IC

# THE FUTURE OF NEWSPRINT MANUFACTURING IN CANADA

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Report No. 2

## NORTH AMERICAN RECYCLED PAPER SUPPLY-DEMAND ANALYSIS

(1993 - 1998)

Competitiveness Analysis
Corporate and Industrial Analysis Branch

in collaboration with

Forest Industries
Resource Processing Industries Branch

INDUSTRY CANADA

May 31, 1994

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# Executive Summary

The Corporate and Industrial Analysis Branch of Industry Canada has embarked upon an analysis of the long run competitiveness of Canada's newsprint industry. The significant development in this industry which has occasioned the need to explore this matter is the current trend towards using recycled fibre. Concerns arise regarding the cost competitiveness of Canadian virgin fibre mills relative to mills using recycled fibre. At issue also is the cost competitiveness of Canadian mills producing newsprint from recycled fibre.

An important issue in this analysis is the projected availability and price of old newspapers (ONP) which are used in the making of recycled fibre. Part One of the current study addresses this issue. It examines factors such as the attainable practical limit of ONP recovery, and the supply-side costs of its collection. It also looks at voluntary and mandatory regulations which encourage the usage of recycled fibre in the U.S. Further, it looks at growth in demand for ONP, and projects the demand, supply and price of ONP for 1998.

It is found that ONP demand will increase by 2.7 million tons by 1998 in North America, reaching a total of more than 10 million tons. This will require an ONP recovery rate of almost 60%, well above the current rate of 45%, but within the practical attainable level of 65%. The recycled fibre usage in newsprint which is implicit in this demand growth is also well above levels required in regulatory timetables, and undermines the need for further regulation. The price for ONP should range between $30 US per net ton (a price which is sufficient to cover net curbside collection costs) and $60 US per ton (a price which brings the recycled newsprint producer's costs up to the level of low cost virgin fibre newsprint producers). Our analysis is based on the most likely price range being from $40 to $45 US per net ton.

Part Two of the study examines this recycled fibre issue on a site-specific basis. It projects and compares available supply of ONP for five sites in North America in 1998: Bromptonville (Quebec), Thunder Bay (Ontario), Boligee (Alabama), Hale Eddy (New York State) and the Bronx (New York City). Available sources of supply for these mills were determined on the basis of a detailed demand and supply balance: all existing and planned recycling mills which use ONP received their allocation from the projected volume of supply in major urban areas in central, southern and eastern U.S. ONP was also allocated to exports and to non-paper uses (such as animal bedding and cellulosic insulation).

The result is a detailed list of supply centres for each of the five mill sites examined, with the corresponding tonnage of ONP that would be received from each supply centre. Two scenarios were analyzed regarding the recycled fibre content of the newsprint produced by the mills in Alabama, Ontario and Quebec: (1) 20% recycled fibre content (2) 40% recycled fibre content. Meanwhile, the two New York State mills were assumed to produce 100% recycled fibre newsprint. One New York mill is a "maxi" mill requiring 280,000 tons of ONP a year; the other is a "mini" mill using 100,000 tons a year.

Transportation costs (truck and rail) were estimated for the delivery of this ONP to our mills on the basis of the distance between these supply centres and the newsprint mill. Transportation costs for the New York (Bronx) mini mill averaged $15 (Cdn) per ton. The New York maxi mill, which requires much more fibre, had average transportation costs of $26 (Cdn) per ton. Alabama's costs ranged from $26 to $32 (the higher cost occurs when the mill makes 40% recycled content newsprint; for it needs to go further afield to locate the additional ONP). In Quebec, the transportation cost ranged from $30 to $35 per ton. And in Thunder Bay, which makes the greatest use of rail transport, the costs ranged from $35 to $38.

# Part I

## Overview of North American ONP Supply and Demand

# 1. The Economics of ONP

## 1.1 Determinants of Supply

Maximum Practical Collection Rate

¶ There are practical limitations to the amount of old newspapers (ONP) that can be collected. For example, due to economic limitations, the recovery rate of ONP from rural areas is lower than in urban areas. Maximum practical limits are estimated to be 40% for rural areas, and 70% for urban areas, with an overall weighted average (for U.S.) of 65%.

Avoided Costs

¶ When municipalities collect and sell ONP, they avoid waste disposal costs. A principal disposal cost is the "tipping fee": the fee to landfill a ton of garbage. The higher the tipping fee, the greater the incentive to collect ONP.

Collection Costs

¶ There are costs involved in the collection and sorting and baling of ONP. To the extent that these costs prove to be burdensome, municipalities will require higher revenues from ONP sales. In general, the higher the collection costs, the lower the incentive to collect ONP.

## 1.2 Determinants of Demand

Legislation

¶ Twenty six states in the U.S. have either mandatory or voluntary programs imposing certain levels of recycled content in newspapers published in those states. The requirements become more stringent over time, and there are penalties for non-compliance. There is an initiative before the federal U.S. government which, if successful, would place considerable demands on ONP supply.

Market Driven Demand

¶ Deinking capacity has increased significantly in recent years. As long as ONP prices remain reasonable, it would appear to be economical to produce newsprint from recycled fibre in certain areas of North America.

Non-Newsprint Usages for ONP

¶ ONP is used for animal bedding and cellulosic insulation. These end uses, while important in their own right, are not large enough to be a concern in our demand analysis.

¶ However, there is a significant demand for a lower-quality ONP (boardgrade #6 ONP) for the production of boxboard. Nevertheless, if supply conditions were to become tight relative to demand, some of this #6 ONP would be converted to higher quality #8 ONP (through the removal of contaminants) and be made available for newsprint.

¶ North American producers of recycled tissue tend to require a higher grade of recycled fibre. However, a modest amount of ONP will continue to find its way into recycled tissue.

¶ Meanwhile, there are higher quality groundwood papers (coated and uncoated) which will demand an increasing quantity of ONP at the expense of newsprint applications. How quickly this demand will develop and how significant it will become in the overall demand-supply balance, remains to be seen.

¶ Finally, a certain amount of ONP is exported. If necessitated by domestic supply-demand circumstances, these exports would be supplanted by domestic end uses.

## 1.3 Determinants of Price

Supply-Demand Balance

¶ Wastepaper prices are highly cyclical. Price peaks and valleys tend to anticipate price movements in the general paper and board industry. Long term, however, wastepaper prices have moved downward in real terms.

¶ Under current circumstances, supply of ONP has surpassed demand, and prices have remained low. However, sources of demand are currently growing more rapidly than supply and we can expect prices to increase. But it is difficult to estimate the long run equilibrium price. This will depend upon how the demand and supply determinants mentioned above will play themselves out.

Floor Price

¶ No matter how the supply-demand dynamics works out, the price of ONP cannot be below a "floor price": municipalities must receive enough revenue from ONP sales in order to cover their collection costs, net of avoided costs (tipping fees). Collection programs cannot be subsidized indefinitely. Thus there is a certain minimum price for ONP that can be estimated based on collection costs and tipping fees.

Maximum Price

¶ The price of ONP could increase dramatically as a result of increasing demand (whether driven by legislation or markets) if supply problems arise. However, the price cannot rise above the cost of using virgin fibre (plus non-compliance penalties paid by publishers). Otherwise, production will merely switch to virgin fibre and find willing buyers. This maximum price can be estimated.

# 2. ONP Supply

## 2.1 Definition of ONP

¶ ONP, or "old newspapers" include inserts and flyers commonly found in newspapers. This adds roughly 15% to 20% to the available tonnage of ONP. Also included is preconsumer waste of newsprint such as pressroom waste and newsstand returns.

¶ Excluded from ONP are items such as telephone books, containerboard, boxboard, magazines and catalogues. These papers are included in boardgrade ONP (#6 ONP), but must be separated from ONP for recycled newsprint applications (#8 ONP). Note that a co-mingled newsprint and magazine mix would be suitable for deinking facilities which use flotation technology.

## 2.2 Practical Limits of Collection

¶ In 1992 in the U.S., it is estimated that 44.5% of available ONP (as defined above) was collected. (Iannazzi, Pricing Report, pg 2).

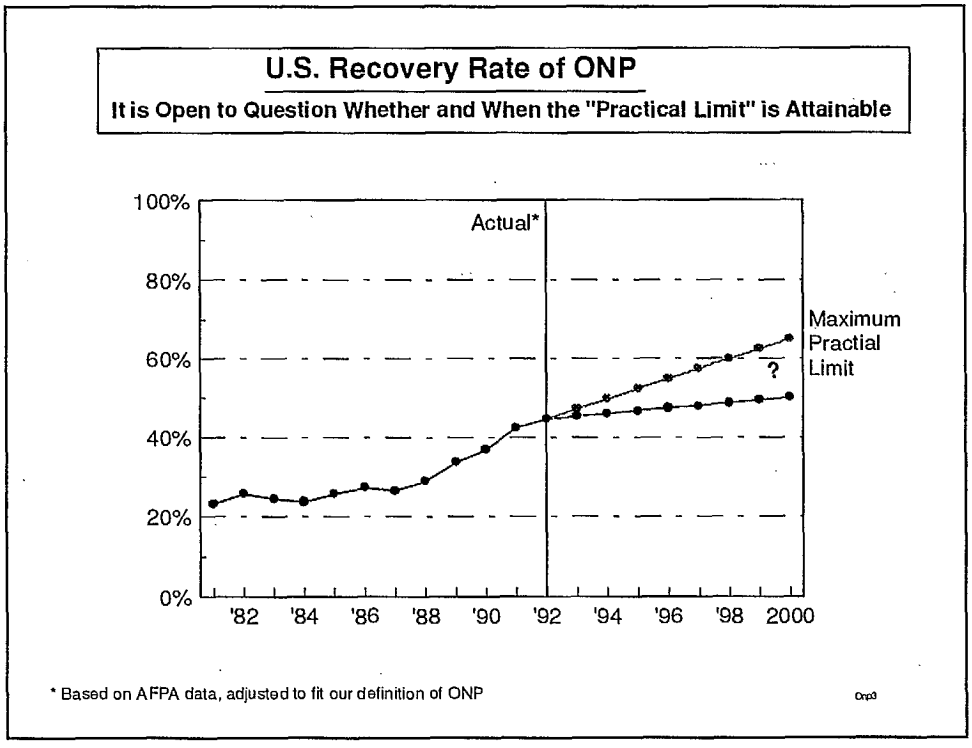
¶ Roughly 15% of all newspapers are lost in the office waste paper stream. Despite this loss, Fred Iannazzi estimates that urban areas can attain recovery rates of 70% of urban newspaper consumption (pg 12 of Pricing Report).

¶ Meanwhile, maximum attainable recovery rates in rural areas is 40%. Excluded from this recovery rate is the ONP used for animal bedding.

¶ Weighting these municipal and rural recovery rates by urban and rural populations, the maximum practical recovery rate for the U.S. becomes 65%.

¶ How quickly these recovery rates will be achieved will depend upon (i) the economics of ONP collection, and (ii) the rate of growth of demand for ONP. It is believed that the 65% recovery rate could be achieved in the U.S. by the year 2000 (New York State Newspaper Recycling Task Force).

¶ However, the highest practical collection rate could be lower than 65%; or conditions may be such that reaching a 65% recovery rate could take longer than anticipated.

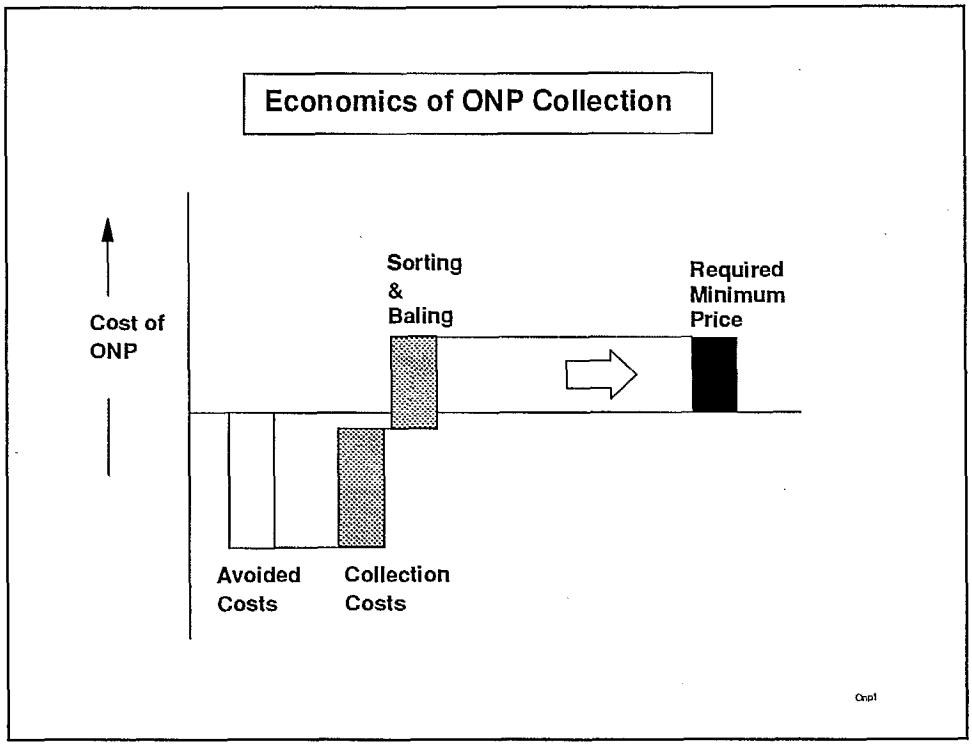


## 2.3 Economics of ONP Collection

¶ ONP can be collected by municipalities themselves. More often, the city contracts with a waste hauler to collect the ONP. The waste hauler may have its own MRF (material recovery facility) for sorting and baling, or it may sell the collected ONP to a processing agency (or "packer"). Backward integrated newsprint producers have their own MRFs and sometimes even collect their own ONP.

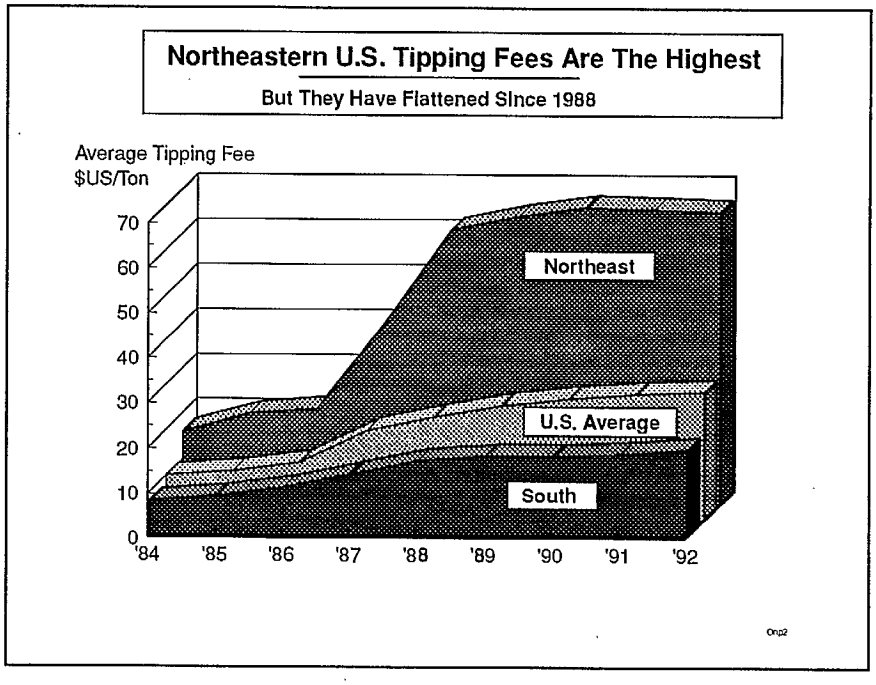
¶ In all cases, in order for ONP collection to be economical, the collecting and processing agencies must not incur costs which exceed their revenues. In the case of the municipality, this means that the recycling program must not be more expensive than the alternative cost of landfilling the old newspapers.

¶ Ultimately, the revenues from the sale of ONP must offset collection and processing costs (sorting and baling) net of the avoided landfilling costs. In a simple world, avoided costs would equal the cost of collection, and the price of ONP would be driven by the costs of sorting and baling.



### 2.3.1 Avoided Costs - Tipping Fees

¶ Many municipal recycling programs were started when it was believed that tipping fees would keep rising as the world ran out of landfill space. However, tipping fees have stabilized since 1988.



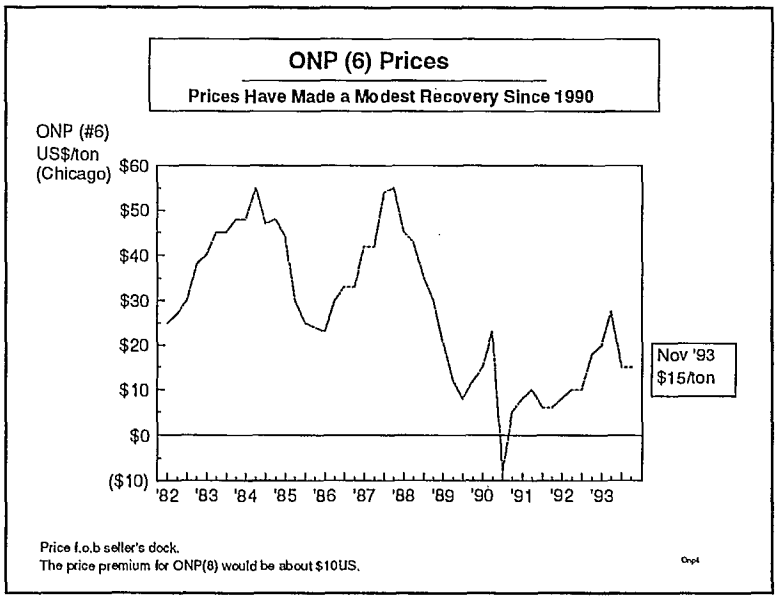

¶ In addition, some municipalities own their own landfill sites. In these cases, tipping fees are not an immediate out of pocket cost and so are not entirely an avoided cost.

¶ Further, much of the costs of garbage collection (the cost of a truck and driver) are fixed costs. Thus the municipality may save very little money when it removes 5% (by weight) of recyclable waste from the waste stream.

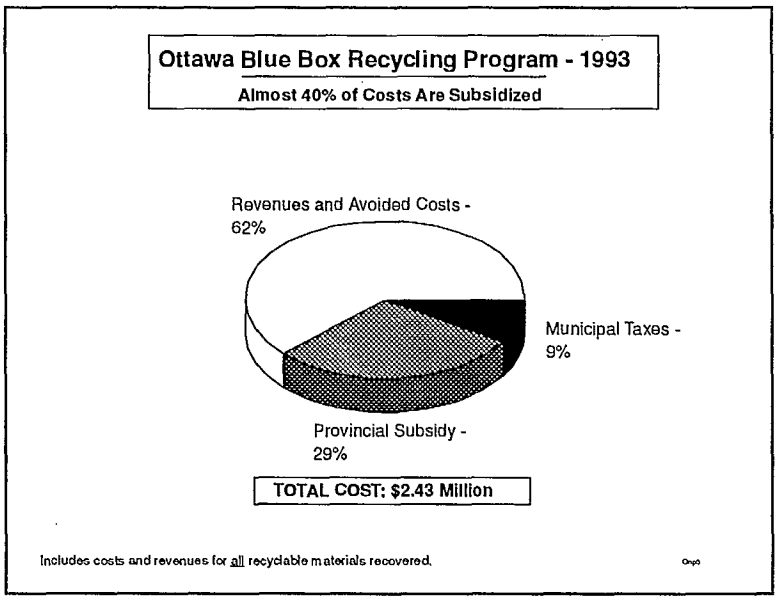
Consequently, it may be the case that the value of avoided costs are lower than had been anticipated.

### 2.3.2 ONP Revenues Versus the Costs of Collection

¶ Due to an over-supply of ONP in eastern U.S, prices have fallen significantly and have been slow to recover.




¶ As a result of these lower revenues and high costs of collection, some municipalities are discovering that revenues from selling ONP (and other recovered materials) are not covering the costs. For example, the avoided costs and revenues in the blue box recycling program in Ottawa, Ontario cover only 62% of the costs of collection.

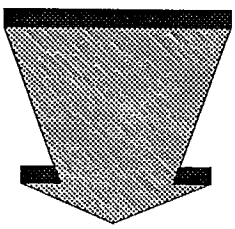


¶ The situation in Ottawa is not an exception: 35% of the costs of recycling programs in Ontario are funded by provincial subsidies.

¶ Although these subsidies are being extended for another two years, they cannot be continued indefinitely. Public sector deficits will force governments to find other methods to overcome this financial shortfall.

¶ There is a lack of evidence that the recycling of newsprint helps the environment. And once the true costs of recycling programs come to light, the political will could develop to begin landfilling old newspapers once again in certain jurisdictions.

¶ Already some municipalities are trying to alleviate the cost problem by reducing the frequency of collections. Implicit in this action is a cutback in the level of collection.



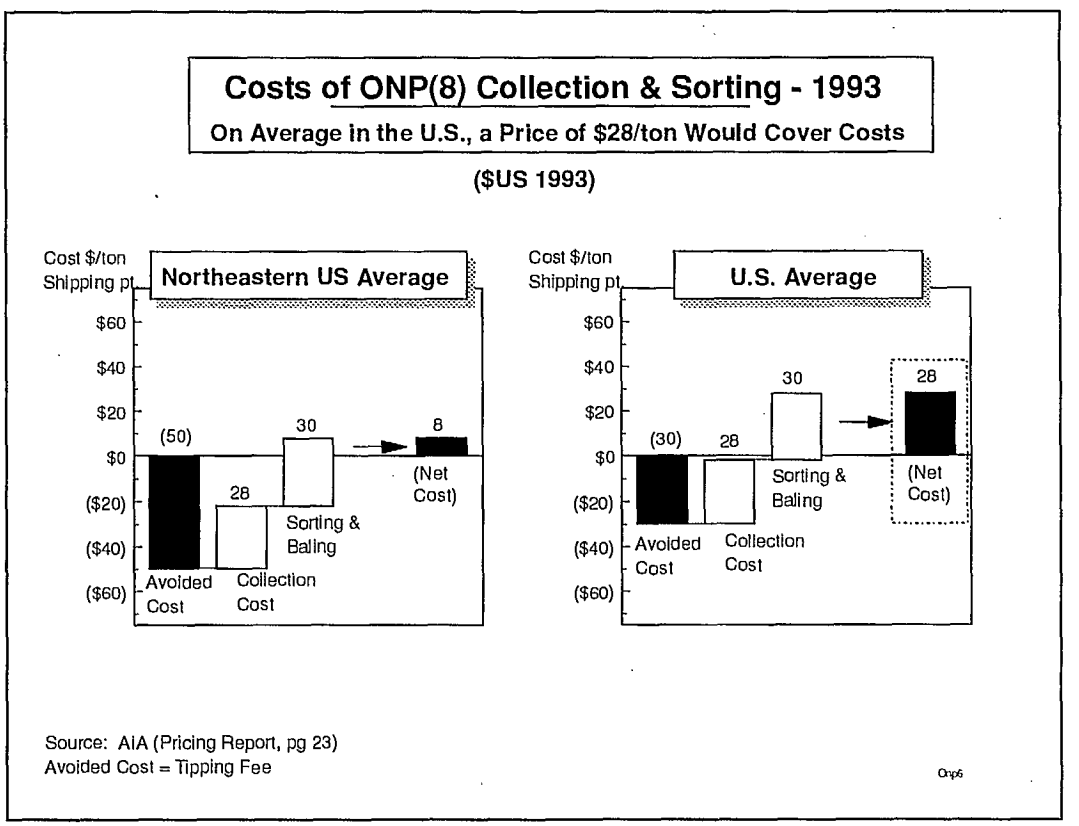
The economic collection of ONP remains problematic: unless solutions are found, supply levels may not reach optimum levels.

### 2.3.3 Supply Price

¶ From our Ontario data, it would appear that current ONP prices are not yet at levels that cover costs. What is the price level that must be reached in order to make ONP recovery economic?

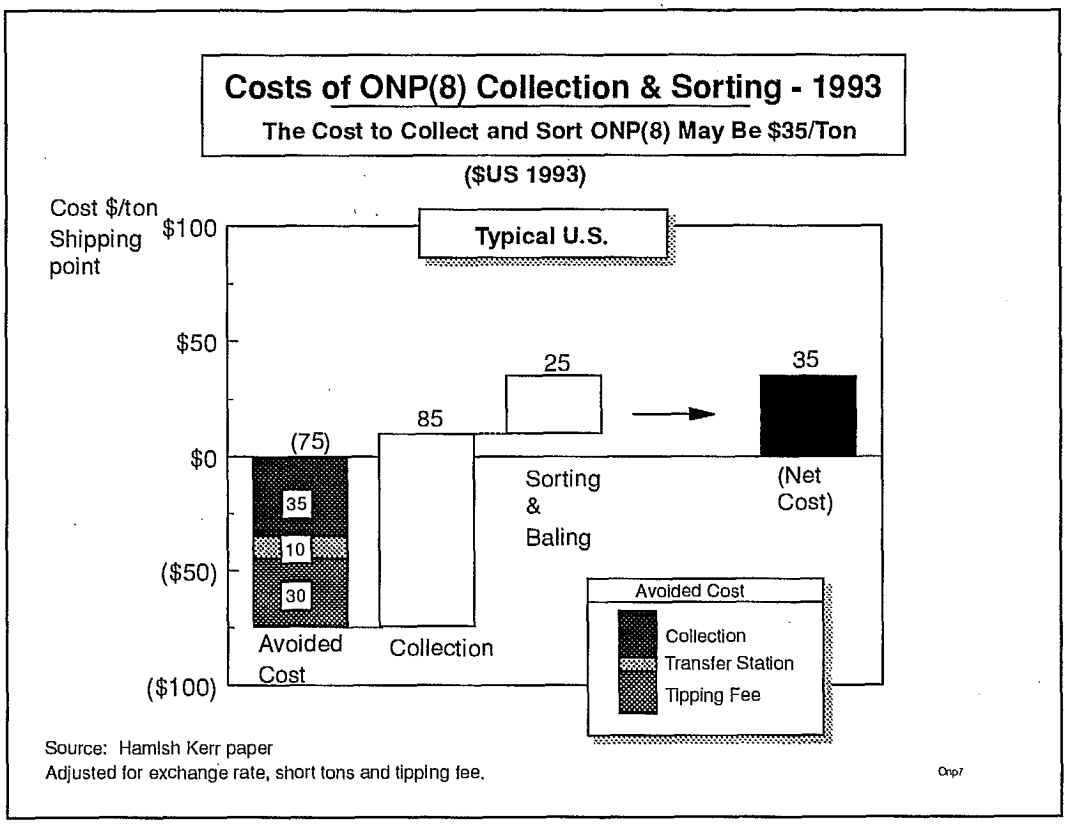
¶ The economics of ONP collection will vary by region, depending mostly upon differences in landfill (tipping) costs.

¶ Fred Iannazzi's analysis (Pricing Report, page 23) indicates a cost-driven price for ONP(8) of $8 US/ton in Northeastern U.S. where tipping fees are the highest. The average required economic ONP price for United States as a whole is $28/ton. (Note that tipping fees and ONP prices in the mid-west (Chicago) tend to be close to the national average).



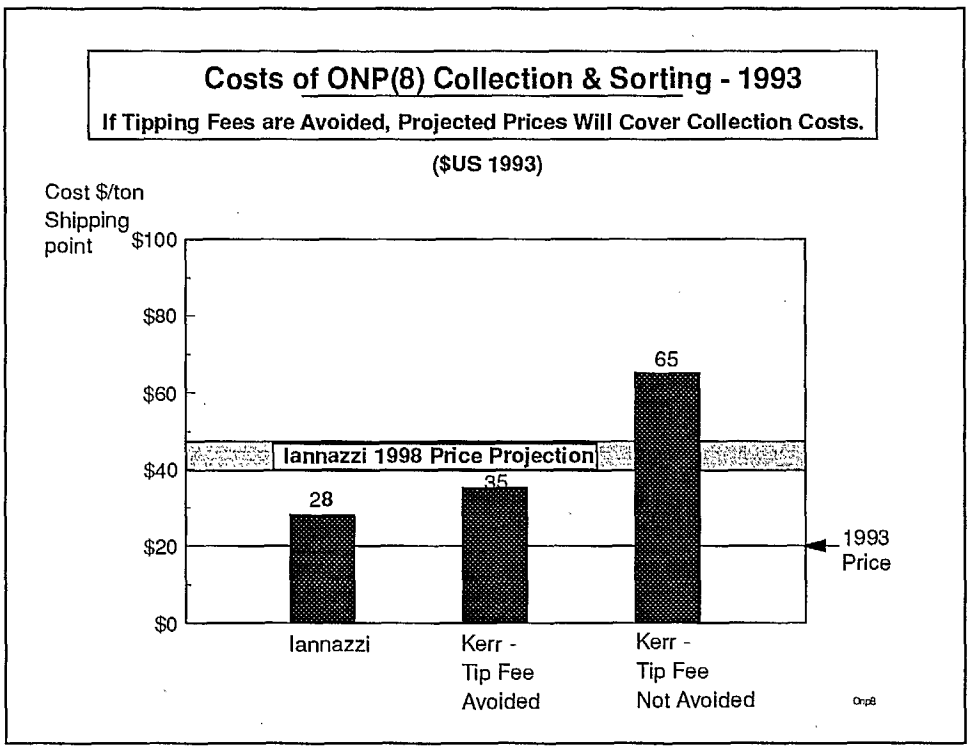

¶ The average price of ONP(8) in Eastern U.S. for 1993 was about $20US per ton. A price of $28 represents an increase of 40%, and should help alleviate some of the burden experienced by Ontario recycling programs.

¶ Another analyst, Hamish Kerr, arrives at a higher supply price for ONP. When we adjust his calculations for short tons, exchange rate, and the normalization of tipping fees, we arrive at an ONP cost of $35 (US 1993)/ton.



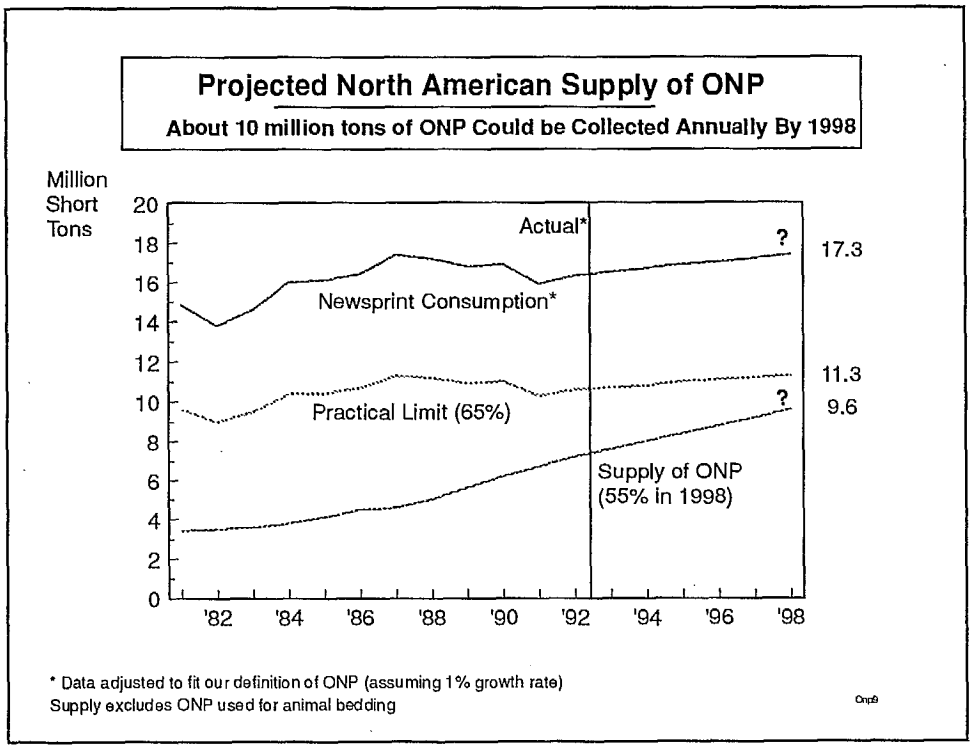
¶ Hamish Kerr suggests that tipping fees are not always a variable (and thus avoided) cost. As such, in some cases the required supply price might more accurately be $30/ton higher, or $65/ton.

¶ Fred Iannazzi projects that ONP prices will rise to the $40 - $45 ($US 1993) range by 1998 (Price report, page 29). This is the price range that we assume in our newsprint cost competitiveness analysis. At this level, and assuming that tipping fees are an avoided cost, then the newsprint portion of recycling programs would pay for itself.



¶ We assume that newspaper demand in North America will grow by 1% per year.

¶ If ONP(8) prices increase to the $40+ ($US 1993) level, and recycling programs overcome their financial difficulties, then we can assume that recovery rates of ONP will continue to increase. The annual supply of ONP in North America could come close to 10 million tons by 1998 if ONP recovery rates were to increase to a point half way between current levels (45%) and the practical limit (65%).




Will there be sufficient demand growth to pull prices up to the $40+ level, permitting the ONP recovery rate to continue its increase towards a practical maximum?

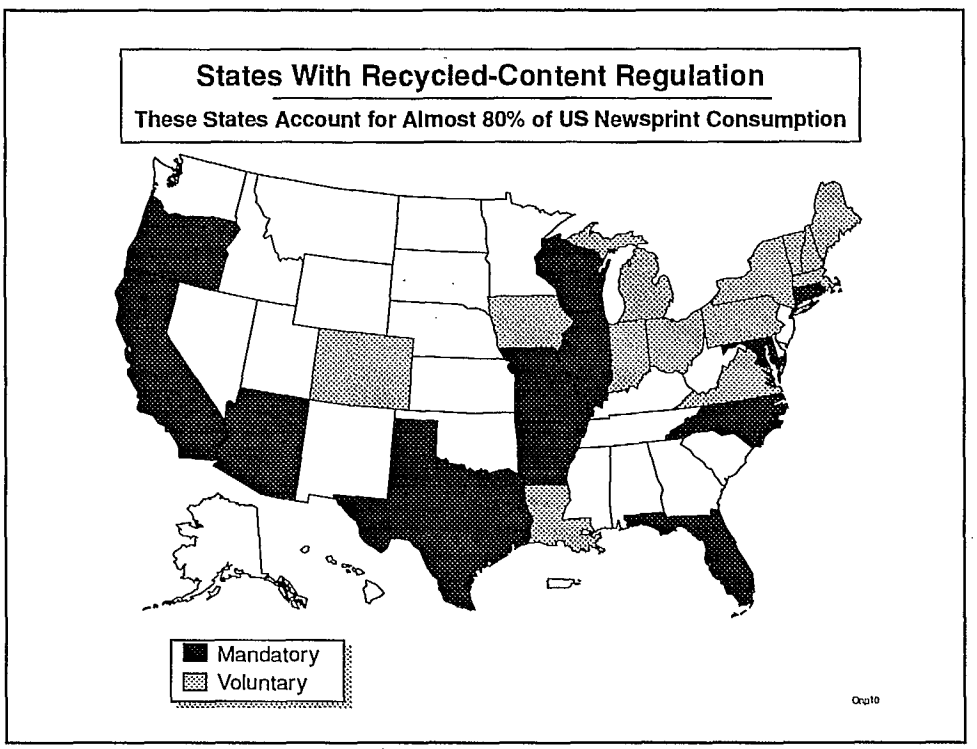
# 3. ONP Demand

## 3.1 Regulatory Driven Demand

### 3.1.1 Background

¶ In the context of rising dumping fees, and concerns about landfill scarcity, curbside collection projects quadrupled between 1988 and 1992. However, demand for ONP did not keep pace, and prices fell.

¶ Consequently, governments were pressured to encourage end-use markets for ONP: some U.S. states have passed stringent guidelines forcing publishers to increase recycled newsprint content over time. Other states initiated voluntary programs. There are 26 states with mandatory or voluntary programs regarding recycled content requirements imposed on newspaper publishers. These states account for almost 80% of the consumption of newsprint in the US




¶ One author (Romain Jacques - research note) points out that most of the US states that are active regarding recycled newsprint regulation are the very states which have the greatest percentage of Canadian newsprint consumption in their home market. Thus recycled-content legislation does not merely support regulated collection programs of recyclables, but also acts as a trade barrier for Canadian newsprint.

### 3.1.2 Types of Regulation and Recycling Targets

¶ There are two types of recycling targets that have been established by various U.S. state programs:

1.Percentage recycled fibre content as a percentage of recycled fibre used.

2.Percentage of newsprint tonnage purchased that has recycled content.

¶ The latter type of target can be further split into two types:

2.aThose that do not specify any minimum fibre content in newsprint in order for it to be counted as "recycled"

2.bThose that do specify a minimum fibre content, usually 40% as defined by the Environmental Protection Agency.

The average percentage recycled fibre content is more difficult to estimate for states with recycling targets of this second type since not all publishers will use the minimum required content for their paper, and no credit is given when the minimum is exceeded.

¶ The recycling targets in different states have different timetables regarding the achievement of interim levels. However, they all reach their final level by the year 2000.

¶ Meanwhile, the Resource Conservation and Recovery Act (RCRA) aims at implementing a U.S. federal law regarding recycled content in newspapers. If such as act were passed, it could require a recycled fibre content of 40% or even 50%, either for all publishers or for the largest publishers.

However, this act has low priority on the Clinton government agenda; accordingly, it is thought to be unlikely that such a federal law will be passed in the near term.

### 3.1.3 Impact of These Recycling Targets on Demand for ONP

¶ The following assumptions were made in order to arrive at the total ONP required to meet regulatory requirements by the year 2000:

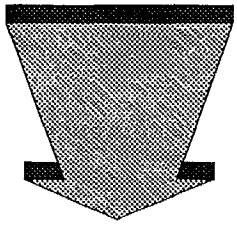
1.When a minimum definition of "recycled content" is not given (type "2a" above), it is assumed that the average recycled fibre content of recycled paper will be 40%.

2.When a minimum definition of "recycled content" is given (type "2b" above), it is assumed that the average recycled fibre content of recycled paper is 70%. (This 70% is an arbitrary number between 40% and 100%).

3.Newsprint consumption is assumed to grow by 1% per year through to the year 2000.

4.The fibre yield from wastepaper is assumed to be 83%. That is, one needs 1.2 tons of wastepaper (ONP and OMG) in order to make 1 ton of recycled fibre.

5.The wastepaper used for producing the required fibre is assumed to consist of ONP and OMG in the ratio of 80:20. (80% ONP).



The weighted average recycled fibre content implicit in these guidelines for the regulated states in the year 2000 works out to be 31.75%. 3.3 million tons of ONP is needed to meet these guidelines.

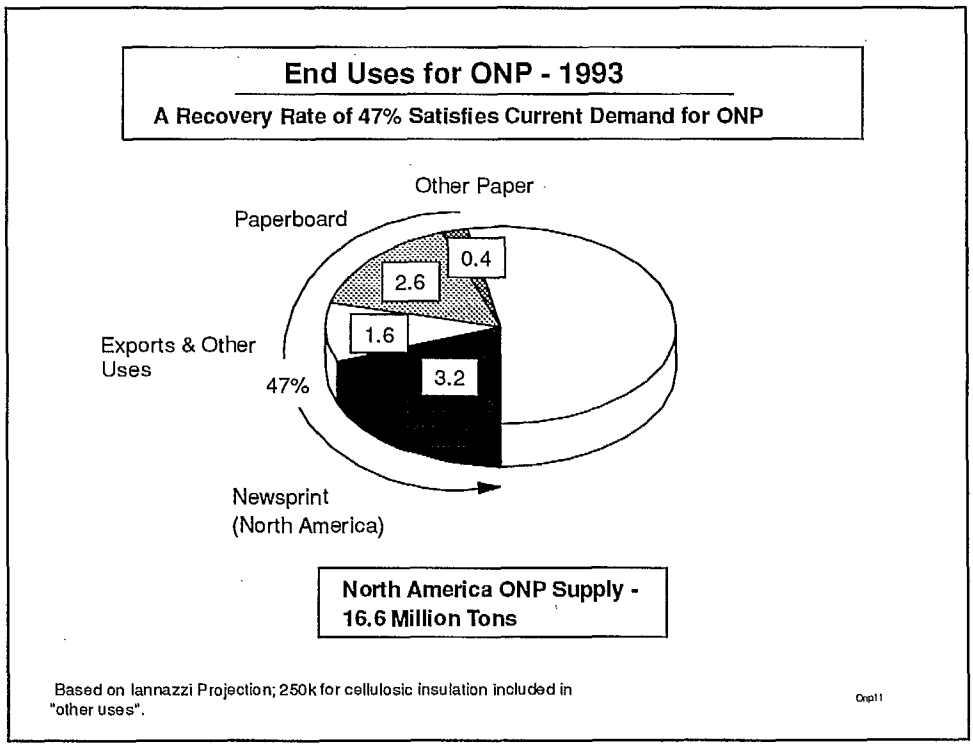
If a federal law were enacted requiring 40% recycled fibre content in newsprint, then 5.3 million tons of ONP would be needed. And 6.6 million tons would be needed to achieve a recycled fibre content of 50% across the U.S.

¶ The following table illustrates the ONP requirements to achieve a recycled fibre content

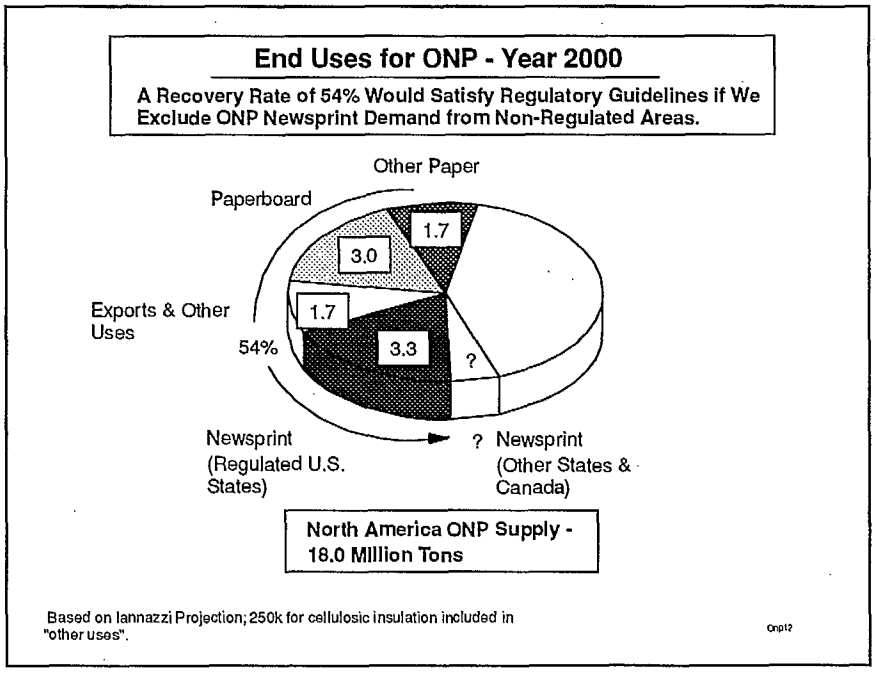
rate of 31.75% in the regulated states, and 40% and 50% in the U.S. as a whole:

| For Year 2000: | Regulated States Only | All U.S. (40% law) | All U.S. (50% law) |
|---|---|---|---|
| Recycled Fibre Content | 31.75% | 40.0% | 50.0% |
| Newsprint Consumption (Mil. tons) | 10.8 | 13.6 | 13.6 |
| Deinked Pulp Required (Mil tons) | 3.4 | 5.4 | 6.8 |
| Wastepaper Required (Mil tons) | 4.1 | 6.6 | 8.2 |
| ONP Required (Mil tons) | 3.3 | 5.3 | 6.6 |
| OMG Required (Mil tons) | 0.8 | 1.3 | 1.6 |

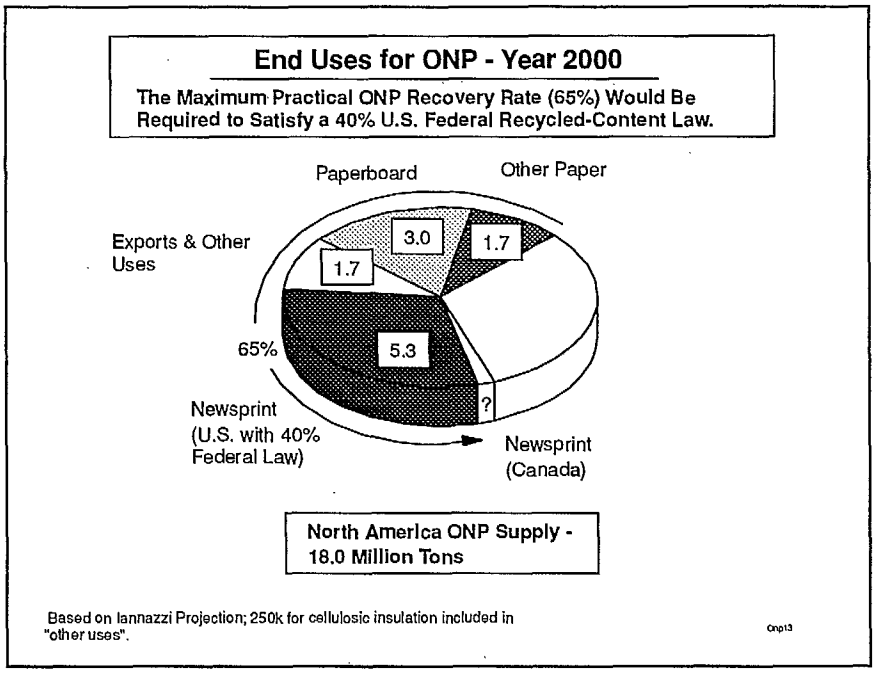
¶ Currently (1993) about 47% of the available supply of ONP (including inserts and supplements) is collected. Over half of this amount finds applications other than recycled newsprint for North American newspapers.



¶ If current state guidelines for the year 2000 were met, and abstracting from the recycled fibre used in newsprint in non-regulated areas, then the recovery rate of ONP would need to reach 54%. Note that much of this increase results from the higher projected demand for ONP for the manufacture of "other paper".

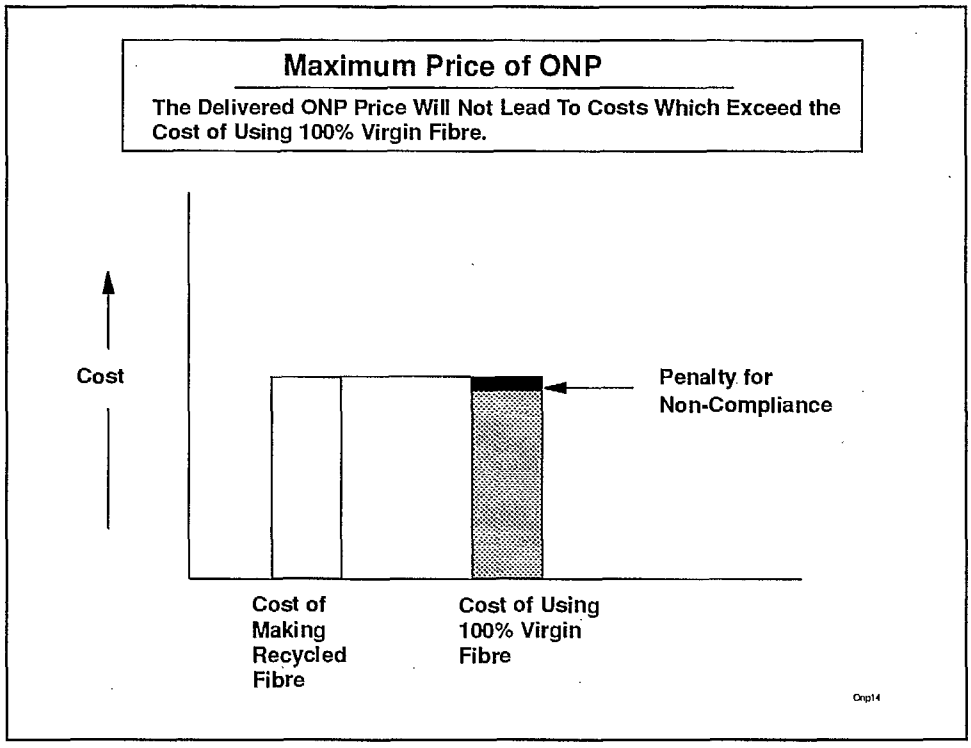



¶ If a 40% recycled content federal law is passed, then ONP recovery rates would need to reach the practical maximum to provide the required supply. And a 50% recycled content law could not be satisfied without ONP being withdrawn from paperboard and export applications.



### 3.1.4 Impact of Regulations on Pricing

¶ If ONP supply shortages should develop, then prices for ONP would skyrocket. However, at the point where the cost of using ONP exceeds the cost of using virgin fibre, newsprint production would switch to virgin fibre, thereby dampening demand and limiting further ONP price increases. Included in this maximum price level of ONP is the penalty paid by publishers for non-compliance to the recycled fibre content legislation.




¶ Non-compliance penalties exist for at least eight of the thirteen mandatory state programs in the U.S. Penalties tend to range between $5 and $15 per ton for each deficient ton of recycled newsprint or shortfall in tonnage of recycled fibre (depending upon the type of regulatory target in place). Some states have fees and credits for newsprint disposal depending upon the achievement of recycling targets.

¶ Most states with non-compliance penalties also have "escape clauses" related to the availability and quality of recycled fibre. For example, if recycled fibre newsprint cannot be acquired at a price within 5% of the price of virgin fibre newsprint, then publishers are absolved of compliance penalties. Accordingly, the price of ONP cannot endure at levels which lead to recycled newsprint prices which exceed virgin newsprint prices by 5%.

## 3.2 Market Driven Demand

### 3.2.1 Background

¶ U.S. and Canadian newsprint producers responded to the threat of regulatory guidelines regarding recycled-content by spending $2 billion from 1989 to 1992 in deinking projects. The number of mills in North America capable of producing recycled newsprint rose from five in 1989 to over thirty by 1993.

¶ Demand also increased for non-newsprint applications and for exports.

¶ Continued growth in ONP usage is expected as announced deinking projects come online. The majority of this increased usage will come from newsprint. But growth in ONP demand will also come from other paper products such as tissue, recycled paperboard, construction grades and printing and writing papers.

### 3.2.2 Inconsistencies in ONP Demand Data

¶ Different data sources report different amounts of ONP usage among the various recycled paper applications. Part of the problem would appear to relate to variations in the definition of types of wastepaper.

For example, an AFPA survey estimates that 533,000 tons of ONP would be used in U.S. tissue production in 1992, and that this consumption would rise to 625,000 tons by 1995. Iannazzi, by contrast, suggests that 1993 ONP usage for tissue paper is 175,000 tons, growing to 200,000 by 1995. According to Iannazzi, much of the reported ONP tonnage used in tissue manufacture "actually consisted of coated and uncoated printing and writing paper".

Reported ONP data for paperboard applications may also be inflated. The reason for this is that some non-newsprint paper, such as corrugated containers and magazines, is counted as ONP. This discrepancy arises because these non-newsprint papers are collected together with ONP and sold as "board-grade news".

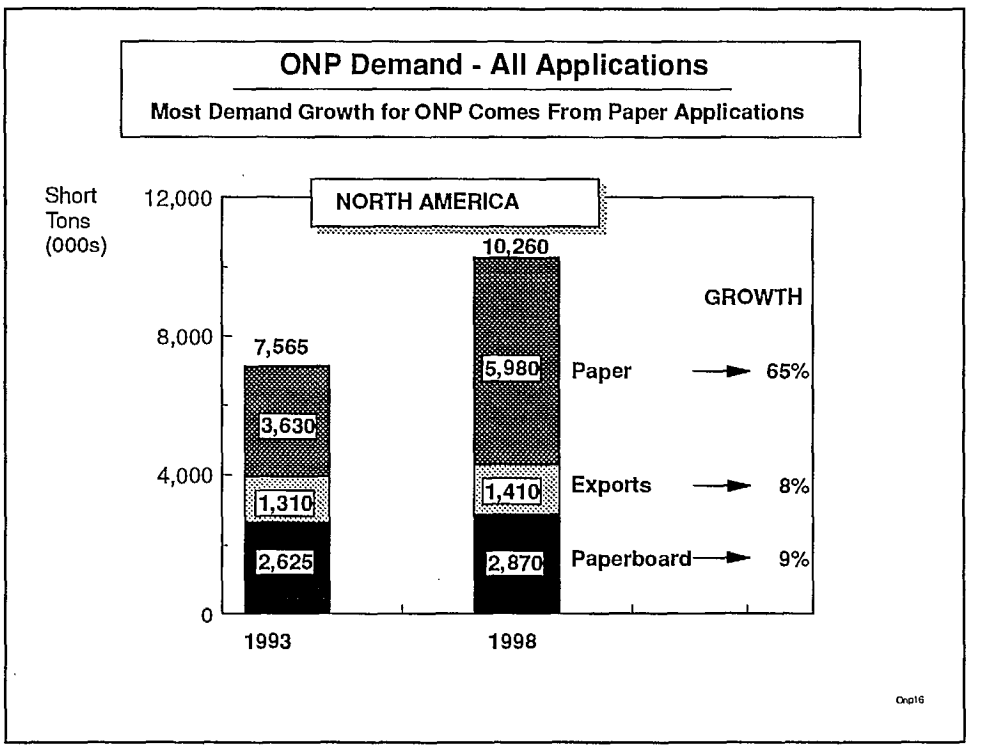
¶ Another area of confusion relates to the amount of ONP used in non-paper applications. The problem here may relate to getting good source data. For example, how do we estimate how much ONP is used for animal bedding or for cellulosic insulation?

RISI claims that 800,000 tons of ONP is used in the category of "other end uses" (Pulp and Paper Review). However, RISI includes "packaging" in its "other end use" category. Most of packaging is moulded pulp products, and Iannazzi includes this under paperboard applications.

Following a suggestion from Iannazzi, we assume that demand for ONP for cellulosic insulation amounts to 250,000 tons. We also will use Iannazzi's numbers for ONP demand for tissue and paperboard applications. Meanwhile, demand for ONP for animal bedding, although growing, is too insignificant to estimate.

### 3.2.3 Demand Projections for ONP Applications

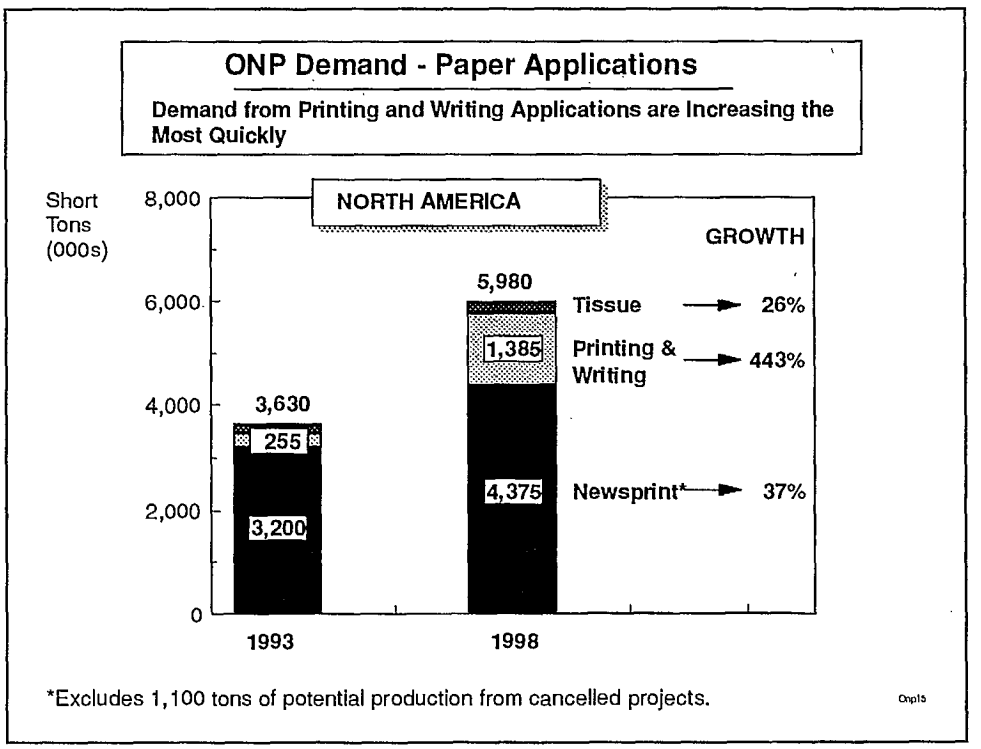
¶ ONP demand for paper applications is expected to show the greatest growth, far outstripping growth in paperboard and export applications.




¶ As prices for ONP increase, the comparative prices of other sources of recycled fibre (such as mixed papers and telephone directories) become more attractive for some non-newsprint applications. For example, as a result of higher prices, a certain amount of ONP(6) would shift away from paperboard applications and be converted into ONP(8) for paper applications (newsprint, printing and writing papers) .

Also, overseas buyers may develop their own ONP collection systems rather than pay the higher prices for U.S. ONP. These factors will help moderate the increase in demand for ONP for paperboard and exports.

¶ Among paper applications, Iannazzi believes the greatest demand growth in percentage terms will come from printing and writing papers (mainly coated and uncoated groundwood). Meanwhile, growth in ONP demand for newsprint remains significant despite the cancellation of 1.1 million tons of deinked pulp mill projects.



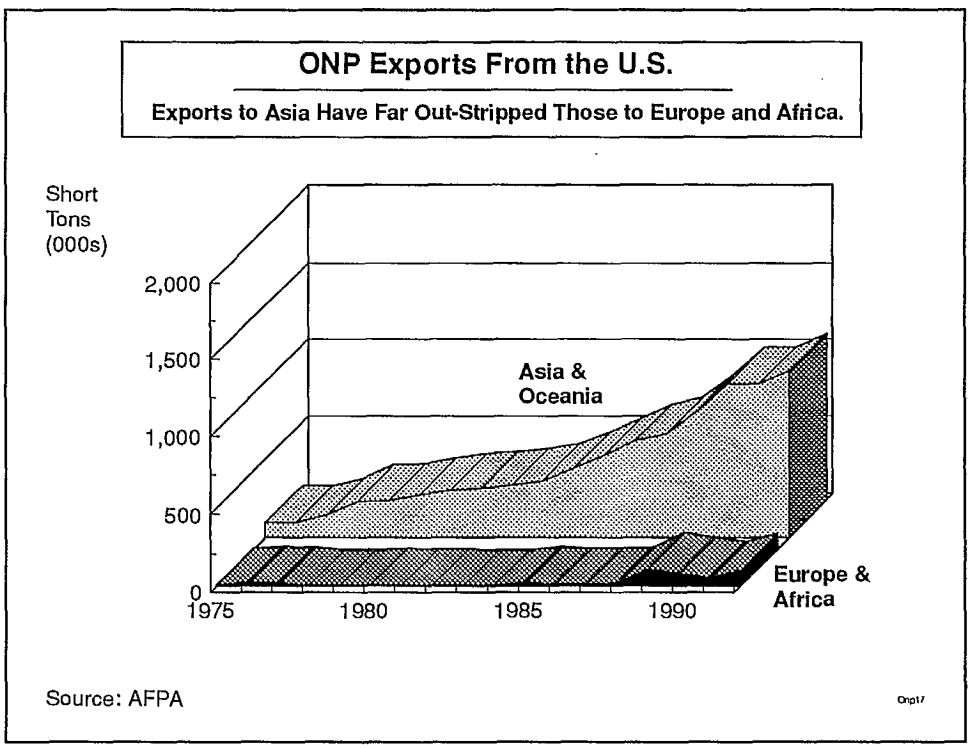

¶ Total projected demand for ONP for 1998 in North America is 10.3 million tons. The ONP recovery rate needed to meet this demand is roughly 60%. This level of market driven demand leads to a supply of ONP which surpasses current regulatory requirements. (Our analysis of regulatory guidelines concerning newsprint pointed to a recovery rate of +54%).

The original intent of recycling legislation was to create a market for ONP. This appears to have happened. Thus regulations regarding recycled content in newspapers may soon not be needed.

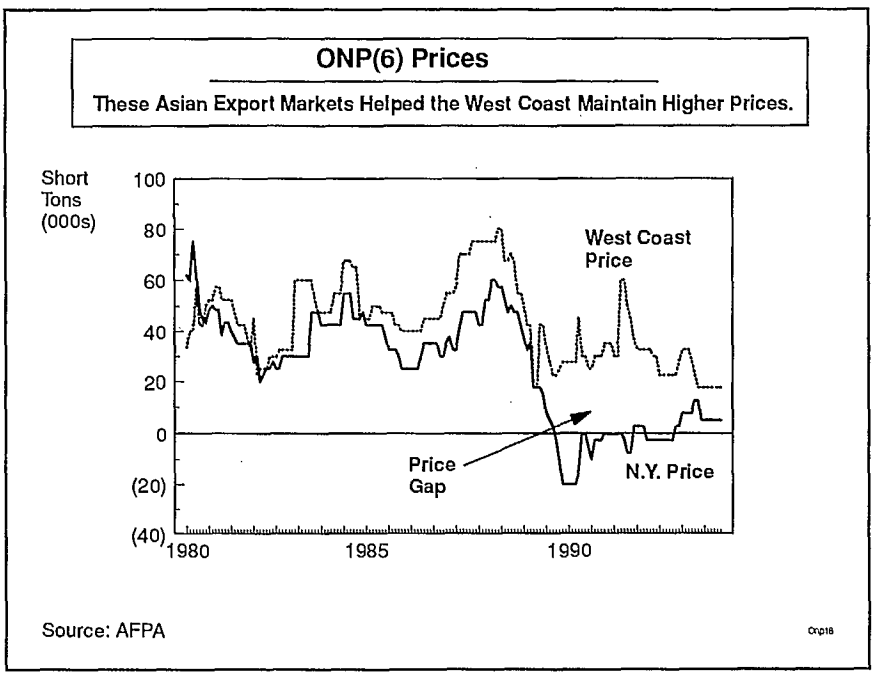
# 4. ONP Price

## 4.1 Supply-Demand Balance

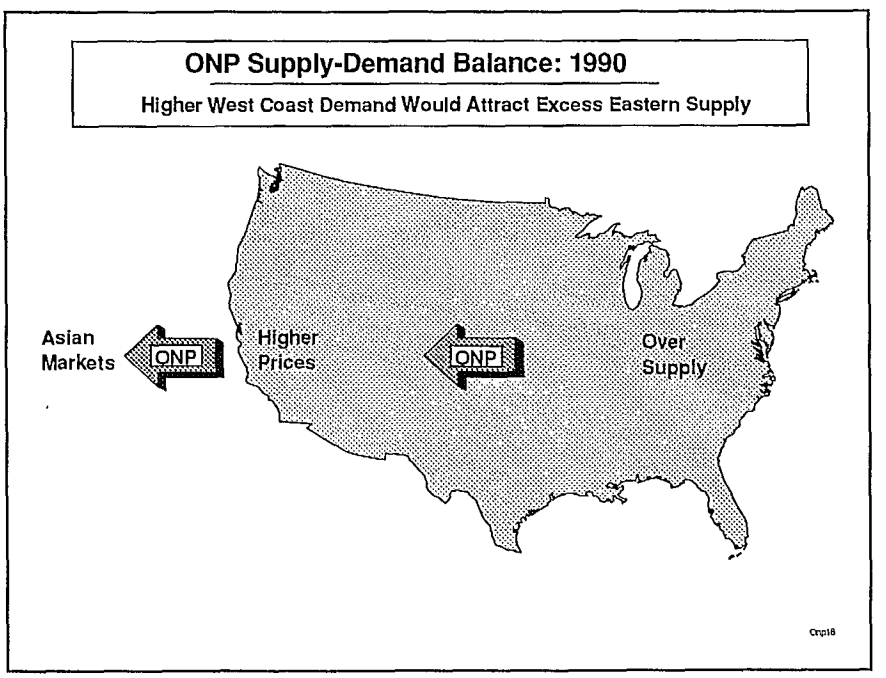
¶ Western U.S. enjoys a strong demand for ONP exports to Asia. Exports from the east coast, by contrast, are much smaller.



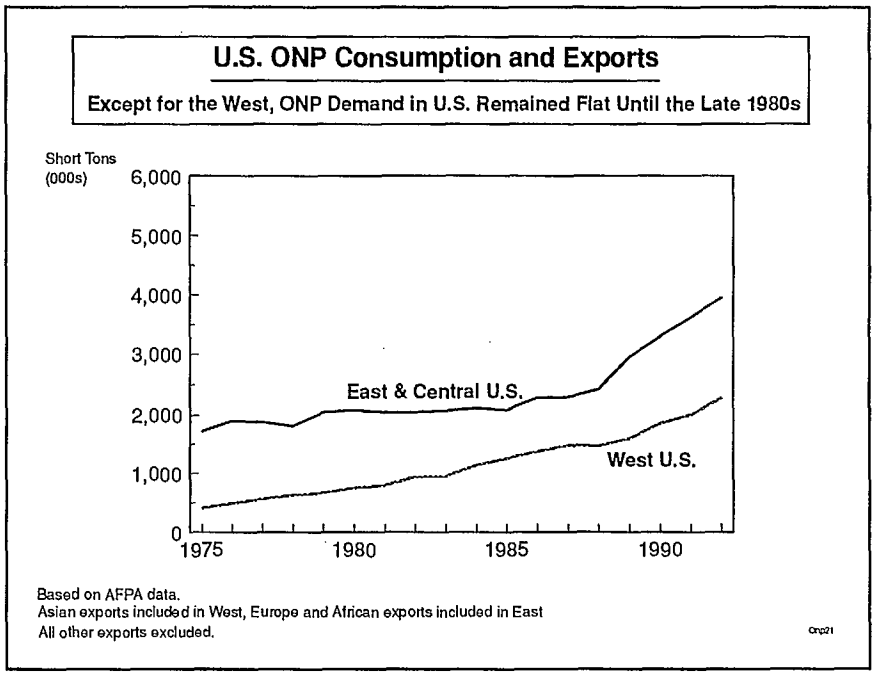
¶ Aided by Asian demand, and by a more rapid response to concerns about the environment, suppliers in the U.S. west coast was able to maintain a higher price.



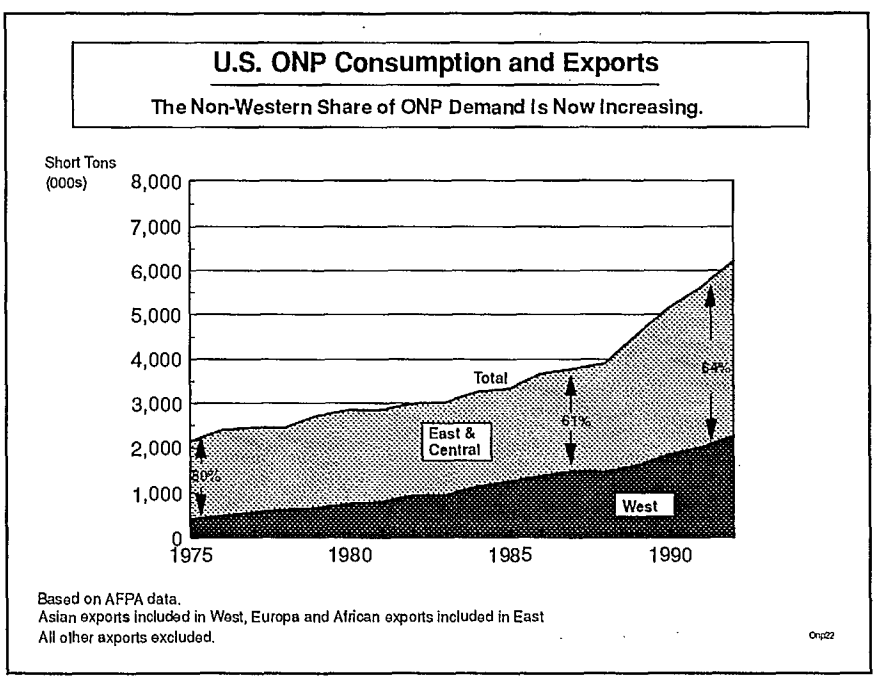

¶ Meanwhile, demand for ONP in eastern U.S. fell behind supply and a large regional disparity and price gap developed between eastern and western U.S.



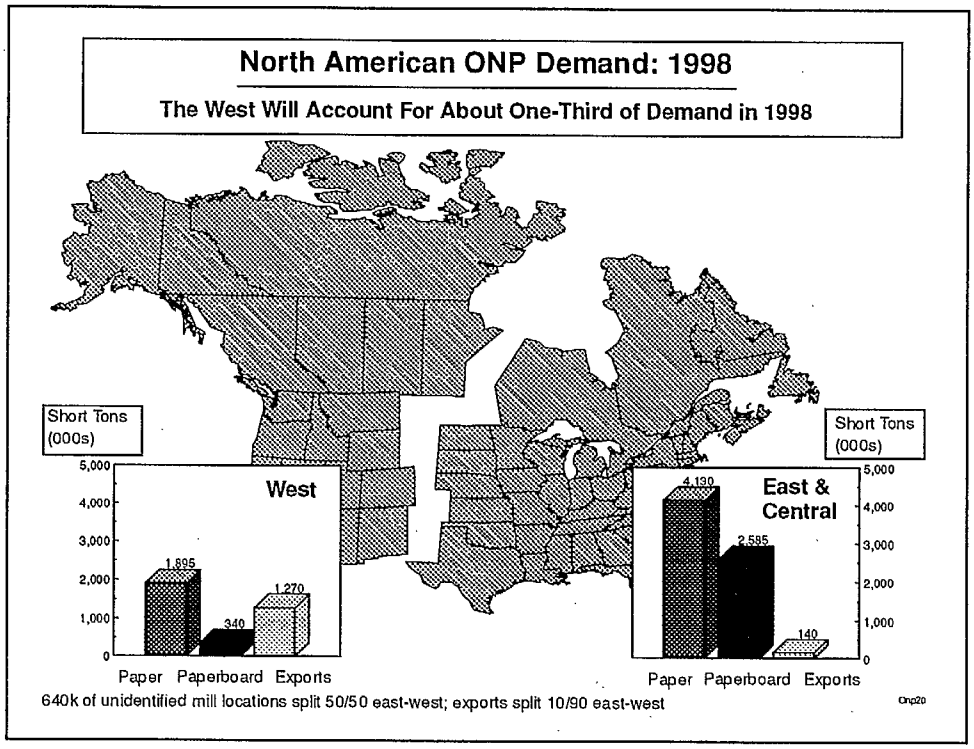
¶ Demand (including exports) grew steadily in the West while remaining flat in the East in the 1980s.



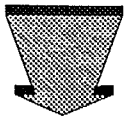

¶ However, demand has picked up across the entire U.S., and the share of ONP demand in non-western regions has increased.



¶ By 1998, the Western share of ONP demand (including exports) will drop to one-third.




¶ Accordingly, the east-west demand-supply imbalance is expected to dissipate: the price gap between east and west is already showing signs of closing.



Over the years ahead, Iannazzi expects regional prices to deviate by only plus or minus $5 per ton from the national average.

## 4.2 Floor Price

### 4.2.1 Background

¶ As a result of rising demand across North America, we can expect prices to increase and to find a common level across regions. But what will be this long run equilibrium price level?

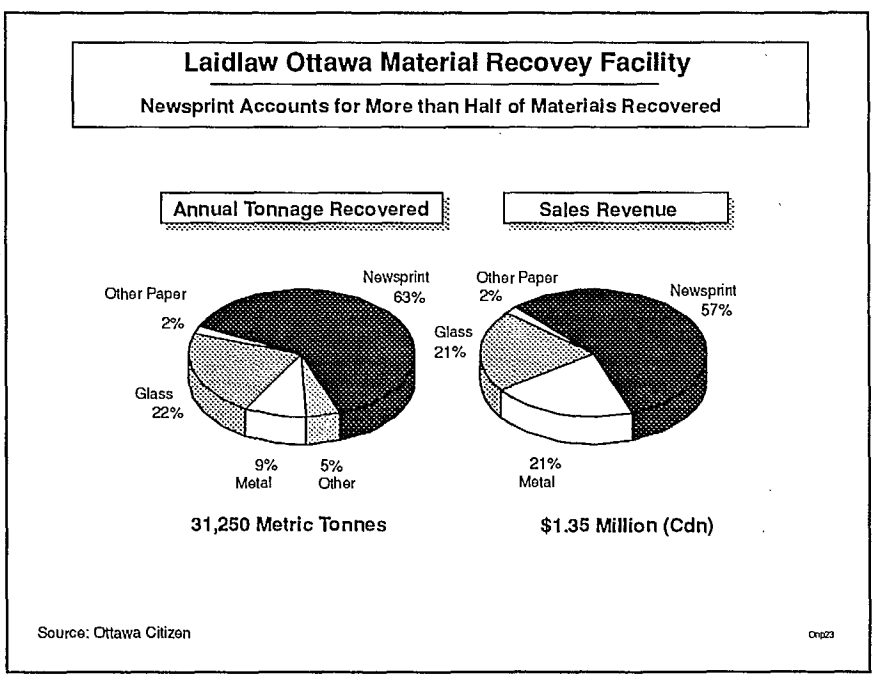
¶ At a minimum, ONP prices must achieve a certain minimum long run level so as to make municipal recycling programs viable. Thus we can begin with an analysis of this minimum price level.

¶ The problem we face in determining the minimum required ONP price level is that recycling programs are not dependent upon newsprint collection alone. Even if newsprint prices were to rise, if other recyclable materials do not yield an adequate return, then ONP supply levels could still suffer (and prices skyrocket).

### 4.2.2 Analysis of Ontario Data

¶ The Laidlaw materials recovery facility (MRF) in Ottawa processed 31,000 tonnes of recovered materials in 1993, or 7% of the total processed in the province of Ontario.

¶ Note that newspaper accounts for 63% of recovered materials by weight, and 57% by revenue.



¶ By extrapolating from our single facility data to the province as a whole, we estimate that newspaper collection accounts for $10.8 million (Cdn) of total processor sales of $19 million (Cdn).

**Estimate for Province of Ontario**

(Ottawa Data has been Extrapolated for the Entire Province)

(1993)

| | OTTAWA | | | ONTARIO | |
|---|---|---|---|---|---|
| | Tonnes (000s) | $/Tonne | Revenue ($000s) | Tonnes (000s) | Revenue ($000s) |
| Newsprint | 19.70 | 39 | 768.3 | 277.4 | 10,817 |
| Clear Glass | 3.74 | 43 | 160.8 | 52.7 | 2,264 |
| Coloured Glass | 3.06 | 38 | 116.3 | 43.1 | 1,637 |
| Tin | 2.60 | 70 | 182.0 | 36.6 | 2,562 |
| Aluminum | .13 | 800 | 100.0 | 1.8 | 1,408 |
| PET | .02 | 140 | 2.8 | .2 | 39 |
| Brown Bags | .17 | 120 | 20.4 | 2.4 | 287 |
| Telephone Books | .35 | 0 | 0 | 4.9 | 0 |
| Other | 1.49 | 0 | 0 | 20.9 | 0 |
| TOTAL | 31.25 | | 1,350.6 | 440.0 | 19,015 |

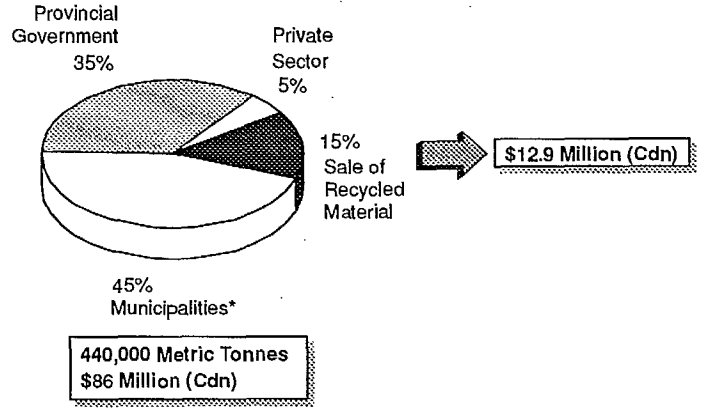
Onp24

¶ Of this $19 million collected by the processor, the amount that flows through to municipalities is $12.9 million (Cdn), or 15% of annual blue box costs.

**Province of Ontario Blue Box Costs**

Sales of recycled materials generate $12.9 Million for Municipalities

(1993)




* We assume that most of this portion includes municipal avoided costs.

Onp25

¶ We propose the following experiment with our Ottawa and Ontario data:

1. Increase the Eastern U.S. ONP(8) price to the (Iannazzi) U.S. average required to cover collection costs (i.e. $28 per ton).

2. Calculate the additional revenue that will accrue to Ontario processors.

3 Pass on that additional revenue entirely to Ontario municipalities and determine how close it brings them to replacing the provincial subsidy.

4. Calculate the U.S. price increase that would be required to make the provincial subsidy unnecessary (again assuming that the entire price increase flows through to the municipality).

¶ In order to perform this experiment, we make the following pricing assumptions:

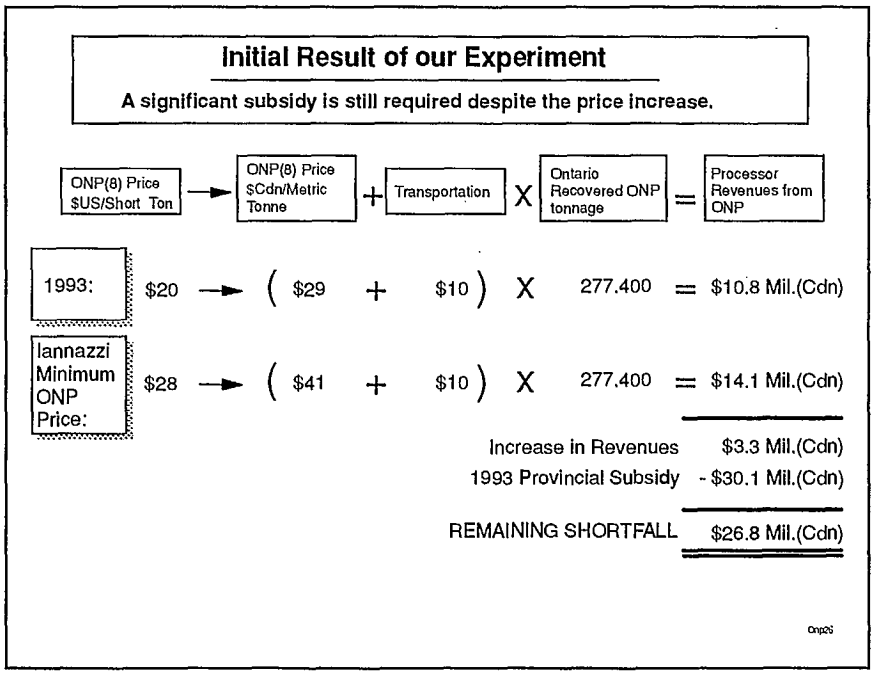
1.The eastern U.S. average price for ONP(8) ("baled deinked grade") in 1993 was approximately $20 (US) a short ton.

2.The exchange rate for 1993 is assumed to be $1 Cdn = $0.75 US. Thus the ONP(8) price becomes $26.67 Cdn per short ton, and $29 per metric tonne.

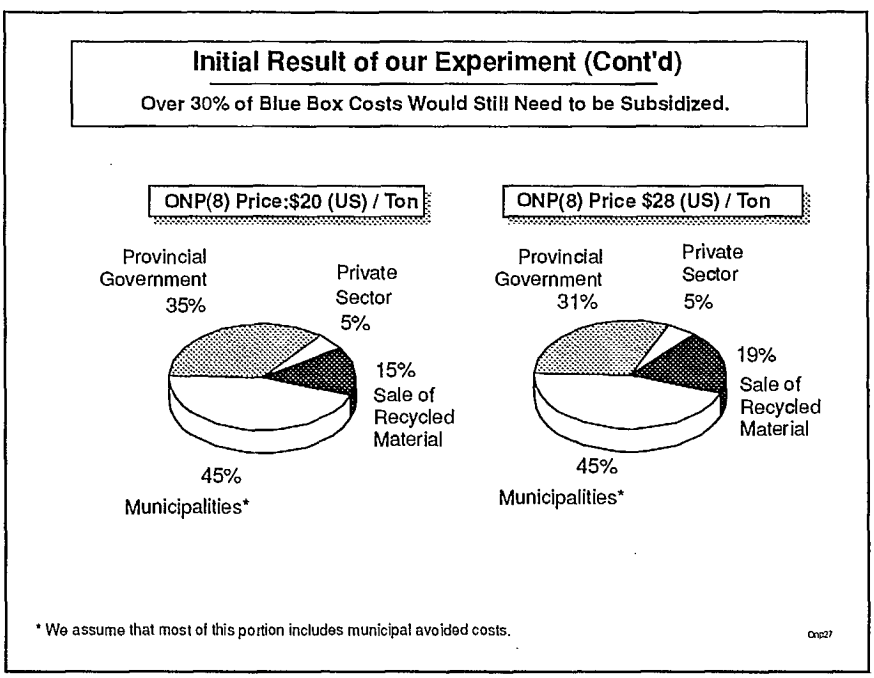
4.The Ottawa price (as per the Laidlaw data) was $39 per metric tonne. We assume that the difference between U.S. East and Ottawa price is transportation (i.e. 39-29 = $10 per tonne).

¶ When we increase our Eastern U.S. ONP price from $20 / ton to the Iannazzi minimum

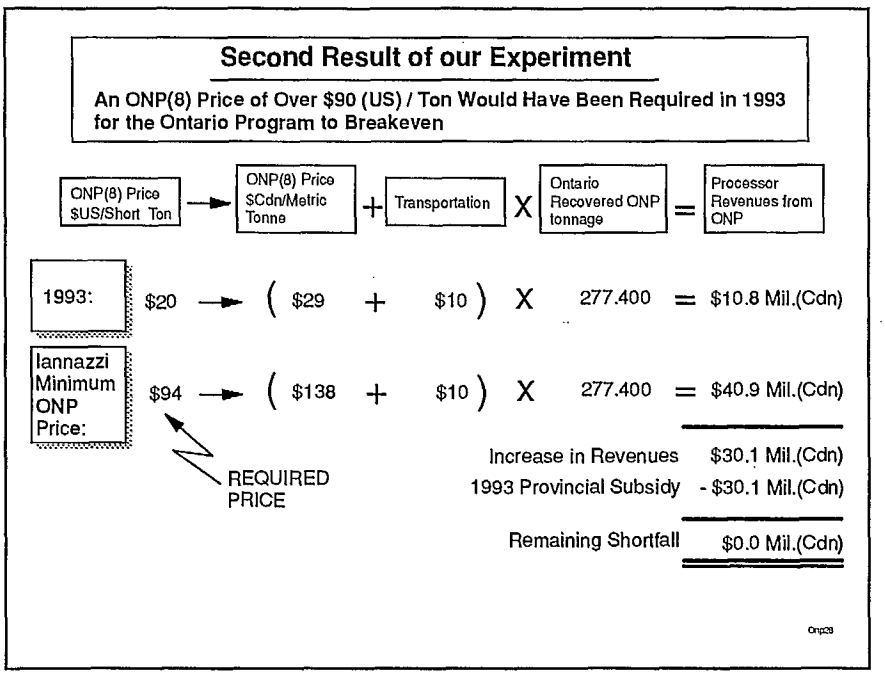
required U.S. average of $28 /ton, the Ontario Blue Box program still falls short by $27 million.




¶ The higher ONP price only serves to reduce the provincial subsidy from 35% to 31%.



¶ In order for the Ontario Blue Box program to break even, the price of ONP(8) would have to increase to $94 (US) per ton. This is almost five times current eastern values, and over three times higher than the value calculated by Iannazzi for the U.S.




¶ It should be pointed out, however, that our analysis, at best, only holds for Ontario. Whether municipalities in other regions are experiencing financial difficulties of a similar magnitude is unknown.

¶ However, it should also be pointed out that our assumptions are somewhat "conservative":

1.Not all municipalities sell their own recovered materials. In many cases, increased revenue from higher prices would not filter down to the municipality, but would be absorbed in part or in whole by the processor.

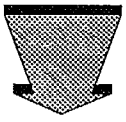
2.We have assumed that avoided costs offset the entire contribution made by municipalities in financing the blue box program. However, as we have seen in the city of Ottawa example (Section 2.3.2 above), municipal tax-payers have been forced to subsidize the blue box program as well.

### 4.2.3 Conclusions

¶ Some recycling programs have financial difficulties that won't be easily overcome, even if there are significant increases in the price of ONP.

¶ Solutions to these difficulties will require a co-ordinated effort among governments and all the industries concerned (paper, glass, metal, plastic).

¶ In the meantime, on the ONP supply-side, considerable upward pressure could develop on prices.



How high could prices go?

## 4.3 Maximum Price

### 4.3.1 Background

¶ We have seen that demand for ONP in North America will reach 10 million tons or more by 1998. This will require a recovery rate of close to 60%, a rate which is within practical maximum limits (65%). Thus the supply of ONP should be available as long as municipal recycling programs can find solutions to their financial difficulties.

¶ However, if a supply shortage should develop, there would be an upward pressure on ONP prices. Nevertheless, at a certain point, the cost of ONP to the newsprint producer would make the economics of making newsprint from recycled fibre unfavourable when compared with the cost of producing newsprint from virgin fibre. Prices for ONP could not be sustained at levels above this point without causing production to switch from recycled fibre to virgin fibre.

At what maximum ONP price level does this occur?

### 4.3.2 Cost of Virgin Pulp Versus Deinked Pulp

¶ Iannazzi performs a cost comparison of virgin versus recycled fibre production, focussing on mechanical (TMP) pulp (exclusive of kraft) on the one hand, and deinked pulp made solely from ONP (exclusive of old magazines or OMG) on the other hand (pg 26 of price report).

¶ Iannazzi's cost comparison has the following characteristics:

1.He looks at two sizes of DIP mill, a 200 ton-per-day facility and a 400 ton-per-day facility. The costs of producing recycled paper in the smaller mill are higher; thus this mill requires lower ONP prices to remain economical.

2.The costs of these recycling mills are compared with the costs of "existing low cost" and an "existing high cost" TMP producers.

3.Iannazzi applies "significantly higher" depreciation costs to the new DIP (deinked pulp) mills than to the assumed already existing TMP facilities. He acknowledges that if he were to use a new TMP facility, its costs would be higher, but claims that the current situation makes it appropriate to model existing mill costs.

¶ Iannazzi results:

The small recycling mill becomes uncompetitive with low cost TMP mills when the price for ONP rises above $5 per ton.

A larger mill is competitive with low cost TMP mills at ONP prices of $60 / ton, and can compete with high cost TMP mills until the price of ONP reaches $110 / ton.

**Maximum ONP(8) Price**

**A Larger Recycling Mill Can Compete with Low Cost TMP Mills at ONP(8) Prices up to $60 / Ton.**

Maximum ONP(8) Price that Can Be Sustained by Small and Large Recycling Mills And Remain Competitive with Low and High Cost TMP Mills:

| ONP Price $(US) / Short Ton | Low Cost TMP Mill | High Cost TMP Mill |
|---|---|---|
| Small DIP Mill (70k tons / yr) | $5 | $55 |
| Large DIP Mill (140k tons / yr) | $60 | $110 |

Source: Iannazzi price report, pg 27.

onp29

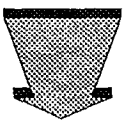
¶ Industry Canada is in the process of comparing the cost of state-of-the-art recycling and TMP mills. The results of this work should shed new light on the maximum ONP price that could be sustained by recycling mills.

### 4.3.3 Future ONP Price

¶ On the basis of a minimum required ONP supply price of $28 per ton, and a maximum $60 per ton ONP price that is sustainable by larger recycling mills competing with a low cost TMP mill, Iannazzi projects an in-between price range of $40 to $45 ($US 1993) per ton for ONP (No 8).

Iannazzi suggests that board grade (No 6) will be $5 to $10 per ton lower; and West coast prices will be$5 to $10 higher.

¶ In the current study, suspicion has been raised regarding the amount of subsidy that is required by suppliers of ONP. The upward supply-side push on prices may be considerable. Meanwhile, demand is expected to be very strong. Accordingly, the Iannazzi price projection may prove to be somewhat on the conservative side.



Accordingly, Industry Canada, in its newsprint analysis, should consider a range of possible ONP prices ($US 1993, short tons):

A minimum price of $30 per ton.

An Iannazzi projected price of $45 per ton.

An Iannazzi maximum price of $60 per ton.

## 5. Summary and Conclusions

ONP demand is growing rapidly in this decade. Most of this increased usage of ONP is for newsprint applications. (The number of mills in North America capable of producing recycled newsprint increased from five in 1989 to over thirty in 1993). There could also be a very significant growth in ONP demand for printing and writing papers.

On the whole, projected demand for ONP (based on existing and planned recycled pulp mills) should increase by 2.7 million tons to over 10 million net tons by 1998. The rate of ONP usage for newsprint applications implicit in this growth is ample for fulfilling current regulatory targets for this decade. Thus mandatory and voluntary programs encouraging publishers to use recycled newsprint may soon not be needed.

Meanwhile, 60% of used newspapers will need to be recovered in order to fulfill this growing demand for recycled fibre by 1998. This rate of recovery can be attained: it is estimated that a 65% recovery rate is practical in the U.S.

However, there are concerns regarding the costs of collection. There is some evidence that municipalities are not able to cover costs without provincial and state subsidies and higher taxes. With demand for ONP on the rise, prices will increase and should help alleviate these supply side financing difficulties somewhat. However, in the longer term, solutions will need to be found for the financing of recycling programs that do not dip into the public purse.

On the basis of work done by Fred Iannazzi of Andover International, we project that adequate supply of ONP will be available for recycling mills during this decade, and that the price for this ONP will fall between a minimum price of $28 US per ton (the price which covers average collection, sorting and baling costs, net of avoided dumping costs) and a maximum price of $60 to $110 US (the price that a recycling mill can sustain and remain competitive with low cost and high cost TMP mills, respectively). Iannazzi projects a 1998 price of $40 to $45 US (in $1993) per net ton.

# Part II

## Detailed Analysis of ONP Supply-Demand By Specific Region

# 1. Introduction

¶ The objective of this analysis is to determine where a newsprint mill, beginning operation in 1998, would be able to obtain its required supply of ONP and how much it would cost to transport it to the mill.

¶ In this study we compared five sites, for newsprint mills, in eastern Canada and the United States. These sites are Bromptonville (Quebec), Thunder Bay (Ontario), Boligee (Alabama), Hale Eddy (New York), and Bronx (New York).

¶ The mills in Bromptonville, Thunder Bay, and Boligee were all designed to produce newsprint containing 40% recycled fibre as well as 20% recycled fibre. In New York, a Mini mill (Bronx) and a Maxi mill (Hale Eddy) were examined. Both New York mills will produce newsprint containing 100% recycled fibre. The recycled fibre content contains a 70/30 blend of ONP/OMG. Each hypothetical newsprint mill was assumed to begin operation in 1998.

¶ In our comparison of the new hypothetical mills, each mill, except the New York City Mini mill, was added to the demand-supply balance, examined and then removed. The Mini mill was added to the demand-supply balance and then left in. The Mini mill remained in the balance since it was modelled after a real mill that is going to be opening in the Bronx during the same time period.

## Part II: Detailed Analysis of ONP Supply-Demand by Specific Region
## Introduction

¶ To simplify our analysis we grouped states and provinces into regions. The regions we used and the states within each region are:

| | |
|---|---|
| New England: | Connecticut, Maine, Massachusetts, New Hampshire, Rhode Island, and Vermont |
| Middle Atlantic: | New Jersey, New York, Pennsylvannia |
| South Atlantic: | Delaware, Maryland, Virginia, West Virginia, North Carolina, South Carolina, Georgia, Florida |
| East North Central: | Michigan, Illinois, Indiana, Ohio, Wisconsin |
| West North Central: | Kansas, Minnesota, Iowa, North Dakota, South Dakota, Missouri, Nebraska |
| East South Central: | Kentucky, Alabama, Tennessee, Mississippi |
| West South Central: | Louisianna, Oklahoma, Arkansas, Texas |
| Atlantic Provinces: | Nova Scotia, New Brunswick, Newfoundland, P.E.I. |
| Ontario: | Ontario |
| Quebec: | Quebec |
| D. of Columbia: | Washington D.C. |

¶ This section of the report determines the demand centres, sources of supply for the newsprint mills, and the cost of transporting the ONP from these destinations, in 1998. The assumptions, input data, and a description of the transportation costing models used are also included.

# 2. Determination of Sources of Supply

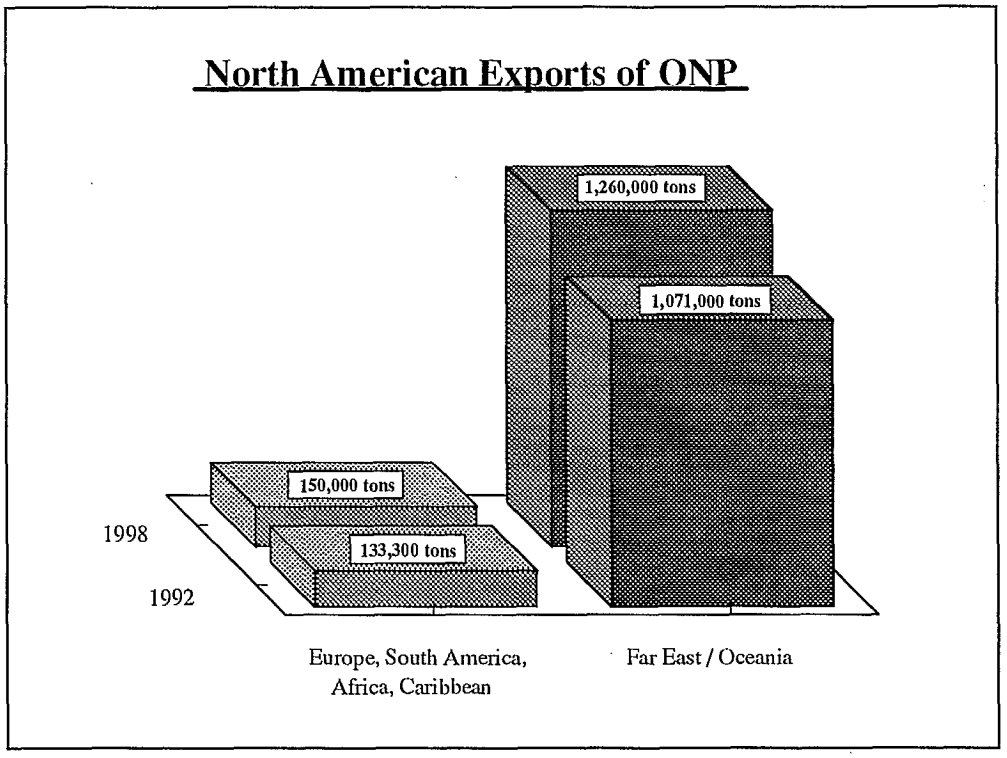
## 2.1 Demand Assumptions

### 2.1.1 Exports

¶ The Pulp and Paper Forecaster published a chart containing the amount of exports from the United States to various countries and regions of countries in 1992. The amount exported to Canada was subtracted from the total US exports. Since Canada does not export ONP this amount represents the total exports from Canada and the United States.

¶ Exports to regions and countries such as the Caribbean, Europe, Africa and parts of South America, which are closer to eastern North America, were summed together. This represents the total exports from eastern North America. Comparing this to the total exports from North America, it was determined that 90% is exported by western North America to the Pacific Rim countries.

¶ Andover International Associates estimates that 1.41 million short tons of ONP will be demanded for export in 1998. By assuming that roughly 10% will be exported from eastern North America it was determined that the export demand for ONP in 1998 will be approximately 150,000 short tons.



¶ We determined the major cities along the Atlantic Coast, with shipping ports. The export demand was supplied from these MSA's according to their supply of ONP. The following chart shows the total amount of ONP, in thousands of short tons, exported by state.

| State | Conn. | Maine | Mass. | R.I. | N.J. | N.Y. | N.C. | Virg. | S.C. | GA |
|---|---|---|---|---|---|---|---|---|---|---|
| Export | 7.9 | 3.2 | 31.0 | 7.8 | 3.7 | 77.2 | 2.0 | 10.5 | 4.2 | 2.5 |

### 2.1.2 Recycled Paper Mills

¶ All recycled paper mills that are presently in existence as well as any that are scheduled to open before 1998 were included in the total demand. The paper mills include newsprint and groundwood (coated and uncoated) mills. The demand figures for all paper mills were obtained from Andover International Associates.

¶ Andover suggests that four new paper mills, two in Canada and two in the United States, will open in 1998. These mills have yet to be announced. Since the location of these four new mills hasn't been determined, we assumed that they would be in the west, for convenience.

¶ The New York mini mill was included in the ONP demand by recycled paper mills since it was modelled after a mill that is scheduled to open in 1997. The demand by the other four hypothetical mills was not included.

### 2.1.3 Paperboard Mills

¶ The total demand, in 1998, for ONP by paperboard mills is 2.87 million short tons, as projected by Andover International Associates.

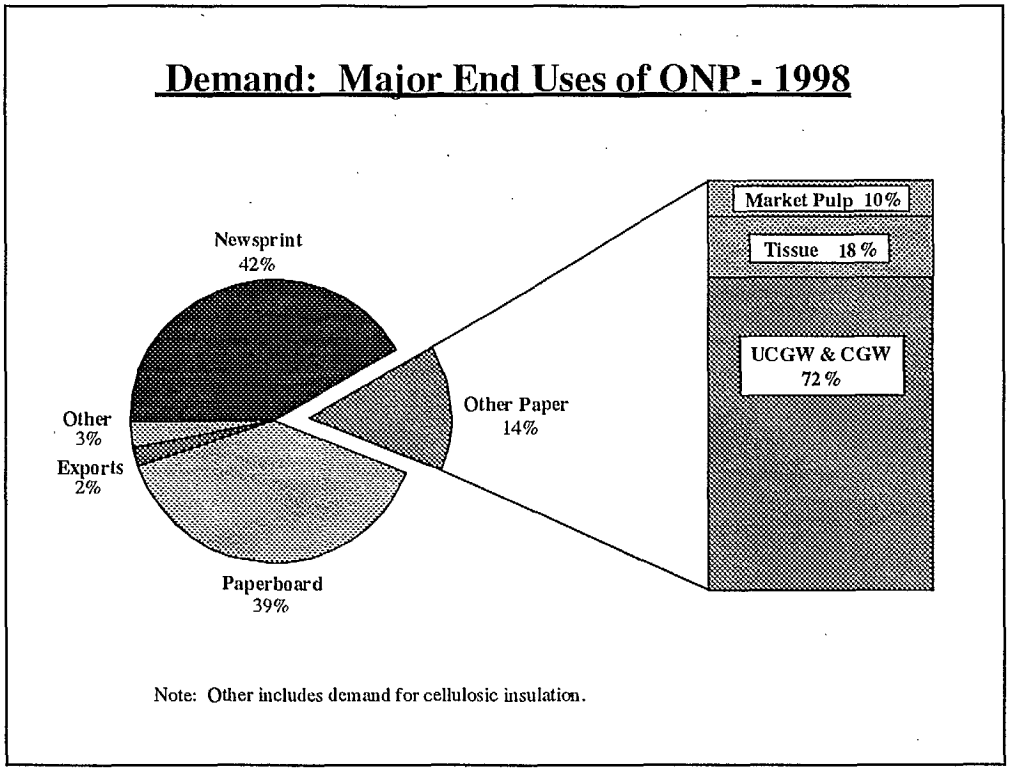
¶ The exact demand by each mill is unknown. Andover uses letters to represent the probable range of demand by each mill. By choosing values for the letters and adjusting these values until they matched the total paperboard demand we obtained a possible solution. To increase the accuracy of our results we represented the paperboard demand by state.

### 2.1.4 Non Paper Demand

¶ Non paper demand includes the use of ONP for cellulosic insulation, animal bedding, and packaging. It was estimated in the *RISI Pulp and Paper Review* that 800,000 tons of old newsprint was used for these purposes in 1991.

¶ Andover claims that the ONP demand for animal bedding is supplied by the rural areas and the values for available supply of rural ONP already assume that this demand has been satisfied. Andover's ONP demand values also include mills that use recycled fibre to produce packaging containers.

¶ Andover did not include any considerations for the demand of ONP for cellulosic insulation. They did, however, estimate that demand was between 200,000 and 300,000 short tons in the eastern United States. Assuming 300,000 short tons of demand, we added 10%, based upon population statistics, to represent Canada. The demand for ONP in the eastern United States is approximately 80% of the total demand. Taking 80% of 330,000 short tons we obtained the 1998 ONP demand for cellulosic insulation in eastern North America which is roughly 260,000 short tons.



¶ The United States imported 44,000 short tons in 1992 according to a chart published by RISI. Adding 10% to account for Canada, gives a total of 49,000 short tons. Without sufficient information to forecast a growth rate or determine the destination of the imports we assumed that 49,000 short tons was imported by eastern North America in 1998.

¶ We subtracted the imports of ONP from the non-paper demand. Hence, the total amount of ONP required for non-paper applications, net of imports, is 215,000 short tons. To account for the non-paper demand, 5,000 short tons were allocated to the 37 states involved and 15,000 tons each were assigned to Ontario and Quebec.

The following table summarizes the demand for ONP by selected state/province.

## 1998 North American ONP Demand by Selected State/Province
('000 short tons)

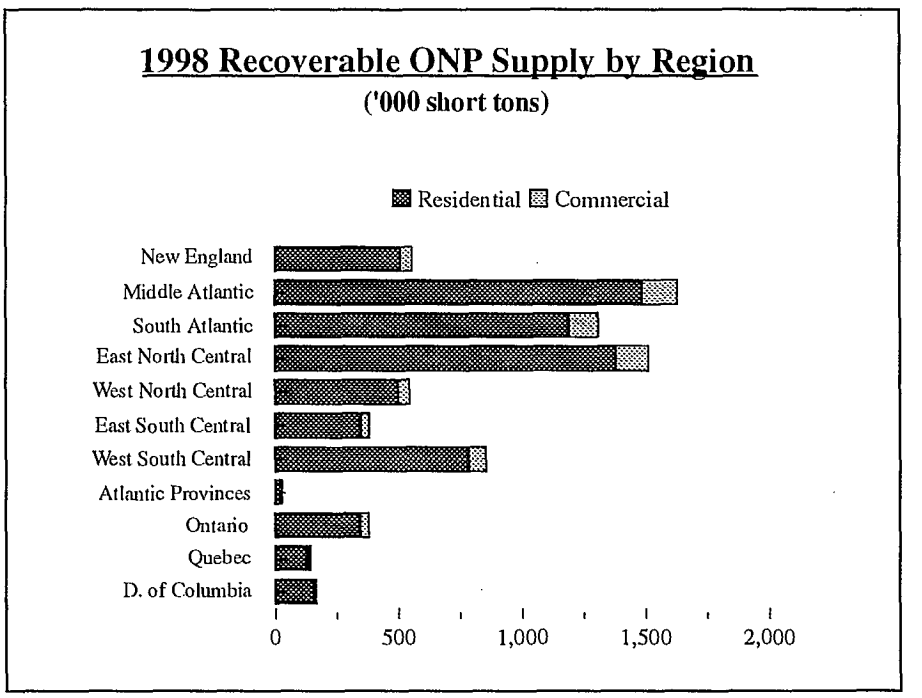
| State | Paper | Paperboard | Total |
|---|---|---|---|
| Connecticut | 0 | 75 | 75 |
| Maine | 135 | 10 | 145 |
| Massachusetts | 0 | 65 | 65 |
| New Hampshire | 0 | 20 | 20 |
| Vermont | 0 | 20 | 20 |
| New Jersey | 355 | 210 | 565 |
| New York | 180 | 140 | 320 |
| Pennsylvannia | 76 | 170 | 246 |
| Maryland | 0 | 40 | 40 |
| North Carolina` | 0 | 25 | 25 |
| Virginia | 60 | 70 | 130 |
| West Virginia | 0 | 25 | 25 |
| Ohio | 0 | 220 | 220 |
| Michigan | 0 | 190 | 190 |
| South Carolina | 0 | 55 | 55 |
| Illinois | 136 | 100 | 236 |
| Indiana | 0 | 75 | 75 |
| Iowa | 0 | 15 | 15 |
| Minnesota | 0 | 70 | 70 |
| Wisconsin | 255 | 155 | 410 |
| Florida | 0 | 35 | 35 |
| Georgia | 797 | 85 | 882 |
| Alabama | 112 | 115 | 227 |
| Mississippi | 0 | 10 | 10 |
| Tennessee | 95 | 85 | 180 |
| Arkansas | 0 | 45 | 45 |
| Oklahoma | 25 | 90 | 115 |
| Kansas | 0 | 35 | 35 |
| Missouri | 0 | 40 | 40 |
| Louisianna | 0 | 45 | 45 |
| Texas | 134 | 65 | 199 |
| Quebec | 680 | 55 | 735 |
| Ontario | 616 | 150 | 766 |
| Atlantic Provinces | 155 | 25 | 180 |
| **TOTAL** | **3,811** | **2,630** | **6,441** |
| **Exports** | | | **150** |

## 2.2 Supply Assumptions

Commercial/Non-Commercial Supply

¶ All supply amounts were obtained from a chart published by Andover International Associates. The commercial supply of ONP consists of press waste and newsstand returns. The potential supply of newsstand returns is listed by MSA, state, and region, whereas the press waste is only listed as a region total.

¶ To allocate each region's press waste of ONP, we divided it evenly amongst the region's MSA's. Assuming that press waste would only be created in large cities and MSA's, no press waste was assigned to the rural districts. By summing the total commercial supply and the total non-commercial supply we obtained the total potential ONP supply for 1993.



Growth Rate

¶ To project the total potential supply from 1993 to 1998 we used a 1% annual growth rate. This is the rate of increase, Andover forecasts, for consumption of newsprint in North America during this time frame.

Recovery Rate

¶ In 1993, ONP had an overall recovery rate of 46%. Andover predicts that the recovery rate of ONP will rise to 59% in 1998. As mentioned before, Andover suggests the maximum attainable recovery rate of ONP is 70% within an MSA, 40% outside an MSA, and 65% combined.

¶ To be conservative, we determined a halfway point between the maximum and present recovery rates. We assumed a recovery rate of 60% within an MSA, 35% outside an MSA, and 55% combined.

Location of Rural Supply

¶ The total potential ONP supply, projected to 1998, is listed by MSA and state. The difference between the total supply of ONP by state and the sum of the MSA's supply within the state is considered the rural supply.

¶ We determined the total recovered ONP supply, for 1998, by applying the corresponding recovery rates to the total potential ONP supply. In order to give all supply a point of origin, the rural supply was split and evenly allocated to each MSA within the state.

The following table summarizes the supply of ONP by selected state/province.

## 1998 North American ONP Supply by Selected State/Province
('000 short tons)

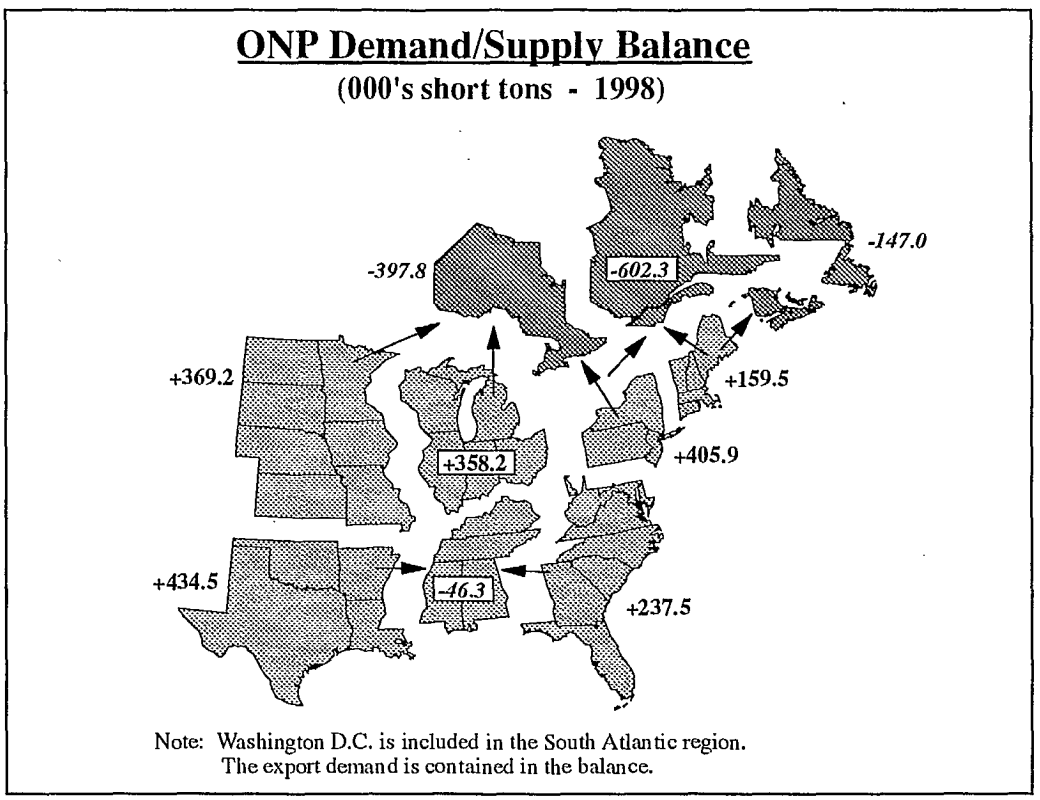
| State | Total ONP Supply | Total |
|---|---|---|
| Connecticut | 259.5 | 151.3 |
| Maine | 84.5 | 40.8 |
| Massachusetts | 453.2 | 266.1 |
| New Hamp. | 71.8 | 37.4 |
| Rhode Island | 73.4 | 42.4 |
| Vermont | 35.8 | 21.5 |
| New Jersey | 625.1 | 351.8 |
| New York | 1,305.1 | 783.1 |
| Pennsylvannia | 839.4 | 497.1 |
| Delaware | 43.6 | 23.0 |
| D.of Columbia | 282.8 | 169.7 |
| Maryland | 177.3 | 101.6 |
| North Carolina | 383.7 | 200.4 |
| Virginia | 270.6 | 142.2 |
| West Virginia | 106.8 | 47.4 |
| Ohio | 740.0 | 402.9 |
| Kentucky | 163.8 | 75.7 |
| Michigan | 666.1 | 366.5 |
| South Carolina | 191.5 | 95.6 |
| Illinois | 650.8 | 376.0 |
| Indiana | 373.6 | 200.1 |
| Iowa | 194.3 | 88.2 |
| Minnesota | 267.7 | 143.0 |
| North Dakota | 41.5 | 20.6 |
| South Dakota | 39.6 | 16.2 |
| Nebraska | 111.6 | 54.7 |
| Wisconsin | 321.8 | 168.7 |
| Florida | 916.9 | 536.2 |
| Georgia | 316.3 | 167.6 |
| Alabama | 149.0 | 79.3 |
| Mississippi | 199.7 | 76.0 |
| Tennessee | 286.9 | 154.7 |
| Arkansas | 162.1 | 76.1 |
| Oklahoma | 213.4 | 107.0 |
| Kansas | 178.6 | 76.4 |
| Missouri | 280.8 | 150.2 |
| Louisianna | 214.0 | 115.1 |
| Texas | 1,022.6 | 560.4 |
| Atlantic Prov. | 60.0 | 33.0 |
| Quebec | 295.4 | 147.7 |
| Ontario | 718.9 | 383.2 |
| **TOTAL** | **13,789.5** | **7,546.9** |

## 2.3 Sources of Supply

¶ Comparing the 1998 ONP demand and the recoverable ONP supply, a balance for each region was obtained. A positive demand-supply balance indicates there is an excess of supply, within a region, while a negative demand-supply balance signifies a deficit of supply. The demand by the New York Mini mill was included in the Middle Atlantic region's balance.

¶ The ONP export demand was allocated to the New England, Middle Atlantic, and the South Atlantic regions. This demand was subtracted from the demand-supply balance for these regions. The ONP demand-supply balance now represents the amount of ONP, in each region, available for mills in eastern North America.

¶ The Atlantic Provinces, Ontario, Quebec, and the East South Central regions all had negative demand-supply balances. The excess supply of ONP required by these regions was obtained from the surrounding regions with positive balances. By judging where each region could obtain their required amount of ONP, we were able to determine the maximum distance between our mills and their potential sources of supply.



¶ We assumed that each hypothetical mill would have to transport some ONP from the region of furthest distance, as determined above. Amounts of ONP supplied from states within the same region as a hypothetical mill were proportioned according to the total supply of the states, relative to the region. Supply obtained from other regions depended on the distance to the mill and the amount of supply in the specific MSA.

¶ The sources of supply and the supply amounts were adjusted to consider the back-hauling of ONP and major transportation routes. Finally the sources of supply for each hypothetical mill were presented to a company in the industry. The company was able to point out any implausible sources and suggest any probable sources that had been left out.

The following tables illustrate the sources of supply for each of the hypothetical mills.

Bromptonville Mill (40% R.F.)

| State | MSA | ONP Supply ('000 short tons) |
|---|---|---|
| Connecticut | Hartford | 1.5 |
| | New Haven | 1.0 |
| | New London | 0.5 |
| Massachusetts | Boston | 8.0 |
| | Fitchburg | 2.0 |
| | Springfield | 0.7 |
| Rhode Island | Providence | 2.0 |
| Pennsylvannia | Lancaster | 0.5 |
| | Pittsburgh | 2.0 |
| | Philadelphia | 11.0 |
| | York | 1.5 |
| D. of Columbia | Washington | 9.0 |
| Maryland | Baltimore | 5.0 |
| Ohio | Youngstown | 3.0 |
| | Cleveland | 4.0 |
| | Columbus | 2.0 |
| Michigan | Detroit | 1.5 |
| New York | Manhattan | 17.0 |
| | Nassau | 10.7 |
| New Jersey | Bergen | 3.0 |
| | Middlesex | 3.0 |
| | Newark | 6.0 |
| Delaware | Wilmington | 2.6 |
| Ontario | Toronto | 3.0 |
| | Kingston | 3.5 |
| Quebec | Drummond | 3.0 |
| | Montreal | 5.0 |
| | **TOTAL** | **112.0** |

Bromptonville Mill (20% R.F.)

| State | MSA | ONP Supply ('000 tons) |
|---|---|---|
| Connecticut | Hartford | 1.5 |
| | New Haven | 1.0 |
| | New London | 0.5 |
| Massachusetts | Boston | 3.5 |
| | Fitchburg | 1.0 |
| Rhode Island | Providence | 0.9 |
| Pennsylvannia | Pittsburgh | 1.8 |
| | Philadelphia | 8.0 |
| New Jersey | Bergen | 4.0 |
| | Newark | 5.3 |
| New York | Manhattan | 10.0 |
| | Nassau | 7.5 |
| Ontario | Kingston | 3.0 |
| | Toronto | 3.0 |
| Quebec | Drummond | 2.0 |
| | Montreal | 3.0 |
| | **TOTAL** | **56.0** |

Thunder Bay Mill (40% R.F.)

| State | MSA | ONP Supply ('000 short tons) |
|---|---|---|
| Michigan | Detroit | 11.0 |
| | Grand Rapids | 1.5 |
| | Lansing | 2.1 |
| Iowa | Des Moines | 2.5 |
| | Dubuque | 1.9 |
| | Iowa City | 2.0 |
| | Waterloo | 3.5 |
| Minnesota | Duluth | 2.0 |
| | Minneapolis | 4.0 |
| South Dakota | Sioux Falls | 3.0 |
| Wisconsin | Madison | 3.5 |
| | Milwaukee | 7.2 |
| Illinois | Chicago | 12.0 |
| | Lake County | 2.6 |
| Indiana | Bloomington | 2.0 |
| | Gary | 6.0 |
| | Indianapolis | 12.0 |
| | Kokomo | 2.0 |
| | Lafayette | 2.0 |
| | Terre-Haute | 2.0 |
| Ohio | Cleveland | 6.3 |
| | Dayton | 3.5 |
| | Lima | 1.0 |
| | Mansfield | 1.6 |
| | Toledo | 4.3 |
| Ontario | Kingston | 3.5 |
| | Sault Ste. Marie | 1.5 |
| | Toronto | 3.0 |
| | Thunder Bay | 2.5 |
| | **TOTAL** | **112.0** |

Thunder Bay Mill (20% R.F.)

| State | MSA | ONP Supply ('000 tons) |
|---|---|---|
| Michigan | Detroit | 7.5 |
| | Grand Rapids | 1.0 |
| Iowa | Dubuque | 1.0 |
| | Iowa City | 2.0 |
| | Waterloo | 2.0 |
| Minnesota | Duluth | 2.0 |
| | Minneapolis | 4.0 |
| Wisconsin | Madison | 3.0 |
| | Milwaukee | 7.2 |
| Illinois | Chicago | 10.8 |
| | Lake County | 1.0 |
| Indiana | Gary | 2.5 |
| | Indianapolis | 6.0 |
| Ontario | Sault Ste. Marie | 1.5 |
| | Toronto | 2.5 |
| | Thunder Bay | 2.0 |
| | **TOTAL** | **56.0** |

Boligee Mill (40% R.F.)

| State | MSA | ONP Supply ('000 short tons) |
|---|---|---|
| Indiana | Terre-Haute | 0.9 |
| Florida | Fort Walton | 2.8 |
| | Jacksonville | 2.1 |
| | Orlando | 3.1 |
| | Panama City | 2.0 |
| | Pensacola | 2.4 |
| | Tallahassee | 2.6 |
| Alabama | Anniston | 0.5 |
| | Birmingham | 4.0 |
| | Dothan | 1.2 |
| | Florence | 1.3 |
| | Gadsen | 1.2 |
| | Huntsville | 1.5 |
| | Mobile | 1.5 |
| | Montgomery | 1.7 |
| | Tuscaloosa | 0.9 |
| Mississippi | Biloxi | 3.0 |
| | Jackson | 2.8 |
| | Pascagoula | 2.8 |
| Arkansas | Fayetteville | 2.0 |
| | Little Rock | 6.2 |
| Louisianna | Alexandria | 0.5 |
| | Baton-Rouge | 1.3 |
| | Monroe | 0.9 |
| | New Orleans | 3.7 |
| | Shreveport | 1.3 |
| Tennessee | Chattanooga | 5.0 |
| | Nashville | 7.0 |
| | Memphis | 2.3 |
| Kentucky | Louisville | 3.2 |
| | Owensboro | 2.3 |
| Georgia | Albany | 0.7 |
| | Atlanta | 8.5 |
| | Columbus | 2.5 |
| South Carolina | Greenville | 2.1 |
| | Columbia | 1.6 |
| North Carolina | Asheville | 0.6 |
| | Charlotte | 1.3 |
| | Greensboro | 0.7 |
| Texas | Austin | 4.0 |
| | Dallas | 10.0 |
| | Houston | 6.0 |
| | **TOTAL** | **112.0** |

Boligee Mill (20% R.F.)

| State | MSA | ONP Supply ('000 tons) |
|---|---|---|
| Florida | Fort Walton | 1.4 |
| | Panama City | 1.0 |
| | Pensacola | 1.7 |
| | Tallahassee | 1.8 |
| Alabama | Anniston | 1.0 |
| | Birmingham | 3.0 |
| | Dothan | 1.0 |
| | Florence | 0.9 |
| | Gadsen | 0.5 |
| | Huntsville | 1.5 |
| | Mobile | 1.5 |
| | Montgomery | 2.1 |
| | Tuscaloosa | 0.9 |
| Mississippi | Biloxi | 2.9 |
| | Jackson | 2.5 |
| | Pascagoula | 2.6 |
| Arkansas | Little Rock | 2.3 |
| Louisianna | Baton-Rouge | 1.2 |
| | New Orleans | 2.1 |
| Tennessee | Chattanooga | 3.6 |
| | Nashville | 3.2 |
| | Memphis | 1.9 |
| Georgia | Albany | 0.5 |
| | Atlanta | 4.0 |
| | Columbus | 1.2 |
| South Carolina | Greenville | 1.1 |
| | Columbia | 1.0 |
| North Carolina | Charlotte | 1.3 |
| Kentucky | Lexington | 2.4 |
| | Louisville | 2.5 |
| | Owensboro | 1.4 |
| | **TOTAL** | **56.0** |

New York Mini Mill

| State | MSA | ONP Supply ('000 short tons) |
|---|---|---|
| New York | Bronx | 8.5 |
| | Brooklyn | 8.2 |
| | Manhattan | 32.0 |
| | Queens | 19.5 |
| | Richmond | 3.6 |
| | Orange Co. | 5.2 |
| Pennsylvannia | Philadelphia | 8.0 |
| New Jersey | Bergen | 5.0 |
| | Middlesex | 3.0 |
| | Newark | 7.0 |
| | **TOTAL** | **100.0** |

New York Maxi Mill

| State | MSA | ONP Supply ('000 tons) |
|---|---|---|
| New York | Albany | 13.2 |
| | Binghamton | 0.8 |
| | Buffalo | 9.9 |
| | Nassau | 33.3 |
| | Brooklyn | 6.8 |
| | Manhattan | 36.5 |
| | Queens | 5.5 |
| | Richmond | 2.3 |
| | Niagara Falls | 4.4 |
| | Orange Co. | 1.6 |
| | Poughkeepsie | 4.0 |
| | Rochester | 8.8 |
| | Syracuse | 6.6 |
| Pennsylvannia | Allentown | 4.6 |
| | Harrisburg | 4.3 |
| | Philadelphia | 23.7 |
| | Pittsburgh | 11.7 |
| | Scranton | 3.6 |
| | York | 4.2 |
| New Jersey | Atlantic City | 4.1 |
| | Bergen | 7.4 |
| | Middlesex | 6.9 |
| | Newark | 9.5 |
| D. of Columbia | Washington | 23.5 |
| Massachusetts | Boston | 17.6 |
| Maryland | Baltimore | 10.2 |
| Delaware | Wilmington | 2.0 |
| Connecticut | Bridgeport | 1.7 |
| | Hartford | 2.3 |
| Virginia | Norfolk | 2.5 |
| | Richmond | 2.5 |
| Maine | Portland | 3.0 |
| Vermont | Burlington | 4.0 |
| New Hampshire | Manchester | 3.0 |
| | **TOTAL** | **286.0** |

# 3. Transportation Costs

## 3.1 Introduction

¶ One of the principal determinants of any manufacturing facility's competitiveness is its costs of production. Transportation costs are often a significant part of a newsprint mill's production costs. Transportation by truck and by rail are the two main methods that are used to ship ONP to newsprint mills.

¶ The total transportation cost for a newsprint mill includes the cost of supplying the mill with the required input materials as well as the cost of transporting the finished product to market. This section of the report investigates the cost of transporting the required supply of ONP to each of the newsprint mills. Cost models were developed for both truck and rail transportation. Using these transportation cost models, the cost of supplying ONP to each of the five hypothetical newsprint mills, was calculated.

## 3.2 Modes of Transportation

¶ Volumes and distances are primary determinants of recycled paper transportation costs. However, mode selection and location also influence the total costs. Naturally, total transportation costs and cost per ton of paper production increase as more volume is shipped to distant markets.

¶ While transportation by rail is not competitive on short and medium length hauls, it does offer an alternative for reducing transportation costs on long hauls to distant markets. Unfortunately these savings are not substantial enough to off-set their higher overall transportation costs because of their distance from the markets.

¶ Although railways do provide mills with a choice mode of transportation, there are disadvantages of using rail transportation. If a mill is not situated near a convenient rail spur, additional costs would be incurred in trucking paper from the nearest railhead to the newsprint mill. Also, transportation by truck offers the flexibility to schedule shipments to individual mills more accurately. Rail transportation is less flexible because it requires larger volumes to realize the cost savings on full shipment rates.

## 3.3 Transportation by Truck

Fixed Costs

¶ Fixed costs are the typical annual costs associated with owning and operating a trucking unit. The trucking company covers these expenses by including them in the fee it charges its customers, including the newsprint mills. Fixed costs do not vary with the level of business activity and are allocated based on the number of hours that the truck operates each year. Therefore, the fewer hours a truck operates each year, the higher the fixed hourly charge.

¶ Fixed costs include charges for vehicle depreciation, insurance, business licenses, interest charges on financed equipment purchases, adminstration and other miscellaneous charges.

Variable Costs

¶ Variable costs are expenses that vary directly with the use of a vehicle. Like fixed costs, the customers must compensate the trucking company for these charges. Variable costs include expenses for operating supplies, fuel, repairs and maintenance, driver's wages, tires, cleaning and other miscellaneous charges.

Hauling Distance

¶ The effect of fixed costs on the overall cost of transportation varies depending on the distance travelled. There are two main categories that the hauling distance between a mill and its supplier may fit in, short haul and long haul. The barrier between the two categories is sixty miles, in this analysis.

¶ Under sixty miles, the hauling distance is irrelevant because the fixed costs are the major determinant of the total cost. The overall transportation cost of a long haul, however, is largely affected by the variable costs. In the transportation cost model for long hauls, the variable costs are expressed as a factor of the hauling distance. To this is added a charge to cover the fixed costs.

¶ Different classes of short and long hauls are formed depending on the location of a mill compared to its suppliers. In this analysis, the six hauling distance categories are; Canadian short haul, Canadian long haul, Canada to the United States long haul, United States long haul, United States short haul except for New York state, and New York state short haul.

Truck Capacity

¶ Each newsprint mill has a specified yearly demand of ONP. Each truck that is used to transport this demand has a fixed cost associated with it. The overall cost of transportation can be lowered by minimizing the number of trucks required to ship the ONP. A truck's hauling capacity, therefore, is a large factor in the overall cost of transportation for a newsprint mill.

¶ The maximum gross vehicle weight for highway trucks is dictated by state and province regulations. On average the maximum gross vehicle weight in the United States is slightly less than in Canada. Local regulations usually allow larger trucks to transport ONP for short distances. There are no restrictions on the gross vehicle weight of off-highway trucks.

¶ A truck can either be filled by weight or by size. If a truck is filled by weight then the maximum load weight is attained before the truck is full. If a truck is filled by size then the truck has not reached the maximum gross vehicle weight, although the trailer is full. Trucks transporting ONP are filled by weight.

¶ The maximum truck load capacity in this analysis was assumed to be twenty short tons for Canadian short haul, Canada to the United States long haul, United States short haul except New York state, United States long haul, and New York state short haul. Canadian long haul was assumed to have a maximum truck capacity of thirty short tons.

Contingency

¶ Other factors require a contingency to be added to the trucking transportation cost models. Time delays caused by multiple stops and cross-docking increase the projected cost of transportation. Cross-docking is the exchange of cargo from one truck to another.

¶ We assumed in the cost projections that each truck would be loaded to capacity. Since it is probable that some trucks will not be fully loaded, a contingency was added to the overall transportation cost to account for this.

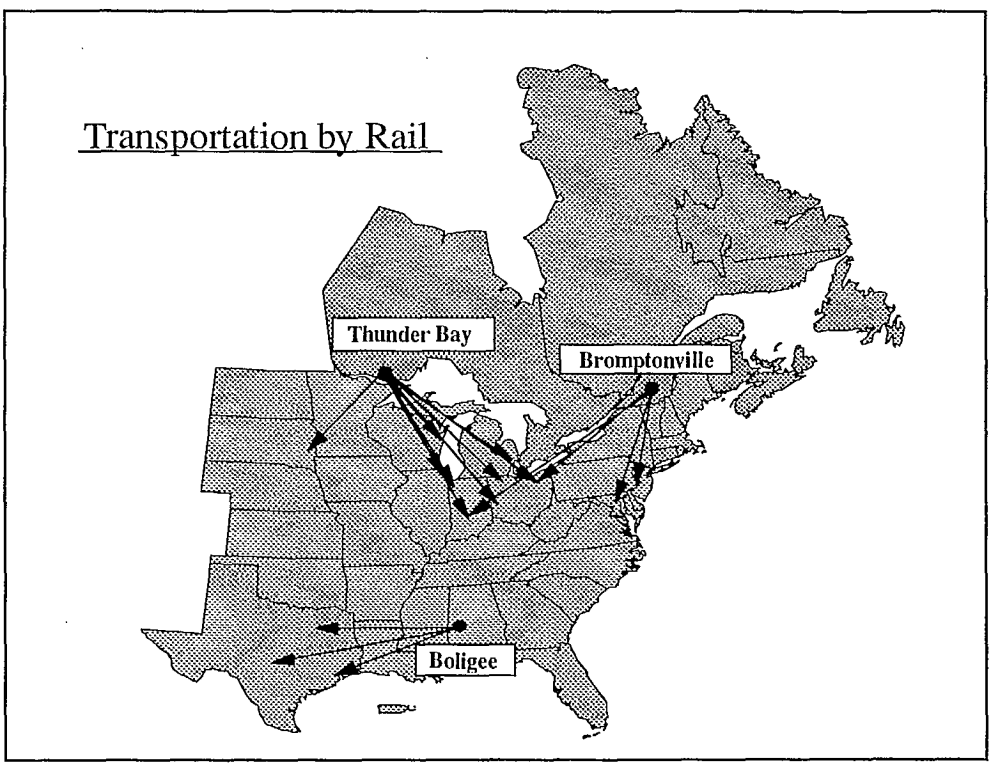
¶ A contingency of twenty percent was added to the transportation cost model for each of the hauling distance classes, except the Canadian long haul. The transportation cost model for Canadian long haul required a thirty percent contingency because the maximum load capacity of the trucks in this class is thirty short tons compared to twenty short tons in the other classes. This increases the chance of a less than full load and necessitates the higher contingency.

## 3.4 Transportation by Rail

Box Car Quotes

¶ The costs of transportation, by rail, were estimated as the product of the tonnage of ONP supplied to each newsprint mill and the quoted rail rate. The suppliers for each newsprint mill that would use rail transportation, instead of transporting by truck, were determined based on the distance to the mill and the availability of a major rail line. Since the costs of transporting ONP by rail are only competitive on long hauls, only the distant suppliers were considered for this mode of transportation.

¶ Detroit, Sioux Falls, Milwaukee, Chicago, Toledo, Dayton, Cleveland, Gary, and Indianapolis are the sources of supply, for the Thunder Bay mill, that were determined to use rail transportation. The Bromptonville mill will be supplied by rail from Philadelphia, Washington D.C., Cleveland, and Indianapolis while Austin, Dallas, and Houston use rail transportation to supply the Boligee newsprint mill with ONP. Both New York mills were able to obtain their supply of ONP from nearby markets so that rail transportation was not needed.



¶ The rail quotations for the Bromptonville and Thunder Bay newsprint mills were obtained from Canadian National Railways (CNR). CSX Transportation provided the rail quotations for the Boligee, Alabama newsprint mill.

¶ The prices for transporting ONP, by rail, were quoted as a cost per hundred weight (one hundred pounds). This price was converted to a cost per short ton (two thousand pounds). We assumed that each box car would have a maximum capacity of fifty five short tons. By multiplying the cost per ton by fifty five, we determined the transportation cost per box car of ONP.

¶ The transportation cost per box car

| | | |
|---|---|---|
| for Bromptonville is: | $1,106 | from Philadelphia and Cleveland |
| | $1,610 | from Washington D.C. |
| | $1,405 | from Indianapolis |
| for Thunder Bay is: | $1,435 | from Detroit and Indianapolis |
| | $1,524 | from Sioux Falls |
| | $1,555 | from Milwaukee |
| | $1,564 | from Chicago |
| | $1,500 | from Gary |
| | $1,794 | from Toledo and Cleveland |
| | $1,973 | from Dayton |
| for Boligee is: | $2,167 | from Austin |
| | $1,980 | from Dallas |
| | $1,991 | from Houston |

Exchange Rate

¶ The quoted rail rates have to be adjusted to convert them from United States dollars to Canadian dollars. We assumed an average long term exchange rate of $1 Cdn = $0.80US (or Canadian rates 25 per cent above U.S.).

¶ Approximately sixty percent of the CNR rail cost is denominated in U.S. dollars (related to the expense of using rail lines owned by United States railways). Therefore, only sixty percent of the exchange rate differential was used. That is, we increased the US$ rates, quoted by CNR, by fifteen percent when we converted to Canadian dollars.

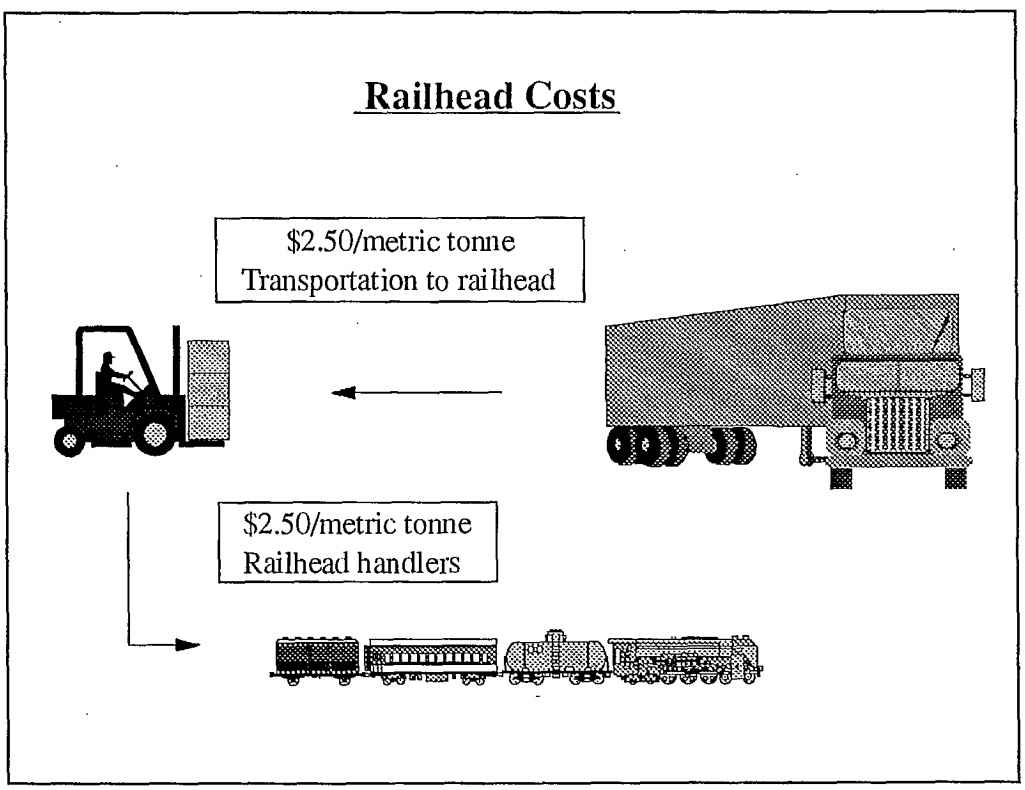
¶ Since all of the CSX rail costs are denominated in U.S. dollars, we increased the quoted rates by the full twenty five percent when converting to Canadian dollars.

Railhead Cost

¶ The disadvantage of rail transportation is that the source of supply may not be located near a railway spur. Now there is the expense of transporting the ONP and OMG to the railway from the broker. Associated with this is the expense of paying for railhead handlers, who unload the ONP and OMG from the truck and then load it onto the train.

¶ An additional cost of $5 per metric tonne was added to cover the railhead costs. Two dollars and fifty cents per metric tonne for transporting the cargo from the broker to the railhead and $2.50 per metric tonne to pay for the railhead handlers. This is equivalent to adding $4.54 per short ton.

¶ Since each box car has a maximum capacity of fifty five short tons of ONP and OMG, two hundred and fifty dollars ($4.54 x 55) per box car was added to the transportation cost.



### 3.5 Travel Distance

¶ Distances are required to compute the transportation costs between the newsprint mills and their sources of supply. Distance information is obtainable from road atlases, commercial tables, and in computerized form. It is often more efficient, however, to compute distances using coordinate points. Unfortunately, it is sometimes less accurate.

¶ We calculated the distance between each mill and its sources of supply using the Great Circle (Spherical Trigonometry) Distance Formula. Latitude and longitudes coordinates, in radians, for the two end points form the input data used by this formula. An advantage of the great circle distance formula is that it avoids mapping distortions and also accounts for the curvature of the earth. Other advantages include; latitude and longitude coordinates are universal, the coordinates are available from a wide variety of sources, the formula is easily computerized, and the results have good accuracy.

The great circle distance formula is:

$$D_{A\text{-}B} = 3959 * (\arccos(\sin(LAT_A) * \sin(LAT_B) + \cos(LAT_A) * \cos(LAT_B) * \cos(\text{abs}(LONG_B - LONG_A))))$$

where

$D_{A\text{-}B}$ = great circle distance between points A and B, in statute miles
$LAT_A$ = latitude of point A
$LONG_A$ = longitude of point A
$LAT_B$ = latitude of point B
$LONG_B$ = longitude of point B

¶ Straight line distances always understate the actual travel distance between two points. Since roads are rarely straight, a factor has to be added to compensate for route impedances such as detours to and around urban centres, geographical features, and any other deviations from the straight line. The computed distance was multiplied by a factor of 1.17 to convert the straight line distance to a more accurate travel distance. The travel distances between twenty U.S. cities were compared to distances obtained from an approved road atlas. While variations of up to seven percent occurred between individual cities, the error in the total mileage was less than one-half percent.

## 3.6 Transportation Cost Models for Trucks

¶ The following formulas represent the transportation cost model for trucks. Each formula was derived from the preceding assumptions. The formulas were used to calculate the transportation cost, by truck, of supplying a newsprint mill with the required amount of ONP and OMG from a specific location. The sum of these costs is the total transportation cost, by truck, for the newsprint mill.

Canadian Short Haul

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $150
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (20 short tons)
C = contingency = 20%

Canadian Long Haul

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $50 + ($1.50 x hauling distance)
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (30 short tons)
C = contingency = 30%

Canada to the United States Long Haul

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $50 + ($1.50 x hauling distance)
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (20 short tons)
C = contingency = 20%

United States Short Haul Except New York State

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $150
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (20 short tons)
C = contingency = 20%

United States Long Haul

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $50 + ($1.50 x hauling distance)
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (20 short tons)
C = contingency = 20%

New York State Short Haul

Total transportation cost by truck = A x B x C
where,
A = fixed and variable costs = $277 + ($1.40 x hauling distance)
B = number of trucks required
= ONP/OMG supply / maximum truck capacity (20 short tons)
C = contingency = 20%

### 3.7 Transportation Cost Model for Rail

¶ The following formulas represent the rail transportation cost model. Each formula was derived from the industry quotes and the exchange rate and railhead cost assumptions. The formulas were used to calculate the transportation cost, by rail, of supplying a newsprint mill with the required amount of ONP from a specific location. The sum of these costs is the total transportation cost, by rail, for the newsprint mill.

Bromptonville Mill

Total transportation cost by rail = ((A x 1.15) + $250) x B
where,
A = $1,106 for Philadelphia and Cleveland
$1,610 for Washington D.C.
$1,405 for Indianapolis
B = number of box cars required
= ONP/OMG supply / maximum box car capacity (55 short tons)

Thunder Bay Mill

Total transportation cost by rail = ((A x 1.15) + $250) x B
where,
A = $1,435 from Detroit and Indianapolis
$1,524 from Sioux Falls
$1,555 from Milwaukee
$1,564 from Chicago
$1,500 from Gary
$1,794 from Toledo and Cleveland
$1,973 from Dayton
B = number of box cars required
= ONP/OMG supply / maximum box car capacity (55 short tons)

Boligee Mill

Total transportation cost by rail = (A x $250) x B
where,
A = $2,167 from Austin
$1,980 from Dallas
$1,991 from Houston
B = number of box cars required
= ONP/OMG supply / maximum box car capacity (55 short tons)

## 3.8 Total Transportation Cost

¶ The transportation cost models were applied to the each of the newsprint mills. The cost of supplying ONP from each supply point to each mill was calculated. The typical furnish of recycled fibre is made up of 70% ONP and 30% OMG (old magazines). The supply numbers below include OMG. The sum of the total transportation cost by truck and the total rail transportation cost provides the total transportation cost of supplying each newsprint mill with ONP and OMG. The following tables summarize this cost by state and also as a cost per ton of supply.

**Total Transportation Cost for Bromptonville (20% R.F.)**

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Connecticut | 3.0 | $96,359.08 |
| Massachusetts | 4.5 | $113,832.35 |
| New Jersey | 9.3 | $375,763.10 |
| New York | 17.5 | $595,571.36 |
| Ontario | 6.0 | $160,306.98 |
| Pennsylvannia | 9.8 | $306,894.47 |
| Quebec | 5.0 | $43,745.28 |
| Rhode Island | 0.9 | $27,489.44 |
| **TOTAL** | **56.0** | **$1,719,962.07** |
| **Cost Per Ton** | | **$30.71** |

Total Transportation Cost for Bromptonville (40% R.F.)

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Connecticut | 3.0 | $96,359.08 |
| Delaware | 2.6 | $130,099.91 |
| D. of Columbia | 9.0 | $304,436.64 |
| Massachusetts | 10.7 | $271,943.67 |
| Maryland | 5.0 | $271,523.29 |
| Michigan | 1.5 | $100,818.69 |
| New Jersey | 12.0 | $490,494.57 |
| New York | 27.7 | $957,974.57 |
| Ohio | 9.0 | $429,411.91 |
| Ontario | 6.5 | $170,714.59 |
| Pennsylvannia | 15.0 | $495,276.84 |
| Quebec | 8.0 | $70,051.65 |
| Rhode Island | 2.0 | $61,087.63 |
| **TOTAL** | **112.0** | **$3,850,120.44** |
| **Cost Per Ton** | | **$34.38** |

Total Transportation Cost for Thunder Bay (40% R.F.)

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Illinois | 14.6 | $520,115.50 |
| Indiana | 26.0 | $1,091,540.68 |
| Iowa | 9.9 | $514,496.46 |
| Michigan | 14.6 | $518,987.25 |
| Minnesota | 6.0 | $181,683.15 |
| Ohio | 16.7 | $712,818.38 |
| Ontario | 10.5 | $381,423.35 |
| South Dakota | 3.0 | $96,763.64 |
| Wisconsin | 10.7 | $379,725.08 |
| **TOTAL** | **112.0** | **$4,397,553.49** |
| **Cost Per Ton** | | **$39.26** |

Total Transportation Cost for Thunder Bay (20% R.F.)

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Illinois | 11.8 | $404,024.28 |
| Indiana | 8.5 | $263,363.64 |
| Iowa | 5.0 | $253,824.39 |
| Michigan | 8.5 | $278,306.36 |
| Minnesota | 6.0 | $181,683.15 |
| Ontario | 6.0 | $166,698.59 |
| Wisconsin | 10.2 | $359,234.48 |
| **TOTAL** | **56.0** | **$1,907,134.89** |
| **Cost Per Ton** | | **$34.06** |

Total Transportation Cost for Boligee (40% R.F.)

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Alabama | 13.8 | $230,985.14 |
| Arkansas | 8.2 | $293,935.77 |
| Florida | 15.0 | $481,019.09 |
| Georgia | 11.7 | $310,849.12 |
| Indiana | 0.9 | $47,477.38 |
| Kentucky | 5.5 | $241,674.14 |
| Louisianna | 7.7 | $226,477.04 |
| Mississippi | 8.6 | $157,919.46 |
| North Carolina | 2.6 | $136,324.99 |
| South Carolina | 3.7 | $161,581.12 |
| Tennessee | 14.3 | $427,516.96 |
| Texas | 20.0 | $1,009,454.55 |
| **TOTAL** | **112.0** | **$3,725,214.76** |
| **Cost Per Ton** | | **$33.26** |

Total Transportation Cost for Boligee (20% R.F.)

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Alabama | 12.4 | $206,968.61 |
| Arkansas | 2.3 | $73,515.13 |
| Florida | 5.9 | $124,547.82 |
| Georgia | 5.7 | $151,707.01 |
| Kentucky | 6.3 | $290,623.00 |
| Louisianna | 3.3 | $91,456.37 |
| Mississippi | 8.0 | $147,267.15 |
| North Carolina | 1.3 | $68,075.00 |
| South Carolina | 2.1 | $92,259.82 |
| Tennessee | 8.7 | $257,151.01 |
| **TOTAL** | **56.0** | **$1,503,570.93** |
| **Cost Per Ton** | | **$26.85** |

## Total Transportation Cost for the New York Maxi Mill

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| Connecticut | 4.0 | $70,854.83 |
| Delaware | 2.0 | $43,266.57 |
| D. of Columbia | 23.5 | $703,896.14 |
| Maine | 3.0 | $96,194.30 |
| Maryland | 10.2 | $248,959.99 |
| Massachusetts | 17.6 | $450,738.87 |
| New Hampshire | 3.0 | $74,055.32 |
| New Jersey | 27.9 | $477,825.75 |
| New York | 133.7 | $2,131,438.27 |
| Pennsylvannia | 52.1 | $1,059,701.41 |
| Vermont | 4.0 | $104,923.14 |
| Virginia | 5.0 | $207,092.75 |
| **TOTAL** | **286.0** | **$5,668,947.33** |
| **Cost Per Ton** | | **$19.82** |

## Total Transportation Cost for the New York Mini Mill

| State | Supply ('000 short tons) | Transportation Cost ($ Cdn) |
|---|---|---|
| New Jersey | 15.0 | $128,571.43 |
| New York | 77.0 | $1,298,230.13 |
| Pennsylvannia | 8.0 | $98,123.90 |
| **TOTAL** | **100.0** | **$1,524,925.45** |
| **Cost Per Ton** | | **$15.25** |

# Appendix I

## ONP and OMG Demand By Recycling Mill

File: DIPS.wk4 Date: 16-May

C = Cancelled Mills

## Newsprint, Printing & Writing & Tissue

| Company | Mill | Location | Start Date | Product | ONP Demand | | % OMG | OMG Demand | OMG Demand |
|---|---|---|---|---|---|---|---|---|---|
| Bowater | East Millinocket | Maine | Exists | News | 60 | | 30% | 26 | D |
| Caithness-King | Pejepscot | Maine | 1997 | Mkt Pulp | 108 | C | 30% | 46 | J |
| Fraser Paper | Madawaska | Maine | Exists | UCGW,CGW | 6 | | 50% | 6 | |
| Fraser Paper | Madawaska | Maine | 1997 | UCGW,CGW | 69 | | 50% | 69 | C |
| Madison Paper Industries | Madison | Maine | 1997 | UCGW,CGW | | | | | D |
| Garden State | Garfield | New Jersey | Exists | News | 255 | | 0% | 0 | |
| Int'l Resource Recyling | Camden | New Jersey | 1995 | Mkt Pulp | 100 | | 30% | 43 | |
| Marcal Paper | Elmwood Park | New Jersey | Exists | Tissue | | | | 30 | D |
| Champion Int'l | Deferiet | New York | 1996 | UCGW | 80 | | 35% | 43 | |
| Ponderosa Fibre | Albany | New York | 1995 | News,Mkt Pulp | 99 | C | 30% | 42 | E |
| Ponderosa Fibre | South Bronx | New York | 1997 | News | 99 | | 30% | 42 | E |
| Smurfit Newsprint | ? | New York | 1997 | News | 181 | C | 30% | 78 | G |
| Int'l Paper Co. | Lock Haven | Pennsylvania | Exists | UCGW | 76 | | 35% | 41 | |
| Bear Island | Ashland | Virginia | Exists | News | 60 | | 30% | 26 | |
| FSC Paper | Alsip | Illinois | Exists | News | 136 | | 0% | 0 | |
| Manistique Papers (Kruger?) | Manistique | Michigan | Exists | News | 0 | | 100% | 69 | J |
| Caithness-King | ? | Michigan | 1997 | Mkt Pulp | | C | | | J |
| Consolidated Paper | Stephens Pt. | Wisconsin | 1996 | UCGW,CGW | 60 | | 30% | 26 | |
| Fort Howard | Green Bay | Wisconsin | Exists | Tissue | 75 | | | 80 | est |
| REPAP | Kimberly | Wisconsin | 1996 | UCGW,CGW | 60 | | 30% | 26 | |
| Niagara of Wisconsin | Niagara | Wisconsin | 1995 | CGW | 60 | | 30% | 26 | |
| Augusta Newsprint | Augusta | Georgia | Exists | News | 86 | | 30% | 37 | |
| Augusta Newsprint | Augusta | Georgia | 1996 | News | 147 | | 30% | 63 | F |
| Fort Howard | Rincon | Georgia | Exists | Tissue | 75 | | | 80 | est |
| Southeast Paper | Dublin | Georgia | Exists | News | 489 | | 0% | 0 | |
| Alabama River Newprt | Claiborne | Alabama | Exists | News | 86 | | 30% | 37 | D |
| Kimberly-Clark | Coosa Pines | Alabama | Exists | News, UCGW | 26 | | 30% | 11 | D |
| Bowater | Calhoun | Tennessee | Exists | News | 95 | | 30% | 41 | E |
| Ford Howard Corp | Muskogee | Oklahoma | Exists | Tissue | 25 | | | 30 | est |
| Champion International | Sheldon | Texas | Exists | News | 134 | | 25% | 45 | D |
| K-Chico | ? | Texas | 1997 | News | 20 | C | ? | 0 | |
| Kenaf Paper | Raymondville | Texas | 1997 | News | 20 | C | ? | 0 | |
| OTHER US (unkown location) | | West US | 1998 | UCGW | 150 | | 15% | 26 | |
| | | West US | 1998 | News | 170 | | 30% | 73 | |
| Miramichi Pulp&Paper | Newcastle | New Brunswick | 1997 | UCGW | 60 | | 15% | 11 | |
| Stora | Port Hawkesbury | Nova Scotia | 1996 | News | 95 | | 20% | 24 | |
| Abitibi-Price | Abitibi | Quebec | 1995 | News, UCGW | 80 | | 30% | 34 | |
| CPFP | Gatineau | Quebec | Exists | News | 173 | | 30% | 74 | G |
| Daishowa Forest | Quebec City | Quebec | Exists | News, UCGW | 73 | | 30% | 31 | |
| Desencrage C.D.M. | Cap-de-la-Madeleine | Quebec | Exists | News | 121 | | 30% | 52 | F |
| Cascades | Kingsey Falls | Quebec | Exists | Tissue | 0 | | | 25 | est |
| Kruger | Bromptonville | Quebec | Exists | News | 48 | | 30% | 21 | |
| QUNO | Baie Comeau | Quebec | 1997 | News | 80 | | 30% | 34 | E |
| Soucy Inc | Riviere-du-Loup | Quebec | 1995 | News | 45 | | 30% | 19 | |
| Stone Consolidated | Shawinigan | Quebec | Exists | News | 60 | | 30% | 26 | |
| Abitibi-Price | Thunder Bay | Ontario | 1997 | News | 69 | | 30% | 30 | |
| Atlantic Newsprint | Whitby | Ontario | Exists | News | 130 | | 30% | 56 | F |
| Atlantic Packaging | Scarborough | Ontario | Exists | Tissue | 0 | | | 10 | est |
| Boise Cascade | Kenora | Ontario | 1997 | News,UCGW | 86 | | 30% | 37 | D |
| CPFP | Thunder Bay | Ontario | Exists | News | 95 | | 30% | 41 | E |
| QUNO | Thorold | Ontario | Exists | News,UCGW | 186 | | 30% | 80 | G |
| Spruce Falls | Kapuskasing | Ontario | Exists | News | 50 | | 0% | 0 | |

OTHERS CANADA

| | |
|---|---|
| A= | 5 |
| B= | 10 |
| C= | 20 |
| D= | 30 |
| E= | 40 |
| F= | 50 |
| G= | 75 |
| H= | 100 |
| J= | 125 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Alberta Newsprint | Whitecourt | Alberta | Exists | News | 25 | 30% | 11 | |
| Alberta Newsprint | Whitecourt | Alberta | 1995 | News | 136 | 30% | 58 | |
| Newstech Recycling | Coquitlam | BC | Exists | Mkt Pulp | 112 | 30% | 48 | E |
| ? | ? | ? | 1998 | UCGW | 150 | 15% | 26 | |
| ? | ? | ? | 1998 | News | 170 | 30% | 73 | |

| | |
|---|---|
| Cdn ONP Tota | 2044 |
| Cdn OMG Tota | 820 |

OTHERS USA

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Evergreen Pulp & Paper | Redrock | Arizona | 1997 | News | 216 C | 30% | 93 | G |
| Stone Container | Snowflake | Arizona | Exists | News | 169 | 20% | 42 | F |
| Golden State | Pomona | California | Exists | News | 159 | 0% | 0 | |
| Golden State | Pomona | California | 1995 | News | 337 | 0% | 0 | |
| MacMillan Bloedel | Central Valley | California | 1997 | News | 259 C | 30% | 111 | G |
| Smurfit Newsprint | Newberg | Oregon | Exists | News | 216 | 0% | 0 | |
| Smurfit Newsprint | Oregon City | Oregon | Exists | News,UCGW | 87 | 25% | 29 | E |
| Westbrook Wood Prod. | Klamath Falls | Oregon | 1997 | News | 199 C | 30% | 85 | G |
| Boise Cascade | Steilacoom | Washington | Exists | News | 73 | 30% | 31 | D |
| Daishowa Forest | Port Angeles | Washington | Exists | UCGW | 73 | 0% | 0 | |
| Inland-Empire | Milwood | Washington | Exists | News | 45 | 0% | 0 | |
| North Pacific Paper | Longview | Washington | Exists | News | 143 | 30% | 61 | F |
| | | cancelled mills | | | -199 | 30% | -85 | |
| | | cancelled mills | | | -259 | 30% | -111 | |
| | | cancelled mills | | | -216 | 30% | -93 | |
| | | cancelled mills | | | -20 | ? | 0 | |
| | | cancelled mills | | | -20 | ? | 0 | |
| | | cancelled mills | | | -181 | 30% | -78 | |
| | | cancelled mills | | | -99 | 30% | -42 | |
| | | cancelled mills | | | -108 | 30% | -46 | |
| | | | | | -100 | 30% | -43 | |

| | | ONP | OMG |
|---|---|---|---|
| TOTAL DEMAND: | NA Total: | 5925 | 1935 |
| DIP Mills | Cdn Tot: | 2044 | 820 |
| | US Tot: | 3881 | 1115 |

## PAPERBOARD MILLS

| | | | Recycling Capacity | ONP (1998) Demand | ONP (1998) Demand | OMG (1998) Demand | |
|---|---|---|---|---|---|---|---|
| REGION A | | | | | | | |
| Federal Paper Board | Versailles | Connecticut | 132 | E | 40 | 15 | |
| Lydall Inc | Manchester | Connecticut | 30 | A | 10 | | |
| Rand-Whitney Paperboard | Montville | Connecticut | 18 | A | 10 | 3 | |
| Simkins Industries | New Haven | Connecticut | 62 | B | 15 | 5 | |
| Yorktowne Paper Mills | Gardiner | Maine | 30 | A | 10 | | |
| Haverhill Paperboard | Haverhill | Massachusetts | 112 | B | 15 | | |
| Natick Paperboard | Natick | Massachusetts | 35 | B | 15 | | |
| Newark Atlantic Paperboard | Lawrence | Massachusetts | 60 | B | 15 | 5 | |
| Pekit Folding Box Board | Boston | Massachusetts | 25 | A | 10 | | |
| Sonoco Products | Holyoke | Massachusetts | 70 | A | 10 | | |
| APC Inc | Claremont | New Hampshir | 20 | A | 10 | | |
| Papertech Corp | W.Hopkinton | New Hampshir | 30 | A | 10 | | |
| Rock-Tenn Co | Sheldon Springs | Vermont | 50 | A | 10 | | |
| Specialty Paperboard | Brattleboro | Vermont | 30 | A | 10 | | |
| REGION B | | | | | | | |
| Caraustar Industries | Camden | New Jersey | 45 | B | 15 | 5 | |
| Davey Co. | Jersey City | New Jersey | 35 | B | 15 | | |
| Georgia-Pacific | Delair | New Jersey | 70 | C | 25 | 10 | |
| Homasote Co. | West Trenton | New Jersey | 120 | C | 25 | | |
| Lowe Paper Co. | Ridgefield | New Jersey | 48 | B | 15 | | |
| Mafcote Industries | Garwood | New Jersey | 40 | B | 15 | | |
| Newark Boxboard | Newark | New Jersey | 45 | B | 15 | | |
| Paperboard Specialties | Patterson | New Jersey | 40 | A | 10 | | |
| Recycled Paperboard | Clifton | New Jersey | 52 | B | 15 | | |
| US Gypsum Co | Clark | New Jersey | 140 | F | 60 | 20 | |
| Armstrong World Industries | Fulton | New York | 32 | A | 10 | | |

| | |
|---|---|
| A= | 10 |
| B= | 15 |
| C= | 25 |
| D= | 35 |
| E= | 40 |
| F= | 60 |
| G= | 80 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Beaver Specialty Paper Products | Brownville | New York | 28 | A | 10 | | |
| Champion International | Deferiet | New York | 105 | G | 80 | start 1998 | |
| Climax Manufacturing Co | Carthage | New York | 45 | A | 10 | | |
| Columbia Corp | Chatham | New York | 35 | B | 15 | | |
| Domtar Gypsum | Lockport | New York | 65 | B | 15 | | |
| Fort Orange Paper | Castleton-on-Hudsoı | New York | 36 | A | 10 | | |
| Martisco Paper CO. | Marcellus | New York | 5 | A | 10 | | |
| Sonoco Products | Amsterdam | New York | 20 | A | 10 | | |
| Specialty Paperboard | Beaver Falls | New York | 9 | A | 10 | | |
| US Gypsum Co. | Oakfield | New York | 36 | B | 15 | | 5 |
| | | | | | | | |
| American Paper Board | Lancaster | Pennsylvania | 17 | A | 10 | | |
| Brandywine Paperbard Mills | Downingtown | Pennsylvania | 16 | A | 10 | | |
| Jefferson Smurfit (CCA) | Philadelphia | Pennsylvania | 155 | E | 40 | | |
| National Gypsum CO. | Milton | Pennsylvania | 107 | D | 35 | | 10 |
| Newman & Co. | Philadelphia | Pennsylvania | 67 | B | 15 | | |
| Rock-Tenn Co | Delaware Water Gaı | Pennsylvania | 40 | C | 25 | | 10 |
| Sonoco Products | Downingtown | Pennsylvania | 55 | A | 10 | | |
| Stone Container Corp | York | Pennsylvania | 129 | A | 10 | | |
| Yorktowne Paper Mills | York | Pennsylvania | 35 | B | 15 | | |
| Unidentified Pennsylvania Mill | | | | | | | |
| | | | | | | | |
| REGION C | | | | | | | |
| Chesapeake Corp | Baltimore | Maryland | 79 | C | 25 | | |
| Simkins Industries | Catonsville | Maryland | 59 | B | 15 | | |
| | | | | | | | |
| Carolina Paper Board | Charlotte | North Carolina | 40 | B | 15 | | |
| Halifax Paperboard | Roanoke Rapids | North Carolina | 30 | A | 10 | | |
| | | | | | | | |
| Chesapeake Corp | West Point | Virginia | 200 | A | 10 | | |
| Georgia-Bonded | Buena Vista | Virginia | 15 | A | 10 | | |
| Manchester Board & Paper | Richmond | Virginia | 40 | A | 10 | | |
| Rock-Tenn Co | Lynchburg | Virginia | 110 | B | 15 | | 5 |
| Sonoco Products | Richmond | Virginia | 64 | C | 25 | | 10 |
| | | | | | | | |
| REGION D | | | | | | | |
| Certainteed Corp | Avery | Ohio | 30 | A | 10 | | |
| Cincinnati Paperboard Corp | Cincinnati | Ohio | 64 | B | 15 | | |
| Georgia-Pacific | Franklin | Ohio | 45 | C | 25 | | |
| Grief Board Co | Massillon | Ohio | 120 | A | 10 | | |
| Jefferson Smurfitt (CCA) | Lockland | Ohio | 97 | C | 25 | | 10 |
| Jefferson Smurfitt (CCA) | Middletown | Ohio | 84 | A | 10 | | 3 |
| Newark Boxboard | Franklin | Ohio | 55 | A | 10 | | |
| Newark Boxboard | Middletown | Ohio | 45 | B | 15 | | |
| Packaging Corp of America | Rittman | Ohio | 112 | D | 35 | | 10 |
| Rock-Tenn | Cincinnati | Ohio | 40 | B | 15 | | |
| Sonoco Products | Lancaster | Ohio | 28 | A | 10 | | |
| Sonoco Products | Monroe Falls | Ohio | 24 | A | 10 | | |
| USG Industries | Gypsum | Ohio | 35 | B | 15 | | |
| Valley Converting | Toronto | Ohio | 38 | B | 15 | | |
| | | | | | | | |
| Halltown Paperboard Co | Halltown | West Virginia | 70 | C | 25 | | |
| | | | | | | | |
| REGION E | | | | | | | |
| Celotex Corp | Quincy | Illinois | 105 | D | 35 | | 10 |
| Chicago Paperboard Co | Chicago | Illinois | 65 | A | 10 | | |
| Davey Co | Aurora | Illinois | 35 | A | 10 | | |
| Manville Sales Corp | Joliet | Illinois | 69 | C | 25 | | |
| Quaker Oats | Pekin | Illinois | 28 | A | 10 | | |
| Sonoco Products | Rockton | Illinois | 21 | A | 10 | | |
| | | | | | | | |
| Beveridge Paper Co. | Indianapolis | Indiana | 20 | A | 10 | | |
| Jeferson Smurfit (CCA) | Lafayette | Indiana | 43 | B | 15 | | |
| Jeferson Smurfit (CCA) | Wabash | Indiana | 114 | C | 25 | | |
| Kieffer Paper Inc | Brownstown | Indiana | 25 | A | 10 | | |
| Rock-Tenn Co. | Eaton | Indiana | 50 | B | 15 | | |
| | | | | | | | |
| Big M Paperboard | Palmyra | Michigan | 28 | A | 10 | | |
| Converters Paperboard Co | Rockford | Michigan | 28 | A | 10 | | 3 |
| James River Corp | Kalamazoo | Michigan | 170 | E | 40 | | 15 |
| Jeferson Smurfit (CCA) | Monroe | Michigan | 45 | B | 15 | | |
| Michigan Paperboard | Battle Creek | Michigan | 110 | C | 25 | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Monroe Paper | Monroe | Michigan | 69 | A | 10 | |
| Rock-Tenn Co. | Otsego | Michigan | 70 | C | 25 | |
| Simplex Products | Constantine | Michigan | 50 | A | 10 | |
| Waldorf Corp | Battlecreek | Michigan | 91 | D | 35 | 10 |
| White Pigeon Paper Board | White Pigeon | Michigan | 52 | A | 10 | 3 |
| | | | | | | |
| REGION F | | | | | | |
| Packaging Corp of America | Tama | Iowa | 40 | B | 15 | 5 |
| | | | | | | |
| Certainteed Corp | Shakopee | Minnesota | 64 | B | 15 | |
| Waldorf Corp | St.Paul | Minnesota | 90 | E | 40 | |
| Waldorf Corp | St.Paul | Minnesota | 28 | B | 15 | 5 |
| | | | | | | |
| Beloit Boax Board | Beloit | Wisconsin | 20 | A | 10 | |
| Globe Building Materials | Cornell | Wisconsin | 69 | B | 15 | |
| US Paper Mills | DePere | Wisconsin | 35 | A | 10 | |
| US Paper Mills | Menasha | Wisconsin | 90 | B | 15 | |
| Wisconsin Paperboard Corp | Milwaukee | Wisconsin | 145 | C | 25 | |
| | | | | | | |
| REGION G | | | | | | |
| St Joe Forest Products | Port St.Joe | Florida | 50 | A | 10 | 3 |
| US Gypsum Co | Jacksonville | Florida | 80 | C | 25 | 10 |
| | | | | | | |
| Austell Box Board Corp | Austell | Georgia | 120 | B | 15 | |
| Armstrong World Industries | Macon | Georgia | 35 | D | 35 | |
| Jeferson Smurfit | Cedartown | Georgia | 20 | A | 10 | |
| Sonoco Products | Atlanta | Georgia | 35 | A | 10 | |
| Stone Container Corp | Port Wentworth | Georgia | 70 | B | 15 | 5 |
| | | | | | | |
| Carotell Paper Board | Taylors | South Carolina | 59 | B | 15 | |
| Sonoco Products | Hartsville | South Carolina | 190 | E | 40 | |
| | | | | | | |
| REGION H | | | | | | |
| Armstrong World Industries | Mobile | Alabama | 120 | F | 60 | |
| GAF Corp | Mobile | Alabama | 40 | B | 15 | |
| National Gypsum Co | Anniston | Alabama | 75 | C | 25 | 10 |
| Newark Box Board Co | Mobile | Alabama | 85 | B | 15 | |
| | | | | | | |
| Atlas Roofing Corp | Meridian | Mississippi | 35 | A | 10 | |
| | | | | | | |
| Caraustar Industries | Chattanooga | Tennessee | 48 | A | 10 | |
| Lydall Inc | Covington | Tennessee | 20 | A | 10 | |
| Rock-Tenn Co | Chattanooga | Tennessee | 135 | E | 40 | |
| Sonoco Products | Newport | Tennessee | 95 | A | 10 | |
| Tamko Asphalt | Knoxville | Tennessee | 65 | B | 15 | |
| | | | | | | |
| REGION J | | | | | | |
| Celotex Corp | Camden | Arkansas | 15 | A | 10 | |
| Green Bay Packaging | Morriton | Arkansas | 180 | C | 25 | 10 |
| International Paper CO | Camden | Arkansas | 65 | A | 10 | |
| | | | | | | |
| Republic Paperboard | Hutchinson | Kansas | 75 | C | 25 | |
| Tamco Asphalt | Philipsburg | Kansas | 30 | A | 10 | |
| | | | | | | |
| Huebert Fibreboard | Boonville | Missouri | 25 | A | 10 | |
| Tamko Asphalt | Joplin | Missouri | 50 | B | 15 | |
| US Gypsum Co | N. Kansas City | Missouri | 35 | B | 15 | 5 |
| | | | | | | |
| Georgia-Pacific | Ardmore | Oklahoma | 15 | A | 10 | |
| Georgia-Pacific | Pryor | Oklahoma | 80 | B | 15 | 5 |
| National Gypsum Co | Pryor | Oklahoma | 80 | C | 25 | 10 |
| | | | | | | |
| REGION K | | | | | | |
| Celotex Corp | Marrero | Louisiana | 70 | D | 35 | |
| GS Roofing | Ahreveport | Louisiana | 80 | A | 10 | |
| | | | | | | |
| Georgia-Pacific | Daingerfield | Texas | 15 | A | 10 | |
| Rock-Tenn Co | Dallas | Texas | 122 | E | 40 | 15 |
| USG Industries | Galena Park | Texas | 60 | B | 15 | |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| CANADA | | | | | | | |
| Fraser | Edmudston | New Brunswick | 15 | B | 15 | | |
| Minas Basin Pulp & Power Co | Hantsport | Nova Scotia | 35 | A | 10 | | |
| Cascades | East Angus | Quebec | 25 | B | 15 | 5 | |
| Daishowa Forest Products | Quebec City | Quebec | 100 | B | 15 | | |
| Paperboard Industries Corp | Montreal | Quebec | 35 | B | 15 | | |
| Sonoco Ltd | Terrebonne | Quebec | 20 | A | 10 | | |
| Beaver Wood Fibre Co | Thorold | Ontario | 125 | B | 15 | | |
| Paperboard Industries | Glen Miller | Ontario | 35 | A | 10 | | |
| Paperboard Industries | Toronto | Ontario | 112 | G | 80 | 30 | D |
| Sonoco Ltd | Brantford | Ontario | 45 | A | 10 | | |
| Strathcona Paper Co | Napanee | Ontario | 53 | D | 35 | 15 | |
| Other Canada and US | | | | | | | |
| Paperboard Industries | Burnaby | BC | 160 | D | 35 | | |
| Leatherback Industries | Alburquerque | New Mexico | 40 | B | 15 | | |
| California Paper Board | Santa Clara | California | 50 | B | 15 | | |
| Domtar Gypsum | Sal Leandro | California | 65 | B | 15 | 3 | |
| Domtar Gypsum | Vernon | California | 55 | C | 25 | 10 | |
| Fontana Paper Mills | Fontana | California | 20 | A | 10 | | |
| Jefferson Smurfit | Santa Clara | California | 88 | C | 25 | 10 | |
| Jefferson Smurfit | Vernon | California | 75 | A | 10 | | |
| Leatherback Industries | Hollister | California | 20 | A | 10 | | |
| Los Angeles Paper Box & Board | Los Angeles | California | 30 | A | 10 | | |
| Lunday-Thagard | Southgate | California | 10 | A | 10 | | |
| Newark Pacific Paperboard | Los Angeles | California | 46 | B | 15 | 5 | |
| Newark Sierra Paperboard | Stockton | California | 84 | C | 25 | 10 | |
| PABCO Paper Board | Vernon | California | 56 | D | 35 | 10 | |
| Sonoco Products | City of Industry | California | 25 | A | 10 | | |
| Specialty Paper Mills | Santa Fe Springs | California | 25 | A | 10 | | |
| USG Industries | South Gate | California | 70 | C | 25 | | |
| Jefferson Smurfit (CCA) | Tacoma | Washington | 40 | B | 15 | | |
| Simpson Tacoma Kraft | Tacoma | Washington | 150 | B | 15 | 5 | |
| Sonoco Products | Sumner | Washington | 20 | A | 10 | | |

| | ONP | OMG |
|---|---|---|
| TOTAL DEMAND FOR PAPERBOARD | 2905 | 353 |

# Appendix II

# ONP Supply By Urban Area

ONP Supply (000's short tons)

R= 0.35
U= 0.6
C= 0.55

| State | MSA | Press Waste | Newsstand Returns | Total Commercial | Non-Comm. Dist'd | Total ONP Supply | Projected to 1998 | Rural or Urban | Percentage Recovered | Recovered ONP (1998) | | Recovered ONP by MSA |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Connecticut | | 11.20 | 9.70 | 20.90 | 226.00 | 246.90 | 259.49 | C | 0.55 | 142.72 | | 142.72 |
| | Rural | 0.00 | 0.70 | 0.70 | 16.10 | 16.80 | 17.66 | R | 0.35 | | | 0.00 |
| | Bridgeport | 2.80 | 2.60 | 5.40 | 60.60 | 66.00 | 69.37 | U | 0.6 | 41.62 | 1.54 | 43.16 |
| | Hartford | 2.80 | 3.20 | 6.00 | 74.90 | 80.90 | 85.03 | U | 0.6 | 51.02 | 1.54 | 52.56 |
| | New Haven | 2.80 | 2.40 | 5.20 | 56.10 | 61.30 | 64.43 | U | 0.6 | 38.66 | 1.54 | 40.20 |
| | New London | 2.80 | 0.80 | 3.60 | 18.30 | 21.90 | 23.02 | U | 0.6 | 13.81 | 1.54 | 15.36 |
| Maine | | 8.40 | 2.90 | 11.30 | 69.10 | 80.40 | 84.50 | C | 0.55 | 46.48 | | 46.48 |
| | Rural | 0.00 | 1.50 | 1.50 | 36.30 | 37.80 | 39.73 | R | 0.35 | | | 0.00 |
| | Bangor | 2.80 | 0.40 | 3.20 | 9.60 | 12.80 | 13.45 | U | 0.6 | 8.07 | 4.63 | 12.71 |
| | Lewiston | 2.80 | 0.30 | 3.10 | 6.80 | 9.90 | 10.40 | U | 0.6 | 6.24 | 4.63 | 10.88 |
| | Portland | 2.80 | 0.70 | 3.50 | 16.40 | 19.90 | 20.92 | U | 0.6 | 12.55 | 4.63 | 17.18 |
| Mass. | | 14.00 | 17.20 | 31.20 | 400.00 | 431.20 | 453.20 | C | 0.55 | 249.26 | | 249.26 |
| | Rural | 0.00 | 0.90 | 0.90 | 21.40 | 22.30 | 23.44 | R | 0.35 | | | 0.00 |
| | Boston | 2.80 | 10.90 | 13.70 | 252.80 | 266.50 | 280.09 | U | 0.6 | 168.06 | 1.64 | 169.70 |
| | Fitchburg | 2.80 | 2.00 | 4.80 | 45.80 | 50.60 | 53.18 | U | 0.6 | 31.91 | 1.64 | 33.55 |
| | Fall River | 2.80 | 1.40 | 4.20 | 33.30 | 37.50 | 39.41 | U | 0.6 | 23.65 | 1.64 | 25.29 |
| | Pittsfield | 2.80 | 0.40 | 3.20 | 10.10 | 13.30 | 13.98 | U | 0.6 | 8.39 | 1.64 | 10.03 |
| | Springfield | 2.80 | 1.60 | 4.40 | 36.60 | 41.00 | 43.09 | U | 0.6 | 25.85 | 1.64 | 27.50 |
| New Hamp. | | 5.60 | 2.60 | 8.20 | 60.10 | 68.30 | 71.78 | C | 0.55 | 39.48 | | 39.48 |
| | Rural | 0.00 | 0.90 | 0.90 | 20.60 | 21.50 | 22.60 | R | 0.35 | | | 0.00 |
| | Manchester | 2.80 | 0.90 | 3.70 | 21.10 | 24.80 | 26.07 | U | 0.6 | 15.64 | 3.95 | 19.59 |
| | Portsmouth | 2.80 | 0.80 | 3.60 | 18.40 | 22.00 | 23.12 | U | 0.6 | 13.87 | 3.95 | 17.83 |
| Rhode Is. | | 2.80 | 2.80 | 5.60 | 64.20 | 69.80 | 73.36 | C | 0.55 | 40.35 | | 40.35 |
| | Rural | 0.00 | 0.30 | 0.30 | 5.80 | 6.10 | 6.41 | R | 0.35 | | | 0.00 |
| | Providence | 2.80 | 2.50 | 5.30 | 58.40 | 63.70 | 66.95 | U | 0.6 | 40.17 | 2.24 | 42.41 |
| Vermont | | 2.80 | 1.30 | 4.10 | 30.00 | 34.10 | 35.84 | C | 0.55 | 19.71 | | 19.71 |
| | Rural | 0.00 | 1.00 | 1.00 | 22.00 | 23.00 | 24.17 | U | 0.6 | | | 0.00 |
| | Burlington | 2.80 | 0.30 | 3.10 | 8.00 | 11.10 | 11.67 | U | 0.6 | 7.00 | 14.50 | 21.50 |
| New Jersey | | 21.03 | 28.80 | 49.83 | 544.90 | 594.73 | 625.06 | C | 0.55 | 343.78 | | 343.78 |
| | Rural | 0.00 | 4.30 | 4.30 | 84.30 | 88.60 | 93.12 | R | 0.35 | | | 0.00 |
| | Atlantic City | 2.63 | 1.20 | 3.83 | 21.80 | 25.63 | 26.94 | U | 0.6 | 16.16 | 4.07 | 20.24 |
| | Bergen | 2.63 | 4.90 | 7.53 | 91.90 | 99.43 | 104.50 | U | 0.6 | 62.70 | 4.07 | 66.77 |
| | Jersey City | 2.63 | 1.60 | 4.23 | 29.60 | 33.83 | 35.55 | U | 0.6 | 21.33 | 4.07 | 25.41 |
| | Middlesex | 2.63 | 4.40 | 7.03 | 83.00 | 90.03 | 94.62 | U | 0.6 | 56.77 | 4.07 | 60.85 |
| | Monmouth | 2.63 | 3.70 | 6.33 | 70.20 | 76.53 | 80.43 | U | 0.6 | 48.26 | 4.07 | 52.33 |
| | Newark | 2.63 | 6.70 | 9.33 | 126.40 | 135.73 | 142.65 | U | 0.6 | 85.59 | 4.07 | 89.66 |
| | Trenton | 2.63 | 1.60 | 4.23 | 29.80 | 34.03 | 35.76 | U | 0.6 | 21.46 | 4.07 | 25.53 |
| | Vineland | 2.63 | 0.40 | 3.03 | 7.90 | 10.93 | 11.49 | U | 0.6 | 6.89 | 4.07 | 10.97 |
| New York | | 44.68 | 60.10 | 104.78 | 1137.00 | 1241.78 | 1305.12 | C | 0.55 | 717.82 | | 717.82 |
| | Rural | 0.00 | -0.0 | -0.00 | 0.00 | -0.00 | -0.00 | R | 0.35 | -0.00 | | -0.00 |
| | Albany | 2.63 | 2.80 | 5.43 | 53.40 | 58.83 | 61.83 | U | 0.6 | 37.10 | | 37.10 |
| | Binghamton | 2.63 | 0.80 | 3.43 | 15.60 | 19.03 | 20.00 | U | 0.6 | 12.00 | | 12.00 |
| | Buffalo | 2.63 | 3.50 | 6.13 | 65.50 | 71.63 | 75.28 | U | 0.6 | 45.17 | | 45.17 |
| | Elmira | 2.63 | 0.30 | 2.93 | 5.50 | 8.43 | 8.86 | U | 0.6 | 5.31 | | 5.31 |
| | Glens Falls | 2.63 | 0.40 | 3.03 | 7.50 | 10.53 | 11.07 | U | 0.6 | 6.64 | | 6.64 |
| | Nassau | 2.63 | 10.20 | 12.83 | 193.70 | 206.53 | 217.06 | U | 0.6 | 130.24 | | 130.24 |
| | Bronx | 2.63 | 2.40 | 5.03 | 44.70 | 49.73 | 52.26 | U | 0.6 | 31.36 | | 31.36 |
| | Brooklyn | 2.63 | 4.60 | 7.23 | 87.20 | 94.43 | 99.24 | U | 0.6 | 59.55 | | 59.55 |
| | Manhattan* | 2.63 | 18.90 | 21.53 | 356.00 | 377.53 | 396.79 | U | 0.6 | 238.07 | | 238.07 |
| | Queens | 2.63 | 5.60 | 8.23 | 105.80 | 114.03 | 119.84 | U | 0.6 | 71.91 | | 71.91 |
| | Richmond | 2.63 | 1.60 | 4.23 | 30.70 | 34.93 | 36.71 | U | 0.6 | 22.03 | | 22.03 |
| | Niagara Falls | 2.63 | 0.90 | 3.53 | 16.20 | 19.73 | 20.73 | U | 0.6 | 12.44 | | 12.44 |
| | Orange Co. | 2.63 | 1.10 | 3.73 | 20.80 | 24.53 | 25.78 | U | 0.6 | 15.47 | | 15.47 |
| | Poughkeepsie | 2.63 | 0.90 | 3.53 | 16.90 | 20.43 | 21.47 | U | 0.6 | 12.88 | | 12.88 |
| | Rochester | 2.63 | 3.00 | 5.63 | 57.30 | 62.93 | 66.14 | U | 0.6 | 39.68 | | 39.68 |
| | Syracuse | 2.63 | 2.20 | 4.83 | 41.60 | 46.43 | 48.80 | U | 0.6 | 29.28 | | 29.28 |
| | Utica | 2.63 | 0.90 | 3.53 | 18.60 | 22.13 | 23.26 | U | 0.6 | 13.95 | | 13.95 |
| Penn. | | 36.79 | 38.30 | 75.09 | 723.60 | 798.69 | 839.44 | C | 0.55 | 461.69 | | 461.69 |
| | Rural | 0.00 | 1.20 | 1.20 | 20.70 | 21.90 | 23.02 | R | 0.35 | | | 0.00 |
| | Allentown | 2.63 | 2.70 | 5.33 | 50.20 | 55.53 | 58.36 | U | 0.6 | 35.02 | 0.58 | 35.59 |
| | Altoona | 2.63 | 0.40 | 3.03 | 8.30 | 11.33 | 11.91 | U | 0.6 | 7.14 | 0.58 | 7.72 |
| | Erie | 2.63 | 1.00 | 3.63 | 18.00 | 21.63 | 22.73 | U | 0.6 | 13.64 | 0.58 | 14.21 |
| | Harrisburg | 2.63 | 1.90 | 4.53 | 35.10 | 39.63 | 41.65 | U | 0.6 | 24.99 | 0.58 | 25.57 |
| | Johnstown | 2.63 | 0.70 | 3.33 | 13.90 | 17.23 | 18.11 | U | 0.6 | 10.86 | 0.58 | 11.44 |
| | Lancaster | 2.63 | 1.30 | 3.93 | 24.30 | 28.23 | 29.67 | U | 0.6 | 17.80 | 0.58 | 18.38 |
| | Philadelphia | 2.63 | 15.40 | 18.03 | 290.40 | 308.43 | 324.16 | U | 0.6 | 194.50 | 0.58 | 195.07 |
| | Pittsburgh | 2.63 | 7.20 | 9.83 | 136.60 | 146.43 | 153.90 | U | 0.6 | 92.34 | 0.58 | 92.91 |
| | Reading | 2.63 | 1.10 | 3.73 | 21.40 | 25.13 | 26.41 | U | 0.6 | 15.85 | 0.58 | 16.42 |
| | Scranton | 2.63 | 3.10 | 5.73 | 58.90 | 64.63 | 67.92 | U | 0.6 | 40.75 | 0.58 | 41.33 |
| | Sharon | 2.63 | 0.30 | 2.93 | 5.90 | 8.83 | 9.28 | U | 0.6 | 5.57 | 0.58 | 6.14 |
| | State College | 2.63 | 0.30 | 2.93 | 6.30 | 9.23 | 9.70 | U | 0.6 | 5.82 | 0.58 | 6.39 |
| | Williamsport | 2.63 | 0.20 | 2.83 | 4.70 | 7.53 | 7.91 | U | 0.6 | 4.75 | 0.58 | 5.32 |
| | York | 2.63 | 1.50 | 4.13 | 28.90 | 33.03 | 34.71 | U | 0.6 | 20.83 | 0.58 | 21.40 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| [redacted]aware | | 2.30 | 2.00 | 4.30 | 37.20 | 41.50 | 43.62 | C | 0.55 | 23.99 | | 23.99 |
| [redacted] | Rural | 0.00 | 0.60 | 0.60 | 11.30 | 11.90 | 12.51 | R | 0.35 | | | 0.00 |
| | Wilmington | 2.30 | 1.40 | 3.70 | 25.90 | 29.60 | 31.11 | U | 0.6 | 18.67 | 4.38 | 23.04 |
| Dis. of Col. | | 2.30 | 13.40 | 15.70 | 253.40 | 269.10 | 282.83 | C | 0.55 | 155.55 | | 155.55 |
| [redacted] | Rural | 0.00 | 0.00 | 0.00 | | 0.00 | 0.00 | R | 0.35 | 0.00 | | 0.00 |
| | Washington | 2.30 | 13.40 | 15.70 | 253.40 | 269.10 | 282.83 | U | 0.6 | 169.70 | 0.00 | 169.70 |
| Maryland | | 6.90 | 8.10 | 15.00 | 153.70 | 168.70 | 177.31 | C | 0.55 | 97.52 | | 97.52 |
| | Rural | 0.00 | 0.90 | 0.90 | 17.30 | 18.20 | 19.13 | R | 0.35 | | | 0.00 |
| [redacted] | Baltimore | 2.30 | 6.50 | 8.80 | 123.10 | 131.90 | 138.63 | U | 0.6 | 83.18 | 2.23 | 85.41 |
| | Cumberland | 2.30 | 0.30 | 2.60 | 5.40 | 8.00 | 8.41 | U | 0.6 | 5.04 | 2.23 | 7.28 |
| | Hagerstown | 2.30 | 0.40 | 2.70 | 7.90 | 10.60 | 11.14 | U | 0.6 | 6.68 | 2.23 | 8.92 |
| North Car. | | 20.70 | 17.30 | 38.00 | 327.10 | 365.10 | 383.72 | C | 0.55 | 211.05 | | 211.05 |
| [redacted] | Rural | 0.00 | 5.80 | 5.80 | 107.60 | 113.40 | 119.18 | R | 0.35 | | | 0.00 |
| | Asheville | 2.30 | 0.40 | 2.70 | 8.40 | 11.10 | 11.67 | U | 0.6 | 7.00 | 4.63 | 11.63 |
| | Burlington | 2.30 | 0.50 | 2.80 | 8.80 | 11.60 | 12.19 | U | 0.6 | 7.32 | 4.63 | 11.95 |
| | Charlotte | 2.30 | 3.70 | 6.00 | 70.90 | 76.90 | 80.82 | U | 0.6 | 48.49 | 4.63 | 53.13 |
| | Fayetteville | 2.30 | 0.70 | 3.00 | 13.20 | 16.20 | 17.03 | U | 0.6 | 10.22 | 4.63 | 14.85 |
| [redacted] | Greensboro | 2.30 | 3.00 | 5.30 | 56.10 | 61.40 | 64.53 | U | 0.6 | 38.72 | 4.63 | 43.35 |
| | Hickory | 2.30 | 0.50 | 2.80 | 10.10 | 12.90 | 13.56 | U | 0.6 | 8.13 | 4.63 | 12.77 |
| | Jacksonville | 2.30 | 0.30 | 2.60 | 5.70 | 8.30 | 8.72 | U | 0.6 | 5.23 | 4.63 | 9.87 |
| | Raleigh | 2.30 | 2.00 | 4.30 | 38.80 | 43.10 | 45.30 | U | 0.6 | 27.18 | 4.63 | 31.81 |
| | Wilmington | 2.30 | 0.40 | 2.70 | 7.50 | 10.20 | 10.72 | U | 0.6 | 6.43 | 4.63 | 11.07 |
| [redacted]ginia | | 11.50 | 12.30 | 23.80 | 233.70 | 257.50 | 270.64 | C | 0.55 | 148.85 | | 148.85 |
| | Rural | 0.00 | 3.80 | 3.80 | 73.00 | 76.80 | 80.72 | R | 0.35 | | | 0.00 |
| | Charlottesville | 2.30 | 0.50 | 2.80 | 9.90 | 12.70 | 13.35 | U | 0.6 | 8.01 | 5.65 | 13.66 |
| [redacted] | Lynchburg | 2.30 | 0.40 | 2.70 | 7.60 | 10.30 | 10.83 | U | 0.6 | 6.50 | 5.65 | 12.15 |
| | Norfolk | 2.30 | 4.00 | 6.30 | 75.50 | 81.80 | 85.97 | U | 0.6 | 51.58 | 5.65 | 57.23 |
| | Richmond | 2.30 | 2.80 | 5.10 | 52.80 | 57.90 | 60.85 | U | 0.6 | 36.51 | 5.65 | 42.16 |
| | Roanoke | 2.30 | 0.80 | 3.10 | 14.90 | 18.00 | 18.92 | U | 0.6 | 11.35 | 5.65 | 17.00 |
| [redacted] Virginia | | 6.60 | 4.80 | 11.40 | 90.20 | 101.60 | 106.78 | C | 0.55 | 58.73 | | 58.73 |
| [redacted] | Rural | 0.00 | 3.20 | 3.20 | 60.20 | 63.40 | 66.63 | R | 0.35 | | | 0.00 |
| | Charleston | 2.20 | 0.90 | 3.10 | 16.80 | 19.90 | 20.92 | U | 0.6 | 12.55 | 7.77 | 20.32 |
| | Huntington | 2.20 | 0.40 | 2.60 | 7.30 | 9.90 | 10.40 | U | 0.6 | 6.24 | 7.77 | 14.02 |
| | Parkersburg | 2.20 | 0.30 | 2.50 | 5.90 | 8.40 | 8.83 | U | 0.6 | 5.30 | 7.77 | 13.07 |
| [redacted]o | | 24.20 | 34.10 | 58.30 | 645.80 | 704.10 | 740.02 | C | 0.55 | 407.01 | | 407.01 |
| | Rural | 0.00 | 7.90 | 7.90 | 148.40 | 156.30 | 164.27 | R | 0.35 | | | 0.00 |
| | Akron | 2.20 | 2.40 | 4.60 | 45.00 | 49.60 | 52.13 | U | 0.6 | 31.28 | 5.23 | 36.50 |
| | Canton | 2.20 | 1.30 | 3.50 | 24.60 | 28.10 | 29.53 | U | 0.6 | 17.72 | 5.23 | 22.95 |
| [redacted] | Cincinnati | 2.20 | 3.80 | 6.00 | 72.50 | 78.50 | 82.50 | U | 0.6 | 49.50 | 5.23 | 54.73 |
| | Cleveland | 2.20 | 6.30 | 8.50 | 119.60 | 128.10 | 134.63 | U | 0.6 | 80.78 | 5.23 | 86.01 |
| | Columbus | 2.20 | 4.10 | 6.30 | 78.00 | 84.30 | 88.60 | U | 0.6 | 53.16 | 5.23 | 58.39 |
| | Dayton | 2.20 | 3.00 | 5.20 | 56.90 | 62.10 | 65.27 | U | 0.6 | 39.16 | 5.23 | 44.39 |
| | Lima | 2.20 | 0.50 | 2.70 | 10.30 | 13.00 | 13.66 | U | 0.6 | 8.20 | 5.23 | 13.42 |
| [redacted] | Mansfield | 2.20 | 0.40 | 2.60 | 8.30 | 10.90 | 11.46 | U | 0.6 | 6.87 | 5.23 | 12.10 |
| | Steubenville | 2.20 | 0.50 | 2.70 | 10.20 | 12.90 | 13.56 | U | 0.6 | 8.13 | 5.23 | 13.36 |
| | Toledo | 2.20 | 2.10 | 4.30 | 39.00 | 43.30 | 45.51 | U | 0.6 | 27.31 | 5.23 | 32.53 |
| | Youngstown | 2.20 | 1.80 | 4.00 | 33.00 | 37.00 | 38.89 | U | 0.6 | 23.33 | 5.23 | 28.56 |
| [redacted]ntucky | | 6.60 | 7.50 | 14.10 | 141.70 | 155.80 | 163.75 | C | 0.55 | 90.06 | | 90.06 |
| [redacted] | Rural | 0.00 | 4.30 | 4.30 | 81.50 | 85.80 | 90.18 | R | 0.35 | | | 0.00 |
| | Lexington | 2.20 | 0.90 | 3.10 | 17.40 | 20.50 | 21.55 | U | 0.6 | 12.93 | 10.52 | 23.45 |
| | Louisville | 2.20 | 2.00 | 4.20 | 37.70 | 41.90 | 44.04 | U | 0.6 | 26.42 | 10.52 | 36.94 |
| | Owensboro | 2.20 | 0.30 | 2.50 | 5.10 | 7.60 | 7.99 | U | 0.6 | 4.79 | 10.52 | 15.31 |
| [redacted]ichigan | | 18.00 | 30.90 | 48.90 | 584.90 | 633.80 | 666.13 | C | 0.55 | 366.37 | | 366.37 |
| | Rural | 0.00 | 6.40 | 6.40 | 119.80 | 126.20 | 132.64 | R | 0.35 | | | 0.00 |
| [redacted] | Ann Arbor | 1.80 | 1.10 | 2.90 | 21.10 | 24.00 | 25.22 | U | 0.6 | 15.13 | 4.64 | 19.78 |
| | Battle Creek | 1.80 | 0.50 | 2.30 | 8.90 | 11.20 | 11.77 | U | 0.6 | 7.06 | 4.64 | 11.71 |
| | Benton Harbor | 1.80 | 0.40 | 2.20 | 7.60 | 9.80 | 10.30 | U | 0.6 | 6.18 | 4.64 | 10.82 |
| | Detroit | 1.80 | 16.10 | 17.90 | 304.90 | 322.80 | 339.27 | U | 0.6 | 203.56 | 4.64 | 208.20 |
| | Grand Rapids | 1.80 | 2.10 | 3.90 | 39.90 | 43.80 | 46.03 | U | 0.6 | 27.62 | 4.64 | 32.26 |
| [redacted] | Jackson | 1.80 | 0.50 | 2.30 | 9.90 | 12.20 | 12.82 | U | 0.6 | 7.69 | 4.64 | 12.34 |
| | Kalamazoo | 1.80 | 0.70 | 2.50 | 13.60 | 16.10 | 16.92 | U | 0.6 | 10.15 | 4.64 | 14.80 |
| | Lansing | 1.80 | 1.20 | 3.00 | 22.80 | 25.80 | 27.12 | U | 0.6 | 16.27 | 4.64 | 20.91 |
| | Muskegon | 1.80 | 0.50 | 2.30 | 10.30 | 12.60 | 13.24 | U | 0.6 | 7.95 | 4.64 | 12.59 |
| | Saginaw | 1.80 | 1.40 | 3.20 | 26.10 | 29.30 | 30.79 | U | 0.6 | 18.48 | 4.64 | 23.12 |
| [redacted] Carolina | | 8.50 | 8.70 | 17.20 | 165.00 | 182.20 | 191.49 | C | 0.55 | 105.32 | | 105.32 |
| | Rural | 0.00 | 3.70 | 3.70 | 69.90 | 73.60 | 77.35 | R | 0.35 | | | 0.00 |
| | Anderson | 1.70 | 0.40 | 2.10 | 7.30 | 9.40 | 9.88 | U | 0.6 | 5.93 | 5.41 | 11.34 |
| [redacted] | Charleston | 1.70 | 1.30 | 3.00 | 24.60 | 27.60 | 29.01 | U | 0.6 | 17.40 | 5.41 | 22.82 |
| | Columbia | 1.70 | 1.20 | 2.90 | 23.50 | 26.40 | 27.75 | U | 0.6 | 16.65 | 5.41 | 22.06 |
| | Florence | 1.70 | 0.30 | 2.00 | 5.30 | 7.30 | 7.67 | U | 0.6 | 4.60 | 5.41 | 10.02 |
| | Greenville | 1.70 | 1.80 | 3.50 | 34.40 | 37.90 | 39.83 | U | 0.6 | 23.90 | 5.41 | 29.31 |
| [redacted]llinois | | 21.60 | 30.00 | 51.60 | 567.60 | 619.20 | 650.79 | C | 0.55 | 357.93 | | 357.93 |
| [redacted] | Rural | 0.00 | 2.80 | 2.80 | 52.40 | 55.20 | 58.02 | R | 0.35 | | | 0.00 |
| | Aurora | 1.80 | 1.30 | 3.10 | 24.20 | 27.30 | 28.69 | U | 0.6 | 17.22 | 1.69 | 18.91 |
| | Bloomington | 1.80 | 0.40 | 2.20 | 8.50 | 10.70 | 11.25 | U | 0.6 | 6.75 | 1.69 | 8.44 |
| | Champaign | 1.80 | 0.50 | 2.30 | 9.30 | 11.60 | 12.19 | U | 0.6 | 7.32 | 1.69 | 9.01 |
| | Chicago | 1.80 | 17.70 | 19.50 | 335.10 | 354.60 | 372.69 | U | 0.6 | 223.61 | 1.69 | 225.31 |
| [redacted] | Davenport | 1.80 | 1.30 | 3.10 | 24.40 | 27.50 | 28.90 | U | 0.6 | 17.34 | 1.69 | 19.03 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Decatur | 1.80 | 0.40 | 2.20 | 7.30 | 9.50 | 9.98 | U | 0.6 | 5.99 | 1.69 | 7.68 |
| | Joliet | 1.80 | 1.10 | 2.90 | 20.50 | 23.40 | 24.59 | U | 0.6 | 14.76 | 1.69 | 16.45 |
| | Kankakee | 1.80 | 0.30 | 2.10 | 6.50 | 8.60 | 9.04 | U | 0.6 | 5.42 | 1.69 | 7.12 |
| | Lake County | 1.80 | 1.50 | 3.30 | 28.00 | 31.30 | 32.90 | U | 0.6 | 19.74 | 1.69 | 21.43 |
| | Peoria | 1.80 | 1.20 | 3.00 | 22.10 | 25.10 | 26.38 | U | 0.6 | 15.83 | 1.69 | 17.52 |
| | Rockford | 1.80 | 0.80 | 2.60 | 16.00 | 18.60 | 19.55 | U | 0.6 | 11.73 | 1.69 | 13.42 |
| | Springfield | 1.80 | 0.70 | 2.50 | 13.30 | 15.80 | 16.61 | U | 0.6 | 9.96 | 1.69 | 11.66 |
| Indiana | | 21.60 | 16.80 | 38.40 | 317.10 | 355.50 | 373.63 | C | 0.55 | 205.50 | | 205.50 |
| | Rural | 0.00 | 4.70 | 4.70 | 86.90 | 91.60 | 96.27 | R | 0.35 | | | 0.00 |
| | Anderson | 1.80 | 0.50 | 2.30 | 9.70 | 12.00 | 12.61 | U | 0.6 | 7.57 | 2.81 | 10.38 |
| | Bloomington | 1.80 | 0.30 | 2.10 | 6.40 | 8.50 | 8.93 | U | 0.6 | 5.36 | 2.81 | 8.17 |
| | Elkhart | 1.80 | 0.50 | 2.30 | 9.40 | 11.70 | 12.30 | U | 0.6 | 7.38 | 2.81 | 10.19 |
| | Evansville | 1.80 | 1.00 | 2.80 | 19.30 | 22.10 | 23.23 | U | 0.6 | 13.94 | 2.81 | 16.74 |
| | Gary | 1.80 | 2.20 | 4.00 | 40.80 | 44.80 | 47.09 | U | 0.6 | 28.25 | 2.81 | 31.06 |
| | Fort Wayne | 1.80 | 1.20 | 3.00 | 22.70 | 25.70 | 27.01 | U | 0.6 | 16.21 | 2.81 | 19.01 |
| | Indianapolis | 1.80 | 4.00 | 5.80 | 76.40 | 82.20 | 86.39 | U | 0.6 | 51.84 | 2.81 | 54.64 |
| | Kokomo | 1.80 | 0.40 | 2.20 | 7.60 | 9.80 | 10.30 | U | 0.6 | 6.18 | 2.81 | 8.99 |
| | Lafayette | 1.80 | 0.40 | 2.20 | 6.70 | 8.90 | 9.35 | U | 0.6 | 5.61 | 2.81 | 8.42 |
| | Muncie | 1.80 | 0.40 | 2.20 | 7.60 | 9.80 | 10.30 | U | 0.6 | 6.18 | 2.81 | 8.99 |
| | South Bend | 1.80 | 0.80 | 2.60 | 15.90 | 18.50 | 19.44 | U | 0.6 | 11.67 | 2.81 | 14.47 |
| | Terre-Haute | 1.80 | 0.40 | 2.20 | 7.70 | 9.90 | 10.40 | U | 0.6 | 6.24 | 2.81 | 9.05 |
| Iowa | | 8.40 | 8.90 | 17.30 | 167.60 | 184.90 | 194.33 | C | 0.55 | 106.88 | | 106.88 |
| | Rural | 0.00 | 5.50 | 5.50 | 102.60 | 108.10 | 113.61 | R | 0.35 | | | 0.00 |
| | Cedar Rapids | 1.40 | 0.60 | 2.00 | 11.20 | 13.20 | 13.87 | U | 0.6 | 8.32 | 6.63 | 14.95 |
| | Des Moines | 1.40 | 1.20 | 2.60 | 22.40 | 25.00 | 26.28 | U | 0.6 | 15.77 | 6.63 | 22.39 |
| | Dubluque | 1.40 | 0.30 | 1.70 | 6.40 | 8.10 | 8.51 | U | 0.6 | 5.11 | 6.63 | 11.74 |
| | Iowa City | 1.40 | 0.40 | 1.80 | 7.30 | 9.10 | 9.56 | U | 0.6 | 5.74 | 6.63 | 12.37 |
| | Sioux City | 1.40 | 0.40 | 1.80 | 7.70 | 9.50 | 9.98 | U | 0.6 | 5.99 | 6.63 | 12.62 |
| | Waterloo | 1.40 | 0.50 | 1.90 | 10.00 | 11.90 | 12.51 | U | 0.6 | 7.50 | 6.63 | 14.13 |
| Minnesota | | 5.60 | 12.50 | 18.10 | 236.60 | 254.70 | 267.69 | C | 0.55 | 147.23 | | 147.23 |
| | Rural | 0.00 | 3.30 | 3.30 | 63.80 | 67.10 | 70.52 | R | 0.35 | | | 0.00 |
| | Duluth | 1.40 | 1.00 | 2.40 | 19.40 | 21.80 | 22.91 | U | 0.6 | 13.75 | 6.17 | 19.92 |
| | Minneapolis | 1.40 | 7.30 | 8.70 | 137.20 | 145.90 | 153.34 | U | 0.6 | 92.01 | 6.17 | 98.18 |
| | Rochester | 1.40 | 0.40 | 1.80 | 7.20 | 9.00 | 9.46 | U | 0.6 | 5.68 | 6.17 | 11.85 |
| | St. Cloud | 1.40 | 0.50 | 1.90 | 9.00 | 10.90 | 11.46 | U | 0.6 | 6.87 | 6.17 | 13.04 |
| N. Dakota | | 4.20 | 1.80 | 6.00 | 33.50 | 39.50 | 41.51 | C | 0.55 | 22.83 | | 22.83 |
| | Rural | 0.00 | 0.80 | 0.80 | 15.70 | 16.50 | 17.34 | R | 0.35 | | | 0.00 |
| | Bismarck | 1.40 | 0.30 | 1.70 | 5.10 | 6.80 | 7.15 | U | 0.6 | 4.29 | 2.02 | 6.31 |
| | Fargo | 1.40 | 0.50 | 1.90 | 8.70 | 10.60 | 11.14 | U | 0.6 | 6.68 | 2.02 | 8.71 |
| | Grand Forks | 1.40 | 0.20 | 1.60 | 4.00 | 5.60 | 5.89 | U | 0.6 | 3.53 | 2.02 | 5.55 |
| S. Dakota | | 1.40 | 1.80 | 3.20 | 34.50 | 37.70 | 39.62 | C | 0.55 | 21.79 | | 21.79 |
| | Rural | 0.00 | 1.40 | 1.40 | 27.60 | 29.00 | 30.48 | R | 0.35 | | | 0.00 |
| | Sioux Falls | 1.40 | 0.40 | 1.80 | 6.90 | 8.70 | 9.14 | U | 0.6 | 5.49 | 10.67 | 16.15 |
| Nebraska | | 2.80 | 5.20 | 8.00 | 98.20 | 106.20 | 111.62 | C | 0.55 | 61.39 | | 61.39 |
| | Rural | 0.00 | 2.30 | 2.30 | 44.30 | 46.60 | 48.98 | R | 0.35 | | | 0.00 |
| | Lincoln | 1.40 | 0.80 | 2.20 | 15.00 | 17.20 | 18.08 | U | 0.6 | 10.85 | 8.57 | 19.42 |
| | Omaha | 1.40 | 2.10 | 3.50 | 38.90 | 42.40 | 44.56 | U | 0.6 | 26.74 | 8.57 | 35.31 |
| Wisconsin | | 14.00 | 14.70 | 28.70 | 277.50 | 306.20 | 321.82 | C | 0.55 | 177.00 | | 177.00 |
| | Rural | 0.00 | 4.80 | 4.80 | 88.10 | 92.90 | 97.64 | R | 0.35 | | | 0.00 |
| | Appleton | 1.40 | 1.00 | 2.40 | 19.40 | 21.80 | 22.91 | U | 0.6 | 13.75 | 3.42 | 17.16 |
| | Eau Claire | 1.40 | 0.40 | 1.80 | 7.50 | 9.30 | 9.77 | U | 0.6 | 5.86 | 3.42 | 9.28 |
| | Green Bay | 1.40 | 0.70 | 2.10 | 13.50 | 15.60 | 16.40 | U | 0.6 | 9.84 | 3.42 | 13.25 |
| | Janesville | 1.40 | 0.50 | 1.90 | 8.60 | 10.50 | 11.04 | U | 0.6 | 6.62 | 3.42 | 10.04 |
| | Kenosha | 1.40 | 0.40 | 1.80 | 8.00 | 9.80 | 10.30 | U | 0.6 | 6.18 | 3.42 | 9.60 |
| | La Crosse | 1.40 | 0.30 | 1.70 | 5.90 | 7.60 | 7.99 | U | 0.6 | 4.79 | 3.42 | 8.21 |
| | Madison | 1.40 | 1.00 | 2.40 | 20.70 | 23.10 | 24.28 | U | 0.6 | 14.57 | 3.42 | 17.98 |
| | Milwaukee | 1.40 | 4.90 | 6.30 | 93.40 | 99.70 | 104.79 | U | 0.6 | 62.87 | 3.42 | 66.29 |
| | Sheboygan | 1.40 | 0.40 | 1.80 | 6.90 | 8.70 | 9.14 | U | 0.6 | 5.49 | 3.42 | 8.90 |
| | Wausau | 1.40 | 0.30 | 1.70 | 5.50 | 7.20 | 7.57 | U | 0.6 | 4.54 | 3.42 | 7.96 |
| Florida | | 32.30 | 42.20 | 74.50 | 797.90 | 872.40 | 916.90 | C | 0.55 | 504.30 | | 504.30 |
| | Rural | 0.00 | 4.00 | 4.00 | 49.20 | 53.20 | 55.91 | R | 0.35 | | | 0.00 |
| | Brandenton | 1.70 | 0.90 | 2.60 | 16.50 | 19.10 | 20.07 | U | 0.6 | 12.04 | 1.03 | 13.07 |
| | Daytona Beach | 1.70 | 1.50 | 3.20 | 28.50 | 31.70 | 33.32 | U | 0.6 | 19.99 | 1.03 | 21.02 |
| | Ft. Lauterdale | 1.70 | 4.10 | 5.80 | 76.70 | 82.50 | 86.71 | U | 0.6 | 52.02 | 1.03 | 53.05 |
| | Fort Myers | 1.70 | 1.10 | 2.80 | 20.40 | 23.20 | 24.38 | U | 0.6 | 14.63 | 1.03 | 15.66 |
| | Fort Pierce | 1.70 | 1.00 | 2.70 | 18.30 | 21.00 | 22.07 | U | 0.6 | 13.24 | 1.03 | 14.27 |
| | Fort Walton | 1.70 | 0.40 | 2.10 | 8.10 | 10.20 | 10.72 | U | 0.6 | 6.43 | 1.03 | 7.46 |
| | Gainesville | 1.70 | 0.60 | 2.30 | 12.00 | 14.30 | 15.03 | U | 0.6 | 9.02 | 1.03 | 10.05 |
| | Jacksonville | 1.70 | 2.30 | 4.00 | 73.80 | 77.80 | 81.77 | U | 0.6 | 49.06 | 1.03 | 50.09 |
| | Lakeland | 1.70 | 1.40 | 3.10 | 27.00 | 30.10 | 31.64 | U | 0.6 | 18.98 | 1.03 | 20.01 |
| | Melborne | 1.70 | 1.30 | 3.00 | 24.30 | 27.30 | 28.69 | U | 0.6 | 17.22 | 1.03 | 18.25 |
| | Miami | 1.70 | 5.70 | 7.40 | 107.10 | 114.50 | 120.34 | U | 0.6 | 72.20 | 1.03 | 73.23 |
| | Ocala | 1.70 | 0.70 | 2.40 | 12.40 | 14.80 | 15.55 | U | 0.6 | 9.33 | 1.03 | 10.36 |
| | Orlando | 1.70 | 2.90 | 4.60 | 55.20 | 59.80 | 62.85 | U | 0.6 | 37.71 | 1.03 | 38.74 |
| | Panama City | 1.70 | 0.40 | 2.10 | 7.60 | 9.70 | 10.19 | U | 0.6 | 6.12 | 1.03 | 7.15 |
| | Pensacola | 1.70 | 0.80 | 2.50 | 14.20 | 16.70 | 17.55 | U | 0.6 | 10.53 | 1.03 | 11.56 |
| | Sarasota | 1.70 | 1.20 | 2.90 | 21.80 | 24.70 | 25.96 | U | 0.6 | 15.58 | 1.03 | 16.61 |
| | Tallahassee | 1.70 | 0.70 | 2.40 | 12.90 | 15.30 | 16.08 | U | 0.6 | 9.65 | 1.03 | 10.68 |
| | Tampa | 1.70 | 7.60 | 9.30 | 144.30 | 153.60 | 161.44 | U | 0.6 | 96.86 | 1.03 | 97.89 |
| | W. Palm Beach | 1.70 | 3.60 | 5.30 | 67.60 | 72.90 | 76.62 | U | 0.6 | 45.97 | 1.03 | 47.00 |
| Georgia | | 11.90 | 14.50 | 26.40 | 274.50 | 300.90 | 316.25 | C | 0.55 | 173.94 | | 173.94 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Rural | 0.00 | 4.20 | 4.20 | 80.00 | 84.20 | 88.50 | R | 0.35 | | | 0.00 |
| | Albany | 1.70 | 0.30 | 2.00 | 5.90 | 7.90 | 8.30 | U | 0.6 | 4.98 | 4.42 | 9.41 |
| | Athens | 1.70 | 0.40 | 2.10 | 7.60 | 9.70 | 10.19 | U | 0.6 | 6.12 | 4.42 | 10.54 |
| | Atlanta | 1.70 | 6.90 | 8.60 | 131.00 | 139.60 | 146.72 | U | 0.6 | 88.03 | 4.42 | 92.46 |
| | Augusta | 1.70 | 0.70 | 2.40 | 13.30 | 15.70 | 16.50 | U | 0.6 | 9.90 | 4.42 | 14.33 |
| | Columbus | 1.70 | 0.50 | 2.20 | 9.50 | 11.70 | 12.30 | U | 0.6 | 7.38 | 4.42 | 11.80 |
| | Macon | 1.70 | 0.80 | 2.50 | 14.80 | 17.30 | 18.18 | U | 0.6 | 10.91 | 4.42 | 15.33 |
| | Savannah | 1.70 | 0.70 | 2.40 | 12.40 | 14.80 | 15.55 | U | 0.6 | 9.33 | 4.42 | 13.76 |
| Alabama | | 11.70 | 6.50 | 18.20 | 123.60 | 141.80 | 149.03 | C | 0.55 | 81.97 | | 81.97 |
| | Rural | 0.00 | 2.00 | 2.00 | 36.70 | 38.70 | 40.67 | R | 0.35 | | | 0.00 |
| | Anniston | 1.30 | 0.20 | 1.50 | 4.70 | 6.20 | 6.52 | U | 0.6 | 3.91 | 1.58 | 5.49 |
| | Birmingham | 1.30 | 1.70 | 3.00 | 31.50 | 34.50 | 36.26 | U | 0.6 | 21.76 | 1.58 | 23.34 |
| | Dothan | 1.30 | 0.20 | 1.50 | 3.50 | 5.00 | 5.26 | U | 0.6 | 3.15 | 1.58 | 4.73 |
| | Florence | 1.30 | 0.20 | 1.50 | 4.70 | 6.20 | 6.52 | U | 0.6 | 3.91 | 1.58 | 5.49 |
| | Gadsen | 1.30 | 0.20 | 1.50 | 4.20 | 5.70 | 5.99 | U | 0.6 | 3.59 | 1.58 | 5.18 |
| | Huntsville | 1.30 | 0.50 | 1.80 | 9.70 | 11.50 | 12.09 | U | 0.6 | 7.25 | 1.58 | 8.83 |
| | Mobile | 1.30 | 0.80 | 2.10 | 15.10 | 17.20 | 18.08 | U | 0.6 | 10.85 | 1.58 | 12.43 |
| | Montgomery | 1.30 | 0.40 | 1.70 | 8.30 | 10.00 | 10.51 | U | 0.6 | 6.31 | 1.58 | 7.89 |
| | Tuscaloosa | 1.30 | 0.30 | 1.60 | 5.20 | 6.80 | 7.15 | U | 0.6 | 4.29 | 1.58 | 5.87 |
| M[redacted]issippi | | 3.90 | 9.30 | 13.20 | 176.80 | 190.00 | 199.69 | C | 0.55 | 109.83 | | 109.83 |
| | Rural | 0.00 | 8.40 | 8.40 | 158.20 | 166.60 | 175.10 | R | 0.35 | | | 0.00 |
| | Biloxi | 1.30 | 0.30 | 1.60 | 5.90 | 7.50 | 7.88 | U | 0.6 | 4.73 | 20.43 | 25.16 |
| | Jackson | 1.30 | 0.40 | 1.70 | 8.80 | 10.50 | 11.04 | U | 0.6 | 6.62 | 20.43 | 27.05 |
| | Pascagoula | 1.30 | 0.20 | 1.50 | 3.90 | 5.40 | 5.68 | U | 0.6 | 3.41 | 20.43 | 23.83 |
| T[redacted]nessee | | 7.80 | 13.30 | 21.10 | 251.90 | 273.00 | 286.93 | C | 0.55 | 157.81 | | 157.81 |
| | Rural | 0.00 | 3.20 | 3.20 | 63.20 | 66.40 | 69.79 | R | 0.35 | | | 0.00 |
| | Chattanooga | 1.30 | 1.00 | 2.30 | 18.60 | 20.90 | 21.97 | U | 0.6 | 13.18 | 4.07 | 17.25 |
| | Clarksville | 1.30 | 0.30 | 1.60 | 5.00 | 6.60 | 6.94 | U | 0.6 | 4.16 | 4.07 | 8.23 |
| | Johnson City | 1.30 | 1.30 | 2.60 | 23.90 | 26.50 | 27.85 | U | 0.6 | 16.71 | 4.07 | 20.78 |
| | Knoxville | 1.30 | 2.40 | 3.70 | 44.50 | 48.20 | 50.66 | U | 0.6 | 30.40 | 4.07 | 34.47 |
| | Memphis | 1.30 | 2.40 | 3.70 | 45.50 | 49.20 | 51.71 | U | 0.6 | 31.03 | 4.07 | 35.10 |
| | Nashville | 1.30 | 2.70 | 4.00 | 51.20 | 55.20 | 58.02 | U | 0.6 | 34.81 | 4.07 | 38.88 |
| A[redacted]nsas | | 7.20 | 7.40 | 14.60 | 139.60 | 154.20 | 162.07 | C | 0.55 | 89.14 | | 89.14 |
| | Rural | 0.00 | 4.10 | 4.10 | 76.50 | 80.60 | 84.71 | R | 0.35 | | | 0.00 |
| | Fayetteville | 1.80 | 0.40 | 2.20 | 7.30 | 9.50 | 9.98 | U | 0.6 | 5.99 | 7.41 | 13.40 |
| | Fort Smith | 1.80 | 0.40 | 2.20 | 8.30 | 10.50 | 11.04 | U | 0.6 | 6.62 | 7.41 | 14.03 |
| | Little Rock | 1.80 | 2.20 | 4.00 | 40.90 | 44.90 | 47.19 | U | 0.6 | 28.31 | 7.41 | 35.73 |
| | Pine Bluff | 1.80 | 0.30 | 2.10 | 6.60 | 8.70 | 9.14 | U | 0.6 | 5.49 | 7.41 | 12.90 |
| Oklahoma | | 7.20 | 9.80 | 17.00 | 186.00 | 203.00 | 213.36 | C | 0.55 | 117.35 | | 117.35 |
| | Rural | 0.00 | 4.00 | 4.00 | 76.00 | 80.00 | 84.08 | R | 0.35 | | | 0.00 |
| | Enid | 1.80 | 0.20 | 2.00 | 4.10 | 6.10 | 6.41 | U | 0.6 | 3.85 | 7.36 | 11.20 |
| | Lawton | 1.80 | 0.30 | 2.10 | 5.90 | 8.00 | 8.41 | U | 0.6 | 5.04 | 7.36 | 12.40 |
| | Oklahoma City | 1.80 | 3.00 | 4.80 | 56.10 | 60.90 | 64.01 | U | 0.6 | 38.40 | 7.36 | 45.76 |
| | Tulsa | 1.80 | 2.30 | 4.10 | 43.90 | 48.00 | 50.45 | U | 0.6 | 30.27 | 7.36 | 37.63 |
| K[redacted]sas | | 5.40 | 8.30 | 13.70 | 156.20 | 169.90 | 178.57 | C | 0.55 | 98.21 | | 98.21 |
| | Rural | 0.00 | 5.90 | 5.90 | 111.30 | 117.20 | 123.18 | R | 0.35 | | | 0.00 |
| | Lawrence | 1.80 | 0.30 | 2.10 | 5.80 | 7.90 | 8.30 | U | 0.6 | 4.98 | 14.37 | 19.35 |
| | Topeka | 1.80 | 0.60 | 2.40 | 10.80 | 13.20 | 13.87 | U | 0.6 | 8.32 | 14.37 | 22.69 |
| | Wichita | 1.80 | 1.50 | 3.30 | 28.30 | 31.60 | 33.21 | U | 0.6 | 19.93 | 14.37 | 34.30 |
| M[redacted]souri | | 10.80 | 12.90 | 23.70 | 243.50 | 267.20 | 280.83 | C | 0.55 | 154.46 | | 154.46 |
| | Rural | 0.00 | 3.50 | 3.50 | 66.30 | 69.80 | 73.36 | R | 0.35 | | | 0.00 |
| | Columbia | 1.80 | 0.40 | 2.20 | 6.70 | 8.90 | 9.35 | U | 0.6 | 5.61 | 4.28 | 9.89 |
| | Joplin | 1.80 | 0.50 | 2.30 | 8.60 | 10.90 | 11.46 | U | 0.6 | 6.87 | 4.28 | 11.15 |
| | Kansas City | 1.80 | 3.10 | 4.90 | 59.20 | 64.10 | 67.37 | U | 0.6 | 40.42 | 4.28 | 44.70 |
| | St. Joseph | 1.80 | 0.30 | 2.10 | 6.10 | 8.20 | 8.62 | U | 0.6 | 5.17 | 4.28 | 9.45 |
| | St. Louis | 1.80 | 4.40 | 6.20 | 83.20 | 89.40 | 93.96 | U | 0.6 | 56.38 | 4.28 | 60.66 |
| | Springfield | 1.80 | 0.70 | 2.50 | 13.40 | 15.90 | 16.71 | U | 0.6 | 10.03 | 4.28 | 14.31 |
| L[redacted]isianna | | 8.00 | 8.00 | 16.00 | 187.60 | 203.60 | 213.99 | C | 0.55 | 117.69 | | 117.69 |
| | Rural | 2.00 | 2.00 | 4.00 | 46.70 | 50.70 | 53.29 | R | 0.35 | | | 0.00 |
| | Alexandria | 0.30 | 0.30 | 0.60 | 6.20 | 6.80 | 7.15 | U | 0.6 | 4.29 | 2.33 | 6.62 |
| | Baton-Rouge | 0.90 | 0.90 | 1.80 | 21.80 | 23.60 | 24.80 | U | 0.6 | 14.88 | 2.33 | 17.21 |
| | Hourma | 0.40 | 0.40 | 0.80 | 8.60 | 9.40 | 9.88 | U | 0.6 | 5.93 | 2.33 | 8.26 |
| | Lafayette | 0.30 | 0.30 | 0.60 | 7.70 | 8.30 | 8.72 | U | 0.6 | 5.23 | 2.33 | 7.57 |
| | Lake Charles | 0.40 | 0.40 | 0.80 | 9.50 | 10.30 | 10.83 | U | 0.6 | 6.50 | 2.33 | 8.83 |
| | Monroe | 0.30 | 0.30 | 0.60 | 6.00 | 6.60 | 6.94 | U | 0.6 | 4.16 | 2.33 | 6.49 |
| | New Orleans | 2.70 | 2.70 | 5.40 | 63.70 | 69.10 | 72.62 | U | 0.6 | 43.57 | 2.33 | 45.91 |
| | Shreveport | 0.70 | 0.70 | 1.40 | 17.40 | 18.80 | 19.76 | U | 0.6 | 11.86 | 2.33 | 14.19 |
| T[redacted]xas | | 38.20 | 38.20 | 76.40 | 896.60 | 973.00 | 1022.63 | C | 0.55 | 562.45 | | 562.45 |
| | Rural | 7.90 | 7.90 | 15.80 | 186.80 | 202.60 | 212.93 | R | 0.35 | | | 0.00 |
| | Abilene | 0.30 | 0.30 | 0.60 | 6.70 | 7.30 | 7.67 | U | 0.6 | 4.60 | 3.24 | 7.84 |
| | Amarillo | 0.50 | 0.50 | 1.00 | 10.80 | 11.80 | 12.40 | U | 0.6 | 7.44 | 3.24 | 10.68 |
| | Austin | 1.80 | 1.80 | 3.60 | 43.30 | 46.90 | 49.29 | U | 0.6 | 29.58 | 3.24 | 32.82 |
| | Beaumont | 1.00 | 1.00 | 2.00 | 23.60 | 25.60 | 26.91 | U | 0.6 | 16.14 | 3.24 | 19.38 |
| | Bryan College | 0.30 | 0.30 | 0.60 | 7.50 | 8.10 | 8.51 | U | 0.6 | 5.11 | 3.24 | 8.35 |
| | Corpus Christi | 0.70 | 0.70 | 1.40 | 15.40 | 16.80 | 17.66 | U | 0.6 | 10.59 | 3.24 | 13.83 |
| | Dallas | 9.50 | 9.50 | 19.00 | 223.50 | 242.50 | 254.87 | U | 0.6 | 152.92 | 3.24 | 156.16 |
| | El Paso | 0.80 | 0.80 | 1.60 | 18.50 | 20.10 | 21.13 | U | 0.6 | 12.68 | 3.24 | 15.92 |
| | Houston | 7.50 | 7.50 | 15.00 | 175.40 | 190.40 | 200.11 | U | 0.6 | 120.07 | 3.24 | 123.31 |
| | Killeen | 0.50 | 0.50 | 1.00 | 11.90 | 12.90 | 13.56 | U | 0.6 | 8.13 | 3.24 | 11.38 |
| | Laredo | 0.20 | 0.20 | 0.40 | 5.00 | 5.40 | 5.68 | U | 0.6 | 3.41 | 3.24 | 6.65 |
| | Lubbock | 0.50 | 0.50 | 1.00 | 11.00 | 12.00 | 12.61 | U | 0.6 | 7.57 | 3.24 | 10.81 |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Mc Allen | 0.40 | 0.40 | 0.80 | 9.90 | 10.70 | 11.25 | U | 0.6 | 6.75 | 3.24 | 9.99 |
| | Midland | 0.30 | 0.30 | 0.60 | 6.50 | 7.10 | 7.46 | U | 0.6 | 4.48 | 3.24 | 7.72 |
| | Odessa | 0.30 | 0.30 | 0.60 | 6.20 | 6.80 | 7.15 | U | 0.6 | 4.29 | 3.24 | 7.53 |
| | San Angelo | 0.20 | 0.20 | 0.40 | 5.60 | 6.00 | 6.31 | U | 0.6 | 3.78 | 3.24 | 7.02 |
| | San Antonio | 3.60 | 3.60 | 7.20 | 83.90 | 91.10 | 95.75 | U | 0.6 | 57.45 | 3.24 | 60.69 |
| | Sherman | 0.30 | 0.30 | 0.60 | 7.50 | 8.10 | 8.51 | U | 0.6 | 5.11 | 3.24 | 8.35 |
| | Texarkana | 0.20 | 0.20 | 0.40 | 4.40 | 4.80 | 5.04 | U | 0.6 | 3.03 | 3.24 | 6.27 |
| | Tyler | 0.40 | 0.40 | 0.80 | 8.70 | 9.50 | 9.98 | U | 0.6 | 5.99 | 3.24 | 9.23 |
| | Victoria | 0.20 | 0.20 | 0.40 | 5.00 | 5.40 | 5.68 | U | 0.6 | 3.41 | 3.24 | 6.65 |
| | Waco | 0.50 | 0.50 | 1.00 | 11.60 | 12.60 | 13.24 | U | 0.6 | 7.95 | 3.24 | 11.19 |
| | Wichita Falls | 0.30 | 0.30 | 0.60 | 7.90 | 8.50 | 8.93 | U | 0.6 | 5.36 | 3.24 | 8.60 |
| uebec | | 12.00 | 13.70 | 25.70 | 255.40 | 281.10 | 295.44 | C | 0.55 | 162.49 | | 162.49 |
| | Rural | 0.00 | 5.70 | 5.70 | 106.90 | 112.60 | 118.34 | R | 0.35 | | | 0.00 |
| | Drummond | 3.00 | 0.30 | 3.30 | 5.10 | 8.40 | 8.83 | U | 0.6 | 5.30 | 10.36 | 15.65 |
| | Montreal | 3.00 | 6.20 | 9.20 | 115.30 | 124.50 | 130.85 | U | 0.6 | 78.51 | 10.36 | 88.87 |
| | Quebec City | 3.00 | 1.20 | 4.20 | 23.10 | 27.30 | 28.69 | U | 0.6 | 17.22 | 10.36 | 27.57 |
| | Trois-Rivieres | 3.00 | 0.30 | 3.30 | 5.00 | 8.30 | 8.72 | U | 0.6 | 5.23 | 10.36 | 15.59 |
| Ontario | | 29.11 | 33.40 | 62.51 | 621.50 | 684.01 | 718.90 | C | 0.55 | 395.40 | | 395.40 |
| | Rural | 0.10 | 9.30 | 9.40 | 173.66 | 183.06 | 192.40 | R | 0.35 | | | 0.00 |
| | Hamilton | 2.91 | 0.20 | 3.11 | 4.20 | 7.31 | 7.68 | U | 0.6 | 4.61 | 6.73 | 11.34 |
| | Kitchener | 2.90 | 1.30 | 4.20 | 24.20 | 28.40 | 29.85 | U | 0.6 | 17.91 | 6.73 | 24.64 |
| | London | 2.90 | 1.40 | 4.30 | 26.10 | 30.40 | 31.95 | U | 0.6 | 19.17 | 6.73 | 25.90 |
| | Oshawa | 2.90 | 0.90 | 3.80 | 17.00 | 20.80 | 21.86 | U | 0.6 | 13.12 | 6.73 | 19.85 |
| | Ottawa | 2.90 | 2.50 | 5.40 | 46.80 | 52.20 | 54.86 | U | 0.6 | 32.92 | 6.73 | 39.65 |
| | St. Catherines | 2.90 | 1.40 | 4.30 | 25.54 | 29.84 | 31.36 | U | 0.6 | 18.82 | 6.73 | 25.55 |
| | Sudbury | 2.90 | 0.60 | 3.50 | 10.80 | 14.30 | 15.03 | U | 0.6 | 9.02 | 6.73 | 15.75 |
| | Thunder Bay | 2.90 | 0.50 | 3.40 | 8.90 | 12.30 | 12.93 | U | 0.6 | 7.76 | 6.73 | 14.49 |
| | Toronto | 2.90 | 14.30 | 17.20 | 265.60 | 282.80 | 297.23 | U | 0.6 | 178.34 | 6.73 | 185.07 |
| | Windsor | 2.90 | 1.00 | 3.90 | 18.70 | 22.60 | 23.75 | U | 0.6 | 14.25 | 6.73 | 20.99 |
| Brunswick | | 0.61 | 1.20 | 1.81 | 22.00 | 23.81 | 25.02 | C | 0.55 | 13.76 | | 13.76 |
| | Rural | | | 0.00 | | 0.00 | 0.00 | | | 0.00 | | 0.00 |
| | Urban | | | 0.00 | | 0.00 | 0.00 | | | 0.00 | | 0.00 |
| ova Scotia | | 0.61 | 1.20 | 1.81 | 21.60 | 23.41 | 24.60 | C | 0.55 | 13.53 | | 13.53 |
| | Rural | | | 0.00 | | 0.00 | 0.00 | | | 0.00 | | 0.00 |
| | Urban | | | 0.00 | | 0.00 | 0.00 | | | 0.00 | | 0.00 |
| ewfoundland | | 0.61 | 0.32 | 0.93 | 6.01 | 6.94 | 7.29 | C | 0.55 | 4.01 | | 4.01 |
| E.I | | 0.61 | 0.12 | 0.73 | 2.21 | 2.94 | 3.09 | C | 0.55 | 1.70 | | 1.70 |
| Manitoba | | 3.23 | 2.60 | 5.83 | 2.60 | 8.43 | 8.9 | C | 0.55 | 4.87 | | 4.87 |
| | Rural | 0.00 | 1.10 | 1.10 | 1.10 | 2.20 | 2.3 | R | 0.35 | | | 0.00 |
| | Winnepeg | 3.20 | 1.50 | 4.70 | 1.50 | 6.20 | 6.5 | U | 0.6 | 3.91 | 0.81 | 4.72 |