

The Potential for Greater Fiber Recovery from Magazines, Catalogs, and Direct Mail

Prepared for:

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I. Introduction and Summary of Findings

This document presents a review and analysis of information on the degree to which magazines, catalogs, and direct mail are recycled for their paper fiber content, and whether there are technical or economic factors that might limit future efforts to increase the effective recycling and recovery of paper fiber in these materials. One potential concern that has been expressed is whether the presence of “insert” or “ride-along” pieces in magazines, catalogs, marketing mail, and envelopes might limit or preclude their suitability for recycling. These may take the form of compact disks (CDs) or other small plastic items, small metal foil pouches (e.g., to contain fragrance), ribbon, and even batteries, as well as cellophane or other plastic to contain and protect the insert. Accordingly, SLS Consulting has performed extensive research, using both published and well-informed primary sources, to develop the relevant facts needed to determine whether and to what extent the practice of including ride-along or inserts in the items of interest here does or might inhibit their recycling and recovery following use. We also have developed and include herein relevant information and perspective on the importance of other contaminants in the recovered paper stream, the nature of paper recovery efforts and intermediate products, markets for recovered paper, and the principal products that are manufactured using recycled magazines, catalogs, direct mail, and envelopes.

Our principle findings include the following:

1. There is both the need and the opportunity to substantially increase residential recycling of magazines, catalogs, direct mail, and envelopes for paper fiber recovery and use, as demand for paper fiber will continue to grow through at least the end of this decade, and current recycling rates for these materials are far lower than for other commercially important used paper and paper board types. There are no economic or technical impediments to doing so.
2. Substantial quantities of used magazines, catalogs, direct mail, and envelopes are currently recovered through residential recycling, and are used in the manufacture of an array of paper and paper board products, including newsprint, tissue products, paper and box board, and to a lesser degree, printing and writing papers.
3. The presence of magazine, catalog, and direct mail inserts and ride-alongs does not and likely will not pose significant obstacles to continued, and perhaps, greater recovery of paper fiber from these sources except in extreme (and largely theoretical) cases.

This report contains five sections in addition to this introduction. First, we provide some additional context for the analysis presented in this report. Next, given the prominence of the “inserts” issue, we discuss the nature and extent of use of inserts and similar “ride along” pieces and more generally, the materials in which they are placed. The report then describes the paper recovery process and the recovered paper stream, including product markets. Following these discussions, the report then presents information on the technologies and practices that are used to convert recovered paper into new products, with particular emphasis on the importance and management of paper contaminants. We then present our study conclusions, and provide a list of references. The attached Appendix identifies industry sources that we contacted and who provided valuable information, insights, and other assistance in the preparation of this report.

II. Context

This study has been prepared on behalf of three trade associations, The Direct Marketing Association (DMA), the Magazine Publishers of America (MPA), and the Envelope Manufacturers Association (EMA). These three groups and their member companies have a strong interest in promoting greater recycling and recovery of paper fiber, and are considering an awareness-raising campaign intended to induce more recycling activity, particularly from residential sources. Early stage discussions with U.S. federal government regulatory agencies having an interest in the issue¹ have elicited general support for the idea. At the same time, however, agency representatives have expressed concerns about whether and to what extent the presence of non-paper materials in items such as magazines and catalogs would limit the extent or magnitude of actual recycling and reuse of these historically underutilized sources of paper fiber.

Accordingly, our research and analysis activities as summarized here have focused on characterizing the current and prospective types and levels of paper recovery that are and can be achieved through magazine, catalog, and direct mail recycling. Moreover, given the issues raised by the regulatory agency personnel having an interest in this topic, we also have thoroughly investigated the current and potential impacts of inserts on fiber recovery, and on developing an informed understanding of how the paper recovery supply chain is or might be affected by the presence of these non-paper components of the recycled paper material stream.

III. Magazines, Catalogs, and Direct Mail, and Contained Inserts and Ride-Alongs

In this section, we describe the quantities of magazines and direct mail that are produced annually in the United States. Generally, these items have a short “shelf life” and are discarded by the end user within a matter of days or weeks. At that time, they enter the solid waste stream or are directly recycled. Accordingly and to put the influence of these materials into context, we relate them to the types and quantities of other materials that enter the solid waste stream and/or are recycled and recovered.

In an effort to attract and capture the interest of prospective customers, companies have in recent years made increasing use of innovative devices that can be included in or along with another product. These inserted items can take many different forms, and may be found in magazines, catalogs, and in direct marketing mail. Accordingly, this section also provides some basic information on these materials, and attempts to place their presence in the recovered solid waste and recovered paper streams into an appropriate context.

Magazines

More than 18,000 different magazine titles are available in the U.S., of which 6,325 are oriented exclusively toward the consumer (MPA, 2006). According to MPA data, 87 percent of magazines are purchased on a subscription basis, with the remaining 13 percent purchased on a single issue basis, e.g., at a newsstand or retail store. Magazines purchased by subscription are delivered to the subscriber via the U.S. mail. Accordingly, some basic facts about the U.S. Postal Service (USPS) and how it handles mailed magazines may be useful here.

The Postal Service classifies magazines and other published materials that are delivered to the same address multiple times per year as “Periodicals,” and has established mailing requirements and fee schedules that apply specifically to such materials. The Periodicals category also includes newsletters, mailed newspapers, scientific and other journals, and other published items that conform to the USPS

¹ Specifically, the U.S. Federal Trade Commission (FTC) and Environmental Protection Agency (EPA).

criteria. The Postal Service distinguishes between periodicals mailed from one location to another within the same county (called “within county”) and those that are sent to more distant destinations (“outside county”) and has set rates that may differ substantially between these sub-categories. Data showing the mailed volumes of periodicals over the past several years are displayed in Exhibit 1 below.

Exhibit 1
Volumes of Mailed Magazines and Other Periodicals^{1/}

Fiscal Year	Periodicals (Outside County)			Periodicals (Inside County)			Total Periodicals Sent via Mail		
	Total Pieces (millions)	Total Weight (million pounds)	Ave. Weight/ piece (oz.)	Total Pieces (millions)	Total Weight (million pounds)	Ave. Weight/ piece (oz.)	Total Pieces (millions)	Total Weight (million pounds)	Total Weight (million tons)
2000	9,467.7	4,458.3	7.5	897.1	262.0	4.7	10,364.8	4,720.3	2.4
2001	9,198.3	4,154.5	7.2	879.1	253.9	4.6	10,077.4	4,408.4	2.2
2002	8,839.8	3,764.3	6.8	849.9	241.8	4.6	9,689.7	4,006.1	2.0
2003	8,526.4	3,764.4	7.1	793.5	230.6	4.7	9,319.9	3,995.0	2.0
2004	8,375.3	3,820.7	7.3	760.0	246.9	5.2	9,135.3	4,067.6	2.0
2005	8,307.3	3,772.8	7.3	762.7	252.8	5.3	9,070.0	4,025.6	2.0

^{1/} Source: USPS Cost and Revenue Analysis, fiscal years 2000-2005

The data show a gradual decline in the number of mailed periodicals of about ten percent over the past six years, and that overall periodical volumes are now about nine billion pieces per year. This table also includes the results of SLS calculations showing the total mass of mailed periodicals, a large portion of which enter the solid waste or recovered paper stream following use by the subscriber. Thus, approximately two million tons of periodicals are mailed annually. If the additional periodicals that are purchased on a single copy basis are added, the total periodical stream would be approximately 2.3 million tons per year (2 million divided by 87 percent).

Magazine Ride-Alongs

Most consumer magazines contain a roughly equal balance of subject matter and advertising. Advertising is, of course, an important element in producing a diverse array of magazines and other periodicals that can be sold to consumers at a reasonable price and still generate an acceptable return on investment. As consumers have become more informed and sophisticated and as competition for their time and attention has become more intense (e.g., from the emergence of the Internet), advertisers have sought new ways in which to reach their intended audience. One innovative method for doing so is inclusion of ride-alongs in magazines and other periodicals. Use of ride-alongs is not an entirely new idea, but its use in periodicals was inhibited for many years by the existing mail classification system of the Postal Service. Essentially, paying for the extra postage for the insert, called a “ride-along” piece, made their use prohibitively expensive in most cases.

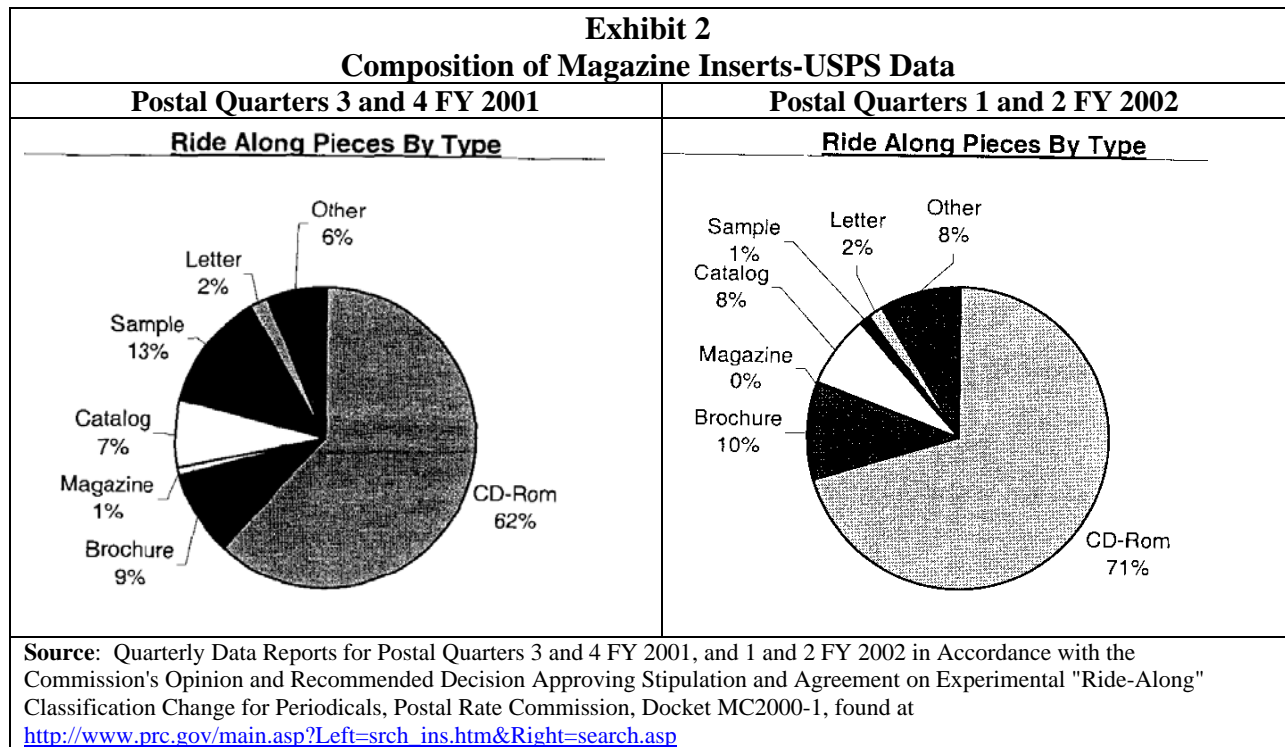
This changed, however, five years ago, as mailers successfully petitioned the Postal Service to experiment with a new classification and rate scheme that would make ride along pieces in periodicals much more cost-effective. A magazine industry proponent of this change describes its impetus well:

“Starting at some time in the mid-1990s we became inundated with requests for these types of innovative advertisements... The advertiser is charged for the appropriate space rate plus any other additional costs for printing, binding, and paper, where applicable... Some examples of potential candidates for the Ride-Along classification would be:

samples of an actual product (i.e., swatches of fabric, packets of actual skin care cream or cosmetics); advertisements made up of non-printed sheets (i.e., fabric or plastic); battery-operated lights; advertisements which include a tone activator, such as a music chip found in a greeting card; and a computer disk or CD-ROM” (Schwartz, 1999).

The U.S. Postal Rate Commission, which has broad oversight authority over USPS, approved an experimental classification and rate scheme in 2001, the terms of which required the Postal Service to report at regular intervals regarding the volume and composition of ride-along pieces. Data developed and reported by USPS during the final year of the experimental period addressing the composition of ride along pieces are presented in Exhibit 2. These are the most recent readily data available showing the percentages of ride along pieces by type.

These data illustrate several important facts. One is that throughout the measurement period (2001-2), approximately two-thirds of the ride-along pieces were CD disks. Another is that roughly 20 percent of these pieces were brochures, catalogs, letters, or magazines, all of which are made of paper rather than some other material. The remaining ten to 20 percent of ride-along pieces were classified as “other,” a category that presumably includes the foil packets, batteries, computer chips, fabric, plastic, and other materials that advertisers might wish to provide as inserts.



Following completion of the experimental period, which was viewed as a success, the Postal Service adopted permanent changes to its classification and postage rate categories that enable ride along pieces to continue to be placed in periodicals in a cost-effective manner. In response, use of this technique for reaching prospective customers has increased among advertisers, as shown by USPS data for the most recently completed fiscal year. These data are presented below in Exhibit 3. While it is very difficult to predict whether use of ride-along pieces will grow further, the recent data indicate a leveling off of volume growth, as the costs and benefits of using the technique under the new rate regime have become well understood by advertisers.

Exhibit 3
Ride-Along Pieces in Mailed Periodicals-2005 USPS Data

USPS Periodicals Category	2005 Periodical Volumes		Ride-Along Pieces			
	Total Pieces	Ride-Along Pieces	Maximum Percentage of Mailed Periodicals Containing Ride-Along Pieces	Average Weight (oz.) ^{3/}	Total Weight of Mailed Ride-Along Pieces (lbs.)	Total Weight of Mailed Ride-Along Pieces (tons)
Outside County ^{1/}	8,307,329,578	166,757,583	2.0%	1.45	15,112,406	7,556
Within County ^{2/}	762,709,809	651,197	0.1%	1.45	59,015	30
Total	9,070,039,387	167,408,780	1.8%	1.45	15,171,421	7,586

^{1/} Piece data from Postal Rate Commission, Docket R2006-1: USPS-LR-L-126: REV 7-13-2006 LR 126 Outside County Revised.xls

^{2/} Piece data from Postal Rate Commission, Docket R2006-1: USPS-LR-L-126: REV_7-13-2006_LR_126_Within_County_Revised.xls

^{3/} Postal Rate Commission, Docket R2006-1: Responses of Postal Service Witness Tang to Interrogatories of Magazine Publishers of America, Inc. (MPA/USPS-T35--1-2(a-d, f))

Using the conservative assumption that each publication includes a maximum of one ride-along piece, nearly two percent of mailed periodicals may have contained a ride along piece in fiscal year 2005. The exhibit also shows a calculated tonnage of the ride along pieces mailed in FY 2005. Nationwide, total estimated tonnage is about 7,600 tons. Dividing this number into the estimated 2.0 million tons of periodicals mailed in FY 2005 yields a weight percentage of 0.38 percent. That is, the ride-along pieces included in periodicals account for a bit less than 0.4 percent of the total weight of the periodicals. Accordingly, even if the ride-along piece is not removed and either used (the desired response) or discarded by the recipient, the maximum contribution of ride-along pieces to the periodicals component of the solid waste or recovered paper stream is substantially less than half of one percent. Moreover, as shown above, if one assumes that different ride-along piece types have a reasonably consistent mass per piece, the available data suggest that by weight, 20 percent of this fraction consists of paper, while two-thirds is in the form of a relatively large plastic (CD) disk. Thus, on an overall basis, the magazines that enter the recovered paper stream can reliably be assumed to be more than 99 percent coated paper.

Direct (Advertising) Mail²

Direct mail is an important component of commercial advertising. Moreover, advertising represents the most frequent use of the U.S. mail. Indeed, slightly over half of the mail received by households and non-households in FY 2004 (106.7 billion pieces) contained advertising (SLS Consulting, 2005, Appendix A). Of total mail volume, 24 percent of First-Class Mail and 85 percent of Standard Mail contained advertising.

Based on the assumption that the average weight of advertising mail in each class of mail is the same as the average weight of all mail in that class, mailers generated 5.3 million tons of advertising mail in FY 2004. This is 42 percent of the weight of all the mail.³ While quantitative data are not available, virtually all of the content and mass of advertising mail consists of paper.

² The following discussion draws heavily from a recent study by SLS Consulting examining the environmental impact of advertising mail. See SLS Consulting, 2006 in the References section of this report.

³ According to the 2004 USPS Revenue, Piece, and Weight Report, all domestic mail weighed 12.528 million tons.

From all appearances, advertising mail will continue to be a significant portion of the mail. Although the USPS expects total First-Class Mail volumes to decrease by 2.1 percent from 97.9 billion pieces in 2004 to 95.8 billion pieces, in 2006 the portion of this mail class that contains advertising mail is projected to increase slightly. Furthermore, total Standard Mail volumes are expected to increase by 8.9 percent, from 95.6 billion pieces in 2004 to 104.1 billion pieces in 2006.⁴

Envelopes

Virtually all letter and flat shaped advertising mail, and well as other first class mail and some periodicals, are enclosed in paper envelopes prior to mailing. In 2005, 184 billion envelopes were mailed in the U.S., virtually all of which consisted of uncoated free sheet or kraft (brown) paper (Benjamin, 2006a). With an average weight of 0.6 oz., the total weight of these envelopes, were they to be considered separately within the solid waste/paper stream, would amount to 34,500 tons per year.

The Influence of Magazines, Direct Mail, and Envelopes on the Municipal Solid Waste Stream

According to U.S. EPA data, in 2003, 236.2 million tons of MSW was generated, which is only a very small fraction of the 11.4 billion tons of the total amount of solid waste typically generated per year.

Moreover, although advertising mail accounts for almost 52 percent of total USPS mail volume and 42 percent of the total weight, it represents only 2.2 percent of the municipal solid waste (MSW) stream.⁵ It is an even smaller fraction when compared to all solid waste.⁶

Exhibit 4 shows MSW generation by weight in the United States from 1990 to 2003, by material type. In 2003, other paper/paperboard, yard trimmings, food wastes, and plastics accounted for almost 70 percent of all MSW. For each year data is collected by the EPA, every listed waste stream accounts for a larger portion of MSW than advertising mail, which accounted for 5.1 million tons or only 2.2 percent of MSW in 2003.

These data document that paper and paper board are important components of the MSW stream, and therefore, that non-recovered paper products within the MSW represent a potentially important source of fiber with which to manufacture new, recycled content paper and board products.

⁴ Direct Testimony of Lillian Waterbury on Behalf of United States Postal Service, Docket No. R2005-1, USPS-T-10, Exhibit USPS-10B.

⁵ Municipal Solid Waste generally means common garbage or trash generated by industries, businesses, institutions, and homes, but excludes hazardous waste specifically regulated separately.

⁶ "Solid waste" includes all liquid and non-liquid waste materials ranging from municipal garbage to many industrial non-hazardous wastes, wastewater treatment sludges, fly ash and bottom ash, medical infectious wastes, construction/demolition debris, sewage sludge, agricultural refuse, demolition wastes, and mining residues. Solid waste is sometimes technically referred to as "Subtitle D" waste (named after Subtitle D of the Resource Conservation and Recovery Act (RCRA), which defines these wastes).

Exhibit 4
Composition of the Municipal Solid Waste Stream in the U.S.
(million tons)

MSW Component Type	1990	1995	2000	2003	Percent of Total-2003
Yard Trimmings	35	29.7	27.7	28.6	12.1%
Food Wastes	20.8	21.7	25.9	27.6	11.7%
Plastics	17.1	18.9	24.7	26.7	11.3%
Metals	16.6	15.9	18	18.8	8.0%
Glass	13.1	12.8	12.8	12.5	5.3%
Wood	12.2	10.4	12.7	13.6	5.8%
Textiles	5.8	7.4	9.4	10.6	4.5%
Rubber & Leather	5.8	6	6.4	6.8	2.9%
Other	6.1	6.8	7.5	7.9	3.3%
<i>Paper & Paperboard:</i>					
First-Class Mail	1.7	1.9	2.2	2.1	0.9%
Standard Mail	3.8	4.6	5.6	5.4	2.3%
Other Paper/Paperboard	67.2	75.2	78.9	75.6	32.0%
Total	205.2	211.3	231.8	236.2	100.0%
Total Paper & Paperboard					35.2%
Estimated Advertising Mail ^{1/}	2.8	3.4	4.1	5.1	2.2%

^{1/} Estimated advertising mail tons for 1990, 1995, and 2000 are for household advertising mail only.

Source: US EPA, Municipal Solid Waste Generation, Recycling, and Disposal in the United States: Data Tables for 2003 ("2003 MSW Data"). Table 1. First-Class Mail and Standard Mail weights are from RPW. Other data from Environmental Impact of Mail Update/Study, October 2003.

Exhibit 5 presents a breakout of the paper and paperboard components of the MSW stream. The data contained therein show that half of the paper and board in MSW consists of corrugated box stock and newspapers. Direct mail is estimated at about 6.1 percent of the paper/board component. Separate data for magazines and other periodicals are not provided, but if all of the 2.3 million tons of periodicals produced per year, as estimated above, were to enter the MSW stream, they would account for 2.8 percent of the paper/board stream, and just under one percent of the total MSW stream⁷. Envelopes are almost certainly accounted for in the aggregate data for first-class and standard mail. Were this not true, the 34,500 tons per year of paper envelopes mailed in 2005, if added to the MSW stream, would account for 0.01 percent of the MSW stream, and about 0.04 percent of the paper and board fraction thereof.

⁷ This calculation likely overstates the contribution of these materials in the MSW/paper stream, for two reasons. One is that not all periodicals are discarded, even after a period of several years. The other is that the MSW stream has continued to grow as a function of population growth and a continuing economic expansion in the years since 2003, i.e., the denominator of the calculation is larger than assumed here.

Exhibit 5
Paper and Paperboard Products in MSW
(millions tons)

Waste Type	1990	1995	2000	2003	Percent of Total-2003
Corrugated Boxes	24.0	28.8	30.2	29.7	35.8%
Newspapers	13.4	13.1	15	12.6	15.2%
Office Papers	6.4	6.8	7.5	7.1	8.6%
Other Commercial Printing	4.5	7.1	7	6.9	8.3%
Folding Cartons	4.3	5.3	5.6	5.6	6.7%
First-Class Mail	1.7	1.9	2.2	2.1	2.5%
Standard Mail	3.8	4.6	5.6	5.4	6.5%
Other	14.6	14	13.6	13.6	16.4%
Total	72.7	81.7	86.7	83	100.0%
Estimated Advertising Mail ^{1/}	2.8	3.4	4.1	5.1	6.1%

^{1/} Estimated advertising mail tons for 1990, 1995, and 2000 are for household advertising mail only.

Sources: 2003 MSW Data. Table 4. Other data from Environmental Impact of Mail Update/Study, October 2003.

If this paper and paper board material is treated as a waste rather than a resource, there are significant financial implications. According to the National Solid Waste Management Association (NSWMA) the average fee charged nationwide for discarding solid waste in 2004 was \$34.29 per ton for landfills, and \$61.64 per ton for incineration (or waste-to-energy conversion).⁸ This fee is commonly known as a “tipping fee” and varies by location or region. SLS calculates a weighted average cost of discarding advertising mail and other recoverable paper products of \$39.81 per ton. Accordingly, there is the possibility that economic incentives exist or could be created to stimulate recovery of paper and other MSW components for productive use. As described in subsequent sections of this report, existing incentives are sufficient to stimulate paper recovery on a significant scale, provided that public awareness is sufficient and public policy (particularly at the federal government level) does not impede recovery efforts.

IV. Paper Recovery and the Recovered Paper Material Stream

This section describes where recovered paper originates, how it is collected, its composition and physical characteristics, and the intermediate markets by which supply of and demand for this material are expressed. These elements of the issue are examined in turn below.

Waste Paper Collection Practices

Potential sources of waste paper are numerous and diverse, and correspond to virtually all sectors of the economy and every household in the U.S. In practice, a general distinction is drawn between residential and commercial waste paper sources. Each is serviced by a refuse collection system that serves as the conduit linking the source and the user of the waste paper. Because the principal focus of the recycling initiative being considered by DMA, MPA, and EMA is the end consumer of the products offered by their members, and because the vast majority of these products are delivered to and used within the home, we focus here on residential solid waste collection. That said, commercial settings also offer opportunities

⁸ Data derived from NSWMA’s 2005 Tipping Fee Survey.

for incremental collection and reuse of waste paper, and once collected, the material is subject to the same general processes, factors, and constraints as that collected by residential solid waste management systems.

Residential solid waste management became a prominent environmental issue in the 1980s as new standards governing the construction and operation of municipal solid waste (MSW) landfills were enacted by the EPA. In the years that followed, a new focus on material recovery was one outcome arising from a concern that future landfill capacity could become constrained, and recycling programs for certain components of the solid waste stream came into being. Old newspaper (ONP) was one of the first materials for which extensive recycling programs were adopted, and today it is still the mainstay of MSW paper recovery programs.

Recycling programs enjoyed substantial growth from the 1980s through the mid-1990s before tapering off more recently as the concept was adopted in most of the major cities and metropolitan areas in which it is cost-effective. As of 2005, 86 percent of the total U.S. population had access to residential paper recycling, an all-time high. Today, approximately 56 percent of the people in the U.S. have access to curbside programs, while 64 percent have access to drop-off recycling (R.W. Beck, 2005, pg. ES-2).⁹ Summary data are presented in Exhibit 6, below.

Exhibit 6

Summary Results of AF&PA's 2005 Paper/Paperboard Recycling Program Summary				
	Results by Population with Access		Results by Community	
	Population (Millions)	Percent of U.S. Total	Number of Communities	Percent of U.S. Total
Curbside Recycling Programs	148	56%	9,119	27%
Drop-off Recycling Programs	165	64%	20,240	59%
Total Recycling Programs	254	86%	23,519	69%

Source: Waste Age, Jun 1, 2006

Interestingly, with the continued expansion and evolution of paper recycling programs and downstream markets, the types of paper that can be productively recycled and recovered has expanded significantly. Periodic surveys of paper recycling access conducted by the American Forest and Paper Association (AF&PA) document the emergence of collection programs for a wide variety of used paper grades, including used corrugated cardboard, magazines, phone books, office paper, direct mail, kraft paper, and paperboard, as well as ONP. A review and analysis of the data contained in the most recent AF&PA-sponsored study shows that at least 66 percent of the U.S. population has access to recycling of old magazines (OMG), and at least 61 percent has access to recycling of advertising mail.¹⁰ As discussed further below, many of these specific materials, when recovered, are defined commodities that are bought and sold in markets and material exchanges on a global basis. Others are contained in mixed paper grades that are more heterogeneous in composition but nonetheless have specifications and also are bought and sold world-wide on a daily basis. Exhibit 7 displays some recent summary data on used paper supply, recovery, and prices for major recovered paper and board types.

⁹ Note that the percentages do not add up to the reported total (86 percent) because in some communities, people have access to both curbside access and drop-off facilities.

¹⁰ SLS estimate derived from data presented in Insert 2-1 of the R.W. Beck report.

Exhibit 7
Recovered Paper Supply, Recovery, and Prices

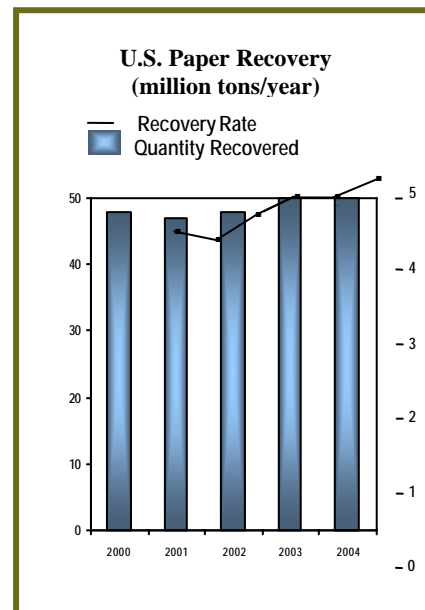
Type	2005 Supply (MM Tons/year)	1996 Recovery Rate	2005 Recovery Rate	2005 Recovered Quantity MM Tons/year)	US National Average Price: 2000-2006 (\$/ton FOB)
OCC -old corrugated cardboard	32.3	73%	77%	24.7	\$50 – 90
Mixed Paper	35.4	19%	30%	10.8	\$21 – 60
ONP -old newspaper	13.9	53%	70%	9.7	\$43 – 90
OMG -old magazines ^{1/}	3.6	25%	30%	1.1	\$65 – 105
SOP -sorted office paper	9.4	41%	50%	4.7	\$86 – 148

^{1/} This category also includes catalogs.
Source: Moore, B. and P. Engel, 2006.

In some cases, the data for estimated “supply” of used paper do not correspond closely to the estimated quantities of paper and board entering the MSW stream developed above, particularly for magazines. There are two primary explanations. One is that the categories are defined somewhat differently. For example, Moore & Engel include catalogs in the OMG category, due to the physical similarities between magazines and catalogs. In the data developed above, in contrast, catalogs are considered a component of direct mail. The other is likely the fact that the Moore & Engel data consider both residential and industrial, commercial, and institutional (ICI) sources of paper products. In any event, the available data demonstrate that while paper recovery has increased across all of the major paper types, the ones with the most remaining potential “upside” for incremental collection and reuse are mixed paper, magazines, and sorted office paper. Also, given the positive and relatively stable prices of all of these grades, the data also show that far from being properly considered waste or nuisance materials, each type is instead a valued commodity. This basic fact is further substantiated and explored later in this report.

Despite the emergence of recovery of non-newspaper paper types during the past ten years, on an overall basis, paper recovery in the U.S. has leveled off, in parallel with the growth rate of residential recycling programs, as shown in the adjacent diagram (Grogan, 2005). Although recovery rates have increased modestly during the past several years, reductions in the quantities of paper used have resulted in an overall flattening in the amount of paper recovered on an annual basis.

Regarding paper collection, one additional trend is worthy of note here. During the past several years, many communities have adopted “single stream” collection programs, in which the resident places recyclables along with household refuse in a single container. The contents of these containers are then collected into a single truck and transported to a material recovery facility (MRF), where sorting of the many components of the waste stream occurs. Single stream collection has grown rapidly to more than 500 programs nationwide (Kinsella, S. and Gertman, R., 2006, pg. 9), and now is available to 27 percent of the population with access to curbside recycling (R.W. Beck, pg. ES-4). The popularity of this collection scheme is attributed by many to perceived cost



advantages (operating one collection truck and making one trip per household versus two), and to the possibility that ease of use will stimulate greater household participation in recycling programs. Unfortunately, however, while more than 75 percent of the material recovered from single stream collection consists of paper fiber (Kinsella, S. and Gertman, R., 2006, pg. 9), according to several sources, use of this collection method substantially diminishes the quality of the recovered paper stream, and poses real challenges to the operators of paper mills that use it. This issue is examined in greater depth below.

Sorting and Paper Recovery

Once the used paper is collected (in either segregated or mixed form) it is then transported to either landfill disposal, a waste-to-energy (MSW combustion) facility, or a material recovery facility (MRF) for material sorting and further processing. At the MRF, a variety of material separation methods may be used to segregate the valuable components of the stream from the remaining debris and unusable materials. Obviously, the more segregated the materials are upon entry into the MRF (or downstream receiving paper mill), the less effort and associated cost are required to process and package them for delivery to commodity material buyers. As a general matter, recovered paper is sorted to varying degrees, and then baled for transport. It is important to recognize that this somewhat heterogeneous material generally contains non-paper constituents that are expressed in units of *percent by weight*, rather than by more familiar measures of contaminant concentration such as parts per million (ppm).

In some cases, more sophisticated operations may make use of optical scanning equipment to mechanically sort and separate the various paper constituents of the waste (or recovered paper) stream. Such systems have been found to be cost-effective for larger operations in a number of cases (Grogan, 2006a). Moreover, depending upon the product(s) being manufactured and relationships with the local governments, some paper mill operators will arrange to receive the MSW stream (or paper-bearing components) directly, allowing the material sorting operation typically conducted at the MRF to be completely bypassed (Brown, 2006).

With the evolution of paper sorting and recovery techniques and recovered paper markets over time, several companies have vertically integrated their operations, such that major paper and board manufacturers also may operate paper recovery and brokerage businesses. Several national or international scale companies operate ten or more paper recovery centers around the country, and many have contracts for pick-up of OCC and other paper and board materials with major retailers, distributors, and transportation firms. Generally, these materials have a positive price, i.e., the recovery company pays to obtain the material to be removed and recovered.

Recovered Paper Types and Grades

Recovered paper is an established commodity for which fully developed global markets exist to bring together buyers and sellers and establish transactional norms. In the U.S. the participants in recovered paper markets have developed definitions for a wide variety of paper grades and specifications for each. Similar standards and guidelines have been developed for many other recycled commodities as well, under the auspices of the Institute for Scrap Recycling Industries (ISRI). Paper and paper board grades and specifications are defined by ISRI's Paper Stock Industries (PSI) group. Information from the ISRI/PSI guidelines that is pertinent to the current study¹¹ is summarized below in Exhibit 8. Importantly, deviation from the limits and procedures outlined in the guidelines is grounds for either rejecting a shipment of recovered paper or re-negotiating the terms of the sale, including the price (ISRI, 2006).

¹¹ The ISRI/PSI guidelines define and provide standards for more than 50 distinct recovered paper grades.

According to the ISRI Specifications, paper is bundled and sold in one ton increments (or, optionally, metric ton increments for international sale), with either buyer pickup or delivery specified in the purchase contract. Recovered paper sales are arranged through a network of paper processors, brokers, and agents, and may be made under contracts or through purchases on the spot market.¹² Note again that the presence of one to two weight percent (i.e., 20 to 40 pounds per one-ton bale) of non-paper contaminants in the recovered paper is both permissible and expected.

Exhibit 8 Recovered Paper Grades and Specifications

Paper Stock: Domestic and Export Transactions			
Category Number & Name	Description	Maximum % Prohibitive Materials^{1/}	Maximum % Out-Throws^{2/}
(1) Soft Mixed Paper	Consists of a mixture of various qualities of paper not limited as to type of baling or fiber content.	2	10
(2) Mixed Paper	Consists of a clean, sorted mixture of various qualities of paper containing less than 10% of groundwood content.	0.5	3
(6) News	Consists of newspaper as typically generated from news drives and curbside collections.	1	5
(10) Magazines (OMG)	Consists of coated magazines, catalogues, and similar printed materials. May contain a small percentage of uncoated newtype paper.	1	3
^{1/} Defined as any materials which by their presence in a packing of paper stock, in excess of the amount allowed, will make the packaging unusable as the grade specified or any materials that may be damaging to equipment			
^{2/} Defined as all papers that are so manufactured or treated or are in such a form as to be unsuitable for consumption as the grade specified.			
Source: ISRI, Scrap Specifications Circular 2006, pp. 25-35.			

Paper recovery centers at numerous locations around the country are operated by Waste Management, Weyerhaeuser, Smurfit-Stone, the Newark Group, Caraustar Industries, and perhaps ten additional national-scale companies, as well as a large number of smaller local and regional firms (Mullen, 2006). These operations provide processed, packaged, and graded paper of various types for sale to both domestic and international paper mill customers. Given that some (e.g., Weyerhaeuser, Smurfit-Stone, Newark, and Caraustar) also operate networks of domestic paper and/or board mills, they also may fulfill internal fiber needs. Recovered paper is bought and sold through supply contracts, transactions arranged by brokers, and through sales on commodity markets.

Recovered Paper Markets and Trends

Markets for recovered paper are fully developed and functioning for all or virtually all of the grades of paper designated in the ISRI guidelines.

Pricing data are collected and regularly reported by several industry publications, including *Official Board Markets*, *Pulp & Paper Week*, *Secondary Fiber Pricing*, and the *Paper Stock Report*. The latter reportedly lists both dealer (loose) and mill (baled) recovered paper prices. The publisher of each of these publications operates a web site and provides its pricing data and publications electronically on a subscription basis.

¹² See, for example, used paper commodity listings at <http://www.recycle.net/Paper/waste/index.html>, some of which, though not all, conform to the ISRI guidelines.

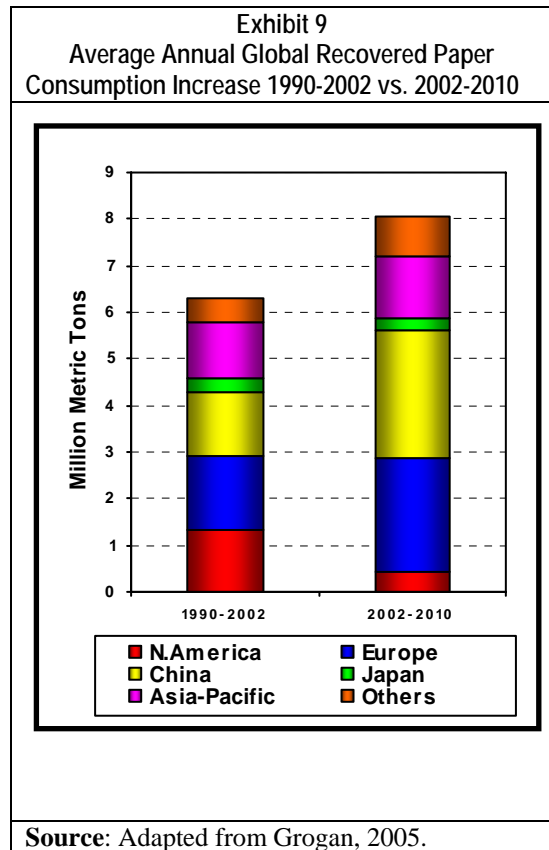
Further evidence that recovered paper is increasingly recognized as a stable commodity may be found in the recent announcement that Dow Jones, Inc. has launched a new index specifically for recovered paper. Initial quotes have been provided for OCC, with additional paper grades planned through 2006.¹³

It also is necessary to recognize that today, like those of other commodities, markets for recovered paper are global in nature. Moreover, the geographic distribution of major forests and forest products (including paper pulp) does not in all cases correlate well with the locations of manufacture of finished paper products nor with major end use markets. This is particularly true in Asia. Indeed, while market pulp is produced in about 25 countries, historically more than two-thirds of world output has come from five northern countries: the United States, Canada, Sweden, Finland, and Norway (Gale Encyclopedia of American Industries, 2005).

While demand in traditional markets in North America, Europe, and Japan has been relatively steady in recent years, demand for paper goods in the large and rapidly growing economies of China and India has been increasing substantially. To illustrate this phenomenon, historical and projected growth in the consumption of recovered paper are presented in Exhibit 9. This chart shows that global demand for recovered paper fiber has been growing by more than six percent per year, and that during the next several years, average annual growth is expected to increase even more, to about eight percent. This is expected to occur because demand for recovered fiber in most major paper and paperboard producing regions will increase, with the notable exceptions of the U.S. and Japan (Clapp, 2006).

In parallel with this demand for fiber, the past several years have witnessed a steady increase in the value of U.S. exports of recovered paper, pulp made with recovered paper, and virgin pulp of various kinds. Illustrative data are presented in Exhibit 10. For example, today the U.S. exports roughly 8 million tons of the former to China alone, making it the largest exporter of recovered paper to this rapidly growing economy (Metafore, 2006).

These data illustrate that the value of exports of recovered paper have been increasing by roughly \$200 million per year and now make up about one-third of the value of all pulp and scrap paper exported from the U.S. Moreover, because the total value of finished paper goods in 2005 was \$12.336 billion, about one-third of total exports of all paper, board, and related products were pulp and recovered materials, while about two-thirds were in the form of finished products.



¹³ See <http://www.djindexes.com/mdsidx/?event=paper> for further information.

Exhibit 10
Value of Wood Pulp and Recovered Paper and Paperboard - Exports to Rest of World
(\$ USD)

Product Number and Name	2000	2001	2002	2003	2004	2005
4703--CHEMICAL WOODPULP; SODA OR SULFATE; NOT DISSOLY GR	\$2,695,868,349	\$2,220,229,081	\$2,186,787,397	\$2,177,791,073	\$2,397,347,389	\$2,739,023,723
4707--WASTE AND SCRAP OF PAPER OR PAPERBOARD	\$1,242,990,217	\$892,823,251	\$1,082,506,973	\$1,380,631,306	\$1,513,421,734	\$1,720,765,624
4702--CHEMICAL WOODPULP; DISSOLVING GRADES	\$361,228,023	\$284,394,979	\$282,750,029	\$264,439,388	\$266,306,828	\$321,737,971
4706--PULPS OF FIBERS FROM RECOVERED PPR; OTH CELL MAT'L	\$193,845,446	\$182,729,440	\$148,807,145	\$135,983,365	\$132,918,706	\$160,599,853
4705--WOODPULP FROM MECHANICAL/CHEMICAL PULP PROCESSES	\$81,410,499	\$88,670,861	\$86,027,068	\$125,688,320	\$182,638,238	\$141,280,863
4704--CHEMICAL WOODPULP; SULFITE; NOT DISSOLVING GRADES	\$89,196,139	\$57,367,495	\$115,639,192	\$96,632,734	\$94,149,882	\$67,072,091
4701--MECHANICAL WOODPULP	\$49,507,387	\$42,736,329	\$37,265,756	\$35,229,129	\$35,014,967	\$29,599,817
Total	\$4,714,046,060	\$3,768,951,436	\$3,939,783,560	\$4,216,395,315	\$4,621,797,744	\$5,180,079,942

Source: U.S. Department of Commerce, <http://tse.export.gov/NTDChartDisplay.aspx?UniqueURL=yz54b345iurkbtfavscz2c3n-2006-10-11-17-41-4>

Some further explication of China's role in global recovered paper markets is in order here. This is because according to recent estimates, China will account for more than 40 percent of future growth in world demand for recovered paper. China is, in fact, in the process of constructing substantial new paper manufacturing capacity (Grogan, 2006b), and is expected to bring on line new capacity to produce newsprint (6 mills, 1.365 million tons/year capacity), boxboard (7 mills, 1.7 million tons/year capacity), and containerboard (22 mills, 6.61 million tons/year capacity) (Clapp, 2006). Because China has, relative to other major producers, very little forested land, it is (and will continue to be) highly dependent upon imports of virgin and recovered fiber if it is to keep its new (and state of the art) paper and board mills operating at anywhere near capacity. The flip side of this coin is that exports to China, as well as to other major producers with limited forest resources, will likely be the dominant source of growth in demand for U.S. fiber, as they have been in the recent past.

An industry projection of the overall growth in recovered paper by major type is presented in Exhibit 11. This table shows that demand for all of the major types of paper will be substantial, with corrugated stock accounting for more than 40 percent of new demand, newsprint and magazines for 25 percent, and mixed paper accounting for 20 percent.

Exhibit 11 Projected Annual "New" Global Demand for Recovered Paper, 2002-2010 (million tons/year)	
Mixed Paper	1.6
Corrugated	3.4
Newsprint & Magazines	2.0
Office Paper	1.0
Total Recovered Paper Demand	8.0
Source: Grogan, 2005.	

These phenomena have several important implications within the current context. One is that demand for and prices of recovered paper are no longer primarily determined by individual regional market

conditions within the U.S. or by overall national economic trends. Another is that for the foreseeable future, it is unlikely that demand for recovered fiber will decline—at most, one would expect possible moderation in the rate of increase as a function of general economic and business conditions in China and other large, emerging economies. Because of this, paper mill operators in the U.S. have far less leverage than previously in setting market prices for recovered fiber. And because demand from global players has been so strong, domestic mill operators have had limited leverage in insisting that the recovered paper delivered to them meets ISRI/PSI standards and/or is otherwise suitable for introduction into their production processes. Along with the emergence of single stream residential collection as discussed above, this factor has enabled a widespread deterioration in the quality of incoming recovered paper stocks in recent years. Better design of collection systems could help to reverse this trend (Kinsella, S. and R. Gertman, 2006) as could increased public awareness of both the importance of recycling all types of paper and ensuring that this fiber source is protected from contamination.

V. Recovered Paper Processing Technologies and Relationships to Paper Manufacturing

This section provides some descriptive information on the domestic pulp and paper industry, with particular emphasis on users of recovered paper.

U.S. Pulp Mill Characteristics and Operations¹⁴

Followed by Canada, the U.S. pulp industry is by far the world's largest, representing roughly one-third of worldwide production in recent years. U.S. pulp mills produce a wide variety of pulps for making paper and paperboard. In 2000, shipment values for U.S. pulp mills totaled about \$3.7 billion, representing about 4.7 percent of total shipment values for pulp, paper, and paperboard mills. An undated industry publication states that paper, paperboard, and building products are manufactured in 521 U.S. mills, and that the 450 mills that use at least some recovered paper operate in 42 states (TAPPI, 2006).

Most of the pulp made in the United States is chemical pulp, which is produced by a chemical digestion process that converts wood chips into pulp by chemically liberating the cellulose fibers from the lignin that holds them together in the wood. Mechanical, or “groundwood” pulps are made with large “grinders” that physically shred the wood pulp into individual fibers. Some processes combine elements of mechanical and chemical pulping.

After the wood chips are digested or ground, they are called wood pulp, as is recovered paper once it is returned to a mill and slurried (described below). This wood pulp is cleaned, screened, and refined. Pulp to be used for white paper is bleached; otherwise the pulp retains its natural brown color. At this point, the pulp is ready to be used in papermaking and paper board manufacturing. Various grades of pulp can be made from softwood trees such as southern pine, hardwood trees such as oak, or from other sources that include recovered paper, rags, or agricultural products such as cotton linters, kenaf, bagasse, and straw.

Most pulp produced in the U.S. is used in captive, integrated pulp and paper mills. There are, however, numerous smaller paper mills that are not connected with a pulp mill. They purchase “market pulp” on the open market from other pulp producers. Some companies produce only market pulp, while as discussed above, other companies sell the pulp that they produce in excess of what can be used by their paper machines.

¹⁴ The industry and process descriptions provided in this section are largely drawn from the “Pulp Mills” chapter of the Gale Encyclopedia of American Industries, 2005.

The percentage of virgin wood fiber used in paper and board production in the United States and other countries has been steadily declining. This decline is explained by several trends. While virgin wood fiber has long been the fiber of choice in most advanced papermaking operations, it is coming under sustained challenge from other fiber sources, particularly from the increases in incoming recycled paper, as discussed above. Use of virgin wood fiber also has been limited from the growing use of mineral coatings and inert fillers, particularly in printing and writing papers. Producers of these grades have completed a long-term shift from acid pulp to alkaline pulp. One reason for this shift is that paper produced from acid pulp becomes brittle and breaks up over time, while alkaline papers tend to last longer. More important, however, is the fact that alkaline papermaking tends to be less expensive because it permits greater use of fillers, such as calcium carbonate, that replace a percentage of the wood fiber in the finished paper. In U.S. printing and writing papers, such as copy paper, the amount of filler can be 10 to 20 percent of the finished paper. The cost of fillers is about one third that of wood pulp, providing an obvious financial incentive to increase the use of fillers. Papermakers use filler not only to reduce the amount of wood fiber used but also to increase the smoothness and opacity of their finished products.

Recovered Paper Processing

When and where used in the production of paper and board, recovered paper is first inspected and, at some mills, sorted. Sorting operations at the mill may be somewhat intensive, particularly if residential paper sources are being exploited directly.

The baled or loose paper is then repulped. This involves placement in one or more large, cylindrical tanks with water to form a five percent slurry (5 percent paper to 95 percent water). The mixture is stirred using an agitator and large or dense contaminants are removed using physical (generally, centrifugal) cleaners. At some mills, flotation techniques are used, in which air is introduced at the bottom of the tank along with detergents. Fine-grained, insoluble foreign materials attach to the surface of the bubbles that are formed as a result, and rise to the surface, where they can be removed via vacuum or physical methods (e.g., skimming). Several (four or five) such washings may be used for a given batch of pulp if required by product quality standards (e.g., for printing and writing papers) (Benjamin, 2006a). The repulped fiber is then sent through several successively finer screens, which remove the vast majority of non-fiber constituents of the pulp stream in most cases. The materials removed typically amount to about one to two percent by mass of the incoming stream (Grogan, 2006a), but may be more, depending upon the composition of the recovered paper.

In this way, inserts such as CD disks, pieces of fabric, cellophane, foil, and the like are routinely removed without substantial effort, trouble, or expense. In some cases, these non-paper materials can be separated, baled, and sold as feedstocks for other manufacturing processes. For example, CDs and plastic coatings from cartons can be recovered and thermoformed into new products (Benjamin, 2006b). Other contaminants, however, can pose serious problems for the mill operator. These include certain types of water-insoluble adhesives (particularly hot-melt varieties), liquid samples, glass fibers, food residues, and dirt (Moore, 2006; Mullen, 2006). The presence of these contaminants in any significant concentration can pose real obstacles in certain paper grades, such as fine printing and writing papers (Benjamin, 2006b). This fact has limited use of recovered paper to produce these product grades, and likely will continue to do so in the future.

Following the successive screening steps, the cleaned pulp may be bleached (or not), and then fiber from other (often virgin) sources is added as required to provide the required physical properties. On an industry-wide basis, the average fiber blend in Canada and the United States today is 69 percent fresh and 31 percent recycled fiber (Metafore, 2006). The finished pulp is then sent to downstream papermaking or board manufacturing operations.

Products Made with Recovered Paper

According to the American Forest & Paper Association, the domestic industry's largest and most prominent trade association, nearly 80 percent of all U.S. papermakers use at least some recovered paper in their products, and more than 37 percent of the raw material used to produce new paper products each year comes from recycled paper (AF&PA, undated). Moreover, U.S. recovered fiber is generally considered to be of the highest quality, due to its relatively high fiber content (roughly 40 percent, on average) (Brown, 2006).

A wide array of paper and board products is manufactured using recycled fiber. The paper that is recovered and recycled by mills in Canada and the U.S. is used in containers (41 percent), packages (25 percent), newsprint (12 percent), tissue (10 percent), printing & writing paper (5 percent), other uses (4 percent), and other grades (3 percent) (Metafore, 2006). In fact, a number of products have *always* been manufactured using recovered fiber, including several grades of boxboard (e.g., wallboard covering; tubes and cores; and specialty board for ring binders, textbooks, and board games), while others (e.g., clay coated board for cereal boxes) routinely contain 50 percent or more recycled fiber (Brown, 2006).

Recovered old magazines (OMG) are most commonly used in the production of newsprint, in which the coatings present in magazine paper are helpful in deinking (removing ink from) recycled newspaper stock (ONP). Catalogs are attractive to newsprint producers for the same reason. The major material used in newsprint production is, however, old newsprint (ONP), and other recovered paper types, (e.g., mixed paper containing direct mail) generally are not desirable for this end use. Approximately two-thirds of recovered magazines and catalogs are put to this end use by nearly 30 U.S. newsprint mills, some of which produce 100 percent recycled content newsprint (Moore, 2006).

Tissue products are a major end use for many recycled paper types. A number of manufacturers produce 100 percent recycled content product lines at dozens of plants around the U.S., which incorporate recovered paper from an array of sources, including curbside collection, drop off centers, converting operations, and print shops. Tissue production can accommodate a higher concentration of dirt and other contaminants (as much as *several percent* by weight) in the incoming paper stream in the incoming pulp than can manufacture of higher quality paper (Thery, 2006). Old magazines, catalogs, direct mail, and various mixed papers all can be and are used in tissue production.

Printing, writing, and office papers are manufactured by an array of large and smaller producers, some of which offer recycled-content grades. Two specialty mills produce printing and writing or coated sheet using relatively high percentages of OMG (Moore, 2006), but this practice is rare. Mixed paper, including direct mail, is used more frequently, but there are important limitations. Production of these papers is far less tolerant to variability (including the presence of non-paper fiber contaminants, than that of the other major paper and board types. Glass shards, plastics, grit, binders/adhesives, and other materials can result in equipment wear and damage and product quality impacts that are very difficult to accommodate in a cost-effective manner. In most cases, it costs more to put post-consumer fiber into high-end paper products than into more generic newsprint, tissue, and board products and such fiber may not be cost-competitive with virgin pulp in the production of printing and writing papers (Whitfield, 2006). This is because, in general, much of the available recovered post-consumer fiber is, as discussed above, of limited and variable quality.

The last prominent domestic end use of recovered magazines and catalogs and direct mail is in the manufacture of boxboard. Magazine and catalog stock can add brightness and, because of the presence of clay fillers in magazine paper, improve the uniformity of the filler layer(s) in the boxboard sheet product. Because, however, of the relatively low fiber content of coated paper, board producers cannot cost-effectively pay premium prices for this material. Approximately 70 mills in the U.S. manufacture

recycled board products, and in the aggregate, they have the existing capacity (7-8 million tons/year) to receive and process roughly twice the volume of recovered paper that they currently receive (Brown, 2006).

Finally, as discussed above, it should be recognized that exports also constitute a major end use of the recovered paper grades of interest here. While approximately 71 percent of the total recovered OMG is used domestically, the remaining 29 percent is sold to overseas newsprint mills, principally in South Korea and China (Gower, *et al*, 2006). Moreover, most (about 55 percent of) mixed paper, which includes recovered direct mail, is exported, principally to meet growing demand in China and other emerging paper manufacturing centers (Moore, 2006).

Emerging Challenges

It would appear that the most significant obstacles to greater paper fiber recovery in the U.S. are posed not by the presence of small quantities of inserted materials or by additional volumes of magazines, envelopes, and marketing mail to be recovered, but rather the declining quality of the paper stream arising from residential MSW management. Notwithstanding the existence of defined paper types, grades, and market prices, according to informed industry sources, in practice the paper that is recovered, purchased by mills, and used to manufacture new paper and board products in the U.S. often falls short of established standard specifications and guidelines. Indeed, during the course of our research, an informed industry source remarked that historically, his company had experienced contaminant levels of about four percent, but had recently observed levels rising to about six percent by weight (Thery, 2006).¹⁵ According to another expert from the not-for-profit sector, several factors have contributed to an overall degradation of the quality of the paper stream over the past several years (Kinsella, 2006). One is the emergence of major international sources of demand for recovered paper, particularly China, which has the effect of weakening the bargaining position of the domestic paper mills to set both quality and pricing requirements, as discussed above.

More important, however, is a general trend toward less material sorting at the point of collection, as reflected in the emergence of single stream MSW collection. In essence, contaminant levels in the recovered paper that is packaged, sold, and fed into paper and board manufacturing has declined because municipal governments have attempted to maximize collection (or diversion) without giving due consideration to downstream processing, while the ability of the consumers of recovered paper to dictate quality and price through normal market mechanisms has declined.

VI. Conclusions

In this report, we have described and characterized the nature and extent of recycling of magazines, catalogs, direct mail, and envelopes for paper recovery and reuse in the U.S.; quantities of magazine and direct mail inserts and of the “host” materials in which they are placed; and the possible adverse effects that magazine and direct mail inserts could impart to paper recovery and reuse efforts. From the information provided above, we offer the following conclusions.

- ◆ Magazines, direct mail, and used envelopes comprise a small fraction of the municipal solid waste stream, and no more than nine percent of the paper and paper board fraction thereof.
- ◆ Inserts, or ride-along pieces, are in widespread use by magazine publishers and direct mailers. Most of these inserts, by volume (and presumably by weight) appear to be plastic CD disks and paper

¹⁵ Interestingly, he attributed much of this upward trend in contaminant levels to an increase in document destruction in recent years following the 9/11 attacks, rather than to the growth in single stream MSW collection.

products, though plastics, metal foil, fabrics, and small quantities of liquids also are used. At most, about two percent of mailed periodicals contain such pieces, and they represent no more than 0.4 percent of the total weight of U.S. periodicals. The vast majority of direct marketing mailings do not contain non-paper inserts.

- ◆ Paper recycling in the U.S has evolved and matured over the past 20 years or so, and formal programs now collect and process a variety of paper and board materials, including old newspaper, magazines, catalogs, direct mail, cardboard, and mixed paper. More than 60 percent of Americans have access to recycling of magazines, catalogs, and direct mail, through curbside pickup, drop-off centers, or both. Public awareness of this capacity, however, does not appear to be high, as recovery rates for these paper grades substantially lag those of old newspaper and cardboard.
- ◆ Used paper is collected and processed in a variety of ways by numerous entities, ranging from single-stream (combined) residential curbside pickup by municipal governments to long-term supply contracts between integrated paper processors and large retail and other commercial establishments. Used paper is an established commodity, and several dozen defined types and grades are routinely collected, processed, packaged, and shipped to pulp mills across the U.S. and internationally. Industry-developed standards dictate acceptable levels of both paper and non-paper contaminants, which for recovered magazines, catalogs, and mixed paper (the repository of most direct mail) are expressed in weight percentage terms.
- ◆ Recovered paper is used to make a variety of new paper and paper board products, some of which commonly exhibit very high recycled fiber content, in some cases 100 percent. Recovered magazines and catalogs are not generally suitable for making new magazine/catalog paper, but are commonly used in production of newsprint and tissue products, and also may be used, along with other types/sources of fiber, to manufacture boxboard, and even writing and printing paper. Most recycled direct mail and used envelopes (mixed paper) is currently exported, though substantial quantities also are employed in the production of paper/box board and tissue.
- ◆ Regardless of type, at the mill, recovered paper is repulped (suspended in a dilute waterborne slurry) and cleaned prior to reintroduction into the paper or board manufacturing process. Physical, and to some degree, chemical methods are employed to removed undesirable constituents, and these methods are very effective in removing most large contaminants such as plastics, film, foil, fabric, and metals (e.g., intact batteries). Certain insoluble adhesives can pose problems, as can liquid samples, food particles, and dirt, particularly in the production of paper products with rigorous quality standards, such as fine writing and printing papers.
- ◆ Despite these concerns, many paper and board producers have a strong interest in using recovered paper, and during the course of our research, many stated that they would use more recovered paper were it available. This is particularly true of producers of recycled content products that do not have rigorous product quality standards for uniformity and brightness; these products include newsprint, tissue, and paper and box board. These manufacturers are accustomed to and equipped for dealing with recovered paper of variable quality and characteristics. The presence of inserts does not and likely will not deter them from making continued and, if possible, more extensive use of recovered magazines, catalogs, and direct mail.
- ◆ Markets for recovered paper are reasonably well developed, accessible, and global, and are growing more transparent over time. Regional, national, and international pricing data are available from a variety of commercial sources, and the industry has developed its own definitions, grades, criteria, and contract terms to govern transactions for recovered paper.

- ◆ The most prominent obstacles confronting users and promoters of recovered paper appear to be the ongoing degradation of recovered paper quality, particularly with the advent of single stream residential solid waste collection, and a general lack of public awareness and/or interest in recycling all of the paper products for which recovery capacity exists.
- ◆ To address the latter obstacle, one or more awareness raising campaigns might be considered, in the interests of promoting the public understanding needed to stimulate greater participation in residential resource recovery programs.

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Appendix: Primary Information Sources

Name	Title and Affiliation	Notes
Maynard Benjamin	Executive Director Envelope Manufacturers Association (EMA)	<ul style="list-style-type: none"> ◆ EMA represents domestic envelope manufacturers ◆ Authoritative source on envelope use, quantities, composition, and mailing characteristics
Tom Brown	CEO <i>Emeritus</i> Caraustar Industries	<ul style="list-style-type: none"> ◆ Caraustar is one of the world's largest integrated manufacturers of converted recycled paperboard ◆ Operates 15 paperboard mills in U.S. ◆ Also operates seven recovered paper processing operations and eight brokerage locations
Ed Gillis	Consultant	<ul style="list-style-type: none"> ◆ Retired paper mill manager and executive ◆ Current market development consultant to American Eagle Paper Co.
Pete Grogan	Manager, Market Development Weyerhaeuser Recycling	<ul style="list-style-type: none"> ◆ Weyerhaeuser is one of the world's largest integrated forest products companies ◆ Major collector, processor, and user of recycled paper ◆ Recognized industry expert, particularly on paper recovery issues
Susan Kinsella	Executive Director Conservatree, inc.	<ul style="list-style-type: none"> ◆ Conservatree is a not-for-profit dedicated to raising awareness and promoting use of recycled paper products ◆ Former operator of recycled paper business ◆ Recognized expert in paper recycling and recycled content product market characteristics
Bill Moore	President Moore & Associates, Inc.	<ul style="list-style-type: none"> ◆ Moore & Associates is a specialty consulting firm with expertise in paper recycling and recovery ◆ Recognized expert in paper fiber recovery trends, collection program design, and related issues
Bob Mullen	CEO The Newark Group, Inc.	<ul style="list-style-type: none"> ◆ The Newark Group operates 12 paper/board mills, 10 in the U.S. ◆ It also operates 10 paper recovery centers, and is about the 4th largest paper recovery firm ◆ The firm also operates regional paper brokerages around the U.S.
Ron They	Vice President, Manufacturing SCA Tissue Division	<ul style="list-style-type: none"> ◆ SCA operates 8 tissue production facilities across the U.S. ◆ Mills use 750,000 tons/year recycled paper ◆ 80-90% of products use 100% recycled fiber ◆ Focus on food service & institutional markets
Chuck Whitfield	Vice President American Eagle Paper Co.	<ul style="list-style-type: none"> ◆ Former plant manager at MeadWestvaco, current operations manager at mill producing recycled and other writing papers ◆ 50 years pulp and paper industry experience