Operations Planning
Evaluation and Control

NYC Department of Sanitation

NEW YORK CITY WASTE COMPOSITION STUDY (1989-90)

EXECUTIVE SUMMARY

Help Reduce
New York's Waste.
Please Recycle.

New York City
Waste Composition Study
(1989-1990)

Executive Summary

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ACKNOWLEDGEMENTS

This report, New York City Waste Composition Study (1989-90), was developed under New York City Department of Sanitation Contract No. 89-07653 with SCS Engineers. Alex Prutkovsky, Deputy Director, Operations Planning, Evaluation and Control (OPEC), provided the overall direction. W. Gregory Vogt of SCS Engineers was the Project Manager. The major contributors to the study were staff members at the Operations Management Division of OPEC under the guidance of Mr. Prutkovsky, and solid waste staff at SCS Engineers in Reston, Virginia. Subconsultant services were provided by Konheim & Ketcham of Brooklyn, New York.

Pre-paid orders are accepted for the entire set of 10 volumes of the study, or for individual volumes. An Executive Summary highlighting the major findings of the study is also available. For information, call (212) 788-3802, or write to the Office of the Assistant Commissioner, Department of Sanitation, Room 715, 125 Worth Street, New York, New York 10013.

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INTRODUCTION

The solid waste management alternatives available today are more complex than the traditional landfilling of waste, requiring a more in-depth knowledge of two important waste stream characteristics -- quantity and composition. Assessment of the waste stream is necessary to provide the basic information to evaluate the existing solid waste management systems and to make effective decisions specific to implementation of future waste management programs. This study reflects the efforts of the Department of Sanitation (DOS) to accurately define the waste stream generated in New York City.

The project was initiated in response to Local Law 19 requiring the City to achieve a mandatory recycling goal of at least 25 percent of the waste stream. The field data collected will be used by DOS to implement recycling feasibility studies, pilot-scale and demonstration scale projects, and full-scale facilities. In addition, the study's results will be used to develop marketing programs and future waste management strategies. Examples of future follow-on efforts include:

- Evaluation of existing collection systems.
- Design of source reduction programs.
- Development of educational programs.
- Evaluation of waste-to-energy or resource recovery programs.
- Identification and removal of small quantity toxics in the waste stream.

Because it is important to understand "who" is generating "how much" of "what type" of waste, DOS designed a study to assess separately the waste generated by three distinct sources: residences, institutions, and commercial establishments. As a result, over 750,000 pounds of refuse were sampled from:

- 23 residential communities across four boroughs.
- 40 private and municipal institutions.
- Over 200 private businesses.

Because waste generation and composition is influenced by seasonal changes, the study was designed to evaluate seasonality by sampling wastes generated during different times of the year.

This Executive Summary is intended to provide an overview of the methodology developed for the waste composition study; present a brief description of New York City waste generation and composition; summarize the results obtained for the residential, institutional, and commercial waste streams; present a synopsis of waste composition and generation projections for the years 1995 and 2000; and briefly discuss the solid waste management policy implications presented by the study results. All of the information obtained from the study is presented as a 10-volume series:

- Volume 1 - Final Report: Presents a general overview of the study methodology, results obtained, and implications for waste management planning.

- Volume 2 - Residential Sector: Provides the results of the residential waste composition study by season including composition, bulk items, and generation rates.

- Volume 3 - Institutional Sector: Presents the seasonal results of the insitutional waste composition study.

- Volume 4 - Commercial Sector: Presents estimated composition and generation rates for commercial waste based on the results of the 1-season study.

- Volume 5 - Chemical Analysis: Provides a discussion of the chemical characteristics of the New York City waste stream as determined by a laboratory analysis of waste stream samples.

- Volume 6 - Compaction Testing: Presents the results of the compaction testing program designed to measure changes in residential and institutitional refuse density.

- Volume 7 - Residential Sector Raw Data: Provides data gathered during the residential waste composition study field activities

- Volume 8 - Institutional Sector Raw Data: Presents data gathered during field activities undertaken during the instutional waste composition study.

- Volume 9 - Commercial Sector Raw Data: Includes data gathered as part of the commercial waste composition study.

- Volume 10 - Chemical Analysis Raw Data: Provides data developed during the chemical analysis of residential and institutional refuse samples.

OVERVIEW OF THE SOLID WASTE MANAGEMENT SYSTEM

The design of the waste composition study generally was developed around key aspects of the existing solid waste management system for the City. This system includes the generation, collection, and disposal of various waste types by both the public and private sectors. An understanding of the existing waste system was necessary so as to design a sampling program representative of the total waste stream. The principle sources of solid waste and the key programs in place to manage this waste stream are described below.

Generation and Collection

Exhibit 1 presents a breakdown by proportion of the major generators of MSW in the City, based on historical disposal records maintained by DOS. As indicated, the three major generators of municipal solid waste in the City are commercial, residential, and institutional activities. In addition, Exhibit 1 indicates a breakdown by percent of those who perform collection services for the waste generated. In general, collection services are provided by DOS, private carters, and by generators themselves. Department records indicate that approximately 30,000 tons of municipal solid waste were generated per day in 1990.

Collection of solid waste by either the public or private sector is usually a function of the waste type generated. For example, waste generated from households is considered residential. Virtually all residences within the five City boroughs receive collection service from DOS.

Solid waste originating from public agencies, non-profit organizations, and selected public service entities is considered institutional. The collection system for institutional establishments is provided by both DOS and the generators themselves. For the majority of the institutions (e.g., schools, hospitals, City government), collection and disposal services are provided by DOS. The remaining establishments (generators) which do not receive DOS collection (e.g., Transit Authority) contract for collection services through a private carter. For these instances, the private carter is entitled to dispose of the institutional waste it collects free-of-charge at DOS facilities. Exhibit 1 indicates that approximately 1,000 tons (3 percent of 30,000 tpd) of free disposal wastes are collected daily.

Solid waste generated from business, trade, or other commercial establishments is considered commercial. The collection system for commercial establishments is serviced almost exclusively by private carters

As shown in Exhibit 1, based on historical disposal records, quantities of residential and commercial waste generated City-wide are similar (41 to 47 percent), with institutional wastes making up the remaining 12 percent. For collection services, private carters collect slightly more than half of the City's total waste stream, through collection of the commercial waste sector and the collection/free disposal service to selected institutions.

DOS Collection Programs

Exhibit 2 presents a breakdown of major DOS refuse collection programs by collection quantities, based on 1990 historical disposal records maintained by DOS. These collection programs are regular/curbside, bulk, and containerized. Exhibit 2 also provides a summary of the number of collection vehicles used per day under each collection program.

Regular or curbside collection operations are those which require the individual generators (e.g., households) to put refuse for collection out onto the sidewalk on specified collection days. Refuse then is collected using a rear-loading compacter vehicle and DOS crews. Most (81 percent) of the City's collection fleet is equipped to service this type of collection program

Larger waste items found in the waste stream, such as unwanted furniture or household appliances, are collected by DOS separately as bulk waste. Bulk items constitute about 10 percent of waste quantities collected by DOS. Bulk waste is made up lot cleaning, bulk items left on the curbside with other refuse, and "self-help" drop-off sites. Bulk waste is difficult to collect efficiently; it requires more collection vehicles than regular/curbside programs on a per-ton of waste basis.

Due to the large quantities of wastes generated from high-density housing (e.g., apartment complexes) and larger institutions (e.g., municipal hospitals), DOS provides collection service at these points through the use of large waste containers. This containerized service uses front-end loading E-Z Pak collection vehicles (roll-on/off hoist-fitted chassis vehicles), operated by a one or two man crew. This type of operation collects about 10 percent of the total waste collected by DOS. As shown in

Exhibit 2, DOS containerized collection represents about six percent of the daily collection vehicle fleet.

DOS Recyclables Collection Programs

Exhibit 3 presents a breakdown of the major DOS recycling collection programs by quantities collected, based on 1990 disposal records maintained by DOS. Exhibit 3 also provides a summary of the number of collection vehicles used per day under the specific recycling programs.

Generally, the four recycling collection programs are curbside, lot cleaning, containerized, and organic wastes. A total of 703 tons per day were generated from these programs in 1991, collected by approximately 182 DOS vehicles.

DOS Street Cleaning Operations

An additional source of MSW generated in the City and collected by DOS is street cleaning waste. Three DOS programs for collection of street cleaning wastes are:

- MLP/Dump Outs: includes all quantities collected by the Motorized Litter Patrol plus the street cleaning dump-outs at specific locations.
- Basket Routes: includes street-side containers of loose refuse.
- Mechanical Brooms: includes street cleaning quantities not left at dump-outs.

Exhibit 4 presents the estimated quantities of street cleaning wastes collected per day, as well as the number of workshifts (8-hour day) used by DOS to provide this service. As shown, approximately 800 tons of street cleaning wastes are collected on a daily basis.

MSW Disposal/Processing

Exhibit 5 presents a graphical comparison of major MSW disposal and processing operations performed by DOS and by private carters. For the 15,700 tons per day of DOS wastes, disposal/processing options include landfilling, incineration, and recycling. Over 90 percent of these DOS-collected wastes are landfilled, while only four percent are recycled

For the waste quantities collected by private carters, an estimated 24 percent is either recycled or processed at local facilities; the remainder is exported outside of the City for ultimate disposal (landfilling or incineration).

PROGRAM DESIGN

Because of the variation in waste generated by residences, commercial establishments, and institutions, the objective of the overall program design was to perform field sampling of each major waste stream. A further objective was to perform field sampling for specific key generators within each targeted waste stream so as to gain defendable data that could be used to represent the total waste stream generated in New York City in 1989-1990, as well as to make useful projections of the character of the City's waste stream in future years. To this end, the program design relied on stratified random sampling for specific generators within the residential, institutional, and commercial sectors.

Because of the number of residences, institutions, and commercial establishments that exist within the city, it was not practical to collect, weigh, and sort waste from every source. Waste generators were selected, therefore, that were considered representative of significant portions of each waste stream. The following provides a general discussion of the methodology used to identify and select representative strata and generators for each of the waste streams.

Residential Wastes

The residential waste composition study methodology was based on the assumption that waste generation patterns are influenced by population variations. The two demographic factors evaluated in this study were median household income and population density. Nine residential sampling strata were developed based on income and population density (high, medium, or low). The information used to develop the sampling strata was obtained from 1980 Census data.

Initial selection of residential areas for sampling was made at the Census tract level as an appropriate means to describe past, present, and future demographic profiles. Census tracts were excluded from consideration based on the following general criteria:

- Income and/or population density within the tract fell within the top or bottom 5 percent of the population as a whole;
- Recycling programs were already established and in-place within the tract; and,
- The Census tract was located close to or adjacent to the boundary of the next borough or Sanitation District.

Institutional Wastes

In general, the institution categories were selected based on their size and the respective quantities of waste generated from each category. In all, 14 categories were developed for the study, some of which were not sampled each season. In addition to estimated quantities of waste generated, specific facilities were selected for the study based on the following:

- Method of waste collection (serviceable by DOS containerized service);

- Representativeness of general category based on relevant activities and characteristics;
- Lack of any ongoing or planned recycling program during the course of the study;
- Geographic location to enable efficient route development;
- Size of facility.

Commercial Wastes

The first step in the selection process was to identify general categories of commercial establishments. This was accomplished through the use of Standard Industrial Classification (SIC) Codes. In general, the 2-digit SIC Code was used to target general commercial classifications most representative of New York City. Further review of apparent key commercial sub-sectors was performed. Based on economic indicators (employees and payroll), eight sub-sectors were targeted for intensive sampling during one seasonal event. In general, the sub-sectors considered in this study account for about 80 percent of the entire commercial activity in the City, and thus, the majority of the City's commercial waste stream.

Bulk Item Survey

Collection routes were designed to include targeted neighborhoods or institutions, according to strata or institutional category. DOS collection vehicles then collected refuse from each individual group, providing the study with designated refuse samples from each residential strata, institutional category, or commercial sub-sector.

Prior to obtaining refuse samples for component characterization, residential and institutional sample loads (the entire wasteload within the refuse vehicle) were screened to remove items too large to fit in a standard 30-gallon trash can. These items were weighed and classified separately as part of the bulk item survey. Bulk items are collected curbside in these manners: generally mixed with curbside refuse, and separate placement on the curb for special pick-up service. Data from both collection programs were compiled for waste stream projection purposes.

Waste Composition Sort Protocol

Once refuse samples were obtained from representative residences, institutions, and commercial establishments, the refuse was sorted according to prescribed procedures and in a methodical manner. During the course of the study, more than 1,300 residential refuse samples and 1,200 institutional refuse samples were sorted into 45 separate categories. A total of 277 commercial refuse samples were sorted into 17 categories.

Waste Generation Study

In conjunction with refuse sampling and sorting activities, waste generation rates were calculated for the residential and commercial sectors based on a refuse weighing program. "Activity units," or socio-economic indicators, were developed for each sector to define waste generation.

Seasonality Factors

Waste generation and composition are known to change during the course of the year. For instance, residents in low density areas will tend their yard more during the growing season, resulting in higher generation rates (more waste tonnage per household from lawn clippings), and a significant change in composition (more organic material in the waste stream from the added yard wastes). Waste sampling was performed over four separate seasons to capture seasonal differences. In this manner, waste composition and generation data were collected for each waste type, for each sub-sector of each waste type, and for each season (except for the commercial sector which was sampled for one season only).

Changes in waste stream characteristics due to seasonality occur on a weekly and monthly basis. For residential and institutional generators, seasonality changes for months in between sampling events were calculated using interpolation techniques for each waste component measured. These models were then normalized to reconcile projected changes with historical records of generation for the residential population (e.g., old landfill records). Commercial waste estimates were made based on one round of sampling. Historical records of transfer station operations were used to define changes in generation by season, and waste composition was assumed to remain unchanged over the course of the year.

Laboratory Sampling Protocol

Concurrent with the sampling efforts described above, a field sampling and laboratory analysis program was conducted to estimate the physical and chemical properties of solid wastes generated within the City. For the purpose of laboratory analysis, the waste stream was divided into 13 major components such as paper, plastic organics, glass, and so on. Each component was sampled separately from the residential and institutional waste streams. After analysis, data on chemical properties for each component were compiled according to observed composition so as to provide accurate estimates of the chemical and physical properties for each targeted waste type.

Compaction Ratio Test Method

Sampled refuse was subjected to compaction testing during each of the four seasonal field events to measure changes in refuse density due to the removal of certain components present in the waste stream. Residential and institutional refuse quantities were tested separately to estimate how the removal of cardboard, newspaper, and other recyclable materials would affect the density of the collected and disposed waste. Stockpiled raw waste from each sector, or separated recyclables from the same, were loaded into a modified refuse collection vehicle and separate measurements were obtained for loose and compacted refuse densities using a prescribed procedure. A graphic summary of the program testing approach is presented in Exhibit 6.

WASTE GENERATION

Discussion

As described in the program design, waste generation was measured during four seasonal sampling events. Generation was measured as a function of time, weight, and population units (e.g., pounds per housing unit per week for residential generators). Four overall generation rates were observed and were used to define a generation curve by month, covering January through December 1990. Total tonnages were projected from the curve-fitted values.

Generation was then estimated by month and these tonnage totals were aggregated into four seasons for seasonal generation rates. Generation curves were developed separately for the Residential and Institutional sectors; these curves were used to estimate City-wide waste generation.

Residential

For each sampling strata, a known number of households (units) wwas collected by dedicated DOS vehicles and the refuse weighed to estimate a generation rate for each stratum. This sampling was performed each season, resulting in four generation rates, in pounds per unit per week. Exhibit 7 presents these generation rates by strata for each of the four seasons.

To estimate a City-wide generation rate, the residential population of New York City was divided between the nine strata by household, with each household being assigned to a strata based on income data from the Census and housing density as measured by DOS. The total number of housing units occupying each strata was then multiplied by the estimated monthly rates developed from Exhibit 7 to project the total residential MSW tonnage generated by the City's residential population during the study year. results of these projections are summarized in Exhibit 8.

Institutional

For each institutional category, targeted establishments were collected by dedicated DOS vehicles (for the category of Transportation Hubs, a private carter was used). Estimates of generation rates were attempted using factors such as enrollment (schools), number of patients (hospitals), number of inmates (correctional facilities), etc. However, reliable information on these activity units for each category was not readily available, particularly on a City-wide basis. A common activity unit, employment, was eventually used to derive estimated generation rates.

Collected refuse from each institution was weighed to determine a generation rate for each category. This sampling was performed each season, resulting in four observed generation rates, in pounds per employee per week. Exhibit 9 presents these generation rates by institutional category for each of the four seasons.

In order to make City-wide projections for the institution sector, certain employment groups not sampled under the program design were assigned to the institutional sector by virtue of their stated mission. Examples of generators that were included in the institutional projections for generation rates included:

- Communications and utility companies;
- Doctor's offices and outpatient clinics;
- Libraries, museums, zoos and other such public service organizations; and

- Municipal and public service agencies (Federal, State, and local such as military agencies, housing authorities, law enforcement agencies, etc.

Because of these additions and the availability of employment data by certain sub-sectors, the institutional sector was redefined for purposes of projecting current and future generation rates. Consequently, each known institutional type in the City was categorized as one of the below sub-sectors as follows:

Institutional Sub-Sector	Includes:
T.C.P.U.	Transportation Hubs Communications Utilities (except DOS)
Selected Health Services	Health-related Offices Nursing Homes Hospitals Outpatient Clinics
Selected Educational Services	Schools Colleges Libraries
Social Services	Social Services
Other Selected Services	Museums Zoos Botanical Gardens
Organizations	Labor Unions Ethnic Organizations Special Interest Groups Other Membership Organizations

Selected Public Sector	Federal Government
	State Government
	Corrections
	Police, Fire, Sanitation
	City Government
	Other Local

Field data from the Study were supplemented with additional data from a DOS-OPEC field survey of City institutions. This survey considered differences in generation between large and small institutions. To determine a City-wide generation rate, the total number of employees engaged by each institutional activity was then multiplied by the measured (or in some cases, estimated) generation rates to project the total institutional MSW tonnage generated by the City. The results of these projections are summarized in Exhibit 10.

Commercial

Targeted commercial establishments were collected by dedicated vehicles as part of the program design, either by private carters vehicles, or by DOS vehicles. Similar to projections made for institutional types, employment by commercial sub-sector was used to make estimates for generation rates.

Collected refuse from each business was weighed and these data aggregated to estimate a generation rate for each sub-sector. This sampling was performed once, resulting in a generation rate, in pounds per employee per week for each sub-sector. Historical tonnage records were then used to develop an estimate of change in generation for the commercial sector during the course of the year. Using these factors, generation rates for each season were modelled using summary data provided by DOS. Exhibit 11 presents these estimated seasonal generation tonnages by sub-sector for each of the four seasons.

Because of the limited size and duration of the commercial field sampling program, some significant segments of the commercial waste stream were not sampled directly. Estimates had to be made for these segments (or sub-sectors) so as to make projections for the entire commercial waste stream. As indicated in Exhibit 11, approximately 21 percent of the applicable waste stream was not sampled directly under the study. The use of available employment data for the unsampled sub-sectors allowed the complete projections presented in Exhibit 12.

Combined Waste Stream Tonnage Estimate

The estimates obtained for the residential, institutional, and commercial sectors were combined to provide an overview of City-wide waste generation. A graphical summary of the combined waste stream tonnage estimate is provided in Exhibit 13.

As shown, approximately 8,500,000 tons of waste are generated annually in New York City. The commercial sector is the largest generator, accounting for 45 percent of the waste stream (approximately 3.9 million tons per year). The residential sector is the second largest generator with 41 percent of the waste stream (approximately 3.6 million tons). The institutional sector generates approximately 1.2 million tons, representing 14 percent of the combined City waste stream.

CITY-WIDE WASTE COMPOSITION

Discussion

Observed field values for waste component composition by season were used to define a composition curve by month for the study period. Using generation rates developed concurrently, the total weight of each component was estimated and expressed as a percent of the total waste stream. Seasonal composition modelling was performed for the residential and institutional sectors by strata and institutional type; these compositions were used to determine a City-wide composition by sector, as described below.

Residential

For each demographic grouping (or sampling strata), a waste composition was developed from the statistical summary of collected samples from each strata. This sampling was performed each season, resulting in four individual compositions. Exhibit 14 presents these compositions by strata for each of the four seasons.

Composition by Borough--

To estimate the waste composition by borough, the residential population of each borough was divided between the nine strata, with households from each DOS collection district being assigned to a strata based on income data from the census and housing density as designated by DOS. Initial efforts to distribute the residential population between the boroughs by simple population density (the unit used in sample design) proved to be too general and not descriptive. To calculate a borough-wide composition, the residential population was reassigned at the DOS household level, using the following criteria:

Designation	Income Criteria	Density Criteria
High	Less than $11,690	74 percent of housing with 4 stories or more.
Low	$11,690 to $16,199	74 percent of housing with 1 to 2-family units.
Medium	Greater than $16,199	All others.

Historical records of population per housing unit were compiled to give an average number of people per housing unit and population estimates for each district converted to an estimated number of housing units.

Using the seasonal generation rates developed previously, the total number of housing units occupying each strata were multiplied by the applicable seasonal composition to project the total tonnage of each waste component generated by each borough's residential population. These tonnages, expressed as a percentage of the borough's total residential waste stream, constitute the estimated residential waste composition borough-wide. The results of these projections are summarized in Exhibit 15 and present residential composition in percentages, by season and aggregated to a single annual value. Tonnage estimates using this method included bulk waste generation from residential sources.

Composition City-wide--

To estimate a City-wide composition, the residential waste quantities estimated for each borough were combined. These tonnages, expressed as a percentage of the City residential waste stream, represent the estimated residential MSW composition City-wide. The results of these projections are summarized in Exhibit 16.

Institutional

For each institutional category, a waste composition was developed from the statistical summary of collected samples from each institution. This sampling was performed each season, resulting in four individual compositions. Exhibit 17 presents these compositions by institutional category for each of the four seasons.

Composition by Borough--

Based on the total number of establishments in each borough and the estimated tonnage generated by each institution type, an overall composition by borough was calculated. These composition results are presented in Exhibit 18.

Composition City-Wide--

To determine a City-wide composition, the estimated institutional waste tonnage and composition for each borough were combined to project the total tonnage of each waste component generated by the City's institutional population. These tonnages, expressed as a percentage of the total institutional waste stream, represent the institutional waste composition City-wide. The results of this projection are summarized in Exhibit 18.

Commercial

For each commercial sub-sector, a waste composition was developed from the statistical summary of collected samples from each business. Exhibit 19 presents these compositions.

Composition by Borough--

To determine a waste composition for each borough, the commercial population of each borough was divided between a number of commercial sub-sectors, some sampled and others unsampled. Literature data was used to provide generation rates for those subsectors excluded from the sample. Composition for the unsampled sectors was assumed to be the same as the aggregated commercial waste stream as a whole.

The total number of employees engaged by each sub-sector was then multiplied by the measured composition shown in Exhibit 19 to project the total tonnage of each waste component generated by the individual borough's commercial population.

These compositions were adjusted to account for the presence of bulk items in the Commercial waste stream. While bulk items were not sampled in the field for this sector, it was assumed that the majority of bulk items would be construction and demolition materials. Estimated tonnages for construction and demolition wastes for each borough were developed and included in the overall composition. Adjusted tonnages, expressed as a percentage of the total commercial waste stream, represent the estimated commercial waste composition for each borough. The results of these projections are summarized in Exhibit 20.

Composition City-wide--

To estimate a City-wide composition, borough-wide composition and tonnages were combined to project the total tonnage of each waste component generated by the City's commercial population. These tonnages, expressed as a percentage of the total commercial waste stream, represent the commercial waste composition City-wide. The results of these projections are summarized in Exhibit 20.

Combined Waste Stream Composition

The results obtained for the residential, institutional, and commercial surveys were combined to provide an overview of City-wide waste composition. A summary of the combined waste stream composition is provided in Exhibit 21.

As shown in Exhibit 21:

- The paper fraction is the largest portion of the City-wide aggregate waste stream at about 42 percent. Mixed paper is the largest single paper component at 16 percent.

- The commercial sector accounts for the greatest quantities of paper generated, estimated at approximately 1.9 million tons annually.

- Organics, at 29 percent, represent the second largest fraction of the City's waste stream. Food waste is the largest single organic component, accounting for 12 percent of the waste stream.

- Plastics are the third largest fraction in the waste stream, representing 7.5 percent of the total waste stream. Films and bags represent the single largest component of the plastic fraction at 4 percent.

- The total metal fraction represents 3.6 percent of the waste stream, followed by glass at 3.4 percent.

- Yard waste accounts for 2.3 percent of the total waste stream. Over 150,000 tons of yard waste are generated by the residential sector annually.

WASTE STREAM PROJECTIONS

One goal in defining waste generation and composition by several succinct sub-sets of the City's population was to facilitate the reliable projection of waste stream characteristics for the New York City of the future; projections for the City's waste stream were made through to the year 2000. To test the reliability of these projections, the same algorithms and statistical methodologies used to forecast waste stream characteristics were applied to historical data, to test model conclusions against actual recorded values for the waste shed maintained by DOS.

Residential and Non-residential Designations

Although much data exist on demographics in the City, the distinctions between commercial and institutional waste generators are loosely defined. For these sectors, projections were combined because of the available SIC code groupings (e.g., SIC 60; Finance, Insurance, and Real Estate (F.I.R.E.), SIC 70; Services, etc.) best suited for forcasting. As a result, study data for institutional and commercial generators were aggregated into a single data set, designated "non-residential," for projection purposes.

Projected Residential Tonnage

Exhibit 22 presents the forecast of projected residential population (in terms of housing units) and projected annual tonnage, from 1952 to 2000. Projections were made by interpolation from housing unit estimates for 1980, 1985, and 1988. Housing forecasts were multiplied by the applicable generation rate assuming no change in the relative generating proportions of each strata over time.

Projected Non-Residential Tonnage

Exhibit 23 presents a summary of projected non-residential population by commercial activity from 1952 to 2000. These forecasts were multiplied by the generation rates developed for each sector, from the waste generation study sample, to give the City-wide projected annual tonnage by commercial activity, summarized in Exhibit 24.

Combined City-wide Projected Tonnage

The tonnage projections shown in Exhibits 22 and 24 were combined to give a total waste stream tonnage projection, by residential and non-residential sources. The projections are summarized in Exhibit 25, showing that an estimated 8.5 million tons of municipal solid waste was generated in New York City in 1990, or approximately 28,000 tons per day. In addition, Exhibit 25 presents a graphical summary that indicates that the residential waste stream represents an increasing portion of the City-wide total with time.

These projections are based on the assumption that waste generation rates are constant with time. However, generation rates will change to some degree with consumer purchasing habits, packaging practices, source reduction activities (such as backyard composting and paperless transactions), and economic vitality.

Composition of the waste stream also is expected to change with time. Trends observed over the past few years show an increase in paper and plastics discards and a decrease in metals and glass. The following projections can be made:

- Paper: Continued growth is expected, due the fact that this material is used in almost all activities, and that potential competition from plastics, metal, and glass will be largely limited to packaging.

- Newspapers: The market is saturated and under heavy competition from television and magazines. This will limit the growth rate of newspaper discards.

- Magazines: Readership is growing, while increasing numbers of trade and special interest magazines are reaching the market. It is anticipated that magazines will be the growth sector of paper discards; however, they will remain a relatively minor component of the paper category through the mid 1990s, even with the high growth rate.

- Corrugated Cardboard: Uses of corrugated paper are, to some extent cyclical, since the material is used to package bulk purchases. But cardboard is also used by people when they move; therefore, its discards also reflect population growth. A slight decline is projected.

- Plastics: As a broad category, this is the fastest growing material because of its convenience and versatility, although environmental concerns may set limits on future growth. Like paper, plastics are used in most of our daily activities. Plastic packaging of food has virtually displaced glass; plastic shopping bags have virtually displaced paper bags.

- Metals: This group includes metal bulk and food containers. The first is cyclical, as people discard furniture and appliances only when they are able to purchase new items. The second is stable; as food spending tends to remain stable, a further decline in this recyclable material is expected.

- Glass: Glass discards are expected to decline, because consumers have turned away from this material; it is heavy, breakable, and not compatible with the changing preference for "heat and eat" microwaveable containers.

LABORATORY ANALYSIS

Analytical Results

The mean result from laboratory analysis of residential refuse samples are summarized, by waste component and tested parameter, in Exhibit 26. A similar table of results for institutional refuse samples is presented in Exhibit 27.

Data from Exhibits 26 and 27 were then normalized using their respective waste sector composition summaries to derive the overall chemical and physical characteristics of each waste stream. The final results of this analysis are presented in Exhibits 28 and 29, for residential and institutional wastes, respectively.

Estimated Composition of Commercial Waste

Commercial waste was not sampled for laboratory analysis as part of the study. Chemical and physical properties for this waste stream were assumed to be similar to institutional wastes. The mean sample analysis for institutional samples was used, substituting the commercial waste composition shown in Exhibit 21. An estimated characterization was thus developed for the commercial waste stream, as shown in Exhibit 30.

Composition for Combined Waste Stream

Using the annual projected tonnage for each generating sector, estimated analyses for all three sectors (residential, institutional, and commercial) were aggregated to provide a composition for the combined waste stream. This composition is presented in Exhibit 31.

COMPACTION TESTING

Compaction testing was performed to measure changes in refuse density due to the removal of targeted recyclable components found in the waste stream. The testing included density measurements for compacted waste with and without recyclables, for compacted recyclables alone, and for uncompacted material with similar compositions.

Residential Waste

Testing results are given, by season, in Exhibit 32. As shown, slightly higher densities were achieved from uncompacted refuse with recyclables removed, compared to as-received wastes with the recyclables in-place. When compacted, these differences become less noticeable, although generally raw MSW (with recyclables) can be better compacted.

Institutional Waste

Testing results are given, by season, in Exhibit 33. As shown, slightly higher densities were achieved from uncompacted refuse with recyclables removed, compared to as-received wastes with the recyclables in-place. When compacted, these differences become less noticeable, although generally as-received wastes (with recyclables) are more difficult to compact.

FINDINGS

Generation

The primary factor affecting residential waste generation is population. Differences in generation between demographic groups are subtle, except for high-density neighborhoods which consistently generate less waste per person than any other residential population group. For the residential sector as a whole, residential waste generation is expected to increase through the end of the decade.

The primary factor affecting non-residential waste generation is the distribution of employment among the various commercial activity classifications (i.e., SIC codes). Over time, the working population is moving out of the low SIC groups (agriculture, mining, manufacturing, etc.) and into the service and government sectors. The type of work activity prevalent in these service groups generates far less waste per employee than manufacturing, for instance. Therefore, while overall employment may remain stable in the future, non-residential waste quantities are expected to decline.

Composition

Overall, the aggregate waste stream composition of New York City is comparable to national averages, considering that New York City is not average. Exhibit 34 presents a graphical summary of the City's aggregated waste stream composition for the Study period.

Exhibit 35 presents a comparison of the USEPA national average for solid waste composition and that measured during this study. The most notable variation is found in the yard debris fraction. National figures indicate that 17.6 percent of the waste stream should be comprised of yard debris. Intuitively, this discrepancy seems valid.

Policy Implications

The waste composition study offers a basis for identifying and quantifying relationships between consumption and waste generation as an avenue for waste management planning, particularly for designing reduction, recycling, incineration, and composting programs. For example:

- Evaluation of program options (i.e., recycling or source reduction programs).
- Evaluation of policy options (i.e., the implications of a "bottle bill" or the replacement of polystyrene products with paper).
- Evaluation of current operations including collection services and facilities, as well as for planning for future services.
- Education of New York City residents on solid waste management concerns and programs.
- Evaluation of waste management options
- Development of new markets for recyclables.

More specifically, this study identified the presence of significant quantities of recyclables disposed in the City's residential, institutional and commercial waste streams every day. This information, coupled with the estimated rate of generation by location in the City, should be used as the basis for developing future recycling programs, and for implementing pilot-scale and demonstration projects, or full-scale facilities.

Further Study

More in-depth study of the New York City waste stream may be warranted to support feasibility studies and/or implementation of future source reduction and recycling programs. Examples of further study associated with the findings of this project include:

- The City-wide quantities and composition of commercial wastes are not well known. Activities under this study indicated a need for further work to establish the level of commercial recycling, the composition of commercial wastes on a seasonal basis, and the quantities generated from various businesses with time.

- Projections were made based on the 1980 Census data. It may be useful to update the projections based on changes measured by the 1990 Census data.

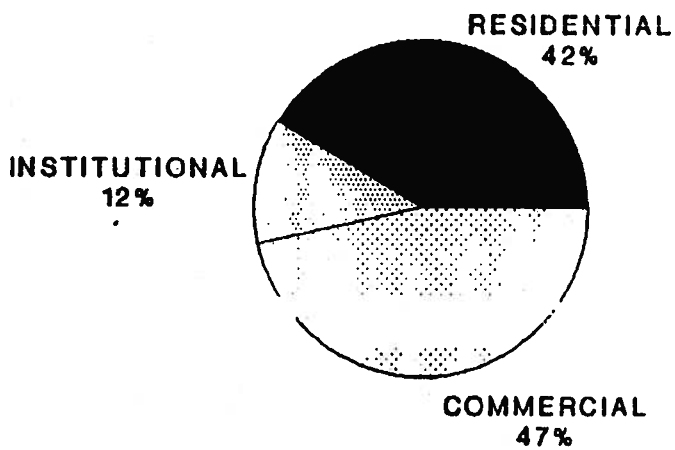
- The impacts of increased waste generation during holidays generally were avoided under this study. Further study would provide field comparisons of waste quantities and composition generated during holiday and non-holiday weeks.

- The study was not exhaustive in describing residential waste composition by income and density. Further study should focus more closely on waste differences associated with neighborhood diversification, percent of people unemployed or those staying at home, and other indicators.

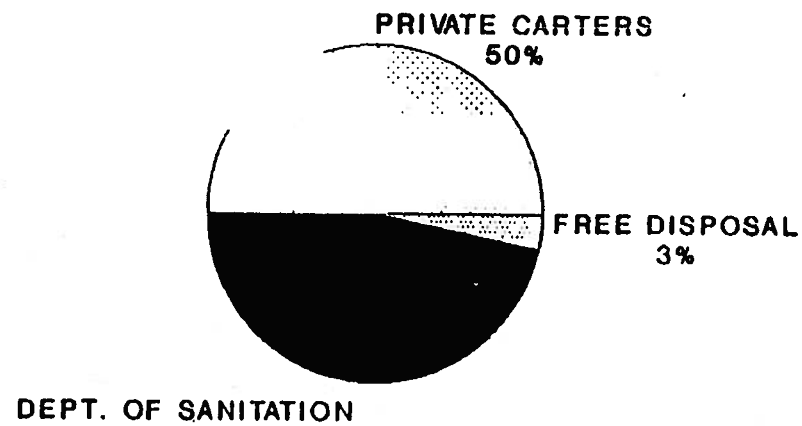
- The technical literature covering waste composition studies generally does not include bulk items (e.g., white goods, large furniture, tires) and other special wastes (e.g., street sweepings) as part of the solid waste stream. USEPA literature for nationwide waste composition estimates does not include most bulk items, and yard waste estimates (leaves, grass, and green wood wastes) are not based on field data. Solid waste managers need to consider the differences presented in the waste stream when certain components are excluded or removed from the aggregate compilations. Further study would place greater emphasis on making distinctions between New York City data and other technical literature.

EXHIBIT

MSW GENERATION AND COLLECTION NEW YORK CITY



GENERATORS



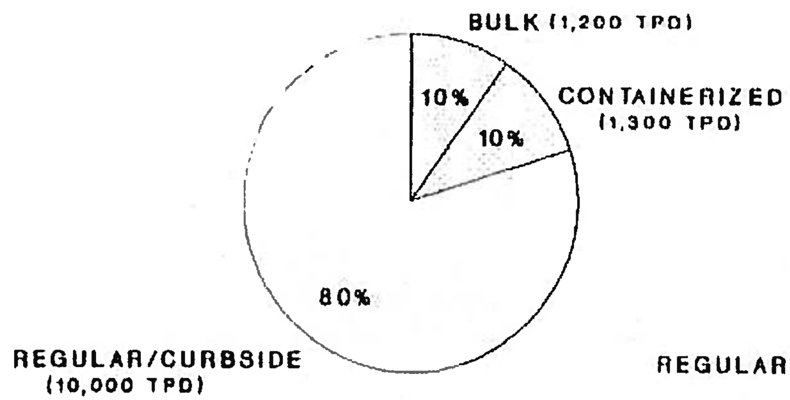
COLLECTORS

TOTAL = 30,000 TPD

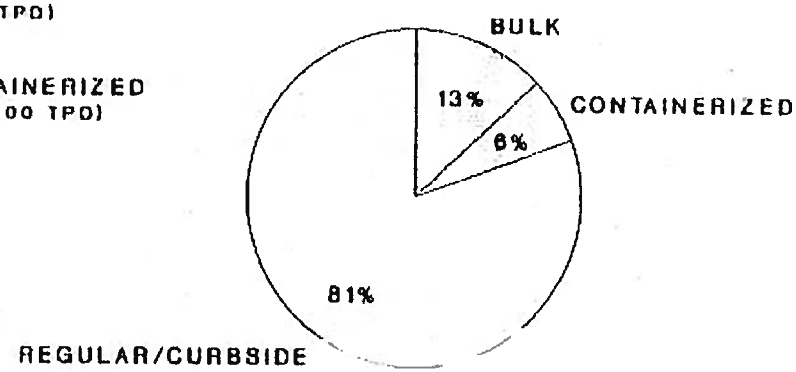
EXHIBIT 2

MAJOR DOS REFUSE COLLECTION OPERATIONS

COLLECTION QUANTITIES



COLLECTION VEHICLES



TOTAL = 12,500 TPD

TOTAL = 1,240 TRUCKS/DAY

EXHIBIT 3

MAJOR DOS RECYCLING OPERATIONS

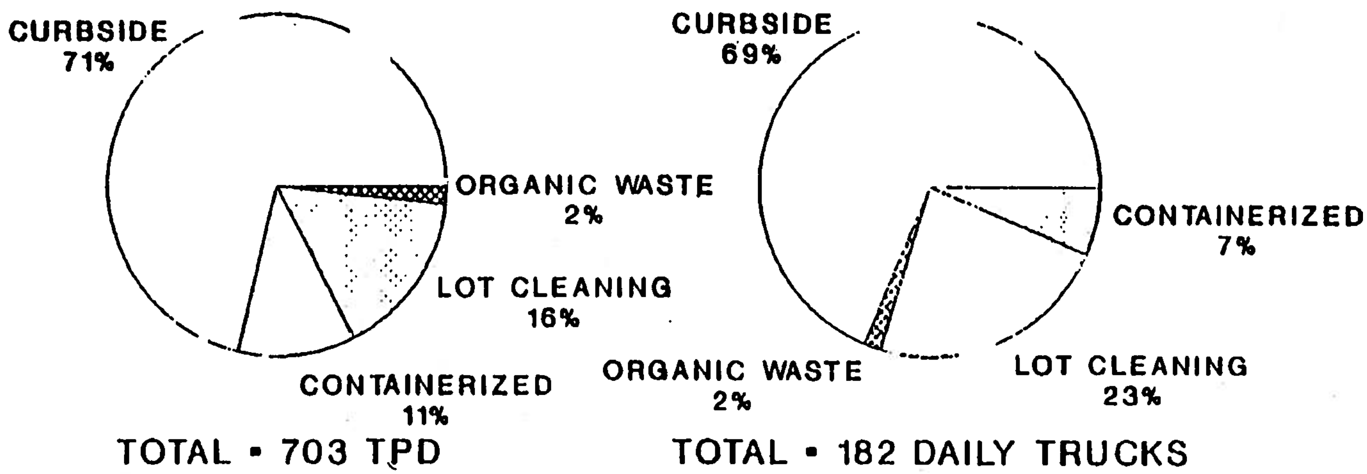
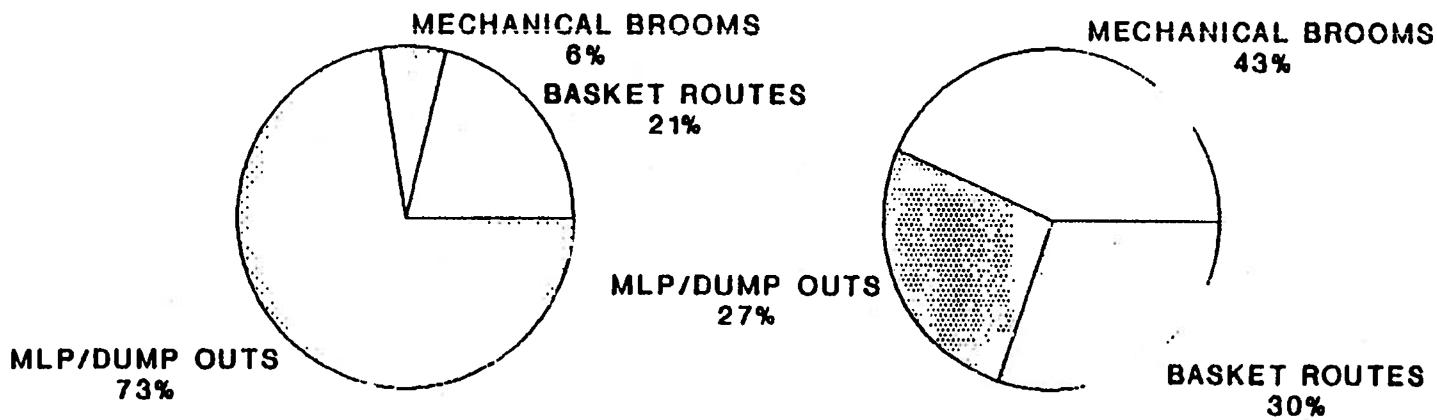


EXHIBIT 4

MAJOR DOS STREET CLEANING OPERATIONS



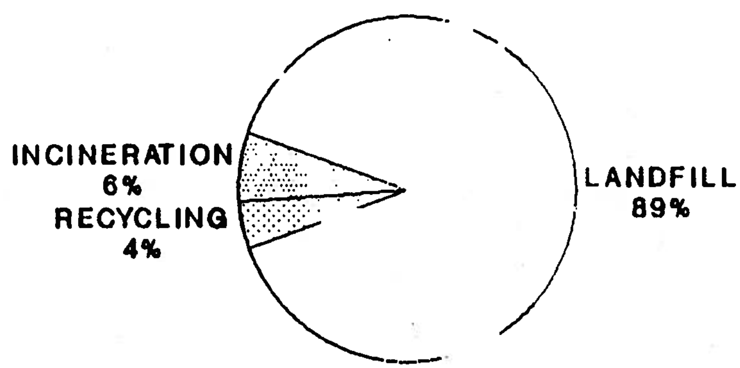
TOTAL = 800 TPD

TOTAL = 415 DAILY WORKSHIFTS

EXHIBIT 5

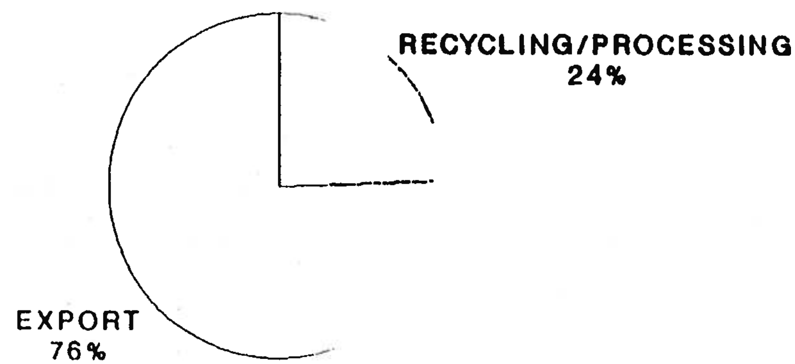
MSW DISPOSAL/PROCESSING

DOS WASTES



TOTAL = 15,700 TPD

PRIVATE CARTER WASTE



TOTAL = 14,300 TPD

EXHIBIT 6
PROGRAM DESIGN FOR WASTE COMPOSITION STUDY

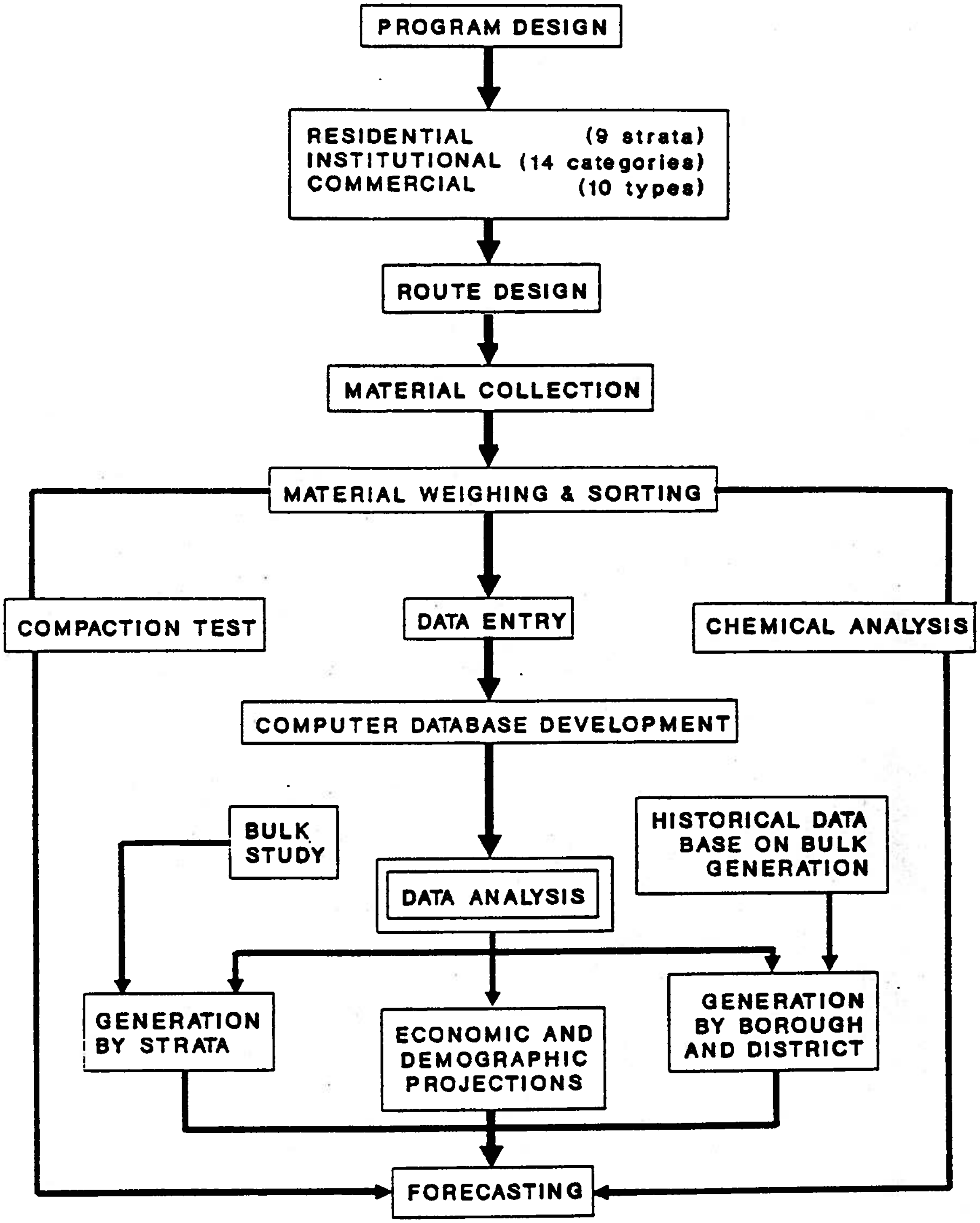


EXHIBIT 7
RESIDENTIAL WASTE GENERATION RATES BY STRATA

SAMPLE STRATA	NO. OF UNITS SAMPLED	GENERATION RATE (lbs/unit/week)				ANNUAL RATE (tons/unit)
		SUMMER	FALL	WINTER	SPRING	
LOW INCOME/LOW DENSITY	412	51	68	49	49	4
LOW INCOME/MEDIUM DENSITY	1,030	48	44	40	53	1.2
LOW INCOME/HIGH DENSITY	2,284	40	43	33	35	1.0
MEDIUM INCOME/LOW DENSITY	398	50	40	53	60	1.3
MEDIUM INCOME/MEDIUM DENSITY	2,312	42	43	39	41	1.1
MEDIUM INCOME/HIGH DENSITY	1,920	20	21	19	21	0.5
HIGH INCOME/LOW DENSITY	425	64	57	65	62	1.6
HIGH INCOME/MEDIUM DENSITY	1,165	37	33	31	32	0.9
HIGH INCOME/HIGH DENSITY	2,171	27	27	23	26	0.7
TOTAL	12,109					

NOTES:

1. Generation Rates rounded to the nearest pound or tenth of a ton.

EXH B T 8

EST MATED RESIDENT AL GENERAT ON BY BOROUGH

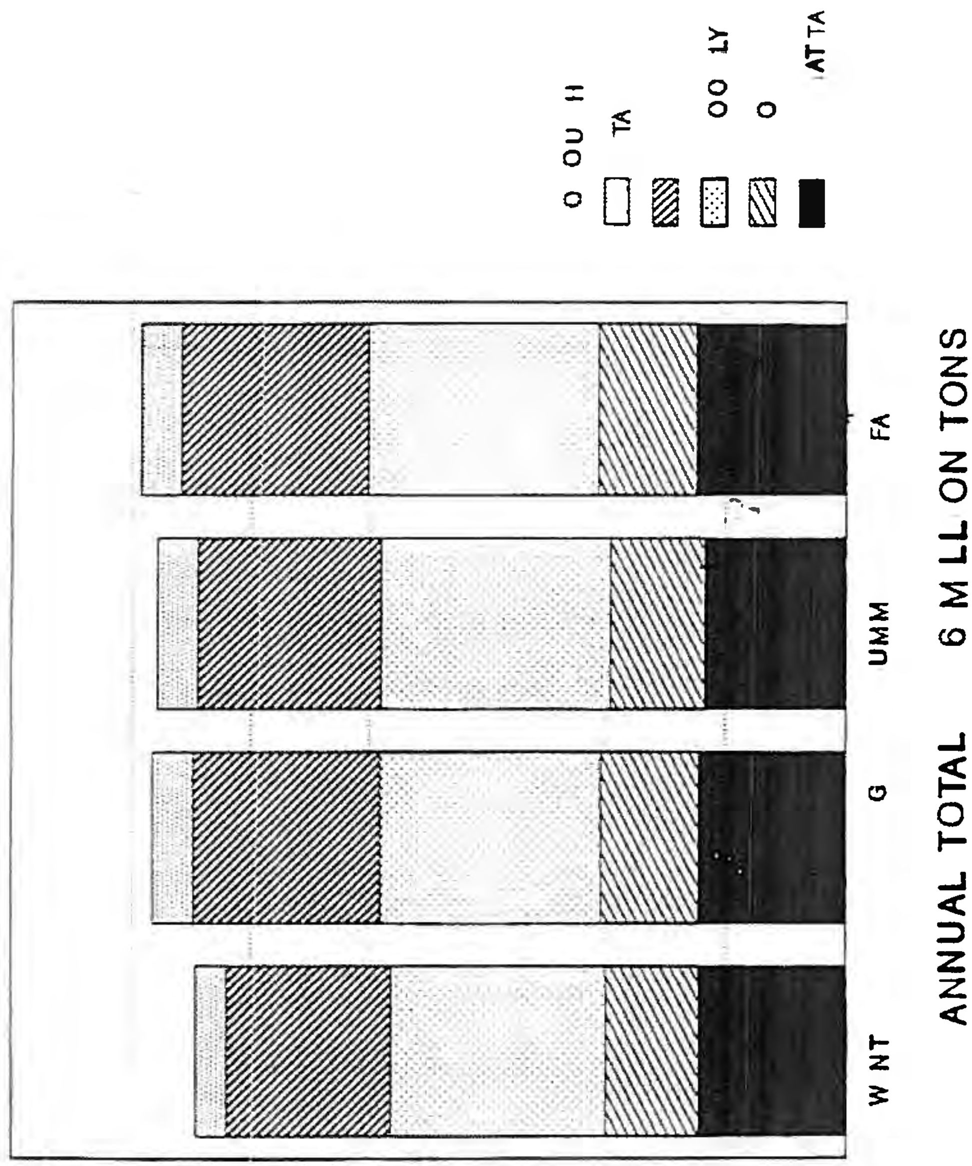


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EXHIBIT 9
INSTITUTIONAL WASTE GENERATION RATES

CATEGORY NUMBER	DESCRIPTION	NO. OF EMPLOYEES SAMPLED	GENERATION RATE (lbs/employee/week)				ANNUAL RATE (tons/employee/year)
			SUMMER	FALL	WINTER	SPRING	
1	Public Elementary School	1,722	16	48	60	42	0.8
2	Junior High School	353	25	34	38	43	0.9
3	Private School (K–8th Grade)	116	44	47	46	77	1.4
4	Private School (6–12th Grade)	431	57	15	8	12	0.6
5	Psychiatric Hospital	1,560	15	15	11	7	0.3
6	Skilled Nursing Facility	2,615	15	12	12	12	0.3
7	Municipal Hospital	1,445	53	42	48	49	0.9
8	Teaching Hospital	490	41	42	36	34	1.0
9	Non–Profit Hospital	725	28	28	26	21	0.5
10	Government Office	660	26	21	17	21	0.6
11	Correctional Facility	516	27	36	27	52	0.9
12	College	3,850	3	5	5	6	0.1
13	Public High School	404	33	40	31	28	0.6
14	Transportation Hub	2,000	52	86	65	60	1.7
TOTAL		16,886					

NOTES:

Generation Rates rounded to the nearest pound or tenth of a ton.

EXH B T 0

EST MATED NST TUT ONAL GENERAT ON BY BOROUGH

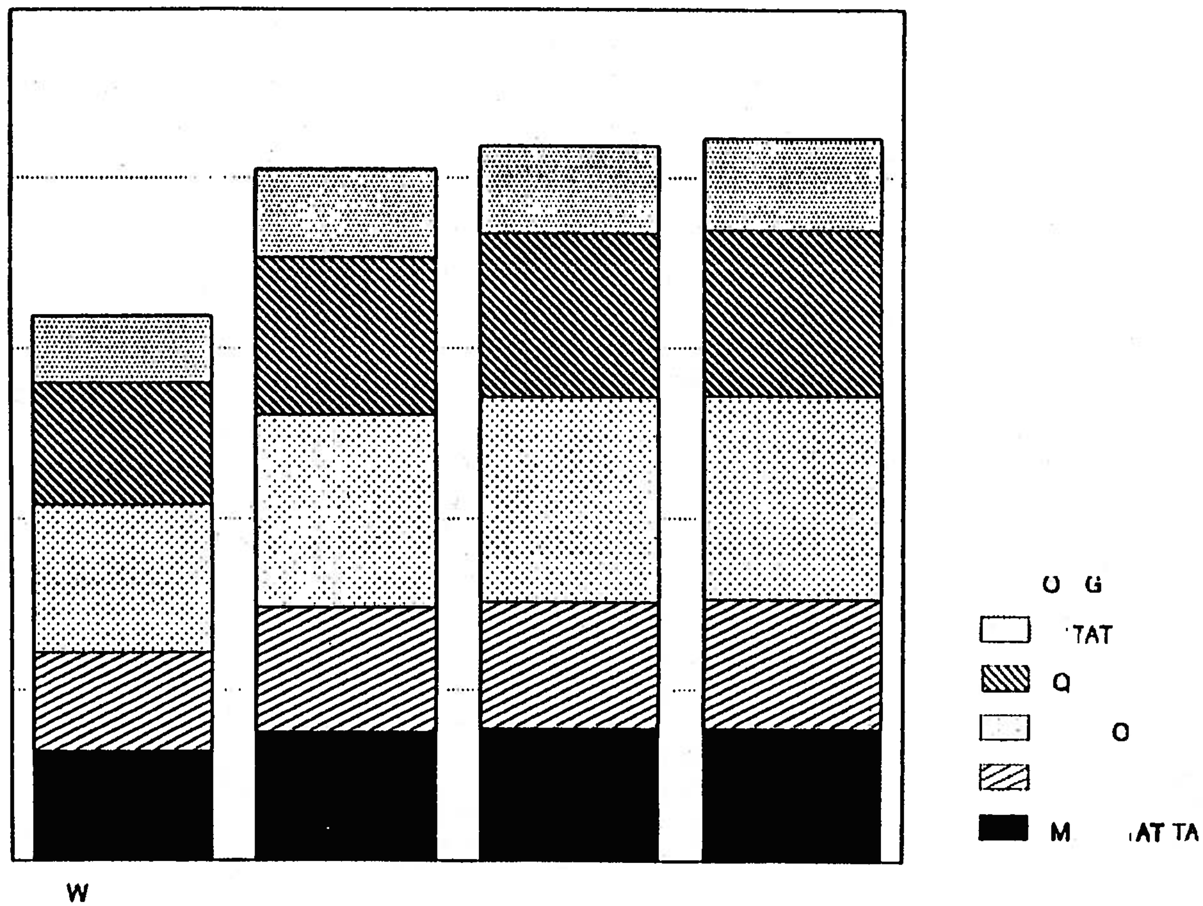

EXHIBIT 11

COMMERCIAL WASTE GENERATION BY SEASON

SUB–SECTOR DESCRIPTION	ESTIMATED NO. OF EMPLOYEES	GENERATION RATE (Tons/Year/Employee)	ESTIMATED TOTAL WASTE GENERATION BY SEASON Winter	Spring	Summer	Fall	TOTAL ANNUAL WASTE GENERATION (Tons/Year)	PERCENTAGE OF COMMERCIAL STREAM
Sampled								
Single Tenant Offices (SIC 60)	407,000	0.2	15,500	17,600	21,700	18,600	73,300	1.9%
Multi–tenant Offices (SIC 61–69, 72, 73, 81, 89)	626,100	0.3	42,300	48,100	59,300	50,700	200,400	5.2%
Wholesale (SIC 50–51)	226,000	1.2	56,700	64,600	79,500	68,100	268,900	7.0%
General Retail (SIC 52–53, 56–57, 59)	189,000	1.1	43,400	49,500	60,900	52,100	206,000	5.3%
Eating and Drinking (SIC 58)	136,000	3.9	113,000	128,700	158,500	135,600	535,800	13.9%
Textile and Apparel Manufacturing (SIC 22, 23)	120,000	1.2	29,100	33,100	40,800	34,900	138,000	3.6%
Printing and Publishing (SIC 27)	87,000	6.1	111,600	127,100	156,500	133,900	529,000	13.7%
Food Stores (SIC 54)	60,000	5.3	67,300	76,700	94,400	80,800	319,200	8.3%
Hotel (SIC 70)	32,000	1.9	12,500	14,300	17,600	15,100	59,500	1.5%
Construction (SIC 15 – 17)	114,000	6.4 #	153,900	175,300	215,800	184,700	729,600	18.9%
TOTAL, SAMPLED	1,997,100 (88%)		645,300	735,000	905,000	774,500	3,059,700	79.2%
Not Sampled								
Other Services (SIC 75, 76, 78, 79)	98,900	1.2 #	25,500	29,000	35,700	30,600	120,700	3.1%
Other Manufacturing (SIC 20, 24–26, 28–39)	144,000	4.5 #	135,400	154,300	190,000	162,600	642,200	16.6%
Agricultural/Mining (SIC 07, 10–13)	4,000	0.8 #	700	800	900	800	3,200	0.1%
Automotive (SIC 55)	18,000	1.7 #	6,300	7,200	8,900	7,600	30,100	0.8%
Unclassified	11,200	0.8 #	1,900	2,200	2,700	2,300	9,000	0.2%
TOTAL, NOT SAMPLED	276,100 (12%		169,800	193,500	238,200	203,900	805,200	20.8%
TOTAL, COMMERCIAL SECTOR	2,273,200		815,100	928,500	1,143,200	978,400	3,864,900	100.0%
							12,800 TPD	

NOTES:

1. * = A determination of the tenancy–type for each SIC group was based on number of employees per establishment City–wide for each SIC code (see Commercial Study Report).
2. # = Estimated Value from literature data.
3. Generation rates rounded to the nearest tenth of a ton; Estimated total generation by season rounded to the nearest 100 tons.

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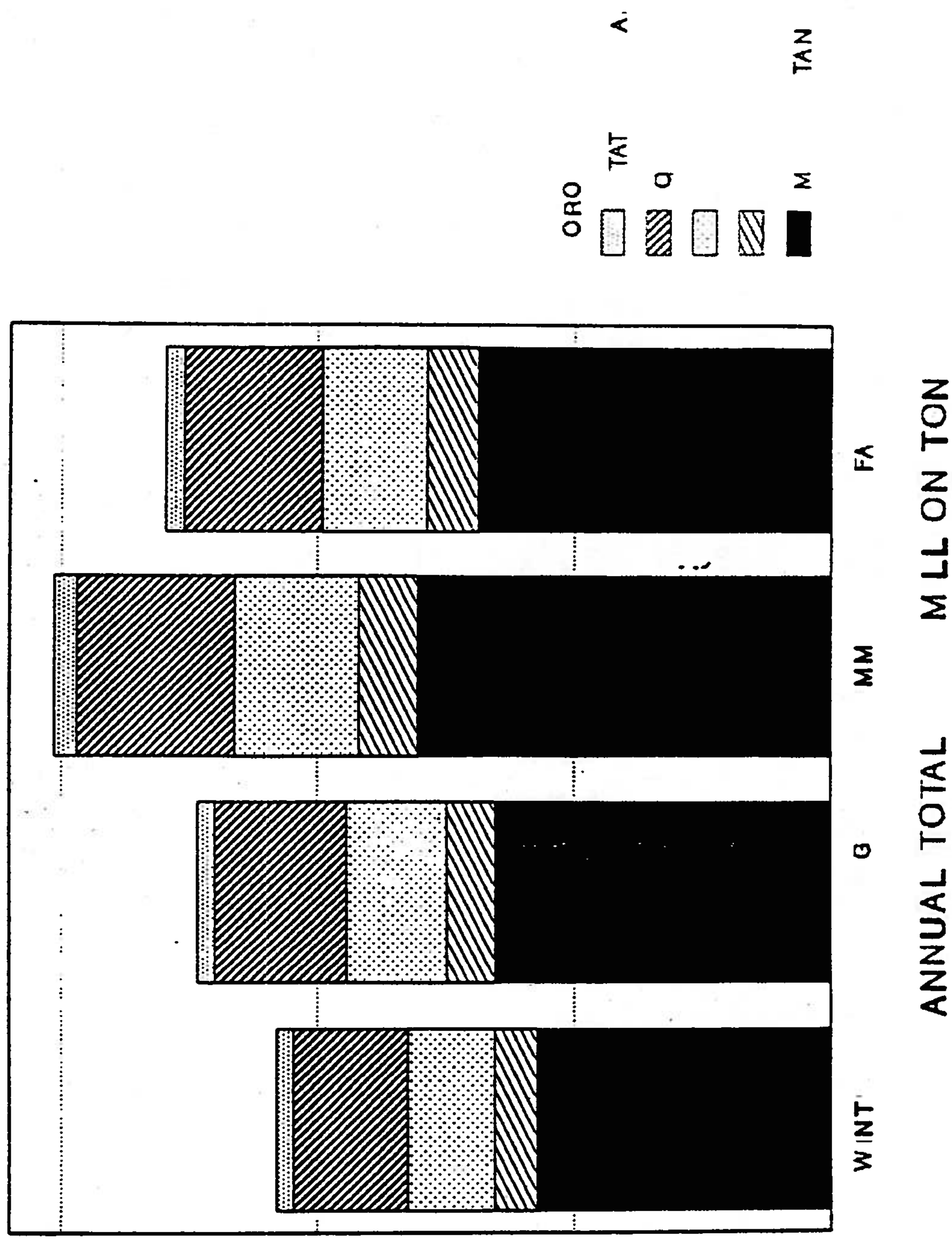
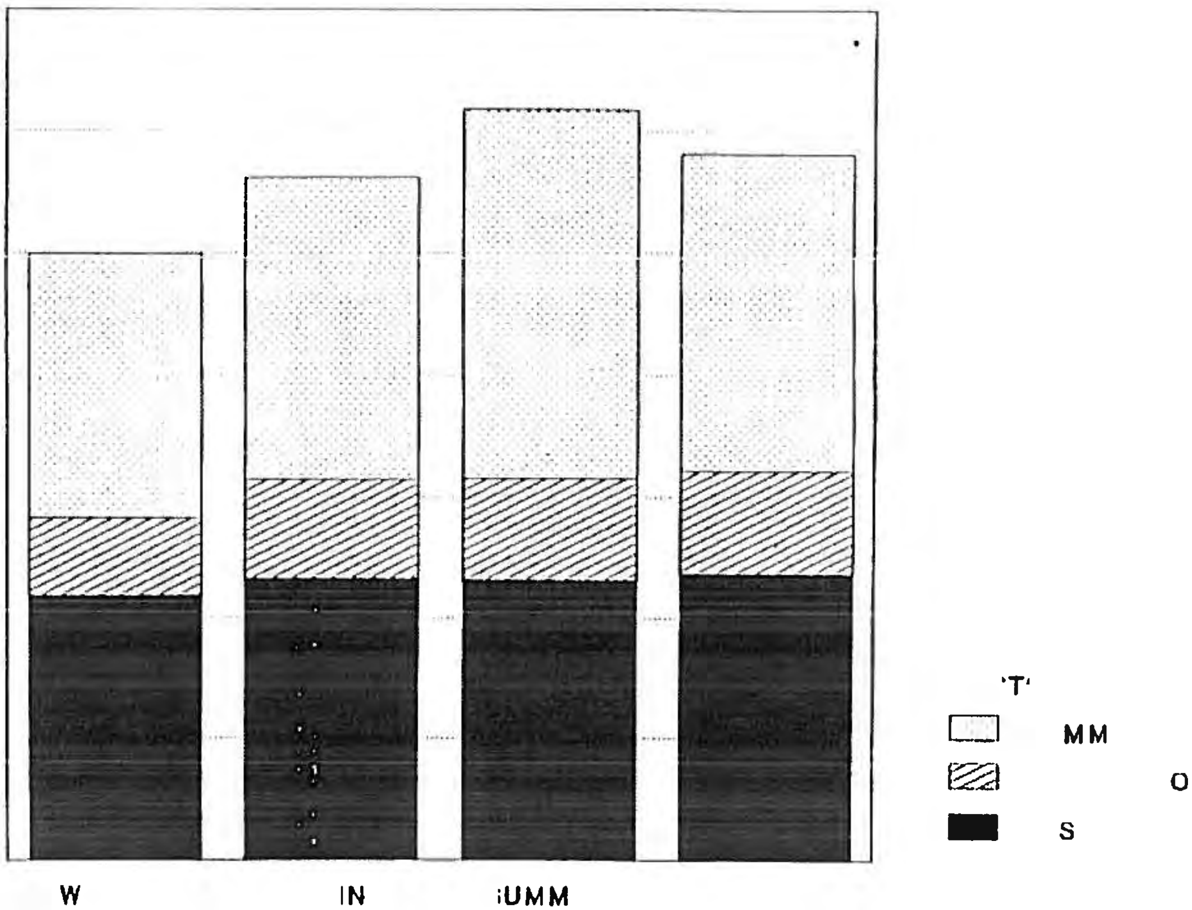
2273200

EXH B T 2

EST MATED COMMERC AL GENERAT ON BY BOROUGH



EXH B T 3
SEASONAL MSW GENERAT ON BY MAJOR SECTOR



ANNUAL TOTAL M LL ON ON

EXHIBIT 14
RESIDENTIAL WASTE COMPOSITION BY STRATA

SUMMER SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage)								
	LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	4.0	4.8	5.9	4.7	4.7	5.2	4.3	5.3	5.0
Newsprint	10.2	8.5	7.4	9.9	9.9	16.8	8.7	9.3	12.3
Office/Computer	1.7	1.0	0.7	1.8	1.3	1.5	1.8	1.7	2.1
Magazines and Glossy	2.0	2.0	2.9	3.9	2.7	4.5	2.8	2.3	3.9
Book/Phone Book	1.0	0.8	1.3	0.7	1.8	3.9	0.9	0.9	0.4
Non-Corrugated Cardboard	3.9	3.5	3.0	3.4	2.9	3.6	5.3	3.6	3.9
Mixed	11.4	7.8	7.3	8.5	6.8	8.1	6.8	7.8	7.8
TOTAL PAPER FRACTION	34.2	26.4	26.5	32.9	31.9	43.6	30.5	30.9	35.4
Clear HDPE containers	0.5	0.5	0.8	0.6	0.6	0.4	0.5	0.7	0.7
Colored HDPE containers	0.5	0.6	0.8	0.8	0.7	0.9	0.5	0.6	1.0
LDPE	0.3	0.2	0.3	0.1	0.3	0.1	0.2	0.3	0.1
Films and Bags	4.1	5.0	6.2	5.0	5.1	6.1	3.5	4.7	6.7
Green PET containers	0.2	0.1	0.1	0.1	0.3	0.1	0.1	0.2	0.1
Clear PET containers	0.4	0.4	0.6	0.8	0.5	0.5	0.3	0.4	0.6
PVC	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Polypropylene	0.1	0.1	0.3	0.1	0.1	0.2	0.1	0.1	0.1
Polystyrene (Estimated in Summer)	0.9	0.8	0.8	1.1 *	1.0	1.1	0.6	0.7 *	0.9
Miscellaneous Plastic	1.3	1.3	1.6	2.0	1.1	0.8	1.7	1.7	1.2
TOTAL PLASTIC FRACTION	8.5	9.3	11.3	10.7	9.6	10.3	7.7	9.7	11.7
Grass/Leaves	5.6	1.1	0.0	2.1	1.4	0.0	5.4	4.0	1.0
Brush/Prunings/Stumps	0.6	1.6	0.0	0.7	0.4	0.0	4.5	0.8	0.0
TOTAL YARD WASTE FRACTION	6.2	2.7	0.1	2.8	1.8	0.1	9.9	4.8	1.0
Lumber	1.2	4.3	3.2	2.0	2.4	2.1	3.1	1.8	0.9
Textiles	6.0	6.0	8.4	4.0	6.4	3.9	6.0	5.7	6.2
Rubber	0.1	0.1	0.3	0.4	0.2	0.0	0.3	0.0	0.1
Fines	2.0	2.0	3.3	2.9	1.8	2.7	1.9	1.7	3.7
Diapers	3.2	3.6	4.1	2.9	2.6	3.0	4.1	4.1	3.2
Foodwaste	16.9	14.4	12.7	14.5	18.3	10.1	12.1	20.1	10.7
Miscellaneous Organic	5.1	7.9	9.6	7.9	9.5	10.6	8.9	6.3	14.3
TOTAL ORGANIC FRACTION	34.5	40.3	41.9	34.6	41.4	32.4	36.4	39.7	39.1
Clear Glass containers	4.2	2.5	3.2	3.1	3.6	2.3	3.0	3.9	2.0
Green Glass containers	1.0	1.3	1.6	0.9	1.3	0.6	0.9	1.2	0.9
Brown Glass containers	1.2	1.1	1.2	0.8	1.2	0.6	0.7	1.2	0.7
Miscellaneous Glass	0.2	0.4	0.9	0.8	0.3	0.6	0.2	0.1	0.4
TOTAL GLASS FRACTION	6.6	5.3	6.9	5.5	6.3	4.4	4.9	6.5	4.0
Aluminium Food Containers/Foil	0.3	0.4	0.6	0.5	0.4	0.4	0.3	0.3	0.9
Aluminium Beverage Cans	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.3
Miscellaneous Aluminium	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.3
TOTAL ALUMINIUM FRACTION	0.9	1.0	1.2	1.1	1.1	0.9	0.7	0.9	1.4
Ferrous Metal Food containers	2.1	1.6	2.2	1.8	2.0	2.0	1.6	1.9	2.3
Other Ferrous Metal	1.0	3.8	2.7	2.0	2.0	0.8	1.0	2.2	1.2
TOTAL FERROUS METAL FRACTION	3.1	5.4	4.9	3.8	4.0	2.8	2.7	4.1	3.5
Bimetal Cans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	4.0	6.3	6.2	4.9	5.1	3.7	3.4	5.0	5.0
Non-bulk Ceramics	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Miscellaneous Inorganic	3.2	6.7	2.6	3.5	0.5	1.7	0.8	0.4	0.8
TOTAL INORGANIC FRACTION	3.3	6.7	2.6	3.5	0.6	1.9	0.9	0.4	0.9
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Dry Cell Batteries	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.1	0.2	0.2	0.0	0.1	0.2	0.2	0.0	0.1
TOTAL HHW FRACTION	0.2	0.4	0.5	0.1	0.2	0.3	0.8	0.1	0.2
BULK	2.4	2.6	2.0	4.6	2.9	3.3	5.6	2.9	2.8

EXHIBIT 14 (continued)
RESIDENTIAL WASTE COMPOSITION BY STRATA

FALL SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage) LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	4 4	5.1	6.1	7.3	5.4	5.7	3.8	4.8	5.0
Newsprint	9 9	8.3	8.0	9.3	10.3	17.9	11.4	12.8	17.7
Office/Computer	1.8	0.4	0.1	1.0	0.8	0.8	1.6	0.9	0.6
Magazines and Glossy	3.3	2.4	2.2	3.1	2.8	3.7	4.1	1.8	4.2
Book/Phone Book	1 2	0 7	0 3	0.4	1.0	1.0	2.0	2.1	0.7
Non-Corrugated Cardboard	3.5	2.1	2.9	2.5	2.4	1.9	1 9	2.8	2.1
Mixed	15.7	11 1	9.8	12.8	13.8	12.5	13.0	14 8	16.1
TOTAL PAPER FRACTION	39.8	30.1	29.2	36.5	36.3	43.5	37 8	39.8	46.3
Clear HDPE containers	0.5	0.6	0.7	0.6	0.4	0.3	0.3	0.4	0.4
Colored HDPE containers	0.5	0.5	0.7	0.8	0.5	0.3	0.7	0.5	0.7
LDPE	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1
Films and Bags	4.2	5.0	6.5	4.2	5.2	5.9	2.9	5.5	6.3
Green PET containers	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1
Clear PET containers	0.3	0.3	0.5	0.5	0.4	0.3	0.3	0.3	0.3
PVC	0.2	0.4	0.2	0.2	0.1	0.0	0.0	0.1	0.1
Polypropylene	0.2	0.2	0.1	0.1	0.2	0.1	0.3	0.2	0.3
Polystyrene (Estimated in Summer)	0.5	0.6	0.9	0.9 *	0.7	0.9	0.4	0.3 *	1.0
Miscellaneous Plastic	1.2	1.4	1.0	1.2	1.3	1.2	0.8	1.9	0.8
TOTAL PLASTIC FRACTION	7.8	9.1	11.0	8.4	9.2	9.3	5.7	9.4	10.2
Grass/Leaves	5.3	4 2	0.2	7 2	2.5	6.5	12.1	3.9	3.8
Brush/Prunings/Stumps	1.0	0.1	0.0	0.5	0.1	0.1	0.4	0.0	0.6
TOTAL YARD WASTE FRACTION	6.4	4 3	0.2	7.7	2.5	6.5	12.5	3.9	4.4
Lumber	1.0	3.6	2.5	2.2	3.7	0.7	1.6	2.8	1 6
Textiles	4.5	4.7	7.3	3.5	5.5	5.0	2.4	4.1	4.0
Rubber	0.0	0.2	0.0	0.1	0.1	0.1	0.9	0.0	0.1
Fines	2.1	2.4	2.8	2.1	2.0	1.8	1.9	2.0	2.0
Diapers	3 2	3.5	4.3	3.0	3.8	1.9	2.9	4.3	2.8
Foodwaste	13.1	15.6	15.8	12.6	15.2	11.3	13.1	13.6	10 6
Miscellaneous Organic	7.1	10.9	9.3	7.1	7.2	5.6	7.7	7.3	5.5
TOTAL ORGANIC FRACTION	31.1	41.0	42.0	30.6	37.3	26.6	30.5	34.1	26.6
Clear Glass containers	3 5	2.9	3.2	2.8	3.1	2.6	2.5	3.2	2.4
Green Glass containers	0.7	1.0	1.7	1.0	0.9	0.6	0.5	0.7	0.4
Brown Glass containers	0.7	0.6	1.2	1 2	0.7	0.4	0.7	0.6	0 6
Miscellaneous Glass	0 2	0.2	0.3	0.2	0.2	0.3	0.0	0.0	0.4
TOTAL GLASS FRACTION	5.0	4 7	6.3	5.1	4.8	4 0	3.8	4 5	3.8
Aluminium Food Containers/Foil	0.5	0.4	0.5	0.7	0.6	0.5	0.4	0.5	0.5
Aluminium Beverage Cans	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.3	0.3
Miscellaneous Aluminium	0.2	0.1	0.1	0.3	0.1	0.5	0.2	0.1	0.4
TOTAL ALUMINIUM FRACTION	0.9	0.8		1.3	1.0	1.2	0.9	0.9	.2
Ferrous Metal Food containers	1.7	2.0	2.7	2.0	2.0	1.8	1.4	1.9	1.9
Other Ferrous Metal	1.7	3.5	2.0	1.9	1.5	2.9	3.0	0.8	2.2
TOTAL FERROUS METAL FRACTION	3.4	5.5	4.7	3.9	3.5	4.7	4.4	2.7	4.1
Bimetal Cans		0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
TOTAL METAL FRACTION		6.3	5 8	5.2	4.6	6.0	5.2	3.7	5.3
Non-bulk Ceramics	0.2	0.3	0.1	0.1	0.1	0.1	0.4	0.1	0.0
Miscellaneous Inorganic	0.1	2.5	2.9	2.9	2.1	1.7	0.4	1.3	0.3
TOTAL INORGANIC FRACTION	0 2	2.8	3.0	3.0	2.2	1.8	0.8	1.4	0.3
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.0	0.0	0.1	0.1	0.0	0.4	0.0	0.0	0.0
Dry Cell Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
TOTAL HHW FRACTION	0.0	0.1	0.2	0.2	0.3	0.5	0.0	0.0	0.1
BULK	5.4	1.5	2.0	3.3	2.8	2.0	3.6	3.2	3.0

EXHIBIT 14 (continued)

RESIDENTIAL WASTE COMPOSITION BY STRATA

WINTER SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage)								
	LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	3.6	5.5	5 6	5.4	4 7	3.9	5.2	4 7	4 7
Newsprint	6 9	8.2	7 2	8.8	9.0	14.9	5.7	10.7	13 4
Office/Computer	0 2	0.2	0.2	1.2	0.3	1.4	0.3	0.1	0.6
Magazines and Glossy	2.7	2.1	1.6	2.4	2.6	4.5	2.6	3.0	3.6
Book/Phone Book	0.3	0.5	0.4	0.4	0.3	0.3	0.5	0.2	0.5
Non-Corrugated Cardboard	2.4	2.7	3.1	2.5	3.2	2.6	2.4	2.6	2.6
Mixed	11.5	12.0	9.7	13.0	13.7	15.4	11.3	14.5	14 2
TOTAL PAPER FRACTION	27.5	31.1	27.8	33.8	33.7	43.0	26.0	35.9	39.7
Clear HDPE containers	0.5	0.6	0.6	0.5	0.7	0.4	0.3	0.5	0.4
Colored HDPE containers	0.6	0.6	0.7	0.6	0.6	0.8	0.5	0.5	0.6
LDPE	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Films and Bags	3.9	5.7	5.2	4.8	5.5	6.6	3.6	6.3	5.8
Green PET containers	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.1
Clear PET containers	0.5	0.6	0.5	0.5	0.7	0.5	0.4	0.5	0.6
PVC	0.2	0.1	0.2	0.1	0.1	0.2	0.0	0.1	0.1
Polypropylene	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0
Polystyrene (Estimated in Summer)	1 1	0.9	0 9	0.9 *	1.1	1.2	0.9	0.9 *	0.8
Miscellaneous Plastic	1.1	1.0	1.4	1.3	1.2	1.0	0.7	1.4	0.9
TOTAL PLASTIC FRACTION	8.0	9.7	10.2	9.1	10.3	10.9	6.6	10.4	9.5
Grass/Leaves	6.5	1.6	0.6	1.7	1.1	0.7	18.1	0.6	4.0
Brush/Prunings/Stumps	3.8	0.3	0.0	0.2	0.7	1.1	0.6	0.3	1.1
TOTAL YARD WASTE FRACTION	10.3	1.9	0.6	2.0	1.8	1.8	19.0	0.9	5.
Lumber	1.2	2.2	1.3	0.9	1.7	1.4	3.1	1.6	1.2
Textiles	4.5	4.4	5.3	5.2	4.8	3.5	5.3	3.7	3.9
Rubber	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Fines	2.2	2.4	2.2	2.8	2.0	1.8	2.2	2.2	2.1
Diapers	4 1	3.6	5.9	4.0	5.0	2.7	3.7	4 1	2.5
Foodwaste	13.4	16.4	17.7	13.6	16.1	13.5	9.1	15.3	11 9
Miscellaneous Organic	7 7	13.8	11.0	6.6	7.0	6.7	6 2	7.3	8 2
TOTAL ORGANIC FRACTION	33.3	43.0	43.5	35.2	36.5	29.6	29.7	34 2	29 8
Clear Glass containers	4.1	2.5	4 4	2.9	4.4	2.9	3.0	4 0	2.6
Green Glass containers	1.1	1.0	1.5	0.9	1.3	0.9	1.1	0.7	0.6
Brown Glass containers	0.9	0.7	1.5	0.7	1.0	0.8	0.8	0.7	0.8
Miscellaneous Glass	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0
TOTAL GLASS FRACTION	6.1	4.4	.7.4	4.6	6.9	4.6	4.9	5.4	3.9
Aluminium Food Containers/Foil	0.7	0.5	0.5	0.5	0.7	0.5	0.5	0.6	0.6
Aluminium Beverage Cans	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.4
Miscellaneous Aluminium	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0
TOTAL ALUMINIUM FRACTION	1.1	1.0	0.9	1.0	1.1	0.9	0.6	1.0	
Ferrous Metal Food containers	2.5	2.1	2.9	2.4	2.5	1.9	1.7	2.3	2.7
Other Ferrous Metal	2.2	1 9	2.3	2.2	1.9	1.6	2.3	3.0	1.3
TOTAL FERROUS METAL FRACTION	4 7	4.0	5.1	4.6	4.4	3.6	3.9	5.2	4.0
Bimetal Cans	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	5.7	5.1	6.1	5.6	5.6	4.4	4.6	6.3	5.1
Non-bulk Ceramics	0.5	0.1	0.6	0.4	0.3	0.2	0.1	0.2	0.1
Miscellaneous Inorganic	1.7	2.0	1.3	4.9	2.8	1.1	1.2	2.7	4.0
TOTAL INORGANIC FRACTION	2.2	2.1	1.9	5.3	3.1	1.3	1.2	2.8	4.1
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0 1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0 0	0.0	0.5	0.1	0.1	0.1	0.1	0.1	0.0
Dry Cell Batteries	0 0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0 0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
TOTAL HHW FRACTION	0.2	0.1	0.6	0.1	0.2	0.1	0.2	0.3	0.3
BULK	6.6	2.7	2.0	4.4	2.1	4 2	5.4	3.6	2.7

EXHIBIT 14 (continued)
RESIDENTIAL WASTE COMPOSITION BY STRATA

SPRING SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage) LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	3.9	6.4	4.2	4.2	3.8	4.7	4.6	5.8	4.0
Newsprint	9.2	5.9	4.9	8.5	7.7	13.1	8.0	11.5	14.7
Office/Computer	0.1	0.3	0.2	0.5	0.2	0.5	0.1	0.3	0.6
Magazines and Glossy	2.5	2.2	2.2	2.2	2.0	4.3	2.6	1.7	3.6
Book/Phone Book	0.5	0.3	1.0	0.6	0.5	0.5	0.2	0.4	1.6
Non-Corrugated Cardboard	2.1	1.9	1.9	1.9	2.0	1.9	2.0	2.3	2.0
Mixed	12.6	13.7	13.2	13.0	11.7	16.0	10.3	10.9	14.9
TOTAL PAPER FRACTION	31.0	30.7	27.6	30.9	27.8	41.0	27.7	32.9	41.3
Clear HDPE containers	0.4	0.6	0.6	0.5	0.5	0.4	0.3	0.4	0.5
Colored HDPE containers	0.5	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.6
LDPE	0.0	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1
Films and Bags	4.5	4.9	5.7	4.4	5.3	5.6	4.0	5.1	6.2
Green PET containers	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Clear PET containers	0.6	0.5	0.5	0.5	0.6	0.3	0.3	0.6	0.5
PVC	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Polypropylene	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2
Polystyrene (Estimated in Summer)	1.0	0.9	0.7	1.3 *	1.1	1.3	0.7	0.9 *	1.0
Miscellaneous Plastic	1.5	1.1	0.9	0.6	1.0	0.9	1.7	1.5	0.9
TOTAL PLASTIC FRACTION	8.9	9.1	9.6	8.4	9.3	9.3	7.8	9.2	10.2
Grass/Leaves	5.2	0.5	0.6	0.9	2.0	1.9	5.4	1.2	2.6
Brush/Prunings/Stumps	1.3	0.6	0.0	0.8	0.8	1.1	2.8	0.1	0.3
TOTAL YARD WASTE FRACTION	6.5	1.1	0.6	1.7	2.8	3.0	8.2		
Lumber	2.4	3.8	3.7	3.4	4.4	2.3	3.9	2.9	1.3
Textiles	4.4	5.2	6.1	4.4	5.9	4.5	4.6	5.9	5.2
Rubber	0.0	0.2	0.6	0.5	0.1	0.1	0.0	0.1	0.0
Fines	3.1	3.2	2.9	2.8	2.7	3.3	2.8	2.3	2.7
Diapers	4.2	2.7	4.4	3.8	4.2	2.7	3.6	4.8	2.8
Foodwaste	12.3	17.6	19.9	13.3	15.0	11.7	11.0	14.6	12.3
Miscellaneous Organic	10.0	8.1	7.1	8.6	8.1	9.0	10.6	6.4	6.5
TOTAL ORGANIC FRACTION	36.3	40.7	44.7	36.7	40.5	33.5	36.4	37.0	30.8
Clear Glass containers	4.8	2.9	4.1	3.3	3.4	2.6	3.1	3.7	2.9
Green Glass containers	1.2	1.2	1.6	0.9	0.9	0.7	0.8	0.8	0.6
Brown Glass containers	0.8	1.0	1.2	1.1	0.7	0.5	0.8	0.7	0.6
Miscellaneous Glass	0.0	0.1	0.2	0.2	0.2	0.4	0.0	0.7	0.2
TOTAL GLASS FRACTION	7.0	5.2	7.1	5.5	5.1	4.3	4.6	5.9	4.3
Aluminium Food Containers/Foil	0.6	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Aluminium Beverage Cans	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3
Miscellaneous Aluminium	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
TOTAL ALUMINIUM FRACTION	1.0	0.9	0.7	0.8	0.8	0.8	0.8	0.9	0.8
Ferrous Metal Food containers	2.2	2.0	2.4	2.6	2.0	2.1	1.5	2.1	2.0
Other Ferrous Metal	2.1	2.3	1.8	2.2	2.3	1.9	4.0	3.4	0.9
TOTAL FERROUS METAL FRACTION	4.3	4.3	4.2	4.9	4.3	4.0	5.5	5.5	3.0
Bimetal Cans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	5.3	5.2	4.9	5.7	5.1	4.7	6.4	6.3	3.8
Non-bulk Ceramics	0.1	0.1	0.7	0.1	0.2	0.1	0.0	0.4	0.1
Miscellaneous Inorganic	3.4	5.3	2.4	3.8	6.5	1.3	1.2	4.3	4.9
TOTAL INORGANIC FRACTION	3.4	5.3	3.1	3.9	6.7	1.4	1.2	4.8	5.0
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.2	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0
Dry Cell Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.3	0.0	0.0	0.5	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.0	0.3	0.1	0.1	0.0	0.1	0.1	0.0	0.1
TOTAL HHW FRACTION	0.3	0.4	0.3	0.7	0.4	0.3	0.8	0.2	0.2
BULK	1.3	2.3	2.0	6.5	2.3	2.5	6.8	2.3	1.5

EXHIBIT 15

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: WINTER 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.4	30.5	28.7	32.2	29.0
			PAPER BREAKDOWN:		
CORRUGATED CARDBOARD	4.7	4.8	4.4	4.7	4.8
NEWSPAPERS	10.3	8.5	7.8	8.7	7.0
OFFICE/COMPUTER PAPER	0.5	0.5	0.8	0.7	0.5
MAGAZINES/GLOSSY PAPER	2.8	2.4	2.3	2.8	2.7
BOOKS	0.5	0.5	0.4	0.6	0.7
NON-CORR. CARDBOARD	2.5	2.5	2.3	2.3	2.1
MIXED PAPER	12.1	11.4	11.0	12.4	11.5
PLASTICS	9.6	9.1	8.3	8.0	6.5
			PLASTICS BREAKDOWN:		
CLEAR HDPE CONTAINERS	0.6	0.6	0.5	0.4	0.3
COLORED HDPE CONTAINERS	0.6	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.1	0.1	0.1	0.0
FILMS AND BAGS	5.4	4.9	4.5	4.4	3.7
GREEN PET CONTAINERS	0.1	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.5	0.5	0.4
PVC	0.2	0.2	0.1	0.1	0.0
POLYPROPYLENE	0.1	0.1	0.1	0.1	0.1
POLYSTYRENE	0.9	0.8	0.9	0.9	0.8
MISCELLANEOUS PLASTICS	1.1	1.1	1.0	0.9	0.7
ORGANICS	37.5	38.4	38.2	38.9	
			ORGANICS BREAKDOWN:		
GRASS/LEAVES	1.9	2.6	2.9	7.8	13.1
BRUSH/PRUNINGS/STUMPS	0.5	0.5	0.7	0.7	0.7
LUMBER	1.6	1.7	1.7	2.0	2.4
TEXTILES	4.6	4.6	4.2	4.4	4.3
RUBBER/LEATHER	0.1	0.2	0.1	0.1	0.2
FINES	2.2	2.2	2.1	2.2	2.0
DISPOSABLE DIAPERS	4.0	4.2	3.8	3.5	3.4
FOOD WASTE	14.3	14.2	13.0	11.8	9.6
MISCELLANEOUS ORGANIC	8.4	8.3	7.9	6.9	6.0
GLASS	6.4	5.5	4.9	4.6	4.4
			GLASS BREAKDOWN:		
CLEAR GLASS CONTAINERS	3.3	3.4	3.0	2.9	2.7
GREEN GLASS CONTAINERS	1.0	1.1	1.0	0.9	0.9
BROWN GLASS CONTAINERS	1.0	1.0	0.8	0.7	0.7
MISCELLANEOUS GLASS	0.1	0.1	0.1	0.1	0.0
ALUMINUM	0.9	0.9	0.8	0.9	0.8
			ALUMINUM BREAKDOWN:		
BEVERAGE CONTAINERS	0.4	0.4	0.3	0.3	0.3
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.0	0.0	0.0	0.1	0.1
FERROUS METAL	4.2	4.2	3.9	4.0	3.8
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.4	2.3	2.0	1.9	1.6
OTHER FERROUS METAL	1.6	1.9	1.9	2.0	2.2
INORGANIC/NON-HAZARDOUS	2.6	2.6	2.5	2.6	1.3
			INORGANIC BREAKDOWN:		
BI-METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.2	0.2	0.1
MISCELLANEOUS INORGANIC	2.4	2.4	2.3	2.4	1.2
HAZARDOUS WASTE	0.4	0.4	0.3	0.3	0.2
			HAZARDOUS WASTE BREAKDOWN:		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.2	0.2	0.1	0.1	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.1	0.1	0.1	0.0
CAR BATTERIES	0.1	0.0	0.0	0.0	0.0
MISCELLANEOUS HAZARDOUS	0.0	0.0	0.1	0.1	0.1
BULK ITEMS	6.1	8.5	14.5	6.7	12.4

EXHIBIT 15 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: SPRING 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.3	29.7	28.9	31.0	26.6
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	4.5	4.4	4.4	4.5	4.3
NEWSPAPERS	8.7	8.0	7.8	9.4	7.9
OFFICE/COMPUTER PAPER	0.7	0.6	0.5	0.7	0.5
MAGAZINES/GLOSSY PAPER	3.0	2.6	2.5	2.6	2.4
BOOKS	1.1	0.9	0.7	0.7	0.4
NON-CORR CARDBOARD	2.3	2.2	2.2	2.4	2.3
MIXED PAPER	11.9	11.2	10.8	10.7	8.8
PLASTICS	10.1	9.3	8.8	8.8	7.5
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.5	0.5	0.5	0.5	0.4
COLORED HDPE CONTAINERS	0.6	0.8	0.6	0.8	0.5
LDPE CONTAINERS	0.1	0.1	0.1	0.1	0.1
FILMS AND BAGS	5.6	5.1	4.8	4.5	3.7
GREEN PET CONTAINERS	0.2	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.5	0.4	0.3
PVC	0.1	0.1	0.1	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.9	0.9	0.6
MISCELLANEOUS PLASTICS	1.3	1.2	1.2	1.4	1.7
ORGANICS	38.2	39.0	38.0	40.0	40.3
			ORGANICS BREAKDOWN		
GRASS/LEAVES	1.3	1.4	1.7	3.0	4.5
BRUSH/PRUNINGS/STUMPS	0.3	0.8	0.8	1.6	2.4
LUMBER	2.5	3.0	3.0	3.2	3.2
TEXTILES	5.5	5.3	4.8	4.6	4.7
RUBBER/LEATHER	0.3	0.3	0.3	0.2	0.0
FINES	2.8	2.7	2.6	2.8	2.3
DISPOSABLE DIAPERS	3.5	3.8	3.3	3.5	3.5
FOOD WASTE	14.1	14.3	13.6	12.4	10.9
MISCELLANEOUS ORGANIC	7.9	7.9	7.8	8.8	8.8
GLASS	5.4	5.6	5.3	4.9	4.5
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	3.1	3.3	3.2	3.1	2.9
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.8	0.6
BROWN GLASS CONTAINERS	0.9	0.9	0.9	0.8	0.8
MISCELLANEOUS GLASS	0.3	0.3	0.3	0.2	0.1
.UMINUM	0.9	0.9	0.8	0.8	0.7
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS		0.3	0.3	0.3	0.2
OTHER ALUMINUM CONTAINERS		0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM		0.1	0.1	0.1	0.0
FERROUS METAL	3.8	4.1	4.0	4.4	4.4
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.1	2.1	2.0	1.9	1.5
OTHER FERROUS METAL	1.6	2.0	2.0	2.5	2.9
INORGANIC/NON-HAZARDOUS	3.0	3.0	3.2	2.6	1.4
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.3	0.3	0.2	0.1	0.1
MISCELLANEOUS INORGANIC	2.7	2.7	3.0	2.5	1.3
HAZARDOUS WASTE	0.3	0.4	0.4	0.6	0.7
			HAZARDOUS WASTE BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.1	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.2	0.4
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.2	0.2	0.2
BULK ITEMS	5.1	8.1	10.6	6.9	

EXHIBIT 15 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: SUMMER 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	32.5	30.9	28.7	32.0	27.3
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	5.2	5.1	4.4	4.6	3.9
NEWSPAPERS	10.3	9.2	8.5	9.9	8.2
OFFICE/COMPUTER PAPER	1.1	1.1	1.1	1.5	1.5
MAGAZINES/GLOSSY PAPER	3.2	3.0	2.8	3.1	2.6
BOOKS	1.1	1.1	1.1	1.1	0.6
NON-CORR. CARDBOARD	3.2	3.0	2.8	3.2	3.0
MIXED PAPER	8.4	8.4	8.2	8.5	7.3
PLASTICS		10.7	9.3	1	
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.8	0.6	0.5	0.6	0.5
COLORED HDPE CONTAINERS	0.8	0.7	0.8	0.7	0.5
LDPE CONTAINERS	0.2	0.2	0.2	0.2	0.2
FILMS AND BAGS	6.0	5.4	4.6	4.5	3.3
GREEN PET CONTAINERS	0.2	0.2	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.4	0.4	0.3
PVC	0.2	0.2	0.2	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.6	0.6	0.5
MISCELLANEOUS PLASTICS	1.9	1.9	1.7	1.9	1.8
ORGANICS	38.2	37.6	34.8	38.8	38.6
			ORGANICS BREAKDOWN		
GRASS/LEAVES	0.9	1.5	1.9	3.6	4.9
BRUSH/PRUNINGS/STUMPS	0.2	0.4	0.6	1.4	2.2
LUMBER	2.1	2.5	2.2	2.5	2.5
TEXTILES	6.0	5.9	5.1	4.8	4.7
RUBBER/LEATHER	0.2	0.2	0.2	0.2	0.2
FINES	2.8	2.8	2.2	2.2	1.8
DISPOSABLE DIAPERS	3.4	3.5	3.0	3.4	3.6
FOOD WASTE	11.4	12.8	12.3	12.7	11.5
MISCELLANEOUS ORGANIC	9.4	6.6	7.3	8.0	7.3
GLASS		5.6	5.2	4.9	
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS		2.9	2.8	2.9	
GREEN GLASS CONTAINERS		1.2	1.1	0.9	
BROWN GLASS CONTAINERS		1.0	0.9	0.8	
MISCELLANEOUS GLASS		0.5	0.4	0.3	
ALUMINUM		1.1	0.9	0.9	
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.3	0.3	0.2	0.2	0.1
OTHER ALUMINUM CONTAINERS	0.7	0.6	0.5	0.8	0.5
MISCELLANEOUS ALUMINUM	0.3	0.2	0.2	0.2	0.1
FERROUS METAL		4.1	3.5	3.5	
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.1	2.0	1.7	1.6	1.5
OTHER FERROUS METAL	1.9	2.0	1.8	1.7	1.5
INORGANIC/NON-HAZARDOUS		2.2	2.2	1.5	
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.1	0.1	0.1	0.1	0.1
MISCELLANEOUS INORGANIC	1.6	2.1	2.1	1.4	0.7
HAZARDOUS WASTE		0.4	0.4	0.5	
			HAZARDOUS BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.1	0.1	0.1	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.0	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.2	0.3
MISCELLANEOUS HAZARDOUS	0.2	0.2	0.2	0.2	0.3
BULK ITEMS	7.4	7.4	15.1	8.6	17.5

EXHIBIT 15 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: FALL 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	36.2	32.6	31.1	38.1	33.4
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	5.2	5.3	4.9	4.8	3.7
NEWSPAPERS	11.9	10.0	9.0	10.9	9.6
OFFICE/COMPUTER PAPER	0.4	0.6	0.8	1.1	1.1
MAGAZINES/GLOSSY PAPER	2.9	2.6	2.5	3.2	3.1
BOOKS	0.5	0.6	0.6	1.1	1.4
NON-CORR. CARDBOARD	2.4	2.5	2.4	2.1	1.8
MIXED PAPER	11.9	11.2	10.9	13.2	12.8
PLASTICS	9.9	9.4	8.4		6.0
			PLASTIC BREAKDOWN		
CLEAR HDPE CONTAINERS	0.5	0.8	0.5	0.5	0.3
COLORED HDPE CONTAINERS	0.6	0.8	0.6	0.7	0.6
LDPE CONTAINERS	0.1	0.2	0.2	0.1	0.1
FILMS AND BAGS	5.8	5.2	4.5	4.2	3.2
GREEN PET CONTAINERS	0.1	0.1	0.1	0.1	0.0
CLEAR PET CONTAINERS	0.4	0.4	0.4	0.4	0.3
PVC	0.2	0.2	0.2	0.1	0.0
POLYPROPYLENE	0.2	0.2	0.1	0.2	0.2
POLYSTYRENE	0.9	0.9	0.6	0.7	0.5
MISCELLANEOUS PLASTICS	1.0	1.1	1.0	0.9	0.7
ORGANICS	36.3	37.2	35.9	37.0	37.3
			ORGANICS BREAKDOWN		
GRASS/LEAVES	2.3	3.0	3.8	7.3	9.9
BRUSH/PRUNINGS/STUMPS	0.3	0.3	0.4	0.5	0.6
LUMBER	1.6	1.9	1.9	1.8	1.8
TEXTILES	5.1	5.1	4.4	3.8	2.8
RUBBER/LEATHER	0.1	0.1	0.1	0.3	0.5
FINES	2.2	2.2	2.0	2.0	1.8
DISPOSABLE DIAPERS	3.5	3.6	3.2	3.0	2.9
FOOD WASTE	12.7	13.2	12.5	12.0	11.0
MISCELLANEOUS ORGANIC	7.5	7.8	7.6	6.6	6.2
GLASS	4.9	5.1	4.6	4.2	3.7
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	2.6	2.9	2.8	2.7	2.4
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.7	0.6
BROWN GLASS CONTAINERS	0.9	0.9	0.8	0.7	0.6
MISCELLANEOUS GLASS	0.2	0.2	0.1	0.1	0.1
ALUMINUM	1.1	1.0	0.9	1.0	0.8
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.4	0.4	0.3	0.3	0.3
OTHER ALUMINUM CONTAINERS	0.4	0.5	0.4	0.5	0.4
MISCELLANEOUS ALUMINUM	0.2	0.2	0.2	0.2	0.2
FERROUS METAL	4.2	4.2	3.9	3.9	3.7
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.2	2.2	1.9	1.7	1.4
OTHER FERROUS METAL	2.0	2.0	2.0	2.2	2.3
INORGANIC/NON-HAZARDOUS	1.9	2.2	2.1	1.7	0.9
			INORGANIC BREAKDOWN		
BI - METAL CANS		0.0	0.0	[illegible]	0.0
NON-BULK CERAMICS		0.1	0.2	[illegible]	0.3
MISCELLANEOUS INORGANIC		2.1	1.9	1	0.6
HAZARDOUS WASTE	0.5	0.5	0.3	0.2	0.1
			HAZARDOUS BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.4	0.4	0.2	0.1	
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS HAZARDOUS	0.0	0.0	0.0	0.0	0.0
BULK ITEMS	7.0	7.7	12.9	8.1	14.2

EXHIBIT 15 (continued)

RESIDENTIAL ANNUAL WASTE COMPOSITION BY BOROUGH: 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.6	30.9	29.3	32.8	28.9
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	4.9	4.9	4.5	4.6	4.1
NEWSPAPERS	10.5	8.9	8.3	9.7	8.1
OFFICE/COMPUTER PAPER	0.7	0.7	0.7	1.0	0.9
MAGAZINES/GLOSSY PAPER	3.0	2.7	2.5	.3.0	2.7
BOOKS	0.6	0.8	0.7	0.8	0.8
NON-CORR. CARDBOARD	2.8	2.8	2.4	2.5	2.3
MIXED PAPER	11.0	10.5	10.2	11.2	10.0
PLASTICS	10.3	9.6	8.7	8.5	6.9
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.6	0.6	0.5	0.5	0.4
COLORED HDPE CONTAINERS	0.7	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.2	0.2	0.1	0.1
FILMS AND BAGS	5.7	5.2	4.6	4.4	3.5
GREEN PET CONTAINERS	0.2	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.4	0.4	0.3
PVC	0.2	0.2	0.1	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.6	0.8	0.6
MISCELLANEOUS PLASTICS	1.3	1.3	1.3	1.3	1.2
ORGANICS	36.8	38.1	36.2	38.7	39.4
			ORGANIC BREAKDOWN		
GRASS/LEAVES	1.8	2.1	2.5	5.3	8.0
BRUSH/PRUNINGS/STUMPS	0.3	0.4	0.8	1.1	1.5
LUMBER	2.0	2.3	2.2	2.4	2.4
TEXTILES	5.3	5.2	4.6	4.4	4.1
RUBBER/LEATHER	0.2	0.2	0.2	0.2	0.2
FINES	2.5	2.4	2.2	2.3	2.0
DISPOSABLE DIAPERS	3.6	3.7	3.3	3.4	3.3
FOOD WASTE	13.1	13.8	12.9	12.2	10.7
MISCELLANEOUS ORGANIC	8.3	8.1	7.6	7.6	7.1
GLASS	5.2	5.5	5.0	4.7	4.2
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	3.0	3.1	2.9	2.9	2.7
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.8	0.7
BROWN GLASS CONTAINERS	0.9	1.0	0.9	0.8	0.7
MISCELLANEOUS GLASS	0.3	0.3	0.2	0.2	0.1
ALUMINUM	1.0	1.0	0.9	0.9	0.8
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.3	0.3	0.3	0.3	0.2
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.2	0.1	0.1	0.1	0.1
FERROUS METAL			3.8	3.9	3.7
			FERROUS BREAKDOWN		
FOOD CONTAINERS	2.2	2.1	1.9	1.8	1.5
OTHER FERROUS METAL	1.8	2.0	1.9	2.1	2.2
INORGANIC/NON-HAZARDOUS	2.4	2.5	2.5	2.1	
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.2	0.1	0.1
MISCELLANEOUS INORGANIC	2.2	2.3	2.3	2.0	0.9
HAZARDOUS WASTE	0.4	0.4	0.4	0.4	0.4
			HAZARDOUS BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.2	0.2	0.1	0.1	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.0	0.0	0.1	0.2
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.1	0.1	0.2
BULK ITEMS	8.4	7.9	13.3	8.1	14.7

EXHIBIT 16

CITY-WIDE RESIDENTIAL WASTE COMPOSITION BY SEASON: 1990

WASTE COMPONENT	WINTER	SPRING	SUMMER	FALL	ANNUAL
PAPER	30.8	30.3	30.5	33.7	31.3
CORRUGATED CARDBOARD	4.6	4.4	4.7	4.9	4.7
NEWSPAPERS	8.6	8.8	9.3	10.3	9.2
OFFICE/COMPUTER PAPER	0.6	0.6	1.2	0.8	0.8
MAGAZINES/GLOSSY PAPER	2.6	2.7	2.9	2.8	2.7
BOOKS	0.5	0.8	1.1	0.8	0.8
NON-CORR. CARDBOARD	2.4	2.3	3.0	2.3	2.5
MIXED PAPER	11.7	10.9	8.3	11.9	10.7
PLASTICS	8.4	9.0	9.8	8.5	8.9
CLEAR HDPE CONTAINERS	0.5	0.5	0.6	0.5	0.5
COLORED HDPE CONTAINERS	0.8	0.6	0.7	0.6	0.6
LDPE CONTAINERS	0.1	0.1	0.2	0.1	0.1
FILMS AND BAGS	4.6	4.8	4.8	4.7	4.8
GREEN PET CONTAINERS	0.1	0.1	0.2	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.4	0.5	0.4	0.4
PVC	0.1	0.1	0.2	0.1	0.1
POLYPROPYLENE	0.1	0.1	0.2	0.2	0.1
POLYSTYRENE	0.9	0.9	0.8	0.6	0.8
MISCELLANEOUS PLASTICS	1.0	1.3	1.8	1.0	1.3
ORGANICS	37.9	38.9	36.7	36.3	37.5
GRASS/LEAVES	4.7	2.1	2.3	4.7	3.4
BRUSH/PRUNINGS/STUMPS	0.6	1.0	0.8	0.4	0.7
LUMBER	1.8	3.0	2.3	1.8	2.2
TEXTILES	4.4	5.0	5.3	4.3	4.7
RUBBER/LEATHER	0.1	0.2	0.2	0.2	0.2
FINES	2.2	2.7	2.3	2.0	2.3
DISPOSABLE DIAPERS	3.7	3.5	3.3	3.3	3.4
FOOD WASTE	12.7	13.3	12.2	12.4	12.7
MISCELLANEOUS ORGANIC	7.6	8.2	8.1	7.2	7.8
GLASS	4.9	5.2	5.1	4.8	5.0
CLEAR GLASS CONTAINERS	3.1	3.1	2.8	2.7	2.9
GREEN GLASS CONTAINERS	1.0	1.0	1.0	0.9	1.0
BROWN GLASS CONTAINERS	0.8	0.9	0.9	0.8	0.9
MISCELLANEOUS GLASS	0.1	0.3	0.4	0.2	0.2
ALUMINUM	0.9	0.8	1.0	1.0	0.9
BEVERAGE CONTAINERS	0.3	0.3	0.2	0.3	0.3
OTHER ALUMINUM CONTAINEF	0.5	0.5	0.6	0.5	0.5
MISCELLANEOUS ALUMINUM	0.1	0.1	0.2	0.2	0.1
FERROUS METAL	4.0		3.6	4.0	3.9
FOOD CONTAINERS	2.1	2.0	1.8	1.9	2.0
OTHER FERROUS METAL	1.9	2.1	1.8	2.1	2.0
INORGANIC/NON-HAZARDOU	2.5	2.8	1.8	1.9	2.3
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.1	0.2	0.2
MISCELLANEOUS INORGANIC	2.3	2.7	1.7	1.7	2.1
HAZARDOUS WASTE	0.3	0.5	0.5		0.4
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.1	0.0	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.2	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.1	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.0	0.1
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.2	0.0	0.1
BULK ITEMS	10.4	8.4	11.1	8.9	9.9

EXHIBIT 17
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

SUMMER

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	10.16	9.53	6.02	6.06	12.62	9.07	24.21	11.00	26.59	4.68	7.88	8.76	11.99	6.55
Newsprint	3.32	1.67	1.50	6.62	2.07	0.63	1.33	5.98	2.64	6.90	6.49	5 23	4.38	30.35
Office/Computer	2.60	4.77	1.03	6.70	6.63	1.98	10.21	14.51	10.57	51.17	5.74	22.56	3.75	7.01
Magazines and Glossy	0.98	0.44	6.28	3.06	0.50	0.38	2.70	0.60	0.57	1.77	0.69	5.40	0.83	1.48
Book/Phone Book	0.74	0.41	18.19	2.25	0.04	0.12	0.03	0.98		2.57	0.69	7.99	2.24	0.92
Non−Corrugated OCC	3.56	4.65	2.03	1.29	6.34	3.70	5.06	6.33	3.39	3.19	2.12	3.53	10.18	2.24
Mixed	6.26	4 66	6.66	6.55	5.16	5.81	12.08	12.69	11.19	12.22	11.53	12.36	24.29	16.42
TOTAL PAPER FRACTION	27.59	28.33	41.71	32.56	35.58	21.85	55.64	52.07	54.93	84.50	35.13	65.85	57.66	64.97
Clear HDPE containers	0.27	0.34	0.14	0 31	0.30	0.38	0.20	0.45	0.30	0.08	0.23	0.30	0.17	0.27
Colored HDPE containers	0.34	0 22	0 11	0 21	0 57	0.35	0.62	1.56	0.06	0.08	0.45	0.24	0.09	0.34
LDPE	0.05	0.05		0.01	0.13	0.23	0.30	0.12	0.19	0.08	0.11	0.08	0.02	0.06
Films and Bags	3.58	3.24	2.75	10.34	4 59	5 06	3.45	5.13	3.97	1.70	8.38	3.60	5.03	3.22
Green PET containers	0.11	0.01	0.08		0.13		0.24	0.32	0.01	0.04	0.26	0.43	0.03	0.12
Clear PET Containers	0.23	0.43	0.12	0.09	0.21	0.03	0.16	0.17	0.04	0.13	0.12	0.27	0.10	0.25
PVC	0.08	0.08	0 01	0 04	0.01		0 08		0.22	0.08	0.10	0.01	0.03	0.09
Polypropylene	0.12	0.02	0.01	0.07	0.08	0 14	0.23	0.25	0.73	0.20	0.23	0.02	0.05	⁻0.07
Polystyrene (Estimated for Summer)	2.67	1 10	1 25	1 08	7 23	5 58	2.54	4 69	5 74	1 05	1 38	1 67	1 83	0.83
Miscellaneous Plastic	1.83	5.58	0.38	0.25	0.20	0.10	2.00	0.40	4.46	1.05	1.63	0.25	0.87	0.52
TOTAL PLASTIC FRACTION	9.28	11.04	4 64	12.40	13.45	11.86	9.82	13.11	15.72	4 46	12.86	6 86	6 23	5.77
Grass/Leaves	6 74		2.66	13 28	4 58	0 05	0 23			0.11	13.79	0.37	1 21	0.49
Brush/Prunings/Stumps	1 09	1 23	0.33	8 55	0.74	0 58					1 66	0.35	1 18	
TOTAL YARD WASTE FRACTION	7 83	1 23	2.99	21 84	5.32	0 63	0.23			0.11	15.46	0.72	2.39	
Lumber	5 79	1 80	0.27	6 68	0.94	0.16	0.41	1 43	C 66	0.05	1 61	0.88	1.32	0.60
Textiles	2.67	1 50	0 69	1 69	3.76	3.06	2 79	5.64	1 29	0.60	3 92	1.52	0.75	3.54
Rubber	0 03		0.13	0 23	0 15	0.19	0.35	0 45			1 04	0.24	0.03	0.43
Fines	2.07	1 29	0.65	1 55	1 53	1 66	0.96	1.33	0.60	0.65	2 26	0.72	1 34	2.31
Diapers	1 59	0.32	0.14	0 06	1.31	33.29	4 30	2.43	11.86	0.05	0.05	0.09	0.00	0.27
Foodwaste	16.85	21.48	37.65	3 24	18.01	14 07	11.56	12.73	8.25	2.26	9.79	15.12	8.68	2.17
Miscellaneous Organic	5.21	8.88	1 25	4 26	7 33	6.73	3.75	1 66		0.60	4.52	2.02	5.00	2.64
TOTAL ORGANIC FRACTION	34.21	35.27	40.77	17.74	33.02	59.18	24.11	25.67	22.65	4 41	23.18	20.56	17.11	11.96
Clear Glass containers	1.75	1.31	0.39	1.50	1.77	0.69	8.30	0.56	1 39	2.14	1 21	1 37	1.48	3.71
Green Glass containers	0.26	0.29	0.03	0.31	0.05	0.09	0.10	0.51		0.32	0.26	0.41	0.16	1.09
Brown Glass containers	0.26	0.61	0.05	0.33	0.15	0.08	0.23	0.03		0.08	0.12	0.23	0.08	0.73
Miscellaneous Glass	0.43	0.04				0.03			0.04				1.31	2.02
TOTAL GLASS FRACTION	2.71	2.26	0.47	2.14	1.96	0 68	6.63	1.10	1.43	2.54	1 60	2.01	3.03	7 55
Aluminum Food Containers/Foil	0.45	0.66	0 32	0.51	1 01	0.40	0.58	0 96	0.24	0 80	0.32	0.17	0.65	0.51
Aluminum Beverage Cans	0.31	0.25	0 16	0.41	0.40	0 20	0.48	0.59	0.42	0 69	0.44	0.61	0.89	1.11
Miscellaneous Aluminum	0 14	0 03	0.07	0 06	0.06	0 17	0.09	0.40		0.17	0.20	0.08	0.14	0.11
TOTAL ALUMINIUM FRACTION	0 89	0 94	0 55	0 98	1 47	0 77	1.15	1 94	0.66	1 65	0 96	0 86	1.68	1.72
Ferrous Metal Food containers	1 60	1 72	2 06	1 03	4 46	2.96	1 19	2.39	3 18	0 35	1 28	0.43	1 87	0 67
Other Ferrous Metal	1 93	1 64	0 97	1 61	0.41	0.21	0.36	0 08	0 27	0.28	2.54	1 29	5 28	2.64
TOTAL FERROUS METAL FRACTION	3.53	3 36	3.03	2.64	4 87	3.17	1.55	2.47	3.45	0 63	3.82	1.73	7.16	3.31
Bimetal Cans							0.05						0.04	
TOTAL METAL FRACTION	4 42	4 30	3.58	3 62	6.34	3 94	2.74	4 41		2.28	4 78	2.58	8.88	5.03
Non−bulk Ceramics	0.02	0.03	0.05	0.28						0.02	0.20		0.11	0.08
Miscellaneous Inorganic	3 24	13.64	0.78	6 54	1 98	0.59	0.05	0.03		0.01	4 39		1.24	3.22
TOTAL INORGANIC FRACTION	3.26	13.67	0.83	6.83	1.98	0.59	0.05	0.03		0.03	4.58		1.35	3.30
Pesticides									0.12				0.00	
Non−pesticide Poisons	0 01				0.04	0.01			0.01				0.02	
Paint/Solvent/Fuel	0.56	0.40	0.02		0.09		0.01		0.12	0.08	0.26	0.01	0.03	0 03
Dry Cell Batteries	0 01		0.01		0.01	0.09	0.01			0.03	0.01		0.01	0 04
Car Batteries														
Medical Waste	0 04				0.29	0 37	0.49	3.05	0.76				0.00	
Miscellaneous HHW	0.32		0.02		0.07			0.14					0.03	0.42
TOTAL HHW FRACTION	0.94	0.40	0.05		0.50	0.47	0.51	3.19	1.01	0.11	0.27	0.01	0.10	0.49
TOTAL BULK ITEMS	9.81	5.52	4 79	2.9	1 86	0.57	0.27	0.41	0.12	1.53	2.11	1.4	1.24	0.43

OMD

09-Sep-98

DEMOGRAPHIC DATA FROM THE 1990 CENSUS

INCOME

LOW MEDIAN_HOUSEHOLD_INCOME < $25072
MEDIUM $25072 <= MEDIAN_HOUSEHOLD_INCOME <= $33365
HIGH MEDIAN_HOUSEHOLD_INCOME > $33365

DENSITY

LOW PERCENTAGE OF 1-2 UNITS BUILDING > 67.00
HIGH PERCENTAGE OF 10 OR GREATER UNITS BUILDING > 67.00
MEDIUM OTHERWISE

BORO	DISTRICT	INCOME	INCOME STRATA	PERCENTAGE OF UNITS LOW	MEDIUM	HIGH	DENSITY STRATA	OPULATION	HOUSE_UNITS	HOUSEHOLDS
BK	1	19.9	L	14	50	37	M	155972	55293	52541
BK	2	33.0	M	12	32	57	M	93186	41985	38703
BK	3	17.2	L	22	49	29	M	138291	54209	48510
BK	4	16.7	L	22	68	10	M	102572	31921	30133
BK	5	20.7	L	36	25	39	M	160651	51352	48973
BK	6	35.0	H	20	54	26	M	103234	47400	43949
BK	7	26.5	M	36	40	24	M	110394	40555	38251
BK	8	22.2	L	16	34	50	M	88644	35319	32730
BK	9	25.6	M	20	15	65	M	113398	38319	36938
BK	10	32.7	M	39	21	40	M	111248	51609	48882
BK	11	27.5	M	42	29	29	M	149816	61590	59359
BK	12	26.1	M	36	27	38	M	158948	57139	54253
BK	13	19.8	L	15	12	73	H	106380	45968	44289
BK	14	28.9	M	20	7	73	H	156522	57080	55115
BK	15	32.0	M	44	12	45	M	138667	59546	56714
BK	16	15.7	L	18	30	52	M	82338	27497	25537
BK	17	31.2	M	38	22	41	M	166450	55294	53640
BK	18	38.4	H	72	13	15	L	163953	61595	59682
BX	1	9.9	L	4	13	83	H	77196	25319	24643
BX	2	10.9	L	6	16	78	H	56649	13812	13165
BX	3	10.9	L	6	11	83	H	55333	18444	17670
BX	4	16.1	L	4	7	89	H	118704	41449	39861
BX	5	14.7	L	5	7	89	H	121557	40094	38292
BX	6	12.8	L	8	12	80	H	66103	22393	21403
BX	7	23.4	L	6	6	88	H	130942	50023	48111
BX	8	36.5	H	10	4	86	H	88881	39101	37237
BX	9	24.6	L	20	15	65	M	165913	62199	59499
BX	10	33.6	H	38	12	49	M	97871	41739	40460
BX	11	28.9	M	35	14	51	M	103084	42649	41101
BX	12	32.1	M	44	20	35	M	121556	43733	42670
MN	1	52.1	H	2	15	83	H	24183	13072	11524
MN	2	41.7	H	2	16	82	H	93765	56053	52103
MN	3	20.2	L	1	11	88	H	163578	69108	65864
MN	4	30.7	M	1	12	87	H	84421	53624	48829
MN	5	44.2	H	1	9	91	H	41893	30077	23204
MN	6	47.7	H	1	7	93	H	135362	93188	83730
MN	7	42.2	H	1	10	89	H	211066	125403	115284
MN	8	59.3	H	1	6	93	H	210880	136583	121715
MN	9	21.6	L	1	9	89	H	107480	43585	40396
MN	10	13.9	L	2	15	84	H	99104	46794	41577
MN	11	15.5	L	1	13	87	H	110070	42211	39860
MN	12	22.1	L	1	3	96	H	205734	75429	72336
QN	1	27.7	M	26	32	43	M	174499	74541	71898
QN	2	29.6	M	22	23	55	M	92350	38915	37356
QN	3	31.1	M	34	20	46	M	134517	50694	48558
QN	4	30.1	M	24	26	50	M	133909	47338	45260
QN	5	32.1	M	57	36	7	M	150128	62635	59968
QN	6	36.8	H	19	4	77	H	105912	54130	51289
QN	7	37.0	H	44	13	42	M	221511	87000	83082
QN	8	39.7	H	44	16	40	M	129318	52707	50431
QN	9	35.5	H	57	16	28	M	112003	42944	40967
QN	10	39.2	H	77	15	8	L	108369	37289	36010
QN	11	46.6	H	72	13	15	L	108475	43400	41764
QN	12	33.4	H	64	8	28	M	198959	64045	61538
QN	13	45.8	H	83	7	9	L	181026	58682	57168
QN	14	27.8	M	41	10	49	M	100622	38370	34860
SI	1	36.7	H	67	12	21	L	137801	54161	49949
SI	2	44.9	H	81	9	10	L	114192	42126	39512
SI	3	51.1	H	91	5	4	L	126984	43439	41058

EXHIBIT 17 (continued)
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

FALL

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	12.41	11.10	12.68	13.92	10.73	9.66	19.85	10.55	19.81	5.03	7.61	15.89	15.39	9.33
Newsprint	3.20	4.36	4.36	4.31	3.68	3.27	4.16	5.41	3.94	8.57	4.24	9.57	5.91	36.40
Office/Computer	3.92	5.51	1.62	2.61	3.70	3.65	6.26	9.49	3.70	36.38	0.94	10.77	5.28	2.13
Magazines and Glossy	1.17	1.57	1.40	0.42	2.12	0.90	1.64	1.72	1.32	2.84	0.35	1.47	0.98	1.64
Book/Phone Book	2.00	2.89	2.73	1.22	1.25	0.71	0.62	3.21	0.85	5.40	0.46	0.93	4.46	0.13
Non-Corrugated OCC	3.40	12.61	2.11	1.94	5.08	1.73	3.41	5.30	2.59	3.99	2.13	1.15	3.35	1.77
Mixed	19.32	11.86	27.32	24.59	10.31	9.55	15.16	15.10	19.64	23.95	12.20	25.82	19.75	15.75
TOTAL PAPER FRACTION	45.42	49.91	52.20	48.99	36.88	29.47	51.09	50.77	51.85	86.14	27.92	65.59	55.09	67.16
Clear HDPE containers	0.12	0.08	0.18	0.08	0.14	0.23	0.19	0.06	0.33	0.11	0.12	0.23	0.14	0.11
Colored HDPE containers	0.09	0.06	0.25	0.08	0.54	0.15	0.26	0.19	0.11	0.07	0.08	0.14	0.05	0.06
LDPE	0.01	0.07	0.03	0.01	0.19	0.26	0.44	0.29	0.09	0.01	0.03	0.02	0.01	0.02
Films and Bags	4.37	2.49	4.11	3.56	6.42	5.68	4.45	5.12	4.82	2.79	4.14	4.53	4.00	3.57
Green PET containers	0.02	0.01	0.04	0.01	0.17	0.04	0.73	0.02	0.03	0.24	0.01	0.30	0.03	0.05
Clear PET Containers	0.03	0.08	0.18	0.10	0.18	0.02	0.05	0.04	0.02	0.10	0.07	0.23	0.07	0.10
PVC	0.02	0.02	0.13	0.13	0.04	0.32	0.12	0.28	0.11	0.03	0.03	0.05	0.06	0.13
Polypropylene	0.10	0.01			0.44	0.22	0.26	0.27	0.08	0.02	0.06	0.02	0.01	0.04
Polystyrene (Estimated for Summer)	2.97	0.76	1.28	0.38	1.53	1.25	0.76	0.29	2.54	0.55	0.76	1.89	3.35	0.69
Miscellaneous Plastic	2.76	0.75	0.79	0.86	4.92	3.71	2.85	4.62	4.72	1.64	0.24	0.69	1.30	0.62
TOTAL PLASTIC FRACTION	10.48	4.33	6.99	5.19	14.56	11.68	10.11	11.19	12.85	5.55	5.54	8.09	9.03	5.36
Grass/Leaves	5.39	2.46	8.61	29.43	0.96	4.57	1.16	5.62	0.26	0.08	0.79	5.15	1.46	1.30
Brush/Prunings/Stumps			0.95	0.06		0.11						0.07		0.01
TOTAL YARD WASTE FRACTION	5.39	2.46	9.56	29.49	0.96	4.68	16	5.62	0.26	0.08	0.79	5.22		
Lumber	0.93	1.07	0.18	0.01	0.19	0.28	1.57	0.17	0.24		0.33	2.05	3.30	3.10
Textiles	0.64	0.51	1.75	1.11	3.69	1.40	3.29	3.89	1.56	0.48	2.71	0.84	1.23	4.52
Rubber	0.33		0.07			0.11	0.03	0.08	0.30					0.20
Fines	1.12	1.75	0.47	0.42	1.62	1.88	1.44	0.80	1.27	0.60	0.70	0.62	0.71	1.53
Diapers	0.42	1.49			1.72	19.46	5.56	2.46	3.69		0.13	0.18		0.08
Foodwaste	17.79	19.61	21.18	8.07	13.27	19.37	14.18	12.57	17.90	1.32	55.73	7.26	8.66	0.74
Miscellaneous Organic	3.43	7.36	2.62	0.68	5.22	6.42	5.09	7.48	5.34	0.04	2.41	1.33	2.37	2.03
TOTAL ORGANIC FRACTION	24.65	31.80	26.27	10.29	25.71	48.72	31.16	27.47	30.50	2.43	62.01	12.28	16.26	12.17
Clear Glass containers	0.63	0.80	0.63	0.63	3.98	0.54	1.84	1.20	0.82	1.83	0.35	2.54	1.53	2.38
Green Glass containers	0.23	0.06	0.04	0.06	0.78	0.04	0.08	0.14	0.14	0.64	0.19	0.33	0.17	0.78
Brown Glass containers	0.05	0.03	0.14	0.04	0.70		0.15	0.03	0.07	0.14	0.02	0.20	0.15	0.43
Miscellaneous Glass	0.03		0.09	0.15	5.34	0.03	0.18		0.02	0.02		0.90		0.33
TOTAL GLASS FRACTION	0.94	0.89	0.90	0.87	10.77	0.61	2.24	1.37	1.05	2.63	0.56	3.98	1.85	3.90
Aluminum Food Containers/Foil	0.38	0.26	0.95	0.33	0.31	0.18	0.15	0.24	0.29	0.61	0.29	0.54	0.47	0.13
Aluminum Beverage Cans	0.33	0.17	0.57	1.48	0.48	0.22	0.38	0.49	0.23	0.86	0.25	1.41	0.55	0.57
Miscellaneous Aluminum	0.19		0.08	0.08		0.05	0.02	0.05		0.04			0.01	
TOTAL ALUMINIUM FRACTION	0.87	0.43	1.60	1.89	0.79	0.45	0.55	0.78	0.52	1.51	0.54	1.95	1.03	0.70
Ferrous Metal Food containers	3.27	1.89	1.25	0.73	5.27	2.53	1.67	1.15	2.03	0.44	2.09	0.53	1.31	0.42
Other Ferrous Metal	0.79	1.02	0.93	1.66	2.63	0.95	0.55	0.42	0.45	0.73	0.38	0.53	11.48	6.80
TOTAL FERROUS METAL FRACTION	4.06	2.91	2.18	2.39	7.90	3.47	2.21	1.57	2.48	1.17	2.47	1.07	12.79	7.22
Bimetal Cans												0.02		
TOTAL METAL FRACTION	4.93	3.34	3.78	4.28	8.68	3.92	2.78	2.35	3.00	2.67	3.01	3.04	13.82	7.92
Non-bulk Ceramics	0.68		0.04		0.02		0.02	0.03	0.12		0.01	0.05	0.33	0.05
Miscellaneous Inorganic	6.27	6.39	0.18		1.71	0.35	0.24			0.11	0.01	0.80	0.96	1.65
TOTAL INORGANIC FRACTION	6.95	6.39	0.22		1.73	0.35	0.26	0.03	0.12	0.11	0.02	0.85	1.29	1.69
Pesticides														
Non-pesticide Poisons													0.07	
Paint/Solvent/Fuel			0.05							0.04				
Dry Cell Batteries	0.01		0.03		0.12	0.01		0.08		0.01	0.01			
Car Batteries														
Medical Waste	0.01					0.18	0.37	0.99	0.29					
Miscellaneous HHW	0.06			0.14			0.15		0.12	0.07	0.10		0.09	
TOTAL HHW FRACTION	0.08		0.08	0.14	0.12	0.19	0.52	1.07	0.41	0.12	0.11	0.01	0.16	
TOTAL BULK ITEMS	1.18	0.86		0.74	0.54	0.19	0.69	0.13		0.28	0.04	0.93	1.02	

EXHIBIT 17 (continued)
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

WINTER

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	7 52	8.39	11 48	10 83	12.95	6 06	19.52	10 50	21 87	7 88	9 88	15 51	10 73	9 22
Newsprint	1 79	3 17	1 74	4 24	3.64	1 33	2.45	4 52	2.95	10 51	3.65	9 22	3.10	29 44
Office/Computer	2.07	4 45	3 28	2 47	6 43	1 18	5 75	7 24	5 35	19 50	3 07	14 51	4 86	2.62
Magazines and Glossy	0 96	2.29	2 84	3 92	0 99	0.44	1 87	1 53	0.80	1 10	0.52	2.16	1 31	0 92
Book/Phone Book	0.55	2.73	1 63	0 95	0.81	0 06	0.24	0 34	0 35	2.12	0.28	4 38	1.72	3.76
Non-Corrugated OCC	10.55	10.69	2.91	5 41	2.17	1.38	3.48	3.51	2 89	1 51	2.15	1 20	17 77	1 85
Mixed	15 94	23.06	35.16	26.25	15.02	13 28	19.69	19 21	16.66	32.44	15.23	25.75	21 32	19.36
TOTAL PAPER FRACTION	39.39	54 79	59 03	50.87	42.02	23.73	53.01	46.85	50.87	75 07	34 78	72.71	60.81	67.16
Clear HDPE containers	0.21	0 40	0 54	0 33	0 22	0.23	0.18	0 50	0 26	0.18	0.29	0 27	0 27	0 24
Colored HDPE containers	0.13	0 04	0 12	0 21	0 18	0 20	0 38	0.17	0.09	0.10	0 20	0 12	0.03	0.16
LDPE		0 04	0 01	0 01	0 05	0 01	0 25	0 04	0.09	0.02	0.06	0 14		0.04
Films and Bags	4 38	6 07	4 83	5 60	7 91	9 64	4 62	7.90	4 80	3.84	6.43	4 00	8.18	3.34
Green PET containers	0.05	0.02	0 07	0 08	0 02	0.07	0.34	0.07	0.01	0.01	0.08	0.09	0.05	0 02
Clear PET Containers	0 05	0 08	0 14	0 12	0 24	0.02	0.10	0 23	0.04	0.15	0.18	0.18	0 08	0.09
PVC	0 01	0.02	0.03	0 09	0.05	0 03	0 06	0.13	0.11	0 05	0.11	0.05	0.02	0.03
Polypropylene	0.01	0 06	0.02		0 08	0 03	0 19	0 10	0.29	0.03	0.13	0 02	0.13	0.05
Polystyrene (Estimated for Summer)	2 10	1 32	1 85	1 83	10.67	9.73	2.54	6 79	5.75	1 33	1 84	1 38	1 14	0 92
Miscellaneous Plastic	0 21	0 94	1 23	0 66	0 63	0.51	2.27	2.50	3.33	0.95	0 61	1 07	0 77	0.85
TOTAL PLASTIC FRACTION	7 14	8 99	8 84	8.91	20 05	20.46	10.93	18.42	14 78	6.65	9 90	7 31	9 67	5.74
Grass/Leaves			1 11	0 28	0.39	0 14	0 48	0 13	0.09			0 03	0 02	
Brush/Prunings/Stumps	0 02		0 07		0.14				0.01	0.08		0 05		
TOTAL YARD WASTE FRACTION	0 02		1 18	0 28	0 53		0.48	0.13	0.10	0 08		0.08	0 02	
Lumber	0 35	0 77	1 36	0 15	1 32	0 23	0 78	0 85	0 40	0 29	0 19	0 35	0 16	1 45
Textiles	0 49	4 18	1 09	1 71	5 07	1 33	2 99	3 97	1.71	2.15	3 33	1 15	0 25	5 02
Rubber		0 09	0 06		0.05		0.41	0 15	0.40		0 23		0 04	0 62
Fines	1 91	2 63	2 40	1 77	1 70	1 30	1 10	1 68	0 98	1 52	1 28	1 18	1 60	2 88
Diapers	0 69	0 05	0 09		1 84	21 04	5 91	2 19	6 78	0 02	0 02	0 44	0 01	0 06
Foodwaste	10 14	8 60	8 52	3 93	9 22	18 89	12 34	9.02	14 96	4 34	37 69	8 33	7 96	1 99
Miscellaneous Organic	7 06	6 84	6 09	6 78	8 55	5 44	3.56	6 49	3.41	1 89	4 45	1 48	8.28	2.74
TOTAL ORGANIC FRACTION	20 64	23.15	19 61	14 34	27 73	48 23	27.08	24 34	28.62	10 22	47 19	12 91	18 49	14 75
Clear Glass containers	0.77	0 78	1 60	1 20	1 78	0.57	3.64	2.02	0 98	2.24	0 83	2.92	1 75	1 92
Green Glass containers	0.05	0.34	0 17	0 02	0.52	0.01	0.09	0.17	0.08	0 26	0 10	0.37	0 19	0 40
Brown Glass containers	0.04	0.15			0.28	0.02	0 25	0 25	0.03	0.12	0 04	0 18		0.31
Miscellaneous Glass		0.09	0 02	0 02	0 24	0 07	0 06	0.13	0.03	0 05	0 08	0 09	0 31	0 01
TOTAL GLASS FRACTION	0 86	1 34	1 79	1 24	2.77	0.67	4 04	2.57	1 13	2.67	1 05	3 56	2.24	2.64
Aluminium Food Containers/Foil	0.57	0.69	1 67	1 03	1 08	0.62	0.43	0 77	0.30	0.85	0.23	0 23	0 85	0 21
Aluminium Beverage Cans	0 24	0 81	1 34	1 67	0.52	0.22	0 43	0.78	0 31	0.84	0.35	1 30	1 35	0 83
Miscellaneous Aluminium	0.06	0 11	0.20	0 03	0 05		0.04	0.01	0.01	0.02	0 01			0.01
TOTAL ALUMINIUM FRACTION	0 87	1 61	3 21	2.73	1 65	0 83	0.91	1 56	0.62	1 70	0.58	1 53	2.20	1 05
Ferrous Metal Food containers	2.15	1 40	1 65	0 79	3 17	3 89	1 33	2.35	2 55	0 99	3 90	0 41	2.34	1 08
Other Ferrous Metal	0 24	0 94	2 53	0 46	0 76	0.56	0 58	0.76	0.39	1 45	0 96	1 02	1 46	5 34
TOTAL FERROUS METAL FRACTION	2.38	2.34	4 18	1 25	3.93	4 45	1.92	3.11	2.94	2.44	4 86	1 43	3.80	6 42
Bimetal Cans		0 07	0.06	0 02	0 01		0.02	0 02	0 00	0.02		0 02	0.12	0.03
TOTAL METAL FRACTION	3 25	4 02	7 45	4 00	5.59	5.28	2.84	4 69	3.57	4 16	5.44	2 97	6 12	7 50
Non-bulk Ceramics	0 05	0 10	0 02	0 03	0 03	0.10	0.01	0.01	0 05	0.16	0.01	0.05		0.16
Miscellaneous Inorganic	27 09	5 27	1 47	19 34	0 64	0.08	0 21	0.86		0.55	0.17	0 09	2.27	0 73
TOTAL INORGANIC FRACTION	27 14	5 37	1 49	19 37	0 67	0 18	0.22	0.87	0 05	0.73	0.18	0 14	2.27	0 58
Pesticides							0.01		0.04					
Non-pesticide Poisons			0 01	0 01					0.00	0.03				0.04
Paint/Solvent/Fuel			0 09	0 05	0 02	0 01	0 01	0.01	0.05		0.37	0 04		0 35
Dry Cell Batteries	0.03		0.01				0.01	0.04	0 00	0.04	0 02		0 01	0 61
Car Batteries														
Medical Waste					0 29	0.58	0.79	0.77	0.70					
Miscellaneous HHW		0 15	0 02		0.10		0.11		0.04		0.02			0.18
TOTAL HHW FRACTION	0.03	0.15	0.13	0.08	0.41	0.59	0.92	0.82	0.83	0 07	0.41	0 04	0.01	1 16
TOTAL BULK ITEMS	1 55	2.2	0.46	0 94	0.24	0.74	0.46	1 29	0.06	0.36	1.09	0.28	1 38	0.16

EXHIBIT 17 (continued)
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

SPRING

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	10.06	7.74	7.54	5.45	14.42	8.78	14.51	10.87	19.21	5.24	6.70	10.21	9.87	7.35
Newsprint	2.29	2.63	2.09	3.12	3.49	1.37	1.87	5.98	2.29	11.48	2.79	7.48	4.15	34.97
Office/Computer	0.33	0.85	1.51	1.48	1.73	0.91	0.80	4.72	1.77	13.70	1.69	8.57	1.13	0.72
Magazines and Glossy	0.31	0.48	1.34	0.63	0.33	0.18	1.28	1.60	0.50	1.82	0.39	2.81	0.19	1.00
Book/Phone Book	0.21	3.34	1.09	4.13	0.50	0.06	0.07	0.29	0.21	2.35	0.40	6.11	0.54	0.28
Non-Corrugated OCC	4.09	4.23	1.44	1.56	0.54	0.77	1.96	2.62	2.71	1.26	1.23	1.22	9.38	1.36
Mixed	30.59	28.40	24.66	25.59	17.72	13.41	31.83	28.05	19.15	42.19	14.48	28.03	31.79	18.69
TOTAL PAPER FRACTION	47.88	47.73	39.68	41.93	38.73	25.45	52.32	54.12	45.83	78.02	27.68	64.42	57.05	64.34
Clear HDPE containers	0.19	0.28	0.27	0.22	0.04	0.29	0.16	0.27	0.14	0.14	0.14	0.41	0.11	0.25
Colored HDPE containers	0.18	0.10	0.22	0.17	0.10	0.13	0.27	0.22	0.11	0.14	0.28	0.18	0.19	0.25
LDPE	0.12	0.09		0.01		0.02		0.03			0.05		0.05	0.01
Films and Bags	4.74	5.88	3.29	4.75	8.47	5.93	5.95	8.80	5.62	4.55	6.20	4.09	4.91	2.72
Green PET containers	0.03	0.01	0.02		0.04	0.02	0.05	0.02		0.04	0.02	0.05	0.01	0.01
Clear PET Containers	0.14	0.12	0.06	0.32	0.24	0.01	0.07	0.14	0.06	0.19	0.15	0.35	0.15	0.21
PVC		0.01	0.02			0.01	0.01	0.02	0.01	0.02	0.01			
Polypropylene	0.01		0.10	0.08		0.02	0.07	0.07	0.07	0.02	0.05	0.11	0.02	0.06
Polystyrene (Estimated for Summer)	3.72	1.32	0.77	1.02	9.78	5.76	4.31	6.91	8.95	1.30	1.52	1.79	1.00	0.89
Miscellaneous Plastic	0.24	2.09	0.65	0.54	0.21	0.44	1.98	1.02	0.81	0.48	0.39	0.69	0.55	0.99
TOTAL PLASTIC FRACTION	9.35	9.85	5.40	7.12	16.88	12.63	12.65	15.49	15.77	6.88	8.78	7.64	6.98	5.39
Grass/Leaves	1.53	5.67	26.34	6.21	0.19	1.02	0.04	3.34	0.01	2.18		1.06	2.14	0.95
Brush/Prunings/Stumps	0.03	0.39	0.22			0.03		0.06	0.03	0.06		0.05	3.52	
TOTAL YARD WASTE FRACTION	1.56	6.06	26.55	6.21	0.19	1.05	0.04	3.40	0.04	2.24		1.11	5.66	0.95
Lumber	0.54	0.77	2.30	1.75	1.10	0.28	0.35	1.01	0.31	0.05	0.77	1.08	0.51	0.83
Textiles	1.79	1.10	1.52	4.04	5.35	1.04	2.88	2.52	2.27	0.61	2.68	1.12	0.78	3.51
Rubber	0.25	0.19	0.03	0.05	0.19	0.30	0.85	0.63	0.90		0.03		0.08	0.06
Fines	1.32	1.06	1.16	4.25	1.02	0.94	0.91	0.81	1.07	0.38	0.78	1.28	1.51	1.99
Diapers	1.05		0.08		2.95	26.80	7.87	1.49	4.54	0.08	0.04	0.08		0.08
Foodwaste	23.08	10.94	5.95	3.29	14.19	21.05	11.28	9.46	18.73	3.90	49.60	11.28	9.35	3.10
Miscellaneous Organic	3.94	3.74	4.35	5.35	6.27	3.08	1.82	2.79	4.89	0.88	2.20	2.07	4.38	3.42
TOTAL ORGANIC FRACTION	31.97	17.80	15.38	18.73	31.08	53.49	25.94	18.73	32.70	5.88	56.08	16.88	16.57	12.99
Clear Glass containers	1.39	0.96	0.72	1.09	1.84	0.47	2.80	1.80	0.74	2.51	0.63	4.01	1.15	2.45
Green Glass containers	0.48	0.10	0.05	0.28	0.27	0.05	0.09	0.33	0.11	0.23	0.13	0.56	0.14	1.04
Brown Glass containers	0.30	0.09	0.02	0.08	0.15	0.04	0.36	0.34	0.02	0.26	0.08	0.51	0.10	0.46
Miscellaneous Glass	0.19	0.03	0.01	1.40	0.07	0.05			0.03	0.05	0.35		3.81	0.84
TOTAL GLASS FRACTION	2.36	1.18	0.80	2.81	2.33	0.61	3.24	2.48	0.90	3.05	1.19	5.07	5.00	4.78
Aluminum Food Containers/Foil	0.45	0.91	0.63	0.90	0.76	0.68	0.57	0.93	0.38	0.45	0.24	0.46	0.63	0.32
Aluminum Beverage Cans	0.27	0.86	0.61	1.00	0.37	0.17	0.44	0.72	0.29	0.69	0.14	1.37	0.77	0.58
Miscellaneous Aluminum		0.07	0.01	0.17		0.14	0.02		0.04			0.04	0.41	0.02
TOTAL ALUMINIUM FRACTION	0.72	1.85	1.24	2.07	1.13	0.97	1.03	1.64	0.69	1.13	0.38	1.87	1.82	0.92
Ferrous Metal Food containers	2.57	1.22	0.94	1.46	2.82	2.65	1.14	1.38	2.45	0.46	2.94	0.41	1.97	0.40
Other Ferrous Metal	1.68	5.07	1.76	5.64	0.09	0.74	0.85	0.36	0.45	0.91	0.53	0.92	2.93	6.47
TOTAL FERROUS METAL FRACTION	4.25	6.29	2.70	7.10	2.90	3.38	1.99	1.74	2.90	1.37	3.48	1.33	4.90	6.87
Bimetal Cans	0.01	0.09	0.08	0.01			0.01	0.01	0.01	0.01		0.03	0.01	0.02
TOTAL METAL FRACTION	4.97	8.23	4.02	9.17	4.03	4.35	3.03	3.39	3.60	2.51	3.85	3.23	6.73	7.80
Non-bulk Ceramics						0.03			0.02			0.07		
Miscellaneous Inorganic	1.30	4.90	5.83	5.98	4.28	1.08	0.35	1.54		0.58	19	0.66	0.48	2.53
TOTAL INORGANIC FRACTION	1.30	4.90	5.83	5.98	4.28	1.11	0.35	1.54	0.02	0.58	19	0.73	0.48	2.53
Pesticides							0.02						0.01	
Non-pesticide Poisons								0.01						
Paint/Solvent/Fuel		0.29	0.04	0.02		0.04	0.01	0.01	0.02				0.08	0.01
Dry Cell Batteries			0.03	0.07			0.02		0.01	0.03	0.01	0.01	0.03	0.09
Car Batteries														
Medical Waste					1.07	0.64	1.52	0.24	1.05		0.07	0.03	0.01	
Miscellaneous HHW	0.02	1.05	0.07	0.15	0.51	0.14	0.17			0.10	0.01	0.32	0.01	0.91
TOTAL HHW FRACTION	0.02	1.34	0.14	0.24	1.58	0.82	1.74	0.28	1.06	0.13	0.09	0.38	0.14	
TOTAL BULK ITEMS	0.57	2.66	2.2	7.79	0.88	0.5	0.48	0.61	0.08	0.72	1.18	0.55	1.35	0.2

EXHIBIT 17 (continued)
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

KEY TO INSTITUTIONAL CATEGORY NUMBERS

INSTITUTIONAL CATEGORY NUMBER	DESCRIPTION
1	PUBLIC ELEMENTARY SCHOOLS
2	JUNIOR HIGH SCHOOLS
3	PRIVATE SCHOOLS (KINDERGARTEN – 8TH GRADE)
4	PRIVATE SCHOOLS (8TH – 12TH GRADE)
5	PSYCHIATRIC HOSPITALS
6	SKILLED NURSING FACILITIES
7	MUNICIPAL HOSPITALS
8	TEACHING HOSPITALS
9	NON–PROFIT HOSPITALS
10	GOVERNMENT OFFICE BUILDINGS
11	CORRECTIONAL FACILITIES
12	COLLEGES/UNIVERSITIES
13	PUBLIC HIGH SCHOOLS
14	TRANSPORTATION HUBS

EXHIBIT 18

INSTITUTIONAL WASTE COMPOSITION BY BOROUGH AND CITY-WIDE

	BROOKLYN	BRONX	MANHATTAN	QUEENS	SI	CITY
TOTAL PAPER	53.6	49.5	55.1	51.9	54.2	52.9
CORRUGATED CARDBOARD	9.2	10.0	10.9	9.6	9.4	9.8
NEWSPAPER	5.9	5.1	5.9	5.4	6.2	5.7
OFFICE PAPER	10.8	9.1	10.9	10.0	10.7	10.3
MAGAZINES	2.0	1.8	2.0	1.9	2.0	1.9
BOOKS	2.0	1.9	2.0	1.9	2.3	2.0
NONCORRUGATED CARDBOARD	3.4	3.4	3.2	3.4	3.3	3.4
MIXED PAPER	21.9	20.2	21.0	21.2	22.0	21.3
TOTAL PLASTICS	10.2	11.0	11.2	10.5	9.8	10.5
CLEAR HDPE	0.2	0.2	0.2	0.2	0.2	0.2
COLORED HDPE	0.2	0.2	0.2	0.2	0.2	0.2
LDPE	0.1	0.1	0.1	0.1	0.1	0.1
FILM	4.8	5.1	5.0	4.9	4.7	4.9
GREEN PET	0.0	0.1	0.1	0.0	0.1	0.1
CLEAR PET	0.2	0.2	0.2	0.2	0.2	0.2
PVC	0.1	0.1	0.1	0.1	0.1	0.1
POLYPROPYLENE	0.1	0.1	0.1	0.1	0.1	0.1
POLYSTYRENE	2.6	3.0	3.2	2.8	2.4	2.8
MISCELLANEOUS	1 9	2.0	2.0	1.9	1.8	1.9
TOTAL ORGANICS	22.8	25.9	23.2	24.6	22.5	23.8
GRASS	3.3	2.9	2.3	3.4	3.4	3.1
BRUSH	0.4	0.3	0.2	0.4	0.4	0.4
LUMBER	0.9	0.9	0.8	0.9	1.0	0.9
TEXTILES	2.0	2.2	2.2	2.1	1.9	2.1
RUBBER	0.1	0.2	0.2	0.1	0.1	0.1
FINES	1.3	1.3	1.2	1.3	1.3	1.3
DIAPERS	2.0	2.3	2.2	1.9	1.6	2.0
FOOD WASTE	9.0	11.7	10.3	10.5	9.1	10.1
MISCELLANEOUS	3.8	4.0	3.8	3.9	3.6	3.8
TOTAL GLASS	2.5	2.5	2.8	2.4	2.6	2.5
CLEAR GLASS	1.8	1.8	2.0	1.8	1.8	1.8
GREEN GLASS	0.3	0.3	0.3	0.3	0.3	0.3
BROWN GLASS	0.2	0.2	0.2	0.2	0.2	0.2
MISCELLANEOUS	0.2	0.2	0.3	0.2	0.2	0.2
TOTAL ALUMINUM	1.4	1.3	1.4	1.4	1.4	
BEVERAGE CONTAINERS	0.6	0.6	0.6	0.6	0.7	0.6
ALUMINUM CONTAINERS	0.7	0.6	0.6	0.7	0.6	0.6
MISCELLANEOUS	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL METAL	2.6	2.7	2.5	2.7	2.6	2.6
METAL CONTAINERS	.4	1.6	1.5	1.5	.3	1.5
OTHER METALS	.2	1.1	1.0	1.1	.2	1.1 *
TOTAL INORGANICS	2.9	2.5	1.6	2.7	2.8	2.5
BI - METAL	0.0	0.0	0.0	0.0	0.0	0.0
CERAMICS	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	2.8	2.5	1.6	2.6	2.7	2.5
TOTAL HAZARDOUS	0.3	0.4	0.4	0.3	0.3	0.3
PESTICIDES	0.0	0.0	0.0	0.0	0.0	0.0
NON PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0	0.0
PAINT	0.0	0.0	0.0	0.0	0.0	0.0
DRYCELLS	0.0	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.2	0.2	0.3	0.2	0.2	0.2
CARBATTERY	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.1	0.1	0.0	0.1	0.1	0.1
TOTAL BULK	1.3	1.4	0.9	1.3	1.3	1.3 *

97.8 TOTAL
2.5% BULK

EXHIBIT 19
COMMERCIAL WASTE COMPOSITION BY SUB SECTOR

SUB-SECTOR NUMBER			3							10
WASTE COMPONENTS	SINGLE OFFICE BUILDINGS	MULTI-TENANT OFFICES	WHOLESALE	GENERAL RETAIL	RESTAURANTS	FAST FOOD	APPAREL MANUFACTURE	PRINTING, PUBLISHING	FOOD STORES	HOTELS
PAPER										
Corrugated Craft	11.8	6.7	29.0	45.9	20.0	15.9	11.3		36.1	12.2
Newsprint	10.8	11.1	1.7	9.9	1.9	1.9	0.6	13.5	10.0	7.5
Office/Computer	18.6	27.0	1.3	0.8	0.2	<0.1	0.3	65.0	<0.1	2.8
Magazine/glossy	2.1	3.8	0.4	0.6	0.5	0.7	0.1	.	0.7	4.2
Mixed	43.2	33.9	14.8	10.8	8.7	24.5	11.0	12.7	9.8	24.9
SUBTOTAL	86.4	82.3	47.3	68.0	31.3	43.0	23.3	91.2	56.6	51.6
PLASTICS										
Films and Bags	3.1	2.8	4.8	4.7	4.8	5.4	6.4		2.8	3.3
Rigid Containers	0.3	0.4	0.7	0.5	0.9	1.0	0.1		1.0	0.9
Misc Plastics	2.2	2.7	2.0	3.2	1.2	1.9	1.3	2.1	1.7	2.9
SUBTOTAL	5.6	6.0	7.5	8.4	6.9	8.3	7.8	2.1	5.6	7.2
YARD WASTE										
Misc Yard Wastes	<0.1	0.3	<0.1	<0.1	0.1	0.1	<0.1	2.3	<0.1	0.1
SUBTOTAL	<0.1	0.3	<0.1	<0.1	0.1	0.1	<0.1	2.3	<0.1	0.1
ORGANICS										
Textiles	0.4	0.9	1.0	1.0	0.8	0.4	48.8		0.7	3.6
Food Wastes	1.2	2.1	8.7	1.0	40.8	37.7	0.5		17.5	20.8
Misc Organics	2.1	2.4	25.8	4.2	9.9	4.9	14.8	2.1	14.2	4.4
SUBTOTAL	3.7	5.4	37.4	6.1	51.6	43.0	64.2	2.1	32.4	28.9
GLASS										
Misc Glass	2.0	2.4	1.1	5.2	7.1	2.0	0.5	1.1	1.5	8.5
SUBTOTAL	2.0	2.4	1.1	5.2	7.1	2.0	0.5	1.1	1.5	8.5
METALS										
Misc. Non Ferrous	0.8	1.1	0.6	0.6	0.6	0.8	0.6	1.1	0.7	0.9
Other Ferrous Metals	0.9	1.8	5.5	1.4	2.1	2.6	2.4		2.6	1.4
SUBTOTAL	1.7	2.9	6.1	2.0	2.7	3.4	3.0	1.1	3.3	2.4
HAZARDOUS WASTE										
Misc. HHW	0.2	0.3	<0.1	<0.1		<0.1	0.2			0.2
SUBTOTAL	0.2	0.3	<0.1	<0.1	<0.1	<0.1	0.2		<0.1	0.2
OTHER WASTES										
Misc Other Wastes	0.5	0.6	0.6	10.3	0.3	0.2	1.0	0.2		1.2
SUBTOTAL	0.5	0.6	0.6	10.3	0.3	0.2	1.0	0.2	0.9	1.2
TOTAL	100	100	100	100	100	100	100	100	100	100

NOTE:

Route 8: Printing and Publishing data was collected directly from the private carter and ⟨…⟩ ted by SCS.

EXHIBIT 20

AGGREGATED COMMERCIAL WASTE STREAM COMPOSITION

WASTE COMPONENT	BRONX	BROOKLYN	MANHATTAN	QUEENS	SI	CITY
Corrugated/Kraft	13.4	15.4	19.8	13.6	11.6	17.2
Newsprint	5.4	6.1	6.0	5.2	5.3	5.8
Office/Computer	12.3	14.1	7.3	11.6	13.4	9.7
Magazines/Glossy	0.6	0.6	0.9	0.6	0.5	0.7
Mixed Paper	12.4	13.2	15.2	12.4	11.3	14.0
TOTAL PAPER FRACTION	44.	49.4	49.1	43.5	42.1	47.5
Films and Bags	2.4	2.7	3.2	2.6	2.1	2.9
Rigid Containers	0.4	0.4	0.6	0.4	0.3	0.5
Miscellaneous Plastic	1.5	1.7	1.7	1.5	1.4	1.6
TOTAL PLASTIC FRACTION	4.3	4.8	5.5	4.4	3.9	5.1
TOTAL YARD WASTE FRACTION	0.4	0.5	0.2	0.4	0.4	0.3
Textiles	3.0	4.2	3.6	3.3	2.3	3.5
Foodwaste	8.0	8.5	13.2	9.3	8.0	11.2
Miscellaneous Organic	6.0	6.9	8.9	6.2	4.6	7.7
TOTAL ORGANIC FRACTION	17.0	19.5	25.6	18.8	14.9	22.4
TOTAL GLASS FRACTION	1.9	2.	2.3	2.0	.9	2.2
Miscellaneous Non–Ferrous	0.5	0.5	0.6	0.5	0.4	0.6
Other Ferrous Metals	1.5	1.6	2.0	1.5	1.2	1.8
TOTAL METAL FRACTION	.9	2.2	2.6	2.0	1.6	2.4
TOTAL HAZARDOUS FRACTION	0.0	0.0	0.1	0.0	0.0	0.0
OTHER WASTES	1.2	1.5	1	.2	.2	1.2
BULK	29.1	20.0	13.4	27.6	33.9	18.9

EXHIBIT 21

COMBINED WASTE STREAM COMPOSITION CITY-WIDE

	RESIDENTIAL	INSTITUTIONAL	COMMERCIAL	AGGREGATE
TOTAL PAPER	31.3	52.9	47.5	42.1
CORRUGATED CARDBOARD	4 7	9.8	17.2	11.2
NEWSPAPER	9.2	5.7	5.8	7.2
OFFICE PAPER	0.8	10.3	9.7	6.2
MAGAZINES	2.7	1.9	0.7	1.7
BOOKS	0.8	2.0		
NON-CORRUGATED CARDBOARD	2.5	3.4		
MIXED PAPER	10.7	21.3		
"COMMERCIAL GRADE" MIXED PAPER*	13.9	26.6	14 0	15.9
TOTAL PLASTICS	8.9	10.5	5.	7.5
CLEAR HDPE	0.5	0.2		
COLORED HDPE	0.8	0 2		
LDPE	0.1	0.1		
FILM	4.8	4.9	2.9	4.0
GREEN PET	0.1	0.1		
CLEAR PET	0.4	0.2		
PVC	0.1	0.1		
POLYPROPYLENE	0.1	0.1		
POLYSTYRENE	0.8	2.8		
RIGID CONTAINERS*	2.0	0.8	0 5	1.2
MISCELLANEOUS	1.3	1 9	1 6	1.5
TOTAL ORGANICS	37.5	23.8		
GRASS	3.4	3.1		
BRUSH	0.7	0.4		
TOTAL YARD WASTE*	4 2	3.5	0.3	2.3
LUMBER	2.2	0.9		
TEXTILES	4.7	2.1	3.5	3.8
RUBBER	0.2	0.1		
FINES	2.3	1.3		
DIAPERS	3.4	2.0		
FOOD WASTE	12.7	10.1	11.2	11.8
MISCELLANEOUS	7.8	3.8		
"COMMERCIAL GRADE" MISCELLANEOUS	15 9	8.2	7 7	11.2
TOTAL GLASS	5.0	2.5	2.2	
CLEAR GLASS	2.9	1 8		
GREEN GLASS	1 0	0.3		
BROWN GLASS	0.9	0.2		
MISCELLANEOUS	0.2	0.2		
TOTAL ALUMINUM	0.9	1.4		
BEVERAGE CONTAINERS	0.3	0.6		
ALUMINUM CONTAINERS	0.5	0 6		
MISCELLANEOUS	0.1	0 1		
TOTAL METAL	3.9	2.6	1.6	2.8
METAL CONTAINERS	2 0	1.5		
OTHER METALS [BULK ?]	2.0 1%	1%		
TOTAL INORGANICS	2.3	2.5		
BI - METAL	0.0	0.0		
CERAMICS	0.2	0 0		
MISCELLANEOUS	2.1	2.5		
TOTAL HAZARDOUS	0.4	0.3	<0.1	0.2
PESTICIDES	<0.1	<0.1		
NON PESTICIDE POISONS	<0.1	<0.1		
PAINT	0.1	<0.1		
DRYCELLS	<0.1	<0.1		
MEDICAL WASTE	<0.1	0.2		
CARBATTERY	0.1	<0.1		
MISCELLANEOUS	0.1	0.1		
TOTAL BULK	9.9	1.3	18.9	12.9
OTHER WASTES*	2.3	2.5	1.2	1.8
	100.1	97.8 TOT		

NOTES:

1 * = Commercial Waste Composition Study used different classification scheme from other sectors; Residential and Institutional Compositions recombined according to the Commercial classification as follows:

"Commercial Grade" Mixed Paper includes Books, Magazines/Glossy, and Mixed Paper
"Rigid Containers" includes all HDPE, LDPE, and PET
"Total Yard Waste" includes Grass and Brush
"Commercial Grade" Miscellaneous Organics includes Lumber, Rubber, Fines, Diapers, and Miscellaneous Organics
"Other Wastes" includes Bi-Metal Cans, Non-bulk Ceramics, and Miscellaneous Inorganic

EXHIBIT 22

PROJECTED RESIDENTIAL POPULATION AND WASTE GENERATION 1952–2000

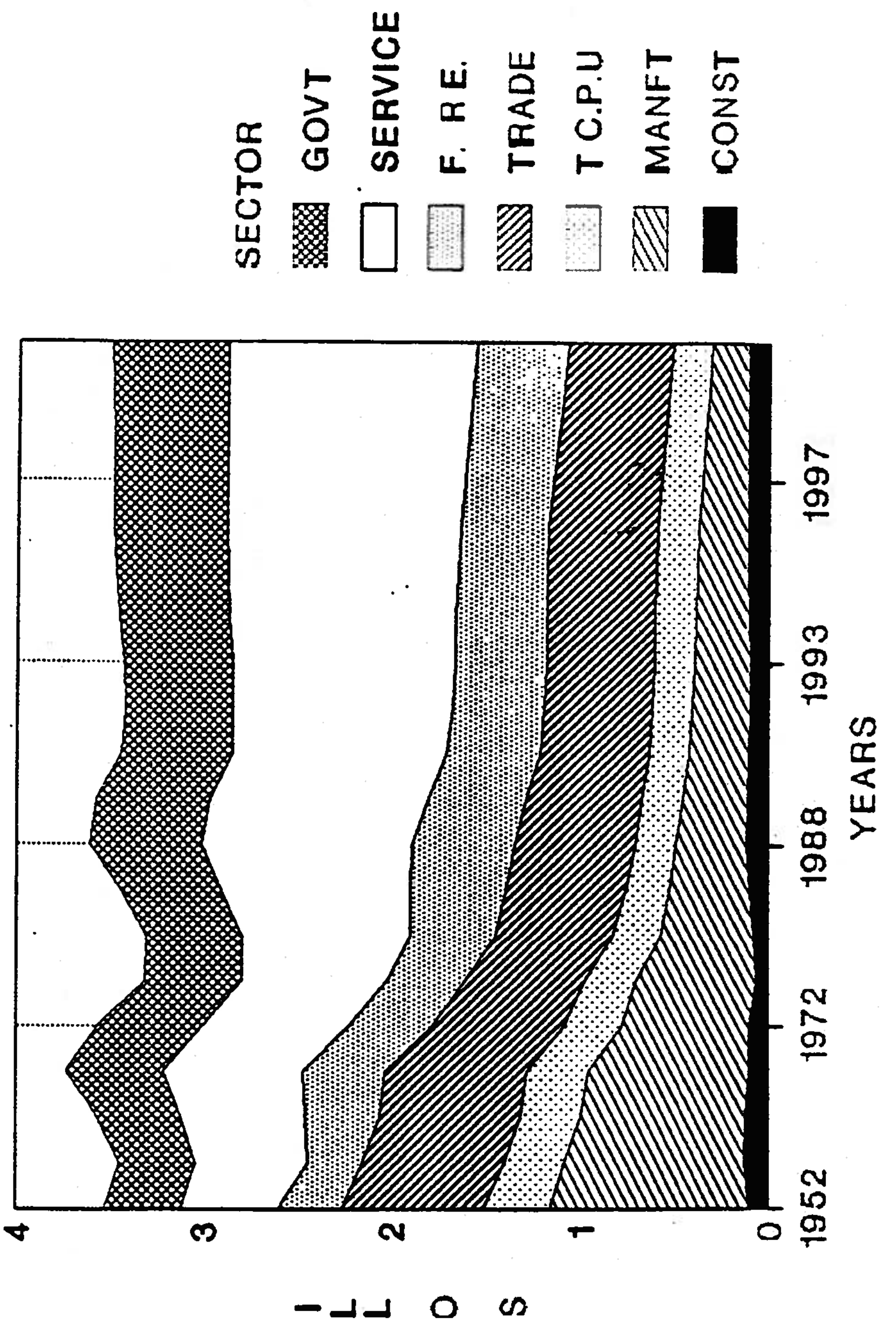
YEAR	PROJECTED HOUSING UNITS*	PROJECTED TONNAGE
	2,744,000	3,213,000
	2,772,000	3,247,000
1960	2,801,000	3,280,000
	2,830,000	3,314,000
	2,858,000	3,348,000
	2,887,000	3,381,000
	2,915,000	3,414,000
	2,959,000	3,465,000
	2,972,000	3,481,000
	3,001,000	3,514,000
	3,015,000	3,531,000
	3,059,000	3,582,000
2000	3,083,000	3,611,000

NOTES.

Housing unit estimates based on data provided by NYC Dept. of Sanitation

EXHIBIT 23

EMPLOYMENT PROJECTIONS CITY WIDE
1952 2000



XH T 4

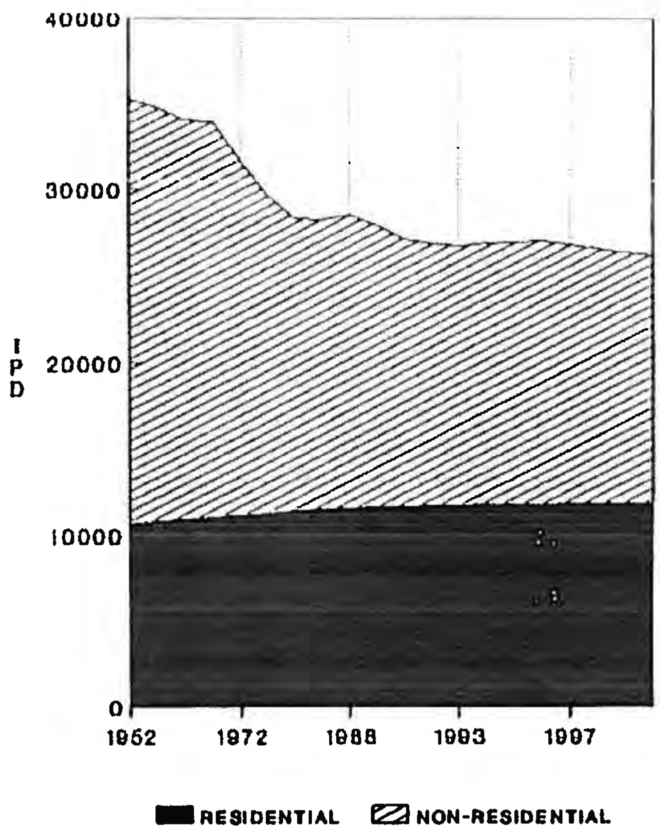
NON RES DENT AL WASTE TONNAGE

PROJECT ONS C TY W DE

952 2000

EXHIBIT 25
PROJECTED AGGREGATE WASTE GENERATION CITYWIDE
1952 - 2000

-SIDENTIAL VERSUS NON-RESIDENTIAL



RESIDENTIAL PORTION OF TOTAL

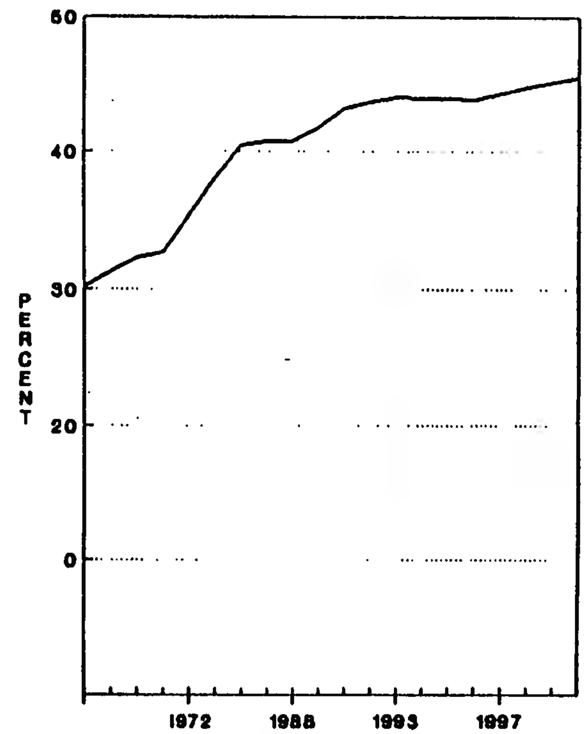


EXHIBIT 26
SUMMARY OF RESIDENTIAL WASTE ANALYSIS
(SAMPLE MEANS)

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS
VOLATILES	%	64.5	79.7	31.9	74.6	77.7	56.2	37.0	26.3				22.4
MOISTURE #	%	18.3	12.7	44.1	10.9	14.7	2.9	60.2	38.1	1.2	0.8	12.0	4.6
ASH	%	6.7	5.0	18.3	1.7	2.4	36.0	3.1	30.3				67.6
FIXED CARBON	%	7.7	1.2	5.1	11.6	9.1	4.4	3.6	7.1				5.3
GROSS HEATING VALUE	BTU / lb	5,389	11,182	2,839	6,523	7,528	8,617	1,681	2,110				1,703
ARSENIC	PPM	3.8	3.1	10.5	4.0	7.6	4.6		3.9	4.0	5.1	31.5	2.3
BARIUM	PPM	27.1	41.3	110.4	34.8	24.1	20.8		81.2	113.8	108.9	24.9	73.0
CADMIUM	PPM	4.8	1.7	5.8	0.6	1.9	1.5		2.0	0.9	0.9	1.3	1.4
CHROMIUM	PPM	8.8	17.9	34.4	7.5	394.8	66.6		29.8	12.9	121.0	45.9	38.7
LEAD	PPM	28.8	58.6	532.4	72.2	15.0	16.4		71.4	767.3	32.4	2066.8	384.7
MERCURY	PPM	0.7	0.7	0.6	0.7	0.5	0.4		0.7	0.1	0.1	0.1	1.1
SELENIUM	PPM	7.2	1.8	1.9	1.5	4.4	41.4		2.6	1.4	1.4	1.7	8.4
SILVER	PPM	0.9	0.9	0.8	1.0	1.5	0.5		0.5	0.9	0.5	0.8	1.0
CARBON	%	34.6	45.2	17.4	42.7	46.3	37.9	15.2	15.2	6.6	1.2		12.8
HYDROGEN	%	7.3	7.6	7.5	6.1	6.0	4.6	10.1	5.6	1.7	1.1		2.7
SULFUR	%	0.12	0.15	0.34	0.06	0.20	0.55	0.06	1.21	0.05	0.08		2.03
NITROGEN	%	0.2	0.1	0.5	0.5	2.4	0.2	0.1	0.7	0.2	0.2		1.7
OXYGEN	%	50.8	49.5	56.0	48.8	42.4	16.8	71.4	46.1	+	+		14.7
CHLORINE	%	0.3	1.3	0.2	0.1	0.4	2.8	0.3	0.2	0.1	0.1		2.3

\# = FOUR SEASON SUMMARY
* = TEST NOT PERFORMED
\+ = NOT DETERMINED

EXHIBIT 27
SUMMARY OF INSTITUTIONAL WASTE ANALYSIS
(SAMPLE MEANS)

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER #	DIAPERS	FINES #	CERAMICS #	GLASS #	METAL #	INORGANICS #
VOLATILES	%	70.9	78.9	37.2	76.0	55.8	59.2	31.0	33.3				19.4
MOISTURE	%	13.6	13.1	52.5	10.3	29.1	2.5	63.4	12.7	0.5	0.3	26.7	8.5
ASH	%	6.7	3.6	4.0	0.6	8.5	24.7	1.9	29.5				70.1
FIXED CARBON	%	8.8	4.3	6.2	13.0	6.5	13.8	3.6	3.1				2.0
GROSS HEATING VALUE	BTU / lb	6,118	12,179	2,779	7,430	6,345	9,902	2,572	2,747				1,210
ARSENIC	PPM	22.1	5.1	60.5	1.0	1.1	1.8		2.0	137.6	2.6	19.4	2.8
BARIUM	PPM	18.6	9.5	10.7	11.1	165.0	10.5		37.6	183.7	89.7	30.4	155.0
CADMIUM	PPM	0.3	12.2	2.6	0.3	3.1	2.9		2.6	6.2	1.1	0.3	0.3
CHROMIUM	PPM	19.8	5.1	78.5	2.6	192.4	710.1		42.7	6.3	55.3	1215.0	16.6
LEAD	PPM	45.9	11.8	11.6	4.9	45.1	618.5		75.0	304.9	700.6	188.8	71.9
MERCURY	PPM	0.5	0.3	1.8	0.7	4.4	0.7		5.2	0.1	0.5	0.8	1.0
SELENIUM	PPM	3.1	1.6	2.2	0.5	1.7	1.1		1.1	1.1	1.2	4.7	1.5
SILVER	PPM	0.5	0.5	0.5	0.6	0.7	0.7		1.5	0.6	0.6	1.6	0.8
CARBON	%	35.5	55.1	19.4	41.4	28.6	49.5	16.2	19.3	1.7	1.7		5.9
HYDROGEN	%	6.8	8.5	8.9	6.4	7.7	5.2	10.0	6.9	1.7	0.7		2.4
SULFUR	%	0.11	0.09	0.15	0.06	0.14	0.67	0.04	0.20	0.11	0.09		0.13
NITROGEN	%	1.00	0.67	0.55	0.02	0.63	1.61	0.28	0.30	0.98	0.44		0.02
OXYGEN	%	49.6	31.3	66.7	51.1	54.0	14.8	71.4	43.7	+	+		22.4
CHLORINE	%	0.27	0.80	0.23	0.33	0.40	3.67	0.13	0.20	0.13	0.86		0.08

= TWO SEASON SUMMARY (SUMMER AND WINTER SEASONS)
* = TEST NOT PERFORMED
+ = NOT DETERMINED

EXHIBIT 28
ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF RESIDENTIAL WASTE STREAM

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS	TOTAL
VOLATILES	%	20.2	7.1	7.8	1.7	3.7	0.1	1.3	0.6				0.6	43.0
MOISTURE #	%	5.7	1.1	10.8	0.2	0.7	0.0	2.1	0.9	0.0	0.0	0.6	0.1	22.3
ASH	%	2.1	0.4	4.5	0.0	0.1	0.1	0.1	0.7	*			1.7	9.7
FIXED CARBON	%	2.4	0.1	1.3	0.3	0.4	0.0	0.1	0.2				0.1	4.9
GROSS HEATING VALUE	BTU / lb	1,685	999	698	145	357	16	57	49	0	0	0	42	4,048
ARSENIC	PPM	1.2	0.3	2.8	0.1	0.4	0.0		0.1	0.0	0.3	1.5	0.1	6.4
BARIUM	PPM	8.5	3.7	27.1	0.8	1.1	0.0		1.9	0.2	5.4	1.2	1.8	51.7
CADMIUM	PPM	1.5	0.2	1.4	0.0	0.1	0.0		0.0	0.0	0.0	0.1	0.0	3.4
CHROMIUM	PPM	2.8	1.6	8.5	0.2	18.7	0.1		0.7	0.0	6.0	2.2	1.0	41.7
LEAD	PPM	9.0	5.2	130.8	1.8	0.7	0.0		1.6	1.2	1.6	100.0	9.5	261.3
MERCURY	PPM	0.2	0.1	0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.0	0.0	0.5
SELENIUM	PPM	2.3	0.2	0.5	0.0	0.2	0.1		0.1	0.0	0.1	0.1	0.2	3.6
SILVER	PPM	0.3	0.1	0.2	0.0	0.1	0.0		0.0	0.0	0.0	0.0	0.0	0.8
CARBON	%	10.8	4.0	4.3	1.0	2.2	0.1	0.5	0.3	0.0	0.1		0.3	23.6
HYDROGEN	%	2.3	0.7	1.8	0.1	0.3	0.0	0.3	0.1	0.0	0.1		0.1	5.8
SULFUR	%	0.04	0.01	0.08	0.00	0.01	0.00	0.00	0.03	0.00	0.00		0.05	0.2
NITROGEN	%	0.06	0.01	0.12	0.01	0.11	0.00	0.00	0.02	0.00	0.01		0.04	0.4
OXYGEN	%	15.9	4.4	13.8	1.1	2.0	0.0	2.4	1.1	+	+		0.4	41.1
CHLORINE	%	0.09	0.12	0.05	0.00	0.02	0.01	0.01	0.00	0.00	0.00		0.06	0.4

= FOUR SEASON SUMMARY
* = TEST NOT PERFORMED
+ = NOT DETERMINED

EXHIBIT 29
ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF INSTITUTIONAL WASTE STREAM

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS	TOTAL
VOLATILES	%	37.5	8.3	6.5	0.7	1.2	0.1	0.6	0.4				0.5	55.6
MOISTURE #	%	7.2	1.4	9.1	0.1	0.6	0.0	1.3	0.2	0.0	0.0	1.1	0.2	21.2
ASH	%	3.5	0.4	0.7	0.0	0.2	0.0	0.0	0.4				2.0	7.2
FIXED CARBON	%	4.7	0.5	1.1	0.1	0.1	0.0	0.1	0.0				0.1	6.6
GROSS HEATING VALUE	BTU / lb	3,235	1,284	483	66	132	14	52	35				34	5,334
ARSENIC	PPM	11.7	0.5	14.0	0.0	0.0	0.0		0.0	0.1	0.1	0.8	0.1	27.2
BARIUM	PPM	9.8	1.0	1.9	0.1	3.4	0.0		0.5	0.1	2.3	1.2	4.3	24.6
CADMIUM	PPM	0.2	1.3	0.5	0.0	0.1	0.0		0.0	0.0	0.0	0.0	0.0	2.1
CHROMIUM	PPM	10.5	0.5	13.6	0.0	4.0	1.0		0.5	0.0	1.4	48.6	0.5	80.7
LEAD	PPM	24.3	1.2	2.0	0.0	0.9	0.9		0.9	0.1	17.6	7.6	2.0	57.8
MERCURY	PPM	0.3	0.0	0.3	0.0	0.1	0.0		0.1	0.0	0.0	0.0	0.0	0.8
SELENIUM	PPM	1.6	0.2	0.4	0.0	0.0	0.0		0.0	0.0	0.0	0.2	0.0	2.5
SILVER	PPM	0.3	0.1	0.1	0.0	0.0	0.0		0.0	0.0	0.0	0.1	0.0	0.5
CARBON	%	18.8	5.6	3.4	0.4	0.6	0.1	0.3	0.2	0.0	0.0		0.2	29.8
HYDROGEN	%	3.6	0.9	1.5	0.1	0.2	0.0	0.2	0.1	0.0	0.0		0.1	6.6
SULFUR	%	0.06	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00		0.00	0.1
NITROGEN	%	0.53	0.07	0.10	0.00	0.01	0.00	0.01	0.00	0.00	0.01		0.00	0.7
OXYGEN	%	26.2	3.3	11.6	0.5	1.1	0.0	1.4	0.6	+	+		0.6	45.3
CHLORINE	%	0.14	0.08	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.02		0.00	0.3

= TWO SEASON SUMMARY (SUMMER AND WINTER SEASONS)
* = TEST NOT PERFORMED
+ = NOT DETERMINED

EXHIBIT 30
ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF COMMERCIAL WASTE STREAM

	UNITS	PAPER	PLASTICS	ORGANICS**	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS++	TOTAL
VOLATILES	%	41.5	4.9	11.2		2.4		+		+			0.3	60.4
MOISTURE	%	8.0	0.6	6.7		1.3		+		+	0.0	0.8	0.1	17.7
ASH	%	3.9	0.2	2.9	+	0.4		+	+	+			1.1	8.5
FIXED CARBON	%	5.2	0.3	1.9	+	0.3	+	+	+	+			0.0	7.6
GROSS HEATING VALUE	BTU / lb	3,584	762	1204.4	+	274	+	+	+	+			19	5,844
ARSENIC	PPM	12.9	0.3	5.0	+	0.0	+				0.1	0.6	0.0	19.0
BARIUM	PPM	10.9	0.6	4.1	+	7.1	+	+	+	+	2.4	0.9	2.4	28.5
CADMIUM	PPM	0.2	0.8	0.5	+	0.1	+	+	+	+	0.0	0.0	0.0	1.6
CHROMIUM	PPM	11.6	0.3	49.4	+	8.3	+	+	+	+	1.5	35.4	0.3	106.7
LEAD	PPM	26.9	0.7	41.9	+	1.9	+	+	+	+	18.8	5.5	1.1	97.0
MERCURY	PPM	0.3	0.0	0.5	+	0.2	+	+	+	+	0.0	0.0	0.0	1.1
SELENIUM	PPM	1.6	0.1	0.3		0.1	+	+	+	+	0.0	0.1	0.0	2.5
SILVER	PPM	0.3	0.0	0.2	+	0.0	+	+	+	+	0.0	0.0	0.0	0.6
CARBON	%	20.6	3.4	6.9	+	1.2	+	+	+	+	0.0		0.1	32.5
HYDROGEN	%	4.0	0.5	1.6	+	0.3	+	+	+	+	0.0		0.0	6.7
SULFUR	%	0.06	0.01	0.05	+	0.01	+	+	+	+	0.00		0.00	0.1
NITROGEN	%	0.59	0.04	0.13	+	0.03	+	+	+	+	0.01		0.00	0.6
OXYGEN	%	29.1	2.0	11.7	+	2.3	+	+	+	+	+		0.3	45.4
CHLORINE	%	0.16	0.05	0.2	+	0.02	+	+	+	+	0.02		0.00	0.5

= BASED ON SUMMARY OF INSTITUTIONAL WASTE ANALYSIS
* = TEST NOT PERFORMED
+ = NOT DETERMINED
** = PHYSICAL/CHEMICAL CHARACTERIZATION FOR ORGANIC INCLUDES LUMBER, RUBBER, DIAPERS, AND FINES
++ = PHYSICAL/CHEMICAL CHARACTERIZATION FOR INORGANIC INCLUDES CERAMICS

EXHIBIT 31
ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF CITY–WIDE WASTE STREAM

	UNITS	RESIDENTIAL PROPERTIES	INSTITUTIONAL PROPERTIES	COMMERCIAL PROPERTIES	WEIGHTED AVERAGE [a]
VOLATILES	%	43.0	55.8	60.4	52.7
MOISTURE	%	22.3	21.2	17.7	20.0
ASH	%	9.7	7.2	8.5	8.8
FIXED CARBON	%	4.9	6.6	7.6	6.4
GROSS HEATING VALUE	BTU / lb	4,048	5,334	5,844	5042.0
ARSENIC	PPM	6.4	27.2	19.0	15.1
BARIUM	PPM	51.7	24.6	28.5	37.4
CADMIUM	PPM	3.4	2.1	6	2.4
CHROMIUM	PPM	41.7	80.7	106.7	76.6
LEAD	PPM	261.3	57.8	97.0	158.4
MERCURY	PPM	0.5	0.8	1.1	0.8
SELENIUM	PPM	3.6	2.5	2.5	2.9
SILVER	PPM	0.8	0.5	0.8	0.7
CARBON	%	23.6	29.8	32.5	28.5
HYDROGEN	%	5.8	6.6	6.7	6.3
SULFUR	%	0.2	0.1	0.	0.2
NITROGEN	%	0.4	0.7	0.8	0.6
OXYGEN	%	41.	45.3	45.4	43.6
CHLORINE	%	0.4	0.3	0.5	0.4

[a] THE AGGREGATED WASTE STREAM IS COMPOSED OF:
3,465,347 TONS OF RESIDENTIAL WASTE,
1,187,132 TONS OF INSTITUTIONAL WASTE, AND
3,864,800 TONS OF COMMERCIAL WASTE

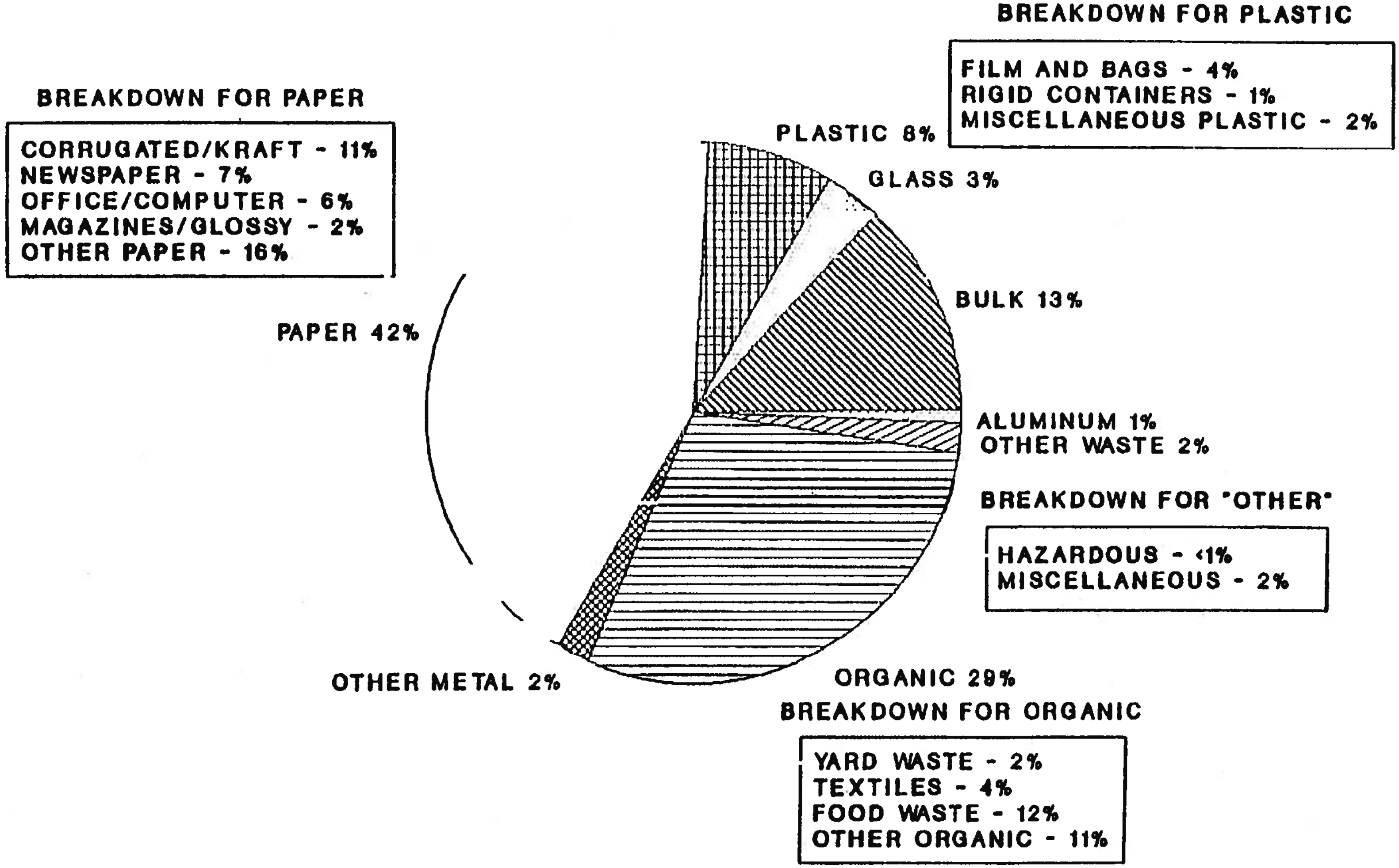
EXHIBIT 32
COMPACTION TESTING OF RESIDENTIAL WASTE

	NUMBER OF MEASUREMENTS	AVERAGE LOOSE DENSITY (LBS/CY3)	AVERAGE COMPACTED DENSITY (LBS/CY3)	COMPACTION INDEX
SPRING 1989				
MIXED	4	0.61	1.27	2.1
W/O RECYCLABLES	5	0.71	1.26	1.8
RECYCLABLES ONLY	1	0.30	0.58	1.9
1989				
MIXED	5	0.57	1.18	2.1
W/O RECYCLABLES	5	0.56	1.16	2.1
RECYCLABLES ONLY	1	0.20	0.48	2.4
WINTER 1990				
MIXED	5	0.49	0.86	1.8
W/O RECYCLABLES	4	0.50	0.70	1.4
RECYCLABLES ONLY	4	0.49	1.01	1.8
SPRING 1990				
MIXED	6	0.39	1.13	2.9
W/O RECYCLABLES	4	0.43	1.49	3.5
RECYCLABLES ONLY	2	0.32	0.83	2.6
TOTAL				
MIXED	20	0.50	1.11	2.2
W/O RECYCLABLES	18	0.56	1.16	2.1
RECYCLABLES ONLY	8	0.39	0.79	2.0

EXHIBIT 33
COMPACTION TESTING OF INSTITUTIONAL WASTE

	NUMBER OF MEASUREMENTS	AVERAGE LOOSE DENSITY (LBS/CY3)	AVERAGE COMPACTED DENSITY (LBS/CY3)	COMPACTION INDEX
FALL 1989				
MIXED	8	0.35	1.01	2.9
W/O RECYCLABLES	8	0.39	1.10	2.8
RECYCLABLES ONLY	1	0.41	0.68	1.6
WINTER 1990				
MIXED	5	0.44	0.83	1.9
W/O RECYCLABLES	4	0.44	0.64	1.5
RECYCLABLES ONLY	3	0.25	0.63	2.5
SPRING 1990				
MIXED	1	0.43	1.25	2.9
W/O RECYCLABLES	3	0.43	1.45	3.4
RECYCLABLES ONLY	6	0.17	0.94	5.7
TOTAL				
MIXED	14	0.39	0.96	2.5
W/O RECYCLABLES	15	0.41	1.05	2.5
RECYCLABLES ONLY	10	0.21	0.82	3.8

EXHIBIT 34
AGGREGATED WASTE STREAM COMPOSITION



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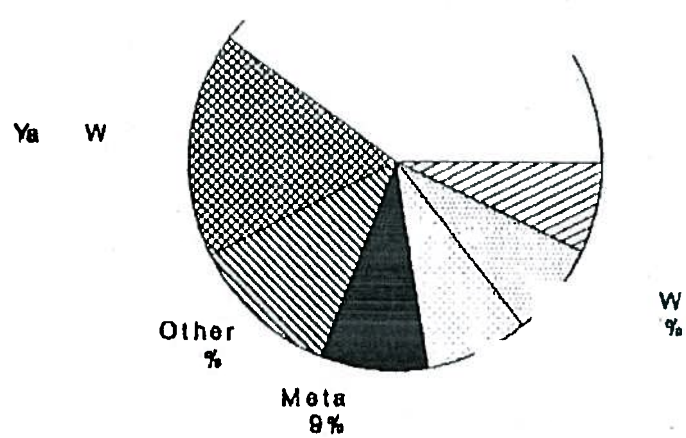

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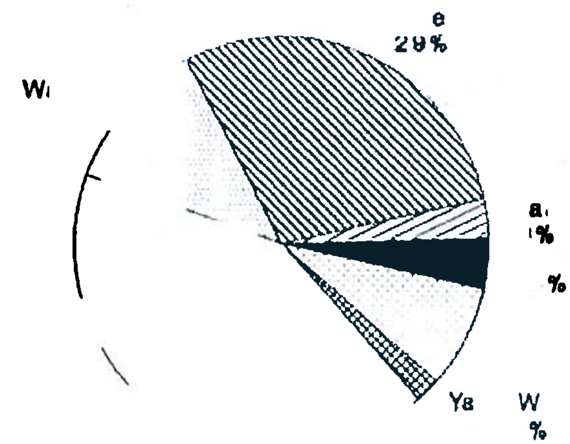

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EXHIBIT 16 (continued)

RESIDENTIAL ANNUAL WASTE COMPOSITION BY BOROUGH: 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.6	30.6	29.3	32.6	28.6
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	4.8	4.8	4.5	4.8	4.1
NEWSPAPERS	10.8	8.8	8.3	8.7	8.1
OFFICE/COMPUTER PAPER	0.7	0.7	0.7	1.0	0.9
MAGAZINES/GLOSSY PAPER	3.0	2.7	2.5	3.0	2.7
BOOKS	0.8	0.8	0.7	0.8	0.6
NON-CORR. CARDBOARD	2.8	2.8	2.4	2.5	2.3
MIXED PAPER	11.0	10.5	10.2	11.2	10.0
PLASTICS	10.3	9.8	8.7	8.5	6.9
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.6	0.8	0.5	0.5	0.4
COLORED HDPE CONTAINERS	0.7	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.2	0.2	0.1	0.1
FILMS AND BAGS	5.7	5.2	4.8	4.4	3.5
GREEN PET CONTAINERS	0.2	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.4	0.4	0.3
PVC	0.2	0.2	0.1	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.8	0.6	0.6
MISCELLANEOUS PLASTICS	1.3	1.3	1.3	1.3	1.2
ORGANICS	38.8	38.1	38.2	38.7	39.4
			ORGANIC BREAKDOWN		
GRASS/LEAVES	1.8	2.1	2.5	5.3	8.0
BRUSH/PRUNINGS/STUMPS	0.3	0.4	0.6	1.1	1.5
LUMBER	2.0	2.3	2.2	2.4	2.4
TEXTILES	5.3	5.2	4.6	4.4	4.1
RUBBER/LEATHER	0.2	0.2	0.2	0.2	0.2
FINES	2.5	2.4	2.2	2.3	2.0
DISPOSABLE DIAPERS	3.6	3.7	3.3	3.4	3.3
FOOD WASTE	13.1	13.8	12.8	12.2	10.7
MISCELLANEOUS ORGANIC	8.3	8.1	7.8	7.6	7.1
GLASS	5.2	5.5	5.0	4.7	
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	3.0	3.1	2.8	2.9	2.7
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.8	0.7
BROWN GLASS CONTAINERS	0.9	1.0	0.9	0.8	0.7
MISCELLANEOUS GLASS	0.3	0.3	0.2	0.2	0.1
ALUMINUM	1.0	1.0	0.9	0.9	0.8
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.3	0.3	0.3	0.3	0.2
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.2	0.1	0.1	0.1	0.1
FERROUS METAL	4.1	4.1	3.8	3.9	3.7
			FERROUS BREAKDOWN		
FOOD CONTAINERS	2.2	2.1	1.9	1.8	1.5
OTHER FERROUS METAL	1.8	2.0	1.9	2.1	2.2
INORGANIC/NON-HAZARDOUS	2.4	2.5	2.5	2.1	1.1
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.2	0.1	0.1
MISCELLANEOUS INORGANIC	2.2	2.3	2.3	2.0	0.8
HAZARDOUS WASTE	0.4	0.4	0.4	0.4	0.4
			HAZARDOUS BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.2	0.2	0.1	0.1	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.0	0.0	0.1	0.2
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.1	0.1	0.2
BULK ITEMS	8.4	7.9	13.3	8.1	14.7

EXHIBIT 16

CITY-WIDE RESIDENTIAL WASTE COMPOSITION BY SEASON: 1989

WASTE COMPONENT	WINTER	SPRING	SUMMER	FALL	ANNUAL
PAPER	30.8	30.3	30.8	33.7	31.3
CORRUGATED CARDBOARD	4.6	4.4	4.7	4.9	4.7
NEWSPAPERS	8.6	8.8	9.3	10.3	9.2
OFFICE/COMPUTER PAPER	0.8	0.8	1.2	0.8	0.8
MAGAZINES/GLOSSY PAPER	2.6	2.7	2.9	2.6	2.7
BOOKS	0.5	0.8	1.1	0.8	0.8
NON-CORR. CARDBOARD	2.4	2.3	3.0	2.3	2.5
MIXED PAPER	11.7	10.8	8.3	11.8	10.7
PLASTICS	8.4	9.0	9.8	9.5	8.9
CLEAR HDPE CONTAINERS	0.5	0.5	0.6	0.5	0.5
COLORED HDPE CONTAINERS	0.6	0.6	0.7	0.6	0.6
LDPE CONTAINERS	0.1	0.1	0.2	0.1	0.1
FILMS AND BAGS	4.6	4.8	4.8	4.7	4.8
GREEN PET CONTAINERS	0.1	0.1	0.2	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.4	0.5	0.4	0.4
PVC	0.1	0.1	0.2	0.1	0.1
POLYPROPYLENE	0.1	0.1	0.2	0.2	0.1
POLYSTYRENE	0.9	0.9	0.6	0.6	0.8
MISCELLANEOUS PLASTICS	1.0	1.3	1.8	1.0	1.3
ORGANICS	37.9	38.9	36.7	36.3	37.5
GRASS/LEAVES	4.7	2.1	2.3	4.7	3.4
BRUSH/PRUNINGS/STUMPS	0.6	1.0	0.8	0.4	0.7
LUMBER	1.8	3.0	2.3	1.8	2.2
TEXTILES	4.4	5.0	5.3	4.3	4.7
RUBBER/LEATHER	0.1	0.2	0.2	0.2	0.2
FINES	2.2	2.7	2.3	2.0	2.3
DISPOSABLE DIAPERS	3.7	3.5	3.3	3.3	3.4
FOOD WASTE	12.7	13.3	12.2	12.4	12.7
MISCELLANEOUS ORGANIC	7.6	8.2	8.1	7.2	7.8
GLASS	4.9	5.2	5.1	4.6	5.0
CLEAR GLASS CONTAINERS	3.1	3.1	2.8	2.7	2.9
GREEN GLASS CONTAINERS	1.0	1.0	1.0	0.9	1.0
BROWN GLASS CONTAINERS	0.8	0.9	0.9	0.8	0.9
MISCELLANEOUS GLASS	0.1	0.3	0.4	0.2	0.2
ALUMINUM	0.9	0.8	1.0	1.0	0.9
BEVERAGE CONTAINERS	0.3	0.3	0.2	0.3	0.3
OTHER ALUMINUM CONTAINEF	0.5	0.5	0.6	0.5	0.5
MISCELLANEOUS ALUMINUM	0.1	0.1	0.2	0.2	0.1
FERROUS METAL	4.0	4.1	3.6	4.0	3.9
FOOD CONTAINERS	2.1	2.0	1.8	1.9	2.0
OTHER FERROUS METAL	1.9	2.1	1.8	2.1	2.0
INORGANIC/NON-HAZARDOU	2.5	2.8	1.8	1.9	2.3
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.1	0.2	0.2
MISCELLANEOUS INORGANIC	2.3	2.7	1.7	1.7	2.1
HAZARDOUS WASTE	0.3	0.5	0.5	0.3	0.4
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.1	0.0	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.2	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.1	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.0	0.1
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.2	0.0	0.1
BULK ITEMS	10.4	8.4	11.1	9.9	9.9

EXHIBIT 17
INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

SUMMER

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	10.18	9.53	8.02	8.06	12.82	6.07	24.21	11.00	28.59	4.88	7.88	6.78	11.89	6.58
Newsprint	3.32	1.67	1.50	8.82	2.07	0.83	1.39	5.98	2.94	8.90	6.49	5.23	4.38	30.35
Office/Computer	2.80	4.77	1.03	6.70	9.83	1.98	10.21	14.51	10.57	81.17	5.74	22.56	3.75	7.91
Magazines and Glossy	0.88	0.44	6.28	3.06	0.50	0.38	2.70	0.80	0.57	1.77	0.88	5.40	0.83	1.48
Book/Phone Book	0.74	0.41	18.19	2.25	0.04	0.12	0.03	0.88		2.57	0.89	7.88	2.24	0.82
Non-Corrugated OCC	3.56	4.65	2.03	1.29	6.34	3.70	5.08	8.33	3.39	3.10	2.12	3.53	10.18	2.39
Mixed	6.29	4.88	8.66	6.55	5.16	5.81	12.06	12.69	11.19	12.22	11.53	12.36	24.29	16.42
TOTAL PAPER FRACTION	27.59	28.33	41.71	32.56	35.56	21.85	58.84	52.07	54.93	84.50	35.13	65.66	57.88	64.97
Clear HDPE containers	0.27	0.34	0.14	0.31	0.30	0.38	0.20	0.46	0.30	0.08	0.23	0.30	0.17	0.27
Colored HDPE containers	0.34	0.22	0.11	0.21	0.57	0.35	0.62	1.56	0.08	0.08	0.45	0.24	0.09	0.34
LDPE	0.05	0.05		0.01	0.13	0.23	0.30	0.12	0.19	0.08	0.11	0.08	0.02	0.08
Films and Bags	3.56	3.24	2.75	10.34	4.59	5.08	3.45	5.13	3.87	1.70	8.38	3.60	5.03	3.22
Green PET containers	0.11	0.01	0.08		0.13		0.24	0.32	0.01	0.04	0.28	0.43	0.03	0.12
Clear PET Containers	0.23	0.43	0.12	0.09	0.21	0.03	0.18	0.17	0.04	0.13	0.12	0.27	0.10	0.25
PVC	0.08	0.08	0.01	0.04	0.01		0.08		0.22	0.08	0.10	0.01	0.03	0.08
Polypropylene	0.12	0.02	0.01	0.07	0.08	0.14	0.23	0.25	0.73	0.20	0.23	0.02	0.06	0.87
Polystyrene (Estimated for Summer)	2.67	1.10	1.25	1.08	7.23	5.58	2.54	4.69	5.74	1.05	1.38	1.67	1.83	0.83
Miscellaneous Plastic	1.83	5.56	0.36	0.25	0.20	0.10	2.00	0.40	4.46	1.05	1.83	0.25	0.87	0.52
TOTAL PLASTIC FRACTION	9.28	11.04	4.84	12.40	13.45	11.88	9.82	13.11	15.72	4.46	12.88	6.66	8.23	5.77
Grass/Leaves	6.74		2.66	13.28	4.58	0.05	0.23			0.11	13.79	0.37	1.21	0.49
Brush/Prunings/Stumps	1.09	1.23	0.33	8.55	0.74	0.58					1.68	0.35	1.18	
TOTAL YARD WASTE FRACTION	7.83	1.23	2.99	21.84	5.32	0.63	0.23				15.46	0.72	2.39	0.49
Lumber	5.79	1.80	0.27	6.68	0.94	0.16	0.41	1.43	0.68	0.05	1.81	0.88	1.32	0.80
Textiles	2.67	1.50	0.69	1.69	3.78	3.08	2.79	5.84	1.29	0.80	3.92	1.52	0.75	3.54
Rubber	0.03		0.13	0.23	0.15	0.19	0.35	0.45			1.04	0.24	0.09	0.45
Fines	2.07	1.29	0.66	1.55	1.53	1.66	0.86	1.33	0.60	0.65	2.26	0.72	1.34	2.31
Diapers	1.59	0.32	0.14	0.06	1.31	33.29	4.30	2.43	11.86	0.05	0.05	0.00	0.00	0.27
Foodwaste	16.85	21.48	37.65	3.24	16.01	14.07	11.56	12.73	6.25	2.26	9.79	15.12	8.68	2.17
Miscellaneous Organic	5.21	8.66	1.25	4.28	7.33	6.73	3.75	1.66		0.60	4.52	2.02	5.00	2.84
TOTAL ORGANIC FRACTION	34.21	35.27	40.77	17.74	33.02	59.18	24.11	25.67	22.65	4.41	23.18	20.59	17.11	11.89
Clear Glass containers	1.75	1.31	0.39	1.50	1.77	0.69	6.30	0.58	1.39	2.14	1.21	1.37	1.48	3.71
Green Glass containers	0.28	0.29	0.03	0.31	0.05	0.09	0.10	0.51		0.32	0.28	0.41	0.16	1.69
Brown Glass containers	0.28	0.61	0.05	0.33	0.15	0.08	0.23	0.03		0.08	0.12	0.23	0.08	0.73
Miscellaneous Glass	0.43	0.04				0.09			0.04				1.31	2.02
TOTAL GLASS FRACTION	2.71	2.28	0.47	2.14	1.98	0.86	6.63	1.10	1.43	2.54	1.60	2.01	3.03	7.55
Aluminium Food Containers/Foil	0.45	0.66	0.32	0.51	1.01	0.40	0.56	0.96	0.24	0.80	0.32	0.17	0.66	0.51
Aluminium Beverage Cans	0.31	0.25	0.16	0.41	0.40	0.20	0.48	0.59	0.42	0.68	0.44	0.61	0.89	1.11
Miscellaneous Aluminium	0.14	0.03	0.07	0.06	0.08	0.17	0.09	0.40		0.17	0.20	0.08	0.14	0.11
TOTAL ALUMINIUM FRACTION	0.89	0.94	0.55	0.98	1.47	0.77	1.15	1.94	0.66	1.65	0.98	0.86	1.68	1.72
Ferrous Metal Food containers	1.60	1.72	2.06	1.03	4.46	2.96	1.19	2.39	3.18	0.35	1.28	0.43	1.87	0.67
Other Ferrous Metal	1.93	1.64	0.97	1.61	0.41	0.21	0.36	0.08	0.27	0.28	2.54	1.29	5.28	2.64
TOTAL FERROUS METAL FRACTION	3.53	3.36	3.03	2.64	4.87	3.17	1.55	2.47	3.45	0.63	3.82	1.73	7.16	3.31
Bimetal Cans							0.05						0.04	
TOTAL METAL FRACTION	4.42	4.30	3.58	3.62	6.34	3.94	2.74	4.41	4.11	2.28	4.78	2.58	8.86	5.03
Non-bulk Ceramics	0.02	0.03	0.06	0.28						0.02	0.20		0.11	0.08
Miscellaneous Inorganic	3.24	13.64	0.78	6.54	1.98	0.59	0.05	0.03		0.01	4.39		1.24	3.22
TOTAL INORGANIC FRACTION	3.26	13.67	0.83	6.83	1.98	0.59	0.05	0.03		0.03	4.58		1.35	3.30
Pesticides									0.12				0.00	
Non-pesticide Poisons	0.01				0.04	0.01			0.01				0.02	
Paint/Solvent/Fuel	0.56	0.40	0.02		0.09		0.01		0.12	0.08	0.26	0.01	0.03	0.03
Dry Cell Batteries	0.01		0.01		0.01	0.09	0.01			0.03	0.01		0.01	0.04
Car Batteries														
Medical Waste	0.04				0.29	0.37	0.49	3.05	0.78				0.00	
Miscellaneous HHW	0.32		0.02		0.07			0.14					0.03	0.42
TOTAL HHW FRACTION	0.94	0.40	0.05		0.50	0.47	0.51	3.19	1.01	0.11	0.27	0.01	0.10	0.49
TOTAL BULK ITEMS	9.81	5.52	4.79	2.9	1.86	0.57	0.27	0.41	0.12	1.53	2.11	1.4	1.24	0.43

Operations Planning
Evaluation and Control

NYC Department of Sanitation

NEW YORK CITY WASTE COMPOSITION STUDY (1989-90)

VOLUME 1

Help Reduce
New York's Waste.
Please Recycle.

New York City
Waste Composition Study
(1989-90)

Final Report
Volume 1

New York City
Department of Sanitation
Operations Planning Evaluation and Control
125 Worth Street, Eighth Floor
New York, New York 10013
(212) 788-3802

ACKNOWLEDGEMENTS

This report, New York City Waste Composition Study (1989-90), was developed under New York City Department of Sanitation Contract No. 89-07653 with SCS Engineers. Alex Prutkovsky, Deputy Director, Operations Planning, Evaluation and Control (OPEC), provided the overall direction. W. Gregory Vogt of SCS Engineers was the Project Manager. The major contributors to the study were staff members at the Operations Management Division of OPEC under the guidance of Mr. Prutkovsky, and solid waste staff at SCS Engineers in Reston, Virginia. Subconsultant services were provided by Konheim & Ketcham of Brooklyn, New York.

Pre-paid orders are accepted for the entire set of 10 volumes of the study, or for individual volumes. An Executive Summary highlighting the major findings of the study is also available. For information, call (212) 788-3802, or write to the Office of the Assistant Commissioner, Department of Sanitation, Room 715, 125 Worth Street, New York, New York 10013.

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VOLUME 1

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SECTION 1

INTRODUCTION

The solid waste management alternatives available today are more complex than the traditional landfilling of waste, requiring a more in-depth knowledge of two important waste stream characteristics -- quantity and composition.

Assessment of the waste stream provides the basic information for evaluating the existing solid waste management system, and supporting effective decisions specific to implementation of future waste management programs.

This study reflects the efforts of the Department of Sanitation (DOS) to accurately define the waste stream generated in New York City. The project was initiated in response to Local Law 19 requiring the City to achieve a mandatory recycling goal of at least 25 percent of the waste stream.

The field data collected will be used by DOS to implement recycling feasibility studies, pilot-scale and demonstration scale projects, and full-scale facilities. Furthermore, the study's results will be used to develop marketing programs and future waste management strategies.

Examples of future follow-on efforts include:

- Evaluation of existing collection systems.
- Design of source reduction programs.
- Development of educational programs.
- Evaluation of waste-to-energy facility feasibility.
- Identification and removal of small quantity toxics in the waste stream.

Because it is important to understand "who" is generating "how much" of "what type" of waste, DOS designed a study to assess separately the waste generated by three distinct sources: residences, institutions, and commercial establishments.

As a result, over 750,000 pounds of refuse were sampled from:

- 23 residential communities across four boroughs.
- 40 private and municipal institutions.
- Over 200 private businesses.

Because waste generation and composition is influenced by seasonal changes, the study was designed to evaluate seasonality by sampling wastes generated during different times of the year.

This Final Report provides:

- A summary of the methodology developed for the waste composition study;
- A description of New York City waste generation and composition;
- A summary of the results obtained for the residential, institutional, and commercial waste streams;
- A synopsis of waste composition and generation projections for the years 1995 and 2000; and
- A discussion of solid waste management policy implications presented by the study results.

The information and field data obtained from the study are presented as a 10-volume series:

- Volume 1 - Final Report: Presents an overview of the study methodology and program design, results obtained, and implications for waste management planning.
- Volume 2 - Residential Sector: Provides the results of the residential waste composition study by season including composition, bulk items, and generation rates.

- Volume 3 - Institutional Sector: Presents the seasonal results of the institutional waste composition study.

- Volume 4 - Commercial Sector: Presents estimated composition and generation rates for commercial waste based on the results of the 1-season study.

- Volume 5 - Chemical Analysis: Provides a discussion of the chemical characteristics of the New York City waste stream as determined by a laboratory analysis of waste stream samples.

- Volume 6 - Compaction Testing: Presents the results of the compaction testing program designed to measure changes in residential and institutional refuse density.

- Volume 7 - Residential Sector Raw Data: Provides data gathered during the residential waste composition study field activities.

- Volume 8 - Institutional Sector Raw Data: Presents data gathered during field activities undertaken during the institutional waste composition study.

- Volume 9 - Commercial Sector Raw Data: Includes data gathered as part of the commercial waste composition study.

- Volume 10 - Chemical Analysis Raw Data: Provides data developed during the chemical analysis of residential and institutional refuse samples.

SECTION 2

OVERVIEW OF THE SOLID WASTE MANAGEMENT SYSTEM

The design of the waste composition study was developed with consideration for key aspects of the City's existing solid waste management system. This system includes the generation, collection, and disposal of various waste types by both the public and private sectors. An understanding of the existing waste system was necessary to ensure that the design of the waste sampling program would obtain and assemble data that are representative of the total municipal solid waste (MSW) stream.

The principle sources of solid waste and the key programs in place to manage this waste stream are described below.

SOLID WASTE GENERATORS

Exhibit 2-1 presents a summary of the major MSW-generating activities in the City, based on historical disposal records maintained by DOS. These records identify the quantity and source of MSW as it is received at DOS facilities around the City; approximately 30,000 tons of municipal solid waste were generated per day in 1990.

As shown, the three major generators of municipal solid waste in the City are commercial, residential, and institutional activities.

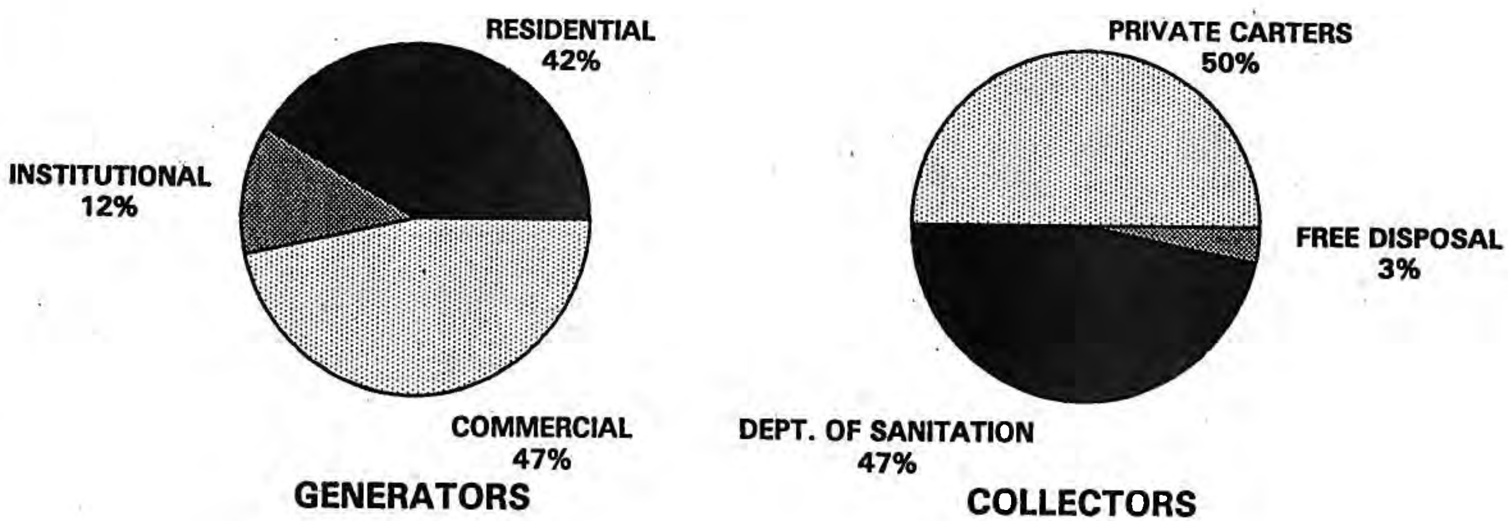
Exhibit 2-1 also shows an analysis of those agencies or organizations which perform collection services for the waste generated, highlighting the relative proportions being collected by each. In general, collection services are provided by DOS, private carters, and by generators themselves.

Collection of solid waste by either the public or private sector is usually a function of the waste type generated. For example, waste generated from households is considered residential. Virtually all residences within the five City boroughs receive collection service from DOS.

Solid waste originating from public agencies, non-profit organizations, and selected public service entities is considered institutional. Waste collection service for institutional establishments is provided by both DOS and the generators themselves.

EXHIBIT 2-1

MSW GENERATION AND COLLECTION
NEW YORK CITY



TOTAL = 30,000 TPD

For the majority of these institutions (e.g., schools, hospitals, City government), collection and disposal services are provided by DOS. Establishments which do not receive DOS collection (e.g., Transit Authority) contract for collection services through a private carter. In cases where a private carter is providing the institutional waste collection service, the hauler is not charged for disposal at DOS facilities.

Exhibit 2-1 shows that approximately 1,000 tons (3 percent of 30,000 tpd) of free disposal wastes are collected daily. Solid waste generated from business, trade, or other commercial establishments is considered commercial. Solid waste from commercial establishments is collected almost exclusively by private carters.

As shown in Exhibit 2-1, quantities of residential and commercial waste generated City-wide are similar (41 compared to 47 percent, by weight), with institutional wastes making up the remaining 12 percent. In terms of total collection service, private carters collect slightly more than half of the City's total waste stream, through collection of the commercial waste sector and the collection/free disposal arrangement provided to select institutions.

SOLID WASTE COLLECTORS

Exhibit 2-2 presents a breakdown of major DOS refuse collection programs by collection quantity, based on 1990 historical disposal records maintained by DOS. These collection programs are regular/curbside, bulk, and containerized. Exhibit 2-2 also provides a summary of the number of collection vehicles used per day under each collection program.

Regular or curbside collection operations are those which require the individual generators (e.g., each household) to put refuse for collection out onto the sidewalk on specified collection days.

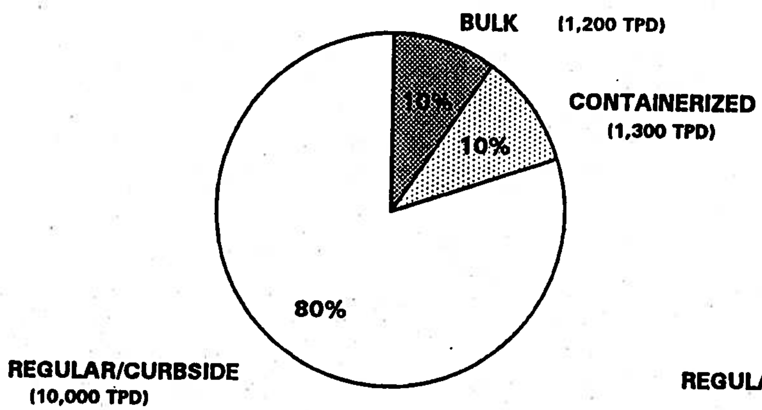
The refuse put out each day is then collected using a rear-loading compactor vehicle, operated by a DOS crew. Most of the City's collection fleet (approximately 80 percent) is equipped to service this type of collection program.

Larger household items requiring disposal, such as unwanted furniture or household appliances, are collected by DOS separately as bulk waste. Bulk items constitute approximately 10 percent of all MSW quantities collected by DOS.

EXHIBIT 2-2

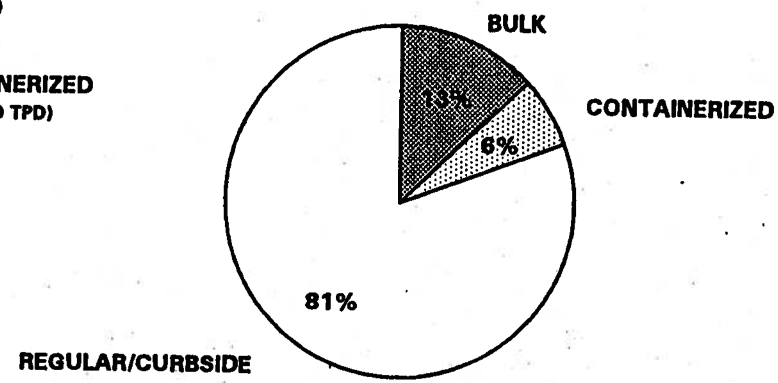
MAJOR DOS REFUSE COLLECTION OPERATIONS

COLLECTION QUANTITIES



TOTAL = 12,500 TPD

COLLECTION VEHICLES



TOTAL = 1,240 TRUCKS/DAY

Bulk waste is made up of lot cleaning, bulk items left on the curbside with other refuse, and drop-off sites open to City residents (known as the "self-help" program). It should be noted that bulk waste is difficult to collect efficiently; it typically requires more collection vehicles than regular/curbside programs on a vehicles-per-ton-collected basis.

Due to the large quantities of waste generated by high-density housing (e.g., apartment complexes) and large institutions (e.g., municipal hospitals), DOS provides collection service at these locations using roll-off containers (or "dumpsters").

This containerized service uses front-end loading E-Z Pak collection vehicles (roll-on/off hoist-fitted chassis vehicles), operated by a one or two-man crew. This operation collects about 10 percent of the total waste collected by DOS.

As shown in Exhibit 2-2, DOS containerized collection represents about six percent of the collection vehicle fleet.

<u>DOS Recyclables Collection Programs</u>

Exhibit 2-3 presents a breakdown of the major DOS recycling collection programs by quantities collected, based on 1990 recycling records maintained by DOS. Exhibit 2-3 also provides a summary of the number of recyclables collection vehicles used per day under the specific recycling programs.

Generally, the four recycling collection programs are curbside, lot cleaning, containerized, and organic wastes. A total of 703 tons per day were generated from these programs in 1991, collected by approximately 182 DOS vehicles.

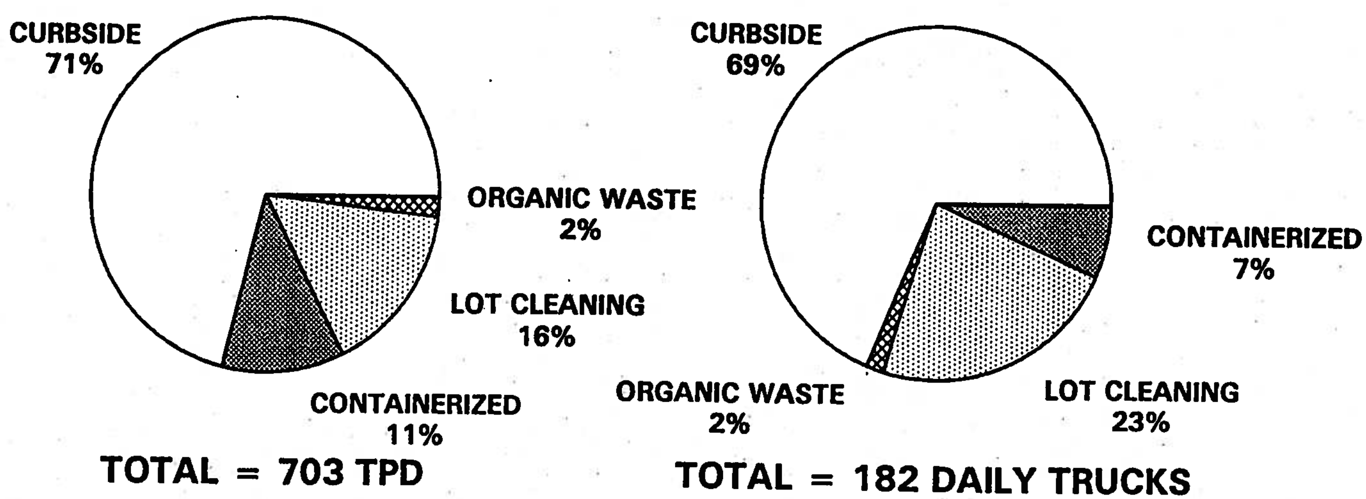
<u>DOS Street Cleaning Operations</u>

An additional source of MSW generated in the City and collected by DOS is street cleaning waste. The three DOS programs for collection of street cleaning wastes are:

- <u>MLP/Dump Outs</u>. This program manages all waste collected by the Motorized Litter Patrol and waste from street cleaning operations dumped out at specific locations.

EXHIBIT 2-3

MAJOR DOS RECYCLING OPERATIONS



- Basket Routes. This program manages street-side containers of loose refuse.

- Mechanical Brooms. This program manages street cleaning waste not left at MLP/dump-out sites.

Exhibit 2-4 presents an estimate of street cleaning waste quantities collected per day, as well as the number of work shifts (8-hour day) used by DOS to provide this service. This estimate was provided by DOS.

As shown, an estimated 800 tons of street cleaning waste are collected on a daily basis.

SOLID WASTE DISPOSAL/PROCESSING

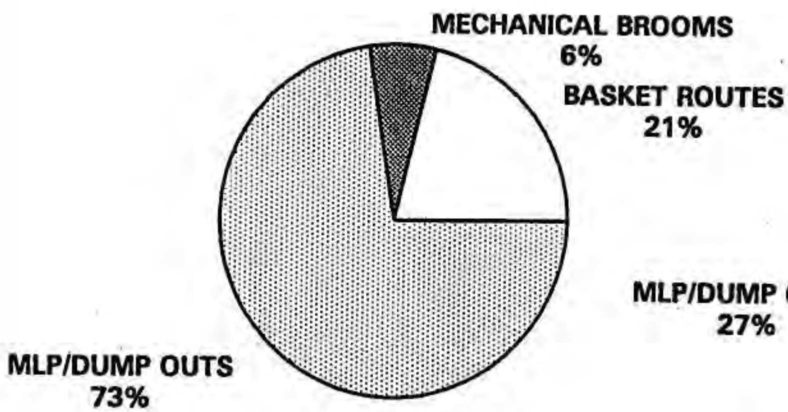
Exhibit 2-5 presents a graphical comparison of major MSW disposal and processing operations performed by DOS and by private carters. For the 15,700 tons per day of waste managed by DOS, disposal/processing options include landfilling, incineration, and recycling.

As shown, over 90 percent of these DOS-collected wastes are landfilled, while only four percent are recycled. For the waste collected by private carters, an estimated 24 percent is either recycled or processed at local facilities.

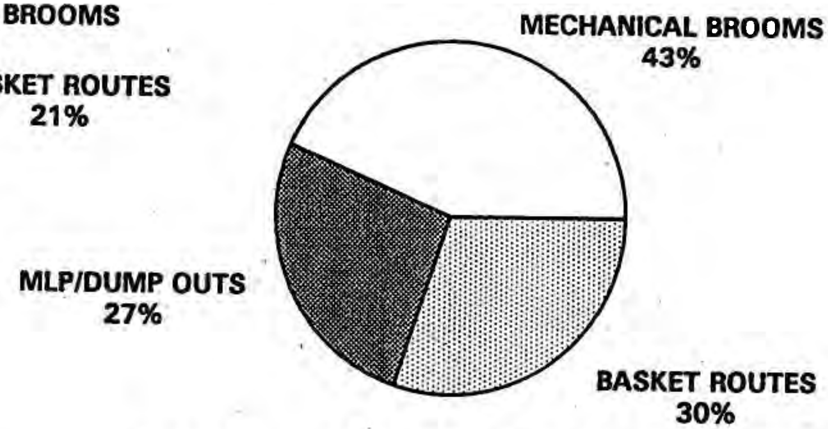
The remaining waste is exported from the City, by various means, for ultimate disposal (usually landfilling or incineration).

EXHIBIT 2-4

MAJOR DOS STREET CLEANING OPERATIONS



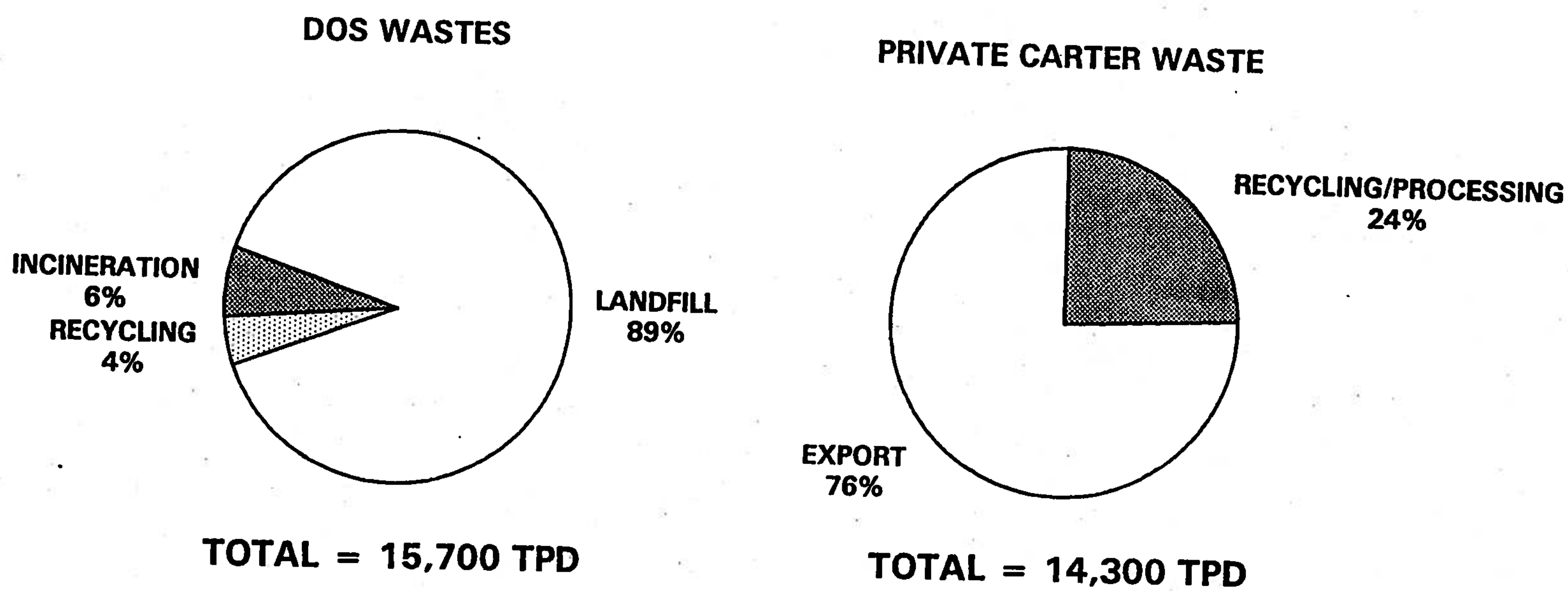
TOTAL = 800 TPD



TOTAL = 415 DAILY WORKSHIFTS

EXHIBIT 2-5

MSW DISPOSAL/PROCESSING



SECTION 3

PROGRAM DESIGN

INTRODUCTION

Because of the variation in waste generated by residences, commercial establishments, and institutions, the objective of the overall program design was to perform field sampling of each major waste stream.

A further objective was to perform field sampling for specific key generators within each targeted waste stream, so as to:

- Gain defendable data that could be used to represent the total waste stream generated in New York City in 1989-1990; and

- Make useful projections of the character of the City's waste stream in future years.

To this end, the program design relied on stratified random sampling for specific generators within the residential, institutional, and commercial sectors.

Because of the large number of residences, institutions, and commercial establishments that exist within the city, it was not practical to collect, weigh, and sort waste from every source.

Therefore, waste generators chosen for study were selected on the basis that they could be considered representative of significant portions of each waste stream. The following provides a general discussion of the methodology used to identify and select representative strata and generators for each of the waste streams.

RESIDENTIAL SAMPLE

The residential waste composition study methodology was based on the assumption that waste generating patterns are influenced by demographic variations. The two demographic factors evaluated in this study were median household income and population density.

Nine residential sampling strata were developed based on relative household income level and population density. The information used to develop the sampling strata was obtained from 1980 Census data.

Initial selection of residential areas for sampling was made at the Census tract level; data from census tracts summaries were considered to be an appropriate means to describe past, present, and future demographic profiles.

For each of approximately 1200 census tracts located in the City, the mean household income and population density (in persons/acre) were calculated. Census tracts were then ranked by mean income.

Income strata were defined such that one third of all Census tracts City-wide would fall into one of three income strata (i.e., the top 600 strata were defined as high income strata, the next 600 defined as medium income, and so on). This ranking and sorting exercise was repeated for population density.

Selection of the actual census tracts to be sampled within each strata was then based on identifying those tracts which did not fail some general sample design criteria. Census tracts were excluded from consideration for sampling based on the following:

- Income and/or population density within the tract fell within the top or bottom 5 percent of the population as a whole;

- Recycling programs were already established and in-place within the tract; and

- The Census tract was located close to or adjacent to the boundary of the next borough or Sanitation District.

After the list of potential Census tracts for sampling was modified using these criteria, two census tracts were selected from each strata for sampling. Selection of the final study tracts considered the following secondary variables:

- Geographic location;

- Ethnicity; and

Specific facilities from each category were selected for the study based on the following:

- Method of waste collection (serviceable by DOS containerized service);
- Representativeness of general category based on relevant activities and characteristics;
- Lack of any ongoing or planned recycling program during the course of the study;
- Geographic location to enable efficient route development; and
- Size of facility.

After the initial list of potential institutions for sampling was developed using these criteria, two or more individual institutions were selected from each category for sampling.

Actual sampling was to be conducted using a dedicated collection vehicle which would collect only waste from selected study institutions. Consequently, final selection of institutions for sampling considered geographic location as a secondary criteria; where possible, institutions that were selected within each category were chosen to be as close to one another as possible (for easier sample collection).

A list of institutions chosen for sampling is presented in Exhibit 3-2.

COMMERCIAL SAMPLE

The first step in the selection process was to identify general categories of commercial establishments. This was accomplished through the use of Standard Industrial Classification (SIC) Codes.

SIC codes were developed and are used by the U.S. Department of Labor to classify commercial businesses by the type of business they conduct. Briefly, commercial activity type is divided into eight major sub-headings, described by a unique SIC code:

EXHIBIT 3-2

INSTITUTIONS CHOSEN FOR SAMPLING

DESIGNATED CATEGORY	BOROUGH	INSTITUTIONS TO BE SAMPLED
Government Offices	Brooklyn	Brooklyn Municipal Building Appellate Court Department of Social Services Department of Health
Public Elementary Schools	Bronx	P.S. #65 P.S. #132 P.S. #63 P.S. #60 P.S. #66 P.S. #75
	Brooklyn	P.S. #181 P.S. #93 P.S. #28 P.S. #73 P.S. #263 P.S. #184
	Queens	P.S. #134 P.S. #116 P.S. #160 P.S. #50 P.S. #40 P.S. #140 P.S. #45 P.S. #142 P.S. #80 P.S. #137 P.S. #15 P.S. #191
Private Schools (K – 8)	Staten Island	Academy of St. Dorothy St. John's Lutheran Joseph Hill Academy St. Patrick St. Joseph and Thomas

EXHIBIT 3-2 (cont'd)

DESIGNATED CATEGORY	BOROUGH	INSTITUTIONS TO BE SAMPLED
Junior High Schools	Brooklyn	J.H.S. #43 J.H.S. #78 Shellbank J.H.S
Private Schools (6 – 12)	Queens	Grover Cleveland H.S. Christ The King H.S.
Public High Schools	Queens	Jamaica H.S. Thomas Edison H.S. Townsend H.S.
Psychiatric Hospital	Brooklyn	Kingsborough Psychiatric Hospital
Municipal Hospital	Manhattan	Metropolitan Hospital
Teaching Hospital	Staten Island	Bayley Seton Hospital
Non–Profit Hospital	Queens	La Guardia Hospital
Nursing Homes	Queens	Peninsula Nursing Home Bezalel Nursing Home
	Bronx	Morningside Home Workmans Circle for the Aged
Correctional Facilities	Queens	Queensboro Correctional Facility
	Bronx	Bronx House of Detention
Colleges/Universities	Manhattan	Fordham University John Jay College
Transportation Hubs	Manhattan	Grand Central Station TA Platform 207 TA Platform 239

SIC Code	Commercial Activity
0 - 09	Agriculture
10 - 19	Mining/Agriculture/Construction
20 - 39	Manufacturing
40 - 49	Transportation and Utilities
50 - 59	Wholesale and Retail
60 - 69	Finance, Insurance and Real Estate (FIRE)
70 - 89	Services
90 - 99	Government

In general, major commercial groups are identified by the lowest SIC code within the group, e.g., Manufacturing may be generally referred to as SIC 20. More specific classifications for each business within each sub-heading can be made by adding more digits to the code.

For example,

- All manufacturing businesses are classified as SIC 20 (the general classification);
- Businesses which manufacture apparel are classified as SIC 23 (the specific type of manufacturing);
- Businesses which manufacture women's and girl's outerwear are classified as SIC 233 (the general type of product being manufactured);
- Businesses which manufacture women's and girl's suits and coats are classified as SIC 2337 (the specific product being manufactured);

In general, the 2-digit SIC Code was used to identify general commercial classifications most representative of New York City, i.e., those which generate most of the commercial MSW in the City.

In cases where 2-digit SIC classifications did not provide specific enough data, further review of these commercial sub-sectors was performed to identify more specific SIC codes.

Based on economic indicators (employees and payroll), eight sub-sectors were targeted for intensive sampling during one seasonal event:

- Office Buildings (SIC 60 - 69, 72, 73, 81, and 89).
- Wholesale (SIC 50 - 51).
- General Retail (SIC 52 - 53, 56 - 57, and 59).
- Eating and Drinking Establishments (SIC 58).
- Textile and Apparel Manufacture (SIC 22 - 23).
- Printing and Publishing (SIC 27).
- Food Retail (SIC 54).
- Hotels (SIC 70).

In general, these sub-sectors (plus SIC 15 - 15: Construction) account for approximately 90 percent of the entire commercial activity in the City, and thus, the majority of the City's commercial waste stream.

To generate better waste information on office buildings, the Office Building sector was divided into further, more specific sub-sectors; Single-tenant Office Buildings (generally SIC 60), and Multi-tenant Office Buildings (the remaining SIC codes applicable to office work).

As discussed in Section 2, almost all waste from commercial establishments in the City is collected by private carters. In order to acquire commercial waste for study, efforts were made to coordinate with the major private carters to provide the project with separate samples of waste from each of the sub-sectors identified above.

An interesting feature of New York City is that certain private carter collection routes are unique to exclusive types of businesses. Private carters who agreed to participate in the study allowed project personnel to review their collection routes. Vehicle routes composed entirely of one business type were selected for inclusion in the study; that is, one route for each sub-sector under study.

At the request of participating carters, the identity of individual businesses being sampled was to remain confidential. Consequently, no list of actual establishments sampled during the study is presented herein.

During the performance of field work, collection vehicles working on commercial study routes were directed to the closest of two sorting sites for vehicle weighing, discharge, and waste sorting. Sorting was conducted for each vehicle load so as to develop composition and generation information for each commercial sub-sector to be sampled.

BULK ITEM SURVEY

Collection routes were designed to include targeted residential neighborhoods, institutions, or businesses according to strata, institutional category, or commercial sub-sector.

Collection vehicles then collected refuse from each individual group, providing the study with designated refuse samples from each residential strata, institutional category, or commercial sub-sector.

Prior to obtaining refuse samples for component characterization, sample loads (the entire waste load within the refuse vehicle) were screened to remove items too large to fit in a standard 30-gallon trash can. These items were weighed and classified separately as part of the bulk item survey.

Bulk items are placed curbside and collected by DOS, either commingled with curbside refuse, or placed separately on the curb for special pick-up service. Data from both collection programs were compiled for waste stream projection purposes. As waste composition summaries for each sample group were derived (from field characterization), these compositions were normalized to include bulk items observed and measured during the survey.

WASTE CHARACTERIZATION PROTOCOL

Once refuse samples were obtained from representative residences, institutions, and commercial establishments (by specially-designed collection routes), study vehicles were discharged at one of two waste characterization (sorting) sites. Representative refuse samples were taken from each vehicle (1 to 6 samples per vehicle) and sorted according to prescribed procedures and in a methodical manner. During the course of the study, more than 1,300 residential refuse samples and 1,200 institutional refuse samples were sorted. A total of 277 commercial refuse samples were sorted.

Residential and institutional samples were sorted into the following component categories:

PAPER

- Corrugated cardboard
- Newsprint
- Office/Computer
- Magazines/Glossy
- Books
- Non-corrugated Cardboard
- Mixed paper

BIMETAL CANS

YARD WASTE

- Grass/leaves
- Brush/Pruning/Stumps

ALUMINUM

- Food container/foil
- Beverage cans
- Miscellaneous aluminum

GLASS

- Clear containers
- Green containers
- Brown containers
- Other glass

PLASTIC

- Clear HDPE containers
- Colored HDPE containers
- LDPE
- Film and bags
- Green PET containers
- Clear PET containers
- PVC
- Polypropylene
- Polystyrene (not sorted in Summer)
- Miscellaneous plastic

ORGANICS

- Lumber
- Textiles
- Rubber
- Fines
- Diapers
- Foodwaste
- Miscellaneous organics

HOUSEHOLD HAZARDOUS WASTE (HHW)

- Pesticides
- Non-pesticide poisons
- Paint/solvent/fuel
- Dry cell batteries
- Medical waste
- Miscellaneous HHW

FERROUS METAL

Food containers
Other ferrous metal

INORGANIC

Non-bulk ceramics
Miscellaneous inorganic

Commercial samples were sorted into the following component categories:

PAPER

Corrugated cardboard
Newsprint
Office/Computer
Magazines/Glossy
Mixed paper

ORGANICS

Textiles
Foodwaste
Miscellaneous organics

HAZARDOUS WASTE

PLASTIC

Rigid containers
Film and bags
Miscellaneous plastic

YARD WASTE

METAL

Non-ferrous
Ferrous

OTHER WASTE

GLASS

GENERATOR SURVEY

In conjunction with refuse sampling and sorting activities, waste generation rates were calculated for the residential and commercial sectors based on a refuse weighing program. This program compiled weight data for all waste sampled by generator source.

For the residential sample, each collection truck used in the study was weighed after the collection route was completed. Given the weight of the truck and the number of housing units collected, residential waste generation was estimated on the basis of pounds per housing unit.

For the institutional sample, a similar program was used, i.e., each collection truck used in the study was weighed after the collection route was completed. Given the weight of the truck and the number of employees based at each institution, institutional waste generation was estimated on the basis of pounds per employee.

For the commercial sample, a different methodology was employed. During the collection of the commercial study routes, waste put out by each individual generator was weighed (rather than weighing the truck after collection was complete).

These weights were combined to give a total weight for each route. As with the institutional approach, given the weight of the truck and the number of employees based at each establishment, commercial waste generation was estimated on the basis of pounds per employee.

In subsequent projections of waste generation, generation data from both the institutional and commercial sectors were combined to give a single waste generation data set for the non-residential waste stream.

SEASONALITY

Waste generation and composition are known to change during the course of the year. For instance, residents in low density areas will tend their yard more during the growing season, resulting in higher generation rates (more waste tonnage per household from lawn clippings), and a significant change in composition (more organic material in the waste stream from the added yard wastes).

Waste sampling was conducted on four separate occasions (over the four seasons) to capture seasonal differences. In this manner, waste composition and generation data were collected for each waste type (residential, institutional, etc.), for each sub-sector of each waste type (residential strata, institutional category, etc.), and for each season (Winter, Spring, etc.). It should be noted, however, that the commercial sector was only sampled for one season.

Changes in the commercial waste stream characteristics due to seasonality gradually occur on a weekly and monthly basis. For residential and institutional generators, seasonality changes for months in between sampling events were calculated using interpolation techniques for each waste component measured.

These models were then normalized to reconcile projected changes with historical records of generation for the residential population (e.g., old landfill records). Commercial waste estimates were based on one round of sampling.

Historical records of transfer station operations were used to define changes in commercial generation by season, while waste composition for each business type was assumed to remain unchanged over the course of the year.

LABORATORY ANALYSIS

Concurrent with the sampling efforts described above, a field sampling and laboratory analysis program was conducted. The purpose of this analysis was to estimate the specific physical and chemical properties of solid wastes generated within the City.

For the purpose of laboratory analysis, the waste stream was divided into 13 major components such as paper, plastic organics, glass, and so on. Each component was sampled separately from the residential and institutional waste streams.

After analysis, the reported chemical properties for each component were compiled according to observed composition for each waste stream. This weighted compilation was used to provide accurate estimates of the unique chemical and physical properties for each waste type separately.

COMPACTION TESTING

Sampled refuse was subjected to compaction testing during each of the four seasonal field events. The purpose of this testing was to measure changes in refuse density due to the removal of certain components present in the waste stream (e.g., implementation of a newspaper recycling program).

Residential and institutional refuse quantities were tested separately to estimate how the removal of cardboard, newspaper, and other recyclable materials would affect the density of the collected and disposed waste.

Stockpiled raw waste from each sector, or separated recyclables from the same, were loaded into a modified refuse collection vehicle and separate measurements were obtained for loose and compacted refuse densities using a prescribed procedure.

Data from each season were averaged to give a mean compaction ratio for refuse with and without recyclables for each season.

PROJECTIONS

As described previously, waste composition and generation were developed for residential and non-residential sources separately. For residential waste, projected changes in quantity through the year 2000 were developed using available projections for the total number of residential housing units, multiplied by the City-wide average generation rate in pounds per household per year.

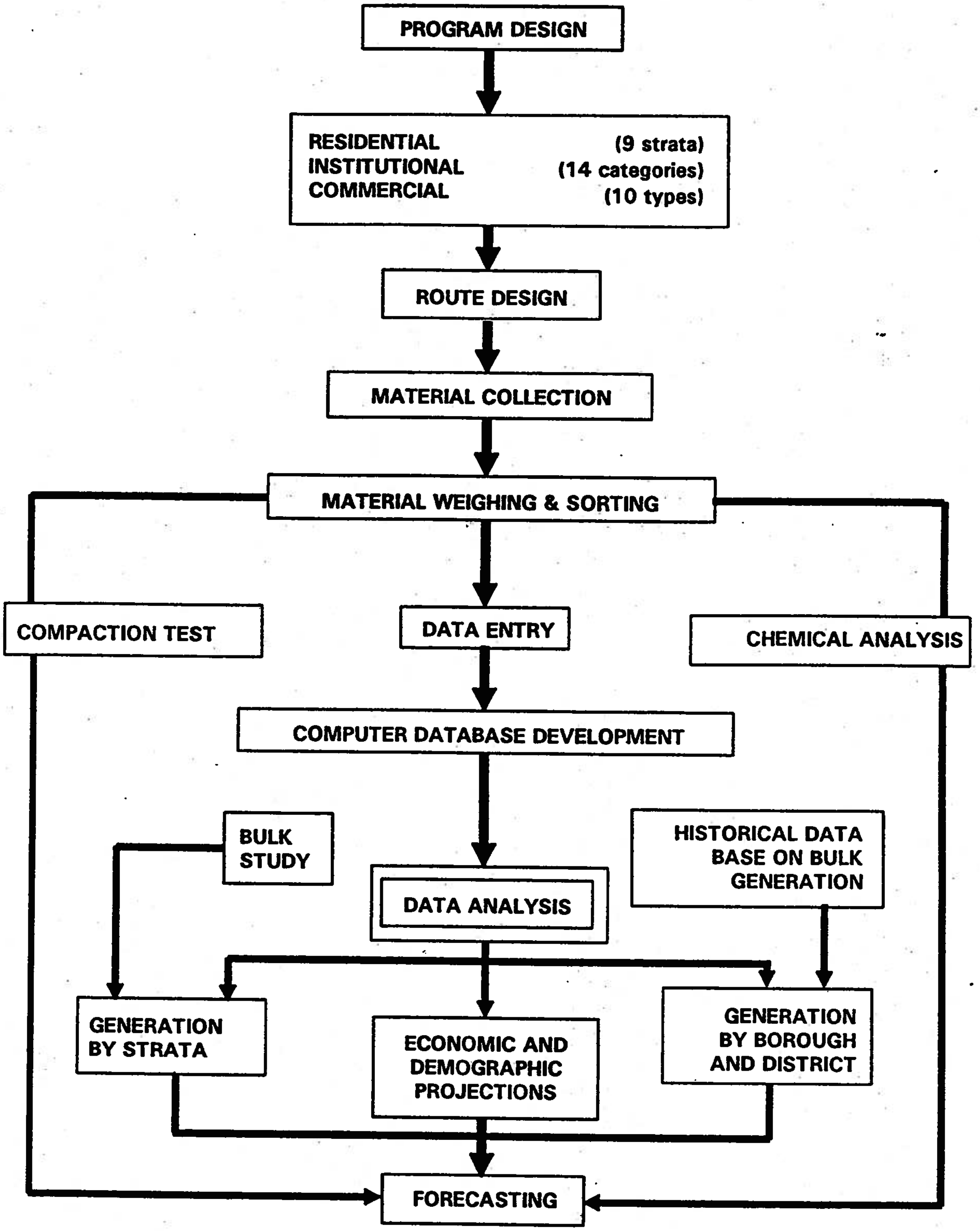
In other words, the projection methodology assumed that, given an increase in the total number of housing units, residential waste generation would also rise proportionately.

Similarly, for non-residential waste, projected changes in quantity through the year 2000 were developed using available projections for total employment within each general SIC group (Government, Services, FIRE, etc.), multiplied by the average generation rate for each group (in pounds per employee per year).

In other words, the projection methodology assumed that, given an increase in the total number of employees within a particular SIC code, commercial waste generation would also rise proportionately.

A methodology flow chart for the waste composition study program design is presented in Exhibit 3-3.

EXHIBIT 3-3
PROGRAM DESIGN FOR WASTE COMPOSITION STUDY



SECTION 4

WASTE GENERATION

INTRODUCTION

As described in Section 3 - Program Design, waste generation was measured during four seasonal sampling events. Generation was measured as a function of time (season), weight (truck weights), and population (e.g, housing units) to give a seasonal generation rate for each waste sector (i.e., pounds per unit for residential generators and pounds per employee for other sources).

Four overall generation rates were observed, and used to define a normalized generation rate by month, covering January through December 1990. Total tonnages were projected from the curve-fitted values.

Generation was then estimated by month, and these tonnage totals aggregated into four seasons to give seasonal generation rates. Generation rates were developed separately for the Residential and Institutional sectors.

The combined totals from the use of these normalized generation rates provided an estimate of City-wide waste generation from all residential and institutional sources combined.

RESIDENTIAL GENERATION

For each sampling strata, a known number of households (units) was collected by dedicated DOS vehicles. Refuse from each collection vehicle was weighed to estimate a generation rate for each stratum sampled.

This sampling was performed each season, resulting in four generation rates, in pounds per unit per week. Exhibit 4-1 presents these generation rates by strata for each of the four seasons.

To estimate a City-wide generation rate, the residential population of New York City was divided between the nine strata by household, with each household being assigned to a strata based on income data from the Census and housing density as measured by DOS.

EXHIBIT 4-1

RESIDENTIAL WASTE GENERATION RATES BY STRATA

SAMPLE STRATA	NO. OF UNITS SAMPLED	GENERATION RATE (lbs/unit/week)				ANNUAL RATE (tons/unit)	TOTAL lbs.
		SUMMER	FALL	WINTER	SPRING		
LOW INCOME/LOW DENSITY	412	51	68	49	49	1.4	217 lbs per week
LOW INCOME/MEDIUM DENSITY	1,030	48	44	40	53	1.2	185
LOW INCOME/HIGH DENSITY	2,284	40	43	33	35	1.0	151
MEDIUM INCOME/LOW DENSITY	398	50	40	53	60	1.3	203
MEDIUM INCOME/MEDIUM DENSITY	2,312	42	43	39	41	1.1	165
MEDIUM INCOME/HIGH DENSITY	1,920	20	21	19	21	0.5	81
HIGH INCOME/LOW DENSITY	425	64	57	65	62	1.6	248
HIGH INCOME/MEDIUM DENSITY	1,165	37	33	31	32	0.9	133
HIGH INCOME/HIGH DENSITY	2,171	27	27	23	26	0.7	103
TOTAL	12,109						1,486

NOTES:

1. Generation Rates rounded to the nearest pound or tenth of a ton.

The total number of housing units occupying each strata was multiplied by the estimated monthly rates (developed using linear regression of seasonal generation from Exhibit 4-1), to estimate the total residential MSW tonnage generated by the City's residential population during the study year.

The City-wide residential generation estimate is summarized, by borough, in Exhibit 4-2.

INSTITUTIONAL GENERATION

For each institutional category, targeted establishments were collected by dedicated DOS vehicles (for the category of Transportation Hubs, a private carter was used).

During the initial round of data analysis, estimates of generation rates were attempted using factors such as enrollment for schools, number of patients for hospitals, number of inmates for correctional facilities, etc. However, reliable information on these specialized activity units for each category was not readily available, particularly on a City-wide basis. Consequently, the activity unit of employment was used to derive estimated generation rates. Collected refuse from each institution was weighed to determine a generation rate for each institutional category. This sampling was performed each season, resulting in four observed generation rates, in pounds per employee per week. Exhibit 4-3 presents these generation rates by institutional category for each of the four seasons.

In order to make City-wide projections for the institutional sector, certain employment groups not sampled under the program design were assigned to the institutional sector for summary purposes. For example, by virtue of their stated mission.

Generators that were included in the institutional projections for generation rates include:

- Communications and utility companies;
- Doctor's offices and outpatient clinics;
- Libraries, museums, zoos and other such public service organizations; and

EXHIBIT 4-2

ESTIMATED RESIDENTIAL GENERATION BY BOROUGH

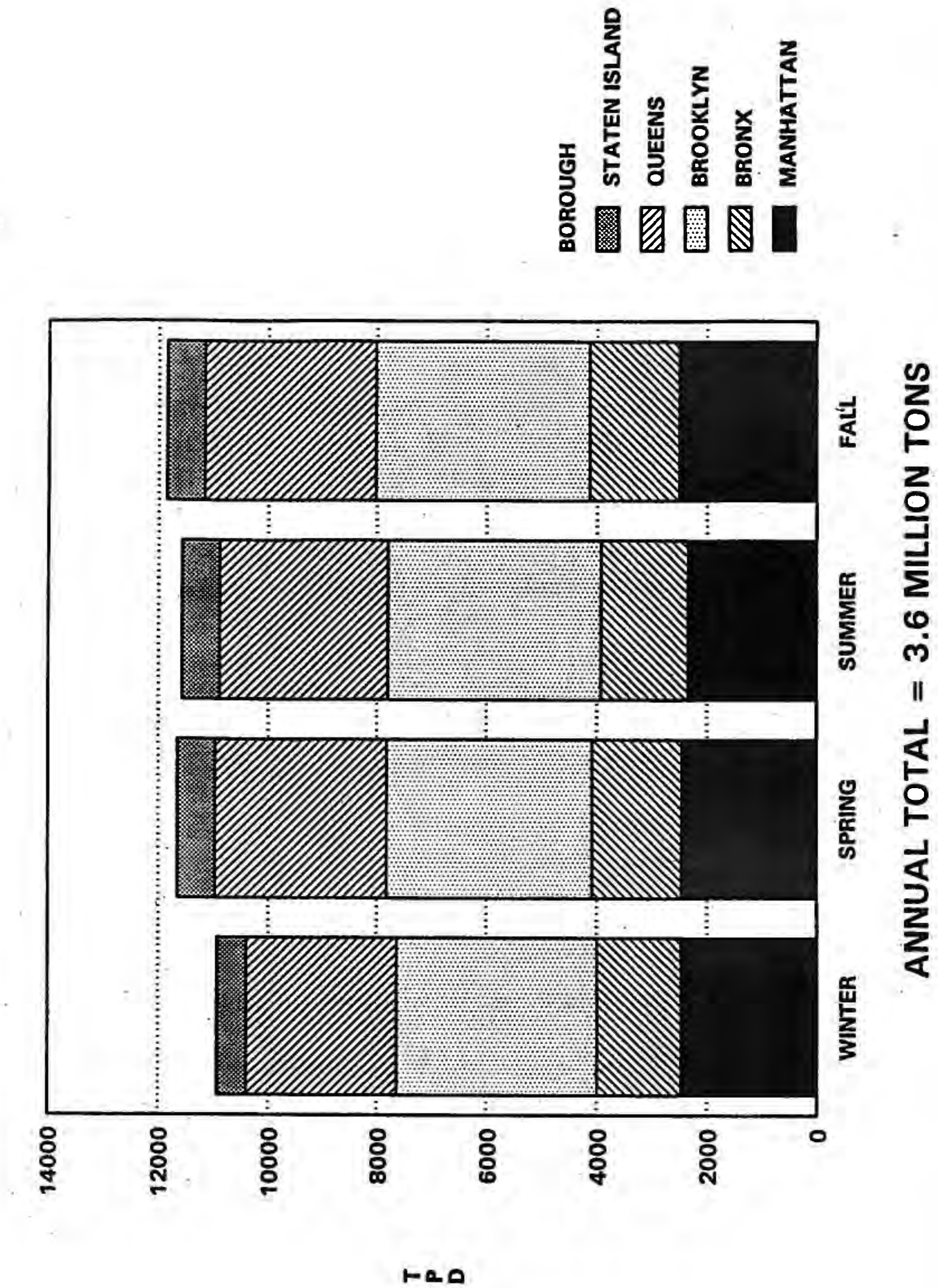


EXHIBIT 4-3

INSTITUTIONAL WASTE GENERATION RATES

CATEGORY NUMBER	DESCRIPTION	NO. OF EMPLOYEES SAMPLED	GENERATION RATE (lbs/employee/week)				ANNUAL RATE (tons/employee/year)
			SUMMER	FALL	WINTER	SPRING	
1	Public Elementary School	1,722	16	48	60	42	0.8
2	Junior High School	353	25	34	38	43	0.9
3	Private School (K–8th Grade)	116	44	47	46	77	1.4
4	Private School (6–12th Grade)	431	57	15	8	12	0.6
5	Psychiatric Hospital	1,560	15	15	11	7	0.3
6	Skilled Nursing Facility	2,615	15	12	12	12	0.3
7	Municipal Hospital	1,445	53	42	48	49	0.9
8	Teaching Hospital	490	41	42	36	34	1.0
9	Non–Profit Hospital	725	28	28	26	21	0.5
10	Government Office	660	26	21	17	21	0.6
11	Correctional Facility	516	27	36	27	52	0.9
12	College	3,850	3	5	5	6	0.1
13	Public High School	404	33	40	31	28	0.6
14	Transportation Hub	2,000	52	86	65	60	1.7
TOTAL		16,886					

NOTES:

1. Generation Rates rounded to the nearest pound or tenth of a ton.

- Municipal and public service agencies (Federal, State, and local) such as military agencies, housing authorities, law enforcement agencies, etc.

Because of these additions, and the limited availability of City-wide employment data for certain sub-sectors, the institutional sector was redefined for purposes of projecting current and future generation rates.

Each known institutional type in the City was categorized as one of the following sub-sectors:

Institutional Sub-Sector	Includes:
T.C.P.U.	Transportation Hubs* Communications* Utilities (except DOS)
Selected Health Services	Health-related Offices Nursing Homes* Hospitals* Outpatient Clinics
Selected Educational Services	Schools* Colleges* Libraries
Social Services	Social Services
Other Selected Services	Museums Zoos Botanical Gardens
Organizations	Labor Unions Ethnic Organizations Special Interest Groups Other Membership Organizations
Selected Public Sector	Federal Government State Government Corrections*

Police, Fire, Sanitation
City Government*

* Directly sampled during study.

Field data from the study were supplemented with additional data from a DOS-OPEC field survey of City institutions which considered differences in generation between large and small institutions within the same category.

To determine a City-wide generation rate, the total number of employees employed within each institutional activity was multiplied by the measured (or in some cases, estimated) generation rates for each activity, to project the total institutional MSW tonnage generated by the City.

A summary of estimated institutional generation by borough is presented in Exhibit 4-4.

COMMERCIAL GENERATION

Waste from targeted commercial establishments was collected by dedicated study vehicles, either by private carters, or in some cases by DOS. Similar to those estimates made for institutions, employment by commercial sub-sector was used to derive estimated generation for the commercial sector.

Collected refuse from each business was weighed and these data aggregated to derive a generation rate for each sub-sector. This sampling was performed once, resulting in a generation rate (in pounds per employee per week) for each sub-sector.

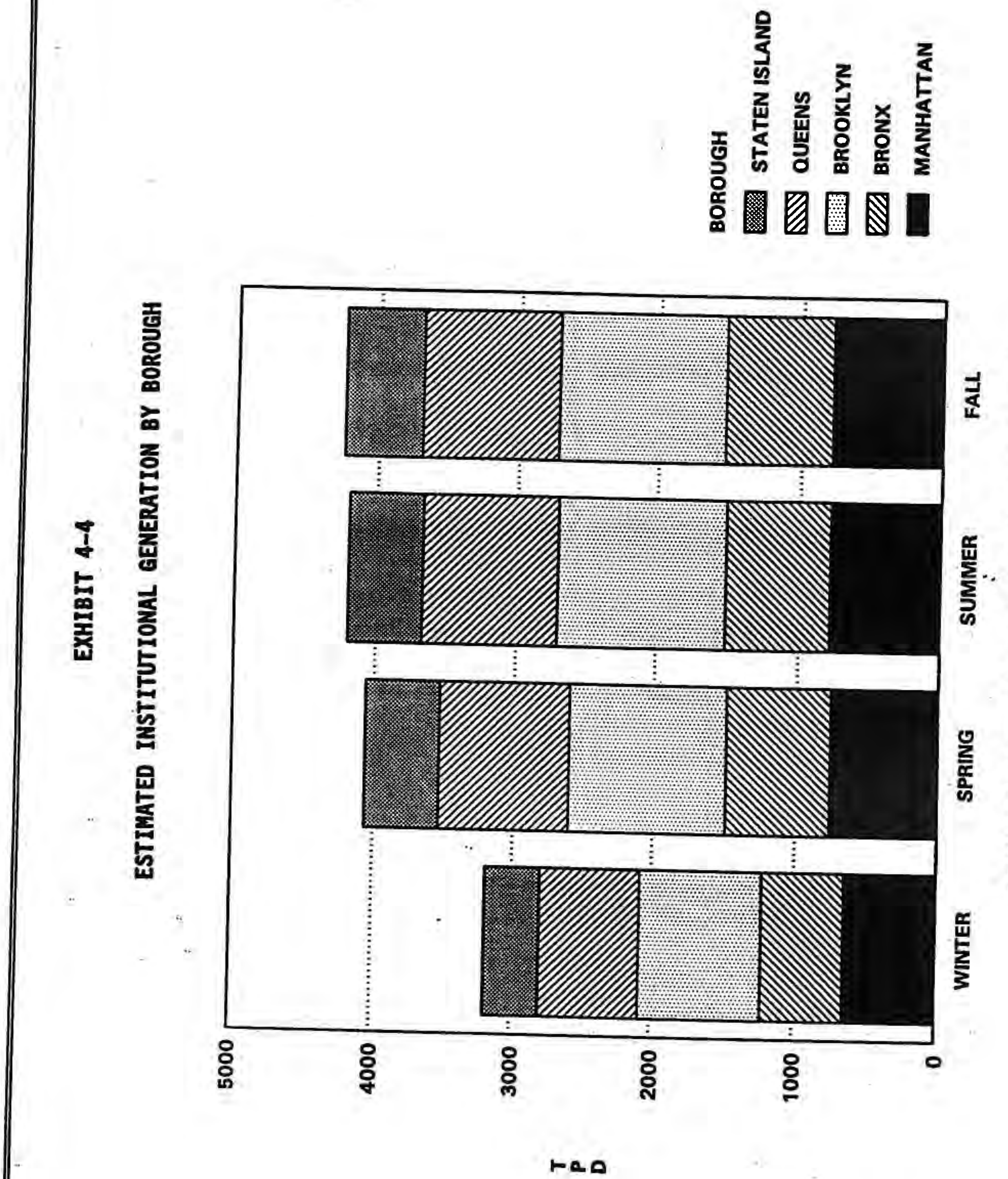
Historical tonnage records were used to develop an estimate of change in generation for the commercial sector during the course of the year. Using these factors, generation rates for each season were modelled using summary data provided by DOS.

Exhibit 4-5 presents these estimated seasonal generation tonnages (i.e., the total waste quantity generated) by each sub-sector for each of four seasons.

Because of the limited size and duration of the commercial field sampling program, some segments of the commercial waste stream were not sampled directly. Estimates had to be made for these segments (or sub-sectors) so as to make projections for the entire commercial waste stream City-wide.

EXHIBIT 4-4

ESTIMATED INSTITUTIONAL GENERATION BY BOROUGH



ANNUAL TOTAL = 1.2 MILLION TONS

EXHIBIT 4-5

COMMERCIAL WASTE GENERATION BY SEASON

SUB-SECTOR DESCRIPTION	ESTIMATED NO. OF EMPLOYEES	GENERATION RATE (Tons/Year/Employee)	ESTIMATED TOTAL WASTE GENERATION BY SEASON				TOTAL ANNUAL WASTE GENERATION (Tons/Year)	PERCENTAGE OF COMMERCIAL STREAM
			Winter	Spring	Summer	Fall		
Sampled								
Single Tenant Offices (SIC 60)	407,000	0.2	15,500	17,600	21,700	18,600	73,300	1.9%
Multi-tenant Offices (SIC 61-69, 72, 73, 81, 89)	626,100	0.3	42,300	48,100	59,300	50,700	200,400	5.2%
Wholesale (SIC 50-51)	226,000	1.2	56,700	64,600	79,500	68,100	268,900	7.0%
General Retail (SIC 52-53, 56-57, 59)	189,000	1.1	43,400	49,500	60,900	52,100	206,000	5.3%
Eating and Drinking (SIC 58)	136,000	3.9	113,000	128,700	158,500	135,600	535,800	13.9%
Textile and Apparel Manufacturing (SIC 22, 23)	120,000	1.2	29,100	33,100	40,800	34,900	138,000	3.6%
Printing and Publishing (SIC 27)	87,000	6.1	111,600	127,100	156,500	133,900	529,000	13.7%
Food Stores (SIC 54)	60,000	5.3	67,300	76,700	94,400	80,800	319,200	8.3%
Hotel (SIC 70)	32,000	1.9	12,500	14,300	17,600	15,100	59,500	1.5%
Construction (SIC 15 – 17)	114,000	6.4 #	153,900	175,300	215,800	184,700	729,600	18.9%
TOTAL, SAMPLED	1,997,100 (88%)		645,300	735,000	905,000	774,500	3,059,700	79.2%
Not Sampled								
Other Services (SIC 75, 76, 78, 79)	98,900	1.2 #	25,500	29,000	35,700	30,600	120,700	3.1%
Other Manufacturing (SIC 20, 24-26, 28-39)	144,000	4.5 #	135,400	154,300	190,000	162,600	642,200	16.6%
Agricultural/Mining (SIC 07, 10-13)	4,000	0.8 #	700	800	900	800	3,200	0.1%
Automotive (SIC 55)	18,000	1.7 #	6,300	7,200	8,900	7,600	30,100	0.8%
Unclassified	11,200	0.8 #	1,900	2,200	2,700	2,300	9,000	0.2%
TOTAL, NOT SAMPLED	276,100 (12%)		169,800	193,500	238,200	203,900	805,200	20.8%
TOTAL, COMMERCIAL SECTOR	2,273,200		815,100	928,500	1,143,200	978,400	3,864,900	100.0%
							12,800 TPD	

NOTES:

1. * = A determination of the tenancy-type for each SIC group was based on number of employees per establishment City-wide for each SIC code (see Commercial Study Report).
2. # = Estimated Value from literature data.
3. Generation rates rounded to the nearest tenth of a ton; Estimated total generation by season rounded to the nearest 100 tons.

As indicated in Exhibit 4-5, approximately 20 percent of the commercial waste stream was not directly sampled under the study. The use of available employment data and generation factors for the unsampled sub-sectors allowed the development of a complete estimate, presented in Exhibit 4-6.

CITY-WIDE GENERATION ESTIMATE

The estimates obtained for the residential, institutional, and commercial sectors were combined to provide an overview of City-wide waste generation. A graphical summary of the combined waste stream tonnage estimate is provided in Exhibit 4-7.

As shown, approximately 8,500,000 tons of waste are generated annually in New York City. The commercial sector is the largest generator, accounting for 45 percent of the waste stream (approximately 3.9 million tons per year).

The residential sector is the second largest generator with 41 percent of the waste stream (approximately 3.6 million tons). The institutional sector generates approximately 1.2 million tons, representing 14 percent of the combined City waste stream.

EXHIBIT 4-6

ESTIMATED COMMERCIAL GENERATION BY BOROUGH

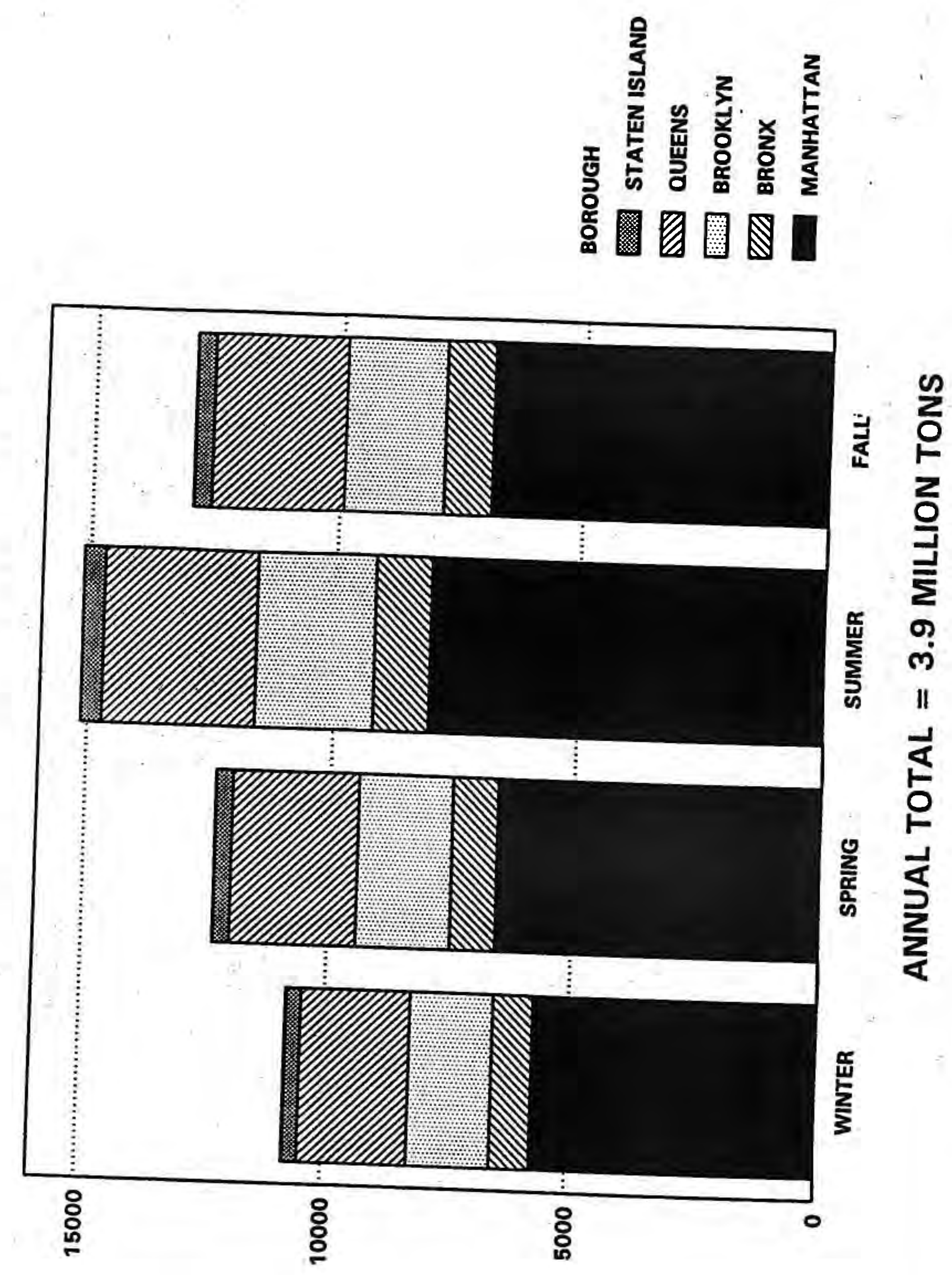
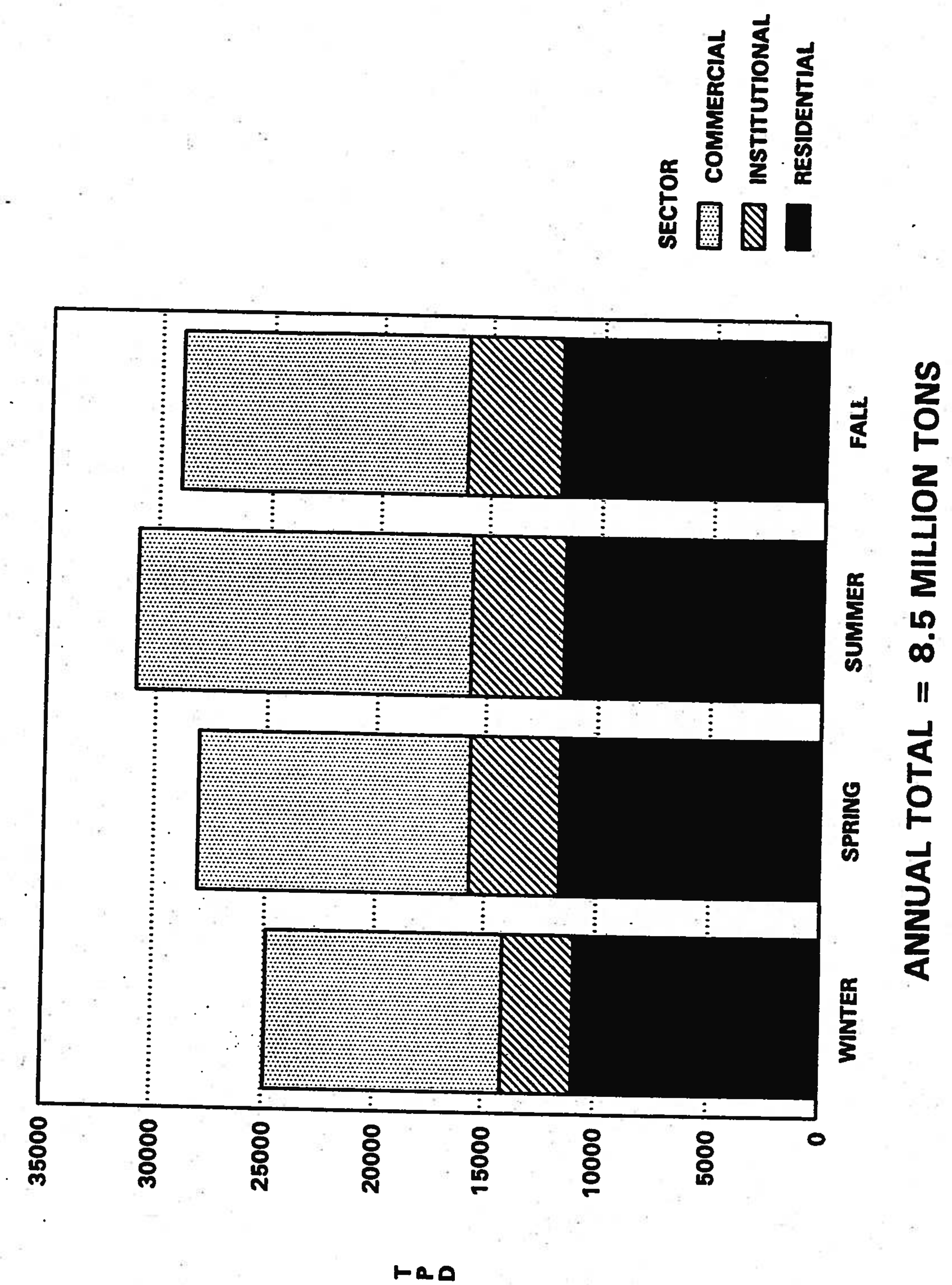


EXHIBIT 4-7

SEASONAL MSW GENERATION BY MAJOR SECTOR



SECTION 5

WASTE COMPOSITION RESULTS

INTRODUCTION

One purpose of the study was to calculate an overall City-wide waste composition, based on field results and other projections. Observed values for waste component composition by season (measured in the field) were used to derive a unique composition for each waste component by month for the study period. Using generation rates developed concurrently, the total weight of each component was estimated and expressed as a percent of the total waste stream.

Seasonal composition modelling was performed for the residential and institutional sectors by strata and institutional type. The waste composition of each commercial sub-sector was assumed to remain constant throughout the year. The combining of these three compositions were used to determine a City-wide composition by sector, as described below.

RESIDENTIAL COMPOSITION

For each demographic grouping (or sampling strata), a waste composition was developed from the statistical summary of collected samples from each strata. This sampling was performed each season, resulting in four separate compositions.

Exhibit 5-1 presents these compositions, by strata, for each of the four seasons.

Composition by Borough

To estimate the waste composition by borough, the residential population of each borough was divided between the nine strata, with households from each DOS collection district being assigned to a strata based on income data from the census and housing density as designated by DOS.

Initial efforts to distribute the residential population between the boroughs by simple population density (the unit used in sample design) proved to be too general and not sufficiently descriptive to meet the study's goals.

EXHIBIT 5-1

RESIDENTIAL WASTE COMPOSITION BY STRATA

SUMMER SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage) LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	4.0	4.8	5.9	4.7	4.7	5.2	4.3	5.3	5.0
Newsprint	10.2	8.5	7.4	9.9	9.9	16.8	8.7	9.3	12.3
Office/Computer	1.7	1.0	0.7	1.8	1.3	1.5	1.9	1.7	2.1
Magazines and Glossy	2.0	2.0	2.9	3.9	2.7	4.5	2.8	2.3	3.9
Book/Phone Book	1.0	0.8	1.3	0.7	1.8	3.9	0.9	0.9	0.4
Non-Corrugated Cardboard	3.9	3.5	3.0	3.4	2.9	3.8	5.3	3.6	3.9
Mixed	11.4	7.8	7.3	8.5	8.8	8.1	6.8	7.8	7.8
TOTAL PAPER FRACTION	34.2	28.4	28.5	32.9	31.9	43.8	30.5	30.9	35.4
Clear HDPE containers	0.5	0.5	0.8	0.6	0.8	0.4	0.5	0.7	0.7
Colored HDPE containers	0.5	0.8	0.8	0.6	0.7	0.9	0.5	0.6	1.0
LDPE	0.3	0.2	0.3	0.1	0.3	0.1	0.2	0.3	0.1
Films and Bags	4.1	5.0	6.2	5.0	5.1	6.1	3.5	4.7	6.7
Green PET containers	0.2	0.1	0.1	0.1	0.3	0.1	0.1	0.2	0.1
Clear PET containers	0.4	0.4	0.6	0.6	0.5	0.5	0.3	0.4	0.6
PVC	0.2	0.1	0.1	0.2	0.2	0.2	0.1	0.2	0.1
Polypropylene	0.1	0.1	0.3	0.1	0.1	0.2	0.1	0.1	0.1
Polystyrene (Estimated in Summer)	0.9	0.9	0.6	1.1 *	1.0	1.1	0.6	0.7 *	0.9
Miscellaneous Plastic	1.3	1.3	1.8	2.0	1.1	0.8	1.7	1.7	1.2
TOTAL PLASTIC FRACTION	8.5	9.3	11.3	10.7	9.8	10.3	7.7	9.7	11.7
Grass/Leaves	5.6	1.1	0.0	2.1	1.4	0.0	5.4	4.0	1.0
Brush/Prunings/Stumps	0.6	1.6	0.0	0.7	0.4	0.0	4.5	0.6	0.0
TOTAL YARD WASTE FRACTION	6.2	2.7	0.1	2.8	1.9	0.1	9.9	4.6	1.0
Lumber	1.2	4.3	3.2	2.0	2.4	2.1	3.1	1.8	0.9
Textiles	6.0	8.0	8.4	4.0	6.4	3.9	6.0	5.7	6.2
Rubber	0.1	0.1	0.3	0.4	0.2	0.0	0.3	0.0	0.1
Fines	2.0	2.0	3.3	2.9	1.8	2.7	1.9	1.7	3.7
Diapers	3.2	3.6	4.1	2.9	2.8	3.0	4.1	4.1	3.2
Foodwaste	16.9	14.4	12.7	14.5	16.3	10.1	12.1	20.1	10.7
Miscellaneous Organic	5.1	7.9	9.8	7.9	9.5	10.6	8.9	6.3	14.3
TOTAL ORGANIC FRACTION	34.5	40.3	41.9	34.6	41.4	32.4	36.4	39.7	39.1
Clear Glass containers	4.2	2.5	3.2	3.1	3.6	2.3	3.0	3.9	2.0
Green Glass containers	1.0	1.3	1.6	0.9	1.3	0.8	0.9	1.2	0.9
Brown Glass containers	1.2	1.1	1.2	0.8	1.2	0.6	0.7	1.2	0.7
Miscellaneous Glass	0.2	0.4	0.9	0.8	0.3	0.6	0.2	0.1	0.4
TOTAL GLASS FRACTION	6.6	5.3	6.9	5.5	6.3	4.4	4.9	6.5	4.0
Aluminium Food Containers/Foil	0.3	0.4	0.6	0.5	0.4	0.4	0.3	0.3	0.9
Aluminium Beverage Cans	0.3	0.3	0.3	0.3	0.4	0.4	0.3	0.4	0.3
Miscellaneous Aluminium	0.2	0.3	0.3	0.3	0.3	0.2	0.1	0.1	0.3
TOTAL ALUMINIUM FRACTION	0.9	1.0	1.2	1.1	1.1	0.9	0.7	0.9	1.4
Ferrous Metal Food containers	2.1	1.8	2.2	1.8	2.0	2.0	1.6	1.9	2.3
Other Ferrous Metal	1.0	3.6	2.7	2.0	2.0	0.8	1.0	2.2	1.2
TOTAL FERROUS METAL FRACTION	3.1	5.4	4.9	3.8	4.0	2.8	2.7	4.1	3.5
Bimetal Cans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	4.0	6.3	6.2	4.9	5.1	3.7	3.4	5.0	5.0
Non-bulk Ceramics	0.1	0.1	0.0	0.0	0.0	0.2	0.1	0.0	0.0
Miscellaneous Inorganic	3.2	6.7	2.8	3.5	0.5	1.7	0.8	0.4	0.8
TOTAL INORGANIC FRACTION	3.3	6.7	2.8	3.5	0.6	1.9	0.9	0.4	0.9
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.0
Dry Cell Batteries	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.3	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.1	0.2	0.2	0.0	0.1	0.2	0.2	0.0	0.1
TOTAL HHW FRACTION	0.2	0.4	0.5	0.1	0.2	0.3	0.6	0.1	0.2
BULK	2.4	2.6	2.0	4.8	2.9	3.3	5.6	2.9	2.8

EXHIBIT 5-1 (continued)

RESIDENTIAL WASTE COMPOSITION BY STRATA

FALL SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage)								
	LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	4.4	5.1	6.1	7.3	5.4	5.7	3.8	4.8	5.0
Newsprint	9.9	6.3	6.0	9.3	10.3	17.9	11.4	12.6	17.7
Office/Computer	1.8	0.4	0.1	1.0	0.8	0.8	1.6	0.9	0.6
Magazines and Glossy	3.3	2.4	2.2	3.1	2.8	3.7	4.1	1.6	4.2
Book/Phone Book	1.2	0.7	0.3	0.4	1.0	1.0	2.0	2.1	0.7
Non-Corrugated Cardboard	3.5	2.1	2.9	2.5	2.4	1.9	1.9	2.8	2.1
Mixed	15.7	11.1	9.8	12.8	13.8	12.5	13.0	14.8	16.1
TOTAL PAPER FRACTION	39.8	30.1	29.2	36.5	36.3	43.5	37.8	39.8	46.3
Clear HDPE containers	0.5	0.8	0.7	0.8	0.4	0.3	0.3	0.4	0.4
Colored HDPE containers	0.5	0.5	0.7	0.8	0.5	0.3	0.7	0.5	0.7
LDPE	0.1	0.2	0.2	0.1	0.2	0.1	0.1	0.1	0.1
Films and Bags	4.2	5.0	6.5	4.2	5.2	5.9	2.9	5.5	6.3
Green PET containers	0.1	0.0	0.1	0.1	0.1	0.0	0.0	0.1	0.1
Clear PET containers	0.3	0.3	0.5	0.5	0.4	0.3	0.3	0.3	0.3
PVC	0.2	0.4	0.2	0.2	0.1	0.0	0.0	0.1	0.1
Polypropylene	0.2	0.2	0.1	0.1	0.2	0.1	0.3	0.2	0.3
Polystyrene (Estimated in Summer)	0.5	0.8	0.9	0.9 *	0.7	0.9	0.4	0.3 *	1.0
Miscellaneous Plastic	1.2	1.4	1.0	1.2	1.3	1.2	0.8	1.9	0.8
TOTAL PLASTIC FRACTION	7.8	9.1	11.0	8.4	9.2	9.3	5.7	9.4	10.2
Grass/Leaves	5.3	4.2	0.2	7.2	2.5	6.5	12.1	3.9	3.8
Brush/Prunings/Stumps	1.0	0.1	0.0	0.5	0.1	0.1	0.4	0.0	0.6
TOTAL YARD WASTE FRACTION	6.4	4.3	0.2	7.7	2.5	6.5	12.5	3.9	4.4
Lumber	1.0	3.8	2.5	2.2	3.7	0.7	1.6	2.8	1.8
Textiles	4.5	4.7	7.3	3.5	5.5	5.0	2.4	4.1	4.0
Rubber	0.0	0.2	0.0	0.1	0.1	0.1	0.9	0.0	0.1
Fines	2.1	2.4	2.8	2.1	2.0	1.8	1.9	2.0	2.0
Diapers	3.2	3.5	4.3	3.0	3.8	1.9	2.9	4.3	2.8
Foodwaste	13.1	15.6	15.6	12.8	15.2	11.3	13.1	13.6	10.6
Miscellaneous Organic	7.1	10.9	9.3	7.1	7.2	5.8	7.7	7.3	5.5
TOTAL ORGANIC FRACTION	31.1	41.0	42.0	30.8	37.3	26.8	30.5	34.1	26.6
Clear Glass containers	3.5	2.9	3.2	2.8	3.1	2.6	2.5	3.2	2.4
Green Glass containers	0.7	1.0	1.7	1.0	0.9	0.8	0.5	0.7	0.4
Brown Glass containers	0.7	0.6	1.2	1.2	0.7	0.4	0.7	0.6	0.6
Miscellaneous Glass	0.2	0.2	0.3	0.2	0.2	0.3	0.0	0.0	0.4
TOTAL GLASS FRACTION	5.0	4.7	6.3	5.1	4.8	4.0	3.6	4.5	3.8
Aluminium Food Containers/Foil	0.5	0.4	0.5	0.7	0.6	0.5	0.4	0.5	0.5
Aluminium Beverage Cans	0.3	0.3	0.4	0.3	0.3	0.2	0.3	0.3	0.3
Miscellaneous Aluminium	0.2	0.1	0.1	0.3	0.1	0.5	0.2	0.1	0.4
TOTAL ALUMINIUM FRACTION	0.9	0.8	1.1	1.3	1.0	1.2	0.9	0.9	1.2
Ferrous Metal Food containers	1.7	2.0	2.7	2.0	2.0	1.8	1.4	1.9	1.9
Other Ferrous Metal	1.7	3.5	2.0	1.9	1.5	2.9	3.0	0.8	2.2
TOTAL FERROUS METAL FRACTION	3.4	5.5	4.7	3.9	3.5	4.7	4.4	2.7	4.1
Bimetal Cans	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.1	0.0
TOTAL METAL FRACTION	4.4	6.3	5.8	5.2	4.6	6.0	5.2	3.7	5.3
Non-bulk Ceramics	0.2	0.3	0.1	0.1	0.1	0.1	0.4	0.1	0.0
Miscellaneous Inorganic	0.1	2.5	2.9	2.9	2.1	1.7	0.4	1.3	0.3
TOTAL INORGANIC FRACTION	0.2	2.8	3.0	3.0	2.2	1.8	0.8	1.4	0.3
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non-pesticide Poisons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.0	0.0	0.1	0.1	0.0	0.4	0.0	0.0	0.0
Dry Cell Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.2	0.0	0.0	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Miscellaneous Hazardous Waste	0.0	0.0	0.1	0.1	0.0	0.0	0.0	0.0	0.0
TOTAL HHW FRACTION	0.0	0.1	0.2	0.2	0.3	0.5	0.0	0.0	0.1
BULK	5.4	1.5	2.0	3.3	2.8	2.0	3.6	3.2	3.0

EXHIBIT 5–1 (continued)

RESIDENTIAL WASTE COMPOSITION BY STRATA

WINTER SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage) LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	3.8	5.5	5.8	5.4	4.7	3.9	5.2	4.7	4.7
Newsprint	6.9	8.2	7.2	6.8	9.0	14.9	5.7	10.7	13.4
Office/Computer	0.2	0.2	0.2	1.2	0.3	1.4	0.3	0.1	0.6
Magazines and Glossy	2.7	2.1	1.6	2.4	2.6	4.5	2.8	3.0	3.6
Book/Phone Book	0.3	0.5	0.4	0.4	0.3	0.3	0.5	0.2	0.5
Non–Corrugated Cardboard	2.4	2.7	3.1	2.5	3.2	2.8	2.4	2.6	2.6
Mixed	11.5	12.0	9.7	13.0	13.7	15.4	11.3	14.5	14.2
TOTAL PAPER FRACTION	27.5	31.1	27.8	33.6	33.7	43.0	28.0	35.9	39.7
Clear HDPE containers	0.5	0.6	0.8	0.5	0.7	0.4	0.3	0.5	0.4
Colored HDPE containers	0.6	0.6	0.7	0.6	0.8	0.8	0.5	0.5	0.6
LDPE	0.0	0.0	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Films and Bags	3.9	5.7	5.2	4.8	5.5	6.8	3.8	6.3	5.6
Green PET containers	0.1	0.1	0.2	0.1	0.1	0.1	0.0	0.1	0.1
Clear PET containers	0.5	0.6	0.5	0.5	0.7	0.5	0.4	0.5	0.6
PVC	0.2	0.1	0.2	0.1	0.1	0.2	0.0	0.1	0.1
Polypropylene	0.0	0.1	0.2	0.1	0.1	0.1	0.0	0.0	0.0
Polystyrene (Estimated in Summer)	1.1	0.9	0.9	0.9 *	1.1	1.2	0.9	0.9 *	0.8
Miscellaneous Plastic	1.1	1.0	1.4	1.3	1.2	1.0	0.7	1.4	0.9
TOTAL PLASTIC FRACTION	8.0	9.7	10.2	9.1	10.3	10.9	6.8	10.4	9.5
Grass/Leaves	6.5	1.6	0.6	1.7	1.1	0.7	18.1	0.6	4.0
Brush/Prunings/Stumps	3.9	0.3	0.0	0.2	0.7	1.1	0.8	0.3	1.1
TOTAL YARD WASTE FRACTION	10.3	1.9	0.6	2.0	1.8	1.8	19.0	0.9	5.1
Lumber	1.2	2.2	1.3	0.9	1.7	1.4	3.1	1.6	1.2
Textiles	4.5	4.4	5.3	5.2	4.6	3.5	5.3	3.7	3.9
Rubber	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.0	0.0
Fines	2.2	2.4	2.2	2.8	2.0	1.8	2.2	2.2	2.1
Diapers	4.1	3.6	5.9	4.0	5.0	2.7	3.7	4.1	2.5
Foodwaste	13.4	16.4	17.7	13.6	16.1	13.5	9.1	15.3	11.9
Miscellaneous Organic	7.7	13.6	11.0	6.6	7.0	6.7	6.2	7.3	8.2
TOTAL ORGANIC FRACTION	33.3	43.0	43.5	35.2	36.5	29.6	29.7	34.2	29.8
Clear Glass containers	4.1	2.5	4.4	2.9	4.4	2.9	3.0	4.0	2.6
Green Glass containers	1.1	1.0	1.5	0.9	1.3	0.9	1.1	0.7	0.6
Brown Glass containers	0.9	0.7	1.5	0.7	1.0	0.8	0.8	0.7	0.6
Miscellaneous Glass	0.0	0.1	0.0	0.0	0.2	0.0	0.0	0.1	0.0
TOTAL GLASS FRACTION	6.1	4.4	7.4	4.6	6.9	4.6	4.9	5.4	3.9
Aluminium Food Containers/Foil	0.7	0.5	0.5	0.5	0.7	0.5	0.5	0.6	0.6
Aluminium Beverage Cans	0.4	0.5	0.4	0.4	0.4	0.4	0.3	0.3	0.4
Miscellaneous Aluminium	0.0	0.0	0.0	0.1	0.0	0.0	0.1	0.1	0.0
TOTAL ALUMINIUM FRACTION	1.1	1.0	0.9	1.0	1.1	0.9	0.8	1.0	1.1
Ferrous Metal Food containers	2.5	2.1	2.9	2.4	2.5	1.9	1.7	2.3	2.7
Other Ferrous Metal	2.2	1.9	2.3	2.2	1.9	1.8	2.3	3.0	1.3
TOTAL FERROUS METAL FRACTION	4.7	4.0	5.1	4.6	4.4	3.6	3.9	5.2	4.0
Bimetal Cans	0.0	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	5.7	5.1	6.1	5.6	5.6	4.4	4.6	6.3	5.1
Non–bulk Ceramics	0.5	0.1	0.6	0.4	0.3	0.2	0.1	0.2	0.1
Miscellaneous Inorganic	1.7	2.0	1.3	4.9	2.8	1.1	1.2	2.7	4.0
TOTAL INORGANIC FRACTION	2.2	2.1	1.9	5.3	3.1	1.3	1.2	2.8	4.1
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non–pesticide Poisons	0.1	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.0	0.0	0.5	0.1	0.1	0.1	0.1	0.1	0.0
Dry Cell Batteries	0.0	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.2
Miscellaneous Hazardous Waste	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.0
TOTAL HHW FRACTION	0.2	0.1	0.6	0.1	0.2	0.1	0.2	0.3	0.3
BULK	6.6	2.7	2.0	4.4	2.1	4.2	5.4	3.6	2.7

EXHIBIT 5–1 (continued)

RESIDENTIAL WASTE COMPOSITION BY STRATA

SPRING SEASON

WASTE COMPONENT	WASTE COMPOSITION (percentage)								
	LL	LM	LH	ML	MM	MH	HL	HM	HH
Corrugated/Kraft	3.9	6.4	4.2	4.2	3.8	4.7	4.6	5.8	4.0
Newsprint	9.2	5.9	4.9	8.5	7.7	13.1	8.0	11.5	14.7
Office/Computer	0.1	0.3	0.2	0.5	0.2	0.5	0.1	0.3	0.6
Magazines and Glossy	2.5	2.2	2.2	2.2	2.0	4.3	2.8	1.7	3.6
Book/Phone Book	0.5	0.3	1.0	0.6	0.5	0.5	0.2	0.4	1.6
Non–Corrugated Cardboard	2.1	1.9	1.9	1.9	2.0	1.9	2.0	2.3	2.0
Mixed	12.6	13.7	13.2	13.0	11.7	16.0	10.3	10.9	14.9
TOTAL PAPER FRACTION	31.0	30.7	27.6	30.9	27.8	41.0	27.7	32.9	41.3
Clear HDPE containers	0.4	0.6	0.6	0.5	0.5	0.4	0.3	0.4	0.5
Colored HDPE containers	0.5	0.7	0.6	0.6	0.6	0.5	0.5	0.5	0.6
LDPE	0.0	0.1	0.1	0.2	0.1	0.1	0.0	0.0	0.1
Films and Bags	4.5	4.9	5.7	4.4	5.3	5.6	4.0	5.1	6.2
Green PET containers	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1
Clear PET containers	0.6	0.5	0.5	0.5	0.6	0.3	0.3	0.6	0.5
PVC	0.1	0.1	0.2	0.1	0.1	0.1	0.1	0.1	0.1
Polypropylene	0.1	0.1	0.2	0.2	0.1	0.1	0.1	0.1	0.2
Polystyrene (Estimated in Summer)	1.0	0.9	0.7	1.3 *	1.1	1.3	0.7	0.9 *	1.0
Miscellaneous Plastic	1.5	1.1	0.9	0.6	1.0	0.9	1.7	1.5	0.9
TOTAL PLASTIC FRACTION	8.9	9.1	9.8	8.4	9.3	9.3	7.8	9.2	10.2
Grass/Leaves	5.2	0.5	0.6	0.9	2.0	1.9	5.4	1.2	2.6
Brush/Prunings/Stumps	1.3	0.6	0.0	0.8	0.8	1.1	2.8	0.1	0.3
TOTAL YARD WASTE FRACTION	6.5	1.1	0.6	1.7	2.8	3.0	8.2	1.4	2.9
Lumber	2.4	3.8	3.7	3.4	4.4	2.3	3.8	2.9	1.3
Textiles	4.4	5.2	6.1	4.4	5.9	4.5	4.6	5.9	5.2
Rubber	0.0	0.2	0.6	0.5	0.1	0.1	0.0	0.1	0.0
Fines	3.1	3.2	2.9	2.8	2.7	3.3	2.8	2.3	2.7
Diapers	4.2	2.7	4.4	3.6	4.2	2.7	3.6	4.6	2.8
Foodwaste	12.3	17.6	19.9	13.3	15.0	11.7	11.0	14.6	12.3
Miscellaneous Organic	10.0	6.1	7.1	6.6	6.1	9.0	10.6	6.4	6.5
TOTAL ORGANIC FRACTION	36.3	40.7	44.7	36.7	40.5	33.5	36.4	37.0	30.8
Clear Glass containers	4.8	2.9	4.1	3.3	3.4	2.8	3.1	3.7	2.9
Green Glass containers	1.2	1.2	1.8	0.9	0.9	0.7	0.6	0.8	0.6
Brown Glass containers	0.6	1.0	1.2	1.1	0.7	0.5	0.6	0.7	0.6
Miscellaneous Glass	0.0	0.1	0.2	0.2	0.2	0.4	0.0	0.7	0.2
TOTAL GLASS FRACTION	7.0	5.2	7.1	5.5	5.1	4.3	4.8	5.9	4.3
Aluminium Food Containers/Foil	0.6	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5
Aluminium Beverage Cans	0.3	0.4	0.3	0.3	0.3	0.2	0.3	0.3	0.3
Miscellaneous Aluminium	0.1	0.0	0.1	0.0	0.0	0.0	0.0	0.1	0.0
TOTAL ALUMINIUM FRACTION	1.0	0.9	0.7	0.8	0.8	0.6	0.8	0.9	0.8
Ferrous Metal Food containers	2.2	2.0	2.4	2.6	2.0	2.1	1.5	2.1	2.0
Other Ferrous Metal	2.1	2.3	1.8	2.2	2.3	1.9	4.0	3.4	0.9
TOTAL FERROUS METAL FRACTION	4.3	4.3	4.2	4.9	4.3	4.0	5.5	5.5	3.0
Bimetal Cans	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
TOTAL METAL FRACTION	5.3	5.2	4.9	5.7	5.1	4.7	6.4	6.3	3.8
Non–bulk Ceramics	0.1	0.1	0.7	0.1	0.2	0.1	0.0	0.4	0.1
Miscellaneous Inorganic	3.4	5.3	2.4	3.8	6.5	1.3	1.2	4.3	4.9
TOTAL INORGANIC FRACTION	3.4	5.3	3.1	3.9	6.7	1.4	1.2	4.8	5.0
Pesticides	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Non–pesticide Poisons	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Paint/Solvent/Fuel	0.2	0.0	0.1	0.2	0.2	0.2	0.1	0.1	0.0
Dry Cell Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Car Batteries	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Medical Waste	0.0	0.0	0.0	0.3	0.0	0.0	0.5	0.0	0.0
Miscellaneous Hazardous Waste	0.0	0.3	0.1	0.1	0.0	0.1	0.1	0.0	0.1
TOTAL HHW FRACTION	0.3	0.4	0.3	0.7	0.4	0.3	0.8	0.2	0.2
BULK	1.3	2.3	2.0	6.5	2.3	2.5	6.8	2.3	1.5

To calculate a borough-wide composition, the residential population was reassigned using the DOS definition of density as follows:

Designation	Income Criteria	Density Criteria
High	Less than $11,690	74 percent of housing with 4 stories or more.
Low	$11,690 to $16,199	74 percent of housing with 1 to 2-family units.
Medium	Greater than $16,199	All others.

Historical records of population per housing unit were compiled to give an average number of people per housing unit and population estimates for each district converted to an estimated number of housing units.

Using the seasonal generation rates developed previously, the total number of housing units occupying each strata were multiplied by the applicable seasonal composition to project the total tonnage of each waste component generated by each borough's residential population. These tonnages, expressed as a percentage of the borough's total residential waste stream, constitute the estimated residential waste composition borough-wide.

The results of these projections are summarized in Exhibit 5-2 and present residential composition in percentages, by season and aggregated to a single annual value. Tonnage estimates using this method included bulk waste generation from residential sources.

Composition City-wide

To estimate a City-wide composition, the residential waste quantities estimated for each borough were combined. These tonnages, expressed as a percentage of the City-wide residential waste stream tonnage, represent the estimated residential MSW composition City-wide.

The results of these projections are summarized in Exhibit 5-3.

EXHIBIT 5-2

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: WINTER 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.4	30.5	28.7	32.2	29.0
PAPER BREAKDOWN:					
CORRUGATED CARDBOARD	4.7	4.8	4.4	4.7	4.6
NEWSPAPERS	10.3	8.5	7.8	8.7	7.0
OFFICE/COMPUTER PAPER	0.5	0.5	0.6	0.7	0.5
MAGAZINES/GLOSSY PAPER	2.8	2.4	2.3	2.8	2.7
BOOKS	0.5	0.5	0.4	0.6	0.7
NON-CORR. CARDBOARD	2.5	2.5	2.3	2.3	2.1
MIXED PAPER	12.1	11.4	11.0	12.4	11.5
PLASTICS	9.6	9.1	8.3	8.0	6.5
PLASTICS BREAKDOWN:					
CLEAR HDPE CONTAINERS	0.6	0.6	0.5	0.4	0.3
COLORED HDPE CONTAINERS	0.6	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.1	0.1	0.1	0.0
FILMS AND BAGS	5.4	4.9	4.5	4.4	3.7
GREEN PET CONTAINERS	0.1	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.5	0.5	0.4
PVC	0.2	0.2	0.1	0.1	0.0
POLYPROPYLENE	0.1	0.1	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.9	0.9	0.6
MISCELLANEOUS PLASTICS	1.1	1.1	1.0	0.9	0.7
ORGANICS	37.5	38.4	36.2	38.9	41.7
ORGANICS BREAKDOWN:					
GRASS/LEAVES	1.9	2.6	2.9	7.6	13.1
BRUSH/PRUNINGS/STUMPS	0.5	0.5	0.7	0.7	0.7
LUMBER	1.6	1.7	1.7	2.0	2.4
TEXTILES	4.6	4.6	4.2	4.4	4.3
RUBBER/LEATHER	0.1	0.2	0.1	0.1	0.2
FINES	2.2	2.2	2.1	2.2	2.0
DISPOSABLE DIAPERS	4.0	4.2	3.6	3.5	3.4
FOOD WASTE	14.3	14.2	13.0	11.6	9.6
MISCELLANEOUS ORGANIC	8.4	8.3	7.9	6.9	6.0
GLASS	5.4	5.5	4.9	4.6	4.4
GLASS BREAKDOWN:					
CLEAR GLASS CONTAINERS	3.3	3.4	3.0	2.9	2.7
GREEN GLASS CONTAINERS	1.0	1.1	1.0	0.9	0.9
BROWN GLASS CONTAINERS	1.0	1.0	0.8	0.7	0.7
MISCELLANEOUS GLASS	0.1	0.1	0.1	0.1	0.0
ALUMINUM	0.9	0.9	0.8	0.9	0.8
ALUMINUM BREAKDOWN:					
BEVERAGE CONTAINERS	0.4	0.4	0.3	0.3	0.3
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.0	0.0	0.0	0.1	0.1
FERROUS METAL	4.2	4.2	3.9	4.0	3.8
FERROUS METAL BREAKDOWN					
FOOD CONTAINERS	2.4	2.3	2.0	1.9	1.6
OTHER FERROUS METAL	1.8	1.9	1.9	2.0	2.2
INORGANIC/NON-HAZARDOUS	2.6	2.6	2.5	2.6	1.3
INORGANIC BREAKDOWN:					
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.2	0.2	0.1
MISCELLANEOUS INORGANIC	2.4	2.4	2.3	2.4	1.2
HAZARDOUS WASTE	0.4	0.4	0.3	0.3	0.2
HAZARDOUS WASTE BREAKDOWN:					
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.2	0.2	0.1	0.1	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.1	0.1	0.1	0.0
CAR BATTERIES	0.1	0.0	0.0	0.0	0.0
MISCELLANEOUS HAZARDOUS	0.0	0.0	0.1	0.1	0.1
BULK ITEMS	6.1	8.5	14.5	8.7	12.4

EXHIBIT 5-2 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: SPRING 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.3	29.7	28.9	31.0	28.6
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	4.5	4.4	4.4	4.5	4.3
NEWSPAPERS	9.7	8.0	7.8	9.4	7.9
OFFICE/COMPUTER PAPER	0.7	0.6	0.5	0.7	0.5
MAGAZINES/GLOSSY PAPER	3.0	2.6	2.5	2.8	2.4
BOOKS	1.1	0.9	0.7	0.7	0.4
NON-CORR. CARDBOARD	2.3	2.2	2.2	2.4	2.3
MIXED PAPER	11.9	11.2	10.8	10.7	8.8
PLASTICS	10.1	9.3	8.8	8.8	7.5
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.5	0.5	0.5	0.5	0.4
COLORED HDPE CONTAINERS	0.6	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.1	0.1	0.1	0.1
FILMS AND BAGS	5.8	5.1	4.6	4.5	3.7
GREEN PET CONTAINERS	0.2	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.5	0.1	0.1
PVC	0.1	0.1	0.1	0.4	0.3
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.9	0.1	0.1
MISCELLANEOUS PLASTICS	1.3	1.2	1.2	0.9	0.6
				1.4	1.7
ORGANICS	38.2	39.0	36.0	40.0	40.3
			ORGANICS BREAKDOWN		
GRASS/LEAVES	1.3	1.4	1.7	3.0	4.5
BRUSH/PRUNINGS/STUMPS	0.3	0.6	0.8	1.6	2.4
LUMBER	2.5	3.0	3.0	3.2	3.2
TEXTILES	5.5	5.3	4.8	4.8	4.7
RUBBER/LEATHER	0.3	0.3	0.3	0.2	0.0
FINES	2.8	2.7	2.6	2.6	2.3
DISPOSABLE DIAPERS	3.5	3.6	3.3	3.5	3.5
FOOD WASTE	14.1	14.3	13.6	12.4	10.9
MISCELLANEOUS ORGANIC	7.9	7.9	7.8	8.8	8.8
GLASS	5.4	5.6	5.3	4.9	4.5
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	3.1	3.3	3.2	3.1	2.9
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.8	0.8
BROWN GLASS CONTAINERS	0.9	0.9	0.9	0.8	0.8
MISCELLANEOUS GLASS	0.3	0.3	0.3	0.2	0.1
ALUMINUM	0.9	0.9	0.8	0.8	0.7
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.3	0.3	0.3	0.3	0.2
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.1	0.1	0.1	0.1	0.0
FERROUS METAL	3.8	4.1	4.0	4.4	4.4
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.1	2.1	2.0	1.9	1.5
OTHER FERROUS METAL	1.6	2.0	2.0	2.5	2.9
INORGANIC/NON-HAZARDOUS	3.0	3.0	3.2	2.6	1.4
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.3	0.3	0.2	0.1	0.1
MISCELLANEOUS INORGANIC	2.7	2.7	3.0	2.5	1.3
HAZARDOUS WASTE	0.3	0.4	0.4	0.6	0.7
			HAZARDOUS WASTE BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.1	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.2	0.4
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.2	0.2	0.2
BULK ITEMS	5.1	8.1	10.6	6.9	14.1

EXHIBIT 5-2 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: SUMMER 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	32.5	30.9	28.7	32.0	27.3
			PAPER BREAKDOWN		
CORRUGATED CARDBOARD	5.2	5.1	4.4	4.6	3.9
NEWSPAPERS	10.3	9.2	8.5	9.9	8.2
OFFICE/COMPUTER PAPER	1.1	1.1	1.1	1.5	1.5
MAGAZINES/GLOSSY PAPER	3.2	3.0	2.6	3.1	2.6
BOOKS	1.1	1.1	1.1	1.1	0.8
NON-CORR. CARDBOARD	3.2	3.0	2.8	3.2	3.0
MIXED PAPER	8.4	8.4	8.2	8.5	7.3
PLASTICS	11.3	10.7	9.3	9.4	7.4
			PLASTICS BREAKDOWN		
CLEAR HDPE CONTAINERS	0.6	0.6	0.5	0.6	0.5
COLORED HDPE CONTAINERS	0.8	0.7	0.6	0.7	0.5
LDPE CONTAINERS	0.2	0.2	0.2	0.2	0.2
FILMS AND BAGS	6.0	5.4	4.6	4.5	3.3
GREEN PET CONTAINERS	0.2	0.2	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.4	0.4	0.3
PVC	0.2	0.2	0.2	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.8	0.8	0.5
MISCELLANEOUS PLASTICS	1.9	1.9	1.7	1.9	1.6
ORGANICS	36.2	37.8	34.8	38.8	38.6
			ORGANICS BREAKDOWN		
GRASS/LEAVES	0.9	1.5	1.9	3.6	4.9
BRUSH/PRUNINGS/STUMPS	0.2	0.4	0.6	1.4	2.2
LUMBER	2.1	2.5	2.2	2.5	2.5
TEXTILES	6.0	5.9	5.1	4.8	4.7
RUBBER/LEATHER	0.2	0.2	0.2	0.2	0.2
FINES	2.8	2.6	2.2	2.2	1.8
DISPOSABLE DIAPERS	3.4	3.5	3.0	3.4	3.6
FOOD WASTE	11.4	12.6	12.3	12.7	11.5
MISCELLANEOUS ORGANIC	9.4	8.6	7.3	8.0	7.3
GLASS	5.2	5.6	5.2	4.9	4.3
			GLASS BREAKDOWN		
CLEAR GLASS CONTAINERS	2.6	2.9	2.8	2.9	2.7
GREEN GLASS CONTAINERS	1.2	1.2	1.1	0.9	0.7
BROWN GLASS CONTAINERS	0.9	1.0	0.9	0.8	0.7
MISCELLANEOUS GLASS	0.5	0.5	0.4	0.3	0.2
ALUMINUM	1.1	1.1	0.9	0.9	0.7
			ALUMINUM BREAKDOWN		
BEVERAGE CONTAINERS	0.3	0.3	0.2	0.2	0.1
OTHER ALUMINUM CONTAINERS	0.7	0.6	0.5	0.6	0.5
MISCELLANEOUS ALUMINUM	0.3	0.2	0.2	0.2	0.1
FERROUS METAL	4.1	4.1	3.5	3.5	2.9
			FERROUS METAL BREAKDOWN		
FOOD CONTAINERS	2.1	2.0	1.7	1.8	1.5
OTHER FERROUS METAL	1.9	2.0	1.8	1.7	1.5
INORGANIC/NON-HAZARDOUS	1.9	2.2	2.2	1.5	0.8
			INORGANIC BREAKDOWN		
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.1	0.1	0.1	0.1	0.1
MISCELLANEOUS INORGANIC	1.8	2.1	2.1	1.4	0.7
HAZARDOUS WASTE	0.4	0.4	0.4	0.5	0.6
			HAZARDOUS BREAKDOWN		
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.1	0.1	0.1	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.0	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.2	0.3
MISCELLANEOUS HAZARDOUS	0.2	0.2	0.2	0.2	0.3
BULK ITEMS	7.4	7.4	15.1	8.6	17.5

EXHIBIT 5-2 (continued)

RESIDENTIAL WASTE COMPOSITION BY BOROUGH & SEASON: FALL 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	35.2	32.6	31.1	36.1	33.4
PAPER BREAKDOWN					
CORRUGATED CARDBOARD	5.2	5.3	4.9	4.8	3.7
NEWSPAPERS	11.9	10.0	9.0	10.9	9.6
OFFICE/COMPUTER PAPER	0.4	0.6	0.8	1.1	1.1
MAGAZINES/GLOSSY PAPER	2.9	2.6	2.5	3.2	3.1
BOOKS	0.5	0.6	0.6	1.1	1.4
NON-CORR. CARDBOARD	2.4	2.5	2.4	2.1	1.8
MIXED PAPER	11.9	11.2	10.9	13.2	12.6
PLASTICS	9.9	9.4	8.4	7.8	6.0
PLASTIC BREAKDOWN					
CLEAR HDPE CONTAINERS	0.5	0.6	0.5	0.5	0.3
COLORED HDPE CONTAINERS	0.6	0.6	0.8	0.7	0.6
LDPE CONTAINERS	0.1	0.2	0.2	0.1	0.1
FILMS AND BAGS	5.8	5.2	4.5	4.2	3.2
GREEN PET CONTAINERS	0.1	0.1	0.1	0.1	0.0
CLEAR PET CONTAINERS	0.4	0.4	0.4	0.4	0.3
PVC	0.2	0.2	0.2	0.1	0.0
POLYPROPYLENE	0.2	0.2	0.1	0.2	0.2
POLYSTYRENE	0.9	0.9	0.8	0.7	0.5
MISCELLANEOUS PLASTICS	1.0	1.1	1.0	0.9	0.7
ORGANICS	35.3	37.2	35.9	37.0	37.3
ORGANICS BREAKDOWN					
GRASS/LEAVES	2.3	3.0	3.8	7.3	9.9
BRUSH/PRUNINGS/STUMPS	0.3	0.3	0.4	0.5	0.6
LUMBER	1.8	1.9	1.9	1.8	1.6
TEXTILES	5.1	5.1	4.4	3.6	2.8
RUBBER/LEATHER	0.1	0.1	0.1	0.3	0.5
FINES	2.2	2.2	2.0	2.0	1.8
DISPOSABLE DIAPERS	3.5	3.6	3.2	3.0	2.9
FOOD WASTE	12.7	13.2	12.5	12.0	11.0
MISCELLANEOUS ORGANIC	7.5	7.8	7.6	6.6	6.2
GLASS	4.9	5.1	4.6	4.2	3.7
GLASS BREAKDOWN					
CLEAR GLASS CONTAINERS	2.8	2.9	2.8	2.7	2.4
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.7	0.6
BROWN GLASS CONTAINERS	0.9	0.9	0.8	0.7	0.6
MISCELLANEOUS GLASS	0.2	0.2	0.1	0.1	0.1
ALUMINUM	1.1	1.0	0.9	1.0	0.8
ALUMINUM BREAKDOWN					
BEVERAGE CONTAINERS	0.4	0.4	0.3	0.3	0.3
OTHER ALUMINUM CONTAINERS	0.4	0.5	0.4	0.5	0.4
MISCELLANEOUS ALUMINUM	0.2	0.2	0.2	0.2	0.2
FERROUS METAL	4.2	4.2	3.9	3.9	3.7
FERROUS METAL BREAKDOWN					
FOOD CONTAINERS	2.2	2.2	1.9	1.7	1.4
OTHER FERROUS METAL	2.0	2.0	2.0	2.2	2.3
INORGANIC/NON-HAZARDOUS	1.9	2.2	2.1	1.7	0.9
INORGANIC BREAKDOWN					
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.1	0.1	0.2	0.2	0.3
MISCELLANEOUS INORGANIC	1.9	2.1	1.9	1.5	0.6
HAZARDOUS WASTE	0.5	0.5	0.3	0.2	0.1
HAZARDOUS BREAKDOWN					
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.4	0.4	0.2	0.1	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS HAZARDOUS	0.0	0.0	0.0	0.0	0.0
BULK ITEMS	7.0	7.7	12.9	8.1	14.2

EXHIBIT 5-2 (continued)

RESIDENTIAL ANNUAL WASTE COMPOSITION BY BOROUGH: 1990

WASTE COMPONENT	MANHATTAN	BRONX	BROOKLYN	QUEENS	STATEN ISLAND
PAPER	33.6	30.9	29.3	32.8	28.9
PAPER BREAKDOWN					
CORRUGATED CARDBOARD	4.9	4.9	4.5	4.6	4.1
NEWSPAPERS	10.5	8.9	8.3	9.7	8.1
OFFICE/COMPUTER PAPER	0.7	0.7	0.7	1.0	0.9
MAGAZINES/GLOSSY PAPER	3.0	2.7	2.5	3.0	2.7
BOOKS	0.8	0.8	0.7	0.8	0.8
NON-CORR. CARDBOARD	2.6	2.6	2.4	2.5	2.3
MIXED PAPER	11.0	10.5	10.2	11.2	10.0
PLASTICS	10.3	9.6	8.7	8.5	6.9
PLASTICS BREAKDOWN					
CLEAR HDPE CONTAINERS	0.6	0.6	0.5	0.5	0.4
COLORED HDPE CONTAINERS	0.7	0.6	0.6	0.6	0.5
LDPE CONTAINERS	0.1	0.2	0.2	0.1	0.1
FILMS AND BAGS	5.7	5.2	4.6	4.4	3.5
GREEN PET CONTAINERS	0.2	0.1	0.1	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.5	0.4	0.4	0.3
PVC	0.2	0.2	0.1	0.1	0.1
POLYPROPYLENE	0.2	0.2	0.1	0.1	0.1
POLYSTYRENE	0.9	0.9	0.8	0.8	0.6
MISCELLANEOUS PLASTICS	1.3	1.3	1.3	1.3	1.2
ORGANICS	36.6	38.1	36.2	38.7	39.4
ORGANIC BREAKDOWN					
GRASS/LEAVES	1.6	2.1	2.5	5.3	8.0
BRUSH/PRUNINGS/STUMPS	0.3	0.4	0.6	1.1	1.5
LUMBER	2.0	2.3	2.2	2.4	2.4
TEXTILES	5.3	5.2	4.6	4.4	4.1
RUBBER/LEATHER	0.2	0.2	0.2	0.2	0.2
FINES	2.5	2.4	2.2	2.3	2.0
DISPOSABLE DIAPERS	3.6	3.7	3.3	3.4	3.3
FOOD WASTE	13.1	13.6	12.9	12.2	10.7
MISCELLANEOUS ORGANIC	8.3	8.1	7.6	7.6	7.1
GLASS	5.2	5.5	5.0	4.7	4.2
GLASS BREAKDOWN					
CLEAR GLASS CONTAINERS	3.0	3.1	2.9	2.9	2.7
GREEN GLASS CONTAINERS	1.1	1.1	1.0	0.8	0.7
BROWN GLASS CONTAINERS	0.9	1.0	0.9	0.8	0.7
MISCELLANEOUS GLASS	0.3	0.3	0.2	0.2	0.1
ALUMINUM	1.0	1.0	0.9	0.9	0.8
ALUMINUM BREAKDOWN					
BEVERAGE CONTAINERS	0.3	0.3	0.3	0.3	0.2
OTHER ALUMINUM CONTAINERS	0.5	0.5	0.5	0.5	0.5
MISCELLANEOUS ALUMINUM	0.2	0.1	0.1	0.1	0.1
FERROUS METAL	4.1	4.1	3.8	3.9	3.7
FERROUS BREAKDOWN					
FOOD CONTAINERS	2.2	2.1	1.9	1.8	1.5
OTHER FERROUS METAL	1.8	2.0	1.9	2.1	2.2
INORGANIC/NON-HAZARDOUS	2.4	2.5	2.5	2.1	1.1
INORGANIC BREAKDOWN					
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.2	0.1	0.1
MISCELLANEOUS INORGANIC	2.2	2.3	2.3	2.0	0.9
HAZARDOUS WASTE	0.4	0.4	0.4	0.4	0.4
HAZARDOUS BREAKDOWN					
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0
PAINT/SOLVENTS/FUEL	0.2	0.2	0.1	0.1	0.0
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.0	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.0	0.0	0.1	0.2
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.1	0.1	0.2
BULK ITEMS	6.4	7.9	13.3	8.1	14.7

EXHIBIT 5-3

CITY-WIDE RESIDENTIAL WASTE COMPOSITION BY SEASON: 1990

WASTE COMPONENT	WINTER	SPRING	SUMMER	FALL	ANNUAL
PAPER	**30.8**	**30.3**	**30.5**	**33.7**	**31.3**
CORRUGATED CARDBOARD	4.6	4.4	4.7	4.9	4.7
NEWSPAPERS	8.6	8.8	9.3	10.3	9.2
OFFICE/COMPUTER PAPER	0.6	0.8	1.2	0.8	0.8
MAGAZINES/GLOSSY PAPER	2.8	2.7	2.9	2.6	2.7
BOOKS	0.5	0.8	1.1	0.6	0.8
NON-CORR. CARDBOARD	2.4	2.3	3.0	2.3	2.5
MIXED PAPER	11.7	10.9	8.3	11.9	10.7
PLASTICS	**8.4**	**9.0**	**9.8**	**8.5**	**8.9**
CLEAR HDPE CONTAINERS	0.5	0.5	0.6	0.5	0.5
COLORED HDPE CONTAINERS	0.6	0.6	0.7	0.6	0.6
LDPE CONTAINERS	0.1	0.1	0.2	0.1	0.1
FILMS AND BAGS	4.6	4.8	4.8	4.7	4.8
GREEN PET CONTAINERS	0.1	0.1	0.2	0.1	0.1
CLEAR PET CONTAINERS	0.5	0.4	0.5	0.4	0.4
PVC	0.1	0.1	0.2	0.1	0.1
POLYPROPYLENE	0.1	0.1	0.2	0.2	0.1
POLYSTYRENE	0.9	0.9	0.8	0.8	0.8
MISCELLANEOUS PLASTICS	1.0	1.3	1.8	1.0	1.3
ORGANICS	**37.9**	**38.9**	**36.7**	**36.3**	**37.5**
GRASS/LEAVES	4.7	2.1	2.3	4.7	3.4
BRUSH/PRUNINGS/STUMPS	0.6	1.0	0.8	0.4	0.7
LUMBER	1.8	3.0	2.3	1.8	2.2
TEXTILES	4.4	5.0	5.3	4.3	4.7
RUBBER/LEATHER	0.1	0.2	0.2	0.2	0.2
FINES	2.2	2.7	2.3	2.0	2.3
DISPOSABLE DIAPERS	3.7	3.5	3.3	3.3	3.4
FOOD WASTE	12.7	13.3	12.2	12.4	12.7
MISCELLANEOUS ORGANIC	7.6	8.2	8.1	7.2	7.8
GLASS	**4.9**	**5.2**	**5.1**	**4.6**	**5.0**
CLEAR GLASS CONTAINERS	3.1	3.1	2.8	2.7	2.9
GREEN GLASS CONTAINERS	1.0	1.0	1.0	0.9	1.0
BROWN GLASS CONTAINERS	0.8	0.9	0.9	0.8	0.9
MISCELLANEOUS GLASS	0.1	0.3	0.4	0.2	0.2
ALUMINUM	**0.9**	**0.8**	**1.0**	**1.0**	**0.9**
BEVERAGE CONTAINERS	0.3	0.3	0.2	0.3	0.3
OTHER ALUMINUM CONTAINEF	0.5	0.5	0.6	0.5	0.5
MISCELLANEOUS ALUMINUM	0.1	0.1	0.2	0.2	0.1
FERROUS METAL	**4.0**	**4.1**	**3.6**	**4.0**	**3.9**
FOOD CONTAINERS	2.1	2.0	1.8	1.9	2.0
OTHER FERROUS METAL	1.9	2.1	1.6	2.1	2.0
INORGANIC/NON-HAZARDOU	**2.5**	**2.8**	**1.8**	**1.9**	**2.3**
BI - METAL CANS	0.0	0.0	0.0	0.0	0.0
NON-BULK CERAMICS	0.2	0.2	0.1	0.2	0.2
MISCELLANEOUS INORGANIC	2.3	2.7	1.7	1.7	2.1
HAZARDOUS WASTE	**0.3**	**0.5**	**0.5**	**0.3**	**0.4**
PESTICIDES	0.0	0.0	0.0	0.0	0.0
NON-PESTICIDE POISONS	0.0	0.0	0.1	0.0	0.0
PAINT/SOLVENTS/FUEL	0.1	0.1	0.1	0.2	0.1
DRY CELL BATTERIES	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.1	0.0	0.0	0.0	0.0
CAR BATTERIES	0.0	0.1	0.1	0.0	0.1
MISCELLANEOUS HAZARDOUS	0.1	0.1	0.2	0.0	0.1
BULK ITEMS	**10.4**	**8.4**	**11.1**	**9.9**	**9.9**

EXHIBIT 5-4

INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

SUMMER

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	10.18	9.53	6.02	6.08	12.82	9.07	24.21	11.00	26.59	4.66	7.86	8.76	11.99	6.55
Newsprint	3.32	1.67	1.50	6.62	2.07	0.83	1.33	5.98	2.64	8.90	6.49	5.23	4.36	30.35
Office/Computer	2.60	4.77	1.03	8.70	6.63	1.96	10.21	14.51	10.57	51.17	5.74	22.56	3.75	7.01
Magazines and Glossy	0.96	0.44	6.28	3.06	0.50	0.38	2.70	0.60	0.57	1.77	0.69	5.40	0.83	1.48
Book/Phone Book	0.74	0.41	18.19	2.25	0.04	0.12	0.03	0.96		2.57	0.69	7.99	2.24	0.92
Non-Corrugated OCC	3.56	4.65	2.03	1.29	6.34	3.70	5.06	6.33	3.39	3.19	2.12	3.53	10.16	2.24
Mixed	6.26	4.86	6.66	8.55	5.16	5.61	12.08	12.69	11.19	12.22	11.53	12.38	24.29	16.42
TOTAL PAPER FRACTION	27.59	26.33	41.71	32.56	35.56	21.65	55.64	52.07	54.93	84.50	35.13	65.85	57.66	64.97
Clear HDPE containers	0.27	0.34	0.14	0.31	0.30	0.38	0.20	0.45	0.30	0.08	0.23	0.30	0.17	0.27
Colored HDPE containers	0.34	0.22	0.11	0.21	0.57	0.35	0.62	1.56	0.06	0.08	0.45	0.24	0.09	0.34
LDPE	0.05	0.05		0.01	0.13	0.23	0.30	0.12	0.19	0.06	0.11	0.08	0.02	0.06
Films and Bags	3.58	3.24	2.75	10.34	4.59	5.06	3.45	5.13	3.97	1.70	6.38	3.60	5.03	3.22
Green PET containers	0.11	0.01	0.06		0.13		0.24	0.32	0.01	0.04	0.26	0.43	0.03	0.12
Clear PET Containers	0.23	0.43	0.12	0.09	0.21	0.03	0.18	0.17	0.04	0.13	0.12	0.27	0.10	0.25
PVC	0.06	0.06	0.01	0.04	0.01		0.06		0.22	0.08	0.10	0.01	0.03	0.09
Polypropylene	0.12	0.02	0.01	0.07	0.08	0.14	0.23	0.25	0.73	0.20	0.23	0.02	0.05	0.07
Polystyrene (Estimated for Summer)	2.67	1.10	1.25	1.08	7.23	5.58	2.54	4.69	5.74	1.05	1.36	1.67	1.83	0.83
Miscellaneous Plastic	1.83	5.58	0.38	0.25	0.20	0.10	2.00	0.40	4.46	1.05	1.83	0.25	0.87	0.52
TOTAL PLASTIC FRACTION	9.26	11.04	4.64	12.40	13.45	11.86	9.82	13.11	15.72	4.46	12.86	6.86	6.23	5.77
Grass/Leaves	6.74		2.66	13.26	4.58	0.05	0.23			0.11	13.79	0.37	1.21	0.49
Brush/Prunings/Stumps	1.09	1.23	0.33	6.55	0.74	0.56					1.66	0.35	1.18	
TOTAL YARD WASTE FRACTION	7.83	1.23	2.99	21.84	5.32	0.63	0.23			0.11	15.46	0.72	2.39	0.49
Lumber	5.79	1.80	0.27	6.68	0.94	0.18	0.41	1.43	0.86	0.05	1.61	0.88	1.32	0.60
Textiles	2.67	1.50	0.69	1.69	3.76	3.08	2.79	5.84	1.29	0.80	3.82	1.52	0.75	3.54
Rubber	0.03		0.13	0.23	0.15	0.19	0.35	0.45			1.04	0.24	0.03	0.43
Fines	2.07	1.29	0.65	1.55	1.53	1.66	0.96	1.33	0.60	0.65	2.26	0.72	1.34	2.31
Diapers	1.59	0.32	0.14	0.06	1.31	33.29	4.30	2.43	11.86	0.05	0.05	0.09	0.00	0.27
Foodwaste	16.85	21.46	37.65	3.24	18.01	14.07	11.56	12.73	8.25	2.26	9.79	15.12	8.66	2.17
Miscellaneous Organic	5.21	6.86	1.25	4.26	7.33	6.73	3.75	1.66		0.60	4.52	2.02	5.00	2.64
TOTAL ORGANIC FRACTION	34.21	35.27	40.77	17.74	33.02	59.18	24.11	25.67	22.65	4.41	23.18	20.58	17.11	11.96
Clear Glass containers	1.75	1.31	0.39	1.50	1.77	0.69	6.30	0.56	1.39	2.14	1.21	1.37	1.48	3.71
Green Glass containers	0.26	0.29	0.03	0.31	0.05	0.09	0.10	0.51		0.32	0.26	0.41	0.16	1.09
Brown Glass containers	0.26	0.61	0.05	0.33	0.15	0.06	0.23	0.03		0.08	0.12	0.23	0.08	0.73
Miscellaneous Glass	0.43	0.04				0.03			0.04				1.31	2.02
TOTAL GLASS FRACTION	2.71	2.26	0.47	2.14	1.96	0.88	6.63	1.10	1.43	2.54	1.60	2.01	3.03	7.55
Aluminium Food Containers/Foil	0.45	0.66	0.32	0.51	1.01	0.40	0.58	0.96	0.24	0.80	0.32	0.17	0.65	0.51
Aluminium Beverage Cans	0.31	0.25	0.16	0.41	0.40	0.20	0.48	0.59	0.42	0.69	0.44	0.61	0.89	1.11
Miscellaneous Aluminium	0.14	0.03	0.07	0.06	0.06	0.17	0.09	0.40		0.17	0.20	0.08	0.14	0.11
TOTAL ALUMINIUM FRACTION	0.89	0.94	0.55	0.98	1.47	0.77	1.15	1.94	0.66	1.65	0.96	0.86	1.68	1.72
Ferrous Metal Food containers	1.60	1.72	2.06	1.03	4.46	2.96	1.19	2.39	3.18	0.35	1.28	0.43	1.87	0.67
Other Ferrous Metal	1.93	1.64	0.97	1.61	0.41	0.21	0.36	0.08	0.27	0.28	2.54	1.29	5.28	2.64
TOTAL FERROUS METAL FRACTION	3.53	3.36	3.03	2.64	4.87	3.17	1.55	2.47	3.45	0.63	3.82	1.73	7.16	3.31
Bimetal Cans							0.05						0.04	
TOTAL METAL FRACTION	4.42	4.30	3.58	3.62	6.34	3.94	2.74	4.41	4.11	2.28	4.78	2.58	8.88	5.03
Non-bulk Ceramics	0.02	0.03	0.05	0.28						0.02	0.20		0.11	0.08
Miscellaneous Inorganic	3.24	13.64	0.78	6.54	1.98	0.59	0.05	0.03		0.01	4.39		1.24	3.22
TOTAL INORGANIC FRACTION	3.26	13.67	0.83	6.83	1.98	0.59	0.05	0.03		0.03	4.58		1.35	3.30
Pesticides									0.12				0.00	
Non-pesticide Poisons	0.01				0.04	0.01			0.01				0.02	
Paint/Solvent/Fuel	0.56	0.40	0.02		0.09		0.01		0.12	0.08	0.26	0.01	0.03	0.03
Dry Cell Batteries	0.01		0.01		0.01	0.09	0.01			0.03	0.01		0.01	0.04
Car Batteries														
Medical Waste	0.04				0.29	0.37	0.49	3.05	0.76				0.00	
Miscellaneous HHW	0.32		0.02		0.07			0.14					0.03	0.42
TOTAL HHW FRACTION	0.94	0.40	0.05		0.50	0.47	0.51	3.19	1.01	0.11	0.27	0.01	0.10	0.49
TOTAL BULK ITEMS	9.81	5.52	4.79	2.9	1.86	0.57	0.27	0.41	0.12	1.53	2.11	1.4	1.24	0.43

Blank values indicate less than 0.01 percent

EXHIBIT 5-4 (continued)

INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

FALL

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	12.41	11.10	12.66	13.92	10.73	9.66	19.85	10.55	19.61	5.03	7.81	15.89	15.39	9.33
Newsprint	3.20	4.36	4.36	4.31	3.68	3.27	4.16	5.41	3.94	8.57	4.24	9.57	5.91	36.40
Office/Computer	3.92	5.51	1.62	2.61	3.70	3.65	6.26	9.49	3.70	36.36	0.94	10.77	5.26	2.13
Magazines and Glossy	1.17	1.57	1.40	0.42	2.12	0.90	1.64	1.72	1.32	2.84	0.35	1.47	0.98	1.64
Book/Phone Book	2.00	2.89	2.73	1.22	1.25	0.71	0.62	3.21	0.85	5.40	0.46	0.93	4.46	0.13
Non-Corrugated OCC	3.40	12.61	2.11	1.84	5.06	1.73	3.41	5.30	2.59	3.99	2.13	1.15	3.35	1.77
Mixed	19.32	11.86	27.32	24.59	10.31	9.55	15.16	15.10	19.64	23.95	12.20	25.82	19.75	15.75
TOTAL PAPER FRACTION	45.42	49.91	52.20	48.99	36.86	29.47	51.09	50.77	51.85	86.14	27.92	65.59	55.09	67.16
Clear HDPE containers	0.12	0.06	0.16	0.06	0.14	0.23	0.19	0.06	0.33	0.11	0.12	0.23	0.14	0.11
Colored HDPE containers	0.09	0.06	0.25	0.06	0.54	0.15	0.26	0.19	0.11	0.07	0.08	0.14	0.05	0.06
LDPE	0.01	0.07	0.03	0.01	0.19	0.26	0.44	0.29	0.09	0.01	0.03	0.02	0.01	0.02
Films and Bags	4.37	2.49	4.11	3.56	6.42	5.68	4.45	5.12	4.62	2.79	4.14	4.53	4.00	3.57
Green PET containers	0.02	0.01	0.04	0.01	0.17	0.04	0.73	0.02	0.03	0.24	0.01	0.30	0.03	0.05
Clear PET Containers	0.03	0.06	0.16	0.10	0.16	0.02	0.05	0.04	0.02	0.10	0.07	0.23	0.07	0.10
PVC	0.02	0.02	0.13	0.13	0.04	0.32	0.12	0.28	0.11	0.03	0.03	0.05	0.08	0.13
Polypropylene	0.10	0.01			0.44	0.22	0.26	0.27	0.06	0.02	0.06	0.02	0.01	0.04
Polystyrene (Estimated for Summer)	2.97	0.76	1.28	0.38	1.53	1.25	0.78	0.29	2.54	0.55	0.76	1.69	3.35	0.69
Miscellaneous Plastic	2.76	0.75	0.79	0.86	4.92	3.71	2.85	4.62	4.72	1.64	0.24	0.69	1.30	0.62
TOTAL PLASTIC FRACTION	10.48	4.33	6.99	5.19	14.56	11.88	10.11	11.19	12.85	5.55	5.54	8.09	9.03	5.38
Grass/Leaves	5.39	2.46	8.61	29.43	0.96	4.57	1.16	5.62	0.26	0.08	0.79	5.15	1.48	1.30
Brush/Prunings/Stumps			0.95	0.06		0.11						0.07		0.01
TOTAL YARD WASTE FRACTION	5.39	2.46	9.56	29.49	0.96	4.68	1.16	5.62	0.26	0.08	0.79	5.22	1.48	1.31
Lumber	0.93	1.07	0.16	0.01	0.19	0.28	1.57	0.17	0.24		0.33	2.05	3.30	3.10
Textiles	0.64	0.51	1.75	1.11	3.69	1.40	3.29	3.89	1.56	0.46	2.71	0.84	1.23	4.52
Rubber	0.33		0.07			0.11	0.03	0.06	0.30					0.20
Fines	1.12	1.75	0.47	0.42	1.62	1.66	1.44	0.80	1.27	0.60	0.70	0.62	0.71	1.53
Diapers	0.42	1.49			1.72	19.46	5.56	2.48	3.89		0.13	0.18		0.06
Foodwaste	17.79	19.61	21.16	6.07	13.27	19.37	14.16	12.57	17.90	1.32	55.73	7.26	8.66	0.74
Miscellaneous Organic	3.43	7.36	2.62	0.68	5.22	6.42	5.09	7.48	5.34	0.04	2.41	1.33	2.37	2.03
TOTAL ORGANIC FRACTION	24.65	31.80	26.27	10.29	25.71	48.72	31.16	27.47	30.50	2.43	62.01	12.28	16.26	12.17
Clear Glass containers	0.63	0.80	0.63	0.63	3.98	0.54	1.84	1.20	0.82	1.83	0.35	2.54	1.53	2.38
Green Glass containers	0.23	0.06	0.04	0.06	0.76	0.04	0.06	0.14	0.14	0.64	0.19	0.33	0.17	0.76
Brown Glass containers	0.05	0.03	0.14	0.04	0.70		0.15	0.03	0.07	0.14	0.02	0.20	0.15	0.43
Miscellaneous Glass	0.03		0.09	0.15	5.34	0.03	0.18		0.02	0.02		0.90		0.33
TOTAL GLASS FRACTION	0.94	0.89	0.90	0.87	10.77	0.61	2.24	1.37	1.05	2.63	0.56	3.96	1.85	3.90
Aluminium Food Containers/Foil	0.36	0.26	0.95	0.33	0.31	0.18	0.15	0.24	0.29	0.61	0.29	0.54	0.47	0.13
Aluminium Beverage Cans	0.33	0.17	0.57	1.48	0.48	0.22	0.38	0.49	0.23	0.86	0.25	1.41	0.55	0.57
Miscellaneous Aluminium	0.19		0.08	0.08		0.05	0.02	0.05		0.04			0.01	
TOTAL ALUMINIUM FRACTION	0.87	0.43	1.60	1.89	0.79	0.45	0.55	0.78	0.52	1.51	0.54	1.95	1.03	0.70
Ferrous Metal Food containers	3.27	1.89	1.25	0.73	5.27	2.53	1.67	1.15	2.03	0.44	2.09	0.53	1.31	0.42
Other Ferrous Metal	0.79	1.02	0.93	1.66	2.63	0.95	0.55	0.42	0.45	0.73	0.38	0.53	11.46	6.80
TOTAL FERROUS METAL FRACTION	4.06	2.91	2.16	2.39	7.90	3.47	2.21	1.57	2.48	1.17	2.47	1.07	12.79	7.22
Bimetal Cans												0.02		
TOTAL METAL FRACTION	4.93	3.34	3.78	4.28	8.68	3.92	2.76	2.35	3.00	2.67	3.01	3.04	13.82	7.92
Non-bulk Ceramics	0.68		0.04		0.02		0.02	0.03	0.12		0.01	0.05	0.33	0.05
Miscellaneous Inorganic	6.27	6.39	0.18		1.71	0.35	0.24			0.11	0.01	0.80	0.96	1.65
TOTAL INORGANIC FRACTION	6.95	6.39	0.22		1.73	0.35	0.26	0.03	0.12	0.11	0.02	0.85	1.29	1.69
Pesticides														
Non-pesticide Poisons													0.07	
Paint/Solvent/Fuel			0.05							0.04				
Dry Cell Batteries	0.01		0.03		0.12	0.01		0.08		0.01	0.01	0.01		0.01
Car Batteries														
Medical Waste	0.01					0.18	0.37	0.99	0.29					
Miscellaneous HHW	0.08			0.14			0.15		0.12	0.07	0.10		0.09	0.17
TOTAL HHW FRACTION	0.08		0.08	0.14	0.12	0.19	0.52	1.07	0.41	0.12	0.11	0.01	0.16	0.18
TOTAL BULK ITEMS	1.18	0.86		0.74	0.54	0.19	0.69	0.13		0.28	0.04	0.93	1.02	0.3

Blank values indicate less than 0.01 percent

EXHIBIT 5-4 (continued)

INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

WINTER

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER 1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	7.52	8.39	11.46	10.63	12.95	6.06	19.52	10.50	21.67	7.88	9.86	15.51	10.73	9.22
Newsprint	1.79	3.17	1.74	4.24	3.64	1.33	2.45	4.52	2.95	10.51	3.65	9.22	3.10	29.44
Office/Computer	2.07	4.45	3.28	2.47	6.43	1.18	5.75	7.24	5.35	19.50	3.07	14.51	4.86	2.62
Magazines and Glossy	0.86	2.29	2.84	0.92	0.89	0.44	1.87	1.53	0.80	1.10	0.52	2.16	1.31	0.92
Book/Phone Book	0.55	2.73	1.63	0.95	0.81	0.06	0.24	0.34	0.35	2.12	0.28	4.36	1.72	3.76
Non-Corrugated OCC	10.55	10.69	2.91	5.41	2.17	1.38	3.48	3.51	2.89	1.51	2.15	1.20	17.77	1.85
Mixed	15.94	23.06	35.16	26.25	15.02	13.26	19.69	19.21	16.66	32.44	15.23	25.75	21.32	19.36
TOTAL PAPER FRACTION	39.39	54.76	59.03	50.67	42.02	23.73	53.01	48.85	50.67	75.07	34.76	72.71	60.81	67.16
Clear HDPE containers	0.21	0.40	0.54	0.33	0.22	0.23	0.16	0.50	0.26	0.18	0.29	0.27	0.27	0.24
Colored HDPE containers	0.13	0.04	0.12	0.21	0.16	0.20	0.38	0.17	0.09	0.10	0.20	0.12	0.03	0.16
LDPE		0.04	0.01	0.01	0.05	0.01	0.25	0.04	0.09	0.02	0.06	0.14		0.04
Films and Bags	4.36	6.07	4.83	5.60	7.91	9.64	4.62	7.90	4.80	3.84	6.43	4.00	6.16	3.34
Green PET containers	0.05	0.02	0.07	0.06	0.02	0.07	0.34	0.07	0.01	0.01	0.06	0.09	0.05	0.02
Clear PET Containers	0.05	0.06	0.14	0.12	0.24	0.02	0.10	0.23	0.04	0.15	0.16	0.16	0.08	0.09
PVC	0.01	0.02	0.03	0.09	0.05	0.03	0.06	0.13	0.11	0.05	0.11	0.05	0.02	0.03
Polypropylene	0.01	0.06	0.02		0.06	0.03	0.19	0.10	0.29	0.03	0.13	0.02	0.13	0.05
Polystyrene (Estimated for Summer)	2.10	1.32	1.85	1.63	10.67	9.73	2.54	6.79	5.75	1.33	1.84	1.38	1.14	0.92
Miscellaneous Plastic	0.21	0.94	1.23	0.66	0.83	0.51	2.27	2.50	3.33	0.95	0.61	1.07	0.77	0.85
TOTAL PLASTIC FRACTION	7.14	8.99	8.64	8.91	20.05	20.46	10.93	18.42	14.78	6.65	9.90	7.31	8.67	5.74
Grass/Leaves			1.11	0.26	0.39	0.14	0.48	0.13	0.09			0.03	0.02	
Brush/Prunings/Stumps	0.02		0.07		0.14				0.01	0.08		0.05		
TOTAL YARD WASTE FRACTION	0.02		1.18	0.26	0.53	0.14	0.48	0.13	0.10	0.08		0.08	0.02	
Lumber	0.35	0.77	1.36	0.15	1.32	0.23	0.78	0.85	0.40	0.29	0.19	0.35	0.16	1.45
Textiles	0.49	4.18	1.09	1.71	5.07	1.33	2.99	3.97	1.71	2.15	3.33	1.15	0.25	5.02
Rubber		0.09	0.06		0.05		0.41	0.15	0.40		0.23		0.04	0.62
Fines	1.91	2.63	2.40	1.77	1.70	1.30	1.10	1.68	0.98	1.52	1.26	1.16	1.80	2.88
Diapers	0.69	0.05	0.09		1.84	21.04	5.91	2.19	6.78	0.02	0.02	0.44	0.01	0.06
Foodwaste	10.14	8.60	8.52	3.83	9.22	18.69	12.34	9.02	14.96	4.34	37.69	8.33	7.96	1.99
Miscellaneous Organic	7.06	6.84	6.09	8.78	8.55	5.44	3.56	6.49	3.41	1.89	4.45	1.48	8.28	2.74
TOTAL ORGANIC FRACTION	20.64	23.15	19.61	14.34	27.73	48.23	27.08	24.34	28.62	10.22	47.19	12.91	18.49	14.75
Clear Glass containers	0.77	0.76	1.60	1.20	1.76	0.57	3.64	2.02	0.98	2.24	0.83	2.92	1.75	1.92
Green Glass containers	0.05	0.34	0.17	0.02	0.52	0.01	0.09	0.17	0.06	0.26	0.10	0.37	0.19	0.40
Brown Glass containers	0.04	0.15			0.26	0.02	0.25	0.25	0.03	0.12	0.04	0.18		0.31
Miscellaneous Glass		0.09	0.02	0.02	0.24	0.07	0.06	0.13	0.03	0.05	0.08	0.09	0.31	0.01
TOTAL GLASS FRACTION	0.86	1.34	1.79	1.24	2.77	0.67	4.04	2.57	1.13	2.87	1.05	3.56	2.24	2.64
Aluminium Food Containers/Foil	0.57	0.69	1.67	1.03	1.08	0.62	0.43	0.77	0.30	0.85	0.23	0.23	0.85	0.21
Aluminium Beverage Cans	0.24	0.81	1.34	1.67	0.52	0.22	0.43	0.78	0.31	0.84	0.35	1.30	1.35	0.83
Miscellaneous Aluminium	0.06	0.11	0.20	0.03	0.05		0.04	0.01	0.01	0.02	0.01			0.01
TOTAL ALUMINIUM FRACTION	0.87	1.61	3.21	2.73	1.65	0.83	0.91	1.56	0.62	1.70	0.58	1.53	2.20	1.05
Ferrous Metal Food containers	2.15	1.40	1.65	0.79	3.17	3.89	1.33	2.35	2.55	0.99	3.90	0.41	2.34	1.08
Other Ferrous Metal	0.24	0.94	2.53	0.46	0.76	0.56	0.56	0.76	0.39	1.45	0.96	1.02	1.46	5.34
TOTAL FERROUS METAL FRACTION	2.38	2.34	4.18	1.25	3.93	4.45	1.92	3.11	2.94	2.44	4.66	1.43	3.80	6.42
Bimetal Cans		0.07	0.06	0.02	0.01		0.02	0.02	0.00	0.02		0.02	0.12	0.03
TOTAL METAL FRACTION	3.25	4.02	7.45	4.00	5.59	5.28	2.84	4.69	3.57	4.16	5.44	2.97	6.12	7.50
Non-bulk Ceramics	0.05	0.10	0.02	0.03	0.03	0.10	0.01	0.01	0.05	0.18	0.01	0.05		0.16
Miscellaneous Inorganic	27.09	5.27	1.47	19.34	0.64	0.08	0.21	0.86		0.55	0.17	0.09	2.27	0.73
TOTAL INORGANIC FRACTION	27.14	5.37	1.49	19.37	0.67	0.18	0.22	0.87	0.05	0.73	0.18	0.14	2.27	0.88
Pesticides							0.01		0.04					
Non-pesticide Poisons			0.01	0.01					0.00	0.03				0.04
Paint/Solvent/Fuel			0.09	0.05	0.02	0.01	0.01	0.01	0.05		0.37	0.04		0.35
Dry Cell Batteries	0.03		0.01				0.01	0.04	0.00	0.04	0.02		0.01	0.61
Car Batteries														
Medical Waste					0.29	0.58	0.79	0.77	0.70					
Miscellaneous HHW		0.15	0.02		0.10		0.11		0.04		0.02			0.18
TOTAL HHW FRACTION	0.03	0.15	0.13	0.06	0.41	0.59	0.92	0.82	0.83	0.07	0.41	0.04	0.01	1.18
TOTAL BULK ITEMS	1.55	2.2	0.48	0.94	0.24	0.74	0.48	1.29	0.06	0.36	1.09	0.28	1.36	0.16

Blank values indicate less than 0.01 percent

EXHIBIT 5-4 (continued)

INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

SPRING

WASTE COMPONENT	INSTITUTIONAL CATEGORY NUMBER													
	1	2	3	4	5	6	7	8	9	10	11	12	13	14
Corrugated/Kraft	10.06	7.74	7.54	5.45	14.42	8.78	14.51	10.87	18.21	5.24	6.70	10.21	9.87	7.35
Newsprint	2.29	2.63	2.09	3.12	3.49	1.37	1.87	5.96	2.29	11.46	2.79	7.46	4.15	34.97
Office/Computer	0.33	0.85	1.51	1.46	1.73	0.91	0.80	4.72	1.77	13.70	1.69	6.57	1.13	0.72
Magazines and Glossy	0.31	0.48	1.34	0.63	0.33	0.16	1.28	1.60	0.50	1.82	0.39	2.81	0.19	1.00
Book/Phone Book	0.21	3.34	1.09	4.13	0.50	0.06	0.07	0.29	0.21	2.35	0.40	8.11	0.54	0.26
Non-Corrugated OCC	4.09	4.29	1.44	1.56	0.54	0.77	1.96	2.62	2.71	1.26	1.23	1.22	9.38	1.36
Mixed	30.59	28.40	24.66	25.59	17.72	13.41	31.83	28.05	19.15	42.19	14.48	28.03	31.79	18.69
TOTAL PAPER FRACTION	47.88	47.73	39.66	41.93	38.73	25.45	52.32	54.12	45.83	78.02	27.66	64.42	57.05	64.34
Clear HDPE containers	0.19	0.26	0.27	0.22	0.04	0.29	0.16	0.27	0.14	0.14	0.14	0.41	0.11	0.25
Colored HDPE containers	0.16	0.10	0.22	0.17	0.10	0.13	0.27	0.22	0.11	0.14	0.26	0.16	0.19	0.25
LDPE	0.12	0.09		0.01		0.02		0.03			0.05		0.05	0.01
Films and Bags	4.74	5.86	3.29	4.75	6.47	5.93	5.85	8.60	5.62	4.55	6.20	4.09	4.91	2.72
Green PET containers	0.03	0.01	0.02		0.04	0.02	0.05	0.02		0.04	0.02	0.05	0.01	0.01
Clear PET Containers	0.14	0.12	0.06	0.32	0.24	0.01	0.07	0.14	0.06	0.19	0.15	0.35	0.15	0.21
PVC		0.01	0.02			0.01	0.01	0.02	0.01	0.02	0.01			
Polypropylene	0.01		0.10	0.06		0.02	0.07	0.07	0.07	0.02	0.05	0.11	0.02	0.06
Polystyrene (Estimated for Summer)	3.72	1.32	0.77	1.02	9.78	5.76	4.31	6.91	8.95	1.30	1.52	1.79	1.00	0.89
Miscellaneous Plastic	0.24	2.09	0.65	0.54	0.21	0.44	1.96	1.02	0.81	0.49	0.39	0.69	0.55	0.99
TOTAL PLASTIC FRACTION	9.35	9.85	5.40	7.12	16.88	12.63	12.85	15.49	15.77	6.88	6.78	7.64	6.98	5.39
Grass/Leaves	1.53	5.67	26.34	6.21	0.19	1.02	0.04	3.34	0.01	2.18		1.06	2.14	0.95
Brush/Prunings/Stumps	0.03	0.39	0.22			0.03		0.06	0.03	0.06		0.05	3.52	
TOTAL YARD WASTE FRACTION	1.56	6.06	26.55	6.21	0.19	1.05	0.04	3.40	0.04	2.24		1.11	5.66	0.95
Lumber	0.54	0.77	2.30	1.75	1.10	0.28	0.35	1.01	0.31	0.05	0.77	1.08	0.51	0.83
Textiles	1.79	1.10	1.52	4.04	5.35	1.04	2.88	2.52	2.27	0.61	2.68	1.12	0.78	3.51
Rubber	0.25	0.19	0.03	0.05	0.19	0.30	0.85	0.63	0.90		0.03		0.06	0.06
Fines	1.32	1.06	1.16	4.25	1.02	0.94	0.91	0.81	1.07	0.38	0.76	1.28	1.51	1.99
Diapers	1.05		0.06		2.95	26.80	7.87	1.49	4.54	0.06	0.04	0.06		0.08
Foodwaste	23.08	10.94	5.95	3.29	14.19	21.05	11.28	9.46	18.73	3.90	49.60	11.26	9.35	3.10
Miscellaneous Organic	3.94	3.74	4.35	5.35	6.27	3.08	1.82	2.79	4.89	0.88	2.20	2.07	4.36	3.42
TOTAL ORGANIC FRACTION	31.97	17.80	15.38	18.73	31.08	53.49	25.94	18.73	32.70	5.88	56.08	16.88	16.57	12.99
Clear Glass containers	1.39	0.96	0.72	1.09	1.84	0.47	2.80	1.80	0.74	2.51	0.63	4.01	1.15	2.45
Green Glass containers	0.48	0.10	0.05	0.26	0.27	0.05	0.09	0.33	0.11	0.23	0.13	0.56	0.14	1.04
Brown Glass containers	0.30	0.09	0.02	0.06	0.15	0.04	0.36	0.34	0.02	0.26	0.08	0.51	0.10	0.46
Miscellaneous Glass	0.19	0.03	0.01	1.40	0.07	0.05			0.03	0.05	0.35		3.61	0.84
TOTAL GLASS FRACTION	2.36	1.18	0.80	2.81	2.33	0.61	3.24	2.46	0.90	3.05	1.19	5.07	5.00	4.78
Aluminium Food Containers/Foil	0.45	0.91	0.63	0.90	0.76	0.66	0.57	0.93	0.36	0.45	0.24	0.46	0.63	0.32
Aluminium Beverage Cans	0.27	0.86	0.61	1.00	0.37	0.17	0.44	0.72	0.29	0.69	0.14	1.37	0.77	0.58
Miscellaneous Aluminium		0.07	0.01	0.17		0.14	0.02		0.04			0.04	0.41	0.02
TOTAL ALUMINIUM FRACTION	0.72	1.85	1.24	2.07	1.13	0.97	1.03	1.64	0.69	1.13	0.38	1.87	1.82	0.92
Ferrous Metal Food containers	2.57	1.22	0.94	1.46	2.82	2.65	1.14	1.38	2.45	0.46	2.94	0.41	1.97	0.40
Other Ferrous Metal	1.68	5.07	1.76	5.64	0.09	0.74	0.85	0.36	0.45	0.91	0.53	0.92	2.93	6.47
TOTAL FERROUS METAL FRACTION	4.25	6.29	2.70	7.10	2.90	3.38	1.99	1.74	2.90	1.37	3.46	1.33	4.90	6.87
Bimetal Cans	0.01	0.09	0.08	0.01			0.01	0.01	0.01	0.01		0.03	0.01	0.02
TOTAL METAL FRACTION	4.97	8.23	4.02	9.17	4.03	4.35	3.03	3.39	3.60	2.51	3.85	3.23	6.73	7.80
Non-bulk Ceramics						0.03			0.02			0.07		
Miscellaneous Inorganic	1.30	4.90	5.83	5.98	4.28	1.08	0.35	1.54		0.56	1.19	0.66	0.46	2.53
TOTAL INORGANIC FRACTION	1.30	4.90	5.83	5.98	4.28	1.11	0.35	1.54	0.02	0.56	1.19	0.73	0.48	2.53
Pesticides							0.02						0.01	
Non-pesticide Poisons								0.01						
Paint/Solvent/Fuel		0.29	0.04	0.02		0.04	0.01	0.01	0.02				0.08	0.01
Dry Cell Batteries			0.03	0.07			0.02		0.01	0.03	0.01	0.01	0.03	0.09
Car Batteries														
Medical Waste					1.07	0.64	1.52	0.24	1.05		0.07	0.03	0.01	
Miscellaneous HHW	0.02	1.05	0.07	0.15	0.51	0.14	0.17			0.10	0.01	0.32	0.01	0.91
TOTAL HHW FRACTION	0.02	1.34	0.14	0.24	1.58	0.82	1.74	0.26	1.08	0.13	0.09	0.36	0.14	1.01
TOTAL BULK ITEMS	0.57	2.86	2.2	7.79	0.86	0.5	0.48	0.81	0.06	0.72	1.18	0.55	1.35	0.2

Blank values indicate less than 0.01 percent

EXHIBIT 5–4 (continued)

INSTITUTIONAL WASTE COMPOSITION BY CATEGORY

KEY TO INSTITUTIONAL CATEGORY NUMBERS

INSTITUTIONAL CATEGORY NUMBER	DESCRIPTION
1	PUBLIC ELEMENTARY SCHOOLS
2	JUNIOR HIGH SCHOOLS
3	PRIVATE SCHOOLS (KINDERGARTEN – 8TH GRADE)
4	PRIVATE SCHOOLS (9TH – 12TH GRADE)
5	PSYCHIATRIC HOSPITALS
6	SKILLED NURSING FACILITIES
7	MUNICIPAL HOSPITALS
8	TEACHING HOSPITALS
9	NON–PROFIT HOSPITALS
10	GOVERNMENT OFFICE BUILDINGS
11	CORRECTIONAL FACILITIES
12	COLLEGES/UNIVERSITIES
13	PUBLIC HIGH SCHOOLS
14	TRANSPORTATION HUBS

Blank values indicate less than 0.01 percent

EXHIBIT 5-5

INSTITUTIONAL WASTE COMPOSITION BY BOROUGH AND CITY-WIDE

	BROOKLYN	BRONX	MANHATTAN	QUEENS	SI	CITY
TOTAL PAPER	**53.6**	**49.5**	**55.1**	**51.9**	**54.2**	**52.9**
CORRUGATED CARDBOARD	9.2	10.0	10.9	9.6	9.4	9.8
NEWSPAPER	5.9	5.1	5.9	5.4	6.2	5.7
OFFICE PAPER	10.8	9.1	10.9	10.0	10.7	10.3
MAGAZINES	2.0	1.8	2.0	1.9	2.0	1.9
BOOKS	2.0	1.9	2.0	1.9	2.3	2.0
NONCORRUGATED CARDBOARD	3.4	3.4	3.2	3.4	3.3	3.4
MIXED PAPER	21.9	20.2	21.0	21.2	22.0	21.3
TOTAL PLASTICS	**10.2**	**11.0**	**11.2**	**10.5**	**9.8**	**10.5**
CLEAR HDPE	0.2	0.2	0.2	0.2	0.2	0.2
COLORED HDPE	0.2	0.2	0.2	0.2	0.2	0.2
LDPE	0.1	0.1	0.1	0.1	0.1	0.1
FILM	4.8	5.1	5.0	4.9	4.7	4.9
GREEN PET	0.0	0.1	0.1	0.0	0.1	0.1
CLEAR PET	0.2	0.2	0.2	0.2	0.2	0.2
PVC	0.1	0.1	0.1	0.1	0.1	0.1
POLYPROPYLENE	0.1	0.1	0.1	0.1	0.1	0.1
POLYSTYRENE	2.6	3.0	3.2	2.8	2.4	2.8
MISCELLANEOUS	1.9	2.0	2.0	1.9	1.8	1.9
TOTAL ORGANICS	**22.8**	**25.9**	**23.2**	**24.6**	**22.5**	**23.8**
GRASS	3.3	2.9	2.3	3.4	3.4	3.1
BRUSH	0.4	0.3	0.2	0.4	0.4	0.4
LUMBER	0.9	0.9	0.8	0.9	1.0	0.9
TEXTILES	2.0	2.2	2.2	2.1	1.9	2.1
RUBBER	0.1	0.2	0.2	0.1	0.1	0.1
FINES	1.3	1.3	1.2	1.3	1.3	1.3
DIAPERS	2.0	2.3	2.2	1.9	1.6	2.0
FOOD WASTE	9.0	11.7	10.3	10.5	9.1	10.1
MISCELLANEOUS	3.8	4.0	3.8	3.9	3.6	3.8
TOTAL GLASS	**2.5**	**2.5**	**2.8**	**2.4**	**2.6**	**2.5**
CLEAR GLASS	1.8	1.8	2.0	1.8	1.8	1.8
GREEN GLASS	0.3	0.3	0.3	0.3	0.3	0.3
BROWN GLASS	0.2	0.2	0.2	0.2	0.2	0.2
MISCELLANEOUS	0.2	0.2	0.3	0.2	0.2	0.2
TOTAL ALUMINUM	**1.4**	**1.3**	**1.4**	**1.4**	**1.4**	**1.4**
BEVERAGE CONTAINERS	0.6	0.6	0.6	0.6	0.7	0.6
ALUMINUM CONTAINERS	0.7	0.6	0.6	0.7	0.6	0.6
MISCELLANEOUS	0.1	0.1	0.1	0.1	0.1	0.1
TOTAL METAL	**2.6**	**2.7**	**2.5**	**2.7**	**2.6**	**2.6**
METAL CONTAINERS	1.4	1.6	1.5	1.5	1.3	1.5
OTHER METALS	1.2	1.1	1.0	1.1	1.2	1.1
TOTAL INORGANICS	**2.9**	**2.5**	**1.6**	**2.7**	**2.8**	**2.5**
BI – METAL	0.0	0.0	0.0	0.0	0.0	0.0
CERAMICS	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	2.8	2.5	1.6	2.6	2.7	2.5
TOTAL HAZARDOUS	**0.3**	**0.4**	**0.4**	**0.3**	**0.3**	**0.3**
PESTICIDES	0.0	0.0	0.0	0.0	0.0	0.0
NON PESTICIDE POISONS	0.0	0.0	0.0	0.0	0.0	0.0
PAINT	0.0	0.0	0.0	0.0	0.0	0.0
DRYCELLS	0.0	0.0	0.0	0.0	0.0	0.0
MEDICAL WASTE	0.2	0.2	0.3	0.2	0.2	0.2
CARBATTERY	0.0	0.0	0.0	0.0	0.0	0.0
MISCELLANEOUS	0.1	0.1	0.0	0.1	0.1	0.1
TOTAL BULK	**1.3**	**1.4**	**0.9**	**1.3**	**1.3**	**1.3**

EXHIBIT 5–6

COMMERCIAL WASTE COMPOSITION BY SUB–SECTOR

SUB–SECTOR NUMBER	1	2	3	4	5	6	7	8*	9	10
WASTE COMPONENTS	SINGLE OFFICE BUILDINGS	MULTI–TENANT OFFICES	WHOLESALE	GENERAL RETAIL	RESTAURANTS	FAST FOOD	APPAREL MANUFACTURE	PRINTING/ PUBLISHING	FOOD STORES	HOTELS
PAPER										
Corrugated Craft	11.8	6.7	29.0	45.9	20.0	15.9	11.3		36.1	12.2
Newsprint	10.8	11.1	1.7	9.9	1.9	1.9	0.6	13.5	10.0	7.5
Office/Computer	18.6	27.0	1.3	0.8	0.2	<0.1	0.3	65.0	<0.1	2.8
Magazine/glossy	2.1	3.6	0.4	0.6	0.5	0.7	0.1		0.7	4.2
Mixed	43.2	33.9	14.8	10.8	8.7	24.5	11.0	12.7	9.8	24.9
SUBTOTAL	86.4	82.3	47.3	68.0	31.3	43.0	23.3	91.2	56.6	51.6
PLASTICS										
Films and Bags	3.1	2.6	4.8	4.7	4.8	5.4	6.4		2.8	3.3
Rigid Containers	0.3	0.4	0.7	0.5	0.9	1.0	0.1		1.0	0.9
Misc. Plastics	2.2	2.7	2.0	3.2	1.2	1.9	1.3	2.1	1.7	2.9
SUBTOTAL	5.6	6.0	7.5	8.4	6.9	8.3	7.8	2.1	5.6	7.2
YARD WASTE										
Misc. Yard Wastes	<0.1	0.3	<0.1	<0.1	0.1	0.1	<0.1	2.3	<0.1	0.1
SUBTOTAL	<0.1	0.3	<0.1	<0.1	0.1	0.1	<0.1	2.3	<0.1	0.1
ORGANICS										
Textiles	0.4	0.9	1.9	1.0	0.8	0.4	48.8		0.7	3.8
Food Wastes	1.2	2.1	9.7	1.0	40.8	37.7	0.5		17.5	20.6
Misc. Organics	2.1	2.4	25.8	4.2	9.9	4.9	14.8	2.1	14.2	4.4
SUBTOTAL	3.7	5.4	37.4	6.1	51.6	43.0	64.2	2.1	32.4	28.9
GLASS										
Misc. Glass	2.0	2.4	1.1	5.2	7.1	2.0	0.5	1.1	1.5	6.5
SUBTOTAL	2.0	2.4	1.1	5.2	7.1	2.0	0.5	1.1	1.5	6.5
METALS										
Misc. Non Ferrous	0.8	1.1	0.6	0.6	0.6	0.6	0.6	1.1	0.7	0.9
Other Ferrous Metals	0.9	1.8	5.5	1.4	2.1	2.8	2.4		2.6	1.4
SUBTOTAL	1.7	2.9	6.1	2.0	2.7	3.4	3.0	1.1	3.3	2.4
HAZARDOUS WASTE										
Misc. HHW	0.2	0.3	<0.1	<0.1	<0.1	<0.1	0.2		<0.1	0.2
SUBTOTAL	0.2	0.3	<0.1	<0.1	<0.1	<0.1	0.2		<0.1	0.2
OTHER WASTES										
Misc. Other Wastes	0.5	0.6	0.6	10.3	0.3	0.2	1.0	0.2	0.9	1.2
SUBTOTAL	0.5	0.6	0.6	10.3	0.3	0.2	1.0	0.2	0.9	1.2
TOTAL	100	100	100	100	100	100	100	100	100	100

NOTE:

Route 8: Printing and Publishing data was collected directly from the private carter and was not sorted by SCS.

The total number of employees engaged by each sub-sector was then multiplied by the measured composition shown in Exhibit 5-6 to project the total tonnage of each waste component generated by the individual borough's commercial population.

These compositions were adjusted to account for the presence of bulk items in the Commercial waste stream. While bulk items were not sampled in the field for this sector, it was assumed that the majority of bulk items would be construction and demolition materials.
Estimated tonnages for construction and demolition wastes for each borough were developed and included in the overall commercial waste stream composition estimate. Adjusted tonnages, expressed as a percentage of the total commercial waste stream, represent the estimated commercial waste composition for each borough. The results of these projections are summarized in Exhibit 5-7.

<u>Composition City-wide</u>

To estimate a City-wide composition, borough-wide commercial waste composition and annual tonnages were combined to project the total tonnage of each waste component generated by the City's commercial population. These tonnages, expressed as a percentage of the total commercial waste stream, represent the commercial waste composition City-wide. The results of these projections are also summarized in Exhibit 5-7.

CITY-WIDE COMPOSITION ESTIMATE

The results obtained for the residential, institutional, and commercial surveys were combined to provide an overview of City-wide waste composition. A summary of the combined waste stream composition is provided in Exhibit 5-8.

Exhibit 5-8 indicates that:

- The paper fraction is the largest portion of the City-wide aggregate waste stream at about 42 percent. Mixed paper is the largest single paper component at 16 percent.

- The commercial sector accounts for the greatest quantities of paper generated, estimated at approximately 1.9 million tons annually.

EXHIBIT 5–8

COMBINED WASTE STREAM COMPOSITION CITY–WIDE

	RESIDENTIAL	INSTITUTIONAL	COMMERCIAL	AGGREGATE
TOTAL PAPER	31.3	52.9	47.5	42.1
CORRUGATED CARDBOARD	4.7	9.8	17.2	11.2
NEWSPAPER	9.2	5.7	5.8	7.2
OFFICE PAPER	0.8	10.3	9.7	6.2
MAGAZINES	2.7	1.9	0.7	1.7
BOOKS	0.8	2.0		
NON–CORRUGATED CARDBOARD	2.5	3.4		
MIXED PAPER	10.7	21.3		
"COMMERCIAL GRADE" MIXED PAPER*	13.9	26.6	14.0	15.9
TOTAL PLASTICS	8.9	10.5	5.1	7.5
CLEAR HDPE	0.5	0.2		
COLORED HDPE	0.8	0.2		
LDPE	0.1	0.1		
FILM	4.8	4.9	2.9	4.0
GREEN PET	0.1	0.1		
CLEAR PET	0.4	0.2		
PVC	0.1	0.1		
POLYPROPYLENE	0.1	0.1		
POLYSTYRENE	0.8	2.8		
RIGID CONTAINERS*	2.0	0.6	0.5	1.2
MISCELLANEOUS	1.3	1.9	1.6	1.5
TOTAL ORGANICS	37.5	23.8	22.4	29.0
GRASS	3.4	3.1		
BRUSH	0.7	0.4		
TOTAL YARD WASTE*	4.2	3.5	0.3	2.3
LUMBER	2.2	0.9		
TEXTILES	4.7	2.1	3.5	3.6
RUBBER	0.2	0.1		
FINES	2.3	1.3		
DIAPERS	3.4	2.0		
FOOD WASTE	12.7	10.1	11.2	11.6
MISCELLANEOUS	7.8	3.8		
"COMMERCIAL GRADE" MISCELLANEOUS	15.9	8.2	7.7	11.2
TOTAL GLASS	5.0	2.5	2.2	3.4
CLEAR GLASS	2.9	1.8		
GREEN GLASS	1.0	0.3		
BROWN GLASS	0.9	0.2		
MISCELLANEOUS	0.2	0.2		
TOTAL ALUMINUM	0.9	1.4	0.6	0.8
BEVERAGE CONTAINERS	0.3	0.6		
ALUMINUM CONTAINERS	0.5	0.6		
MISCELLANEOUS	0.1	0.1		
TOTAL METAL	3.9	2.6	1.8	2.6
METAL CONTAINERS	2.0	1.5		
OTHER METALS	2.0	1.1		
TOTAL INORGANICS	2.3	2.5		
BI – METAL	0.0	0.0		
CERAMICS	0.2	0.0		
MISCELLANEOUS	2.1	2.5		
TOTAL HAZARDOUS	0.4	0.3	<0.1	0.2
PESTICIDES	<0.1	<0.1		
NON PESTICIDE POISONS	<0.1	<0.1		
PAINT	0.1	<0.1		
DRYCELLS	<0.1	<0.1		
MEDICAL WASTE	<0.1	0.2		
CARBATTERY	0.1	<0.1		
MISCELLANEOUS	0.1	0.1		
TOTAL BULK	9.9	1.3	18.9	12.9
OTHER WASTES*	2.3	2.5	1.2	1.8

NOTES:

1. * = Commercial Waste Composition Study used different classification scheme from other sectors; Residential and Institutional Compositions recompiled according to the Commercial classification as follows:

"Commercial Grade" Mixed Paper includes Books, Magazines/Glossy, and Mixed Paper
"Rigid Containers" includes all HDPE, LDPE, and PET
"Total Yard Waste" includes Grass and Brush
"Commercial Grade" Miscellaneous Organics includes Lumber, Rubber, Fines, Diapers, and Miscellaneous Organics
"Other Wastes" includes Bi–Metal Cans, Non–bulk Ceramics, and Miscellaneous Inorganic

- Organics, at 29 percent, represent the second largest fraction of the City's waste stream. Food waste is the largest single organic component, accounting for 12 percent of the waste stream.

- Plastics are the third largest fraction in the waste stream, representing 7.5 percent of the total waste stream. Films and bags represent the single largest component of the plastic fraction at 4 percent.

- The total metal fraction represents 3.6 percent of the waste stream, followed by glass at 3.4 percent.

- Yard waste accounts for 2.3 percent of the total waste stream. Over 150,000 tons of yard waste are generated by the residential sector annually.

SECTION 6

PROJECTIONS

METHODOLOGY

One goal in defining waste generation and composition by several succinct sub-sets of the City's population was to allow for reliable projection of waste stream characteristics for the New York City of the future. Projections for the City's waste stream were made through to the year 2000.

To test the reliability of these projections, the same algorithms and statistical methodologies used to forecast waste stream characteristics were applied to historical data, to test model conclusions against actual recorded values for the waste shed of the past. Historical records of waste stream quantities are maintained by DOS.

Residential and Non-residential Designations

Although much data exist on demographics in the City, the distinctions between commercial and institutional waste generators are not clearly defined. For these sectors of the City, projections were combined into one set of values, because of the available SIC code groupings (e.g., SIC 60; Finance, Insurance, and Real Estate (F.I.R.E.), SIC 70; Services, etc.) do not separately define institutional and commercial services.

Consequently, study data for institutional and commercial generators were aggregated into a single data set, designated "non-residential," for projection purposes.

RESIDENTIAL WASTE GENERATION

Exhibit 6-1 presents the forecast of projected residential population (in terms of housing units) and projected annual tonnage, from 1952 to 2000. Projections were made by interpolation from housing unit estimates for 1980, 1985, and 1988 (provided by DOS).

Housing forecasts were multiplied by the applicable generation rate assuming no change in the relative generating proportions of each strata over time.

EXHIBIT 6-1

PROJECTED RESIDENTIAL POPULATION AND WASTE GENERATION 1952 - 2000

YEAR	PROJECTED HOUSING UNITS*	PROJECTED TONNAGE
1952	2,744,000	3,213,000
1956	2,772,000	3,247,000
1960	2,801,000	3,280,000
1964	2,830,000	3,314,000
1968	2,858,000	3,348,000
1972	2,887,000	3,381,000
1976	2,915,000	3,414,000
1980	2,959,000	3,465,000
1984	2,972,000	3,481,000
1988	3,001,000	3,514,000
1990	3,015,000	3,531,000
1995	3,059,000	3,582,000
2000	3,083,000	3,611,000

NOTES:

1. * = Housing unit estimates based on data provided by NYC Dept. of Sanitation

NON-RESIDENTIAL WASTE GENERATION

Exhibit 6-2 presents a summary of projected non-residential population (i.e., employment) by commercial activity from 1952 to 2000 (provided by DOS). These forecasts were multiplied by the generation rates developed for each sector, from the waste generation study sample, to give the City-wide projected annual tonnage by commercial activity, summarized in Exhibit 6-3.

CITY-WIDE PROJECTION

The tonnage projections shown in Exhibits 6-1 and 6-3 were combined to give a total waste stream tonnage projection, by residential and non-residential sources. The projections are summarized in Exhibit 6-4, showing that an estimated 8.5 million tons of municipal solid waste was generated in New York City in 1990, or approximately 28,000 tons per day.

Furthermore, Exhibit 6-4 presents a graphical summary that indicates that the residential waste stream represents an increasing portion of the City-wide total with time. These projections are based on the assumption that waste generation rates are constant with time. However, generation rates will change to some degree with consumer purchasing habits, packaging practices, source reduction activities (such as backyard composting and paperless transactions), and economic vitality.

EXHIBIT 6-2

PROJECTED EMPLOYMENT
1952 - 2000

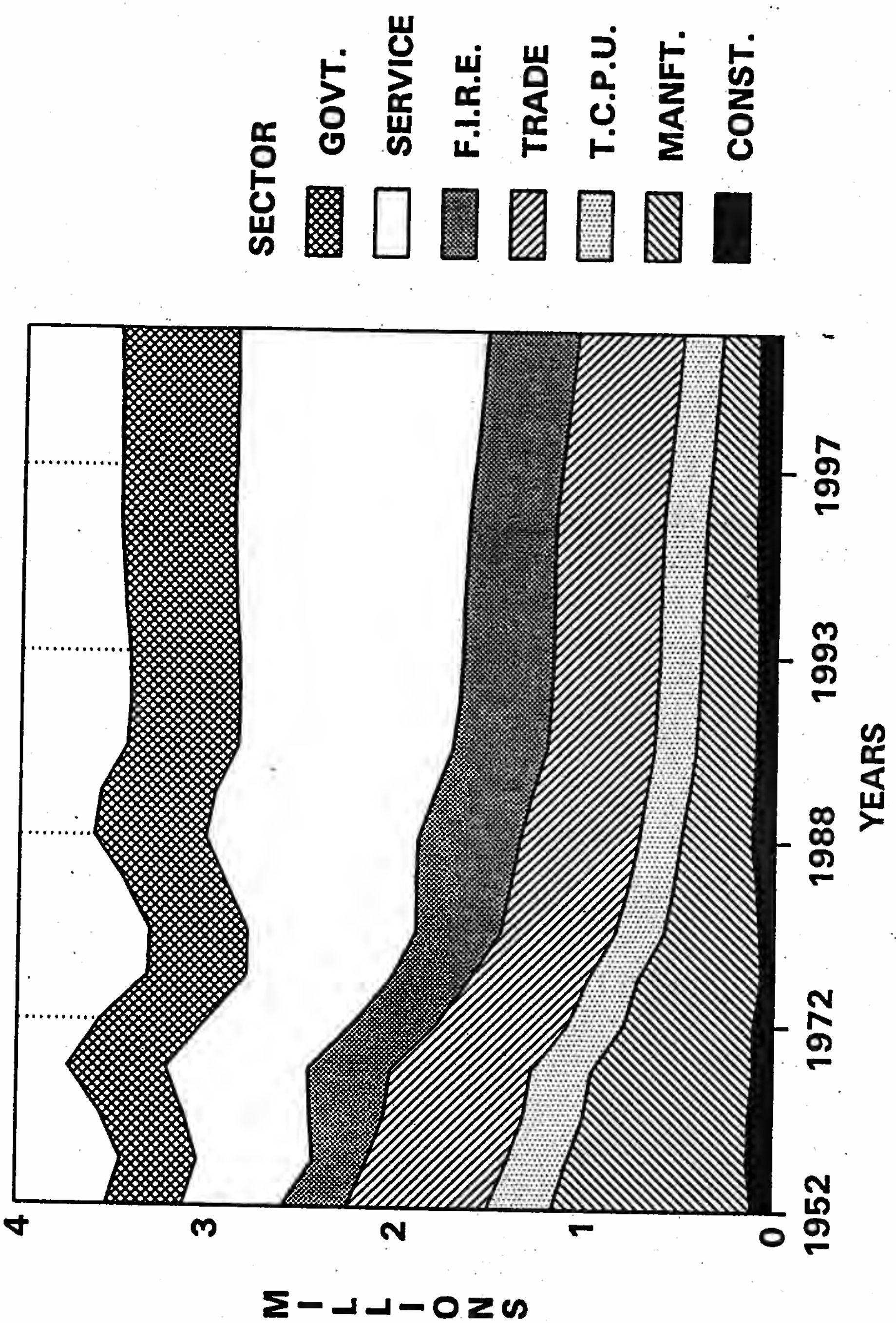


EXHIBIT 6-3

PROJECTED NON-RESIDENTIAL WASTE GENERATION

1952 - 2000

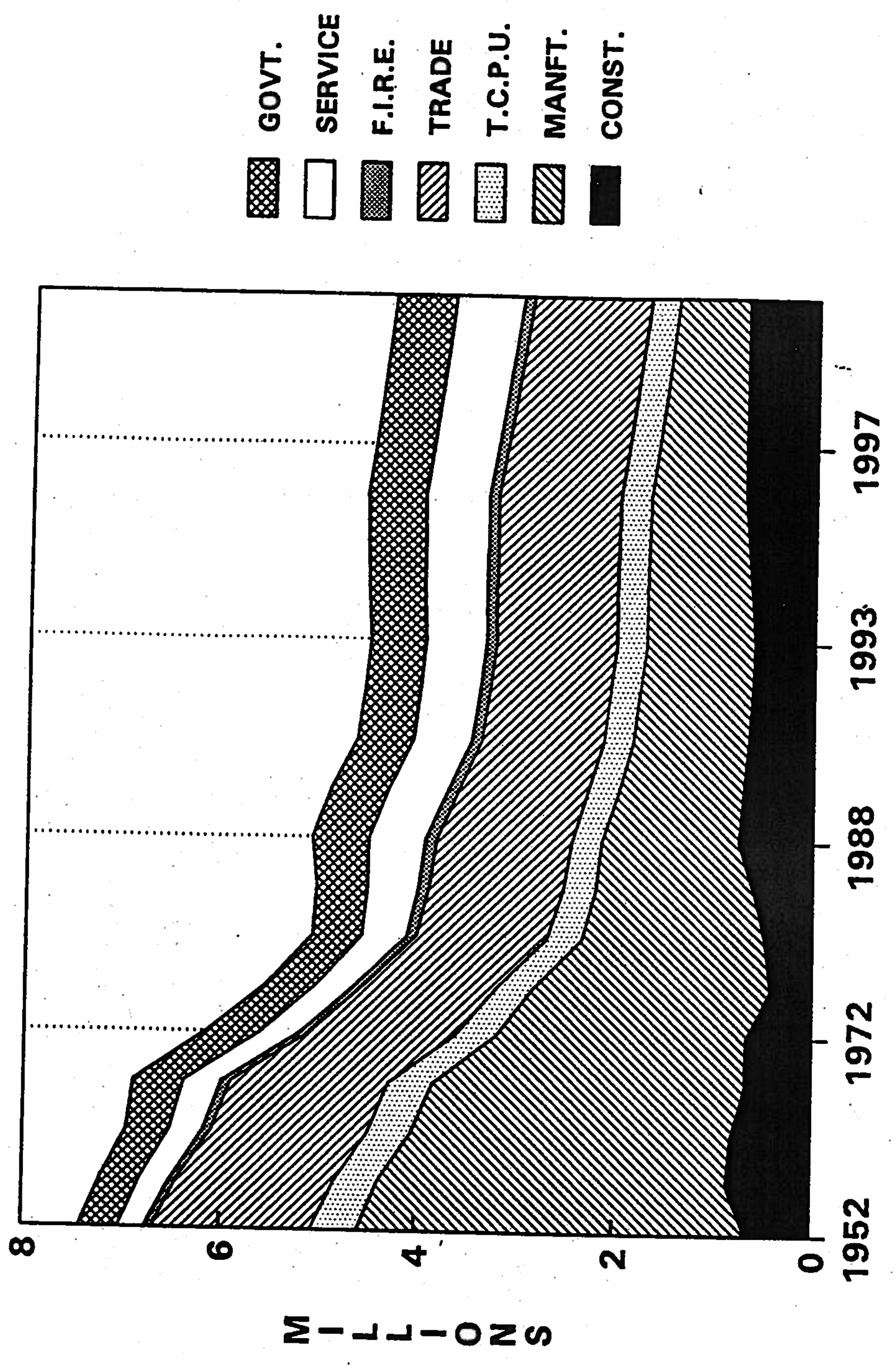
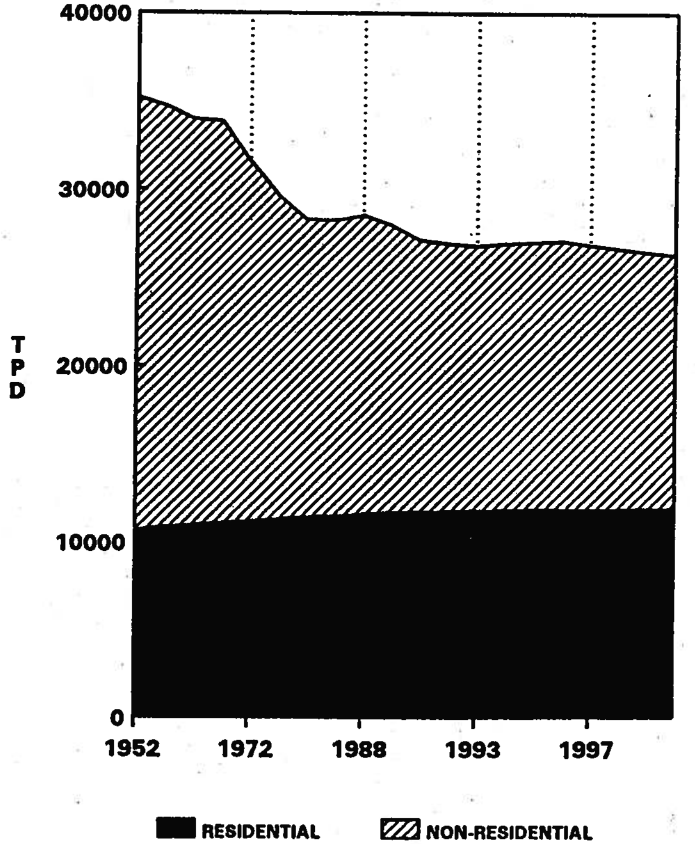


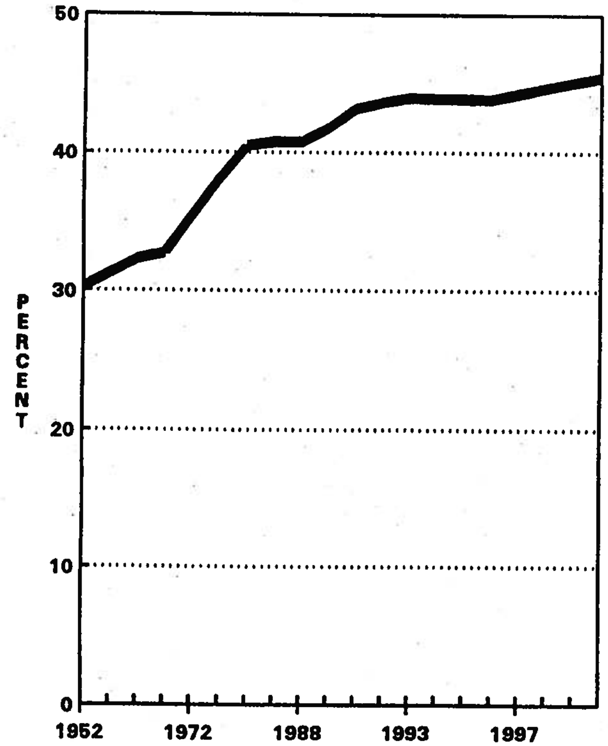
EXHIBIT 6-4

PROJECTED AGGREGATE WASTE GENERATION
1952 - 2000

RESIDENTIAL VERSUS NON-RESIDENTIAL



RESIDENTIAL PORTION OF TOTAL



SECTION 7

LABORATORY ANALYSIS

INTRODUCTION

Concurrent with field work to estimate waste generation and composition, residential and institutional wastes were sampled by major waste fraction to determine the physical and chemical properties of the City's MSW stream.

For the purpose of this analysis, major waste fractions were defined as follows:

FRACTION	EXAMPLES
PAPER	Newspapers, Office Paper, Corrugated Cardboard
PLASTIC	Soda bottles, milk jugs, clam-shell boxes
ORGANICS	Yard waste, food, fecal matter
LUMBER	Pallets, crates, fruit boxes
TEXTILES	Clothes, drapes, carpeting
RUBBER	Insulation, gloves, floor mats
DIAPERS	Infant diapers, incontinence pants
FINES	Any materials with particle size below 0.25 inches
CERAMICS	Mugs, plates, porcelain ornaments
GLASS	Bottles, plate glass, auto glass
METAL	Tin cans, auto parts, aluminum foil
INORGANIC	Bricks, drywall, rocks

ANALYTICAL RESULTS

The mean results from laboratory analysis of residential refuse samples are summarized, by waste component and tested parameter, in Exhibit 7-1. A similar table of results for institutional refuse samples is presented in Exhibit 7-2.

Data from Exhibits 7-1 and 7-2 were then normalized using their respective City-wide waste sector composition summaries to derive the overall chemical and physical characteristics of each waste stream.

The final results of this analysis are presented in Exhibits 7-3 and 7-4 for residential and institutional wastes, respectively.

Estimated Composition of Commercial Waste

Commercial waste was not sampled for laboratory analysis as part of the study. Chemical and physical properties for this waste stream were assumed to be similar to institutional wastes.

The mean sample analysis for institutional samples was used, substituting the commercial waste composition shown previously in Section 5, in Exhibit 5-7. An estimated characterization was thus developed for the commercial waste stream, as shown in Exhibit 7-5.

ESTIMATED ANALYSIS FOR CITY-WIDE WASTE STREAM

Using the annual projected tonnage for each generating sector, estimated analyses for all three sectors (residential, institutional, and commercial) were aggregated to provide a composition for the combined waste stream. This composition is presented in Exhibit 7-6.

EXHIBIT 7–1

SUMMARY OF RESIDENTIAL WASTE ANALYSIS (SAMPLE MEANS)

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS
VOLATILES	%	64.5	79.7	31.9	74.6	77.7	56.2	37.0	26.3	*	*	*	22.4
MOISTURE #	%	18.3	12.7	44.1	10.9	14.7	2.9	60.2	38.1	1.2	0.8	12.0	4.6
ASH	%	6.7	5.0	18.3	1.7	2.4	36.0	3.1	30.3	*	*	*	67.6
FIXED CARBON	%	7.7	1.2	5.1	11.6	9.1	4.4	3.6	7.1	*	*	*	5.3
GROSS HEATING VALUE	BTU / lb	5,389	11,182	2,839	6,523	7,528	8,617	1,681	2,110	*	*	*	1,703
ARSENIC	PPM	3.8	3.1	10.5	4.0	7.6	4.6	*	3.9	4.0	5.1	31.5	2.3
BARIUM	PPM	27.1	41.3	110.4	34.8	24.1	20.8	*	81.2	113.8	108.9	24.9	73.0
CADMIUM	PPM	4.8	1.7	5.8	0.8	1.9	1.5	*	2.0	0.9	0.9	1.3	1.4
CHROMIUM	PPM	8.8	17.9	34.4	7.5	394.8	66.6	*	29.8	12.9	121.0	45.9	38.7
LEAD	PPM	28.8	58.6	532.4	72.2	15.0	16.4	*	71.4	767.3	32.4	2066.8	384.7
MERCURY	PPM	0.7	0.7	0.6	0.7	0.5	0.4	*	0.7	0.1	0.1	0.1	1.1
SELENIUM	PPM	7.2	1.6	1.9	1.5	4.4	41.4	*	2.6	1.4	1.4	1.7	8.4
SILVER	PPM	0.9	0.9	0.8	1.0	1.5	0.5	*	0.5	0.9	0.5	0.8	1.0
CARBON	%	34.6	45.2	17.4	42.7	46.3	37.9	15.2	15.2	6.6	1.2	*	12.8
HYDROGEN	%	7.3	7.6	7.5	6.1	6.0	4.6	10.1	5.6	1.7	1.1	*	2.7
SULFUR	%	0.12	0.15	0.34	0.06	0.20	0.55	0.06	1.21	0.05	0.08	*	2.03
NITROGEN	%	0.2	0.1	0.5	0.5	2.4	0.2	0.1	0.7	0.2	0.2	*	1.7
OXYGEN	%	50.8	49.5	56.0	48.8	42.4	16.8	71.4	46.1	+	+	*	14.7
CHLORINE	%	0.3	1.3	0.2	0.1	0.4	2.8	0.3	0.2	0.1	0.1	*	2.3

NOTES

= FOUR SEASON SUMMARY
* = TEST NOT PERFORMED
+ = NOT DETERMINED

EXHIBIT 7–2

SUMMARY OF INSTITUTIONAL WASTE ANALYSIS (SAMPLE MEANS)

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER #	DIAPERS	FINES #	CERAMICS #	GLASS #	METAL #	INORGANICS #
VOLATILES	%	70.9	78.9	37.2	76.0	55.8	59.2	31.0	33.3	*	*	*	19.4
MOISTURE	%	13.6	13.1	52.5	10.3	29.1	2.5	63.4	12.7	0.5	0.3	26.7	8.5
ASH	%	6.7	3.6	4.0	0.6	8.5	24.7	1.9	29.5	*	*	*	70.1
FIXED CARBON	%	8.8	4.3	6.2	13.0	6.5	13.8	3.6	3.1	*	*	*	2.0
GROSS HEATING VALUE	BTU / lb	6,118	12,179	2,779	7,430	6,345	9,902	2,572	2,747	*	*	*	1,210
ARSENIC	PPM	22.1	5.1	80.5	1.0	1.1	1.8	*	2.0	137.6	2.8	19.4	2.6
BARIUM	PPM	18.6	9.5	10.7	11.1	165.0	10.5	*	37.8	183.7	89.7	30.4	155.0
CADMIUM	PPM	0.3	12.2	2.6	0.3	3.1	2.9	*	2.6	6.2	1.1	0.3	0.3
CHROMIUM	PPM	19.8	5.1	78.5	2.6	192.4	710.1	*	42.7	6.3	55.3	1215.0	16.6
LEAD	PPM	45.9	11.8	11.6	4.9	45.1	616.5	*	75.0	304.9	700.6	188.8	71.9
MERCURY	PPM	0.5	0.3	1.8	0.7	4.4	0.7	*	5.2	0.1	0.5	0.8	1.0
SELENIUM	PPM	3.1	1.6	2.2	0.5	1.7	1.1	*	1.1	1.1	1.2	4.7	1.5
SILVER	PPM	0.5	0.5	0.5	0.6	0.7	0.7	*	1.5	0.6	0.6	1.6	0.8
CARBON	%	35.5	55.1	19.4	41.4	28.6	49.5	16.2	19.3	1.7	1.7	*	5.9
HYDROGEN	%	6.8	8.5	8.9	6.4	7.7	5.2	10.0	6.9	1.7	0.7	*	2.4
SULFUR	%	0.11	0.09	0.15	0.06	0.14	0.67	0.04	0.20	0.11	0.09	*	0.13
NITROGEN	%	1.00	0.67	0.55	0.02	0.63	1.61	0.28	0.30	0.96	0.44	*	0.02
OXYGEN	%	49.6	31.3	66.7	51.1	54.0	14.8	71.4	43.7	+	+	*	22.4
CHLORINE	%	0.27	0.80	0.23	0.33	0.40	3.67	0.13	0.20	0.13	0.86	*	0.08

NOTES

= TWO SEASON SUMMARY (SUMMER AND WINTER SEASONS)
* = TEST NOT PERFORMED
+ = NOT DETERMINED

EXHIBIT 7–3

ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF RESIDENTIAL WASTE STREAM

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS	TOTAL
VOLATILES	%	20.2	7.1	7.8	1.7	3.7	0.1	1.3	0.6	*	*	*	0.6	43.0
MOISTURE #	%	5.7	1.1	10.8	0.2	0.7	0.0	2.1	0.9	0.0	0.0	0.6	0.1	22.3
ASH	%	2.1	0.4	4.5	0.0	0.1	0.1	0.1	0.7	*	*	*	1.7	9.7
FIXED CARBON	%	2.4	0.1	1.3	0.3	0.4	0.0	0.1	0.2	*	*	*	0.1	4.9
GROSS HEATING VALUE	BTU / lb	1,665	999	696	145	357	16	57	49	0	0	0	42	4,046
ARSENIC	PPM	1.2	0.3	2.6	0.1	0.4	0.0	*	0.1	0.0	0.3	1.5	0.1	6.4
BARIUM	PPM	8.5	3.7	27.1	0.8	1.1	0.0	*	1.9	0.2	5.4	1.2	1.8	51.7
CADMIUM	PPM	1.5	0.2	1.4	0.0	0.1	0.0	*	0.0	0.0	0.0	0.1	0.0	3.4
CHROMIUM	PPM	2.8	1.6	8.5	0.2	18.7	0.1	*	0.7	0.0	6.0	2.2	1.0	41.7
LEAD	PPM	9.0	5.2	130.6	1.6	0.7	0.0	*	1.6	1.2	1.6	100.0	9.5	261.3
MERCURY	PPM	0.2	0.1	0.1	0.0	0.0	0.0	*	0.0	0.0	0.0	0.0	0.0	0.5
SELENIUM	PPM	2.3	0.2	0.5	0.0	0.2	0.1	*	0.1	0.0	0.1	0.1	0.2	3.6
SILVER	PPM	0.3	0.1	0.2	0.0	0.1	0.0	*	0.0	0.0	0.0	0.0	0.0	0.6
CARBON	%	10.6	4.0	4.3	1.0	2.2	0.1	0.5	0.3	0.0	0.1	*	0.3	23.6
HYDROGEN	%	2.3	0.7	1.8	0.1	0.3	0.0	0.3	0.1	0.0	0.1	*	0.1	5.6
SULFUR	%	0.04	0.01	0.08	0.00	0.01	0.00	0.00	0.03	0.00	0.00	*	0.05	0.2
NITROGEN	%	0.06	0.01	0.12	0.01	0.11	0.00	0.00	0.02	0.00	0.01	*	0.04	0.4
OXYGEN	%	15.9	4.4	13.8	1.1	2.0	0.0	2.4	1.1	+	+	*	0.4	41.1
CHLORINE	%	0.09	0.12	0.05	0.00	0.02	0.01	0.01	0.00	0.00	0.00	*	0.06	0.4

NOTES

\# = FOUR SEASON SUMMARY
* = TEST NOT PERFORMED
\+ = NOT DETERMINED

EXHIBIT 7–4

ESTIMATED PHYSICAL/CHEMICAL PROPERTIES OF INSTITUTIONAL WASTE STREAM

	UNITS	PAPER	PLASTICS	ORGANICS	LUMBER	TEXTILES	RUBBER	DIAPERS	FINES	CERAMICS	GLASS	METAL	INORGANICS	TOTAL
VOLATILES	%	37.5	8.3	6.5	0.7	1.2	0.1	0.6	0.4	*	*	*	0.5	55.8
MOISTURE #	%	7.2	1.4	9.1	0.1	0.6	0.0	1.3	0.2	0.0	0.0	1.1	0.2	21.2
ASH	%	3.5	0.4	0.7	0.0	0.2	0.0	0.0	0.4	*	*	*	2.0	7.2
FIXED CARBON	%	4.7	0.5	1.1	0.1	0.1	0.0	0.1	0.0	*	*	*	0.1	6.8
GROSS HEATING VALUE	BTU / lb	3,235	1,284	483	66	132	14	52	35	*	*	*	34	5,334
ARSENIC	PPM	11.7	0.5	14.0	0.0	0.0	0.0	*	0.0	0.1	0.1	0.8	0.1	27.2
BARIUM	PPM	9.8	1.0	1.9	0.1	3.4	0.0	*	0.5	0.1	2.3	1.2	4.3	24.6
CADMIUM	PPM	0.2	1.3	0.5	0.0	0.1	0.0	*	0.0	0.0	0.0	0.0	0.0	2.1
CHROMIUM	PPM	10.5	0.5	13.6	0.0	4.0	1.0	*	0.5	0.0	1.4	48.6	0.5	80.7
LEAD	PPM	24.3	1.2	2.0	0.0	0.9	0.9	*	0.9	0.1	17.6	7.6	2.0	57.6
MERCURY	PPM	0.3	0.0	0.3	0.0	0.1	0.0	*	0.1	0.0	0.0	0.0	0.0	0.8
SELENIUM	PPM	1.6	0.2	0.4	0.0	0.0	0.0	*	0.0	0.0	0.0	0.2	0.0	2.5
SILVER	PPM	0.3	0.1	0.1	0.0	0.0	0.0	*	0.0	0.0	0.0	0.1	0.0	0.5
CARBON	%	18.8	5.8	3.4	0.4	0.6	0.1	0.3	0.2	0.0	0.0	*	0.2	29.8
HYDROGEN	%	3.6	0.9	1.5	0.1	0.2	0.0	0.2	0.1	0.0	0.0	*	0.1	6.6
SULFUR	%	0.06	0.01	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	*	0.00	0.1
NITROGEN	%	0.53	0.07	0.10	0.00	0.01	0.00	0.01	0.00	0.00	0.01	*	0.00	0.7
OXYGEN	%	26.2	3.3	11.6	0.5	1.1	0.0	1.4	0.6	+	+	*	0.6	45.3
CHLORINE	%	0.14	0.06	0.04	0.00	0.01	0.01	0.00	0.00	0.00	0.02	*	0.00	0.3

NOTES

\# = TWO SEASON SUMMARY (SUMMER AND WINTER SEASONS)
* = TEST NOT PERFORMED
\+ = NOT DETERMINED

SECTION 8

COMPACTION TESTING

INTRODUCTION

Compaction testing was performed to measure changes in refuse density due to the removal of targeted recyclable components found in the waste stream. The testing included density measurements for compacted waste with and without recyclables, for compacted recyclables alone, and for uncompacted material with similar compositions.

RESIDENTIAL

Testing results are given by season in Exhibit 8-1. As shown, slightly higher densities were achieved from uncompacted refuse with recyclables removed, compared to as-received wastes with the recyclables in-place.

When compacted, these differences become less noticeable, although generally as-received MSW (with recyclables) can be better compacted.

INSTITUTIONAL

Testing results are given by season in Exhibit 8-2. As shown, slightly higher densities were achieved from uncompacted refuse with recyclables removed, compared to as-received wastes with the recyclables in-place.

When compacted, these differences become less noticeable, although generally as-received wastes (with recyclables) are more difficult to compact.

EXHIBIT 8-1

COMPACTION TESTING OF RESIDENTIAL WASTE
SUMMARY OF RESULTS

	NUMBER OF MEASUREMENTS	AVERAGE LOOSE DENSITY (LBS/CY3)	AVERAGE COMPACTED DENSITY (LBS/CY3)	COMPACTION INDEX
SPRING 1989				
MIXED	4	0.61	1.27	2.1
W/O RECYCLABLES	5	0.71	1.26	1.8
RECYCLABLES ONLY	1	0.30	0.58	1.9
FALL 1989				
MIXED	5	0.57	1.18	2.1
W/O RECYCLABLES	5	0.56	1.16	2.1
RECYCLABLES ONLY	1	0.20	0.48	2.4
WINTER 1990				
MIXED	5	0.49	0.86	1.8
W/O RECYCLABLES	4	0.50	0.70	1.4
RECYCLABLES ONLY	4	0.49	1.01	1.8
SPRING 1990				
MIXED	6	0.39	1.13	2.9
W/O RECYCLABLES	4	0.43	1.49	3.5
RECYCLABLES ONLY	2	0.32	0.83	2.6
TOTAL				
MIXED	20	0.50	1.11	2.2
W/O RECYCLABLES	18	0.56	1.16	2.1
RECYCLABLES ONLY	8	0.39	0.79	2.0

EXHIBIT 8-2

COMPACTION TESTING OF INSTITUTIONAL WASTE
SUMMARY OF RESULTS

	NUMBER OF MEASUREMENTS	AVERAGE LOOSE DENSITY (LBS/CY3)	AVERAGE COMPACTED DENSITY (LBS/CY3)	COMPACTION INDEX
FALL 1989				
MIXED	8	0.35	1.01	2.9
W/O RECYCLABLES	8	0.39	1.10	2.8
RECYCLABLES ONLY	1	0.41	0.68	1.6
WINTER 1990				
MIXED	5	0.44	0.83	1.9
W/O RECYCLABLES	4	0.44	0.64	1.5
RECYCLABLES ONLY	3	0.25	0.63	2.5
SPRING 1990				
MIXED	1	0.43	1.25	2.9
W/O RECYCLABLES	3	0.43	1.45	3.4
RECYCLABLES ONLY	6	0.17	0.94	5.7
TOTAL				
MIXED	14	0.39	0.96	2.5
W/O RECYCLABLES	15	0.41	1.05	2.5
RECYCLABLES ONLY	10	0.21	0.82	3.8

SECTION 9

FINDINGS

The purpose of the waste composition study was to estimate City-wide generation rates for the components present in the municipal solid waste stream. Estimates were made through the performance of a comprehensive waste characterization program of the residential and non-residential (i.e., institutional and commercial) waste sectors, the largest such program of its kind in the U.S.

One strength of the program was the development of a sampling design that measured those primary variables that affect urban solid waste generation with time. Execution of the sampling program over a 1-year period resulted in more accurate descriptions of succinct waste streams and better projections for the current and future composition of the waste stream City-wide.

General findings from the study are presented below.

Waste Generation

The primary factor affecting residential waste generation is population. Differences in generation between demographic groups are subtle, except for high-density neighborhoods which consistently generate less waste per person than any other residential population group.

For the residential sector as a whole, residential waste generation is expected to increase through the end of the decade, following projected increases in the residential population of the City (i.e., more people will mean more waste).

The primary factor affecting non-residential waste generation is the distribution of employment among the various commercial activity classifications (i.e., SIC codes). The working population continues to shift from the low SIC groups (agriculture, mining, manufacturing, etc.) and into the service and government groups. The type of work activity prevalent in these service and government groups generates far less waste per employee than manufacturing, for instance. Therefore, while overall employment may remain stable in the future, non-residential waste quantities are expected to decline, following the projected trend towards more employees in the service groups (i.e., more service workers will mean less waste).

Waste Composition

Exhibit 9-1 presents a graphical summary of the City's waste stream composition for the combined residential and non-residential waste sectors. The major components by weight include corrugated/kraft paper (11 percent), other paper (16 percent), food waste (12 percent), other organics (11 percent), and bulk items (13 percent). Other significant components include newspaper (7 percent), office/computer paper (6 percent), and combined plastics (8 percent). Specific data were developed for over 40 categories present in the waste stream.

Exhibit 9-2 presents a comparison of the national averages for solid waste composition with estimates developed for this study. Generally, the waste stream composition of New York City is comparable to national averages (USEPA, 1990), particularly for the combined paper and plastic fractions. Other fractions for the City differ with the national averages to a greater degree. The most notable variation is found in the yard debris fraction.

National figures indicate that about 18 percent of the solid waste stream should be comprised of yard debris. Dense urban settings such as New York City do not have large or open vegetated areas compared to more suburban and rural municipalities. As a result, the two percent value for New York City yard waste (e.g., leaves, grass clippings, brush) appears valid.

Policy Implications

The waste composition study offers a basis to identify and quantify relationships between consumption and waste generation as an avenue for waste management planning, particularly for designing reduction, recycling, incineration, and composting programs. The data obtained can be used to:

- Evaluate the feasibility of targeted programs, such as textile recycling and the addition of food and mixed paper to yard waste composting programs.

EXHIBIT 9-1

AGGREGATE WASTE STREAM COMPOSITION FOR THE CITY OF NEW YORK

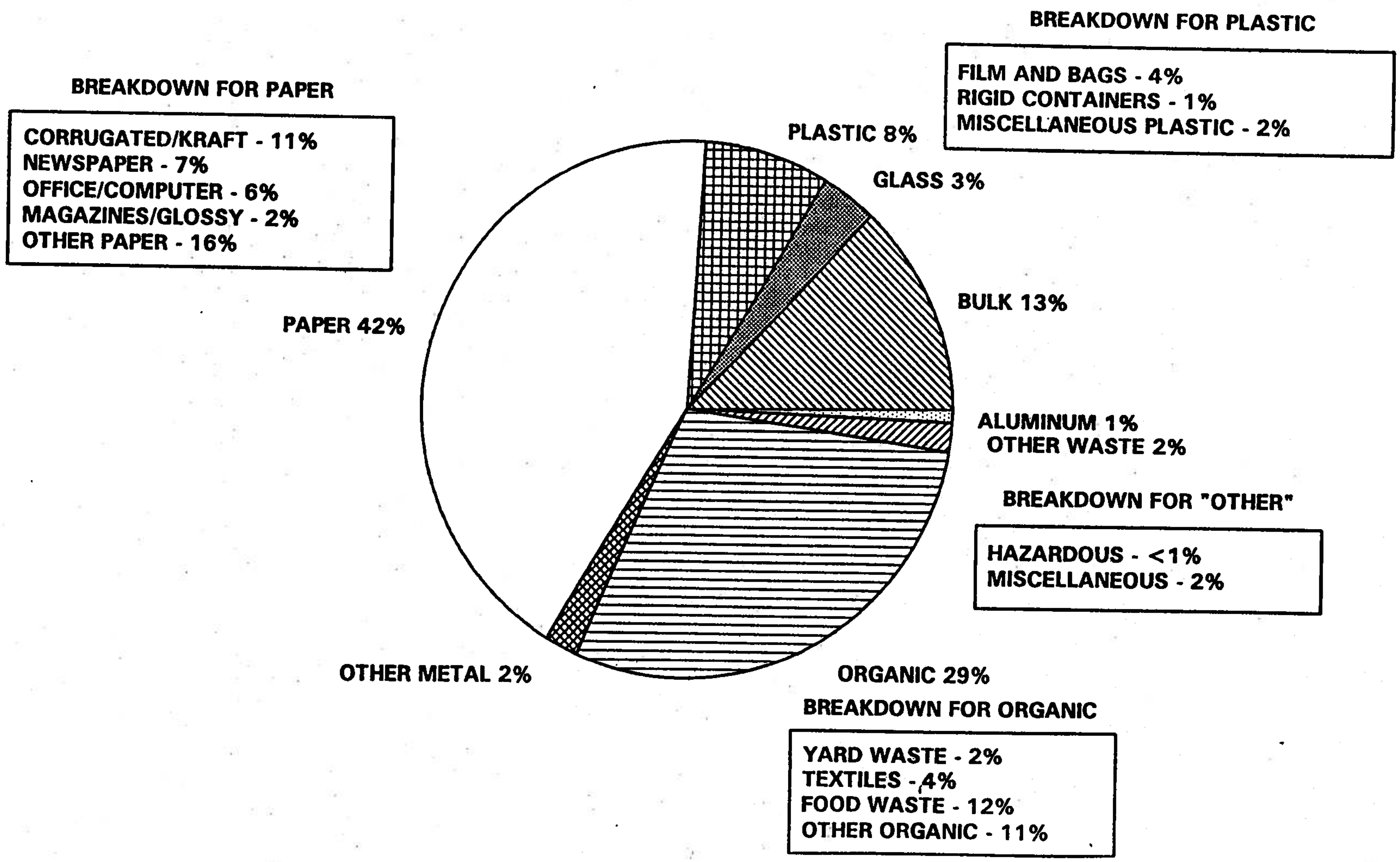
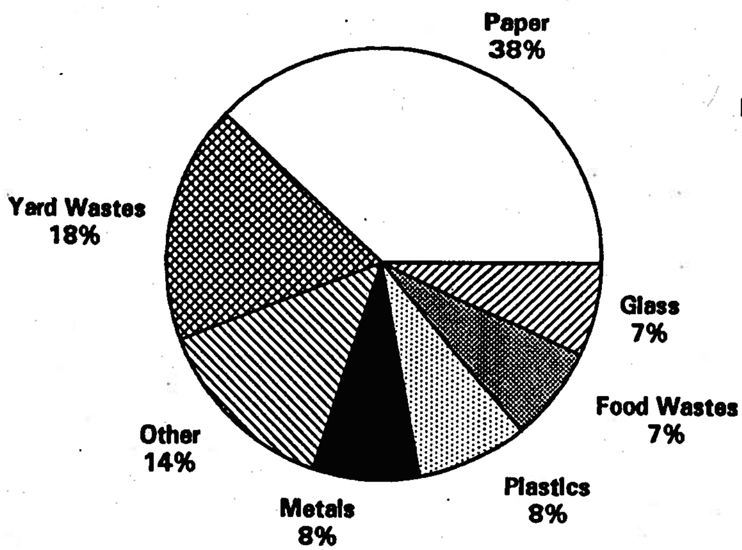
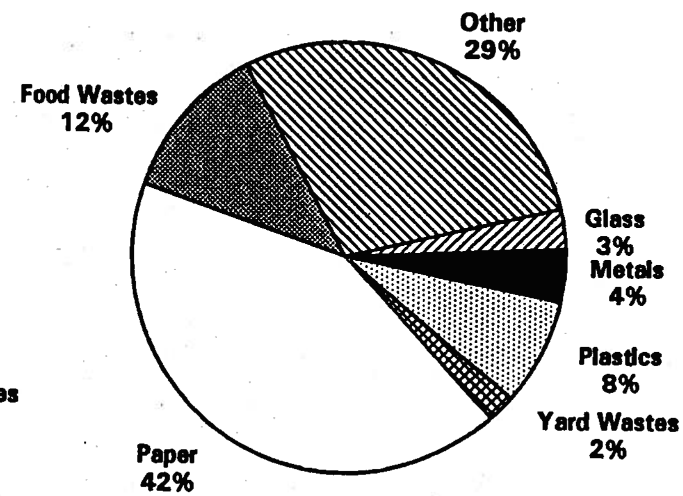


EXHIBIT 9-2

COMPARISON OF NEW YORK CITY WASTE COMPOSITION TO NATIONAL AVERAGE



National Average (1990)*
195.7 Million Tons



New York City
8.5 Million Tons

* Source: "Characterization of MSW in the United States: 1992 Update", U.S.E.P.A., 1992.

- Evaluate policy options (i.e., the implications of a "bottle bill" or the replacement of polystyrene products with paper).

- Evaluate current operations, including the need for certain DOS collection services and support facilities, as well as for planning for future services.

- Educate City residents on solid waste management concerns, new programs, and improved recycling goals.

- Evaluate the feasibility of various waste management options towards implementation of the comprehensive Solid Waste Management Plan.

- Develop and explore new markets for recyclables.

One significant output of this study was the identification and quantification of large quantities of recyclables disposed in the City's residential, institutional, and commercial waste streams every day. This information, coupled with the estimated rate of generation by location in the City, can be used as the basis to develop future recycling programs, and to implement pilot-scale and demonstration projects, or full-scale facilities.

Further Study

More in-depth study of the New York City waste stream may be warranted to support feasibility studies and/or implementation of future source reduction and recycling programs. Examples of further study suggested by the findings of this project include:

- The City-wide quantities and composition of commercial wastes are not well known. Activities under this study indicated a need for further work to establish the level of commercial recycling, the composition of commercial wastes on a seasonal basis, and the quantities generated from various businesses with time.

database. It may be useful to update the projections based on changes reflected in the 1990 Census data.

- The impacts of increased waste generation during holidays generally were avoided under this study. Further study would provide field comparisons of waste quantities and composition generated during holiday and non-holiday weeks.

- The study was not exhaustive in describing residential waste composition by income and density. Further study should focus more closely on waste differences associated with neighborhood diversification, percent of people unemployed or those staying at home, and other indicators.

- The technical literature covering waste composition studies generally does not include bulk items (e.g., white goods, large furniture, tires) and other special wastes (e.g., street sweepings) as part of the solid waste stream. USEPA literature for nationwide waste composition estimates does not include most bulk items, and yard waste estimates (leaves, grass, and green wood wastes) are not based on field data. Solid waste managers need to consider the differences presented in the waste stream when certain components are excluded or removed from the aggregate compilations. Further study would place greater emphasis on making distinctions between New York City data and other technical literature.

Operations Planning
Evaluation and Control

NYC Department of Sanitation

NEW YORK CITY WASTE COMPOSITION STUDY (1989-90) VOLUME 2

Help Reduce
New York's Waste.
Please Recycle.

New York City Waste Composition Study (1989-90)

Residential Sector Volume 2

New York City
Department of Sanitation
Operations Planning Evaluation and Control
125 Worth Street, Eighth Floor
New York, New York 10013
(212) 788-3802

ACKNOWLEDGEMENTS

This report, New York City Waste Composition Study (1989-90), was developed under New York City Department of Sanitation Contract No. 89-07653 with SCS Engineers. Alex Prutkovsky, Deputy Director, Operations Planning, Evaluation and Control (OPEC), provided the overall direction. W. Gregory Vogt of SCS Engineers was the Project Manager. The major contributors to the study were staff members at the Operations Management Division of OPEC under the guidance of Mr. Prutkovsky, and solid waste staff at SCS Engineers in Reston, Virginia. Subconsultant services were provided by Konheim & Ketcham of Brooklyn, New York.

Pre-paid orders are accepted for the entire set of 10 volumes of the study, or for individual volumes. An Executive Summary highlighting the major findings of the study is also available. For information, call (212) 788-3802, or write to the Office of the Assistant Commissioner, Department of Sanitation, Room 715, 125 Worth Street, New York, New York 10013.

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LIST OF EXHIBITS

Exhibit

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SECTION 1

INTRODUCTION

OVERVIEW

The solid waste management alternatives available today are more complex than the traditional landfilling of waste, requiring a more in-depth knowledge of two important waste stream characteristics -- quantity and composition. Assessment of the waste stream, therefore, is necessary to provide the basic information for evaluating existing solid waste management systems and for making decisions regarding future waste management. This study reflects the efforts of the Department of Sanitation (DOS) to accurately define the waste stream generated in New York City (NYC).

The project was initiated in response to Local Law 19 requiring the City to achieve a mandatory recycling goal of 25 percent. The information presented in this report will be used by DOS not only to develop recycling and marketing programs, but also to develop waste management strategies such as:

- Evaluating existing collection systems.
- Designing source reduction programs.
- Developing educational programs.
- Evaluating waste-to-energy or resource recovery programs
- Identifying and addressing toxics in the waste stream.

Because it is important to understand "who" is generating "how much" of "what type" of waste, DOS designed a study to assess separately the waste generated by three distinct sources: residences, institutions, and commercial establishments. As a result, over 750,000 pounds of refuse were sampled from:

- 23 residential communities across four boroughs
- 40 private and municipal institutions.
- Over 200 private businesses.

General findings of this study, by waste stream, include:

Aggregated

- The aggregated waste stream, consisting of residential, institutional, and commercial sectors, generated 8.5 million tons of waste annually.

- The commercial sector accounts for 45 percent (approximately 3.9 million tons per year), followed by the residential sector at 42 percent (3.6 million tons per year), with the institutional sector accounting for the remainder, just over 1 million tons.

- Paper is the largest fraction, consisting of 42 percent. The commercial sector generates more than half of the paper waste in the City.

- Organics is the second largest fraction, accounting for 29 percent Food waste is the single largest component.

Residential

- Food waste was the largest component of the waste stream by weight

- Paper, plastic, and yard waste exhibited the most seasonal variation.

- Bulk waste generation appears lowest during spring months.

- Waste generation rates vary from 20 to 70 pounds per household per week. As housing density increased, per person residential waste generation declined.

Institutional

- Mixed paper was the largest component of the waste stream by weight. Paper accounts for more than 50 percent of the whole waste stream.

- Glass and yard waste varied most on a seasonal basis.

- Bulk waste generation was lowest in the fall.

- Waste generation rates varied significantly between different institution types.

Commercial

- Paper accounts for more than 50 percent of the whole waste stream, ranging from 23 percent (Apparel and Textile Manufacturing) to 91 percent (Printing and Publishing).

- Generation rates per employee observed during the study ranged from 0.2 tons per year for offices, to 6.1 tons per year for printing and publishing.

Overall, the waste stream composition of New York City is comparable to national statistics, considering that New York City is not average. The most notable variation is found in the yard debris fraction. National figures indicate that 17.6 percent of the waste stream should be comprised of yard debris. However, field sorting efforts determined that 2 percent of New York City's waste stream consists of yard debris. Intuitively, this difference seems valid.

For the paper and plastic fractions, the national estimates seem comparable with the study results of 42 and 8 percent, respectively (national averages for these fractions are 40.0 and 8.0 percent).

The information obtained from the study is presented as a 10-volume series The purpose of this volume is to present a summary of specific project findings for the residential waste stream. More specific information, including raw data, can be found in other volumes. The remainder of the project report is organized as follows:

- Executive Summary: Provides a brief overview of the study and presents a summary of the overall findings, conclusions, and recommendations presented in the other volumes.

- Volume 1 - Final Report: Presents a general overview of the study methodology, results obtained, and implications for waste management planning.

- Volume 2 - Residential Sector: Provides the results of the residential waste composition study by season including composition, bulk items, and generation rates.

- Volume 3 - Institutional Sector: Presents the seasonal results of the institutional waste composition study.

- Volume 4 - Commercial Sector: Presents estimated composition and generation rates for commercial waste based on the results of the 1-season study.

- Volume 5 - Chemical Analysis: Provides a discussion of the chemical characteristics of the New York City waste stream as determined by a laboratory analysis of waste stream samples.

- Volume 6 - Compaction Testing: Presents the results of the compaction testing program designed to measure changes in residential and institutional refuse density.

- Volume 7 - Residential Sector Raw Data: Provides data gathered during the residential waste composition study field activities.

- Volume 8 - Institutional Sector Raw Data: Presents data gathered during field activities undertaken during the institutional waste composition study.

- Volume 9 - Commercial Sector Raw Data: Includes data gathered as part of the commercial waste composition study.

- Volume 10 - Chemical Analysis Raw Data: Provides data developed during the chemical analysis of residential and institutional refuse samples.

RESIDENTIAL WASTE COMPOSITION

This volume summarizes the analysis of refuse samples collected from the residential waste stream. Refuse samples were obtained during four seasons of concurrent field sorting activities at the 59th Street Marine Transfer Station (MTS) in Manhattan, and the closed incinerator at Hamilton Avenue, Brooklyn.

Sections 2 through 5 of this report describes the methodology for sampling and analysis. Section 6 presents the results of a bulk item survey and vehicle weighing program for residential sample routes. The remaining sections of the report discusses the results of the four seasons of sampling, and present a qualitative analysis of survey results. Raw data for the residential study are provided in Volume 7.

of Sanitation district and sector numbers, census tract (Bureau of Census), and project sampling stratum.

The number of refuse samples obtained and sorted by components per residential stratum is shown in Exhibit 2-3. A total of 346 residential waste samples were sorted and classified by weight according to 45 component categories during the Summer 1989 activities.

WASTE COMPOSITION RESULTS

As described later in Section 6, residential MSW samples did not include bulky waste items such as furniture, appliances, tires, etc. Therefore, it was necessary to augment the waste composition observed during field sampling with bulk item survey data and historical bulk collection data maintained by DOS.

Tabulated composition results for each of the nine residential strata, are presented in Exhibits 2-4 through 2-12, as follows:

Exhibit	Residential Strata
2-4	LL
2-5	LM
2-6	LH
2-7	ML
2-8	MM
2-9	MH
2-10	HL
2-11	HM
2-12	HH

Summary calculations of component percentages use a weighted average, rather than the arithmetic mean. Weighted averages were used due to variances in sample weights obtained in the field. Sample weights were targeted at 200 to 300 pounds, and varied due to the sampling method (the use of end loaders to obtain grab samples) and the different densities of refuse components. Weighted averages were considered more representative for presentation of the waste stream composition than arithmetic means.

SECTION 2

RESIDENTIAL WASTE ANALYSIS
SUMMER 1989

APPROACH

A field sorting and weighing program was performed to estimate waste types and quantities generated from residential sources on the basis of waste components disposed from selected residential routes served by City forces. For the Summer 1989 activities, field work for the residential waste sector commenced on Monday, August 14, 1989, with sorting activities completed by Saturday, August 19, 1989. Residential waste loads originated from pre-designated City routes, generally described by the sampling strata given below. Waste loads were delivered to two work sites for sampling, measurement, and weighing activities.

Strata	Description
LL	Low Income/Low Density
LM	Low Income/Medium Density
LH	Low Income/High Density
ML	Medium Income/Low Density
MM	Medium Income/Medium Density
MH	Medium Income/High Density
HL	High Income/Low Density
HM	High Income/Medium Density
HH	High Income/High Density

It should be noted that the MM stratum (medium income and medium density) was sampled at twice the frequency of the other strata.

A listing of residential loads delivered to each work site is given in Exhibits 2-1 and 2-2. The number of incoming vehicles ranged from two to six on a daily basis; each vehicle load was identified by originating Department

EXHIBIT 2-1

RESIDENTIAL LOADS DELIVERED TO MTS SITE
SUMMER 1989

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
08/14/89	1	MN-W-9	93	233	LH
	2	BX-W-8	81	281	HH
	3	BX-E-9	91	48	LH
	4	QN-W-1	13	69	LM
08/15/89	1	MN-W-12	123	281	MH
	2	QN-W-1	15	151	MM
08/16/89	1	BX-E-9	91	48	LH
	2	BX-E-9	93	208	ML
	3	MN-W-9	93	233	LH
	4	BX-W-8	81	281	HH
	5	QN-W-1	15	141	ML
	6	BX-E-9	94	70	MM
08/17/89	1	MN-W-12	123	281	MH
	2	QN-W-1	14	69	LM
08/18/89	1	BX-E-9	91	48	LH
	2	MN-W-9	93	233	LH
	3	BX-W-8	81	281	HH
	4	QN-W-1	15	151	MM
08/19/89	1	MN-W-12	123	281	MH
	2	BX-E-9	93	208	ML
	3	QN-W-1	15	141	ML
	4	BX-E-9	94	70	MM

Summary calculations for the week (Summer 1989) include standard deviation, lower and upper confidence intervals (at the 95 percent level), and the number of samples obtained and classified by the project's strata.

Sorting activities included counts for the number of returnable items (i.e., beverage containers where a deposit was charged) found in each sort sample. These counts and the associated statistical values are given at the foot of each composition summary under the heading "returnables count."

The mean result for each sample strata was then adjusted to include a known weight of bulk items, based on the bulk item survey and DOS records. A summary of the adjusted totals are presented in Exhibit 2-13.

EXHIBIT 2-2

RESIDENTIAL LOADS DELIVERED TO HAMILTON AVENUE SITE
SUMMER 1989

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
08/14/89	1	QN-W-3	32	289	HH
	2	QN-W-3	21	249	HM
	3	BK-E-17	174	782	MM
	4	QN-W-13	31	363	LL
08/15/89	1	QN-W-3	31	347	HL
	2	BK-E-2	142	524	HL
	3	QN-W-2	21	263	MM
08/16/89	1	QN-W-2	22	181	MH
	2	BK-E-18	181	974	LL
	3	BK-E-14	142	518	HM
	4	BK-E-17	174	782	MM
	5	BK-N-5	53	1120	LM
08/17/89	1	QN-W-3	13	363	LL
	2	QN-W-2	13	249	HM
	3	QN-W-3	32	289	HH
08/18/89	1	BK-E-17	174	782	MM
	2	BK-E-14	142	524	HL
	3	QN-W-2	211	263	MM
	4	QN-W-3	31	347	HL
08/19/89	1	BK-E-14	142	518	HM
	2	BK-E-18	181	974	LL
	3	QN-W-2	22	181	MH
	4	BK-N-5	53	1120	LM

EXHIBIT 2-3

SORT SAMPLES OBTAINED BY RESIDENTIAL SAMPLING STRATA SUMMER 1989

Assigned Code (Income/Density)	Residential Sampling Strata	Number of Sort Samples
LL	Low Income/Low Density	29
LM	Low Income/Medium Density	28
LH	Low Income/High Density	46
ML	Medium Income/Low Density	31
MM	Medium Income/Medium Density	72
MH	Medium Income/High Density	38
HL	High Income/Low Density	39
HM	High Income/Medium Density	22
HH	High Income/High Density	41
TOTAL		346

EXHIBIT 2-4

WASTE COMPOSITION SUMMARY - LOW INCOME/LOW DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.12	3.22	3.11	5.14	29.
Newsprint	10.42	6.01	8.53	12.32	29.
Office/computer	1.74	1.44	1.28	2.19	29.
Magazines/glossy	2.06	1.61	1.55	2.57	29.
Book/phone books	1.05	2.45	.28	1.82	29.
Non-Corrug. CrdBd.	3.96	1.97	3.34	4.58	29.
Mixed	11.73	4.91	10.18	13.27	29.
Subtotal:	35.08	11.97	31.31	38.86	29.
PLASTICS					
Clear HDPE contnr.	.53	.27	.45	.62	29.
Color HDPE contnr.	.53	.63	.33	.73	29.
LDPE	.34	.26	.26	.42	29.
Films & Bags	4.17	1.75	3.61	4.72	29.
Green PET contnr.	.19	.41	.07	.32	29.
Clear PET contnr.	.44	.26	.36	.52	29.
PVC	.18	.19	.12	.24	29.
Polypropylene	.11	.14	.06	.15	29.
Polystyrene	.00	.00	.00	.00	29.
Misc. Plastics	2.21	1.43	1.76	2.66	29.
Subtotal:	8.69	2.80	7.81	9.58	29.
YARD WASTE					
Grass/Leaves	5.75	7.23	3.46	8.03	29.
Brush/prun./stumps	.63	3.08	-.34	1.60	29.
Subtotal:	6.38	7.35	4.06	8.69	29.
ORGANICS					
Lumber	1.21	1.81	.64	1.78	29.
Textiles	6.18	3.80	4.98	7.38	29.
Rubber	.08	.33	-.03	.18	29.
Fines	2.09	1.78	1.52	2.65	29.
Diapers	3.25	2.27	2.54	3.97	29.
Foodwaste	17.35	9.50	14.35	20.34	29.
Misc. Organics	5.21	7.49	2.84	7.57	29.
Subtotal:	35.35	11.28	31.80	38.91	29.
GLASS					
Clear container	4.26	2.49	3.48	5.05	29.
Green container	1.04	.92	.75	1.33	29.
Brown container	1.28	3.03	.32	2.23	29.
Misc. Glass	.21	.47	.06	.35	29.
Subtotal:	6.79	3.98	5.53	8.04	29.
METALS					
Food Contnr./foil	.31	.37	.20	.43	29.
Beverage Cans	.34	.37	.23	.46	29.
Misc. Aluminum	.25	.38	.13	.37	29.
Food container	2.11	1.11	1.75	2.46	29.
Other	1.06	1.56	.57	1.55	29.
Bimetal Cans	.00	.00	.00	.00	29.
Subtotal:	4.07	2.02	3.43	4.71	29.
INORGANICS					
Non-bulk ceramics	.07	.38	-.05	.19	29.
Misc. Inorganics	3.32	10.39	.04	6.60	29.
Subtotal:	3.39	10.37	.12	6.66	29.
HAZARDOUS WASTE					
Pesticides	.01	.03	-.00	.02	29.
Non-pestic. poisons	.00	.00	.00	.00	29.
Paint/Solvent/fuel	.04	.12	.00	.08	29.
Dry Cell batteries	.04	.10	.01	.07	29.
Car Batteries	.00	.00	.00	.00	29.
Medical Waste	.02	.10	-.01	.05	29.
Misc HHW	.13	.28	.04	.22	29.
Subtotal:	.24	.40	.12	.37	29.
RETURNABLES COUNT					
Plastics	2.10	6.81	-.05	4.24	29.
Aluminum	3.52	10.27	.28	6.76	29.
Glass	3.14	9.64	.09	6.18	29.
Mean Sample Wt:	258.34				

EXHIBIT 2-5

WASTE COMPOSITION SUMMARY - LOW INCOME/MEDIUM DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.91	2.69	4.04	5.77	28.
Newsprint	6.70	5.78	4.84	8.56	28.
Office/computer	1.04	1.00	.72	1.36	28.
Magazines/glossy	2.05	1.42	1.59	2.50	28.
Book/phone books	.81	1.51	.32	1.29	28.
Non-Corrug. CrdBd.	3.58	1.90	2.97	4.19	28.
Mixed	8.00	6.46	5.93	10.08	28.
Subtotal:	27.09	10.46	23.72	30.45	28.
PLASTICS					
Clear HDPE contnr.	.50	.51	.34	.67	28.
Color HDPE contnr.	.78	.51	.62	.95	28.
LDPE	.20	.26	.12	.29	28.
Films & Bags	5.15	3.15	4.14	6.16	28.
Green PET contnr.	.15	.40	.02	.28	28.
Clear PET contnr.	.41	.25	.33	.49	28.
PVC	.15	.24	.08	.23	28.
Polypropylene	.09	.15	.05	.14	28.
Polystyrene	.00	.00	.00	.00	28.
Misc. Plastics	2.15	1.37	1.71	2.59	28.
Subtotal:	9.59	3.24	8.55	10.63	28.
YARD WASTE					
Grass/Leaves	1.10	3.21	.06	2.13	28.
Brush/prun./stumps	1.68	4.03	.38	2.97	28.
Subtotal:	2.78	4.76	1.25	4.31	28.
ORGANICS					
Lumber	4.43	8.52	1.69	7.17	28.
Textiles	8.22	6.58	6.10	10.33	28.
Rubber	.07	.34	-.04	.18	28.
Fines	2.08	2.05	1.42	2.74	28.
Diapers	3.66	2.64	2.82	4.51	28.
Foodwaste	14.78	8.03	12.20	17.37	28.
Misc. Organics	8.11	7.81	5.60	10.62	28.
Subtotal:	41.36	12.11	37.47	45.25	28.
GLASS					
Clear container	2.59	1.78	2.02	3.16	28.
Green container	1.38	1.14	1.02	1.75	28.
Brown container	1.08	1.59	.57	1.59	28.
Misc. Glass	.36	1.30	-.06	.77	28.
Subtotal:	5.41	2.89	4.48	6.34	28.
METALS					
Food Contnr./foil	.44	.51	.28	.60	28.
Beverage Cans	.29	.30	.20	.39	28.
Misc. Aluminum	.27	.60	.08	.46	28.
Food container	1.64	.83	1.37	1.90	28.
Other	3.86	4.66	2.36	5.36	28.
Bimetal Cans	.00	.00	.00	.00	28.
Subtotal:	6.50	4.16	5.16	7.83	28.
INORGANICS					
Non-bulk ceramics	.08	.45	-.06	.23	28.
Misc. Inorganics	6.83	7.45	4.44	9.23	28.
Subtotal:	6.91	7.61	4.47	9.36	28.
HAZARDOUS WASTE					
Pesticides	.01	.05	-.01	.03	28.
Non-pestic. poisons	.00	.00	.00	.00	28.
Paint/Solvent/fuel	.06	.29	-.04	.15	28.
Dry Cell batteries	.14	.59	-.05	.33	28.
Car Batteries	.00	.00	.00	.00	28.
Medical Waste	.00	.00	.00	.00	28.
Misc HHW	.16	.39	.04	.29	28.
Subtotal:	.37	.76	.12	.61	28.
RETURNABLES COUNT					
Plastics	1.56	2.79	.67	2.46	28.
Aluminum	3.10	7.63	.64	5.55	28.
Glass	3.99	11.68	.23	7.75	28.
Mean Sample Wt:	260.47				

EXHIBIT 2-6

WASTE COMPOSITION SUMMARY - LOW INCOME/HIGH DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.03	2.52	5.41	6.65	46.
Newsprint	7.58	5.39	6.26	8.91	46.
Office/computer	.73	1.29	.41	1.05	46.
Magazines/glossy	2.95	2.98	2.22	3.69	46.
Book/phone books	1.28	2.95	.55	2.01	46.
Non-Corrug. CrdBd.	3.09	1.53	2.72	3.47	46.
Mixed	7.42	5.11	6.17	8.68	46.
Subtotal	29.10	9.62	26.73	31.46	46.
PLASTICS					
Clear HDPE contnr.	.58	.29	.51	.65	46.
Color HDPE contnr.	.78	.64	.62	.94	46.
LDPE	.26	.42	.16	.37	46.
Films & Bags	6.31	2.23	5.77	6.86	46.
Green PET contnr.	.14	.16	.10	.18	46.
Clear PET contnr.	.60	1.08	.34	.87	46.
PVC	.10	.15	.06	.13	46.
Polypropylene	.26	.27	.20	.33	46.
Polystyrene	.00	.00	.00	.00	46.
Misc. Plastics	2.54	1.99	2.05	3.03	46.
Subtotal:	11.58	3.56	10.70	12.45	46.
YARD WASTE					
Grass/Leaves	04	.35	-.05	.12	46.
Brush/prun./stumps	02	.10	-.00	.05	46.
Subtotal	.06	.36	-.03	.15	46.
ORGANICS					
Lumber	3.27	6.31	1.72	4.83	46
Textiles	8.61	7.30	6.81	10.41	46.
Rubber	.30	.86	.09	.51	46.
Fines	3.37	3.55	2.49	4.25	46.
Diapers	4.22	2.11	3.70	4.74	46.
Foodwaste	12.96	8.62	10.84	15.09	46.
Misc. Organics	10.05	7.77	8.14	11.96	46.
Subtotal	42.78	10.19	40.27	45.29	46.
GLASS					
Clear container	3.27	2.45	2.67	3.87	46.
Green container	1.59	1.58	1.20	1.98	46.
Brown container	1.24	1.10	.97	1.51	46.
Misc. Glass	.91	1.69	.49	1.32	46.
Subtotal	7.01	3.58	6.13	7.89	46.
METALS					
Food Contnr./foil	.61	.45	.49	.72	46.
Beverage Cans	.35	.31	.28	.43	46.
Misc. Aluminum	.29	.49	.17	.41	46.
Food container	2.28	.97	2.04	2.52	46.
Other	2.76	2.66	2.10	3.42	46.
Bimetal Cans	.00	.00	.00	.00	46.
Subtotal:	6.29	2.74	5.61	6.96	46.
INORGANICS					
Non-bulk ceramics	.02	.10	.00	.05	46
Misc. Inorganics	2.67	5.73	1.26	4.08	46
Subtotal:	2.70	5.73	1.29	4.11	46.
HAZARDOUS WASTE					
Pesticides	.02	.10	-.00	.05	46.
Non-pestic. poisons	.06	.22	.00	.11	46.
Paint/Solvent/fuel	.10	.33	.02	.19	46.
Dry Cell batteries	.05	.08	.03	.07	46.
Car Batteries	.00	.00	.00	.00	46.
Medical Waste	.02	.10	.00	.05	46.
Misc HHW	.24	.68	.07	.41	46.
Subtotal	.49	.99	.25	.74	46.
RETURNABLES COUNT					
Plastics	1.53	5.30	.23	2.84	46.
Aluminum	3.53	10.78	.87	6.18	46.
Glass	3.46	11.46	.64	6.28	46.
Mean Sample Wt:	265.00				

EXHIBIT 2-7

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/LOW DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.89	2.83	4.04	5.75	31.
Newsprint	10.43	5.48	8.77	12.09	31.
Office/computer	1.86	5.32	.25	3.46	31.
Magazines/glossy	4.10	3.92	2.91	5.28	31.
Book/phone books	.78	2.01	.17	1.38	31.
Non-Corrug. CrdBd.	3.59	2.01	2.98	4.20	31.
Mixed	8.96	4.44	7.61	10.30	31.
Subtotal:	34.60	9.27	31.80	37.41	31.
PLASTICS					
Clear HDPE contnr.	.59	.31	.49	.68	31.
Color HDPE contnr.	.83	.56	.66	1.00	31.
LDPE	.14	.25	.07	.22	31.
Films & Bags	5.29	2.57	4.52	6.07	31.
Green PET contnr.	.12	.25	.05	.20	31.
Clear PET contnr.	.65	.43	.52	.78	31.
PVC	.24	.56	.07	.41	31.
Polypropylene	.12	.18	.06	.17	31.
Polystyrene	.00	.00	.00	.00	31.
Misc. Plastics	3.27	4.14	2.02	4.52	31.
Subtotal:	11.26	4.34	9.94	12.57	31.
YARD WASTE					
Grass/Leaves	2.20	3.64	1.10	3.30	31.
Brush/prun./stumps	.73	1.80	.18	1.27	31.
Subtotal:	2.93	3.97	1.73	4.13	31.
ORGANICS					
Lumber	2.11	2.20	1.44	2.77	31.
Textiles	4.20	3.32	3.19	5.20	31.
Rubber	.41	1.26	.03	.79	31.
Fines	3.04	2.95	2.15	3.93	31.
Diapers	3.06	2.08	2.43	3.69	31.
Foodwaste	15.28	9.17	12.51	18.06	31.
Misc. Organics	8.30	7.64	5.99	10.61	31.
Subtotal:	36.40	11.10	33.04	39.75	31.
GLASS					
Clear container	3.26	2.55	2.49	4.04	31.
Green container	.93	.80	.69	1.18	31.
Brown container	.83	1.02	.52	1.14	31.
Misc. Glass	.79	1.85	.23	1.35	31.
Subtotal:	5.82	2.47	5.07	6.57	31.
METALS					
Food Contnr./foil	.57	.39	.45	.68	31.
Beverage Cans	.31	.29	.22	.40	31.
Misc. Aluminum	.31	.48	.16	.45	31.
Food container	1.90	1.21	1.53	2.27	31.
Other	2.09	2.12	1.44	2.73	31.
Bimetal Cans	.00	.00	.00	.00	31.
Subtotal:	5.17	2.55	4.40	5.94	31.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	31.
Misc. Inorganics	3.73	6.20	1.85	5.60	31.
Subtotal:	3.73	6.20	1.85	5.60	31.
HAZARDOUS WASTE					
Pesticides	.00	.02	-.00	.01	31.
Non-pestic. poisons	.02	.11	-.01	.06	31.
Paint/Solvent/fuel	.01	.03	-.00	.02	31.
Dry Cell batteries	.01	.04	.00	.02	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.00	.00	.00	.00	31.
Misc HHW	.05	.20	-.01	.11	31.
Subtotal:	.10	.30	.01	.19	31.
RETURNABLES COUNT					
Plastics	1.83	3.41	.80	2.87	31.
Aluminum	3.37	4.96	1.87	4.87	31.
Glass	2.30	5.25	.71	3.88	31.
Mean Sample Wt:	195.18				

EXHIBIT 2-8

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/MEDIUM DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.84	3.66	4.13	5.56	72.
Newsprint	10.17	6.32	8.93	11.40	72.
Office/computer	1.36	1.88	.99	1.72	72.
Magazines/glossy	2.78	2.94	2.20	3.35	72.
Book/phone books	1.64	4.34	.79	2.49	72.
Non-Corrug. CrdBd.	3.00	2.02	2.60	3.39	72.
Mixed	9.02	6.75	7.70	10.34	72.
Subtotal:	32.80	9.90	30.86	34.73	72.
PLASTICS					
Clear HDPE contnr.	.63	.39	.56	.71	72.
Color HDPE contnr.	.67	.42	.58	.75	72.
LDPE	.32	.32	.26	.38	72.
Films & Bags	5.28	2.70	4.75	5.81	72.
Green PET contnr.	.26	.64	.13	.38	72.
Clear PET contnr.	.48	.31	.42	.54	72.
PVC	.23	.39	.16	.31	72.
Polypropylene	.12	.19	.09	.16	72.
Polystyrene	.00	.00	.00	.00	72.
Misc. Plastics	2.13	1.66	1.80	2.45	72.
Subtotal:	10.12	3.37	9.47	10.78	72.
YARD WASTE					
Grass/Leaves	1.49	4.56	.60	2.38	72.
Brush/prun./stumps	.40	2.15	-.02	.82	72.
Subtotal:	1.89	4.97	.92	2.86	72.
ORGANICS					
Lumber	2.46	4.44	1.59	3.32	72.
Textiles	6.59	4.57	5.70	7.48	72.
Rubber	.17	.67	.04	.30	72.
Fines	1.84	1.43	1.56	2.12	72.
Diapers	2.92	2.17	2.49	3.34	72.
Foodwaste	18.87	10.04	16.91	20.83	72.
Misc. Organics	9.83	9.33	8.00	11.65	72.
Subtotal:	42.67	11.33	40.46	44.89	72.
GLASS					
Clear container	3.71	2.12	3.30	4.13	72.
Green container	1.31	1.13	1.09	1.53	72.
Brown container	1.21	1.14	.98	1.43	72.
Misc. Glass	.26	1.06	.05	.47	72.
Subtotal:	6.49	2.81	5.95	7.04	72.
METALS					
Food Contnr./foil	.40	.76	.25	.55	72.
Beverage Cans	.37	.41	.29	.44	72.
Misc. Aluminum	.36	.68	.23	.49	72.
Food container	2.05	1.34	1.79	2.32	72.
Other	2.04	2.80	1.49	2.58	72.
Bimetal Cans	.04	.22	-.01	.08	72.
Subtotal:	5.25	3.09	4.65	5.85	72.
INORGANICS					
Non-bulk ceramics	.02	.21	-.02	.06	72.
Misc. Inorganics	.56	2.50	.07	1.05	72.
Subtotal:	.58	2.51	.09	1.07	72.
HAZARDOUS WASTE					
Pesticides	.03	.09	.01	.04	72.
Non-pestic. poisons	.01	.04	-.00	.01	72.
Paint/Solvent/fuel	.02	.13	-.01	.05	72.
Dry Cell batteries	.03	.06	.02	.04	72.
Car Batteries	.00	.02	-.00	.00	72.
Medical Waste	.02	.10	-.00	.03	72.
Misc HHW	.10	.30	.04	.16	72.
Subtotal:	.19	.43	.11	.28	72.
RETURNABLES COUNT					
Plastics	1.86	4.35	1.01	2.72	72.
Aluminum	3.10	8.06	1.53	4.67	72.
Glass	2.87	7.71	1.37	4.38	72.
Mean Sample Wt:	233.88				

EXHIBIT 2-9

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/HIGH DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.41	3.95	4.33	6.49	38.
Newsprint	17.36	8.32	15.09	19.64	38.
Office/computer	1.52	2.34	.88	2.16	38.
Magazines/glossy	4.61	4.47	3.39	5.83	38.
Book/phone books	4.08	9.86	1.39	6.77	38.
Non-Corrug. CrdBd.	3.76	1.61	3.32	4.20	38.
Mixed	8.34	5.06	6.96	9.72	38.
Subtotal:	45.09	10.31	42.28	47.91	38.
PLASTICS					
Clear HDPE contnr.	.41	.32	.32	.50	38.
Color HDPE contnr.	.93	.68	.74	1.11	38.
LDPE	.13	.19	.08	.18	38.
Films & Bags	6.28	2.45	5.61	6.95	38.
Green PET contnr.	.12	.36	.02	.22	38.
Clear PET contnr.	.48	.44	.36	.61	38.
PVC	.17	.46	.04	.29	38.
Polypropylene	.25	.57	.09	.40	38.
Polystyrene	.00	.00	.00	.00	38.
Misc. Plastics	1.93	.99	1.66	2.20	38.
Subtotal:	10.70	3.50	9.74	11.65	38.
YARD WASTE					
Grass/Leaves	.05	.30	-.03	.13	38.
Brush/prun./stumps	.02	.10	-.00	.05	38.
Subtotal:	.07	.31	-.01	.16	38.
ORGANICS					
Lumber	2.19	3.50	1.23	3.14	38.
Textiles	4.04	3.18	3.17	4.90	38.
Rubber	.03	.13	-.01	.06	38.
Fines	2.80	1.84	2.30	3.31	38.
Diapers	3.11	1.62	2.67	3.55	38.
Foodwaste	10.40	4.67	9.12	11.67	38.
Misc. Organics	10.96	8.16	8.73	13.19	38.
Subtotal:	33.53	10.17	30.75	36.31	38.
GLASS					
Clear container	2.41	2.50	1.72	3.09	38.
Green container	.87	.93	.62	1.12	38.
Brown container	.58	.63	.41	.75	38.
Misc. Glass	.65	1.59	.22	1.09	38.
Subtotal:	4.51	2.79	3.75	5.27	38.
METALS					
Food Contnr./foil	.37	.37	.27	.47	38.
Beverage Cans	.44	.50	.31	.58	38.
Misc. Aluminum	.17	.43	.05	.28	38.
Food container	2.06	1.71	1.59	2.52	38.
Other	.79	1.39	.41	1.17	38.
Bimetal Cans	.00	.00	.00	.00	38.
Subtotal:	3.82	2.15	3.23	4.40	38.
INORGANICS					
Non-bulk ceramics	.19	.72	.00	.39	38.
Misc. Inorganics	1.76	4.43	.55	2.96	38.
Subtotal:	1.95	4.43	.74	3.16	38.
HAZARDOUS WASTE					
Pesticides	.04	.10	.01	.07	38.
Non-pestic. poisons	.02	.08	-.00	.04	38.
Paint/Solvent/fuel	.01	.05	-.00	.02	38.
Dry Cell batteries	.04	.15	-.00	.08	38.
Car Batteries	.00	.00	.00	.00	38.
Medical Waste	.03	.14	-.00	.07	38.
Misc HHW	.19	.38	.08	.29	38.
Subtotal:	.33	.48	.20	.46	38.
RETURNABLES COUNT					
Plastics	1.57	4.76	.27	2.87	38.
Aluminum	2.49	5.45	1.00	3.98	38.
Glass	1.00	3.11	.15	1.84	38.
Mean Sample Wt:	245.86				

EXHIBIT 2-10

WASTE COMPOSITION SUMMARY - HIGH INCOME/LOW DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.51	3.10	3.67	5.34	39.
Newsprint	9.17	3.87	8.13	10.22	39.
Office/computer	1.95	2.28	1.33	2.57	39.
Magazines/glossy	2.95	3.06	2.13	3.78	39.
Book/phone books	.91	1.23	.58	1.24	39.
Non-Corrug. CrdBd.	5.64	5.05	4.28	7.00	39.
Mixed	7.19	5.51	5.71	8.68	39.
Subtotal:	32.32	10.51	29.48	35.15	39.
PLASTICS					
Clear HDPE contnr.	.56	.77	.35	.77	39.
Color HDPE contnr.	.51	.55	.36	.66	39.
LDPE	.22	.31	.14	.31	39.
Films & Bags	3.72	1.91	3.20	4.24	39.
Green PET contnr.	.08	.13	.04	.11	39.
Clear PET contnr.	.35	.26	.28	.42	39.
PVC	.12	.18	.07	.16	39.
Polypropylene	.13	.28	.05	.20	39.
Polystyrene	.00	.00	.00	.00	39.
Misc. Plastics	2.51	1.99	1.97	3.04	39.
Subtotal:	8.19	2.91	7.40	8.97	39.
YARD WASTE					
Grass/Leaves	5.74	7.86	3.62	7.86	39.
Brush/prun./stumps	4.79	9.55	2.22	7.37	39.
Subtotal:	10.53	13.82	6.81	14.26	39.
ORGANICS					
Lumber	3.28	4.60	2.04	4.52	39.
Textiles	6.37	5.27	4.95	7.79	39.
Rubber	.31	1.98	-.23	.84	39.
Fines	2.01	1.14	1.70	2.32	39.
Diapers	4.36	2.17	3.77	4.94	39.
Foodwaste	12.86	6.45	11.13	14.60	39.
Misc. Organics	9.40	9.46	6.85	11.95	39.
Subtotal:	38.59	11.22	35.57	41.62	39.
GLASS					
Clear container	3.23	1.80	2.74	3.71	39.
Green container	.98	1.37	.61	1.35	39.
Brown container	.75	.99	.49	1.02	39.
Misc. Glass	.26	.61	.09	.42	39.
Subtotal:	5.22	2.15	4.64	5.80	39.
METALS					
Food Contnr./foil	.33	.49	.20	.46	39.
Beverage Cans	.37	.38	.27	.48	39.
Misc. Aluminum	.06	.23	-.00	.12	39.
Food container	1.73	.90	1.49	1.97	39.
Other	1.10	1.31	.75	1.46	39.
Bimetal Cans	.01	.10	-.01	.04	39.
Subtotal:	3.61	1.63	3.17	4.05	39.
INORGANICS					
Non-bulk ceramics	.06	.17	.02	.11	39.
Misc. Inorganics	.85	2.56	.16	1.54	39.
Subtotal:	.91	2.59	.22	1.61	39.
HAZARDOUS WASTE					
Pesticides	.03	.11	.00	.06	39.
Non-pestic. poisons	.02	.07	.00	.04	39.
Paint/Solvent/fuel	.03	.13	-.01	.06	39.
Dry Cell batteries	.05	.11	.02	.08	39.
Car Batteries	.29	1.42	-.10	.67	39.
Medical Waste	.01	.04	-.00	.02	39.
Misc HHW	.21	.38	.11	.32	39.
Subtotal:	.63	1.46	.24	1.03	39.
RETURNABLES COUNT					
Plastics	1.47	5.63	-.05	2.99	39.
Aluminum	2.51	8.64	.18	4.84	39.
Glass	1.04	4.17	-.09	2.16	39.
Mean Sample Wt:	277.11				

EXHIBIT 2-11

WASTE COMPOSITION SUMMARY - HIGH INCOME/MEDIUM DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.44	3.66	4.10	6.78	22.
Newsprint	9.54	5.10	7.68	11.41	22.
Office/computer	1.79	2.41	.91	2.68	22.
Magazines/glossy	2.36	2.15	1.57	3.15	22.
Book/phone books	.96	1.40	.45	1.47	22.
Non-Corrug. CrdBd.	3.66	1.35	3.16	4.15	22.
Mixed	8.07	4.74	6.33	9.80	22.
Subtotal:	31.82	8.05	28.87	34.76	22.
PLASTICS					
Clear HDPE contnr.	.72	.66	.47	.96	22.
Color HDPE contnr.	.64	.51	.46	.83	22.
LDPE	.36	.29	.25	.47	22.
Films & Bags	4.88	2.21	4.07	5.68	22.
Green PET contnr.	.20	.26	.11	.30	22.
Clear PET contnr.	.43	.47	.26	.60	22.
PVC	.16	.43	.00	.32	22.
Polypropylene	.12	.16	.06	.18	22.
Polystyrene	.00	.00	.00	.00	22.
Misc. Plastics	2.48	2.63	1.51	3.44	22.
Subtotal:	9.99	4.07	8.50	11.48	22.
YARD WASTE					
Grass/Leaves	4.11	7.32	1.43	6.78	22.
Brush/prun./stumps	.85	3.61	-.47	2.17	22.
Subtotal:	4.95	9.62	1.43	8.47	22.
ORGANICS					
Lumber	1.83	2.97	.74	2.92	22.
Textiles	5.82	5.96	3.64	8.00	22.
Rubber	.02	.07	-.00	.05	22.
Fines	1.70	1.00	1.34	2.07	22.
Diapers	4.25	2.46	3.35	5.15	22.
Foodwaste	20.75	7.36	18.06	23.45	22.
Misc. Organics	6.53	8.57	3.39	9.66	22.
Subtotal:	40.90	8.50	37.79	44.01	22.
GLASS					
Clear container	4.05	2.33	3.20	4.90	22.
Green container	1.21	1.13	.79	1.63	22.
Brown container	1.27	1.46	.73	1.80	22.
Misc. Glass	.12	.34	-.00	.24	22.
Subtotal:	6.64	2.79	5.62	7.67	22.
METALS					
Food Contnr./foil	.36	.72	.10	.63	22.
Beverage Cans	.43	.35	.30	.56	22.
Misc. Aluminum	.13	.21	.05	.20	22.
Food container	2.00	.89	1.67	2.32	22.
Other	2.24	2.92	1.17	3.31	22.
Bimetal Cans	.00	.00	.00	.00	22.
Subtotal:	5.16	3.16	4.00	6.31	22.
INORGANICS					
Non-bulk ceramics	.04	.14	-.01	.09	22.
Misc. Inorganics	.38	.89	.05	.71	22.
Subtotal:	.42	.90	.09	.75	22.
HAZARDOUS WASTE					
Pesticides	.02	.10	-.02	.06	22.
Non-pestic. poisons	.01	.03	-.00	.02	22.
Paint/Solvent/fuel	.00	.00	.00	.00	22.
Dry Cell batteries	.01	.04	-.00	.03	22.
Car Batteries	.00	.00	.00	.00	22.
Medical Waste	.03	.05	.01	.04	22.
Misc HHW	.05	.09	.01	.08	22.
Subtotal:	.12	.16	.06	.18	22.
RETURNABLES COUNT					
Plastics	2.74	7.96	-.17	5.66	22.
Aluminum	3.86	9.50	.38	7.34	22.
Glass	2.93	6.80	.44	5.42	22.
Mean Sample Wt:	268.50				

 EXHIBIT 2-12

WASTE COMPOSITION SUMMARY - HIGH INCOME/HIGH DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.16	3.23	4.31	6.00	41.
Newsprint	12.64	8.92	10.31	14.97	41.
Office/computer	2.14	2.64	1.45	2.83	41.
Magazines/glossy	3.97	4.32	2.84	5.10	41.
Book/phone books	.43	.96	.18	.68	41.
Non-Corrug. CrdBd.	4.02	2.44	3.38	4.66	41.
Mixed	8.03	4.67	6.81	9.25	41.
Subtotal:	36.38	12.58	33.10	39.67	41.
PLASTICS					
Clear HDPE contnr.	.67	.49	.55	.80	41.
Color HDPE contnr.	1.05	.99	.79	1.31	41.
LDPE	.13	.21	.07	.18	41.
Films & Bags	6.90	2.46	6.26	7.54	41.
Green PET contnr.	.09	.13	.06	.13	41.
Clear PET contnr.	.65	.61	.49	.80	41.
PVC	.15	.21	.09	.20	41.
Polypropylene	.14	.20	.09	.19	41.
Polystyrene	.00	.00	.00	.00	41.
Misc. Plastics	2.24	1.36	1.88	2.59	41.
Subtotal:	12.01	3.16	11.19	12.84	41.
YARD WASTE					
Grass/Leaves	1.04	6.21	-.58	2.66	41.
Brush/prun./stumps	.02	.07	-.00	.04	41.
Subtotal:	1.05	6.21	-.57	2.68	41.
ORGANICS					
Lumber	.94	2.30	.34	1.54	41.
Textiles	6.38	6.05	4.80	7.95	41.
Rubber	.07	.24	.01	.14	41.
Fines	3.77	3.35	2.90	4.65	41.
Diapers	3.29	2.72	2.58	4.00	41.
Foodwaste	11.03	7.61	9.04	13.02	41.
Misc. Organics	14.71	10.41	12.00	17.43	41.
Subtotal:	40.20	13.54	36.67	43.73	41.
GLASS					
Clear container	2.04	1.78	1.58	2.51	41.
Green container	.95	2.70	.25	1.66	41.
Brown container	.72	.99	.47	.98	41.
Misc. Glass	.41	1.21	.09	.72	41.
Subtotal:	4.13	3.38	3.25	5.01	41.
METALS					
Food Contnr./foil	.91	.84	.69	1.13	41.
Beverage Cans	.31	.37	.22	.41	41.
Misc. Aluminum	.27	.57	.12	.42	41.
Food container	2.36	1.44	1.99	2.74	41.
Other	1.26	2.10	.71	1.81	41.
Bimetal Cans	.00	.00	.00	.00	41.
Subtotal:	5.12	2.88	4.37	5.87	41.
INORGANICS					
Non-bulk ceramics	.03	.09	.00	.05	41.
Misc. Inorganics	.86	4.35	-.28	2.00	41.
Subtotal:	.89	4.35	-.25	2.02	41.
HAZARDOUS WASTE					
Pesticides	.01	.05	-.01	.02	41.
Non-pestic. poisons	.02	.16	-.02	.06	41.
Paint/Solvent/fuel	.04	.13	.01	.08	41.
Dry Cell batteries	.03	.06	.01	.05	41.
Car Batteries	.00	.00	.00	.00	41.
Medical Waste	.00	.01	-.00	.01	41.
Misc HHW	.11	.27	.04	.18	41.
Subtotal:	.21	.35	.12	.30	41.
RETURNABLES COUNT					
Plastics	1.57	4.00	.52	2.61	41.
Aluminum	4.42	18.52	-.41	9.25	41.
Glass	1.41	4.73	.18	2.64	41.
Mean Sample Wt:	276.86				

EXHIBIT 2-12

WASTE COMPOSITION SUMMARY - HIGH INCOME/HIGH DENSITY
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.16	3.23	4.31	6.00	41.
Newsprint	12.64	8.92	10.31	14.97	41.
Office/computer	2.14	2.64	1.45	2.83	41.
Magazines/glossy	3.97	4.32	2.84	5.10	41.
Book/phone books	.43	.96	.18	.68	41.
Non-Corrug. CrdBd.	4.02	2.44	3.38	4.66	41.
Mixed	8.03	4.67	6.81	9.25	41.
Subtotal:	36.38	12.58	33.10	39.67	41.
PLASTICS					
Clear HDPE contnr.	.67	.49	.55	.80	41.
Color HDPE contnr.	1.05	.99	.79	1.31	41.
LDPE	.13	.21	.07	.18	41.
Films & Bags	6.90	2.46	6.26	7.54	41.
Green PET contnr.	.09	.13	.06	.13	41.
Clear PET contnr.	.65	.61	.49	.80	41.
PVC	.15	.21	.09	.20	41.
Polypropylene	.14	.20	.09	.19	41.
Polystyrene	.00	.00	.00	.00	41.
Misc. Plastics	2.24	1.36	1.88	2.59	41.
Subtotal:	12.01	3.16	11.19	12.84	41.
YARD WASTE					
Grass/Leaves	1.04	6.21	-.58	2.66	41.
Brush/prun./stumps	.02	.07	-.00	.04	41.
Subtotal:	1.05	6.21	-.57	2.68	41.
ORGANICS					
Lumber	.94	2.30	.34	1.54	41.
Textiles	6.38	6.05	4.80	7.95	41.
Rubber	.07	.24	.01	.14	41.
Fines	3.77	3.35	2.90	4.65	41.
Diapers	3.29	2.72	2.58	4.00	41.
Foodwaste	11.03	7.61	9.04	13.02	41.
Misc. Organics	14.71	10.41	12.00	17.43	41.
Subtotal:	40.20	13.54	36.67	43.73	41.
GLASS					
Clear container	2.04	1.78	1.58	2.51	41.
Green container	.95	2.70	.25	1.66	41.
Brown container	.72	.99	.47	.98	41.
Misc. Glass	.41	1.21	.09	.72	41.
Subtotal:	4.13	3.38	3.25	5.01	41.
METALS					
Food Contnr./foil	.91	.84	.69	1.13	41.
Beverage Cans	.31	.37	.22	.41	41.
Misc. Aluminum	.27	.57	.12	.42	41.
Food container	2.36	1.44	1.99	2.74	41.
Other	1.26	2.10	.71	1.81	41.
Bimetal Cans	.00	.00	.00	.00	41.
Subtotal:	5.12	2.88	4.37	5.87	41.
INORGANICS					
Non-bulk ceramics	.03	.09	.00	.05	41.
Misc. Inorganics	.86	4.35	-.28	2.00	41.
Subtotal:	.89	4.35	-.25	2.02	41.
HAZARDOUS WASTE					
Pesticides	.01	.05	-.01	.02	41.
Non-pestic. poisons	.02	.16	-.02	.06	41.
Paint/Solvent/fuel	.04	.13	.01	.08	41.
Dry Cell batteries	.03	.06	.01	.05	41.
Car Batteries	.00	.00	.00	.00	41.
Medical Waste	.00	.01	-.00	.01	41.
Misc HHW	.11	.27	.04	.18	41.
Subtotal:	.21	.35	.12	.30	41.
RETURNABLES COUNT					
Plastics	1.57	4.00	.52	2.61	41.
Aluminum	4.42	18.52	-.41	9.25	41.
Glass	1.41	4.73	.18	2.64	41.
Mean Sample Wt:	276.86				

SECTION 3

RESIDENTIAL WASTE ANALYSIS
FALL 1989

APPROACH

Field sorting and weighing procedures in Fall 1989 were similar to Summer 1989 activities (Section 2). The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected residential routes served by City forces. For the Fall 1989 activities, field work for the residential waste sector commenced on Monday, October 23, 1989, with sorting activities completed by Saturday, October 28, 1989. As in the preceding season, residential waste loads originated from pre-designated City routes, generally described by the project's nine sampling strata. Waste loads were delivered to two work sites for sampling, measurement, and weighing activities.

A listing of residential loads delivered to each work site is given in Exhibits 3-1 and 3-2. The number of incoming vehicles ranged from two to six vehicles on a daily basis; each vehicle was identified by originating Department of Sanitation district and sector numbers, census tract, and project sampling stratum.

The number of refuse samples obtained and sorted by components per residential stratum is shown in Exhibit 3-3. A total of 329 residential waste samples were sorted and classified according to 45 component categories during the Fall 1989 activities.

WASTE COMPOSITION RESULTS

As described later in Section 6, residential MSW samples did not include bulky waste items such as furniture, appliances, tires, etc. Therefore, it was necessary to augment the waste composition observed during field sampling with bulk item survey data and historical bulk collection data maintained by DOS.

Tabulated composition results for each of the nine residential strata, are presented in Exhibits 3-4 through 3-12, as follows:

Exhibit	Residential Strata
3-4	Low Income/Low Density
3-5	Low Income/Medium Density
3-6	Low Income/High Density
3-7	Medium Income/Low Density
3-8	Medium Income/Medium Density
3-9	Medium Income/High Density
3-10	High Income/Low Density
3-11	High Income/Medium Density
3-12	High Income/High Density

Summary calculations of component percentages show weighted averages, as well as standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and classified by the project's residential strata.

The mean result for each sample strata was then adjusted to include a known weight of bulk items, based on the bulk item survey and DOS records. A summary of the adjusted totals are presented in Exhibit 3-13.

EXHIBIT 3-1

RESIDENTIAL LOADS DELIVERED TO MTS SITE
FALL 1989

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
10/23/89	1	BX-W-8	81	281	HH
	2	MN-W-9	93	233	LH
	3	BX-E-9	91	48	LH
	4	QN-W-I	13	69	LM
10/24/89	1	MN-W-12	123	281	MH
	2	QN-W-1	15	151	MM
10/25/89	1	MN-W-9	93	233	LH
	2	BX-W-8	81	281	HH
	3	BX-E-9	93	208	ML
	4	BX-E-6	91	48	LH
	5	BX-E-9	94	70	MM
	6	QN-W-1	15	141	ML
10/26/89	1	MN-W-12	123	281	MH
	2	QN-W-1	13	69	LM
10/27/89	1	BX-W-8	81	281	HH
	2	BX-E-9	91	48	LH
	3	MN-W-9	93	233	LH
	4	QN-W-1	15	151	MM
10/28/89	1	BX-E-9	93	208	ML
	2	MN-W-12	123	281	MH
	3	QN-W-1	15	141	MI
	4	BX-E-9	94	70	MM

EXHIBIT 3-2

RESIDENTIAL LOADS DELIVERED TO HAMILTON AVENUE SITE FALL 1989

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
10/23/89	1	QN-W-3	31	363	LL
	2	QN-W-3	32	289	HH
	3	QN-W-2	21	249	HM
	4	BK-17	174	782	MM
10/24/89	1	BK-14	142	524	HL
	2	QN-W-3	31	347	HL
	3	QN-W-2	21	263	MM
10/25/89	1	BK-14	142	518	HM
	2	QN-W-2	22	181	MH
	3	BK-18	181	974	LL
	4	BK-5	53	1120	LM
	5	BK-17	174	782	MM
10/26/89	1	QN-W-2	21	249	HM
	2	QN-W-3	32	289	HH
	3	QN-W-3	31	363	LL
10/27/89	1	BK-14	142	524	HL
	2	QN-W-2	21	263	MM
	3	BK-17	174	782	MM
	4	QN-W-3	31	347	HL
10/28/89	1	BK-14	142	518	HM
	2	QN-W-2	22	181	MH
	3	BK-18	181	974	LL
	4	BK-5	53	1120	LM

EXHIBIT 3-3

SORT SAMPLES OBTAINED BY RESIDENTIAL SAMPLING STRATA
FALL 1989

Assigned Code (Income/Density)	Residential Sampling Strata	Number of Sort Samples
LL	Low Income/Low Density	32
LM	Low Income/Medium Density	33
LH	Low Income/High Density	36
ML	Medium Income/Low Density	33
MM	Medium Income/Medium Density	65
MH	Medium Income/High Density	37
HL	High Income/Low Density	28
HM	High Income/Medium Density	27
HH	High Income/High Density	38
TOTAL		329

EXHIBIT 3-4

WASTE COMPOSITION SUMMARY - LOW INCOME/LOW DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.68	3.77	3.56	5.80	32.
Newsprint	10.49	3.73	9.38	11.60	32.
Office/computer	1.68	2.52	.93	2.43	32.
Magazines/glossy	3.52	3.49	2.48	4.56	32.
Book/phone books	1.28	2.06	.67	1.89	32.
Non-Corrug. CrdBd.	3.67	2.98	2.78	4.55	32.
Mixed	16.58	13.04	12.69	20.46	32.
Subtotal:	41.89	11.49	38.47	45.31	32.
PLASTICS					
Clear HDPE contnr.	.48	.41	.36	.60	32.
Color HDPE contnr.	.55	.55	.38	.71	32.
LDPE	.15	.20	.09	.21	32.
Films & Bags	4.44	2.37	3.74	5.15	32.
Green PET contnr.	.08	.23	.01	.15	32.
Clear PET contnr.	.35	.40	.24	.47	32.
PVC	.25	.65	.05	.44	32.
Polypropylene	.17	.29	.09	.26	32.
Polystyrene	.52	.65	.32	.71	32.
Misc. Plastics	1.23	1.35	.83	1.63	32.
Subtotal:	8.22	3.27	7.25	9.19	32.
YARD WASTE					
Grass/Leaves	5.65	7.07	3.55	7.76	32.
Brush/prun./stumps	1.10	3.82	-.03	2.24	32.
Subtotal:	6.76	7.38	4.56	8.95	32.
ORGANICS					
Lumber	1.07	1.63	.58	1.55	32.
Textiles	4.80	4.18	3.55	6.04	32.
Rubber	.04	.14	.00	.09	32.
Fines	2.23	.90	1.96	2.50	32.
Diapers	3.36	3.65	2.27	4.44	32.
Foodwaste	13.87	7.54	11.63	16.12	32.
Misc. Organics	7.54	6.80	5.51	9.56	32.
Subtotal:	32.91	10.96	29.65	36.17	32.
GLASS					
Clear container	3.70	2.25	3.03	4.37	32.
Green container	.74	.55	.58	.90	32.
Brown container	.69	.60	.51	.87	32.
Misc. Glass	.17	.61	-.01	.35	32.
Subtotal:	5.30	2.46	4.57	6.03	32.
METALS					
Food Contnr./foil	.49	.50	.34	.64	32.
Beverage Cans	.28	.26	.21	.36	32.
Misc. Aluminum	.23	.88	-.03	.49	32.
Food container	1.81	1.07	1.49	2.13	32.
Other	1.77	1.83	1.22	2.31	32.
Bimetal Cans	.07	.49	-.08	.21	32.
Subtotal:	4.65	2.52	3.90	5.40	32.
INORGANICS					
Non-bulk ceramics	.17	.66	-.03	.36	32.
Misc. Inorganics	.08	.35	-.02	.19	32.
Subtotal:	.25	.73	.03	.47	32.
HAZARDOUS WASTE					
Pesticides	.01	.02	-.00	.01	32.
Non-pestic. poisons	.00	.03	-.00	.01	32.
Paint/Solvent/fuel	.00	.00	.00	.00	32.
Dry Cell batteries	.01	.03	.00	.02	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.00	.01	.00	.01	32.
Misc HHW	.00	.00	.00	.00	32.
Subtotal:	.03	.06	.01	.04	32.
RETURNABLES COUNT					
Plastics	3.74	8.13	1.32	6.16	32.
Aluminum	3.42	7.08	1.31	5.52	32.
Glass	5.19	7.59	2.93	7.45	32.
Mean Sample Wt:	271.64				

EXHIBIT 3-5

WASTE COMPOSITION SUMMARY - LOW INCOME/MEDIUM DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.16	4.07	3.96	6.35	33.
Newsprint	8.40	5.19	6.87	9.92	33.
Office/computer	.43	.93	.16	.70	33.
Magazines/glossy	2.41	2.02	1.81	3.00	33.
Book/phone books	.76	1.31	.38	1.15	33.
Non-Corrug. CrdBd.	2.15	1.89	1.59	2.70	33.
Mixed	11.29	9.11	8.63	13.96	33.
Subtotal:	30.59	10.50	27.52	33.67	33.
PLASTICS					
Clear HDPE contnr.	.56	.47	.43	.70	33.
Color HDPE contnr.	.49	.34	.39	.59	33.
LDPE	.16	.22	.09	.22	33.
Films & Bags	5.04	2.50	4.31	5.78	33.
Green PET contnr.	.05	.07	.03	.07	33.
Clear PET contnr.	.34	.32	.25	.43	33.
PVC	.36	1.21	.00	.71	33.
Polypropylene	.23	.38	.12	.34	33.
Polystyrene	.64	.57	.48	.81	33.
Misc. Plastics	1.38	1.84	.84	1.92	33.
Subtotal:	9.25	3.99	8.08	10.42	33.
YARD WASTE					
Grass/Leaves	4.28	6.07	2.50	6.06	33.
Brush/prun./stumps	.13	.41	.01	.24	33.
Subtotal:	4.41	6.04	2.64	6.17	33.
ORGANICS					
Lumber	3.68	6.00	1.92	5.44	33.
Textiles	4.81	3.84	3.68	5.93	33.
Rubber	.17	.57	.00	.34	33.
Fines	2.46	1.61	1.99	2.93	33.
Diapers	3.59	2.13	2.96	4.21	33.
Foodwaste	15.82	9.42	13.06	18.58	33.
Misc. Organics	11.08	7.39	8.91	13.25	33.
Subtotal:	41.61	11.63	38.20	45.02	33.
GLASS					
Clear container	2.99	1.35	2.59	3.39	33.
Green container	.99	.89	.73	1.25	33.
Brown container	.61	.67	.42	.81	33.
Misc. Glass	.21	.40	.09	.32	33.
Subtotal:	4.80	2.05	4.20	5.40	33.
METALS					
Food Contnr./foil	.39	.31	.30	.48	33.
Beverage Cans	.31	.27	.23	.39	33.
Misc. Aluminum	.10	.39	-.01	.21	33.
Food container	1.98	.95	1.71	2.26	33.
Other	3.58	4.32	2.31	4.85	33.
Bimetal Cans	.03	.19	-.02	.09	33.
Subtotal:	6.40	3.98	5.23	7.56	33.
INORGANICS					
Non-bulk ceramics	.35	1.89	-.20	.91	33.
Misc. Inorganics	2.50	5.08	1.01	3.98	33.
Subtotal:	2.85	5.23	1.32	4.38	33.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	33.
Non-pestic. poisons	.00	.00	.00	.00	33.
Paint/Solvent/fuel	.02	.18	-.03	.08	33.
Dry Cell batteries	.03	.11	.00	.07	33.
Car Batteries	.00	.00	.00	.00	33.
Medical Waste	.01	.01	.00	.01	33.
Misc HHW	.03	.14	-.01	.07	33.
Subtotal:	.09	.25	.02	.17	33.
RETURNABLES COUNT					
Plastics	2.95	10.38	-.09	5.99	33.
Aluminum	4.23	10.20	1.24	7.22	33.
Glass	4.28	8.99	1.65	6.91	33.
Mean Sample Wt:	286.76				

EXHIBIT 3-6

WASTE COMPOSITION SUMMARY - LOW INCOME/HIGH DENSITY
FALL 1989

Category				SAMPLE#/ROUTE/DATE	
	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	#/ SAMPLES
PAPER					
Corrugated/kraft	6.19	2.59	5.47	6.92	36.
Newsprint	8.19	5.12	6.76	9.63	36.
Office/computer	.11	.29	.03	.19	36.
Magazines/glossy	2.25	2.18	1.64	2.86	36.
Book/phone books	.30	.58	.13	.46	36.
Non-Corrug. CrdBd.	2.93	1.99	2.37	3.49	36.
Mixed	9.82	5.02	8.42	11.23	36.
Subtotal:	29.80	10.43	26.87	32.73	36.
PLASTICS					
Clear HDPE contnr.	.72	.49	.58	.86	36.
Color HDPE contnr.	.69	.46	.57	.82	36.
LDPE	.21	.40	.10	.32	36.
Films & Bags	6.62	2.11	6.03	7.21	36.
Green PET contnr.	.12	.20	.07	.18	36.
Clear PET contnr.	.50	.38	.39	.60	36.
PVC	.24	.48	.11	.38	36.
Polypropylene	.15	.19	.10	.20	36.
Polystyrene	.94	.61	.76	1.11	36.
Misc. Plastics	1.03	1.01	.75	1.32	36.
Subtotal:	11.22	2.44	10.53	11.90	36.
YARD WASTE					
Grass/Leaves	.25	.83	.01	.48	36.
Brush/prun./stumps	.00	.00	.00	.00	36.
Subtotal:	.25	.83	.01	.48	36.
ORGANICS					
Lumber	2.57	2.07	1.99	3.15	36.
Textiles	7.46	6.72	5.58	9.35	36.
Rubber	.04	.18	-.01	.09	36.
Fines	2.81	1.57	2.37	3.25	36.
Diapers	4.41	2.62	3.67	5.14	36.
Foodwaste	16.11	7.37	14.04	18.18	36.
Misc. Organics	9.47	6.71	7.59	11.35	36.
Subtotal:	42.87	10.43	39.95	45.80	36.
GLASS					
Clear container	3.22	1.98	2.67	3.78	36.
Green container	1.77	1.98	1.22	2.33	36.
Brown container	1.18	.84	.95	1.42	36.
Misc. Glass	.26	.60	.10	.43	36.
Subtotal:	6.44	3.58	5.43	7.44	36.
METALS					
Food Contnr./foil	.49	.47	.36	.62	36.
Beverage Cans	.44	.32	.35	.53	36.
Misc. Aluminum	.15	.39	.04	.26	36.
Food container	2.79	.95	2.53	3.06	36.
Other	2.03	3.29	1.11	2.95	36.
Bimetal Cans	.00	.00	-.00	.00	36.
Subtotal:	5.91	3.82	4.84	6.98	36.
INORGANICS					
Non-bulk ceramics	.05	.20	-.01	.10	36.
Misc. Inorganics	2.99	6.51	1.16	4.82	36.
Subtotal:	3.04	6.49	1.22	4.86	36.
HAZARDOUS WASTE					
Pesticides	.00	.01	-.00	.01	36.
Non-pestic. poisons	.00	.00	.00	.00	36.
Paint/Solvent/fuel	.43	2.94	-.39	1.25	36.
Dry Cell batteries	.01	.05	-.00	.03	36.
Car Batteries	.00	.00	.00	.00	36.
Medical Waste	.02	.09	-.00	.05	36.
Misc HHW	.00	.00	.00	.00	36.
Subtotal:	.47	3.01	-.38	1.32	36.
RETURNABLES COUNT					
Plastics	1.70	6.71	-.18	3.58	36.
Aluminum	4.72	9.41	2.08	7.36	36.
Glass	4.76	10.51	1.81	7.71	36.
Mean Sample Wt:	294.12				

EXHIBIT 3-7

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/LOW DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.50	3.74	6.40	8.59	33.
Newsprint	9.63	3.31	8.66	10.60	33.
Office/computer	1.06	2.14	.44	1.69	33.
Magazines/glossy	3.18	3.53	2.15	4.22	33.
Book/phone books	.42	1.00	.12	.71	33.
Non-Corrug. CrdBd.	2.62	1.61	2.14	3.09	33.
Mixed	13.28	6.44	11.40	15.17	33.
Subtotal:	37.68	9.20	34.99	40.38	33.
PLASTICS					
Clear HDPE contnr.	.59	.42	.47	.72	33.
Color HDPE contnr.	.64	.48	.50	.78	33.
LDPE	.14	.25	.07	.21	33.
Films & Bags	4.30	1.62	3.83	4.77	33.
Green PET contnr.	.09	.16	.04	.14	33.
Clear PET contnr.	.48	.35	.38	.59	33.
PVC	.17	.29	.08	.25	33.
Polypropylene	.12	.15	.08	.17	33.
Polystyrene	.97	.44	.84	1.10	33.
Misc. Plastics	1.21	1.88	.66	1.77	33.
Subtotal:	8.73	3.24	7.78	9.68	33.
YARD WASTE					
Grass/Leaves	7.41	6.25	5.58	9.24	33.
Brush/prun./stumps	.55	1.74	.04	1.06	33.
Subtotal:	7.96	6.52	6.05	9.87	33.
ORGANICS					
Lumber	2.32	2.43	1.61	3.04	33.
Textiles	3.66	3.04	2.77	4.55	33.
Rubber	.10	.53	-.06	.26	33.
Fines	2.15	1.30	1.77	2.53	33.
Diapers	3.10	1.57	2.64	3.56	33.
Foodwaste	13.00	5.97	11.25	14.75	33.
Misc. Organics	7.34	5.70	5.67	9.01	33.
Subtotal:	31.67	7.65	29.43	33.91	33.
GLASS					
Clear container	2.86	1.47	2.43	3.29	33.
Green container	.99	1.02	.69	1.28	33.
Brown container	1.28	.97	.99	1.56	33.
Misc. Glass	.16	.41	.04	.29	33.
Subtotal:	5.29	2.82	4.46	6.12	33.
METALS					
Food Contnr./foil	.71	.48	.56	.85	33.
Beverage Cans	.34	.25	.27	.42	33.
Misc. Aluminum	.26	1.40	-.15	.67	33.
Food container	2.08	1.21	1.73	2.44	33.
Other	1.94	1.95	1.37	2.52	33.
Bimetal Cans	.02	.08	-.01	.04	33.
Subtotal	5.35	2.74	4.55	6.16	33.
INORGANICS					
Non-bulk ceramics	.13	.34	.03	.23	33.
Misc. Inorganics	2.97	7.09	.89	5.05	33.
Subtotal:	3.10	7.07	1.03	5.17	33.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	33.
Non-pestic. poisons	.00	.00	.00	.00	33.
Paint/Solvent/fuel	.08	.40	-.04	.20	33.
Dry Cell batteries	.03	.08	.00	.05	33.
Car Batteries	.00	.00	.00	.00	33.
Medical Waste	.00	.01	-.00	.01	33.
Misc HHW	.11	.54	-.05	.27	33.
Subtotal:	.22	.69	.02	.42	33.
RETURNABLES COUNT					
Plastics	1.72	4.13	.51	2.94	33.
Aluminum	3.80	7.02	1.74	5.85	33.
Glass	3.65	7.25	1.53	5.78	33.
Mean Sample Wt:	235.49				

EXHIBIT 3-8

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/MEDIUM DENSITY FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.51	3.34	4.82	6.19	65.
Newsprint	10.59	6.92	9.17	12.02	65.
Office/computer	.81	1.39	.52	1.09	65.
Magazines/glossy	2.84	2.63	2.29	3.38	65.
Book/phone books	1.00	1.61	.67	1.33	65.
Non-Corrug. CrdBd.	2.43	2.16	1.99	2.87	65.
Mixed	14.14	9.10	12.26	16.01	65.
Subtotal:	37.31	10.63	35.13	39.50	65.
PLASTICS					
Clear HDPE contnr.	.43	.39	.35	.51	65.
Color HDPE contnr.	.54	.41	.46	.63	65.
LDPE	.18	.54	.07	.29	65.
Films & Bags	5.36	3.17	4.71	6.01	65.
Green PET contnr.	.08	.16	.05	.12	65.
Clear PET contnr.	.43	.40	.35	.51	65.
PVC	.08	.12	.05	.10	65.
Polypropylene	.23	.49	.13	.33	65.
Polystyrene	.77	1.15	.54	1.01	65.
Misc. Plastics	1.32	1.87	.93	1.70	65.
Subtotal:	9.42	4.17	8.57	10.28	65.
YARD WASTE					
Grass/Leaves	2.52	5.48	1.40	3.65	65.
Brush/prun./stumps	.10	.42	.01	.18	65.
Subtotal:	2.62	5.47	1.49	3.74	65.
ORGANICS					
Lumber	3.84	5.70	2.67	5.01	65.
Textiles	5.67	5.70	4.50	6.84	65.
Rubber	.07	.20	.03	.11	65.
Fines	2.09	1.34	1.82	2.37	65.
Diapers	3.70	2.46	3.20	4.21	65.
Foodwaste	15.58	6.77	14.19	16.98	65.
Misc. Organics	7.41	5.47	6.28	8.53	65.
Subtotal:	38.37	8.05	36.71	40.02	65.
GLASS					
Clear container	3.15	1.86	2.76	3.53	65.
Green container	.93	.79	.77	1.09	65.
Brown container	.70	.78	.54	.86	65.
Misc. Glass	.18	.60	.05	.30	65.
Subtotal:	4.95	2.48	4.44	5.46	65.
METALS					
Food Contnr./foil	.57	.63	.44	.70	65.
Beverage Cans	.33	.37	.26	.41	65.
Misc. Aluminum	.14	.72	-.01	.28	65.
Food container	2.05	1.00	1.84	2.25	65.
Other	1.58	1.84	1.20	1.96	65.
Bimetal Cans	.04	.29	-.02	.10	65.
Subtotal:	4.71	2.20	4.25	5.16	65.
INORGANICS					
Non-bulk ceramics	.10	.35	.03	.17	65.
Misc. Inorganics	2.20	4.99	1.17	3.22	65.
Subtotal:	2.30	4.96	1.28	3.32	65.
HAZARDOUS WASTE					
Pesticides	.01	.06	-.00	.02	65.
Non-pestic. poisons	.00	.00	.00	.00	65.
Paint/Solvent/fuel	.05	.37	-.03	.13	65.
Dry Cell batteries	.01	.03	.00	.02	65.
Car Batteries	.23	1.54	-.08	.55	65.
Medical Waste	.01	.06	-.00	.02	65.
Misc HHW	.01	.06	-.00	.02	65.
Subtotal:	.32	1.60	-.01	.65	65.
RETURNABLES COUNT					
Plastics	2.81	7.38	1.29	4.33	65.
Aluminum	3.92	10.09	1.84	6.00	65.
Glass	4.12	8.78	2.31	5.92	65.
Mean Sample Wt:	262.56				

EXHIBIT 3-9

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/HIGH DENSITY FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.77	3.78	4.73	6.82	37.
Newsprint	18.23	10.48	15.32	21.13	37.
Office/computer	.83	1.42	.44	1.23	37.
Magazines/glossy	3.82	2.82	3.04	4.60	37.
Book/phone books	1.01	1.79	.52	1.51	37.
Non-Corrug. CrdBd.	1.98	1.89	1.46	2.51	37.
Mixed	12.71	8.03	10.48	14.93	37.
Subtotal:	44.35	11.80	41.09	47.62	37.
PLASTICS					
Clear HDPE contnr.	.33	.29	.25	.41	37.
Color HDPE contnr.	.35	.40	.24	.46	37.
LDPE	.12	.29	.04	.20	37.
Films & Bags	6.07	3.54	5.09	7.05	37.
Green PET contnr.	.04	.08	.02	.07	37.
Clear PET contnr.	.31	.24	.24	.38	37.
PVC	.05	.09	.02	.07	37.
Polypropylene	.11	.13	.08	.15	37.
Polystyrene	.87	.78	.65	1.09	37.
Misc. Plastics	1.20	2.59	.48	1.92	37.
Subtotal:	9.45	5.66	7.89	11.02	37.
YARD WASTE					
Grass/Leaves	6.59	10.13	3.78	9.39	37.
Brush/prun./stumps	.07	.38	-.03	.18	37.
Subtotal:	6.66	10.12	3.86	9.46	37.
ORGANICS					
Lumber	.74	1.54	.31	1.16	37.
Textiles	5.07	5.37	3.58	6.55	37.
Rubber	.06	.22	-.00	.12	37.
Fines	1.86	1.15	1.54	2.18	37.
Diapers	1.91	1.13	1.60	2.22	37.
Foodwaste	11.50	7.38	9.46	13.54	37.
Misc. Organics	5.96	4.07	4.84	7.09	37.
Subtotal:	27.09	8.96	24.61	29.57	37.
GLASS					
Clear container	2.61	1.67	2.15	3.08	37.
Green container	.81	.82	.58	1.04	37.
Brown container	.36	.56	.21	.52	37.
Misc. Glass	.27	.95	.00	.53	37.
Subtotal:	4.06	2.43	3.38	4.73	37.
METALS					
Food Contnr./foil	.46	.57	.30	.61	37.
Beverage Cans	.23	.20	.17	.28	37.
Misc. Aluminum	.55	1.63	.10	1.01	37.
Food container	1.84	1.60	1.40	2.29	37.
Other	2.96	4.84	1.61	4.30	37.
Bimetal Cans	.04	.25	-.03	.11	37.
Subtotal:	6.08	5.11	4.67	7.50	37.
INORGANICS					
Non-bulk ceramics	.09	.35	-.01	.18	37.
Misc. Inorganics	1.73	4.74	.41	3.04	37.
Subtotal:	1.81	4.74	.50	3.12	37.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	37.
Non-pestic. poisons	.00	.00	.00	.00	37.
Paint/Solvent/fuel	.43	2.98	-.39	1.26	37.
Dry Cell batteries	.02	.08	-.00	.04	37.
Car Batteries	.00	.00	.00	.00	37.
Medical Waste	.02	.11	-.01	.05	37.
Misc HHW	.02	.13	-.02	.06	37.
Subtotal:	.49	3.18	-.39	1.37	37.
RETURNABLES COUNT					
Plastics	1.79	7.47	-.28	3.86	37.
Aluminum	2.98	7.80	.82	5.14	37.
Glass	2.70	5.29	1.23	4.16	37.
Mean Sample Wt:	268.57				

EXHIBIT 3-10

WASTE COMPOSITION SUMMARY - HIGH INCOME/LOW DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	3.90	3.54	2.76	5.04	28.
Newsprint	11.85	6.77	9.68	14.03	28.
Office/computer	1.63	2.50	.83	2.44	28.
Magazines/glossy	4.23	3.32	3.16	5.30	28.
Book/phone books	2.12	2.95	1.17	3.07	28.
Non-Corrug. CrdBd.	1.93	1.89	1.32	2.54	28.
Mixed	13.52	10.79	10.05	16.99	28.
Subtotal:	39.19	12.99	35.01	43.36	28.
PLASTICS					
Clear HDPE contnr.	.34	.31	.24	.44	28.
Color HDPE contnr.	.72	.59	.53	.91	28.
LDPE	.12	.16	.07	.17	28.
Films & Bags	2.98	1.05	2.65	3.32	28.
Green PET contnr.	.05	.07	.02	.07	28.
Clear PET contnr.	.26	.30	.17	.36	28.
PVC	.05	.08	.02	.08	28.
Polypropylene	.27	.42	.13	.40	28.
Polystyrene	.37	.49	.21	.52	28.
Misc. Plastics	.80	.72	.57	1.03	28.
Subtotal:	5.96	1.87	5.36	6.56	28.
YARD WASTE					
Grass/Leaves	12.56	9.79	9.41	15.71	28.
Brush/prun./stumps	.41	1.46	-.06	.88	28.
Subtotal:	12.97	10.14	9.71	16.23	28.
ORGANICS					
Lumber	1.61	1.73	1.05	2.16	28.
Textiles	2.51	2.22	1.80	3.23	28.
Rubber	.92	4.17	-.42	2.26	28.
Fines	1.97	1.07	1.62	2.31	28.
Diapers	3.06	2.09	2.39	3.73	28.
Foodwaste	13.61	7.45	11.22	16.01	28.
Misc. Organics	7.97	7.48	5.57	10.38	28.
Subtotal:	31.65	12.05	27.78	35.53	28.
GLASS					
Clear container	2.60	1.83	2.02	3.19	28.
Green container	.55	.47	.40	.70	28.
Brown container	.76	.98	.44	1.07	28.
Misc. Glass	.00	.00	.00	.00	28.
Subtotal:	3.91	2.41	3.14	4.69	28.
METALS					
Food Contnr./foil	.41	.64	.20	.61	28.
Beverage Cans	.28	.32	.18	.39	28.
Misc. Aluminum	.21	.53	.04	.38	28.
Food container	1.43	1.31	1.00	1.85	28.
Other	3.09	6.57	.98	5.20	28.
Bimetal Cans	.01	.06	-.01	.03	28.
Subtotal:	5.42	6.33	3.39	7.46	28.
INORGANICS					
Non-bulk ceramics	.42	1.68	-.12	.96	28.
Misc. Inorganics	.44	1.44	-.02	.90	28.
Subtotal:	.86	2.13	.18	1.55	28.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	28.
Non-pestic. poisons	.00	.00	.00	.00	28.
Paint/Solvent/fuel	.01	.08	-.01	.04	28.
Dry Cell batteries	.01	.03	-.00	.02	28.
Car Batteries	.00	.00	.00	.00	28.
Medical Waste	.00	.01	-.00	.01	28.
Misc HHW	.00	.00	-.00	.00	28.
Subtotal:	.02	.08	-.00	.05	28.
RETURNABLES COUNT					
Plastics	3.00	7.04	.73	5.26	28.
Aluminum	3.58	8.43	.87	6.29	28.
Glass	5.58	14.06	1.06	10.10	28.
Mean Sample Wt:	271.61				

EXHIBIT 3-11

WASTE COMPOSITION SUMMARY - HIGH INCOME/MEDIUM DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.95	4.00	3.64	6.26	27.
Newsprint	13.03	7.52	10.56	15.49	27.
Office/computer	.97	1.61	.44	1.50	27.
Magazines/glossy	1.83	2.51	1.00	2.65	27.
Book/phone books	2.21	3.27	1.14	3.28	27.
Non-Corrug. CrdBd.	2.85	4.15	1.49	4.21	27.
Mixed	15.25	12.20	11.25	19.25	27.
Subtotal:	41.08	11.77	37.22	44.94	27.
PLASTICS					
Clear HDPE contnr.	.38	.32	.27	.48	27.
Color HDPE contnr.	.52	.45	.38	.67	27.
LDPE	.11	.12	.07	.15	27.
Films & Bags	5.71	2.28	4.97	6.46	27.
Green PET contnr.	.09	.10	.05	.12	27.
Clear PET contnr.	.30	.26	.22	.39	27.
PVC	.08	.10	.05	.11	27.
Polypropylene	.20	.41	.06	.33	27.
Polystyrene	.35	.47	.19	.50	27.
Misc. Plastics	1.99	2.39	1.21	2.78	27.
Subtotal:	9.72	3.03	8.73	10.71	27.
YARD WASTE					
Grass/Leaves	4.08	6.04	2.10	6.06	27.
Brush/prun./stumps	.00	.00	.00	.00	27.
Subtotal:	4.08	6.04	2.10	6.06	27.
ORGANICS					
Lumber	2.90	4.13	1.54	4.25	27.
Textiles	4.25	3.14	3.22	5.28	27.
Rubber	.00	.00	.00	.00	27.
Fines	2.11	1.05	1.77	2.45	27.
Diapers	4.40	2.82	3.47	5.32	27.
Foodwaste	14.04	6.72	11.84	16.25	27.
Misc. Organics	7.51	6.54	5.36	9.65	27.
Subtotal:	35.21	10.59	31.74	38.68	27.
GLASS					
Clear container	3.28	1.77	2.70	3.86	27.
Green container	.75	.87	.47	1.04	27.
Brown container	.60	.74	.36	.84	27.
Misc. Glass	.00	.00	.00	.00	27.
Subtotal:	4.63	2.23	3.90	5.36	27.
METALS					
Food Contnr./foil	.47	.60	.27	.66	27.
Beverage Cans	.34	.40	.21	.47	27.
Misc. Aluminum	.12	.28	.03	.21	27.
Food container	1.97	.95	1.65	2.28	27.
Other	.80	.90	.50	1.09	27.
Bimetal Cans	.10	.57	-.09	.29	27.
Subtotal:	3.79	1.70	3.23	4.35	27.
INORGANICS					
Non-bulk ceramics	.07	.31	-.03	.18	27.
Misc. Inorganics	1.35	2.68	.47	2.23	27.
Subtotal:	1.42	2.66	.55	2.29	27.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	27.
Non-pestic. poisons	.00	.00	.00	.00	27.
Paint/Solvent/fuel	.01	.08	-.01	.04	27.
Dry Cell batteries	.01	.04	-.00	.03	27.
Car Batteries	.00	.00	.00	.00	27.
Medical Waste	.02	.11	-.01	.06	27.
Misc HHW	.01	.06	-.01	.03	27.
Subtotal:	.07	.15	.02	.11	27.
RETURNABLES COUNT					
Plastics	4.64	7.72	2.11	7.17	27.
Aluminum	3.67	7.60	1.18	6.16	27
Glass	4.79	5.96	2.84	6.75	
Mean Sample Wt:	266.53				

EXHIBIT 3-12

WASTE COMPOSITION SUMMARY - HIGH INCOME/HIGH DENSITY
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	SAMPLE#/ROUTE/DATE UCL%	#/ SAMPLES
PAPER					
Corrugated/kraft	5.12	3.05	4.29	5.95	38.
Newsprint	18.26	8.20	16.02	20.50	38.
Office/computer	.58	1.49	.17	.99	38.
Magazines/glossy	4.33	3.63	3.34	5.32	38.
Book/phone books	.70	2.02	.15	1.25	38.
Non-Corrug. CrdBd.	2.15	1.56	1.72	2.58	38.
Mixed	16.57	10.45	13.72	19.42	38.
Subtotal:	47.71	10.94	44.72	50.70	38.
PLASTICS					
Clear HDPE contnr.	.42	.43	.30	.53	38.
Color HDPE contnr.	.68	.62	.51	.85	38.
LDPE	.11	.22	.05	.17	38.
Films & Bags	6.48	2.66	5.75	7.21	38.
Green PET contnr.	.09	.11	.06	.12	38.
Clear PET contnr.	.36	.24	.30	.43	38.
PVC	.14	.31	.06	.23	38.
Polypropylene	.29	.50	.16	.43	38.
Polystyrene	1.07	.81	.85	1.29	38.
Misc. Plastics	.86	1.70	.39	1.32	38.
Subtotal:	10.50	4.03	9.40	11.60	38.
YARD WASTE					
Grass/Leaves	3.93	6.93	2.03	5.82	38.
Brush/prun./stumps	.59	2.15	.00	1.18	38.
Subtotal:	4.52	7.48	2.48	6.56	38.
ORGANICS					
Lumber	1.64	3.01	.82	2.46	38.
Textiles	4.11	3.28	3.21	5.00	38.
Rubber	.14	.92	-.11	.39	38.
Fines	2.08	1.21	1.75	2.41	38.
Diapers	2.90	2.01	2.35	3.45	38.
Foodwaste	10.94	7.47	8.90	12.99	38.
Misc. Organics	5.65	4.85	4.32	6.97	38.
Subtotal:	27.46	9.57	24.84	30.08	38.
GLASS					
Clear container	2.48	1.89	1.97	3.00	38.
Green container	.41	.58	.26	.57	38.
Brown container	.64	.87	.40	.87	38.
Misc. Glass	.42	1.88	-.10	.93	38.
Subtotal:	3.95	3.13	3.10	4.81	38.
METALS					
Food Contnr./foil	.51	.65	.33	.69	38.
Beverage Cans	.35	.47	.23	.48	38.
Misc. Aluminum	.42	1.88	-.09	.93	38.
Food container	1.92	.94	1.67	2.18	38.
Other	2.26	2.80	1.50	3.03	38.
Bimetal Cans	.00	.00	.00	.00	38.
Subtotal:	5.47	4.08	4.36	6.59	38.
INORGANICS					
Non-bulk ceramics	.02	.09	-.00	.05	38.
Misc. Inorganics	.30	.92	.05	.55	38.
Subtotal:	.32	.92	.07	.57	38.
HAZARDOUS WASTE					
Pesticides	.00	.00	-.00	.00	38.
Non-pestic. poisons	.00	.01	-.00	.01	38.
Paint/Solvent/fuel	.02	.08	.00	.05	38.
Dry Cell batteries	.03	.10	-.00	.05	38.
Car Batteries	.00	.00	.00	.00	38.
Medical Waste	.01	.07	-.00	.03	38.
Misc HHW	.00	.00	.00	.00	38.
Subtotal:	.07	.16	.02	.11	38.
RETURNABLES COUNT					
Plastics	2.75	6.63	.94	4.56	38.
Aluminum	3.58	10.05	.83	6.33	38.
Glass	2.76	6.85	.89	4.63	38.
Mean Sample Wt:	289.66				

SECTION 4

RESIDENTIAL WASTE ANALYSIS
WINTER 1990

APPROACH

Field sorting and weighing procedures in Winter 1990 were similar to the preceding seasonal sorts. The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected residential routes based on the waste components present in the disposed refuse. For the Winter 1990 activities, field work for the residential waste sector was conducted over two 1-week periods. Field data for this season were collected at the MTS work site from Monday, January 29 to February 3, 1990. Field data for Winter 1990 at the Hamilton Avenue work site were collected from Monday, March 12 to March 17, 1990. As in the preceding seasons, residential waste loads originated from pre-designated City routes, generally described by the project's nine sampling strata. Waste loads were delivered by DOS vehicles to the two work sites for subsequent sampling, measurement, and weighing activities.

A listing of residential loads delivered to each work site is given in Exhibits 4-1 and 4-2. The number of incoming vehicles ranged from two to six vehicles on a daily basis; each vehicle was identified by originating Department of Sanitation district and sector, census tract, and project sampling stratum.

The number of refuse samples obtained and sorted by components per residential stratum is shown in Exhibit 4-3. A total of 317 residential waste samples were sorted and classified according to 45 component categories during the Winter 1990 activities.

WASTE COMPOSITION RESULTS

As described later in Section 6, residential MSW samples did not include bulky waste items such as furniture, appliances, tires, etc. Therefore, it was necessary to augment the waste composition observed during field sampling with bulk item survey data and historical bulk collection data maintained by DOS.

Tabulated composition results for each of the nine residential strata, are presented in Exhibits 4-4 through 4-12, as follows:

Exhibit	Residential Strata
4-4	Low Income/Low Density
4-5	Low Income/Medium Density
4-6	Low Income/High Density
4-7	Medium Income/Low Density
4-8	Medium Income/Medium Density
4-9	Medium Income/High Density
4-10	High Income/Low Density
4-11	High Income/Medium Density
4-12	High Income/High Density

Summary calculations of component percentages in these Exhibits show weighted averages, as well as standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and classified by the project's residential strata.

The mean result for each sample strata was then adjusted to include a known weight of bulk items, based on the bulk item survey and DOS records. A summary of the adjusted totals are presented in Exhibit 4-13.

EXHIBIT 4-1

RESIDENTIAL LOADS DELIVERED TO MTS SITE
WINTER 1990

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
01/29/90	1	BX-E-9	91	48	LH
	2	MN-W-9	93	233	LH
	3	BX-W-9	81	281	HH
	4	QN-W-1	13	69	LM
01/30/90	1	MN-W-12	123	281	MH
	2	QN-W-1	15	151	MM
01/31/90	1	BX-W-8	81	281	HH
	2	BX-E-9	91	48	LH
	3	MN-W-9	93	233	LH
	4	QN-W-1	15	141	ML
	5	BX-E-9	93	208	ML
	6	BX-E-9	94	70	MM
02/01/90	1	MN-W-12	123	281	MH
	2	QN-W-1	13	69	LM
02/02/90	1	BX-W-8	81	281	HH
	2	BX-E-9	91	48	LH
	3	MN-W-9	93	233	LH
	4	QN-W-1	15	151	MM
02/03/90	1	MN-W-12	123	281	MH
	2	BX-E-9	93	208	ML
	3	QN-W-1	15	141	ML
	4	BX-E-9	94	70	MM

EXHIBIT 4-2

RESIDENTIAL LOADS DELIVERED TO HAMILTON AVENUE SITE
WINTER 1990

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
03/12/90	1	BK-E-17	174	782	MM
	2	QM-W-2	21	249	HM
	3	QN-W-3	31	363	LL
	4	QN-W-3	32	289	HH
03/13/90	1	QN-W-2	21	263	MM
	2	BK-E-14	142	524	HL
	3	QN-W-3	31	347	HL
03/14/90	1	QN-W-2	22	181	MH
	2	BK-E-14	142	518	HM
	3	BK-E-18	181	974	LL
	4	BK-E-17	174	782	MM
	5	BK-N-5	53	1120	LM
03/15/90	1	QN-W-2	21	249	HM
	2	QN-W-3	31	263	LL
	3	QN-W-3	32	289	HH
03/16/90	1	QN-W-2	21	263	MM
	2	BK-E-17	174	782	MM
	3	BK-E-14	142	524	HL
	4	QN-W-3	31	347	HL
03/17/90	1	BK-E-18	181	974	LL
	2	BK-E-14	142	518	HM
	3	QN-W-2	22	181	MH
	4	BK-N-5	53	1120	LM

EXHIBIT 4-3

SORT SAMPLES OBTAINED BY RESIDENTIAL SAMPLING STRATA
WINTER 1990

Assigned Code (Income/Density)	Residential Sampling Strata	Number of Sort Samples
LL	Low Income/Low Density	32
LM	Low Income/Medium Density	32
LH	Low Income/High Density	31
ML	Medium Income/Low Density	35
MM	Medium Income/Medium Density	62
MH	Medium Income/High Density	31
HL	High Income/Low Density	32
HM	High Income/Medium Density	32
HH	High Income/High Density	30
TOTAL		317

EXHIBIT 4-4

WASTE COMPOSITION SUMMARY - LOW INCOME/LOW DENSITY WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	3.81	4.85	2.37	5.25	32.
Newsprint	7.36	3.82	6.22	8.50	32.
Office/computer	.22	.64	.03	.41	32.
Magazines/glossy	2.86	3.34	1.87	3.86	32.
Book/phone books	.34	.84	.09	.59	32.
Non-Corrug. CrdBd.	2.58	.94	2.30	2.86	32.
Mixed	12.29	4.70	10.89	13.69	32.
Subtotal:	29.47	9.04	26.78	32.16	32.
PLASTICS					
Clear HDPE contnr.	.56	.46	.43	.70	32.
Color HDPE contnr.	.62	.40	.50	.74	32.
LDPE	.03	.04	.02	.04	32.
Films & Bags	4.22	1.51	3.77	4.68	32.
Green PET contnr.	.09	.30	-.00	.18	32.
Clear PET contnr.	.54	.43	.41	.67	32.
PVC	.17	.31	.07	.26	32.
Polypropylene	.05	.11	.02	.09	32.
Polystyrene	1.16	1.06	.84	1.47	32.
Misc. Plastics	1.16	1.26	.78	1.53	32.
Subtotal:	8.60	2.60	7.83	9.38	32.
YARD WASTE					
Grass/Leaves	6.96	10.65	3.79	10.13	32.
Brush/prun./stumps	4.08	8.01	1.69	6.46	32.
Subtotal:	11.04	11.76	7.54	14.54	32.
ORGANICS					
Lumber	1.30	1.61	.82	1.78	32.
Textiles	4.78	3.64	3.69	5.86	32.
Rubber	.14	.60	-.04	.32	32.
Fines	2.38	1.58	1.91	2.85	32.
Diapers	4.41	2.45	3.68	5.14	32.
Foodwaste	14.38	7.70	12.09	16.67	32.
Misc. Organics	8.25	5.50	6.62	9.89	32.
Subtotal:	35.65	9.50	32.82	38.48	32.
GLASS					
Clear container	4.39	2.34	3.69	5.09	32.
Green container	1.18	1.00	.89	1.48	32.
Brown container	.92	.70	.71	1.13	32.
Misc. Glass	.02	.13	-.02	.06	32.
Subtotal:	6.51	3.13	5.58	7.45	32.
METALS					
Food Contnr./foil	.75	.76	.53	.98	32.
Beverage Cans	.38	.48	.24	.53	32.
Misc. Aluminum	.00	.01	-.00	.00	32.
Food container	2.68	1.00	2.38	2.98	32.
Other	2.33	2.21	1.67	2.99	32.
Bimetal Cans	.00	.01	.00	.01	32.
Subtotal:	6.15	2.49	5.41	6.89	32.
INORGANICS					
Non-bulk ceramics	.53	1.62	.04	1.01	32.
Misc. Inorganics	1.83	3.63	.75	2.91	32.
Subtotal:	2.35	4.05	1.15	3.56	32.
HAZARDOUS WASTE					
Pesticides	.01	.09	-.01	.04	32.
Non-pestic. poisons	.07	.36	-.03	.18	32.
Paint/Solvent/fuel	.00	.00	.00	.00	32.
Dry Cell batteries	.02	.03	.01	.02	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.02	.05	.00	.03	32.
Misc HHW	.10	.48	-.04	.25	32.
Subtotal:	.22	.61	.04	.41	32.
RETURNABLES COUNT					
Plastics	3.79	11.08	.50	7.09	32.
Aluminum	4.06	7.52	1.82	6.30	32.
Glass	6.04	12.50	2.31	9.76	32.
Mean Sample Wt:	326.16				

EXHIBIT 4-5

WASTE COMPOSITION SUMMARY - LOW INCOME/MEDIUM DENSITY WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.63	3.54	4.57	6.68	32.
Newsprint	8.47	5.23	6.91	10.03	32.
Office/computer	.17	.43	.04	.30	32.
Magazines/glossy	2.15	1.72	1.64	2.66	32.
Book/phone books	.49	.91	.22	.76	32.
Non-Corrug. CrdBd.	2.73	1.62	2.25	3.22	32.
Mixed	12.34	6.02	10.55	14.14	32.
Subtotal:	31.99	8.07	29.59	34.39	32.
PLASTICS					
Clear HDPE contnr.	.62	.30	.53	.70	32.
Color HDPE contnr.	.63	.37	.52	.74	32.
LDPE	.03	.07	.01	.05	32.
Films & Bags	5.81	1.49	5.37	6.26	32.
Green PET contnr.	.15	.18	.10	.21	32.
Clear PET contnr.	.58	.37	.47	.69	32.
PVC	.08	.16	.03	.13	32.
Polypropylene	.06	.14	.02	.10	32.
Polystyrene	.96	.52	.81	1.12	32.
Misc. Plastics	1.05	.92	.77	1.32	32.
Subtotal:	9.98	1.99	9.39	10.57	32.
YARD WASTE					
Grass/Leaves	1.67	3.23	.71	2.63	32.
Brush/prun./stumps	.28	1.28	-.10	.66	32.
Subtotal:	1.94	4.09	.73	3.16	32.
ORGANICS					
Lumber	2.30	2.74	1.48	3.11	32.
Textiles	4.52	2.97	3.64	5.41	32.
Rubber	.07	.21	.00	.13	32.
Fines	2.49	1.29	2.11	2.88	32.
Diapers	3.69	1.76	3.16	4.21	32.
Foodwaste	16.86	9.15	14.14	19.59	32.
Misc. Organics	14.21	7.41	12.00	16.41	32.
Subtotal:	44.14	8.93	41.48	46.80	32.
GLASS					
Clear container	2.57	1.39	2.16	2.99	32.
Green container	1.06	.91	.79	1.34	32.
Brown container	.72	.71	.51	.93	32.
Misc. Glass	.12	.64	-.07	.31	32.
Subtotal:	4.48	2.24	3.82	5.15	32.
METALS					
Food Contnr./foil	.51	.34	.40	.61	32.
Beverage Cans	.53	.63	.34	.71	32.
Misc. Aluminum	.03	.18	-.02	.08	32.
Food container	2.18	1.07	1.86	2.49	32.
Other	1.97	1.82	1.43	2.51	32.
Bimetal Cans	.01	.02	.00	.01	32.
Subtotal:	5.21	2.17	4.57	5.86	32.
INORGANICS					
Non-bulk ceramics	.10	.21	.04	.17	32.
Misc. Inorganics	2.03	3.62	.95	3.11	32.
Subtotal:	2.13	3.63	1.05	3.21	32.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	32.
Non-pestic. poisons	.00	.00	.00	.00	32.
Paint/Solvent/fuel	.00	.00	.00	.00	32.
Dry Cell batteries	.06	.10	.03	.09	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.02	.06	-.00	.04	32.
Misc HHW	.04	.12	.01	.08	32.
Subtotal:	.12	.18	.06	.17	32.
RETURNABLES COUNT					
Plastics	3.19	9.61	.33	6.05	32.
Aluminum	5.53	10.83	2.31	8.75	32.
Glass	4.87	13.61	.82	8.92	32.
Mean Sample Wt:	336.76				

EXHIBIT 4-6

WASTE COMPOSITION SUMMARY - LOW INCOME/HIGH DENSITY
WINTER 1990

SAMPLE#/ROUTE/DATE

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	#/ SAMPLES
PAPER					
Corrugated/kraft	5.70	2.09	5.07	6.34	31.
Newsprint	7.38	5.68	5.66	9.10	31.
Office/computer	.25	.57	.08	.42	31.
Magazines/glossy	1.60	1.66	1.10	2.11	31.
Book/phone books	.40	1.40	-.02	.82	31.
Non-Corrug. CrdBd.	3.15	1.94	2.56	3.73	31.
Mixed	9.91	5.14	8.36	11.46	31.
Subtotal:	28.40	8.10	25.95	30.85	31.
PLASTICS					
Clear HDPE contnr.	.84	.87	.57	1.10	31.
Color HDPE contnr.	.76	.28	.67	.85	31.
LDPE	.08	.14	.04	.13	31.
Films & Bags	5.26	2.17	4.60	5.91	31.
Green PET contnr.	.18	.26	.10	.26	31.
Clear PET contnr.	.54	.34	.44	.64	31.
PVC	.25	.93	-.03	.54	31.
Polypropylene	.16	.20	.10	.22	31.
Polystyrene	.88	.42	.75	1.00	31.
Misc. Plastics	1.46	1.52	1.00	1.92	31.
Subtotal:	10.41	2.49	9.66	11.17	31.
YARD WASTE					
Grass/Leaves	.60	1.81	.05	1.15	31.
Brush/prun./stumps	.02	.07	-.01	.04	31.
Subtotal:	.62	1.81	.07	1.16	31.
ORGANICS					
Lumber	1.30	1.38	.88	1.71	31.
Textiles	5.45	3.35	4.44	6.47	31.
Rubber	.12	.27	.04	.20	31.
Fines	2.21	1.00	1.90	2.51	31.
Diapers	6.02	3.04	5.11	6.94	31.
Foodwaste	18.05	8.18	15.57	20.52	31.
Misc. Organics	11.22	4.51	9.86	12.59	31.
Subtotal:	44.37	9.37	41.54	47.20	31.
GLASS					
Clear container	4.46	2.37	3.74	5.18	31.
Green container	1.51	1.18	1.16	1.87	31.
Brown container	1.54	.99	1.24	1.84	31
Misc. Glass	.00	.02	-.00	.01	31
Subtotal:	7.52	2.87	6.65	8.38	31
METALS					
Food Contnr./foil	.47	.40	.35	.59	31
Beverage Cans	.41	.31	.32	.51	31.
Misc. Aluminum	.00	.02	-.00	.01	31.
Food container	2.91	1.09	2.58	3.24	31.
Other	2.31	2.39	1.58	3.03	31.
Bimetal Cans	.08	.42	-.05	.21	31.
Subtotal:	6.18	2.44	5.44	6.92	31.
INORGANICS					
Non-bulk ceramics	.62	1.87	.06	1.19	31.
Misc. Inorganics	1.31	3.21	.34	2.28	31.
Subtotal:	1.93	3.74	.80	3.06	31.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	31.
Non-pestic. poisons	.00	.00	.00	.00	31.
Paint/Solvent/fuel	.53	1.36	.11	.94	31.
Dry Cell batteries	.02	.05	.01	.04	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.02	.03	.01	.03	31.
Misc HHW	.01	.02	.00	.01	31.
Subtotal:	.57	1.42	.14	1.00	31.
RETURNABLES COUNT					
Plastics	2.47	6.28	.57	4.37	31.
Aluminum	5.23	14.17	.95	9.52	31.
Glass	6.81	24.29	-.53	14.16	
Mean Sample Wt:	331.00				

EXHIBIT 4-7

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/LOW DENSITY
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.65	2.64	4.90	6.40	35.
Newsprint	9.18	5.79	7.53	10.82	35.
Office/computer	1.27	1.81	.76	1.79	35.
Magazines/glossy	2.49	1.92	1.94	3.04	35.
Book/phone books	.41	.94	.15	.68	35.
Non-Corrug. CrdBd.	2.61	1.61	2.15	3.07	35.
Mixed	13.59	5.58	12.00	15.17	35.
Subtotal:	35.20	8.35	32.82	37.57	35.
PLASTICS					
Clear HDPE contnr.	.56	.58	.40	.73	35.
Color HDPE contnr.	.63	.81	.40	.86	35.
LDPE	.11	.16	.07	.16	35.
Films & Bags	5.06	2.02	4.49	5.64	35.
Green PET contnr.	.10	.15	.06	.15	35.
Clear PET contnr.	.55	.35	.45	.65	35.
PVC	.11	.21	.06	.17	35.
Polypropylene	.09	.17	.05	.14	35.
Polystyrene	.97	.64	.79	1.15	35.
Misc. Plastics	1.36	1.12	1.04	1.68	35.
Subtotal:	9.55	2.79	8.76	10.35	35.
YARD WASTE					
Grass/Leaves	1.81	3.24	.89	2.73	35.
Brush/prun./stumps	.24	1.39	-.15	.64	35.
Subtotal:	2.06	3.74	.99	3.12	35.
ORGANICS					
Lumber	.89	1.44	.48	1.30	35.
Textiles	5.43	4.01	4.29	6.57	35.
Rubber	.10	.20	.04	.15	35.
Fines	2.97	1.21	2.62	3.31	35.
Diapers	4.20	2.24	3.56	4.84	35.
Foodwaste	14.19	6.37	12.38	16.00	35.
Misc. Organics	9.03	5.58	7.44	10.62	35.
Subtotal:	36.81	7.98	34.54	39.08	35.
GLASS					
Clear container	3.06	1.17	2.73	3.40	35.
Green container	.98	1.04	.68	1.27	35.
Brown container	.77	.90	.51	1.02	35.
Misc. Glass	.03	.17	-.01	.08	35.
Subtotal:	4.84	2.21	4.21	5.47	35.
METALS					
Food Contnr./foil	.56	.33	.46	.65	35.
Beverage Cans	.38	.26	.31	.46	35.
Misc. Aluminum	.10	.39	-.01	.21	35.
Food container	2.53	1.14	2.20	2.85	35.
Other	2.26	2.99	1.40	3.11	35.
Bimetal Cans	.00	.01	.00	.01	35.
Subtotal:	5.83	3.20	4.92	6.74	35.
INORGANICS					
Non-bulk ceramics	.40	.83	.17	.64	35.
Misc. Inorganics	5.17	8.73	2.68	7.65	35.
Subtotal:	5.57	8.70	3.09	8.05	35.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	35.
Non-pestic. poisons	.00	.01	-.00	.01	35.
Paint/Solvent/fuel	.07	.28	-.01	.15	35.
Dry Cell batteries	.04	.12	.01	.08	35.
Car Batteries	.00	.00	-.00	.00	35.
Medical Waste	.02	.04	.01	.03	35.
Misc HHW	.01	.03	-.00	.02	35.
Subtotal:	.14	.31	.05	.23	35.
RETURNABLES COUNT					
Plastics	2.55	4.87	1.16	3.93	35.
Aluminum	4.53	8.42	2.14	6.93	35.
Glass	4.80	12.70	1.19	8.42	35.
Mean Sample Wt:	311.88				

EXHIBIT 4-8

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/MEDIUM DENSITY
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.82	2.73	4.24	5.39	62.
Newsprint	9.16	5.61	7.98	10.34	62.
Office/computer	.32	.56	.20	.44	62.
Magazines/glossy	2.64	2.25	2.17	3.11	62.
Book/phone books	.29	.70	.14	.44	62.
Non-Corrug. CrdBd.	3.22	1.29	2.95	3.49	62.
Mixed	13.94	4.76	12.93	14.94	62.
Subtotal:	34.38	8.02	32.69	36.07	62.
PLASTICS					
Clear HDPE contnr.	.72	.81	.55	.89	62.
Color HDPE contnr.	.65	.38	.57	.73	62.
LDPE	.08	.18	.04	.12	62.
Films & Bags	5.62	2.11	5.18	6.07	62.
Green PET contnr.	.13	.20	.08	.17	62.
Clear PET contnr.	.67	.32	.60	.74	62.
PVC	.12	.19	.08	.15	62.
Polypropylene	.09	.22	.04	.14	62.
Polystyrene	1.14	.61	1.01	1.26	62.
Misc. Plastics	1.26	1.47	.96	1.57	62.
Subtotal:	10.48	2.90	9.86	11.09	62.
YARD WASTE					
Grass/Leaves	1.08	2.87	.48	1.69	62.
Brush/prun./stumps	.71	1.86	.32	1.11	62.
Subtotal:	1.80	3.36	1.09	2.51	62.
ORGANICS					
Lumber	1.74	2.72	1.16	2.31	62.
Textiles	4.73	3.14	4.07	5.39	62.
Rubber	.07	.32	.00	.14	62.
Fines	2.07	1.26	1.81	2.34	62.
Diapers	5.07	3.12	4.41	5.72	62.
Foodwaste	16.49	6.68	15.09	17.90	62.
Misc. Organics	7.14	5.05	6.07	8.20	62.
Subtotal:	37.31	9.38	35.33	39.28	62.
GLASS					
Clear container	4.45	2.13	4.00	4.90	62.
Green container	1.35	1.35	1.07	1.63	62.
Brown container	1.01	.67	.87	1.16	62.
Misc. Glass	.21	.81	.04	.38	62.
Subtotal:	7.02	3.18	6.35	7.69	62.
METALS					
Food Contnr./foil	.73	.95	.53	.93	62.
Beverage Cans	.43	.27	.37	.49	62.
Misc. Aluminum	.00	.04	-.00	.01	62.
Food container	2.52	1.29	2.25	2.79	62.
Other	1.98	2.92	1.37	2.60	62.
Bimetal Cans	.01	.03	.00	.02	62.
Subtotal:	5.68	3.10	5.03	6.33	62.
INORGANICS					
Non-bulk ceramics	.30	1.41	.01	.60	62.
Misc. Inorganics	2.82	4.51	1.87	3.77	62.
Subtotal:	3.12	4.61	2.15	4.09	62.
HAZARDOUS WASTE					
Pesticides	.00	.04	-.01	.01	62.
Non-pestic. poisons	.06	.38	-.02	.14	62.
Paint/Solvent/fuel	.06	.34	-.01	.13	62.
Dry Cell batteries	.04	.16	.01	.08	62.
Car Batteries	.00	.00	.00	.00	62.
Medical Waste	.02	.06	.01	.03	62.
Misc HHW	.03	.21	-.01	.08	62.
Subtotal:	.22	.61	.09	.35	62.
RETURNABLES COUNT					
Plastics	4.03	13.23	1.24	6.81	62.
Aluminum	5.92	13.10	3.16	8.68	62.
Glass	7.03	20.23	2.77	11.30	62.
Mean Sample Wt:	341.61				

EXHIBIT 4-9

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/HIGH DENSITY
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.03	2.22	3.36	4.70	31.
Newsprint	15.57	6.01	13.76	17.39	31.
Office/computer	1.50	3.15	.55	2.46	31.
Magazines/glossy	4.69	3.88	3.52	5.87	31.
Book/phone books	.31	.84	.05	.56	31.
Non-Corrug. CrdBd.	2.69	1.94	2.10	3.27	31.
Mixed	16.05	5.31	14.45	17.66	31.
Subtotal:	44.84	8.16	42.37	47.31	31.
PLASTICS					
Clear HDPE contnr.	.39	.29	.30	.48	31.
Color HDPE contnr.	.60	.55	.43	.76	31.
LDPE	.06	.10	.03	.09	31.
Films & Bags	7.13	2.88	6.26	8.00	31.
Green PET contnr.	.10	.12	.07	.14	31.
Clear PET contnr.	.55	.26	.47	.63	31.
PVC	.19	.21	.13	.25	31.
Polypropylene	.08	.11	.05	.12	31.
Polystyrene	1.25	.79	1.02	1.49	31.
Misc. Plastics	1.04	1.17	.69	1.39	31.
Subtotal:	11.41	3.13	10.46	12.36	31.
YARD WASTE					
Grass/Leaves	.70	2.23	.03	1.38	31.
Brush/prun./stumps	1.16	3.60	.07	2.25	31.
Subtotal:	1.86	4.08	.62	3.09	31.
ORGANICS					
Lumber	1.48	2.03	.87	2.09	31.
Textiles	3.63	2.58	2.85	4.42	31.
Rubber	.06	.14	.01	.10	31.
Fines	1.87	1.04	1.55	2.18	31.
Diapers	2.86	1.60	2.37	3.34	31.
Foodwaste	14.05	5.37	12.43	15.67	31.
Misc. Organics	6.99	2.98	6.09	7.89	31.
Subtotal:	30.94	7.67	28.62	33.26	31.
GLASS					
Clear container	3.04	1.41	2.62	3.47	31.
Green container	.91	.67	.70	1.11	31.
Brown container	.83	1.29	.44	1.22	31.
Misc. Glass	.02	.06	-.00	.03	31.
Subtotal:	4.79	2.00	4.19	5.40	31.
METALS					
Food Contnr./foil	.53	.29	.44	.61	
Beverage Cans	.37	.53	.21	.53	31.
Misc. Aluminum	.02	.07	-.00	.04	31.
Food container	2.02	.76	1.79	2.26	31.
Other	1.70	2.68	.89	2.52	31.
Bimetal Cans	.00	.00	-.00	.00	31.
Subtotal:	4.64	2.72	3.82	5.47	31.
INORGANICS					
Non-bulk ceramics	.26	.65	.07	.46	31.
Misc. Inorganics	1.13	2.26	.45	1.81	31.
Subtotal:	1.39	2.30	.70	2.09	31.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	31.
Non-pestic. poisons	.01	.06	-.01	.03	31.
Paint/Solvent/fuel	.09	.40	-.03	.21	31.
Dry Cell batteries	.01	.03	.00	.02	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.02	.03	.01	.02	31.
Misc HHW	.01	.03	-.00	.01	31.
Subtotal:	.13	.41	.00	.25	31.
RETURNABLES COUNT					
Plastics	2.60	7.72	.27	4.94	31.
Aluminum	4.22	13.85	.03	8.41	31.
Glass	4.39	16.09	-.48	9.26	31.
Mean Sample Wt:	357.04				

EXHIBIT 4-10

WASTE COMPOSITION SUMMARY - HIGH INCOME/LOW DENSITY WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.48	5.66	3.79	7.16	32.
Newsprint	6.07	3.33	5.08	7.07	32.
Office/computer	.36	.77	.13	.59	32.
Magazines/glossy	2.75	1.79	2.21	3.28	32.
Book/phone books	.49	1.32	.10	.88	32.
Non-Corrug. CrdBd.	2.52	1.52	2.07	2.97	32.
Mixed	11.98	4.42	10.67	13.30	32.
Subtotal:	29.65	7.96	27.28	32.02	32.
PLASTICS					
Clear HDPE contnr.	.33	.23	.26	.40	32.
Color HDPE contnr.	.54	.31	.45	.63	32.
LDPE	.02	.04	.01	.03	32.
Films & Bags	4.04	1.41	3.62	4.46	32.
Green PET contnr.	.05	.08	.03	.07	32.
Clear PET contnr.	.43	.21	.37	.49	32.
PVC	.03	.04	.01	.04	32.
Polypropylene	.05	.08	.02	.07	32.
Polystyrene	.96	.43	.83	1.08	32.
Misc. Plastics	.74	.80	.50	.98	32.
Subtotal:	7.17	1.83	6.62	7.71	32.
YARD WASTE					
Grass/Leaves	19.15	19.19	13.44	24.86	32.
Brush/prun./stumps	.89	3.10	-.04	1.81	32.
Subtotal:	20.04	19.28	14.30	25.78	32.
ORGANICS					
Lumber	3.30	3.08	2.38	4.22	32.
Textiles	5.63	4.31	4.35	6.91	32.
Rubber	.02	.06	-.00	.03	32.
Fines	2.34	1.51	1.90	2.79	32.
Diapers	3.93	2.75	3.11	4.74	32.
Foodwaste	9.61	5.18	8.07	11.16	32.
Misc. Organics	6.55	6.45	4.63	8.47	32.
Subtotal:	31.38	11.33	28.00	34.75	32.
GLASS					
Clear container	3.12	1.80	2.58	3.65	32.
Green container	1.18	1.77	.65	1.70	32.
Brown container	.84	.95	.56	1.13	32.
Misc. Glass	.05	.12	.01	.08	32.
Subtotal:	5.18	3.44	4.16	6.21	32.
METALS					
Food Contnr./foil	.52	.63	.33	.71	32.
Beverage Cans	.28	.27	.20	.36	32.
Misc. Aluminum	.07	.22	-.00	.13	32.
Food container	1.78	.89	1.51	2.04	32.
Other	2.39	2.84	1.54	3.23	32.
Bimetal Cans	.00	.00	.00	.00	32.
Subtotal:	5.03	3.49	3.99	6.07	32.
INORGANICS					
Non-bulk ceramics	.07	.16	.03	.12	32.
Misc. Inorganics	1.23	2.13	.60	1.86	32.
Subtotal:	1.30	2.11	.68	1.93	32.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	32.
Non-pestic. poisons	.00	.00	.00	.00	32.
Paint/Solvent/fuel	.06	.26	-.01	.14	32.
Dry Cell batteries	.01	.04	-.00	.02	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.03	.07	.01	.05	32.
Misc HHW	.15	.36	.04	.25	32.
Subtotal:	.25	.55	.09	.41	32.
RETURNABLES COUNT					
Plastics	3.47	8.91	.81	6.12	32.
Aluminum	4.69	17.78	-.61	9.98	32.
Glass	4.66	12.40	.97	8.35	32.
Mean Sample Wt:	314.68				

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EXHIBIT 4-11

WASTE COMPOSITION SUMMARY - HIGH INCOME/MEDIUM DENSITY
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.91	3.23	3.95	5.87	32.
Newsprint	11.08	5.77	9.37	12.80	32.
Office/computer	.11	.37	-.00	.22	32.
Magazines/glossy	3.13	2.06	2.52	3.75	32.
Book/phone books	.24	.47	.10	.38	32.
Non-Corrug. CrdBd.	2.71	3.07	1.79	3.62	32.
Mixed	15.11	5.87	13.37	16.86	32.
Subtotal:	37.30	10.12	34.28	40.31	32.
PLASTICS					
Clear HDPE contnr.	.56	.37	.45	.67	32.
Color HDPE contnr.	.51	.35	.41	.62	32.
LDPE	.03	.05	.02	.05	32.
Films & Bags	6.54	2.88	5.68	7.40	32.
Green PET contnr.	.09	.13	.05	.13	32.
Clear PET contnr.	.52	.25	.45	.60	32.
PVC	.06	.09	.04	.09	32.
Polypropylene	.03	.05	.01	.04	32.
Polystyrene	.98	.51	.83	1.13	32.
Misc. Plastics	1.48	1.47	1.04	1.92	32.
Subtotal:	10.81	3.27	9.83	11.78	32.
YARD WASTE					
Grass/Leaves	.64	3.77	-.48	1.77	32.
Brush/prun./stumps	.31	1.80	-.23	.84	32.
Subtotal:	.95	4.12	-.28	2.18	32.
ORGANICS					
Lumber	1.69	2.45	.97	2.42	32.
Textiles	3.84	2.93	2.96	4.71	32.
Rubber	.00	.01	-.00	.01	32.
Fines	2.32	1.17	1.97	2.66	32.
Diapers	4.25	2.58	3.48	5.02	32.
Foodwaste	15.87	7.00	13.78	17.95	32.
Misc. Organics	7.62	4.89	6.16	9.08	32.
Subtotal:	35.58	8.70	32.99	38.17	32.
GLASS					
Clear container	4.13	2.04	3.52	4.74	32.
Green container	.68	.74	.47	.90	32.
Brown container	.72	.74	.50	.94	32.
Misc. Glass	.09	.32	-.01	.18	32.
Subtotal:	5.62	2.28	4.94	6.29	32.
METALS					
Food Contnr./foil	.66	.40	.54	.78	32.
Beverage Cans	.32	.24	.25	.39	32.
Misc. Aluminum	.07	.24	-.00	.14	32.
Food container	2.35	1.26	1.98	2.73	32.
Other	3.10	2.93	2.23	3.97	32.
Bimetal Cans	.01	.01	.00	.01	32.
Subtotal:	6.51	3.31	5.52	7.49	32.
INORGANICS					
Non-bulk ceramics	.18	.56	.02	.35	32.
Misc. Inorganics	2.78	5.28	1.21	4.35	32.
Subtotal:	2.96	5.23	1.40	4.52	32.
HAZARDOUS WASTE					
Pesticides	.00	.01	-.00	.01	32.
Non-pestic. poisons	.00	.00	.00	.00	32.
Paint/Solvent/fuel	.13	.82	-.12	.37	32.
Dry Cell batteries	.01	.03	.00	.02	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.03	.06	.01	.05	32.
Misc HHW	.12	.29	.03	.20	32.
Subtotal:	.29	.89	.02	.55	32.
RETURNABLES COUNT					
Plastics	3.26	9.08	.56	5.96	32.
Aluminum	3.79	10.44	.69	6.90	32.
Glass	4.49	8.75	1.88	7.09	32.
Mean Sample Wt:	351.80				

EXHIBIT 4-12

WASTE COMPOSITION SUMMARY - HIGH INCOME/HIGH DENSITY
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.82	3.15	3.84	5.79	30.
Newsprint	13.80	6.85	11.68	15.92	30.
Office/computer	.58	1.26	.19	.97	30.
Magazines/glossy	3.74	2.54	2.96	4.53	30.
Book/phone books	.55	1.28	.15	.94	30.
Non-Corrug. CrdBd.	2.65	1.77	2.10	3.20	30.
Mixed	14.60	6.74	12.52	16.69	30.
Subtotal:	40.74	9.10	37.92	43.56	30.
PLASTICS					
Clear HDPE contnr.	.46	.73	.24	.69	30.
Color HDPE contnr.	.58	.38	.46	.69	30.
LDPE	.05	.09	.03	.08	30.
Films & Bags	5.99	3.23	4.99	6.99	30.
Green PET contnr.	.12	.44	-.01	.26	30.
Clear PET contnr.	.57	.35	.46	.68	30.
PVC	.10	.16	.05	.15	30.
Polypropylene	.04	.07	.02	.07	30.
Polystyrene	.85	.61	.66	1.04	30.
Misc. Plastics	.96	.95	.66	1.25	30.
Subtotal:	9.72	3.62	8.60	10.84	30.
YARD WASTE					
Grass/Leaves	4.10	5.44	2.41	5.78	30.
Brush/prun./stumps	1.12	2.60	.31	1.92	30.
Subtotal:	5.21	6.01	3.35	7.07	30.
ORGANICS					
Lumber	1.24	1.82	.68	1.81	30.
Textiles	3.96	2.98	3.04	4.88	30.
Rubber	.00	.01	-.00	.00	30.
Fines	2.20	.93	1.91	2.49	30.
Diapers	2.59	1.80	2.03	3.15	30.
Foodwaste	12.21	5.79	10.42	14.01	30.
Misc. Organics	8.41	5.77	6.62	10.20	30.
Subtotal:	30.62	8.91	27.86	33.38	30.
GLASS					
Clear container	2.72	1.61	2.22	3.22	30.
Green container	.66	.71	.44	.88	30.
Brown container	.62	.56	.45	.80	30.
Misc. Glass	.01	.04	.00	.03	30.
Subtotal:	4.02	1.97	3.41	4.63	30.
METALS					
Food Contnr./foil	.64	.49	.48	.79	30.
Beverage Cans	.44	.40	.31	.56	30.
Misc. Aluminum	.02	.12	-.02	.05	30.
Food container	2.76	1.19	2.39	3.13	30.
Other	1.32	1.53	.85	1.79	30.
Bimetal Cans	.03	.13	-.02	.07	30.
Subtotal:	5.19	1.85	4.62	5.77	30.
INORGANICS					
Non-bulk ceramics	.07	.23	-.00	.14	30.
Misc. Inorganics	4.16	7.66	1.78	6.53	30.
Subtotal:	4.23	7.64	1.86	6.59	30.
HAZARDOUS WASTE					
Pesticides	.01	.03	-.00	.02	30.
Non-pestic. poisons	.01	.02	-.00	.01	30.
Paint/Solvent/fuel	.00	.00	.00	.00	30.
Dry Cell batteries	.03	.11	.00	.07	30.
Car Batteries	.18	.49	.03	.33	30.
Medical Waste	.01	.02	.01	.02	30.
Misc HHW	.04	.13	-.00	.08	30.
Subtotal:	.27	.51	.12	.43	30.
RETURNABLES COUNT					
Plastics	3.06	7.60	.70	5.41	30.
Aluminum	6.29	17.47	.88	11.70	30.
Glass	4.32	16.49	-.79	9.43	30.
Mean Sample Wt:	363.04				

SECTION 5

RESIDENTIAL WASTE ANALYSIS
SPRING 1990

APPROACH

Field sorting and weighing procedures in Spring 1990 were similar to the preceding seasonal sorting events. The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected residential routes served by City forces, based on the waste components present in the disposed refuse. For the Spring 1990 activities, field work for the residential waste sector commenced on Monday, April 23, with sorting activities completed by Saturday, April 28, 1990. As in the preceding seasons, residential waste loads originated from pre-designated City routes, generally described by the project's nine sampling strata. Waste loads were delivered to two work sites (changed to the MTS and the Queens Salt Dome [QNS] during Spring 1990) for sampling, measurement, and weighing activities.

A listing of residential loads delivered to each work site is given in Exhibits 5-1 and 5-2. The number of incoming vehicles ranged from two to six vehicles on a daily basis; each vehicle was identified by originating Department of Sanitation collection district and sector numbers, census tract, and project sampling stratum.

The number of refuse samples obtained and sorted by components per residential stratum is shown in Exhibit 5-3. A total of 309 residential waste samples were sorted and classified according to 45 component categories during the Spring 1990 activities.

WASTE COMPOSITION RESULTS

As described later in Section 6, residential MSW samples did not include bulky waste items such as furniture, appliances, tires, etc. Therefore, it was necessary to augment the waste composition observed during field sampling with bulk item survey data and historical bulk collection data maintained by DOS.

Tabulated composition results for each of the nine residential strata, are presented in Exhibits 5-4 through 5-12, as follows:

Exhibit	Residential Strata
5-4	Low Income/Low Density
5-5	Low Income/Medium Density
5-6	Low Income/High Density
5-7	Medium Income/Low Density
5-8	Medium Income/Medium Density
5-9	Medium Income/High Density
5-10	High Income/Low Density
5-11	High Income/Medium Density
5-12	High Income/High Density

Summary calculations of component percentages in these exhibits show weighted averages, as well as associated standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and sorted by the project's residential strata.

The mean result for each sample strata was then adjusted to include a known weight of bulk items, based on the bulk item survey and DOS records. A summary of the adjusted totals are presented in Exhibit 5-13.

EXHIBIT 5-1

RESIDENTIAL LOADS DELIVERED TO MTS SITE
SPRING 1990

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
04/23/90	1	BX-E-9	91	48	LH
	2	BX-W-8	81	281	HH
	3	MN-W-9	93	233	LH
	4	QN-W-1	13	69	LM
04/24/90	1	MN-W-12	123	281	MH
	2	QN-W-1	15	151	MM
04/25/90	1	BX-W-8	81	281	HH
	2	QN-W-1	15	141	ML
	3	BX-E-9	91	48	LH
	4	BX-E-9	93	208	ML
	5	BX-E-9	94	70	MM
	6	MN-W-9	93	233	LH
04/26/90	1	QN-W-1	13	69	LM
	2	MN-W-12	123	281	MH
04/27/90	1	BX-W-8	81	281	HH
	2	BX-E-9	91	48	LH
	3	MN-W-9	93	233	LH
	4	QN-W-1	15	151	MM
04/28/90	1	QN-W-1	15	141	ML
	2	MN-W-12	123	281	MH
	3	BX-E-9	94	700	MM
	4	BX-E-9	93	208	ML

EXHIBIT 5-2

RESIDENTIAL LOADS DELIVERED TO QUEENS SITE
SPRING 1990

Date	Daily Load No.	District	Sector	Census Tract	Sampling Strata (Income/Density)
04/23/90	1	BK-E-17	174	782	MM
	2	QN-W-3	31	363	LL
	3	QN-W-3	32	289	HH
	4	QN-W-2	21	249	HM
04/24/90	1	QN-W-2	21	263	MM
	2	QN-W-3	31	347	HL
	3	BK-E-14	142	524	HL
04/25/90	1	QN-W-2	22	181	MH
	2	BK-E-14	142	518	HM
	3	BK-E-17	174	782	MM
	4	BK-E-18	181	974	LL
	5	BK-N-5	53	1120	LM
04/26/90	1	QN-W-2	21	249	HM
	2	QN-W-3	31	363	LL
	3	QN-W-3	32	289	HH
04/27/90	1	QN-W-2	21	263	MM
	2	BK-E-14	142	524	HL
	3	BK-E-17	174	782	MM
	4	QN-W-3	31	347	HL
04/28/90	1	QN-W-2	22	181	MH
	2	BK-E-18	181	974	LL
	3	BK-E-14	142	518	HM
	4	BK-N-5	53	1120	LM

EXHIBIT 5-3

SORT SAMPLES OBTAINED BY RESIDENTIAL SAMPLING STRATA
SPRING 1990

Assigned Code (Income/Density)	Residential Sampling Strata	Number of Sort Samples
LL	Low Income/Low Density	30
LM	Low Income/Medium Density	31
LH	Low Income/High Density	32
ML	Medium Income/Low Density	31
MM	Medium Income/Medium Density	62
MH	Medium Income/High Density	30
HL	High Income/Low Density	32
HM	High Income/Medium Density	30
HH	High Income/High Density	31
TOTAL		309

EXHIBIT 5-4

WASTE COMPOSITION SUMMARY - LOW INCOME/LOW DENSITY
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	3.95	1.40	3.51	4.38	30.
Newsprint	9.36	4.63	7.93	10.80	30.
Office/computer	.09	.34	-.01	.20	30.
Magazines/glossy	2.56	1.40	2.13	3.00	30.
Book/phone books	.49	1.32	.08	.90	30.
Non-Corrug. CrdBd.	2.10	.89	1.83	2.38	30.
Mixed	12.81	4.60	11.39	14.24	30.
Subtotal:	31.38	7.39	29.09	33.67	30.
PLASTICS					
Clear HDPE contnr.	.44	.21	.38	.51	30.
Color HDPE contnr.	.55	.30	.45	.64	30.
LDPE	.03	.07	.01	.05	30.
Films & Bags	4.59	1.21	4.21	4.96	30.
Green PET contnr.	.14	.30	.04	.23	30.
Clear PET contnr.	.64	.65	.44	.85	30.
PVC	.07	.15	.02	.12	30.
Polypropylene	.09	.10	.05	.12	30.
Polystyrene	1.01	.44	.88	1.15	30.
Misc. Plastics	1.47	1.01	1.16	1.78	30.
Subtotal:	9.03	2.34	8.30	9.75	30.
YARD WASTE					
Grass/Leaves	5.24	6.94	3.09	7.39	30.
Brush/prun./stumps	1.32	2.85	.44	2.21	30.
Subtotal:	6.56	7.09	4.37	8.76	30.
ORGANICS					
Lumber	2.38	3.07	1.43	3.33	30.
Textiles	4.45	3.01	3.52	5.39	30.
Rubber	.04	.10	.01	.07	30.
Fines	3.12	1.59	2.63	3.62	30.
Diapers	4.24	2.26	3.54	4.94	30.
Foodwaste	12.42	4.32	11.08	13.76	30.
Misc. Organics	10.13	6.44	8.13	12.13	30.
Subtotal:	36.78	7.51	34.45	39.10	30.
GLASS					
Clear container	4.91	1.53	4.44	5.38	30.
Green container	1.26	.87	.99	1.53	30.
Brown container	.86	.78	.61	1.10	30.
Misc. Glass	.01	.05	-.00	.03	30.
Subtotal:	7.04	2.18	6.37	7.71	30.
METALS					
Food Contnr./foil	.62	.65	.42	.82	30.
Beverage Cans	.34	.24	.26	.41	30.
Misc. Aluminum	.08	.27	-.01	.16	30.
Food container	2.19	.75	1.96	2.42	30.
Other	2.17	3.43	1.11	3.24	30.
Bimetal Cans	.00	.01	-.00	.00	30.
Subtotal:	5.40	3.27	4.38	6.41	30.
INORGANICS					
Non-bulk ceramics	.06	.14	.02	.11	30.
Misc. Inorganics	3.43	4.54	2.03	4.84	30.
Subtotal:	3.50	4.54	2.09	4.90	30.
HAZARDOUS WASTE					
Pesticides	.00	.02	-.00	.01	30.
Non-pestic. poisons	.02	.09	-.01	.05	30.
Paint/Solvent/fuel	.25	.97	-.05	.55	30.
Dry Cell batteries	.02	.04	.01	.03	30.
Car Batteries	.00	.00	.00	.00	30.
Medical Waste	.03	.07	.00	.05	30.
Misc HHW	.01	.03	.00	.02	30.
Subtotal:	.33	1.01	.01	.64	30.
RETURNABLES COUNT					
Plastics	4.47	16.83	-.74	9.69	30.
Aluminum	4.51	11.17	1.05	7.97	30
Glass	6.27	14.08	1.91	10.63	30
Mean Sample Wt:	309.95				

EXHIBIT 5-5

WASTE COMPOSITION SUMMARY - LOW INCOME/MEDIUM DENSITY
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.59	3.33	5.58	7.60	31.
Newsprint	6.03	4.26	4.74	7.32	31.
Office/computer	.26	1.04	-.06	.58	31.
Magazines/glossy	2.30	1.78	1.76	2.84	31.
Book/phone books	.29	.76	.06	.52	31.
Non-Corrug. CrdBd.	1.90	1.37	1.48	2.32	31.
Mixed	14.05	5.47	12.40	15.71	31.
Subtotal:	31.43	7.36	29.20	33.65	31.
PLASTICS					
Clear HDPE contnr.	.57	.31	.48	.66	31.
Color HDPE contnr.	.70	.60	.52	.88	31.
LDPE	.12	.21	.06	.18	31.
Films & Bags	5.02	1.60	4.54	5.51	31.
Green PET contnr.	.11	.13	.07	.15	31.
Clear PET contnr.	.49	.31	.40	.59	31.
PVC	.15	.16	.10	.19	31.
Polypropylene	.09	.17	.04	.14	31.
Polystyrene	.93	.45	.79	1.07	31.
Misc. Plastics	1.14	1.17	.79	1.49	31.
Subtotal:	9.33	2.58	8.55	10.11	31.
YARD WASTE					
Grass/Leaves	.52	1.17	.16	.87	31.
Brush/prun./stumps	.61	2.52	-.15	1.38	31.
Subtotal:	1.13	2.65	.33	1.93	31.
ORGANICS					
Lumber	3.89	4.97	2.38	5.39	31.
Textiles	5.27	3.56	4.20	6.35	31.
Rubber	.16	.32	.06	.25	31.
Fines	3.31	1.49	2.86	3.76	31.
Diapers	2.73	1.41	2.30	3.15	31.
Foodwaste	17.99	8.36	15.46	20.52	31.
Misc. Organics	8.24	5.05	6.71	9.77	31.
Subtotal:	41.58	8.79	38.92	44.24	31.
GLASS					
Clear container	3.01	1.85	2.45	3.58	31.
Green container	1.18	1.01	.87	1.48	31.
Brown container	1.02	.92	.75	1.30	31.
Misc. Glass	.12	.34	.02	.22	31.
Subtotal:	5.34	3.29	4.34	6.33	31.
METALS					
Food Contnr./foil	.52	.50	.37	.67	31.
Beverage Cans	.36	.30	.27	.45	31.
Misc. Aluminum	.02	.05	.01	.04	31.
Food container	2.03	1.09	1.70	2.36	31.
Other	2.39	3.97	1.19	3.59	31.
Bimetal Cans	.00	.00	-.00	.00	31.
Subtotal:	5.32	3.99	4.11	6.53	31.
INORGANICS					
Non-bulk ceramics	.06	.15	.02	.11	31.
Misc. Inorganics	5.39	9.82	2.42	8.36	31.
Subtotal:	5.45	9.79	2.49	8.41	31.
HAZARDOUS WASTE					
Pesticides	.01	.02	.00	.01	31.
Non-pestic. poisons	.05	.26	-.03	.12	31.
Paint/Solvent/fuel	.01	.03	.00	.02	31.
Dry Cell batteries	.02	.03	.01	.03	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.02	.05	.00	.03	31.
Misc HHW	.32	1.61	-.16	.81	31.
Subtotal:	.42	1.67	-.08	.93	31.
RETURNABLES COUNT					
Plastics	3.35	7.67	1.03	5.67	31.
Aluminum	5.50	13.28	1.48	9.52	31.
Glass	5.41	13.18	1.42	9.39	31.
Mean Sample Wt:	323.85				

EXHIBIT 5-6

WASTE COMPOSITION SUMMARY - LOW INCOME/HIGH DENSITY
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.32	4.41	3.01	5.64	32.
Newsprint	5.02	3.79	3.89	6.15	32.
Office/computer	.17	.41	.05	.29	32.
Magazines/glossy	2.24	2.04	1.63	2.85	32.
Book/phone books	.97	1.44	.54	1.39	32.
Non-Corrug. CrdBd.	1.92	2.07	1.30	2.53	32.
Mixed	13.51	7.66	11.23	15.79	32.
Subtotal:	28.15	9.13	25.43	30.87	32.
PLASTICS					
Clear HDPE contnr.	.60	.33	.50	.70	32.
Color HDPE contnr.	.58	.40	.46	.70	32.
LDPE	.12	.17	.07	.17	32.
Films & Bags	5.80	1.97	5.21	6.39	32.
Green PET contnr.	.15	.23	.08	.22	32.
Clear PET contnr.	.47	.22	.41	.54	32.
PVC	.16	.20	.10	.22	32.
Polypropylene	.22	.30	.13	.31	32.
Polystyrene	.76	.63	.58	.95	32.
Misc. Plastics	.92	1.31	.53	1.31	32.
Subtotal:	9.78	3.56	8.71	10.84	32.
YARD WASTE					
Grass/Leaves	.61	2.33	-.09	1.30	32.
Brush/prun./stumps	.05	.14	.01	.09	32.
Subtotal:	.66	2.32	-.03	1.35	32.
ORGANICS					
Lumber	3.76	7.08	1.65	5.87	32.
Textiles	6.27	3.63	5.19	7.35	32.
Rubber	.61	3.31	-.38	1.59	32.
Fines	2.93	1.31	2.54	3.32	32.
Diapers	4.49	2.07	3.87	5.10	32.
Foodwaste	20.28	8.29	17.82	22.75	32.
Misc. Organics	7.29	3.59	6.23	8.36	32.
Subtotal:	45.63	9.82	42.71	48.56	32.
GLASS					
Clear container	4.19	2.05	3.58	4.80	32.
Green container	1.61	1.29	1.23	1.99	32.
Brown container	1.23	.99	.94	1.53	32.
Misc. Glass	.23	.46	.09	.36	32.
Subtotal:	7.25	3.17	6.31	8.20	32.
METALS					
Food Contnr./foil	.40	.33	.30	.50	32.
Beverage Cans	.26	.20	.20	.32	32.
Misc. Aluminum	.06	.23	-.01	.13	32.
Food container	2.44	.92	2.16	2.71	32.
Other	1.87	2.33	1.18	2.57	32.
Bimetal Cans	.01	.04	.00	.02	32.
Subtotal:	5.04	2.55	4.29	5.80	32.
INORGANICS					
Non-bulk ceramics	.73	2.10	.11	1.36	32.
Misc. Inorganics	2.45	3.59	1.38	3.51	32.
Subtotal:	3.18	4.00	1.99	4.37	32.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	32.
Non-pestic. poisons	.01	.06	-.01	.03	32.
Paint/Solvent/fuel	.14	.76	-.09	.37	32.
Dry Cell batteries	.02	.04	.01	.03	32.
Car Batteries	.00	.00	.00	.00	32.
Medical Waste	.02	.04	.01	.03	32.
Misc HHW	.12	.36	.01	.22	32.
Subtotal:	.31	.84	.06	.56	32.
RETURNABLES COUNT					
Plastics	4.16	10.86	.93	7.39	32.
Aluminum	3.87	9.51	1.04	6.70	32.
Glass	7.12	11.30	3.75	10.48	32.
Mean Sample Wt:	322.80				

EXHIBIT 5-7

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/LOW DENSITY SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.44	1.73	3.92	4.97	31.
Newsprint	9.09	5.79	7.33	10.84	31.
Office/computer	.52	2.03	-.09	1.14	31.
Magazines/glossy	2.35	3.00	1.44	3.25	31.
Book/phone books	.69	1.15	.35	1.04	31.
Non-Corrug. CrdBd.	2.06	1.56	1.59	2.53	31.
Mixed	13.86	5.39	12.23	15.49	31.
Subtotal:	33.01	7.96	30.61	35.42	31.
PLASTICS					
Clear HDPE contnr.	.50	.43	.37	.63	31.
Color HDPE contnr.	.62	.36	.51	.73	31.
LDPE	.17	.21	.11	.23	31.
Films & Bags	4.67	1.13	4.33	5.02	31.
Green PET contnr.	.15	.36	.04	.26	31.
Clear PET contnr.	.49	.29	.40	.58	31.
PVC	.08	.14	.04	.13	31.
Polypropylene	.26	.48	.11	.40	31.
Polystyrene	1.42	1.01	1.12	1.73	31.
Misc. Plastics	.60	.59	.42	.78	31.
Subtotal:	8.97	2.28	8.28	9.66	31.
YARD WASTE					
Grass/Leaves	1.01	2.30	.31	1.70	31.
Brush/prun./stumps	.82	2.52	.05	1.58	31.
Subtotal:	1.83	3.15	.87	2.78	31.
ORGANICS					
Lumber	3.64	5.02	2.12	5.16	31.
Textiles	4.71	3.36	3.69	5.72	31.
Rubber	.55	1.97	-.05	1.15	31.
Fines	3.01	1.28	2.62	3.40	31.
Diapers	3.90	1.71	3.39	4.42	31.
Foodwaste	14.25	6.55	12.27	16.24	31.
Misc. Organics	9.22	8.21	6.74	11.71	31.
Subtotal:	39.29	8.52	36.71	41.86	31.
GLASS					
Clear container	3.53	1.66	3.03	4.03	31.
Green container	.91	.69	.70	1.12	31.
Brown container	1.22	.89	.96	1.49	31.
Misc. Glass	.20	.41	.08	.32	31.
Subtotal:	5.87	1.98	5.27	6.46	31.
METALS					
Food Contnr./foil	.54	.31	.44	.63	31.
Beverage Cans	.32	.23	.25	.39	31.
Misc. Aluminum	.02	.08	-.01	.04	31.
Food container	2.80	1.97	2.20	3.39	31.
Other	2.41	2.59	1.63	3.19	31.
Bimetal Cans	.01	.02	.00	.02	31.
Subtotal:	6.09	3.14	5.14	7.04	31.
INORGANICS					
Non-bulk ceramics	.11	.34	.01	.21	31.
Misc. Inorganics	4.03	6.22	2.15	5.91	31.
Subtotal:	4.15	6.18	2.28	6.02	31.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	31.
Non-pestic. poisons	.00	.00	.00	.00	31.
Paint/Solvent/fuel	.23	.93	-.05	.51	31.
Dry Cell batteries	.01	.03	-.00	.02	31.
Car Batteries	.27	2.39	-.45	1.00	31.
Medical Waste	.13	.49	-.02	.28	31.
Misc HHW	.16	.44	.03	.29	31.
Subtotal:	.80	2.97	-.10	1.70	31.
RETURNABLES COUNT					
Plastics	2.66	5.19	1.10	4.23	31.
Aluminum	4.56	10.39	1.41	7.70	31.
Glass	4.16	7.87	1.78	6.55	31.
Mean Sample Wt:	271.14				

EXHIBIT 5-8

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/MEDIUM DENSITY
SPRING 1990

Category	WGHTD AVRGE%	ST DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	3.86	2.47	3.34	4.38	62.
Newsprint	7.88	4.56	6.92	8.84	62.
Office/computer	.20	.60	.07	.32	62.
Magazines/glossy	2.00	1.63	1.65	2.34	62.
Book/phone books	.51	1.01	.30	.73	62.
Non-Corrug. CrdBd.	2.05	1.87	1.66	2.44	62.
Mixed	11.92	4.92	10.89	12.96	62.
Subtotal:	28.42	8.06	26.72	30.12	62.
PLASTICS					
Clear HDPE contnr.	.49	.34	.42	.56	62.
Color HDPE contnr.	.57	.34	.50	.65	62.
LDPE	.06	.15	.03	.10	62.
Films & Bags	5.40	1.84	5.01	5.78	62.
Green PET contnr.	.12	.19	.08	.16	62.
Clear PET contnr.	.58	.55	.46	.70	62.
PVC	.10	.15	.07	.14	62.
Polypropylene	.12	.19	.08	.16	62.
Polystyrene	1.09	.97	.88	1.29	62.
Misc. Plastics	1.03	.87	.84	1.21	62.
Subtotal:	9.56	2.74	8.98	10.14	62.
YARD WASTE					
Grass/Leaves	2.07	4.53	1.11	3.02	62.
Brush/prun./stumps	.83	1.73	.47	1.19	62.
Subtotal:	2.90	4.64	1.92	3.87	62.
ORGANICS					
Lumber	4.52	5.12	3.44	5.60	62.
Textiles	6.06	4.53	5.11	7.02	62.
Rubber	.09	.76	-.07	.25	62.
Fines	2.74	1.63	2.40	3.09	62.
Diapers	4.33	2.66	3.77	4.89	62.
Foodwaste	15.38	6.79	13.95	16.81	62.
Misc. Organics	8.29	4.77	7.29	9.29	62.
Subtotal:	41.41	9.31	39.45	43.37	62.
GLASS					
Clear container	3.48	1.68	3.13	3.83	62.
Green container	.92	.94	.72	1.12	62.
Brown container	.67	.56	.55	.79	62.
Misc. Glass	.19	1.01	-.02	.41	62.
Subtotal:	5.27	2.61	4.72	5.82	62.
METALS					
Food Contnr./foil	.48	.27	.42	.54	62.
Beverage Cans	.31	.21	.27	.36	62.
Misc. Aluminum	.04	.19	.00	.08	62.
Food container	2.04	.84	1.86	2.22	62.
Other	2.31	2.30	1.83	2.80	62.
Bimetal Cans	.01	.02	.00	.01	62.
Subtotal:	5.20	2.43	4.69	5.71	62.
INORGANICS					
Non-bulk ceramics	.25	.66	.11	.39	62.
Misc. Inorganics	6.64	9.16	4.71	8.57	62.
Subtotal:	6.89	9.14	4.96	8.81	62.
HAZARDOUS WASTE					
Pesticides	.01	.04	-.00	.02	62.
Non-pestic. poisons	.01	.05	-.00	.02	62.
Paint/Solvent/fuel	.25	1.31	-.03	.52	62.
Dry Cell batteries	.03	.08	.02	.05	62.
Car Batteries	.00	.00	.00	.00	62.
Medical Waste	.02	.07	.01	.04	62.
Misc HHW	.04	.12	.02	.07	62.
Subtotal:	.36	1.32	.08	.64	62.
RETURNABLES COUNT					
Plastics	3.77	11.93	1.26	6.29	62.
Aluminum	4.40	9.87	2.32	6.48	62.
Glass	4.94	11.65	2.49	7.39	62.
Mean Sample Wt:	357.24				

EXHIBIT 5-9

WASTE COMPOSITION SUMMARY - MEDIUM INCOME/HIGH DENSITY
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.83	3.88	3.63	6.04	30.
Newsprint	13.41	7.54	11.07	15.75	30.
Office/computer	.48	.72	.25	.70	30.
Magazines/glossy	4.36	3.47	3.29	5.44	30.
Book/phone books	.56	1.63	.06	1.07	30.
Non-Corrug. CrdBd.	1.93	1.74	1.39	2.47	30.
Mixed	16.44	8.50	13.80	19.07	30.
Subtotal:	42.01	12.31	38.20	45.82	30.
PLASTICS					
Clear HDPE contnr.	.38	.24	.30	.45	30.
Color HDPE contnr.	.48	.50	.33	.64	30.
LDPE	.08	.11	.05	.12	30.
Films & Bags	5.72	2.19	5.04	6.40	30.
Green PET contnr.	.09	.15	.05	.14	30.
Clear PET contnr.	.32	.24	.24	.39	30.
PVC	.08	.11	.04	.11	30.
Polypropylene	.11	.18	.06	.17	30.
Polystyrene	1.32	.93	1.04	1.61	30.
Misc. Plastics	.95	1.10	.61	1.29	30.
Subtotal:	9.54	2.96	8.62	10.45	30.
YARD WASTE					
Grass/Leaves	1.91	5.35	.25	3.57	30.
Brush/prun./stumps	1.17	2.65	.35	1.99	30.
Subtotal:	3.08	5.99	1.22	4.93	30.
ORGANICS					
Lumber	2.41	5.70	.64	4.17	30.
Textiles	4.61	4.14	3.33	5.90	30.
Rubber	.08	.24	.01	.15	30.
Fines	3.36	2.00	2.74	3.98	30.
Diapers	2.73	1.98	2.12	3.35	30.
Foodwaste	12.01	7.35	9.73	14.29	30.
Misc. Organics	9.19	7.44	6.88	11.49	30.
Subtotal:	34.39	10.11	31.26	37.52	30.
GLASS					
Clear container	2.70	1.44	2.26	3.15	30.
Green container	.71	.63	.51	.90	30.
Brown container	.53	.60	.34	.71	30.
Misc. Glass	.43	.85	.17	.69	30.
Subtotal:	4.36	2.05	3.73	5.00	30.
METALS					
Food Contnr./foil	.49	.34	.38	.59	30.
Beverage Cans	.25	.21	.19	.32	30.
Misc. Aluminum	.03	.09	.00	.06	30.
Food container	2.18	1.06	1.85	2.51	30.
Other	1.90	1.98	1.29	2.51	30.
Bimetal Cans	.01	.04	-.00	.02	30.
Subtotal:	4.86	2.36	4.13	5.59	30.
INORGANICS					
Non-bulk ceramics	.10	.42	-.03	.23	30.
Misc. Inorganics	1.34	4.60	-.08	2.77	30.
Subtotal:	1.44	4.58	.02	2.86	30.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	30.
Non-pestic. poisons	.00	.01	-.00	.01	30.
Paint/Solvent/fuel	.16	1.00	-.15	.47	30.
Dry Cell batteries	.01	.03	-.00	.02	30.
Car Batteries	.00	.00	.00	.00	30.
Medical Waste	.01	.01	.00	.01	30.
Misc HHW	.15	.62	-.05	.34	30.
Subtotal:	.32	1.17	-.04	.69	30.
RETURNABLES COUNT					
Plastics	2.93	9.90	.14	6.00	30
Aluminum	3.90	10.53	.64	7.17	30
Glass	3.69	10.02	.59	6.80	30
Mean Sample Wt:	317.59				

EXHIBIT 5-10

WASTE COMPOSITION SUMMARY - HIGH INCOME/LOW DENSITY
SPRING 1990

Category	WGHTI AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.91	3.26	3.94	5.89	32.
Newsprint	8.55	4.76	7.13	9.96	32.
Office/computer	.06	.33	-.03	.16	32.
Magazines/glossy	2.80	2.90	1.93	3.66	32.
Book/phone books	.18	.32	.08	.27	32.
Non-Corrug. CrdBd.	2.12	1.27	1.74	2.50	32.
Mixed	11.09	2.90	10.22	11.95	32.
Subtotal:	29.71	8.08	27.30	32.12	32.
PLASTICS					
Clear HDPE contnr.	.36	.31	.26	.45	32.
Color HDPE contnr.	.53	.48	.39	.67	32.
LDPE	.03	.10	.00	.06	32.
Films & Bags	4.26	1.65	3.76	4.75	32.
Green PET contnr.	.09	.16	.04	.13	32.
Clear PET contnr.	.32	.19	.26	.37	32.
PVC	.11	.19	.05	.16	32.
Polypropylene	.06	.13	.02	.10	32.
Polystyrene	.73	.36	.62	.84	32.
Misc. Plastics	1.87	2.43	1.15	2.59	32.
Subtotal:	8.34	3.73	7.23	9.45	32.
YARD WASTE					
Grass/Leaves	5.80	7.41	3.60	8.01	32.
Brush/prun./stumps	3.03	5.89	1.28	4.79	32.
Subtotal:	8.84	8.79	6.22	11.46	32.
ORGANICS					
Lumber	4.14	5.06	2.63	5.64	32.
Textiles	4.93	3.79	3.81	6.06	32.
Rubber	.03	.10	-.00	.05	32.
Fines	2.96	1.73	2.45	3.48	32.
Diapers	3.81	2.51	3.06	4.55	32.
Foodwaste	11.80	5.28	10.23	13.37	32.
Misc. Organics	11.35	9.77	8.45	14.26	32.
Subtotal:	39.01	9.91	36.06	41.96	32.
GLASS					
Clear container	3.32	1.77	2.79	3.85	32.
Green container	.88	1.20	.53	1.24	32.
Brown container	.88	.84	.63	1.13	32.
Misc. Glass	.03	.08	.01	.06	32.
Subtotal:	5.11	2.60	4.34	5.89	32.
METALS					
Food Contnr./foil	.52	.37	.41	.63	32.
Beverage Cans	.33	.26	.25	.41	32.
Misc. Aluminum	.02	.10	-.01	.05	32.
Food container	1.66	.99	1.37	1.96	32.
Other	4.28	5.71	2.58	5.98	32.
Bimetal Cans	.00	.00	.00	.00	32.
Subtotal:	6.81	5.83	5.08	8.55	32.
INORGANICS					
Non-bulk ceramics	.05	.12	.01	.08	32.
Misc. Inorganics	1.25	2.78	.42	2.08	32.
Subtotal:	1.30	2.77	.47	2.12	32.
HAZARDOUS WASTE					
Pesticides	.03	.08	.00	.05	32.
Non-pestic. poisons	.00	.00	.00	.00	32.
Paint/Solvent/fuel	.09	.27	.01	.18	32.
Dry Cell batteries	.04	.07	.02	.06	32.
Car Batteries	.57	2.97	-.31	1.45	32.
Medical Waste	.02	.07	-.00	.04	32.
Misc HHW	.13	.41	.01	.25	32.
Subtotal:	.88	3.08	-.04	1.79	32.
RETURNABLES COUNT					
Plastics	2.93	7.62	.66	5.19	32.
Aluminum	3.89	11.66	.42	7.36	32.
Glass	4.93	11.29	1.57	8.29	32.
Mean Sample Wt:	303.13				

EXHIBIT 5-11

WASTE COMPOSITION SUMMARY - HIGH INCOME/MEDIUM DENSITY SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.97	3.21	4.98	6.97	30.
Newsprint	11.72	6.91	9.58	13.86	30.
Office/computer	.34	2.30	-.37	1.06	30.
Magazines/glossy	1.74	1.83	1.17	2.31	30.
Book/phone books	.41	.81	.16	.66	30.
Non-Corrug. CrdBd.	2.35	1.79	1.80	2.91	30.
Mixed	11.18	4.68	9.73	12.63	30.
Subtotal:	33.73	10.23	30.56	36.90	30.
PLASTICS					
Clear HDPE contnr.	.40	.29	.31	.49	30.
Color HDPE contnr.	.48	.38	.37	.60	30.
LDPE	.01	.02	-.00	.01	30.
Films & Bags	5.21	2.24	4.52	5.91	30.
Green PET contnr.	.12	.17	.07	.17	30.
Clear PET contnr.	.57	.69	.35	.78	30.
PVC	.06	.16	.01	.11	30.
Polypropylene	.08	.13	.04	.12	30.
Polystyrene	.95	.78	.71	1.19	30.
Misc. Plastics	1.55	1.55	1.07	2.03	30.
Subtotal:	9.43	3.13	8.46	10.40	30.
YARD WASTE					
Grass/Leaves	1.25	3.22	.25	2.25	30.
Brush/prun./stumps	.15	.46	.00	.29	30.
Subtotal:	1.40	3.22	.40	2.39	30.
ORGANICS					
Lumber	3.00	3.36	1.96	4.05	30.
Textiles	6.04	4.70	4.59	7.50	30.
Rubber	.07	.19	.01	.13	30.
Fines	2.35	1.37	1.92	2.77	30.
Diapers	4.87	2.99	3.94	5.80	30.
Foodwaste	14.93	6.11	13.04	16.83	30.
Misc. Organics	6.59	3.15	5.61	7.57	30.
Subtotal:	37.86	7.93	35.40	40.32	30.
GLASS					
Clear container	3.78	1.99	3.17	4.40	30.
Green container	.80	.88	.53	1.07	30.
Brown container	.75	.74	.52	.97	30.
Misc. Glass	.73	3.36	-.31	1.77	30.
Subtotal:	6.06	4.09	4.79	7.33	30.
METALS					
Food Contnr./foil	.49	.33	.39	.59	30.
Beverage Cans	.27	.26	.19	.35	30.
Misc. Aluminum	.13	.54	-.04	.30	30.
Food container	2.11	.95	1.82	2.41	30.
Other	3.48	3.32	2.45	4.51	30.
Bimetal Cans	.00	.00	.00	.00	30.
Subtotal:	6.48	3.16	5.50	7.46	30.
INORGANICS					
Non-bulk ceramics	.43	1.20	.05	.80	30.
Misc. Inorganics	4.45	9.15	1.62	7.29	30.
Subtotal:	4.88	9.63	1.90	7.86	30.
HAZARDOUS WASTE					
Pesticides	.00	.02	-.00	.01	30.
Non-pestic. poisons	.00	.00	.00	.00	30.
Paint/Solvent/fuel	.09	.27	.01	.18	30.
Dry Cell batteries	.02	.05	.01	.03	30.
Car Batteries	.00	.00	.00	.00	30.
Medical Waste	.02	.03	.01	.03	30.
Misc HHW	.04	.12	.00	.08	30.
Subtotal:	.17	.31	.08	.27	30.
RETURNABLES COUNT					
Plastics	3.19	8.34	.61	5.78	30.
Aluminum	3.79	10.77	.45	7.13	30.
Glass	5.20	12.20	1.42	8.98	30.
Mean Sample Wt:	317.57				

EXHIBIT 5-12

WASTE COMPOSITION SUMMARY - HIGH INCOME/HIGH DENSITY SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.10	2.78	3.26	4.94	31.
Newsprint	14.96	6.69	12.94	16.98	31.
Office/computer	.57	1.12	.23	.90	31.
Magazines/glossy	3.64	1.89	3.07	4.21	31.
Book/phone books	1.60	2.44	.86	2.34	31.
Non-Corrug. CrdBd.	2.01	1.25	1.63	2.38	31.
Mixed	15.09	6.63	13.08	17.09	31.
Subtotal:	41.96	9.26	39.15	44.76	31.
PLASTICS					
Clear HDPE contnr.	.51	.49	.37	.66	31.
Color HDPE contnr.	.61	.50	.46	.76	31.
LDPE	.11	.17	.06	.16	31.
Films & Bags	6.28	1.86	5.72	6.84	31.
Green PET contnr.	.14	.16	.09	.19	31.
Clear PET contnr.	.47	.33	.37	.57	31.
PVC	.13	.17	.08	.18	31.
Polypropylene	.20	.28	.11	.28	31.
Polystyrene	.98	.62	.79	1.17	31.
Misc. Plastics	.92	1.01	.61	1.22	31.
Subtotal:	10.34	2.76	9.51	11.18	31.
YARD WASTE					
Grass/Leaves	2.59	7.42	.34	4.83	31.
Brush/prun./stumps	.34	1.63	-.16	.83	31.
Subtotal:	2.92	7.49	.66	5.19	31.
ORGANICS					
Lumber	1.30	2.12	.66	1.94	31.
Textiles	5.31	3.92	4.12	6.49	31.
Rubber	.02	.05	.00	.03	31.
Fines	2.70	2.31	2.00	3.40	31.
Diapers	2.86	2.14	2.21	3.51	31.
Foodwaste	12.50	6.76	10.45	14.54	31.
Misc. Organics	6.59	4.62	5.19	7.99	31.
Subtotal:	31.27	7.60	28.97	33.57	31.
GLASS					
Clear container	2.90	1.60	2.41	3.38	31.
Green container	.62	.74	.40	.84	31.
Brown container	.65	.63	.46	.84	31.
Misc. Glass	.16	.37	.05	.27	31.
Subtotal:	4.33	2.34	3.63	5.04	31.
METALS					
Food Contnr./foil	.55	.26	.47	.63	31.
Beverage Cans	.30	.23	.23	.37	31.
Misc. Aluminum	.00	.01	-.00	.00	31.
Food container	2.07	.72	1.86	2.29	31.
Other	.95	.89	.68	1.22	31.
Bimetal Cans	.01	.02	.00	.01	31.
Subtotal:	3.88	1.07	3.56	4.21	31.
INORGANICS					
Non-bulk ceramics	.12	.40	-.00	.24	31.
Misc. Inorganics	4.98	8.39	2.44	7.52	31.
Subtotal:	5.10	8.37	2.56	7.63	31.
HAZARDOUS WASTE					
Pesticides	.01	.04	-.01	.02	31.
Non-pestic. poisons	.01	.04	-.00	.02	31.
Paint/Solvent/fuel	.05	.16	-.00	.09	31.
Dry Cell batteries	.01	.03	.00	.03	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.03	.06	.02	.05	31.
Misc HHW	.09	.45	-.05	.22	31.
Subtotal:	.20	.68	-.01	.40	31.
RETURNABLES COUNT					
Plastics	3.02	6.11	1.17	4.87	31.
Aluminum	4.14	7.83	1.77	6.51	31.
Glass	3.19	6.35	1.27	5.11	31.
Mean Sample Wt:	283.03				

SECTION 6

BULK ITEM SURVEY AND VEHICLE WEIGH PROGRAM

APPROACH

Each incoming residential refuse vehicle was weighed, discharged onto the tipping floor at each sorting site, and surveyed for the presence of bulk items within the entire discharged load. Exhibits 6-1, 6-3, 6-5, and 6-7 indicate the number and weight of residential vehicle loads that were surveyed and observed during each sort season. These exhibits also provide a summary of incoming waste amounts by weight and by the project's residential strata.

The bulk item survey consisted of the identification, counting, and weighing of bulk items found within the residential vehicle loads. A bulk item was defined as specific waste items that could not fit inside a closed 30-gallon trash can (i.e., with its lid on). Bulk items were identified by 15 general categories, including various types of furniture and appliances, wood, tires, carpets, etc.

The results of the bulk item survey provide estimates of the presence of discarded bulk items in the residential waste stream. Combined with DOS records of bulky waste pickups outside of the normal residential MSW collection program, these data provide a basis for estimating overall bulk item generation rates by the residential strata.

BULK ITEM SURVEY RESULTS

Tabulated bulk item composition results for each season are presented in Exhibits 6-2, 6-4, 6-6, and 6-8, for the Summer, Fall, Winter, and Spring sorting events, respectively. These results provide the mean, standard deviation, and lower and upper confidence intervals (95 percent level) derived for the various bulk item categories identified in the field. In addition, these exhibits indicate the number of residential loads observed per season. Other calculations include the average weight of bulk items per load, the average net weight of each vehicle load, and the average bulk item composition (percent by weight) within the residential waste stream.

Bulk items ranged from 2.36 to 3.24 percent of the residential waste stream. Major categories included upholstered furniture, miscellaneous items, rugs/carpets/textiles, and mixed bulk items.

EXHIBIT 6-1

SUMMARY OF RESIDENTIAL VEHICLE LOADS BY WEIGHT
SUMMER 1989

Strata Income/Density	Number of Incoming Vehicles	Average Net Weight of Refuse Per Vehicle (lbs)
Low/Low	4	5,290
Low/Medium	4	12,303
Low/High	6	15,045
Medium/Low	4	4,938
Medium/Medium	9	10,887
Medium/High	5	7,496
High/Low	4	6,815
High/Medium	4	10,830
High/High	5	11,696
TOTAL	45 Vehicles	222.2 Tons

EXHIBIT 6-2

BULK ITEM SURVEY SUMMARY
SUMMER 1989

Material %	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	14.45	19.67	9.55	19.35	45.00
Steel	4.92	9.70	2.50	7.34	45.00
Aluminum	.86	2.32	.28	1.44	45.00
Wood	6.59	17.24	2.30	10.89	45.00
Mixed	3.28	12.38	.20	6.37	45.00
Stoves	1.96	6.85	.25	3.67	45.00
Refrigerators	7.36	16.80	3.18	11.55	45.00
Dishwashers	.33	2.24	-.23	.89	45.00
Others	3.21	7.58	1.32	5.09	45.00
Ferrous	5.29	8.14	3.26	7.32	45.00
Non-ferrous	5.99	16.22	1.95	10.03	45.00
Misc. wood	12.32	16.40	8.24	16.41	45.00
Rugs/carpets/textile	11.38	18.67	6.73	16.03	45.00
Tires	7.16	15.49	3.30	11.02	45.00
Miscellaneous	14.90	21.78	9.47	20.32	45.00
Total Weight	100.00	.00	100.00	100.00	

Average Weight of Bulk Items Found Per Vehicle Load = 320.23
Average Net Weight of Refuse Per Vehicle Load = 9886.89
Average Bulk Item Composition of Residential Waste Stream = 3.24%

EXHIBIT 6-3

SUMMARY OF RESIDENTIAL VEHICLE LOADS BY WEIGHT
FALL 1989

Strata Income/Density	Number of Incoming Vehicles	Average Net Weight of Refuse Per Vehicle (lbs)
Low/Low	4	6,990
Low/Medium	5	9,150
Low/High	6	16,457
Medium/Low	4	3,945
Medium/Medium	9	11,118
Medium/High	5	7,940
High/Low	4	6,020
High/Medium	4	9,695
High/High	5	11,562
TOTAL	46 Vehicles	224.3 Tons

EXHIBIT 6-4

BULK ITEM SURVEY SUMMARY
FALL 1989

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	6.76	13.97	3.32	10.20	46.00
Steel	5.20	10.12	2.71	7.70	46.00
Aluminum	1.00	2.81	.31	1.70	46.00
Wood	4.18	8.87	2.00	6.37	46.00
Mixed	12.42	19.71	7.56	17.27	46.00
Stoves	4.72	10.82	2.06	7.39	46.00
Refrigerators	8.29	20.64	3.21	13.38	46.00
Dishwashers	.00	.00	.00	.00	46.00
Others	9.43	20.81	4.30	14.56	46.00
Ferrous	9.57	13.61	6.22	12.92	46.00
Non-ferrous	.94	3.40	.10	1.78	46.00
Misc. wood	11.45	19.81	6.57	16.33	46.00
Rugs/carpets/textile	8.73	13.44	5.42	12.04	46.00
Tires	.79	2.58	.16	1.43	46.00
Miscellaneous	16.51	22.98	10.85	22.17	46.00
Total Weight	100.00	38.75	90.45	109.55	46.00

Average Weight of Bulk Items Found Per Vehicle Load = 265.46
Average Net Weight of Refuse Per Vehicle Load = 9753.48
Average Bulk Item Composition of Residential Waste Stream = 2.72%

EXHIBIT 6-5

SUMMARY OF RESIDENTIAL VEHICLE LOADS BY WEIGHT
WINTER 1990

Strata Income/Density	Number of Incoming Vehicles	Average Net Weight of Refuse Per Vehicle (lbs)
Low/Low	4	5,040
Low/Medium	4	10,420
Low/High	6	12,707
Medium/Low	4	5,230
Medium/Medium	9	10,420
Medium/High	5	7,164
High/Low	4	6,890
High/Medium	4	8,025
High/High	5	10,116
TOTAL	45 Vehicles	199.4 Tons

EXHIBIT 6-6

BULK ITEM SURVEY SUMMARY
WINTER 1990

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	6.92	11.15	4.14	9.69	45.00
Steel	4.11	8.44	2.00	6.21	45.00
Aluminum	5.11	15.51	1.25	8.98	45.00
Wood	3.10	4.98	1.86	4.34	45.00
Mixed	13.42	18.60	8.79	18.06	45.00
Stoves	2.30	8.04	.29	4.30	45.00
Refrigerators	3.41	9.85	.96	5.87	45.00
Dishwashers	.00	.00	.00	.00	45.00
Others	7.37	14.27	3.81	10.92	45.00
Ferrous	9.19	11.78	6.25	12.12	45.00
Non-ferrous	1.61	3.22	.81	2.42	45.00
Misc. wood	11.52	15.17	7.75	15.30	45.00
Rugs/carpets/textile	17.97	25.87	11.53	24.42	45.00
Tires	4.82	11.18	2.03	7.60	45.00
Miscellaneous	9.15	19.72	4.24	14.06	45.00
Total Weight	100.00	29.11	92.75	107.25	45.00

Average Weight of Bulk Items Found Per Vehicle Load = 273.11
Average Net Weight of Refuse Per Vehicle Load = 8863.11
Average Bulk Item Composition of Residential Waste Stream = 3.08%

EXHIBIT 6-7

SUMMARY OF RESIDENTIAL VEHICLE LOADS BY WEIGHT
SPRING 1990

Strata Income/Density	Number of Incoming Vehicles	Average Net Weight of Refuse Per Vehicle (lbs)
Low/Low	4	5,055
Low/Medium	4	13,770
Low/High	6	13,367
Medium/Low	4	6,000
Medium/Medium	9	10,538
Medium/High	5	8,248
High/Low	4	6,585
High/Medium	4	9,215
High/High	5	11,236
TOTAL	45 Vehicles	217.5 Tons

EXHIBIT 6-8

BULK ITEM SURVEY SUMMARY
SPRING 1990

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	11.59	24.93	5.38	17.80	45.00
Steel	9.93	21.40	4.60	15.26	45.00
Aluminum	.13	.57	-.01	.27	45.00
Wood	5.95	13.02	2.71	9.20	45.00
Mixed	13.40	19.42	8.57	18.24	45.00
Stoves	2.41	10.16	-.12	4.94	45.00
Refrigerators	3.48	11.51	.62	6.35	45.00
Dishwashers	.00	.00	.00	.00	45.00
Others	9.67	19.00	4.94	14.40	45.00
Ferrous	10.66	13.19	7.38	13.95	45.00
Non-ferrous	.83	2.13	.30	1.36	45.00
Misc. wood	10.09	18.51	5.48	14.70	45.00
Rugs/carpets/textile	10.13	17.40	5.80	14.47	45.00
Tires	6.02	12.97	2.79	9.25	45.00
Miscellaneous	5.70	16.35	1.63	9.77	45.00
Total Weight	100.00	32.14	91.99	108.01	45.00

Average Weight of Bulk Items Found Per Vehicle Load = 228.09
Average Net Weight of Refuse Per Vehicle Load = 9665.78
Average Bulk Item Composition of Residential Waste Stream = 2.36%

SECTION 7

COMPARISON OF COMPOSITION BY SELECTED RESIDENTIAL STRATA

The composition of the residential waste stream differed by the project's residential strata. This section provides general trends and observations of the composition data specific to variation by residential strata.

DISCUSSION

Some grouping of the data has been necessary to make reasonable comparisons within certain categories. For example, comparisons were made by grouping together density strata to evaluate the effect of income on waste composition as follows:

Income Group	Grouping of Strata
LOW	Low Income, Low Density Low Income, Medium Density Low Income, High Density
MEDIUM	Medium Income, Low Density Medium Income, Medium Density Medium Income, High Density
HIGH	High Income, Low Density High Income, Medium Density High Income, High Density

Comparison by waste components was performed by combining the 45 individual waste components into seven general waste fractions, as detailed below. The Household Hazardous Waste (HHW) fraction and Bulk Items were not included in this comparison.

- Paper — The cumulative percentage of the seven Paper sort categories.
- Plastic — The cumulative percentage of the 10 Plastic sort categories.

• Yard Waste	The cumulative percentage of the two Yard Waste sort categories.
• Organics	The cumulative percentage of the seven Organic sort categories.
• Glass	The cumulative percentage of the four Glass sort categories.
• Metal	The cumulative percentage of three Aluminum and three Other Metal sort categories.
• Inorganics	The cumulative percentage of both Inorganic sort categories.

<u>Waste Composition Summaries</u>

Waste composition summaries were developed for comparison purposes by the four seasonal events, as given in Exhibits 7-1, 7-3, 7-5, and 7-7. These exhibits compare the average compositions of residential wastes by the seven general fractions for the four seasons. Values in these exhibits are rounded to the nearest 1 percent (or nearest tenth, if less than 1 half of 1 percent).

<u>Component Ranges</u>

Exhibits 7-2, 7-4, 7-6, and 7-8 provide comparisons of the nine residential strata by the seven general waste fractions. The composition values are arithmetic means to the nearest 1 percent or nearest tenth, if less than 1 half of 1 percent. These exhibits emphasize the high and low values observed by component, as well as the major sorting category found within the general waste fractions. For example, Paper during the summer season, stratum MH (Medium Income, High Density) generated the largest portion of paper for all residential strata at 45 percent (Exhibit 7-2). Stratum LM (Low Income, Medium Density) generated the least proportion of Paper at 27 percent by weight.

Comparisons between "Strata" Waste Compositions

General Observations

Comparison of similar strata may be approached using several methodologies. One may be to consider the income distribution of the population evident in a particular type of residential area. Each level of income (with few exceptions), are inhabited primarily by individuals with a certain income dispersion. A second method for stratifying residential areas include the density and the geographical location of each strata. For example, fluctuations in the quantity of yard waste, generated by a particular residential stratum, are not usually determined by specific demographics. Rather, geographical location will determine whether a residence is likely to have open land, the prime source for this fraction. All of these factors can contribute to variance in the composition of a particular strata's waste.

Comparisons Between "Low Income" Waste Compositions

Paper:

1. The LL strata generally had the highest percentage of paper, with a range of 29 to 42 percent. The primary components (in order) for every sorting season were Mixed Paper, Newsprint, and Corrugated/Kraft Paper.

2. The LH strata generally maintained the lowest percentage of paper with a range of 28 to 30 percent.

3. The Fall season generated the highest percentage of paper with a range of 30 to 42 percent, while the other three seasons exhibited a combined range of 27 to 35 percent.

Plastic:

1. The LH strata maintained or equaled the highest percentage of Plastic in the waste stream for all seasons with a range of 10 to 12 percent. The majority component for this fraction was Films and Bags.

2. The LL strata generally had the lowest percentage of Plastic in the waste stream with a range of 8 to 9 percent. Films and Bags was the primary component.

3. Seasonal variation was not significant.

Yard Waste:

1. LL maintained the highest composition of Yard Waste during all four sort seasons with a range of 6 to 11 percent. The other categories had a range of less than 0.1 to 4 percent of Yard Waste throughout the project year.

2. The percentage of Yard Waste generally was found in larger quantities in the "Low Density" strata than the "High Density" strata.

3. Seasonal variation was insignificant for the Low Income stratum.

Organic:

1. The LH stratum had or equaled the highest percentage of Organics in the waste stream for all four seasons with a range of 43 to 46 percent. The majority components in descending order were Food Waste, Miscellaneous Organics, and Textiles.

2. The lowest percentage of Organic material was observed in the LL stratum with a range of 33 to 37 percent. The majority components were Food Waste, Miscellaneous Organics, and Textiles.

3. No significant seasonal variation was observed

Glass:

1. Generally, the percentage of Glass was higher for the LL and LH strata. A range of 5 to 8 percent was observed in both of these residential types, while the primary component was consistently Clear Glass.

2. The LM stratum generally had the lowest composition of Glass with a range of 4 to 5 percent. This category's primary component was Clear Glass.

3. No seasonal variation was observed

Metal:

1. The category's percent composition generally was constant during all four sort seasons. No one stratum consistently had a higher percentage than the other two. The primary components for all three strata were Food Containers and Other Ferrous.

2. Seasonal variation was insignificant

Inorganic:

1 The LM stratum generally had or equaled the greatest amount of Inorganic during each season. With a range of 2 to 7 percent, the primary component was Miscellaneous Inorganics.

2. The highest Inorganics percentages were present in the Spring and Summer sorting efforts with a range of 3 to 7 percent. During the Fall and Winter, a range of less than 0.1 to 3 percent was observed.

Comparison Between "Medium Income" Waste Compositions

Paper:

The waste stream of the MH stratum consistently maintained the highest percentage of paper throughout the entire study, with a range of 42 to 45 percent. The primary components of this stratum were Newsprint, Mixed, and Corrugated/Kraft.

2. The ML stratum maintained the second greatest paper percentage with a range of 33 to 38 percent. Mixed Paper, Newsprint, and Corrugated/Kraft were the primary components in this waste stream.

3. The Spring sort season exhibited the smallest percentage of Paper with range of 28 to 42 percent for all three strata, while the remaining three sort seasons had a combined range of 33 to 45 percent.

Plastic:

1. The MH stratum consistently had or equaled the highest percentage of Plastic for all four seasons sampled. The composition percentage ranged

from 9 to 11 percent with the primary components being Films and Bags and Miscellaneous Plastics.

2. Seasonal variation was not significant.

Yard Waste:

1. The highest percentage of Yard Waste was shown in the ML stratum with a range of 2 to 8 percent observed during the study.

2. The Fall season had the highest Yard Waste composition with the ML, MM, and MH strata averaging 8, 3, and 7 percent, respectively, while the remaining three seasons never achieved an average higher than 3 percent

Organic:

1. The MM stratum during all four sort seasons maintained or equaled the highest percentage of Organics. The Organics composition for this strata was consistently found in the range of 37 to 43 percent, while the other two strata ranged between 27 to 39 percent. The two major components were Food Waste and Miscellaneous Organics.

2. An increased percentage of Organics generally was observed in the Spring and Summer months over the Fall and Winter sort seasons. Spring and Summer ranged from 34 to 43 percent, while the Fall and Winter ranged from 27 to 38 percent.

Glass:

1. The lowest percentage composition of Glass was observed in the MH stratum with a range of 4 to 5 percent, while the ML and MM strata were observed with a combined range of 5 to 7 percent.

2. The primary component of the Glass category was Clear Glass with a range of 2.4 to 4.5 percent for all strata.

3. Seasonal variation was not significant

Metal:

1. The Metals composition in the waste stream was consistent for al sort seasons and strata with a range of 4 to 6 percent.

2. The major components of the Metals category were Food Containers and Other Ferrous.

3. Seasonal variation was not significant.

Inorganic:

1. The percentage of Inorganics was generally highest for the ML stratum during the four sorting seasons with a range of 3 to 6 percent. The highest seasonal percentage, however, was observed in the MM stratum during the Spring season with 7 percent.

2. The MH stratum never exhibited Inorganics in quantities greater than 2 percent of the entire waste stream for all four seasons.

3. For medium income, a gradual increase in Inorganics was observed as density decreased.

4. The Winter and Spring seasons exhibited the highest percentage of Inorganics with a range of 1 to 7 percent, while the Summer and Fall seasons showed a range of 1 to 4 percent.

Comparison Between "High Income" Waste Compositions

Paper:

1 The HH stratum consistently maintained the greatest percentage of Paper with a range of 36 to 48 percent of the total waste stream. The primary components of the HH strata were Newsprint, Mixed Paper, and Corrugated/Kraft.

2. The HM stratum had or equaled the second highest percentage of Paper during all four sort seasons with a range of 34 to 41 percent. Mixed Paper, Newsprint, and Corrugated/Kraft were the primary components.

3. The Fall season exhibited the greatest percentage of Paper with each "High Income" stratum being observed within a range of 39 to 48 percent The remaining three seasons combined ranged from 36 to 42 percent.

Plastic:

1. The percentage of Plastic was generally the highest in the HH stratum with a range of 10 to 12 percent. The primary components of this fraction were Films and Bags and Miscellaneous Plastic.

2. The HL stratum exhibited the least amount of Plastic during the sort with a range of 6 to 8 percent. The primary components were Films and Bags and Miscellaneous Plastic.

3. Seasonal variation was not significant.

Yard Waste:

1. The highest percentage of Yard Waste was shown in the HL with a range of 9 to 20 percent with the primary component being Grass/Leaves.

2. The least amount of Yard Waste observed over the year was in the HM stratum with a range of 1 to 5 percent.

3. The highest composition of Yard Waste was exhibited in the Winter and Fall sort seasons with ranges of 4 to 12 percent and 1 to 20 percent, respectively. While the remaining seasons, Spring and Summer, were observed in ranges of 1 to 9 and 1 to 11 percent.

Organic:

1. The HM stratum generally maintained the greatest percentage of Organics with a range of 35 to 41 percent. The primary components were Food Waste, Miscellaneous Organics, and Textiles.

2. The HH stratum generally maintained the least organic content of the "High Income" strata with a range of 27 to 40 percent. Food Waste, Miscellaneous Organics, and Textiles were the primary components.

3. Generally, the greatest amount of Organics was observed in the Summer and Spring seasons, while the Fall and Winter exhibited the least

amount. The combined range for Summer and Spring was 31 to 41 percent and for Fall and Winter, the combined range was 27 to 36 percent.

Glass:

1. The percentage of Glass for all strata was in the range of 4 to 7 percent for all seasons with the primary component being Clear Glass.

Metal:

1. The composition of Metals ranged between 4 and 7 percent for all strata and seasons. The primary component was generally equally divided between Food Containers and Other Ferrous.

Inorganic:

1. During each season of the study, either the HH stratum or the HM stratum had the highest percentage of Inorganics, with ranges of 0.3 to 5 percent.

2. The HL stratum maintained the lowest percentage of Inorganics with an average of 1 percent during all seasons.

3. Inorganic was found in greater percentages during the Winter and Spring sorting seasons with ranges of 1 to 4 percent and 1 to 5 percent, respectively. The remaining two seasons, Summer and Fall, maintained ranges of 0.4 to 1 percent and 0.3 to 1 percent, respectively.

EXHIBIT 7-1

WASTE COMPOSITION BY RESIDENTIAL STRATUM*
SUMMER 1989

(All figures shown in percentage)

COMPONENT	LL	LM	LH	ML	MM	MH	HL	HM	HH	AVE	
PAPER	35	27	29	35	33	45	32	32	36	34	27-45
PLASTICS	9	10	12	11	10	11	8	10	12	10	8-12
YARD WASTE	6	3	<0.1	3	2	<0.1	11	5	1	3	<0.1-11
ORGANICS	35	41	43	36	43	34	39	41	40	40	
GLASS	7	5	7	6	6	5	5	7	4	6	4-7
METAL	4	7	6	5	5	4	4	5	5	5	4-7
INORGANIC	3	7	3	4	4	2	1	0.4	1	2	0.4-7

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXHIBIT 7-2

COMPONENT RANGE BY RESIDENTIAL STRATA* SUMMER 1989

COMPONENTS	High Range (Strata/Percent)	Major Category (Percent)	Low Range (Strata/Percent)
PAPER	(MH/45%)	Newsprint (17%)	(LM/27%)
PLASTICS	(HH/12%)	Film (7%)	(HL/8%)
YARD WASTE	(HL/11%)	Grass (6%)	(LH, MH/<0.1%)
ORGANICS	(LH, MM/43%)	Food (13-19%	(MH/34%)
	All Strata fall in 4-7% range.	Clear glass was major category.	
	All Strata fall in 4-7% range		
INORGANIC	(LM/7%)	Misc. (7%)	(HM/0.4%)

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXHIBIT 7-3

WASTE COMPOSITION BY RESIDENTIAL STRATUM*
FALL 1989

(All figures shown in percentage)

COMPONENT	LL	LM	LH	ML	MM	MH	HL	HM	HH	AVE	
PAPER	42	31	30	38	37	44	39	41	48	39	30-48
PLASTICS	8	9	11	9	9	9	6	10	11	9	
YARD WASTE	7	4	0.3	8	3	7	13	4	5	5	0.3-13
ORGANICS	33	42	43	32	38	27	32	35	27	35	
GLASS	5	5	6	5	5	4	4	5	4	5	4-6
METAL	5	6	6	5	5	6	5	4	5	5	4-6
INORGANIC	<1	3	3	3	2	2	1	1	0.3	2	0.3-3

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXHIBIT 7-4

COMPONENT RANGE BY RESIDENTIAL STRATA*
FALL 1989

COMPONENTS	High Range (Strata/Percent)	Major Category (Percent)	Low Range (Strata/Percent)
PAPER	(HH/48%)	Newsprint (18%)	(LH/30%)
PLASTICS	(LH, HH/11%)	Film (6-7%)	(HL/6%)
	(HL/13%)	Grass (13%)	(LH/0.3%)
ORGANICS	(LH/43%)	Food (16%)	(MH, HH/27%)
	(LH/6%)	Clear (3%)	(Varies/4%)
	All strata fall in the 4-6% range		
INORGANIC	All strata fall in the 0.3-3% range	Misc. Inorganics was major category.	

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXH :B:

WASTE COMPOSIT ON BY RESIDENTIAL STRATUM*
WINTER 990

(. ig :hown ge

COMPONENT	LL	LM	LH	ML	MM	MH	HL	HM	HH	AVE	RANGE
.AS'											
ARD WAS											-20
ORGA								36			
NORGAN											

L ./Low Den
I M come/Med Den
ncome/H ih Den

M d ome/Low De
MM Me :/Med De
MH Med :/H gl De

igl :/ ow Den
HM igl /Med De
H :/H igl De

EXHIBIT 7-6

COMPONENT RANGE BY RESIDENTIAL STRATA* WINTER 1990

COMPONENTS	High Range (Strata/Percent)	Major Category (Percent)	Low Range (Strata/Percent)
PAPER	(MH/45%)	Mixed (16%)	(LH/28%)
PLASTIC	(MH, MM/11%)	Film (7%)	(HL/7%)
	(HL/20%)	Grass (19%)	(LH, HM/1%)
ORGANICS	(LM, LH/44%)	Food (17-18%	(MH, HL, HH/31%)
	(LH/8%)	Clear (4%)	(LM, HH/4%)
	All Strata fall in 5-7% range	Food containers was major category.	
INORGANIC	(ML/6%)	Misc. (5%)	(MH/HL/1%)

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXHIBIT 7-7

WASTE COMPOSITION BY RESIDENTIAL STRATUM*
SPRING 1990

(Al figures shown in percentage)

COMPONENT	LL	LM	LH	ML	MM	MH	HL	HM	HH	AVE	
PAPER	31	31	28	33	28	42	30	34	42	32	28-42
PLASTICS	9	9	10	9	10	10	8	9	10	9	
YARD WASTE	7	1	1	2	3	3	9	1	3	3	.-9
ORGANICS	37	42	46	39	41	34	39	38	31	39	31-46
GLASS	7	5	7	6	5	4	5	6	4	6	4-7
METAL	5	5	5	6	5	5	7	6	4	5	4-7
INORGANIC	4	5	3	4	7	1	1	5	5	4	1-7

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

EXHIBIT 7-8

COMPONENT RANGE BY RESIDENTIAL STRATUM*
SPRING 1990

COMPONENTS	High Range (Strata/Percent)	Major Category (Percent)	Low Range (Strata/Percent)
PAPER	(MH, HH/42%)	Newsprint (17%)	(LH, MM/28%)
PLASTICS	All Strata fall in 8-10% range.	Films was major category.	
YARD WASTE	(HL/9%)	Grass (6%)	(LM, LH, HM/1%)
ORGANICS	(LH/46%)	Food (13-19%)	(HH/31%)
	(LL, LH/7%)	Clear (4-5%)	(MH, HH/4%)
	(HL/7%)	Other (4%)	(HH/4%)
INORGANIC	(MM/7%)	Misc. (7%)	(MH, HL/1%)

* LL = Low Income/Low Density
LM = Low Income/Medium Density
LH = Low Income/High Density

ML = Medium Income/Low Density
MM = Medium Income/Medium Density
MH = Medium Income/High Density

HL = High Income/Low Density
HM = High Income/Medium Density
HH = High Income/High Density

SECTION 8

COMPARISON OF COMPOSITION BY SEASON

The purpose of this section is to provide a qualitative analysis of the four seasons of residential data and to identify seasonal variations and significant trends in the composition of the residential waste stream (excluding bulk items). These findings are based on the composition data discussed in previous sections.

DISCUSSION

For comparison purposes, the residential waste data were collapsed to the seven major refuse fractions described earlier in Section 7. Development of trends by season was performed by further collapsing the data from the project's nine strata into an aggregate composite for each season, which is presented in Exhibit 8-1. Development of this composite required consolidation of each stratum for a weighted average, dependent on estimated quantities generated for the City as a whole (see discussion in Section 9). Based on Exhibit 8-1, the below observations and findings can be made.

GENERAL TRENDS (NON-SEASONAL)

<u>Paper</u>

Mixed Paper, Newsprint, and Corrugated/Kraft Paper are the most common components of the Paper stream. All other paper components combined to about 25 percent of Paper wastes in the residential stream.

<u>Plastics</u>:

Films and Bags and Miscellaneous Plastics are the most common components of the Plastic stream. These two items account for almost 70 percent of Plastic wastes in the residential stream.

<u>Yard Wastes</u>:

Grass/Leaves is the main component of Yard Waste

Organics:

Food Waste is the most significant component of the Organics category, at about 40 percent of the Organics fraction. Other significant categories are Textiles, Diapers, and the Miscellaneous Organics.

Glass:

Clear Glass containers make up almost 60 percent of the Glass fraction.

Metals:

The metal fraction is made up by over 80 percent of ferrous alloy products. Other Ferrous Metal and Ferrous Food Containers are the largest components of this fraction when compared to aluminum and bimetal categories.

Inorganic:

The greatest fraction of Inorganics is Miscellaneous Inorganics. Non-bulk Ceramics is a small and highly-specific component category. These items only were found in the waste stream on occasion.

COMPARISON OF THE RESIDENTIAL WASTE STREAM BY SEASON

Paper:

- Paper, which was observed at the 31 to 32 percent range throughout three seasons, reached peak proportions in Fall 1989 at 37 percent of the waste stream.

2. The level of Office/Computer Paper in the waste stream was low, ranging from 2 percent to negligible levels.

3. Non-corrugated OCC Paper ranged form 2 to 4 percent by weight over the four seasons.

4. The major component of Paper was Mixed Paper. This category ranged from 8 to 13 percent of the total waste stream during the year.

5. Newsprint was consistent during three sort seasons at 8 to 9 percent, and increased to 11 percent in the Fall.

Plastic:

1. LDPE items decreased in frequency during the year and ranged from 0.08 to 0.13 percent by weight.

2. The Plastic fraction, as a whole, was greatest in the Summer at 9.89 percent.

Yard Waste:

1. The quantity of Brush and other woody Yard Wastes was significantly higher during the Summer and Spring seasons.

2. Grass/Leaves composition percentages ranged from 6 to 7 percent in the Fall and Winter, while the Summer and Spring were both 3 percent.

3. Overall, Yard Waste occupied approximately 5.8 percent of the waste stream.

Glass Fraction:

1. The generation of Glass wastes was consistent during all four seasons, ranging from 4.91 to 5.82 percent by weight.

Hazardous Wastes:

1. Household Hazardous Wastes present in the MSW stream was approximately 80 percent Paint/Solvent/Fuel, Car Batteries, and Miscellaneous items.

EXHIBIT 8-1

SUMMARY OF RESIDENTIAL COMPOSITION BY SEASON *

WASTE COMPONENT	SUMMER	FALL	WINTER	SPRING	ANNUAL
Corrugated/Kraft	5.02%	5.22%	5.27%	4.81%	5.08%
Newsprint	9.48%	11.08%	8.28%	8.39%	9.31%
Office/Computer	1.51%	0.91%	0.46%	0.23%	0.78%
Magazines and Glossy	3.00%	3.22%	2.62%	2.61%	2.86%
Book/Phone Book	1.18%	1.15%	0.42%	0.54%	0.83%
Non-Corrugated OCC	4.14%	2.44%	2.76%	2.03%	2.85%
Mixed	8.03%	12.88%	12.45%	12.88%	11.52%
TOTAL PAPER FRACTION	32.35%	36.91%	32.25%	31.49%	33.24%
Clear HDPE containers	0.57%	0.49%	0.54%	0.47%	0.52%
Colored HDPE containers	0.69%	0.62%	0.62%	0.57%	0.63%
LDPE	0.23%	0.15%	0.05%	0.08%	0.13%
Films and Bags	5.05%	4.93%	5.05%	5.03%	5.01%
Green PET containers	0.13%	0.08%	0.11%	0.12%	0.11%
Clear PET containers	0.47%	0.37%	0.52%	0.44%	0.45%
PVC	0.15%	0.16%	0.11%	0.12%	0.13%
Polypropylene	0.16%	0.21%	0.08%	0.13%	0.14%
Polystyrene (Est. in Summer)	0.86%	0.68%	0.98%	0.93%	0.86%
Miscellaneous Plastic	1.59%	1.09%	1.09%	1.27%	1.26%
TOTAL PLASTIC FRACTION	9.89%	8.78%	9.15%	9.16%	9.25%
Grass/Leaves	2.80%	5.96%	7.59%	2.79%	4.72%
Brush/Prunings/Stumps	1.86%	0.28%	0.77%	1.32%	1.07%
TOTAL YARD WASTE FRACTION	4.66%	6.25%	8.36%	4.11%	5.80%
Lumber	2.87%	2.28%	2.09%	3.63%	2.73%
Textiles	6.71%	4.72%	5.08%	5.31%	5.47%
Rubber	0.22%	0.32%	0.06%	0.21%	0.21%
Fines	2.49%	2.26%	2.33%	2.98%	2.52%
Diapers	3.84%	3.49%	4.34%	3.80%	3.86%
Foodwaste	14.18%	14.34%	13.82%	14.87%	14.31%
Miscellaneous Organic	9.35%	8.26%	8.72%	9.12%	8.87%
TOTAL ORGANIC FRACTION	39.66%	35.66%	36.45%	39.93%	37.97%
Clear Glass containers	3.20%	2.95%	3.51%	3.52%	3.29%
Green Glass containers	1.18%	0.97%	1.17%	1.05%	1.09%
Brown Glass containers	0.97%	0.83%	0.96%	0.94%	0.92%
Miscellaneous Glass	0.47%	0.16%	0.06%	0.17%	0.22%
TOTAL GLASS FRACTION	5.82%	4.91%	5.69%	5.67%	5.52%
Aluminium Food Containers/Foil	0.46%	0.48%	0.56%	0.50%	0.50%
Aluminium Beverage Cans	0.35%	0.33%	0.37%	0.31%	0.34%
Miscellaneous Aluminium	0.21%	0.21%	0.04%	0.04%	0.12%
TOTAL ALUMINIUM FRACTION	1.02%	1.02%	0.97%	0.85%	0.96%
Ferrous Metal Food containers	1.96%	2.00%	2.30%	2.09%	2.08%
Other Ferrous Metal	1.94%	2.45%	2.22%	2.78%	2.35%
TOTAL FERROUS METAL FRACTION	3.89%	4.45%	4.52%	4.88%	4.43%
Bimetal Cans	0.01%	0.03%	0.02%	0.00%	0.01%
TOTAL METAL FRACTION	4.92%	5.50%	5.51%	5.73%	5.41%
Non-bulk Ceramics	0.05%	0.22%	0.27%	0.22%	0.19%
Miscellaneous Inorganic	2.24%	1.65%	2.06%	3.16%	2.29%
TOTAL INORGANIC FRACTION	2.29%	1.88%	2.33%	3.38%	2.48%
Pesticides	0.02%	0.00%	0.00%	0.01%	0.01%
Non-pesticide Poisons	0.02%		0.01%	0.01%	0.01%
Paint/Solvent/Fuel	0.04%	0.06%	0.14%	0.13%	0.09%
Dry Cell Batteries	0.05%	0.02%	0.02%	0.02%	0.03%
Car Batteries	0.09%	0.02%	0.01%	0.20%	0.08%
Medical Waste	0.01%	0.00%	0.02%	0.03%	0.02%
Miscellaneous HHW	0.17%	0.04%	0.07%	0.14%	0.11%
TOTAL HHW FRACTION	0.41%	0.15%	0.28%	0.54%	0.35%

* Does not include bulk items

SECTION 9

GENERATION RATES FOR RESIDENTIAL SOLID WASTE

INTRODUCTION

Estimates for refuse waste quantities generated by residential strata within the City can provide supportive information for planning and implementation of source reduction and recycling programs. Project objectives included calculations of generation rates for each residential stratum, and subsequent application of these rates to the City-wide residential population.

APPROACH

Concurrent with the refuse sorting and classification efforts, a comprehensive vehicle weigh program was conducted to determine the quantities of refuse generated by each stratum. This weigh program was repeated each season to address fluctuations and variations in generation rates by resident types over the course of a year. These fluctuations may be caused by several factors, many of which could not be addressed in this study. Changing levels of activity during certain seasons (e.g., summer vacations may lower generation rates) can impact the amounts of refuse disposed in households.

Seasonal generation rates were calculated by the refuse disposal quantities (as-received amounts at the work sites) measured over one study week per season.

The vehicle weigh program allowed for calculation of total weights of refuse generated by each stratum by season. The seasonal totals for refuse generation by weight (pounds per week) are presented in Exhibit 9-1 by residential strata.

Calculations for residential generation rates were made based on the number of housing units within sample strata. Exhibit 9-2 presents the number of units sampled under the study in accordance with each stratum. The seasonal weight totals calculated for each residential stratum in Exhibit 9-1 were divided by the sampled population (Exhibit 9-2) to calculate a generation factor in pounds per unit per week. Exhibit 9-3 provides estimated generation rates by the program design variables. These generation rates range from 19 to 68 pounds per unit per week.

The study recognized that waste generation rates and composition observed for 6 days each season will change gradually in the course of the year. Extrapolations were made for the time periods between the seasonal sampling events to better reflect monthly generation and composition data. These extrapolations employed linear regression techniques; results for these calculations are presented in Volume 7 - Residential Raw Data. Once these monthly factors were developed, the final step in developing a model of residential waste stream was to apply the generation rates to the City-wide unit totals for each of the residential strata as defined (i.e., LL through HH).

RESULTS

Application of the generation rates calculated from Exhibit 9-3 to City-wide population figures yields total estimated quantities of residential refuse generated on an annual basis.

Exhibit 9-4 is a summary matrix that details the total housing unit count for each residential stratum and the estimated total tonnage of refuse each stratum generated, by season. The final column of Exhibit 9-4 is a cumulative annual total for each stratum.

It should be noted that this total does not include large, bulky waste items collected separately by DOS. DOS-OPEC have compiled tonnage information on these special collections separately, at the Sanitation District level. Consequently, this exhibit projects a total of approximately 3.5 million tons of residential refuse per year. At the direction of OPEC, an allowance was made for bulky wastes collected outside the study sample collection system. This allowance adjusted the projected annual residential waste stream totals to be approximately 3.6 million tons of refuse when bulky waste is included. Annually, bulk waste accounted for about 1 to 7 percent of the residential waste stream.

EXHIBIT 9-1

WEEKLY REFUSE TOTALS FOR RESIDENTIAL SAMPLE

SAMPLE STRATA	CENSUS TRACT NO.	WEIGHT OF REFUSE GENERATED (lbs/week) SUMMER	FALL	WINTER	SPRING
LL	363	11,880	8,940	10,600	10,160
	974	9,280	19,020	9,560	10,060
LL AVERAGE		10,580	13,980	10,080	10,110
LM	69	20,570	20,760	20,840	20,820
	1120	28,640	24,990	20,840	34,260
LM AVERAGE		24,605	22,875	20,840	27,540
LH	48	44,760	41,300	39,500	42,460
	233	45,510	57,440	36,740	37,740
LH AVERAGE		45,135	49,370	38,120	40,100
ML	208	12,520	9,480	13,640	16,400
	141	7,230	6,300	7,280	7,600
ML AVERAGE		9,875	7,890	10,460	12,000
	70	26,100	32,960	30,440	32,580
	151	19,940	19,180	19,880	19,660
	263	13,040	15,080	12,140	13,360
	782	38,900	32,840	27,360	29,240
MM AVERAGE		24,495	25,015	22;455	23,710
MH	181	22,220	23,860	22,140	21,620
	281	15,260	15,840	13,680	19,620
MH AVERAGE		18,740	19,850	17,910	20,620
HL	347	14,160	10,420	9,680	10,960
	524	13,100	13,660	17,880	15,380
HL AVERAGE		13,630	12,040	13,780	13,170
	249	19,020	18,180	14,560	15,820
	518	24,300	20,600	21,500	21,040
HM AVERAGE		21,660	19,390	18,030	18,430
	289	28,440	27,860	21,840	28,560
	281	30,040	29,950	28,740	27,620
HH AVERAGE		29,240	28,905	25,290	28,090

EXHIBIT 9-2

UNIT TOTALS FOR RESIDENTIAL SAMPLE

SAMPLE STRATA	NO. OF UNITS SAMPLED
LOW INCOME/LOW DENSITY	412
LOW INCOME/MEDIUM DENSITY	1,030
LOW INCOME/HIGH DENSITY	2,284
MEDIUM INCOME/LOW DENSITY	398
MEDIUM INCOME/MEDIUM DENSITY	2,312
MEDIUM INCOME/HIGH DENSITY	1,920
HIGH INCOME/LOW DENSITY	425
HIGH INCOME/MEDIUM DENSITY	1,165
HIGH INCOME/HIGH DENSITY	2,171
TOTAL	12,109

EXHIBIT 9–3

RESIDENTIAL WASTE GENERATION RATES BY STRATA

SAMPLE STRATA	NO. OF UNITS SAMPLED	GENERATION RATE (lbs/unit/week) SUMMER	FALL	WINTER	SPRING	ANNUAL RATE (tons/unit)
LOW INCOME/LOW DENSITY	412	51	68	49	49	1.4
LOW INCOME/MEDIUM DENSITY	1,030	48	44	40	53	.2
LOW INCOME/HIGH DENSITY	2,284	40	43	33	35	.0
MEDIUM INCOME/LOW DENSITY	398	50	40	53	60	1.3
MEDIUM INCOME/MEDIUM DENSITY	2,312	42	43	39	41	1.1
MEDIUM INCOME/HIGH DENSITY	1,920	20	21	19	21	0.5
HIGH INCOME/LOW DENSITY	425	64	57	65	62	1.6
HIGH INCOME/MEDIUM DENSITY	1,165	37	33	31	32	0.9
HIGH INCOME/HIGH DENSITY	2,171	27	27	23	26	0:7
TOTAL	12,109					

EXHIBIT 9–4

PROJECTED TONNAGE BY RESIDENTIAL STRATA

SAMPLE STRATA	TOTAL NO. OF UNITS CITY–WIDE	PROJECTED TOTAL REFUSE GENERATED (tons/season) SUMMER	FALL	WINTER	SPRING	ANNUAL TOTAL
LOW INCOME/LOW DENSITY	210,672	69,838	92,000	67,200	67,300	296,338
LOW INCOME/MEDIUM DENSITY	166,798	51,900	48,200	43,900	58,200	202,200
LOW INCOME/HIGH DENSITY	406,175	104,400	113,800	88,200	92,900	399,300
MEDIUM INCOME/LOW DENSITY	437,213	141,200	112,800	149,600	171,700	575,300
MEDIUM INCOME/MEDIUM DENSIT	665,164	177,800	186,200	168,700	177,700	710,400
MEDIUM INCOME/HIGH DENSITY	176,705	22,700	23,900	21,400	25,700	93,700
HIGH INCOME/LOW DENSITY	613,118	255,700	225,600	257,900	246,700	985,900
HIGH INCOME/MEDIUM DENSITY	53,822	13,000	11,700	10,700	11,000	46,400
HIGH INCOME/HIGH DENSITY	229,258	40,300	39,800	34,600	38,800	153,500
TOTAL	2,958,925	876,838	854,000	842,200	890,000	3,463,038

NOTES:

Columns may not add due to rounding.

SECTION 10

ERROR ANALYSIS

INTRODUCTION

Composition data from the project exhibited some degree of variability. While it is recognized that waste composition can vary from season to season, day to day, borough to borough, and by other elements of the program design, there is also a degree of variability that may be introduced from the data collection method (such as changes in sorting site and sorting technician). In order to qualify this variability or error, a limited error analysis was performed on data from two strata of the residential sector. The Medium Income/Medium Density stratum (MM) was chosen because this stratum was sampled the greatest number of times over the course of the study. The choice of a second stratum for evaluation was based on selecting a strata that represented a large section of the City's population. For this analysis, the Low Income/High Density stratum (LH) was selected.

APPROACH

The first step of the analysis was to consider the experimental design of these two strata. Exhibit 10-1 presents the experimental design table for the MM strata, and Exhibit 10-2 presents the same table for LH.

In general, the LH design (Exhibit 10-2) is balanced. The same sorting site was used for all refuse samples obtained, and the same two boroughs (Manhattan and Bronx) were sampled throughout. Conversely, the Medium-Medium design (Exhibit 10-1) is unbalanced. The Queens sorting site was used only during the Spring sampling, and different sites received waste from different boroughs. Only one district was sampled from Brooklyn and Bronx, whereas two districts were sampled from Queens. Moreover, the Hamilton Avenue and the Queens work sites were active on different days than the Marine Transfer Station. This lack of balance makes it more difficult to detect and distinguish differences in variability.

Although the possible root causes for error in this data are almost limitless, analysis was restricted to seven suspected variables of major interest. These variables are:

- Season - the time of year for refuse sampling;
- Site - the work site where refuse samples were sorted;
- Day - the day when refuse was collected;
- Borough - the borough where refuse was collected;
- District - the Sanitation District within the sampled borough;
- Tract - the Census tract where the refuse was collected; and
- Technician - the sort crew supervisor who oversees waste classification.

For these variables (Season, Site, Day, Borough, District, Route, and Sorting Technician), means and variances were calculated for the factors of that particular variable. The factors for each variable are:

- Season - Winter, Spring, Summer, Fall;
- Site - Queens, Hamilton Avenue, Marine Transfer Station;
- Day - Monday, Tuesday, Wednesday, Friday, Saturday;
- Borough - Brooklyn, Bronx, Manhattan, Queens;
- District - W1-15, W2-21, W9-93, E17-174, E9-91, E9-94;
- Tract - T48, T70, T151, T233, T263, T782; and
- Technician - 310, 375, 441, 660, 803, 886, 985, 995, 100, 118, 128, 635, 737, 801, 834, 914, 636

For example, when season was the variable under consideration, statistics were calculated for each of the factors of season (Winter, Spring, Summer, and Fall). Through Analysis of Variance, factor statistics were compared to each other, as well as to the overall mean and variance of the variable. When the variability between the factors becomes large relative to the total variability, there are significant differences between factor populations. It can then be concluded that a significant portion of the total variability is attributable to that variable. For example, if waste differs significantly by season but not by sorting site, then "seasonality" accounts for more of the total variation than sorting site does.

To determine what can be considered a significant difference, the ratio of variability between factors to variability within factors was calculated and compared to the F-statistic. The F-test for comparing two means is equivalent to a t-test. The advantage in using an F-test is that this methodology can compare more than two means, and the sample sizes can also be different.

RESULTS

The most predominant source of error appears to be day of the week. The Paper, Metal, and Inorganic fractions exhibit significant variations in both sampled strata. However, day of the week varies significantly for Yard waste and Glass in the Medium-Medium stratum, whereas significant differences exist in the Low-High stratum for Plastic and Organics fractions.

For these two strata, only one district was sampled for Brooklyn, Bronx, and Manhattan; however, two districts were sampled for Queens. Comparing statistics between boroughs and between districts gives similar results. In both strata, Paper and Glass vary significantly by borough. When districts are compared, there is significant variation between the two Queens districts in the Medium-Medium strata for Yard waste and Organics.

Seasonality affects each stratum differently. The Medium-Medium stratum exhibited much more significant variation for Paper, Glass, and Inorganics than the Low-High stratum does for Plastic and Metals. Season does not affect composition for either stratum in Yard Waste, Glass or Household Site variations do not appear to be significant. Because all of the Low-High stratum waste was sorted at the Marine Transfer Station, there is no variation attributable to the site. In cases where site appears to be significantly different in the Medium-Medium stratum, the Queens sorting site is the outlier. Because the Queens sorting site was only used in the Spring, there is no other season to compare it to. Thus, there is insufficient evidence to conclude that work site contributes to this error.

Variation among sorting technicians was also considered. Because there was no particular individual who sorted in every season or every borough, there is insufficient evidence to conclude that variation among sorters is anything more than variation from other sources.

CONCLUSIONS

Exhibit 10-3 shows the significant variations derived in this analysis. When a waste fraction shows significant variation for more than one variable, a significant interaction between these variables plays an important role in the overall variation. For example, in the Low-High stratum, variation for inorganic materials appears to be caused mainly by borough and day of the week. Consequently, different boroughs have different waste generating profiles during the course of the week. Ignoring inherent error between samples, an interaction between borough and day of the week explains much of the error in the project database.

The variables in Exhibit 10-3 define a significant portion of the variation in this study; however, natural variations within the waste composition are the leading cause of error in the sampled data. It is possible that the natural variation could be further explained by variables not considered in this report, such as weather, clean-up days, differences within a stratum, geographic routes, ethnicity, and social activities (local parades or festivals). These potential variables and others were not controlled enough for further analysis. In summary, assuming all residential strata were sampled and processed under similar conditions, the data appear reliable with no significant systematic error.

EXHIBIT 0-

EXPERIMENTAL DESIGN TABLE
ED UM INCOME/MED UM ENS TY STRATA

SEA	WINTER				SPRING				SUMMER				FALL				SEA
STE	HAM		MTS		QNS		MTS		HAM		MTS		HAM		MTS		STE
BORO	BK	QNS	BX	QNS	BK	QNS	BX	QNS	BK	QNS	BX	QNS	BK	QNS	BX	QNS	BORO
DIS	E17 - 174	W2 - 21	E9 - 94	W1 - 15	E17 - 174	W2 - 21	E9 - 94	W1 - 15	E17 - 174	W2 - 21	E9 - 94	W1 - 15	E17 - 174	W2 - 21	E9 - 94	W1 - 15	DIS
TRA	782	263	70	151	782	263	70	151	782	263	70	151	782	263	70	151	TRA
DAY	M T W F	M T W F	T W F S	T W F S	M T W F	M T W F	T W F S	T W F S	M T W F	M T W F	T W F S	T W F S	M T W F	M T W F	T W F S	T W F S	DAY

EXHIBIT 10-3

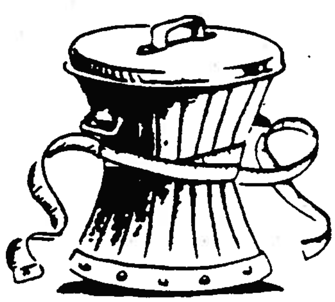
FACTORS CAUSING VARIABILITY

	DAY	SEASON	BOROUGH	DISTRICT
PAPER	MEDIUM-MEDIUM LOW-HIGH	MEDIUM-MEDIUM	MEDIUM-MEDIUM LOW-HIGH	
PLASTIC	LOW-HIGH	LOW-HIGH		
YARD WASTE	MEDIUM-MEDIUM			MEDIUM-MEDIUM
ORGANIC	LOW-HIGH		LOW-HIGH	MEDIUM-MEDIUM
GLASS	MEDIUM-MEDIUM	MEDIUM-MEDIUM	MEDIUM-MEDIUM LOW-HIGH	
METALS	MEDIUM-MEDIUM LOW-HIGH	LOW-HIGH	MEDIUM-MEDIUM	
INORGANIC	MEDIUM-MEDIUM LOW-HIGH	MEDIUM-MEDIUM	LOW-HIGH	
HHW				

Operations Planning
Evaluation and Control

NYC Department of Sanitation

NEW YORK CITY
WASTE COMPOSITION STUDY
(1989-90)
VOLUME 3



**Help Reduce
New York's Waste.
Please Recycle.**

New York City
Waste Composition Study
(1989-90)

Institutional Sector
Volume 3

New York City
Department of Sanitation
Operations Planning Evaluation and Control
125 Worth Street, Eighth Floor
New York, New York 10013
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ACKNOWLEDGEMENTS

This report, New York City Waste Composition Study (1989-90), was developed under New York City Department of Sanitation Contract No. 89-07653 with SCS Engineers. Alex Prutkovsky, Deputy Director, Operations Planning, Evaluation and Control (OPEC), provided the overall direction. W. Gregory Vogt of SCS Engineers was the Project Manager. The major contributors to the study were staff members at the Operations Management Division of OPEC under the guidance of Mr. Prutkovsky, and solid waste staff at SCS Engineers in Reston, Virginia. Subconsultant services were provided by Konheim & Ketcham of Brooklyn, New York.

Pre-paid orders are accepted for the entire set of 10 volumes of the study, or for individual volumes. An Executive Summary highlighting the major findings of the study is also available. For information, call (212) 788-3802, or write to the Office of the Assistant Commissioner, Department of Sanitation, Room 715, 125 Worth Street, New York, New York 10013.

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BULK ITEM SURVEY AND VEHICLE WEIGH PROGRAM

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ERROR ANALYSIS

SECTION 1

INTRODUCTION

The solid waste management alternatives available today are more complex than the traditional landfilling of waste, requiring a more in-depth knowledge of two important waste stream characteristics -- quantity and composition. Assessment of the waste stream, therefore, is necessary to provide the basic information for evaluating existing solid waste management systems and for making decisions regarding future waste management. This study reflects the efforts of the Department of Sanitation (DOS) to accurately define the waste stream generated in New York City (NYC).

The project was initiated in response to Local Law 19 requiring the City to achieve a mandatory recycling goal of 25 percent. The information presented in this report will be used by DOS not only to develop recycling and marketing programs, but also to develop waste management strategies such as:

- Evaluating existing collection systems.
- Designing source reduction programs.
- Developing educational programs.
- Evaluating waste-to-energy or resource recovery programs.
- Identifying and addressing toxics in the waste stream.

Because it is important to understand "who" is generating "how much" of "what type" of waste, DOS designed a study to assess separately the waste generated by three distinct sources: residences, institutions, and commercial establishments. As a result, over 750,000 pounds of refuse were sampled from:

- 23 residential communities across four boroughs.
- 40 private and municipal institutions.
- Over 200 private businesses.

General findings of this study, by waste stream, include:

<u>Aggregated</u>

- The aggregated waste stream, consisting of residential, institutional, and commercial sectors, generated 8.5 million tons of waste annually.

- The commercial sector accounts for 45 percent (approximately 3.9 million tons per year), followed by the residential sector at 42 percent (3.6 million tons per year), with the institutional sector accounting for the remainder, just over 1 million tons.

- Paper is the largest fraction, consisting of 42 percent. The commercial sector generates more than half of the paper waste in the City.

- Organics is the second largest fraction, accounting for 29 percent. Food waste is the single largest component.

<u>Residential</u>

- Food waste was the largest component of the waste stream by weight.

- Paper, plastic, and yard waste exhibited the most seasonal variation.

- Bulk waste generation appears lowest during spring months.

- Waste generation rates vary from 20 to 70 pounds per household per week. As housing density increased, per person residential waste generation declined.

<u>Institutional</u>

- Mixed paper was the largest component of the waste stream by weight. Paper accounts for more than 50 percent of the whole waste stream.

- Glass and yard waste varied most on a seasonal basis.

- Bulk waste generation was lowest in the fall.

- Waste generation rates varied significantly between different institution types.

Commercial

- Paper accounts for more than 50 percent of the whole waste stream, ranging from 23 percent (Apparel and Textile Manufacturing) to 91 percent (Printing and Publishing).

- Generation rates per employee observed during the study ranged from 0.2 tons per year for offices, to 6.1 tons per year for printing and publishing.

Overall, the waste stream composition of New York City is comparable to national statistics, considering that New York City is not average. The most notable variation is found in the yard debris fraction. National figures indicate that 17.6 percent of the waste stream should be comprised of yard debris. However, field sorting efforts determined that 2 percent of New York City's waste stream consists of yard debris. Intuitively, this difference seems valid.

For the paper and plastic fractions, national estimates seem comparable with the study results of 42 and 8 percent, respectively (national averages for these fractions are 40.0 and 8.0 percent).

All of the information obtained from the study is presented as a 10-volume series. The purpose of this volume is to present a summary of specific project findings for the Institutional waste stream. More specific information, including raw data, can be found in other volumes. The remainder of the project report is organized as follows:

- <u>Executive Summary</u>: Provides a brief overview of the study and presents a summary of the overall findings conclusions, and recommendations presented in the other volumes.

- <u>Volume 1</u> - Final Report: Presents a general overview of the study methodology, results obtained, and implications for waste management planning.

- <u>Volume 2</u> - Residential Sector: Provides the results of the residential waste composition study by season including composition, bulk items, and generation rates.

- Volume 3 - Institutional Sector: Presents the seasonal results of the institutional waste composition study.

- Volume 4 - Commercial Sector: Presents estimated composition and generation rates for commercial waste based on the results of the 1-season study.

- Volume 5 - Chemical Analysis: Provides a discussion of the chemical characteristics of the New York City waste stream as determined by a laboratory analysis of waste stream samples.

- Volume 6 - Compaction Testing: Presents the results of the compaction testing program designed to measure changes in residential and institutional refuse density.

- Volume 7 - Residential Sector Raw Data: Provides data gathered during the residential waste composition study field activities.

- Volume 8 - Institutional Sector Raw Data: Presents data gathered during field activities undertaken during the institutional waste composition study.

- Volume 9 - Commercial Sector Raw Data: Includes data gathered as part of the commercial waste composition study.

- Volume 10 - Chemical Analysis Raw Data: Provides data developed during the chemical analysis of residential and institutional refuse samples.

INSTITUTIONAL WASTE COMPOSITION

This volume summarizes the analysis of refuse samples collected from the institutional waste stream. Refuse samples were obtained during four seasons of concurrent field sorting activities at the 59th Street Marine Transfer Station (MTS) in Manhattan, and the closed incinerator at Hamilton Avenue, Brooklyn.

Sections 2 through 5 of this report describes the methodology for sampling and analysis. Section 6 presents the results of a bulk item survey and vehicle weighing program for institutional sample routes. The remaining sections of the report discuss the results of the four seasons of sampling, and present a qualitative analysis of survey results.

Raw data for the institutional study are provided in Volume 8.

SECTION 2

INSTITUTIONAL WASTE ANALYSIS
SUMMER 1989

APPROACH

A field sorting and weighing program was performed to estimate waste types and quantities generated from institutional sources on the basis of waste components disposed from selected institutions served by City forces. For the Summer 1989 activities, field work for the institutional waste sector commenced on Monday, August 21, 1989, with sorting activities completed by Saturday, August 26, 1989. Institutional waste loads originated from pre-designated City routes, generally described by the institutional types given below. Waste loads were delivered to two work sites for sampling, measurement, and weighing activities.

Category No.	Institution Type
1	Elementary Schools
2	Junior High Schools
3	Private Schools (Kindergarten-8th Grade)
4	Private Schools (6th-12th Grade)
5	Psychiatric Hospitals
6	Skilled Nursing Facilities
7	Municipal Hospitals
8	Teaching Hospitals
9	Non-profit Hospitals
10	Government Offices
11	Correctional Facilities
12	Colleges
14	Transportation Hubs

A listing of institutional loads delivered to each work site is given in Exhibits 2-1 and 2-2. The number of incoming vehicles ranged from four to seven on a daily basis; each vehicle load was identified by the originating borough, the Department of Sanitation collection route, and institutional type. No refuse loads were obtained from category 13, Public High Schools, during Summer 1989.

The number of refuse samples obtained and sorted by components per institutional type is shown in Exhibit 2-3. A total of 337 institutional waste samples were sorted and classified by weight according to 45 component categories during the Summer 1989 activities.

WASTE COMPOSITION RESULTS

Tabulated composition results for each of the 13 institutional categories are presented in Exhibits 2-4 through 2-16, as follows:

Exhibit	Institutional Category
2-3	Elementary Schools
2-4	Junior High Schools
2-6	Private Schools (Kindergarten-8th Grade)
2-7	Private Schools (6th-12th Grade)
2-8	Psychiatric Hospitals
2-9	Skilled Nursing Facilities
2-10	Municipal Hospitals
2-11	Teaching Hospitals
2-12	Non-Profit Hospitals
2-13	Government Offices
2-14	Correctional Facilities
2-15	Colleges
2-16	Transportation Hubs

Summary calculations of component percentages use a weighted average, rather than the arithmetic mean. Weighted averages were used due to variances in sample weights obtained in the field. Sample weights were targeted at 200 to 300 pounds, and varied due to the sampling method (the use of end loaders to obtain grab samples) and the different densities of refuse components. Weighted averages were considered more representative for presentation of the waste stream composition than arithmetic means.

Summary calculations for the week (Summer 1989) include standard deviation, lower and upper confidence intervals (at the 95 percent level), and the number of samples obtained and classified by the institutional types.

Waste composition data from the daily institutional sample loads sorted and classified during the seasonal period are presented in Volume 8.

EXHIBIT 2-1

INSTITUTIONAL LOADS DELIVERED TO MTS SITE
SUMMER 1989

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
08/21/89	1	MN	College	Control 6	12
	2	QN	Correctional	Control 9	11
	3	QN	Private (6-12)	Control 10	4
	4	SI	Private (K-8)	Control 14	3
08/22/89	1	BX	Elementary	Control 7	1
	2	QN	Elementary*	Control 12	1
	3	QN	Elementary	Control 13	1
	4	MN	Trans. Hub	Control 18	14
08/23/89	1	MN	College	Control 6	12
	2	QN	Correctional	Control 9	11
	3	MN	Trans. Hub	Control 19	14
	4	MN	Trans. Hub	Control 19	14
	5	MN	Trans. Hub	Control 19	14
08/24/89	1	QN	Private (6-12)	Control 10	4
	2	BK	Govt. Office	Control 4	10
	3	SI	Private (K-8)	Control 14	3
	4	BX	Elementary	Control 7	1
	5	MN	Trans. Hub	Control 19	14
	6	MN	Trans. Hub	Control 19	14
	7	MN	Trans. Hub	Control 18	14
08/25/89	1	MN	College	Control 6	12
	2	QN	Elementary*	Control 12	1
	3	QN	Elementary	Control 13	1
	4	QN	Correctional	Control 9	11

* This load was subsequently identified as unrepresentative by DOS-OPEC. Resultant data to be excluded from study.

EXHIBIT 2-2

INSTITUTIONAL LOADS DELIVERED TO HAMILTON AVENUE SITE
SUMMER 1989

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
08/21/89	1	QN	Non-profit	Control 17	9
	2	MN	Municipal	Control 15	7
	3	BK	Govt. Office	Control 4	10
	4	BK	Elementary	Control 3	1
	5	QN	Skill. Nurs.	Control 11	6
	6	BK	Junior H.S.	Control 2	2
08/22/89	1	SI	Teaching Hosp.	Control 16	8
	2	BX	Skill. Nurs.	Control 8	6
	3	BK	Psych. Hosp.	Control 1	5
	4	BK	Govt. Office	Control 4	10
08/23/89	1	BK	Govt. Office	Control 4	10
	2	BX	Skill. Nurs.	Control 8	6
	3	BK	Elementary	Control 3	1
	4	MN	Municipal	Control 15	7
	5	BK	Junior H.S.	Control 2	2
08/24/89	1	MN	Municipal	Control 15	7
	2	BK	Psych. Hosp.	Control 1	5
	3	QN	Non-profit	Control 17	9
	4	QN	Skill. Nurs.	Control 11	6
	5	BK	Govt. Office	Control 5	10
08/25/89	1	SI	Teaching Hosp.	Control 16	8
	2	BK	Govt. Hosp.	Control 4	10
	3	BK	Elementary	Control 3	1
	4	BX	Skill. Nurs.	Control 8	6
	5	BK	Junior H.S.	Control 2	2
08/26/89	1	BK	Psych. Hosp.	Control 6	5
	2	BX	Elementary	Control 2	1
	3	BK	Govt. Office	Control 4	10
	4	MN	Municipal	Control 15	7

EXHIBIT 2-3

SORT SAMPLES OBTAINED BY INSTITUTIONAL CATEGORY
SUMMER 1989

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF SORT SAMPLES
1	Elementary Schools	54
2	Junior High Schools	13
3	Private Schools, K-8th Grade	16
4	Private Schools, 6-12th Grade	15
5	Psychiatric Hospitals	20
6	Skilled Nursing Facilities	35
7	Municipal Hospitals	27
8	Teaching Hospitals	17
9	Non-profit Hospitals	7
10	Government Hospitals	47
11	Correctional Facilities	20
12	Colleges	20
13	Public High Schools	0
14	Transportation Hubs	46
TOTAL		337

EXHIBIT 2-4

WASTE COMPOSITION SUMMARY - ELEMENTARY SCHOOLS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	11.26	9.14	9.18	13.34	54.
Newsprint	3.68	5.25	2.48	4.87	54.
Office/computer	2.88	5.99	1.52	4.24	54.
Magazines/glossy	1.06	1.89	.63	1.49	54.
Book/phone books	.82	1.62	.45	1.19	54.
Non-Corrug. CrdBd.	3.95	4.51	2.93	4.98	54.
Mixed	6.94	6.50	5.46	8.42	54.
Subtotal:	30.58	12.35	27.78	33.39	54.
PLASTICS					
Clear HDPE contnr.	.30	.40	.20	.39	54.
Color HDPE contnr.	.38	.69	.22	.53	54.
LDPE	.06	.34	-.02	.13	54.
Films & Bags	3.97	1.74	3.57	4.36	54.
Green PET contnr.	.12	.40	.03	.21	54.
Clear PET contnr.	.25	.32	.18	.32	54.
PVC	.07	.17	.03	.11	54.
Polypropylene	.13	.53	.01	.25	54.
Polystyrene	.00	.00	.00	.00	54.
Misc. Plastics	4.99	4.61	3.95	6.04	54.
Subtotal:	10.25	5.24	9.06	11.44	54.
YARD WASTE					
Grass/Leaves	7.47	10.28	5.13	9.80	54.
Brush/prun./stumps	1.21	4.90	.10	2.33	54.
Subtotal:	8.68	12.17	5.91	11.44	54.
ORGANICS					
Lumber	6.42	8.84	4.41	8.43	54.
Textiles	2.96	3.05	2.27	3.66	54.
Rubber	.03	.14	.00	.07	54.
Fines	2.30	2.17	1.81	2.79	54.
Diapers	1.76	9.90	-.49	4.01	54.
Foodwaste	18.68	15.32	15.20	22.16	54.
Misc. Organics	5.78	8.37	3.88	7.69	54.
Subtotal:	37.93	12.64	35.06	40.81	54.
GLASS					
Clear container	1.94	1.76	1.54	2.34	54.
Green container	.29	.57	.16	.42	54.
Brown container	.29	.56	.16	.42	54.
Misc. Glass	.48	1.60	.11	.84	54.
Subtotal:	3.00	2.99	2.32	3.68	54.
METALS					
Food Contnr./foil	.50	.57	.37	.63	54.
Beverage Cans	.34	.34	.26	.42	54.
Misc. Aluminum	.15	.66	.00	.30	54.
Food container	1.77	2.39	1.23	2.31	54.
Other	2.14	3.36	1.37	2.90	54.
Bimetal Cans	.00	.00	.00	.00	54.
Subtotal:	4.90	4.00	3.99	5.81	54.
INORGANICS					
Non-bulk ceramics	.02	.10	-.00	.05	54.
Misc. Inorganics	3.59	7.20	1.96	5.23	54.
Subtotal:	3.62	7.20	1.98	5.25	54.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	54.
Non-pestic. poisons	.01	.11	-.01	.04	54.
Paint/Solvent/fuel	.62	2.02	.16	1.08	54.
Dry Cell batteries	.01	.03	-.00	.01	54.
Car Batteries	.00	.00	.00	.00	54.
Medical Waste	.04	.27	-.02	.10	54.
Misc HHW	.36	1.39	.04	.67	54.
Subtotal:	1.04	3.23	.30	1.77	54.
RETURNABLES COUNT					
Plastics	1.07	3.13	.36	1.78	54.
Aluminum	4.09	12.61	1.22	6.96	54.
Glass	1.26	4.33	.27	2.24	54.
Mean Sample Wt:	250.79				

EXHIBIT 2-5

WASTE COMPOSITION SUMMARY - JUNIOR HIGH SCHOOLS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.09	3.71	8.27	11.91	13.
Newsprint	1.77	1.62	.98	2.57	13.
Office/computer	5.05	5.32	2.44	7.67	13.
Magazines/glossy	.47	.53	.21	.73	13.
Book/phone books	.43	1.07	-.10	.96	13.
Non-Corrug. CrdBd.	4.92	3.14	3.38	6.47	13.
Mixed	5.14	3.35	3.50	6.79	13.
Subtotal:	27.89	7.19	24.36	31.42	13.
PLASTICS					
Clear HDPE contnr.	.36	.22	.25	.47	13.
Color HDPE contnr.	.23	.33	.07	.40	13.
LDPE	.05	.08	.01	.09	13.
Films & Bags	3.43	1.77	2.56	4.31	13.
Green PET contnr.	.01	.03	-.01	.02	13.
Clear PET contnr.	.45	1.03	-.06	.95	13.
PVC	.06	.22	-.05	.17	13.
Polypropylene	.02	.04	-.00	.04	13.
Polystyrene	.00	.00	.00	.00	13.
Misc. Plastics	7.07	3.04	5.58	8.56	13.
Subtotal:	11.67	3.12	10.14	13.20	13.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	13.
Brush/prun./stumps	1.30	4.43	-.88	3.47	13.
Subtotal:	1.30	4.43	-.88	3.47	13.
ORGANICS					
Lumber	1.90	3.88	-.01	3.80	13.
Textiles	1.59	1.71	.75	2.43	13.
Rubber	.00	.00	.00	.00	13.
Fines	1.37	1.14	.81	1.93	13.
Diapers	.34	.91	-.11	.79	13.
Foodwaste	22.73	12.84	16.42	29.04	13.
Misc. Organics	9.40	11.28	3.85	14.94	13.
Subtotal:	37.32	10.69	32.06	42.57	13.
GLASS					
Clear container	1.39	.92	.93	1.84	13.
Green container	.31	.40	.11	.50	13.
Brown container	.65	1.44	-.06	1.35	13.
Misc. Glass	.04	.13	-.02	.10	13.
Subtotal:	2.38	1.48	1.66	3.11	13.
METALS					
Food Contnr./foil	.70	.72	.35	1.05	13.
Beverage Cans	.26	.20	.16	.36	13.
Misc. Aluminum	.03	.13	-.03	.09	13.
Food container	1.82	2.61	.54	3.10	13.
Other	1.74	3.45	.05	3.43	13.
Bimetal Cans	.00	.00	.00	.00	13.
Subtotal:	4.55	3.58	2.79	6.31	13.
INORGANICS					
Non-bulk ceramics	.03	.11	-.02	.09	13.
Misc. Inorganics	14.44	13.58	7.77	21.11	13.
Subtotal:	14.47	13.55	7.82	21.13	13.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	13.
Non-pestic. poisons	.00	.00	.00	.00	13.
Paint/Solvent/fuel	.42	1.47	-.30	1.14	13.
Dry Cell batteries	.00	.00	.00	.00	13.
Car Batteries	.00	.00	.00	.00	13.
Medical Waste	.00	.00	.00	.00	13.
Misc HHW	.00	.00	.00	.00	13.
Subtotal:	.42	1.47	-.30	1.14	13.
RETURNABLES COUNT					
Plastics	.42	1.11	-.12	.97	13.
Aluminum	2.49	5.76	-.33	5.32	13.
Glass	1.10	3.13	-.43	2.64	13.
Mean Sample Wt:	237.42				

EXHIBIT 2-6

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (K-8TH GRADE)
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.32	5.12	4.09	8.56	16.
Newsprint	1.58	1.60	.89	2.28	16.
Office/computer	1.08	2.00	.21	1.95	16.
Magazines/glossy	6.60	12.06	1.34	11.86	16.
Book/phone books	19.11	24.07	8.61	29.62	16.
Non-Corrug. CrdBd.	2.13	2.70	.96	3.31	16.
Mixed	6.99	7.01	3.93	10.05	16.
Subtotal:	43.83	32.04	29.84	57.81	16.
PLASTICS					
Clear HDPE contnr.	.15	.33	.00	.29	16.
Color HDPE contnr.	.12	.41	-.06	.30	16.
LDPE	.00	.00	.00	.00	16.
Films & Bags	2.89	2.58	1.76	4.02	16.
Green PET contnr.	.06	.19	-.02	.15	16.
Clear PET contnr.	.13	.42	-.05	.31	16.
PVC	.01	.04	-.01	.03	16.
Polypropylene	.01	.04	-.01	.03	16.
Polystyrene	.00	.00	.00	.00	16.
Misc. Plastics	1.71	2.87	.46	2.96	16.
Subtotal:	5.08	5.58	2.65	7.51	16.
YARD WASTE					
Grass/Leaves	2.79	5.64	.33	5.26	16.
Brush/prun./stumps	.35	1.45	-.28	.99	16.
Subtotal:	3.15	6.91	.13	6.16	16.
ORGANICS					
Lumber	.28	.53	.04	.51	16.
Textiles	.72	1.22	.19	1.25	16.
Rubber	.14	.54	-.10	.37	16.
Fines	.68	.94	.27	1.09	16.
Diapers	.15	.51	-.08	.37	16.
Foodwaste	39.54	34.50	24.48	54.60	16.
Misc. Organics	1.31	3.72	-.31	2.93	16.
Subtotal:	42.80	33.34	28.25	57.36	16.
GLASS					
Clear container	.41	.76	.08	.74	16.
Green container	.03	.12	-.02	.08	16.
Brown container	.05	.18	-.03	.13	16.
Misc. Glass	.00	.00	.00	.00	16.
Subtotal:	.49	.93	.09	.90	16.
METALS					
Food Contnr./foil	.34	.48	.13	.55	16.
Beverage Cans	.17	.35	.02	.33	16.
Misc. Aluminum	.07	.34	-.08	.22	16.
Food container	2.16	3.61	.59	3.73	16.
Other	1.02	2.01	.14	1.90	16.
Bimetal Cans	.00	.00	.00	.00	16.
Subtotal:	3.76	4.32	1.88	5.65	16.
INORGANICS					
Non-bulk ceramics	.05	.29	-.07	.18	16.
Misc. Inorganics	.82	2.35	-.21	1.84	16.
Subtotal:	.87	2.62	-.28	2.01	16.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	16.
Non-pestic. poisons	.00	.00	.00	.00	16.
Paint/Solvent/fuel	.02	.08	-.02	.05	16.
Dry Cell batteries	.01	.02	-.00	.01	16.
Car Batteries	.00	.00	.00	.00	16.
Medical Waste	.00	.00	.00	.00	16.
Misc HHW	.00	.00	.00	.00	16.
Subtotal:	.02	.08	-.02	.06	16.
RETURNABLES COUNT					
Plastics	.29	2.03	-.59	1.18	16.
Aluminum	1.72	8.96	-2.19	5.64	16.
Glass	.25	2.44	-.81	1.31	16.
Mean Sample Wt:	300.83				

EXHIBIT 2-7

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (6-12TH GRADE)
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.26	4.52	4.22	8.31	15.
Newsprint	6.82	6.16	4.03	9.61	15.
Office/computer	6.90	7.56	3.48	10.32	15.
Magazines/glossy	3.15	4.04	1.32	4.98	15.
Book/phone books	2.32	3.45	.76	3.88	15.
Non-Corrug. CrdBd.	1.33	1.63	.59	2.06	15.
Mixed	6.75	7.36	3.42	10.08	15.
Subtotal:	33.52	16.87	25.89	41.16	15.
PLASTICS					
Clear HDPE contnr.	.32	.39	.14	.50	15.
Color HDPE contnr.	.22	.55	-.03	.47	15.
LDPE	.01	.02	-.00	.02	15.
Films & Bags	10.65	15.41	3.68	17.63	15.
Green PET contnr.	.00	.00	.00	.00	15.
Clear PET contnr.	.09	.31	-.05	.23	15.
PVC	.04	.09	-.01	.08	15.
Polypropylene	.07	.11	.02	.12	15.
Polystyrene	.00	.00	.00	.00	15.
Misc. Plastics	1.37	1.18	.84	1.90	15.
Subtotal:	12.77	16.01	5.53	20.02	15.
YARD WASTE					
Grass/Leaves	13.68	13.42	7.60	19.75	15.
Brush/prun./stumps	8.81	12.58	3.11	14.50	15.
Subtotal:	22.49	16.18	15.16	29.81	15.
ORGANICS					
Lumber	6.88	10.14	2.29	11.47	15.
Textiles	1.74	1.91	.87	2.60	15.
Rubber	.24	.63	-.05	.52	15.
Fines	1.60	1.80	.79	2.41	15.
Diapers	.06	.18	-.02	.14	15.
Foodwaste	3.34	3.22	1.88	4.79	15.
Misc. Organics	4.41	6.70	1.38	7.44	15.
Subtotal:	18.25	11.82	12.90	23.61	15.
GLASS					
Clear container	1.54	1.60	.82	2.27	15.
Green container	.32	.49	.09	.54	15.
Brown container	.34	.44	.14	.54	15.
Misc. Glass	.00	.00	.00	.00	15.
Subtotal:	2.20	1.75	1.41	2.99	15.
METALS					
Food Contnr./foil	.53	.68	.22	.84	15.
Beverage Cans	.42	.33	.28	.57	15.
Misc. Aluminum	.06	.24	-.05	.17	15.
Food container	1.06	1.76	.26	1.86	15.
Other	1.66	2.17	.68	2.65	15.
Bimetal Cans	.00	.00	.00	.00	15.
Subtotal:	3.74	3.70	2.06	5.41	15.
INORGANICS					
Non-bulk ceramics	.29	1.18	-.25	.82	15.
Misc. Inorganics	6.74	9.75	2.33	11.15	15.
Subtotal:	7.03	10.69	2.19	11.87	15.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	15.
Non-pestic. poisons	.00	.00	.00	.00	15.
Paint/Solvent/fuel	.00	.00	.00	.00	15.
Dry Cell batteries	.00	.00	.00	.00	15.
Car Batteries	.00	.00	.00	.00	15.
Medical Waste	.00	.00	.00	.00	15.
Misc HHW	.00	.00	.00	.00	15.
Subtotal:	.00	.00	.00	.00	15.
RETURNABLES COUNT					
Plastics	.32	1.12	-.19	.82	15.
Aluminum	3.47	6.72	.43	6.51	15.
Glass	1.84	4.34	-.13	3.80	15.
Mean Sample Wt:	232.37				

EXHIBIT 2-8

WASTE COMPOSITION SUMMARY - PSYCHIATRIC HOSPITALS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	13.06	5.28	11.02	15.09	20.
Newsprint	2.11	2.17	1.28	2.95	20.
Office/computer	8.79	11.35	4.42	13.17	20.
Magazines/glossy	.51	.87	.17	.85	20.
Book/phone books	.04	.13	-.01	.09	20.
Non-Corrug. CrdBd.	6.46	3.86	4.97	7.95	20.
Mixed	5.26	4.46	3.54	6.98	20.
Subtotal:	36.24	14.38	30.69	41.78	20.
PLASTICS					
Clear HDPE contnr.	.31	.41	.15	.47	20.
Color HDPE contnr.	.58	.57	.36	.80	20.
LDPE	.13	.24	.03	.22	20.
Films & Bags	4.68	2.40	3.76	5.61	20.
Green PET contnr.	.13	.27	.02	.23	20.
Clear PET contnr.	.21	.28	.10	.31	20.
PVC	.01	.06	-.01	.03	20.
Polypropylene	.08	.20	.00	.16	20.
Polystyrene	.00	.00	.00	.00	20.
Misc. Plastics	7.57	3.02	6.41	8.73	20.
Subtotal:	13.70	4.00	12.15	15.24	20.
YARD WASTE					
Grass/Leaves	4.67	10.20	.74	8.61	20.
Brush/prun./stumps	.75	3.16	-.47	1.96	20.
Subtotal:	5.42	10.36	1.42	9.41	20.
ORGANICS					
Lumber	.96	1.95	.20	1.71	20.
Textiles	3.83	3.23	2.58	5.07	20.
Rubber	.15	.38	.00	.30	20.
Fines	1.56	1.39	1.03	2.10	20.
Diapers	1.33	2.26	.46	2.20	20.
Foodwaste	18.35	9.67	14.62	22.08	20.
Misc. Organics	7.47	5.58	5.32	9.63	20.
Subtotal:	33.66	10.70	29.53	37.78	20.
GLASS					
Clear container	1.80	1.12	1.37	2.23	20.
Green container	.05	.14	-.00	.11	20.
Brown container	.15	.44	-.02	.32	20.
Misc. Glass	.00	.00	.00	.00	20.
Subtotal:	2.00	1.00	1.61	2.39	20.
METALS					
Food Contnr./foil	1.03	1.46	.47	1.60	20.
Beverage Cans	.41	.19	.34	.48	20.
Misc. Aluminum	.06	.19	-.01	.14	20.
Food container	4.54	3.11	3.33	5.74	20.
Other	.42	1.79	-.28	1.11	20.
Bimetal Cans	.00	.00	.00	.00	20.
Subtotal:	6.46	3.47	5.12	7.80	20.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	20.
Misc. Inorganics	2.02	4.05	.46	3.58	20.
Subtotal:	2.02	4.05	.46	3.58	20.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	20.
Non-pestic. poisons	.04	.19	-.03	.12	20.
Paint/Solvent/fuel	.09	.47	-.10	.27	20.
Dry Cell batteries	.01	.06	-.01	.03	20.
Car Batteries	.00	.00	.00	.00	20.
Medical Waste	.30	1.49	-.27	.88	20.
Misc HHW	.07	.19	-.00	.14	20.
Subtotal:	.51	1.53	-.08	1.10	20.
RETURNABLES COUNT					
Plastics	1.19	3.68	-.23	2.61	20.
Aluminum	4.88	6.05	2.54	7.21	20.
Glass	.70	2.61	-.31	1.71	20.
Mean Sample Wt:	234.84				

EXHIBIT 2-9

WASTE COMPOSITION SUMMARY - SKILLED NURSING FACILITIES
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	9.12	5.74	7.48	10.75	35.
Newsprint	.83	.97	.56	1.11	35.
Office/computer	1.97	3.66	.93	3.01	35.
Magazines/glossy	.38	1.13	.06	.70	35.
Book/phone books	.12	.48	-.02	.25	35.
Non-Corrug. CrdBd.	3.72	2.82	2.92	4.53	35.
Mixed	5.84	4.71	4.50	7.18	35.
Subtotal:	21.97	8.87	19.45	24.50	35.
PLASTICS					
Clear HDPE contnr.	.38	.68	.19	.58	35.
Color HDPE contnr.	.35	.61	.18	.52	35.
LDPE	.23	.41	.12	.35	35.
Films & Bags	5.09	3.49	4.10	6.09	35.
Green PET contnr.	.00	.02	-.00	.01	35.
Clear PET contnr.	.03	.15	-.01	.07	35.
PVC	.00	.02	-.00	.01	35.
Polypropylene	.14	.30	.06	.23	35.
Polystyrene	.00	.00	.00	.00	35.
Misc. Plastics	5.71	3.47	4.72	6.70	35.
Subtotal:	11.96	6.32	10.16	13.75	35.
YARD WASTE					
Grass/Leaves	.05	.34	-.05	.14	35.
Brush/prun./stumps	.58	2.45	-.12	1.28	35.
Subtotal:	.63	2.73	-.15	1.41	35.
ORGANICS					
Lumber	.16	.74	-.05	.37	35.
Textiles	3.10	4.73	1.76	4.45	35.
Rubber	.19	.33	.10	.28	35.
Fines	1.67	2.55	.94	2.39	35.
Diapers	33.48	18.97	28.08	38.88	35.
Foodwaste	14.15	9.35	11.49	16.82	35.
Misc. Organics	6.77	9.36	4.11	9.43	35.
Subtotal:	59.52	15.35	55.15	63.89	35.
GLASS					
Clear container	.69	.76	.47	.91	35.
Green container	.09	.25	.02	.17	35.
Brown container	.08	.40	-.03	.20	35.
Misc. Glass	.03	.15	-.02	.07	35.
Subtotal:	.89	.90	.64	1.15	35.
METALS					
Food Contnr./foil	.40	.52	.25	.55	35.
Beverage Cans	.20	.28	.12	.28	35.
Misc. Aluminum	.17	.63	-.01	.35	35.
Food container	2.98	2.06	2.39	3.56	35.
Other	.21	.53	.05	.36	35.
Bimetal Cans	.00	.00	.00	.00	35.
Subtotal:	3.96	2.27	3.31	4.60	35.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	35.
Misc. Inorganics	.59	2.26	-.05	1.24	35.
Subtotal:	.59	2.26	-.05	1.24	35.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	35.
Non-pestic. poisons	.01	.06	-.00	.03	35.
Paint/Solvent/fuel	.00	.00	.00	.00	35.
Dry Cell batteries	.09	.53	-.06	.24	35.
Car Batteries	.00	.00	.00	.00	35.
Medical Waste	.37	.94	.10	.64	35.
Misc HHW	.00	.00	.00	.00	35.
Subtotal:	.47	1.07	.17	.78	35.
RETURNABLES COUNT					
Plastics	.20	1.48	-.22	.62	35.
Aluminum	2.16	9.23	-.47	4.79	35.
Glass	.19	1.36	-.20	.57	35.
Mean Sample Wt:	242.34				

EXHIBIT 2-10

WASTE COMPOSITION SUMMARY - MUNICIPAL HOSPITALS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	24.28	13.50	19.86	28.71	27.
Newsprint	1.33	1.41	.87	1.79	27.
Office/computer	10.24	9.11	7.25	13.23	27.
Magazines/glossy	2.71	5.13	1.02	4.39	27.
Book/phone books	.03	.21	-.04	.10	27.
Non-Corrug. CrdBd.	5.09	4.05	3.76	6.42	27.
Mixed	12.11	7.18	9.76	14.46	27.
Subtotal:	55.78	13.62	51.32	60.24	27.
PLASTICS					
Clear HDPE contnr.	.20	.58	.01	.39	27.
Color HDPE contnr.	.62	.96	.31	.94	27.
LDPE	.30	.40	.17	.43	27.
Films & Bags	3.46	1.67	2.91	4.01	27.
Green PET contnr.	.24	.59	.04	.43	27.
Clear PET contnr.	.18	.29	.08	.27	27.
PVC	.06	.15	.01	.11	27.
Polypropylene	.23	.58	.04	.41	27.
Polystyrene	.00	.00	.00	.00	27.
Misc. Plastics	4.56	3.43	3.43	5.69	27.
Subtotal:	9.85	3.85	8.59	11.12	27.
YARD WASTE					
Grass/Leaves	.23	1.20	-.17	.62	27.
Brush/prun./stumps	.00	.00	.00	.00	27.
Subtotal:	.23	1.20	-.17	.62	27.
ORGANICS					
Lumber	.41	1.31	-.02	.83	27.
Textiles	2.80	2.43	2.00	3.59	27.
Rubber	.35	.66	.13	.56	27.
Fines	.96	1.27	.54	1.37	27.
Diapers	4.31	3.00	3.33	5.30	27.
Foodwaste	11.59	11.77	7.73	15.45	27.
Misc. Organics	3.76	5.76	1.87	5.65	27.
Subtotal:	24.17	10.71	20.66	27.68	27.
GLASS					
Clear container	6.32	8.75	3.46	9.19	27.
Green container	.10	.26	.02	.19	27.
Brown container	.23	.44	.09	.38	27.
Misc. Glass	.00	.00	.00	.00	27.
Subtotal:	6.66	9.00	3.71	9.61	27.
METALS					
Food Contnr./foil	.58	.61	.38	.79	27.
Beverage Cans	.48	.20	.42	.55	27.
Misc. Aluminum	.09	.27	.00	.18	27.
Food container	1.19	1.05	.84	1.53	27.
Other	.36	.85	.08	.64	27.
Bimetal Cans	.05	.20	-.02	.11	27.
Subtotal:	2.75	1.29	2.33	3.17	27.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	27.
Misc. Inorganics	.05	.20	-.02	.11	27.
Subtotal:	.05	.20	-.02	.11	27.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	27.
Non-pestic. poisons	.00	.00	.00	.00	27.
Paint/Solvent/fuel	.01	.07	-.01	.04	27.
Dry Cell batteries	.01	.03	-.00	.02	27.
Car Batteries	.00	.00	.00	.00	27.
Medical Waste	.49	.96	.18	.81	27.
Misc HHW	.00	.00	.00	.00	27.
Subtotal:	.51	.97	.20	.83	27.
RETURNABLES COUNT					
Plastics	.87	2.89	-.07	1.82	27.
Aluminum	6.04	7.77	3.50	8.59	27.
Glass	1.21	3.93	-.08	2.49	27.
Mean Sample Wt:	245.70				

EXHIBIT 2-11

WASTE COMPOSITION SUMMARY - TEACHING HOSPITALS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	11.05	8.87	7.31	14.79	17.
Newsprint	6.00	5.19	3.81	8.20	17.
Office/computer	14.57	19.87	6.19	22.96	17.
Magazines/glossy	.60	1.25	.08	1.13	17.
Book/phone books	.96	3.34	-.45	2.37	17.
Non-Corrug. CrdBd.	6.36	6.92	3.44	9.28	17.
Mixed	12.74	8.92	8.97	16.50	17.
Subtotal:	52.29	15.86	45.60	58.98	17.
PLASTICS					
Clear HDPE contnr.	.45	.64	.18	.72	17.
Color HDPE contnr.	1.59	2.26	.64	2.55	17.
LDPE	.12	.36	-.03	.28	17.
Films & Bags	5.15	3.80	3.55	6.76	17.
Green PET contnr.	.32	.44	.14	.51	17.
Clear PET contnr.	.17	.35	.02	.32	17.
PVC	.00	.00	.00	.00	17.
Polypropylene	.25	.57	.01	.49	17.
Polystyrene	.00	.00	.00	.00	17.
Misc. Plastics	5.11	3.10	3.80	6.42	17.
Subtotal:	13.18	7.64	9.95	16.40	17.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	17.
Brush/prun./stumps	.00	.00	.00	.00	17.
Subtotal:	.00	.00	.00	.00	17.
ORGANICS					
Lumber	1.44	2.33	.46	2.42	17.
Textiles	5.66	6.01	3.13	8.20	17.
Rubber	.45	.72	.15	.76	17.
Fines	1.34	1.17	.85	1.84	17.
Diapers	2.44	2.93	1.21	3.68	17.
Foodwaste	12.78	8.47	9.20	16.35	17.
Misc. Organics	1.67	3.61	.15	3.20	17.
Subtotal:	25.79	10.77	21.24	30.33	17.
GLASS					
Clear container	.56	1.11	.09	1.03	17.
Green container	.51	.76	.19	.83	17.
Brown container	.03	.10	-.02	.07	17.
Misc. Glass	.00	.00	.00	.00	17.
Subtotal:	1.10	1.52	.46	1.74	17.
METALS					
Food Contnr./foil	.96	1.30	.41	1.51	17.
Beverage Cans	.59	.42	.41	.77	17.
Misc. Aluminum	.40	.59	.15	.65	17.
Food container	2.40	2.93	1.16	3.64	17.
Other	.08	.34	-.06	.23	17.
Bimetal Cans	.00	.00	.00	.00	17.
Subtotal:	4.43	3.40	3.00	5.86	17.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	17.
Misc. Inorganics	.03	.14	-.03	.09	17.
Subtotal:	.03	.14	-.03	.09	17.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	17.
Non-pestic. poisons	.00	.00	.00	.00	17.
Paint/Solvent/fuel	.00	.00	.00	.00	17.
Dry Cell batteries	.00	.00	.00	.00	17.
Car Batteries	.00	.00	.00	.00	17.
Medical Waste	3.06	4.62	1.11	5.01	17.
Misc HHW	.14	.55	-.09	.37	17.
Subtotal:	3.19	4.60	1.25	5.14	17.
RETURNABLES COUNT					
Plastics	1.12	4.20	-.65	2.90	17.
Aluminum	7.10	9.88	2.93	11.27	17.
Glass	.58	1.86	-.21	1.36	17.
Mean Sample Wt:	214.53				

EXHIBIT 2-12

WASTE COMPOSITION SUMMARY - NON-PROFIT HOSPITALS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	26.62	9.52	19.80	33.44	7.
Newsprint	2.64	1.97	1.22	4.05	7.
Office/computer	10.58	4.09	7.66	13.51	7.
Magazines/glossy	.57	.91	-.08	1.22	7.
Book/phone books	.00	.00	.00	.00	7.
Non-Corrug. CrdBd.	3.39	1.80	2.10	4.67	7.
Mixed	11.20	1.97	9.79	12.61	7.
Subtotal:	54.99	6.00	50.70	59.29	7.
PLASTICS					
Clear HDPE contnr.	.30	.18	.17	.43	7.
Color HDPE contnr.	.06	.11	-.02	.14	7.
LDPE	.19	.10	.13	.26	7.
Films & Bags	3.97	1.26	3.07	4.87	7.
Green PET contnr.	.01	.04	-.01	.04	7.
Clear PET contnr.	.04	.08	-.01	.10	7.
PVC	.22	.43	-.08	.53	7.
Polypropylene	.73	1.50	-.34	1.81	7.
Polystyrene	.00	.00	.00	.00	7.
Misc. Plastics	10.22	2.94	8.11	12.33	7.
Subtotal:	15.77	3.20	13.48	18.06	7.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	7.
Brush/prun./stumps	.00	.00	.00	.00	7.
Subtotal:	.00	.00	.00	.00	7.
ORGANICS					
Lumber	.66	1.39	-.33	1.65	7.
Textiles	1.29	.91	.64	1.94	7.
Rubber	.00	.00	.00	.00	7.
Fines	.60	.26	.41	.79	7.
Diapers	11.87	6.73	7.05	16.69	7.
Foodwaste	8.26	3.43	5.80	10.71	7.
Misc. Organics	.00	.00	.00	.00	7.
Subtotal:	22.68	6.42	18.08	27.27	7.
GLASS					
Clear container	1.39	.77	.84	1.95	7.
Green container	.00	.00	.00	.00	7.
Brown container	.00	.00	.00	.00	7.
Misc. Glass	.04	.10	-.03	.12	7.
Subtotal:	1.44	.86	.82	2.05	7.
METALS					
Food Contnr./foil	.24	.13	.14	.33	7.
Beverage Cans	.42	.39	.14	.70	7.
Misc. Aluminum	.00	.00	.00	.00	7.
Food container	3.18	2.92	1.09	5.27	7.
Other	.27	.48	-.07	.61	7.
Bimetal Cans	.00	.00	.00	.00	7.
Subtotal:	4.11	3.35	1.71	6.51	7.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	7.
Misc. Inorganics	.00	.00	.00	.00	7.
Subtotal:	.00	.00	.00	.00	7.
HAZARDOUS WASTE					
Pesticides	.12	.35	-.13	.37	7.
Non-pestic. poisons	.01	.04	-.02	.05	7.
Paint/Solvent/fuel	.12	.17	-.00	.24	7.
Dry Cell batteries	.00	.00	.00	.00	7.
Car Batteries	.00	.00	.00	.00	7.
Medical Waste	.76	1.50	-.31	1.84	7.
Misc HHW	.00	.00	.00	.00	7.
Subtotal:	1.02	1.59	-.12	2.15	7.
RETURNABLES COUNT					
Plastics	.30	1.03	-.44	1.04	7.
Aluminum	6.71	7.15	1.59	11.84	7.
Glass	.00	.00	.00	.00	7.
Mean Sample Wt:	238.29				

WASTE COMPOSITION SUMMARY - GOVERNMENT OFFICES
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	4.75	3.86	3.81	5.69	47.
Newsprint	9.04	6.60	7.43	10.65	47.
Office/computer	51.96	23.29	46.29	57.64	47.
Magazines/glossy	1.80	3.20	1.02	2.58	47.
Book/phone books	2.61	3.71	1.71	3.52	47.
Non-Corrug. CrdBd.	3.24	3.72	2.34	4.15	47.
Mixed	12.41	14.02	9.00	15.83	47.
Subtotal:	85.82	11.44	83.03	88.61	47.
PLASTICS					
Clear HDPE contnr.	.08	.17	.04	.13	47.
Color HDPE contnr.	.08	.21	.03	.13	47.
LDPE	.06	.11	.03	.09	47.
Films & Bags	1.73	1.58	1.34	2.11	47.
Green PET contnr.	.04	.09	.02	.06	47.
Clear PET contnr.	.13	.27	.07	.20	47.
PVC	.08	.34	.00	.17	47.
Polypropylene	.20	.87	-.01	.41	47.
Polystyrene	.00	.00	.00	.00	47.
Misc. Plastics	2.13	3.08	1.38	2.88	47.
Subtotal:	4.55	4.87	3.36	5.73	47.
YARD WASTE					
Grass/Leaves	.11	.48	-.01	.22	47.
Brush/prun./stumps	.00	.05	-.01	.02	47.
Subtotal:	.11	.49	-.01	.23	47.
ORGANICS					
Lumber	.05	.21	-.00	.10	47.
Textiles	.81	1.78	.37	1.24	47.
Rubber	.00	.00	.00	.00	47.
Fines	.66	.85	.46	.87	47.
Diapers	.05	.21	-.00	.10	47.
Foodwaste	2.30	4.10	1.30	3.30	47.
Misc. Organics	.61	2.10	.10	1.12	47.
Subtotal:	4.48	6.99	2.77	6.18	47.
GLASS					
Clear container	2.17	1.44	1.82	2.52	47.
Green container	.33	.86	.12	.54	47.
Brown container	.08	.16	.04	.12	47.
Misc. Glass	.00	.00	.00	.00	47.
Subtotal:	2.58	1.69	2.16	2.99	47.
METALS					
Food Contnr./foil	.81	1.21	.52	1.11	47.
Beverage Cans	.70	.47	.59	.82	47.
Misc. Aluminum	.17	.54	.04	.30	47.
Food container	.36	.37	.26	.45	47.
Other	.28	.61	.13	.43	47.
Bimetal Cans	.00	.00	.00	.00	47.
Subtotal:	2.32	1.82	1.88	2.76	47.
INORGANICS					
Non-bulk ceramics	.02	.09	-.00	.04	47.
Misc. Inorganics	.01	.06	-.00	.02	47.
Subtotal:	.03	.10	.00	.05	47.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	47.
Non-pestic. poisons	.00	.04	-.01	.02	47.
Paint/Solvent/fuel	.08	.50	-.04	.21	47.
Dry Cell batteries	.03	.10	.00	.05	47.
Car Batteries	.00	.00	.00	.00	47.
Medical Waste	.00	.00	.00	.00	47.
Misc HHW	.00	.02	-.00	.01	47.
Subtotal:	.12	.53	-.01	.25	47.
RETURNABLES COUNT					
Plastics	.73	2.45	.13	1.32	47.
Aluminum	10.15	15.77	6.30	13.99	47.
Glass	1.32	4.07	.33	2.31	47.
Mean Sample Wt:	225.63				

EXHIBIT 2-14

WASTE COMPOSITION SUMMARY - CORRECTIONAL FACILITIES
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	8.05	6.98	5.35	10.74	20.
Newsprint	6.63	4.80	4.78	8.48	20.
Office/computer	5.86	7.50	2.97	8.76	20.
Magazines/glossy	.70	1.24	.22	1.18	20.
Book/phone books	.70	2.21	-.15	1.56	20.
Non-Corrug. CrdBd.	2.17	2.70	1.13	3.21	20.
Mixed	11.78	7.51	8.89	14.68	20.
Subtotal:	35.90	14.07	30.47	41.33	20.
PLASTICS					
Clear HDPE contnr.	.24	.35	.11	.38	20.
Color HDPE contnr.	.46	.65	.21	.71	20.
LDPE	.11	.21	.03	.19	20.
Films & Bags	8.56	7.44	5.69	11.43	20.
Green PET contnr.	.27	.91	-.08	.62	20.
Clear PET contnr.	.12	.35	-.01	.26	20.
PVC	.10	.38	-.04	.25	20.
Polypropylene	.23	.79	-.07	.54	20.
Polystyrene	.00	.00	.00	.00	20.
Misc. Plastics	3.05	4.01	1.50	4.60	20.
Subtotal:	13.15	8.74	9.78	16.52	20.
YARD WASTE					
Grass/Leaves	14.09	20.64	6.13	22.05	20.
Brush/prun./stumps	1.70	2.81	.62	2.79	20.
Subtotal:	15.79	22.61	7.07	24.51	20.
ORGANICS					
Lumber	1.64	2.47	.69	2.59	20.
Textiles	4.00	3.55	2.62	5.37	20.
Rubber	1.06	4.94	-.85	2.96	20.
Fines	2.31	1.85	1.60	3.02	20.
Diapers	.05	.18	-.03	.12	20.
Foodwaste	10.00	11.01	5.76	14.25	20.
Misc. Organics	4.62	5.63	2.45	6.79	20.
Subtotal:	23.67	14.15	18.21	29.13	20.
GLASS					
Clear container	1.24	1.31	.73	1.74	20.
Green container	.27	.94	-.09	.64	20.
Brown container	.12	.29	.01	.24	20.
Misc. Glass	.00	.00	.00	.00	20.
Subtotal:	1.63	2.17	.80	2.47	20.
METALS					
Food Contnr./foil	.33	.50	.14	.52	20.
Beverage Cans	.45	.40	.30	.61	20.
Misc. Aluminum	.20	.46	.02	.38	20.
Food container	1.31	2.86	.21	2.41	20.
Other	2.59	3.82	1.11	4.06	20.
Bimetal Cans	.00	.00	.00	.00	20.
Subtotal:	4.88	4.74	3.05	6.71	20.
INORGANICS					
Non-bulk ceramics	.20	.70	-.06	.47	20.
Misc. Inorganics	4.48	6.56	1.95	7.01	20.
Subtotal:	4.69	6.72	2.10	7.28	20.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	20.
Non-pestic. poisons	.00	.00	.00	.00	20.
Paint/Solvent/fuel	.27	.93	-.09	.63	20.
Dry Cell batteries	.01	.04	-.00	.03	20.
Car Batteries	.00	.00	.00	.00	20.
Medical Waste	.00	.00	.00	.00	20.
Misc HHW	.00	.00	.00	.00	20.
Subtotal:	.28	.92	-.07	.64	20.
RETURNABLES COUNT					
Plastics	.82	3.66	-.59	2.23	20.
Aluminum	4.22	11.00	-.02	8.47	20.
Glass	.79	3.46	-.54	2.13	20.
Mean Sample Wt:	220.23				

EXHIBIT 2-15

WASTE COMPOSITION SUMMARY - COLLEGES

SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	8.88	6.72	6.29	11.47	20.
Newsprint	5.30	4.15	3.70	6.91	20.
Office/computer	22.88	19.84	15.23	30.53	20.
Magazines/glossy	5.48	6.55	2.96	8.01	20.
Book/phone books	8.10	11.33	3.73	12.47	20.
Non-Corrug. CrdBd.	3.58	3.87	2.09	5.08	20.
Mixed	12.56	11.63	8.08	17.05	20.
Subtotal:	66.80	20.09	59.05	74.55	20.
PLASTICS					
Clear HDPE contnr.	.30	.48	.11	.48	20.
Color HDPE contnr.	.24	.61	.00	.47	20.
LDPE	.08	.16	.02	.15	20.
Films & Bags	3.65	2.37	2.73	4.56	20.
Green PET contnr.	.44	1.62	-.19	1.07	20.
Clear PET contnr.	.27	.46	.09	.45	20.
PVC	.01	.03	-.00	.02	20.
Polypropylene	.02	.08	-.01	.05	20.
Polystyrene	.00	.00	.00	.00	20.
Misc. Plastics	1.95	.94	1.59	2.32	20.
Subtotal:	6.94	2.91	5.82	8.07	20.
YARD WASTE					
Grass/Leaves	.38	1.64	-.25	1.01	20.
Brush/prun./stumps	.35	1.92	-.39	1.09	20.
Subtotal:	.73	2.46	-.22	1.68	20.
ORGANICS					
Lumber	.89	1.46	.33	1.46	20.
Textiles	1.54	2.13	.72	2.36	20.
Rubber	.24	.78	-.06	.54	20.
Fines	.73	.99	.34	1.11	20.
Diapers	.09	.20	.01	.16	20.
Foodwaste	15.33	21.99	6.85	23.81	20.
Misc. Organics	2.05	3.07	.87	3.24	20.
Subtotal:	20.87	21.52	12.57	29.17	20.
GLASS					
Clear container	1.39	1.62	.76	2.01	20.
Green container	.42	.85	.10	.75	20.
Brown container	.23	.46	.06	.41	20.
Misc. Glass	.00	.00	.00	.00	20.
Subtotal:	2.05	1.86	1.33	2.76	20.
METALS					
Food Contnr./foil	.17	.28	.06	.27	20.
Beverage Cans	.62	.59	.39	.84	20.
Misc. Aluminum	.08	.22	-.01	.16	20.
Food container	.44	.64	.19	.69	20.
Other	1.31	2.25	.44	2.17	20.
Bimetal Cans	.00	.00	.00	.00	20.
Subtotal:	2.61	2.60	1.60	3.61	20.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	20.
Misc. Inorganics	.00	.00	.00	.00	20.
Subtotal:	.00	.00	.00	.00	20.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	20.
Non-pestic. poisons	.00	.00	.00	.00	20.
Paint/Solvent/fuel	.01	.05	-.01	.03	20.
Dry Cell batteries	.00	.00	.00	.00	20.
Car Batteries	.00	.00	.00	.00	20.
Medical Waste	.00	.00	.00	.00	20.
Misc HHW	.00	.00	.00	.00	20.
Subtotal:	.01	.05	-.01	.03	20.
RETURNABLES COUNT					
Plastics	.87	3.97	-.66	2.40	20.
Aluminum	6.82	10.31	2.84	10.79	20.
Glass	1.57	7.21	-1.21	4.35	20.
Mean Sample Wt:	241.36				

EXHIBIT 2-16

WASTE COMPOSITION SUMMARY - TRANSPORTATION HUBS
SUMMER 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.58	6.68	4.94	8.23	46.
Newsprint	30.48	13.51	27.15	33.81	46.
Office/computer	7.04	13.49	3.71	10.36	46.
Magazines/glossy	1.49	1.50	1.12	1.86	46.
Book/phone books	.92	2.06	.42	1.43	46.
Non-Corrug. CrdBd.	2.25	3.03	1.50	3.00	46.
Mixed	16.49	10.70	13.86	19.13	46.
Subtotal:	65.26	14.36	61.72	68.80	46.
PLASTICS					
Clear HDPE contnr.	.27	.37	.18	.36	46.
Color HDPE contnr.	.34	.61	.19	.49	46.
LDPE	.06	.13	.03	.09	46.
Films & Bags	3.23	3.04	2.48	3.98	46.
Green PET contnr.	.12	.30	.05	.19	46.
Clear PET contnr.	.25	.40	.15	.34	46.
PVC	.09	.22	.04	.15	46.
Polypropylene	.07	.35	-.01	.16	46.
Polystyrene	.00	.00	.00	.00	46.
Misc. Plastics	1.36	1.36	1.02	1.70	46.
Subtotal:	5.79	3.53	4.92	6.66	46.
YARD WASTE					
Grass/Leaves	.49	3.28	-.32	1.30	46.
Brush/prun./stumps	.00	.00	.00	.00	46.
Subtotal:	.49	3.28	-.32	1.30	46.
ORGANICS					
Lumber	.60	.97	.37	.84	46.
Textiles	3.56	3.74	2.64	4.48	46.
Rubber	.43	2.20	-.11	.97	46.
Fines	2.32	3.11	1.55	3.08	46.
Diapers	.27	.74	.09	.46	46.
Foodwaste	2.18	3.55	1.31	3.06	46.
Misc. Organics	2.65	5.04	1.41	3.89	46.
Subtotal:	12.02	8.83	9.84	14.20	46.
GLASS					
Clear container	3.73	2.97	3.00	4.47	46.
Green container	1.09	1.01	.84	1.34	46.
Brown container	.73	.91	.50	.95	46.
Misc. Glass	2.03	5.82	.59	3.46	46.
Subtotal:	7.58	6.88	5.89	9.28	46.
METALS					
Food Contnr./foil	.51	.71	.33	.68	46.
Beverage Cans	1.11	.70	.94	1.28	46.
Misc. Aluminum	.11	.42	.01	.21	46.
Food container	.67	1.14	.39	.95	46.
Other	2.65	3.52	1.79	3.52	46.
Bimetal Cans	.00	.00	.00	.00	46.
Subtotal:	5.05	3.89	4.09	6.00	46.
INORGANICS					
Non-bulk ceramics	.08	1.05	-.17	.34	46.
Misc. Inorganics	3.23	7.64	1.35	5.12	46.
Subtotal:	3.32	7.65	1.43	5.20	46.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	46.
Non-pestic. poisons	.00	.00	.00	.00	46.
Paint/Solvent/fuel	.03	.12	.00	.06	46.
Dry Cell batteries	.04	.08	.02	.05	46.
Car Batteries	.00	.00	.00	.00	46.
Medical Waste	.00	.00	.00	.00	46.
Misc HHW	.42	1.71	.00	.85	46.
Subtotal:	.49	1.75	.06	.92	46.
RETURNABLES COUNT					
Plastics	1.09	3.29	.28	1.90	46.
Aluminum	13.48	21.27	8.24	18.73	46.
Glass	6.50	17.22	2.25	10.74	46.
Mean Sample Wt:	230.21				

SECTION 3

INSTITUTIONAL WASTE ANALYSIS
FALL 1989

APPROACH

Field sorting and weighing procedures in Fall 1989 were similar to Summer 1989 activities (Section 3). The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected institutional facilities served by City forces. For the Fall 1989 activities, field work for the institutional waste sector commenced on Monday, October 30, 1989, with sorting activities completed by Saturday, November 4, 1989. As in the preceding season, institutional waste loads originated from pre-designated City routes, generally described by the project's 14 institutional types (including Public High Schools). Institutional waste loads were delivered to two work sites for sampling, measurement, and weighing activities.

A listing of institutional loads delivered to each work site is given in Exhibits 3-1 and 3-2. The number of incoming vehicles ranged from four to seven vehicles on a daily basis; each vehicle was identified by originating borough, Department of Sanitation collection route, and by institutional type.

The number of refuse samples obtained and sorted by components per institutional type is shown in Exhibit 3-3. A total of 312 institutional waste samples were sorted and classified according to 45 component categories during the Fall 1989 activities.

WASTE COMPOSITION RESULTS

Tabulated composition results for each of the 14 institutional categories are presented sequentially in Exhibits 3-4 through 3-17, as follows:

Exhibit	Institutional Category No.
3-4	Elementary Schools
3-5	Junior High Schools
3-6	Private Schools (Kindergarten-8th Grade)
3-7	Private Schools (6th-12th Grade)

3-8	Psychiatric Hospitals
3-9	Skilled Nursing Facilities
3-10	Municipal Hospitals
3-11	Teaching Hospitals
3-12	Non-Profit Hospitals
3-13	Government Offices
3-14	Correctional Facilities
3-15	Colleges
3-16	Public High Schools
3-17	Transportation Hubs

Summary calculations of component percentages show weighted averages, as well as standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and classified by the project's institutional categories.

Waste composition data from the daily institutional sample loads sorted during the seasonal period are presented in Volume 8.

EXHIBIT 3-1

INSTITUTIONAL LOADS DELIVERED TO MTS SITE
FALL 1989

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
10/30/89	1	MN	College	Control 6	12
	2	QN	Correctional	Control 9	11
	3	SI	Private (6-12)	Control 10	4
	4	QN	Private (K-8)	Control 14	3
10/31/89	1	BX	Elementary	Control 7	1
	2	QN	Public H.S.	Control 20	13
	3	QN	Elementary	Control 13	1
	4	QN	Elementary	Control 12	1
	5	MN	Trans. Hub	Control 18	14
11/01/89	1	MN	Trans. Hub	Control 19	14
	2	MN	College	Control 6	12
	3	QN	Correctional	Control 9	11
	4	MN	Trans. Hub	Control 19	14
	6	MN	Trans. Hub	Control 19	14
	7	MN	Trans. Hub	Control 19	14
11/02/89	1	MN	Trans. Hub	Control 19	4
	2	BK	Govt. Office	Control 4	10
	3	BX	Elementary	Control 7	1
	4	SI	Private (K-8)	Control 14	3
	5	MN	Trans. Hub	Control 19	14
	6	QN	Private (6-12)	Control 10	4
	8	MN	Trans. Hub	Control 18	14
11/03/89	1	QN	Public H.S.	Control 20	12
	2	MN	College	Control 6	1
	3	QN	Elementary	Control 12	1
	4	QN	Correctional	Control 9	11
	5	QN	Elementary	Control 13	1

EXHIBIT 3-2

INSTITUTIONAL LOADS DELIVERED TO HAMILTON AVENUE SITE
FALL 1989

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
10/30/89	1	BK	Govt. Office	Control 4	10
	2	BK	Elementary	Control 3	1
	3	QN	Non-profit	Control 17	9
	4	MN	Municipal	Control 15	7
	5	QN	Skill. Nurs.	Control 11	6
10/31/89	1	BK	Govt. Office	Control 4	10
	2	SI	Teaching Hosp.	Control 16	8
	3	BK	Psych. Hosp.	Control 1	5
	4	BX	Skill. Nurs.	Control 8	6
11/01/89	1	BK	Govt. Office	Control 4	10
	2	BK	Elementary	Control 3	1
	3	BX	Skill. Nurs.	Control 8	6
	4	BK	Junior H.S.	Control 2	2
	5	MN	Municipal	Control 15	7
11/02/89	1	BK	Govt. Office	Control 4	10
	2	QN	Non-profit	Control 17	9
	3	QN	Skill. Nurs.	Control 11	6
	4	BK	Psych. Hosp.	Control 1	5
	5	MN	Municipal	Control 15	7
11/03/89	1	BK	Govt. Office	Control 4	10
	2	BK	Elementary	Control 3	1
	3	SI	Teaching Hosp.	Control 16	8
	4	BX	Skill. Nurs.	Control 8	6
	5	BK	Junior H.S.	Control 2	2
11/04/89	1	BK	Govt. Office	Control 4	10
	2	BK	Psych. Hosp.	Control 1	5
	3	BK	Elementary	Control 7	1
	4	MN	Municipal	Control 15	7

EXHIBIT 3-3

SORT SAMPLES OBTAINED BY INSTITUTIONAL CATEGORY
FALL 1989

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF SORT SAMPLES
1	Elementary Schools	31
2	Junior High Schools	21
3	Private Schools, K-8th Grade	17
4	Private Schools, 6-12th Grade	14
5	Psychiatric Hospitals	20
6	Skilled Nursing Facilities	22
7	Municipal Hospitals	21
8	Teaching Hospitals	19
9	Non-profit Hospitals	23
10	Government Hospitals	25
11	Correctional Facilities	22
12	Colleges	24
13	Public High Schools	24
14	Transportation Hubs	29
TOTAL		312

WASTE COMPOSITION SUMMARY - ELEMENTARY SCHOOLS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	12.56	7.69	10.24	14.89	31.
Newsprint	3.24	5.13	1.69	4.79	31.
Office/computer	3.97	5.37	2.34	5.59	31.
Magazines/glossy	1.18	1.86	.61	1.74	31.
Book/phone books	2.02	3.82	.87	3.18	31.
Non-Corrug. CrdBd.	3.44	5.83	1.68	5.20	31.
Mixed	19.55	13.32	15.52	23.58	31.
Subtotal:	45.96	16.44	40.99	50.93	31.
PLASTICS					
Clear HDPE contnr.	.12	.15	.07	.17	31.
Color HDPE contnr.	.09	.31	-.00	.18	31.
LDPE	.01	.04	.00	.02	31.
Films & Bags	4.42	2.34	3.71	5.13	31.
Green PET contnr.	.02	.06	.00	.04	31.
Clear PET contnr.	.03	.15	-.01	.08	31.
PVC	.02	.08	-.00	.05	31.
Polypropylene	.10	.30	.01	.19	31.
Polystyrene	3.01	3.26	2.02	3.99	31.
Misc. Plastics	2.79	3.86	1.62	3.95	31.
Subtotal:	10.62	4.08	9.38	11.85	31.
YARD WASTE					
Grass/Leaves	5.45	6.32	3.54	7.36	31.
Brush/prun./stumps	.00	.00	.00	.00	31.
Subtotal:	5.45	6.32	3.54	7.36	31.
ORGANICS					
Lumber	.94	2.56	.17	1.72	31.
Textiles	.65	1.09	.32	.98	31.
Rubber	.33	2.26	-.35	1.01	31.
Fines	1.13	.85	.87	1.38	31.
Diapers	.42	1.45	-.02	.85	31.
Foodwaste	18.00	11.35	14.57	21.43	31.
Misc. Organics	3.47	4.02	2.25	4.69	31.
Subtotal:	24.94	12.84	21.06	28.82	31.
GLASS					
Clear container	.64	.79	.40	.88	31.
Green container	.23	.38	.11	.34	31.
Brown container	.05	.11	.01	.08	31.
Misc. Glass	.03	.20	-.03	.09	31.
Subtotal:	.94	1.00	.64	1.24	31.
METALS					
Food Contnr./foil	.36	1.19	-.00	.72	31.
Beverage Cans	.33	.33	.23	.43	31.
Misc. Aluminum	.19	.44	.05	.32	31.
Food container	3.31	2.40	2.58	4.03	31.
Other	.80	1.34	.40	1.21	31.
Bimetal Cans	.00	.00	.00	.00	31.
Subtotal:	4.98	2.30	4.28	5.68	31.
INORGANICS					
Non-bulk ceramics	.69	2.58	-.09	1.47	31.
Misc. Inorganics	6.34	11.69	2.80	9.87	31.
Subtotal:	7.03	11.76	3.47	10.59	31.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	31.
Non-pestic. poisons	.00	.00	.00	.00	31.
Paint/Solvent/fuel	.00	.00	.00	.00	31.
Dry Cell batteries	.01	.03	.00	.02	31.
Car Batteries	.00	.00	.00	.00	31.
Medical Waste	.01	.05	-.00	.02	31.
Misc HHW	.06	.30	-.03	.15	31.
Subtotal:	.08	.32	-.02	.18	31.
RETURNABLES COUNT					
Plastics	.38	2.77	-.45	1.22	31.
Aluminum	3.98	12.09	.32	7.64	31.
Glass	1.23	4.82	-.23	2.69	31.
Mean Sample Wt:	286.06				

EXHIBIT 3-5

WASTE COMPOSITION SUMMARY - JUNIOR HIGH SCHOOLS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	11.20	4.47	9.52	12.88	21.
Newsprint	4.40	4.93	2.54	6.25	21.
Office/computer	5.56	3.55	4.23	6.90	21.
Magazines/glossy	1.58	2.09	.79	2.37	21.
Book/phone books	2.92	2.97	1.80	4.03	21.
Non-Corrug. CrdBd.	12.72	7.35	9.96	15.48	21.
Mixed	11.96	4.01	10.45	13.47	21.
Subtotal:	50.34	12.15	45.78	54.90	21.
PLASTICS					
Clear HDPE contnr.	.08	.13	.03	.12	21.
Color HDPE contnr.	.06	.16	.00	.12	21.
LDPE	.07	.11	.02	.11	21.
Films & Bags	2.51	1.35	2.00	3.02	21.
Green PET contnr.	.01	.03	-.00	.02	21.
Clear PET contnr.	.08	.13	.04	.13	21.
PVC	.02	.06	-.00	.04	21.
Polypropylene	.01	.03	.00	.02	21.
Polystyrene	.77	1.11	.35	1.19	21.
Misc. Plastics	.76	.81	.46	1.07	21.
Subtotal:	4.37	1.95	3.64	5.10	21.
YARD WASTE					
Grass/Leaves	2.48	4.55	.77	4.19	21.
Brush/prun./stumps	.00	.00	.00	.00	21.
Subtotal:	2.48	4.55	.77	4.19	21.
ORGANICS					
Lumber	1.08	1.90	.37	1.79	21.
Textiles	.51	.73	.24	.79	21.
Rubber	.00	.00	.00	.00	21.
Fines	1.77	.78	1.48	2.07	21.
Diapers	1.50	3.26	.27	2.72	21.
Foodwaste	19.78	11.87	15.32	24.23	21.
Misc. Organics	7.44	7.34	4.68	10.19	21.
Subtotal:	32.07	12.43	27.41	36.74	21.
GLASS					
Clear container	.81	.79	.52	1.11	21.
Green container	.06	.13	.01	.12	21.
Brown container	.03	.13	-.02	.08	21.
Misc. Glass	.00	.00	.00	.00	21.
Subtotal:	.91	.78	.62	1.20	21.
METALS					
Food Contnr./foil	.26	.35	.12	.39	21.
Beverage Cans	.17	.15	.11	.23	21.
Misc. Aluminum	.00	.00	.00	.00	21.
Food container	1.91	2.16	1.10	2.72	21.
Other	1.03	2.53	.08	1.98	21.
Bimetal Cans	.00	.00	.00	.00	21.
Subtotal:	3.37	2.81	2.32	4.43	21.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	21.
Misc. Inorganics	6.45	10.92	2.35	10.55	21.
Subtotal:	6.45	10.92	2.35	10.55	21.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	21.
Non-pestic. poisons	.00	.00	.00	.00	21.
Paint/Solvent/fuel	.00	.00	.00	.00	21.
Dry Cell batteries	.00	.01	-.00	.01	21.
Car Batteries	.00	.00	.00	.00	21.
Medical Waste	.00	.00	.00	.00	21.
Misc HHW	.00	.00	.00	.00	21.
Subtotal:	.00	.01	-.00	.01	21.
RETURNABLES COUNT					
Plastics	.45	2.03	-.31	1.21	21.
Aluminum	2.27	7.13	-.41	4.95	21.
Glass	1.11	2.59	.13	2.08	21.
Mean Sample Wt:	253.53				

EXHIBIT 3-6

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (K-8TH GRADE)
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	12.66	6.86	9.76	15.55	17.
Newsprint	4.36	4.12	2.62	6.10	17.
Office/computer	1.62	2.57	.53	2.71	17.
Magazines/glossy	1.40	1.96	.58	2.23	17.
Book/phone books	2.73	4.34	.90	4.56	17.
Non-Corrug. CrdBd.	2.11	3.55	.61	3.61	17.
Mixed	27.32	13.69	21.54	33.10	17.
Subtotal:	52.21	14.81	45.95	58.46	17.
PLASTICS					
Clear HDPE contnr.	.18	.37	.02	.34	17.
Color HDPE contnr.	.25	.28	.13	.37	17.
LDPE	.03	.08	-.00	.06	17.
Films & Bags	4.11	2.32	3.13	5.09	17.
Green PET contnr.	.04	.08	.00	.07	17.
Clear PET contnr.	.18	.30	.05	.30	17.
PVC	.13	.20	.05	.21	17.
Polypropylene	.00	.01	-.00	.01	17.
Polystyrene	1.28	.79	.95	1.62	17.
Misc. Plastics	.79	1.81	.02	1.55	17.
Subtotal:	6.98	3.52	5.50	8.47	17.
YARD WASTE					
Grass/Leaves	8.61	11.92	3.58	13.64	17.
Brush/prun./stumps	.95	2.79	-.23	2.13	17.
Subtotal:	9.56	11.42	4.74	14.38	17.
ORGANICS					
Lumber	.18	.64	-.09	.44	17.
Textiles	1.75	3.18	.41	3.10	17.
Rubber	.07	.12	.02	.12	17.
Fines	.47	.44	.28	.65	17.
Diapers	.00	.00	.00	.00	17.
Foodwaste	21.18	17.05	13.99	28.38	17.
Misc. Organics	2.62	4.54	.70	4.54	17.
Subtotal:	26.27	17.08	19.06	33.47	17.
GLASS					
Clear container	.63	.65	.36	.90	17.
Green container	.04	.10	.00	.09	17.
Brown container	.14	.46	-.05	.33	17.
Misc. Glass	.09	.49	-.12	.30	17.
Subtotal:	.90	.83	.55	1.25	17.
METALS					
Food Contnr./foil	.95	.76	.63	1.27	17.
Beverage Cans	.57	.59	.32	.82	17.
Misc. Aluminum	.08	.27	-.03	.19	17.
Food container	1.25	1.13	.77	1.72	17.
Other	.93	1.51	.30	1.57	17.
Bimetal Cans	.00	.00	.00	.00	17.
Subtotal:	3.78	2.38	2.77	4.78	17.
INORGANICS					
Non-bulk ceramics	.04	.16	-.02	.11	17.
Misc. Inorganics	.18	.65	-.09	.46	17.
Subtotal:	.23	.81	-.11	.57	17.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	17.
Non-pestic. poisons	.00	.00	.00	.00	17.
Paint/Solvent/fuel	.05	.20	-.04	.14	17.
Dry Cell batteries	.03	.12	-.02	.08	17.
Car Batteries	.00	.00	.00	.00	17.
Medical Waste	.00	.00	.00	.00	17.
Misc HHW	.00	.00	.00	.00	17.
Subtotal:	.08	.22	-.02	.17	17.
RETURNABLES COUNT					
Plastics	.33	1.66	-.37	1.03	17.
Aluminum	6.73	17.05	-.47	13.92	17.
Glass	2.05	8.20	-1.41	5.51	17.
Mean Sample Wt:	284.17				

EXHIBIT 3-7

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (6-12TH GRADE)
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	14.02	8.10	10.21	17.83	14.
Newsprint	4.34	5.77	1.63	7.05	14.
Office/computer	2.63	3.49	.99	4.27	14.
Magazines/glossy	.42	1.37	-.23	1.06	14.
Book/phone books	1.23	2.03	.27	2.19	14.
Non-Corrug. CrdBd.	1.95	3.87	.13	3.78	14.
Mixed	24.77	9.77	20.17	29.37	14.
Subtotal:	49.36	11.94	43.74	54.98	14.
PLASTICS					
Clear HDPE contnr.	.06	.12	.00	.12	14.
Color HDPE contnr.	.08	.10	.03	.13	14.
LDPE	.01	.02	-.00	.02	14.
Films & Bags	3.59	1.95	2.68	4.51	14.
Green PET contnr.	.01	.02	-.00	.01	14.
Clear PET contnr.	.10	.18	.01	.18	14.
PVC	.13	.36	-.03	.30	14.
Polypropylene	.00	.00	.00	.00	14.
Polystyrene	.38	.46	.16	.60	14.
Misc. Plastics	.87	1.56	.14	1.60	14.
Subtotal:	5.23	2.07	4.26	6.20	14.
YARD WASTE					
Grass/Leaves	29.65	15.63	22.29	37.00	14.
Brush/prun./stumps	.06	.12	.00	.12	14.
Subtotal:	29.71	15.57	22.38	37.03	14.
ORGANICS					
Lumber	.01	.04	-.00	.03	14.
Textiles	1.12	1.17	.57	1.66	14.
Rubber	.00	.00	.00	.00	14.
Fines	.42	.49	.19	.65	14.
Diapers	.00	.00	.00	.00	14.
Foodwaste	8.13	5.83	5.39	10.88	14.
Misc. Organics	.69	.79	.32	1.06	14.
Subtotal:	10.37	5.68	7.70	13.05	14.
GLASS					
Clear container	.63	.46	.41	.85	14.
Green container	.06	.23	-.05	.17	14.
Brown container	.04	.11	-.02	.09	14.
Misc. Glass	.15	.31	.00	.29	14.
Subtotal:	.88	.53	.63	1.13	14.
METALS					
Food Contnr./foil	.33	.34	.17	.49	14.
Beverage Cans	1.49	1.16	.94	2.03	14.
Misc. Aluminum	.08	.32	-.07	.24	14.
Food container	.74	1.12	.22	1.27	14.
Other	1.67	2.91	.30	3.04	14.
Bimetal Cans	.00	.00	.00	.00	14.
Subtotal:	4.32	3.56	2.64	6.00	14.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	14.
Misc. Inorganics	.00	.00	.00	.00	14.
Subtotal:	.00	.00	.00	.00	14.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	14.
Non-pestic. poisons	.00	.00	.00	.00	14.
Paint/Solvent/fuel	.00	.00	.00	.00	14.
Dry Cell batteries	.00	.00	.00	.00	14.
Car Batteries	.00	.00	.00	.00	14.
Medical Waste	.00	.00	.00	.00	14.
Misc HHW	.14	.33	-.01	.29	14.
Subtotal:	.14	.32	-.01	.29	14.
RETURNABLES COUNT					
Plastics	.13	.89	-.29	.55	14.
Aluminum	23.32	62.86	-6.26	52.91	14.
Glass	1.19	2.41	.06	2.33	14.
Mean Sample Wt:	281.47				

WASTE COMPOSITION SUMMARY - PSYCHIATRIC HOSPITALS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.79	5.13	8.81	12.77	20.
Newsprint	3.70	3.28	2.44	4.96	20.
Office/computer	3.72	4.19	2.10	5.34	20.
Magazines/glossy	2.13	2.56	1.14	3.12	20.
Book/phone books	1.26	1.93	.52	2.01	20.
Non-Corrug. CrdBd.	5.11	5.35	3.04	7.17	20.
Mixed	10.37	7.32	7.54	13.19	20.
Subtotal:	37.08	15.91	30.94	43.21	20.
PLASTICS					
Clear HDPE contnr.	.14	.18	.07	.21	20.
Color HDPE contnr.	.54	1.04	.14	.95	20.
LDPE	.19	.39	.04	.34	20.
Films & Bags	6.45	3.55	5.08	7.82	20.
Green PET contnr.	.17	.50	-.02	.36	20.
Clear PET contnr.	.18	.21	.10	.26	20.
PVC	.04	.11	-.00	.08	20.
Polypropylene	.44	.99	.06	.82	20.
Polystyrene	1.54	3.00	.38	2.69	20.
Misc. Plastics	4.95	3.48	3.61	6.29	20.
Subtotal:	14.66	5.20	12.65	16.66	20.
YARD WASTE					
Grass/Leaves	.97	2.88	-.14	2.08	20.
Brush/prun./stumps	.00	.00	.00	.00	20.
Subtotal:	.97	2.88	-.14	2.08	20.
ORGANICS					
Lumber	.19	.60	-.04	.42	20.
Textiles	3.71	3.54	2.34	5.07	20.
Rubber	.00	.00	.00	.00	20.
Fines	1.63	.99	1.25	2.02	20.
Diapers	1.73	3.09	.54	2.92	20.
Foodwaste	13.34	7.42	10.48	16.21	20.
Misc. Organics	5.25	4.93	3.35	7.15	20.
Subtotal:	25.86	10.28	21.90	29.83	20.
GLASS					
Clear container	4.00	5.18	2.00	6.00	20.
Green container	.76	1.06	.35	1.17	20.
Brown container	.70	1.62	.07	1.32	20.
Misc. Glass	5.37	13.59	.13	10.61	20.
Subtotal:	10.83	17.33	4.15	17.52	20.
METALS					
Food Contnr./foil	.31	.36	.17	.45	20.
Beverage Cans	.48	.44	.31	.65	20.
Misc. Aluminum	.00	.00	.00	.00	20.
Food container	5.30	4.29	3.65	6.95	20.
Other	2.64	2.62	1.63	3.65	20.
Bimetal Cans	.00	.00	.00	.00	20.
Subtotal:	8.74	5.48	6.62	10.85	20.
INORGANICS					
Non-bulk ceramics	.02	.05	-.00	.04	20.
Misc. Inorganics	1.72	4.90	-.17	3.61	20.
Subtotal:	1.74	4.90	-.15	3.63	20.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	20.
Non-pestic. poisons	.00	.00	.00	.00	20.
Paint/Solvent/fuel	.00	.00	.00	.00	20.
Dry Cell batteries	.12	.46	-.06	.30	20.
Car Batteries	.00	.00	.00	.00	20.
Medical Waste	.00	.00	.00	.00	20.
Misc HHW	.00	.00	.00	.00	20.
Subtotal:	.12	.46	-.06	.30	20.
RETURNABLES COUNT					
Plastics	1.40	5.48	-.72	3.51	20.
Aluminum	5.21	18.23	-1.82	12.25	20.
Glass	3.93	17.77	-2.93	10.78	20.
Mean Sample Wt:	268.58				

EXHIBIT 3-9

WASTE COMPOSITION SUMMARY - SKILLED NURSING FACILITIES
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	9.68	5.53	7.65	11.70	22.
Newsprint	3.28	4.10	1.78	4.78	22.
Office/computer	3.66	5.12	1.79	5.53	22.
Magazines/glossy	.90	1.44	.38	1.43	22.
Book/phone books	.71	1.49	.17	1.26	22.
Non-Corrug. CrdBd.	1.73	2.48	.82	2.64	22.
Mixed	9.57	4.40	7.95	11.18	22.
Subtotal:	29.53	12.64	24.90	34.15	22.
PLASTICS					
Clear HDPE contnr.	.23	.40	.08	.37	22.
Color HDPE contnr.	.15	.24	.06	.24	22.
LDPE	.26	.46	.09	.43	22.
Films & Bags	5.69	4.09	4.20	7.19	22.
Green PET contnr.	.04	.07	.01	.06	22.
Clear PET contnr.	.02	.05	-.00	.03	22.
PVC	.32	.54	.12	.51	22.
Polypropylene	.22	.49	.04	.40	22.
Polystyrene	1.25	1.76	.60	1.89	22.
Misc. Plastics	3.72	5.17	1.82	5.61	22.
Subtotal:	11.89	8.09	8.93	14.85	22.
YARD WASTE					
Grass/Leaves	4.58	8.88	1.33	7.84	22.
Brush/prun./stumps	.11	.57	-.10	.32	22.
Subtotal:	4.70	8.89	1.44	7.95	22.
ORGANICS					
Lumber	.28	.79	-.01	.57	22.
Textiles	1.40	2.08	.64	2.16	22.
Rubber	.11	.29	.01	.22	22.
Fines	1.66	.87	1.34	1.98	22.
Diapers	19.52	11.80	15.21	23.84	22.
Foodwaste	19.41	9.98	15.76	23.06	22.
Misc. Organics	6.43	4.98	4.60	8.25	22.
Subtotal:	48.81	11.15	44.73	52.89	22.
GLASS					
Clear container	.54	.68	.29	.79	22.
Green container	.04	.22	-.04	.12	22.
Brown container	.00	.00	.00	.00	22.
Misc. Glass	.03	.12	-.02	.07	22.
Subtotal:	.61	.71	.35	.87	22.
METALS					
Food Contnr./foil	.18	.36	.05	.32	22.
Beverage Cans	.22	.36	.08	.35	22.
Misc. Aluminum	.05	.19	-.02	.12	22.
Food container	2.53	2.36	1.67	3.40	22.
Other	.95	1.91	.25	1.65	22.
Bimetal Cans	.00	.00	.00	.00	22.
Subtotal:	3.93	2.66	2.96	4.91	22.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	22.
Misc. Inorganics	.35	1.40	-.16	.86	22.
Subtotal:	.35	1.40	-.16	.86	22.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	22.
Non-pestic. poisons	.00	.00	.00	.00	22.
Paint/Solvent/fuel	.00	.00	.00	.00	22.
Dry Cell batteries	.01	.03	-.00	.02	22.
Car Batteries	.00	.00	.00	.00	22.
Medical Waste	.18	.53	-.02	.37	22.
Misc HHW	.00	.00	.00	.00	22.
Subtotal:	.19	.52	-.01	.38	22.
RETURNABLES COUNT					
Plastics	.75	4.02	-.72	2.23	22.
Aluminum	1.45	3.88	.03	2.87	22.
Glass	.56	2.29	-.28	1.39	22.
Mean Sample Wt:	253.45				

WASTE COMPOSITION SUMMARY - MUNICIPAL HOSPITALS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	19.99	7.96	17.00	22.98	21.
Newsprint	4.19	4.19	2.61	5.76	21.
Office/computer	6.30	6.50	3.86	8.74	21.
Magazines/glossy	1.65	1.76	.99	2.31	21.
Book/phone books	.62	1.39	.10	1.15	21.
Non-Corrug. CrdBd.	3.43	3.87	1.98	4.88	21.
Mixed	15.27	9.44	11.72	18.82	21.
Subtotal:	51.46	11.68	47.07	55.84	21.
PLASTICS					
Clear HDPE contnr.	.19	.38	.05	.34	21.
Color HDPE contnr.	.26	.57	.05	.48	21.
LDPE	.44	1.39	-.08	.96	21.
Films & Bags	4.48	3.28	3.25	5.72	21.
Green PET contnr.	.74	2.31	-.13	1.61	21.
Clear PET contnr.	.05	.14	-.00	.10	21.
PVC	.12	.29	.01	.23	21.
Polypropylene	.26	.60	.03	.48	21.
Polystyrene	.77	1.58	.17	1.36	21.
Misc. Plastics	2.87	2.94	1.77	3.97	21.
Subtotal:	10.18	4.85	8.36	12.01	21.
YARD WASTE					
Grass/Leaves	1.17	4.66	-.58	2.92	21.
Brush/prun./stumps	.00	.00	.00	.00	21.
Subtotal:	1.17	4.66	-.58	2.92	21.
ORGANICS					
Lumber	1.58	3.95	.09	3.06	21.
Textiles	3.31	3.41	2.03	4.59	21.
Rubber	.03	.09	-.01	.06	21.
Fines	1.45	1.43	.92	1.99	21.
Diapers	5.60	5.33	3.60	7.60	21.
Foodwaste	14.28	10.01	10.52	18.04	21.
Misc. Organics	5.13	5.39	3.10	7.15	21.
Subtotal:	31.38	12.01	26.87	35.89	21.
GLASS					
Clear container	1.85	1.74	1.20	2.50	21.
Green container	.08	.18	.02	.15	21.
Brown container	.15	.37	.02	.29	21.
Misc. Glass	.18	.81	-.12	.49	21.
Subtotal:	2.27	1.91	1.55	2.99	21.
METALS					
Food Contnr./foil	.15	.30	.03	.26	21.
Beverage Cans	.38	.41	.23	.54	21.
Misc. Aluminum	.02	.07	-.01	.04	21.
Food container	1.68	1.55	1.10	2.26	21.
Other	.55	.92	.20	.89	21.
Bimetal Cans	.00	.00	.00	.00	21.
Subtotal:	2.77	1.92	2.05	3.49	21.
INORGANICS					
Non-bulk ceramics	.02	.09	-.02	.05	21.
Misc. Inorganics	.24	.69	-.03	.50	21.
Subtotal:	.25	.70	-.01	.51	21.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	21.
Non-pestic. poisons	.00	.00	.00	.00	21.
Paint/Solvent/fuel	.00	.00	.00	.00	21.
Dry Cell batteries	.00	.00	.00	.00	21.
Car Batteries	.00	.00	.00	.00	21.
Medical Waste	.37	1.37	-.14	.88	21.
Misc HHW	.15	.68	-.10	.41	21.
Subtotal:	.52	1.48	-.04	1.08	21.
RETURNABLES COUNT					
Plastics	.25	.94	-.10	.61	21.
Aluminum	4.01	7.98	1.02	7.01	21.
Glass	3.09	13.02	-1.80	7.98	21.
Mean Sample Wt:	263.41				

EXHIBIT 3-11

WASTE COMPOSITION SUMMARY - TEACHING HOSPITALS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.56	5.25	8.48	12.64	19.
Newsprint	5.42	4.05	3.81	7.03	19.
Office/computer	9.50	10.41	5.37	13.63	19.
Magazines/glossy	1.72	2.43	.76	2.69	19.
Book/phone books	3.21	4.60	1.39	5.04	19.
Non-Corrug. CrdBd.	5.31	5.50	3.13	7.49	19.
Mixed	15.12	7.74	12.05	18.19	19.
Subtotal:	50.85	12.88	45.74	55.95	19.
PLASTICS					
Clear HDPE contnr.	.06	.12	.01	.10	19.
Color HDPE contnr.	.19	.30	.07	.31	19.
LDPE	.29	.65	.03	.55	19.
Films & Bags	5.13	1.86	4.40	5.87	19.
Green PET contnr.	.02	.05	.00	.04	19.
Clear PET contnr.	.04	.08	.01	.08	19.
PVC	.28	.67	.01	.54	19.
Polypropylene	.27	.43	.10	.44	19.
Polystyrene	.29	.62	.04	.53	19.
Misc. Plastics	4.63	3.36	3.29	5.96	19.
Subtotal:	11.19	4.57	9.38	13.01	19.
YARD WASTE					
Grass/Leaves	5.63	8.87	2.11	9.15	19.
Brush/prun./stumps	.00	.00	.00	.00	19.
Subtotal:	5.63	8.87	2.11	9.15	19.
ORGANICS					
Lumber	.17	.73	-.12	.46	19.
Textiles	3.90	4.38	2.16	5.64	19.
Rubber	.08	.32	-.05	.20	19.
Fines	.80	.61	.56	1.04	19.
Diapers	2.48	2.31	1.57	3.40	19.
Foodwaste	12.59	6.93	9.84	15.34	19.
Misc. Organics	7.49	4.76	5.61	9.38	19.
Subtotal:	27.51	8.93	23.96	31.05	19.
GLASS					
Clear container	1.20	1.60	.56	1.83	19.
Green container	.14	.21	.06	.23	19.
Brown container	.03	.08	.00	.07	19.
Misc. Glass	.00	.00	.00	.00	19.
Subtotal:	1.37	1.73	.68	2.06	19.
METALS					
Food Contnr./foil	.24	.31	.11	.36	19.
Beverage Cans	.49	.36	.35	.64	19.
Misc. Aluminum	.05	.23	-.04	.15	19.
Food container	1.15	1.84	.42	1.88	19.
Other	.42	1.10	-.02	.85	19.
Bimetal Cans	.00	.00	.00	.00	19.
Subtotal:	2.35	2.37	1.40	3.29	19.
INORGANICS					
Non-bulk ceramics	.03	.10	-.01	.07	19.
Misc. Inorganics	.00	.00	.00	.00	19.
Subtotal:	.03	.10	-.01	.07	19.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	19.
Non-pestic. poisons	.00	.00	.00	.00	19.
Paint/Solvent/fuel	.00	.00	.00	.00	19.
Dry Cell batteries	.08	.25	-.02	.18	19.
Car Batteries	.00	.00	.00	.00	19.
Medical Waste	.99	2.02	.19	1.79	19.
Misc HHW	.00	.00	.00	.00	19.
Subtotal:	1.07	2.00	.28	1.87	19.
RETURNABLES COUNT					
Plastics	.62	2.36	-.31	1.56	19.
Aluminum	5.70	17.42	-1.21	12.61	19.
Glass	.83	1.92	.07	1.59	19.
Mean Sample Wt:	279.08				

EXHIBIT 3-12

WASTE COMPOSITION SUMMARY - NON-PROFIT HOSPITALS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	19.81	6.18	17.60	22.02	23.
Newsprint	3.94	4.68	2.27	5.61	23.
Office/computer	3.70	4.86	1.97	5.44	23.
Magazines/glossy	1.32	1.38	.82	1.81	23.
Book/phone books	.85	1.43	.33	1.36	23.
Non-Corrug. CrdBd.	2.59	3.13	1.47	3.71	23.
Mixed	19.64	11.25	15.62	23.66	23.
Subtotal:	51.84	10.33	48.15	55.54	23.
PLASTICS					
Clear HDPE contnr.	.33	.52	.14	.51	23.
Color HDPE contnr.	.11	.14	.06	.16	23.
LDPE	.09	.14	.04	.14	23.
Films & Bags	4.82	2.01	4.10	5.54	23.
Green PET contnr.	.03	.06	.01	.06	23.
Clear PET contnr.	.02	.04	.00	.04	23.
PVC	.11	.25	.02	.20	23.
Polypropylene	.08	.12	.04	.12	23.
Polystyrene	2.54	3.04	1.46	3.63	23.
Misc. Plastics	4.72	4.25	3.20	6.24	23.
Subtotal:	12.84	4.62	11.19	14.50	23.
YARD WASTE					
Grass/Leaves	.26	.86	-.05	.56	23.
Brush/prun./stumps	.00	.00	.00	.00	23.
Subtotal:	.26	.86	-.05	.56	23.
ORGANICS					
Lumber	.24	.61	.02	.46	23.
Textiles	1.56	2.27	.75	2.37	23.
Rubber	.30	.71	.04	.55	23.
Fines	1.27	.78	.99	1.55	23.
Diapers	3.89	3.71	2.56	5.21	23.
Foodwaste	17.90	11.54	13.77	22.02	23.
Misc. Organics	5.34	5.54	3.36	7.32	23.
Subtotal:	30.49	10.82	26.62	34.35	23.
GLASS					
Clear container	.82	.76	.55	1.09	23.
Green container	.14	.25	.05	.22	23.
Brown container	.07	.22	-.01	.15	23.
Misc. Glass	.02	.09	-.01	.05	23.
Subtotal:	1.04	.89	.72	1.36	23.
METALS					
Food Contnr./foil	.29	.26	.20	.38	23.
Beverage Cans	.23	.23	.14	.31	23.
Misc. Aluminum	.00	.00	.00	.00	23.
Food container	2.03	2.08	1.29	2.78	23.
Other	.45	.93	.11	.78	23.
Bimetal Cans	.00	.00	.00	.00	23.
Subtotal:	3.00	2.39	2.14	3.85	23.
INORGANICS					
Non-bulk ceramics	.12	.58	-.08	.33	23.
Misc. Inorganics	.00	.00	.00	.00	23.
Subtotal:	.12	.58	-.08	.33	23.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	23.
Non-pestic. poisons	.00	.00	.00	.00	23.
Paint/Solvent/fuel	.00	.00	.00	.00	23.
Dry Cell batteries	.00	.01	-.00	.01	23.
Car Batteries	.00	.00	.00	.00	23.
Medical Waste	.29	.52	.10	.47	23.
Misc HHW	.12	.53	-.07	.31	23.
Subtotal:	.41	.92	.08	.74	23.
RETURNABLES COUNT					
Plastics	.51	1.63	-.07	1.10	23.
Aluminum	2.95	6.27	.71	5.20	23.
Glass	1.61	4.58	-.03	3.25	23.
Mean Sample Wt:	262.00				

WASTE COMPOSITION SUMMARY - GOVERNMENT OFFICES

FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.73	4.46	4.29	7.16	28.00
Newsprint	8.97	5.45	7.22	10.73	28.00
Office/computer	34.80	27.98	25.81	43.79	28.00
Magazines/glossy	2.94	3.74	1.74	4.15	28.00
Book/phone books	5.94	5.68	4.11	7.76	28.00
Non-Corrug. CrdBd.	3.84	5.59	2.04	5.63	28.00
Mixed	24.19	16.06	19.03	29.35	28.00
Subtotal:	86.40	7.14	84.11	88.70	28.00
PLASTICS					
Clear HDPE contnr.	.10	.23	.03	.17	28.00
Color HDPE contnr.	.07	.15	.02	.12	28.00
LDPE	.02	.06	-.00	.03	28.00
Films & Bags	2.78	1.80	2.20	3.36	28.00
Green PET contnr.	.22	.97	-.09	.53	28.00
Clear PET contnr.	.09	.25	.01	.17	28.00
PVC	.03	.08	.01	.06	28.00
Polypropylene	.02	.06	.00	.04	28.00
Polystyrene	.52	.77	.27	.76	28.00
Misc. Plastics	1.58	1.76	1.01	2.14	28.00
Subtotal:	5.43	3.20	4.40	6.46	28.00
YARD WASTE					
Grass/Leaves	.07	.25	-.01	.15	28.00
Brush/prun./stumps	.00	.00	.00	.00	28.00
Subtotal:	.07	.25	-.01	.15	28.00
ORGANICS					
Lumber	.00	.00	.00	.00	28.00
Textiles	.44	1.18	.06	.82	28.00
Rubber	.00	.02	-.00	.01	28.00
Fines	.66	.67	.44	.87	28.00
Diapers	.02	.12	-.02	.06	28.00
Foodwaste	1.35	2.29	.62	2.09	28.00
Misc. Organics	.11	.49	-.05	.26	28.00
Subtotal:	2.57	2.69	1.71	3.44	28.00
GLASS					
Clear container	1.88	1.17	1.51	2.26	28.00
Green container	.63	1.11	.27	.99	28.00
Brown container	.20	.50	.04	.36	28.00
Misc. Glass	.02	.09	-.01	.05	28.00
Subtotal:	2.73	1.87	2.13	3.33	28.00
METALS					
Food Contnr./foil	.59	.86	.31	.87	28.00
Beverage Cans	.87	.72	.64	1.10	28.00
Misc. Aluminum	.03	.14	-.01	.08	28.00
Food container	.42	.77	.17	.67	28.00
Other	.68	1.35	.25	1.12	28.00
Bimetal Cans	.00	.00	.00	.00	28.00
Subtotal:	2.60	2.07	1.93	3.26	28.00
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	28.00
Misc. Inorganics	.10	.27	.01	.19	28.00
Subtotal:	.10	.27	.01	.19	28.00
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	28.00
Non-pestic. poisons	.00	.00	.00	.00	28.00
Paint/Solvent/fuel	.03	.13	-.01	.08	28.00
Dry Cell batteries	.01	.03	-.00	.02	28.00
Car Batteries	.00	.00	.00	.00	28.00
Medical Waste	.00	.00	.00	.00	28.00
Misc HHW	.06	.43	-.08	.20	28.00
Subtotal:	.10	.44	-.04	.24	28.00
RETURNABLES COUNT					
Plastics	.65	2.17	-.04	1.35	28.00
Aluminum	11.50	21.21	4.68	18.32	28.00
Glass	4.15	7.84	1.63	6.67	28.00
Mean Sample Wt:	267.62				

EXHIBIT 3-14

WASTE COMPOSITION SUMMARY - CORRECTIONAL FACILITIES
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.61	4.62	5.92	9.31	22.
Newsprint	4.24	2.78	3.23	5.26	22.
Office/computer	.94	1.37	.43	1.44	22.
Magazines/glossy	.35	.81	.06	.65	22.
Book/phone books	.46	.81	.17	.76	22.
Non-Corrug. CrdBd.	2.13	2.53	1.21	3.06	22.
Mixed	12.20	8.88	8.95	15.45	22.
Subtotal:	27.94	13.47	23.01	32.87	22.
PLASTICS					
Clear HDPE contnr.	.12	.19	.05	.19	22.
Color HDPE contnr.	.08	.15	.03	.14	22.
LDPE	.03	.07	.00	.05	22.
Films & Bags	4.14	1.72	3.51	4.77	22.
Green PET contnr.	.01	.04	-.01	.02	22.
Clear PET contnr.	.07	.14	.02	.12	22.
PVC	.03	.06	.01	.05	22.
Polypropylene	.06	.09	.03	.10	22.
Polystyrene	.76	1.23	.31	1.21	22.
Misc. Plastics	.24	.56	.04	.45	22.
Subtotal:	5.55	2.42	4.66	6.43	22.
YARD WASTE					
Grass/Leaves	.79	3.23	-.39	1.97	22.
Brush/prun./stumps	.00	.00	.00	.00	22.
Subtotal:	.79	3.23	-.39	1.97	22.
ORGANICS					
Lumber	.33	.79	.04	.62	22.
Textiles	2.71	2.93	1.64	3.78	22.
Rubber	.00	.00	.00	.00	22.
Fines	.70	.73	.44	.97	22.
Diapers	.13	.31	.02	.24	22.
Foodwaste	55.75	16.87	49.58	61.93	22.
Misc. Organics	2.41	2.33	1.56	3.26	22.
Subtotal:	62.03	14.95	56.56	67.50	22.
GLASS					
Clear container	.35	.51	.17	.54	22.
Green container	.19	.45	.02	.35	22.
Brown container	.02	.10	-.02	.06	22.
Misc. Glass	.00	.00	.00	.00	22.
Subtotal:	.56	.88	.24	.88	22.
METALS					
Food Contnr./foil	.29	.39	.15	.43	22.
Beverage Cans	.25	.28	.14	.35	22.
Misc. Aluminum	.00	.00	.00	.00	22.
Food container	2.09	2.24	1.27	2.91	22.
Other	.38	.99	.02	.74	22.
Bimetal Cans	.00	.00	.00	.00	22.
Subtotal:	3.00	2.35	2.14	3.86	22.
INORGANICS					
Non-bulk ceramics	.01	.09	-.02	.05	22.
Misc. Inorganics	.01	.02	-.00	.02	22.
Subtotal:	.02	.09	-.01	.05	22.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	22.
Non-pestic. poisons	.00	.00	.00	.00	22.
Paint/Solvent/fuel	.00	.00	.00	.00	22.
Dry Cell batteries	.01	.03	-.00	.02	22.
Car Batteries	.00	.00	.00	.00	22.
Medical Waste	.00	.00	.00	.00	22.
Misc HHW	.10	.55	-.10	.30	22.
Subtotal:	.11	.55	-.09	.31	22.
RETURNABLES COUNT					
Plastics	.41	2.38	-.46	1.28	22.
Aluminum	2.91	10.48	-.93	6.75	22.
Glass	.77	3.66	-.57	2.12	22.
Mean Sample Wt:	311.01				

EXHIBIT 3-15

WASTE COMPOSITION SUMMARY - COLLEGES
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	16.04	7.60	13.38	18.69	24.
Newsprint	9.66	4.42	8.12	11.21	24.
Office/computer	10.87	8.12	8.03	13.70	24.
Magazines/glossy	1.48	1.65	.90	2.05	24.
Book/phone books	.94	1.70	.34	1.53	24.
Non-Corrug. CrdBd.	1.16	1.20	.74	1.58	24.
Mixed	26.06	11.38	22.09	30.04	24.
Subtotal:	66.20	14.69	61.07	71.34	24.
PLASTICS					
Clear HOPE contnr.	.23	.33	.12	.35	24.
Color HDPE contnr.	.14	.18	.08	.20	24.
LDPE	.02	.03	.01	.03	24.
Films & Bags	4.57	1.40	4.09	5.06	24.
Green PET contnr.	.30	1.88	-.36	.95	24.
Clear PET contnr.	.23	.27	.14	.33	24.
PVC	.05	.15	-.00	.10	24.
Polypropylene	.02	.07	-.01	.04	24.
Polystyrene	1.91	1.38	1.43	2.40	24.
Misc. Plastics	.70	.75	.44	.96	24.
Subtotal:	8.18	2.70	7.24	9.12	24.
YARD WASTE					
Grass/Leaves	5.20	6.82	2.82	7.58	24.
Brush/prun./stumps	.07	.34	-.05	.19	24.
Subtotal:	5.27	6.78	2.91	7.64	24.
ORGANICS					
Lumber	2.07	3.77	.75	3.38	24.
Textiles	.85	1.25	.41	1.29	24.
Rubber	.00	.00	.00	.00	24.
Fines	.63	.49	.46	.80	24.
Diapers	.18	.69	-.06	.42	24.
Foodwaste	7.33	8.36	4.40	10.25	24.
Misc. Organics	1.34	2.46	.48	2.20	24.
Subtotal:	12.39	11.42	8.40	16.38	24.
GLASS					
Clear container	2.56	2.34	1.74	3.37	24.
Green container	.33	.53	.15	.52	24.
Brown container	.20	.40	.06	.34	24.
Misc. Glass	.91	1.71	.31	1.51	24.
Subtotal:	4.00	2.86	3.00	5.00	24.
METALS					
Food Contnr./foil	.55	1.14	.16	.95	24.
Beverage Cans	1.42	.91	1.11	1.74	24.
Misc. Aluminum	.00	.00	.00	.00	24.
Food container	.54	1.18	.13	.95	24.
Other	.54	.97	.20	.88	24.
Bimetal Cans	.02	.11	-.02	.06	24.
Subtotal:	3.08	1.89	2.42	3.74	24.
INORGANICS					
Non-bulk ceramics	.05	.21	-.02	.13	24.
Misc. Inorganics	.81	5.01	-.94	2.56	24.
Subtotal:	.86	5.01	-.89	2.61	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.00	.00	.00	.00	24.
Dry Cell batteries	.01	.02	-.00	.01	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	.00	.00	.00	.00	24.
Subtotal:	.01	.02	-.00	.01	24.
RETURNABLES COUNT					
Plastics	1.09	4.35	-.43	2.61	24.
Aluminum	17.26	28.68	7.24	27.27	24.
Glass	3.76	8.39	.83	6.69	24.
Mean Sample Wt:	233.98				

EXHIBIT 3-16

WASTE COMPOSITION SUMMARY - PUBLIC HIGH SCHOOLS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	15.55	11.20	11.64	19.46	24.
Newsprint	5.97	7.27	3.44	8.51	24.
Office/computer	5.31	7.45	2.70	7.91	24.
Magazines/glossy	.99	1.42	.49	1.48	24.
Book/phone books	4.51	7.37	1.93	7.08	24.
Non-Corrug. CrdBd.	3.38	4.06	1.97	4.80	24.
Mixed	19.95	11.44	15.96	23.95	24.
Subtotal:	55.66	19.82	48.74	62.58	24.
PLASTICS					
Clear HDPE contnr.	.14	.27	.05	.24	24.
Color HDPE contnr.	.05	.13	.00	.09	24.
LDPE	.01	.04	-.00	.02	24.
Films & Bags	4.04	2.12	3.30	4.78	24.
Green PET contnr.	.03	.16	-.03	.08	24.
Clear PET contnr.	.07	.29	-.03	.17	24.
PVC	.08	.35	-.05	.20	24.
Polypropylene	.01	.09	-.02	.04	24.
Polystyrene	3.38	2.39	2.55	4.22	24.
Misc. Plastics	1.31	5.35	-.56	3.18	24.
Subtotal:	9.12	5.61	7.16	11.08	24.
YARD WASTE					
Grass/Leaves	1.50	2.66	.57	2.43	24.
Brush/prun./stumps	.00	.00	.00	.00	24.
Subtotal:	1.50	2.66	.57	2.43	24.
ORGANICS					
Lumber	3.33	7.76	.62	6.04	24.
Textiles	1.24	2.17	.48	2.00	24.
Rubber	.00	.00	.00	.00	24.
Fines	.72	.76	.45	.98	24.
Diapers	.00	.00	.00	.00	24.
Foodwaste	8.75	8.59	5.75	11.75	24.
Misc. Organics	2.39	2.30	1.58	3.19	24.
Subtotal:	16.43	10.42	12.79	20.06	24.
GLASS					
Clear container	1.55	1.86	.90	2.20	24.
Green container	.17	.33	.06	.29	24.
Brown container	.15	.45	-.00	.31	24.
Misc. Glass	.00	.00	.00	.00	24.
Subtotal:	1.88	2.21	1.11	2.65	24.
METALS					
Food Contnr./foil	.47	.98	.13	.81	24.
Beverage Cans	.56	.66	.33	.79	24.
Misc. Aluminum.	.01	.05	-.00	.03	24.
Food container	1.32	2.71	.37	2.27	24.
Other	11.60	13.79	6.78	16.41	24.
Bimetal Cans	.00	.00	.00	.00	24.
Subtotal:	13.96	13.33	9.30	18.62	24.
INORGANICS					
Non-bulk ceramics	.33	2.20	-.44	1.10	24.
Misc. Inorganics	.97	2.46	.11	1.83	24.
Subtotal:	1.30	3.21	.18	2.42	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.07	.27	-.02	.16	24.
Paint/Solvent/fuel	.00	.00	.00	.00	24.
Dry Cell batteries	.00	.00	.00	.00	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	.09	.55	-.10	.28	24.
Subtotal:	.16	.60	-.05	.37	24.
RETURNABLES COUNT					
Plastics	.24	1.44	-.27	.74	24.
Aluminum	6.90	12.73	2.45	11.34	24.
Glass	2.23	5.00	.49	3.98	24.
Mean Sample Wt:	210.85				

EXHIBIT 3-17

WASTE COMPOSITION SUMMARY - TRANSPORTATION HUBS
FALL 1989

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	9.36	6.25	7.38	11.33	29.
Newsprint	36.51	21.65	29.68	43.34	29.
Office/computer	2.14	2.90	1.22	3.05	29.
Magazines/glossy	1.64	1.79	1.08	2.21	29.
Book/phone books	.13	.69	-.09	.34	29.
Non-Corrug. CrdBd.	1.78	2.22	1.08	2.48	29.
Mixed	15.80	8.81	13.02	18.58	29.
Subtotal:	67.35	18.38	61.55	73.15	29.
PLASTICS					
Clear HDPE contnr.	.11	.18	.06	.17	29.
Color HDPE contnr.	.06	.15	.01	.11	29.
LDPE	.02	.03	.01	.03	29.
Films & Bags	3.58	3.58	2.45	4.71	29.
Green PET contnr.	.05	.15	-.00	.09	29.
Clear PET contnr.	.10	.19	.04	.16	29.
PVC	.13	.39	.01	.26	29.
Polypropylene	.04	.11	.00	.07	29.
Polystyrene	.69	.95	.39	.99	29.
Misc. Plastics	.62	.96	.31	.92	29.
Subtotal:	5.39	4.57	3.95	6.83	29.
YARD WASTE					
Grass/Leaves	1.30	3.00	.35	2.25	29.
Brush/prun./stumps	.01	.02	.00	.01	29.
Subtotal:	1.30	3.02	.35	2.26	29.
ORGANICS					
Lumber	3.11	5.94	1.23	4.98	29.
Textiles	4.53	4.59	3.08	5.98	29.
Rubber	.20	.38	.08	.32	29.
Fines	1.53	1.44	1.07	1.98	29.
Diapers	.06	.37	-.06	.18	29.
Foodwaste	.74	1.47	.28	1.21	29.
Misc. Organics	2.04	3.57	.92	3.17	29.
Subtotal:	12.20	10.11	9.01	15.39	29.
GLASS					
Clear container	2.39	3.22	1.37	3.41	29.
Green container	.76	.99	.45	1.07	29.
Brown container	.43	.87	.15	.70	29.
Misc. Glass	.33	1.32	-.08	.75	29.
Subtotal:	3.91	4.87	2.38	5.45	29.
METALS					
Food Contnr./foil	.13	.18	.08	.19	29.
Beverage Cans	.57	.50	.42	.73	29.
Misc. Aluminum	.00	.00	.00	.00	29.
Food container	.42	.58	.24	.61	29.
Other	6.82	6.77	4.69	8.96	29.
Bimetal Cans	.00	.00	.00	.00	29.
Subtotal:	7.95	6.81	5.81	10.10	29.
INORGANICS					
Non-bulk ceramics	.05	.37	-.06	.17	29.
Misc. Inorganics	1.65	3.23	.63	2.67	29.
Subtotal:	1.70	3.22	.68	2.72	29.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	29.
Non-pestic. poisons	.00	.00	.00	.00	29.
Paint/Solvent/fuel	.00	.00	.00	.00	29.
Dry Cell batteries	.01	.03	.00	.02	29.
Car Batteries	.00	.00	.00	.00	29.
Medical Waste	.00	.00	.00	.00	29.
Misc HHW	.17	.49	.01	.32	29.
Subtotal:	.18	.52	.02	.35	29.
RETURNABLES COUNT					
Plastics	.37	2.43	-.39	1.14	29.
Aluminum	8.26	22.24	1.24	15.28	29.
Glass	5.06	24.80	-2.77	12.88	29.
Mean Sample Wt:	296.05				

SECTION 4

INSTITUTIONAL WASTE ANALYSIS
WINTER 1990

APPROACH

Field sorting and weighing program in Winter 1990 were similar to the preceding seasonal sorts. The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected institutional facilities based on the waste components present in the disposed refuse. For the Winter 1990 activities, field work for the institutional waste sector was conducted over two 1-week periods. Field data for this season were collected at the MTS work site from Monday, February 5 to Saturday, February 10, 1990. Field data for Winter 1990 at the Hamilton Avenue work site were collected from Monday, March 5 to Saturday, March 10, 1990.

As in the preceding seasons, institutional waste loads originated from pre-designated facilities served by City forces, generally described by the project's 14 institutional types. Waste loads were delivered by DOS to the two work sites for subsequent sampling, measurement, and weighing activities.

A listing of institutional loads delivered to each work site is given in Exhibits 4-1 and 4-2. The number of incoming vehicles ranged from two to 10 vehicles on a daily basis; each vehicle was identified by borough, Department of Sanitation collection route, and institutional type. Institutional categories Municipal Hospitals and Non-profit Hospitals were not sampled during the Winter season at the discretion of DOS.

The number of refuse samples obtained and sorted by components per institutional type is shown in Exhibit 4-3. A total of 254 institutional waste samples were sorted and classified according to 45 component categories during the Winter 1990 activities.

WASTE COMPOSITION RESULTS

Tabulated composition results for each of the 12 institutional categories are presented sequentially in Exhibits 4-4 through 4-15, as follows:

Exhibit	Institutional Category
4-4	Elementary Schools
4-5	Junior High Schools
4-6	Private Schools (Kindergarten-8th Grade)
4-7	Private Schools (6th-12th Grade)
4-8	Psychiatric Hospitals
4-9	Skilled Nursing Facilities
4-10	Teaching Hospitals
4-11	Government Offices
4-12	Correctional Facilities
4-13	Colleges
4-14	Public High Schools
4-15	Transportation Hubs

Summary calculations of component percentages in these exhibits show weighted averages, as well as standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and classified by the project's institutional categories.

Waste composition data from the daily institutional loads sorted during the seasonal period are presented in Volume 8.

EXHIBIT 4-1

INSTITUTIONAL LOADS DELIVERED TO MTS SITE
WINTER 1990

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
02/05/90	1	MN	College	Control 6	12
	2	MN	Pilot*		
	3	MN	Pilot*		
	4	QN	Correctional	Control 9	11
02/06/90	1	MN	Pilot*		
	2	MN	Pilot*		
	3	MN	Pilot*		
	4	MN	Pilot*		
	5	MN	Pilot*		
02/07/90	1	MN	Pilot*		
	2	MN	Pilot*		
	3	MN	College	Control 6	12
	4	MN	Pilot*		
	5	QN	Trans. Hub	Control 19	14
	6	MN	Correctional	Control 9	11
	7	MN	College	Control 6	12
	8	MN	Govt. Office#	Control 20A	10
	9	MN	Trans. Hub	Control 19	14
	10	MN	Trans. Hub	Control 19	14
02/08/90	1	MN	Pilot*		
	2	MN	Pilot*		
	3	MN	Pilot*		

EXHIBIT 4-1 (continued)

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
	4	MN	Pilot*		
	5	MN	Trans. Hub	Control 19	14
	6	MN	Pilot*		
	7	MN	Trans. Hub	Control 19	14
	8	MN	Pilot*		
	9	MN	Govt. Office#	Control 20	10
	10	MN	Trans. Hub	Control 18	14
02/09/90	1	MN	Pilot*		
	2	MN	College	Control 6	12
	3	QN	Correctional	Control 9	11
	4	MN	Pilot*		
	1	MN	Pilot*		
	2	MN	Pilot*		
	3	MN	Pilot*		

* Loads designated as "Pilot" were stratified samples from designated High Density housing areas in Manhattan. Refuse sampling, and the subsequent sort, were directed under a separate set of procedures to the rest of the project, and findings are discussed in a separate sub-task report.

\# This load was subsequently identified as unrepresented by DOS-OPEC. Resultant data to be excluded from study.

EXHIBIT 4-2

INSTITUTIONAL LOADS DELIVERED TO HAMILTON AVENUE SITE WINTER 1990

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
03/05/90	1	BK	Junior H.S.	Control 3	2
	2	BK	Govt. Office	Control 4	10
	3	QN	Private (6-12)	Control 10	4
	4	SI	Private (K-8)	Control 14	3
	5	QN	Skill. Nursing	Control 11	6
03/06/90	1	BK	Govt. Office	Control 4	10
	2	BK	Psych. Hosp.	Control 1	5
	3	SI	Teaching Hosp.	Control 16	8
	4	BX	Skill. Nurs.	Control 8	6
	5	QN	Public H.S.	Control 20	13
	6	QN	Elementary	Control 13	1
03/07/90	1	BK	Govt. Office	Control 4	10
	2	BK	Junior H.S.	Control 3	2
	3	BX	Skill. Nurs.	Control 8	6
03/08/90	1	BK	Govt. Office	Control 4	10
	2	QN	Private (6-12)	Control 10	4
	3	BK	Psych. Hosp.	Control 1	5
	4	BK	Govt. Office	Control 4	10
	5	QN	Skill. Nurs.	Control 11	6
	6	SI	Private (K-8)	Control 14	3
03/09/90	1	BK	Govt. Office	Control 4	10
	2	SI	Teaching Hosp.	Control 16	8
	3	BK	Junior H.S.	Control 3	2
	4	BX	Skill. Nurs.	Control 8	6
	5	QN	Public H.S.	Control 20	13
	6	QN	Elementary	Control 13	1
03/10/90	1	BK	Psych. Hosp.	Control 1	5
	2	BK	Govt. Office	Control 4	10

EXHIBIT 4-3

SORT SAMPLES OBTAINED BY INSTITUTIONAL CATEGORY WINTER 1989

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF SORT SAMPLES
1	Elementary Schools	18
2	Junior High Schools	18
3	Private Schools, K-8th Grade	18
4	Private Schools, 6-12th Grade	13
5	Psychiatric Hospitals	24
6	Skilled Nursing Facilities	25
7	Municipal Hospitals	0
8	Teaching Hospitals	30
9	Non-profit Hospitals	0
10	Government Hospitals	24
11	Correctional Facilities	24
12	Colleges	22
13	Public High Schools	19
14	Transportation Hubs	19
TOTAL		254

EXHIBIT 4-4

WASTE COMPOSITION SUMMARY - ELEMENTARY SCHOOLS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.64	4.52	5.79	9.49	18.
Newsprint	1.82	1.35	1.27	2.37	18.
Office/computer	2.10	2.45	1.09	3.10	18.
Magazines/glossy	.98	.95	.59	1.38	18.
Book/phone books	.56	.95	.17	.95	18.
Non-Corrug. CrdBd.	10.72	4.95	8.70	12.74	18.
Mixed	16.19	6.31	13.61	18.77	18.
Subtotal:	40.01	12.55	34.88	45.14	18.
PLASTICS					
Clear HDPE contnr.	.21	.22	.12	.30	18.
Color HDPE contnr.	.13	.26	.03	.24	18.
LDPE	.00	.00	.00	.00	18.
Films & Bags	4.45	2.03	3.62	5.28	18.
Green PET contnr.	.05	.13	-.01	.10	18.
Clear PET contnr.	.05	.09	.01	.08	18.
PVC	.01	.02	.00	.02	18.
Polypropylene	.01	.03	-.00	.02	18.
Polystyrene	2.13	1.76	1.41	2.85	18.
Misc. Plastics	.21	.47	.02	.40	18.
Subtotal:	7.24	3.30	5.89	8.59	18.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	18.
Brush/prun./stumps	.02	.07	-.01	.05	18.
Subtotal:	.02	.07	-.01	.05	18.
ORGANICS					
Lumber	.36	.66	.09	.63	18.
Textiles	.50	.57	.27	.73	18.
Rubber	.00	.00	.00	.00	18.
Fines	1.94	1.31	1.40	2.47	18.
Diapers	.70	.88	.33	1.06	18.
Foodwaste	10.30	6.50	7.64	12.96	18.
Misc. Organics	7.17	5.89	4.76	9.58	18.
Subtotal:	20.96	8.17	17.63	24.30	18.
GLASS					
Clear container	.78	.56	.56	1.01	18.
Green container	.05	.12	-.00	.09	18.
Brown container	.04	.12	-.01	.08	18.
Misc. Glass	.00	.00	.00	.00	18.
Subtotal:	.87	.62	.61	1.12	18.
METALS					
Food Contnr./foil	.58	.57	.34	.81	18.
Beverage Cans	.24	.22	.15	.33	18.
Misc. Aluminum	.06	.21	-.02	.15	18.
Food container	2.18	1.85	1.43	2.94	18.
Other	.24	.35	.09	.38	18.
Bimetal Cans	.00	.01	-.00	.00	18.
Subtotal:	3.30	1.95	2.50	4.10	18.
INORGANICS					
Non-bulk ceramics	.05	.18	-.03	.12	18.
Misc. Inorganics	27.52	18.96	19.77	35.27	18.
Subtotal:	27.57	18.92	19.84	35.30	18.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	18.
Non-pestic. poisons	.00	.00	.00	.00	18.
Paint/Solvent/fuel	.00	.00	.00	.00	18.
Dry Cell batteries	.03	.20	-.05	.11	18.
Car Batteries	.00	.00	.00	.00	18.
Medical Waste	.00	.00	.00	.00	18.
Misc HHW	.00	.00	.00	.00	18.
Subtotal:	.03	.20	-.05	.11	18.
RETURNABLES COUNT					
Plastics	.50	2.13	-.37	1.37	18.
Aluminum	1.77	5.22	-.36	3.91	18.
Glass	1.06	3.68	-.45	2.56	18.
Mean Sample Wt:	378.75				

EXHIBIT 4-5

WASTE COMPOSITION SUMMARY - JUNIOR HIGH SCHOOLS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	8.58	4.91	6.57	10.58	18.
Newsprint	3.24	4.50	1.40	5.08	18.
Office/computer	4.55	4.91	2.54	6.56	18.
Magazines/glossy	2.34	3.28	1.00	3.68	18.
Book/phone books	2.79	3.69	1.28	4.30	18.
Non-Corrug. CrdBd.	10.93	3.84	9.35	12.50	18.
Mixed	23.58	7.29	20.60	26.56	18.
Subtotal:	56.00	14.02	50.27	61.74	18.
PLASTICS					
Clear HDPE contnr.	.41	.53	.19	.62	18.
Color HDPE contnr.	.04	.07	.01	.07	18.
LDPE	.04	.10	-.00	.07	18.
Films & Bags	6.21	2.92	5.01	7.40	18.
Green PET contnr.	.02	.06	-.00	.05	18.
Clear PET contnr.	.08	.10	.04	.12	18.
PVC	.02	.03	.00	.03	18.
Polypropylene	.06	.24	-.03	.16	18.
Polystyrene	1.35	1.08	.91	1.79	18.
Misc. Plastics	.96	1.34	.41	1.51	18.
Subtotal:	9.19	3.11	7.92	10.46	18.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	18.
Brush/prun./stumps	.00	.00	.00	.00	18.
Subtotal:	.00	.00	.00	.00	18.
ORGANICS					
Lumber	.79	.88	.43	1.15	18.
Textiles	4.27	4.86	2.28	6.26	18.
Rubber	.09	.45	-.09	.28	18.
Fines	2.69	2.16	1.81	3.57	18.
Diapers	.05	.22	-.04	.14	18.
Foodwaste	8.79	4.53	6.94	10.65	18.
Misc. Organics	6.99	5.12	4.90	9.08	18.
Subtotal:	23.68	8.56	20.18	27.17	18.
GLASS					
Clear container	.78	.48	.59	.98	18.
Green container	.35	.61	.11	.60	18.
Brown container	.15	.50	-.06	.35	18.
Misc. Glass	.09	.33	-.04	.23	18.
Subtotal:	1.38	1.20	.89	1.87	18.
METALS					
Food Contnr./foil	.71	.61	.46	.96	18.
Beverage Cans	.83	.33	.70	.96	18.
Misc. Aluminum	.11	.26	.01	.22	18.
Food container	1.43	1.16	.96	1.90	18.
Other	.96	.94	.58	1.34	18.
Bimetal Cans	.07	.15	.01	.13	18.
Subtotal:	4.11	1.75	3.40	4.83	18.
INORGANICS					
Non-bulk ceramics	.10	.33	-.04	.23	18.
Misc. Inorganics	5.39	10.07	1.28	9.50	18.
Subtotal:	5.49	10.09	1.36	9.61	18.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	18.
Non-pestic. poisons	.00	.00	.00	.00	18.
Paint/Solvent/fuel	.00	.00	.00	.00	18.
Dry Cell batteries	.00	.01	-.00	.00	18.
Car Batteries	.00	.00	.00	.00	18.
Medical Waste	.00	.00	.00	.00	18.
Misc HHW	.15	.61	-.09	.40	18.
Subtotal:	.16	.61	-.09	.40	18.
RETURNABLES COUNT					
Plastics	.70	2.82	-.45	1.85	18.
Aluminum	12.74	22.30	3.62	21.85	18.
Glass	1.74	5.07	-.33	3.81	18.
Mean Sample Wt:	293.10				

EXHIBIT 4-6

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (K-8TH GRADE)
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	11.52	3.75	9.99	13.06	18.
Newsprint	1.75	1.48	1.14	2.35	18.
Office/computer	3.30	4.70	1.38	5.22	18.
Magazines/glossy	2.85	2.50	1.83	3.87	18.
Book/phone books	1.64	3.23	.32	2.96	18.
Non-Corrug. CrdBd.	2.92	1.80	2.18	3.65	18.
Mixed	35.33	8.92	31.68	38.98	18.
Subtotal:	59.31	7.46	56.26	62.36	18.
PLASTICS					
Clear HDPE contnr.	.54	.41	.37	.71	18.
Color HDPE contnr.	.12	.14	.06	.18	18.
LDPE	.01	.02	.00	.02	18.
Films & Bags	4.85	1.46	4.26	5.45	18.
Green PET contnr.	.07	.17	-.00	.14	18.
Clear PET contnr.	.14	.17	.08	.21	18.
PVC	.03	.07	.00	.05	18.
Polypropylene	.02	.04	.01	.04	18.
Polystyrene	1.86	1.21	1.37	2.35	18.
Misc. Plastics	1.24	1.59	.59	1.89	18.
Subtotal:	8.89	2.89	7.71	10.07	18.
YARD WASTE					
Grass/Leaves	1.12	4.09	-.56	2.79	18.
Brush/prun./stumps	.07	.23	-.02	.17	18.
Subtotal:	1.19	4.08	-.48	2.85	18.
ORGANICS					
Lumber	1.36	1.31	.82	1.89	18.
Textiles	1.10	1.54	.47	1.73	18.
Rubber	.06	.22	-.03	.15	18.
Fines	2.41	1.11	1.95	2.86	18.
Diapers	.09	.18	.02	.16	18.
Foodwaste	8.56	3.42	7.16	9.96	18.
Misc. Organics	6.12	3.76	4.58	7.66	18.
Subtotal:	19.69	5.52	17.43	21.95	18.
GLASS					
Clear container	1.61	1.36	1.05	2.16	18.
Green container	.17	.31	.04	.30	18.
Brown container	.00	.00	.00	.00	18.
Misc. Glass	.02	.04	.00	.03	18.
Subtotal:	1.80	1.48	1.19	2.40	18.
METALS					
Food Contnr./foil	1.68	.94	1.30	2.06	18.
Beverage Cans	1.35	.80	1.03	1.68	18.
Misc. Aluminum	.20	.52	-.01	.41	18.
Food container	1.66	1.33	1.12	2.21	18.
Other	2.54	3.65	1.04	4.03	18.
Bimetal Cans	.06	.10	.01	.10	18.
Subtotal:	7.49	4.99	5.45	9.53	18.
INORGANICS					
Non-bulk ceramics	.02	.14	-.03	.08	18.
Misc. Inorganics	1.48	2.54	.44	2.52	18.
Subtotal:	1.50	2.53	.47	2.53	18.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	18.
Non-pestic. poisons	.01	.05	-.01	.03	18.
Paint/Solvent/fuel	.09	.38	-.06	.25	18.
Dry Cell batteries	.01	.03	-.00	.02	18.
Car Batteries	.00	.00	.00	.00	18.
Medical Waste	.00	.00	.00	.00	18.
Misc HHW	.02	.09	-.02	.06	18.
Subtotal:	.13	.43	-.04	.31	18.
RETURNABLES COUNT					
Plastics	1.24	4.09	-.43	2.91	18.
Aluminum	22.75	58.88	-1.32	46.81	18.
Glass	1.05	2.66	-.04	2.14	18.
Mean Sample Wt:	259.84				

EXHIBIT 4-7

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (6-12TH GRADE)
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.73	5.91	7.83	13.64	13.
Newsprint	4.28	3.88	2.38	6.19	13.
Office/computer	2.49	3.30	.87	4.11	13.
Magazines/glossy	.93	1.08	.40	1.46	13.
Book/phone books	.96	1.98	-.01	1.94	13.
Non-Corrug. CrdBd.	5.46	4.97	3.02	7.90	13.
Mixed	26.50	14.59	19.33	33.67	13.
Subtotal:	51.35	16.97	43.02	59.69	13.
PLASTICS					
Clear HDPE contnr.	.33	.42	.13	.54	13.
Color HDPE contnr.	.21	.48	-.03	.45	13.
LDPE	.01	.02	.00	.02	13.
Films & Bags	5.65	2.04	4.65	6.65	13.
Green PET contnr.	.06	.22	-.05	.16	13.
Clear PET contnr.	.12	.13	.05	.18	13.
PVC	.09	.14	.02	.16	13.
Polypropylene	.00	.00	.00	.00	13.
Polystyrene	1.85	1.36	1.18	2.53	13.
Misc. Plastics	.67	1.30	.03	1.30	13.
Subtotal:	8.98	3.97	7.04	10.93	13.
YARD WASTE					
Grass/Leaves	.26	.62	-.05	.56	13.
Brush/prun./stumps	.00	.00	.00	.00	13.
Subtotal:	.26	.62	-.05	.56	13.
ORGANICS					
Lumber	.15	.45	-.07	.38	13.
Textiles	1.73	2.71	.40	3.06	13.
Rubber	.00	.00	.00	.00	13.
Fines	1.79	.85	1.38	2.21	13.
Diapers	.00	.00	.00	.00	13.
Foodwaste	3.97	3.07	2.46	5.48	13.
Misc. Organics	6.84	4.98	4.39	9.29	13.
Subtotal:	14.49	8.41	10.36	18.62	13.
GLASS					
Clear container	1.21	.90	.77	1.66	13.
Green container	.02	.05	-.01	.05	13.
Brown container	.00	.00	.00	.00	13.
Misc. Glass	.02	.04	-.00	.04	13.
Subtotal:	1.25	.95	.78	1.72	13.
METALS					
Food Contnr./foil	1.04	.76	.67	1.42	13.
Beverage Cans	1.69	.85	1.27	2.11	13.
Misc. Aluminum	.03	.15	-.04	.11	13.
Food container	.80	1.12	.25	1.35	13.
Other	.46	.63	.15	.77	13.
Bimetal Cans	.02	.07	-.02	.05	13.
Subtotal:	4.04	2.11	3.00	5.08	13.
INORGANICS					
Non-bulk ceramics	.03	.13	-.03	.09	13.
Misc. Inorganics	19.52	23.26	8.09	30.94	13.
Subtotal:	19.55	23.23	8.14	30.96	13.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	13.
Non-pestic. poisons	.01	.03	-.00	.02	13.
Paint/Solvent/fuel	.05	.10	.01	.10	13.
Dry Cell batteries	.00	.02	-.01	.02	13.
Car Batteries	.00	.00	.00	.00	13.
Medical Waste	.00	.01	-.00	.01	13.
Misc HHW	.00	.00	.00	.00	13.
Subtotal:	.07	.13	.01	.13	13.
RETURNABLES COUNT					
Plastics	.74	3.12	-.80	2.27	13.
Aluminum	22.11	38.74	3.08	41.14	13.
Glass	1.64	4.12	-.38	3.66	13.
Mean Sample Wt:	229.96				

EXHIBIT 4-8

WASTE COMPOSITION SUMMARY - PSYCHIATRIC HOSPITALS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	12.98	5.88	10.93	15.03	24.
Newsprint	3.65	2.42	2.81	4.50	24.
Office/computer	6.45	7.56	3.80	9.09	24.
Magazines/glossy	.99	.96	.66	1.33	24.
Book/phone books	.81	1.29	.37	1.26	24.
Non-Corrug. CrdBd.	2.18	1.31	1.72	2.64	24.
Mixed	15.06	4.18	13.60	16.52	24.
Subtotal:	42.13	9.04	38.97	45.29	24.
PLASTICS					
Clear HDPE contnr.	.22	.33	.11	.34	24.
Color HDPE contnr.	.18	.20	.11	.26	24.
LDPE	.05	.07	.02	.07	24.
Films & Bags	7.93	3.07	6.86	9.00	24.
Green PET contnr.	.02	.04	.00	.03	24.
Clear PET contnr.	.24	.29	.14	.34	24.
PVC	.05	.17	-.01	.11	24.
Polypropylene	.08	.17	.02	.13	24.
Polystyrene	10.70	3.54	9.46	11.93	24.
Misc. Plastics	.63	.79	.36	.91	24.
Subtotal:	20.10	5.19	18.28	21.91	24.
YARD WASTE					
Grass/Leaves	.39	1.62	-.17	.96	24.
Brush/prun./stumps	.14	.63	-.08	.36	24.
Subtotal:	.53	2.23	-.25	1.31	24.
ORGANICS					
Lumber	1.32	2.18	.56	2.08	24.
Textiles	5.08	3.45	3.87	6.28	24.
Rubber	.05	.13	.00	.10	24.
Fines	1.70	.90	1.38	2.01	24.
Diapers	1.84	2.48	.97	2.70	24.
Foodwaste	9.24	5.71	7.24	11.23	24.
Misc. Organics	8.57	4.67	6.94	10.20	24.
Subtotal:	27.78	6.45	25.53	30.04	24.
GLASS					
Clear container	1.76	1.14	1.36	2.15	24.
Green container	.52	.75	.26	.78	24.
Brown container	.26	.56	.07	.46	24.
Misc. Glass	.24	.86	-.06	.54	24.
Subtotal:	2.78	1.78	2.16	3.40	24.
METALS					
Food Contnr./foil	1.08	1.14	.69	1.48	24.
Beverage Cans	.52	.39	.38	.65	24.
Misc. Aluminum	.05	.19	-.02	.12	24.
Food container	3.18	1.10	2.80	3.56	24.
Other	.76	.73	.51	1.02	24.
Bimetal Cans	.01	.03	-.00	.02	24.
Subtotal:	5.60	1.67	5.02	6.18	24.
INORGANICS					
Non-bulk ceramics	.03	.09	-.01	.06	24.
Misc. Inorganics	.64	1.32	.18	1.10	24.
Subtotal:	.67	1.31	.21	1.12	24.
HAZARDOUS WASTE					
Pesticides	.00	.01	-.00	.00	24.
Non-pestic. poisons	.00	.01	-.00	.01	24.
Paint/Solvent/fuel	.02	.09	-.01	.05	24.
Dry Cell batteries	.00	.00	.00	.00	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.29	.85	-.00	.59	24.
Misc HHW	.10	.26	.01	.19	24.
Subtotal:	.42	.86	.12	.72	24.
RETURNABLES COUNT					
Plastics	1.16	4.05	-.26	2.57	24.
Aluminum	6.01	12.43	1.67	10.35	24.
Glass	3.19	7.30	.64	5.74	24.
Mean Sample Wt:	371.14				

EXHIBIT 4-9

WASTE COMPOSITION SUMMARY - SKILLED NURSING FACILITIES
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.11	3.69	4.85	7.37	25.
Newsprint	1.34	1.48	.83	1.84	25.
Office/computer	1.19	1.41	.70	1.67	25.
Magazines/glossy	.44	.98	.10	.77	25.
Book/phone books	.06	.23	-.02	.14	25.
Non-Corrug. CrdBd.	1.39	1.30	.94	1.83	25.
Mixed	13.38	6.08	11.30	15.46	25.
Subtotal:	23.91	8.40	21.04	26.78	25.
PLASTICS					
Clear HDPE contnr.	.23	.32	.11	.34	25.
Color HDPE contnr.	.20	.29	.10	.29	25.
LDPE	.01	.03	.00	.02	25.
Films & Bags	9.71	5.53	7.82	11.60	25.
Green PET contnr.	.07	.13	.02	.11	25.
Clear PET contnr.	.02	.04	.00	.03	25.
PVC	.03	.12	-.01	.08	25.
Polypropylene	.03	.06	.01	.05	25.
Polystyrene	9.80	5.46	7.94	11.67	25.
Misc. Plastics	.51	.93	.19	.82	25.
Subtotal:	20.59	8.45	17.70	23.48	25.
YARD WASTE					
Grass/Leaves	.14	.78	-.12	.41	25.
Brush/prun./stumps	.00	.00	.00	.00	25.
Subtotal:	.14	.78	-.12	.41	25.
ORGANICS					
Lumber	.23	.65	.01	.45	25.
Textiles	1.34	2.46	.50	2.18	25.
Rubber	.00	.00	.00	.00	25.
Fines	1.31	.83	1.03	1.59	25.
Diapers	21.20	12.42	16.96	25.45	25.
Foodwaste	19.03	13.06	14.57	23.49	25.
Misc. Organics	5.48	4.19	4.05	6.91	25.
Subtotal:	48.59	14.45	43.65	53.53	25.
GLASS					
Clear container	.57	.79	.30	.84	25.
Green container	.01	.04	-.00	.02	25.
Brown container	.02	.05	-.00	.03	25.
Misc. Glass	.07	.54	-.11	.26	25.
Subtotal:	.67	.89	.37	.98	25.
METALS					
Food Contnr./foil	.62	1.04	.27	.97	25.
Beverage Cans	.22	.20	.15	.28	25.
Misc. Aluminum	.00	.00	.00	.00	25.
Food container	3.92	2.20	3.17	4.68	25.
Other	.56	.87	.27	.86	25.
Bimetal Cans	.00	.00	.00	.00	25.
Subtotal:	5.32	2.61	4.43	6.21	25.
INORGANICS					
Non-bulk ceramics	.10	.31	-.00	.21	25.
Misc. Inorganics	.08	.39	-.05	.22	25.
Subtotal:	.19	.48	.02	.35	25.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	25.
Non-pestic. poisons	.00	.00	.00	.00	25.
Paint/Solvent/fuel	.01	.04	-.01	.02	25.
Dry Cell batteries	.00	.00	.00	.00	25.
Car Batteries	.00	.00	.00	.00	25.
Medical Waste	.58	1.09	.21	.95	25.
Misc HHW	.00	.00	.00	.00	25.
Subtotal:	.58	1.08	.22	.95	25.
RETURNABLES COUNT					
Plastics	.58	2.19	-.17	1.32	25.
Aluminum	2.15	6.28	.00	4.29	25.
Glass	.44	2.16	-.30	1.18	25.
Mean Sample Wt:	290.62				

EXHIBIT 4-10

WASTE COMPOSITION SUMMARY - TEACHING HOSPITALS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.64	6.85	8.52	12.77	30.
Newsprint	4.58	4.24	3.27	5.90	30.
Office/computer	7.33	4.14	6.05	8.61	30.
Magazines/glossy	1.55	1.48	1.09	2.01	30.
Book/phone books	.34	.74	.11	.57	30.
Non-Corrug. CrdBd.	3.56	1.52	3.09	4.03	30.
Mixed	19.46	7.39	17.17	21.75	30.
Subtotal:	47.46	8.69	44.77	50.15	30.
PLASTICS					
Clear HDPE contnr.	.51	.50	.36	.67	30.
Color HDPE contnr.	.17	.19	.11	.23	30.
LDPE	.04	.07	.02	.06	30.
Films & Bags	8.00	3.49	6.92	9.08	30.
Green PET contnr.	.07	.19	.01	.13	30.
Clear PET contnr.	.23	.32	.13	.33	30.
PVC	.13	.29	.04	.22	30.
Polypropylene	.10	.19	.05	.16	30.
Polystyrene	6.88	3.19	5.89	7.86	30.
Misc. Plastics	2.53	1.63	2.03	3.04	30.
Subtotal:	18.67	5.39	17.00	20.34	30.
YARD WASTE					
Grass/Leaves	.13	.55	-.04	.30	30.
Brush/prun./stumps	.00	.00	.00	.00	30.
Subtotal:	.13	.55	-.04	.30	30.
ORGANICS					
Lumber	.86	1.78	.31	1.41	30.
Textiles	4.02	2.96	3.10	4.94	30.
Rubber	.15	.58	-.03	.33	30.
Fines	1.70	.89	1.43	1.98	30.
Diapers	2.22	1.90	1.63	2.81	30.
Foodwaste	9.14	4.29	7.81	10.47	30.
Misc. Organics	6.57	4.70	5.11	8.02	30.
Subtotal:	24.67	6.78	22.57	26.77	30.
GLASS					
Clear container	2.05	.88	1.77	2.32	30.
Green container	.17	.33	.06	.27	30.
Brown container	.25	.37	.14	.37	30.
Misc. Glass	.13	.61	-.06	.32	30.
Subtotal:	2.60	1.45	2.15	3.05	30.
METALS					
Food Contnr./foil	.78	1.00	.47	1.10	30.
Beverage Cans	.79	.47	.65	.94	30.
Misc. Aluminum	.01	.03	-.00	.02	30.
Food container	2.38	1.40	1.94	2.81	30.
Other	.77	1.01	.46	1.09	30.
Bimetal Cans	.02	.05	.01	.04	30.
Subtotal:	4.76	2.26	4.06	5.45	30.
INORGANICS					
Non-bulk ceramics	.01	.07	-.01	.03	30.
Misc. Inorganics	.87	1.95	.26	1.47	30.
Subtotal:	.88	1.95	.27	1.48	30.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	30.
Non-pestic. poisons	.00	.00	.00	.00	30.
Paint/Solvent/fuel	.01	.06	-.01	.03	30.
Dry Cell batteries	.04	.31	-.05	.14	30.
Car Batteries	.00	.00	.00	.00	30.
Medical Waste	.78	1.05	.45	1.10	30.
Misc HHW	.00	.02	-.00	.01	30.
Subtotal:	.84	1.08	.50	1.17	30.
RETURNABLES COUNT					
Plastics	1.10	3.41	.05	2.16	30.
Aluminum	11.36	17.44	5.96	16.77	30.
Glass	2.28	3.89	1.08	3.49	30.
Mean Sample Wt:	284.56				

EXHIBIT 4-11

WASTE COMPOSITION SUMMARY - GOVERNMENT OFFICE BUILDING
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.70	4.53	4.12	7.29	24.
Newsprint	12.18	6.11	10.05	14.31	24.
Office/computer	21.84	11.53	17.81	25.87	24.
Magazines/glossy	1.00	.92	.68	1.32	24.
Book/phone books	2.93	3.26	1.79	4.06	24.
Non-Corrug. CrdBd.	1.94	2.12	1.20	2.68	24.
Mixed	33.61	10.36	29.99	37.23	24.
Subtotal:	79.20	8.17	76.35	82.05	24.
PLASTICS					
Clear HDPE contnr.	.15	.33	.04	.27	24.
Color HDPE contnr.	.07	.13	.02	.11	24.
LDPE	.01	.02	-.00	.02	24.
Films & Bags	3.65	1.77	3.03	4.27	24.
Green PET contnr.	.02	.07	.00	.05	24.
Clear PET contnr.	.14	.20	.07	.21	24.
PVC	.03	.05	.01	.05	24.
Polypropylene	.01	.03	.00	.02	24.
Polystyrene	1.49	1.16	1.09	1.90	24.
Misc. Plastics	1.04	1.68	.45	1.62	24.
Subtotal:	6.61	3.12	5.52	7.70	24.
YARD WASTE					
Grass/Leaves	.01	.03	-.00	.02	24.
Brush/prun./stumps	.12	.54	-.07	.31	24.
Subtotal:	.13	.57	-.07	.33	24.
ORGANICS					
Lumber	.20	.32	.09	.32	24.
Textiles	1.29	1.83	.65	1.94	24.
Rubber	.00	.00	.00	.00	24.
Fines	1.58	1.69	.99	2.17	24.
Diapers	.03	.11	-.00	.07	24.
Foodwaste	1.69	1.23	1.27	2.12	24.
Misc. Organics	1.38	1.83	.74	2.02	24.
Subtotal:	6.19	3.65	4.91	7.46	24.
GLASS					
Clear container	2.88	1.44	2.38	3.39	24.
Green container	.36	.45	.20	.52	24.
Brown container	.15	.39	.02	.29	24.
Misc. Glass	.08	.29	-.02	.18	24.
Subtotal:	3.48	1.82	2.84	4.11	24.
METALS					
Food Contnr./foil	.86	.85	.57	1.16	24.
Beverage Cans	1.08	.59	.87	1.28	24.
Misc. Aluminum	.02	.10	-.02	.05	24.
Food container	.57	.41	.42	.71	24.
Other	.84	.89	.53	1.15	24.
Bimetal Cans	.02	.11	-.02	.06	24.
Subtotal:	3.39	1.93	2.71	4.06	24.
INORGANICS					
Non-bulk ceramics	.05	.16	-.01	.10	24.
Misc. Inorganics	.86	1.85	.21	1.51	24.
Subtotal:	.91	1.84	.26	1.55	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.04	.12	-.00	.08	24.
Paint/Solvent/fuel	.00	.00	.00	.00	24.
Dry Cell batteries	.06	.19	-.01	.13	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	.00	.00	.00	.00	24.
Subtotal:	.10	.22	.02	.17	24.
RETURNABLES COUNT					
Plastics	.97	2.90	-.04	1.99	24.
Aluminum	16.48	26.91	7.08	25.88	24.
Glass	4.94	9.16	1.74	8.14	24.
Mean Sample Wt:	269.82				

EXHIBIT 4-12

WASTE COMPOSITION SUMMARY - CORRECTIONAL FACILITIES
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	9.99	5.88	7.94	12.05	24.
Newsprint	3.69	2.43	2.84	4.54	24.
Office/computer	3.10	3.84	1.76	4.44	24.
Magazines/glossy	.53	.77	.26	.80	24.
Book/phone books	.28	.56	.08	.47	24.
Non-Corrug. CrdBd.	2.17	1.84	1.53	2.81	24.
Mixed	15.40	5.88	13.34	17.45	24.
Subtotal:	35.16	10.54	31.48	38.84	24.
PLASTICS					
Clear HDPE contnr.	.29	.61	.07	.50	24.
Color HDPE contnr.	.20	.27	.10	.29	24.
LDPE	.06	.11	.02	.09	24.
Films & Bags	6.50	2.08	5.77	7.22	24.
Green PET contnr.	.06	.16	.00	.12	24.
Clear PET contnr.	.18	.26	.09	.27	24.
PVC	.11	.13	.06	.15	24.
Polypropylene	.13	.19	.07	.20	24.
Polystyrene	1.86	1.11	1.47	2.24	24.
Misc. Plastics	.62	1.14	.22	1.02	24.
Subtotal:	10.00	2.48	9.13	10.86	24.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	24.
Brush/prun./stumps	.00	.00	.00	.00	24.
Subtotal:	.00	.00	.00	.00	24.
ORGANICS					
Lumber	.19	.39	.05	.33	24.
Textiles	3.37	2.74	2.41	4.33	24.
Rubber	.23	.83	-.06	.52	24.
Fines	1.29	.58	1.09	1.49	24.
Diapers	.02	.06	-.00	.04	24.
Foodwaste	38.11	11.72	34.02	42.20	24.
Misc. Organics	4.50	2.59	3.59	5.40	24.
Subtotal:	47.71	11.33	43.75	51.67	24.
GLASS					
Clear container	.84	.74	.58	1.10	24.
Green container	.10	.38	-.03	.23	24.
Brown container	.04	.07	.02	.07	24.
Misc. Glass	.08	.37	-.05	.21	24.
Subtotal:	1.06	.79	.78	1.33	24.
METALS					
Food Contnr./foil	.23	.30	.12	.34	24.
Beverage Cans	.35	.35	.22	.47	24.
Misc. Aluminum	.01	.08	-.02	.03	24.
Food container	3.94	2.51	3.07	4.82	24.
Other	.97	1.89	.31	1.63	24.
Bimetal Cans	.00	.00	.00	.00	24.
Subtotal:	5.49	2.49	4.62	6.36	24.
INORGANICS					
Non-bulk ceramics	.01	.03	-.00	.02	24.
Misc. Inorganics	.17	.56	-.03	.36	24.
Subtotal:	.17	.56	-.02	.37	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.37	1.27	-.07	.81	24.
Dry Cell batteries	.02	.04	.00	.03	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	.02	.07	-.00	.05	24.
Subtotal:	.41	1.26	-.03	.85	24.
RETURNABLES COUNT					
Plastics	.66	1.96	-.03	1.34	24.
Aluminum	4.24	14.17	-.71	9.19	24.
Glass	1.63	8.62	-1.38	4.64	24.
Mean Sample Wt:	291.68				

EXHIBIT 4-14

WASTE COMPOSITION SUMMARY - COLLEGES
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/OATE #/ SAMPLES
PAPER					
Corrugated/kraft	15.55	10.00	11.89	19.22	22.
Newsprint	9.25	4.69	7.54	10.97	22.
Office/computer	14.55	7.48	11.81	17.29	22.
Magazines/glossy	2.17	1.58	1.59	2.75	22.
Book/phone books	4.37	4.09	2.87	5.86	22.
Non-Corrug. CrdBd.	1.20	.94	.85	1.54	22.
Mixed	25.82	13.10	21.02	30.62	22.
Subtotal:	72.91	11.74	68.61	77.21	22.
PLASTICS					
Clear HDPE contnr.	.27	.37	.14	.41	22.
Color HDPE contnr.	.12	.29	.02	.23	22.
LDPE	.14	.63	-.09	.37	22.
Films & Bags	4.01	1.70	3.38	4.63	22.
Green PET contnr.	.09	.24	.00	.18	22.
Clear PET contnr.	.18	.16	.12	.24	22.
PVC	.05	.12	.01	.09	22.
Polypropylene	.02	.04	.01	.03	22.
Polystyrene	1.38	.62	1.15	1.61	22.
Misc. Plastics	1.07	1.44	.55	1.60	22.
Subtotal:	7.34	2.40	6.46	8.22	22.
YARD WASTE					
Grass/Leaves	.03	.14	-.02	.08	22.
Brush/prun./stumps	.05	.22	-.03	.13	22.
Subtotal:	.08	.25	-.01	.17	22.
ORGANICS					
Lumber	.35	.60	.13	.57	22.
Textiles	1.15	.88	.83	1.47	22.
Rubber	.00	.01	-.00	.01	22.
Fines	1.18	.61	.95	1.40	22.
Diapers	.44	1.26	-.02	.91	22.
Foodwaste	8.35	10.65	4.45	12.24	22.
Misc. Organics	1.48	1.43	.95	2.00	22.
Subtotal:	12.94	11.02	8.90	16.97	22.
GLASS					
Clear container	2.93	1.91	2.23	3.63	22.
Green container	.37	.38	.24	.51	22.
Brown container	.18	.42	.03	.34	22.
Misc. Glass	.09	.44	-.07	.25	22.
Subtotal:	3.58	1.88	2.89	4.27	22.
METALS					
Food Contnr./foil	.23	.22	.15	.31	22.
Beverage Cans	1.30	.68	1.05	1.55	22.
Misc. Aluminum	.00	.00	.00	.00	22.
Food container	.41	.59	.20	.63	22.
Other	1.02	2.40	.14	1.89	22.
Bimetal Cans	.02	.06	-.00	.04	22.
Subtotal:	2.98	2.52	2.05	3.90	22.
INORGANICS					
Non-bulk ceramics	.05	.10	.01	.08	22.
Misc. Inorganics	.09	.40	-.06	.23	22.
Subtotal:	.14	.45	-.03	.30	22.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	22.
Non-pestic. poisons	.00	.00	.00	.00	22.
Paint/Solvent/fuel	.04	.26	-.06	.13	22.
Dry Cell batteries	.00	.01	-.00	.00	22.
Car Batteries	.00	.00	.00	.00	22.
Medical Waste	.00	.00	.00	.00	22.
Misc HHW	.00	.00	.00	.00	22.
Subtotal:	.04	.26	-.05	.14	22.
RETURNABLES COUNT					
Plastics	.75	2.89	-.30	1.81	22.
Aluminum	14.54	28.96	3.94	25.15	22.
Glass	6.16	16.90	-.02	12.35	22.
Mean Sample Wt:	344.42				

EXHIBIT 4-14

WASTE COMPOSITION SUMMARY - PUBLIC HIGH SCHOOLS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.88	3.55	9.47	12.29	19.
Newsprint	3.14	2.08	2.31	3.96	19.
Office/computer	4.93	3.41	3.58	6.28	19.
Magazines/glossy	1.33	1.82	.61	2.06	19.
Book/phone books	1.74	2.51	.74	2.73	19.
Non-Corrug. CrdBd.	18.02	6.74	15.35	20.70	19.
Mixed	21.61	8.75	18.13	25.08	19.
Subtotal:	61.65	11.44	57.11	66.19	19.
PLASTICS					
Clear HDPE contnr.	.27	.32	.15	.40	19.
Color HDPE contnr.	.03	.07	.01	.06	19.
LDPE	.00	.01	-.00	.00	19.
Films & Bags	6.27	1.92	5.51	7.04	19.
Green PET contnr.	.05	.14	-.01	.11	19.
Clear PET contnr.	.08	.19	.00	.15	19.
PVC	.02	.07	-.01	.05	19.
Polypropylene	.13	.57	-.09	.36	19.
Polystyrene	1.16	.86	.82	1.50	19.
Misc. Plastics	.78	3.15	-.47	2.03	19.
Subtotal:	8.81	3.54	7.40	10.21	19.
YARD WASTE					
Grass/Leaves	.02	.11	-.02	.07	19.
Brush/prun./stumps	.00	.00	.00	.00	19.
Subtotal:	.02	.11	-.02	.07	19.
ORGANICS					
Lumber	.16	.47	-.02	.35	19.
Textiles	.25	.43	.08	.42	19.
Rubber	.04	.16	-.02	.10	19.
Fines	1.82	1.27	1.31	2.32	19.
Diapers	.01	.07	-.01	.04	19.
Foodwaste	8.07	7.95	4.92	11.22	19.
Misc. Organics	8.39	5.61	6.17	10.62	19.
Subtotal:	18.74	8.00	15.57	21.92	19.
GLASS					
Clear container	1.77	1.21	1.29	2.25	19.
Green container	.19	.32	.06	.32	19.
Brown container	.00	.00	.00	.00	19.
Misc. Glass	.31	.67	.04	.57	19.
Subtotal:	2.27	1.45	1.69	2.84	19.
METALS					
Food Contnr./foil	.86	.92	.50	1.23	19.
Beverage Cans	1.37	.66	1.11	1.63	19.
Misc. Aluminum	.00	.00	.00	.00	19.
Food container	2.37	1.46	1.79	2.95	19.
Other	1.48	2.20	.61	2.35	19.
Bimetal Cans	.12	.36	-.02	.27	19.
Subtotal:	6.20	2.86	5.07	7.34	19.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	19.
Misc. Inorganics	2.30	4.86	.37	4.22	19.
Subtotal:	2.30	4.86	.37	4.22	19.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	19.
Non-pestic. poisons	.00	.00	.00	.00	19.
Paint/Solvent/fuel	.00	.00	.00	.00	19.
Dry Cell batteries	.01	.03	-.00	.00	19.
Car Batteries	.00	.00	.00	.02	19.
Medical Waste	.00	.00	.00	.00	19.
Misc HHW	.00	.00	.00	.00	19.
Subtotal:	.01	.03	-.00	.02	19.
RETURNABLES COUNT					
Plastics	.42	1.80	-.30	1.13	19.
Aluminum	18.49	25.07	8.54	28.43	19.
Glass	3.36	11.32	-1.13	7.85	19.
Mean Sample Wt:	266.20				

EXHIBIT 4-15

WASTE COMPOSITION SUMMARY - TRANSPORTATION HUBS
WINTER 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/OATE #/ SAMPLES
PAPER					
Corrugated/kraft	9.23	5.96	6.87	11.60	19.
Newsprint	29.49	23.11	20.32	38.65	19.
Office/computer	2.62	4.08	1.00	4.24	19.
Magazines/glossy	.92	.77	.61	1.22	19.
Book/phone books	3.77	9.74	-.10	7.63	19.
Non-Corrug. CrdBd.	1.85	2.08	1.03	2.67	19.
Mixed	19.39	8.87	15.87	22.91	19.
Subtotal:	67.26	12.73	62.21	72.31	19.
PLASTICS					
Clear HDPE contnr.	.24	.24	.14	.34	19.
Color HDPE contnr.	.16	.24	.07	.25	19.
LDPE	.04	.06	.02	.06	19.
Films & Bags	3.35	1.59	2.72	3.97	19.
Green PET contnr.	.02	.03	.00	.03	19.
Clear PET contnr.	.09	.07	.06	.12	19.
PVC	.03	.06	.01	.06	19.
Polypropylene	.05	.11	.01	.10	19.
Polystyrene	.92	.70	.64	1.19	19.
Misc. Plastics	.85	.98	.46	1.24	19.
Subtotal:	5.75	1.96	4.97	6.53	19.
YARO WASTE					
Grass/Leaves	.00	.00	.00	.00	19.
Brush/prun./stumps	.00	.00	.00	.00	19.
Subtotal:	.00	.00	.00	.00	19.
ORGANICS					
Lumber	1.46	2.85	.33	2.60	19.
Textiles	5.03	5.03	3.03	7.02	19.
Rubber	.62	1.38	.07	1.17	19.
Fines	2.88	1.65	2.22	3.53	19.
Oiapers	.06	.23	-.04	.15	19.
Foodwaste	1.99	3.18	.72	3.25	19.
Misc. Organics	2.74	3.00	1.55	3.93	19.
Subtotal:	14.77	8.15	11.54	18.00	19.
GLASS					
Clear container	1.92	1.40	1.37	2.48	19.
Green container	.40	.56	.18	.62	19.
Brown container	.31	.67	.04	.58	19.
Misc. Glass	.01	.06	-.01	.04	19.
Subtotal:	2.65	2.24	1.76	3.53	19.
METALS					
Food Contnr./foil	.21	.18	.14	.28	19.
Beverage Cans	.83	1.07	.41	1.26	19.
Misc. Aluminum	.01	.04	-.00	.03	19.
Food container	1.08	3.41	-.27	2.44	19.
Other	5.35	6.97	2.58	8.11	19.
Bimetal Cans	.03	.10	-.01	.07	19.
Subtotal:	7.52	7.72	4.46	10.58	19.
INORGANICS					
Non-bulk ceramics	.15	.57	-.07	.38	19.
Misc. Inorganics	.73	2.10	-.11	1.56	19.
Subtotal:	.88	2.13	.04	1.72	19.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	19.
Non-pestic. poisons	.04	.15	-.02	.10	19.
Paint/Solvent/fuel	.35	1.46	-.23	.92	19.
Ory Cell batteries	.61	1.49	.02	1.21	19.
Car Batteries	.00	.00	.00	.00	19.
Medical Waste	.00	.00	.00	.00	19.
Misc HHW	.18	.64	-.08	.44	19.
Subtotal:	1.18	2.01	.38	1.97	19.
RETURNABLES COUNT					
Plastics	.73	1.90	-.03	1.48	19.
Aluminum	8.09	15.70	1.86	14.32	19.
Glass	3.10	7.52	.12	6.09	19.
Mean Sample Wt:	332.49				

SECTION 5

INSTITUTIONAL WASTE ANALYSIS
SPRING 1990

APPROACH

Field sorting and weighing procedures in Spring 1990 were similar to the preceding seasonal sorting events. The purpose of the waste sorting and classification was to estimate waste types and quantities generated from selected institutional facilities served by City forces, based on the waste components present in the disposed refuse. For the Spring 1990 activities, field work for the institutional waste sector commenced on Monday, April 30, with sorting activities completed by Saturday, May 5, 1990.

As in the preceding seasons, institutional waste loads originated from pre-designated institutions, generally described by the project's 14 institutional types. Waste loads were delivered to two work sites (changed to the MTS and the Queens Salt Dome [QNS] during Spring 1990) for sampling, measurement, and weighing activities.

A listing of institutional loads delivered to each work site is given in Exhibits 5-1 and 5-2. The number of incoming vehicles ranged from two to eight vehicles on a daily basis; each vehicle was identified by originating borough, Department of Sanitation collection route, and institutional type.

The number of refuse samples obtained and sorted by components per institutional type is shown in Exhibit 5-3. A total of 309 institutional waste samples were sorted and classified according to 45 component categories during the Spring 1990 activities.

WASTE COMPOSITION RESULTS

Tabulated composition results for each of the 14 institutional categories are presented sequentially in Exhibits 5-4 through 5-17, as follows:

Exhibit	Institutional Category
5-4	Elementary Schools
5-5	Junior High Schools
5-6	Private Schools (Kindergarten-8th Grade)
5-7	Private Schools (6th-12th Grade)
5-8	Psychiatric Hospitals
5-9	Skilled Nursing Facilities
5-10	Municipal Hospitals
5-11	Teaching Hospitals
5-12	Non-Profit Hospital
5-13	Government Offices
5-14	Correctional Facilities
5-15	Colleges
5-16	Public High Schools

5-17 Transportation Hubs

Summary calculations of component percentages in these exhibits show weighted averages, as well as associated standard deviation, lower and upper confidence intervals (95 percent level), and the number of samples obtained and sorted by the project's institutional categories.

EXHIBIT 5-1

INSTITUTIONAL LOADS DELIVERED TO MTS SITE
SPRING 1990

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
04/30/90	1	MN	College	Control 6	12
	2	QN	Correctional	Control 9A	11
	3	SI	Private (K-8)	Control 14	3
	4	QN	Private (6-12)	Control 10	4
	5	QN	Correctional	Control 9B	11
05/01/90	1	BX	Elementary	Control 7	1
	2	QN	Public H.S.	Control 20	13
05/02/90	1	QN	Correctional	Control 9A	11
	2	MN	Trans. Hub	Control 19	14
	3	QN	Correctional	Control 9B	11
	4	QN	Correctional	Control 9C	11
	5	MN	College	Control 6	12
	6	MN	Govt. Office*	Control 20A	10
	7	MN	Trans. Hub	Control 19	14
05/03/90	1	MN	Trans. Hub	Control 19	14
	2	BX	Elementary	Control 7	1
	3	QN	Private (6-12)	Control 10	4
	4	MN	Trans. Hub	Control 19	14
	5	SI	Private (K-8)	Control 14	3
	6	MN	Govt. Office*	Control 20A	10
	7	MN	Trans. Hub	Control 18	14
05/04/90	1	QN	Correctional	Control 9A	11
	2	MN	College	Control 6	12
	3	QN	Correctional	Control 9C	11
	4	QN	Public H.S.	Control 20	13
	5	QN	Correctional	Control 9B	11

* This load was subsequently identified as unrepresentative by DOS-OPEC. Resultant data to be excluded from study.

EXHIBIT 5-2

INSTITUTIONAL LOADS DELIVERED TO QUEENS SITE
SPRING 1990

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
04/30/90	1	QN	Skill. Nurs.	Control 1	6
	2	BK	Junior H.S.	Control 3	2
	3	SI	Non-profit Hosp.	Control 17	9
	4	BK	Govt. Office	Control 4	10
	5	BK	Elementary	Control 2	1
	6	BK	Municipal Hosp.	Control 15	7
05/01/90	1	BK	Psych. Hosp.	Control 1	5
	2	BX	Skill. Nurs.	Control 8	6
	3	BK	Govt. Office	Control 4	10
	4	QN	Elementary	Control 12	1
	5	BK	Teaching Hosp.	Control 16	8
	6	QN	Elementary	Control 13	1
05/02/90	1	BK	Junior H.S.	Control 3	2
	2	BK	Govt. Office	Control 4	10
	3	BX	Skill. Nurs.	Control 8	6
	4	BK	Municipal Hosp.	Control 15	7
	5	BK	Elementary	Control 2	1
05/03/90	1	QN	Skill. Nurs.	Control 11	6
	2	BK	Municipal	Control 15	7
	3	BK	Govt. Office	Control 4	10
	4	BK	Govt. Office	Control 5	10
05/04/90	1	BX	Skill. Nurs.	Control 8	6
	2	BK	Junior H.S.	Control 3	2
	3	QN	Elementary	Control 13	1
	4	BK	Teaching Hosp.	Control 16	8
	5	QN	Elementary	Control 12	1
	6	BK	Elementary	Control 2	1

EXHIBIT 5-2 (continued)

Date	Daily Load No.	Borough	Generator	Tract/Route	Institutional Category No.
	7	BK	Govt. Office	Control 4	10
	8	BK	Govt. Office	Control 4	5
05/05/90	1	SI	Non-profit Hosp.	Control 17	9
	2	BK	Psych. Hosp.	Control 1	5
	3	BK	Govt. Office	Control 4	10
	4	BK	Municipal Hosp.	Control 15	7
	5	BX	Elementary	Control 7	1

EXHIBIT 5-3

SORT SAMPLES OBTAINED BY INSTITUTIONAL CATEGORY
SPRING 1990

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF SORT SAMPLES
1	Elementary Schools	28
2	Junior High Schools	24
3	Private Schools, K-8th Grade	24
4	Private Schools, 6-12th Grade	11
5	Psychiatric Hospitals	8
6	Skilled Nursing Facilities	24
7	Municipal Hospitals	20
8	Teaching Hospitals	24
9	Non-profit Hospitals	24
10	Government Hospitals	17
11	Correctional Facilities	28
12	Colleges	25
13	Public High Schools	23
14	Transportation Hubs	29
TOTAL		309

EXHIBIT 5-4

WASTE COMPOSITION SUMMARY - ELEMENTARY SCHOOLS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.12	8.10	7.51	12.72	28.
Newsprint	2.30	2.80	1.40	3.20	28.
Office/computer	.33	1.14	-.03	.70	28.
Magazines/glossy	.31	.62	.11	.50	28.
Book/phone books	.21	.82	-.05	.47	28.
Non-Corrug. CrdBd.	4.11	5.56	2.32	5.90	28.
Mixed	30.77	12.50	26.75	34.79	28.
Subtotal:	48.15	15.23	43.25	53.04	28.
PLASTICS					
Clear HDPE contnr.	.19	.22	.12	.27	28.
Color HDPE contnr.	.16	.23	.09	.24	28.
LDPE	.12	.74	-.12	.36	28.
Films & Bags	4.77	1.89	4.16	5.38	28.
Green PET contnr.	.03	.09	-.00	.06	28.
Clear PET contnr.	.14	.17	.08	.19	28.
PVC	.00	.01	.00	.00	28.
Polypropylene	.01	.04	.00	.03	28.
Polystyrene	3.74	2.74	2.86	4.62	28.
Misc. Plastics	.24	.47	.09	.39	28.
Subtotal:	9.41	3.56	8.27	10.56	28.
YARD WASTE					
Grass/Leaves	1.54	6.72	-.62	3.70	28.
Brush/prun./stumps	.03	.12	-.01	.07	28.
Subtotal:	1.57	6.72	-.59	3.73	28.
ORGANICS					
Lumber	.54	.69	.32	.76	28.
Textiles	1.80	3.00	.84	2.77	28.
Rubber	.25	1.14	-.12	.62	28.
Fines	1.33	1.31	.91	1.75	28.
Diapers	1.06	1.83	.47	1.65	28.
Foodwaste	23.21	13.86	18.75	27.66	28.
Misc. Organics	3.96	3.29	2.90	5.02	28.
Subtotal:	32.14	14.37	27.52	36.76	28.
GLASS					
Clear container	1.40	1.22	1.01	1.80	28.
Green container	.48	.51	.32	.65	28.
Brown container	.30	.46	.15	.45	28.
Misc. Glass	.19	.33	.09	.30	28.
Subtotal:	2.38	1.60	1.87	2.89	28.
METALS					
Food Contnr./foil	.45	.36	.34	.57	28.
Beverage Cans	.27	.27	.19	.36	28.
Misc. Aluminum	.00	.00	.00	.00	28.
Food container	2.58	2.04	1.93	3.24	28.
Other	1.69	2.83	.78	2.60	28.
Bimetal Cans	.01	.05	-.01	.02	28.
Subtotal:	5.01	3.38	3.92	6.09	28.
INORGANICS					
Non-bulk ceramics	.00	.01	.00	.00	28.
Misc. Inorganics	1.31	3.51	.19	2.44	28.
Subtotal:	1.32	3.51	.19	2.44	28.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	28.
Non-pestic. poisons	.00	.00	.00	.00	28.
Paint/Solvent/fuel	.00	.00	.00	.00	28.
Dry Cell batteries	.00	.00	.00	.00	28.
Car Batteries	.00	.00	.00	.00	28.
Medical Waste	.00	.00	.00	.00	28.
Misc HHW	.02	.05	.00	.04	28.
Subtotal:	.02	.05	.00	.04	28.
RETURNABLES COUNT					
Plastics	.46	1.22	.07	.85	28.
Aluminum	3.87	11.42	.20	7.54	28.
Glass	2.56	5.57	.77	4.35	28.
Mean Sample Wt:	280.60				

EXHIBIT 5-5

WASTE COMPOSITION SUMMARY - JUNIOR HIGH SCHOOLS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.97	4.62	6.35	9.58	24.
Newsprint	2.71	2.16	1.96	3.47	24.
Office/computer	.87	1.55	.33	1.42	24.
Magazines/glossy	.49	1.37	.01	.97	24.
Book/phone books	3.44	5.43	1.54	5.34	24.
Non-Corrug. CrdBd.	4.42	4.33	2.91	5.93	24.
Mixed	29.24	14.78	24.08	34.41	24.
Subtotal:	49.15	12.50	44.78	53.52	24.
PLASTICS					
Clear HDPE contnr.	.27	.23	.19	.35	24.
Color HDPE contnr.	.10	.17	.04	.16	24.
LDPE	.09	1.34	-.38	.56	24.
Films & Bags	6.03	3.21	4.91	7.15	24.
Green PET contnr.	.01	.10	-.03	.04	24.
Clear PET contnr.	.12	.13	.08	.17	24.
PVC	.01	.03	.00	.02	24.
Polypropylene	.00	.03	-.01	.01	24.
Polystyrene	1.36	1.26	.93	1.80	24.
Misc. Plastics	2.15	3.73	.85	3.45	24.
Subtotal:	10.15	4.72	8.50	11.80	24.
YARD WASTE					
Grass/Leaves	5.84	9.22	2.62	9.06	24.
Brush/prun./stumps	.40	1.49	-.12	.92	24.
Subtotal:	6.25	9.19	3.04	9.45	24.
ORGANICS					
Lumber	.79	2.05	.07	1.50	24.
Textiles	1.13	2.20	.36	1.89	24.
Rubber	.20	.45	.04	.35	24.
Fines	1.09	1.09	.71	1.47	24.
Diapers	.00	.00	.00	.00	24.
Foodwaste	11.26	6.71	8.92	13.61	24.
Misc. Organics	3.85	3.37	2.67	5.03	24.
Subtotal:	18.32	8.08	15.50	21.14	24.
GLASS					
Clear container	.99	.62	.78	1.21	24.
Green container	.10	.19	.04	.17	24.
Brown container	.09	.29	-.01	.20	24.
Misc. Glass	.03	.09	.00	.06	24.
Subtotal:	1.22	.77	.96	1.49	24.
METALS					
Food Contnr./foil	.94	.86	.64	1.24	24.
Beverage Cans	.89	.53	.71	1.08	24.
Misc. Aluminum	.07	.24	-.01	.16	24.
Food container	1.26	1.34	.79	1.73	24.
Other	5.22	5.25	3.39	7.05	24.
Bimetal Cans	.09	.13	.04	.14	24.
Subtotal:	8.48	4.59	6.88	10.08	24.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	24.
Misc. Inorganics	5.04	6.63	2.73	7.36	24.
Subtotal:	5.04	6.63	2.73	7.36	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.30	1.19	-.11	.72	24.
Dry Cell batteries	.00	.00	-.00	.00	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	1.08	2.16	.33	1.84	24.
Subtotal:	1.39	2.37	.56	2.21	24.
RETURNABLES COUNT					
Plastics	1.05	5.15	-.75	2.85	24.
Aluminum	14.54	30.50	3.89	25.19	24.
Glass	1.52	2.50	.64	2.39	24.
Mean Sample Wt:	313.22				

EXHIBIT 5-6

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (K-8TH GRADE)
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.71	4.99	5.97	9.46	24.
Newsprint	2.14	2.31	1.33	2.95	24.
Office/computer	1.54	2.01	.83	2.24	24.
Magazines/glossy	1.37	1.38	.89	1.85	24.
Book/phone books	1.11	1.56	.57	1.66	24.
Non-Corrug. CrdBd.	1.47	1.46	.96	1.99	24.
Mixed	25.21	9.68	21.83	28.59	24.
Subtotal:	40.56	10.75	36.80	44.31	24.
PLASTICS					
Clear HDPE contnr.	.28	.25	.20	.37	24.
Color HDPE contnr.	.22	.32	.10	.33	24.
LDPE	.00	.02	-.00	.01	24.
Films & Bags	3.36	1.71	2.77	3.96	24.
Green PET contnr.	.02	.05	-.00	.03	24.
Clear PET contnr.	.06	.10	.02	.10	24.
PVC	.02	.06	-.00	.04	24.
Polypropylene	.10	.22	.02	.17	24.
Polystyrene	.79	.57	.59	.99	24.
Misc. Plastics	.68	.83	.39	.97	24.
Subtotal:	5.53	2.07	4.81	6.26	24.
YARD WASTE					
Grass/Leaves	26.93	19.72	20.04	33.81	24.
Brush/prun./stumps	.22	.55	.03	.41	24.
Subtotal:	27.15	19.76	20.25	34.05	24.
ORGANICS					
Lumber	2.35	5.63	.39	4.32	24.
Textiles	1.55	1.92	.88	2.22	24.
Rubber	.03	.12	-.01	.07	24.
Fines	1.19	1.11	.80	1.57	24.
Diapers	.08	.24	-.01	.16	24.
Foodwaste	6.08	4.04	4.67	7.49	24.
Misc. Organics	4.45	8.40	1.52	7.39	24.
Subtotal:	15.73	11.04	11.87	19.58	24.
GLASS					
Clear container	.74	.94	.41	1.07	24.
Green container	.05	.10	.01	.08	24.
Brown container	.02	.08	-.01	.05	24.
Misc. Glass	.01	.04	-.01	.02	24.
Subtotal:	.82	.95	.48	1.15	24.
METALS					
Food Contnr./foil	.64	.35	.52	.76	24.
Beverage Cans	.62	.67	.39	.86	24.
Misc. Aluminum	.01	.04	-.00	.02	24.
Food container	.96	1.10	.57	1.34	24.
Other	1.80	2.30	1.00	2.61	24.
Bimetal Cans	.08	.10	.05	.12	24.
Subtotal:	4.12	2.70	3.18	5.06	24.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	24.
Misc. Inorganics	5.96	8.97	2.82	9.09	24.
Subtotal:	5.96	8.97	2.82	9.09	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.04	.19	-.03	.10	24.
Dry Cell batteries	.03	.14	-.01	.08	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.00	.00	.00	.00	24.
Misc HHW	.07	.41	-.07	.22	24.
Subtotal:	.14	.45	-.01	.30	24.
RETURNABLES COUNT					
Plastics	.47	1.62	-.10	1.04	24.
Aluminum	9.10	32.40	-2.21	20.42	24.
Glass	.68	2.73	-.27	1.64	24.
Mean Sample Wt:	274.63				

WASTE COMPOSITION SUMMARY - PRIVATE SCHOOLS (6-12TH GRADE)

SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.91	3.54	3.99	7.83	11.
Newsprint	3.38	2.32	2.13	4.64	11.
Office/computer	1.58	1.92	.55	2.62	11.
Magazines/glossy	.68	.79	.25	1.10	11.
Book/phone books	4.48	8.27	.01	8.96	11.
Non-Corrug. CrdBd.	1.69	1.31	.99	2.40	11.
Mixed	27.75	11.71	21.41	34.09	11.
Subtotal:	45.48	11.14	39.45	51.51	11.
PLASTICS					
Clear HDPE contnr.	.24	.30	.08	.40	11.
Color HDPE contnr.	.18	.35	-.01	.37	11.
LDPE	.01	.04	-.01	.03	11.
Films & Bags	5.15	1.89	4.13	6.18	11.
Green PET contnr.	.00	.00	.00	.00	11.
Clear PET contnr.	.35	.51	.08	.63	11.
PVC	.00	.00	.00	.00	11.
Polypropylene	.09	.21	-.03	.20	11.
Polystyrene	1.11	.54	.81	1.40	11.
Misc. Plastics	.59	.61	.26	.92	11.
Subtotal:	7.72	2.34	6.45	8.99	11.
YARD WASTE					
Grass/Leaves	6.73	9.76	1.44	12.02	11.
Brush/prun./stumps	.00	.00	.00	.00	11.
Subtotal:	6.73	9.76	1.44	12.02	11.
ORGANICS					
Lumber	1.90	2.16	.72	3.07	11.
Textiles	4.38	3.79	2.33	6.44	11.
Rubber	.05	.14	-.02	.13	11.
Fines	4.61	5.81	1.47	7.76	11.
Diapers	.00	.00	.00	.00	11.
Foodwaste	3.57	2.99	1.94	5.19	11.
Misc. Organics	5.80	5.57	2.78	8.82	11.
Subtotal:	20.31	10.03	14.88	25.74	11.
GLASS					
Clear container	1.18	.56	.88	1.49	11.
Green container	.28	.39	.07	.50	11.
Brown container	.07	.12	.00	.13	11.
Misc. Glass	1.52	6.09	-1.78	4.81	11.
Subtotal:	3.05	6.27	-.34	6.44	11.
METALS					
Food Contnr./foil	.98	1.20	.33	1.63	11.
Beverage Cans	1.08	1.03	.53	1.64	11.
Misc. Aluminum	.18	.34	-.00	.37	11.
Food container	1.58	2.71	.12	3.05	11.
Other	6.12	5.04	3.39	8.85	11.
Bimetal Cans	.01	.02	.00	.03	11.
Subtotal:	9.97	5.74	6.86	13.07	11.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	11.
Misc. Inorganics	6.49	10.02	1.06	11.91	11.
Subtotal:	6.49	10.02	1.06	11.91	11.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	11.
Non-pestic. poisons	.00	.00	.00	.00	11.
Paint/Solvent/fuel	.02	.08	-.02	.06	11.
Dry Cell batteries	.08	.12	.01	.14	11.
Car Batteries	.00	.00	.00	.00	11.
Medical Waste	.00	.00	.00	.00	11.
Misc HHW	.16	.62	-.18	.50	11.
Subtotal:	.26	.70	-.12	.63	11.
RETURNABLES COUNT					
Plastics	1.27	2.33	.01	2.53	11.
Aluminum	15.92	23.16	3.38	28.46	11.
Glass	1.66	2.66	.23	3.10	11.
Mean Sample Wt:	251.26				

WASTE COMPOSITION SUMMARY - PSYCHIATRIC HOSPITALS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	14.55	5.69	10.81	18.29	8.
Newsprint	3.52	4.72	.42	6.62	8.
Office/computer	1.75	4.68	-1.33	4.83	8.
Magazines/glossy	.33	.34	.11	.56	8.
Book/phone books	.50	1.37	-.39	1.40	8.
Non-Corrug. CrdBd.	.54	.77	.04	1.05	8.
Mixed	17.88	5.78	14.08	21.68	8.
Subtotal:	39.08	9.75	32.67	45.49	8.
PLASTICS					
Clear HDPE contnr.	.04	.03	.01	.06	8.
Color HDPE contnr.	.10	.09	.04	.16	8.
LDPE	.00	.00	.00	.00	8.
Films & Bags	6.53	2.32	5.01	8.06	8.
Green PET contnr.	.04	.06	.00	.09	8.
Clear PET contnr.	.24	.24	.08	.40	8.
PVC	.00	.00	.00	.00	8.
Polypropylene	.00	.00	.00	.00	8.
Polystyrene	9.87	4.13	7.16	12.59	8.
Misc. Plastics	.21	.14	.12	.30	8.
Subtotal:	17.04	5.79	13.23	20.84	8.
YARD WASTE					
Grass/Leaves	.19	.32	-.02	.40	8.
Brush/prun./stumps	.00	.00	.00	.00	8.
Subtotal:	.19	.32	-.02	.40	8.
ORGANICS					
Lumber	1.11	1.52	.11	2.11	8.
Textiles	5.40	2.94	3.47	7.34	8.
Rubber	.19	.20	.06	.32	8.
Fines	1.03	.71	.57	1.50	8.
Diapers	2.98	2.42	1.39	4.57	8.
Foodwaste	14.32	6.37	10.13	18.51	8.
Misc. Organics	6.33	7.13	1.64	11.02	8.
Subtotal:	31.36	7.51	26.43	36.30	8.
GLASS					
Clear container	1.86	1.40	.94	2.78	8.
Green container	.27	.38	.02	.53	8.
Brown container	.15	.34	-.07	.37	8.
Misc. Glass	.07	.17	-.04	.18	8.
Subtotal:	2.35	1.72	1.22	3.48	8.
METALS					
Food Contnr./foil	.77	.60	.38	1.17	8.
Beverage Cans	.37	.21	.23	.51	8.
Misc. Aluminum	.00	.00	.00	.00	8.
Food container	2.84	1.56	1.81	3.87	8.
Other	.09	.20	-.05	.22	8.
Bimetal Cans	.00	.00	.00	.00	8.
Subtotal:	4.07	1.52	3.07	5.07	8.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	8.
Misc. Inorganics	4.32	4.28	1.51	7.13	8.
Subtotal:	4.32	4.28	1.51	7.13	8.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	8.
Non-pestic. poisons	.00	.00	.00	.00	8.
Paint/Solvent/fuel	.00	.00	.00	.00	8.
Dry Cell batteries	.00	.00	.00	.00	8.
Car Batteries	.00	.00	.00	.00	8.
Medical Waste	1.08	1.98	-.22	2.38	8.
Misc HHW	.51	1.21	-.29	1.30	8.
Subtotal:	1.59	3.18	-.50	3.68	8.
RETURNABLES COUNT					
Plastics	.71	1.66	-.38	1.80	8.
Aluminum	4.99	7.22	.25	9.74	8.
Glass	3.23	5.84	-.61	7.07	8.
Mean Sample Wt:	282.81				

EXHIBIT 5-9

WASTE COMPOSITION SUMMARY - SKILLED NURSING FACILITIES

SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	8.82	5.95	6.74	10.90	24.
Newsprint	1.38	1.81	.75	2.01	24.
Office/computer	.91	1.69	.32	1.51	24.
Magazines/glossy	.16	.25	.07	.25	24.
Book/phone books	.06	.30	-.05	.16	24.
Non-Corrug. CrdBd.	.77	1.07	.40	1.15	24.
Mixed	13.48	5.88	11.42	15.53	24.
Subtotal:	25.57	8.38	22.65	28.50	24.
PLASTICS					
Clear HDPE contnr.	.29	.36	.16	.41	24.
Color HDPE contnr.	.13	.21	.06	.20	24.
LDPE	.02	.03	.01	.03	24.
Films & Bags	5.96	2.83	4.97	6.95	24.
Green PET contnr.	.02	.04	.00	.03	24.
Clear PET contnr.	.01	.02	.00	.02	24.
PVC	.01	.02	.00	.01	24.
Polypropylene	.02	.06	.00	.04	24.
Polystyrene	5.79	3.04	4.73	6.85	24.
Misc. Plastics	.44	1.02	.08	.80	24.
Subtotal:	12.68	4.74	11.02	14.33	24.
YARD WASTE					
Grass/Leaves	1.03	5.85	-1.01	3.08	24.
Brush/prun./stumps	.03	.12	-.01	.07	24.
Subtotal:	1.06	5.84	-.98	3.11	24.
ORGANICS					
Lumber	.28	.62	.06	.49	24.
Textiles	1.05	1.23	.62	1.48	24.
Rubber	.30	.52	.12	.48	24.
Fines	.94	1.10	.56	1.32	24.
Diapers	26.93	9.65	23.56	30.30	24.
Foodwaste	21.16	13.98	16.28	26.04	24.
Misc. Organics	3.10	3.86	1.75	4.45	24.
Subtotal:	53.76	11.14	49.87	57.64	24.
GLASS					
Clear container	.47	.58	.27	.67	24.
Green container	.05	.11	.02	.09	24.
Brown container	.04	.10	.01	.08	24.
Misc. Glass	.05	.14	.00	.10	24.
Subtotal:	.61	.57	.41	.82	24.
METALS					
Food Contnr./foil	.66	1.51	.13	1.18	24.
Beverage Cans	.17	.12	.13	.21	24.
Misc. Aluminum	.14	.63	-.07	.36	24.
Food container	2.66	2.39	1.82	3.49	24.
Other	.74	1.81	.11	1.37	24.
Bimetal Cans	.00	.00	.00	.00	24.
Subtotal:	4.37	3.44	3.16	5.57	24.
INORGANICS					
Non-bulk ceramics	.03	.08	-.00	.06	24.
Misc. Inorganics	1.09	2.43	.24	1.94	24.
Subtotal:	1.12	2.44	.27	1.97	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.04	.20	-.02	.11	24.
Dry Cell batteries	.00	.00	.00	.00	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.64	.83	.35	.93	24.
Misc HHW	.14	.49	-.03	.31	24.
Subtotal:	.82	.99	.48	1.17	24.
RETURNABLES COUNT					
Plastics	.77	4.00	-.63	2.17	24.
Aluminum	1.65	3.92	.28	3.02	24.
Glass	.52	1.62	-.05	1.08	24.
Mean Sample Wt:	330.35				

EXHIBIT 5-10

WASTE COMPOSITION SUMMARY - MUNICIPAL HOSPITALS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	14.58	10.46	10.55	18.62	20.
Newsprint	1.88	3.26	.63	3.14	20.
Office/computer	.80	2.67	-.23	1.83	20.
Magazines/glossy	1.29	3.09	.09	2.48	20.
Book/phone books	.07	.39	-.08	.22	20.
Non-Corrug. CrdBd.	1.97	2.04	1.18	2.76	20.
Mixed	31.98	13.61	26.73	37.23	20.
Subtotal:	52.58	12.90	47.60	57.55	20.
PLASTICS					
Clear HDPE contnr.	.16	.20	.09	.24	20.
Color HDPE contnr.	.27	.32	.15	.40	20.
LDPE	.00	.00	.00	.00	20.
Films & Bags	5.98	2.54	5.00	6.96	20.
Green PET contnr.	.05	.06	.02	.07	20.
Clear PET contnr.	.07	.09	.04	.11	20.
PVC	.01	.03	.00	.03	20.
Polypropylene	.07	.12	.02	.11	20.
Polystyrene	4.33	2.60	3.33	5.34	20.
Misc. Plastics	1.97	1.98	1.20	2.73	20.
Subtotal:	12.92	3.42	11.60	14.24	20.
YARD WASTE					
Grass/Leaves	.04	.13	-.01	.09	20.
Brush/prun./stumps	.00	.00	.00	.00	20.
Subtotal:	.04	.13	-.01	.09	20.
ORGANICS					
Lumber	.35	.82	.04	.67	20.
Textiles	2.89	3.16	1.67	4.11	20.
Rubber	.85	.86	.52	1.18	20.
Fines	.91	.72	.63	1.19	20.
Diapers	7.91	5.47	5.80	10.02	20.
Foodwaste	11.33	7.85	8.30	14.36	20.
Misc. Organics	1.83	2.02	1.05	2.61	20.
Subtotal:	26.07	11.02	21.82	30.32	20.
GLASS					
Clear container	2.81	1.57	2.21	3.42	20.
Green container	.09	.21	.01	.17	20.
Brown container	.36	.37	.22	.50	20.
Misc. Glass	.00	.00	.00	.00	20.
Subtotal:	3.27	1.75	2.59	3.94	20.
METALS					
Food Contnr./foil	.57	.38	.42	.71	20.
Beverage Cans	.44	.19	.36	.51	20.
Misc. Aluminum	.02	.08	-.01	.05	20.
Food container	1.15	.90	.80	1.50	20.
Other	.85	2.18	.01	1.69	20.
Bimetal Cans	.01	.02	.00	.01	20.
Subtotal:	3.03	2.37	2.12	3.94	20.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	20.
Misc. Inorganics	.35	1.04	-.05	.75	20.
Subtotal:	.35	1.04	-.05	.75	20.
HAZARDOUS WASTE					
Pesticides	.02	.07	-.00	.05	20.
Non-pestic. poisons	.00	.00	.00	.00	20.
Paint/Solvent/fuel	.01	.02	-.00	.01	20.
Dry Cell batteries	.02	.08	-.01	.05	20.
Car Batteries	.00	.00	.00	.00	20.
Medical Waste	1.53	1.44	.98	2.09	20.
Misc HHW	.17	.51	-.03	.36	20.
Subtotal:	1.75	1.42	1.20	2.29	20.
RETURNABLES COUNT					
Plastics	.47	1.45	-.09	1.03	20.
Aluminum	4.14	10.21	.20	8.08	20.
Glass	2.92	7.59	-.01	5.85	20.
Mean Sample Wt:	278.92				

EXHIBIT 5-11

WASTE COMPOSITION SUMMARY - TEACHING HOSPITALS

SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.94	7.05	8.48	13.41	24.
Newsprint	6.00	3.94	4.62	7.38	24.
Office/computer	4.75	5.11	2.97	6.54	24.
Magazines/glossy	1.61	1.52	1.08	2.14	24.
Book/phone books	.29	.68	.05	.52	24.
Non-Corrug. CrdBd.	2.64	1.96	1.96	3.33	24.
Mixed	28.22	7.97	25.44	31.00	24.
Subtotal:	54.45	8.64	51.44	57.47	24.
PLASTICS					
Clear HDPE contnr.	.27	.31	.16	.38	24.
Color HDPE contnr.	.22	.30	.12	.32	24.
LDPE	.03	.06	.01	.05	24.
Films & Bags	6.84	2.44	5.99	7.69	24.
Green PET contnr.	.02	.05	.01	.04	24.
Clear PET contnr.	.14	.17	.08	.20	24.
PVC	.02	.05	-.00	.03	24.
Polypropylene	.07	.14	.02	.12	24.
Polystyrene	6.95	3.27	5.81	8.10	24.
Misc. Plastics	1.03	.94	.70	1.36	24.
Subtotal:	15.59	4.34	14.07	17.10	24.
YARD WASTE					
Grass/Leaves	3.36	7.05	.89	5.82	24.
Brush/prun./stumps	.06	.24	-.02	.14	24.
Subtotal:	3.42	7.03	.96	5.87	24.
ORGANICS					
Lumber	1.02	1.91	.35	1.68	24.
Textiles	2.54	2.49	1.67	3.41	24.
Rubber	.63	.70	.39	.88	24.
Fines	.82	.48	.65	.99	24.
Diapers	1.50	1.47	.99	2.02	24.
Foodwaste	9.52	7.50	6.90	12.14	24.
Misc. Organics	2.81	2.27	2.01	3.60	24.
Subtotal:	18.84	7.28	16.29	21.38	24.
GLASS					
Clear container	1.81	1.01	1.45	2.16	24.
Green container	.33	.41	.18	.47	24.
Brown container	.34	.62	.12	.55	24.
Misc. Glass	.00	.01	-.00	.01	24.
Subtotal:	2.48	1.31	2.02	2.93	24.
METALS					
Food Contnr./foil	.93	.81	.64	1.21	24.
Beverage Cans	.72	.28	.62	.82	24.
Misc. Aluminum	.00	.00	.00	.00	24.
Food container	1.39	1.26	.95	1.83	24.
Other	.36	.74	.10	.62	24.
Bimetal Cans	.01	.04	-.01	.02	24.
Subtotal:	3.40	1.51	2.87	3.93	24.
INORGANICS					
Non-bulk ceramics	.00	.00	-.00	.00	24.
Misc. Inorganics	1.55	4.90	-.16	3.27	24.
Subtotal:	1.55	4.90	-.16	3.27	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.01	.04	-.00	.03	24.
Paint/Solvent/fuel	.01	.09	-.02	.04	24.
Dry Cell batteries	.00	.00	.00	.00	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	.24	.43	.09	.39	24.
Misc HHW	.00	.01	-.00	.01	24.
Subtotal:	.27	.44	.12	.42	24.
RETURNABLES COUNT					
Plastics	1.03	3.46	-.17	2.24	24.
Aluminum	9.53	15.62	4.07	14.99	24.
Glass	2.84	6.00	.75	4.94	24.
Mean Sample Wt:	278.51				

EXHIBIT 5-12

WASTE COMPOSITION SUMMARY - NON-PROFIT HOSPITALS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	19.22	10.78	15.46	22.99	24.
Newsprint	2.29	1.52	1.76	2.82	24.
Office/computer	1.77	2.54	.88	2.65	24.
Magazines/glossy	.50	.58	.30	.71	24.
Book/phone books	.21	.74	-.05	.47	24.
Non-Corrug. CrdBd.	2.71	2.07	1.99	3.44	24.
Mixed	19.16	6.49	16.89	21.42	24.
Subtotal:	45.86	13.14	41.27	50.45	24.
PLASTICS					
Clear HDPE contnr.	.14	.25	.05	.23	24.
Color HDPE contnr.	.11	.16	.05	.16	24.
LDPE	.00	.01	-.00	.01	24.
Films & Bags	5.62	2.29	4.82	6.42	24.
Green PET contnr.	.00	.01	-.00	.00	24.
Clear PET contnr.	.06	.08	.03	.09	24.
PVC	.01	.04	-.01	.02	24.
Polypropylene	.07	.14	.02	.12	24.
Polystyrene	8.96	4.70	7.32	10.60	24.
Misc. Plastics	.81	.89	.50	1.12	24.
Subtotal:	15.78	5.35	13.91	17.65	24.
YARD WASTE					
Grass/Leaves	.01	.03	-.00	.02	24.
Brush/prun./stumps	.03	.07	.00	.06	24.
Subtotal:	.04	.08	.01	.06	24.
ORGANICS					
Lumber	.31	.73	.05	.56	24.
Textiles	2.27	2.21	1.50	3.04	24.
Rubber	.90	.50	.72	1.07	24.
Fines	1.07	1.58	.52	1.63	24.
Diapers	4.54	3.16	3.43	5.64	24.
Foodwaste	18.74	9.82	15.31	22.18	24.
Misc. Organics	4.89	7.06	2.43	7.36	24.
Subtotal:	32.72	11.34	28.76	36.68	24.
GLASS					
Clear container	.74	.58	.54	.95	24.
Green container	.11	.21	.04	.18	24.
Brown container	.02	.07	-.00	.05	24.
Misc. Glass	.03	.22	-.04	.11	24.
Subtotal:	.91	.63	.69	1.13	24.
METALS					
Food Contnr./foil	.36	.33	.24	.47	24.
Beverage Cans	.29	.15	.23	.34	24.
Misc. Aluminum	.04	.17	-.03	.10	24.
Food container	2.45	2.46	1.59	3.31	24.
Other	.45	.83	.16	.75	24.
Bimetal Cans	.01	.03	.00	.02	24.
Subtotal:	3.60	2.87	2.59	4.60	24.
INORGANICS					
Non-bulk ceramics	.02	.09	-.01	.05	24.
Misc. Inorganics	.00	.00	.00	.00	24.
Subtotal:	.02	.09	-.01	.05	24.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	24.
Non-pestic. poisons	.00	.00	.00	.00	24.
Paint/Solvent/fuel	.02	.15	-.04	.07	24.
Dry Cell batteries	.01	.02	.00	.01	24.
Car Batteries	.00	.00	.00	.00	24.
Medical Waste	1.05	1.02	.69	1.40	24.
Misc HHW	.00	.00	.00	.00	24.
Subtotal:	1.07	1.00	.72	1.42	24.
RETURNABLES COUNT					
Plastics	.32	2.00	-.38	1.02	24.
Aluminum	3.61	7.18	1.10	6.12	24.
Glass	.67	2.01	-.03	1.37	24.
Mean Sample Wt:	336.02				

EXHIBIT 5-13

WASTE COMPOSITION SUMMARY - GOVERNMENT OFFICE BUILDINGS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	5.48	3.42	4.04	6.93	17.
Newsprint	10.98	3.69	9.42	12.54	17.
Office/computer	15.77	25.80	4.88	26.65	17.
Magazines/glossy	2.02	3.86	.39	3.65	17.
Book/phone books	1.38	3.73	-.19	2.96	17.
Non-Corrug. CrdBd.	1.50	1.52	.86	2.14	17.
Mixed	46.39	16.85	39.28	53.51	17.
Subtotal:	83.53	9.82	79.38	87.67	17.
PLASTICS					
Clear HDPE contnr.	.15	.26	.04	.26	17.
Color HDPE contnr.	.03	.06	.00	.06	17.
LDPE	.00	.00	.00	.00	17.
Films & Bags	4.01	2.50	2.96	5.07	17.
Green PET contnr.	.05	.11	.01	.10	17.
Clear PET contnr.	.22	.18	.14	.30	17.
PVC	.03	.10	-.01	.07	17.
Polypropylene	.01	.03	-.00	.02	17.
Polystyrene	1.52	1.19	1.01	2.02	17.
Misc. Plastics	.49	.52	.27	.71	17.
Subtotal:	6.52	3.95	4.85	8.19	17.
YARD WASTE					
Grass/Leaves	.08	.23	-.02	.17	17.
Brush/prun./stumps	.08	.16	.01	.15	17.
Subtotal:	.16	.27	.04	.27	17.
ORGANICS					
Lumber	.00	.00	.00	.00	17.
Textiles	.58	.92	.19	.97	17.
Rubber	.01	.04	-.01	.02	17.
Fines	.33	.83	-.02	.68	17.
Diapers	.08	.22	-.01	.18	17.
Foodwaste	1.51	1.59	.84	2.19	17.
Misc. Organics	1.12	1.97	.29	1.95	17.
Subtotal:	3.63	2.49	2.58	4.68	17.
GLASS					
Clear container	3.00	2.06	2.12	3.87	17.
Green container	.22	.31	.09	.35	17.
Brown container	.34	.40	.17	.51	17.
Misc. Glass	.00	.00	.00	.00	17.
Subtotal:	3.56	2.44	2.52	4.59	17.
METALS					
Food Contnr./foil	.54	.41	.37	.71	17.
Beverage Cans	.83	.47	.63	1.02	17.
Misc. Aluminum	.01	.02	-.00	.01	17.
Food container	.54	.44	.35	.72	17.
Other	.67	2.99	-.59	1.93	17.
Bimetal Cans	.01	.03	.00	.03	17.
Subtotal:	2.59	3.08	1.29	3.89	17.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	17.
Misc. Inorganics	.00	.00	.00	.00	17.
Subtotal:	.00	.00	.00	.00	17.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	17.
Non-pestic. poisons	.00	.00	.00	.00	17.
Paint/Solvent/fuel	.00	.00	.00	.00	17.
Dry Cell batteries	.02	.05	-.00	.04	17.
Car Batteries	.00	.00	.00	.00	17.
Medical Waste	.00	.00	.00	.00	17.
Misc HHW	.00	.00	.00	.00	17.
Subtotal:	.02	.05	-.00	.04	17.
RETURNABLES COUNT					
Plastics	1.03	2.94	-.21	2.27	17.
Aluminum	9.59	22.12	.25	18.92	17.
Glass	4.45	9.92	.26	8.64	17.
Mean Sample Wt:	273.65				

EXHIBIT 5-14

WASTE COMPOSITION SUMMARY - CORRECTIONAL FACILITIES
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	6.78	4.00	5.49	8.06	28.
Newsprint	2.82	3.05	1.84	3.80	28.
Office/computer	1.71	3.08	.72	2.70	28.
Magazines/glossy	.39	.58	.20	.57	28.
Book/phone books	.40	1.10	.05	.76	28.
Non-Corrug. CrdBd.	1.24	1.79	.66	1.81	28.
Mixed	14.65	8.43	11.94	17.36	28.
Subtotal:	27.98	13.03	23.80	32.17	28.
PLASTICS					
Clear HDPE contnr.	.14	.31	.04	.24	28.
Color HDPE contnr.	.26	.50	.10	.42	28.
LDPE	.05	.11	.01	.08	28.
Films & Bags	6.27	4.13	4.95	7.60	28.
Green PET contnr.	.02	.05	.01	.04	28.
Clear PET contnr.	.15	.18	.09	.21	28.
PVC	.01	.03	.00	.02	28.
Polypropylene	.05	.10	.02	.08	28.
Polystyrene	1.54	4.23	.18	2.90	28.
Misc. Plastics	.39	.95	.09	.70	28.
Subtotal:	8.88	6.89	6.66	11.10	28.
YARD WASTE					
Grass/Leaves	.00	.00	.00	.00	28.
Brush/prun./stumps	.00	.00	.00	.00	28.
Subtotal:	.00	.00	.00	.00	28.
ORGANICS					
Lumber	.78	2.86	-.14	1.70	28.
Textiles	2.71	2.81	1.81	3.61	28.
Rubber	.03	.15	-.02	.08	28.
Fines	.77	.94	.46	1.07	28.
Diapers	.04	.20	-.02	.11	28.
Foodwaste	50.19	25.26	42.07	58.31	28.
Misc. Organics	2.23	4.86	.67	3.79	28.
Subtotal:	56.74	22.20	49.61	63.88	28.
GLASS					
Clear container	.64	.73	.41	.87	28.
Green container	.13	.33	.02	.23	28.
Brown container	.08	.15	.03	.13	28.
Misc. Glass	.35	1.57	-.16	.85	28.
Subtotal:	1.20	2.08	.53	1.87	28.
METALS					
Food Contnr./foil	.24	.27	.15	.33	28.
Beverage Cans	.14	.17	.08	.19	28.
Misc. Aluminum	.00	.00	.00	.00	28.
Food container	2.98	4.27	1.61	4.36	28.
Other	.54	2.25	-.18	1.26	28.
Bimetal Cans	.00	.00	.00	.00	28.
Subtotal:	3.90	4.76	2.37	5.43	28.
INORGANICS					
Non-bulk ceramics	.00	.02	-.00	.01	28.
Misc. Inorganics	1.20	4.80	-.34	2.75	28.
Subtotal:	1.21	4.80	-.34	2.75	28.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	28.
Non-pestic. poisons	.00	.00	.00	.00	28.
Paint/Solvent/fuel	.00	.00	.00	.00	28.
Dry Cell batteries	.01	.05	-.01	.03	28.
Car Batteries	.00	.00	.00	.00	28.
Medical Waste	.07	.24	-.01	.15	28.
Misc HHW	.01	.05	-.01	.03	28.
Subtotal:	.09	.25	.01	.17	28.
RETURNABLES COUNT					
Plastics	.66	2.20	-.05	1.37	28.
Aluminum	2.31	7.00	.06	4.55	28.
Glass	.90	4.57	-.56	2.37	28.
Mean Sample Wt:	331.56				

EXHIBIT 5-15

WASTE COMPOSITION SUMMARY - COLLEGES
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.27	6.37	8.09	12.44	25.
Newsprint	7.50	4.61	5.93	9.08	25.
Office/computer	8.62	6.00	6.58	10.67	25.
Magazines/glossy	2.83	3.42	1.66	4.00	25.
Book/phone books	6.14	9.30	2.96	9.32	25.
Non-Corrug. CrdBd.	1.23	1.23	.80	1.65	25.
Mixed	28.19	6.92	25.82	30.55	25.
Subtotal:	64.78	11.47	60.86	68.70	25.
PLASTICS					
Clear HDPE contnr.	.41	1.13	.03	.80	25.
Color HDPE contnr.	.16	.28	.06	.25	25.
LDPE	.00	.01	-.00	.01	25.
Films & Bags	4.11	1.34	3.65	4.57	25.
Green PET contnr.	.05	.10	.02	.09	25.
Clear PET contnr.	.35	.31	.24	.45	25.
PVC	.00	.01	-.00	.01	25.
Polypropylene	.11	.19	.04	.17	25.
Polystyrene	1.80	1.25	1.38	2.23	25.
Misc. Plastics	.69	1.15	.30	1.09	25.
Subtotal:	7.69	2.42	6.86	8.51	25.
YARD WASTE					
Grass/Leaves	1.07	5.41	-.77	2.92	25.
Brush/prun./stumps	.05	.14	.01	.10	25.
Subtotal:	1.13	5.40	-.72	2.97	25.
ORGANICS					
Lumber	1.09	2.10	.37	1.81	25.
Textiles	1.13	2.32	.34	1.92	25.
Rubber	.00	.00	.00	.00	25.
Fines	1.29	.99	.95	1.63	25.
Diapers	.06	.25	-.02	.14	25.
Foodwaste	11.32	9.50	8.07	14.56	25.
Misc. Organics	2.08	2.57	1.21	2.96	25.
Subtotal:	16.97	9.59	13.70	20.25	25.
GLASS					
Clear container	4.03	2.38	3.22	4.85	25.
Green container	.56	.94	.24	.88	25.
Brown container	.51	.66	.28	.73	25.
Misc. Glass	.00	.00	.00	.00	25.
Subtotal:	5.10	3.00	4.08	6.13	25.
METALS					
Food Contnr./foil	.46	.44	.31	.61	25.
Beverage Cans	1.38	.77	1.12	1.64	25.
Misc. Aluminum	.04	.22	-.04	.11	25.
Food container	.41	.59	.21	.61	25.
Other	.93	1.54	.40	1.45	25.
Bimetal Cans	.03	.08	-.00	.05	25.
Subtotal:	3.24	1.85	2.61	3.88	25.
INORGANICS					
Non-bulk ceramics	.07	.26	-.02	.16	25.
Misc. Inorganics	.66	1.60	.11	1.21	25.
Subtotal:	.73	1.78	.12	1.34	25.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	25.
Non-pestic. poisons	.00	.00	.00	.00	25.
Paint/Solvent/fuel	.00	.00	.00	.00	25.
Dry Cell batteries	.01	.03	-.00	.02	25.
Car Batteries	.00	.00	.00	.00	25.
Medical Waste	.03	.11	-.01	.07	25.
Misc HHW	.32	1.38	-.15	.79	25.
Subtotal:	.36	1.38	-.12	.83	25.
RETURNABLES COUNT					
Plastics	1.86	5.06	.14	3.59	25.
Aluminum	24.99	33.75	13.46	36.52	25.
Glass	7.71	18.01	1.56	13.87	25.
Mean Sample Wt:	248.88				

EXHIBIT 5-16

WASTE COMPOSITION SUMMARY - PUBLIC HIGH SCHOOLS

SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	10.00	5.38	8.08	11.92	23.
Newsprint	4.21	6.27	1.97	6.46	23.
Office/computer	1.15	1.69	.54	1.75	23.
Magazines/glossy	.19	.49	.01	.36	23.
Book/phone books	.55	1.33	.08	1.03	23.
Non-Corrug. CrdBd.	9.51	10.37	5.81	13.22	23.
Mixed	32.22	16.39	26.36	38.08	23.
Subtotal:	57.83	17.47	51.59	64.08	23.
PLASTICS					
Clear HDPE contnr.	.11	.13	.06	.15	23.
Color HDPE contnr.	.19	.33	.07	.31	23.
LDPE	.05	.21	-.02	.13	23.
Films & Bags	4.98	2.40	4.13	5.84	23.
Green PET contnr.	.01	.03	-.00	.02	23.
Clear PET contnr.	.15	.54	-.04	.35	23.
PVC	.00	.01	-.00	.01	23.
Polypropylene	.02	.04	.00	.03	23.
Polystyrene	1.01	.90	.69	1.33	23.
Misc. Plastics	.56	.94	.23	.90	23.
Subtotal:	7.08	3.04	6.00	8.17	23.
YARD WASTE					
Grass/Leaves	2.17	6.83	-.27	4.62	23.
Brush/prun./stumps	3.57	5.93	1.45	5.69	23.
Subtotal:	5.75	9.11	2.49	9.00	23.
ORGANICS					
Lumber	.52	1.04	.15	.89	23.
Textiles	.79	2.42	-.08	1.65	23.
Rubber	.06	.25	-.03	.15	23.
Fines	1.53	1.82	.88	2.18	23.
Diapers	.00	.00	.00	.00	23.
Foodwaste	9.48	9.48	6.09	12.86	23.
Misc. Organics	4.42	5.57	2.43	6.41	23.
Subtotal:	16.80	9.76	13.31	20.28	23.
GLASS					
Clear container	1.17	1.41	.67	1.68	23.
Green container	.14	.28	.05	.24	23.
Brown container	.10	.31	-.01	.21	23.
Misc. Glass	3.66	9.24	.36	6.96	23.
Subtotal:	5.08	9.09	1.83	8.33	23.
METALS					
Food Contnr./foil	.64	.58	.44	.85	23.
Beverage Cans	.78	.51	.60	.96	23.
Misc. Aluminum	.42	1.12	.02	.82	23.
Food container	2.00	2.82	.99	3.01	23.
Other	2.97	6.64	.59	5.34	23.
Bimetal Cans	.01	.03	.00	.02	23.
Subtotal:	6.83	6.49	4.51	9.15	23.
INORGANICS					
Non-bulk ceramics	.00	.00	.00	.00	23.
Misc. Inorganics	.49	.82	.20	.79	23.
Subtotal:	.49	.82	.20	.79	23.
HAZARDOUS WASTE					
Pesticides	.01	.04	-.00	.03	23.
Non-pestic. poisons	.00	.00	.00	.00	23.
Paint/Solvent/fuel	.08	.29	-.03	.18	23.
Dry Cell batteries	.03	.15	-.02	.08	23.
Car Batteries	.00	.00	.00	.00	23.
Medical Waste	.01	.06	-.01	.03	23.
Misc HHW	.01	.05	-.01	.03	23.
Subtotal:	.14	.36	.02	.27	23.
RETURNABLES COUNT					
Plastics	.65	4.03	-.79	2.09	23.
Aluminum	13.81	22.65	5.72	21.91	23.
Glass	1.67	4.58	.03	3.31	23.
Mean Sample Wt:	220.98				

EXHIBIT 5-17

WASTE COMPOSITION SUMMARY - TRANSPORTATION HUBS
SPRING 1990

Category	WGHTD AVRGE%	ST. DEV.	LCL%	UCL%	SAMPLE#/ROUTE/DATE #/ SAMPLES
PAPER					
Corrugated/kraft	7.36	6.31	5.37	9.35	29.
Newsprint	35.04	24.17	27.41	42.66	29.
Office/computer	.72	1.07	.38	1.05	29.
Magazines/glossy	1.00	.99	.69	1.32	29.
Book/phone books	.26	.52	.09	.42	29.
Non-Corrug. CrdBd.	1.36	2.35	.62	2.11	29.
Mixed	18.73	8.76	15.96	21.49	29.
Subtotal:	64.47	19.14	58.43	70.50	29.
PLASTICS					
Clear HDPE contnr.	.25	.27	.17	.34	29.
Color HDPE contnr.	.25	.74	.02	.48	29.
LDPE	.01	.03	.00	.02	29.
Films & Bags	2.73	1.61	2.22	3.24	29.
Green PET contnr.	.01	.06	-.01	.03	29.
Clear PET contnr.	.21	.24	.14	.29	29.
PVC	.00	.02	-.00	.01	29.
Polypropylene	.06	.16	.01	.11	29.
Polystyrene	.89	.85	.62	1.16	29.
Misc. Plastics	.99	2.23	.29	1.70	29.
Subtotal:	5.41	2.96	4.48	6.35	29.
YARD WASTE					
Grass/Leaves	.95	4.01	-.32	2.21	29.
Brush/prun./stumps	.00	.00	.00	.00	29.
Subtotal:	.95	4.01	-.32	2.21	29.
ORGANICS					
Lumber	.83	1.53	.34	1.31	29.
Textiles	3.52	3.20	2.51	4.53	29.
Rubber	.06	.49	-.09	.22	29.
Fines	1.99	2.24	1.28	2.69	29.
Diapers	.08	.18	.02	.14	29.
Foodwaste	3.11	3.92	1.87	4.35	29.
Misc. Organics	3.43	6.03	1.52	5.33	29.
Subtotal:	13.01	8.58	10.31	15.72	29.
GLASS					
Clear container	2.45	2.73	1.59	3.32	29.
Green container	1.04	1.59	.54	1.54	29.
Brown container	.46	.74	.23	.69	29.
Misc. Glass	.84	1.26	.44	1.24	29.
Subtotal:	4.79	5.54	3.05	6.54	29.
METALS					
Food Contnr./foil	.32	.30	.22	.41	29.
Beverage Cans	.58	.44	.44	.71	29.
Misc. Aluminum	.02	.06	-.00	.03	29.
Food container	.40	.40	.27	.53	29.
Other	6.48	11.21	2.94	10.02	29.
Bimetal Cans	.02	.04	.00	.03	29.
Subtotal:	7.81	11.12	4.30	11.32	29.
INORGANICS					
Non-bulk ceramics	.00	.01	-.00	.01	29.
Misc. Inorganics	2.54	10.06	-.64	5.71	29.
Subtotal:	2.54	10.06	-.64	5.71	29.
HAZARDOUS WASTE					
Pesticides	.00	.00	.00	.00	29.
Non-pestic. poisons	.00	.00	.00	.00	29.
Paint/Solvent/fuel	.01	.06	-.00	.03	29.
Dry Cell batteries	.09	.24	.01	.17	29.
Car Batteries	.00	.00	.00	.00	29.
Medical Waste	.00	.01	-.00	.01	29.
Misc HHW	.91	1.65	.39	1.43	29.
Subtotal:	1.02	1.67	.49	1.54	29.
RETURNABLES COUNT					
Plastics	.86	3.21	-.16	1.87	29.
Aluminum	8.88	22.44	1.80	15.96	29.
Glass	4.35	17.35	-1.12	9.83	29.
Mean Sample Wt:	322.38				

SECTION 6

BULK ITEM SURVEY AND VEHICLE WEIGH PROGRAM

APPROACH

Each incoming institutional refuse vehicle was weighed, discharged onto the tipping floor at each sorting site, and surveyed for the presence of bulk items within the entire discharged load. Exhibits 6-1, 6-3, 6-5, and 6-7 indicate the number and weight of institutional vehicle loads that were surveyed and observed during each sort season. These exhibits also provide a summary of incoming waste amounts by weight and by institutional types.

DISCUSSION

For this study, only institutions served by the free-disposal program were sampled. As a result, a portion of the institutional bulk waste stream remained unsampled. The DOS maintains tonnage records on the sampled stream and these records were used to make tonnage adjustments to city-wide waste stream projections.

The bulk item survey consisted of the identification, counting, and weighing of bulk items found within the institutional vehicle loads. A bulk item was defined as specific waste items that could not fit inside a closed 30-gallon trash can (i.e., with its lid on). Bulk items were identified by 15 general categories, including various types of furniture and appliances, wood, tires, carpets, etc.

The results of the bulk item survey provide estimates of the presence of discarded bulk items in the institutional waste stream, and provide a basis for estimating generation rates according to the institutional types studied.

BULK ITEM SURVEY RESULTS

Tabulated bulk item composition results for each season are presented in Exhibits 6-2, 6-4, 6-6, and 6-8, for the Summer, Fall, Winter, and Spring sorting events, respectively. These results provide the mean, standard deviation, and lower and upper confidence intervals (95 percent level) derived for the various bulk item categories identified in the field. In addition, these exhibits indicate the number of institutional loads observed per season. Other calculations include the average weight of bulk items per load, the average net weight of each vehicle load, and the average bulk item composition (percent by weight) within the institutional waste stream.

Bulk items ranged from 0.53 to 1.66 percent of the institutional waste stream. Major categories included miscellaneous wood, ferrous metal, rugs/carpet/textiles, and mixed bulk items.

Daily field results from the vehicle weigh program and the bulk item survey for the four seasonal sorting events are appended in Volume 8.

EXHIBIT 6-1

INSTITUTIONAL LOADS DELIVERED TO MTS SITE
SUMMER 1989

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF INCOMING VEHICLES	AVERAGE NET WEIGHT OF REFUSE PER VEHICLE (lbs)
1	Elementary Schools	8	3,465
2	Junior High Schools	3	2,992
3	Private Schools, K-8th Grade	2	2,560
4	Private Schools, 6-12th Grade	2	12,360
5	Psychiatric Hospitals	3	7,670
6	Skilled Nursing Facilities	5	7,852
7	Municipal Hospitals	4	19,320
8	Teaching Hospitals	2	10,000
9	Non-profit Hospitals	2	10,220
10	Government Hospitals	7	2,496
11	Correctional Facilities	3	4,687
12	Colleges	3	3,973
13	Public High Schools	0	0
14	Transportation Hubs	7	14,977
TOTAL		51 Vehicles	184.0 Tons

EXHIBIT 6-2

BULK ITEM SURVEY SUMMARY
SUMMER 1989

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	12.87	23.81	7.30	18.44	51.00
Steel	2.08	5.62	.77	3.40	51.00
Aluminum	.25	1.31	-.06	.56	51.00
Wood	6.41	16.66	2.51	10.31	51.00
Mixed	2.06	4.99	.89	3.23	51.00
Stoves	.00	.00	.00	.00	51.00
Refrigerators	.00	.00	.00	.00	51.00
Dishwashers	.57	3.00	-.13	1.27	51.00
Others	.63	3.30	-.14	1.40	51.00
Ferrous	19.93	25.49	13.97	25.90	51.00
Non-ferrous	6.36	15.41	2.76	9.96	51.00
Misc. wood	24.00	28.90	17.24	30.76	51.00
Rugs/carpets/textile	2.99	7.00	1.36	4.63	51.00
Tires	5.45	15.46	1.83	9.07	51.00
Miscellaneous	16.39	25.84	10.35	22.44	51.00
Total Weight	100.00	45.52	89.35	110.65	51.00

Average Weight of Bulk Items Found Per Vehicle Load	119.95
Average Net Weight of Refuse Per Vehicle Load	7217.06
Average Bulk Item Composition of Institutional Waste Stream	1.66%

EXHIBIT 6-3

SUMMARY OF INSTITUTIONAL VEHICLE LOADS BY WEIGHT
~~SUMMER~~ Fall 1989

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF INCOMING VEHICLES	AVERAGE NET WEIGHT OF REFUSE PER VEHICLE (lbs)
1	Elementary Schools	10	8,320
2	Junior High Schools	2	6,040
3	Private Schools, K-8th Grade	2	2,710
4	Private Schools, 6-12th Grade	2	3,260
5	Psychiatric Hospitals	3	7,800
6	Skilled Nursing Facilities	5	6,400
7	Municipal Hospitals	4	15,035
8	Teaching Hospitals	2	10,200
9	Non-profit Hospitals	2	10,110
10	Government Hospitals	7	2,024
11	Correctional Facilities	3	6,273
12	Colleges	3	6,653
13	Public High Schools	2	8,170
14	Transportation Hubs	8	21,395
TOTAL		55 Vehicles	251.9 Tons

EXHIBIT 6-4

BULK ITEM SURVEY SUMMARY
~~SUMMER~~ 1989
Fall

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	.34	.57	.21	.46	55.00
Steel	17.67	21.74	12.78	22.57	55.00
Aluminum	.11	.31	.04	.18	55.00
Wood	6.86	11.34	4.31	9.41	55.00
Mixed	11.10	13.08	8.15	14.05	55.00
Stoves	.00	.00	.00	.00	55.00
Refrigerators	.00	.00	.00	.00	55.00
Dishwashers	.00	.00	.00	.00	55.00
Others	1.44	4.12	.51	2.37	55.00
Ferrous	2.92	4.84	1.83	4.01	55.00
Non-ferrous	.81	2.32	.29	1.34	55.00
Misc. wood	16.97	23.59	11.65	22.28	55.00
Rugs/carpets/textile	1.73	3.54	.93	2.53	55.00
Tires	3.78	5.76	2.48	5.08	55.00
Miscellaneous	36.27	31.64	29.14	43.40	55.00
Total Weight	100.00	49.48	88.85	111.15	55.00

Average Weight of Bulk Items Found Per Vehicle Load	48.74
Average Net Weight of Refuse Per Vehicle Load	9160.55
Average Bulk Item Composition of Institutional Waste Stream	0.53%

EXHIBIT 6-5

SUMMARY OF INSTITUTIONAL VEHICLE LOADS BY WEIGHT
SUMMER 1989

Winter

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF INCOMING VEHICLES	AVERAGE NET WEIGHT OF REFUSE PER VEHICLE (lbs)
1	Elementary Schools	2	12,750
2	Junior High Schools	3	4,473
3	Private Schools, K-8th Grade	2	2,690
4	Private Schools, 6-12th Grade	2	1,720
5	Psychiatric Hospitals	3	5,880
6	Skilled Nursing Facilities	5	6,168
7	Municipal Hospitals	0	
8	Teaching Hospitals	2	8,930
9	Non-profit Hospitals	0	
10	Government Hospitals	9	5,747
11	Correctional Facilities	3	6,187
12	Colleges	4	4,520
13	Public High Schools	2	6,300
14	Transportation Hubs	6	21,680
TOTAL		43 Vehicles	172.6 Tons

EXHIBIT 6-6

BULK ITEM SURVEY SUMMARY
~~SUMMER~~ 1989
Winter

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	.00	.00	.00	.00	43.00
Steel	3.46	8.26	1.36	5.57	43.00
Aluminum	1.86	5.45	.47	3.24	43.00
Wood	.44	1.57	.04	.84	43.00
Mixed	13.98	21.21	8.58	19.38	43.00
Stoves	.00	.00	.00	.00	43.00
Refrigerators	4.35	15.43	.42	8.28	43.00
Dishwashers	.00	.00	.00	.00	43.00
Others	.00	.00	.00	.00	43.00
Ferrous	16.29	24.39	10.08	22.51	43.00
Non-ferrous	1.47	3.29	.63	2.31	43.00
Misc. wood	20.35	27.22	13.41	27.28	43.00
Rugs/carpets/textile	4.26	14.18	.65	7.88	43.00
Tires	10.65	17.59	6.17	15.13	43.00
Miscellaneous	22.89	31.19	14.94	30.83	43.00
Total Weight	100.00	51.07	86.99	113.01	43.00

Average Weight of Bulk Items Found Per Vehicle Load 47.45
Average Net Weight of Refuse Per Vehicle Load 8026.05
Average Bulk Item Composition of Institutional Waste Stream 0.59%

EXHIBIT 6-7

SUMMARY OF INSTITUTIONAL VEHICLE LOADS BY WEIGHT
~~SUMMER~~ 1989

Spring

CATEGORY	INSTITUTIONAL TYPE	NUMBER OF INCOMING VEHICLES	AVERAGE NET WEIGHT OF REFUSE PER VEHICLE (lbs)
1	Elementary Schools	10	7,158
2	Junior High Schools	3	5,080
3	Private Schools, K-8th Grade	2	4,490
4	Private Schools, 6-12th Grade	2	2,500
5	Psychiatric Hospitals	3	3,888
6	Skilled Nursing Facilities	5	6,243
7	Municipal Hospitals	4	17,704
8	Teaching Hospitals	2	8,223
9	Non-profit Hospitals	2	7,695
10	Government Hospitals	9	5,746
11	Correctional Facilities	8	3,358
12	Colleges	3	7,167
13	Public High Schools	2	5,610
14	Transportation Hubs	5	24,040
TOTAL		60 Vehicles	238.9 Tons

EXHIBIT 6-8

BULK ITEM SURVEY SUMMARY
~~SUMMER~~ 1989

Spring

Material %

	MEAN	ST. DEV.	LCL	UCL	# of LOADS
Upholstered	6.29	15.32	2.98	9.59	60.00
Steel	5.35	11.53	2.86	7.84	60.00
Aluminum	.00	.00	.00	.00	60.00
Wood	2.84	8.09	1.10	4.59	60.00
Mixed	22.51	31.32	15.75	29.27	60.00
Stoves	.00	.00	.00	.00	60.00
Refrigerators	2.78	13.02	-.03	5.59	60.00
Dishwashers	.00	.00	.00	.00	60.00
Others	1.50	5.17	.39	2.62	60.00
Ferrous	17.16	22.97	12.21	22.11	60.00
Non-ferrous	2.99	13.04	.18	5.80	60.00
Misc. wood	7.88	17.15	4.18	11.58	60.00
Rugs/carpets/textile	1.99	5.46	.82	3.17	60.00
Tires	10.17	19.68	5.93	14.42	60.00
Miscellaneous	18.54	28.42	12.41	24.67	60.00
Total Weight	100.00	49.82	89.25	110.75	60.00

Average Weight of Bulk Items Found Per Vehicle Load	71.90
Average Net Weight of Refuse Per Vehicle Load	7963.67
Average Bulk Item Composition of Institutional Waste Stream	0.90%

SECTION 7

COMPARISON OF COMPOSITION BY SELECTED INSTITUTIONAL TYPE

DISCUSSION

The purpose of this section is to provide an analysis from the four sorting seasons and to compare specific and seasonal variation within selected institutional types. This analysis grouped two sets of similar institution types as listed below and highlighted the seasonal variation within the remaining categories.

"Schools"

Category #1	Elementary School
Category #2	Junior High School
Category #3	Private School (K-8)
Category #4	Private School (6-12)
Category #13	Public High School

"Medical Facilities"

Category #5	Psychiatric Hospital
Category #7	Municipal Hospital
Category #8	Teaching Hospital
Category #9	Non-profit Hospital

"Other Institutions"

Category #6	Skilled Nursing Facility
Category #10	Government Office
Category #11	Correctional Facility
Category #14	Transportation Hub
Category #12	College

For this section of the analyses, compositions are compared in a matrix format with emphasis given to the seven basic waste fractions given below. The comparisons do not include the HHW fraction because the presence of these materials was below one percent by weight. In addition, the institutional category of Public High Schools was not sampled during the Summer season and Municipal and Non-profit Hospitals were not sampled during the Winter season.

- Paper — The cumulative percentage of the seven Paper sort categories.
- Plastic — The cumulative percentage of the 10 Plastic sort categories.
- Yard Waste — The cumulative percentage of the two Yard Waste sort categories.
- Organics — The cumulative percentage of the seven Organic sort categories.
- Glass — The cumulative percentage of the four Glass sort categories.
- Metal — The cumulative percentage of three Aluminum and three Other Metal sort categories.
- Inorganics — The cumulative percentage of both Inorganic sort categories.
- Bulk — The projected percentage of bulk items (estimated by DOS).

Exhibits 7-1, 7-3, 7-5, and 7-7

Exhibits 7-1, 7-3, 7-5, and 7-7 (Waste Composition by Institutional Category), compare the compositions of institutional wastes by the above seven fractions for the four seasons. These exhibits compare each institutional category's general composition for each season.

Exhibits 7-2, 7-4, 7-6, and 7-8

Exhibits 7-2, 7-4, 7-6, and 7-8 (Component Range by Institutional Category), compare the compositions of the 14 institutional categories by the seven general waste fractions described previously. These exhibits indicate relative differences (high and low ranges) by waste fraction observed. For example, Exhibit 7-2 indicates that Paper during Summer 1989 was generated at

86 percent of the waste stream for Category 10 (Government Offices). Similarly, Category 6 (Skilled Nursing Facilities) generated the least amount of paper of all the institutions at 22 percent Paper by weight.

In addition, these exhibits identify the major sort category within each general waste fraction. For example, Exhibit 7-2 indicates that Office/Computer paper was the largest single component of the Paper fraction for the Government Office institution at 52 percent of total stream.

COMPARISONS BETWEEN SCHOOL CATEGORIES

The below findings were observed for comparisons between five institutional categories for schools, seven types of waste fractions, and four seasons.

1. Colleges consistently had the highest percentage of paper, with a range of 65 to 73 percent. The primary components in descending order were Mixed, Corrugated, and Office Paper.

2. During the three seasons sampled, Public High Schools had the second highest percentage of paper, with a range of 56 to 62 percent.

3. For Elementary, Junior High, and Private (6-12) Schools, less paper was evident during the Summer season. This is probably due to lower levels of activity in schools during the Summer.

4. The proportion of Plastic generated by schools was generally consistent for all seasons. The major component for this fraction was Films/Bags.

5. Private Schools (Categories #3 and #4), generally had the highest composition of Yard Waste throughout the sort, with a maximum of 27 percent for #3, and 30 percent for #4. The other categories had a range of 0 to 9 percent Yard Waste throughout the entire sort.

6. The composition of Yard Waste dropped to negligible level for all school categories during the Winter sort.

7. For Colleges, Elementary, Junior High, and Private (K-8) Schools, the Organics fraction was highest during the Summer sort.

8. Generally, the percentage of glass was higher for Colleges and Public High Schools than for the other school categories. A range of 2 to 5 percent was observed in both of these institution types.

9. The Inorganics percentage was highest in the Winter season, primarily due to ash received from Elementary and Private (6-12) Schools. These categories measured 28 percent and 20 percent, respectively, during that season.

COMPARISONS BETWEEN MEDICAL FACILITIES CATEGORIES

The below findings were observed between four institutional categories for medical facilities, seven types of waste fractions, and four seasons.

1. The waste streams of Skilled Nursing Facilities and Psychiatric Hospitals contained the lowest percentage of Paper throughout the entire study, with a range of 22 to 30 percent and 36 to 42 percent, respectively.

2. Municipal, Teaching, and Non-profit Hospitals had ranges for Paper of 51 to 56 percent, 47 to 54 percent, and 46 to 55 percent, respectively.

3. Municipal Hospitals consistently had the lowest percentage of Plastic in the three seasons sampled. The percentage ranged from 10 to 13 percent.

4. The Winter season had the highest percentage of Plastics for Psychiatric Hospitals, Skilled Nursing Facilities, and Teaching Hospitals, with each category showing percentages of 20, 21, and 19, respectively.

5. The smallest percentage of Yard Waste was shown in the Municipal and Non-profit Hospital waste streams, with a range of 0 to 1 percent observed in all sampling seasons.

6. In the Fall and Spring seasons, Teaching Hospitals generated 3 to 6 percent more Yard Waste (percentage of total stream) over the Summer and Winter seasons.

7. For Psychiatric Hospitals, Yard Waste was observed in a range of percentages of 0 to 1 percent for three seasons and for Summer the level was 5 percent.

8. The highest percentage for Organics consistently was found in Skilled Nursing Facilities, with a range of 47 to 60 percent, while all other categories strata never exceeded 34 percent. This disparity is due to the significant presence of Diapers (range was 20 to 33 percent), and to some extent, a higher Food Waste percentage, ranging from 14 to 19.

9. The Summer season had the highest percentage of Organics for Psychiatric Hospitals and Skilled Nursing Facilities with each category at 34 and 60 percent, respectively.

10. Skilled Nursing Facilities and Non-profit Hospitals both had 1 percent Glass in their waste stream throughout all four seasons of the study.

11. For the Fall season, Psychiatric Hospitals had an 11 percent Glass composition, with 5 percent from Miscellaneous Glass. The presence of storm windows accounted for much of the Miscellaneous Glass.

12. Psychiatric Hospitals had or equalled the highest composition of Metals, with a range of 4 to 9 percent in all four seasons.

13. Other institutions had a range of 2 to 5 percent, with the primary component being Ferrous Metal Food Containers, resultant from food preparation.

14. With a range of 1 to 4 percent, Psychiatric Hospitals had or equaled the highest composition of Inorganics through out the entire study.

15. For Skilled Nursing Facilities and Municipal and Non-profit Hospitals, the percentage of Inorganics ranged from 0 to 1 percent.

COMPARISONS BETWEEN OTHER INSTITUTIONAL CATEGORIES

The below findings were observed between five grouped institutional categories, seven types of waste fractions, and four seasons.

1. The Summer and Fall seasons had the highest percentage of Paper, each maintaining 86 percent of the total waste stream, and the Winter and Spring seasons had 79 and 83 percent compositions, respectively.

2. The percentage of Plastic was higher in Winter and Spring (at 7 percent) than in Summer and Fall (5 to 6 percent).

3. The Winter season had the highest Organics composition at 6 percent.

4. No seasonal variation for Glass was observed. The percentage of Glass was 3 percent in Summer and Fall, and 4 percent in Winter and Spring.

5. For Correctional Facilities, both the Winter and Spring seasons had a 0 percent composition of Yard Waste. The Summer season was the highest at 16 percent.

6. Organics in the Correctional Facilities waste stream showed a range of 48 to 62 percent in the Fall, Winter, and Spring seasons and the Summer season had only 24 percent organic material.

7. Inorganics in the Correctional Facilities waste stream showed a 5 percent level in the Summer season; the other seasons never exceeded over 1 percent.

8. For the Transportation Hub category, the Paper proportion of the waste stream remained constant with a range of 64-67 percent throughout the year.

9. For every season, the Plastic fraction was between 5 and 6 percent for Transportation Hubs.

10. Yard Waste remained at less than 1 percent for Transportation Hubs.

EXHIBIT 7-1

WASTE COMPOSITION BY INSTITUTIONAL CATEGORY
SUMMER 1989

(All figures shown in percentage)

COMPONENT	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	RANGE
PAPER	31	28	44	34	36	22	56	52	55	86	36	67	N/A	65	49
PLASTICS	10	12	5	13	14	12	10	13	16	5	13	7	N/A	6	9
YARD WASTE	9	1	3	22	5	1	0.2	0	0	0.1	16	1	N/A	0.5	4
ORGANICS	38	37	43	18	34	60	24	26	23	4	24	21	N/A	12	28
GLASS	3	2	0.5	2	2	1	7	1	1	3	2	2	N/A	8	3
METAL	5	5	4	4	6	4	3	4	4	2	5	3	N/A	5	4
INORGANIC	4	14	1	7	2	1	<.1	<.1	0	<.1	5	0	N/A	3	2

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School (unsampled)
#14 = Transportation Hub

EXHIBIT 7-2

COMPONENT RANGE BY INSTITUTIONAL CATEGORY*
SUMMER 1989

COMPONENTS	High Range (Institutional Category/Percent)	Major Category (Percent)	Low Range (Institutional Category/Percent)
PAPER	(10/86%)	Office Paper (52%)	(6/22%)
PLASTICS	(9/16%)	Misc. (10%)	(3, 10/5%)
YARD WASTE	(4/22%)	Grass (14%)	(8, 9/0%)
ORGANICS	(6/60%)	Diapers (34%)	(10/4%)
GLASS	(14/8%)	Clear (4%)	(3/0.5%)
METAL	(5/6%)	Food Cont. (5%)	(10/2%)
INORGANIC	(2/14%)	Misc. (14%)	(9, 12/0%)

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-3

WASTE COMPOSITION BY INSTITUTIONAL CATEGORY
FALL 1989

(All figures shown in percentage)

COMPONENT	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	AVE
PAPER	46	50	52	49	37	30	51	51	52	86	28	66	56	67	52
PLASTICS	11	4	7	5	15	12	10	11	13	6	6	8	9	5	9
YARD WASTE	5	2	10	30	1	5	1	6	0.3	.1	1	5	2	1	4
ORGANICS	25	32	26	10	26	49	31	28	30	2	62	12	16	12	26
GLASS	1	1	1	1	11	1	2	1	1	3	1	4	2	4	2
METAL	5	3	4	4	9	4	3	2	3	3	3	3	14	8	5
INORGANIC	7	6	0.2	0	2	0.4	0.3	<.1	.1	.11	<.1	1	1	2	2

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-4

COMPONENT RANGE BY RESIDENTIAL STRATA*
FALL 1989

COMPONENTS	High Range (Institutional Category/Percent)	Major Category (Percent)	Low Range (Institutional Category/Percent)
PAPER	(10/86%)	Office Paper (36%)	(11/28%)
PLASTICS	(5/15%)	Film (6%)	(varies/5%)
YARD WASTE	(4/30%)	Grass (30%)	(10/0.1%)
ORGANICS	(11/62%)	Food (56%)	(10/2%)
GLASS	(5/11%)	Misc. Glass (5%)	(varies/1%)
METAL	(13/14%)	Other Ferrous (12%)	(8/2%)
INORGANIC	(1/7%)	Misc. (6%)	(4/0%)

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-5

WASTE COMPOSITION BY INSTITUTIONAL CATEGORY*
WINTER 1990

(All figures shown in percentage)

COMPONENT	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	AVE
PAPER	40	56	59	51	42	24	N/A	47	N/A	79	35	73	62	67	53
PLASTICS	7	9	9	9	20	21	N/A	19	N/A	7	10	7	9	6	12
YARD WASTE	<.1	0	1	0.3	1	0.1	N/A	0.1	N/A	0.1	0	0.1	<.1	0	0.2
ORGANICS	21	24	20	14	28	49	N/A	25	N/A	6	48	13	19	15	24
GLASS	1	1	2	1	3	1	N/A	3	N/A	4	1	4	2	3	2
METAL	3	4	7	4	6	5	N/A	5	N/A	3	5	3	6	8	5
INORGANIC	28	5	2	20	1	0.2	N/A	1	N/A	1	0.2	0.1	2	1	4

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-6

COMPONENT RANGE BY RESIDENTIAL STRATA*
WINTER 1990

COMPONENTS	High Range (Institutional Category/Percent)	Major Category (Percent)	Low Range (Institutional Category/Percent)
PAPER	(10/79%)	Mixed (34%)	(6/24)
PLASTICS	(6/21%)	Polystyrene (10%)	(14/6%)
YARD WASTE	(3, 5/1%)	Grass (6.4 - 1%)	(varies/0%)
ORGANICS	(6/49%)	Diapers (21%)	(10/6%)
GLASS	(12/4%)	Clear (3%)	(varies/1%)
METAL	(14/8%)	Other Ferrous (5%)	(1, 12/3%)
INORGANIC	(14/28%)	Misc. (28%)	(10, 12/<1%)

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-7

WASTE COMPOSITION BY INSTITUTIONAL CATEGORY*
SPRING 1990

(All figures shown in percentage)

COMPONENT	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10	#11	#12	#13	#14	AVE
PAPER	48	49	41	45	39	26	53	54	46	83	28	65	58	64	49
PLASTICS	9	10	6	8	17	13	13	16	16	7	9	8	7	5	10
YARD WASTE	2	6	27	7	0.2	1	<.1	3	<.1	2	0	1	6	1	4
ORGANICS	32	18	16	20	31	54	26	19	33	4	57	17	17	13	27
GLASS	2	1	1	3	2	1	3	2	1	4	1	5	5	5	2
METAL	5	8	4	10	4	4	3	3	4	3	4	3	7	8	5
INORGANIC	1	5	6	6	4	1	0.4	2	<.1	<.1	1	1	0.5	3	2

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

EXHIBIT 7-8

COMPONENT RANGE BY INSTITUTIONAL CATEGORY
SPRING 1990

COMPONENTS	High Range (Institutional Category/Percent)	Major Category (Percent)	Low Range (Institutional Category/Percent)
PAPER	(10/83%)	Mixed (43%)	(6/26%)
PLASTICS	(5/17%)	Polystyrene (10%)	(14/5%)
YARD WASTE	(3/27%)	Grass (27%)	(14/0%)
ORGANICS	(11/57%)	Food (50%)	(10/4%)
GLASS	(12/5%)	Clear (4%)	(varies/1%)
METAL	(4/10%)	Other Ferrous (5%)	(varies/3%)
INORGANIC	(4/6%)	Misc. (6%)	(9/<0.1%)

* Institutional Categories:

#1 = Elementary School
#2 = Junior High School
#3 = Private School (K-8th grade)
#4 = Private School (6-12th grade)
#5 = Psychiatric Hospital
#6 = Skilled Nursing Facility
#7 = Municipal Hospital
#8 = Teaching Hospital
#9 = Non-profit Hospital
#10 = Government Office
#11 = Correctional Facility
#12 = College/University
#13 = Public High School
#14 = Transportation Hub

SECTION 8

COMPARISON OF COMPOSITION BY SEASON

The purpose of this section is to provide a qualitative analysis of the four seasons of institutional data and to identify seasonal variations and significant trends in the composition of the institutional waste stream. These findings are based on the composition data presented in previous sections.

DISCUSSION

For comparison purposes, the institutional waste data were collapsed to the seven major refuse fractions described earlier in Section 7. Development of trends by season was performed by further collapsing the data from the project's 14 institution types into an aggregate composite for each season, which is presented in Exhibit 8-1. Development of this composite required consolidation of each institution for a weighted average, dependent on estimated quantities generated for the City as a whole (see discussion in Section 9). Based on Exhibit 8-1, the observations and findings made below can be made.

General Trends (non-seasonal)

Paper --

Mixed Paper, Newsprint, and Corrugated/Kraft Paper are the most common components of the Paper stream. All other components combined only account for 17 percent of Paper wastes in the institutional waste stream.

Plastics --

Films and Bags, Polystyrene, and Miscellaneous Plastics are the most common components of the Plastic component. These three items account for over 91 percent of plastic wastes in the institutional waste stream.

Yard Wastes --

Grass and Leaves are the predominant component of Yard Waste.

Organics --

Food Waste is consistently the predominant component (approximately 43 percent of organics fraction). Other significant categories are Textiles, Diapers, and the Miscellaneous Organics category.

Glass --

Clear Glass containers make up more than half of the Glass fraction.

Metals --

Eighty percent of the metal fraction is made up of ferrous alloy products. Annually, Other Ferrous Metal is the single largest component of this fraction.

Inorganic --

The greatest fraction of Inorganics is Miscellaneous Inorganics. Non-bulk Ceramics is a small and highly-specific component category. These items were found in the waste stream only on occasion.

Comparison of the Institutional Waste Stream by Season

Paper --

1. Newsprint, which was observed at the 12 to 14 percent range throughout the year, reached peak proportions in Fall 1989 at over 17 percent of the waste stream.

2. The level of Office/Computer Paper apparent in the waste stream gradually decreased throughout the year, from 8 percent to 1 percent by weight.

3. Mixed Paper ranged from 12 percent to 24 percent of the waste stream.

4. The majority component of Paper for three seasons (not including Summer) was Mixed Paper.

Plastic --

1. LDPE items decreased in frequency during the study and ranged from 0.04 to 0.12 percent by weight.

2. The Plastic fraction, as a whole, ranged from 8.44 to 9.74 percent by weight.

Yard Waste --

1. The quantity of Brush and other woody Yard Wastes was significantly reduced in the Winter.

2. Overall, Yard Waste occupied approximately 2.06 percent of the waste stream.

Glass Fraction --

1. The generation of Glass wastes peaked during the Summer season.

Hazardous Wastes --

1. The majority of Household Hazardous Wastes present in the MSW stream was either Medical Wastes or Miscellaneous items.

EXHIBIT 8-1

SUMMARY OF INSTITUTIONAL COMPOSITION BY SEASON

WASTE COMPONENT	------AGGREGATED STREAM COMPOSITION BY SEASON--------				
	SUMMER	FALL	WINTER	SPRING	(ANNUALLY)
Corrugated/Kraft	12.57%	12.31%	10.96%	10.35%	11.57%
Newsprint	12.03%	17.19%	14.53%	13.16%	14.40%
Office/Computer	7.51%	3.78%	3.37%	1.14%	3.85%
Magazines and Glossy	1.42%	1.41%	1.10%	0.72%	1.17%
Book/Phone Book	1.15%	1.13%	2.12%	0.45%	1.16%
Non-Corrugated OCC	3.63%	2.75%	4.19%	2.53%	3.19%
Mixed	12.24%	16.98%	19.39%	23.57%	18.14%
TOTAL PAPER FRACTION	50.55%	55.54%	55.67%	51.91%	53.48%
Clear HDPE containers	0.28%	0.15%	0.25%	0.21%	0.22%
Colored HDPE containers	0.32%	0.10%	0.16%	0.19%	0.19%
LDPE	0.12%	0.07%	0.05%	0.04%	0.07%
Films and Bags	4.23%	4.15%	4.88%	4.48%	4.41%
Green PET containers	0.09%	0.08%	0.06%	0.02%	0.06%
Clear PET Containers	0.17%	0.07%	0.08%	0.14%	0.11%
PVC	0.08%	0.11%	0.04%	0.00%	0.06%
Polypropylene	0.20%	0.09%	0.06%	0.05%	0.10%
Polystyrene (Est. in Summer)	2.67%	1.58%	2.84%	3.41%	2.57%
Miscellaneous Plastic	1.59%	2.03%	1.11%	0.84%	1.43%
TOTAL PLASTIC FRACTION	9.74%	8.44%	9.53%	9.38%	9.21%
Grass/Leaves	1.92%	2.79%	0.11%	1.97%	1.81%
Brush/Prunings/Stumps	0.81%	0.03%	0.01%	0.18%	0.24%
TOTAL YARD WASTE FRACTION	2.73%	2.82%	0.12%	2.16%	2.06%
Lumber	1.50%	1.81%	0.90%	0.65%	1.24%
Textiles	2.64%	2.66%	3.24%	2.42%	2.71%
Rubber	0.23%	0.19%	0.38%	0.30%	0.27%
Fines	1.64%	1.33%	2.15%	1.44%	1.60%
Diapers	6.57%	2.40%	3.28%	4.23%	4.01%
Foodwaste	9.10%	10.23%	8.25%	12.78%	10.22%
Miscellaneous Organic	3.53%	3.42%	4.44%	3.62%	3.71%
TOTAL ORGANIC FRACTION	25.21%	22.03%	22.63%	25.44%	23.77%
Clear Glass containers	2.60%	1.55%	1.67%	1.69%	1.85%
Green Glass containers	0.46%	0.41%	0.25%	0.49%	0.41%
Brown Glass containers	0.34%	0.22%	0.18%	0.27%	0.26%
Miscellaneous Glass	0.80%	0.22%	0.05%	0.49%	0.39%
TOTAL GLASS FRACTION	4.20%	2.40%	2.15%	2.94%	2.90%
Aluminium Food Containers/Foil	0.49%	0.25%	0.44%	0.47%	0.40%
Aluminium Beverage Cans	0.65%	0.45%	0.67%	0.46%	0.54%
Miscellaneous Aluminium	0.10%	0.05%	0.03%	0.05%	0.06%
TOTAL ALUMINIUM FRACTION	1.24%	0.74%	1.14%	0.98%	1.00%
Ferrous Metal Food containers	1.71%	1.59%	1.75%	1.56%	1.64%
Other Ferrous Metal	1.66%	3.80%	2.76%	3.11%	2.91%
TOTAL FERROUS METAL FRACTION	3.36%	5.39%	4.51%	4.66%	4.55%
Bimetal Cans	0.01%	0.00%	0.03%	0.02%	0.01%
TOTAL METAL FRACTION	4.61%	6.13%	5.68%	5.66%	5.57%
Non-bulk Ceramics	0.05%	0.19%	0.10%	0.01%	0.09%
Miscellaneous Inorganic	2.33%	2.24%	3.38%	1.75%	2.37%
TOTAL INORGANIC FRACTION	2.38%	2.43%	3.48%	1.75%	2.46%
Pesticides	0.02%		0.00%	0.00%	0.00%
Non-pesticide Poisons	0.01%	0.00%	0.02%	0.00%	0.01%
Paint/Solvent/Fuel	0.10%	0.00%	0.16%	0.03%	0.06%
Dry Cell Batteries	0.03%	0.01%	0.27%	0.04%	0.08%
Car Batteries					
Medical Waste	0.26%	0.08%	0.21%	0.34%	0.22%
Miscellaneous HHW	0.18%	0.11%	0.10%	0.38%	0.19%
TOTAL HHW FRACTION	0.58%	0.20%	0.77%	0.78%	0.56%

SECTION 9

GENERATION RATES FOR INSTITUTIONAL SOLID WASTE

INTRODUCTION

Estimates for refuse waste quantities generated by institutional sources within the City can provide supportive information for planning and implementation of source reduction and recycling programs. Project objectives included calculations of generation rates for each institutional type, and subsequent application of these rates to the City-wide waste stream.

APPROACH

Concurrent with the refuse sorting and classification efforts, a comprehensive vehicle weigh program was conducted to determine the quantities of refuse generated by each institutional category during the study-week. This weigh program was repeated each season to address fluctuations and variations in generation rates by institution types over the course of a year. These fluctuations may be caused by several factors, many of which could not be addressed in this study. Changing levels of activity during certain seasons (e.g., summer vacations for most schools may lower generation rates) can impact the amounts of refuse disposed by institutions.

Calculations for generation rates assume that the one study week per season represents a 13-week season. In addition, the refuse disposal rate (as-received amounts at the work site) was assumed to be equivalent to the generation rate.

The vehicle weigh program allowed for calculation of total weights of refuse generated by each institution type by season. The seasonal totals for refuse generation by weight (pounds per week) are presented in Exhibit 9-1 by institution type.

Calculations for institutional generation rates were made based on total employment attributed to institution types and their respective solid waste generation. For example, the number of workers employed at a government office building may be directly related to the waste quantities it generates.

Exhibit 9-2 presents the estimated number of employees sampled as part of the study, based on available information. The seasonal weight totals calculated for each Institutional category (Exhibit 9-1) were then divided by the total number of estimated employees (Exhibit 9-2) to provide a generation factor, in pounds per unit per week, for each institutional category by season. Exhibit 9-3 provides estimated generation rates by season for the specific institution types.
The final step in developing a model of the institutional waste stream was to apply the generation rates from Exhibit 9-3 to the City-wide populations for each of the 14 institutional types.

RESULTS

Application of the generation rates calculated in Exhibit 9-3 to City-wide figures (for number of available employees) yields total estimated quantities of institutional refuse generated on an annual basis.

Exhibit 9-4 is a summary matrix that details the total unit count for each institutional category and the estimated total tonnage of refuse each category generated, by season. It should be noted that, while the sample was acquired from DOS-collected wastes, the final column of Exhibit 9-4 is a cumulative annual total for each category. By this method, the projected annual institutional waste stream totals over 320,000 tons.

It should be noted that these projections include bulk item quantities, discussed in Section 6. Annually, bulk waste in the institutional sector accounted for about 0.5 to 1.7 percent of the waste stream.

A graphic presentation of institutional generation by the general institution types is given in Exhibit 9-5.

EXHIBIT 9-1

ESTIMATED WEIGHT OF REFUSE GENERATED BY CATEGORY FOUR SEASONS

CATEGORY NUMBER	INSTITUTION TYPE	WEIGHT OF REFUSE GENERATED BY SAMPLE (lbs/week)			
		SUMMER	FALL	WINTER	SPRING
1	Public Elementary School	27,720	83,200	25,500	71,580
2	Junior High School	8,976	12,080	13,420	15,240
3	Private School (K-8th Grade)	5,120	5,420	5,380	8,980
4	Private School (6-12th Grade)	24,720	6,520	3,440	5,000
5	Psychiatric Hospital	23,010	23,400	17,640	11,665
6	Skilled Nursing Facility	39,260	32,000	30,840	31,215
7	Municipal Hospital	77,280	60,140	UNSAMPLED	70,815
8	Teaching Hospital	20,000	20,400	17,860	16,445
9	Non-Profit Hospital	20,440	20,220	UNSAMPLED	15,390
(5-9)	All Hospitals (Total)	179,990	156,160	66,340	145,530
10	Government Office	17,472	14,170	11,360	13,910
11	Correctional Facility	14,061	18,820	13,940	26,860
12	College	11,919	19,960	18,080	21,500
13	Public High School	UNSAMPLED	16,340	12,600	11,220
14	Transportation Hub	104,839	171,160	130,080	120,200

EXHIBIT 9-2

TOTAL ACTIVITY UNITS PER CATEGORY SAMPLED

INST. CAT. NO.	INSTITUTION TYPE	TOTAL UNITS SAMPLED	ACTIVITY UNIT
1	Public Elementary School	16,000	students
2	Junior High School	3,440	students
3	Private School (K-8th Grade)	5,395	students
4	Private School (6-12th Grade)	2,600	students
5	Psychiatric Hospital	650	beds
6	Skilled Nursing Facility	1,369	beds
7	Municipal Hospital	602	beds
8	Teaching Hospital	204	beds
9	Non-Profit Hospital	302	beds
(5-9)	All Hospitals (Total)	3,127	beds
10	Government Office	468,000	sq. ft.
11	Correctional Facility	1387	inmates
12	College	15,345	students
13	Public High School	5,412	students
14	Transportation Hub	3	hub

EXHIBIT 9-3

SUMMARY OF CALCULATED GENERATION RATES
FOUR SEASONS

INST. CAT. NO.	INSTITUTION TYPE	GENERATION RATE (lbs/unit/week)			
		SUMMER	FALL	WINTER	SPRING
1	Public Elementary School	1.73	5.20	1.59	4.47
2	Junior High School	2.61	3.51	3.90	4.43
3	Private School (K-8th Grade)	0.95	1.00	1.00	1.66
4	Private School (6-12th Grade)	9.51	2.51	1.32	1.92
5	Psychiatric Hospital	35.40	36.00	27.14	17.95
6	Skilled Nursing Facility	28.68	23.37	22.53	22.80
7	Municipal Hospital	128.37	99.90	115.30 @	117.63
8	Teaching Hospital	98.04	100.00	87.55	80.61
9	Non-Profit Hospital	67.68	66.95	61.87 @	50.96
(5-9)	All Hospitals (Total)	57.56	49.94	51.35	46.54
10	Government Office	0.04	0.03	0.02	0.03
11	Correctional Facility	10.14	13.57	10.05	19.37
12	College	0.78	1.30	1.18	1.40
13	Public High School	2.47 @	3.02	2.33	2.07
14	Transportation Hub	34,946	57,053	43,360	40,067

@ = Estimated Value

EXHIBIT 9-4

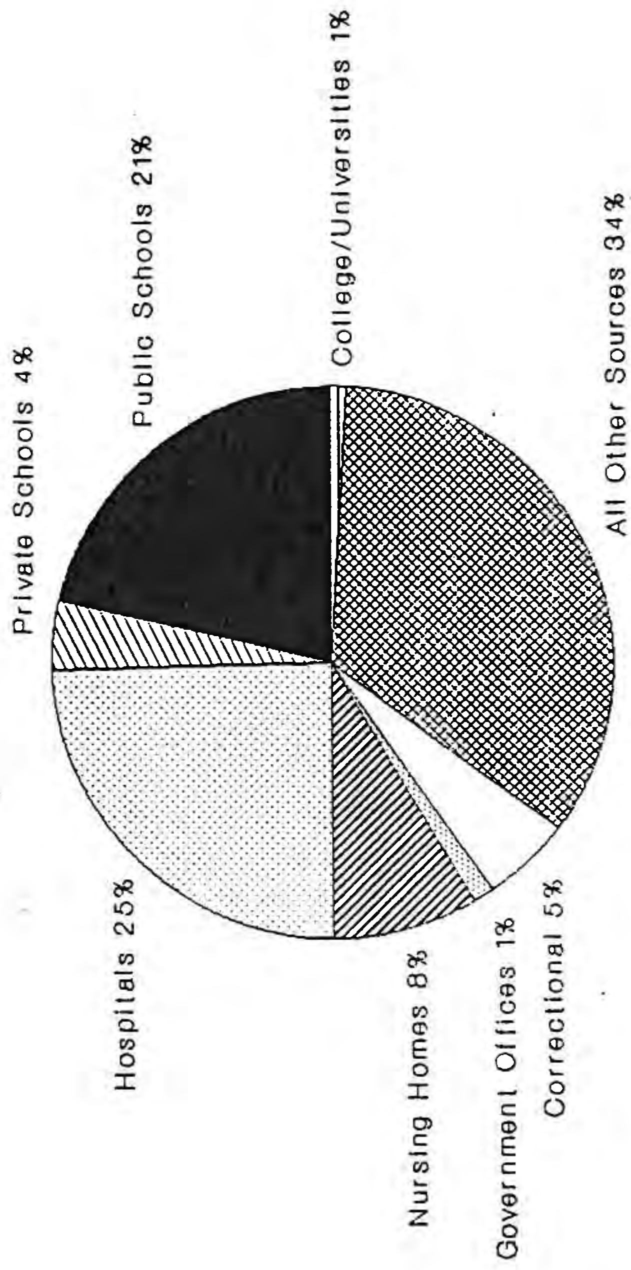
SUMMARY OF PROJECTED INSTITUTIONAL TONNAGE CITY-WIDE FOUR SEASONS

INST. CAT. NO.	INSTITUTION TYPE	TOTAL NO. OF UNITS CITY-WIDE	PROJECTED TOTAL REFUSE GENERATED (tons/season) SUMMER	FALL	WINTER	SPRING	ANNUAL TOTAL
1	Public Elementary School	552,339	6,220	18,669	5,722	16,062	46,673
2	Junior High School	95,950	1,627	2,190	2,433	2,763	9,014
3	Private School (K-8th Grade)	229,806	1,418	1,501	1,490	2,486	6,894
4	Private School (6-12th Grade)	64,326	3,975	1,049	553	804	6,381
5	Psychiatric Hospital	4,525	1,041	1,059	798	528	3,426
6	Skilled Nursing Facility	44,592	8,312	6,775	6,530	6,609	28,226
7	Municipal Hospital	7,914	6,604	5,139	5,931	6,051	23,725
8	Teaching Hospital	1,401 @	893	911	797	734	3,335
9	Non-Profit Hospital	23,962 @	10,542	10,428	9,636	7,937	38,543
(5-9)	All Hospitals (Total)	82,394	30,827	26,746	27,499	24,925	109,996
10	Government Office	5,000,000 @	1,213	984	789	966	3,952
11	Correctional Facility	50,000 @	3,295	4,410	3,266	6,294	17,265
12	College	100,000 @	505	845	766	911	3,027
13	Public High School	244,400	3,929	4,796	3,699	3,293	15,718
14	Transportation Hub	100 @	22,715	37,085	28,184	26,043	114,027
							320,205

@ = Estimated Value

EXHIBIT 9-5

CHART OF WASTE SOURCES FOR INSTITUTIONAL WASTE STREAM



SCS ENGINEERS, 1990

SECTION 10

ERROR ANALYSIS

INTRODUCTION

Composition data from the project exhibited some degree of variability. While it is recognized that waste composition can vary from season to season, day to day, borough to borough, and by other elements of the program design, there is also a degree of variability that may be introduced from the data collection method (such as changes in sorting site and sorting technician). In order to qualify this variability or error, a limited error analysis was performed on data from two categories of the institutional sector. The categories selected were Government Office Buildings and Colleges.

APPROACH

The first step of the analysis was to consider the experimental design of these two categories. Exhibit 10-1 presents the experimental design table for the Government Office Buildings; Exhibit 10-2 presents the same table for Colleges.

In general, the Colleges design (Exhibit 10-2) is balanced. The same sorting site was used for all refuse samples obtained, and all samples originated from the same borough. Conversely, the Government Office Building design (Exhibit 10-1) is unbalanced. The Queens sorting site was used only during the Spring sampling, and the same days were not sampled throughout the year. This lack of balance makes it more difficult to detect and distinguish differences in variability.

Although the possible root causes for error in this data are almost limitless, analysis was restricted to five suspected variables of major interest. These variables are:

- Season - the time of year for refuse sampling;
- Site - the work site where refuse samples were sorted;
- Day - the day when refuse was collected;
- Tract - the Census tract where refuse was collected; and
- Technician - the sort crew supervisor who oversees waste classification

For these variables (Season, Site, Day, Tract, and Sorting Technician), means and variances were calculated for the factors of that particular variable. The factors for each variable are:

- Season - Winter, Spring, Summer, Fall;
- Site - Queens, Hamilton Avenue;
- Day - Monday, Tuesday, Wednesday, Thursday, Friday, Saturday;
- Tract - C4, C5, C6;
- Technician - 310, 375, 441, 660, 803, 886, 985, 995, 100, 118, 128, 635, 737, 801, 834, 914, 636

For example, when season was the variable under consideration, statistics were calculated for each of the factors of season (Winter, Spring, Summer, and Fall). Through Analysis of Variance, factor statistics were compared to each other as well as to the overall mean and variance of the variable. When the variability between the factors becomes large relative to the total variability, there are significant differences between factor populations. It can then be concluded that a significant portion of the total variability is attributable to that variable. For example, if waste differs significantly by season but not by sorting site, then "seasonality" accounts for more of the total variation than sorting site does.

To determine what can be considered a significant difference, the ratio of variability between factors to variability within factors was calculated and compared to the F-statistic. The F-test for comparing two means is equivalent to a t-test. The advantage in using an F-test is that this methodology can compare more than two means, and the sample sizes can also be different.

RESULTS

The most obvious source of error appears to be season. Seasons vary significantly in Government Office Buildings for Paper and Inorganics; whereas significant differences exist in Colleges for Yard Waste, Glass, and Aluminum. Season is the only variable studied that contributes significantly to the overall variation of waste at Colleges.

There does not appear to be a difference in sorting site for the Government Office Building category. The data derived from the Queens work site are not significantly different when compared to the Hamilton Avenue work site.

Because of a paper recycling program, the waste in Census Tract C5 was almost completely paper. Consequently, Census Tract C5 is significantly different from C4. Because Tract C5 was sampled only on Thursdays, Paper is significantly higher on Thursday than any other day. When Census Tract C5 is deleted, only Aluminum and Inorganics vary significantly by day of the week.

Variation among sorting technicians was also considered. Because there was no particular individual who sorted in every season or every borough, there is insufficient evidence to conclude that variation among sorters is anything more than variation from other sources.

CONCLUSIONS

Exhibit 10-3 shows the significant variations derived in this analysis. When a waste fraction shows significant variation for more than one variable, a significant interaction between these variables plays an important role in the overall variation. For example, in the Government Office Building category, variation for Inorganics appears to be caused mainly by season and day of the week. Consequently, different seasons could have different waste generating profiles during the course of the week. Ignoring inherent error between samples, an interaction between Census Tract and day of the week explains much of the error (i.e., variability) in the project database. The variables in Exhibit 10-3 define a significant portion of the variation in this study; however, natural variations within the waste composition are the leading cause of error in the sampled data. It is possible that the natural variation could be further explained by variables not considered in this report, such as weather, local events associated with institutional types, differences within an institutional type. These potential variables and others were not controlled enough for further analysis. In summary, assuming all institutional types were sampled and processed under similar conditions, the data appear reliable with no significant systematic error.

EXHIBIT 10-1

EXPERIMENTAL DESIGN TABLE
COLLEGES

SEA	WINTER	SPRING	SUMMER	FALL	SEA
STE	MTS	MTS	MTS	MTS	STE
BORO	MN	MN	MN	MN	BORO
TRA	C6	C6	C6	C6	TRA
DAY	MONDAY WEDNESDAY FRIDAY	MONDAY WEDNESDAY FRIDAY	MONDAY WEDNESDAY FRIDAY	MONDAY WEDNESDAY FRIDAY	DAY

EXHIBIT 10-2

EXPERIMENTAL DESIGN TABLE
GOVERNMENT OFFICE BUILDINGS

SEA	WINTER		SPRING		SUMMER		FALL		SEA
STE	HAM		HAM		HAM		HAM		STE
BORO	BK		BK		BK		BK		BORO
TRA	C4	C5	C4	C5	C4	C5	C4	C5	TRA
DAY	MONDAY TUESDAY WEDNESDAY FRIDAY SATURDAY	THURSDAY	THURSDAY FRIDAY SATURDAY	THURSDAY	MONDAY TUESDAY WEDNESDAY FRIDAY SATURDAY	THURSDAY	MONDAY TUESDAY WEDNESDAY FRIDAY SATURDAY	THURSDAY	DAY

EXHIBIT 10-3

SIGNIFICANT VARIATION BETWEEN TESTED INSTITUTIONS
FOUR SEASONS

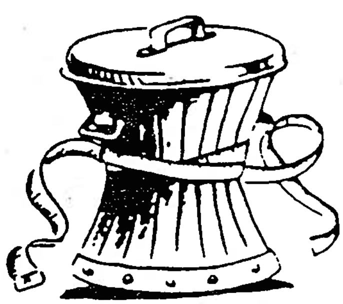
	DAY	SEASON
PAPER		GOVERNMENT OFFICE BUILDINGS
PLASTIC		
YARD WASTE		COLLEGES
ORGANIC		
GLASS		COLLEGES
METALS	GOVERNMENT OFFICE BUILDINGS	COLLEGES
INORGANIC	GOVERNMENT OFFICE BUILDINGS	COLLEGES
HHW		

Commercial

Operations Planning
Evaluation and Control

NYC Department of Sanitati

NEW YORK CITY WASTE COMPOSITION STUDY (1989-90)



Help Reduce
New York's Waste.
Please Recycle.

New York City
Waste Composition Study
(1989-90)

Commercial Sector
Volume 4

New York City
Department of Sanitation
Operations Planning Evaluation and Control
125 Worth Street, Eighth Floor
New York, New York 10013
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ACKNOWLEDGEMENTS

This report, New York City Waste Composition Study (1989-90), was developed under New York City Department of Sanitation Contract No. 89-07653 with SCS Engineers. Alex Prutkovsky, Deputy Director, Operations Planning, Evaluation and Control (OPEC), provided the overall direction. W. Gregory Vogt of SCS Engineers was the Project Manager. The major contributors to the study were staff members at the Operations Management Division of OPEC under the guidance of Mr. Prutkovsky, and solid waste staff at SCS Engineers in Reston, Virginia. Subconsultant services were provided by Konheim & Ketcham of Brooklyn, New York.

Pre-paid orders are accepted for the entire set of 10 volumes of the study, or for individual volumes. An Executive Summary highlighting the major findings of the study is also available. For information, call (212) 788-3802, or write to the Office of the Assistant Commissioner, Department of Sanitation, Room 715, 125 Worth Street, New York, New York 10013.

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SECTION 1

INTRODUCTION

The solid waste management alternatives available today are more complex than the traditional landfilling of waste, requiring a more in-depth knowledge of two important waste stream characteristics -- quantity and composition. Assessment of the waste stream, therefore, is necessary to provide the basic information for evaluating existing solid waste management systems and for making decisions regarding future waste management. This study reflects the efforts of the Department of Sanitation (DOS) to accurately define the waste stream generated in New York City (NYC).

The project was initiated in response to Local Law 19 requiring the City to achieve a mandatory recycling goal of 25 percent. The information presented in this report will be used by DOS not only to develop recycling and marketing programs, but also to develop waste management strategies such as:

- Evaluating existing collection systems.
- Designing source reduction programs.
- Developing educational programs.
- Evaluating waste-to-energy or resource recovery programs.
- Identifying and addressing toxics in the waste stream.

Because it is important to understand "who" is generating "how much" of "what type" of waste, DOS designed a study to assess separately the waste generated by three distinct sources: residences, institutions, and commercial establishments. As a result, over 750,000 pounds of refuse were sampled from:

- 23 residential communities across four boroughs.
- 40 private and municipal institutions.
- Over 200 private businesses.

General findings of this study, by waste stream, include:

<u>Aggregated</u>

- The aggregated waste stream, consisting of residential, institutional, and commercial sectors, is estimated at 8.5 million tons of waste annually.

- The commercial sector accounts for 45 percent (approximately 3.9 million tons per year), followed by the residential sector at 42 percent (3.6 million tons per year), with the institutional sector accounting for the remainder, just over 1 million tons per year.

- Paper is the largest fraction, consisting of 42 percent. The commercial sector generates more than half of the paper waste in the City.

- Organics is the second largest fraction, accounting for 29 percent. Food waste is the single largest component.

Residential

- Food waste was the largest single component of the waste stream.

- Paper, plastic, and yard waste exhibited the largest seasonal variation.

- Bulk waste generation appears lowest during spring months.

- Waste generation rates vary from 20 to 70 pounds per household per week. As housing density increased, residential waste generation declined.

Institutional

- Mixed paper was the largest component of the waste stream by weight. Paper accounts for more than 50 percent of the whole waste stream.

- Glass and yard waste varied most on a seasonal basis.

- Bulk waste generation appears lowest in the fall.

- Waste generation rates varied significantly between different institution types.

Commercial

- Paper accounts for almost 50 percent of the whole waste stream, ranging from 23 percent (Apparel and Textile Manufacturing) to 91 percent (Printing and Publishing).

- Generation rates per employee observed during the study ranged from 0.2 tons per year for offices, to 6.1 tons per year for printing and publishing.

Overall, the waste stream composition of New York City is comparable to national statistics, considering that New York City is not average. The most notable variation is found in the yard debris fraction. National figures indicate that 17.6 percent of the waste stream should be comprised of yard debris. However, field sorting efforts determined that two percent of New York City's waste stream consists of yard debris. Intuitively, this difference seems valid.

For the paper and plastic fractions, national estimates seem comparable with the study results of 42 and 8 percent, respectively (national averages for these fractions are 40.0 and 8.0 percent).

All of the information obtained from the study is presented as a 10-volume series. The purpose of this volume is to present a summary of specific project findings for the commercial waste stream. More specific information, including raw data, can be found in other volumes. The remainder of the project report is organized as follows:

- Executive Summary: Provides a brief overview of the study and presents a summary of the overall findings conclusions, and recommendations presented in the other volumes.

- Volume 1 - Final Report: Presents a general overview of the study methodology, results obtained, and implications for waste management planning.

- Volume 2 - Residential Sector: Provides the results of the residential waste composition study by season including composition, bulk items, and generation rates.

- Volume 3 - Institutional Sector: Presents the seasonal results of the institutional waste composition study.

- Volume 4 - Commercial Sector: Presents estimated composition and generation rates for commercial waste based on the results of the 1-season study.

- Volume 5 - Chemical Analysis: Provides a discussion of the chemical characteristics of the New York City waste stream as determined by a laboratory analysis of waste stream samples.

- Volume 6 - Compaction Testing: Presents the results of the compaction testing program designed to measure changes in residential and institutional refuse density.

- Volume 7 - Residential Sector Raw Data: Presents data gathered during field activities undertaken during the institutional waste composition study.

- Volume 8 - Institutional Sector Raw Data: Presents data gathered during field activities undertaken during the institutional waste composition study.

- Volume 9 - Commercial Sector Raw Data: Includes data gathered as part of the commercial waste composition study.

- Volume 10 - Chemical Analysis Raw Data: Provides data developed during the chemical analysis of residential and institutional refuse samples.

COMMERCIAL WASTE COMPOSITION

This volume summarizes the analysis of refuse samples collected from the commercial waste stream. Refuse samples were obtained during a full week (7 days) of concurrent field sorting activities at the 59th Street Marine Transfer Station (MTS) in Manhattan, and the Highway Salt Dome near LaGuardia, Queens.

Section 2 of this report describes the methodology for sampling and analysis. Section 3 presents the results of the survey and vehicle weighing program for commercial sample routes. Section 4 of the report presents the conclusions of the sampling, and a qualitative analysis of survey results.

Raw data for the commercial study are provided in Volume 9.

SECTION 2

STUDY METHODOLOGY

The methodology used to sample the commercial waste stream in New York City is presented in this section. The following areas are addressed:

- Sub-Sector Selection.
- Route Development.
- Route Collection.
- Waste Generation Rate Survey
- Waste Composition Sort Protocol

SUB-SECTOR SELECTION

Commercial solid waste is generated by a large variety of businesses in New York City. Because it is not practical to collect, weigh, and sort all waste from every commercial source, a methodology was developed to select "sub-sectors" for sampling that would be representative of the City's commercial waste stream.

The first step in the selection process was to identify general categories of commercial establishments. This was accomplished through the use of Standard Industrial Classification (SIC Codes). In general, the 2-digit SIC Code was used to keep the initial number of sub-sectors to a minimum. However, 3- or 4-digit codes were used for certain sub-sectors, where the number of establishments warranted additional detail. A listing of SIC codes is given in Appendix A.

The commercial sector activity in NYC was defined by SIC Codes 07 through 89. However, certain SIC Codes were excluded from consideration, because they were considered unrepresentative of New York City commercial activity. For example, SIC Codes 10 through 13 (Mining) were excluded from the selection process, based on the small percentage of the number of employees and establishments. To further reduce the number of initial sub-sectors, certain SIC Codes were grouped together under a more generic heading. For example, SIC Codes 41 through 49 were grouped as "Transportation and Other Public Utilities," and SIC Codes 60 through 67 were grouped as "Finance, Insurance, and Real Estate (F.I.R.E.)."

Following several iterations, the project team selected a manageable number (i.e., 10 or fewer) of sub-sectors for sampling. A detailed description of the methodology used to select sub-sectors is provided in Appendix B.

The Economic Census Series [1, 2, 3, 4, 5] and the County Business Patterns [6] are the most homogenous sources of data available on New York City's commercial sector. SCS used the Economic Census Series and defined the following "activity units" for the purposed of this study:

- Annual sales ($,000)
- Number of employees.
- Annual payroll ($,000).
- Number of establishments.

However, square footage data were not available on a city-wide basis, and annual sales data were not available for all 2-digit SIC Codes. Consequently, the primary factors for comparison were limited to number of employees, payroll, and number of establishments. Since these activity units may not necessarily correlate to the amount of refuse generated, waste generation rates from other relevant studies and memoranda also were used to evaluate the "representativeness" of the chosen sub-sectors. [7, 8, 9]

Exhibit 2-1 presents a summary of the final sub-sectors selected for sampling and shows the economic indicators (employees, payroll, and establishments) for sub-sectors selected for study versus those excluded from consideration. As noted on the Exhibit, the sub-sectors considered during this study account for about half of the entire commercial activity in New York City.

While emphasis was placed on selecting sub-sectors by objective means, some of the choices were tempered by the judgement and experience of SCS and DOS project management involved in the selection process. In summary, eight sub-sectors were selected, based on economic indicators, existing waste generation estimates, and professional judgement.

ROUTE DEVELOPMENT

After the representative sub-sectors were selected, a sampling scheme was developed whereby dedicated collection vehicles picked up refuse from similar generators within the sub-sector. Collected waste was weighed and taken to a work site for sorting.

EXHIBIT 2-1

SUMMARY OF ECONOMIC INDICATORS BY SUB-SECTOR
NEW YORK CITY COMMERCIAL SECTOR

Sub-Sector Description	Percent of Employees	Percent of Payroll	Percent Establishments
Sampled			
Offices (SIC 60-67, 801-804, 81, 86)	22.4	32.2	
Wholesale (SIC 50-51)	7.2	7.9	
General Retail (SIC 52-53, 56-57, 59	5.6	3.2	
Eating and Drinking (SIC 58)	4.0	1.7	
Textile and Apparel Mft (SIC 22, 23)	3.9	2.3	
Printing and Publishing (SIC 27)	3.2	3.8	
Food Stores (SIC 27)	1.9	0.8	
Hotels (SIC 70)	1.0	0.7	
TOTAL SAMPLED	49.2%	52.6%	
Not Sampled			
Services (SIC 72, 73, 76, 78, 79, 805-809, 82, 83, 84, 89)*	31.5	26.3	23.5
Transportation (SIC 41-49)*	7.5	8.8	4.2
General Manufacturing (SIC 20-22, 24-26, 28-39)	6.6	6.7	3.3
Agriculture, Mining, and Construction (SIC 07, 10-13, 15-17)	3.7	4.4 5.1	
Automotive (SIC 55, 75)	1.1	0.8	3.1
Unclassified	0.4	0.5	3.9
TOTAL NOT SAMPLED	50.8%	47.4%	42.9%
TOTAL OF NYC	100.0%	100.0%	100.0%

* Includes population segments sampled under the institutional study.

Specific objectives for this task were:

- To develop 10 study routes with 45 to 90 generators from each selected sub-sector. The high number of generators was to ensure that there would be at least a sample of 30 for the final study route in order to provide adequate statistical validity. A large attrition of generators was expected, due to strict criteria for the field weighing program.

- To ensure all generators on any given route employed the same waste disposal method (using either bags or 1 to 2 cubic yard containers exclusively).

- To confirm that generators had adequate outside lighting and pavement conditions to allow the curbside weighing program to proceed safely.

Two sub-sectors, "Offices" and "Eating and Drinking," were considered to be significant, both economically and in terms of waste generation. These two sub-sectors were each further divided into two study routes. Exhibit 2-2 presents the eight sub-sectors and the resultant 10 study routes discussed in this section.

Route development required the cooperation of specific private carters operating in the city. The requirements of the study were described to a number of interested carters, and the cooperation of several companies was secured. The sampling scheme was designed to require several routes, each with only one sub-sector (i.e., all food stores). In addition, the study routes required 45 to 90 generators on each route. To reduce costs, and to ensure carter participation, most generators on a given route were located geographically close to one another.

As a prelude to actual refuse sampling, the carters provided customer lists to SCS, and field visits were made to each proposed establishment to confirm suitability for sampling. Criteria for inclusion included the method of waste disposal, SIC Code, and outside lighting and pavement conditions. The disposal method had to be exclusively bags or 1- or 2-cubic yard containers in order to minimize logistical problems. The refuse from each generator was weighed at curbside. The bags were weighed individually by spring scale, and the containers were weighed with a platform scale. Each generator was confirmed to be engaged in the business specified by its SIC Code. If the

EXHIBIT 2-2

COMPARISON OF SUB-SECTORS AND STUDY ROUTES

Sub-sector	SIC Code	Study Route
1. Office	60-67, 801-804, 81, 86	1 Office (10 buildings)
2. Wholesale	50, 51	3 Wholesale
3. Retail	52, 53, 56, 57, 59	4 General Retail
4. Eating & Drinking	58	5 Restaurant
5. Textile Mill Products, Apparel, & Other Textile Products	22, 23	7 Apparel & Textile Manufacturing
6. Printing & Publishing	27	8 Printing & Publishing
7. Food Stores	54	9 Food Stores
8. Hotels	70	10 Hotels

business was not the selected sub-sector, or other conditions were not met, the generator was removed from the study route.

For the collection of refuse from each study route, private carters provided dedicated trucks and crews for each night of the entire study week. These trucks were used only to collect refuse from generators specified by SCS. The refuse collected during this study included wastes and materials which otherwise would have been recycled. Generators were instructed to set out both wastes and recyclables; these materials were weighed and then mixed for transport to the waste sort site.

Exhibit 2-3 provides a description of each study route. The matrix also provides general comments on the number of generators and number of collections. Route 1 was limited to 10 office buildings, due to the collection vehicle capacity. Route 10 consisted of three hotels, two of which were collected in one truck, while the other was collected in a separate roll-off container.

ROUTE COLLECTION

The field activities for the commercial study required 24-hour-a-day work schedules in two separate operations. The night shift was responsible for refuse collection and weighing activities, which will be discussed later in this section. The day shift was responsible for waste sorting activities. In general, refuse collection and weighing activities occurred in the evening after 8:00 p.m. and continued until 5:00 a.m., Monday through Friday, although several routes did have a Sunday evening pick-up. Refuse was weighed at each stop, collected, and delivered to the designated DOS sorting site. While it was originally anticipated that five of the 10 routes would be collected by DOS vehicles, only one route (the multi-tenant office building), was picked up by DOS each night. The remaining routes were collected by private carters.

On each route, an SCS route supervisor was assigned to oversee all work. The route supervisor was assigned a crew of four to six laborers to assist with the weighing and collection activities. On average, refuse from 30 to 40 generators was weighed each night over a period of 4 to 5 hours. At each stop, the SCS route supervisor recorded the weight of the total waste put out for collection by each generator. This information was recorded by generator number in order to ensure confidentiality.

Upon completion of the weighing activities for each night, SCS staff accompanied the collection vehicle to the sorting site and processed the vehicle through the site. The vehicle contents were discharged at the sort site under the direction of the SCS site manager. The day shift sorted

EXHIBIT 2-3

COMMERCIAL STUDY ROUTE DESCRIPTIONS

Study Route	SIC Code	Route Location	Description of Routes	Comments
1 OFFICE	60-67, 801-804, 81, 86	Lower Manhattan	"F.I.R.E," law, professional, and accounting firms	• 10 buildings • Collection 5 days/week; M-F
2 SINGLE OFFICE	60-67, 801-804, 81, 86	Lower Manhattan	"F.I.R.E," law, professional, and accounting firms	• 1-32 story building w/ 38 generators: bag and tag waste • Collection 5 days/week; M-F
3 WHOLESALE	50-51	Maspeth Queens	Distributors of: paper products, groceries, apparel, sporting goods, electrical goods, office equipment, and computers	• 24 generators • Collection 5 days/week; not all are picked up every day
4 GENERAL RETAIL	52, 53, 56, 57, 59	Upper Manhattan	Apparel, jewelry, clothing, furniture, drug, hardware, and department stores	• 33 generators • Small shops, waste in bags • Collection 6 days/week; S-Th
5 RESTAURANT	58	Mid-Manhattan	Restaurants, coffee shops, and cafes	• 42 generators • Most waste in small, heavy bags • Collection 6 days/week; S-Th
6 FAST FOOD	58	Lower Manhattan	Pizzerias, delis, McDonald's, Roy Rogers, and Nathan's	• 22 generators • Waste in light bags; easy to weigh • Collection 6 days/week; S-Th
7 APPAREL AND TEXTILE MANUFACTURING	22, 23	Greenpoint Brooklyn	Manufacturers of sportswear, fabrics, clothing, hosiery, towels, linen, and upholstery	• 26 generators • Collection 5 days/week; S-Th • 1 to 2 cy containers
8 PRINTING/PUBLISHING	27	Lower Manhattan	Printers and publishers of: newspapers, periodicals, books, business forms, greeting cards, etc.	• 24 generators • Not all are collected every day
9 FOOD STORES	54	Union Tnpke Queens	Grocery stores and markets, meat, vegetable and fruit markets, ice cream stores	• 47 generators • 1 to 2 cy containers • Collection 5 days/week; not all are collected every day
10 HOTELS	70	Midtown Manhattan	Hotels - luxury, business, and tourist	• 3 hotels

samples from each of the loads the following day according to prescribed procedures.

Commercial waste sampling was conducted over a 2-week period (June 10-23, 1990). Six routes were sampled the first week, June 10-16, and three routes were sampled the second week, June 17-23.

One route, Printing and Publishing, was neither collected nor sampled during field activities. Instead, a major waste processor (V. Ponte & Sons) provided the study with weight and composition data from a number of printers and publishers on its collection routes.

Exhibit 2-4 presents a map indicating the general location of each study route in the City. The first week of refuse collection and weighing activities took place in Manhattan, where businesses typically have a 5 to 6 nights-per-week collection schedule. The following week, the study routes were located in Queens and Brooklyn, where refuse is typically collected 2 to 3 nights each week. This difference in frequency of collection is related to the amount of refuse storage space. In Manhattan, there is little storage space available for each establishment to store trash, and the waste is collected daily. In Queens and Brooklyn, where more space is available, refuse containers can be larger and collection is less frequent.

WASTE GENERATION RATE SURVEY

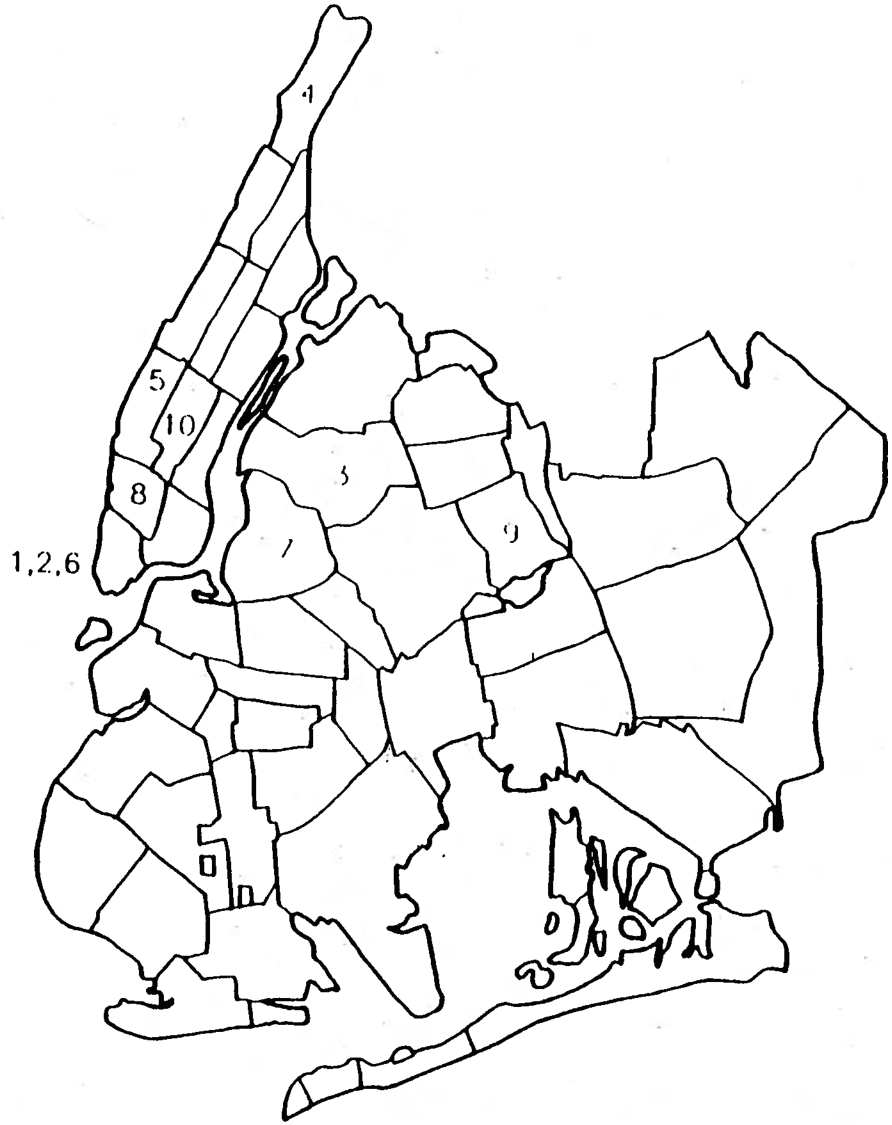
To extrapolate study findings city-wide, commercial waste generation rates were calculated using common denominators, in this case, "activity units." Multiplying waste generation rates by the number of activity units in a given sub-sector provided an estimate of total waste generated (city-wide) for that sub-sector.

For this study, number of employees, sales, and square footage were initially selected as waste generation activity units. Three waste generation rates were calculated for each sub-sector where information was available. However, sales data were found to be generally unavailable or inaccurate for most sub-sectors. For the Hotel sub-sector, waste generation rates were also expressed in terms of number of rooms. Because both wastes and materials which otherwise would have been recycled were collected during this study, the waste generation rates derived include recyclables.

EXHIBIT 2-4

LOCATION OF COMMERCIAL ROUTES

ROUTE	DESCRIPTION
1.	OFFICE
2.	OFFICE
3.	WHOLESALE
4.	GENERAL RETAIL
5.	RESTAURANTS
6.	FAST FOOD
7.	APPAREL MANUFACTURING
8.	PRINTING/PUBLISHING
9.	FOOD STORES
10.	HOTELS



NEW YORK CITY (EXCEPT STATEN ISLAND)

Private carters had recommended that the generators not be informed of the waste sampling program prior to the commencement of field activities. The carters were of the opinion that generators might alter their disposal practices, at least for the study period. In general, SCS found that generators were initially skeptical towards the survey, and many refused to provide socio-economic data. In an attempt to address this problem, a signed letter of introduction from DOS was made available to each generator. The letter subsequently helped to increase participation levels.

Two forms (the Survey Form and the Final Data Form) were used to record data from each generator. The Survey Form was used to record all contact with each generator. The Final Data Form was used to compile only data subsequently deemed pertinent. Generator numbers were used on the Survey Form to ensure confidentiality of any sensitive information. Further details specific to the waste generator rate survey is provided in Appendix C.

WASTE COMPOSITION SORT PROTOCOL

Subsequent to the weighing and collection of refuse on the study routes, the collected material was delivered to the sorting site. Initially, the field-sorting and vehicle weighing programs were scheduled to take place concurrently at the 59th Street Marine Transfer Station (MTS) and Queens Salt Dome. However, due to a delay in operations for sampling on two of the study routes, sorting took place at the two sites over a period of two weeks; the first week in Manhattan and second week in Queens.

An SCS site manager directed all activities at the site, including vehicle weighing, load discharge, sample acquisition, sample sorting, and component weighing. SCS sort crew leaders were responsible for the supervision of the crews performing the actual sorting. Six loads arrived each day in the first week, and three loads each day during the second week. Exhibits 2-5 and 2-6 list the number and type of loads delivered to the 59th Street MTS and Queens Salt Dome for each day of the study. Incoming and outgoing vehicles were weighed by SCS personnel to obtain the weight of the incoming refuse, as well as a tare weight for each vehicle. The site manager collected the truck serial number, carting company name, and SCS route number for each incoming vehicle.

EXHIBIT 2-5

COMMERCIAL LOADS DELIVERED TO MTS SITE
JUNE 1990

Date	Route #	Generator Type	Samples
6/10/90	4	General Retail	6
	5	Restaurant	6
	6	Fast Food	3
	10	Hotel	6
			21
6/11/90	1	Office	6
	2	Multi-Tenant Office	6
	4	General Retail	6
	5	Restaurant	6
	6	Fast Food	6
	10	Hotel	6
			36
6/12/90	1	Office	6
	2	Multi-Tenant Office	6
	3	General Retail	6
	5	Restaurant	6
	6	Fast Food	6
	10	Hotel	7
			37
6/13/90	1	Office	6
	2	Multi-Tenant Office	6
	3	General Retail	6
	5	Restaurant	6
	6	Fast Food	6
	10	Hotel	7
			37
6/14/90	1	Office	6
	2	Multi-Tenant Office	6
	4	General Retail	6
	5	Restaurant	6
	6	Fast Food	6
	10	Hotel	6
			36
6/15/90	1	Office	6
	2	Multi-Tenant Office	6
	5	Restaurant	6
	6	Fast Food	6
	10	Hotel	6
			30

EXHIBIT 2-6

COMMERCIAL LOADS DELIVERED TO QUEENS SITE
JUNE 1990

Date	Route #	Generator Type	Samples
6/18/90	9	Food Retail	10
6/19/90	9	Food Retail	4
	3	Wholesale	3
	7	Apparel	6
			13
6/20/90	9	Food Retail	4
	3	Wholesale	5
	7	Apparel	6
			15
6/21/90	9	Food Retail	6
	3	Wholesale	6
	7	Apparel	6
			18
6/22/90	9	Food Retail	6
	3	Wholesale	6
	7	Apparel	6
			18
6/23/90	9	Food Retail	6

After the SCS site manager supervised the correct disposition of an incoming load, the sample acquisition manager obtained the sort sample. A front-end loader was used to acquire and move the sample to the sort area. Each sample was at least 200 pounds. Exhibits 2-5 and 2-6 provide a summary of the number of samples obtained per day, and per route. The total number of samples obtained from all sub-sectors was 277, and the total weight of all samples was 2,858 pounds. The highest number of samples obtained was 38 for study Route 10 (Hotel), and the lowest number of samples was 20 for Route 3 (Wholesale). The largest mean sample weight for a given route was 398 pounds for Route 10 (Hotel), and the smallest mean sample was 264.7 pounds for Route 1 (Office). Each sample was manually sorted into separate containers for each sort category. A list of the 17 sort categories used for the commercial study is provided in Exhibit 2-7. Each container was filled with refuse, weighed, and emptied. The process was repeated until each sample had been completely sorted. All weights were recorded and checked prior to entry to the project database.

EXHIBIT 2-7

COMMERCIAL SORT CATEGORIES

Sort Categories	Examples
PAPER	
1. Corrugated/Kraft	Cardboard
2. Newsprint	Newspaper
3. Office/Computer	White and Colored Paper
4. Magazines/Glossy	Magazines
5. Mixed Paper	Phone Books, Mail
PLASTICS	
6. Films and Bags	Plastic Wrap, Refuse Bags
7. Rigid Containers	Milk and Beverage Containers
8. Miscellaneous Plastics	Fast Food Packaging
YARD WASTE	
9. Miscellaneous Yard Waste	Grass, Leaves
ORGANICS	
10. Textiles	Clothing, Scraps
11. Food Waste	Food
12. Miscellaneous Organics	
GLASS	
13. Miscellaneous Glass	Food and Beverage Bottles
METALS	
14. Miscellaneous Non-Ferrous Metals	Aluminum Cans
15. Other Ferrous Metals	
HAZARDOUS WASTE	
16. Miscellaneous HHW	Batteries, Oil
OTHER WASTE	
17. Miscellaneous Other Waste	

database. It may be useful to update the projections based on changes reflected in the 1990 Census data.

- The impacts of increased waste generation during holidays generally were avoided under this study. Further study would provide field comparisons of waste quantities and composition generated during holiday and non-holiday weeks.

- The study was not exhaustive in describing residential waste composition by income and density. Further study should focus more closely on waste differences associated with neighborhood diversification, percent of people unemployed or those staying at home, and other indicators.

- The technical literature covering waste composition studies generally does not include bulk items (e.g., white goods, large furniture, tires) and other special wastes (e.g., street sweepings) as part of the solid waste stream. USEPA literature for nationwide waste composition estimates does not include most bulk items, and yard waste estimates (leaves, grass, and green wood wastes) are not based on field data. Solid waste managers need to consider the differences presented in the waste stream when certain components are excluded or removed from the aggregate compilations. Further study would place greater emphasis on making distinctions between New York City data and other technical literature.

SECTION 3

RESULTS

WASTE GENERATION RATES

The weight of refuse generated by each establishment, and subsequent transformations of these data, are presented in Volume 9 of this report. Generation rates were calculated for each generator. These rates express waste generation in terms of the square footage, number of employees, and (where applicable) weekly sales information for each generator.

Exhibit 3-1 presents a summary of waste generation rates per square foot for each of the study routes. The average generation rate (tons/year/sq. foot) ranges from 0.0001 for Offices, Wholesale, and Hotels to 0.032 for Restaurant, and 0.021 for Fast Food. Eating and Drinking establishments generate more waste per square foot than any other type of business sampled.

Exhibit 3-2 presents a summary of waste generation rates per employee. The values for the average generation rate (tons/year/employee) range from a low of 0.18 to Single Tenant Offices to 6.08 for Printing and Publishing. Food Stores, Eating and Drinking establishments, and Printing and Publishing businesses have the highest generation rates by employee. Offices is the lowest volume generator per employee, with an average of approximately seven lbs./employee/week. The generation for the Offices rate is comparable to the results of other studies [8, 9, 10].

Exhibit 3-3 presents a summary of waste generation rate per weekly sales ($,000). Sales data were collected only from the Retail routes (General Retail, Restaurant, Fast Food, and Food Stores) and the Apparel and Textile Manufacturing route. The average generation rates (in tons/$/year) ranged from 0.001 for General Retail to 0.006 for Restaurant.

To estimate total tonnages of wastes generated by commercial generators, the waste generation rates were multiplied by employment data from the 1990 Economic Census (the most recent year for which data were available). The projections were based on the employment waste generation rates, because data for the entire city on square footage and sales were unavailable. Exhibit 3-4 presents the results of the estimated waste generation in the commercial sector city-wide.

EXHIBIT 3-1

SUMMARY OF WASTE GENERATION RATES
(Generation Rate Per Square Foot)

Study Route		Average (lbs/wk)	Rate* (tons/yr)
1.	Single-Tenant Office Buildings	0.03	0.001
2.	Multi-Tenant Office Buildings	0.06	0.002
3.	Wholesale	0.04	0.001
4.	General Retail	0.18	0.005
5.	Restaurant	1.24	0.032
6.	Fast Food	0.81	0.021
7.	Apparel & Textile Manufacturing	0.08	0.002
8.	Printing/Publishing	0.34	0.009
9.	Food Stores	0.39	0.010
10.	Hotel	0.05	0.001

Note:

1. * = Annual rate based on 52 weeks of operation per year.

EXHIBIT 3-2

SUMMARY OF WASTE GENERATION RATES
(Generation Per Employee)

Study Route		Average (lbs/wk)	Rate* (tons/yr)
1.	Office	6.83	0.18
2.	Office	11.94	0.31
3.	Wholesale	45.86	1.19
4.	General Retail	45.44	1.18
5.	Restaurant	173.96	4.52
6.	Fast Food	126.64	3.29
7.	Apparel & Textile Manufacturing	45.15	1.17
8.	Printing/Publishing	233.66	6.08
9.	Food Stores	204.69	5.32
10.	Hotel	71.37	1.86

Note:

1. * = Annual rate based on 52 weeks of operation per year.

EXHIBIT 3-3

SUMMARY OF WASTE GENERATION RATES
(Generation Per ($) Weekly Sales)

Study Route*		Average (lbs/wk)	Rate* (tons/yr)
4.	General Retail	0.04	0.001
5.	Restaurant	0.22	0.006
6.	Fast Food	0.15	0.004
7.	Apparel & Textile Manufacturing	0.07	0.002
9.	Food Stores	0.11	0.003

Note:

1. * = Sales data were not available or considered inappropriate for all study routes.
2. ** = Annual rate based on 52 weeks of operation per year.

EXHIBIT 3-4

COMMERCIAL WASTE GENERATION BY SEASON

SUB-SECTOR DESCRIPTION	ESTIMATED NO. OF EMPLOYEES	GENERATION RATE (Tons/Year/Employee)	ESTIMATED TOTAL WASTE GENERATION BY SEASON Winter	Spring	Summer	Fall	TOTAL ANNUAL WASTE GENERATION (Tons/Year)	PERCENTAGE OF COMMERCIAL STREAM
Sampled								
Single Tenant Offices (SIC 60)	407,000	0.2	15,500	17,600	21,700	18,600	73,300	1.9%
Multi-tenant Offices (SIC 61-69, 72, 73, 81, 89)	626,100	0.3	42,300	48,100	59,300	50,700	200,400	5.2%
Wholesale (SIC 50-51)	226,000	1.2	56,700	64,600	79,500	68,100	268,900	7.0%
General Retail (SIC 52-53, 56-57, 59)	189,000	1.1	43,400	49,500	60,900	52,100	206,000	5.3%
Eating and Drinking (SIC 58)	136,000	3.9	113,000	128,700	158,500	135,600	535,800	13.9%
Textile and Apparel Manufacturing (SIC 22, 23)	120,000	1.2	29,100	33,100	40,800	34,900	138,000	3.6%
Printing and Publishing (SIC 27)	87,000	6.1	111,600	127,100	156,500	133,900	529,000	13.7%
Food Stores (SIC 54)	60,000	5.3	67,300	76,700	94,400	80,800	319,200	8.3%
Hotel (SIC 70)	32,000	1.9	12,500	14,300	17,600	15,100	59,500	1.5%
Construction (SIC 15 – 17)	114,000	6.4 #	153,900	175,300	215,800	184,700	729,600	18.9%
TOTAL, SAMPLED	1,997,100 (88%)		645,300	735,000	905,000	774,500	3,059,700	79.2%
Not Sampled								
Other Services (SIC 75, 76, 78, 79)	98,900	1.2 #	25,500	29,000	35,700	30,600	120,700	3.1%
Other Manufacturing (SIC 20, 24-26, 28-39)	144,000	4.5 #	135,400	154,300	190,000	162,600	642,200	16.6%
Agricultural/Mining (SIC 07, 10-13)	4,000	0.8 #	700	800	900	800	3,200	0.1%
Automotive (SIC 55)	18,000	1.7 #	6,300	7,200	8,900	7,600	30,100	0.8%
Unclassified	11,200	0.8 #	1,900	2,200	2,700	2,300	9,000	0.2%
TOTAL, NOT SAMPLED	276,100 (12%)		169,800	193,500	238,200	203,900	805,200	20.8%
TOTAL, COMMERCIAL SECTOR	2,273,200		815,100	928,500	1,143,200	978,400	3,864,900	100.0%
							12,800 TPD	

NOTES:

1. * = A determination of the tenancy-type for each SIC group was based on number of employees per establishment City-wide for each SIC code (see Commercial Study Report).
2. # = Estimated Value from literature data.
3. Generation rates rounded to the nearest tenth of a ton; Estimated total generation by season rounded to the nearest 100 tons.

51396

EXHIBIT 3-5

WASTE COMPOSITION BY ROUTE

Sort Categories	Office 1	Office 2	Whlsl 3	Gen Rtl 4	Rest 5	FF 6	Apprl 7	P/P 8*	Fd Rtl 9	Hotel 10	AVERAGE
PAPER											
Corrugated Craft	11.8	6.7	29.0	45.9	20.0	15.9	11.3	N/A	36.1	12.2	
Newsprint	10.8	11.1	1.7	9.9	1.9	1.9	0.6	13.5	10.0	7.5	
Office/Computer	18.6	27.0	1.3	0.8	0.2	0.0	0.3	65.0	0.0	2.8	
Magazine/Glossy	2.1	3.6	0.4	0.6	0.5	0.7	0.1	N/A	0.7	4.2	
Mixed	43.2	33.9	14.8	10.8	8.7	24.5	11.0	12.7	9.8	24.9	
SUBTOTAL	86.4	82.3	47.3	68.0	31.3	43.0	23.3	91.2	56.6	51.6	
PLASTICS											
Films and Bags	3.1	2.8	4.8	4.7	4.8	5.4	6.4	N/A	2.8	3.3	
Rigid Containers	0.3	0.4	0.7	0.5	0.9	1.0	0.1	N/A	1.0	0.9	
Misc. Plastics	2.2	2.7	2.0	3.2	1.2	1.9	1.3	2.1	1.7	2.9	
SUBTOTAL	5.6	6.0	7.5	8.4	6.9	8.3	7.8	2.1	5.6	7.2	
YARO WASTE											
Misc. Yard Wastes	0.0	0.3	0.0	0.0	0.1	0.1	0.0	2.3	0.0	0.1	
ORGANICS											
Textiles	0.4	0.9	1.9	1.0	0.8	0.4	48.8	NR	0.7	3.8	
Food Wastes	1.2	2.1	9.7	1.0	40.8	37.7	0.5	N/A	17.5	20.8	
Misc. Organics	2.1	2.4	25.8	4.2	9.9	4.9	14.8	2.1	14.2	4.4	
SUBTOTAL	3.7	5.4	37.4	6.1	51.6	43.0	64.2	2.1	32.4	28.9	
GLASS											
Misc. Glass	2.0	2.4	1.1	5.2	7.1	2.0	0.5	1.1	1.5	8.5	
METALS											
Misc. Non Ferrous	0.8	1.1	0.6	0.6	0.6	0.8	0.6	1.1	0.7	0.9	
Other Ferrous Metals	0.9	1.8	5.5	1.4	2.1	2.6	2.4	N/A	2.6	1.4	
SUBTOTAL	1.7	2.9	6.1	2.0	2.7	3.4	3.0	1.1	3.3	2.4	
HAZAROOUS WASTE											
Misc. HHW	0.2	0.3	0.0	0.0	0.0	0.0	0.2	NR	0.0	0.2	
OTHER WASTES											
Misc. Other Wastes	0.5	0.6	0.6	10.3	0.3	0.2	1.0	0.2	0.9	1.2	
TOTAL	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	
MEAN SAMPLE WEIGHT (lbs)	264.7	301.0	294.6	269.0	365.2	321.2	292.9	--	351.5	398.3	317.6
NUMBER OF SAMPLES	30	30	20	30	36	33	24	0	36	38	30.8

NR = Not Reported

* Route 8 not sampled by SCS

Textile and Apparel Manufacturing was the lowest paper generating sub-sector, with only 23.3 percent of total paper in that sub-sector's waste. Also, for this sub-sector, Corrugated Kraft represents 11.3 percent of the waste stream, and Mixed Paper accounts for 11.0 percent.

Recycling of office/computer paper and corrugated cardboard is underway in many commercial sub-sectors, performed by either the private carter or a contracted paper recycler. Representative generators were selected for sampling with the intention that all of the waste generated by these establishments could be collected for study. However, many of the private carters use separate collection vehicles for businesses generating large quantities of easily-recycled materials, or separate these materials out of the waste stream at privately-owned transfer stations. Consequently, it is possible that the amount of recyclables present has been underestimated by this study.

The Plastics fraction was relatively constant between sub-sectors. General Retail at 8.4 percent and Fast Food at 8.3 percent are the two largest plastic generating sub-sectors, compared to Office and Food Retail, both at 5.6 percent for all four plastic components. For all sub-sectors, the major Plastics component was Films and Bags, and Textile and Apparel Manufacturing was the single largest generating sub-sector of Films and Bags at 6.4 percent.

The Apparel Manufacturing waste stream included 64.2 percent Organics, of which Textile accounted for 48.8 percent. Office Route 1 had the lowest percentage of Organics. Restaurants, Fast Food, and Hotels had the largest proportion of Food Wastes at 40.8 percent, 37.7 percent, and 20.8 percent, respectively. Several of the textile and apparel manufacturers indicated that some of their wastes are currently recycled. Recycled Textile and Apparel wastes were not collected or included in this analysis, nor is there an estimate for the percentage or weight of material recycled.

Hotel and Restaurant waste contained 8.5 percent glass, the largest proportion for the sub-sectors studied. Apparel manufacture waste had the least portion of glass, with 0.5 percent. Wholesale generates 6.1 percent metals, of which 5.5 percent is Other Ferrous Metals. The lowest metal generating sub-sector is Offices, with 1.7 percent metals.

The Other Wastes fraction was largest for the General Retail Route at 10.3 percent of the waste stream. Other wastes for this route included significant amounts of clothing racks (a plastic and metal composite), air conditioning filters, and dirt. The Other Waste category was low for all other commercial routes, primarily because the waste stream could be accurately broken down and classified by the prescribed sorted materials.

SECTION 4

CONCLUSIONS

STUDY ASSUMPTIONS

Several assumptions were necessary to conduct the one-season study of the commercial waste stream. Some of these are presented below:

- The socio-economic information used to develop the commercial waste samples for this study was derived from the 1987 Economic Census [1, 2, 3, 4]; this information served as the basis for the model used to project commercial sector economic activities.

- The sub-sectors sampled were assumed to represent approximately 80 percent of the commercial sector's waste stream generated in New York City.

- For the sub-sectors sampled, the activity levels for the specific generators were assumed to be accurate, as well as representative.

- The generation and composition of commercial waste may be affected by economic forces such as available markets and processing technology. For example, the generation and composition of the waste from Printing and Publishing is affected by the demand for printed products.

- Seasonal generation and composition information was not gathered as part of the field sampling efforts. Data from the one-season study was assumed to represent waste characterizations for the full year.

- City-wide population totals were adjusted to reconcile with tonnage projections made for the institutional sector.

GENERATION RATES

Exhibit 4-1 presents a graphic summary of the percentage of waste generated by each commercial sub-sector, both sampled and not sampled, as defined in this study. Over 79 percent of the waste generated by New York City was generated by sub-sectors included in the sampling strata for this study.

Of the eight sub-sectors sampled, Construction, Eating and Drinking establishments, and Printing and Publishing generate the major proportions of the commercial waste in New York City. Hotels (1.5 percent) and Textile Manufacturing (3.6 percent) generate the smallest percentage of commercial waste for sub-sectors which were sampled.

ESTIMATED WASTE COMPOSITION

Exhibit 4-2 presents the aggregate composition of the commercial sector based on the information collected from the sorting activities, the waste generation rates calculated from this study, and waste generation and composition data prepared by others [7, 8, 9].

The single largest component of the commercial sector waste stream is Paper at 47.5 percent. Of the Paper component, Corrugated Kraft is the largest single component of the Paper category at 17.2 percent. Mixed Paper follows at 14.0 percent. Newsprint and Office Paper make up a sizable percentage of the Paper category at 5.8 and 9.7 percent, respectively.

The next largest component of the commercial waste stream is Organics at 22.4 percent with food wastes accounting for 11.2 percent of the category. Three of the remaining categories, Plastic, Glass, and Metal, account for approximately 10 percent of the commercial waste sector. Exhibit 4-3 presents a graphic summary of the composition of commercial sector waste generated in the City of New York.

EXHIBIT 4-1

COMMERCIAL WASTE GENERATION BY SECTOR

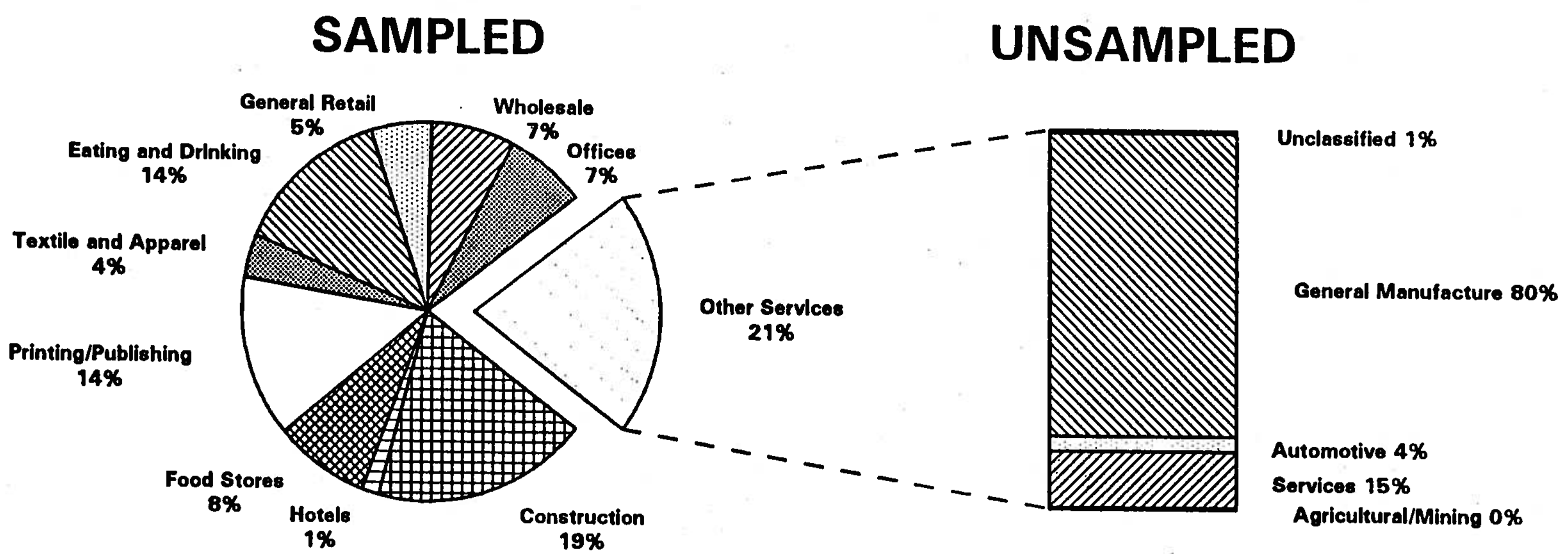


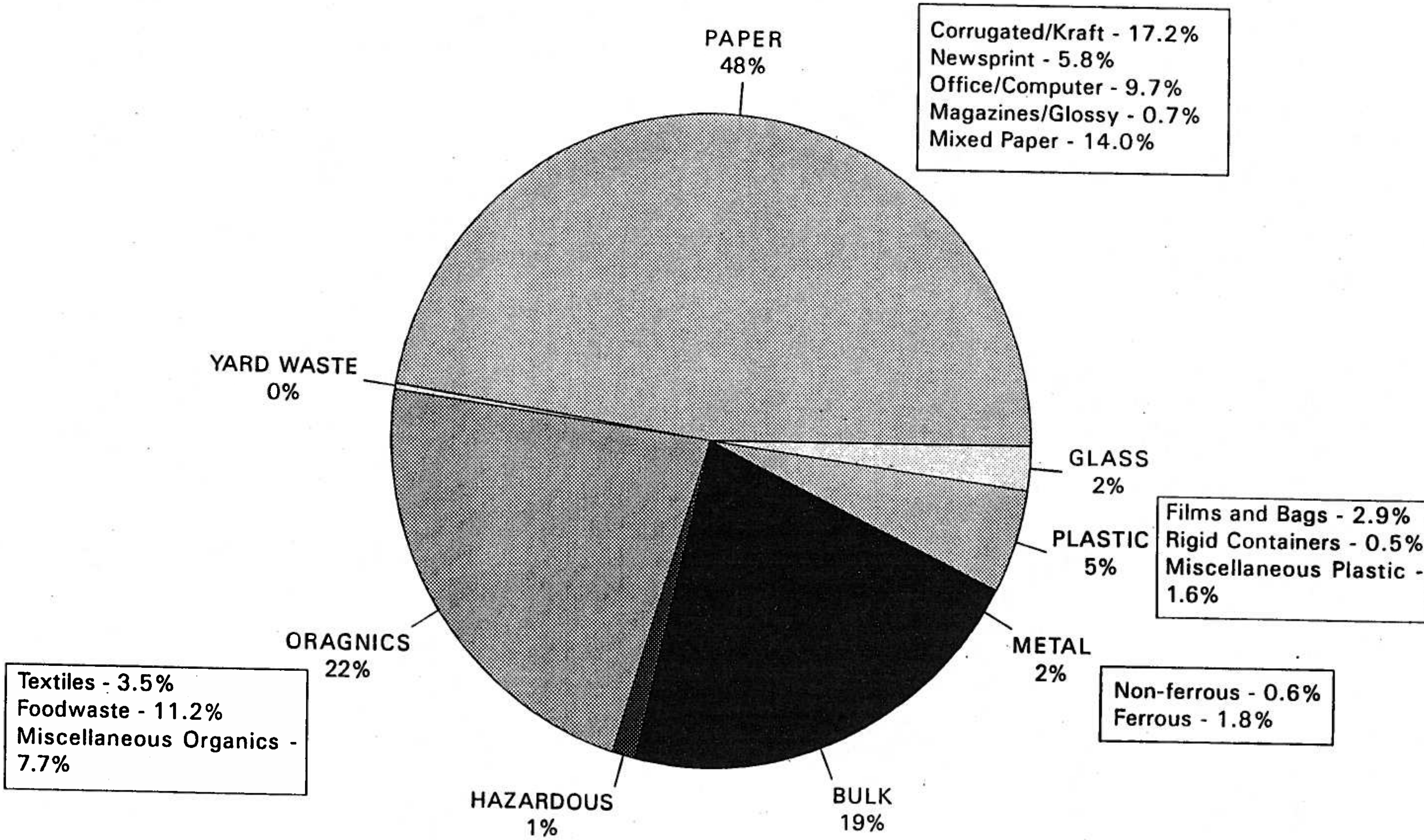
EXHIBIT 4-2

AGGREGATED COMMERCIAL WASTE STREAM COMPOSITION

WASTE COMPONENT	
Corrugated/Kraft	17.2
Newsprint	5.8
Office/Computer	9.7
Magazines/Glossy	0.7
Mixed Paper	14.0
TOTAL PAPER FRACTION	47.5
Films and Bags	2.9
Rigid Containers	0.5
Miscellaneous Plastic	1.6
TOTAL PLASTIC FRACTION	5.1
TOTAL YARD WASTE FRACTION	0.3
Textiles	3.5
Food Waste	11.2
Miscellaneous Organic	7.7
TOTAL ORGANIC FRACTION	22.4
TOTAL GLASS FRACTION	2.2
Miscellaneous Non-Ferrous	0.6
Other Ferrous Metals	1.8
TOTAL METAL FRACTION	2.4
TOTAL HAZARDOUS FRACTION	0.0
OTHER WASTES	1.2
BULK	18.9

EXHIBIT 4-3

COMMERCIAL WASTE STREAM COMPOSITION



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APPENDIX A

COMMERCIAL SECTOR

LISTING OF STANDARD INDUSTRIAL CLASSIFICATION CODES

LISTING OF STANDARD INDUSTRIAL CLASSIFICATION CODES

SIC Code Number	Description of SIC Code
Agriculture, Mining, Forestry, and Fisheries	
07.	Agricultural Services, Forestry, and Fisheries
08.	Not Present
09.	Not Present
10.	Metal Mining
11.	Not Present
12.	Not Present
13.	Oil and Gas Extraction
14.	Not Present
Contract Construction	
15.	General Contractors
16.	Heavy Construction Contractors
17.	Special Trade Contractors
18.	Not Present
19.	Not Present
Manufacturing	
20.	Food Manufacturing
21.	Tobacco Manufacture
22.	Textile Mill Products
23.	Apparel and Other Textile Products
24.	Lumber and Wood Products
25.	Furniture and Fixtures
26.	Paper and Allied Products
27.	Printing and Publishing
28.	Chemicals and Allied Products
29.	Petroleum and Coal Products
30.	Rubber and Miscellaneous Plastic Products
31.	Leather and Leather Products
32.	Stone, Clay, and Glass Products
33.	Primary Metal Industries
34.	Fabricated Metal Products
35.	Machinery, Except Electrical
36.	Electric and Electronic Equipment
37.	Transportation Equipment
38.	Instruments and Related Products
39.	Miscellaneous Manufacturing Industries
40.	Not Present

LISTING OF STANDARD INDUSTRIAL CLASSIFICATION CODES (continued)

SIC Code Number	Description of SIC Code
Transportation and Other Public Utilities	
41.	Local and Inter-Urban Passenger Transit
42.	Trucking and Warehousing
43.	Not Present
44.	Water Transportation
45.	Transportation by Air
46.	Pipeline, Except Natural Gas
47.	Transportation Services
48.	Communication
49.	Electric, Gas, and Sanitary Services
Wholesale Trade	
50.	Wholesale Trade - Durable Goods
51.	Wholesale Trade - Non-durable Goods
Retail Trade	
52.	Building Materials and Garden Supplies
53.	General Merchandise Stores
54.	Food Stores
55.	Automotive dealers and service stations
56.	Apparel and Accessory Stores
57.	Furniture and Home Furnishing Stores
58.	Eating and Drinking Places
59.	Miscellaneous Retail
F.I.R.E. (Financial, Insurance, & Real Estate)	
60.	Banking
61.	Credit Agencies Other Than Banks
62.	Security, Commodity Brokers, and Services
63.	Insurance Carriers
64.	Insurance Agents, Brokers, and Services
65.	Real Estate
66.	Combined Real Estate, Insurance
67.	Holding and Other Investment Offices
68.	Not Present
69.	Not Present

LISTING OF STANDARD INDUSTRIAL CLASSIFICATION CODES (continued)

SIC Code Number	Description of SIC Code
Services	
70.	Hotels and Other Lodging Places
71.	Not Present
72.	Personal Services
73.	Business Services
74.	Not Present
75.	Auto Repair, Services, and Garages
76.	Miscellaneous Repair Services
77.	Not Present
78.	Motion Picture
79.	Amusements and Recreation Services
80.	Health Services
81.	Legal Services
82.	Educational Services
83.	Social Services
84.	Museums, Botanical, Zoological Gardens
85.	Not Present
86.	Membership Organizations
87.	Not Present
88.	Not Present
89.	Miscellaneous Services

Source: Executive Office of the President, Office of Management and Budget. Standard Industrial Classification Manual, 1987.

APPENDIX B

COMMERCIAL SECTOR

SUB-SECTOR SELECTION

SUB-SECTOR SELECTION

INTRODUCTION

A sampling methodology was devised to sample to commercial sector waste generation rates and composition. This methodology consisted of five rounds of analysis detailed in the following discussion.

Round 1

In the first round of analysis, the level of commercial activity for each of the 52 initial sub-sectors was compared to the total commercial activity of New York City using the factors discussed above (i.e., number of employees, payroll, and number of establishments). A cursory review of the data revealed that the degree of commercial activity for any given sub-sector was either far greater than 1 percent of the total New York City commercial activity, or at an insignificant level much below 1 percent. This round of selection resulted in a list of 43 sub-sectors. Using 1 percent as an arbitrary cut-off point, any commercial sub-sector with less than 1 percent of the activity city-wide was removed from consideration.

Round 2

The following sectors: Wholesale (SIC Codes 50 and 51) and Miscellaneous Retail (SIC Code 59) comprised a large percentage of NYC commercial activity (e.g., SIC Code 50 Wholesale - Non-Durable represented 4.2 percent of NYC employees, and 6.0 percent of the number of establishments). In Round 2, these sub-sectors were presented at the 3-digit SIC Code level for further analysis.

The category "Office" was introduced as a sub-sector to encompass SIC Codes 60 through 67, 73, 80 through 83, 86, and 89. These SIC Codes were combined on the basis that these are typical "office" categories. For example, SIC Codes 60 through 67 are Finance, Insurance, and Real Estate (F.I.R.E.) types of offices which are similar to SIC Code 81, which is the Legal type of offices. In addition, it was anticipated that the sampling program would sample whole office buildings in Manhattan, and it would be impractical to select only SIC Code 60 through 67 out of a 30- to 40-story building with hundreds of tenants. Therefore, the Office sub-sector was created to consolidate similar SIC Codes into one sub-sector for sampling purposes.

The use of the office sector reduced the total number of sub-sectors for consideration to 42. The selection criterion remained at 1 percent of total NYC activity for the 2-digit SIC sub-sectors, but was reduced to 0.5 percent for the 3-digit SIC sub-sectors. The 0.5 percent criterion for selection of the 3-digit SIC sub-sectors was based on a comparison of the nine 3-digit sub-sectors within each at the 2-digit level. The 0.5 percent criterion allowed an appropriate level of attrition for the sub-sectors. Those sub-sectors not meeting the criteria were removed from further consideration and, consequently, reduced the total to 24.

Round 3

The selection criteria was increased to the 2 percent activity level for the 2-digit SIC Codes, and 1 percent for the 3-digit level for any activity unit. The selection criteria were increased in order to eliminate a number of the sub-sectors from consideration. This effort resulted in a remaining total of 19 sub-sectors, which included 14 at the 2-digit level and 5 at the 3-digit level.

Round 4

This round of selection involved estimating waste generation amounts (tons/year) for each sub-sector, using an average of available generation rates. The majority of waste generation rates were multiplied by the number of employees, with the remainder multiplied by sales or square footage to estimate the amount of waste generated by each sub-sector. In cases where two or more generation rates were available, an average of all available rates was used (due to large variation among the available rates). The purpose of calculating the amount of refuse generated was to confirm that the largest waste producing sub-sectors, not simply the strongest sectors by solely economic indicators, were included. Based on this method, these 19 sub-sectors generate approximately 80 percent of the commercial waste generated in New York City. None of the sectors were eliminated from consideration based on waste generation.

Round 5

All sub-sectors presented at the 3-digit SIC Code level were consolidated and reintroduced at the 2-digit level. For example, SIC Code 513 (Apparel, Piece Goods), 514 (Groceries), and 519 (Miscellaneous Non-Durable) were consolidated, and SIC Code 51 (Wholesale - Non-Durable) was reintroduced. Data for SIC Codes 50, 51, and 59 were consolidated in this manner.

Next, SIC Code 21 (Tobacco) was removed from the final list based on the anomaly that this sector represents 2.69 percent of the New York City payroll and yet 0.0 percent of the number of establishments.

Several sub-sectors were removed upon recognition of certain logistical difficulties in defining an appropriate sampling route. The sub-sectors removed for this reason were SIC Codes 78 (Motion Pictures), 79 (Amusements), 84 (Museums), 41 through 49 (Transportation), and 72 (Personal Services). The sub-sectors selected for sampling were: Offices, Wholesale, General Retail, Eating and Drinking, Textile and Apparel Manufacturing, Printing and Publishing, Food Stores, and Hotels.

The final selection of sub-sectors was based on the described methodology, review, and discussion with DOS, and limitations subsequently imposed by field conditions. The Office sector (SIC Codes 60 through 67, 801 through 804, 81, and 86) initially included SIC Codes 73, all of 80, 82 through 83, and 87. This represented 50.5 percent of the total number of commercial employees in the City. However, during the subsequent development of sampling routes and the collection of generator background data, these SIC Codes were not represented in the study route areas. Therefore, SIC Codes (SIC Codes 73, 805 through 809, 82 through 83, and 87) were removed from the definition of the Office sub-sector. The revised Office sub-sector represented 22.4 percent of the total commercial employees in the City.

Through discussions with DOS, SIC Code 22 (Textile Mill Products) was added and combined with SIC Code 23 (Apparel and Other Textile Products). In addition, SIC 70 (Hotels) was added, recognizing the importance of the hotel and tourist trade to New York City, as well as the estimated volume of refuse generated by these establishments.

APPENDIX C

COMMERCIAL SECTOR

WASTE GENERATION RATE SURVEY

WASTE GENERATION RATE SURVEY

INTRODUCTION

The waste generation rate survey was conducted during July 1990. Each generator on every study route (with several exceptions) was contacted to obtain information on the number of employees, sales, and square footage. The following discussion documents the field activities for each study route.

Initially, generator contact was made by telephone, followed up by a field visit (or more phone calls) if necessary. Information from study Routes 1 and 2 (Office) was collected solely by telephone survey of the individual building managers. No follow-up calls were needed to generators from study Route 8 (Printing and Publishing) and study Route 10 (Hotels), because the information was provided by the private carters servicing these routes. For study Route 4 (General Retail) and study Route 9 (Food Stores), SCS arranged to conduct the survey accompanied by a representative from the relevant carting company. No phone calls were made to the generators on the General Retail route prior to the survey, because introductions were to be made by the carting company in order to increase participation levels. Phone calls were made to the Food Retail generators prior to field visits, due to the large number of generators, in hopes of reducing the number of visits.

STUDY ROUTE DESCRIPTIONS

<u>Study Route 1 - Offices</u> (SIC Codes 60-67, 801-804, 81, and 86)

This route consisted of 10 buildings in lower Manhattan which were collected during the first week of sampling activities. At the initiation of sampling, one building was removed from the study, because the hauler no longer collected that building's refuse. A replacement building was subsequently added to the route, leaving the total at 10 buildings. Data gathered from this route are of good quality, given that there was ample time, lighting, and space for the weighing program. The generator data was obtained from each of the building managers by telephone survey.

Study Route 2 - Single Office Building (SIC Codes 60-67, 801-804, 81, and 86)

This route was comprised of 38 generators (tenants) in a 32-story office building in lower Manhattan. The waste was bagged and tagged for each individual generator and each bag was weighed. This weight by bag was added up for each night of the week to produce a total weight for each generator for the one week period. There was no reduction in the number of generators surveyed on this route during the study. SCS worked closely with the building management company and the cleaning service to ensure the success of the weighing program. SCS personnel coordinated with custodial staff and tagged each bag of waste collected by generator and by floor number. These bags were removed to the loading dock, weighed, and placed at the curbside for removal.

Three data forms were used (including a Bag/Tag form, Bag Removal form, and Weight form) to track refuse at each stage of the collection process. The building manager compiled information on the total number of employees and total square footage for each generator. Information from this route is very reliable, due to the controlled nature of the data collection.

Study Route 3 - Wholesale (SIC Code 50-51)

Collection from this route was postponed until the second week, June 17-23. Initially, the carter provided a list of 29 wholesale establishments. However, during collection activities, 25 stops were removed and 23 replacement stops were added, leaving 27 generators (most of which had not been field checked to confirm SIC Code). During the generator survey, these establishments were surveyed to ensure the appropriate SIC Code, resulting in a final total of 23 confirmed generators. Number of employees and square footage data were obtained for each generator by a telephone and a field survey. Twenty-one generators provided complete information. The field weighing data is of average quality, due to the significant change in selected generators during collection activities. The number of employees and square footage data are expected to be accurate.

Study Route 4 - General Retail (SIC Codes 52, 53, 56, 57, and 59)

This route was collected during the first week, June 10-17 and was located in upper Manhattan. Initially, this route consisted of 53 generators. Of the 53 available generators, 43 were sampled, as some establishments were closed or were determined to be unrepresentative. Of the 43 generators sampled during the weighing program, 33 yielded good data. The data of the remaining 10 generators were unacceptable due to contamination of the waste stream by inappropriate sources, or because the generators were unrepresentative of this route (i.e., wrong SIC Code). For example, the waste from a tuxedo rental store (SIC Code 72 - not a general retail generator) was combined with the waste from the clothing store (SIC Code 56) next door. Occasionally, the refuse could not be differentiated between generators, thus resulting in potential contamination of the sample refuse. For example, the tuxedo rental store may initially look like a used clothing store or possibly does sell used clothing; however, the contamination by the tuxedo rental portion of the business, particularly the sales data, precludes the inclusion of this generator in the survey.

The generator survey served to confirm SIC Codes and was conducted in conjunction with a field representative from the carting company. The field survey was supplemented with follow-up telephone calls. The data from this route are considered to be good.

<u>Study Route 5 - Restaurant</u> (SIC Code 58).

This route was initially composed of 45 generators in Greenwich Village. However, due to delays identified as unacceptable by the hauler, the waste from this route was not initially weighed at curbside. In addition, the collection vehicle operator refused to collect only the SCS-selected generators and instead, collected the normal businesses serviced on this route. Therefore, in order to obtain some data from this route, the bags from each generator were tagged and counted for the first three nights of the survey in order to differentiate study refuse form the rest of the load.

The back-up methodology to obtain waste generation data was to tag the bags for each generator, transport the waste via collection vehicle to the sorting site where the day shift would sort, weigh, and record weights for each bag by generator. By counting the bags from each generator during collection, this would serve to confirm the weighing activities at the sorting site. However, after the bags were discharged from the collection vehicle at the sorting site, this method was discovered to be inadequate. The tags would become detached from their bags during collection and discharging activities due to the high liquid content of the refuse.

Later in the week the standard weighing program, using a portable scale, was implemented for this route. Actual weights of refuse by generator were obtained on Wednesday, Thursday, and part of Friday.

During collection activities, eight restaurants were removed at the request of the private carter and seven replacement generators were added for a final total of 44 generators. During the generator survey, two were removed due to SIC Code non-conformance. Seventy-three percent of the generators responded with sales data.

Data quality from this route is poor to average in terms of waste composition, and below average for waste generation information. Many owners/managers reported fewer employees than SCS observed. The square footage data was either pace-estimated or confirmed by SCS personnel. Few establishments gave actual sales data; most gave an approximate weekly sales figure for an "average week in June."

<u>Study Route 6 - Fast Food</u> (SIC Code 58)

This route collected the first week and was comprised of 30 generators in lower Manhattan. This route was collected for five days, Sunday through Thursday night. Seven establishments were removed during collection activities (business closed) and three were added, leaving a total of 26 generators sampled. An additional four generators were removed during the generator survey due to apparent contamination of sampled wastes by the generator prior to collection. Seventy-seven percent of the generators provided sales data.

As with the restaurant route, the number of employees provided by the generator seemed low, as compared to SCS field observations. This could be due to the large number of part-time employees needed during weekday lunch-time preparations in lower Manhattan. Square footage data was estimated by pacing the length and width of the establishment. The sales figures were weekly estimates by the owner, or manager for the summer. Data quality for this route is good.

<u>Study Route 7 - Textile and Apparel Manufacturing</u> (SIC Codes 22 and 23)

This route was collected the second week of the study and was composed of 45 companies. This route posed severe operational problems for the hauler and was, consequently, collected in the same vehicle as waste form the wholesale route. Each route was collected on its entirety prior to beginning the next route. As a result, upon discharge, SCS field crews could easily determine which half of the discharge load was from which route. Every effort was made to prevent cross-contamination by sampling wastes from opposite sides of the refuse pile. During collection activities, 23 establishments were removed and nine were added. Those which were removed were either closed or the collection vehicle operator refused to pick up the refuse. During the generator survey, five generators were removed due to closure of the business or the wrong SIC profile. Approximately 62 percent responded with sales information, although two businesses refused to cooperate. Data quality from this route is average.

Study Route 8 - Printing/Publishing Manufacturing (SIC Code 27)

Information describing the waste generated by Printing/Publishing Manufacturing activities was provided by a waste hauler/processor who collects this type of waste. The information provided gave a characterization of the composition of paper waste, as well as the volume of material. Information was also provided by the hauler to convert the volume of material into weight. This hauler did not collect the entire waste stream--only the paper wastes. An estimate of volume and composition was provided on the remaining portion of the waste stream by the waste hauler. SCS did not confirm any information provided for this route. The data from this route should, however, be considered reliable and represents an average week in June.

Study Route 9 - Food Stores (SIC Code 54)

This route was collected during the second week of the study and comprised of 51 generators. Only one generator was removed during collection activities (out of business), leaving a total of 50 generators. During the generator survey, three were removed due to closure of business or wrong SIC Codes, leaving a total of 47 generators. Sixty-two percent responded to the survey with sales data. The number of employees and square footage data were confirmed in the field by SCS personnel. The sales data were weekly averages for the summer.

Study Route 10 - Hotels (SIC Code 10)

This route included only three hotels, due to the limited number of hotels collected by any individual carter, and recognizing the large volume of refuse generated by an average hotel in the City. Two trucks were used to collect the refuse for this route, due to the large volume of material, for the week of the study. Information on the number of employees, rooms, and square footage was provided by the hauler. Sales data were not applicable to this route and was replaced with the number of rooms. Data quality for this route is considered to be good.