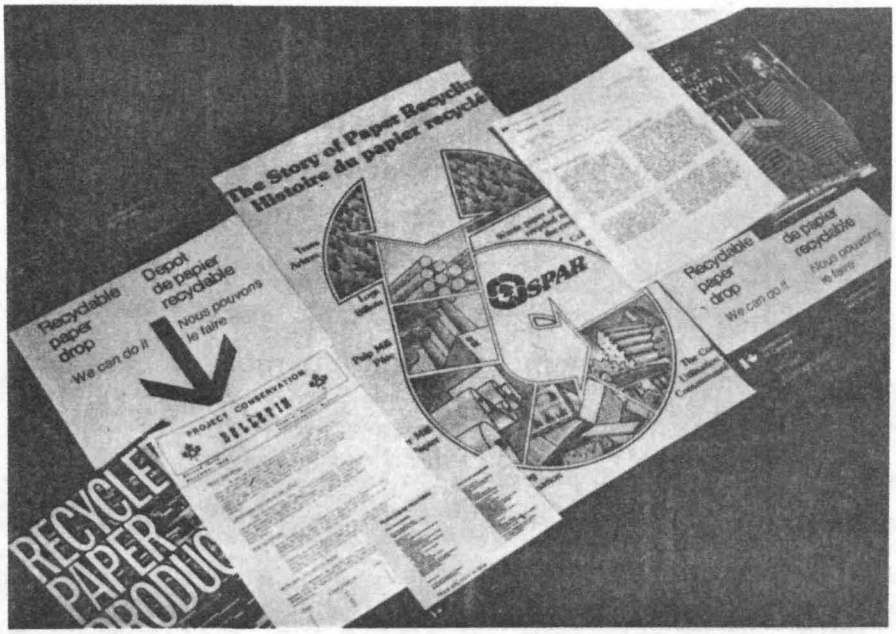

FIGURE 10 PUBLICITY MATERIALS

Publicity materials should emphasize:

- how the program works
- where the central containers are located
- acceptable and unacceptable paper products
- the savings that will come from the program
- the name and telephone number of the program co-ordinator.

Slogans, memorable names and strong graphics have played important roles in many past programs.

Publicity materials developed for three federal office buildings in Ottawa-Hull are available and recommended for reference. These include camera-ready art for posters and labels, a slide show describing Environment Canada's program, and a 16 mm film used by the Department of Energy, Mines and Resources. These may be borrowed from the Waste Management Branch of Environment Canada (see Section 4 for address and telephone number).

Briefing Session

Employee educational sessions are crucial. They must be properly planned and scheduled.

Management, program monitors, cleaning staff and employees should all attend sessions. Cleaning staff, because of their hours, may have to be briefed separately. A briefing to the department's management may be necessary before the Executive Support memo is released.

The briefing sessions should be arranged about one week before the program begins. Sessions should be organized by floors, using executive meeting rooms. Avoid holiday periods. Try to allow employees a choice of two or more sessions, preferably in mid-morning or mid-afternoon. Distribute briefing schedules at least one week in advance.

The session itself shouldn't last more than 20 minutes. It should include a 10 minute formal presentation using a narrated slide show and 5 to 10 minutes for questions.

A display of desk-top containers, central containers and publicity materials should be set up for each briefing session. Be sure to have a sample of waste paper on hand and demonstrate what is acceptable and what is not.

The desk-top holders, and a summary label showing acceptable paper, could be distributed to each employee during the briefing session. Otherwise the desk-top holders should be distributed just prior to the start of the program.

Employees should be instructed to deposit the separated paper from their desk-top holders into the central containers when they leave their work stations at the end of the work day or beginning of their lunch periods, in order to avoid interrupting their work routines.

Employees in areas which occasionally produce large quantities of ledger paper (obsolete files, reports, computer printout, computer cards, in-house printing wastes, etc.) should be instructed to separate ledger paper into cardboard boxes marked to indicate that they contain paper for recycling, and put them out in hallways near the elevators when they are full. Otherwise central containers will be filled too quickly.

Through DPW, the cleaning staff should be instructed to remove the full jute bags from the central containers, take them to the storage area, and put empty bags in the central contianers. They should also be instructed to take

the specially marked boxes of waste paper from the high generation areas to the waste paper storage area.

The need to keep high grade ledger paper separated from other types of waste paper and refuse should be stressed in all phases of the educational campaign.

STEP 9: Implement System

The only remaining task before the program begins is to assemble all the equipment, to affix to holders and to central containers the respective labels and to distribute them throughout the building. The assembly and distribution of desk-top holders, containers and jute bags could be undertaken by DPW as tenants' service.

If the desk-top holders were distributed during the briefing sessions then only the central containers are to be placed in all designated areas. As was indicated earlier, these central containers should be properly marked to clearly distinguish them from general refuse containers. They should be placed in high traffic areas such as: outside of washrooms, near drinking fountains, elevators, photocopy machines, etc. One central container is needed for about every 20 employees in most areas of the building. Additional containers will be required for computer and in-house printing rooms. Containers should not be placed near areas likely to generate significant amounts of contaminants (coffee machines, kitchens, etc.).

STEP 10: Monitor Program

To be successful, the paper recovery program will require on-going administrative time as well as continuing publicity. The project co-ordinator should spend about 5% of his/her time monitoring the program and ensuring that interest and commitment are at a high level. The following tasks should be undertaken:

(a) Regular Check-Ups

The central containers and the storage room should be checked regularly for contaminants. Explain the program carefully to new employees and cleaning staff. Resolve the day-to-day problems raised by employees, managers, the waste paper dealer (through CADC), and the cleaning staff (through DPW).

(b) Tabulation of Results

Be sure to keep copies of receipts given to you by the waste paper dealer upon removal of waste paper from your building and maintain a tabulation of amounts collected.

(c) Continuing Publicity

One of the best ways to maintain co-operation is by regular reports to all those involved. Tell them how much paper has been recycled, how much energy has been saved, and the environmental benefits (background information can be obtained from the Supplement to the Guide). People involved in a voluntary, co-operative program need to hear how it's going. In-house newsletters, staff meetings and notices on bulletin boards can help to keep up the momentum.

(d) Streamline the System

Try to streamline the system as much as possible. Be sure there is no excess accumulation of paper at the central containers. Change their location if necessary. Be very responsive to questions from employees and the cleaning staff. As dealers become more accustomed to the use of office waste paper, be prepared to make the changes they recommend through CADC. Determine the most efficient pick-up schedule for the waste paper and change the list of prohibited materials as recommended by the dealer.

STEP 11: Conduct a Detailed Re-evaluation (if requested)

Once an at-source separation program has been in operation for a reasonable length of time (perhaps one year), it may be advisable to carry out a detailed re-evaluation.

This interim period should be long enough to allow for meaningful averaging of available data. The working data should be as comprehensive as possible and should include such things as employee recovery rates, reductions in overall waste generation, actual itemized start-up and on-going costs and, of course, total revenues. Only with detailed statistical information can a program be accurately assessed in terms of its economic viability. It is important, therefore, that the program co-ordinator ensure that on-going monitoring is carried out.

For example, Table 5 lists the items that are commonly included in detailed cost-revenue analysis and presents typical before-and-after separation data for a general office building of 1,000 employees where storage is an empty room. The selected recovery rate is 0.3 kg/employee/day (0.6 lb/employee/day) and the price is $44/tonne ($40/ton) for coloured ledger. The collection and disposal savings can be either calculated using an estimated $16.50/tonne ($15/ton) (based on the assumption that half the $33/tonne ($30/ton) often charged for collection and disposal of

TABLE 5 EXAMPLE OF SOLID WASTE MANAGEMENT COST/REVENUE ANALYSIS FOR 1,000 EMPLOYEES IN GENERAL OFFICE BUILDINGS ($/YEAR)

Item	Without Separation Program	With Separation Program 1st Year	Separation Program Costs Amortized over 5 Years at 10%	2nd Yr & on (without amortization) & 6th Yr & on (after amortization)
COSTS				
Collection Labour				
• mixed refuse	common	common	common	common
• recovered paper	-	-	-	-
Collection Equipment				
• mixed refuse	common	common	common	common
• recovered paper				
- desk-top containers	-	$1,500	-	-
- central containers	-	$1,000	$ 780	-
- miscellaneous	-	$ 500	-	$ 100
Storage				
• containers	common	common	common	common
• equipment	common	common	common	common
• space	common	common	common	common
Administration & Management				
• labour (on-going)	-	$ 750	$ 750	$ 750
• labour (fixed)	-	$1,200	$ 312	-
Education				
• publicity/education material	-	$ 300	-	-
• employee orientation time	-	$1,500	$ 468	-
Sub Total	n/a	$6,750	$2,310	$ 850
REVENUES (per year)				
Collection and Disposal Savings	-	$1,080	$1,080	$1,080
Revenue @ $40/ton	-	$2,880	$2,880	$2,880
Sub Total	n/a	$3,960	$3,960	$3,960
NET PROFIT (OR LOSS)	n/a	($2,790)	$1,650	$3,110

Note: "common" means no change

commercial refuse can actually be saved) or using actual "before" and "after" costs. If available, the latter is preferable. This evaluation also includes the cost of familiarizing employees with the program during the briefing sessions. It is based on 15 minutes/employee with an average salary of $6/hour. In this evaluation, the start-up costs of the program (desk-top containers, central containers, administrative time, and educational materials) are amortized over five years at the rate of 10% interest.

STEP 12: Expand Program

Once a program for the recovery of coloured ledger from desk-tops is operating and a regular pick-up of waste paper is going to the dealer or mill, then it will be quite natural to use this existing arrangement to draw other types of waste paper into the productive stream as well. For example, certain quantities of newspaper and telephone books (which are printed on newsprint stock) are discarded into the office waste stream every year. And, as mentioned previously, large specialty areas within the building (computer rooms, printing rooms, stock rooms, and filing areas) may generate large quantities of special high grade paper and justify separate recovery.

A special comment on newspapers and telephone books is warranted. While they may constitute a significant portion of the total amount of waste, these products do not consitute a high grade of paper. When combined with higher types of paper (good quality printing and writing stock), they render the waste paper far less valuable and indeed useless for some applications. However, if properly separated and handled, newspapers and telephone books can be used in the manufacture of certain types of boxboard and building materials. In some parts of the continent, old newspapers are used to make newsprint. They are also an ingredient in cellulosic insulation.

A pilot study is underway to assess the feasibility and practicality of recovering telephone directories. When completed, the results will be reviewed and procedures established explaining how to expand the existing high grade paper recovery program, by adding a program to recover telephone directories. This information will be available from the Waste Management Branch of Environment Canada (see Section 4 for address and telephone number).

4 FURTHER SOURCES OF INFORMATION

Background information on other recovery programs, recovery methods, the economics of recovery systems, the waste paper industry and other factors affecting the implementation of a program are contained in the Supplement to the Guide for the Recovery of High Grade Waste Paper from Federal Office Buildings. The report is available from the Waste Management Branch of Environment Canada.

If you have any questions or want advice on how to organize and implement a waste paper recovery program in your office, you are urged to contact:

Waste Management Branch
Environmental Impact Control Directorate
Environmental Protection Service
Environment Canada
Ottawa, Ontario
K1A 1C8

Telephone: (613) 997-3212

REFERENCES

1. Office of Solid Waste, Fourth Report to Congress: Resource Recovery and Waste Reduction. U.S. Environmental Protection Agency, Washington, D.C., 1977.

2. SCS Engineers, Optimization of Office Paper Recovery Systems (Final Report and Addendum). Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C., 1976.

3. Myslicki, John, Office Paper Recovery Through At-Source Separation. Waste Management Branch, Environment Canada, Ottawa, 1977.

4. SCS Engineers, Quality and Composition of Solid Waste Generated by U.S. Environmental Protection Agency Offices. Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C., 1976.

5. Woods, Gordon & Co., Recycling of Mixed Office Waste from the National Capital Area. Waste Management Branch, Environment Canada, Ottawa, 1975.

6. Reed Ltd., Recycling of Wastepaper from Federal and Provincial Buildings in Toronto. Waste Management Branch, Environment Canada, Ottawa, 1977.

7. Myslicki, John and Hidiroglou, Dr. M.A., Methodology - Waste Paper Sampling Study. Waste Management Branch, Environment Canada, 1976.

8. Middleton Associates, Paper Recycling: A Socio-Economic Perspective. Pollution Probe Foundation, Toronto, 1975.

The following is a list of additional studies and reports which the interested reader should consult:

9. American Paper Institute, Office Waste Paper Recycling: A Proven Way to Increase Profits by Reducing Disposal Costs, Increasing Value of Office Waste Paper. American Paper Institute, New York, 1975.

10. Environmental Protection Agency, "Source Separation for Materials Recovery Guidelines". Federal Register, Vol. 41, No. 80, Washington, D.C., April 23, 1976.

11. Love, Peter, Net Energy Savings from Solid Waste Management Options. Waste Management Branch, Environment Canada, Ottawa, 1976.

12. Stearns, Robert, et al., Office Paper Recovery: An Implementation Manual. Office of Solid Waste, U.S. Environmental Protection Agency, Washington, D.C., 1977.

13. Paper Stock Institute of America, Recycled Paper Products. National Association of Secondary Material Industries, Inc., New York.

14. Shade Information Systems, Waste Not. Shade Information Systems, Green Bay, Wisconsin, 1976.

APPENDIX I
REGIONAL AND DISTRICT OFFICES
OF THE
ENVIRONMENTAL PROTECTION SERVICE

APPENDIX I

REGIONAL AND DISTRICT OFFICES OF THE
ENVIRONMENTAL PROTECTION SERVICE

Regional Director General, Atlantic Region
Environmental Protection Service
Environment Canada
Bank of Montreal Tower
P.O. Box 2406
Halifax, N.S. B3J 3E4
Tel. 426-6132

District Director
Environmental Protection Service
New Brunswick
c/o New Brunswick Department
of Environment
P.O. Box 6000
Fredericton, New Brunswick
Tel. 453-2864

Regional Director General, Ontario Region
Environmental Protection Service
Environment Canada
135 St. Clair Ave. West, 2nd Floor
Toronto, Ontario M4V 1P5
Tel. 966-7510

Regional Director General, Northwest Region
Environmental Protection Service
Environment Canada
Room 901, 10025 Jasper Ave.
Edmonton, Alberta T5J 2X9
Tel. 425-4580

District Director
Environmental Protection Service
P.O. Box 2310
Yellowknife, N.W.T. X0E 1H0
Tel. 873-3456

District Director
Environmental Protection Service
P.O. Box 9367
Building 310, Pleasantville
St. John's, Newfoundland A1A 2Y3
Tel. 722-3403

District Director
Environmental Protection Service
P.O. Box 1115, Dominion Bldg.
Queen Street
Charlottetown, P.E.I. C1A 4A9
Tel. 892-8511

Regional Director General, Quebec Region
Environmental Protection Service
Environment Canada
P.O. Box 1330, Station B
2020 University Street, Suite 502
Montreal, Quebec H3A 2A5
Tel. 283-6480

Director, Technical Services
Ontario District Office
Environmental Protection Service
Environment Canada
River Road Labs, River Road
Ottawa, Ontario K1A 0H3
Tel. 998-3420

District Director
Manitoba District Office
Environment Canada
Environmental Protection Service
800 Kensington Building
275 Portage Avenue
Winnipeg, Manitoba R3B 2B3
Tel. 985-2961

Regional Director General, Pacific Region
Environmental Protection Service
Environment Canada
Kapilano 100, Park Royal
West Vancouver, B.C. V7T 1A2
Tel. 666-6711 Ext. 240

District Director
Environmental Protection Service
Environment Canada
9th Floor, 975 Avord Tower
2002 Victoria Avenue
Regina, Saskatchewan
Tel. 522-6671

District Director
Environmental Protection Service
Room 225
Federal Building
Whitehorse, Y.T. Y1A 2B5
Tel. 667-6487

District Director
Alberta District Office
Environmental Protection Service
Environment Canada
Room 901, 10025 Jasper Ave.
Edmonton, Alberta T5J 2X9
Tel. 425-4573