CITY OF SEATTLE
DEPARTMENT OF ENGINEERING
SOLID WASTE UTILITY

1990

WASTE STREAM COMPOSITION STUDY

Final Report

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In cooperation with:

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DEPARTMENT OF ENGINEERING
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I. Summary of Findings

A. Introduction

This report provides waste composition estimates for the City of Seattle, Washington based on sampling from January through December, 1990. The primary focus of this year's study was the monitoring of two primary waste substreams:

- residential route-collected wastes; and
- self-hauled wastes.

Composition data are provided for these waste streams. This sampling program was a continuation of the 1988/89 waste composition analysis.

B. Study Overview

In response to the need for a more detailed examination of the City's waste stream composition, the Solid Waste Utility launched the Waste Stream Characterization Study in early 1988. The City's objectives included:

- obtaining information for characterizing the total waste stream;
- establishing a factual basis for recycling and waste reduction programs and a baseline for continued long-term measurement of system performance;
- obtaining specific data about various waste substreams to enable the City to estimate the recycling potential within each;
- understanding the differences between substreams so that targeted recycling programs can be designed, implemented, and monitored;
- determining waste generation factors for various residential and commercial substreams, thereby enabling the City to forecast future composition; and
- creating a database for ongoing evaluation and analysis of waste composition sampling data.

A consultant team led by the Matrix Management Group began work in February, 1988. The results of the first year's efforts can be found in the report entitled *"Waste Stream Composition Study 1988-1989,"* prepared by the Matrix Management Group for the City of Seattle Solid Waste Utility.

A research and sampling methodology was established in cooperation with the Utility's Staff. The work began by gathering pertinent information regarding routes, demographics, facilities, and operating schedules which would impact the sampling program. The focus of these initial activities was to develop a sampling design and to organize sampling activities. In all, 550 field samples were sorted during the first 13 months of the Study. In late March, 1988, residential sampling began. Self-haul and commercial sampling began in April. Residential and commercial sampling concluded in February, 1989. Self-haul sampling concluded in March.

A similar sequence of events occurred for the 1990 study. The second year of sampling began in January, 1990. A total of 317 samples, 114 residential and 203 self-haul, were sorted over a 12-month period. Samples from both residential and self-haul waste substreams were sampled monthly on a random basis. The detailed methodology is presented in the Appendix.

C. Results

Sampling Overview

Recycling occurred in all instances *upstream* from the point of sampling. Consequently, the sampling data do not represent waste at the point of generation; it reflects the composition of *disposed* waste.

A total of 317 samples were sorted from January through December, 1990. Waste from the two substreams were sampled as follows:

Substream		Number of Samples
Residential Route Collected:		114
Single-family	89	
Multi-Family	25	
Self-hauled:		203
Residential	139	
Commercial	64	
TOTAL:		317

Wastes were sampled at both the City's North and South Transfer Stations. One 200-300 pound sample was taken from each of 114 full truckloads of residential waste from selected contract-collection routes. Self-hauled waste was sampled from vehicles arriving at the transfer stations.

Below are comparisons of waste composition and quantity between the 1988/89 data and 1990 data are provided below. The accompanying figures highlight the decrease in disposed tonnage between 1988 and 1990, as well as notable changes in waste composition for the residential and self-haul waste substreams. Detailed data for each substream are presented in following Sections.

Changes in Residential Wastes

A significant change in waste composition occurred between 1988/89 and 1990 in the residential waste stream. The Citywide implementation of separate curbside collection for yard wastes and the expansion of the single-family curbside and multifamily recycling programs have produced noticeable changes in the quantity and composition of the residential waste stream, as shown in Figures I-1 and I-2. Overall, route-collected tonnage decreased from 180,000 in 1988 to 142,000 in 1990.

The largest decline occurred in "Yard Waste" (Prunings and Leaves & Grass) which dropped from over 17% to less than 3%. This decrease is depicted in Figures I-3 and I-4. The combined paper components, now the largest group of disposed material, were expected to compensate for much of the Yard Waste proportion reduction. Total disposed paper did increase significantly, from 31% to 38%. That a greater effect did not occur is most likely due to a simultaneous increase in paper recycling.

A notable change took place in the relative percentages of "Mixed Scrap Paper" and "Other Paper." The 1988/89 estimates showed three-quarters of these two components being "Mixed Scrap Paper." The relative proportions have nearly reversed for 1990. "Other Paper" is now over two-thirds of this combination.

Approximately half of this shift can be attributed to the fact that small paper scraps (under 2 inches square) were considered recyclable in 1988/89 and non-recyclable in the 1990 study. These paper scraps also have higher level of contaminated food waste. The remaining shift can be explained by the finding that non-recyclable papers exist in the waste stream is quantities *at least as great* as those in 1988/89. In fact, national trends indicate that per capita generation of these papers are actually on the rise. Coupled with increased recovery of recyclable paper, the impact of non-recyclable papers on the waste stream has become more pronounced.

Total disposed plastics and "Food" both increased as percentages of the residential waste stream. Overall tonnages of plastics also increased—the only component in addition to "Other Paper" to do so. This increase might be the result of a rise in the generation of

plastic packaging, with no appreciable increase in recovery to offset it. In addition, the packaging, which consists mostly of film plastics, was more contaminated in 1990 than in previous years.

Changes in Self-Haul Waste

The self-haul waste stream has also been affected by the City's yard waste regulations, which require separation of these materials from other self-hauled refuse. Disposed yard waste decreased significantly, from nearly 26% to just over 3%. In turn, this drop in yard waste amounts caused an increase in percentage figures for other major self-haul waste components.

Notable increases are evident for "Wood", "Textiles", "Gypsum", and "Newspaper", with "Wood" alone increasing from 24% to 35%. These changes are noted in Figures I-5 and I-6. The overall self-haul tonnage disposed decreased from 81,500 in 1988 to 66,165[1] in 1990.

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[1] This was adjusted to eliminate the effect of unusually large amounts of construction and demolition waste that entered the City's self-haul waste stream from March 1990 to August 1990. This dramatic increase was due to closure of alternative disposal facilities.

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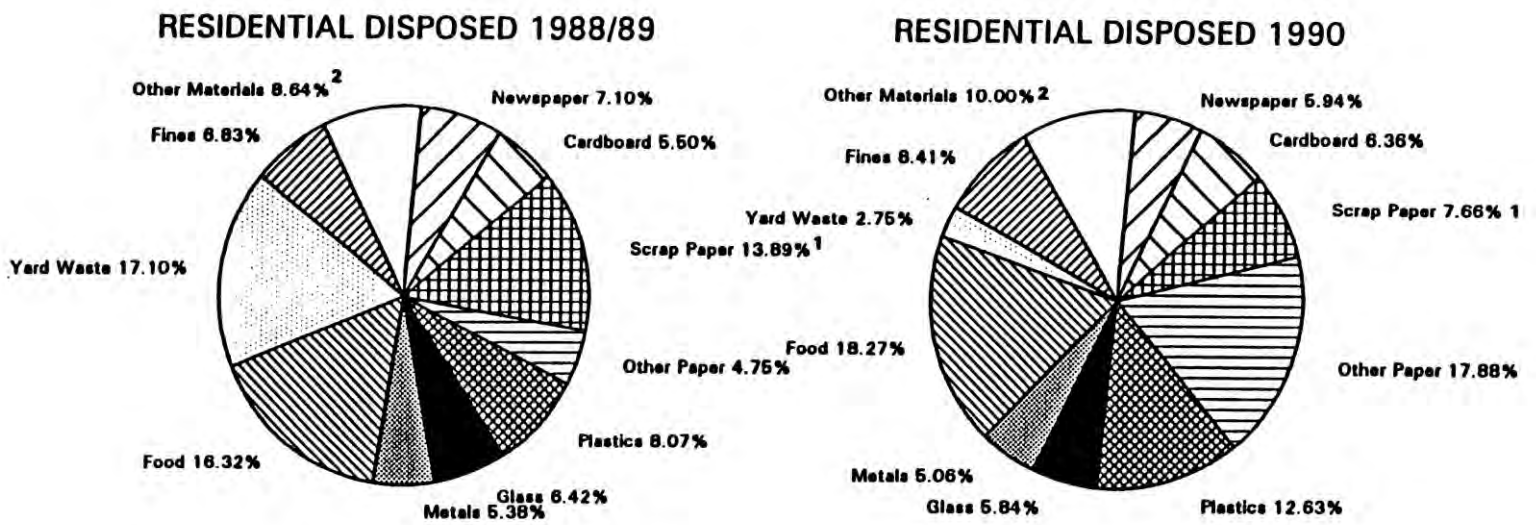
Figure I-1

RESIDENTIAL ROUTE-COLLECTED WASTE COMPOSITION

Percentages by Weight

1988/89 versus 1990

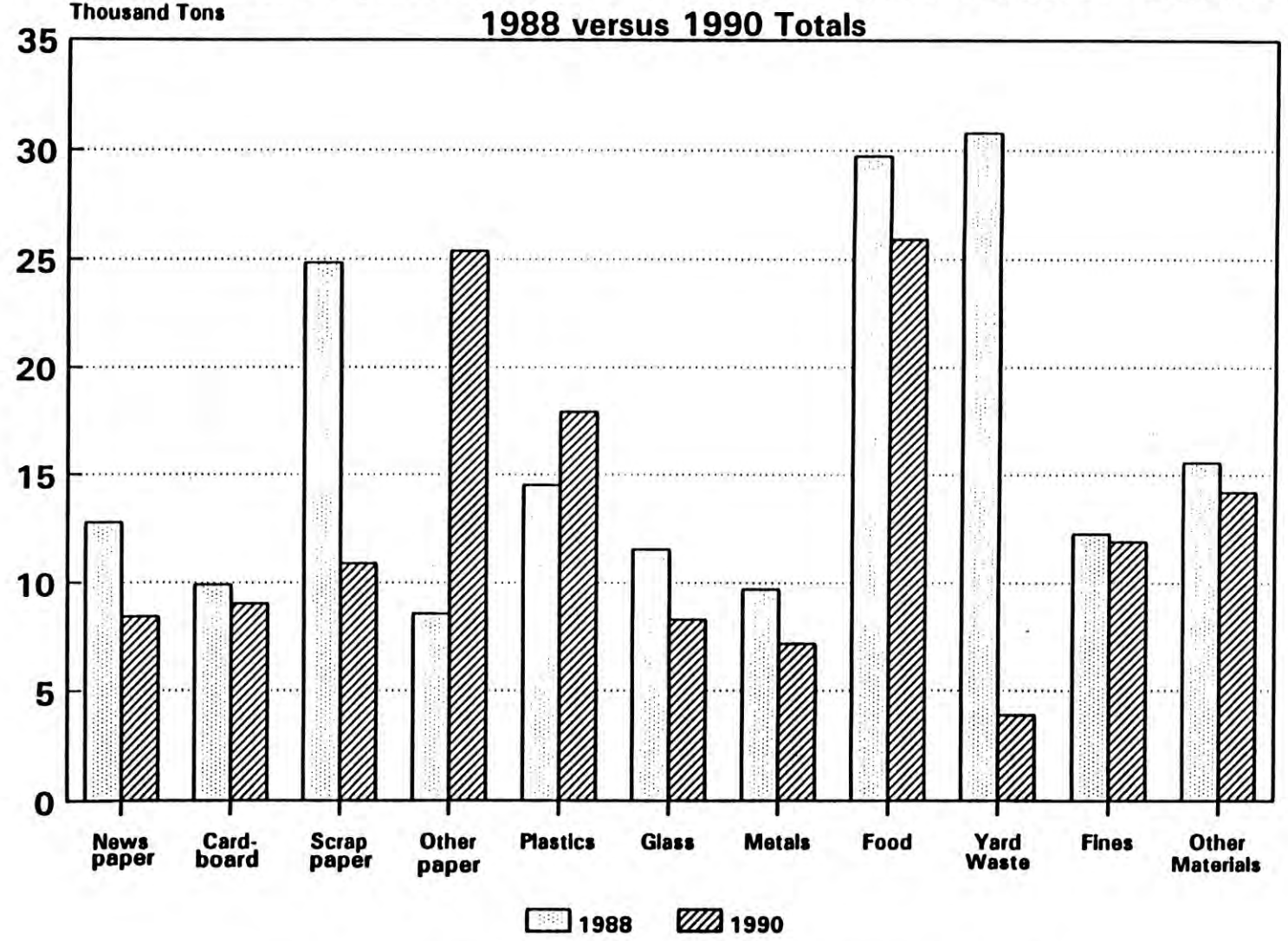


1 "Scrap Paper" Includes Office and Computer Paper

2 "Other Materials" Includes Rubber, Wood, Diapers, Textiles, Leather, Ash, Ceramics, Rocks, Drywall, Fiberglas, Debris, and Hazardous Materials

Figure I-2

RESIDENTIAL ROUTE-COLLECTED WASTE COMPONENT QUANTITIES



1988 total tonnage = 180,000; 1990 total tonnage = 142,000

Figure I-3

RESIDENTIAL YARD WASTE DISPOSAL
1988 versus 1990

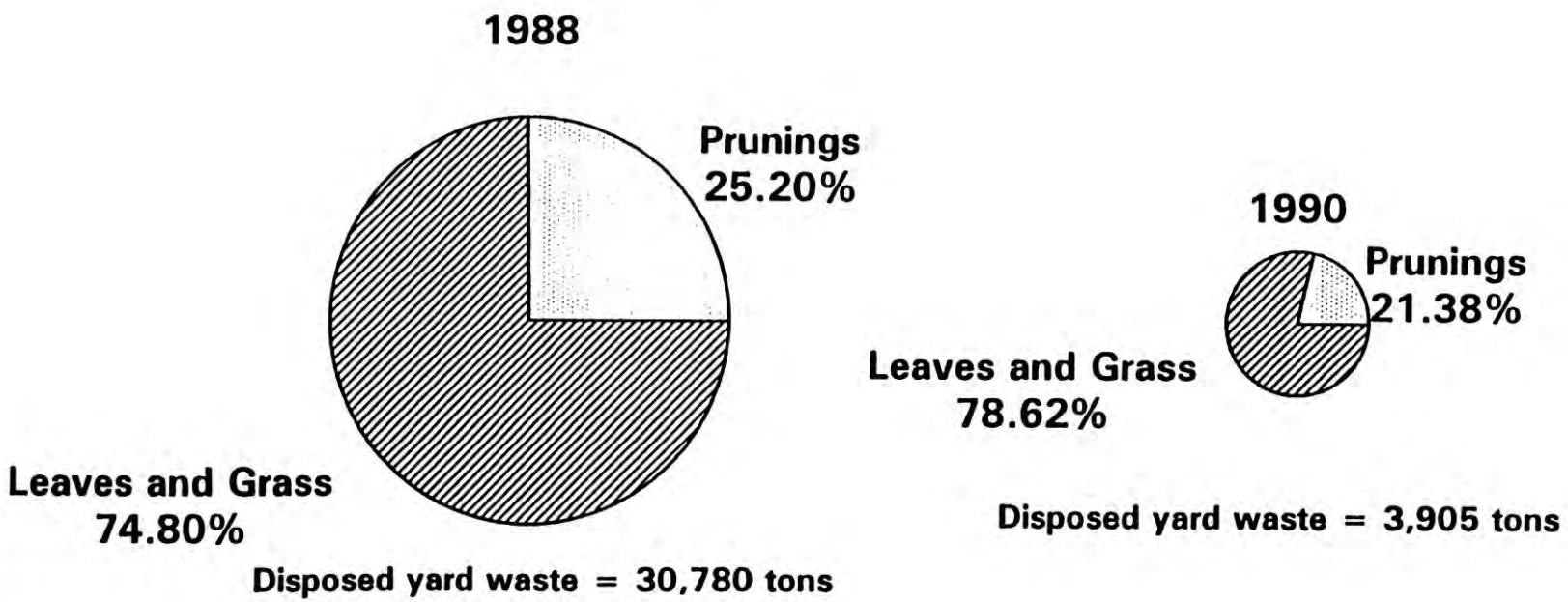


Figure I-4

SELF-HAUL YARD WASTE DISPOSAL
1988 versus 1990

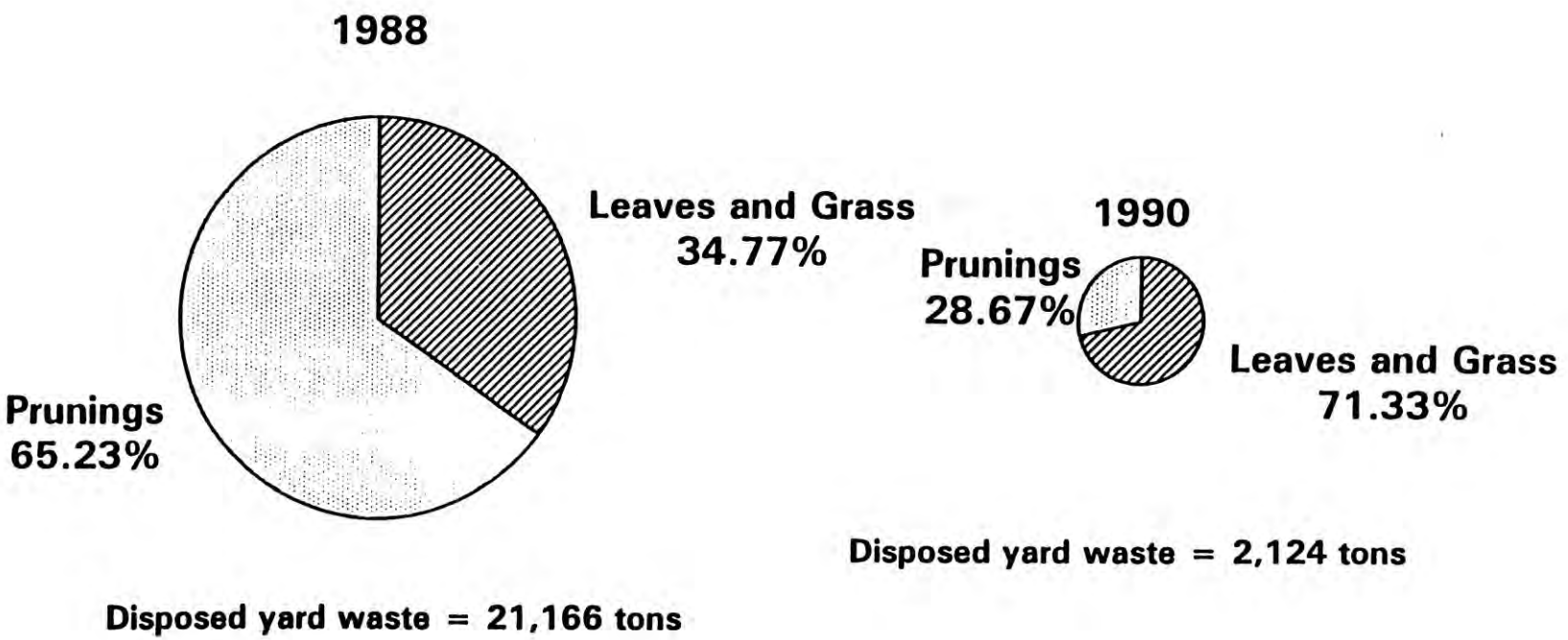
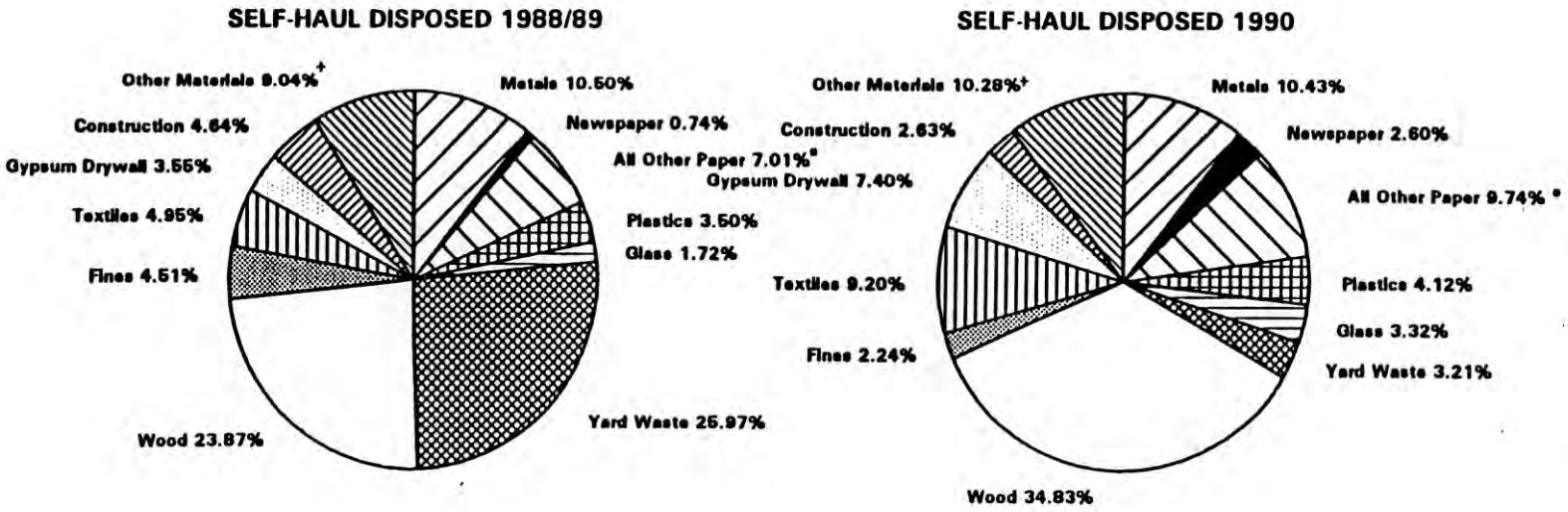


Figure I-5

SELF-HAUL WASTE COMPOSITION
Percentages by Weight
1988/89 versus 1990



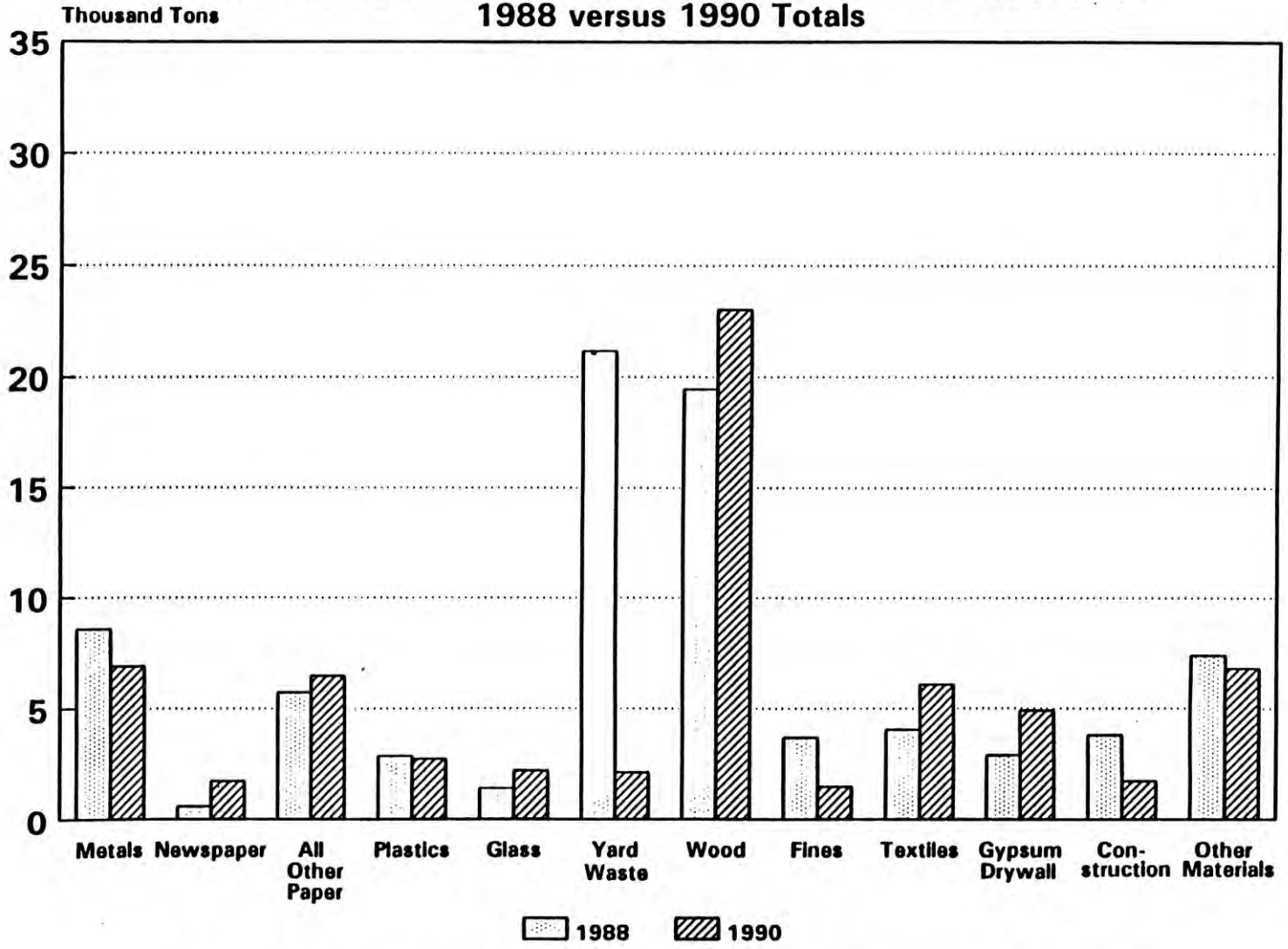
* "All Other Paper" includes Corrugated, Computer, Office, Scrap, and Other Paper

\+ "Other Materials" includes Rubber, Food, Diapers, Leather, Ash, Ceramics, Rocks, Fiberglass, and Hazardous Materials

Figure I-6

SELF-HAUL WASTE COMPONENT QUANTITIES

1988 versus 1990 Totals



1988 total tonnage = 81,500; 1990 total tonnage = 66,165

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II. Background

A. Differences Between the 1988/89 and 1990 Studies

The most notable difference between the two studies is that commercial wastes were not sampled during the 1990 program. Emphasis was placed instead on monitoring trends in the residential and self-hauled substreams. The sampling methodologies for both substreams remained basically unchanged from those used in the 1988/89 study.

Residential routes were randomly selected from the universe of routes serviced by U.S. Disposal and General Disposal, the City's two residential collection contractors. Sampling occurred each month, alternating between the two transfer stations. Eight to ten residential routes were sampled each month.

Self-haul sampling consisted of one day of sampling per month occurring alternately at the North and South Transfer Stations. Vehicles sampled were chosen by a random systematic process, i.e., every "nth" vehicle was selected. Sampling intervals were based upon 1989 vehicle counts and tonnages.

An additional component was added to this year's list of waste categories: "Other Plastic Bottles" were separated out of the "Plastic Packaging" category.

Procedures for weighing and recording both food and household hazardous wastes were also modified. In the 1988/89 study, food containers which held a measurable amount of food were weighed along with the food itself. In the 1990 study, all food was removed from containers of appreciable weight. The food and containers were separately weighed. The food containers were classified according to the material of which they were made.

For twelve randomly selected residential samples, the total weight of food containers was recorded, and an average ratio of food-to-container weight was calculated. The results showed that, on and average, 97% of the wight of the container plus the food within was contributed by the food alone. Only 3% of the weight came from the container. This means that the 1988/89 data for "Food" overstates the contribution of actual food materials, by the proportion calculated. The data for calculating this ratio are presented in Appendix A.

In the 1988/89 study, empty containers of household hazardous waste (HHW) were weighed, recorded and classified as household hazardous waste. In the 1990 study, only

those containers with at least a trace of content remaining were classified as HHW. Completely empty containers were categorized as the material of which they were made.

During six months of the 1990 study, a separate tally sheet was used to catalog all HHW containers, whether they were empty or not. Estimates of the ratio of empty container weights to containers with a trace of more material were calculated. Batteries were excluded from this calculation. Results showed that, for residential waste, approximately 30% of the weight of *all* HHW was made up of empty containers. For self-haul waste, this proportion is approximately 3%. This means that, for HHW other than batteries, the 1988/89 data overstates the contribution of actual hazardous waste by the proportions calculated.

This year's self-haul sampling was affected by the closure of two local construction and demolition waste disposal sites during the sampling period, as well as by changes in City regulations concerning acceptable waste materials. The City estimated that an additional 16,820 tons of such waste were diverted to the transfer stations as a result of the site closures. Estimated self-hauled tonnages and composition were adjusted to account for this unusual occurrence.

B. Terminology and Definitions

Substreams

The total waste stream is composed of various substreams. A "substream" can be defined by the particular generation, collection, or composition characteristics which make it a unique portion of the total waste stream. For this study, two primary substreams were analyzed: residential, and self-hauled.

The **residential** substream is defined as the total route-collected waste from residential service areas covered by the two haulers providing contract collection services for the City. Residential wastes from both single- and multifamily dwellings are included.

The **self-hauled** substream is defined as waste hauled to the City's two transfer stations by any vehicle except for U.S. Disposal and General Disposal vehicles engaged in providing residential collection services. Self-haul waste contains both residential and commercial wastes.

Waste Component Categories

Waste samples were sorted by hand into more than 50 waste component categories. Medical wastes, animal carcasses, feces, and similar substances were excluded from sorting; virtually everything else was weighed and recorded. A defined list of component categories follows:

NEWSPAPER: Printed newsprint, including advertising "slicks" (glossy paper), unless found separately.

CORRUGATED PAPER: Old corrugated container boxes and kraft paper, and brown paper bags, unless waxed or laminated with other paper such as glossy stock.

COMPUTER PAPER: Continuous-feed sulphite/sulphate/ground wood computer printouts and forms of all types, excluding carbonless paper.

OFFICE PAPER: White or lightly colored sulphite/sulphate bond, copy papers, and envelopes.

MIXED SCRAP PAPER: Low-grade, potentially recyclable papers, including magazines, colored papers, bleached kraft, boxboard, mailing tubes, and paperback books.

OTHER PAPER: Contaminated papers including carbon/carbonless copy paper, tissues, paper towels, paper plates, waxed papers, frozen food containers, envelopes with plastic windows, paper combined with metal or plastic parts, and hardcover books.

PET BOTTLES: Polyethylene terephthalate 2-liter and 16-ounce pop bottles, with base, and PET liquor bottles.

HDPE BOTTLES: High-density polyethylene milk and juice containers.

OTHER PLASTIC BOTTLES: Plastic bottles and containers not otherwise classified in the defined PET or HDPE categories.

EXPANDED POLYSTYRENE: Includes packaging and finished products made of expanded polystyrene.

PLASTIC PACKAGING: All plastic packaging, films, and shipping materials including thermoplastics and thermosetting plastics used as packaging.

OTHER PLASTIC PRODUCTS: Finished plastic products such as toys, toothbrushes, vinyl hose, and shower curtains. Includes fiberglass resin products and materials.

NONREFILLABLE BEER BOTTLES: All green, clear, or quart-sized glass beer bottles; all brown glass beer bottles not categorized as refillable.

REFILLABLE BEER BOTTLES: Refillable brown glass bottles from western breweries, such as Rainier, Olympia, and Lucky.

NONREFILLABLE POP BOTTLES: All non-deposit glass soda pop, juice, and water bottles of any colors.

REFILLABLE POP BOTTLES: Deposit glass soda pop bottles of any color.

CONTAINER GLASS: All glass food containers, wine and wine cooler bottles, liquor bottles and other glass containers of any color.

NON-RECYCLABLE GLASS: Window glass, light bulbs, glassware, etc.

ALUMINUM CANS: Aluminum beverage cans (UBC).

ALUMINUM CONTAINERS: Aluminum food containers and aluminum foil.

TINNED CANS: Tinned steel food containers.

BI-METAL CANS: Steel-aluminum food and beverage cans.

FERROUS METALS: Ferrous and alloyed ferrous scrap metals to which a magnet adheres and which are not significantly contaminated with other metals or materials.

WHITE GOODS: Large household appliances or parts thereof.

NONFERROUS METALS: Metals not derived from iron, to which a magnet will not adhere, which are not significantly contaminated with other metals or materials.

MIXED METALS/MATERIALS: Small appliances, motors, insulated wire, and finished products containing a mixture of metals, or other materials, whose weight is derived significantly from the metal portion of its construction.

RUBBER PRODUCTS: Finished products and scrap materials made of rubber, such as bath mats, inner tubes, rubber hose, and foam rubber.

TIRES: Vehicle tires of all types.

FOOD: Food wastes and scraps, including bone, rinds, etc. Excludes the weight of food containers, except when container weight is not appreciable compared to the food inside.

YARD WASTE—PRUNINGS: Cut prunings, 6" or less in diameter, from bushes, shrubs, and trees.

YARD WASTE—LEAVES AND GRASS: Grass clippings, leaves, and weeds.

WOOD: Finished lumber, products made of wood, and prunings or stumps 6" or greater in diameter.

DISPOSABLE DIAPERS: Disposable baby diapers and adult protective undergarments.

TEXTILES: Cloth, carpeting, upholstery material, fiber rope, rubberized cloth.

LEATHER: Finished products or scraps of leather.

ASH: Fireplace, burn barrel, or firepit ash.

CERAMICS, PORCELAIN, CHINA: Finished ceramic products of such material including dishware, toilets, etc.

ROCK, CONCRETE, BRICKS: Includes rock gravel larger than 2" diameter, Portland cement mixtures (set or unset), and fired-clay bricks.

SAND, SOIL, DIRT, AND NONDISTINCT FINES: Contains mixed fines smaller than 2" in diameter including, nondistinct organics.

GYPSUM DRYWALL: Used or new gypsum wallboard.

FIBERGLASS INSULATION: Fiberglass building and mechanical insulation, batt or rigid.

CONSTRUCTION DEBRIS: Construction debris, other than wood, which could not be classified into other component categories, e.g., asphalt shingles, mixed fine material scraps.

HOUSEHOLD HAZARDOUS WASTES: Latex paints, adhesives/glues, oil-based paints, cleaners, pesticides/herbicides, batteries, gasoline, motor oil/diesel oil, asbestos, explosives, and other chemicals.

Composition Calculations

The composition estimates represent **component percentages by weight** for each noted substream. They are derived by summing each component's weight across all of the selected records, as shown in the following equation:

$$C = (w/t) * 100$$

where: C = Component mean percentage by weight for the selected samples.
w = Sum of the component weights in pounds for the selected samples.
t = Sum of the sample weights in pounds for the selected samples.

Precision levels at the 90% confidence level are calculated for a component's mean as follows:

$$PL_{lbs} = \pm (z * s) / \text{square root of } n$$

where: z = Value of the t statistic (1.645) corresponding to a 90% confidence level.
s = Standard deviation of the mean component weight of the selected samples.
n = Number of selected samples.

The formula above results in a precision level expressed as a range of pounds around the mean component weight per sample. This is converted to a percentage as follows:

$$PL_{pct} = (PL_{lbs} / x) * C$$

where: x = Mean value in pounds for the component.

The precision range for each component's proportion estimate is then calculated:

$$\text{Lower limit of range} = C - PL_{pct}$$
$$\text{Upper limit of range} = C + PL_{pct}$$

III. The Residential Waste Stream

A. Disposed Composition

Residential sampling occurred from January through December, 1990. A total of 114 samples were sorted during this period. Composition estimates were calculated for single-family and multifamily generators, as for the North and South collection areas. Single-family generators included up to four-plex residences using single cans; multifamily generators included five or more units using dumpsters. Eighty-nine of the samples were from single-family routes; 25 samples came from multifamily routes.

The City's curbside recycling program has been under way since 1988, serving single-family residences. To date, multifamily residences are not included in the curbside recycling program. Some multifamily recycling was occurring through private service providers. In addition, a small diversion credit program for multifamily buildings began in May 1989; 9.5% of all multifamily buildings participated by the end of 1990. The City also implemented a separate yard-waste collection recovery program in 1989. Residential sampling occurred at the City transfer stations after curbside and dropoff/buyback programs had diverted some recyclable materials at the individual household level.

TABLE III-1: RESIDENTIAL SAMPLING INFORMATION

Table III-1 provides general information regarding these residential samples. Composition estimates are presented in Tables III-2 through III-6. Each of these tables is described below.

TABLE III-2: TOTAL RESIDENTIAL WASTE BY ORIGIN AND OVERALL

Samples were taken from randomly selected routes in proportion to the total residential waste collected in the North and South service areas during 1989. Accordingly, 70 samples from the North and 44 samples from the South were sorted.

TABLE III-3: TOTAL RESIDENTIAL WASTE BY RESIDENCE TYPE

Table III-3 presents composition data for Citywide single-family and multifamily collection. The proportion of multifamily samples to single-family samples was a function of the random selection of residential routes.

TABLE III-4: SINGLE-FAMILY RESIDENTIAL WASTE BY ORIGIN

The composition of North and South single-family residential waste, and of all single-family residences, is given in Table III-4. The split between the number of North and South samples was predetermined, based on the proportionate amounts of disposed waste.

TABLE III-5: MULTIFAMILY RESIDENTIAL WASTE BY ORIGIN

The composition of North and South multifamily residential waste, and of all multifamily residences, is given in Table III-5. The split between the number of North and South samples was predetermined, based on the proportionate amounts of disposed waste.

TABLE III-6: RESIDENTIAL WASTE BY SEASON

This table provides the overall mean percentages by component for each of the four seasons. Winter is defined as December through February, spring is defined as March through May, summer is defined as June through August, and fall is defined as September through November. All 114 residential samples are represented within this table; proportionate single-family and multifamily estimates were combined. Figure III-1 graphically represents the seasonal differences in composition for the residential waste stream.

B. Disposed Quantity

The total disposed residential waste from the City's two contract haulers was determined from Utility records. This disposed quantity amounted to 179,968 tons in 1988. This figure was 142,000 in 1990. This represents a 21% decrease over the past two years.

C. Findings

Statistically[1] significant changes occurred in the components listed below:

Increases	Decreases
Other Paper	Mixed Scrap Paper
Plastic Packaging	Tinned Cans
Refillable Pop	Prunings
	Leaves and Grass
	Ash
	Adhesives
	Cleaners
	Motor Oil

As described in Section I.C, the large decrease in yard waste shifted the relative proportion of other components. The increase in "Other paper" is due in part to high levels of contamination and moisture affecting small-sized papers, rendering them so indistinguishable or so highly contaminated that they were classified as non-recyclable. "Plastic Packaging" was also affected by contamination.

[1] Statistically significant differences occur where the ranges for two estimates of the same component do not overlap.

SEATTLE WASTE COMPOSITION STUDY
RESIDENTIAL SAMPLING INFORMATION

TABLE III-1

GENERAL INFORMATION

Sampling period: January, 1990 through December 1990
Total number of samples: 114
North origin: 70
South origin: 44

Average sample weight (pounds): 268.2

Sum of sample weights (pounds): 30,574.1

Average total load weight: 12,980

Sum of total load weight: 1,479,706

INFORMATION BY GENERATOR TYPE

Number of single-family samples: 89
North origin: 53
South origin: 44

Average sample weight (pounds): 263.3

Average total load weight: 12,349

Sum of sample weights: 23,434.4

Sum of total load weights: 1,099,026

Number of multifamily samples: 25
North origin: 17
South origin: 8

Average sample weight (pounds): 285.6

Average total load weight: 15,227

Sum of sample weights: 7,139.7

Sum of total load weights: 380,680

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE III-2

TOTAL RESIDENTIAL BY ORIGIN
January, 1990 through December, 1990

	ALL RESIDENTIAL NORTH	ALL RESIDENTIAL SOUTH	ALL RESIDENTIAL Mean Percentages and Ranges at the 90% Confidence Level %	+/-	Low %	Hi %
PAPER						
Newspaper	5.89	6.02	5.94	0.84	5.09	6.78
Corrugated Paper	7.23	4.91	6.36	0.68	5.67	7.03
Computer Paper	0.03	0.00	0.02	0.01	0.01	0.03
Office Paper	0.25	0.32	0.28	0.13	0.15	0.41
Mixed Scrap Paper	7.55	7.05	7.36	1.01	6.35	8.37
Other Paper	18.13	17.47	17.88	1.46	16.42	19.34
PLASTIC						
PET Bottles	0.25	0.34	0.28	0.06	0.22	0.35
HDPE Bottles	0.32	0.35	0.33	0.05	0.29	0.38
Other Plastic Bottles	0.92	1.01	0.95	0.10	0.85	1.05
Expanded Polystyrene	0.59	0.74	0.65	0.09	0.56	0.73
Plastic Packaging	9.56	9.10	9.39	0.91	8.48	10.29
Other Plastic Products	0.94	1.19	1.03	0.22	0.81	1.26
GLASS						
Nonrefillable Beer	0.83	1.51	1.08	0.22	0.86	1.31
Refillable Beer	0.11	0.22	0.15	0.07	0.09	0.22
Nonrefillable Pop	0.58	0.94	0.71	0.14	0.58	0.85
Refillable Pop	0.06	0.09	0.07	0.03	0.04	0.10
Container Glass	3.37	3.82	3.54	0.45	3.09	3.98
Nonrecyclable Glass	0.32	0.24	0.29	0.16	0.13	0.45
METAL						
Aluminum Cans	0.51	0.59	0.54	0.07	0.47	0.61
Aluminum Containers	0.16	0.23	0.19	0.05	0.14	0.24
Tinned Cans	1.18	1.98	1.48	0.15	1.33	1.63
Bi-metal Cans	0.06	0.04	0.05	0.05	0.00	0.11
Ferrous Metals	0.51	0.33	0.44	0.13	0.31	0.58
White Goods	0.00	0.00	0.00	0.00	0.00	0.00
Nonferrous Metals	0.22	0.11	0.18	0.09	0.09	0.26
Mixed Metals/Materials	2.49	1.67	2.18	0.37	1.80	2.55
RUBBER						
Rubber Products	0.57	0.33	0.48	0.19	0.29	0.67
Tires	0.00	0.00	0.00	0.00	0.00	0.00
ORGANICS						
Food	17.57	19.43	18.27	1.99	16.28	20.26
Prunings	0.68	0.44	0.59	0.25	0.35	0.84
Leaves and Grass	1.61	3.08	2.16	0.96	1.21	3.12
Wood	1.45	1.05	1.30	0.38	0.92	1.68
OTHER						
Disposable Diapers	2.08	3.17	2.49	0.45	2.04	2.94
Textiles	3.64	3.66	3.65	0.72	2.94	4.37
Leather	0.06	0.12	0.08	0.06	0.03	0.14
Ash	0.02	0.03	0.02	0.02	0.00	0.04
Ceramics, Porcelain, China	0.12	0.19	0.15	0.09	0.05	0.24
Rocks, Concrete, Bricks	0.33	0.53	0.41	0.34	0.07	0.74
Soil, Dirt, Non-distinct Fine	9.18	7.13	8.41	1.41	7.00	9.82
Gypsum Drywall	0.24	0.00	0.15	0.11	0.04	0.26
Fiberglass Insulation	0.00	0.00	0.00	0.00	0.00	0.00
Construction Debris	0.02	0.52	0.21	0.15	0.06	0.36
HAZARDOUS						
Latex Paints	0.11	0.03	0.08	0.06	0.01	0.14
Adhesives, Glues	0.00	0.00	0.00	0.00	0.00	0.00
Oil-based Paints	0.01	0.01	0.01	0.01	0.00	0.02
Cleaners	0.00	0.00	0.00	0.00	0.00	0.00
Pesticides	0.00	0.01	0.01	0.01	0.00	0.01
Batteries	0.20	0.00	0.13	0.17	-0.05	0.30
Gasoline	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.03	0.01	0.02	0.02	0.00	0.04
Asbestos	0.00	0.00	0.00	0.00	0.00	0.00
Explosives	0.01	0.00	0.00	0.00	0.00	0.00
Other Chemicals	0.02	0.02	0.02	0.01	0.01	0.03
NUMBER OF SAMPLES:	70	44	114			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE III-3

TOTAL RESIDENTIAL BY RESIDENCE TYPE
January, 1990 through December, 1990

	ALL SINGLE-FAMILY RESIDENTIAL	ALL MULTIFAMILY RESIDENTIAL	ALL RESIDENTIAL
PAPER			
Newspaper	4.53	10.55	5.94
Corrugated Paper	5.80	8.17	6.36
Computer Paper	0.01	0.02	0.02
Office Paper	0.20	0.54	0.28
Mixed Scrap Paper	6.57	9.97	7.36
Other Paper	18.56	15.65	17.88
PLASTIC			
PET Bottles	0.27	0.35	0.28
HDPE Bottles	0.34	0.29	0.33
Other Plastic Bottles	1.07	0.55	0.95
Expanded Polystyrene	0.70	0.48	0.65
Plastic Packaging	10.33	6.30	9.39
Other Plastic Products	0.97	1.23	1.03
GLASS			
Nonrefillable Beer	0.91	1.65	1.08
Refillable Beer	0.13	0.23	0.15
Nonrefillable Pop	0.67	0.85	0.71
Refillable Pop	0.08	0.04	0.07
Container Glass	3.45	3.84	3.54
Nonrecyclable Glass	0.33	0.16	0.29
METAL			
Aluminum Cans	0.49	0.72	0.54
Aluminum Containers	0.20	0.14	0.19
Tinned Cans	1.41	1.70	1.48
Bi-metal Cans	0.07	0.01	0.05
Ferrous Metals	0.47	0.34	0.44
White Goods	0.00	0.00	0.00
Nonferrous Metals	0.14	0.31	0.18
Mixed Metals/Materials	2.21	2.07	2.18
RUBBER			
Rubber Products	0.51	0.37	0.48
Tires	0.00	0.00	0.00
ORGANICS			
Food	20.59	10.65	18.27
Prunings	0.38	1.27	0.59
Leaves and Grass	1.84	3.24	2.16
Wood	1.23	1.54	1.30
OTHER			
Disposable Diapers	2.57	2.23	2.49
Textiles	3.01	5.75	3.65
Leather	0.10	0.03	0.08
Ash	0.02	0.00	0.02
Ceramics, Porcelain, China	0.19	0.01	0.15
Rocks, Concrete, Bricks	0.53	0.01	0.41
Soil, Dirt, Non-distinct Fine	8.53	8.03	8.41
Gypsum Drywall	0.18	0.04	0.15
Fiberglass Insulation	0.00	0.00	0.00
Construction Debris	0.27	0.00	0.21
HAZARDOUS			
Latex Paints	0.06	0.15	0.08
Adhesives, Glues	0.00	0.00	0.00
Oil-based Paints	0.01	0.00	0.01
Cleaners	0.00	0.00	0.00
Pesticides	0.01	0.00	0.01
Batteries	0.02	0.48	0.13
Gasoline	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.01	0.05	0.02
Asbestos	0.00	0.00	0.00
Explosives	0.00	0.00	0.00
Other Chemicals	0.02	0.02	0.02
NUMBER OF SAMPLES:	89	25	114

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE III-4

SINGLE-FAMILY RESIDENTIAL BY ORIGIN
January, 1990 through December, 1990

	RESIDENTIAL SINGLE-FAMILY NORTH	RESIDENTIAL SINGLE-FAMILY SOUTH	ALL SINGLE-FAMILY Mean Percentages and Ranges at the 90% Confidence Level %	+/-	Low %	Hi %
PAPER						
Newspaper	4.51	4.57	4.53	0.55	3.98	5.08
Corrugated Paper	6.41	4.81	5.80	0.56	5.24	6.36
Computer Paper	0.02	0.00	0.01	0.01	0.00	0.03
Office Paper	0.12	0.33	0.20	0.13	0.07	0.33
Mixed Scrap Paper	6.37	6.89	6.56	0.95	5.61	7.52
Other Paper	19.44	17.15	18.56	1.59	16.97	20.16
PLASTIC						
PET Bottles	0.26	0.28	0.27	0.07	0.19	0.34
HDPE Bottles	0.35	0.33	0.34	0.05	0.29	0.40
Other Plastic Bottles	1.04	1.12	1.07	0.11	0.96	1.18
Expanded Polystyrene	0.69	0.72	0.70	0.10	0.60	0.80
Plastic Packaging	10.70	9.73	10.33	1.10	9.23	11.43
Other Plastic Products	0.88	1.12	0.97	0.20	0.78	1.17
GLASS						
Nonrefillable Beer	0.77	1.14	0.91	0.19	0.72	1.10
Refillable Beer	0.13	0.14	0.13	0.06	0.07	0.20
Nonrefillable Pop	0.56	0.86	0.67	0.15	0.52	0.83
Refillable Pop	0.07	0.10	0.08	0.04	0.04	0.12
Container Glass	3.08	4.04	3.45	0.42	3.03	3.87
Nonrecyclable Glass	0.35	0.30	0.33	0.20	0.13	0.53
METAL						
Aluminum Cans	0.48	0.50	0.49	0.06	0.43	0.55
Aluminum Containers	0.19	0.23	0.20	0.06	0.15	0.26
Tinned Cans	1.09	1.93	1.41	0.15	1.26	1.56
Bi-metal Cans	0.08	0.05	0.07	0.07	0.00	0.13
Ferrous Metals	0.58	0.30	0.47	0.16	0.31	0.63
White Goods	0.00	0.00	0.00	0.00	0.00	0.00
Nonferrous Metals	0.14	0.13	0.14	0.06	0.08	0.19
Mixed Metals/Materials	2.51	1.72	2.21	0.44	1.77	2.65
RUBBER						
Rubber Products	0.64	0.31	0.51	0.22	0.29	0.74
Tires	0.00	0.00	0.00	0.00	0.00	0.00
ORGANICS						
Food	19.92	21.69	20.59	2.43	18.16	23.03
Prunings	0.36	0.42	0.38	0.20	0.19	0.58
Leaves and Grass	1.32	2.68	1.84	0.91	0.93	2.75
Wood	1.26	1.18	1.23	0.38	0.85	1.61
OTHER						
Disposable Diapers	2.22	3.15	2.57	0.47	2.11	3.04
Textiles	2.89	3.20	3.01	0.52	2.49	3.53
Leather	0.07	0.14	0.10	0.07	0.03	0.17
Ash	0.02	0.03	0.02	0.03	0.00	0.05
Ceramics, Porcelain, China	0.16	0.24	0.19	0.12	0.07	0.30
Rocks, Concrete, Bricks	0.43	0.68	0.53	0.44	0.09	0.96
Soil, Dirt, Non-distinct Fine	9.44	7.04	8.53	1.72	6.80	10.25
Gypsum Drywall	0.29	0.00	0.18	0.14	0.04	0.32
Fiberglass Insulation	0.00	0.00	0.00	0.00	0.00	0.00
Construction Debris	0.02	0.68	0.27	0.19	0.08	0.47
HAZARDOUS						
Latex Paints	0.07	0.04	0.06	0.04	0.02	0.09
Adhesives, Glues	0.00	0.01	0.00	0.00	0.00	0.01
Oil-based Paints	0.02	0.01	0.01	0.02	0.00	0.03
Cleaners	0.00	0.00	0.00	0.00	0.00	0.00
Pesticides	0.01	0.01	0.01	0.01	0.00	0.02
Batteries	0.03	0.00	0.02	0.01	0.01	0.03
Gasoline	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.01	0.01	0.01	0.01	0.00	0.02
Asbestos	0.00	0.00	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals	0.02	0.02	0.02	0.01	0.01	0.03
NUMBER OF SAMPLES:	53	36	89			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE III-5

MULTIFAMILY RESIDENTIAL BY ORIGIN
January, 1990 through December, 1990

	RESIDENTIAL MULTIFAMILY NORTH	RESIDENTIAL MULTIFAMILY SOUTH	ALL MULTI-FAMILY Mean Percentages and Ranges at the 90% Confidence Level %	'+/-	Low %	Hi %
PAPER						
Newspaper	10.29	11.02	10.55	2.54	8.01	13.09
Corrugated Paper	9.83	5.25	8.17	2.14	6.03	10.30
Computer Paper	0.04	0.00	0.02	0.03	0.00	0.05
Office Paper	0.67	0.30	0.54	0.35	0.19	0.88
Mixed Scrap Paper	11.31	7.61	9.97	2.81	7.16	12.78
Other Paper	13.97	18.62	15.65	3.52	12.14	19.17
PLASTIC						
PET Bottles	0.23	0.54	0.35	0.14	0.21	0.49
HDPE Bottles	0.24	0.39	0.29	0.10	0.19	0.40
Other Plastic Bottles	0.52	0.61	0.55	0.14	0.41	0.69
Expanded Polystyrene	0.28	0.82	0.48	0.16	0.32	0.64
Plastic Packaging	5.94	6.92	6.30	1.06	5.24	7.35
Other Plastic Products	1.12	1.42	1.23	0.71	0.52	1.94
GLASS						
Nonrefillable Beer	1.02	2.77	1.65	0.68	0.97	2.34
Refillable Beer	0.07	0.49	0.23	0.21	0.02	0.44
Nonrefillable Pop	0.66	1.19	0.85	0.31	0.54	1.16
Refillable Pop	0.03	0.06	0.04	0.03	0.00	0.07
Container Glass	4.28	3.05	3.84	1.33	2.50	5.17
Nonrecyclable Glass	0.23	0.02	0.16	0.12	0.04	0.27
METAL						
Aluminum Cans	0.60	0.93	0.72	0.21	0.51	0.93
Aluminum Containers	0.09	0.22	0.14	0.10	0.04	0.23
Tinned Cans	1.44	2.16	1.70	0.39	1.31	2.09
Bi-metal Cans	0.02	0.01	0.01	0.02	0.00	0.03
Ferrous Metals	0.29	0.43	0.34	0.24	0.11	0.58
White Goods	0.00	0.00	0.00	0.00	0.00	0.00
Nonferrous Metals	0.46	0.04	0.31	0.31	-0.01	0.62
Mixed Metals/Materials	2.40	1.47	2.07	0.71	1.36	2.78
RUBBER						
Rubber Products	0.35	0.40	0.37	0.33	0.04	0.70
Tires	0.00	0.00	0.00	0.00	0.00	0.00
ORGANICS						
Food	10.07	11.66	10.65	1.82	8.82	12.47
Prunings	1.71	0.51	1.27	0.80	0.48	2.07
Leaves and Grass	2.53	4.47	3.24	2.81	0.42	6.05
Wood	2.08	0.54	1.52	1.03	0.49	2.55
OTHER						
Disposable Diapers	1.64	3.26	2.23	1.18	1.05	3.40
Textiles	6.04	5.28	5.76	2.44	3.32	8.20
Leather	0.03	0.02	0.03	0.03	0.00	0.05
Ash	0.00	0.00	0.00	0.00	0.00	0.00
Ceramics, Porcelain, China	0.01	0.02	0.01	0.02	0.00	0.03
Rocks, Concrete, Bricks	0.02	0.00	0.01	0.02	-0.01	0.03
Soil, Dirt, Non-distinct Fine	8.36	7.45	8.03	2.17	5.86	10.20
Gypsum Drywall	0.07	0.00	0.04	0.07	-0.03	0.12
Fiberglass Insulation	0.00	0.00	0.00	0.00	0.00	0.00
Construction Debris	0.00	0.00	0.00	0.00	0.00	0.00
HAZARDOUS						
Latex Paints	0.23	0.00	0.15	0.24	-0.09	0.39
Adhesives, Glues	0.00	0.00	0.00	0.00	0.00	0.00
Oil-based Paints	0.00	0.00	0.00	0.00	0.00	0.00
Cleaners	0.00	0.00	0.00	0.00	0.00	0.00
Pesticides	0.00	0.00	0.00	0.00	0.00	0.00
Batteries	0.75	0.00	0.48	0.75	-0.27	1.22
Gasoline	0.00	0.00	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.08	0.00	0.05	0.08	-0.03	0.13
Asbestos	0.00	0.00	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00	0.00	0.00
Other Chemicals	0.01	0.03	0.02	0.02	0.00	0.04
NUMBER OF SAMPLES:	17	8	25			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

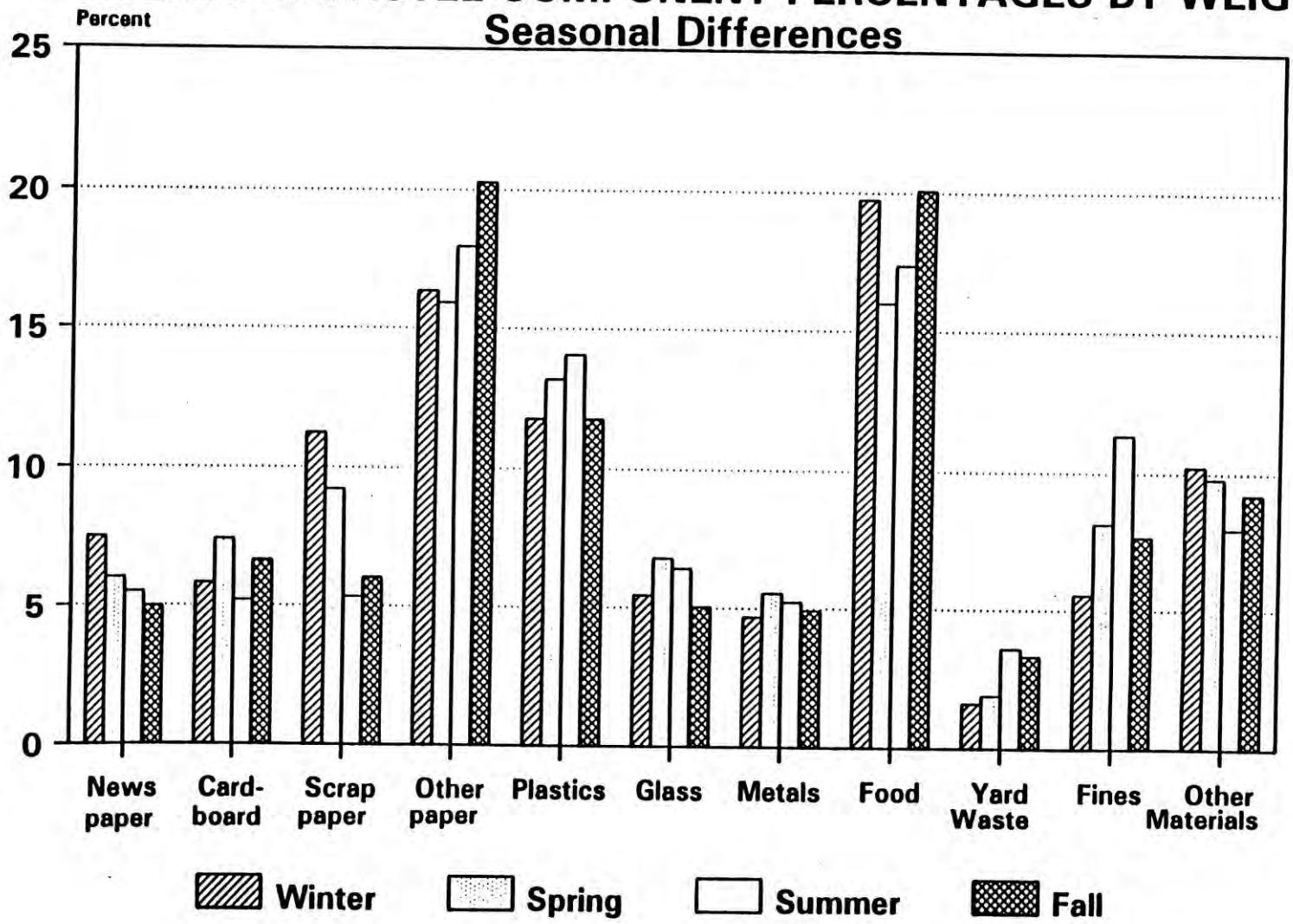
TABLE III-6

TOTAL RESIDENTIAL BY SEASON
January, 1990 through December, 1990

	WINTER	SPRING	SUMMER	FALL
PAPER				
Newspaper	7.47	6.02	5.51	4.99
Corrugated Paper	5.84	7.39	5.21	6.64
Computer Paper	0.02	0.03	0.02	0.00
Office Paper	0.22	0.35	0.21	0.34
Mixed Scrap Paper	11.00	8.85	5.12	5.71
Other Paper	16.38	15.94	17.95	20.28
PLASTIC				
PET Bottles	0.30	0.29	0.23	0.31
HDPE Bottles	0.34	0.42	0.29	0.29
Other Plastic Bottles	0.84	1.43	0.78	0.81
Expanded Polystyrene	0.75	0.94	0.41	0.56
Plastic Packaging	8.16	9.01	11.73	8.56
Other Plastic Products	1.09	1.14	0.64	1.25
GLASS				
Nonrefillable Beer	1.19	0.56	1.47	1.09
Refillable Beer	0.13	0.24	0.05	0.20
Nonrefillable Pop	0.68	0.55	0.87	0.73
Refillable Pop	0.12	0.18	0.01	0.01
Container Glass	3.31	4.88	3.87	2.51
Nonrecyclable Glass	0.05	0.37	0.15	0.51
METAL				
Aluminum Cans	0.69	0.47	0.66	0.40
Aluminum Containers	0.32	0.31	0.10	0.10
Tinned Cans	1.78	1.69	1.11	1.45
Bi-metal Cans	0.21	0.03	0.01	0.02
Ferrous Metals	0.33	0.31	0.74	0.39
White Goods	0.00	0.00	0.00	0.00
Nonferrous Metals	0.16	0.09	0.15	0.28
Mixed Metals/Materials	1.19	2.68	2.48	2.30
RUBBER				
Rubber Products	0.36	0.59	0.30	0.66
Tires	0.00	0.00	0.00	0.00
ORGANICS				
Food	19.73	16.01	17.36	20.07
Prunings	0.71	0.40	0.52	0.77
Leaves and Grass	0.92	1.52	3.08	2.57
Wood	0.48	1.52	1.51	1.52
OTHER				
Disposable Diapers	2.95	3.02	2.01	2.27
Textiles	5.57	3.39	3.12	3.00
Leather	0.05	0.01	0.06	0.17
Ash	0.05	0.00	0.04	0.00
Ceramics, Porcelain, China	0.06	0.28	0.03	0.20
Rocks, Concrete, Bricks	0.14	0.52	0.42	0.53
Soil, Dirt, Non-distinct Fine	5.75	8.11	11.34	7.66
Gypsum Drywall	0.22	0.35	0.07	0.03
Fiberglass Insulation	0.01	0.00	0.00	0.00
Construction Debris	0.23	0.03	0.07	0.45
HAZARDOUS				
Latex Paints	0.13	0.01	0.15	0.01
Adhesives, Glues	0.01	0.00	0.00	0.00
Oil-based Paints	0.00	0.03	0.02	0.00
Cleaners	0.00	0.00	0.00	0.00
Pesticides	0.00	0.00	0.01	0.01
Batteries	0.04	0.02	0.02	0.35
Gasoline	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.06	0.00	0.02	0.00
Asbestos	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.01	0.02	0.06	0.00
NUMBER OF SAMPLES:	30	27	27	30

Figure III-1

RESIDENTIAL WASTEE COMPONENT PERCENTAGES BY WEIGHT
Seasonal Differences



IV. The Self-Haul Waste Stream

A. Disposed Composition

Self-haul sampling occurred on a monthly basis from January through December, 1990. The sampling included a total of 88 samples from the South Transfer Station and 115 from the North Transfer Station. Sample distribution was proportionate to 1989 self-haul quantities recorded by the two transfer stations.

The sample distribution between numbers of autos and trucks was estimated to be approximately 40% and 60%, respectively, and was based on recorded tonnages contributed by these two vehicle types in 1989.

The 1990 tonnages included approximately 16,820 tons of construction and demolition waste that would have normally been disposed at sites designated for construction and demolition waste - sites other than the City's transfer stations. During a portion of the sampling period, these other sites were closed to the public, creating an unusual peak in the quantity of these wastes received at the transfer stations. Therefore, prior to analyzing self-haul sample data, this differential amount was subtracted from the recorded total. Eleven of the 203 samples were deemed as part of this shifted waste and were removed from the data prior to calculating composition estimates.

The composition estimate for self-haul waste was calculated by combining three separate substreams: 1) self-haul commercial trucks; 2) self-haul residential trucks, and 3) self-haul autos. The distribution of self-hauled samples between residential and commercial generators was a function of random selection. Each driver of a sample vehicle was asked whether he was disposing of waste from a residence or from a commercial establishment.

Self-haul sampling occurred as this waste was delivered to City transfer stations. Recycling activities undoubtedly occurred upstream at both residences and businesses before materials were hauled to the transfer station. Loads depositing recyclables, clean green yard wastes, or clean wood were excluded from the sample. The overall composition and quantity of these materials were tracked separately by the Utility.

Composition estimates were first calculated for each vehicle type by generator class, i.e., residential or commercial. These estimates were weighted by the estimated tonnages contributed by each vehicle type. The results were then combined to create an overall composition estimate, weighted to reflect relative commercial and residential contributions to total self-haul tonnage.

TABLE IV-1: SELF-HAUL SAMPLING INFORMATION

Table IV-1 provides a general profile of the 192 samples used in this report. Composition tables are explained below.

TABLE IV-2: SELF-HAUL BY VEHICLE TYPE

The composition estimates which follow in Tables IV-3 through IV-5 are combined in this table by vehicle type. Truck composition is a weighted combination of wastes from both residential and commercial trucks. Component quantities from automobiles and trucks were combined to calculate the overall self-haul substream percentages.

TABLE IV-3: SELF-HAUL COMMERCIAL TRUCKS
TABLE IV-4: SELF-HAUL RESIDENTIAL TRUCKS
TABLE IV-5: SELF-HAUL RESIDENTIAL AUTOS

Three unweighted self-haul composition estimates are presented in these tables: commercial trucks, residential trucks, and residential automobiles. Precision levels for these estimates are also provided.

Analysis of sampling results indicated that 52% of the total weight delivered by self-haul trucks was actually from residences. On the other hand, there were only two automobiles among the 40 automobiles sampled which were hauling commercial waste. Due to their small number of samples, commercial self-haul automobile composition estimates were not calculated. Commercial automobile self-haul appears to be less than 5% of all auto self-hauled tonnage. All automobile tonnage has been treated here as residential, and only one composition estimate is provided.

TABLE IV-6: WEIGHTED SELF-HAUL BY GENERATOR TYPE

These generator-type compositions were calculated by applying the composition estimates from Tables IV-3 through IV-5 to the corresponding estimated vehicle tonnages for 1990.

First, component weights for the separate truck and automobile substreams were summed together to calculate composition percentage estimates for the residential self-haul substream. Because there was an insignificant number of automobiles hauling commercial waste, there was no need to weight commercial figures by vehicle type. Thus, the commercial composition estimate was derived solely from the sampling of commercial trucks.

The residential and commercial component tonnages were then added to determine total self-haul composition.

TABLE IV-7: SELF-HAUL COMMERCIAL TRUCKS BY SEASON
TABLE IV-8: SELF-HAUL RESIDENTIAL TRUCKS BY SEASON
TABLE IV-9: SELF-HAUL AUTOS BY SEASON

These three tables give the seasonal distribution and composition percentages of the 56, 96, and 40 samples taken respectively from commercial trucks, residential trucks, and autos.

B. Disposed Quantity

According to Utility records, the 1990 self-haul tonnages from both transfer stations are grouped as follows:

Self-haul autos: 7,433 tons
Self-haul trucks: 75,550 tons

The chart below illustrates the adjustment for unusual construction and demolition wastes.

SELF-HAUL TONNAGE ADJUSTMENTS FOR RE-DIRECTED CONSTRUCTION, DEMOLITION AND WOOD WASTES

	UNADJUSTED		ADJUSTED	
	TRUCKS	CARS	TRUCKS	CARS
Jan-90	4,712	523	4,712	523
Feb-90	4,144	424	4,144	424
Mar-90	6,642	676	3,941	574
Apr-90	7,183	677	4,482	575
May-90	8,202	678	5,501	576
Jun-90	8,534	762	5,833	660
Jul-90	8,833	774	6,132	672
Aug-90	8,999	733	6,298	631
Sep-90	5,583	717	5,583	717
Oct-90	4,447	558	4,447	558
Nov-90	4,220	403	4,220	403
Dec-90	4,051	508	4,051	508
TOTALS:	75,550	7,433	59,344	6,821

In order to weight the sampling data, it was necessary to redistribute these quantities by generator type (residential/commercial) and vehicle type (auto/truck).

Self-haul trucks involved in the field sampling disposed the following residential and commercial quantities:

Residential	= 53,038 pounds (52%)
Commercial	= 48,410 pounds (48%)
Total Sampled	=101,448 pounds (100%)

Residential trucks accounted for 52% of the total tonnage, while commercial trucks contributed 48% of the total. Applying these percentage distributions against the adjusted 1990 truck tons yields the following:

Estimated 1990 Self-haul
Residential Truck Tonnage = 59,344 x 0.520 = 30,859 tons

Estimated 1990 Self-haul
Commercial Truck Tonnage = 59,344 x 0.480 = 28,485 tons

Thus, the 1990 self-haul wastes are calculated to include:

Auto	= 6,821 tons
Residential truck	= 30,859
Commercial truck	= 28,485
Total	= 66,165 tons

C. Findings

Statistically [2]significant changes, by origin, are listed below.

Origin	Increase	Decrease
Commercial Truck	Textiles Ceramics	Prunings Leaves and Grass
Residential Truck	Refillable Pop Gypsum Drywall	Prunings Leaves and Grass
Auto	Newspaper	Prunings Leaves and Grass Other Chemicals

"Wood" increased from 24% to 35%; this increase is not statistically significant but represents a major increase. This percentage increase,as well as the increases listed above, were probably caused by the dramatic decrease in yard waste.

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2 Statistically significant differences occur where the ranges for two estimates of the same component do not overlap.

SEATTLE WASTE COMPOSITION STUDY
SELF-HAUL SAMPLING INFORMATION

TABLE IV-1

GENERAL INFORMATION

Sampling period: January, 1990 through December 1990
Total number of samples: 192
North transfer station: 109
South transfer station: 83

Average sample weight (pounds): 292.4

Sum of sample weights (pounds): 56,133.7

Average total load weight: 582

Sum of total load weights: 111,700

INFORMATION BY GENERATOR TYPE

Number of residential samples: 134
North: 76
South: 58

Number of commercial samples: 58
North: 33
South: 25

Average total residential load weight: 469

Average total commercial load weight: 843

INFORMATION BY VEHICLE TYPE

Number of trucks sampled: 152
Commercial: 56
Residential: 96

Number of autos sampled: 40
Commercial: 2
Residential: 38

Average total load weight
All trucks (pounds): 667

Average total load weight
All autos (pounds): 256

Average total load weight
Commercial trucks: 864

Average total load weight
Commercial autos: 230

Average total load weight
Residential trucks: 552

Average total laod weight
Residential autos: 258

Sum of total loads for
All trucks (pounds): 101,448

Sum of total loads for
All autos (pounds): 10,252

Sum of total loads for
Commercial trucks: 48,410

Sum of total loads for
Commercial autos: 460

Sum of total loads for
Residential trucks: 53,038

Sum of total loads for
Residential autos: 9,792

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-2

SELF-HAUL BY VEHICLE TYPE
January, 1990 through December, 1990

	ALL SELF-HAUL AUTO	ALL SELF-HAUL TRUCK	ALL SELF-HAUL
PAPER			
Newspaper	8.98	1.86	2.60
Corrugated Paper	2.83	5.21	4.97
Computer Paper	0.00	0.08	0.07
Office Paper	1.35	0.64	0.71
Mixed Scrap Paper	6.73	2.75	3.16
Other Paper	1.52	0.75	0.83
PLASTIC			
PET Bottles	0.15	0.03	0.04
HDPE Bottles	0.16	0.12	0.13
Other Plastic Bottles	0.10	0.02	0.03
Expanded Polystyrene	0.81	0.26	0.31
Plastic Packaging	1.71	1.24	1.28
Other Plastic Products	2.75	2.28	2.33
GLASS			
Nonrefillable Beer	0.72	0.09	0.16
Refillable Beer	0.23	0.29	0.29
Nonrefillable Pop	0.06	0.10	0.10
Refillable Pop	0.19	0.27	0.26
Container Glass	0.83	0.73	0.74
Nonrecyclable Glass	0.61	1.90	1.77
METAL			
Aluminum Cans	0.26	0.49	0.46
Aluminum Containers	0.34	0.13	0.15
Tinned Cans	0.41	0.16	0.18
Bi-metal Cans	0.00	0.00	0.00
Ferrous Metals	7.25	4.44	4.73
White Goods	3.37	0.17	0.50
Nonferrous Metals	1.05	0.16	0.25
Mixed Metals/Materials	5.22	4.04	4.16
RUBBER			
Rubber Products	1.28	0.72	0.78
Tires	0.07	0.15	0.14
ORGANICS			
Food	5.60	1.39	1.81
Prunings	1.39	0.87	0.92
Leaves and Grass	3.07	2.21	2.29
Wood	18.64	36.64	34.83
OTHER			
Disposable Diapers	0.44	0.19	0.22
Textiles	4.56	9.70	9.20
Leather	0.13	0.09	0.10
Ash	0.95	0.06	0.16
Ceramics, Porcelain, China	0.22	0.81	0.75
Rocks, Concrete, Bricks	5.54	2.64	2.94
Soil, Dirt, Non-distinct Fine	4.25	2.02	2.24
Gypsum Drywall	3.61	7.84	7.40
Fiberglass Insulation	0.03	2.85	2.57
Construction Debris	1.61	2.74	2.63
HAZARDOUS			
Latex Paints	0.26	0.27	0.27
Adhesives, Glues	0.44	0.17	0.20
Oil-based Paints	0.00	0.22	0.20
Cleaners	0.02	0.02	0.02
Pesticides	0.09	0.00	0.01
Batteries	0.01	0.00	0.00
Gasoline	0.00	0.03	0.02
Motor Oil, Diesel Oil	0.18	0.08	0.09
Asbestos	0.00	0.03	0.03
Explosives	0.00	0.00	0.00
Other Chemicals	0.00	0.02	0.02
NUMBER OF SAMPLES:	40	152	192

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-3

SELF-HAUL COMMERCIAL TRUCKS
January, 1990 through December, 1990

	Mean Percentages and Ranges at the 90% Confidence Level			
	%	+/-	Low %	Hi %
PAPER				
Newspaper	0.91	0.83	0.09	1.74
Corrugated Paper	5.61	3.42	2.19	9.03
Computer Paper	0.14	0.20	-0.05	0.34
Office Paper	1.21	1.39	-0.18	2.60
Mixed Scrap Paper	1.77	0.77	1.01	2.54
Other Paper	0.79	0.61	0.18	1.40
PLASTIC				
PET Bottles	0.03	0.03	0.00	0.05
HDPE Bottles	0.18	0.25	-0.08	0.43
Other Plastic Bottles	0.00	0.00	0.00	0.01
Expanded Polystyrene	0.25	0.14	0.11	0.39
Plastic Packaging	1.62	0.88	0.74	2.51
Other Plastic Products	2.24	1.22	1.02	3.46
GLASS				
Nonrefillable Beer	0.01	0.01	-0.01	0.02
Refillable Beer	0.38	0.43	-0.05	0.82
Nonrefillable Pop	0.15	0.15	0.00	0.30
Refillable Pop	0.49	0.72	-0.24	1.21
Container Glass	0.42	0.35	0.07	0.77
Nonrecyclable Glass	3.00	3.60	-0.61	6.60
METAL				
Aluminum Cans	0.72	1.06	-0.34	1.78
Aluminum Containers	0.11	0.17	-0.06	0.28
Tinned Cans	0.05	0.05	0.00	0.10
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	3.73	1.88	1.85	5.61
White Goods	0.18	0.29	-0.11	0.46
Nonferrous Metals	0.05	0.06	-0.01	0.11
Mixed Metals/Materials	4.58	2.49	2.09	7.07
RUBBER				
Rubber Products	0.89	0.91	-0.01	1.80
Tires	0.00	0.00	0.00	0.00
ORGANICS				
Food	0.58	0.81	-0.23	1.39
Prunings	0.41	0.66	-0.25	1.07
Leaves and Grass	0.28	0.45	-0.16	0.73
Wood	40.42	8.36	32.06	48.78
OTHER				
Disposable Diapers	0.00	0.00	0.00	0.00
Textiles	11.81	5.22	6.59	17.03
Leather	0.05	0.05	-0.01	0.10
Ash	0.09	0.15	-0.06	0.25
Ceramics, Porcelain, China	0.52	0.47	0.05	0.99
Rocks, Concrete, Bricks	1.56	1.50	0.06	3.05
Soil, Dirt, Non-distinct Fines	0.75	0.56	0.20	1.31
Gypsum Drywall	5.28	3.77	1.51	9.05
Fiberglass Insulation	5.55	5.50	0.05	11.05
Construction Debris	2.66	2.34	0.31	5.00
HAZARDOUS				
Latex Paints	0.01	0.02	-0.01	0.03
Adhesives, Glues	0.18	0.25	-0.07	0.43
Oil-based Paints	0.23	0.26	-0.02	0.49
Cleaners	0.00	0.00	0.00	0.00
Pesticides	0.00	0.00	0.00	0.00
Batteries	0.00	0.00	0.00	0.00
Gasoline	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.00	0.00	0.00	0.01
Asbestos	0.06	0.10	-0.04	0.17
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.05	0.07	-0.03	0.12
NUMBER OF SAMPLES:	56			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-4

SELF-HAUL RESIDENTIAL TRUCKS
January, 1990 through December, 1990

	Mean Percentages and Ranges at the 90% Confidence Level			
	%	+/-	Low %	Hi %
PAPER				
Newspaper	2.74	1.38	1.35	4.12
Corrugated Paper	4.83	1.35	3.48	6.18
Computer Paper	0.03	0.05	-0.02	0.08
Office Paper	0.11	0.08	0.03	0.19
Mixed Scrap Paper	3.65	1.33	2.32	4.98
Other Paper	0.72	0.32	0.39	1.04
PLASTIC				
PET Bottles	0.03	0.03	0.00	0.06
HDPE Bottles	0.07	0.06	0.01	0.14
Other Plastic Bottles	0.04	0.04	0.01	0.08
Expanded Polystyrene	0.26	0.14	0.12	0.40
Plastic Packaging	0.88	0.28	0.61	1.16
Other Plastic Products	2.32	0.84	1.49	3.16
GLASS				
Nonrefillable Beer	0.17	0.13	0.04	0.30
Refillable Beer	0.21	0.18	0.03	0.39
Nonrefillable Pop	0.06	0.06	0.00	0.12
Refillable Pop	0.06	0.05	0.01	0.11
Container Glass	1.01	0.67	0.35	1.69
Nonrecyclable Glass	0.88	0.37	0.51	1.26
METAL				
Aluminum Cans	0.27	0.15	0.12	0.42
Aluminum Containers	0.14	0.12	0.02	0.26
Tinned Cans	0.26	0.10	0.16	0.36
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	5.09	1.80	3.29	6.89
White Goods	0.17	0.24	-0.07	0.41
Nonferrous Metals	0.26	0.14	0.12	0.40
Mixed Metals/Materials	3.54	1.17	2.37	4.72
RUBBER				
Rubber Products	0.57	0.42	0.15	0.99
Tires	0.29	0.30	-0.01	0.59
ORGANICS				
Food	2.13	1.28	0.85	3.41
Prunings	1.30	1.20	0.10	2.50
Leaves and Grass	4.00	2.03	1.97	6.03
Wood	33.15	5.70	27.45	38.85
OTHER				
Disposable Diapers	0.37	0.35	0.02	0.72
Textiles	7.76	2.17	5.59	9.94
Leather	0.13	0.20	-0.06	0.33
Ash	0.04	0.07	-0.03	0.12
Ceramics, Porcelain, China	1.08	0.91	0.17	1.98
Rocks, Concrete, Bricks	3.63	2.26	1.37	5.89
Soil, Dirt, Non-distinct Fines	3.19	1.86	1.32	5.05
Gypsum Drywall	10.20	4.17	6.03	14.37
Fiberglass Insulation	0.35	0.36	-0.01	0.72
Construction Debris	2.82	1.72	1.10	4.54
HAZARDOUS				
Latex Paints	0.51	0.36	0.15	0.87
Adhesives, Glues	0.17	0.22	-0.06	0.39
Oil-based Paints	0.27	0.17	0.10	0.43
Cleaners	0.04	0.04	0.00	0.09
Pesticides	0.00	0.00	0.00	0.00
Batteries	0.00	0.01	0.00	0.01
Gasoline	0.05	0.07	-0.02	0.12
Motor Oil, Diesel Oil	0.15	0.16	0.00	0.31
Asbestos	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.00	0.01	0.00	0.01
NUMBER OF SAMPLES:	96			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-5

SELF-HAUL AUTOS
January, 1990 through December, 1990

	Mean Percentages and Ranges at the 90% Confidence Level			
	%	+/-	Low %	Hi %
PAPER				
Newspaper	8.98	5.98	3.00	14.95
Corrugated Paper	2.83	1.03	1.80	3.86
Computer Paper	0.00	0.00	0.00	0.00
Office Paper	1.35	1.95	-0.60	3.30
Mixed Scrap Paper	6.73	3.10	3.63	9.83
Other Paper	1.53	1.13	0.40	2.65
PLASTIC				
PET Bottles	0.15	0.13	0.02	0.28
HDPE Bottles	0.16	0.25	-0.09	0.41
Other Plastic Bottles	0.10	0.16	-0.06	0.26
Expanded Polystyrene	0.81	0.76	0.05	1.58
Plastic Packaging	1.71	1.33	0.38	3.04
Other Plastic Products	2.75	1.27	1.48	4.02
GLASS				
Nonrefillable Beer	0.72	1.15	-0.43	1.88
Refillable Beer	0.23	0.28	-0.05	0.51
Nonrefillable Pop	0.06	0.10	-0.04	0.15
Refillable Pop	0.19	0.25	-0.05	0.44
Container Glass	0.83	0.81	0.02	1.65
Nonrecyclable Glass	0.61	0.40	0.20	1.01
METAL				
Aluminum Cans	0.26	0.24	0.02	0.51
Aluminum Containers	0.34	0.47	-0.13	0.81
Tinned Cans	0.41	0.27	0.14	0.68
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	7.25	3.93	3.32	11.18
White Goods	3.37	5.20	-1.84	8.57
Nonferrous Metals	1.05	0.77	0.28	1.82
Mixed Metals/Materials	5.22	2.88	2.34	8.10
RUBBER				
Rubber Products	1.28	1.00	0.28	2.28
Tires	0.07	0.11	-0.04	0.18
ORGANICS				
Food	5.60	5.98	-0.38	11.58
Prunings	1.39	2.29	-0.90	3.68
Leaves and Grass	3.07	2.81	0.26	5.87
Wood	18.64	8.41	10.22	27.05
OTHER				
Disposable Diapers	0.44	0.67	-0.23	1.10
Textiles	4.56	1.97	2.59	6.53
Leather	0.13	0.14	-0.01	0.27
Ash	0.95	1.15	-0.20	2.10
Ceramics, Porcelain, China	0.22	0.35	-0.14	0.57
Rocks, Concrete, Bricks	5.54	4.59	0.94	10.13
Soil, Dirt, Non-distinct Fines	4.25	3.49	0.77	7.74
Gypsum Drywall	3.61	3.30	0.31	6.91
Fiberglass Insulation	0.03	0.04	-0.02	0.07
Construction Debris	1.61	1.86	-0.25	3.47
HAZARDOUS				
Latex Paints	0.26	0.29	-0.04	0.55
Adhesives, Glues	0.44	0.72	-0.28	1.16
Oil-based Paints	0.00	0.00	0.00	0.00
Cleaners	0.02	0.03	-0.01	0.04
Pesticides	0.09	0.14	-0.05	0.23
Batteries	0.01	0.01	0.00	0.02
Gasoline	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.18	0.29	-0.11	0.46
Asbestos	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.00	0.00	0.00	0.00
NUMBER OF SAMPLES:	40			

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-6

SELF-HAUL BY GENERATOR TYPE
January, 1990 through December, 1990

	ALL SELF-HAUL RESIDENTIAL	ALL SELF-HAUL COMMERCIAL	ALL SELF-HAUL
PAPER			
Newspaper	3.87	0.91	2.60
Corrugated Paper	4.47	5.61	4.97
Computer Paper	0.02	0.14	0.07
Office Paper	0.33	1.21	0.71
Mixed Scrap Paper	4.21	1.77	3.16
Other Paper	0.87	0.79	0.83
PLASTIC	0.00		
PET Bottles	0.05	0.03	0.04
HDPE Bottles	0.09	0.18	0.13
Other Plastic Bottles	0.05	0.00	0.03
Expanded Polystyrene	0.36	0.25	0.31
Plastic Packaging	1.03	1.62	1.28
Other Plastic Products	2.40	2.24	2.33
GLASS	0.00		
Nonrefillable Beer	0.27	0.01	0.16
Refillable Beer	0.21	0.38	0.29
Nonrefillable Pop	0.06	0.15	0.10
Refillable Pop	0.08	0.49	0.26
Container Glass	0.98	0.42	0.74
Nonrecyclable Glass	0.83	3.00	1.77
METAL	0.00		
Aluminum Cans	0.27	0.72	0.46
Aluminum Containers	0.18	0.11	0.15
Tinned Cans	0.29	0.05	0.18
Bi-metal Cans	0.00	0.00	0.00
Ferrous Metals	5.48	3.73	4.73
White Goods	0.75	0.18	0.50
Nonferrous Metals	0.40	0.05	0.25
Mixed Metals/Materials	3.84	4.58	4.16
RUBBER	0.00		
Rubber Products	0.70	0.89	0.78
Tires	0.25	0.00	0.14
ORGANICS	0.00		
Food	2.76	0.58	1.81
Prunings	1.32	0.41	0.92
Leaves and Grass	3.83	0.28	2.29
Wood	30.52	40.42	34.83
OTHER	0.00		
Disposable Diapers	0.38	0.00	0.22
Textiles	7.18	11.81	9.20
Leather	0.13	0.05	0.10
Ash	0.20	0.09	0.16
Ceramics, Porcelain, China	0.92	0.52	0.75
Rocks, Concrete, Bricks	3.98	1.56	2.94
Soil, Dirt, Non-distinct Fine	3.38	0.75	2.24
Gypsum Drywall	9.01	5.28	7.40
Fiberglass Insulation	0.29	5.55	2.57
Construction Debris	2.60	2.66	2.63
HAZARDOUS	0.00		
Latex Paints	0.46	0.01	0.27
Adhesives, Glues	0.22	0.18	0.20
Oil-based Paints	0.22	0.23	0.20
Cleaners	0.04	0.00	0.02
Pesticides	0.02	0.00	0.01
Batteries	0.00	0.00	0.00
Gasoline	0.04	0.00	0.02
Motor Oil, Diesel Oil	0.16	0.00	0.09
Asbestos	0.00	0.06	0.03
Explosives	0.00	0.00	0.00
Other Chemicals	0.00	0.05	0.02
NUMBER OF SAMPLES:	134	58	192

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-7

SELF-HAUL COMMERCIAL TRUCKS BY SEASON
January, 1990 through December, 1990

	WINTER	SPRING	SUMMER	FALL
PAPER				
Newspaper	0.75	1.91	0.00	0.91
Corrugated Paper	6.58	3.31	1.05	12.74
Computer Paper	0.55	0.05	0.00	0.05
Office Paper	0.00	1.44	2.99	0.00
Mixed Scrap Paper	0.61	1.86	1.72	2.81
Other Paper	0.82	0.01	1.97	0.36
PLASTIC				
PET Bottles	0.00	0.04	0.00	0.06
HDPE Bottles	0.00	0.00	0.57	0.11
Other Plastic Bottles	0.00	0.00	0.01	0.00
Expanded Polystyrene	0.12	0.13	0.22	0.55
Plastic Packaging	3.19	0.74	1.96	0.83
Other Plastic Products	0.45	2.81	1.65	3.89
GLASS				
Nonrefillable Beer	0.00	0.00	0.00	0.04
Refillable Beer	1.00	0.04	0.58	0.00
Nonrefillable Pop	0.00	0.17	0.31	0.08
Refillable Pop	0.00	0.00	1.65	0.18
Container Glass	0.49	0.15	1.01	0.00
Nonrecyclable Glass	10.00	0.77	0.71	1.83
METAL				
Aluminum Cans	0.03	0.07	2.49	0.11
Aluminum Containers	0.00	0.01	0.01	0.45
Tinned Cans	0.00	0.12	0.01	0.08
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	0.05	7.43	0.35	6.53
White Goods	0.00	0.00	0.00	0.75
Nonferrous Metals	0.00	0.17	0.00	0.02
Mixed Metals/Materials	2.74	6.71	2.03	6.62
RUBBER				
Rubber Products	2.17	0.14	1.39	0.05
Tires	0.00	0.00	0.00	0.00
ORGANICS				
Food	2.24	0.00	0.36	0.00
Prunings	1.87	0.02	0.00	0.00
Leaves and Grass	0.00	0.04	0.00	1.16
Wood	37.06	45.25	41.75	36.15
OTHER				
Disposable Diapers	0.00	0.00	0.00	0.00
Textiles	10.53	17.13	12.65	5.60
Leather	0.00	0.16	0.00	0.00
Ash	0.00	0.00	0.35	0.00
Ceramics, Porcelain, China	0.00	0.64	0.39	1.02
Rocks, Concrete, Bricks	0.39	0.78	3.05	1.86
Soil, Dirt, Non-distinct Fine	0.00	0.23	0.50	2.38
Gypsum Drywall	13.52	2.07	0.95	6.50
Fiberglass Insulation	3.95	0.20	17.31	0.00
Construction Debris	0.90	3.57	0.00	6.23
HAZARDOUS				
Latex Paints	0.00	0.00	0.00	0.05
Adhesives, Glues	0.00	0.64	0.00	0.00
Oil-based Paints	0.00	0.83	0.00	0.00
Cleaners	0.00	0.00	0.00	0.00
Pesticides	0.00	0.00	0.00	0.00
Batteries	0.00	0.01	0.00	0.00
Gasoline	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.00	0.01	0.00	0.00
Asbestos	0.00	0.22	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.00	0.16	0.00	0.00
NUMBER OF SAMPLES:	13	15	14	14

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-8

SELF-HAUL RESIDENTIAL TRUCKS BY SEASON
January, 1990 through December, 1990

	WINTER	SPRING	SUMMER	FALL
PAPER				
Newspaper	2.01	3.14	3.29	2.11
Corrugated Paper	5.97	4.72	4.66	4.24
Computer Paper	0.00	0.11	0.00	0.00
Office Paper	0.23	0.06	0.15	0.00
Mixed Scrap Paper	4.24	2.46	3.43	4.69
Other Paper	0.85	0.42	0.59	1.03
PLASTIC				
PET Bottles	0.01	0.09	0.00	0.01
HDPE Bottles	0.17	0.02	0.00	0.15
Other Plastic Bottles	0.10	0.08	0.00	0.00
Expanded Polystyrene	0.63	0.12	0.15	0.26
Plastic Packaging	1.52	0.50	0.68	0.91
Other Plastic Products	3.06	1.72	2.79	1.70
GLASS				
Nonrefillable Beer	0.17	0.31	0.00	0.20
Refillable Beer	0.01	0.43	0.00	0.37
Nonrefillable Pop	0.03	0.12	0.00	0.09
Refillable Pop	0.16	0.00	0.00	0.12
Container Glass	2.63	0.13	0.33	1.38
Nonrecyclable Glass	0.74	1.89	0.29	0.59
METAL				
Aluminum Cans	0.27	0.23	0.06	0.51
Aluminum Containers	0.22	0.08	0.09	0.21
Tinned Cans	0.30	0.20	0.10	0.44
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	2.92	6.90	4.61	5.62
White Goods	0.00	0.03	0.59	0.00
Nonferrous Metals	0.06	0.37	0.27	0.30
Mixed Metals/Materials	2.25	4.34	3.59	3.73
RUBBER				
Rubber Products	0.85	1.10	0.12	0.35
Tires	0.00	0.59	0.50	0.00
ORGANICS				
Food	2.06	3.37	0.76	2.33
Prunings	5.32	0.62	0.10	0.23
Leaves and Grass	3.32	5.62	4.14	2.92
Wood	25.27	36.14	41.66	26.99
OTHER				
Disposable Diapers	0.16	0.04	0.48	0.76
Textiles	10.13	6.56	6.64	8.12
Leather	0.06	0.00	0.44	0.00
Ash	0.00	0.17	0.00	0.00
Ceramics, Porcelain, China	0.68	1.10	0.62	1.82
Rocks, Concrete, Bricks	3.71	4.23	3.29	3.12
Soil, Dirt, Non-distinct Fine	2.07	3.24	0.26	7.02
Gypsum Drywall	8.62	6.57	12.30	12.83
Fiberglass Insulation	1.10	0.02	0.42	0.10
Construction Debris	6.13	0.89	1.44	3.75
HAZARDOUS				
Latex Paints	0.27	0.08	0.96	0.66
Adhesives, Glues	0.02	0.62	0.00	0.00
Oil-based Paints	0.28	0.40	0.17	0.21
Cleaners	0.10	0.01	0.00	0.07
Pesticides	0.00	0.00	0.00	0.00
Batteries	0.00	0.02	0.00	0.00
Gasoline	0.19	0.02	0.00	0.00
Motor Oil, Diesel Oil	0.57	0.12	0.00	0.05
Asbestos	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.00	0.00	0.01	0.00
NUMBER OF SAMPLES:	23	23	25	25

SEATTLE WASTE COMPOSITION STUDY
SAMPLING RESULTS
COMPONENT PERCENTAGES BY WEIGHT

TABLE IV-9

SELF-HAUL AUTO BY SEASON
January, 1990 through December, 1990

	WINTER	SPRING	SUMMER	FALL
PAPER				
Newspaper	31.73	2.53	2.64	1.34
Corrugated Paper	3.98	2.09	2.88	2.29
Computer Paper	0.00	0.00	0.00	0.00
Office Paper	4.73	0.00	0.46	0.00
Mixed Scrap Paper	11.62	4.96	4.05	5.60
Other Paper	2.59	0.10	0.78	2.94
PLASTIC				
PET Bottles	0.18	0.00	0.29	0.14
HDPE Bottles	0.07	0.00	0.00	0.61
Other Plastic Bottles	0.00	0.00	0.46	0.00
Expanded Polystyrene	0.47	0.03	0.13	2.63
Plastic Packaging	1.60	0.54	0.35	3.99
Other Plastic Products	2.86	1.82	1.46	4.96
GLASS				
Nonrefillable Beer	2.73	0.00	0.00	0.00
Refillable Beer	0.88	0.00	0.00	0.00
Nonrefillable Pop	0.22	0.00	0.00	0.00
Refillable Pop	0.83	0.00	0.00	0.00
Container Glass	0.94	2.04	0.26	0.16
Nonrecyclable Glass	1.23	0.03	0.94	0.28
METAL				
Aluminum Cans	0.53	0.03	0.03	0.46
Aluminum Containers	0.00	0.06	0.00	1.29
Tinned Cans	1.19	0.00	0.00	0.89
Bi-metal Cans	0.00	0.00	0.00	0.00
Ferrous Metals	1.82	14.42	5.49	5.50
White Goods	0.00	0.00	0.94	12.71
Nonferrous Metals	1.21	2.01	0.63	0.00
Mixed Metals/Materials	0.70	2.63	14.20	4.63
RUBBER				
Rubber Products	0.32	0.62	0.11	3.98
Tires	0.00	0.00	0.31	0.00
ORGANICS				
Food	0.93	0.34	163.08	7.47
Prunings	0.00	0.00	6.38	0.00
Leaves and Grass	0.00	0.26	12.11	1.39
Wood	9.21	33.30	5.28	21.51
OTHER				
Disposable Diapers	3.18	0.00	0.00	0.00
Textiles	0.87	6.11	2.22	7.61
Leather	0.32	0.00	0.20	0.00
Ash	0.00	1.10	0.00	2.54
Ceramics, Porcelain, China	0.00	0.74	0.00	0.00
Rocks, Concrete, Bricks	3.09	8.08	8.98	1.62
Soil, Dirt, Non-distinct Fine	7.76	6.75	0.00	1.32
Gypsum Drywall	1.00	6.10	6.77	0.35
Fiberglass Insulation	0.00	0.00	0.12	0.00
Construction Debris	0.00	2.52	4.02	0.00
HAZARDOUS				
Latex Paints	0.00	0.47	0.54	0.00
Adhesives, Glues	0.00	0.00	0.00	1.76
Oil-based Paints	0.00	0.00	0.00	0.00
Cleaners	0.06	0.00	0.00	0.00
Pesticides	0.00	0.29	0.03	0.00
Batteries	0.02	0.00	0.00	0.00
Gasoline	0.00	0.00	0.00	0.00
Motor Oil, Diesel Oil	0.00	0.00	0.80	0.00
Asbestos	0.00	0.00	0.00	0.00
Explosives	0.00	0.00	0.00	0.00
Other Chemicals	0.00	0.00	0.00	0.00
NUMBER OF SAMPLES:	11	10	8	11

1990

WASTE STREAM COMPOSITION STUDY

Final Report: Appendix A

Appendix A
Sampling Summary

Section I. General Comments On Monthly Samplings

JANUARY, 1990

Nine residential samples were taken at the South Transfer Station (STS) on January 25th and 20 self-haul samples were conducted at the North Transfer Station (NTS) on the 30th.

Obtaining residential samples which averaged 300 pounds was difficult, due to an apparent change in the density and physical composition of the waste from the 1988/89 sampling effort. The virtual removal of all yard waste caused the waste density to decline. In addition to the absence of yard wastes, the paper fractions had undergone a noticeable change. In general, paper components appeared to be smaller in size and more mixed than in the 1988/89 sampling. This had the effect of creating more "volume", in terms of visually estimating a 300-pound sample. While the supervisors were extracting approximately one-cubic-yard samples, previously averaging 300 pounds, they were in fact obtaining samples closer to 200 pounds.

Normally, if a sample is deemed too small (its weight is estimated by lifting the tarp on which it was deposited) additional material is extracted from the same sample cell to bring the weight up. Unfortunately, this proved to be a problem, because the hauler's routing scheme caused most of the sample truckloads to arrive at the transfer stations within a narrow window of time each day. The resulting congestion was substantially aggravated if transfer station personnel were delayed from processing the waste in order to mechanically extract additional material. By the time the loader had deposited a sample on a tarp, where its weight could be assessed, the remaining load had, by necessity, been disposed. While both of the sampling supervisors and equipment operators made efforts to extract a "larger than normal amount," undersampling continued to be a problem for the first few attempts.

FEBRUARY, 1990

Ten residential samples were obtained on February 20th at the NTS. Supervisors again had trouble compensating for residential truckloads arriving all at once. Since this was the first time the NTS personnel had dealt with the intrusion of a crew on-site, the situation was similar to what had occurred in January at the STS. Fifteen self-haul samples were taken the STS on February 27th.

MARCH, 1990

Ten residential samples were sorted on March 1st at the STS. During the residential sort, one truckload deposited on the tipping floor inadvertently spilled over onto two samples. Portions of these samples were subsequently lost when the remaining pile was pushed into the pit, resulting in final sample weights for these loads being much lighter than expected. These two samples were later declared unsuitable, and not included in the database. Nineteen self-haul loads were sampled on the 29th at the NTS.

APRIL, 1990

Nine residential loads were sorted on April 16th at the NTS. By March, the residential crew had mostly resolved the sample extraction issues, and the April sampling went much more smoothly. However, two truckloads were missed due to their earlier-than-expected arrivals at the transfer station. Fifteen 15 self-haul samples were taken on the 12th at the STS.

MAY, 1990

Nineteen self-haul samples occurred at the NTS on May 3rd, and eight residential route-collected sorts took place on May 9th at the NTS. There was no unusual activity to report.

JUNE, 1990

Ten residential route-collected samples were obtained on June 15th at the NTS. Two of the residential samples were subsequently eliminated because their fines and supermix were dumped before they could be sorted and weighed. Fourteen self-haul loads were sampled on the 7th at the STS.

JULY, 1990

Eight of the ten preselected residential route-collected samples, plus two additional makeup samples were obtained. Sampling occurred on July 24th at the STS. Nineteen self-haul samples were taken on the 15th at the NTS.

AUGUST, 1990

Nine residential route-collected samples were obtained on August 20th at the NTS. Sorters noticed much bundled newspaper, both in bags and with string. They commented that "It seemed that the people made an attempt at segregating waste but for some reason did not actually recycle the newspapers."

Fifteen self-haul samples were obtained from the STS on the 23rd. The transfer station equipment was inoperable until 10 a.m., causing the supervisor to expand the interval between vehicle selections in the morning to alleviate problems with disposed waste overflow.

SEPTEMBER, 1990

Ten residential samples were sorted on October 3rd at the STS. Two residential trucks had unexpectedly disposed their loads prior to the crew's arrival, so two additional truckloads were later substituted as makeups. One sample included unopened cans of food that could not be separated, as well as an oil filter full of oil, which spilled onto the ground prior to measurement. Another sample included large amounts of food. Nineteen self-haul loads were sampled at the NTS on September 25th.

OCTOBER, 1990

A total of ten residential route-collected loads were obtained on the 3rd at the NTS. A few early trucks were missed; subsequent trucks were substituted in their place. Fifteen self-haul loads were also sampled on the 11th at the STS.

NOVEMBER, 1990

All ten originally scheduled residential loads were sampled on the 20th at the STS. One sample contained a significant amount nursing home/infectious waste. Nineteen self-haul loads were also sampled on the 17th at the NTS.

DECEMBER, 1990

Ten residential route-collected loads were obtained, two of which were makeups for missed loads. Residential sampling occurred on the 11th at the NTS. Fourteen self-haul samples had previously been taken on the 4th at the STS.

Section II. Sampling Schedules

Table A-II gives a variety of information for all samples taken during 1990.

SEATTLE WASTE COMPOSITION STUDY
SAMPLE LISTING - 317 SAMPLES
January, 1990 through December 1990

TABLE A-II.1

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
R	003	AM	1/25/90	1	X	S	X
R	005	AM	1/25/90	1	X	S	X
R	006	AM	1/25/90	1	X	S	X
R	008	AM	1/25/90	1	X	S	X
R	009	AM	1/25/90	1	X	S	X
R	010	AM	1/25/90	1	X	S	X
R	011	AM	1/25/90	1	X	S	X
R	013	AM	1/25/90	1	X	S	X
R	016	AM	1/25/90	1	X	S	X
R	018	AM	1/25/90	1	X	S	X
S	017	11	1/30/90	X	A	N	P
S	101	11	1/30/90	1	X	N	A
S	225	10	1/30/90	1	X	N	P
S	240	12	1/30/90	1	X	N	A
S	377	14	1/30/90	X	F	N	A
S	624	12	1/30/90	1	X	N	P
S	860	09	1/30/90	X	K	N	P
S	912	12	1/30/90	1	X	N	P
S	994	14	1/30/90	1	X	N	A
S	GP7	11	1/30/90	1	X	N	P
S	H61	11	1/30/90	X	K	N	P
S	HTN	12	1/30/90	1	X	N	P
S	IAB	12	1/30/90	1	X	N	A
S	LH8	10	1/30/90	X	K	N	P
S	LJ5	12	1/30/90	X	K	N	T
S	PZ9	13	1/30/90	1	X	N	P
S	TZ3	14	1/30/90	X	K	N	P
S	XS5	13	1/30/90	1	X	N	P
R	102	AM	2/20/90	2	X	N	X
R	003	AM	2/20/90	1	X	N	X
R	007	AM	2/20/90	1	X	N	X
R	009	AM	2/20/90	1	X	N	X
R	111	PM	2/20/90	2	X	N	X
R	014	PM	2/20/90	1	X	N	X
R	015	AM	2/20/90	1	X	N	X
R	122	PM	2/20/90	2	X	N	X
R	024	AM	2/20/90	1	X	N	X
R	103	AM	2/20/90	2	X	N	X

TABLE A.II-2

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
S	052	10	2/27/90	1	X	S	P
S	164	11	2/27/90	X	J	S	P
S	301	10	2/27/90	1	X	S	P
S	652	12	2/27/90	1	X	S	P
S	765	10	2/27/90	1	X	S	A
S	DBA	10	2/27/90	1	X	S	A
S	HV9	10	2/27/90	1	X	S	P
S	HZ2	12	2/27/90	1	X	S	P
S	HZ2	13	2/27/90	1	X	S	P
S	HZ3	12	2/27/90	1	X	S	P
S	LTJ	10	2/27/90	2	X	S	A
S	PE3	09	2/27/90	X	J	S	P
S	TY2	11	2/27/90	1	X	S	P
S	UB9	10	2/27/90	1	X	S	P
S	UL2	12	2/27/90	X	J	S	T
R	001	AM	3/1/90	1	X	S	X
R	003	AM	3/1/90	1	X	S	X
R	004	AM	3/1/90	1	X	S	X
R	006	AM	3/1/90	1	X	S	X
R	009	AM	3/1/90	1	X	S	X
R	011	AM	3/1/90	1	X	S	X
R	012	AM	3/1/90	1	X	S	X
R	014	AM	3/1/90	1	X	S	X
R	015	AM	3/1/90	1	X	S	X
R	199	PM	3/1/90	2	X	S	X
S	188	14	3/29/90	X	C	N	P
S	209	15	3/29/90	X	J	N	P
S	336	13	3/29/90	1	X	N	P
S	364	15	3/29/90	X	I	N	P
S	612	09	3/29/90	1	X	N	A
S	694	11	3/29/90	1	X	N	P
S	721	13	3/29/90	1	X	N	P
S	776	11	3/29/90	1	X	N	A
S	854	11	3/29/90	1	X	N	P
S	DKX	12	3/29/90	2	X	N	A
S	GJ9	14	3/29/90	1	X	N	P
S	HB7	12	3/29/90	1	X	N	P
S	HC2	14	3/29/90	X	J	N	P
S	HJE	13	3/29/90	1	X	N	A
S	LW8	10	3/29/90	1	X	N	P
S	PS6	09	3/29/90	X	J	N	P
S	TH5	09	3/29/90	1	X	N	P
S	TY2	12	3/29/90	1	X	N	T

TABLE A-II.3

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
S	163	13	4/12/90	X	E	S	P
S	203	12	4/12/90	1	X	S	P
S	704	14	4/12/90	1	X	S	A
S	A51	15	4/12/90	1	X	S	P
S	D30	09	4/12/90	X	J	S	T
S	LKI	14	4/12/90	1	X	S	P
S	LXA	10	4/12/90	1	X	S	A
S	LZ8	09	4/12/90	1	X	S	P
S	PT9	10	4/12/90	1	X	S	P
S	PX6	11	4/12/90	1	X	S	P
S	UB4	08	4/12/90	X	J	S	T
R	001	PM	4/16/90	1	X	N	X
R	105	AM	4/16/90	2	X	N	X
R	106	AM	4/16/90	2	X	N	X
R	009	AM	4/16/90	1	X	N	X
R	009	PM	4/16/90	1	X	N	X
R	010	AM	4/16/90	1	X	N	X
R	014	PM	4/16/90	1	X	N	X
R	018	PM	4/16/90	1	X	N	X
R	020	AM	4/16/90	1	X	N	X
S	131	12	5/3/90	X	J	N	P
S	207	13	5/3/90	X	J	N	P
S	248	13	5/3/90	1	X	N	P
S	499	11	5/3/90	2	X	N	P
S	911	15	5/3/90	1	X	N	P
S	962	11	5/3/90	1	X	N	A
S	HS6	13	5/3/90	X	J	N	P
S	HS8	15	5/3/90	1	X	N	P
S	KKT	11	5/3/90	2	X	N	A
S	LLJ	12	5/3/90	2	X	N	A
S	LP5	09	5/3/90	X	J	N	P
S	LS9	14	5/3/90	2	X	N	P
S	LX2	10	5/3/90	1	X	N	T
S	PW4	14	5/3/90	X	J	N	P
S	UB5	11	5/3/90	X	J	N	P
S	UEH	14	5/3/90	2	X	N	A
S	XG1	10	5/3/90	1	X	N	P
S	XL5	11	5/3/90	X	J	N	P
S	XU5	12	5/3/90	1	X	N	P
R	001	AM	5/9/90	1	X	S	X
R	002	AM	5/9/90	1	X	N	X
R	004	AM	5/9/90	1	X	N	X
R	013	PM	5/9/90	1	X	N	X
R	015	PM	5/9/90	1	X	N	X
R	019	PM	5/9/90	1	X	N	X
R	023	PM	5/9/90	1	X	N	X
R	156	PM	5/9/90	2	X	S	X

TABLE A-II.4

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
S	149	11	6/7/90	X	J	S	P
S	153	11	6/7/90	X	A	S	T
S	231	13	6/7/90	X	J	S	T
S	244	09	6/7/90	1	X	S	P
S	709	08	6/7/90	1	X	S	P
S	714	10	6/7/90	2	X	S	A
S	761	09	6/7/90	1	X	S	P
S	848	12	6/7/90	2	X	S	P
S	887	13	6/7/90	1	X	S	P
S	A68	10	6/7/90	1	X	S	P
S	BTG	13	6/7/90	1	X	S	P
S	GM5	13	6/7/90	X	J	S	P
S	LX6	09	6/7/90	X	A	S	P
R	001	AM	6/15/90	1	X	N	X
R	008	AM	6/15/90	1	X	N	X
R	012	AM	6/15/90	1	X	N	X
R	017	PM	6/15/90	1	X	N	X
R	018	AM	6/15/90	1	X	N	X
R	125	AM	6/15/90	2	X	N	X
R	133	AM	6/15/90	2	X	N	X
R	134	AM	6/15/90	2	X	N	X
S	265	13	7/15/90	1	X	N	P
S	349	11	7/15/90	1	X	N	A
S	382	13	7/15/90	1	X	N	A
S	GP7	11	7/15/90	1	X	N	P
S	GRT	15	7/15/90	1	X	N	A
S	GX8	14	7/15/90	X	J	N	P
S	HE5	12	7/15/90	1	X	N	P
S	HND	11	7/15/90	1	X	N	P
S	HZ1	12	7/15/90	1	X	N	P
S	JUE	14	7/15/90	2	X	N	P
S	L83	14	7/15/90	1	X	N	P
S	LL1	12	7/15/90	1	X	N	P
S	LX7	10	7/15/90	1	X	N	P
S	LX7	11	7/15/90	1	X	N	P
S	OMM	14	7/15/90	1	X	N	A
S	UB3	14	7/15/90	2	X	N	P
S	UDU	13	7/15/90	1	X	N	P
S	UHO	12	7/15/90	1	X	N	A
S	XA3	10	7/15/90	X	J	N	P
R	003	AM	7/24/90	1	X	S	X
R	011	AM	7/24/90	1	X	N	X
R	014	AM	7/24/90	1	X	S	X
R	014	PM	7/24/90	1	X	N	X
R	015	AM	7/24/90	1	X	S	X
R	018	AM	7/24/90	1	X	S	X
R	023	AM	7/24/90	1	X	N	X
R	024	AM	7/24/90	1	X	N	X
R	155	AM	7/24/90	2	X	S	X
R	156	AM	7/24/90	2	X	S	X

TABLE A-II.5

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
R	001	AM	8/20/90	1	X	N	X
R	005	AM	8/20/90	1	X	N	X
R	005	PM	8/20/90	1	X	N	X
R	008	AM	8/20/90	1	X	N	X
R	011	PM	8/20/90	1	X	N	X
R	012	AM	8/20/90	1	X	N	X
R	023	PM	8/20/90	1	X	N	X
R	024	PM	8/20/90	1	X	N	X
R	108	AM	8/20/90	2	X	N	X
S	8AJ	11	8/23/90	1	X	S	P
S	921	10	8/23/90	X	J	S	P
S	924	10	8/23/90	1	X	S	P
S	DOT	08	8/23/90	1	X	S	A
S	GE5	12	8/23/90	1	X	S	P
S	HTZ	13	8/23/90	1	X	S	P
S	LE3	08	8/23/90	X	J	S	P
S	LL8	15	8/23/90	X	J	S	P
S	N13	10	8/23/90	X	J	S	P
S	OVG	10	8/23/90	X	J	S	P
S	PT2	10	8/23/90	1	X	S	T
S	TF2	08	8/23/90	X	J	S	T
S	WDU	11	8/23/90	1	X	S	A
S	XV5	09	8/23/90	1	X	S	P
S	XV9	09	8/23/90	X	B	S	P
R	001	AM	9/13/90	1	X	S	X
R	002	AM	9/13/90	1	X	S	X
R	003	AM	9/13/90	1	X	N	X
R	004	AM	9/13/90	1	X	S	X
R	011	PM	9/13/90	1	X	N	X
R	012	AM	9/13/90	1	X	N	X
R	019	PM	9/13/90	1	X	N	X
R	156	AM	9/13/90	2	X	S	X
R	199	AM	9/13/90	2	X	S	X
R	012	AM	9/13/90	1	X	S	X
S	226	13	9/25/90	1	X	N	P
S	415	14	9/25/90	X	J	N	P
S	454	09	9/25/90	X	F	N	P
S	583	09	9/25/90	1	X	N	A
S	617	12	9/25/90	1	X	N	P
S	650	15	9/25/90	X	J	N	P
S	723	11	9/25/90	1	X	N	A
S	982	15	9/25/90	1	X	N	P
S	GL8	12	9/25/90	X	J	N	P
S	H90	14	9/25/90	X	J	N	P
S	KRL	13	9/25/90	1	X	N	A
S	LZ3	15	9/25/90	X	J	N	P
S	ROW	12	9/25/90	1	X	N	P
S	TE1	09	9/25/90	X	K	N	P
S	UBG	14	9/25/90	X	J	N	A
S	UL7	11	9/25/90	X	J	N	P
S	UW9	13	9/25/90	1	X	N	P
S	XC3	10	9/25/90	X	A	N	P
S	XM4	11	9/25/90	1	X	N	P

TABLE A-II.6

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
R	103	AM	10/3/90	2	X	N	X
R	005	PM	10/3/90	1	X	N	X
R	107	AM	10/3/90	2	X	N	X
R	011	PM	10/3/90	1	X	N	X
R	112	PM	10/3/90	2	X	N	X
R	114	PM	10/3/90	2	X	N	X
R	015	PM	10/3/90	1	X	N	X
R	019	PM	10/3/90	1	X	N	X
R	021	PM	10/3/90	1	X	N	X
R	023	PM	10/3/90	1	X	N	X
S	105	13	10/11/90	1	X	S	P
S	107	11	10/11/90	1	X	S	A
S	300	10	10/11/90	X	J	S	P
S	616	09	10/11/90	X	J	S	P
S	948	10	10/11/90	1	X	S	P
S	H26	14	10/11/90	1	X	S	P
S	ICT	09	10/11/90	1	X	S	A
S	PA1	11	10/11/90	1	X	S	P
S	UI5	10	10/11/90	1	X	S	P
S	UW7	08	10/11/90	1	X	S	P
S	UW7	13	10/11/90	1	X	S	P
S	XC4	12	10/11/90	2	X	S	P
S	XM4	11	10/11/90	1	X	S	P
S	XS7	12	10/11/90	2	X	S	P
S	XXX	09	10/11/90	1	X	S	A
S	049	10	11/17/90	1	X	N	A
S	305	16	11/17/90	1	X	N	A
S	602	09	11/17/90	1	X	N	P
S	788	10	11/17/90	1	X	N	P
S	789	12	11/17/90	1	X	N	A
S	792	12	11/17/90	1	X	N	P
S	831	14	11/17/90	X	J	N	P
S	GLH	11	11/17/90	1	X	N	P
S	GP7	14	11/17/90	X	J	N	P
S	JAJ	12	11/17/90	1	X	N	P
S	LW7	16	11/17/90	1	X	N	P
S	T42	08	11/17/90	1	X	N	P
S	TY4	13	11/17/90	X	E	N	P
S	UH6	13	11/17/90	1	X	N	P
S	WIV	08	11/17/90	1	X	N	A
S	XE6	15	11/17/90	1	X	N	P
R	001	AM	11/20/90	1	X	S	X
R	009	AM	11/20/90	1	X	S	X
R	010	PM	11/20/90	1	X	S	X
R	011	AM	11/20/90	1	X	S	X
R	012	AM	11/20/90	1	X	S	X
R	112	PM	11/20/90	2	X	S	X
R	016	PM	11/20/90	1	X	S	X
R	017	AM	11/20/90	1	X	S	X
R	020	AM	11/20/90	1	X	S	X
R	199	AM	11/20/90	2	X	S	X

TABLE A-II.7

LOADTYPE	ROUTE OR LICENSE	AM/PM, TYPE, OR TIME	SAMPLING DATE	RESIDENCE TYPE	GENERATOR TYPE	DESTINATION OR ORIGIN	VEHICLE TYPE
S	146	09	12/4/90	X	J	S	P
S	184	11	12/4/90	1	X	S	A
S	653	11	12/4/90	1	X	S	P
S	684	14	12/4/90	1	X	S	P
S	803	15	12/4/90	1	X	S	P
S	915	10	12/4/90	X	J	S	T
S	GZ6	12	12/4/90	2	X	S	P
S	HC3	16	12/4/90	X	J	S	P
S	IMS	14	12/4/90	1	X	S	A
S	LJ1	13	12/4/90	1	X	S	P
S	LW8	17	12/4/90	X	J	S	P
S	PK5	11	12/4/90	X	J	S	P
S	US6	10	12/4/90	1	X	S	P
S	UX2	11	12/4/90	1	X	S	P
R	001	PM	12/11/90	1	X	N	X
R	002	AM	12/11/90	1	X	N	X
R	107	AM	12/11/90	2	X	N	X
R	007	PM	12/11/90	1	X	N	X
R	108	AM	12/11/90	2	X	N	X
R	011	AM	12/11/90	1	X	N	X
R	011	PM	12/11/90	1	X	N	X
R	013	AM	12/11/90	1	X	N	X
R	015	AM	12/11/90	1	X	N	X
R	132	PM	12/11/90	2	X	N	X

Section III. Container Ratios

Container-to-Food Ratio

Weight of		Weight of	
0.0	pounds	44.0	pounds
0.0		16.3	
0.0		51.3	
0.4		22.2	
0.5		31.7	
1.1		28.0	
1.5		48.9	
1.7		21.3	
2.0		39.2	
2.1		17.4	
2.9		11.4	
3.4		119.9	
15.6		451.7	

Ratio of Container-to-Food = .0345

HHW Empty Container Ratio
(All Samples July - December)

	Weight of Containers with Material		Weigh of Empty Containers		Percent by weight Empty
Residential Wastes	27.4	pounds	11.5	pounds	29.2%
Self-haul Wastes	250.4		8.3		3.2%

1990

WASTE STREAM COMPOSITION STUDY

Final Report: Appendix B

Appendix B
Sampling Methodology

Section I. Residential Waste Stream Sampling

A. Objective

The objective of the residential waste stream sampling was to provide statistically significant composition data by component of waste for Seattle residents. For purposes of comparison, the residential sector was segregated into single- and multifamily substreams. "Single-family" included detached single-family houses, duplexes, triplexes, and fourplexes using waste cans. "Multifamily" was comprised of apartments with five or more units using dumpsters (due to current collection practices, a small portion of sampled multifamily waste may have come from single-family dwellings).

B. Sample Selection

Samples to be sorted were selected from 110 truckloads of residential waste collected by City-contracted haulers. Approximately nine truckloads per month were sampled, from January through December, 1990. Sampling sorting sites alternated between the City's North and South Transfer Stations.

The truckloads to be sampled were selected a priori (excepting January), using the following procedure:

1. The two residential haulers holding City contracts provided information identifying every truckload of single-family and multifamily waste hauled on their weekly collection schedules. Truckloads for the total population were identified by:

   - day
   - route number

For the northern area contractor, truckloads were further identified by:

- time of day of disposal (morning or afternoon).

This was done because single-family trucks owned by the northern contractor often bring in two loads per day, while the southern contractor's single-family trucks typically make only one trip to the transfer station daily.

Note that the "population" from which the sample was constructed is truckloads and not individuals, families, housing units, or neighborhoods.

2. The northern area contractor disposes of collected waste at the North Transfer Station; the southern area contractor disposes at the South Transfer Station. Two complete sets of truckloads, one for the North and one for the South Transfer Station, were entered into the computer database, with unique identifier codes for each load.

The proportion of the total of 110 routes to be sampled from the northern versus the southern contractor routes was based on tonnages received at each facility during 1989. The resulting distribution was:

- 82 samples from the northern routes;
- 28 samples from the southern routes.

Due to budget constraints for this study, sample sorting could occur at one site only during any given sampling day. Approximately 10 samples could be sorted during a sampling day. If normal practice were followed, this would mean that sorting for southern truckloads would occur on only three days during the year (28 samples/10 samples per day).

Therefore, it was decided to conduct sampling for six days at each of the two transfer stations. In this way, southern route samples could be distributed more evenly throughout the year, reducing the probability of seasonal bias. During days when the sorting crew was at the South Transfer Station, the northern route truckloads to be sampled were redirected to the South Transfer Station.

3. One sampling day per month was randomly selected from the full set of possible sampling days. Days on which collection does not occur, such as weekends and holidays, were excluded from consideration.

The resulting sampling days looked something like this:

March 4th	Friday
April 25th	Monday
etc.	

4. These randomly selected days were assigned alternately to the North and South Transfer Stations, thus:

March 4th	Friday	North
April 25th	Monday	South
etc.		

5. Ten truckloads to be sampled were then randomly selected for each sampling day. The schedule of residential route-collected samples is displayed in Exhibit I-A.

C. Hauler and Transfer Station Participation

The sampling schedules were given to each hauler. The hauler was requested to provide information about:

- geographic area the route covered on the sorting day (the morning and afternoon runs for northern sector), and
- the number of accounts included in the run on that day (or on the route as a whole, for the southern contractor).

As the sampling days approached, the hauler was requested to inform the drivers of trucks to be included in the sample. Each involved driver was then made aware of the process to be followed upon entering the transfer station at the completion of his run.

Transfer station managers were also provided with the schedule of sampling days and other pertinent information. The field manager worked out the details of truck diversion, sample extraction, sorting, and disposal of sorted waste with the transfer station manager at the beginning of each sorting day.

D. Field Sampling Procedures

Pre-established daily sampling schedules, like that shown in Exhibit I-B, were used for each day's sampling. Truck numbers, obtained from the haulers just prior to sampling, were filled in before each sort. As each sample load arrived, the field supervisor recorded the total load weight and approximate arrival time.

The entire truckload of waste was dumped onto the floor or at the edge of the pit. An imaginary 8-section, 2-layer grid (16 cells total) was superimposed on the load, and a randomly selected cell was identified for sampling. Approximately 200-300 pounds of waste were extracted from the designated cell and laid on a clean tarp.

Each sample was sorted by hand into the defined component groups. Baskets were normally used for cans, bottles, food, and other components, depending on the nature of the sample. Clear polyethylene bags were also used to contain component portions. Clear plastic and open baskets allowed the supervisor to see the material as it accumulated and to verify sample purity.

Food containers were separated from the food and classified according to the containers' material. For approximately one-third of all samples, the proportion by weight of food and containers was recorded.

Once a sample had been sorted, its components were weighed on portable scales and recorded on tally sheets, such as that shown in Exhibit I-C.

Each sample was sorted to the greatest reasonable detail, until no more than a small amount of non-sortable material remained. The amount and composition of this "supermix" varied. Generally, supermix consisted of mixed fines and pieces of waste material smaller than two inches. The goal was to sort each sample directly into the component categories, leaving no supermix at all. However, this was frequently not practical.

Any remaining supermix was combined, and its total weight recorded. Approximately 20% by weight of the total supermix was then selected as a subsample. This supermix sample was sorted and weighed using categories listed on the sampling sheet. Based on this subsample, supermix component weights were calculated and added to the appropriate overall component weights.

Exhibit I-A

RESIDENTIAL ROUTE-COLLECTED WASTE SAMPLING PROCEDURE - Route Numbers To Be Sampled

Month	Date	Location	General Disposal (North Routes)	U.S. Disposal (South Routes)
February	TU 20	North TS	SFD AM: 3 7 9 15 24 SFD PM: 14 MFD: 2 4 13 16	SFD: None MFD: None
March	Th 1	South TS	SFD AM: None SFD PM: None MFD: None	SFD: 1 6 9 13 18 + 4 others MFD: 99-1st
April	MO 16	North TS	SFD AM: 9 10 20 SFD PM: 1 2 9 14 18 MFD: 5 6	SFD: None MFD: None
May	WE 9	South TS	SFD AM: 2 4 SFD PM: 13 15 19 23 MFD: None	SFD: 1 6 MFD: 56-2nd, 99-1st
June	FR 15	North TS	SFD AM: 2 5 6 16 18 24 SFD PM: 21 MFD: 2 8 9	SFD: None MFD: None
July	TU 24	South TS	SFD AM: 11 23 SFD PM: 14 23 24 MFD: None	SFD: 3 5 14 18 MFD: 56-1st
August	MO 20	North TS	SFD AM: 1 5 8 12 SFD PM: 5 11 23 24 MFD: 4 14	SFD: None MFD: None
Sept.	TH 13	South TS	SFD AM: 3 10 SFD PM: 9 11 12 19 MFD: None	SFD: 7 10 17 MFD: 99-2nd
October	WE 3	North TS	SFD AM: 11 15 SFD PM: 3 5 10 21 23 MFD: 1 6 14	SFD: None MFD: None
Nov.	TU 20	South TS	SFD AM: 17 20 SFD PM: 10 16 MFD: 12	SFD: 1 9 11 12 MFD: 99-2nd
December	TU 11	North TS	SFD AM: 2 13 17 SFD PM: 1 7 11 13 MFD: 5 7 8	SFD: None MFD: None

NOTE: SFD = Single-family dwelling unit collection
MFD = ultifamily dwelling unit collection

Exhibit I-B

SUPERVISOR'S DAILY SAMPLING RECORD

SAMPLING DATE: 11/20/90					SOUTH TRANSFER STATION		
WEATHER:							
SUPERVISOR:							TOTAL
					SAMPLE	ARRIVAL	LOAD
HAULER	ROUTE	TRUCK	RUN	#	CELL	TIME	WEIGHT
GEN	17	17	1		1		
GEN	20	20	1		7		
GEN	10	10	2		15		
GEN	16	16	2		3		
GEN	12MF		1		11		
US	1		1		9		
US	9		1		13		
US	11		1		10		
US	12		1		6		
US	99MF		2		4		

Exhibit I-C.1

1990 SEATTLE WASTE COMPOSITION STUDY

SINGLE SAMPLE RESULTS								
DATE:						**LOAD NUMBER:**		
DESTINATION:						**LOAD TYPE:**		
ROUTE #:				**TARE:**		**TRAY ONLY**		
RUN #:						**TRAY & BASKET**		
TRUCK #:						**TRAY & TARP**		
SUPERVISOR:						**WEATHER:**		
						TOTAL SAMPLE:		
PAPER								**TOTALS**
Newspaper								
Corrugated Paper								
Computer Paper								
Office Paper								
Mixed Scrap Paper								
Nonrecyclable Paper								
PLASTIC								
PET Bottles								
HDPE Bottles								
Other Plastic Bottles								
Polystyrene								
Plastic Packaging								
Other Plastic Products								
GLASS								
Nonrefillable Beer								
Refillable Beer								
Nonrefillable Soft Drink								
Refillable Soft Drink								
Container Glass								
Nonrecyclable Glass								
METAL								
Aluminum Cans								
Aluminum Containers								
Tin Cans								
Bi-metal Cans								
Ferrous Metal								
White Goods								
Nonferrous Metal								
Mixed Metal/Materials								
RUBBER								
Rubber Products								
Tires								

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Exhibit I-C.2

1990 SEATTLE WASTE COMPOSITION STUDY

					LOAD NUMBER:			
ORGANIC								
Food (excluding containers)								
Prunings								
Leaves and Grass								
OTHER								
Disposable Diapers								
Wood								
Textiles								
Leather								
Ash								
Ceramics, Porcelain, China								
Rock, Concrete, Brick								
Sand, Soil, Nondistinct Fines								
Gypsum Wallboard								
Fiberglass Insulation								
Construction Debris								
HAZARDOUS (excluding spent containers)								
Latex Paint								
Adhesives, Glues								
Oil Paint, Solvents								
Caustic Cleaners								
Pesticide, Herbicide								
Batteries								
Gas, Kerosene								
Motor Oil, Diesel Oil								
Asbestos								
Explosives								
Other Chemicals								

SUPERMIX WEIGHTS:		SUPER SAMPLE COMPONENTS:	LBS.	%
	#1			
	#2			
	#3			
	#4			
	#5			
	#6			
SUPERMIX TOTAL:		SUPERSAMPLE TOTAL:		100

FOOD CONTAINERS ONLY:

COMMENTS:

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Section II. Self-Haul Waste Stream Sampling

A. Objective

The objective of the self-haul sampling task was to understand the sources and composition of waste which is not hauled by City-contracted collectors. This includes waste from individual households and from commercial establishments. For the purposes of this study, vehicles were excluded if they carried nothing but "yard waste" (leaves, grass, branches, and other organic putrescible waste), or nothing but recyclables (to deposit in recycling bins). The Utility separately records the aggregate composition and quantity of these wastes. Two hundred samples total were to be sorted, from January through December, 1990.

B. Sample Selection

In self-haul waste composition studies, specific vehicles cannot be preselected for sampling. This is because, by definition, self-haul waste is not collected through the use of established routes. Therefore, vehicles to be sampled must be chosen by a random systematic process (i.e., every "nth" vehicle is selected). Using 1989 monthly figures, the consultants determined the tonnages and the number of self-haul vehicles entering the transfer stations.

The proportion of samples taken at the North versus South Transfer Stations was determined based on tonnages reported as received at each facility during 1989. The resulting allocation was:

- 112 samples from the North Transfer Station;
- 88 samples from the South Transfer Station.

The steps used in determining the loads to be sampled were as follows:

1. One sampling day per month was randomly selected from the full set of possible sampling days. Days on which the transfer stations are not open were excluded from consideration.

2. These randomly selected days were assigned alternately to the North and South Transfer Stations.

3. There are two major identifiable classes of self-haul vehicles entering the transfer stations: trucks and automobiles. Because automobiles generally haul less weight than trucks do, vehicles cannot be selected systematically as they enter the transfer station; automobiles must be undersampled.

Calculations showed that automobiles contributed 11% of the tons self-hauled in 1989. Determining sample distribution solely on weight contributed would result in only 22 automobiles being sampled (11% of 200 total samples). In order to have enough samples from automobiles to make statistically significant comparisons between trucks and automobiles, it was decided to sample loads from:

- 40 automobiles, and
- 160 trucks.

This resulted in oversampling autos and undersampling trucks.

4. Tonnage figures for 1989 were used to allocate the samples between the North and South Transfer Stations. The allocation resulted in the following sampling frame:

North Transfer Station

Automobiles	26
Trucks	86
TOTAL	112

South Transfer Station

Automobiles	14
Trucks	74
TOTAL	88

5. Historical data for 1989 (on the same day—not date—of the week) were used to estimate the number of automobiles and trucks expected to enter the transfer stations on each sampling day. For each sampling day and vehicle type, this expected value was divided by the number of samples required on that day.

The resulting figure was then multiplied by 0.67 to calculate the "sampling interval," i.e., the number of vehicles to skip before taking a load from the chosen vehicle (e.g., every 5th truck). The reason for using the 0.67 multiplier was to compensate for the lower number of self-haul vehicles expected in 1990, compared to 1989. This expectation is based on trends observed between 1987 and 1989.

In summary, the sampling interval was calculated using data from the same day of the same week in 1989 and the following formula:

$$\frac{\text{Anticipated number of autos (or trucks)}}{\text{Desired number of samples}} * 0.67 = \text{Sampling interval}$$

6. The starting times (i.e., the set of unique times at which vehicle selection commences on each sampling day) were randomly selected from the first 120 minutes of operation at the site for each sampling day. An exception to this practice was when historical data showed no vehicles arriving for a significant time after opening. In these cases, the starting times were randomly selected from the first 120 minutes after vehicles were expected to start arriving. Exhibit II-A shows the overall self-haul sampling schedule.

C. Transfer Station and Customer Participation

Transfer station managers were provided with sampling schedules and vehicle diversion guidelines appropriate to their sites. On the sampling day, gatehouse staff identified every "nth" vehicle from the two subsets of vehicle types (autos and trucks) arriving at the site. The driver was informed that the usual dump fee would be waived in exchange for his participation in the study. Each selected vehicle was tagged and instructed to enter the transfer station.

The Field Supervisor then briefly explained to the driver that a waste sampling project was being conducted for the City of Seattle, that his vehicle was randomly selected for inclusion in the study, and that anonymity was assured. The driver was asked whether he lived within the Seattle City limits, and if so, to identify the approximate street address from which the waste in his vehicle came. Census tracts were subsequently assigned to each sample based on this address.

The supervisor asked the driver to complete the "Self-haul Driver's Questionnaire" as his vehicle was unloaded.

Some drivers selected for the sample brought part of their loads to the transfer station for deposit in the recycling bins. These loads were dumped, examined, and weighed like any others in the sample. Recyclable materials were then placed in recycling bins.

Exhibit II-A

1990 SEATTLE WASTE STREAM SAMPLING STUDY

SELF-HAULED WASTE SAMPLING PROCEDURE

Month	Date	Start	Location	Total	REQUIRED SAMPLES Trucks/Int	Autos/Int
January						
February	TU 27	9:37	South TS	15	12/every 5th	3/every 6th
March	TH 29	8:45	North TS	19	15/every 8th	4/every 15th
April	TH 12	7:38	South TS	15	13/every 10th	2/every 16th
May	TH 3	9:31	North TS	19	15/every 8th	4/every 15th
June	TH 7	7:49	South TS	14	12/every 11th	2/every 17th
July	SU 15	10:31	North TS	19	14/every 8th	5/every 20th
August	TH 23	7:45	South TS	15	13/every 8th	2/every 13th
Sept.	TU 25	8:23	North TS	19	15/every 7th	4/every 10th
October	TH 11	7:20	South TS	15	12/every 5th	3/every 5th
Nov.	SA 17	8:33	North TS	19	14/every 8th	5/every 15th
Dec.	TU 4	7:09	South TS	14	12/every 6th	2/every 6th

NOTE: "Int" = Sampling interval

D. Field Sampling Procedures

Forms like the one shown as Exhibit II-B were used by the gatehouse attendant to count and select sample vehicles and to record sample vehicle information. After entering the transfer station, each sample customer was asked by the field supervisor the questions on the Driver's Questionnaire. This form appears as Exhibit II-C.

Self-hauled loads which, in the estimation of the field supervisor, obviously totaled less than 100 pounds, were passed up in favor of the next available vehicle of the appropriate type. This was necessary in order to adjust for the inevitable occurrence of extremely small samples. Large loads from which a random 300-pound sample could not be reasonably obtained due to the physical difficulty in segregating the load were sampled in their entirety. Such samples were proportionately adjusted downward to 300 pounds prior to data entry.

The sorting and weighing procedures were the same as for residential route-collected loads, except that material too heavy for the scale (greater than 130 pounds) was either estimated or derived by subtracting the weights of the remaining components from the vehicle's total net load weight.

Exhibit II-B

1990 SEATTLE WASTE COMPOSITION STUDY

SELF-HAUL SAMPLING COUNT & WEIGHT SHEET	DATE:	7/15/90
	LOCATION:	NTS
	START TIME:	10:31

VEHICLE SELECTION PROCEDURE:

1. Count ALL vehicles depositing material EXCEPT the following:

   RESIDENTIAL HAULERS (US or General)
   CLEAN GREEN vehicles
   100% RECYCLERS

2. Classify vehicles by type of license plate, either PASSENGER or TRUCK.
3. Cross off numbers until the end of a row is reached. THE LAST VEHICLE IS TO BE SAMPLED.
4. PARTICIPANTS DUMP FREE. Use Account # 9680 to record into computer.
5. For sample participants, record E.T.A., PLATE number, and NET weight.

PASSENGER PLATES: EVERY 20th VEHICLE

													E.T.A.	PLATE	GROSS	TARE	NET
1	1	2	3	4	5	6	7	8	9	10	11	12					
	13	14	15	16	17	18	19	20									
2	1	2	3	4	5	6	7	8	9	10	11	12					
	13	14	15	16	17	18	19	20									
3	1	2	3	4	5	6	7	8	9	10	11	12					
	13	14	15	16	17	18	19	20									
4	1	2	3	4	5	6	7	8	9	10	11	12					
	13	14	15	16	17	18	19	20									
5	1	2	3	4	5	6	7	8	9	10	11	12					
	13	14	15	16	17	18	19	20									

TRUCK PLATES: EVERY 12th VEHICLE

													E.T.A.	PLATE	GROSS	TARE	NET
1	1	2	3	4	5	6	7	8									
2	1	2	3	4	5	6	7	8									
3	1	2	3	4	5	6	7	8									
4	1	2	3	4	5	6	7	8									
5	1	2	3	4	5	6	7	8									
6	1	2	3	4	5	6	7	8									
7	1	2	3	4	5	6	7	8									
8	1	2	3	4	5	6	7	8									
9	1	2	3	4	5	6	7	8									
10	1	2	3	4	5	6	7	8									
11	1	2	3	4	5	6	7	8									
12	1	2	3	4	5	6	7	8									
13	1	2	3	4	5	6	7	8									
14	1	2	3	4	5	6	7	8									

SH1-90

Exhibit II-C

DRIVER'S QUESTIONAIRE

VEHICLE PLATE:_____ E.T.A:_____

APPROXIMATE ADDRESS:_____

VEHICLE TYPE:
_____ AUTO
_____ PICK-UP/VAN
_____ OTHER TRUCK
_____ TRAILER

IF RESIDENTIAL:

_____ 1. single family
_____ 2. multi-family

IF COMMERCIAL:

_____ a. manufacturer
_____ b. wholesaler
_____ c. retailer
_____ d. restaurant
_____ e. hotel/motel
_____ f. office
_____ g. health facility
_____ h. educational
_____ i. transportation shop
_____ j. other services

If residential, continue below:

1. Do you participate in a recycling program? YES NO

If YES, is it: _____ City's curbside program?
_____ take to neighborhood recycling center?
_____ collected by a recycler?
_____ take to transfer station?
_____ Other?_____

2. Did you bring any of this load to recycle it? YES NO

If YES, what materials?_____

3. What do you think is the most compelling reason for recycling?

_____ Protect the environment
_____ Conserve resources
_____ Money for recyclables
_____ Other:_____

4. If not recycling now, what are some of the reasons?

_____ no place/no room to store recyclables
_____ no convenient way to dispose of recyclables
_____ don't have many recyclables
_____ too messy/too much trouble/too inconvenient
_____ other reasons:_____

SH2-90

Section III. Database Description

Sampling records maintained in the database contain a wide variety of load-specific information in addition to the actual composition sampling results. Each record includes route, demographic, and delivery characteristics of the sample. A description of the data fields and structure of each record follows.

A. Structure of the Database

Each record consists of 74 fields of fixed size and type, requiring a total of 338 bytes per record. The database file is compatible with the dBase III Plus file construct. A complete description of all fields is given below.

The field types used include Character, Date, Numeric, and Memo. The Character and Date field widths represent the total formatted width of the field. Dates are carried as "mm/dd/yy". Numeric field widths represent the total number of digits contained, including the decimal point, if applicable. Each record could have an associated Memo of up to 64K characters in length.

Fields 14 to 19 were initially set aside for future use; places for three numeric variables and three character variables were included in these extended variable fields. Fields 14 and 15 have been filled with census tract income levels for residential and self-haul loads, as applicable.

Field #	Field Name	Type	Width	Dec.	Description
1	LOADTYPE	C	1		Type of Load
2	RD1	C	3		Route Designator 1
3	RD2	C	2		Route Designator 2
4	DATE	D	8		Date Collected
5	RESTYPE	C	1		Residence Type
6	GENTYPE	C	1		Generator Type
7	DESTNATN	C	1		Load Destination/Origin
8	VECLTYPE	C	1		Vehicle Type
9	TRACT1	C	5		Census Tract 1
10	TRACT2	C	5		Census Tract 2
11	RECYCLE	C	1		Recycling ?
12	HAULER	C	1		Name of Hauler
13	NUMACCTS	N	3	0	# of Accounts
14	NV1	N	5	0	Income Level (Residential)
15	NV2	N	5	0	Income Level (Self-Haul)

Field #	Field Name	Type	Width	Dec.	Description
16	NV3	N	5	0	Num Var 3
17	CV1	C	3		Char Var 1
18	CV2	C	3		Char Var 2
19	CV3	C	3		Char Var 3
20	TOTLOADWT	N	6	0	Net Total Load
21	TOTSAMPWT	N	5	1	Net Total Sample
22	NEWSPAP	N	5	1	Newspaper
23	CORRPAP	N	5	1	Corrugated Paper
24	COMPPAP	N	5	1	Computer Paper
25	OFFPAP	N	5	1	Office Paper
26	SCRAPAP	N	5	1	Mixed Scrap Paper
27	NRPAP	N	5	1	Other Paper
28	DIAPERS	N	5	1	Diapers
29	PETBOT	N	5	1	PET Bottles
30	HDPEBOT	N	5	1	HDPE Bottles
31	STYRO	N	5	1	Expanded Polystyrene
32	NRPLAS	N	5	1	Plastic Packaging
33	HARDPLAS	N	5	1	Other Plastics
34	NRBEER	N	5	1	Nonrefill Beer Bottles
35	REBEER	N	5	1	Refill Beer Bottles
36	NRPOP	N	5	1	Nonrefill Pop Bottles
37	REPOP	N	5	1	Refill Pop Bottles
38	CNTGLAS	N	5	1	Container Glass
39	NRGLASS	N	5	1	N/R Glass
40	ALCANS	N	5	1	Aluminum Cans
41	ALCONT	N	5	1	Aluminum Containers
42	TINCAN	N	5	1	Tinned Cans
43	BICANS	N	5	1	Bi-metal Cans
44	FERRMET	N	5	1	Ferrous Metals
45	WHTGDS	N	5	1	Large Appliances
46	NONFERR	N	5	1	Non-ferrous Metal
47	MIXMET	N	5	1	Mixed Metals
48	RUBBER	N	5	1	Rubber Products
49	TIRES	N	5	1	Tires
50	FOOD	N	5	1	Food
51	PRUNINGS	N	5	1	Prunings
52	LEAVES	N	5	1	Leaves and Grass
53	WOOD	N	5	1	Wood
54	TEXTILES	N	5	1	Textiles
55	LEATHER	N	5	1	Leather
56	ASH	N	5	1	Ashes
57	CHINA	N	5	1	Ceramics/China
58	ROCKS	N	5	1	Rocks/Concrete
59	FINES	N	5	1	Dirt/Sand/Fines
60	GYPSUM	N	5	1	Gypsum Wallboard
61	INSUL	N	5	1	Fiberglass Insulation
62	DEBRIS	N	5	1	Construction Debris

Field #	Field Name	Type	Width	Dec.	Description
63	LATEX	N	5	1	Latex Paints
64	GLUE	N	5	1	Glues/Adhesives
65	SOLVENT	N	5	1	Oil-based paints
66	CLEANER	N	5	1	Cleaners
67	PESTS	N	5	1	Pesticides
68	BATTS	N	5	1	Batteries
69	GAS	N	5	1	Gasoline
70	OIL	N	5	1	Motor,Diesel Oil
71	ASBESTOS	N	5	1	Asbestos Products
72	EXPLODE	N	5	1	Explosives
73	CHEMICAL	N	5	1	Other Chemicals
74	MEMO	M	10		Comments, etc...

B. Individual Record Structures

There are four types of sample loads represented in the database. These "LOADTYPEs" are:

Route-collected Residential
Route-collected Commercial
Route-collected Commercial Pure
Self-hauled

The database fields applicable to the records for each of these load types are described below. Only the header information is listed, because all records contained a complete set of components (Fields 22 -73) and a memo field (Field 74).

Fields which were not applicable to an individual record, or contained missing values, were filled with an "X" or "-9" for Character and Numeric fields, respectively. Except for those records which included census tract income levels, all extra variables (Fields 14-19) have missing value identifiers in them.

RESIDENTIAL RECORDS:

Field #	Field Name	Type	Width	Dec	Description
1	LOADTYPE	C	1		Type of Load
2	RD1	C	3		Route Designator 1
3	RD2	C	3		Route Designator 2
4	DATE	D	8		Date Collected
5	RESTYPE	C	1		Residence Type
7	DESTNATN	C	1		Load Origin
9	TRACT1	C	5		Census Tract 1
10+*	TRACT2	C	5		Census Tract 2
11	RECYCLE	C	1		Recycling?
12	HAULER	C	1		Name of Hauler
13+	NUMACCTS	N	3	0	# of Accounts
14++	NV1	N	5	0	TRACT1 Median Income
15++	NV2	N	5	0	TRACT2 Median Income
20	TOTLOADWT	N	6	0	Total Load Weight
21	TOTSAMPWT	N	6	1	Total Sample Weight

\+ Not applicable to RESTYPE 2 (multifamily)

* Tract 2 pertains to RESTYPE 1 (single), and may or may not be applicable for an individual record

++ As applicable for individual record

COMMERCIAL RECORDS:

Field #	Field Name	Type	Width	Dec	Description
1	LOADTYPE	C	1		Type of Load
2	RD1	C	3		Route Designator 1
3	RD2	C	2		Route Designator 2
4	DATE	D	8		Date Collected
6	GENTYPE	C	1		Generator Type
7	DESTNATN	C	1		Load Destination
11	RECYCLE	C	1		Recycling?
12	HAULER	C	1		Name of Hauler
20	TOTLOADWT	N	6	0	Total Load Weight
21	TOTSAMPWT	N	6	1	Total Sample Weight

COMMERCIAL PURE RECORDS:

Field #	Field Name	Type	Width	Dec	Description
1	LOADTYPE	C	1		Type of Load
2	RD1	C	3		Route Designator 1
3	RD2	C	2		Route Designator 2
4	DATE	D	8		Date Collected
6	GENTYPE	C	1		Generator Type
7	DESTNATN	C	1		Load Destination
12	HAULER	C	1		Name of Hauler
20	TOTLOADWT	N	6	0	Total Load Weight
21	TOTSAMPWT	N	6	1	Total Sample Weight

SELF-HAUL RECORDS:

Field #	Field Name	Type	Width	Dec	Description
1	LOADTYPE	C	1		Type of Load
2	RD1	C	1		Route Designator 1
3	RD2	C	1		Route Designator 2
4	DATE	D	8		Date Collected
5+	RESTYPE	C	1		Residence Type
6+	GENTYPE	C	1		Generator Type
7	DESTNATN	C	1		Load Destination
8	VECLTYPE	C	1		Vehicle Type
9*	TRACT1	C	5		Census Tract 1
14++	NV1	N	5		TRACT1 Median Income

\+ One, or the other, as applicable (residential or commercial determination)
* Applicable only if residential, and if within City limits
++ As applicable for individual record

C. Field Definitions and Descriptions

Each field accepts only those values or characters which are specified as valid types of input. The valid entries and allowable ranges for each field are given below. A definition of the field is also given.

Field #	Field Name	Valid Inputs
1	LOADTYPE Load Type	R = Residential C = Commercial P = Commercial Pure S = Self Haul
2	RD1 Route Designator 1	(See Note Below)
3	RD2 Route Designator 2	(See Note Below)
4	DATE Date load was collected (not necessarily date of sample sorting)	MM/DD/YY

NOTE: SAMPLE NUMBERS

The first four fields collectively form the "Sample Number" of each record. There is no "Sample Number" field, per se. Each Sample Number is unique, providing the user with a reference identifier for any given record, during both data collation and program use. These fields are also the four sorting key variables used by the program to sequentially store unprocessed data. The default sorting hierarchy is by DATE, LOADTYPE, RD1, and RD2. All data entry files and primary databases are organized according to these key variables.

The allowable valid inputs for the RD1 and RD2 fields are specific to the LOADTYPE of each record. Route Designator 1 could be any combination of three numbers or letters signifying the route number for all but Self-Haul samples. Self-Haul samples use this field for the first three vehicle license characters. Route Designator 2 identifies whether the AM or PM portion of a Residential route was sampled. For Commercial and Commercial Pure loads, RD2 represents the truck type: Roll Off, Front Loader or Rear Loader. The 24-hour arrival time designation is contained in this field for Self-Haul samples. The construction of "Sample Numbers" is given below:

Residential
Sample Number: R(_____)(___)(_____)

- MMDDYY: Date Collected
- AM or PM portion of Route?
- XXX: Three-character Route (e.g. "065")

Commercial
Sample Number: C(_____)(___)(_____)

- MMDDYY: Date Collected
- __: Truck type: RO, FL or RL
- XXX: Three-character Route (e.g. "0S4")

Commercial Pure
Sample Number: C(_____)(___)(_____)

- MMDDYY: Date Collected
- __: Truck type: RO, FL or RL
- XXX: Three-character Route (e.g. "002")

Self Haul
Sample Number: S(_____)(___)(_____)

- MMDDYY: Date Collected
- ##: 24-hour arrival time of Load
- XXX: First three characters of License

5	RESTYPE Residence Type	1 = Single-family 2 = Multi Family X = Not Applicable
6	GENTYPE Commercial Generator Type	A = Manufacturer B = Wholesaler C = Retailer D = Restaurant/Eatery E = Hotel/Motel/Inn F = Office - Private or Government G = Health Facility H = Educational Institution I = Transportation Shop J = Other Service K = Mixed Generator Types X = Not Applicable
7	DESTNATN Origin or destination of load	S = South Transfer Station or residential service area N = North Transfer Station or residential service area C = Newcastle Landfill B = Bayside Disposal's yard E = Evergreen (Seattle Disposal's yard)
8	VECLTYPE Type of Self Haul Vehicle which delivered the load	A = Passenger Auto (passenger plates) P = Pickup Trucks, Vans (truck plates) T = Other Trucks, and cars with trailers (truck plates) X = Not Applicable
9	TRACT1	##### - a five-digit number

10	TRACT2 Census Tract(s) from which Residential or Self Haul sample was collected	corresponding to one of 130 possible census tracts. Two decimals are implied. Two tracts may be listed for each Residential Single Family Load, or one for each Self Haul Residential Load within City limits. X = Not Applicable
11	RECYCLE For Residential: For Commercial:	Y = Yes N = No X = Not Applicable Was Curbside Recycling in effect? Would the Hauler normally divert this load for recycling?
12	HAULER Name of residential, commercial, or commercial pure Contract Hauler	B = Bayside Disposal S = Seattle Disposal G = General Disposal U = US Disposal X = Not Applicable
13	NUMACCTS Approximate Number of Residential Accounts served by the load	### - from 1 to 999 -9 = Not Applicable

14, 15, 16	NV1, NV2, NV3 Numerical Variable 1 Numerical Variable 2 Numerical Variable 3	#####—a five-digit numerical variable reserved for future use. (filled with "-9" identifier) EXCEPT: Single-family residential and residential self-haul within City limits contain TRACT1 and TRACT2 Median Income in NV1 and NV2, respectively.
17, 18, 19	CV1, CV2, CV3 Character Variable 1 Character Variable 2 Character Variable 3	XXX—a three-character alpha-numeric variable reserved for future use. (Filled with "X" identifier)
20	TOTLOADWT Total Net Weight in pounds of the Load from which the sample was taken	###### - up to a maximum of 999,999 lbs.
21	TOTSAMPWT Total Net Weight in pounds of the Sample, derived from the sum of all component weights	####.# - up to a maximum of 9,999.9 lbs..
22 ... 73	COMPONENTS Net Weight in pounds of Sample Component	###.# - up to a maximum of 999.9 lbs

74	MEMO	Field sampling comments, notes and miscellaneous information about the sample	Any and all text narrative is allowed in this field. This field is not an active processing field; it is part of the total historical record of the sample.