

# Plumbing the Unknown

Recycling Practices, Tonnages, and Rates in the Private Sector on Long Island in the 1990s  
Part III of an Assessment of Recycling on Long Island

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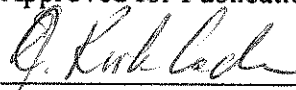
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## **Executive Summary**

This is the third part of a six-part series on recycling on Long Island. This part, Plumbing the Unknown, is a report on recycling outside of municipal programs in Nassau and Suffolk Counties -- that is to say, recycling in the private sector.

Long Island, as considered in this report, is comprised of Nassau and Suffolk Counties. It contains a population of approximately 2.6 million. It is primarily suburban in character (although it has some urban areas in western Nassau County, and the eastern portions of Suffolk County contain agricultural and/or undeveloped land, and tourist resorts). Most of the suburbanization of Long Island occurred after World War II.

The first part of the series, Doing the Right Thing, discussed the growth and extent of municipal recycling programs. Long Island municipal recycling programs began in earnest after

the Islip Garbage Barge in 1986. By 1994 (the last year completely discussed in the report), all 15 municipalities in Nassau and Suffolk Counties had mandatory source separation programs. Although each program is unique, all of the mandatory programs recycle newspaper, and glass, metal and plastic containers. All but one of the mandatory programs also target corrugated cardboard; all but one of the municipalities also recycle yard wastes. All of the municipalities target additional materials, as well, although the particulars vary. Differences in the means of amassing recyclables, processing them, and the participants of the recyclables programs also distinguish each municipality.

These programs represent tremendous growth over the preceding ten years. Only one mandatory and several voluntary programs existed in 1986. The second volume, Comparing Apples and Oranges, discussed municipal recycling quantitatively, and found, naturally, that the amount of wastes managed through recycling programs increased tremendously with the qualitative changes in general waste management strategies.

Comparing Apples and Oranges was divided into two parts. Part A was essentially a compilation of waste management statistics from the 15 municipal programs with a focus on recycling statistics. Part B was an analysis of the data presented in Part A. The conclusions of Volume II can be summarized as follows:

- 1) Based on data supplied by the municipalities, the Long Island-wide recycling rate for 1994 was 31%. By factoring in the entire Long Island waste stream, this rate was closer to 25%.

On a per capita basis, in 1994 Long Islanders recycled an average of 625 pounds (nearly 2 pounds person<sup>-1</sup> day<sup>-1</sup>).

2) For 1994, based on claimed tonnages and rates (or our estimations of those rates, where data were not made available), the Town of Shelter Island appeared to have had the best recycling rate (45% of its claimed waste stream). In terms of per capita tonnages claimed, the Town of Hempstead could be considered to have recycled the most (955 pounds person<sup>-1</sup> year<sup>-1</sup>). If "household recyclables" (the paper and containers collected at curbside or separated at drop-off centers) only are considered, then the Town of East Hampton separated the most (365 pounds person<sup>-1</sup> year<sup>-1</sup>). Huntington could be considered to have had the best curbside collection program, collecting 241 pounds person<sup>-1</sup> year<sup>-1</sup>.

However, all municipalities had clearly increased the amount of wastes recycled over time. Many Long Island recycling programs appear to have become "mature" by 1994, with slowed or little increases in recycling tonnages except by adding new materials or changing accounting procedures.

3) According to municipal statistics, household recyclables accounted for less than 30% of all recycling in 1994. Yard waste accounted for nearly 40% of the claimed tonnages, and "other materials" (predominantly private sector recycling and post-collection recyclables separation) was another third of the tonnages. Of the household recyclables, paper accounted for well over two-thirds of the tonnages, and newspaper alone was more than half of the materials collected.

There appears to be a disparity between public perception of recycling (the household recyclables) and what accounts for most of Long Island's recycling credits.

4) We did not find support in the data for either of two contentions: 1) WTE incineration detracts from recycling program effectiveness; or 2) Pay-per-Bag systems increase recycling (the analysis of this contention was inconclusive, rather than negative). We did seem to find a positive relationship between household income and curbside collection program efficiency. It is not clear why this relationship exists.

This volume (Volume III) of our series is an attempt to discuss private sector recycling activities in much the same terms as we had previously examined municipal recycling. We regret to report that Plumbing the Unknown does not document the private sector with nearly the same breadth or detail as was possible with municipal efforts. There are several reasons for this, including:

1) the nature of the private waste management industry on Long Island. Waste management companies on Long Island tend to be small and privately-held. This limits publicly available information. Secondly, it has been documented that there is a substantial organized crime role in the Long Island carting industry. This also tends to reduce information, in two ways: a) there is a disinclination to reveal illegal practices; and b) there is an intimidation factor.

2) inadequate governmental oversight. This also is found in several ways. The New York State Department of Environmental Conservation (NYSDEC), for example, is required to collect

quarterly reports from permitted transfer stations and recycling enterprises. The NYSDEC does so, but does not maintain any one data bank for these reports, nor does it require that the data submitted by these enterprises be comprehensible. On a municipal level, all Long Island local governments conform with a State law (GML-120-aa). This law requires mandatory source separation of recyclables for all wastes generated within the municipalities, regardless of the source of the wastes, or who manages them. Enforcement and documentation of compliance with this law, as of 1994, were essentially non-existent for most of Long Island.

Therefore, it was impossible to pierce the veil of secrecy surrounding the private sector's activities with the same degree of data collection and documentation that was possible for the municipal sector. Nonetheless, the following conclusions and surmises were made, mostly through model projections based on a limited data base:

1) It is likely that some 200,000 tons of commercially-generated solid wastes are recycled by private sector enterprises (carters and associated transfer stations), in addition to any recycling documented by the municipalities. These materials may be collected through source separation, but it is more likely that they are produced through post-collection separation at transfer stations. It is also likely that the sum of 200,000 tons includes a large proportion of materials separated from construction and demolition debris (C&D). Most authorities do not consider C&D to be part of the municipal solid waste stream, and inclusion of these recyclables therefore inflates the recyclables total. The 200,000 tons represents approximately 6% of the total Long Island waste stream.

2) It is also likely that at least 75,000 tons of paper are marketed directly by the waste generator to recycling middlemen. These tons are likewise not documented by the Long Island municipalities. This estimate is based on greater than 23,000 tons of corrugated cardboard recycled by Waldbaum's (which has 20% of the Long Island supermarket market), and a 1991 estimate of 30,000 tons of office paper and corrugated cardboard recycling in the Town of North Hempstead alone (approximately 10% of Long Island's population).

3) It is also possible that 75,000 tons of yard wastes are composted in small sites by landscapers and nursery businesses. Solid waste managers have been puzzled by the disappearance of these wastes from the municipal waste stream, especially in light of increasing business by landscaping firms. The total proposed here is highly speculative.

In sum, although the data are either estimated or speculative, there are good reasons to believe that some 350,000 tons of materials were recovered outside of the municipalities' accounting in 1994. This represents some 11% of the annual Long Island waste generation total.

## **Introduction**

The Waste Reduction and Management Institute (WRMI) was established in 1985 by the New York State Legislature (as the Waste Management Institute). The mission of WRMI is to reduce the impact of waste generation on society through a program of research, assessment, education, and policy analysis. Locally, there is a need to compile accurate and credible information about Long Island's solid waste stream and infrastructure. This need was initially addressed by the publication of Where Does It All Go? in 1992 (Tonjes and Swanson).

Solid waste management on Long Island has evolved considerably since the data were collected for that report. This project began as an update to Where Does It All Go? In the course of data collection and analysis, it became obvious that certain aspects of Long Island's solid waste structure were deserving of study in and of themselves. The focus of the proposed report became recycling and its associated processes. As our assessment grew, it was suggested

to us that the report had grown to unwieldy size, and would be of little utility if issued as a single document. We therefore have attempted to break the initial report down into manageable pieces.

This paper, Plumbing the Unknown, is the third of a series of six related reports. All six of the reports discuss some aspect of recycling in Nassau and Suffolk Counties. Each report is intended to stand alone; however, the reader interested in all aspects of the recycling process on Long Island would reap the most benefit by reading the reports in order.

Plumbing the Unknown is a report on recycling activities in the private sector on Long Island. The completeness and accuracy of the report was hindered by a lack of documentation of these activities. Nonetheless, we believe it is the most complete assessment yet available on the private sector's recycling. This judgement is allowed because we believe this work is unique.

Doing the Right Thing (Tonjes and Swanson, 1996a), the first report in the series, was a report on the growth and evolution of Long Island's municipal recycling programs. It was a qualitative, descriptive account, examining the differences and similarities among the Long Island municipalities' approaches to recycling. It naturally concentrated on recycling activities accomplished by the municipalities themselves.

Comparing Apples and Oranges: Part A: The Data Report (Tonjes and Swanson, 1996b) followed the format of Doing the Right Thing. Each municipality was given a separate section, and details of changes in recycling tonnages (in total, and by material) and percentages were

presented, as available. We believe the detail of Part A is necessary to support the levels of analysis that we presented in its companion volume, Part B; we also recognize that interest in these details may be restricted to a very select audience.

Comparing Apples and Oranges: Part B: The Data Analysis (Tonjes and Swanson, 1996c) used the information from Part A to reach several conclusions regarding municipal recycling efforts. The overall conclusion is that recycling has become an important waste management tool on Long Island, and has grown significantly since 1986 (when recycling could fairly be described as a waste management novelty). Quantitatively, based on data supplied by the municipalities, the Long Island-wide recycling rate for 1994 was 31%. By factoring in the entire Long Island waste stream, this rate was better considered to be 25%. On a per capita basis, in 1994 Long Islanders recycled an average of 625 pounds (nearly 2 pounds person<sup>-1</sup> day<sup>-1</sup>).

These rates and percentages varied widely for different municipalities. For 1994, based on claimed tonnages and rates (or our estimations of those rates, where data were not made available), the Town of Shelter Island appeared to have had the best recycling rate (45% of its claimed waste stream). In terms of per capita tonnages claimed, the Town of Hempstead could be considered to have recycled the most (955 pounds person<sup>-1</sup> year<sup>-1</sup>). If "household recyclables" (the paper and containers collected at curbside or separated at drop-off centers) only are considered, then the Town of East Hampton separated the most (365 pounds person<sup>-1</sup> year<sup>-1</sup>). Huntington could be considered to have had the best curbside collection program, collecting 241 pounds person<sup>-1</sup> year<sup>-1</sup>. All municipalities had clearly increased the amount of wastes recycled

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This volume, Plumbing the Unknown (Part III of the series), is our attempt to address private sector recycling practices. Information is less available for this portion of the recycling

industry on Long Island. Nonetheless, this report contains qualitative and quantitative descriptions, such as were available or could be inferred.

The next part of the series, Extending the Definition, will synthesize the data from the first three parts of the series. It will also discuss waste reduction efforts more fully, and attempt to create a means of quantifying them. These steps will be combined to create a more complete account of overall Long Island waste stream recovery and diversions. The reports to follow Part IV will thus build on the total description of recycling on Long Island, to meet our goal of the most complete account of recycling on Long Island hitherto attempted.

## **1. The General Structure of Private Sector Recycling**

Quantitative descriptions of recycling activities in the private sector on Long Island are difficult to compile, although it is obvious a great deal of Long Island's solid waste management occurs outside of municipal programs (Tonjes and Swanson, 1996a). This was even more true for much of 1994 and 1995, due to a U.S. Supreme Court decision, and the local interpretations of the decision (which have been affected by legal appeals). These legal complications will be addressed in some detail in the Appendix to this report. Nonetheless, some general accounts of private sector recycling can be given, in terms of the structure of private carting enterprises on Long Island.

The Long Island carting industry is fragmented, consisting of a multitude of small-to-mid-sized companies. Many of these are closely-held, family-run businesses. They have no outside

stockholders to report to, and are mostly regulated by the municipalities (unless they operate facilities requiring State or County permits).

The Long Island carting industry has been shown to be dominated by elements of organized crime. Money skimming, illegal, anti-competitive practices, bribery of public officials and landfill employees, and at least the unspoken threat of physical retributions are some of the results of Mafia participation in Long Island carting. In addition, two murders have been attributed to organized crime's attempts to maintain control over the industry. Although recent prosecutions and law suit settlements are pointed to by current members of the industry as signs that the old order has changed, it is not clear that this is true. For example, a study commissioned by the Town of Babylon found that the collection and service fees charged by carters servicing Babylon businesses were several times similar fees charged outside the New York metropolitan region. The conclusion of the Babylon study was that the local fee structure was not determined by competitive forces, but rather was dependent on certain factors that minimized competition (Rueter, 1988; Cahill and McCann, 1993; Goldstock, 1994; Stevens, 1994)<sup>1</sup>.

Some of the more egregious violators of the law (SSC and Jamaica Ash and Rubbish, in particular) were assigned a monitor to oversee the firms' continuing operations under settlements

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<sup>1</sup> In fact, as this report entered its final review, the U.S. District Attorney announced a 30-count indictment of three principals of a Town of Islip carting firm, two owners of reputed "front" firms, and the alleged head of the Columbo crime family. They were charged with illegally collecting commercial wastes in Islip, and that their mode of business resulted in a "mob tax" on businesses in Islip. The purpose of these firms was, according to the indictment, to "facilitate the control and domination by organized crime of the carting industry on Long Island" (Kessler, 1996).

of a civil RICO lawsuit, filed by the federal District Attorney (Goldstock, 1994). The effectiveness of the federal monitor on current private sector activities is unknown.

This is not to say that all Long Island carters are members of the Mafia. Rueter (1988) discussed how tacit acceptance of a rigged marketplace is advantageous to members of an industry such as Long Island's carters. The cost of entering the industry is not exceptionally large, and few specialized skills are required to operate such a business. Prevention of new players in the industry is worth the fixed market shares that result from bid-rigging and assigned territories. Additionally, due to the lack of "natural" competition and the unnatural difficulty of entering the business arena, established businesses have inflated net worths (for receiving loans or put out for sale). Therefore, there are incentives to allow a certain "atmosphere" to exist, to view extortion as "costs of doing business" (similar, perhaps, to trade organization dues), and, eventually, to establish the entire state of affairs as the natural way for a particular industry to operate.

These two elements of closed business structures minimally regulated and the illegal nature of many aspects of business development and operation have created a secretive industry. This is not the case in other parts of the country.

Nationwide, waste management is dominated by two large publicly-held companies, Waste Management, Inc. (Chicago) and Browning-Ferris, Inc. (Houston). These two large companies not only are responsive to shareholders, but have large, well-developed publicity departments which are designed to present the companies' activities in the best possible light. In general, other

waste management companies around the nation are compelled to follow these two giants' leads, and so are forthcoming about plans and activities. This is seen in trade journals and newsletters, where the practices of small and mid-sized companies are often featured -- no doubt as tactical moves to attract business from the industry giants (Myerson, 1995). Thus much of Long Island's private recycling practices can be understood in terms of general, nationwide activities.

The discussion which follows is based on broad descriptions of recycling in businesses and other commercial enterprises, drawn from either limited local studies, or from accounts in the trade press. Some specifics known about Long Island activities in particular will be added as appropriate.

When broadly considering recycling, re-use, and materials recovery from the private sector waste stream, often overlooked are recovery activities that are an inherent part of a business, and which avoid formal waste management systems. This can be overt, as with scrap metal dealers or the rag trade, and less obviously in businesses where "seconds" or manufacturing scraps were ordinarily returned to the manufacturing process (such as with plastic fabricators). The use of refillable bottles (such as in the old dairy industry) would also qualify under current definitions of waste avoidance (New York State Department of Environmental Conservation, 1995; Soter, 1995).

More "traditional recycling" activities depend on the realization that elements of the commercial waste stream can be valuable. This can be because the recovered material has

positive value itself, or because the diminution of the to-be-disposed waste stream by removing the materials pays for the costs of managing the recovered material separately (known as the "avoided costs" justification). Depending on the particular type of business generating the wastes, different recyclables can be expected to be recovered (Reaven et al., 1991; Tonjes, 1992; Cornell Cooperative Extension [Suffolk County] and County of Suffolk, 1993; Soter, 1995).

Commonly, a single material is separated from the waste stream. In general, corrugated cardboard and office paper are the two most often source separated recyclables at businesses. This is because they are relatively bulky materials and are often produced in large quantities at certain types of businesses (providing large avoided costs savings). These materials are usually collected in an extra dumpster or compactor. Due to the high prices received for paper recyclables in 1994 and 1995, collection boxes may be provided at no charge to the business. Supermarkets recognized the savings from avoided costs from corrugated cardboard separation as long ago as 1990. These businesses may separate and broker their cardboard themselves, often using delivery trucks to return the cardboard to a central location. When the prices for used paper cycles high, hefty profits can be realized (Cornell Cooperative Extension [Suffolk County] and County of Suffolk, 1993; Green and Rickmers, 1993; Town of North Hempstead, 1993; Scully, 1994; New York State Department of Environmental Conservation, 1995).

Other paper separators may use their MSW carting firm to manage the recyclables, or may contract directly with paper processors. Paper baling and resale businesses have propagated with the 1994 - 1995 boom in used paper prices. Other firms have been established much longer. On

Long Island, Westbury Paper appears to be the largest paper processor. Other companies of note include Dominic DeMatteo (Babylon), who has had a role in this business for over thirty years. Detail Carting (Medford) is locally important in central Suffolk County (DeMatteo, 1991; DeMatteo, 1994; Heil, 1994; Ronan, 1994; Swenson, 1994; Heil, 1995b).

There are other, more specialized recycling opportunities for "pure stream" recyclables. Wood pallets have long been reused, and old pallets have been separately recycled or disposed outside of the mainstream MSW pathways. Metal shops have been known to access scrap dealers to dispose of cuttings and trimmings. Butchers and restaurants have often used renderers to manage fats and greases. Landscapers produce a compostable waste stream (Reaven et al., 1991; Tonjes, 1992; Heil, 1995b; Soter, 1995).

Gershow Recycling must be mentioned in any discussion of Long Island recycling. Gershow dominates the scrap metal market on Long Island. The firm began as a typical junk yard, and now appears to manage most scrap metals marketed on Long Island. PK Metals (Medford) and other scrap dealers can provide competition for Gershow in specialized situations and materials (Heil, 1995a).

Other processors of note include a major yard waste composter, Long Island Composting, in East Moriches (Ain, 1995), and a source-separated polystyrene collection company, Tri-State, in Amityville (Heil, 1994). Tri-State began business in reaction to the proposed Suffolk County plastics ban. The company appears, as with many other recyclers, to make its primary profit

through collection fees; if any economic advantage can be gained through selling the recyclables, then the company has realized extra profit (Swanson et al., 1993). "Collection fees" are the combination of charges consisting of rental of a container or containers, and a service fee for emptying the container(s). Sometimes a disposal fee is added to the collection fees. The combination of charges can result in a waste generator unwittingly paying more per ton for recyclables collection than for regular MSW services. It should be noted that the sometimes high prices in the paper markets have changed this situation for paper products, from time to time.

There appear to be many more composters in the region than is officially recognized. The plethora of lawn care companies, faced with yard waste or grass clippings disposal bans at most municipal facilities, do not appear to be illegally dumping collected grass clippings; nor do they all appear to be using the one large, regulated compost facility on Long Island (Long Island Composting) (Heil, 1994). This suggests that many nurseries, tree care firms, and the like, may have small compost piles at the rear of their business lots.

Some businesses may separate more than one type of recyclable. Collecting more than one type of recyclable in the same stream is known as commingled recycling (the kind all Long Island residences receiving recyclables collection service participate in). This is not a common kind of separation approach, especially on Long Island, because of the degree of additional processing required to market the recyclables. Major private Materials Recovery Facilities (MRFs), that is, facilities that process commingled recyclables, appear to be limited to Omni Recycling in Westbury and Babylon, and Island Recycling in Central Islip. These facilities appear

to receive most of their inputs from municipal programs (Ronan, 1994; Heil, 1995b; McNulty-Gallo, 1995; New York State Department of Environmental Conservation, Region I, 1995). All three are related to the Jamaica Ash and Rubbish circle of companies. Some Brooklyn recyclers, such as the ReSource-Star group of companies, and JLJ, appear to attract some Long Island wastes (Lomangino, 1994; Groben, 1995). Some paper processors appear to have the capability to "high-grade" their feedstocks (sort the paper into multiple categories) if markets require it.

Construction and demolition debris (C&D), although we would prefer not to include it in our definition of MSW, can be an especially fruitful source of recovered material, and has even been treated as if it were entirely commingled recyclables. Wood, steel, concrete, and other structural materials have extensive reuse markets. Construction sites also generate large amounts of cardboard, smaller amounts of bottles, cans, newspapers, and other recyclable "trash," and economically significant amounts of non-ferrous metals such as copper and brass. Soil has a good market, and trees and branches can be recovered for mulching, composting, and (although not technically recycling) recovery of energy through incineration. Finally, C&D, when crushed, screened and tested for the absence of hazardous contaminants, has received approval from various regulators as "alternate daily cover" (a replacement for sand) for landfills (Formato, 1992; Groben, 1995; Heil, 1995b; New York State Department of Environmental Conservation, 1995; Broughton, 1996). Long Island's participants in C&D recycling will be discussed, in other contexts, below.

On Long Island, most businesses do not source separate recyclables. One factor is a lack of space for many retail establishments -- strip malls and downtown stores were not designed with multiple garbage containers in mind, and the use of parking spaces for customers' cars rather than recycling bins may be deemed a more proper allocation. Recycling a single material requires doubling the number of garbage containers used, and, given the dearth of commingled recyclables processors, each additional material recycled requires its own container. A second factor limiting source separation is that the carter may not be willing to offer direct recycling services, or may price them in such a fashion so as to dissuade the business from participating (Tonjes, 1992; Tonjes, 1993; Smith, 1995).

Part of this lack of source separation services may stem from the structure of the private carting industry on Long Island. The small carting companies may only have one or two "routes:" collections of stops that have a degree of efficiency to minimize collection costs. Routes are the basis of carting company valuations, and have been decried as a signal of the anti-competitive, illegal nature of Long Island carting. Clearly, if stops could freely assign themselves to competing carters, route structures would not be lasting or valued (Rueter, 1987; Cahill and McCann, 1993). The counter-argument sometimes advanced is that these routes are so efficient, it is impossible to compete for an individual stop without creating an entire competing route.

In any case, a carter with only one or two commercial routes may find it difficult to offer source separation of recyclables, even only corrugated cardboard, or office paper. It could be risky to offer the service, if the collection costs for the recyclables would be excessive because the

trucks used are not being well-filled. In addition, by reducing the amounts collected in the MSW portion of the route, the efficiencies of the route are unbalanced, again increasing costs. In general, source-separation at any one location is contraindicated because of the extra collection costs imposed to collect twice.

Such extra costs would be dissipated by additional participants, and recyclables values are enhanced through source-separation. Thus, what is not cost-effective for one location may become economical for many stops. If the company considering such a service has many routes and stops, some re-arrangement of stops and routes can undoubtedly be found that improves efficiency. Smaller carting companies may not be able to reconstitute routes, or may not wish to risk such an implementation only to discover they lack the necessary elements to restore the most profitable arrangement of trucks, stops, and waste volumes.

This does not mean that recyclables are not extracted from the prototypical Long Island business place. Many carters either own, or access, a transfer station cum recycling center. The use of such facilities began in the mid-1980s with selective bans on certain materials (such as C&D) or waste streams (such as commercial wastes) at Long Island landfills. The trucks used for collection were not suitable for long distance hauling. Therefore, facilities were developed where wastes were transferred from the collection vehicle to a more suitable trailer. It was soon realized that if the wastes could be densified (often by simple packing methods, or by size reduction) more wastes would fit into the trailers. As long as the material was being handled on the floor of the transfer station, it also soon made sense to remove some materials for cheaper disposal, or even

for direct profit. For example, disposal of a waste in the early 1990s could cost \$100 ton<sup>-1</sup> or more (including transportation); but cardboard only cost (perhaps) \$20 ton<sup>-1</sup> for recycling; and aluminum returned \$400 ton<sup>-1</sup>. If the workers removing the material earned minimum wages or so, significant savings could be realized (Formato, 1992; Town of Brookhaven, 1992; Leteri, 1993; Eisenbud, 1994a; Heil, 1994; Scully, 1994; Heil, 1995b; Tonjes and Swanson, 1996a).

There were 24 permitted transfer stations on Long Island in 1994, and, by some estimates, at least that many unpermitted facilities (Waste Management Institute, 1994). By 1995 the number of permitted transfer stations had grown to 30 (43 transfer stations totaled in Heintz et al., 1996, minus the 13 municipal facilities). Larger transfer stations include Island Recycling in Glen Cove, A-1 (and affiliates) in Glen Cove, Jamaica Ash and Rubbish in Westbury, Jet Recycling in Central Islip, All Island (Maggio's) in Medford, and Selas (SSC) in Holtsville. Most of these facilities separate recyclables by hand after the wastes have been dumped on the tipping floor, although some of the larger operations have added mechanical elements such as magnets and conveyer belts. As far as can be determined, all these facilities also process C&D.

Recycling, as a process, involves more than the collection and marketing of materials. It also requires that the materials be re-used. Long Island appears to have just two types of end-users for recyclables. These are soil manufacturers (such as Bittle, in Medford, although there are quite a great number of such companies), and plastics manufacturers. Soil manufacturers use compost (almost always from yard wastes) as a mixing agent to provide bulk and carbon to deficient sands, or, sometimes, clays (Tonjes, 1992). Plastic manufacturers on Long Island may

intentionally use recycled polymers in fashioning new products. Because of the nature of some plastics recycling, where the process may result in the production of basic monomers indistinguishable from virgin raw materials, the use of recycled plastic may be unintentional and unknown (Swanson et al., 1993).

As late as 1992, three plastic lumber companies operated on Long Island. Plastic lumber production, in general, had a difficult time with quality control before the companies learned to be more discriminating in the polymers used in the process. The lumber also has faced a price barrier. Only one company, Tri-max of Ronkonkoma, still is in existence, and it is under bankruptcy law protections (Swanson et al., 1993; Noto, 1995).

There is another aspect of materials recovery that should be mentioned. New York State mandates a five-cent deposit at the point of sale on individual soft drink and beer containers. This measure was instituted to reduce roadside litter, but was also later recognized as an important incentive for separating plastic, glass, and aluminum containers from the waste stream. By definition, municipalities may not include estimates of deposit container returns in their waste stream recovery calculations. These recovery activities do take place in the private sector -- at supermarkets (through the supermarkets themselves or subcontractors) or, more typically, at beer/soda wholesalers or distributors -- and therefore might be considered to be a topic of discussion in this report. We have not included the deposit containers in this report, however, because of the New York State definitional ban, and also because we had not included these tons in our earlier (1992) definition of the Long Island waste stream (Tonjes and Swanson, 1992; New

York State Department of Environmental Conservation, 1993; Swanson et al., 1993; Heintz et al, 1996). We will discuss deposit containers in Part 4, Extending the Definition.

Therefore, on Long Island commercial recycling activities outside of municipal collection services appear to divide themselves into the following categories:

(1) source-separation. This can be through a carting firm, where a separate collection is provided. However, much of this activity appears to be through direct marketing by the generator to a recycler (as in the case of supermarket corrugated cardboard);

(2) "pure" waste stream recovery. This is when a single component waste stream is either totally or partially recovered. Examples include lawn-care companies' composting, or in-house salvaging of scraps or imperfect products.

(3) post-collection separation. Materials are salvaged from the waste stream after being collected as commingled MSW. This process can become intertwined with C&D recovery and processing operations.

(4) small-scale, limited manufacturing based on recyclables. This appears to be limited to soil manufacture and plastic lumber fabrication.

## **2. Barriers to Quantifying Private Sector Recycling**

It is difficult to account fully for private sector recycling. For each of the recycling collection and processing components identified above, certain counting difficulties arise.

Source separated recyclables, if managed by the generator and marketed directly to brokers, may not be counted by any authority without a special effort. The Town of Islip, for example, became aware of the Waldbaum's supermarket chain central receiving area for corrugated cardboard in Central Islip in 1993. By approaching the firm directly, the Town learned that this center brokered 23,413 tons of cardboard that year (Scully, 1994). In a similar fashion, by approaching individual businesses and retailers, the Town of North Hempstead was able to estimate that over 60,000 tons of paper products were recovered by its private sector in 1991 (Town of North Hempstead, 1993). In general, there is no requirement for directly marketed recyclables to be reported to any regulators, and, especially with the demise of flow

control authorizations (see below), no means for municipalities to control these activities. State law also forbids municipal interference with established recycling enterprises (New York State Legislature, 1988).

A further complication of this form of recycling is that it is not clear that these waste streams are included in general assessments of the size of Long Island's waste stream. If these materials have been diverted from the waste stream since the late 1980s, for example (as could be the case with much supermarket cardboard), then they would not have been included in our 1991 assessment of the Long Island waste stream (Tonjes and Swanson, 1992). Nor would they have been included in other assessments, which, in general, accord with a MSW generation estimate of 3.25 million tons per year (Romalewski, 1991; Long Island Regional Planning Board, 1993; New York State Assembly Legislative Committee on Solid Waste, 1995). Therefore, if this is so, inclusion of these recyclables into any general Long Island recycling assessment should require that the total waste stream size for Long Island be increased.

Source separation activities by carters have been enumerated, somewhat, by several Long Island municipalities. The municipalities license carter companies that operate within their bounds. Two municipalities required carters to tally their recycling efforts as part of this licensing procedure (Babylon and Oyster Bay), and Hempstead requested recycling information from its carters on an annual basis (Kluesener, 1994; Ronan, 1994; Swenson, 1994). Other Long Island municipalities do not request this information. There are no county or State requirements for carters with regard to this form of recycling.

Pure stream recycling activities also are poorly documented. Composting operations smaller than 3,000 cubic yards are not required to be permitted by the NYSDEC, although they should register with that agency. Registration does require reporting of wastes received and managed (New York State Department of Environmental Conservation, 1993). Apparently, the NYSDEC has not made any effort to determine compliance with this regulation. Therefore, it is unlikely that the small composting operations that seem to be prevalent for yard wastes generated by landscapers have been accounted for. Back-counting these wastes by determining the amount of wastes "missing" from municipal collections would not be practical, as too many other variables are involved in changes of the sizes of municipal waste streams.

Additionally, it is not clear whether some of this recycling should be considered recycling at all. The return of scraps and seconds within a manufacturing process does avoid the production of solid wastes; however, it is also a common sense part operating a business efficiently. There are those who believe that the return of scraps and seconds to another location for refabrication, as a newspaper publisher might send paper back to a mill, is acceptable. Others would reserve the recycling label for inclusion of the material in a pre-determined recycling process, as when the newspaper sends off-prints to a paper recycler. Still others would require distribution to the marketplace (although no actual consumer sale need happen), as when a paper or magazine distributor collects unsold copies, and recycles those materials. Some require that all recycling be initiated by the consumer, and would not permit any of the above to be labelled "recycling" (National Recycling Coalition, 1989; deKadt, 1992; Cornell Cooperative Extension [Suffolk County] and County of Suffolk, 1993; New York State Department of Environmental

Conservation, 1995; Heintz et al., 1996). In any case, these activities have generally not been included in any assessments of waste stream size, and are certainly not accounted for in any of the information available on Long Island recycling.

Post-collection recovery of recyclables at NYSDEC-permitted transfer stations should be the easiest of the categories to enumerate. The regulations regarding these facilities are rife with reporting requirements, and the facilities, in part, appear to comply with these regulations (see below) (New York State Department of Environmental Conservation, 1993). Four difficulties arise, however.

The first is that the Long Island Regional Office of NYSDEC does not have any central collection of these data. The collection of the data is part of the overall regulatory responsibilities of the monitors assigned to each facility. These reports are filed only by the particular facilities, not in any general database. Accessing this data apparently requires citing each facility by name, as general requests for information have not resulted in adequate responses from the NYSDEC.

Secondly, most of these facilities also process construction and demolition debris (C&D). This material is usually not considered to be part of MSW (National Recycling Coalition, 1989; Tonjes and Swanson, 1992; United States Environmental Protection Agency, 1994). However, the facilities do not (and, to be fair, largely can not) distinguish whether recovered materials began as MSW or C&D. Thus, any records reflect mixtures of materials that "should" and "should not" be counted under the rubric of MSW recycling and recovery.

Thirdly, the records of these facilities are often based on inconsistent sets of measures. The typical facility receives materials on a volume basis (cubic yards, usually), based on dumpsters or roll-off containers, although some materials may be weighed. Very often these facilities pay for disposal, or are paid for recyclables, on a weight basis (in pounds or tons). Even more commonly, outgoing wastes are counted both in volume and weight, depending on whether disposal or sale of the material is volume- or weight-based. The processing of these materials at the facility changes the densities of the various materials, so there are few means of ascertaining whether outflows equal inflows, or in equating the distributions of different materials.

The data in Table 1 were received from the NYSDEC for Friendly Carting/USA Recycling (Smithtown) for 1993 (Friendly Carting, 1994). This recycling center happens to have received the first permit for a private recyclables recovery facility on Long Island (Leteri, 1993), but it was not chosen for any reason other than the simplicity of its data presentation, and the typical incomprehensibility of those data.

Table 1. Friendly Carting 1993 Annual Transfer Station Report Data

Materials In (cubic yards)		Materials Out (Yds) (Lbs)		
Garbage	30655	Garbage	26485	
Mixed	26955	OCC	17535	
OCC	940	Wood	7370	
C&D	1792	Mixed metal	3160	
Trees	30	C&D	3325	
		Trees	400	
		Mixed paper	852	51870
Total	60487	Totals: Recyclables	23437	
		Mixed paper		51870

An initial difficulty is that of determining the size of the incoming waste stream for the facility. Two general waste streams are cited: MSW and "mixed." In addition, three other, minor inputs are given (corrugated cardboard ["OCC"], C&D, and trees). All are measured in (cubic) yards. From a practical standpoint, it is impossible to translate these figures into tons. The MSW and mixed wastes may or may not have been compacted by the delivering truck; it is unlikely that the C&D was compacted, but unprocessed C&D is highly variable in density (consider the case of a truckload of brickwork versus site-clearing debris, such as bushes and tree branches). The trees are unlikely to have been compacted; it is not clear whether or not the incoming OCC would have been.

Outputs are listed in pounds and cubic yards. Some of the outputs in yards can be assigned reasonable densities: processed C&D at approximately one-half ton per yard, compacted garbage at one-third ton per yard -- except that such figures are generally based on materials still containing recyclables. Removal of recyclables may change the densities, although reasonable arguments can be made for either increasing or decreasing the resultant densities (depending on the assumptions about which materials have been removed from the waste mixes). The translation of other outputs are purely speculative, and depend upon the packing of materials in the outgoing container(s). The mixed paper outgoing totals are given both in pounds and yards. Although it is not explicitly stated, it seems reasonable to assume these are not the same amounts (otherwise the density of the mixed paper would be less than 60 pounds per cubic yard). It is also impossible to find a sum of cubic yards of individual materials equal to the reported sum of outgoing recyclable materials.

Fifteen similar reports were obtained for 1993 (New York State Department of Environmental Conservation, Region I, 1995). Information in each of the reports followed the same format. No relations could be drawn from one facility's waste streams and product streams to another. Thus, in general, it is impossible to determine exactly what is being recycled from the permitted transfer stations.

The fourth difficulty in accounting for private transfer station recycling activities, if they could be added up correctly, concerns the assignment of the credits. Most of these facilities collect wastes from more than one municipality. Some cross county lines, and some may even collect wastes from both Long Island and New York City. Disregarding "arbitrary" municipal boundaries makes good business sense in many cases, and, absent flow control restrictions and given the proper permitting, seems to violate no regulations. Statistical sets for reporting requirements, however, are usually based upon these municipal distinctions. The Solid Waste Planning Units on Long Island charged with meeting the New York State 1997 goal of 50% waste stream recovery are the municipalities. If these municipalities wish to take credit for private sector recycling to assist in meeting this ambitious goal, it would seem to require some means of partitioning of the recycling credits from the facilities to the respective municipalities. Only three municipalities have historically concerned themselves with these credits, however (see below, page 26).

Added to these difficulties is the fact that not all transfer stations have permits -- and thus have even less documentation than the permitted facilities.

Other problems exist. One is the distinct tendency for residential and commercial waste streams to become mixed, in various ways. Some of these will be discussed in the Appendix (on Flow Control). Others include situations unique to the East End Towns that do not have residential waste collection services. There the carters have no special incentive to separate commercial from residential collections (except for equipment reasons). If it is in the carter's interest to deliver MSW or recyclables to the municipality, no distinction can be made between the sources of the materials.

Other factors in other Towns tend toward the mixing of wastes. The primary is the means of paying the contract carters for residential service. Some Towns do not have a tipping fee for residential wastes (or recyclables). In those instances, it is worthwhile for a dishonest carter to include MSW (or recyclables, depending on market conditions) collected from commercial stops in with residentially-collected MSW. Other Towns include a disposal fee in the monies paid to carters for residential collection services. There, depending on the cost of alternate disposal, a carter may find extra profit in avoiding the municipal system that the carter has already been paid to patronize (Cahill, 1994; Del Col, 1994; Heil, 1994; Scully, 1994).

This was especially true for recyclables in late 1994 and 1995. The tremendous rise in recyclable materials' values, and municipalities' uncertainty with how to react to the series of flow control decisions (see the Appendix) led to large diversions of residential recyclables from municipal systems. Because municipalities did not pay carters to deliver collected residential recyclables to the municipal venues, as paper products remained worth over \$100 ton<sup>-1</sup> (1995),

packer trucks full of recyclables were worth too much money to empty without being paid.

Therefore, many carting companies simply marketed the paper goods outside of their contracted sites. Some of this activity was disguised under commercial sector recovery activities (although most firms were blatant about the diversion due to flow control uncertainties) (Heil, 1994; Scully, 1994; Swenson, 1994; Groben, 1995; Heil, 1995a). This, of course, added to other confusions over the sources and amounts of recyclables in the private sector

Finally, the structure of private carting on Long Island is inimical to open information flows, as discussed above. Factors such as fear of rivals and the natural privacy concerns of small businesses, together with more nefarious reasons such as income underreporting and organized crime involvement, all make it difficult to determine exactly what occurs within the world of private carting on Long Island.

### **3. Estimating Private Sector Recycling**

The factors discussed in the preceding section make direct determinations of private sector recycling quantities impossible. However, we believe it is possible to develop a credible estimation of this activity.

Three municipalities make (or did make) concerted efforts to record private sector recycling tonnages (Babylon prior to 1994, Hempstead, and Oyster Bay). Table 2 lists the tonnages recorded by each municipality for 1993 and 1994. Babylon and Oyster Bay collected the figures by requiring each carter (seeking a commercial collection license) to disclose the extent of the previous year's recycling in the respective Town; Hempstead apparently obtained its figures by contacting facilities where the recycling of Town wastes was likely to occur (Town of Babylon, 1994; Town of Hempstead Department of Sanitation, 1994; Town of Oyster Bay, 1994;

Town of Hempstead Department of Sanitation, 1995; Town of Oyster Bay, 1995). These two different approaches generated distinctly different recycling rates, when computed on per capita basis. The Oyster Bay and Babylon figures were similar (~290 pounds per person per year), while Hempstead's rates were much lower (75 pounds per person per year in 1993 and 133 pounds per person per year in 1994). Hempstead's partial collection of commercially generated recyclables may factor into this difference somewhat.

Table 2. Municipally-collected Private Sector Recycling Data (in tons)

Municipality	Year	Curbside Recycling	Private Recycling	Ratio Private: Curbside	Per Capita Private Recycling (lbs/yr)
Babylon	1993	12138	29398	2.4	290
Hempstead	1993	57149	27251	0.5	75
Hempstead	1994	58324	48237	0.8	133
Oyster Bay	1993	24963	42711	1.7	292
Oyster Bay	1994	26213	40871	1.6	280

Table 3 breaks down the tonnages reported to the municipalities (in a format used in earlier sections of this overall report [Tonjes and Swanson, 1996b]). The private recycling activities reported to the different municipalities seem to be quite different -- although both Babylon and Oyster Bay received over half the recycling totals from paper products, and Hempstead seemed to draw much more on C&D-related recyclables (wood, mixed metals, concrete [reported under "C&D"] and "bulky wastes" [reported under "other"]).

Table 3. Municipally-reported Private Sector Recycling Data (in tons)

Private Sector Recycling	Babylon	Hempstead	Hempstead	Oyster Bay	Oyster Bay
	1993	1993	1994	1993	1994
Recycling Total	29398	27251	48237	42711	40871
Paper	19235	8633	8012	31785	31854
Newspaper				16872	15026
OCC	12571	5762	6438	14571	15438
office	3841	2871	1574		
mixed				342	1480
other	2823				
Containers				28	15
Metal					
Tin					
Alum.					
Glass					
Clear					
Brown					
Green					
Mixed					
Plastic	98				
HDPE					
PET					
other					
White goods/mixed metal	3748	3672	8536	6771	8149
Yard Waste/compost				154	39
Grass					
Leaves				67	
Brush					
Other Wood		7647	8572		
Waste Oil		161	382	17	75
Batteries				100	1
C&D	5766	1380	1196	3955	647
Other	551	5758	20707	1	1

None of these three municipalities reported office paper or corrugated cardboard recycling programs as large as those reported in the North Hempstead Solid Waste Management Plan (3,000 tons per month of office paper and 2,500 tons of corrugated cardboard per month) (Town of North Hempstead, 1993), or from single large generators of cardboard as in Islip (Waldbaum's supermarkets, 24,000 tons in 1993) (Scully, 1994). This provides further evidence that tallying

these tonnages requires special effort beyond the normal scope of assessing private sector recycling. Additionally, no large quantities of yard wastes were included in these accounts.

The definition of "recycled" may not have been strictly applied by all firms reporting data to these Towns. Information received from Hubbard Power and Light (a wood-burning electrical generating plant in the Town of Islip), together with some of the annual reports we accessed, indicate that some carters sold separated wood to Hubbard. Hubbard then burnt the wood to generate electricity. Although this is a form of "resource recovery," burning recyclables to generate electricity is usually not considered to be "recycling" the materials (Heil, 1995b; New York State Department of Environmental Conservation, Region I, 1995).

Nonetheless, the striking similarity of the data from Babylon and Oyster Bay suggests that this data may be useful in constructing an estimate of private sector recycling quantities. Some of the municipalities, however, do provide some forms of either business sector recycling, or incorporate some private sector data into their reports. A smaller per capita estimate of uncounted private sector recycling quantities should be used in those cases. We therefore have applied the following model:

- 1) we will determine two commercial recycling rates for each municipality, one based on a 290 pound per person rate, and another based on a 125 pound per person rate (this rate is modified from the 1994 Hempstead data);

2) a "best choice" for each municipality will be made on the following bases:

- a) where the municipality has not accounted for any commercial sector recycling in its reported statistics, a 290 pound per person commercial sector recycling rate will be added;
- b) where the municipality has accounted for some of its commercial recycling implicitly through its collection or drop-off accounting procedures, a 125 pound per person rate will be added;
- c) where the municipality has already employed efforts to account for commercial sector recycling, no addition will be made to the municipality's accounting.

Because of the estimation process, all tonnages developed from this model will be rounded to two significant figures.

Table 4 displays the results of this model. The model results in greater estimated private sector recycling tonnages for Suffolk County. This is because the Nassau County municipalities had made greater efforts to include commercial sector recycling tonnages in their official statistics and/or tended to collect a portion of business recyclables in the curbside programs. The model suggests that approximately 6% of Long Island's total waste stream is recycled by the private sector, but not reported to the municipalities.

Table 4. Model for Estimating Private Sector Recycling Tonnages (Based on 1994 Data) (in tons)

	Private Sector (290 lbs/cap)	Private Sector (125 lbs/cap)	"Best Choice" <sup>2</sup>
Nassau County			19000
Glen Cove	3500	1500	1500
Hempstead	110000	45000	
Long Beach	4900	2100	2100
North Hempstead*	31000/2	13000/2	15500
Oyster Bay	42000	18000	
Suffolk County			180000
Babylon	29000	13000	29000
Brookhaven	59000	26000	59000
East Hampton	2300	1000	1000
Huntington	28000	12000	28000
Islip	43000	19000	43000
Riverhead	3400	1400	3400
Shelter Island	330	140	140
Smithtown	16000	7100	16000
Southampton	6600	2800	2800
Southold	2900	1200	1200
Long Island Total			200000
Est. Percent of Total Waste Stream			6%

\*North Hempstead's tonnages were divided in half, because commercial wastes were managed by the Town for half the year.

Two additional, possible sources for recycling credits were discussed above. These were paper recovery directly by the producer (as with Waldbaum supermarkets' extensive corrugated cardboard recycling program), and the hypothesized composting of yard wastes by landscapers.

<sup>2</sup> Municipalities receiving no additional credit were Hempstead and Oyster Bay. Hempstead collected a portion of the Town's commercially generated recyclables; both Towns canvassed the private sector for recycling credits. The four East End Towns with drop-off collection programs (East Hampton, Shelter Island, Southampton, and Southold) were assumed to collect a portion of their commercial recyclables; and Glen Cove and Long Beach collected a portion of their commercially-generated recyclables curbside. These six municipalities were given the 125 lbs. person<sup>-1</sup> year<sup>-1</sup> credit. All other municipalities were assumed to have accounted for no commercially-generated recyclables, and received the 290 lbs. person<sup>-1</sup> year<sup>-1</sup> credit (Tonjes and Swanson, 1996a).

It is not clear whether or not these kinds of recycling credits should be added to our analysis, especially if they are not factored into our calculation of the overall Long Island waste stream.

If they were to be included, a conservative approach might be sketched as follows. It seems reasonable that the other supermarket chains on Long Island could, in total, triple Waldbaum's efforts (Waldbaum's holds about a 20% market share in the Long Island supermarket market [Bernstein, 1996]). This would generate another 75,000 tons of recyclables, for a total of 100,000 tons of corrugated cardboard recycled by Long Island's supermarkets.

As discussed earlier, it also seems apparent that much paper recycling appears to go unaccounted for in Long Island recycling totals. Estimates of paper recycling in the North Hempstead Solid Waste Management Plan (1993) were 30,000 tons year<sup>-1</sup> of corrugated cardboard in the commercial sector; however, quantifications of commercial sector corrugated cardboard recycling summed for neighboring Hempstead and Oyster Bay by private firms were much less (see Table 3). This is so, even though the joint population of Hempstead and Oyster Bay is more than four times that of North Hempstead. Therefore, the supposition that general source separation of commercially-generated paper goods is undercounted on Long Island seems to be valid.

Therefore, it would appear to be acceptably conservative to assume that paper recycling in the business sector is undercounted by at least 75,000 tons in the 1994 statistical set. These 75,000 tons are meant to account for both the presumably uncounted supermarket corrugated

cardboard recycling undercount, and direct office paper recycling undercounts. We do realize that these tons may not have been included in our baseline  $3.25 \times 10^6$  tons of waste generation for Long Island.

In addition, it has been supposed that landscaping firms are making use of space at loading yards, greenhouses, and nurseries for composting disposal of collected yard wastes (as few municipal managers can account for the detritus associated with such businesses) (Heil, 1994; Scully, 1994; Heil, 1995b). The material apparently is not being processed at permitted municipal or private compost sites; nor is it being disposed as MSW.

If these various firms used as little as 30 acres in the bi-county region for composting efforts, at NYSDEC-estimated loading rates this would add to 150,000 yards<sup>3</sup> of composting. Cubic yards of compost are generally translated into weights at a rate of a ton per every two yards. This suggests that another 75,000 tons of recycling credits can be expected from undocumented yard waste recovery activities.

Applying these tonnages equally, at the county levels, produces Table 5. Table 5 is a modification of of Table 4. Table 4 suggests that Long Island, as a whole, had approximately 350,000 tons per year (approximately 11% of the total baseline waste stream) that was not included in the municipal data bases, from private sector activities.

Table 5. Estimated Total 1994 Private Sector Recycling (Not Included in Municipal Data) (in tons)

	Modelled Private Sector Recycling	Supermarket OCC	Landscaper Composting	Est. Total (1994)
Nassau County	19000	37500	37500	94000
Glen Cove	1500			
Hempstead				
Long Beach	2100			
North Hempstead	15500			
Oyster Bay				
Suffolk County	180000	37500	37500	255000
Babylon	29000			
Brookhaven	59000			
East Hampton	1000			
Huntington	28000			
Islip	43000			
Riverhead	3400			
Shelter Island	140			
Smithtown	16000			
Southampton	2800			
Southold	1200			
Long Island Total	200000	75000	75000	350000
Est. Percent of Total Waste Stream	6%	2%	2%	11%

## **Conclusions**

Often with intention (and sometimes the intention is malicious), the private sector of waste management on Long Island has made itself opaque to detailed analysis through public documentation. The causes of this difficulty include the small, privately-held nature of many of the companies; organized crime involvement and influence is another. Inadequate management of records by the NYSDEC and a lack of oversight by most of the 15 Long Island municipalities also contribute to the sparse nature of readily-available, accurate statistics.

The overall framework of private sector recycling can be sketched through descriptions of nation-wide trends, and through anecdotes and observations of local practices. Three major means of recovering materials for re-use emerge from such an analysis:

(1) source-separation. This can be through a carting firm, where a separate collection is provided. However, much of this activity appears to be through direct marketing by the generator to a recycler (as in the case of supermarket corrugated cardboard). Long Island carters appear to offer little in the way of source separation because of the relatively small size of most companies (which limits flexibility in establishing economic routing) and because of real or perceived space limitations at the generation points.

(2) "pure" waste stream recovery. This is when a single component waste stream is either totally or partially recovered. Examples include lawn-care companies' composting, or in-house salvaging of scraps or imperfect products. The latter example is rarely included in assessments of the degree of materials recycled from a waste stream.

(3) post-collection separation. Materials are salvaged from the waste stream after being collected as commingled MSW. This process can become intertwined with C&D recovery and processing operations. This appears to be the dominant means of recovery from the commercial waste stream on Long Island. The large number of transfer stations (30 permitted facilities in 1995, with more unpermitted facilities) expedites this process. Transfer stations exist because of limited or economically uncompetitive local disposal sites; the removal of recyclables is largely motivated by reduced hauling costs, although resale value will encourage efficiency.

Although it is difficult to determine exactly how much is recovered from the commercial waste stream outside of some limited municipal efforts, we developed an estimate based on some available municipal data. This estimate is that carting companies and transfer stations recovered approximately 200,000 tons of materials from the waste stream in 1994, which was not included in any municipal accounting of Long Island recycling. This tonnage represents 6% of the total baseline amount of MSW generated on Long Island. It is not possible to determine how inflated that estimate is because of recoveries from C&D (not considered part of the MSW waste stream).

Additionally, we estimate that a minimum of 75,000 tons of source separated paper goods were recovered, and marketed directly, by the waste generators (typically, supermarkets). We also suggest that it is feasible that another 75,000 tons of yard wastes were composted by landscaping firms and related businesses, without being included in any reckoning by local or State authorities.

The impact of these activities would then have been to recover an additional 350,000 tons from the waste stream beyond the amounts counted by the local municipalities. This additional recycling accounts for some 11% of the baseline annual generation of MSW on Long Island.

## **Appendix: Flow Control Issues and Private Carting on Long Island**

In May, 1994, the U.S. Supreme Court ruled (*C&A Carbone et al. vs. Town of Clarkstown et al.*, 1994) that flow control ordinances were unconstitutional as a violation of the so-called Commerce Clause. The U.S. Congress has the sole power to affect interstate commerce through many Supreme Court decisions on this constitutional clause. Restrictions on the interstate marketing of commodities (and garbage had been ruled a commodity in Philadelphia v. New Jersey [1963] by the Court) have been generally ruled to be subject to the Commerce Clause. Flow control laws determine exactly where MSW may be disposed, and therefore restrict access to markets by the MSW in question. Because these laws were not enacted by the U.S. Congress, but by local municipalities generally acting under authorities derived from State legislatures, they were ruled to be invalid.

The local federal District Court was quickly involved in two flow control related decisions -- one filed prior to the Supreme Court decision, and one filed soon after. The same jurist, Judge Platt, presided. One case was a suit filed by SSC against the Town of Smithtown, when the Town of Smithtown attempted to break its contracts with SSC. Smithtown had evidence that SSC was bringing garbage collected from residences in the Town to its transfer station for transshipment off Long Island, rather than bringing the MSW to Smithtown's WTE incinerator (which is shared with the Town of Huntington). The contracts between SSC and Smithtown specified, under flow control authority, that the MSW had to be brought to the incinerator, and SSC was being paid to do so. The second case was in relation to the Town of Babylon's attempt to create a commercial garbage improvement district. Babylon was sued because the creation of the district was seen as a transparent attempt to control the flow of wastes, primarily through a mechanism of not paying the contractor for disposal of the wastes. Not including monies for the disposal of the wastes would require disposal at the Town incinerator (where no tip fee was to be charged for such commercial wastes generated within the Town). A rather more speculative aspect of the suit was a provision asking that all such districts (presumably including long-standing residential districts) be found to be ipso facto impediments to interstate commerce by restricting participation in waste collection to a select few carters (A.A. & M. Carting Service et al. vs. Town of Babylon, NY et al., 1994; C&A Carbone et al. vs. Town of Clarkstown et al., 1994; USA Recycling, Inc. et al. vs. Town of Babylon, NY et al., 1994; SSC Corporation v. Town of Smithtown et al., 1995).

Judge Platt deemed that these decisions were of such import and interest that any decision he made would be immediately appealed by the losing side. He therefore issued

injunctions against the Babylon district implementation, and against Smithtown enforcing penalty clauses or cancelling SSC's contracts by briefly referencing the Carbone decision, and inviting the Towns to appeal (Platt, 1994).

The demise of flow control on Long Island not only allowed carters managing commercial wastes to avoid municipal waste disposal systems and seek the least expensive disposal option, but also allowed carters managing residential garbage districts to do likewise. This had small effects on certain municipalities -- Huntington and Babylon, for example, where free disposal was the rule for "district" MSW, and in Oyster Bay and Hempstead, where municipal collection crews predominate. However, residential contracts in Brookhaven, Islip, North Hempstead, and Smithtown were structured so that the carters' service fees included recompense for paying a municipal tip fee. If the municipal fee was higher than alternative options, the carters could now legally take the MSW to the alternate disposal site, and pocket the difference. Quite a few carters took at least portions of the residential waste stream out of the municipal system for this reason. Finances for the affected municipalities were seriously impacted. These municipalities paid the carters fees (in the range of \$65 - \$80 ton<sup>-1</sup>; the municipalities expected to recover all this money when the waste was tipped). For municipalities with "put-or-pay" contracts for disposal, the effect was multiplied. In those cases, not only had the municipality lost the expected repayment for the missing wastes, but the municipality had to pay the disposal fee anyway -- or, at least a portion of it (Scully, 1994; Groben, 1995; Heil, 1995a).

The same effect occurred with residential recyclables. Because the markets for paper goods, especially, were so positive (with a ton of newspaper worth up to \$200 during some portions of 1994), carters collecting recyclables for the municipalities sometimes found it tempting to broker these materials on their own behalf, instead of managing them as the municipalities directed.

In September, 1995, the U.S. Court of Appeals overruled Judge Platt. The decisions allowed Smithtown to designate a disposal facility for its wastes, but on the basis of contractual relationships freely entered into, not on flow control bases (the flow control provisions of Smithtown's contracts and legal arguments were held to be unconstitutional -- but this had no practical effects on the decision). The decisions also allowed Babylon to institute its commercial district, as the formation of garbage improvement districts was held to be a proper expression of government authority. Under the Smithtown decision, Babylon will be allowed to designate its incinerator as the sole permitted disposal venue (*A.A. & M. Carting Service et al. vs. Town of Babylon, NY et al.*, and *USA Recycling, Inc. et al. vs. Town of Babylon, NY et al.* [consolidated cases], 1995; *SSC Corp. vs. Town of Smithtown et al.*, 1995; *Tonjes and Swanson*, 1996a).

However, the legal situation between May, 1994, and September, 1995, created a disincentive for more openness regarding the flow of wastes outside the municipal systems. Although the diversion of wastes had something of a legal imprimatur, the diversions were still in violation of contracts under which the carters were still expected to be (and were, in fact) paid. If appeals overturned the decisions (as was the case), penalties for these actions could be assessed.

In the Town of Brookhaven, for example, several carters were removed from bid districts (for a combination of bad service and illegally disposing of wastes) (Groben, 1996).

When flow control laws were still legal, there had been something of an incentive to not report activities which might be deemed in violation of such ordinances. USA Recycling, for instance, was embroiled in disputes with the Town of Smithtown. Smithtown insisted that all residues from the USA transfer station/recycling center must be disposed at the Huntington incinerator, under flow control, because the recycling facility was located in Smithtown, and therefore the residues were generated in Smithtown. USA Recycling attempted to negotiate this position, stating that it collected MSW from many Towns on Long island, and Smithtown should only expect to receive a proportionate share of the residues. Smithtown's position was that it was impossible for such an amount to be correctly determined, and, especially, to be audited (Eisenbud, 1994c; Leteri, 1994; Zollo, 1994).

Several of the carters with permitted recycling facilities formed an organization (the Environmental Coalition of Long Island -- ECLI) to support changes in waste management planning and laws on Long Island. They, with the support of the Regional Director of NYSDEC, attempted to open communications with the municipalities. One suggestion was to construct a Long Island-wide waste management plan. ECLI believed that more rational planning would show there was no reason to restrict commercial waste disposal options (Eisenbud, 1994b).

The western Suffolk County municipal waste managers had been meeting to discuss the situation from their perspective. They also believed that some reformation of Long Island's waste management structure was advisable. However, their approach centered on creating more controls on the commercial sector waste stream. These included reporting requirements for recyclables and other activities, as a condition of licensing. Although not all of the Towns involved had incinerators, the primary thrust of the additional controls was to ensure the delivery of all due wastes to the incinerators (Cahill, 1994).

The Carbone decision ended the prospect of either planning effort receiving funding.

However, the Carbone decision did directly lead to the formation of the Babylon Commercial District. Babylon required enforcement of its own flow control law to meet its own put-or-pay obligations at the WTE plant. Failure to receive commercial wastes could have cost the Town approximately \$8 million per year. The Town had planned for an unfavorable Supreme Court flow control decision. Within 45 days of the court decision, the Town released a RFP for a commercial waste district (Tonjes and Swanson, 1996a).

Essentially, the commercial district would be like the residential district -- Town-wide, with no tipping fee for collected wastes. The Town designed the system so that each commercial establishment would receive base services for one cubic yard of wastes per week, at a fixed price. A matrix of additional services was established. At least part of the rationale offered for the district was that it would include implementation of mandatory commercial recycling, as each

establishment would also receive a container to separate out recyclable materials. Implementation began in January, 1996 (Tonjes and Swanson, 1996a).

In Babylon, rumors abound (in 1996) that carters are attacking the Babylon commercial collection district indirectly. State law forbids interference with recyclables collection (New York State Legislature, 1988). Babylon's commercial district provides for a base two-yard per week MSW collection, with additional fees for additional amounts of service (Jacob, 1994). Some carters apparently are letting former customers know that, for a fee, they will continue to provide recycling services. This fee is set below the amount the customer would have to pay to receive the additional MSW removal from the district. Although the carters purportedly remind the businesses that it is illegal to mix MSW with recyclables, the rumors indicate that this is an unsubtle attempt to compromise the effectiveness of the municipal district by diverting MSW from the system. The rumors indicate that the Town will be seeking to prosecute those carters the Town can show are engaged in this practice. It is not clear how the offending carters might account for these practices in annual reports.

Thus, the convolutions over flow control have played a large overt role in determining recycling in the commercial sector. On one hand, the demise of flow control played a part in the legal viability of small transfer stations (such as USA Recycling). By ending most Towns' roles in determining the disposal destination of commercial wastes, it has helped the economic viability of transfer stations (especially the larger ones that can easily repackage wastes for off-Long Island destinations). It defeated a movement towards greater accounting of private sector activities.

However, it also has led to the greatest threat to the status quo -- the Babylon Commercial District. The success or failure of this district is being closely watched by municipal waste managers throughout Long Island (Tonjes and Swanson, 1996a).



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