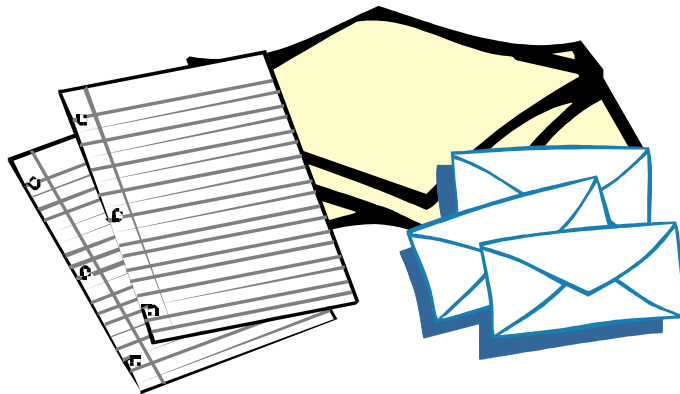


# Paper: Mixed Paper

## COMMODITY PROFILE

North Carolina Department of  
Environment and Natural Resources  
DIVISION OF POLLUTION PREVENTION  
AND ENVIRONMENTAL ASSISTANCE

MARKETS ASSESSMENT 1998



### OVERVIEW

The definition of mixed paper can be extremely broad, with few unacceptable papers, and often includes items such as discarded mail, telephone books, catalogs, and cereal boxes. It can include virtually all types of paper generated in offices and a large percentage of papers generated in residences. Unacceptable paper types typically include plastic-coated papers, such as frozen food packages, and paper towels / tissues. In many communities, mixed paper collections include paper grades that could be collected and marketed individually (such as office paper or old magazines).

In 1997, North Carolina generated more than 678,000 tons of mixed paper. More than 115,000 tons of mixed paper were recovered in North Carolina, for a recovery rate of 17 percent. Private sector recovery accounted for 80 percent of this tonnage.

Most of the mixed paper recovered in the United States (37 percent) is used to make recycled paperboard. Exports represent the second largest share of total consumption at 24 percent. The remainder is divided evenly between the manufacture of tissue paper, printing and writing paper, and all other uses.

Demand for mixed paper is projected to increase at a higher rate than other paper grades during the next several years. However, loss of production time and contamination problems will likely continue to contribute to the current oversupply.

### **Defining Mixed Paper**

As noted above, the definition of mixed paper can be extremely broad, with few unacceptable papers. The standard industry definitions are also broad, yet they restrict the allowable levels of contaminants.<sup>1</sup>

**Figure 1: Estimated Supply of Mixed Paper in North Carolina**

	1997	2002
<b>Generation</b>	678,384	719,849
<b>Recovery</b>	115,182	143,970

- *Soft mixed paper* consists of various qualities of paper not limited as to type of baling or fiber content. Prohibitive materials may not exceed two percent, and total outthrows may not exceed 10 percent.<sup>2</sup>
- *Mixed paper* consists of a baled, clean, sorted mixture of various qualities of paper containing less than 10 percent groundwood content. Prohibitive materials may not exceed .5 of one percent, and total outthrows may not exceed three percent.

Although generally referred to as residential mixed paper, or RMP, mixed paper can be collected from the residential or commercial sectors. Both sectors tend to include the same materials; however, commercial collections may contain higher-grade papers in the mix, thus offering greater opportunities to sort and market them individually. Materials collected as RMP through North Carolina local government programs generally include any combination of white ledger, computer paper, discarded envelopes, magazines, catalogs, and boxboard.

The Chicago Board of Trade (CBOT) Recyclables Exchange defines RMP as a combination of computer printout, white ledger, colored ledger, envelopes, coated paper, and coated paperboard. This definition specifically excludes any OCC and ONP / OMG that consists predominantly of groundwood fiber. Commingling the ONP / OMG groundwood fibers with other types degrades the overall quality and marketability of the material according to CBOT specifications.<sup>3</sup>

As these definitions illustrate, there is not a uniform definition of mixed paper. For this reason, recycling collection programs tend to be geared toward end-user specifications, which can be problematic if end-user needs change or disappear altogether. Developing a consistent definition for this grade would enable collectors to work with a wider range of processors and end users.

**Figure 2: Estimated Supply of Mixed Paper in Southeast Region**

	1997	2002
<b>Generation</b>	4,646,718	4,930,740
<b>Recovery</b>	929,343	986,148

## SUPPLY

### Generation

In 1997, North Carolina generated 678,384 tons of mixed paper. This number does not include grades that are typically sorted and marketed separately from mixed, such as office paper and old magazines. Per capita generation of mixed paper nationally was calculated using EPA data, and this factor was used to estimate generation by population in North Carolina for 1997 and 2002.<sup>4</sup> In 2002, North Carolina generation is expected to be 719,849 tons based on projected population increases. This projection assumes no change in the per capita generation rate.

About 4.65 million tons of mixed paper were generated in the Southeast region in 1997.<sup>5</sup> This tonnage was estimated by applying the national per capita generation rate to each state's population. In 2002, generation in the region is anticipated to be slightly more than 4.9 million tons based on projected population increases.<sup>6</sup>

### Recovery

In 1997, more than 115,000 tons of mixed paper were recovered in North Carolina, yielding a recovery rate of 17 percent. The projection for recovery in 2002 — almost 144,000 tons — assumes that North Carolina's recovery rate for mixed paper has reached the projected national average of 20 percent, which seems consistent with potential growth in mixed paper markets in North Carolina.<sup>7</sup> Recovery was calculated using public and private sector recycling data.<sup>8</sup>

Recovery in the Southeast region was calculated by applying the projected national recovery rate to the generation numbers for the region. This calculation likely over-estimates recovery in the region. In 1997, more than 929,000 tons of mixed paper were recovered in the region, and almost 986,000 tons will be recovered in 2002 if recovery remains at 20 percent. Figures 1 and 2 present supply data for North Carolina and the Southeast region.

Recovery of mixed paper occurs primarily in the private sector in North Carolina. Private sector recovery accounted

**Figure 3: Estimated Demand for Mixed Paper in North Carolina (in thousands of tons)**

End Use	1997	2002
Recycled paperboard	52.6	62.1
Export	34.1	40.3
Tissue	18.5	21.8
Printing & writing paper	17.1	20.1
Other	19.9	23.5
<b>Total</b>	<b>142.2</b>	<b>167.8</b>

for 80 percent of total mixed paper recovery, or 92,543 tons, with the remaining 20 percent collected through North Carolina’s local government recycling programs.<sup>9</sup>

## DEMAND

Mixed paper is projected to be the fastest growing of the recovered paper grades during the next three years, expanding 3.6 percent annually.<sup>10</sup> This growth suggests that the industry is accepting a broader range of recovered papers, but also that recovery may be reaching maximum achievable levels for some other paper grades.

RMP serves as a secondary fiber source in the production of new paper and paperboard, meaning it is primarily used as a partial replacement for more expensive recovered fiber. In paperboard applications, RMP typically replaces OCC and ONP when prices rise. End users of RMP can be classified into two groups: (1) producers of recycled paper and paperboard — including boxboard, linerboard, corrugating medium, and tissue and (2) other end users who can handle large percentages of mixed paper in their recycled furnish — including producers of gypsum wallboard, roofing felt, chipboard, and some molded pulp products (typically limited to small packing material operations for molded pulp).<sup>11</sup>

RMP is a potentially attractive substitute for other fibers for the following reasons:<sup>12</sup>

- *It can provide significant savings in fiber costs*, as it has the lowest value of any paper grade.
- *It is potentially available in large quantities*, as it has the lowest recovery rate of any paper grade.
- *It may allow for a more secure supplier base* for mills that consistently use it. Mills that establish relationships with suppliers in sluggish markets may be better able to protect this supply from competitors when markets are stronger.

However, the disadvantages of using RMP still need to be overcome. These disadvantages include loss of production time from paper breaks caused by shorter fibers in the RMP mix, quality problems because of high contamination, and increased rejects, which result in higher disposal costs. Experts expect boxboard and containerboard mills to continue to increase their use of RMP, especially at current low prices; however, the extent of this growth is uncertain.<sup>13</sup> At least one end user in North Carolina has expressed interest in establishing long-term contracts with local governments to ensure a high quality supply of mixed paper. Many mills are still figuring out what mix of RMP they can use while maintaining quality and performance characteristics.

Most of the mixed paper recovered in the United States (37 percent) is used to make recycled paperboard. Exports represent the second largest share of total consumption at 24 percent. Tissue consumes 13 percent of the total, printing and writing paper consumes about 12 percent, and all other uses consume 14 percent.<sup>14</sup>

Figures 3 and 4 present demand for mixed paper by end use in 1997 and 2002.<sup>15</sup> These numbers overestimate consumption of mixed paper as it has been defined in this report, because mixed paper as defined by the AF&PA includes office paper and old magazines.<sup>16</sup>

The following North Carolina end users use mixed paper as feedstock.<sup>17</sup> These descriptions do not imply endorsement by the North Carolina Division of Pollution Prevention and Environmental Assistance (DPPEA) or The North Carolina Department of Environment and Natural Resources (DENR) of any company or its products.

- **Carolina Paper Board Co., Charlotte, North Carolina:** Products: 100 percent recycled rigid and folding boxboard and chipboard. Total paperboard production capacity: 50,730 metric tons per

**Figure 4: Estimated Demand for Mixed Paper in Southeast Region (in thousands of tons)**

End Use	1997	2002
<b>Recycled paperboard</b>	562	663.1
<b>Export</b>	364.5	430.1
<b>Tissue</b>	197.4	233
<b>Printing &amp; writing paper</b>	182.3	215.1
<b>Other</b>	212.6	250.9
<b>Total</b>	1,518.8	1,792.2

year. Feedstock: OCC, double-lined kraft (DLK), ONP, mixed paper, and pulp substitutes.

- **Cascades Industries, Inc., Rockingham, North Carolina:** Products: tissue and toweling, jumbo rolls, roll toilet tissue, boxed facial tissue. Production: 69 tons daily. Tissue production capacity: 25,000 tons per year. Feedstock: high-grade deinking, mixed paper, pulp substitutes.
- **Halifax Paper Board Co., Inc., Roanoke Rapids, North Carolina:** Products: rigid and folding boxboard, chipboard, pasted board, and mounting and laminated board. Production capacity: 105 tons daily. Total paperboard production capacity: 34,360 metric tons per year. Feedstock: OCC, DLK, ONP, mixed paper and pulp substitutes.

The following end users in South Carolina also use mixed paper as feedstock:<sup>18</sup>

- **Somerset Fiber Co., Cowpens, South Carolina**
- **Caraustar Industries, Inc., Taylors, South Carolina**
- **Sonoco Products Co., Hartsville, South Carolina**

### **Other Uses of Recovered Mixed Paper**

Secondary markets for mixed paper continue to grow. Composting of mixed paper (alone or with other degradable materials) continues to be explored as an alternative to disposal for contaminated and unrecyclable paper. However, even in weak market conditions, mixed paper has more fiber value as a raw material in paper/board production.<sup>19</sup>

This application, using mixed paper as a bulking agent when composting municipal wastewater sludge, was tested in

Durham, North Carolina, in 1991-92.<sup>20</sup> The mixed paper was shredded, then mixed with sludge, and composted. The project managers reported that the paper greatly enhanced the composting of the sludge. Temperatures necessary to kill pathogens were achieved, and analyses for residual heavy metals detected no levels in excess of EPA's 503 regulations for wastewater sludge management. Potential customers compared the end product to aged pine bark mulch, hardwood bark mulch, and dried horse or cow manure and indicated that it could replace some or all of the organic amendments in topsoil blends. Chatham County, North Carolina, has conducted more recent mixed paper composting trials.

DPPEA, along with N.C. State University and the N.C. Department of Agriculture, is also investigating the feasibility of using ground mixed paper as bedding in chicken houses throughout North Carolina. The paper is provided by Eastern Carolina Vocational Center, ground by US Fibers, and used in broiler houses owned by Perdue and Tyson Foods. The results of the first trial run are promising. Farmers like the paper bedding, because it helps eliminate beetle problems (due to boric acid content), and cellulose insulation installers are interested in blowing it into chicken houses. Based on preliminary finding, animal bedding appears to be a suitable end use for mixed paper, especially where wood shavings are in short supply.<sup>21</sup> A final report on the project is expected in early 1999.

Other possible end uses of recovered mixed paper include pelletized fuel and paper paneling. Mixed paper has been tested as a replacement for coal and wood in applications such as greenhouse heating and crop drying, and it has also been used in acoustic and thermal insulation panels.<sup>22</sup>

### **SUPPLY / DEMAND RELATIONSHIP**

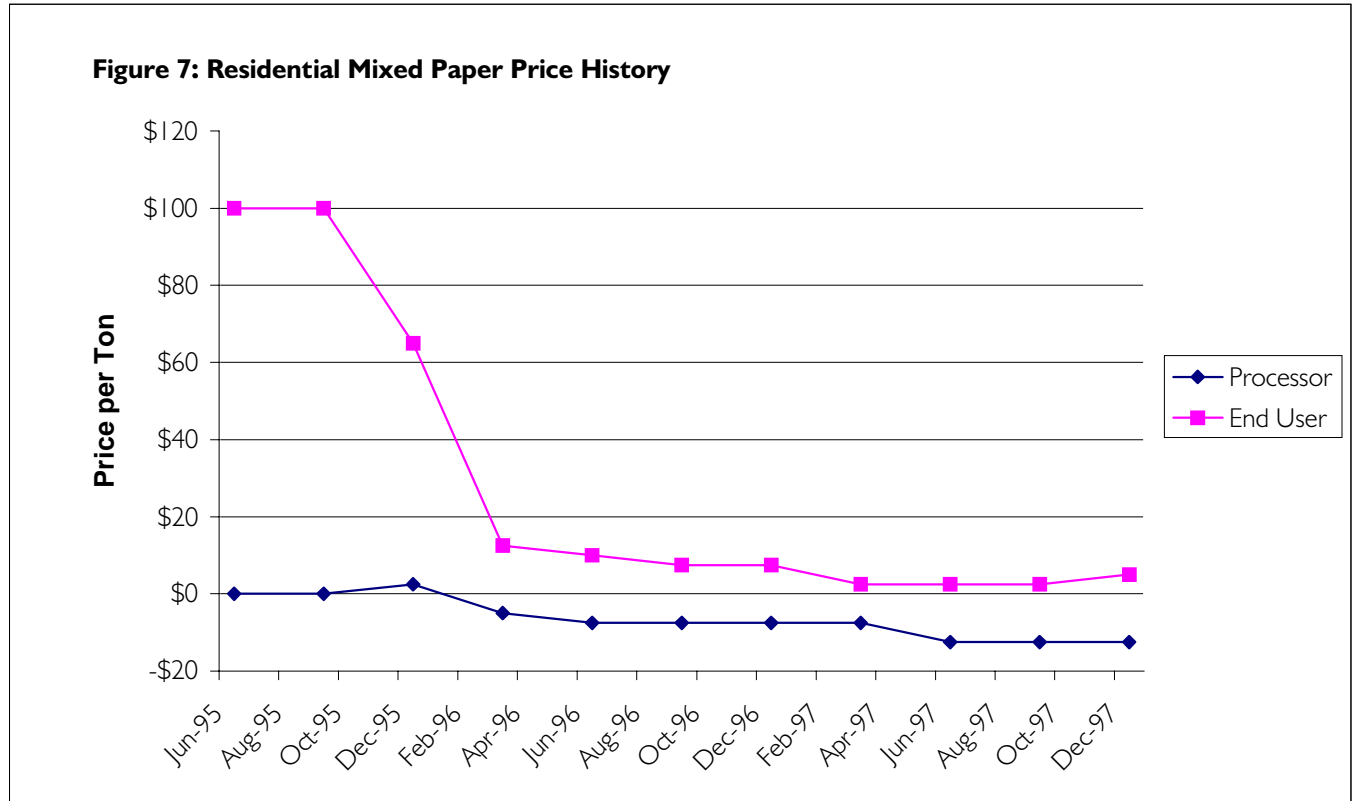
There appears to be an imbalance between supply and demand in North Carolina and the Southeast region, with demand exceeding supply. (See Figures 5 and 6.) How-

**Figure 5: Estimated Supply and Demand for Mixed Paper in North Carolina**

	1997	2002
<b>Supply</b>	115,182	143,970
<b>Demand</b>	142,200	167,800

**Figure 6: Estimated Supply and Demand for Mixed Paper in Southeast Region**

	1997	2002
<b>Supply</b>	929,343	986,148
<b>Demand</b>	1,518,800	1,792,200



ever, these comparisons are not strictly parallel, as the demand figures overestimate mixed paper consumption by including grades that are typically sorted and marketed separately from mixed, such as office paper and old magazines. It is more likely that supply exceeds demand, which is consistent with the depressed prices of mixed paper, and this oversupply is expected to continue during the next five years. Assuming this oversupply continues, research and demonstration of secondary markets for recovered mixed paper could stimulate demand.

**Price History**

Figure 7 illustrates the price history for mixed paper during the past three years.<sup>23</sup> Although prices have dropped from the highs of the price spike of 1994 and 1995, current levels mirror historical levels prior to the spike. Since prices

fell in 1995, they have remained consistently below \$20 per baled ton.

Many communities added RMP to their recycling programs during the price spike for the three reasons: higher prices meant additional revenues, strong public demand to recycle more materials, and RMP helped municipalities meet recycling goals, as it was an under-recovered fiber. Now that prices have returned to historic levels, some of these programs are struggling to market mixed paper.

**CONCLUSION**

There is still room for growth in mixed paper recovery; however, stronger demand is needed to justify increased recovery.

## RECOMMENDATIONS

Actions that could stimulate supply and demand for mixed paper in North Carolina follow:

- To increase the amount and quality of mixed paper recovered from the residential sector, the state should encourage an OCC / RMP mix. Markets for this material should be secured before adding it to local programs; paperboard mills would likely be interested in this mix.
- To increase the quantity of mixed paper collected throughout the state, equitable, waste reduction based collection systems such as pay-as-you-throw (PAYT) could be encouraged. PAYT programs charge system users based on the amount of waste generated, providing financial incentives to reduce and recycle.
- To ensure demand for recovered mixed paper, the state should work to create local domestic markets for mixed paper by focusing its market development work on recycled paperboard users. For example, DPPEA could facilitate discussion among collectors, processors, and end-users in various regions of the state, with the desired end result of encouraging collectors to add mixed paper based on guarantees from end users.
- Along the same lines, the state should continue to support creation of new domestic markets, such as animal bedding and mixed paper composting.
- Demand for post-consumer recovered paper, like demand for virgin pulp, is dependent on the production strength of the industries that consume the feedstock. As the economies of the United States and its foreign trading partners improve, demand for paper products will improve, and paper producers will increase their demand for mixed paper. Until then, the state should continue to educate the recycling community about the relationship between economic productivity and demand for secondary materials.

<sup>1</sup> Institute of Scrap Recycling Industries, Inc. "Guidelines for Paper Stock: PS-98 Domestic Transactions." *Scrap Specifications Circular*. 1998, p. 34.

<sup>2</sup> Prohibitive materials are non-paper contaminants, such as metals or plastics. Outthrows are papers that do not meet specifications, such as those with groundwood content or plastic coatings.

<sup>3</sup> Gormley, Timothy. "Mixed Paper: An Emerging Commodity in the Recycling Industry." *Wastecon Conference Proceedings, SWANA*. September 1996.

<sup>4</sup> U.S. EPA. *Characterization of Municipal Solid Waste in the U.S.: 1997 Update*. May 1998.

<sup>5</sup> The following states are included in the southeast region: AL, FL, GA, KY, MS, NC, SC, TN, VA, and WV.

<sup>6</sup> This projection assumes no change in the per capita generation rate.

<sup>7</sup> Franklin Associates, Ltd. "Recovered Paper Forecast: The Role of Residential Collection." *Wastepaper VI Conference Proceedings*. 1995. p. 10. In this paper, a national post-consumer recovery rate of 20 percent was projected for mixed paper in 2000.

<sup>8</sup> Public sector data come from responses to the *Annual Solid Waste Management Reports* submitted by local governments, and private sector data come from a recycling survey conducted by DPPEA in the spring of 1998.

<sup>9</sup> DPPEA recycling survey. Spring 1998.

<sup>10</sup> Miller Freeman, Inc. "Paper industry's use of recovered paper to slow considerably." *Paper Recycler*. Vol. 8, No. 12. December 1997.

<sup>11</sup> Despite indications that mixed paper would be a good feedstock for molded pulp products, few of these manufacturers use it, as they generally cannot handle the processing required. Personal communication, Bill Moore, Bill Moore & Associates, September 1998.

<sup>12</sup> Jones, Kevin. "What's in store for old newspapers and residential mixed paper markets?" *Resource Recycling*. Vol. XVI, No. 5. May 1997.

<sup>13</sup> Ibid.

<sup>14</sup> AF&PA, Inc. *1998 Annual Statistical Summary: Recovered Paper Utilization*. 12<sup>th</sup> ed. June 1998. p. 36, 47, 83.

<sup>15</sup> AF&PA, Inc. *1998 Annual Statistical Summary: Recovered Paper Utilization*. 12<sup>th</sup> ed. June 1998. Total demand for the Southeast region is actual demand reported by AF&PA, while total demand for North Carolina is interpolated using these data. End use data are estimated using current percentages reported by AF&PA. Projections for 2002 assume an annual growth rate of 3.6 percent, and the same breakdown among end uses as in 1997.

<sup>16</sup> Personal communication, Stan Lancey, Statistical Committee. AF&PA. August 1998.

<sup>17</sup> AF&PA. *PaperMatcher*. 4<sup>th</sup> ed. Miller Freeman, Inc. 1997 Lockwood-Post's *Directory of the Pulp, Paper and Allied Trades*, Miller Freeman, Inc., *1998 International Pulp & Paper Directory*, manufacturer surveys.

<sup>18</sup> Ibid.

<sup>19</sup> Personal communication, Bill Moore, Moore & Associates. September 1998.

<sup>20</sup> Anderson, Geoffrey and Smith, Karen. "Mixed Paper Teams Up With Biosolids." *BioCycle*. March 1994.

<sup>21</sup> Personal communication, John Nelms. N.C. Department of Commerce. August 1998.

<sup>22</sup> Glaub, John C. "Fuel: An Alternative Use for Mixed Paper Waste." *Waste Age*. July 1987. Brewer, Gretchen. "Quite, cozy and green: recycled mixed paper panels." *Resource Recycling*. January 1991.

<sup>23</sup> *Waste Age's Recycling Times*, "The Markets Page."