

MASIC
x
GC
1
.S65
no. 103
c. 2

Where Does It All Go?

The Size and Methods of Disposal of
Long Island's Solid Waste
1986 and 1991

David J. Tonjes
R.L. Swanson
Waste Management Institute
December, 1992



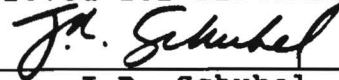
Where Does It All Go?

The Size and Methods of Disposal of
Long Island's Solid Waste
1986 and 1991

David J. Tonjes
R.L. Swanson
Waste Management Institute
December, 1992

Special Report 103
Reference Number 92-12

Approved for Distribution



J.R. Schubel
Dean and Director

MASIC

x

GC

1

.565

no. 103

c. 2

	<u>Page</u>
<u>Table of Contents</u>	
Notes on Abbreviations	
List of Tables	
List of Figures	
Executive Summary	1
I. Introduction	7
II. Report on the Municipalities	
<u>Nassau County</u>	
1. Glen Cove	13
2. Hempstead	15
3. Long Beach	18
4. North Hempstead	20
5. Oyster Bay	23
<u>Suffolk County</u>	
6. Babylon	27
7. Brookhaven	36
8. East Hampton	42
9. Huntington	47
10. Islip	53
11. Riverhead	57
12. Shelter Island	59
13. Smithtown	63
14. Southampton	68
15. Southold	70
III. Statistical Analysis	
1. Means and Errors	75
2. Per Capita Generation Rates	85
3. Extending the Analysis	90
3. Long Island Waste Generation	98
IV. The Shift in the Means of Disposal	107
V. Conclusions	111
Acknowledgements	117
References	119
Appendix -- LILCO Population Data, 1986, 1991	123

BBN 7096

32163283

3
1/5
25
R

Notes on abbreviations

MSW = municipal solid waste

tpy = tons per year

tpm = tons per month

tpd = tons per day

C&D = construction and demolition debris

LIRPB = Long Island Regional Planning Board

MRF = Materials Recycling Facility

= Municipal Recycling Facility

= Materials Recovery Facility

NYPIRG = New York Public Interest Research Group

NYSDEC = New York State Department of Environmental
Conservation

NYSWRC = New York State Legislative Commission on Water
Resource Needs of Long Island

WMI = Waste Management Institute

WMI est. = source tpd x 260 days to create tpy data
(based on "standard" 260-day working year)

List of Tables

		<u>page</u>
Table 1.	Glen Cove 1990 Recycling Waste Stream Estimates	15 15
Table 2.	Hempstead 1991 Recycling Waste Stream Estimates	17 18
Table 3.	Long Beach 1990, 1991 Recycling Waste Stream Estimates	20 20
Table 4.	North Hempstead 1989, 1991 Recyclin Waste Stream Estimates	22 23
Table 5.	Oyster Bay 1990, 1991 Recycling Waste Stream Estimates	26 26
Table 6.	Babylon 1990 Recycling Waste Stream Estimates	34-35 36
Table 7.	Brookhaven 1991 Recycling Waste Stream Estimates	41 42
Table 8.	East Hampton 1991 Recycling Waste Stream Estimates	46 47
Table 9.	Huntington 1989, 1990, 1991 Recycling Waste Stream Estimates	52 53
Table 10.	Islip 1991 Recycling Waste Stream Estimates	56 57
Table 11.	Riverhead 1989 Recycling Waste Stream Estimates	59 59
Table 12.	Shelter Island 1989, 1990 Recycling Waste Stream Estimates	62 63
Table 13.	Smithtown 1989, 1990, 1991 Recycling Waste Stream Estimates	67 68
Table 14.	Southampton 1989 Recycling Waste Stream Estimates	69 70
Table 15.	Southold 1987, 1991 Recycling Waste Stream Estimates	72 73
Waste Stream Estimates, Means, Errors:		
Table 16.	Glen Cove	75-76
Table 17.	Hempstead	76
Table 18.	Long Beach	77
Table 19.	North Hempstead	77-78
Table 20.	Oyster Bay	78
Table 21.	Babylon	79
Table 22.	Brookhaven	80
Table 23.	East Hampton	80-81
Table 24.	Huntington	81
Table 25.	Islip	82
Table 26.	Riverhead	82
Table 27.	Shelter Island	83
Table 28.	Smithtown	83-84
Table 29.	Southampton	84
Table 30.	Southold	85
Table 31.	Per Capita Waste Generation, by Municipality, 1986	86
Table 32.	Per Capita Waste Generation, by Municipality, 1991	88
Table 33.	County and Long Island Waste Generation Estimates	90

List of Tables, continued

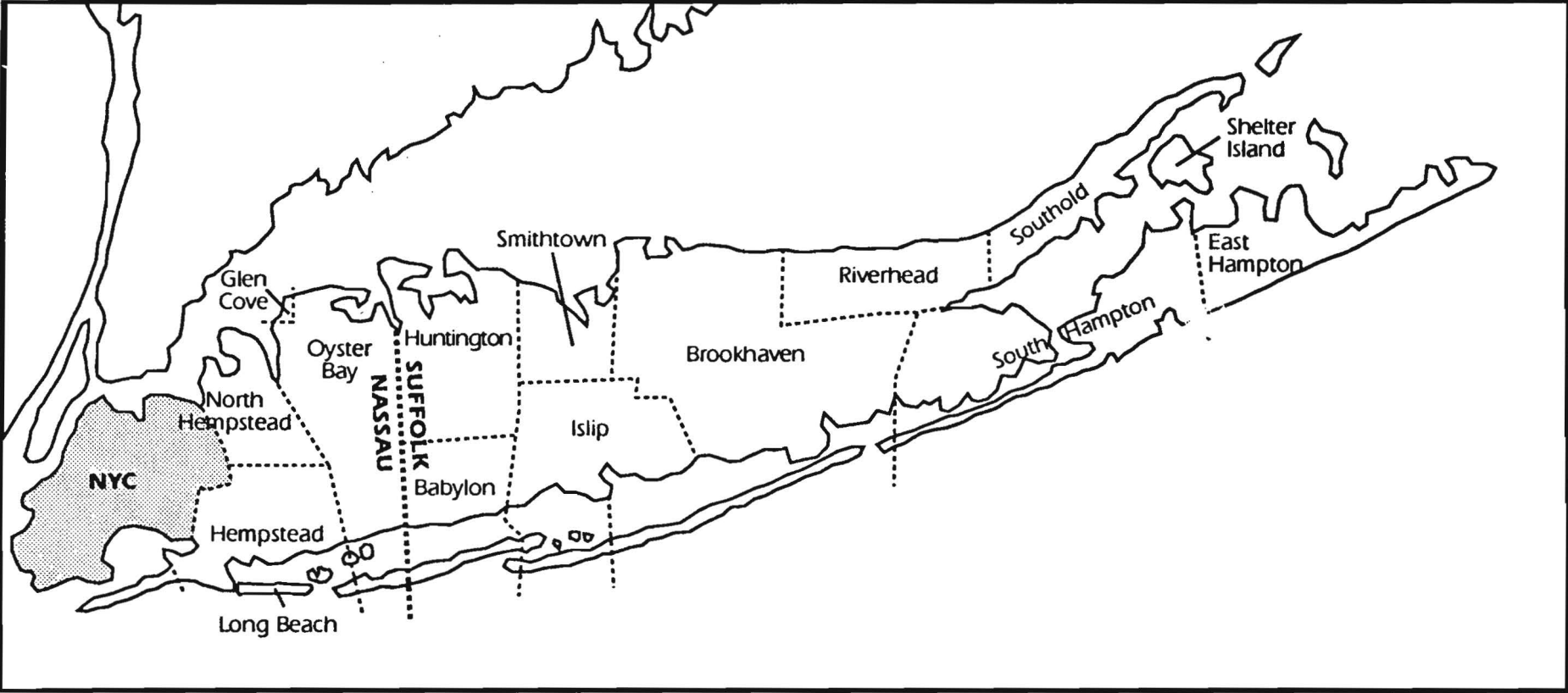
	<u>page</u>
Table 34. Waste Generation (Means of Disposal), 1986	96
Table 35. Waste Generation (Means of Disposal), 1991	96
Table 36. Long Island Waste Generation	99
Table 37. Long Island Per Capita Waste Generation	101
Table 38. Suffolk County Means of Disposal (1992 Projection)	108
Table 39. Means of Disposal	109
Table 40. Long Island Means of Disposal (1993 Projection)	112

List of Figures

		<u>page</u>
fig. 1	Long Island Political Boundaries	frontispiece
fig. 2	Per Capita Waste Generation, 1986	87
fig. 3	Per Capita Waste Generation, 1991	89
fig. 4	Nassau County Waste Generation	91
fig. 5	Nassau County Waste Generation	91
fig. 6	Suffolk County Waste Generation	92
fig. 7	Suffolk County Waste Generation	92
fig. 8	Long Island Waste Generation	93
fig. 9	Long Island Waste Generation	93
fig. 10	Nassau County Means of Disposal	97
fig. 11	Suffolk County Means of Disposal	97
fig. 12	Long Island Means of Disposal	98
fig. 13	Nassau County Waste Generation Rates	100
fig. 14	Suffolk County Waste Generation Rates	100
fig. 15	Long Island Waste Generation Rates	101
fig. 16	Nassau County Per Capita Waste Generation Rates	102
fig. 17	Suffolk County Per Capita Waste Generation Rates	102
fig. 18	Long Island Per Capita Waste Generation Rates	103
fig. 19	Long Island Means of Disposal	109
fig. 20	Long Island Means of Disposal	113
fig. 21	Relative Proportions of Disposal Methods 1986, 1991, 1992, 1993	114

Figure 1

Long Island Political Boundaries



EXECUTIVE SUMMARY

This report concerns the rates and means of disposal for solid waste on Long Island, NY, and has been written with seven objectives in mind:

- 1) To unify various data sets generated over the years on and about Long Island municipal solid waste (MSW), with the end of creating a more useful, precise, and accurate estimate of Long Island MSW generation;
- 2) To examine any changes in waste generation from 1986 to the present;
- 3) To quantify changes in disposal methodologies, such as recycling, landfilling, incineration, and off-Island transportation;
- 4) To identify variations in generation rates between municipalities, and, if possible, explain the source or sources of the variations;
- 5) To identify areas where statistical consistency in this field might be emphasized or enhanced;
- 6) To provide assistance in long-range municipal planning, and aid in efforts to either meet, mold, or re-define State and Federal objectives; and,
- 7) To establish the basis for a long-term, useful time series on solid waste on Long Island.

To achieve these ends, interviews and questionnaires were used to reach solid waste professionals in the fifteen municipalities on

Long Island charged with MSW disposal responsibilities. In addition, various reports and articles were gathered from daily and weekly newspapers, organizations such as the New York Public Interest Research Group (NYPIRG), the New York State Legislature, the Long Island Regional Planning Board, and planning units and consultant organizations. Reports on the fifteen municipalities' MSW handling for the period of 1986 to 1991 were compiled, and verified with professionals in those municipalities. The varied estimates of solid waste generation were statistically analyzed. The following conclusions can be drawn:

1) The Long Island waste stream was most probably 3,000,000 tons per year (tpy) in 1986. At that time, 2,400,000 tpy were landfilled, 175,000 tpy were incinerated, perhaps 25,000 tpy were recycled, and 400,000 tpy were transported for off-Long Island disposal.

2) The Long Island waste stream in 1991 was most probably between 3,250,000 tpy and 3,500,000 tpy. Of that total, 1,350,000 tpy were incinerated, 675,000 tpy were recycled, 850,000 tpy were landfilled on Long Island despite the December 1990 deadline date for the Long Island Landfill Law, and the remainder (375,000 tpy to 525,000 tpy) were transported off Long Island for disposal (although some of this last category could be accounted for by commercial carting recycling activities undocumented by the municipalities).

3) Per capita generation rate estimates for the fifteen municipalities in 1986 varied from 4.1 lbs/person/day in Long Beach to 10.0 lbs./person/day in Southold; in 1991 the range was 4.0 lbs./person/day (Long Beach) to 13.5 lbs./person/day (East Hampton). These numbers are subject to a great deal of methodological difficulties, including imprecise population and waste stream estimates, and conflicting definitions of what should be counted as "MSW" by the different municipalities. Nonetheless, there was a distinct geographic trend in the data, along with a general increase for almost all municipalities over the five year period.

4) Per capita waste generation for Long Island as a whole appeared to have risen from three-quarters to one pound over the five years (although better counting may be a factor contributing to the change). Generation rates in Suffolk County exceeded those in Nassau County. The 1991 Long Island per capita generation rate appeared to be approximately seven pounds per person per day.

5) The massive shift in the methods of MSW disposal on Long Island will continue in the near future. Indications are that the 850,000 tpy landfilled in 1991 will shrink to 60,000 tpy by the end of 1993. In those years, only one incinerator is slated to go on-line, with a mere 50,000 tpy capacity; thus Long Island's waste disposal system will have to either recycle or transport off-Long Island at least 750,000 tpy more in 1993 than in 1991, given no increase in the waste

generation rates (which is contrary to the trend of the collected data).

These statements are subject to many uncertainties; indisputable, unquestionable data for Long Island as a whole are lacking. This is due to the previously remarked lack of uniformity in the definitions of what is and is not to be counted as MSW by the fifteen municipalities. In large part, it is also due to Long Island's reliance on the private carting industry for a great deal of its solid waste handling, and general lack of oversight and regulation of this industry.

What is certain is, despite a new-found spirit of co-operation among the municipal solid waste authorities, and participation in waste management cutting edge initiatives by many communities (MSW composting planning, "Don't Bag It" programs, "per-bag" collection fees, and post-collection recycling facilities), Long Island will remain dependent on "the kindness of strangers" beyond its borders for the disposal of a million tons or more of MSW each year for the foreseeable future, unless it is able to double or triple its recycling efforts. While this situation does not constitute a "crisis" at this point, it should be a matter for serious planning efforts in order to avert a crisis in the future.

For such planning to be effective, the following items must be addressed:

- 1) A rational, accepted definition of MSW must be adopted, whether it is in terms of what must be disposed, or in terms of agreed-upon waste stream constituents, in order to define the extent of the problem accurately and precisely.
- 2) The extent of the activities of the commercial carting community must be defined and enumerated.
- 3) Despite the fluctuating flow of MSW to municipal disposal facilities, the inadequacy of present-day Long Island disposal capacity for its MSW must be admitted and publicized.
- 4) Despite our doubts about the possibility of realistically absorbing the excess of wastes through recycling and waste reduction, these initiatives should be robustly encouraged. Though they are not economic panacea, there do not appear to be any cheap, on-Long Island disposal options in the 1990s.

I. INTRODUCTION

The purposes of this report on solid waste generation rates and means of waste disposal on Long Island are seven-fold:

- 1) To unify various data sets generated over the years on and about Long Island municipal solid waste (MSW) with the end of creating a more useful, precise, and accurate estimate of Long Island MSW generation;
- 2) To examine any changes in waste generation from 1986 to the present;
- 3) To quantify changes in disposal methodologies, such as recycling, landfilling, incineration, and off-Island transportation;
- 4) To identify variations in generation rates between municipalities, and, if possible, explain the source or sources of the variations;
- 5) To identify areas where statistical consistency in this field might be emphasized or enhanced;
- 6) To provide assistance in long-range municipal planning, and aid in efforts to either meet, mold, or re-define State and Federal objectives; and,
- 7) To establish the basis for a long-term, useful time series on solid waste on Long Island.

To meet these goals, our methodology was to take two "snapshots" -- one from 1986, and one from the "present," by gathering data from published sources and through questioning

municipal employees. When this project began in October, 1991, we foresaw difficulties in collecting the most up-to-date information and so we limited our scope to considering 1990 as the "present." As data collection continued into 1992, and much 1991 information became available, our focus shifted slightly in an attempt to keep up with the rapidly evolving state of Long Island waste management. Therefore this report contains 1991 data as it was available to us through April, 1992. Unless noted, all descriptions are current and accurate for the Spring of 1992.

Counting MSW in general is a difficult task. The most widely accepted nation-wide estimates of waste generation, those of the Franklin Institute (made for the United States Environmental Protection Agency), rely on complex manipulations of data on manufacturing, imports, exports, and product life-span due to the inconsistencies and paucity of data on actual waste disposal across the country. Long Island is a much more promising arena for actual collection of "real" waste disposal figures. Municipalities often have computerized scales at disposal facilities, and since most have charged tipping fees for the use of those facilities for years, assumptions for the existence of accurate weights for Long Island's MSW are well-grounded.

However, even in 1986 (the year of the infamous Long Island garbage barge), waste management was not a priority for many Long Island municipalities. It was merely a service offered by the

municipalities to their residents, and the accompanying businesses in the area. The aim was to manage the wastes as simply and as cheaply as possible. Despite the collection of fees to use disposal facilities, records were either skimpy or unkept. When records were kept, often they were archived in areas beyond today's employees' abilities to recall them. Even today, with the New York State Department of Environmental Conservation's (NYSDEC) requirements for accurate record-keeping and regular report-writing, local governments under pressure from residents to downsize and cut costs have been unable to find the time and means to quantify and measure the amount of trash that is being created and disposed on Long Island. In addition, the intractable problems of "what to count" and "how to count it" are unavoidable in waste management. Is a car that is sent to a scrap dealer to be considered part of the waste stream? Should it be counted as recycled? What about construction and demolition debris (C&D)? Is there any way of quantifying backyard composting? What about redeemed deposit containers? Is merely collecting recyclable materials good enough, or must they be processed, and sent to a recycler? Must a municipality ensure that the recycler in fact recycles the material for it to be counted as a recyclable?

Is there even one set definition for municipal solid waste?

These difficulties involved in collecting information on Long Island's waste stream are often increased by governmental problems.

Complicating factors include the stress and strain of NYSDEC consent orders to change their means and practices of waste disposal, and suits against the NYSDEC to continue current practices and facilities. Other municipalities are changing and rethinking the very bases of their waste handling practices, and/or changing the governments that establish the policies, manage the programs, and record the data on local waste management.

Long Island's waste management infrastructure and institutional character add to the complications. In the two counties of Nassau and Suffolk, there are no fewer than fifteen primary governmental units responsible for waste disposal. Many of these towns and cities contain sub-units (such as villages or garbage districts) that take an active role in managing more local garbage sub-divisions. As environmental laws in general, and waste management regulations in particular, become more complex and demanding, almost all Long Island municipalities turn to outside engineering firms for guidance and assistance. It has been difficult for municipalities to understand and define waste management practices, quantities, and policies. The reader should understand that any apparent contradictions in these pages over how much of what was put where seems inherent in the actual practice of managing Long Island's MSW. These contradictions and confusion stem from the unsettled and rapidly evolving state of affairs in the ways and means of local waste management, the divided state of authority as a result of regulatory stringencies and contingencies,

and also the daily press of business.

Another major factor complicates any depiction or attempt to understand Long Island's waste stream. For almost all of Long Island, a great deal of the carrying of MSW from one place to another is accomplished by private enterprise, with little or no oversight by local governments. For the most part, local governments have been and still are unconcerned with the practices of local carters as they deal with the "commercial" waste stream (that is, solid waste produced by businesses, schools, apartment buildings -- essentially everything and everyone not in a detached family house), as long as no laws are being flouted. As waste disposal has become more expensive, and therefore business opportunities more lucrative, as new markets for recyclable materials have appeared and disappeared, as incinerators and lined landfills have been constructed (and now need to be paid off), as private disposal facilities have sprung up, and as out-of-state (or merely off-Island) disposal venues have become either comparatively (or actually) cheaper in price with passing time, garbage has ebbed and flowed across the landscape as these garbage entrepreneurs have sought the greatest possible profit. While some may applaud their initiative, and others may see these situations as solutions to immediate waste disposal problems here on Long Island, we (and others concerned with the size of the local waste stream) have found that this "float" of garbage has made it impossible, on top of the other complications mentioned above, to say with certainty

exactly how much is being thrown out on Long Island, and where it all may be going.

Nonetheless, this is the most comprehensive examination of solid waste data on Long Island available. Attempts have been made to minimize errors and omissions by careful fact-checking with all of the involved municipalities; and care has been taken to provide support for the analyses made.

We begin with reports on waste generation and disposal practices on Long Island on a municipality-by-municipality basis, collected from the municipalities and from widely available documents from State, local, and environmentally-concerned sources, and newspapers. Following this is a statistical analysis of the collected data, and a report on the shifts that have occurred in the means of waste disposal on Long Island. The conclusion offers some thoughts on what the near-future may hold for Long Island's MSW disposal practices, and on the lessons that might be drawn from this examination of Long Island's MSW.

II. REPORT ON THE MUNICIPALITIES

1. GLEN COVE

References: 7, 12, 23, 30, 31, 38, 47, 57, 58, 59, 61

In 1986, the City of Glen Cove had an incinerator that burnt approximately 18,000-20,000 tpy of its waste. The City also burnt sludge generated by its sewage treatment plant. The remainder of the City's waste stream, approximately 4,000-5,000 tpy was landfilled out-of-City. This waste is called "by-pass" waste, and either consisted of garbage that was unsuitable for incineration, or was generated during times the incinerator was not working or was undergoing maintenance ("downtime"). There was no recycling program in 1986. The excess capacity of the incinerator was utilized by out-of-City carters.

By 1991, the City had only one active solid waste facility. The incinerator was closed in August, 1991, due to air-quality violations. The waste that was being burnt at the incinerator is now being shipped out-of-City. Until January 1992, this was done by the Montenay Glen Cove Corporation, which had managed the incinerator. The Corporation's contract required that it handle the City's waste in any manner it deemed best. The City assumed responsibility for the waste stream on January 1, 1992. NYSDEC now (November, 1992) reports that Island Recycling has assumed responsibility for the waste stream, shipping the wastes to Pennsylvania, and expects to re-open the incinerator as a waste-to-energy (WTE) plant by July, 1993.

In 1990, the City's waste stream was 22,638 tpy. Incineration accounted for 14,699 tons, and 5,259 tons were treated as bypass waste and shipped out-of-City. Recycling added to 2,680 tons in 1990. There is also a leaf composting program, which was included in the recycling figures.

The City's recyclables were handled by Eveready, a City-based broker. Eveready remodelled the City Municipal Recycling Facility (MRF), and began providing recycling services on August 1, 1991. As reported by NYSDEC, this service is now provided by Island Recycling. Prior to Eveready, the City had brokered individual materials through a multiplicity of recyclers.

The City estimates that commercial waste is 10% of the total waste stream. It is unclear whether this figure is comparatively small because of either municipal service being provided to small businesses (as occurs in Hempstead), or because most commercial waste is being exported to cheaper disposal venues.

The City offers a twice-yearly STOP program.

The City was considering having a private vendor provide composting services; Newsday also reported (January 28, 1992) that the City was seeking a private company to renovate or rebuild the old incinerator. It appears that Island Recycling is this company.

Table 1(a) 1990 Recycling (Tons)

newspaper	1,652
glass	380
mixed plastic	64
white goods	250
leaves	375
wood chips	165
Total	2,680

Table 1(b) Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Total</u>
CGC	1986	18,000-20,000		4,000-5,000	22,000-25,000
LIRPB	1986				26,000
<u>Newsday</u>	1987	95%	5%		75 tpd
WMI est.	1987				19,500
CGC	1990	14,699	2,680	5,259	22,638
NYPIRG	1990	17,877	2,080		19,577
<u>Newsday</u>	1991	16,000	3,000	4,000	23,000

CGC = City of Glen Cove

2. HEMPSTEAD

References: 7, 23, 26, 30, 34, 38, 46, 47, 57, 58

In 1986, the Town of Hempstead's waste stream was at least 900,000 tpy, but could have been over 1,000,000 tpy. The Town disposed of all material generated within the Town, and did not make any distinctions by categories. Thus, the figures from 1986 include C&D, junked cars, and other materials that the Town no longer counts in its waste stream. Some 200,000 tpy were shipped off Long Island for disposal; the remainder was landfilled at the Town landfill (in Oceanside).

In 1991, the Town burnt 583,905 tons at its waste-to-energy (WTE) plant. Recycled materials summed to 187,854 tons. The total

waste stream was 771,759 tons. In 1990, 683,505 tons were incinerated, and 110,230 tons recycled, equalling a total of 793,735 tons. The difference between 1991 and 1990 was ascribed to the improved recycling program, and the economic downturn.

Excess capacity at the WTE plant (it burnt 913,739 tons of garbage in 1990) has been filled by allowing out-of-town commercial carters (from Babylon, Oyster Bay, North Hempstead, Glen Cove, and New York City, among other areas) to tip there. The Villages of Mineola and Old Westbury were also using the facility. Beginning on January 1, 1992, the Inter-Municipal Agreement (IMA) between Hempstead and Brookhaven became fully operational: Brookhaven began shipping some 200,000 tpy to Hempstead for incineration. In exchange Brookhaven accepts all the ash produced by Hempstead's WTE plant. As of late Fall, 1992, NYSDEC and other sources report that another IMA appears imminent -- between Hempstead and the Town of Oyster Bay. Apparently the Town has been incinerating some of Oyster Bay's wastes this Fall, and will formalize this agreement in the near future.

In 1990, the "residential" sector provided 560,000 tons to the incinerator and the "commercial" sector 123,000 tons. This unusual ratio (compared with other Towns' estimates of 50% commercial wastes) occurs because Hempstead provides municipal curbside carting service to small businesses (unlike most other Long Island

municipalities), and does not distinguish between garbage collected from homes or small businesses.

The curbside recycling program includes newspapers, bottles, metal cans, plastics, corrugated cardboard, and white goods, as well as leaves and other yard waste. The recyclables are delivered directly to vendors for the most part, by the municipal collection crews: newspaper and corrugated cardboard to Westbury Paper Stock, and bottles, cans, and plastics to Omni Recycling. White goods are delivered to a Town transfer station, and then removed by Mid-Island Salvage. Yard waste is being composted in Pennsylvania, by a private concern. Commercial recycling not handled by the Town is expected to include metal, office paper, C&D, and bulk items, and has not been quantified. It is estimated that the vast majority of recyclables collected by the municipal program come from residents, not businesses.

The Town participates in the Nassau County STOP program.

<u>Table 2(a)</u>	1991 Recycling Data (Tons)
newspaper	40,291
corrugated cardboard	10,453
computer paper	204
high grade bond paper	3,294
clear glass	4,301
mixed cans and glass	9,577
white goods and metal from incinerator	60,994
other metal	1,141
plastic	658
waste oil	170
batteries	36
tires	151
C&D reclaimed soil	4,060
compost	47,548
clamshells (used for temporary roads)	3,320
flotsam timber (used by Conservation and Waterways)	1,654
Total	187,854

Table 2(b) Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Total</u>
NYSWRC	1985					2400 tpd
WMI est.	1985					624,000
TOH	1986	700,000- 800,000			200,000	900,000- 1,000,000
LIRPB	1986					900,000
NYSWRC	1987					624,000
Newsday	1987	78%			22%	2565 tpd
WMI est.	1987					666,900
TOH	1990		683,505	110,230		793,735
NYPIRG	1990		683,505	110,230		793,735
TOH	1991		583,905	187,854		771,759
Newsday	1991		683,505	110,230		793,735

TOH = Town of Hempstead

3. LONG BEACH

References: 7,16,30,38,43,47

In 1986, the City of Long Beach was disposing its solid waste in the Oceanside landfill (Town of Hempstead). The best approximation of the size of the waste stream for that year is 31,000 tons. The City did not and does not distinguish between residential and commercial generation. The City did not have a recycling program in 1986.

By 1990, the City had a recycling program, and a waste-to-energy (WTE) plant. This incinerator has a 200 tpd capacity, of which approximately 70 tpd is used by the City. The owners of the facility (Long Beach Resource Recovery Facility) sell the remainder of the capacity to other waste generators. In 1990, 22,047 tons

were incinerated, and 2,744 tons were collected for recycling, for a total waste stream of 24,791 tons. The City attributes the change in its waste stream from 1986 to diversion of concrete and other construction debris from the waste stream, and also to the different economy in 1990 (which may have led residents to not make new purchases of bulky items such as home appliances, thus decreasing discards from these sources). In 1991, the City incinerated 21,742 tons, and recycled 2,835 tons, for a total waste stream of 24,577 tons.

The City has curbside collection of newspaper (it is brought to a transfer station, where it is collected by Westbury Paper), and commingled collection of tin cans, aluminum, plastics (PET, coded #1, and HDPE, coded #2), and glass (collected at the transfer station by Omni Recycling); the City also collects bulk metal items curbside.

The City did not have a STOP program in 1986, but now participates in the Nassau County program (the costs are prohibitive for the City to run its own program).

Long Beach has proposed adding a pre-processing facility to its existing WTE plant. Wastes would be fed onto a conveyor to a bag splitter, through a magnet to collect ferrous wastes, and then past hand-picking stations. The remaining, unrecyclable wastes would then be processed through the incinerator.

<u>Material</u>	<u>1990</u>	<u>1991</u>
Newspaper	1849	1908
Bulk Metal	473	441
Plastics/cans/ glass	422	486
Totals	2744	2835

<u>Source</u>	<u>Year</u>	<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Total</u>
CLB	1986			31,000	31,000
LIRPB	1986				30,000
<u>Newsday</u>	1987		some	most	62 tpd
WMI est.	1987				16,120
CLB	1990	22,047	2,744		24,791
NYPIRG	1990	22,047	2,744		24,791
CLB	1991	21,742	2,835		24,577
<u>Newsday</u>	1991				24,791

CLB = City of Long Beach

4. NORTH HEMPSTEAD

References: 6,7,15,18,23,30,32,34,38,47,57,58,59

In 1986, the Town of North Hempstead was landfilling all its waste. As the tipping fee was only \$45/ton, it is believed that some of the waste was from out-of-town sources (including MSW from New York City). The amount of wastes landfilled was 333,101 tons. This waste stream was divided into four categories: residential; commercial; drop-off (landscapers, C&D, governments, and non-profit businesses); and non-payable (Nassau County, New York State, and Parks Department). The breakdown was:

164,394 tons residential	95,410 tons commercial
32,299 tons drop-off	41,007 tons non-payable

A voluntary drop-off recycling program was begun in December of 1986, with the materials going straight to the recycler. Since the program had no costs, no records were kept.

In 1990, the Town landfilled 219,200 tons, and recycled 23,456 tons, for a total waste stream of 242,656 tons. By comparison, the amount landfilled in 1989 was 240,000 tons, and there were 20,000 tons of recyclables collected, for a total waste stream of 260,000 tons. Since the Town Comprehensive Recycling Analysis (CRA) prepared by the Malcolm Pirnie engineering firm projected a waste stream total of 312,343 tons for 1991 (down from 363,004 tons in 1989, but more than the projected 250,000 tons in 1992), it seems that a portion of the Town's commercial waste stream was transported to other facilities outside of North Hempstead. This could be because of an increase in the Town's tipping fee. In January, 1991, NYSDEC closed the Town's landfill, and the Town was required to transport its wastes off-Island. Star Allied Carting is the shipper, and the contract calls for it to only use licensed and permitted landfills. For 1991 the total transported was 184,000 tons, and the recycled tonnage amounted to 35,000. Despite the disparity between the projections from the Town CRA and actual tonnages, the Town believes that these statistics still reflect a waste stream with a 50% commercial waste composition. The Town believes that the decrease is due to some incorporated villages and commercial carters seeking cheaper disposal sites, and from diverting yard wastes and C&D from the waste stream.

As of late 1991, the Town was sorting recyclables in a temporary MRF. The Town recycles HDPE and PET plastics through New England CRInc.; newspapers were recycled through NB International of New Jersey until June, 1991, when more favorable prices led to a switch to Westbury Paper. Cans and bottles are recycled through Omni Recycling. In July, 1991, the Town began a voluntary drop-off program for grass clippings and leaves, and also began collecting landscapers' debris, all of which goes to Earth-Gro in Connecticut.

In March, 1992, the Town announced an Inter-Municipal Agreement with the Town of Babylon, where the Town of Babylon would assume the operations of the North Hempstead transfer operation, and transfer 120,000 tpy to its soon-to-open recycling/compost facility (see the Town of Babylon report). By late Fall, 1992, the agreement had been almost entirely implemented.

Though the Town did not have a STOP program in 1986, it did schedule 12 dates for 1991. After the first 6 dates, the budget was exhausted, and so the program was suspended.

<u>Table 4(a)</u> <u>Materials</u>	Recycling Data (Tons)	
	<u>1989 (NYSWRC)</u>	<u>1991 (estimated)</u>
plastics		2,000
newspaper	14,564	12,000
cans/bottles		5,000
metal	2,364	
grass/leaves		13,000
other	4,945	
white goods/ scrap steel		4,000
tires		800
Totals	21,873	35,000

<u>Table 4(b)</u>		<u>Waste Stream Estimates (TPY)</u>			
<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Recycled</u>	<u>Transported</u>	<u>Total</u>
NYSWRC	1985				750 tpd
WMI est.	1985				195,000
TNH	1986	333,101	1		333,101
LIRPB	1986				322,000
NYSWRC	1987		925 tpm		195,000
<u>Newsday</u>	1987	93%	7%		785 tpd
WMI est.	1987				204,100
MP	1989				363,004
NYPIRG	1990	219,200	23,456		242,656
TNH	1991	2	35,000	184,000	219,000
MP	1991				312,343
<u>Newsday</u>	1991		18,900		283,100
MP	1992				250,000

TNH = Town of North Hempstead

MP = Malcolm Pirnie, for the Town of North Hempstead

¹ no records were kept of the amounts recycled.

² MSW was landfilled for the first 18 days of January.

5. OYSTER BAY

References: 2,7,23,30,34,38,47,55,57,58

In 1986, the Town of Oyster Bay was forced to close its two means of solid waste management -- the landfill was closed under a consent decree from NYSDEC in April, and the 500 tpd incinerator was closed in December. These facilities have not been replaced. Thus, since the end of 1986 the Town has shipped all of its non-recycled MSW out-of-Town for disposal. The size of the Town waste stream circa 1986 is not known exactly, although estimates range from 907 tpd (Newsday, 1988) to 850 tpd (NYSWRC, 1985, 1987). The NYSWRC estimate is translated to 221,000 tpy (1987), which, if the same conversion factor (a 260-day year) were used with the Newsday figure, would translate the Newsday tpd estimate to approximately

235,000 tpy. Newsday cites a 1% recycling rate in 1988 (2,000-3,000 tpy).

By the 1990-1991 period, the Town was utilizing a transfer station for all residential waste collected in the Town garbage districts. Several of the incorporated villages have opted not to use the Town facilities (this MSW may be going to the Hempstead waste-to-energy plant, or to Island Recycling's facilities in Glen Cove, among other possibilities). In 1990, the sum of residential wastes handled at the transfer station and by Town recycling programs was 285,274 tons. In 1991, the comparable figure was 219,894 tons. In addition, the Town compiled data on commercial recycling programs in the Town, and added some special programs above and beyond the 1990 Town recycling programs. These sum to a Town waste stream of 242,446 tons in 1991. The 1990 and 1991 figures do not include some wastes generated in the Town -- specifically, non-recycled commercial wastes, and some residential wastes from the districts that decided not to participate in the Town-sponsored shipping program. These factors make the 1990 NYPIRG estimate of 328,400 tons and the 1991 Newsday estimate of 384,000 tons of solid waste generation as Town-wide generation, from all sources, more credible than the Town-provided figures. However, the figures from NYPIRG and Newsday have a large variability (60,000 tpy). Areas of Long Island with population densities similar to Oyster Bay, such as Huntington and Babylon, typically report commercial waste generation rates of 80-100% of

the residential rate (approximately 40-50% of the total waste stream). We applied such criteria to Oyster Bay totals from 1990 and 1991 (factoring in the reported commercial recycling activities), which led to total waste generation estimates of between 510,000-570,000 tons in 1990, and 395,000-440,000 tons in 1991. These estimates may be too high.

In 1986, the residential recycling program had not yet begun. By 1990, the Town was collecting glass, metal, and plastic containers, newspapers, leaves and Christmas trees from residences, and also was recycling automobile tires and batteries. The Town also had office paper recycling as a special program. The Town itself was recycling C&D and "cleanfill." In 1991, the Town added "mixed paper" to the residential pick-up program (anecdotal evidence exists that this is "junk mail" collected for Marcal Paper), and separate special programs to recycle aluminum and "other" metals. In addition, commercial recycling efforts in all categories were enumerated, as well as separate categories for commercial corrugated cardboard and wood recycling.

Late Fall, 1992, brought reports that the Town was utilizing the excess capacity at the Hempstead waste-to-energy plant to incinerate some of its wastes (50,000 tpy). NYSDEC reports that negotiations for an Inter-Municipal Agreement to formalize and possibly expand this relationship are proceeding at a rapid pace.

Material	Residential		Special Town Programs		Commercial
	1990	1991	1990	1991	1991
Glass/Metal/Plastics	5,863				
Glass/Metal	6,578				34
Aluminum				3	34
Other Metals				8	5,433
Plastics		641			11
Newspaper	17,232				
Newspaper/Mixed Paper		16,245			2,552
Office Paper			12	20	385
Corrugated Cardboard					14,150
Leaf Compost	10,999	11,803			31
Holiday Trees	55	67			
Wood					2
Tires	115	182			1
Batteries	16	16			0.5
C&D			64,837	9,989	72
Totals	34,280	35,532	64,849	10,020	22,706

Total 1990: 99,111 tons

Total 1991: 68,259 tons

However, these totals ignore 41,583 gallons of waste oil collected by the Town, and 3920 gallons collected by commercial haulers. If a figure of 7 lbs./gal. is used for these wastes, the Town could claim another 159 tons of recycling in 1991.

Source	Year	Recycled	Transported	Total
NYSWRC	1985			850 tpd
WMI est.	1985			221,000
LIRPB	1986			302,400
NYSWRC	1987	8%		221,000
Newsday	1987	<1%	99+%	907 tpd
WMI est.	1987			235,820
TOB	1990	99,111	186,163	285,274
NYPIRG	1990	47,119	281,281	328,400
WMI (high)	1990			570,000
WMI (low)	1990			510,000
TOB	1991	68,259	174,187	242,446
Newsday	1991	99,000	186,163	384,000
WMI (high)	1991			440,000
WMI (low)	1991			395,000

TOB = Town of Oyster Bay

6. BABYLON

References: 7,13,14,18,23,28,30,36,38,40,47,48,57,58

In 1986, the Town of Babylon had a landfill, which was used to dispose all of its solid waste. Exactly how much this was is not certain; the engineering firm Camp, Dresser and McKee used a per capita waste generation rate to set the amount at 231,518 tons for 1985 (calculated in 1985). However, a similar calculation made in 1987 set waste generation at 257,952 tons for 1985. Another engineering firm, H2M, calculated the 1985 generation at 273,200 tons. To further complicate the issue, the Town itself calculated the waste stream accepted at the landfill for July 1986 to September 1987 at 247,555 tons (an average of 18,296 tons per month). Using the monthly average to generate one year's data, the amount of waste received at the landfill in 1986 would appear to have been 219,552 tons. There was no Town recycling program.

By 1990, waste handling in the Town had changed radically. The Town had a 750 tpd waste-to-energy (WTE) plant (which also returns \$25/ton in electricity), a recycling program, and used the landfill for by-pass wastes (materials unsuitable for incineration, or generated during times when the incinerator is closed for repairs or maintenance) and as an ashfill. However, establishing exactly how large the Town's waste stream is at this time is difficult (despite the use of scales at all facilities). The most direct method would be to sum the scalehouse weights, and subtract the weight of ash to avoid double-counting, as suggested by an engineer with the Town consultant Gershman, Brickner & Bratton

(GBB). The result of such calculations is a gross waste stream of 367,041 tons minus the weight of ash -- and the Recycling Facility Bond Document (RFBD) gives the weight of the ash as 62,583 tons -- for a total waste stream of 304,458 tons.

Other Town documents provide more complicated means of computation, and none of the answers seem to agree. Reports of the amount of wastes incinerated vary according to the Town document or source referenced: the Solid Waste Management Plan (SWMP) for the Town gives the amount of waste incinerated as 223,720 tons; the Recycling Facility Bond Document (RFBD) gives the amount of wastes incinerated as 218,929 tons. The SWMP lists Town recyclables as 56,040 tons; the RFBD lists Total Town recycling as 77,552 tons, divisible into 18,837 tons of residential recycling and 58,715 tons of commercial recycling. The RFBD lists the amount of wastes landfilled as 41,758 tons. Adding the amounts from the SWMP and RFBD gives two distinct sets of figures; in addition, at another place in the RFBD, waste handling in the Town at Town facilities for 1990 (defined as "landfilling, recycling, or incinerating") is listed as 272,917 tons. The sum of residential recycling, by-pass waste landfilling, and incineration from the same document adds to 279,524 tons.

These discrepancies appear to have arisen because the Town has different reasons and purposes for each set of figures. For some applications, the amount of material delivered to Town facilities

is important; for others, the total size of the waste stream is what matters. Using the most detailed figures from the RFBD, and adding commercial recycling totals, it appears that the Town generated 338,239 tons in 1990. However, there is an additional 309 tons in the RFBD table, marked "non-accepted burnable waste," which appears to have been landfilled (although it is not included in the "landfilled" category; it is included in the total of "waste generated" in the Town). Adding these wastes to the prior total gives a sum of 338,548 tons generated in Babylon in 1990.

Both NYPIRG and Newsday record the Town waste stream as 313,000 tons; however, the NYPIRG figures, which distinguish recycling, landfilling, and incineration, match with only the amount of waste incinerated as listed in the SWMP; all other figures that the Town was able to supply to us had discrepancies with NYPIRG's figures.

In addition, the Town residential:commercial waste ratio has been estimated at 45:55, with the size of the residential waste stream given as 90,000 tpy. This implies a commercial waste stream of 110,000 tpy, or a total waste stream of 200,000 tpy. Wastes at the WTE plant sampled in August 1990 and March 1991 were found to be 41:59 residential:commercial in composition; assuming an incinerator waste stream of 220,000 tpy, this would imply that the residential waste stream (exclusive of recyclables) would be 88,000 tpy, and the commercial waste stream (exclusive of recycling

efforts) would be 130,000 tpy. The unknown in these calculations is the origin of the wastes received at the WTE plant. Assuming all came from in-Town, and using the "average" recycling estimates for the residential and commercial waste streams (see below), the residential waste stream would appear to be just over 100,000 tpy, and the commercial waste stream in the region of 180,000 tons. Adding to this the bulky wastes handled by the Town (approximately 40,000 tpy), the 1990 waste stream appears to have been about 320,000 tpy.

Residential recycling began as a pilot program in October, 1988. The Town has a curbside collection recycling program, an "Igloo" drop-off program, and a drop-off program at the Town MRF (a converted airplane hangar, being used temporarily). The Town also calculates the amount of recycling done by the Town commercial carters. Again, as can be seen below, the size of each component of the recycling effort depends on the source of the information. The Town does collect newspaper, cans, and glass curbside; it collects cans, glass and plastic in the Igloos; it collects corrugated cardboard, tires, automobile batteries and waste oil at the recycling center; and white goods are picked up curbside, or accepted at the landfill. The landfill previously accepted small amounts of cement and concrete for road construction and maintenance. Materials recycled by commercial carters that the Town has included in at least some evaluations are: newspapers; corrugated cardboard; high grade paper; "other" paper; ferrous;

mixed metals; glass; cement and concrete; trees; mixed C&D; and tires. Bottles and cans from the curbside program are sold commingled to Omni Recycling for \$28/ton; newspapers are either burnt at the incinerator, or marketed through the Long Island Recycling Co-op, depending on the price received for them or costs of recycling them, balanced against the electricity return from the WTE plant, and the cost of burning the papers. The Town also collects leaves from area residents, but has not been composting them. The leaves have been stockpiled for the time-being. Their ultimate destination may be Earth-Gro, in Connecticut, for composting, or the incinerator -- it depends on the economics of the choices at the time the decision is made.

The Town uses a consortium of 12 local garbage haulers to collect residential wastes and recyclables. The contract with the consortium has a different approach than most other Towns have utilized, in that the consortium haulers can dump up to 2 tons/household-serviced free at the incinerator. The Town is obligated to provide the operator of the WTE plant, Ogden-Martin, with 225,000 tons of waste each year; it fell just short of this mark in 1990. In 1991, the Town accepted some of the Town of Islip's wastes to help meet this goal.

In 1991, while the incinerator was down for repairs, the Town entered into a three-way Inter-Municipal Agreement with Huntington and Islip. Babylon ended up with ash from Huntington's WTE plant,

while having some wastes burnt at this incinerator. Islip had wastes burnt at both plants, while accepting ash for its experimental Rolite ash process in return. These and similar cooperative arrangements have continued into 1992.

During 1992, the Town opened an innovative Commercial-Residential Recycling Facility (CRRF). The CRRF will be owned and operated by Solar International Trading Co. on rented Town land; the Town will be obligated to provide Solar 1,300 tpd (198,000 tpy) of wastes, at a cost to the Town of \$31/ton. The CRRF will have two lines: one which sorts commingled recyclables; and one which processes unsorted wastes, separating out recyclable materials, compostable materials, and residues. The residues will be sold to the incinerator at a cost to Solar of \$78/ton. Solar is obligated to find markets or disposal sites for the recyclables and compostables.

With the CRRF on-line, the Town-wide wastes will be handled as follows: regular residential garbage pick-ups will go to the WTE plant; commingled residential recyclables will go to the CRRF for sorting and marketing (except for newspaper, which will be recycled separately by the Town); and Town commercial wastes will go to the CRRF for processing into compostables, recyclables, and residues. The CRRF will also handle C&D, and the Town is allowing Solar to solicit out-of-Town commercial wastes. The CRRF is not allowed to handle hazardous wastes, powders, or liquid wastes. To meet its

obligation to Solar, the Town signed an Inter-Municipal Agreement with North Hempstead to operate the North Hempstead transfer station; the Town has agreed to process at least 120,000 tpy of North Hempstead's wastes. It may be that the Town will have excess capacity at its incinerator, as Solar has promised the Town a 40% recycling rate through its process. With the "accepted" residential waste stream of approximately 90,000 tpy, including between 12,000 and 18,000 tons of recyclables, somewhere in the region of 75,000 tons of residential wastes will be incinerated. This leaves 150,000 tons of wastes to be provided to the WTE plant from the CRRF process, and implies a 250,000 tpy waste stream for the CRRF (if its recycling efficiency is the promised 40%). The Town is only obligated to provide 198,000 tpy, and has only arranged for 120,000 tpy of confirmed wastes (from North Hempstead); the remainder must be collected from commercial carters, and the residential recycling program (exclusive of newspaper). The Town and Solar are confident that the low tipping fee at the CRRF will attract the necessary business.

No STOP program was offered in 1986. In 1990, there were two STOP days. The Town hopes that daily STOP drop-offs will be offered at the Recycling Center in the future.

Table 6(a)i Recycling Data 1990 (Tons)

Material	SWMP	RFB		total
		residential	commercial	
newspaper	9,142	8,337	353	8,690
corrugated cardboard	10,000	81	10,516	10,597
office paper	35			
hi-grade paper			2,787	2,787
mixed paper	200			
other paper	20		2,582	2,582
PET	2			
mixed plastics	6,110			
plastic		23	213	236
aluminum cans	63			
ferrous cans	564			
glass bottles	1,880			
cans and bottles		3,439		3,439
leaves	500			
grass	500			
tires	50	22		22
waste oil				42
auto batteries		14		14
C&D	20,000		31,819	31,819
other ferrous	6,800			
ferrous		6,879	4,298	11,177
tin			796	796
aluminum			414	414
mixed metals			4,915	4,915
white goods	166			
other misc.	38			
Totals	56,040	18,837	58,715	77,552

Table 6(a)ii from the Town of Babylon "Annual Report" (Tons)

Material	Curbside	Igloo Recycling Center	Commercial	Total
newspaper	8,337		353	8,690
corrugated cardboard		81	10,516	10,597
hi-grade paper			2,787	2,787
other paper			2,582	2,582
tin			796	796
aluminum			414	414
ferrous metal			3,428	3,428
white goods	725			725
mixed metals			4,915	4,915
cans/bottles	3,362	77		3,349
glass			22	22
plastics		23	213	236
concrete			12,720	12,720
wood			4,306	4,306
trees			214	214
C&D			5,846	5,846
tires		22	163	185
waste oil				42
batteries				14
Totals	12,425	100	49,275	61,959

Materials	from "1990 Town of Babylon Recycling Activities" (Tons)					total
	curbside	drop-off	Igloo landfill	commercial		
newspaper	8,337			353		8,690
corrugated cardboard		81		10,455		10,536
hi-grade paper				2,787		2,787
tin cans	773		18			791
tin				796		796
aluminum cans	34		1			35
aluminum				414		414
ferrous				5,499	3,383	8,882
mixed metals					4,915	4,915
white goods	1				1	870
cars ²						1,539
glass	2,488		57		22	2,567
plastic			23		213	236
cement					8,570	21,290
wood					4,276	4,276
trees					214	214
C&D					5,846	5,846
tires		22			163	185
car batteries		14				14
waste oil		42				42
Totals	11,632 ¹	159	99	14,069 ¹	49,139	77,507 ²

¹ 870 tons of white goods were picked up as part of the curbside program, and also were collected at the landfill; this is not included under either category.

² 1,539 tons of automobiles were recycled under the Town "Abandoned Auto" program, and not included under the other categories.

By adding the 145 tons of white goods not accounted for in the "Annual Report" to the Landfill total in the "Recycling Activities", and then adding the new Landfill total, and the Abandoned Cars total to the "Annual Report", a total of 77,712 tons is reached. While this does not agree with any of the other totals, it seems safe to say that the Town seems to have recycled about 75,600 tons in 1990.

<u>Table 6(b)</u>		<u>Waste Stream Estimates (TPY)</u>			
<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Recycled</u>	<u>Incinerated</u>	<u>Total</u>
NYSWRC	1985				700 tpd
WMI est.	1985				182,000
CDM'85	1985	231,518			231,518
CDM'87	1985	257,952			257,952
H2M	1985	273,200			273,200
TOB	1986	18,296 tpm			18,296 tpm
WMI est.	1986	219,552			219,552
LIRPB	1986				225,000
NYSWRC	1987		50,000 ¹		182,000
<u>Newsday</u>	1987	96%	4%		627 tpd
WMI est.	1987				163,200
CDM'87	1988				264,980
SWMP	1990		56,040	223,720	279,760
RFBD	1990	41,758	77,552	218,929	338,239
GBB	1990				304,458
WMI proj.	1990				320,000
NYPIRG	1990	27,321	61,959	223,720	313,000
<u>Newsday</u>	1991		61,959	223,720	313,000

TOB = Town of Babylon

CDM'85 = Camp, Dresser & McKee report of 1985, as reported by Gershman, Brickner & Bratton

CDM'87 = Camp, Dresser & McKee report of 1987, as reported by Gershman, Brickner & Bratton

H2M = H2M Solid Waste Management Plan, as reported by Gershman, Brickner & Bratton

RFBD = Recycling Facility Bond Document

GBB = Gershman, Brickner & Bratton

¹ expected amount

7. BROOKHAVEN

References: 7,26,30,34,38,46,47,57,58

In 1986, the Town of Brookhaven landfilled all its solid waste. The size of the waste stream appears to have been between 1,200 tpd and 1,400 tpd. Using the standard conversion figure (a 260-workday year), this amount would translate to 312,000 to 364,000 tpy. This is considerably less than the amount of wastes generally acknowledged as being generated today in the Town, but

Brookhaven, unlike most of Long Island, grew steadily in population through the 1980s.

Since 1986, the Town's waste handling has radically changed. Residential curbside recycling was implemented, a Materials Recovery Facility (MRF) was constructed, and a yard waste composting facility was opened. At the landfill, an ashfill was constructed, and now receives ash from the Hempstead incinerator. In exchange for landfilling the ash, the Town can ship up to 200,000 tpy of solid waste to Hempstead for incineration. This agreement was fully implemented in January, 1992 (ash was accepted at the landfill beginning in September, 1991). In fact, though the Town has been allowed to landfill solid waste, waste quantities received early in 1992 were too small to require that any be landfilled. (The Town received NYSDEC permission to landfill solid waste until July, 1993, notwithstanding the Long Island Landfill Law, which is popularly and erroneously believed to "outlaw" all landfilling of MSW.) It appears that quantities since mid-March have risen above the point where the Inter-Municipal Agreement will suffice to handle all its solid waste. The Town will not be able to landfill solid waste in the new cell of the landfill (expected to be opened in 1993 or 1994); it is to be used for residues from composting and recycling operations, by-pass wastes, rejects from other solid waste facilities, and non-processible wastes. The Town expects to contract for MSW composting services from a private

vendor for that portion of the waste stream which is not recycled or sent to the Hempstead waste-to-energy plant.

Quantifying any Town's waste stream can be difficult, and the totals will depend on what is counted. Brookhaven provided us with data the Town had collected at its various facilities; for this report, we then tried to make these figures comparable with other municipalities. As with the Town of Babylon (the immediately preceding report), the size of the waste stream can vary with what is included in the totals. For example, in 1990, solid waste received at the landfill from residential sources totaled 266,539 tons, and commercial wastes totaled 139,155 tons, for a total of 405,693 tons landfilled. In addition, 730 tpy (37,960 tpy) were recycled at the MRF for a new residential waste stream of 304,499 tons (assuming, for simplicity's sake, that all collected recyclables were residential and from in the Town), and a total waste stream of 443,654 tons. The Town composted approximately 50,000 cubic yards of leaves (and some grass), which is approximately equal to 17,000 tons. This would adjust the recycling figure to approximately 55,000 tons, and the waste stream figure to 460,000 tons. Most municipalities count C&D (8,467 tons) into recycling figures (making the recyclables 65,000 tons, and the waste stream 470,000), and more controversially, some count cleanfill (60,089 tons) in both recycling (now 125,000 tons) and waste stream figures (530,000 tons). In addition, the Town receives car fluff from Gershow Recycling (32,147 tons), but does

not count the weight of the cars so "recycled" at Gershow. The Town also landfills sewage sludge ash (and some treated by-pass sludge) from the Southwest Sewer District (13,202 tons), and has waste categories of "other" (3,430 tons) and "process residues" (324,932 tons of C&D materials from two companies in Brookhaven which process in- and out-of-Town C&D material). This makes a total "waste stream" in the vicinity of 900,000 tons. The Town also composts leaves at the Holtsville Ecology Center, and chips brush at the Manorville Compost Site -- none of which are included in the above recycling or waste stream figures. The Town believes that 95% of all wastes are generated in the Town (except for the majority of the C&D and ash, which are from out-of-Town) -- but at least some of the wastes are from out-of-Town. To make the Town's figures comparable with other Towns, it seems reasonable to count recyclables, residential and commercial landfilled wastes, and compost (as quantified), while excluding the other categories. This will tend to understate the Town's waste stream; however, in counterbalance, ignoring the potential 5% of out-of-Town wastes will tend to slightly overstate the size of the waste stream. Doing this gives an "official" waste stream size (that is to say, one which is comparable to what other municipalities count as a waste stream, and is similar to the data we are reporting for those other municipalities) of 460,653 tons, of which 405,693 tons were landfilled and 54,960 tons recycled. Following a similar process for 1991 data gives a total waste stream size of 492,174 tons, of which 419,963 tons were landfilled, and 72,211 tons recycled. The

commercial portion of the waste stream in 1990 was 30%, and was 27% in 1991 (assuming all yard waste and other recycled goods were "residential"; this is not strictly true, since the Town accepts some limited quantities of recyclables from schools and commercial sources). Unlike the Town of Oyster Bay, where it seemed possible to compare the size of the commercial waste stream in that Town to those in Huntington and Babylon, there is no comparable municipality to Brookhaven on Long Island. The Town is more suburbanized than its neighbors to the East, and more developed commercially; it is more rural, and contains much less development, as a whole, than its neighbors to the west.

In 1991, the Town recycled aluminum, ferrous, glass, and HDPE and PET plastic containers, aluminum foil, aerosol cans, newspapers, kraft bags, and corrugated cardboard, all of which were picked up curbside from residences. "Junk" mail was added to this list in 1992, and white goods and other bulky metal wastes are also picked up from residents. Bulk iron and aluminum are also collected at the landfill, as well as waste oil (also collected at other locations in the Town). There was a pilot program to separate bulk ferrous from the ash received from Hempstead, but it has been discontinued at present. Leaves are composted at Manorville (and Holtsville, although this amount was not quantified), and brush was chipped at the landfill (more than usual, due to Hurricane Bob and the "Halloween" storm of 1991). New England CRInc, which runs the MRF for the Town, is responsible

for marketing all materials processed through the MRF. (It should be noted that the MRF is generally acknowledged as one of the largest and most modern municipal MRFs in the country -- also see the report on Islip.) Compost is available to Town residents, and a small amount was sold to Bittle Soil; compost will also be used for capping operations at the landfill.

The Town did not have any STOP days in 1990 due to insurance difficulties, but two days were held in 1991. The Town was planning to open a permanent STOP facility in the Fall of 1992; this has been delayed.

Table 7(a) **1991 Recycling Data (Tons)**

newspaper	19,334
corrugated cardboard	444
hi-grade paper	6
lo-grade paper	186
ferrous cans	1,873
aluminum cans	91
white goods	2,736
bulk iron	15
bulk aluminum	7
flint glass	1,884
green glass	551
amber glass	214
mixed glass	184
plastics	495
compost (leaves)	20,000
yard waste	24,000
car batteries	22
waste oil	159
Totals	72,211

Table 7(b)		Waste Stream Estimates (TPY)		
Source	Year	Landfilled	Recycled	Total
NYSWRC	1985			1200 tpd
WMI est.	1985			312,000
LIRPB	1986			550,000
NYSWRC	1987		2-10%	312,000
Newsday	1987	99%	1%	1,440 tpd
WMI est.	1987			374,400
TOB ¹	1990	405,693	54,960	460,653
NYPIRG	1990	463,664	68,401	532,065
TOB ¹	1991	419,963	72,211	492,174
Newsday	1991		68,401	500,000

TOB = Town of Brookhaven
¹ interpreted by WMI

8. EAST HAMPTON

References: 4,7,21,30,38,42,47,51,57,58,62

In 1986, the Town of East Hampton was landfilling almost all its waste at two landfills (one in Montauk, and one in East Hampton); a pilot recycling program was begun that year, and a brush/wood chipping operation was solicited for the landfill in East Hampton. This chipping contractor, still working there, separates soil and other "salvageable" materials from heavy brush, wood stumps, etc., and then runs the residue through a chipper. He sells the "salvageables," and the Town uses the mulch for landfill cover and other public works projects. The Town waste stream was not well quantified in 1986, although it was certainly less than the present waste stream (the Town is now more developed -- although 1990 census figures do not seem to reflect this development process accurately). One estimate is that the waste

stream was 18,000 tpy in 1986 (although the figure seems low -- other estimates from the same source seem to be below what the waste stream sizes for other municipalities were accepted to be).

Currently the Town is recycling its wastes, and landfilling the residues at the East Hampton landfill (the Montauk landfill has been closed). The Town is suing NYSDEC over the Department's insistence on applying the Long Island Landfill Law to the Town. It is the Town's position that the landfill is not in the Deep Recharge Zone, and so the Town should be exempt from the law. (The Town has additional, practical/economic arguments against having to follow the law. Several other East End Towns are also litigants in this action.) The size of the Town waste stream is better understood than in 1986, but still is not precisely defined (only carters are weighed at the landfill, and resident drop-off is still a large portion of waste collection). In the Town Solid Waste Management Plan (SWMP) the waste generated in the Town was quantified as 40,034 tpy. It is not accurate to say that the amount landfilled equals the amount generated minus the amount recycled. That number would certainly be the largest amount that would be landfilled, however. In 1991, the amount of waste recycled was 13,845 tons; therefore, the most that could have been landfilled was 26,189 tons. The Town does not accept C&D; that waste stream is listed as 1,717 tons in the SWMP, leaving a maximum amount landfilled as 24,472 tons. If the category of "land clearing waste" is what the contractor grinds at the landfill, as

The Town has applied for an NYSDEC permit to open a recycling/composting facility, and is perplexed because the permit process has taken so long. In 1988, Barry Commoner (Center for the Biology of Natural Systems, Queens College) organized a demonstration recycling project in the Town, in which recycling rates of approximately 80% were achieved. The Town planned this facility with this success in mind. The waste stream will be divided into several parts. One will be source-separated recyclables (glass, cans, HDPE/PET containers, newspapers, corrugated cardboard, office and computer paper, and mixed papers), making up 4,412 tons of the waste stream, which will be prepared for market at the facility. It is estimated there will be 244 tons of residue from this waste stream. Food wastes, soiled paper, diapers, compostable and chippable yard wastes, sludge, and about 32% of the "mixed solid wastes" stream (3,319 tons) will be composted (a total of 15,407 tons), through various compost troughs, producing 3,396 tons of food and paper compost, 1,661 tons of MSW compost, 5,986 tons of mulch, 100 tons of recyclable steel, and 1,991 tons of process residues. A portion of bulky wastes and tires will be salvaged (551 tons out of 1,377 tons), land clearing debris (9,841 tons) will all be ground by the private contractor to mulch, C&D will continue to be diverted to private operators (1,717 tons), and the remainder of the waste stream (waste oil, hazardous household chemicals, and infectious wastes -- 111 tons) will be subject to special handling procedures. The grand total shows 10,036 tons out of a waste stream of 40,034 tons as having to be

<u>Table 8(b)</u>		<u>Waste Stream Estimates (TPY)</u>		
<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Recycled</u>	<u>Total</u>
NYSWRC	1985			72 tpd
WMI est.	1985			18,720
LIRPB	1986			21,200
NYSWRC	1987			18,720
<u>Newsday</u>	1987	90%	10%	73 tpd
WMI est.	1987			18,980
TEH	1989		7,319	
TEH	1990		5,806	
NYPIRG	1990	35,513	1,672	37,815
TEH	1991	26,189 ¹	13,845	40,034
TEH	1991	24,472 ¹	13,845	40,034
TEH	1991	14,631 ¹	13,845	40,034
<u>Newsday</u>	1991	35,513	1,672	37,815

TEH = Town of East Hampton

¹ the "correct" total depends on the disposition of C&D and land clearing debris

Note: Town officials took great pains to point out the anomalous nature of the 1991 recycling figures. Because of damage from Hurricane Bob and the "Halloween" storm, a great deal of brush was collected and chipped in 1991. Recycling rates are expected to return to earlier levels, until the recycling/composting facility is opened.

9. HUNTINGTON

References: 3,7,13,23,25,30,35,38,39,40,47,57,58

In 1986, the Town of Huntington was disposing wastes at its East Northport landfill. At this site were three old incinerators which were used to reduce the volume of the wastes to be landfilled. The Town accepted all materials at the landfill -- C&D, yard wastes, anything that was generated in the Town, with the exception of hazardous wastes. The waste stream was estimated at 350,000 tpy. The Town opened a drop-off recycling center in 1987,

applying to NYSDEC to have ash permitted in the landfill. During the early part of 1992 most of the ash from the incinerator was shipped to North Carolina; now most is sent to Islip. The WTE plant has a design capacity of 750 tpd, but it may be able to handle more waste than that -- the current estimate is 300,000 tpy. All wastes from Smithtown and Huntington, except recyclables, C&D, and yard waste will be incinerated. Bypass waste will be minimized by the use of a pre-process shredder, and by pre-incineration metals collection.

Huntington's waste stream, as seen at its various disposal facilities, has been greatly affected by tipping fees. As the Town's tipping fee has increased, its waste stream has decreased. The Town-wide generation ratio of commercial:residential wastes is estimated at 50:50; however, by October 1991, with the prospect of a tipping fee rise from \$80/ton to \$160/ton (Huntington and Smithtown are obligated to pay a total of \$27 million/year for the WTE plant, and Huntington hoped to recoup its share of this money through the tipping fee) the commercial waste stream had fallen to 500 tons/month, as compared to a total waste stream of 15,190 tons/month (a 33:1 residential:commercial ratio). This has put great pressure on the Town to reduce the tipping fee, and raise the money necessary to pay for the incinerator through other means. As of April, 1992, the tipping fee was falling (currently \$65/ton), the volume of wastes received at the WTE plant was up, and a fiscal solution had yet to be decided. As of late Fall, 1992, the Town

Curbside collection of recyclables began in Huntington on a pilot basis in July, 1987. In 1989, the program was expanded Town-wide. As of April, 1992, the Town was collecting newspapers, corrugated cardboard, metal cans, glass, and HDPE and PET containers, and yard waste curbside, and had just added "junk" mail to the list. White goods are also picked up. Waste oil, batteries, and tires are handled on a drop-off basis. The commingled, non-paper, non-yard waste recyclables are taken "as is" by Island Recycling for a tipping fee of \$34.50/ton. Paper is also marketed through the Island Recycling. The Town has a yard waste compost site in Melville, and accepts yard waste and wood at the site, producing compost and wood chips. However, the site is limited to 60,000-70,000 cubic yards, which is not enough for the entire Town yard waste stream (estimated at 140,000 cubic yards). Therefore, some of the compostable yard wastes collected by the Town have been shipped to Earth-Gro, in Connecticut. Compost from the Melville site had been sold to Custom Clay and Soil, which happens to be across the street from the site (Custom Clay paid \$1 per cubic yard for unscreened compost, and \$5 for screened compost). Now compost is more generally marketed to local nurseries as well as other sand and gravel operators. Late Fall, 1992, brought reports that the Town, due to odor complaints from nearby businesses, would be closing the site. No alternative disposal option has been identified by the Town yet. The Town is considering a "red-bag" program for batteries (as they have been implicated in producing toxins through incineration, and

<u>Table 9(b) Waste Stream Estimates (TPY)</u>						
<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Incinerated</u>	<u>Recycled</u>	<u>Transported</u>	<u>Total</u>
NYSWRC	1985					900 tpd
WMI est.	1985					234,000
TOH	1986	1	1			350,000
LIRPB 1986						231,600
NYSWRC	1987					234,000
Newsday	1987	79%	20%	1%		772 tpd
WMI est.	1987					200,720
TOH	1988			16,652		230,033
TOH	1989			31,301		265,222
TOH	1990			32,723	191,846	224,569
NYPIRG	1990			44,228	201,373	245,601
TOH ²	1991			39,742	108,625	148,367
WMI ³	1991					178,041
TOH ⁴	1991			39,742	108,625	300,000
WMI ³	1991					360,000
Newsday	1991			44,228		245,601

TOH = Town of Huntington

¹ some wastes were incinerated, and then landfilled

² first ten months only

³ projected yearly total from ten-month figures

⁴ first ten months with estimated missing commercial wastes added

10. ISLIP

References: 7, 11, 13, 20, 23, 28, 30, 36, 38, 40, 44, 47, 48, 57, 58

The Town of Islip was unable to provide information about 1986 practices. However, other sources indicate that the waste stream was 328,500 tpy to 359,890 tpy. In 1987, reportedly 9% of the waste stream was being recycled (through the Town Materials Recycling Facility (MRF) and the Ronkonkoma Composting Facility), with mandatory household separation of newspaper, and glass and metal containers; the remaining 91% was landfilled in Hauppauge.

believes the residential and commercial waste streams are equivalent. This suggests that somewhere in the region of 120,000 tons of commercial wastes may have left the Town for alternate disposal sites. When the Landfill Law took effect, there were concerns that the Town would be unable to dispose of all its wastes through recycling, composting, and the present incinerator. However, the Town doubled its tipping fee at the incinerator (to \$80/ton) on January 1, 1991. Wastes received at the WTE plant fell by one-third, and the Town's facilities were able to handle the Town's wastes. However, there has been a slow increase in the amounts of wastes received at Town facilities, and the Town has had to make various Inter-Municipal arrangements to use the excess incinerator capacity at Babylon and Huntington. As of late 1992, the Town had arranged for 50,000 tpy of capacity at the Huntington plant. The Town has received approval for an experiment in ash stabilization at the Town landfill (the "Rolite" process). This stabilized ash will be used for capping material at the closed portion of the Hauppauge landfill.

The Town won praise in the late 1980s for its recycling program, but also received later criticism concerning whether the Town's reported recycling rate had been inflated. In 1991, the Town residential curbside program included newspaper, corrugated cardboard, and glass, metal, and plastic containers. The Town also (at that time) picked up grass clippings and leaves, and other residential yard wastes. White goods were also picked up from

Table 10(b) Waste Stream Estimates (TPY)

Source	Year	Landfilled	Incinerated	Recycled	Transported	Total
NYSWRC	1985					900 tpd
WMI est. ¹	1985					328,500
LIRPB	1986					330,000
NYSWRC ¹	1987					328,500
Newsday	1987	91%		9%		986 tpd
WMI est. ¹	1987					359,800
NYPIRG	1990	190,741	144,600	77,339		412,680
TOI	1991	56,945	132,310	105,109	11,790	309,279
WMI ²	1991					430,000
Newsday	1991		260,000	77,339		412,680

TOI = Town of Islip

¹ there exists evidence that Islip, unlike almost all other Long Island municipalities, reported its "tpd" waste stream figures on the basis of a 365-day year

² estimate based on 50:50 commercial:residential waste generation rate and TOI information

11. RIVERHEAD

References: 7,8,9,17,19,30,33,38,47,51,57,58,59,62

Waste stream data was unavailable from Town of Riverhead sources. Historically (over the past decade or so) the Town's waste stream has been estimated at 100 tpd (26,000 tpy). In 1986, this was all landfilled.

By 1990, the Town had instituted a drop-off recycling program at the landfill. The Town collects newspapers, chipboard, tin aluminum, glass, and commingled plastic containers. How this material is marketed was not available. In addition, the Town has a composting program at the landfill for yard waste (3,000 cubic yards -- approximately 1,000 tons -- in 1991). It does not appear that this tonnage has been included in published reports of

separate out recyclable materials, and compost all organic matter in the waste stream. This could lead to recycling rates of 50-70%. In addition, Omni will be responsible for disposal of all process residues, which would take the Town out of the solid waste disposal industry all together.

Table 11(a) **Recycling Data 1989 (NYSWRC) (Tons)**

paper	105
glass	7
plastic	4
metal	690
other	525
Totals	1,411

Table 11(b) **Waste Stream Estimates (TPY)**

<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Recycled</u>	<u>Total</u>
NYSWRC	1985			100 tpd
WMI est.	1985			26,000
LIRPB	1986			29,600
NYSWRC	1987			26,000
<u>Newsday</u>	1987	almost all		100 tpd
WMI est.	1987			26,000
NYSWRC	1989		1,411	
NYPIRG	1990	36,219	1,381	38,600
<u>Newsday</u>	1991	36,219	1,381	38,600
WMI ¹	1991	36,219	2,400	39,600

¹ 1,000 tons of compost added to Newsday data

12. SHELTER ISLAND

References: 7, 30, 38, 47, 49, 50, 53, 57, 58, 59, 62

Until October 15, 1991, the Town of Shelter Island did not have scales at the landfill to check the weights of any vehicles entering the landfill (although spot-checks were made on weights by

the waste stream was being recycled at the end of 1991 (in 1989 approximately 760 tons were recycled, according to one source), and approximately one-third of all wastes were being recycled in Spring, 1992; some 70% of these recyclables are from the residents of the Island. Unfortunately, it also appears that some residents may have established their own landfills on the Island, or are burning wastes in backyard barrels, due to the imposition of disposal fees. The Town believes that its current system will allow for quantification and characterization of its waste stream with some certainty in the future, and that the "per-bag" system will lead residents to attempt to minimize their generation of garbage, and to recycle as much as they can of what is generated. The Town does not believe any wastes are either imported to or exported from the Island.

Prior to the system put in place on October 15, 1991, the Town had a drop-off recycling program, and utilized several vendors for the collected material. As the Town used combinations of volumes and weights to measure its recycling, it is difficult to quantify this recycling effort in terms comparable to other municipalities. Collected metals went to North Fork Sanitation, plastics to Trimax, newspaper to BP, glass and white office paper to the Town of Southold, waste oil to Strebels, tires to New York Tire, clothing to St. Vincent DePaul, and cars to Gershow Metal.

Table 12(b)		Waste Stream Estimates (TPY)			Total
Source	Year	Landfilled	Recycled	Transported	
NYSWRC	1985				10 tpd
WMI est.	1985 ¹				3,650
LIRPB	1986				3,100
NYSWRC	1987				3,650
Newsday	1987	almost all			14 tpd
WMI est.	1987 ¹				5,110
NYSWRC	1989		760		
NYPIRG	1990	4,648	208		4,856
TSI	1990		400-800		
Newsday	1991		208		4,856
TSI	1991		14-15%	²	3,000-4,000

TSI = Town of Shelter Island

¹ as with the Town of Islip, evidence exists that the Town was using a 365-day year for its "tpd" estimates (unlike almost all other Long Island municipalities).

² began shipping wastes off Long Island October 15.

13. SMITHTOWN

References: 7,13,30,35,38,40,47,54,56,57,58,63

The Town of Smithtown was the first municipality on Long Island to begin recycling part of its waste stream. In the early 1970s the Town collected newspapers on a once-monthly basis from area residences; the program was suspended after six months due to a lack of participation. With funding from New York State, the Town opened its Municipal Services Building on January 1, 1978, and re-initiated residential recycling. The facility used magnets and hand-sorting to separate recyclables from the waste stream. A residential drop-off area for paper, steel, aluminum, and clear, brown, and green glass was also created. The Town demonstrated the capability of separating out at least 8% of its waste stream during a three-week test period in 1981. Unfortunately, an explosion

cardboard (the full ban was instituted on September 15, 1988). Glass, metal and plastic containers were substituted for cardboard on January 15, 1990 -- corrugated cardboard was excluded from the ban because the recycling market had collapsed for that material. In addition, yard waste was banned from the landfill, and was required to be taken to Productive Recycling for composting (in Fall, 1991). The Town has just instituted a tipping fee with the use of the WTE plant, and established garbage districts (there were some problems with the carter bidding for these districts; the troubles seemed resolved at this time), and it remains to be seen at what level the waste stream will settle. At times the Town has believed that out-of-Town commercial wastes have been disposed of through Town facilities; this is especially true as Huntington's tipping fee has risen (although Smithtown has less than half the population of Huntington, the amount of commercial wastes received by Smithtown was ten times the amount received by Huntington in 1991, perhaps double what it "should be"). Flow control laws appear impossible to enforce; this situation is further complicated by the fact that many carting companies operate in both Smithtown and Huntington, and the two Towns share the same incinerator. Nonetheless, since the Towns' tipping fees are now approximately equal, Smithtown believes that the waste stream it receives this year (1992) will be an accurate reflection of the Town waste stream. The waste streams from previous years are probably slightly inflated. The data available to us indicates that the waste stream for Smithtown has varied between an

was no market). Other recyclables were collected at a rate comparable to the year before. The recycling rate for the first nine months of 1991 appears comparable to 1989.

The Town did not have a STOP program in 1986, or in 1990-1991.

<u>Table 13(a)</u>	<u>Recycling Data (Tons)</u>		
<u>Material</u>	<u>1989</u>	<u>1990</u>	<u>1991</u>
paper	12,915	3,474 ¹	
cardboard	1,699	758 ¹	
metal	3,821		
glass	266	337	
aluminum	9	11	
white goods & tin cans		3,172	
plastic	47	72	
batteries	29	2,000 pieces ²	
waste oil		13,300 gallons ²	
leaves/brush			
Totals	18,786	7,973	14,200³

- ¹ not collected January - August
- ² not included in totals
- ³ first nine months only

waste disposal. The Town was a party to the suit against the threatened closure of the East End landfills, but withdrew when granted a temporary permit from NYSDEC to continue using its doubled-lined landfill. The Town later received a permit to continue using its landfill through 1995.

The Town composted 12,000 tons in 1991, and according to other sources, recycled 4,447 tons in 1990 and 3,247 tons in 1989. If the waste stream totals 54,000 tpy, then that suggests approximately 37,500 tons were landfilled in 1991. However, the other sources also suggest that the Town landfills a great deal more than that -- nearly 65,000 tpy.

Information on exactly what the Town recycles or composts was not available at this time, although one source listed the materials as glass, paper, plastic, metal, and "other." Another source listed the materials as newspaper, cardboard, bottles, cans, plastics (HDPE and PET), scrap metal, and yard wastes.

The Town had two STOP days in 1986, and now has a permanent, permitted facility.

<u>Table 14(a)</u>	<u>Recycling Data 1989 (NYSWRC) (Tons)</u>
paper	1,703
glass	286
plastic	60
metal	1,007
other	183
Totals	3,247

waste stream was much smaller -- 39,921 tons. The decrease was attributed to the economic slowdown, especially as it related to home building and renovations. These actions create a large portion of the Town's waste stream, and, as reflected in the permits issued in 1991 as compared to the late 1980s, decreased appreciably in 1991. In 1991, the Town added the composting totals to its recycling figures, and so the amount landfilled in 1991 was listed at 33,604 tons, and the amount recycled at 6,317. The Town believes that some out-of-Town wastes are deposited at Town facilities, as it does not charge residents a tipping fee as neighboring Towns do, and so it may be that some neighbors are taking advantage of this opportunity for savings. In addition, at least two carters with routes in Southold do business in the neighboring Towns, and these carters would have an opportunity to mix loads from the various towns. Loads suspected of out-of-Town origins are turned away from Town facilities. The Town knows that some C&D wastes, as well as corrugated cardboard from supermarkets, are disposed of or recycled out-of-Town. Some scrap metal and junked automobiles are also handled at out-of-Town facilities. It should be noted that the Town is a party to the lawsuit against the order to close the East End landfills (pursuant to the Long Island Landfill Law).

In 1991, the Town was collecting the following materials at the landfill, and recycling them in the following ways: glass containers (to EWG Recycling); plastic containers (National Waste

<u>Table 15(b)</u>		Waste Stream Estimates (TPY)		
<u>Source</u>	<u>Year</u>	<u>Landfilled</u>	<u>Recycled</u>	<u>Total</u>
NYSWRC	1985			75 tpd
WMI est.	1985			19,500
LIRPB	1986			31,000
TOS	1987	36,500	1,124	37,624
NYSWRC	1987		20%	100 tpd
NYSWRC	1987			25,200 ¹
<u>Newsday</u>	1987	most	the rest	75 tpd
WMI est.	1987			19,500
TOS	1990	46,199	1,919	48,108
NYPIRG	1990	46,199	1,919	48,108
TOS	1991	33,604	6,317	39,921
<u>Newsday</u>	1991	46,199	1,919	48,108

TOS = Town of Southold

¹ apparently based on 252-day year

III. STATISTICAL ANALYSIS

1. Means and Errors

The data sets that follow (collected from Tables 1-15 in the previous section) have been used to create arithmetic means for the years 1986 and 1991 for the solid waste generation of all the municipalities. In addition, an "error" equal to one standard deviation has been calculated from these data sets. The statistical methods used are those of Hoel (1962). Where data sets provided by a municipality were available, a weighted arithmetic mean (M_w) (with the municipality's data weighted at two) has been developed. When the NYWREC data given for 1985 were not different from the 1987 data, the data sets were assumed to be the same and thus were weighted only once.

Table 16 GLEN COVE

For 1986:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
CGC	1986	22,000
CGC	1986	25,000
LIRPB	1986	26,000
WMI est.	1987	19,500

The City tonnage spread was treated as two data points; the WMI estimate is based on Newsday tpd data.

Mean: 23,125 +/- 2,559 tpy
 M_w : 23,250 +/- 2,268 tpy

Table 18 LONG BEACH

For 1986:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
CLB	1986	31,000
LIRPB	1986	30,000
WMI est.	1987	16,120

The WMI estimate is based on Newsday tpd data.

Mean: 25,707 +/- 6,791 tpy
M_w: 27,030 +/- 6,312 tpy

For 1991:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
CLB	1990	24,791
NYPIRG	1990	24,791
CLB	1991	24,577
<u>Newsday</u>	1991	24,791

The City 1991 data was weighted.

Mean: 24,738 +/- 93 tpy
M_w: 24,705 +/- 105 tpy

CLB = City of Long Beach

Table 19 NORTH HEMPSTEAD

For 1986:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
TNH	1986	333,101
LIRPB	1986	322,000
NYSWRC	1987	195,000
WMI est.	1987	204,100

The WMI estimate is based on Newsday tpd data.

Mean: 263,550 +/- 63,655 tpy
M_w: 277,060 +/- 63,115 tpy

Table 21 BABYLON

For 1986:

Waste Stream Estimates (TPY)

Source	Year	Total
CDM'85	1985	231,518
CDM'87	1985	257,952
H2M	1985	273,200
WMI est.	1986	219,552
LIRPB	1986	225,000
NYSWRC	1987	182,000
WMI est.	1987	163,200
CDM'87	1988	264,980

The 1986 WMI data were weighted; the 1986 WMI estimate is based on Town tpm data; the 1987 WMI estimate is based on Newsday tpd data.

Mean: 227,175 +/- 36,589 tpy
M_v: 226,328 +/- 34,605 tpy

For 1991:

Waste Stream Estimates (TPY)

Source	Year	Total
SWMP	1990	279,760
RFBD	1990	338,239
GBB	1990	304,458
WMI proj.	1990	320,000
NYPIRG	1990	313,000
<u>Newsday</u>	1991	313,000

The SWMP, RFBD, and GBB data were all weighted.

Mean: 311,410 +/- 17,553 tpy
M_v: 310,102 +/- 20,009 tpy

TOB = Town of Babylon

CDM'85 = Camp, Dresser & McKee report of 1985, as reported by Gershman, Brickner & Bratton

CDM'87 = Camp, Dresser & McKee report of 1987, as reported by Gershman, Brickner & Bratton

H2M = H2M Solid Waste Management Plan, as reported by Gershman, Brickner & Bratton

RFBD = Recycling Facility Bond Document

GBB = Gershman, Brickner & Bratton

For 1991:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
NYPIRG	1990	37,815
TEH	1991	40,034
<u>Newsday</u>	1991	37,815

Mean: 38,555 +/- 1,046 tpy

M_v: 38,925 +/- 1,109 tpy

TEH = Town of East Hampton

Table 24 HUNTINGTON

For 1986:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
TOH	1986	350,000
LIRPB	1986	231,600
NYSWRC	1987	234,000
WMI est.	1987	200,720
TOH	1988	230,033

The Town 1986 data were weighted; the WMI estimate is based on Newsday tpd data.

Mean: 249,271 +/- 51,806 tpy

M_v: 266,059 +/- 60,380 tpy

For 1991:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
TOH	1989	265,222
TOH	1990	224,569
NYPIRG	1990	245,601
WMI proj#1	1991	178,041
WMI proj#2	1991	360,000
<u>Newsday</u>	1991	245,601

The WMI 1991 projection #2 data were weighted; both WMI projections were based on Town 10-month data, the first on waste handled by the Town, the second based on Town estimates of waste generation.

Mean: 253,172 +/- 54,977 tpy

M_v: 268,433 +/- 63,151 tpy

TOH = Town of Huntington

Table 27 SHELTER ISLAND

For 1986:

Waste Stream Estimates (TPY)

Source	Year	Total
LIRPB	1986	3,100
NYSWRC	1987	3,650
WMI est.	1987	5,110

The WMI estimate is based on Newsday tpd data.

Mean: 3,953 +/- 848 tpy

For 1991:

Waste Stream Estimates (TPY)

Source	Year	Total
NYPIRG	1990	4,856
<u>Newsday</u>	1991	4,856
TSI	1991	3,000
TSI	1991	4,000

The Town tonnage spread was treated as two data points. Both were weighted.

Mean: 4,178 +/- 765 tpy

M_w: 3,952 +/- 758 tpy

TSI = Town of Shelter Island

Table 28 SMITHTOWN

For 1986:

Waste Stream Estimates (TPY)

Source	Year	Total
LIRPB	1986	173,500
TOS	1987	128,805
NYSWRC	1987	78,000
WMI est.	1987	110,240
TOS	1988	123,222

The 1987 Town data were weighted; the 1987 WMI estimate is based on Newsday tpd data.

Mean: 122,753 +/- 30,892 tpy

M_w: 123,762 +/- 28,290 tpy

Table 30 **SOUTHOLD**

For 1986:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
WMI est.	1985	19,500
LIRPB	1986	31,000
TOS	1987	37,624
NYSWRC	1987	25,200
WMI est.	1987	19,500

The 1985 WMI estimate is based on NYSWREC tpd data; the 1987 WMI estimate is based on Newsday tpd data.

Mean: 30,465 +/- 7,996 tpy
M_v: 31,658 +/- 8,256 tpy

For 1991:

Waste Stream Estimates (TPY)

<u>Source</u>	<u>Year</u>	<u>Total</u>
TOS	1990	48,108
NYPIRG	1990	48,108
TOS	1991	39,921
<u>Newsday</u>	1991	48,108

The Town 1991 data were weighted.

Mean: 46,061 +/- 3,545 tpy
M_v: 44,833 +/- 4,011 tpy

TOS = Town of Southold

2. Per Capita Generation Rates

The data from the individual municipalities can be examined in other ways. A statistic often used in reports on waste generation is "per capita waste generation" (defined as the amount of wastes produced by each person each day). Using the various means compiled above (Tables 16-30), the rates reported by the municipalities, and population data from LILCO (see the appendix) [29,30], Table 31 and Table 32 have been created.

Figure 2

Per Capita Waste Generation, 1986

based on computed mean waste generation

(lbs/person/day)

(1 cm. = 5 lbs. per capita)

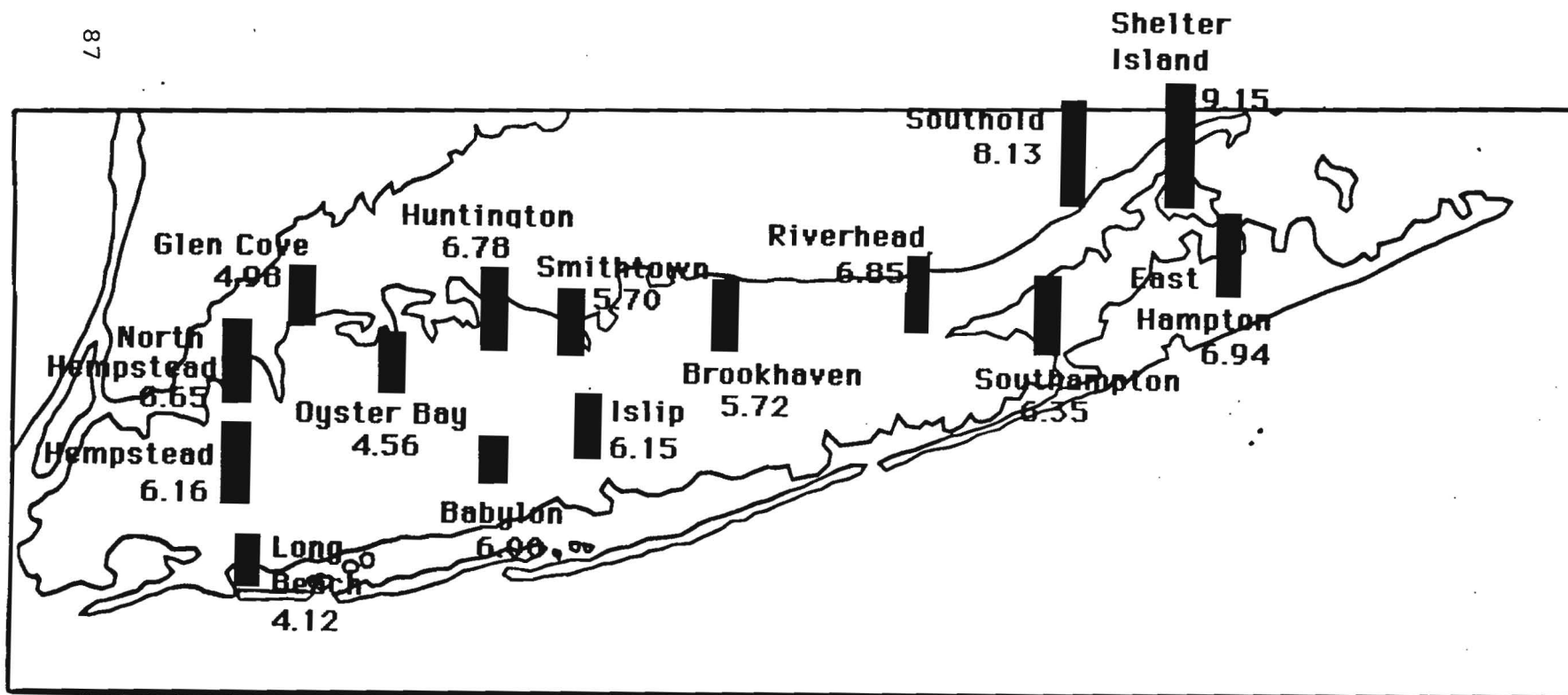
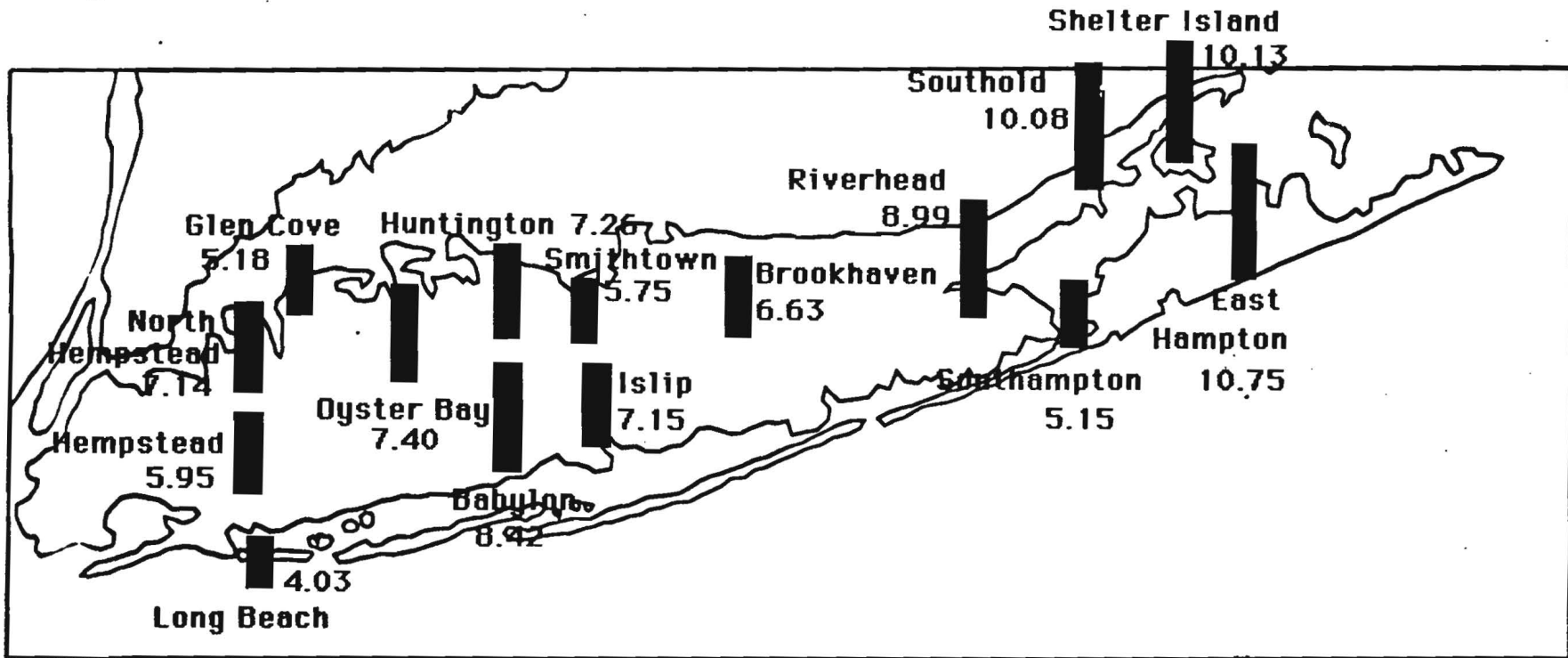


Figure 3

Per Capita Waste Generation, 1991

based on computed mean waste generation
adjusted for summer populations
(lbs/person/day)
(1 cm. = 5 lbs. per capita)

68



3. Extending the Analysis

Using data compiled from the individual municipalities, it has been possible to create County- and Long Island-wide compilations of waste stream tonnages, and per capita generation rates. Such figures have been generated by pooling the means and standard deviations in the respective categories for the constituent municipalities. (If there was no M_w for a particular municipality, the mean was used in the compilation.)

Table 33

NASSAU COUNTY

For 1986:

Mean: 1,383,635 +/- 163,601 tpy
 M_w : 1,436,256 +/- 157,587 tpy

For 1991:

Mean: 1,505,917 +/- 113,628 tpy
 M_w : 1,478,554 +/- 116,394 tpy

SUFFOLK COUNTY

For 1986:

Mean: 1,487,216 +/- 124,378 tpy
 M_w : 1,505,359 +/- 127,024 tpy

For 1991:

Mean: 1,762,253 +/- 79,923 tpy
 M_w : 1,753,176 +/- 89,218 tpy

LONG ISLAND

For 1986:

Mean: 2,870,851 +/- 205,511 tpy
 M_w : 2,941,615 +/- 202,407 tpy

For 1991:

Mean: 3,268,170 +/- 138,921 tpy
 M_w : 3,231,730 +/- 146,654 tpy

Figure 4 Nassau County Waste Generation (Means)

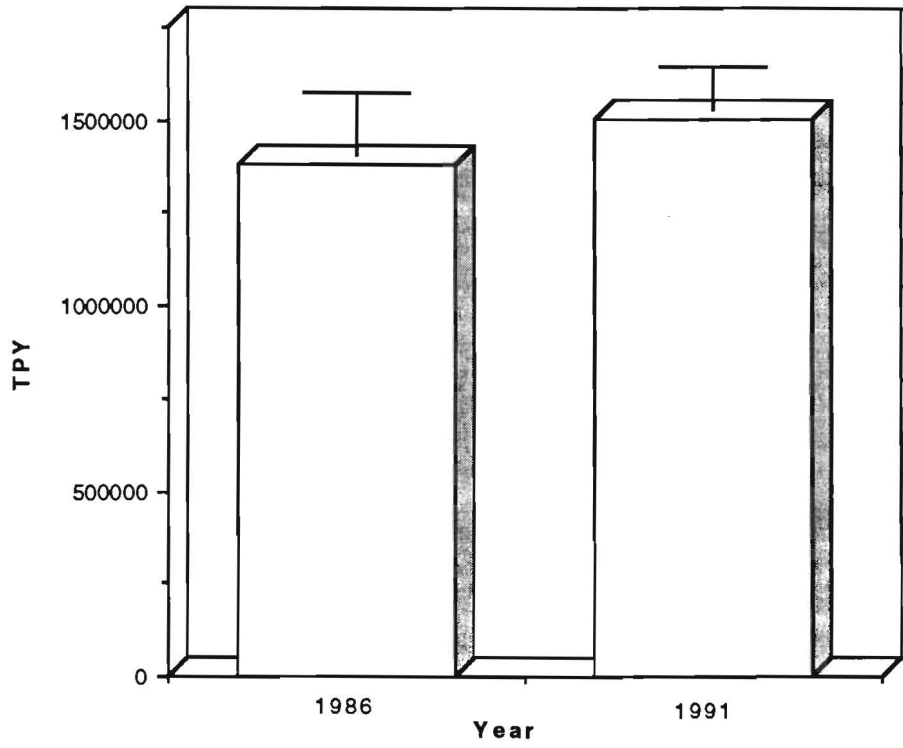


Figure 5 Nassau County Waste Generation (Weighted Means)

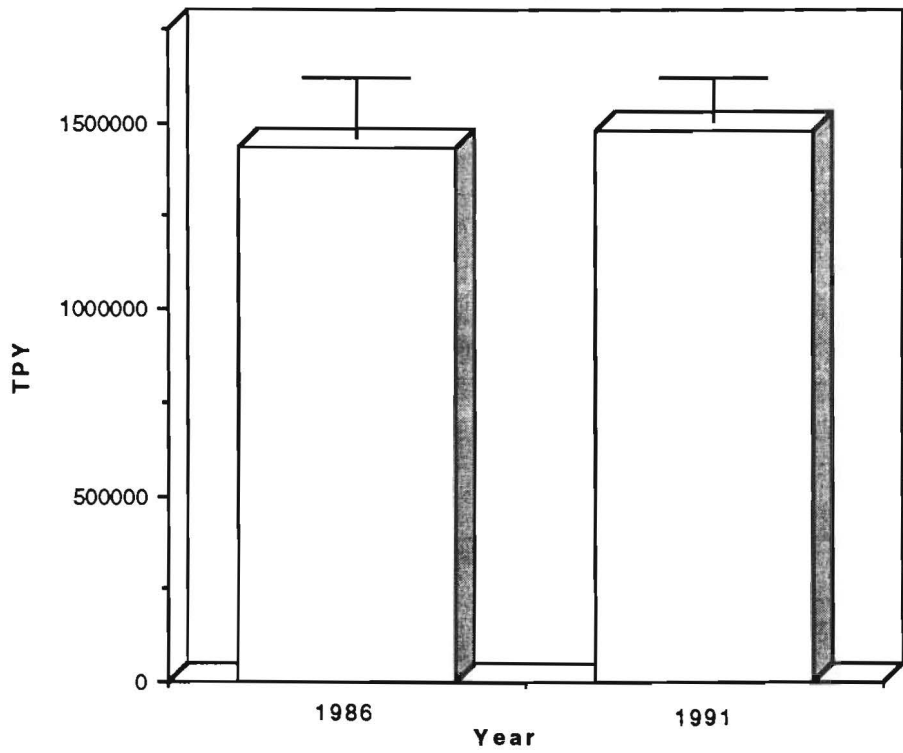


Figure 6

**Suffolk County Waste Generation
(Means)**

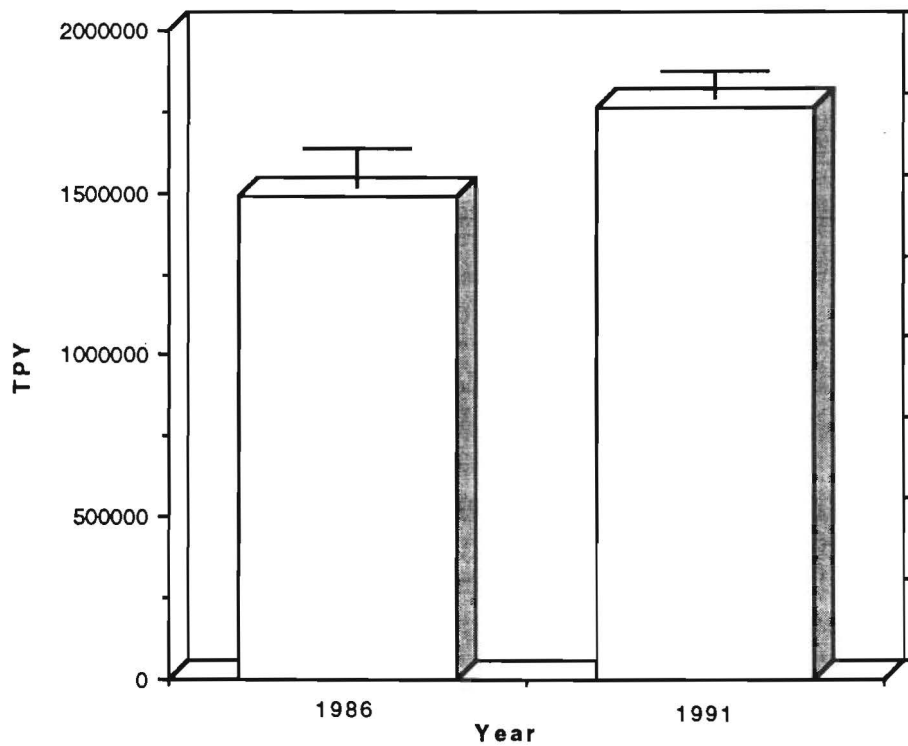


Figure 7

**Suffolk County Waste Generation
(Weighted Means)**

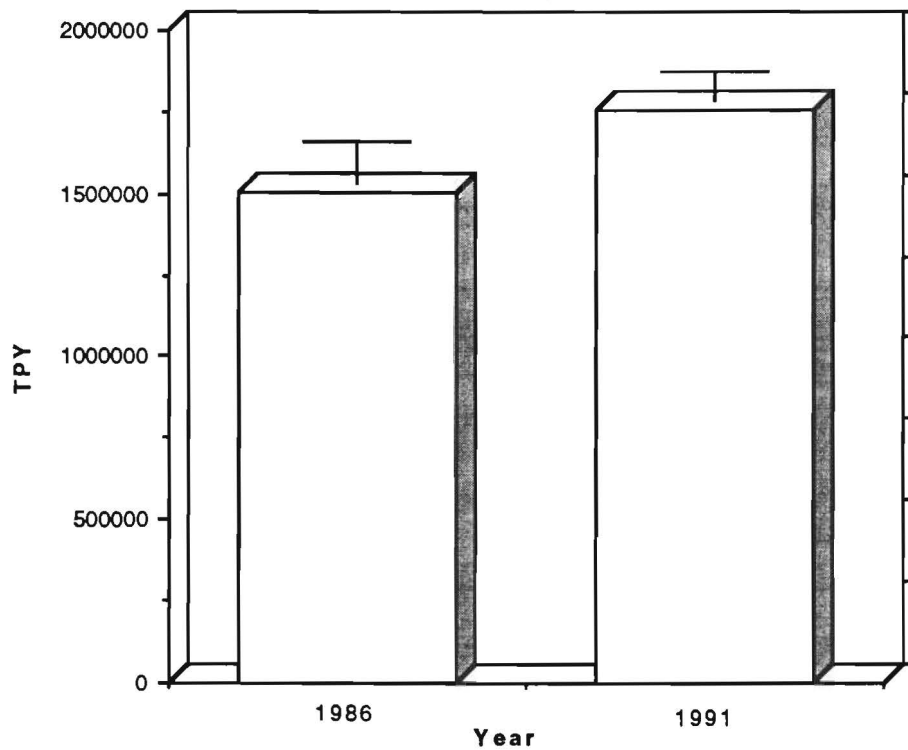


Figure 8

Long Island Waste Generation
(Means)

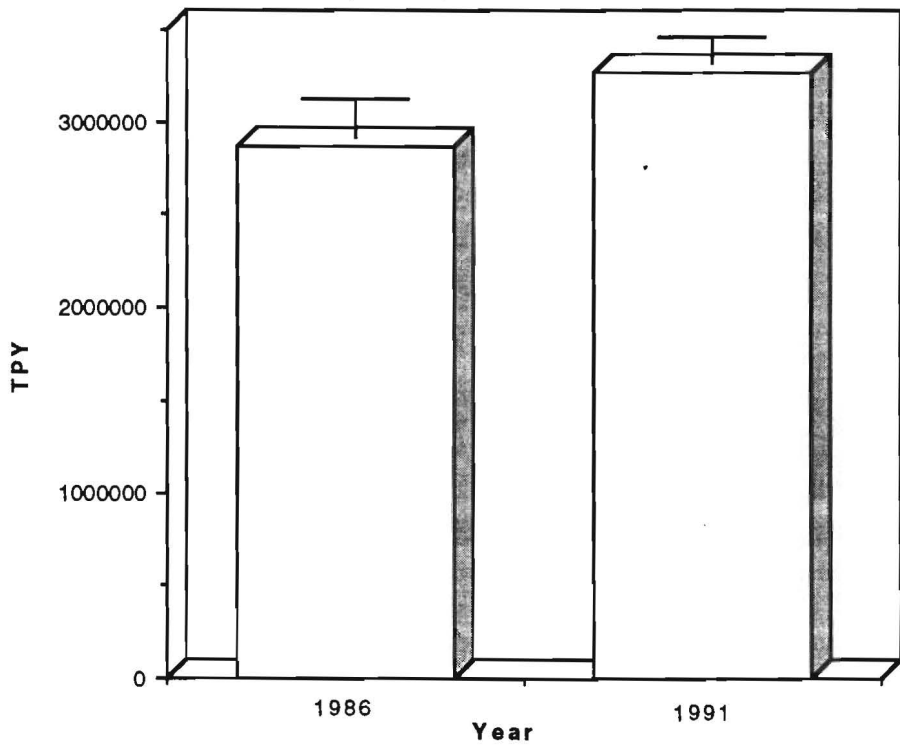
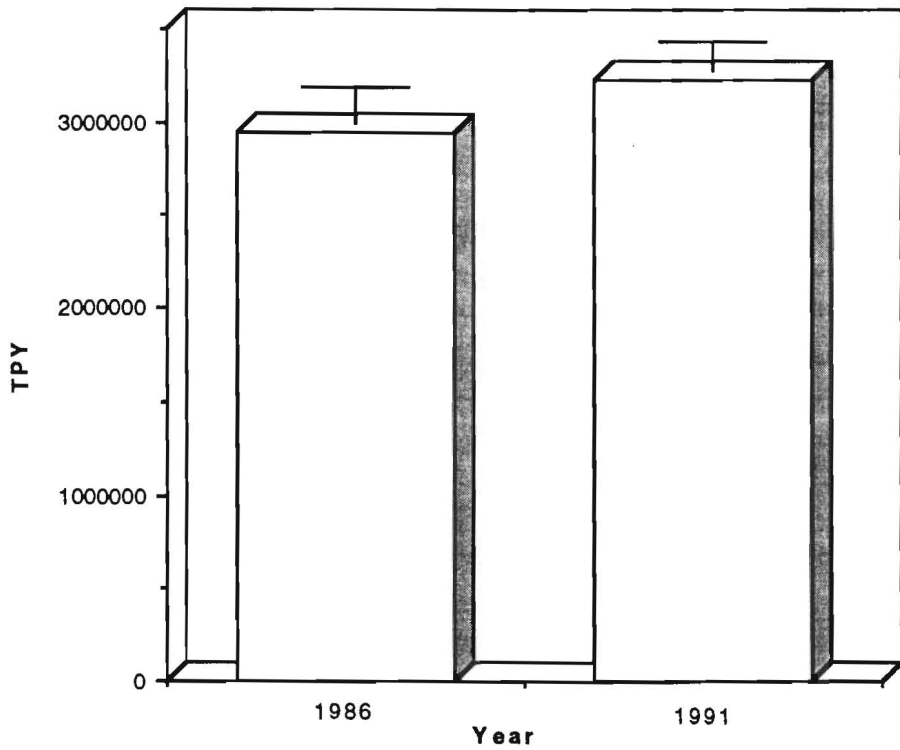


Figure 9

Long Island Waste Generation
(Weighted Means)



A somewhat independent estimate of the waste stream size can be made by examining the reported tonnages from the various municipalities by means of disposal (i.e. recycled, transported, incinerated, landfilled). The following assumptions have been made in this effort:

- 1) All tonnages reported by disposal type were rounded to the nearest 25,000 tpy.
- 2) For 1986
 - a) all wastes disposed of at the Glen Cove incinerator were assumed to originate in Nassau County;
 - b) the amount of wastes disposed of at the Town of Hempstead landfill was assumed to be 750,000 tpy, and 200,000 tpy was shipped off-Island (Long Beach is subsumed in this total);
 - c) only 300,000 tpy of the wastes landfilled in North Hempstead originated in Nassau County;
 - d) Oyster Bay shipped 200,000 tpy off-Island; the remainder of its waste stream was assumed to have been "hidden" in other Nassau County disposal totals;
 - e) the only recycling on Long Island was in Islip (approximately 10% of the waste stream);
 - f) all of Suffolk County's wastes were otherwise landfilled in the County.

3) For 1991

a) recycling totals were correctly reported;

b) all incinerated wastes were generated within the respective Counties, and the incinerators had an 80% operational efficiency;

c) 250,000 tpy of "transported" wastes from the commercial operations in Oyster Bay, North Hempstead, Huntington, and Islip were absorbed into the excess incinerator capacity at Long Beach and Hempstead; for ease of bookkeeping, all non-residential wastes from North Hempstead and Oyster Bay were so assigned; this meant all the commercial "transported" wastes in Huntington and Islip were assumed to have been disposed off-Island;

d) 200,000 tpy of Huntington's transported residential wastes were assigned to Smithtown's landfill.

Table 34

Waste Generation, from the Means of Disposal, 1986 (TPY)

Incinerated	Recycled	Transported	Landfilled	Total
<u>Nassau County</u> 75,000	0	400,000	1,050,000	1,525,000
<u>Suffolk County</u> 100,000(?)*	25,000	0	1,350,000(?)*	1,475,000
<u>Long Island</u> 175,000	25,000	400,000	2,400,000	3,000,000

* 100,000 tpy of Huntington's wastes assumed to have been incinerated, then landfilled -- only counted under "incinerated"

Table 35

Waste Generation, from the Means of Disposal, 1991 (TPY)

Incinerated	Recycled	Transported*	Landfilled	Total
<u>Nassau County</u> 1,000,000	300,000	350,000	0	1,650,000
<u>Suffolk County</u> 350,000	375,000	375,000	850,000	1,850,000
<u>Long Island</u> 1,350,000	675,000	625,000	850,000	3,500,000

* "transported" could also mean recycled, because of the lack of information regarding Long Island's commercial carting community; this material was not disposed in a Long Island municipal venue.

Figure 10

Nassau County Means of Disposal

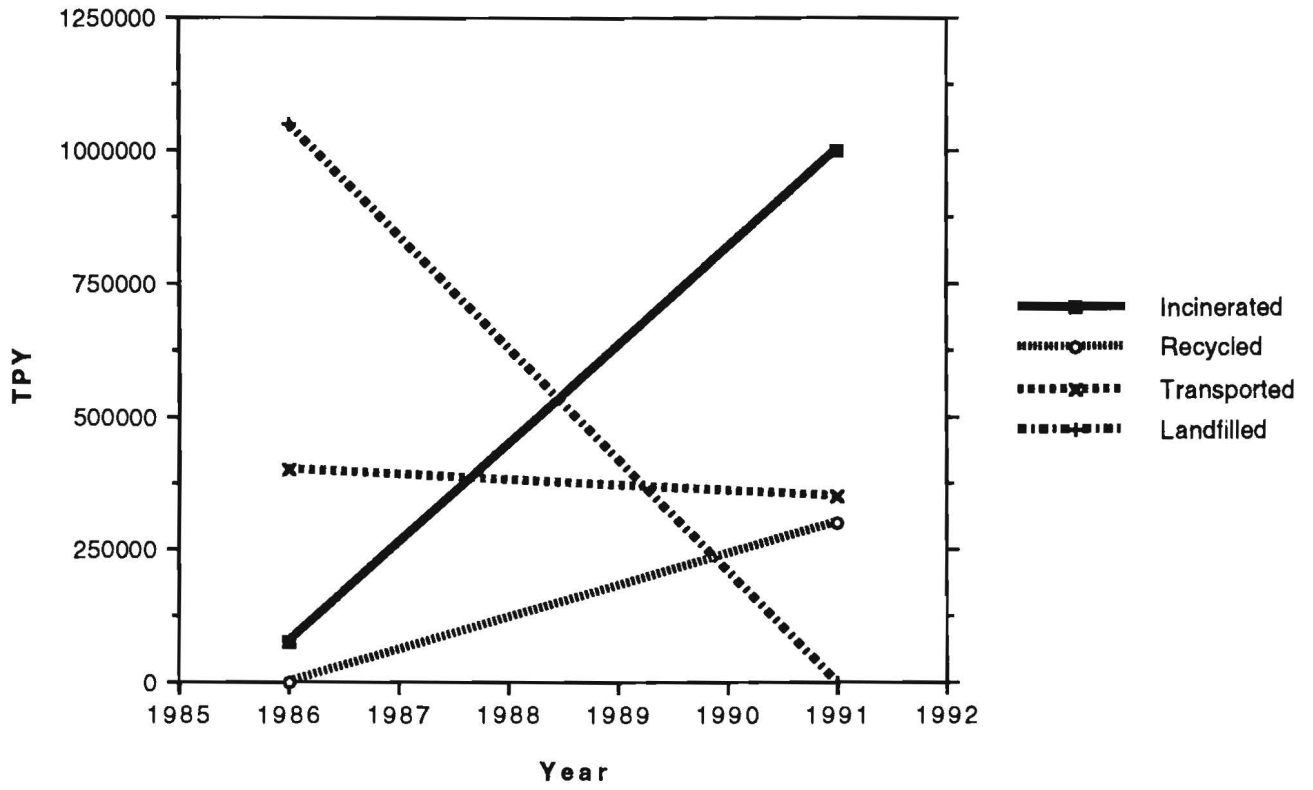


Figure 11

Suffolk County Means of Disposal

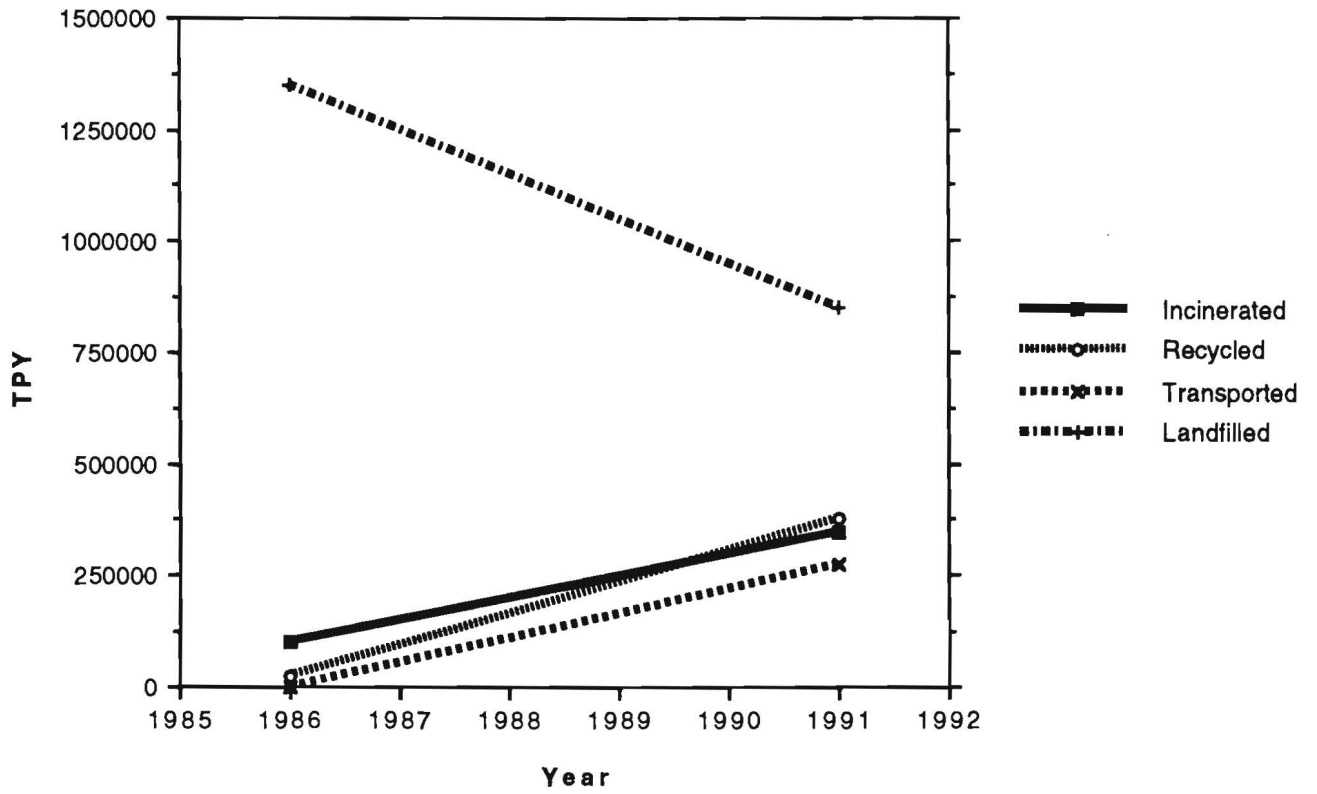
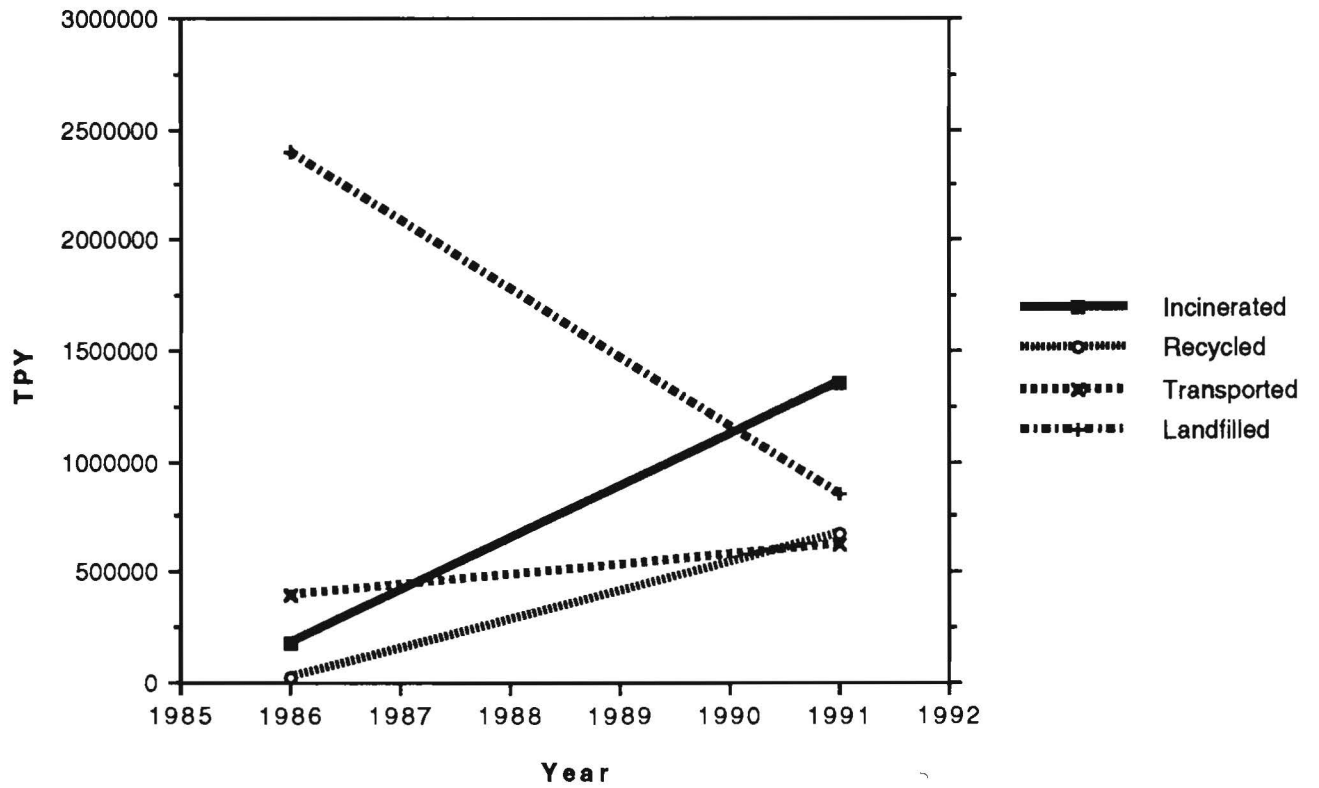


Figure 12

Long Island Means of Disposal



4. Long Island Waste Generation

The following tables combine all the data sets, perhaps to answer the question: how much MSW is generated on Long Island?

Table 36

Long Island Waste Generation (TPY)

<u>Locale</u>	<u>Year</u>	<u>Method</u>	<u>Mean</u>	<u>High</u>	<u>Low</u>
Nassau	1986	1	1,383,635	1,547,236	1,220,034
		2	1,436,256	1,593,843	1,278,669
		3	1,525,000		
Suffolk	1986	1	1,487,216	1,611,594	1,362,838
		2	1,505,359	1,632,383	1,378,335
		3	1,475,000		
Long Island	1986	1	2,870,851	3,076,362	2,665,340
		2	2,941,615	3,144,022	2,739,208
		3	3,000,000		
Nassau	1991	1	1,505,917	1,619,545	1,392,289
		2	1,478,554	1,594,948	1,362,160
		3	1,650,000		
Suffolk	1991	1	1,762,253	1,842,176	1,682,330
		2	1,753,176	1,842,394	1,663,958
		3	1,850,000		
Long Island	1991	1	3,268,170	3,407,091	3,129,249
		2	3,231,730	3,378,384	3,085,076
		3	3,500,000		

Method 1: from Table 33, Mean; the error provided the high and low
Method 2: from Table 33, M_w ; the error provided the high and low
Method 3: from Table 34 and Table 35

Figure 13

Nassau County Waste Generation Rates

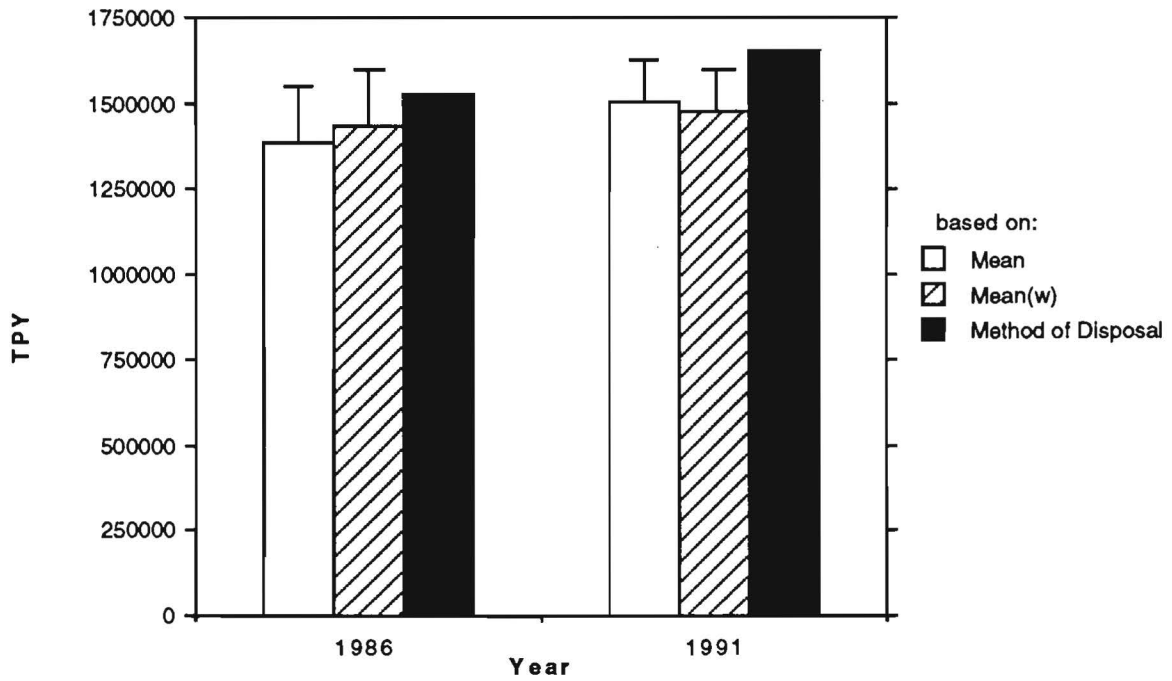


Figure 14

Suffolk County Waste Generation Rates

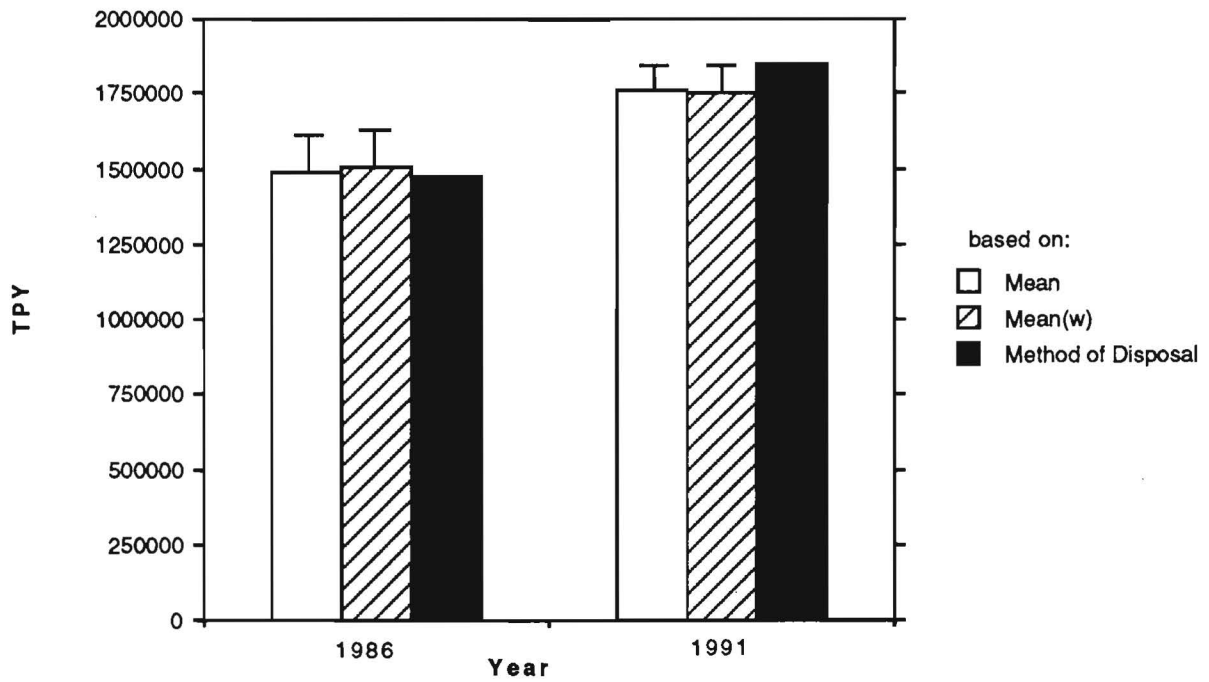


Figure 15 Long Island Waste Generation Rates

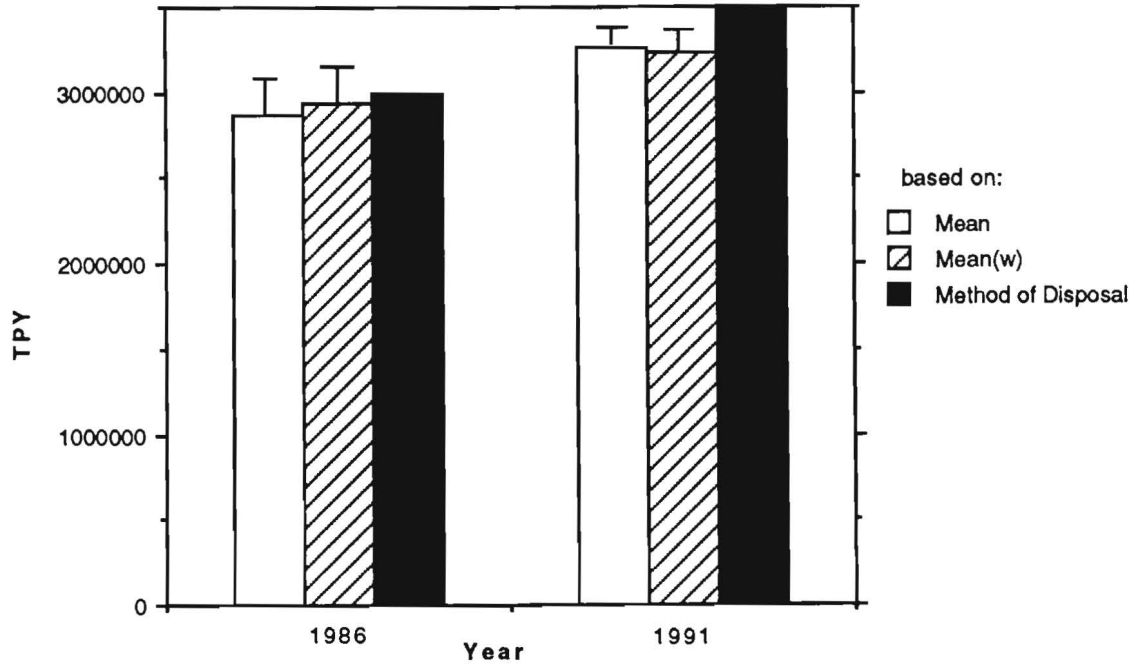


Table 37

Long Island Per Capita Waste Generation (lbs/person/year)

Locale	Year	Method	Per Capita
Nassau	1986	1	5.79
		2	6.01
		3	6.38
Suffolk	1986	1	6.11
		2	6.19
		3	6.06
Long Island	1986	1	5.95
		2	6.10
		3	6.22
Nassau	1991	1	6.41
		2	6.29
		3	7.02
Suffolk	1991	1	7.30
		2	7.26
		3	7.66
Long Island	1991	1	6.86
		2	6.78
		3	7.35

Population data from LILCO [29,30]; not adjusted for seasonal variations.

Method 1: from Table 33, Mean Method 2: from Table 33, M_w

Method 3: from Table 34 and Table 35

Figure 16

Nassau County Per Capita
Waste Generation Rates

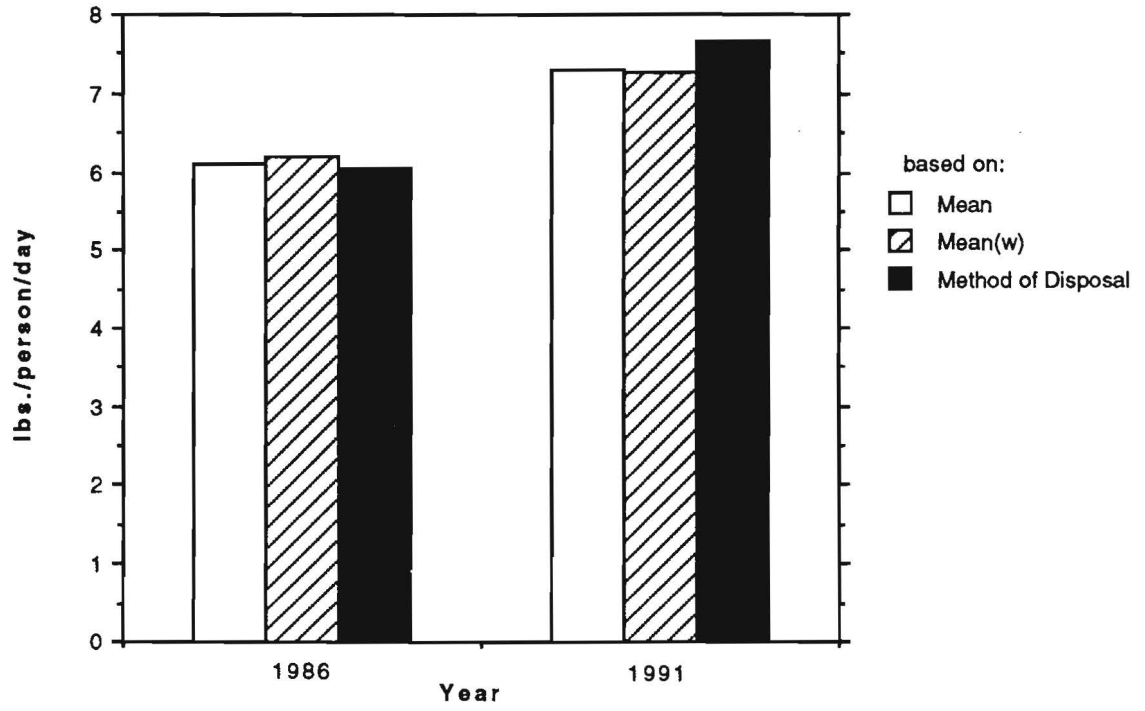


Figure 17

Suffolk County Per Capita
Waste Generation Rates

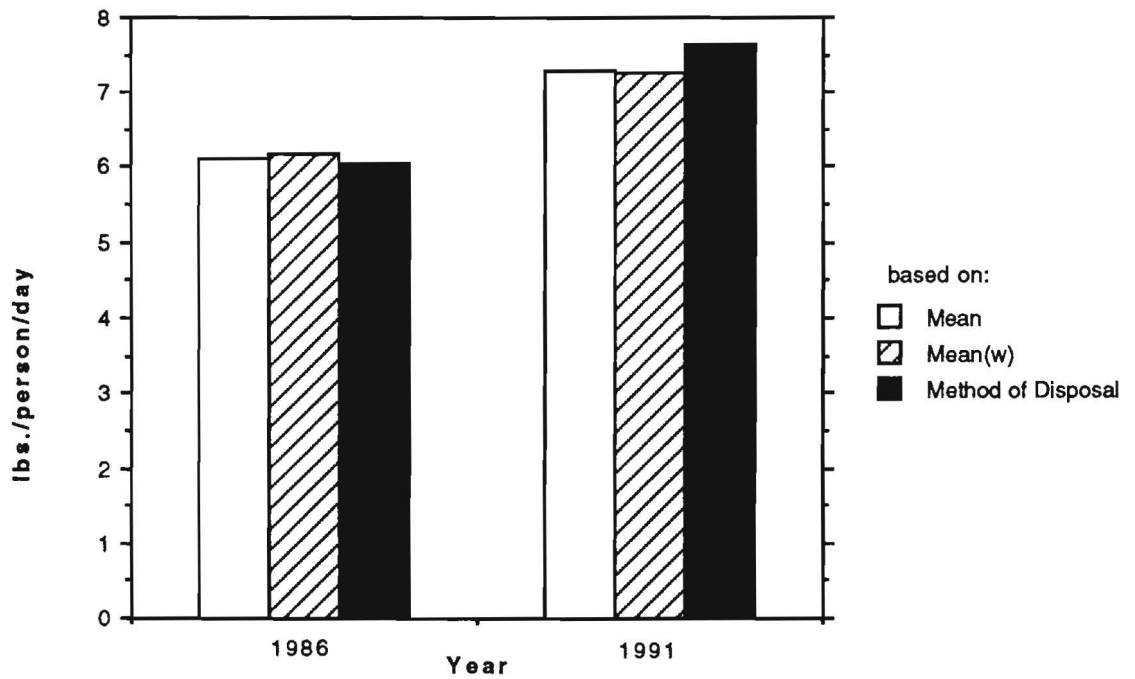
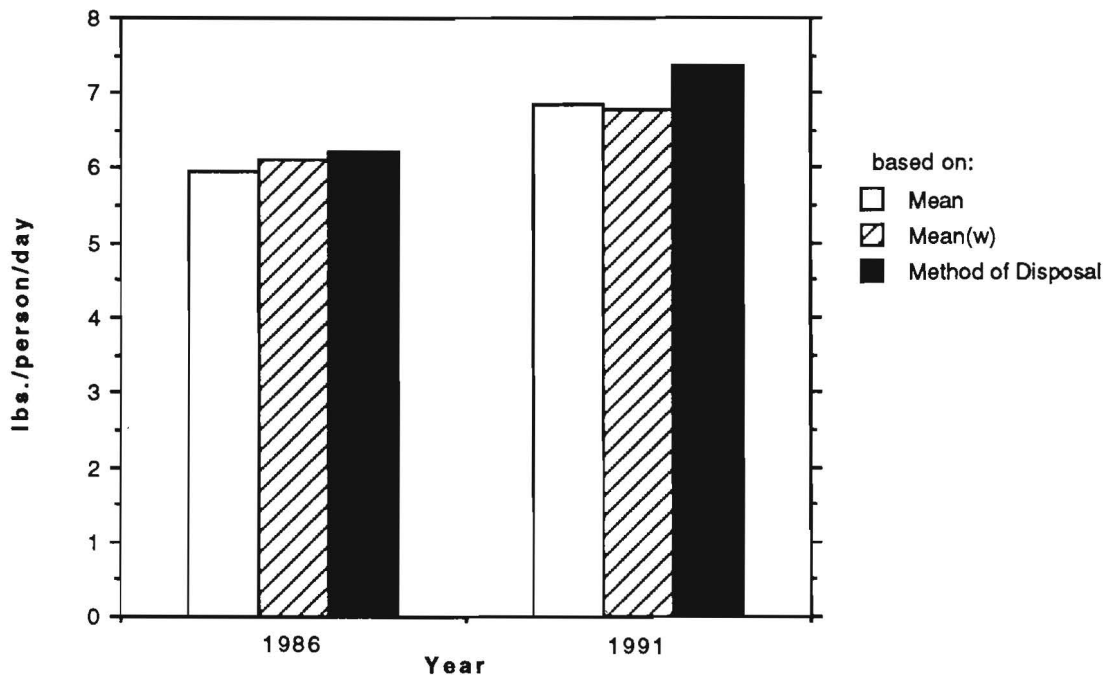


Figure 18

Long Island Per Capita
Waste Generation Rates



Even from this array of numbers it is not possible to determine which one number is the "correct" MSW generation rate for Long Island. Although the mean values seem to center around certain figures, it is possible that the figures are artifacts of different sources quoting the same figures. A more reasonable analysis might focus on the range of values created by using the "high" and "low" generation rates, especially when viewed in conjunction with Table 34 and Table 35. The means generated in Table 3 may underestimate the actual generation rate for MSW Island-wide.

Examining the per-capita generation rates (Table 31 and Table 32) does bring out some noteworthy points. For one, the difference in waste generation between urbanized Long Beach and other Long

Island municipalities is readily apparent. In addition, the problem of using "year-round residents" as a measure of population over-estimates per capita data for the East End, as the large numbers of summer and other part-time residents are unaccounted for -- although the garbage generated was not. The adjustment for summertime residents offered in Table 32 does not bring all of the East End Towns' rates down to the levels seen further west, however, so other factors are influencing these numbers. Some municipalities such as Babylon and Huntington seem to count more wastes in the waste stream than other municipalities do -- this was mentioned in passing when we developed these tables, but differences between the neighboring Towns of Huntington and Smithtown and East Hampton and Southampton are especially striking. This may be one of the missing factors in the high generation rates noted for much of the East End. Some of our adjustments made to reflect missing data (in North Hempstead, Oyster Bay, and Islip in particular) may have been too great, judging from the per capita generation rate differences in what is perceived to be a fairly homogenous suburban area.

All measures show an increasing Long Island waste stream over the five-year period, whether considered as a gross tonnage or a per capita rate. Although New York State has committed to waste reduction as the highest priority in waste management, this policy has not had a noticeable effect here on Long Island, as indicated by the data. Of course, some of this "increase" may only be due to

better counting methods for MSW, or revised categories of solid waste that lead to higher tonnages. The uncertainty factors caused by no municipal oversight for most commercial carting makes any blanket statement open to valid criticism; this is true even though the errors computed for 1991 are smaller than those computed for 1986 (this decrease may simply be attributable to the different sources calling on the same resources for MSW figures, thus leading to more precision -- though not necessarily more accuracy). Nonetheless, it is hard to dispute that Long Island's MSW generation rate is at least 3,250,000 tons per year (Huntington Supervisor Steven Ferraro has been quoted in the New York Times suggesting that Long Island's waste stream was 3,231,000 tpy in 1990 [1]; a 1990 NYSDEC policy paper projected a generation rate of 3,500,000 tpy [37]), and quite likely it is 3,500,000 tons per year. This is in comparison with a generation rate of 3,000,000 tons per year in 1986.

The 1989 Office of Technology Assessment study, Facing America's Trash, defines municipal solid waste as "solid waste generated at residences, commercial establishments ... and institutions ... MSW does not include construction and demolition debris or automobile scrap." A serious question facing those concerned with the amount of wastes generated on Long Island is -- how should Long Island count its waste? Should a common definition of solid waste be agreed upon? Or should the pragmatic definition of MSW as "the waste a municipality must handle at its facilities"

be used? With facilities costing hundreds of millions of dollars being built by governments that are strapped for revenue, some need for waste stream sizing exists. The next section of this report will point out what we perceive as a lack of disposal facilities on Long Island; however, if a re-definition of the materials to be handled is made, what must be planned, sited, and built may change drastically -- and the direction of that change is not obvious. For example, it can be argued that Brookhaven's waste stream currently is less than 350,000 tpy or so -- as that is all the "MSW" the Town is disposing of in 1992 [26]. In 1991 the same categories of waste summed to almost 500,000 tons. The change is attributed to higher tipping fees at the Town facilities, lower out-of-state disposal fees, more aggressive commercial recycling ventures, and the recession. Given fiscal realities, which figure should planners use to size the Town's facilities? Or is it more realistic to speak of the disposal needs of the Town -- which in 1991 added to over 900,000 tons when all materials were counted (see the Town of Brookhaven report in section 2)? The disparate needs and purposes of the many planning units and regulators in Long Island solid waste make it unlikely that one method of counting wastes will be adopted soon to end the confusions seen in portions of this report.

IV. THE SHIFT IN THE MEANS OF DISPOSAL

Although there are good reasons to be concerned about the accuracy of the waste generation rates, the validity of the massive shift in the means of waste disposal for the two counties over the five-year period cannot be disputed.

For example, in 1986 the municipalities in Nassau County disposed approximately 1,050,000 tpy by landfilling; in 1991 there were no active landfills in the County. Incineration has essentially replaced landfilling as the disposal choice in the County (an estimated 1,000,000 tpy in 1991 in Nassau County) -- although a large amount of MSW is transported off Long Island for landfilling. The disposal methods have been now partitioned into approximately one-half incineration, and one-quarter recycling and one-quarter off-Long Island transportation. The disappearance of landfilling in Nassau County is inarguable. Recycling increased tremendously, from one small pilot program in North Hempstead, to its large role in 1991 waste handling. In 1986 in Suffolk County, with the exception of a pilot recycling program in East Hampton, the nascent Islip curbside recycling program, and the incineration of some wastes in Huntington for volume reduction, all solid waste was landfilled. By 1991 in Suffolk County, landfilling had certainly declined as a disposal method. Indeed, as the new Huntington incinerator (which operated for only a short month or so officially in 1991) was not included in the compilations of waste stream disposal methods, the decline documented in Table 35 is

understated by some 300,000 tpy. The Brookhaven-Hempstead ash-for-trash agreement should reduce an additional 200,000 tpy from the landfilling calculations. These updates make incineration the most widely used disposal choice available on Long Island. Ignoring the complex Babylon-North Hempstead agreement, and Shelter Island's small off-Long Island shipping deal, the following projection for Suffolk County 1992 disposal methods can be made (assuming recycling rates and other variables remain constant, and remembering that the "transported" category may include private carter recycling):

Table 38
Suffolk County Means of Disposal, 1992 projected (TPY)

Total	Incinerated	Recycled	Transported	Landfilled
1,825,000	650,000	350,000	475,000	350,000

Combining sets of figures (given all of the above assumptions, including: counting Brookhaven's 1992 wastes to Hempstead under incineration, and assuming those wastes displace some other 200,000 tpy of Long Island-generated wastes into the off-Long Island transported category; neglecting any effects of the Babylon-North Hempstead deal; and assuming that all other factors for 1992 remain constant, such as recycling and overall waste generation rates) produces the following Long Island-wide estimates of waste disposal methods (Table 39).

Table 39

Means of Disposal (TPY)

1986

Total	Incinerated	Recycled	Transported	Landfilled
3,000,000	175,000	25,000	400,000	2,400,000

1991

3,500,000	1,350,000	675,000	625,000	850,000
-----------	-----------	---------	---------	---------

1992 (projected)

3,500,000	1,650,000	675,000	825,000	350,000
-----------	-----------	---------	---------	---------

Figure 19 Long Island Means of Disposal
(with 1992 projections)

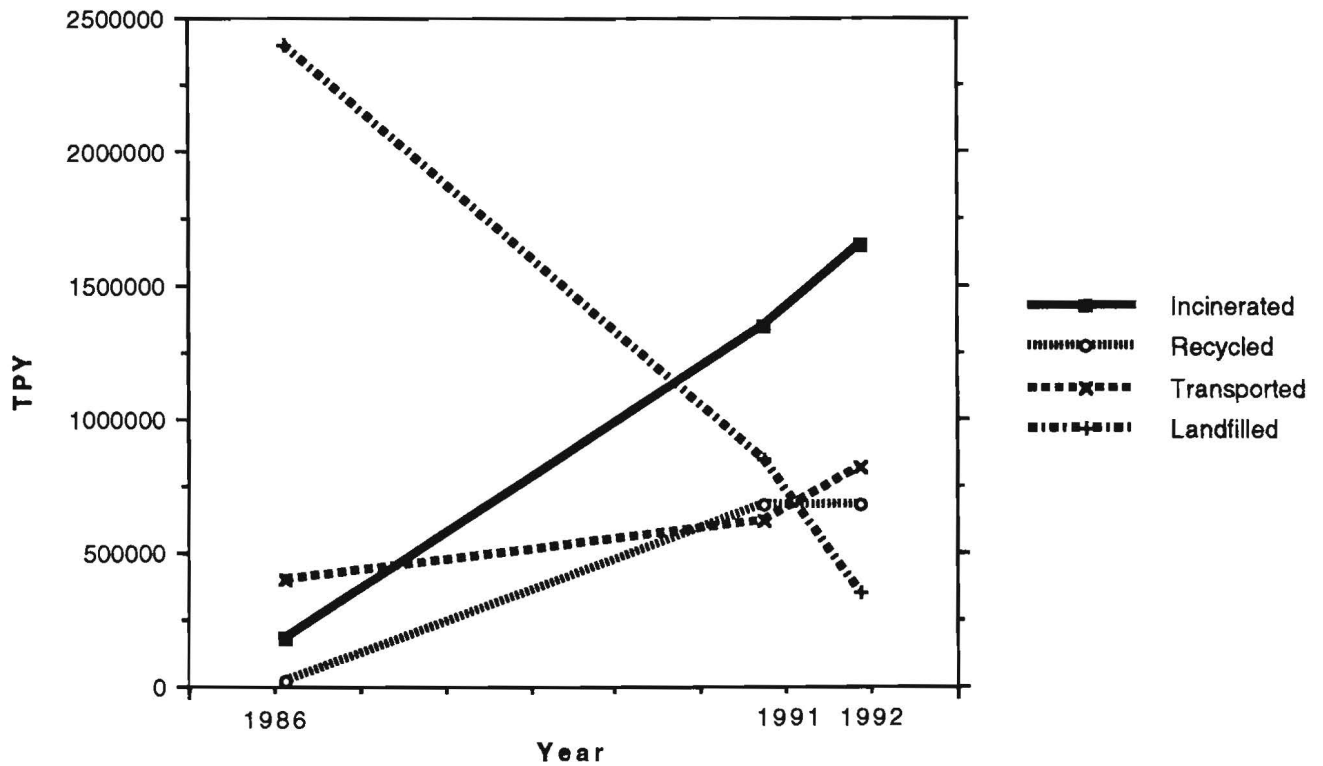


Table 36 (see Figure 19) clearly illustrates the radical changes in Long Island's waste disposal methods. The former reliance on cheap landfills has now changed to a predominant use of incineration, with a doubled need for off-Long Island disposal sites, a rapidly expanding recycling commitment, and an ever-shrinking use of landfills. Long Island's solid waste planners, although they are free from finding new sites for local landfills for raw garbage, now face the perhaps more formidable problems of finding markets for collected recyclables, battling inter-state garbage shipment bans, and finding acceptable, affordable disposal locations for incineration ash. Solid waste on Long Island has changed from the lower-profile issues involved in the immediate neighborhoods of disposal facilities (the so-called "NIMBY" issues) to being a major fiscal centerpiece in a cost and tax conscious environment. And the quality of life issues that have always pervaded the field of solid waste disposal have intensified in today's climate of ecological sensitivity, economic uncertainty, and scrutiny of risks associated with contaminants of air and groundwater.

V. CONCLUSIONS

This report has compiled descriptions of the amounts of municipal solid waste, and the means used to dispose of that waste, for the years 1986 and 1991. Several statistical tools were used to attempt to refine estimates of the size of the waste streams; however, simple mass balance treatments suggest that the current statistics may underestimate the size of Long Island's waste stream -- by as much as 10%. This is to be expected, as the measurements used are based on wastes handled at Long Island's municipal waste management facilities, and most often do not count commercial wastes which may be transported off Long Island for disposal. These measurements (with several exceptions) also do not account for private sector recycling activities.

It is readily apparent that Long Island has experienced a revolutionary change in the way it handles its solid waste. A near-total reliance on landfilling in 1986 has evolved into a multi-faceted combination of incineration, municipal recycling programs, off-Island disposal, and vestigial landfilling (despite the 1990 implementation of the Long Island Landfill Law).

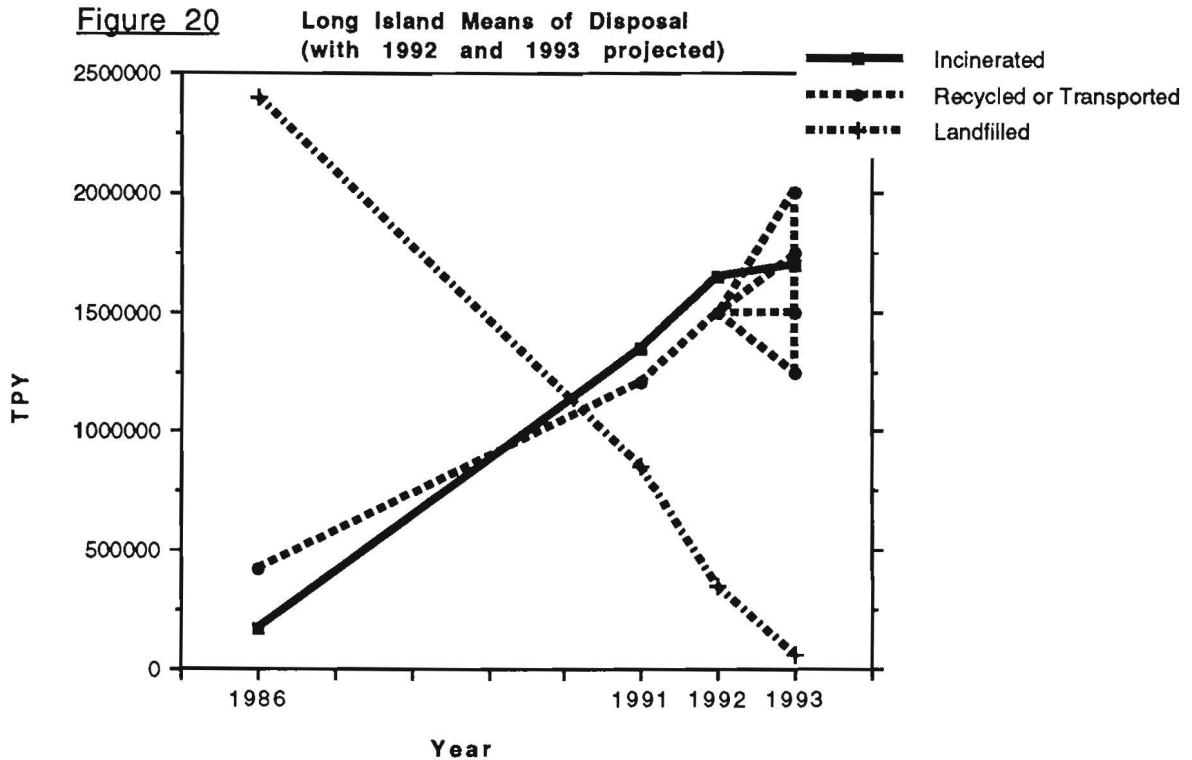
It also seems apparent that the future will bring further changes to Long Island's waste disposal means. In 1992 there have been major changes in the ways the Towns of Babylon, Brookhaven, Huntington, North Hempstead, and Smithtown handle their wastes, just as 1991 brought the introduction to Long Island of several

waste reduction steps (the "Don't Bag It" yard waste campaign initiated in Islip, and the "per-bag" method of waste-handling fees begun in the Town of Shelter Island). Next year (1993) the City of Glen Cove may resume incinerating its solid waste, Brookhaven, East Hampton, Riverhead, and Southampton may make major steps towards solid waste composting, and, if recent court decisions and NYSDEC rulings stand, all landfills save Southampton's may be closed to raw MSW. The projected amounts and methods of waste disposal for Long Island under such a scenario (minus the unknown amount of MSW composting to occur in the future) are given in Table 40. Four different waste generation rates are given to account for the uncertainty of the exact waste generation on Long Island mentioned above; the middle two seem to be most appropriate to consider.

Table 40
Long Island Means of Disposal 1993, projected (TPY)

<u>Total</u>	<u>Incinerated</u>	<u>Recycled or Transported</u>	<u>Landfilled</u>
3,000,000	1,700,000	1,250,000	60,000
3,250,000	1,700,000	1,500,000	60,000
3,500,000	1,700,000	1,750,000	60,000
3,750,000	1,700,000	2,000,000	60,000

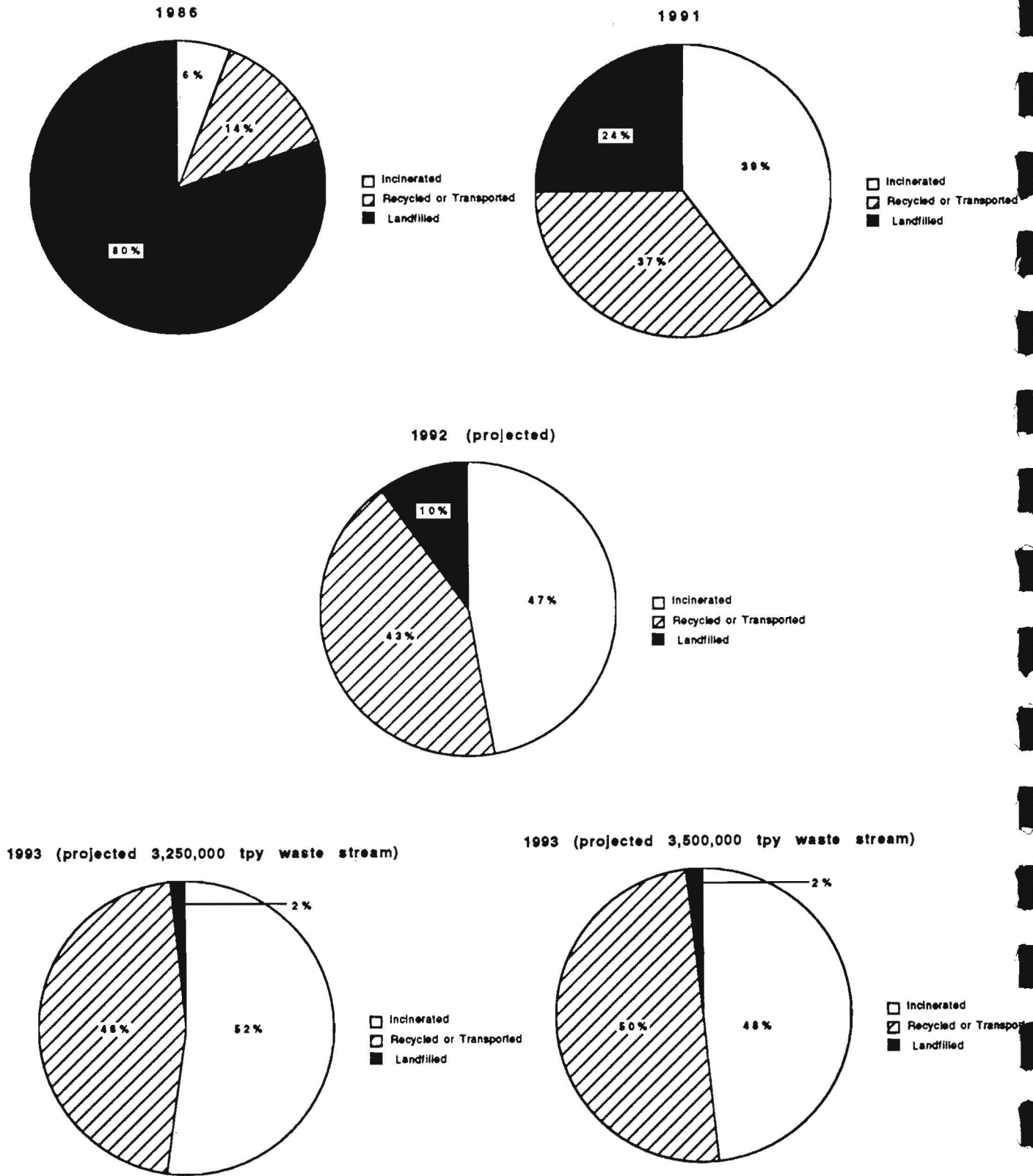
It is certainly true that the full extent of commercial recycling is not reflected in the data collected in this report. However, it is not likely that counting commercial recycling and expanding municipal recycling will be enough to eliminate Long Island's perceived need to continue to ship solid waste to disposal venues off the Island in the near future.



In the early part of 1992 it was known that nearly no commercial wastes generated west of the East End Towns were being disposed on Long Island -- an amount of wastes estimated to be at least 1.5 million tpy [6,12,13,26,34,43,56]. This was due to favorable disposal prices out-of-state, and increases in local tipping fees (and certainly some diversion of wastes through recycling by commercial operators). Those wastes have, at the time of this writing, begun to reappear at various municipal facilities. Long Island's solid waste planners should not assume that the solid waste generation rates seen in early 1992 are to hold constant in the future. Of the 1.25 million to 2 million tpy of MSW generated on Long Island which may not be able to be incinerated or landfilled in 1993, only 650,000 tpy are accounted for by recycling

Figure 21

Relative Proportions of Disposal Methods



(a 15% - 20% rate, well short of the 42% - 52% expected of the region by 1997 by NYSDEC planners). Although it appears that the next several years may begin to see the beginning of MSW composting as a disposal option for at least some of Long Island's wastes, that technology has a spotty record of success in this country to date, especially for large-scale facilities. It may not be prudent to depend upon experimental technology which requires at least several years for siting and construction to appear in the near future here on Long Island, and provide the necessary disposal capacity for the Island's solid waste. Waste reduction efforts, chiefly "Don't Bag It" programs, have achieved notice among solid waste planners; such programs only target yard waste at the moment, however, and yard wastes have the (admittedly fragile) Long Island-available disposal option of windrow composting. Creating capacity at the windrow compost sites already present on the Island will not free space for more recalcitrant portions of the MSW stream. Currently Long Island commercial carters and municipalities have access to cheap, alternate disposal sites for wastes which lack Long Island disposal options. Questions that must be seriously considered: will those sites remain available? And what is the potential for recycling, as presently undertaken on Long Island, to manage a portion of the wastes that cannot find such disposal venues?

There can be no doubt that much of the wastes disposed at municipal facilities can theoretically be recycled. The difficult questions associated with these wastes are: what will be the cost

and effort to remove these materials from their current collection flow, and who will separate them from the waste stream -- the municipalities, in efforts such as the Babylon CRRF, or the waste producer, through more intensive source separation campaigns? Will these materials find markets, and, if so, will taxpayers be willing to continue to subsidize still-struggling recycled- and secondary-materials markets? If the commercial carters' recycling efforts are accurately accounted for, will the sum total of these materials make a large difference in the mass balance of "recycled-transported" wastes? If commercial recycling efforts do turn out to be significant, can these wastes be counted on to be continued to be recycled, given the volatility of recycling markets, and the pure pragmatism which drives the carters' recycling?

Many Long Islanders appear caught between the environmental, NIMBY, and regulatory realities that have determined that continued landfilling and new incinerators are not appropriate on Long Island, and the wishful thought that bearing down a little harder on recycling and waste reduction will make the remainder of our MSW disappear. Although it is not clear exactly how much MSW would have to be swept up in such expanded efforts, 750,000 tpy to 1,000,000 tpy would appear to be a minimal estimate. Since those sums are greater than the amounts currently being recycled by Long Island municipalities, it appears that Long Island will continue to "depend on the kindness of strangers" for disposal of its MSW for the indefinite future.

Acknowledgements

The authors of this report would like to gratefully acknowledge the assistance and encouragement given by the many busy waste management professionals and their staffs here on Long Island, particularly those cited in the references that follow. In addition, Barbara Vallely, Anne West-Valle, and Frank Roethel of the Waste Management Institute provided invaluable assistance "behind the scenes" in the creation of this report. The sharp eyes and editing pen of Marci Bortman were indispensable. The graphics are the result of much needed assistance from Arnoldo Valle-Levinson and encouragement from Michael Steinberg. The support of Dr. Jerry Schubel of the Marine Science Research Center was also most necessary for this work.

Reviewers of this paper, whose expenditures of time and careful comments were invaluable, were: Dr. Jerry Schubel, Dr. Vincent Breslin, and Dr. Sheldon Reaven, MSRC, SUNY at Stony Brook; James Heil, PE, Commissioner of Waste Management, Town of Brookhaven, and Samuel Kearing, Esq., Commissioner of Environmental Control, Town of Huntington; and Robert Mitrey, PE, Solid Waste Engineer, Region I, New York State Department of Environmental Conservation.

References

1. Ain, Stewart. 1992. "Soaring Garbage Fees Plague Town Officials." New York Times, March 1. New York, NY. Section 12, pp.1,15.
2. Antonelli, Leonard. 1992. Recycling Co-ordinator, Town of Oyster Bay. Personal communications.
3. Bleyer, Bill. 1992. "Raking in Yard Waste, Critics." Newsday, March 8. Melville, NY. Huntington Special, pp.1, 6.
4. Bullock, Tony. 1991, 1992. Supervisor, Town of East Hampton. Personal communications.
5. Bunchuck, Jim. 1992. Supervisor, Department of Public Works, Town of Southold. Personal communications.
6. Burgner, Rand. 1991, 1992. Executive Director, Solid Waste Management Authority, Town of North Hempstead. Personal communications.
7. Bush, Fredrick. 1991. "Taking out the Trash," chart. Newsday, October 21. Melville, NY. p.25.
8. Cameron Engineering, P.C. 1991. Final Environmental Impact Statement, East End Intensive Recycling/Composting Facility. Prepared for Omni Technical Services. Smithtown, NY.
9. Cameron Engineering, P.C. 1990. Draft Environmental Impact Statement, East End Intensive Recycling/Composting Facility. Prepared for Omni Technical Services. Smithtown, NY.
10. Carpenter, Diane. 1992. Town Clerk's Office, Town of Southampton. Personal Communication.
11. Daly, Peter. 1991. Recycling Co-ordinator, Town of Islip. Oral presentation before the Town of Islip Recycling Advisory Board.
12. D'Ambrosio, Lou. 1992. Superintendent, Department of Public Works, City of Glen Cove. Personal communications.
13. Del Col, Patricia. 1991, 1992. Director, Resource Recovery Authority, Town of Huntington. Personal communications.
14. Donaldson, Lufkin & Jenrette, Securities Corporation. 1991. "Feasibility Report of Gershman, Brickner & Bratton" in Limited Offering Memorandum for the Town of Babylon Industrial Development Agency (New York), Recycling Facility Revenue Bonds (Babylon Recycling Center, Inc. Project) Series 1991. New York, NY.
15. Eisenberg, Carol. 1991. "Town Landfill Ordered Shut." Newsday, January 10. Melville, NY. pp.6, 29.

16. Fabrizio, Joe. 1991. Environmental Planner, City of Long Beach. Personal communication.
17. Fagin, Dan. 1991. "Fertile Idea for Garbage." Newsday, November 21. Melville, NY. pp.51-52.
18. Fan, Maureen, and Gallagher, Mike. 1992. "Towns Agree on 'Trash for Cash'." Newsday, February 28. Melville, NY. p.28.
19. Gablanz, Monique. 1991. Deputy Supervisor, Town of Riverhead. Personal communication.
20. Gallagher, Elizabeth. 1992. Commissioner, Department of Environmental Conservation, Town of Islip. Personal communication.
21. Gallagher, Tim. 1991, 1992. Personal Assistant to the Supervisor, Town of East Hampton. Personal communications.
22. Gilbride, Brian. 1992. Sanitation Supervisor, Town of Southampton. Personal communication.
23. Gold, Peter. 1992. Office of the Director of Solid Waste, New York State Department of Environmental Conservation, Region I, Stony Brook. Personal communication.
24. Harris, Scott. 1992. Supervisor, Town of Southold. Personal communication.
25. Hartnett, James. 1989. Director, Solid Waste Management, Town of Huntington. Personal communication.
26. Heil, James. 1991, 1992. Commissioner, Department of Waste Management, Town of Brookhaven. Personal communications.
27. Hoel, Paul. 1962. "Introduction to Mathematical Statistics." John Wiley & Sons, New York, NY. 428 pp.
28. Huff, William J. 1991. Vice-President, Gershman, Brickner & Bratton, Inc. Falls Church, VA. Personal communication.
29. Long Island Lighting Company. 1991. "Population Survey, 1991." Hicksville, NY. 38 pp.
30. Long Island Regional Planning Board. 1987. "Data Summary and Projections, Task 1.1, Long Island Ash Inventory." 25 pp. plus appendices. From Long Island Ash Management Study, prepared for the Long Island Regional Planning Board, Hauppauge, NY, and the New York State Energy Research and Development Authority, Albany, NY.
31. Mangan, Bob. 1991. Director of Public Works, City of Glen Cove. Personal communication.
32. McBride, Tim. 1991. Recycling Co-ordinator, Town of North Hempstead. Personal communications.

33. McDonald, John. 1992. "Town Drops Garbage Firm Limit." Newsday, January 16. Melville, NY. p.23.
34. McGrane, William. 1991, 1992. Commissioner, Department of Sanitation, Town of Hempstead. Personal communications.
35. McNulty-Gallo, Audrey. 1991, 1992. Personal Assistant to the Director, Resource Recovery Authority, Town of Huntington. Personal communications.
36. Melitto, Tom. 1991. Deputy Supervisor, Town of Babylon. Personal communication.
37. New York State Department of Environmental Conservation. 1990. "Proposed Solid Waste Management Strategy for Long Island: A Technical Assistance Planning Document." Appendix B in: Town of Brookhaven, New York, Solid Waste Management Plan: Draft 1991 Update, Supplemental Generic Environmental Impact Statement. 1991. Medford, NY.
38. Newsday. 1987. "Across Long Island," chart in "The Rush to Burn," special reprint. Originally printed December 22. Melville, NY. pp.46-47.
39. O'Neill, Maureen. 1992. "In Search of Cash for Trash." Newsday, March 22. Melville, NY. Huntington Special, pp.1, 6.
40. O'Neill, Maureen. 1992. "Four Towns in Trash, Ash Swap." Newsday, March 4. Melville, NY. p.29.
41. Office of Technology Assessment. 1989. "Facing America's Trash: What Next For Municipal Solid Waste?" National Technical Information Service, United States Department of Commerce, Washington, DC. 377 pp.
42. Paoelli, Dave. 1991. Superintendent of Sanitation, Town of East Hampton. Personal communication.
43. Raab, Robert. 1991, 1992. Commissioner of Public Works, City of Long Beach. Personal communications.
44. Reaven, Sheldon, and Tonjes, David. unpublished manuscript, "Report to the USEPA on the Town of Islip Restaurant Waste Reduction and Recycling Project."
45. Reeves, Sandy. 1992. Supervisor's Office, Town of Riverhead. Personal communication.
46. Reichart, Robert. 1992. Assistant Commissioner, Department of Waste Management, Town of Brookhaven. Personal communications.
47. Romalewski, Steven A. 1991. "A Legacy of Waste: Solid Waste Generation and Disposal on Long Island." Toxics Project, New York Public Interest Research Group. New York, NY. 42 pp.

48. Senatore, Peter. 1991, 1992. Program Director, Gershman, Brickner & Bratton, Inc. North Babylon, NY. Personal communications.
49. Sherman, Huson. 1992. Supervisor, Town of Shelter Island. Personal communication.
50. Simes, Jeffrey. 1991. Supervisor, Town of Shelter Island. Personal communication.
51. Smith, Don. 1992. "Landfill Trial Delayed." Newsday, March 18. Melville, NY. p.28.
52. Soito, Patty. 1991. Personal Assistant to the Supervisor, Town of Southold. Personal communication.
53. Springer, Fran. 1991. Town Bookkeeper, Town of Shelter Island. Personal communications.
54. Suffolk Life Newspapers. 1991. "Garbage Bid Granted," in "County Briefs." December 4. Riverhead, NY. p.2.
55. Swenson, Eric. 1991. unpublished manuscript, "A History of Solid Waste Management in the Town of Oyster Bay, New York."
56. Trent, John. 1991, 1992. Assistant Civil Engineer, Town of Smithtown. Personal communications.
57. Trunzo, Caesar, and DiNapoli, Thomas. 1986. Progress Report of the New York State Legislative Commission on Water Resource Needs of Long Island, 1985.
58. Trunzo, Caesar, and DiNapoli, Thomas. 1988. Progress Report of the New York State Legislative Commission on Water Resource Needs of Long Island, 1987.
59. Trunzo, Caesar, and DiNapoli, Thomas. 1992. Progress Report of the New York State Legislative Commission on Water Resource Needs of Long Island, 1991.
60. Vincent, Stuart. 1992. "For Sale: Glen Cove Incinerator." Newsday, January 28. Melville, NY. pp.19-20.
61. Vincent, Stuart. 1991. "EPA Cites Glen Cove's Incinerator." Newsday, October 17. Melville, NY. pp.25-26.
62. Wick, Steve. 1990. "East End Suing Over Landfills." Newsday, December 21. Melville, NY. p22.
63. Wolke, Andrew. 1991. Sanitation Supervisor, Town of Smithtown. Personal communication.

Appendix Population Data used in this report

<u>Town</u>	<u>1986</u>	<u>1991</u>
Glen Cove	25,429	24,125
Hempstead	728,274	725,402
Long Beach	34,167	33,636
North Hempstead	217,261	211,659
Oyster Bay	304,310	292,204
Nassau County	1,309,441	1,287,026
Babylon	207,514	202,619
Brookhaven	394,610	410,066
East Hampton	15,511	16,197
Huntington	202,883	191,016
Islip	302,416	299,903
Riverhead	21,760	23,109
Shelter Island	2,368	2,261
Smithtown	118,103	112,977
Southampton	47,642	45,415
Southold	20,545	19,831
Suffolk County	1,333,352	1,323,394
Long Island	2,642,793	2,610,420

Sources: LILCO Long Island Population Survey, 1986* [30], 1991 [29]

* 1986 survey was quoted in the Long Island Ash Management Study, 1987, prepared by the Long Island Regional Planning Board



3 1794 02299071 8

DUE DATE

