

The Regional Municipality of Halton
“WasteWatch” Program
- Waste Characterization Study Final Report -

Prepared with Funding from the Waste Diversion Organization

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Executive Summary

In October of 1999, Regional Council adopted a new waste management strategy that included a program called “WasteWatch”. The purpose of the “WasteWatch” Program is to monitor on an ongoing basis of four times a year the amount, nature and composition of the waste that is generated by the residents in Halton and sent to the Regional landfill. As well, the “WasteWatch” program is intended to assist in the evaluation and development of current and future waste management programs in the Region such as the “BlueMax”, “WasteLess” and "WasteThree" programs.

January of 2000 marked the beginning of the “WasteWatch” program and was followed by three additional sampling periods - May/June, September and November. The focus of the study was on low density, detached and semi-detached housing.

Methodology

The sample size was calculated to be 150 households from across Halton, which is statistically significant at a 90% confidence limit on a Regional level. The selection of the sample areas was accomplished using a multi stage sampling approach, grouping the 150 households into 15 clusters of 10 houses each in order to make collection easier. Each cluster was collected and sorted twice over a two-week period in order to obtain capture rates for recycling and yard waste. Collection was spread over five days, sorting three clusters each day. The clusters were randomly selected from individual garbage collection routes that were also randomly selected from the collection days. In order for the result to be representative of the overall population, the breakdown of the number of clusters from each municipality was not even (Burlington – 5, Oakville – 4, Halton Hills – 3 and Milton – 3).

The garbage from each cluster was collected separately by two regional employees using a pick-up truck and taken to the Halton Waste Management Facility for sorting and classification by five sorters. Yard waste and recycling were not collected but weighed at the curb, the weights recorded and left for regular collection.

At the landfill, each cluster was first weighed in order to get a pre-sort weight (which was used to calculate sampling error as well as the average bag weight) then sorted into different waste classes (see appendix A). Each waste class was then weighed, the waste re-bagged and sent to the on-site container station for disposal. Some of the initial 34 waste classes were broken down further in subsequent audits to better evaluate the material.

Results

Total Waste Generated

- In the initial January audit it was estimated that the total of residential waste landfilled for the year 2000 would be approximately 78042.3 tonnes. This total does

not include the waste that would be collected from the IC&I sector. The actual weight of residential garbage sent to landfill was 78130.92 tonnes.

- In order for the results to be representative among the four municipalities (although not statistically significant) the total waste generated was compared on a weight/day basis.
 - Garbage only:
 - Weight/dwelling /day = 1.74 kg
 - Weight/person/day = 0.56 kg
 - Recycling only:
 - Weight/dwelling /day = 0.80 kg
 - Weight/person/day = 0.26 kg

Breakdown of the Waste Categories

- Overall the amount of glass and metal in the garbage was quite low at 3% each.
- The paper category made up about 20% and over half of that was recyclable material.
- The plastics category was 10% of the entire garbage stream and half of that weight consisted of film plastic.
- Organics made up around 40% of the entire garbage stream. Over half of all the organics were considered to be compostable material.
- The miscellaneous category made up about 23% of the total garbage weight. A large portion of the miscellaneous category was the unclassifiable items sub-category one third of which was kitty litter and cage materials
- Less than 1% of the total garbage stream consisted of HHW and the most frequent item found was household batteries.

Percent Capture of Recyclables

- Halton captured 66% of all the available recyclable material in the entire waste stream (recycling and garbage).
- 29% of the total waste stream (recycling and garbage) consisted of recyclable material (19% was the recyclable material diverted away from landfill and 10% was the recyclable material still in the garbage stream). The 19% diversion of recyclable material is lower than the value obtained through regional data of 24%.

Set Out Frequencies

- Out of the 89% of homes that set out garbage, 87% of those homes also set out blue boxes and 62% of them set out blue bags.
- Although Halton has a six bag limit for garbage, the average number of bags of garbage/house was only 2.44 with a standard deviation of 1.67. The most common number of bags, or the mode, seen at the curb during the study was one.

Conclusions

- Of the materials that are found in the garbage, 47% could be recycled through Halton's existing program are.
- Capturing the aluminium currently set out in the garbage would not have much of an effect on diversion percentages but would a definite impact revenue.
- Organics was consistently found to be the largest waste class for all four sampling periods. The implementation of a full kitchen organics program would increase waste diversion substantially. In addition, ways to enhance the participation of backyard composting should also be looked at.
- Lowering the limit of garbage bags per household per set out could increase participation in the recycling and composting programs.

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1.0 Introduction

The Region of Halton, which had a population in 2000 of approximately 372 000 people, is comprised of the four municipalities of Burlington, Halton Hills, Milton and Oakville. The individual municipalities ran their own waste management operations until it became the responsibility of the Region in 1996.

1.1 Past Waste Management Initiatives

In the 1980's Halton began to implement new waste management programs in order to reduce the amount of waste going to landfill. These programs included:

- the implementation of Household Hazardous Waste (HHW) special collection days in 1986 (a permanent depot opened in 1994);
- the start of the Region wide blue box program in 1987;
- Provincially subsidized backyard composter sales by the area municipalities from the mid-80's until 1994; and
- the start of the curbside yard waste collection and composting program in 1996.

In 1989, the province introduced new guidelines to reduce the amount of waste going to landfill by 25% by 1992 and 50% by the year 2000. In 1992 the Region opened the Halton Waste Management Site in rural Milton, at that time the landfill had a projected life expectancy of 20 years and a total waste capacity for about four million tonnes. As part of the landfill's original Certificate of Approval, Halton was to also implement an Energy From Waste (EFW) facility after eight years of operation to ensure that the 20 year life expectancy of the landfill was met.

When the landfill opened in 1992, the amount of waste managed by the Region decreased from about 200 000 tonnes of waste/year in 1989 to 100 000 tonnes of waste/year.

1.2 Present and Future Waste Management Initiatives

In October of 1999, Regional Council adopted a new Solid Waste Management Strategy for the Regional Municipality of Halton. The intent of the new strategy was to divert 58% of residential waste away from the landfill, an increase from 37%, which would extend the life of the landfill from the estimated 36 years to 47 years.

One component of the Strategy is the "WasteWatch" Program. The purpose of the "WasteWatch" Program is to monitor on an ongoing basis the amount, nature and composition of residential waste that is generated by households in Halton Region. As well, it would be used to evaluate the current waste management programs already in place and help determine the direction of future programs.

The data for the "WasteWatch" waste characterization study was obtained from four sampling periods (January 10 to January 21, May 29 to June 9, September 11 to September 22 and November 6 to November 17) in the year 2000. The "WasteWatch"

program characterizes the waste management practices of low-density, detached and semi-detached, homes for all four municipalities in the Halton Region.

The data collected for the “WasteWatch” program represents snapshots in time from grab samples that were used to make a composite sample representative of Halton Region. Municipal data is noted in this report, however the results of this study are statistically significant on a Regional level only and not on a municipal level. Background data and values have been obtained through Regional records.

2.0 Methodology

2.1 Sample Size

The sample size was determined using the standard deviation calculated from the individual weight of garbage per household. The following equations were used to determine the standard deviation and sample size.

$$\text{Variance} = \sigma^2 = \frac{\sum x^2 - (\sum x)^2/n}{n-1}$$

$$\text{Standard Deviation} = \sigma = \sqrt{\sigma^2}$$

$$\text{Sample Size} = N = (1.645\sigma / 0.10X)^2$$

σ = standard deviation of weight per household

x = the individual weight of garbage per household per set out

n = the number of household weights obtained

N = the number of households to be used in the waste study

X = the average weight of garbage per household per set out

The individual weight of garbage per household was recorded from 301 (n) households in Burlington and Oakville. It was calculated that the average weight per household per set out was 13.98 kg (X) with a standard deviation of 10.42 kg (σ). Using those values, the sample size of the waste composition study was calculated to be 150 households with a minimum confidence limit equal to or greater than 90%.

For the purpose of collection, the sample size was divided into 15 clusters of 10 houses each. A July 1991 Ontario Ministry of the Environment Report, Procedures for the Assessment of Solid Waste Residential and Commercial, volume 3 of the Ontario Waste Composition Study, cited Klee and Carruth (1971) who stated that a sample weight of approximately 90-150 kgs of garbage would compose a representative sample weight (2-7).

2.2 Selection of Sample Areas

Ideally, selection of the sample households would have been done through completely random methods, however for this study it was logistically impossible to do so.

Therefore, a multi-stage sampling approach was taken. The sample size (consisting of 150 households) was divided into five days, collecting and sorting 30 households each day (three clusters). One period of sampling for the entire region took two weeks and each of the designated households was audited twice over that two-week period.

Garbage collection routes were randomly selected from each of the selected collection days using random numbers, except for Milton and Halton Hills where the collection days were the routes. One cluster was randomly chosen from each of the selected routes (using random grids). The method of one cluster to one route was chosen so that the collection trucks could be instructed not to collect from the sample area during the morning, therefore allowing enough time for the samples to be picked up.

Both waste collection contractors were informed by fax and by phone of the areas that they were not to collect from. However, over the course of the study the sample collection crew discovered sample areas where some or all of the wastes were already collected. During the first week of the January sampling period when the sample crew arrived to an area that had already been collected, they choose another set of houses as close as possible to the original cluster. Those houses became the sample areas for the duration of the “WasteWatch” Program.

2.3 Sample Area Collection Procedure

The garbage from each cluster was collected separately at the curb and transported to the Halton Waste Management Site for sorting and classification indoors. Recycling was weighed at the curb (using a 23 kg digital hand held scale with detachable weigh bin), the weights recorded and left at the curb for regular collection. The cluster area, weather conditions, number of bags at the curb and whether or not yard waste and/or recycling were at the curb was also recorded in a field data sheet (appendix B). Sample collection occurred twice for each cluster over the two-week period in order to obtain capture rates for recycling.

In the event that residents were to inquire about the individual collection of their waste the sample collection crew carried a letter detailing the waste study. Residents who were not comfortable participating in the waste study had the option to withdraw. If a resident chose to withdraw from the study, a household would have been added to the end of the cluster, ensuring that 10 households were included in every cluster. Some residents did inquire about the study and were satisfied with the verbal response given.

2.4 Sorting Procedure

At the Halton Waste Management Site bags were segregated and evaluated according to cluster. Each bag was weighed using a 100 kg Cardinal EF 218C-708 bench scale, therefore the average weight per bag, average weight per household and the total weight of each cluster was calculated. The waste from each cluster was then sorted into the waste categories as outlined in the Waste Classification Key (appendix A). Each

category was then weighed and the weight recorded. The process was repeated for each of the three clusters.

The sorted waste was disposed of at the on site container station and Household Hazardous Waste Depot.

2.5 Field Crew

Staffing was a problem at the beginning of each audit regardless of the effort that went in to ensuring that all required staff would be there. It was quickly discovered that five was the optimum number of people to sort approximately 70 bags of waste efficiently in an eight hour day. It was also discovered that sorting became quicker and more efficient as the sort crew became more familiar with the different waste classes.

A temporary employment agency was used to provide personnel to carry out the waste sorting procedure and two Regional employees were used to collect the waste during the morning using a Regional pick-up truck. Collection of the first cluster began at 7:30 a.m. and sorting commenced at 8:30 a.m. while the collection crew continued to pick up the remaining two clusters.

The temporarily employed individuals were made aware of the type of work that they would be carrying out for the audit. It was recommended that if they had any health concerns, they were to make arrangements to consult a health care professional and receive the appropriate vaccinations prior to the start-up of the project. All personnel involved in the sorting procedure were required to have WHMIS training and green patch safety boots. All personnel were supplied gloves, safety glasses, particle respirators and rubber aprons. They were also instructed in the appropriate safety procedures for situations such as contacting sharps (needles and syringes). Sharps were encountered during each sampling period at least once.

3.0 Discussion of Results

Over each of the four two-week sampling periods a total of 30 sample sorts were performed for 15 clusters, the data has been condensed based on the municipality and for the Region but it was not evaluated based on the individual sorts. The sampling error for each sort was within 5% for 110 out of the 120 sorts that were performed during the course of the entire study. During the November sampling period there were minor problems with the bench scale. Those problems may have increased the error between the pre-sort and post-sort weights for that sampling period.

The average cluster weight for each of the four sampling periods can be found in table 1. The average cluster weights all fall between the optimal range of 90 kg to 150 kg. As seen in table 1, the November cluster weights were more variable than the cluster weights for the other three sampling periods.

Table 1. Average Cluster Weights in Kg Year 2000

Month	Total Weight (30 Clusters)	Ave Cluster Weight	Standard Deviation
January	3381.65	112.72	+/- 36.66
May/June	3526.25	117.54	+/- 32.40
September	3851.60	128.39	+/- 31.26
November	3865.00	128.83	+/- 49.41

The results are broken down into total waste generated, composition of residential garbage, recyclable material, set out frequencies and potential waste diversion.

3.1 Total Waste Generated

The number of sample households from each of the four municipalities were not equal (50 from Burlington, 40 from Oakville, 30 from Milton and 30 from Halton Hills), therefore comparing the total waste from each municipality would not be representative. To alleviate the problem, waste generation for the municipalities was evaluated based on waste generation/day/dwelling and waste generation/day/capita. The following equation, taken from the MOE Report, Procedures for the Assessment of Solid Waste Residential and Commercial, volume 3 of the Ontario Waste Composition Study (8-4), was used to calculate total waste generated/day including both garbage and recycling. Garbage is generated over a period of 7 days, whereas recycling is generated over a period of 14 days.

$$\text{Kg/dwel/day} = \frac{(\text{weight of garbage/dwelling})}{7 \text{ days}} + \frac{(\text{weight of recycling/dwelling})}{14 \text{ days}}$$

$$\text{Kg/capita/day} = \frac{\text{kg/dwel/day}}{\text{People/household}}$$

Table 2 shows the total waste generated for each municipality and the Region and includes both garbage and recycling waste for the Year 2000. Calculations in table 2 were done using combined data from all four sampling periods. Yard waste was not included in this calculation.

Table 2. Total Waste Generated/Day (in Kg) Year 2000

Municipality	per dwelling	per capita
Burlington	2.66	0.88
Halton Hills	2.10	0.68
Milton	2.88	0.92
Oakville	2.26	0.70
Region	2.54	0.81

Table 3 shows the combined data from all four sampling periods, broken down into the individual waste sub-categories totalled from each municipality and the Region. Table 3 also shows the weight/dwelling, weight/capita and the percent composition of the individual

garbage sub-categories on the Regional level. Weight/dwelling is based on the total number of households in the sample (including those that did not set out any garbage).

Table 3. Waste Generation in Garbage Stream Year 2000

Municipality (Weight in Kg)									
Category	Burlington	Halton Hills	Milton	Oakville	Region	Wt/Dwelling	Wt/Capita	%Comp.	Wt/Year (tonnes)
Glass									
Clear & Coloured Glass	49.75	23.15	40.95	42.05	155.90	0.52	0.17	1.07%	832.89
Liquor Bottles	16.25	32.50	37.65	23.55	109.95	0.37	0.12	0.75%	587.40
Other Glass	39.35	25.60	21.85	36.10	122.90	0.41	0.13	0.84%	656.59
Glass Sub-total	105.35	81.25	100.45	101.70	388.75	1.30	0.41	2.66%	2076.88
Paper									
Recyclable Paper	339.85	143.75	192.85	244.85	921.30	3.07	0.98	6.30%	4922.02
Magazines & Catalogues	66.60	38.50	38.40	54.05	197.55	0.66	0.21	1.35%	1055.40
OCC	59.00	27.10	31.10	35.55	152.75	0.51	0.16	1.04%	816.06
Boxboard	111.00	70.45	87.20	83.90	352.55	1.18	0.38	2.41%	1883.49
Polycoat	50.20	18.60	32.70	34.55	136.05	0.45	0.15	0.93%	726.84
Other Paper	365.35	207.30	268.75	294.10	1135.50	3.78	1.21	7.76%	6066.37
Paper Sub-total	992.00	505.70	651.00	747.00	2895.70	9.65	3.09	19.80%	15470.18
Metal									
Steel	36.15	18.45	22.20	26.20	103.00	0.34	0.11	0.70%	550.27
Aluminium	25.95	15.05	15.95	16.00	72.95	0.24	0.08	0.50%	389.73
Aerosol Cans	13.15	5.30	8.30	7.85	34.60	0.12	0.04	0.24%	184.85
Other Metal	70.25	36.30	55.95	46.45	208.95	0.70	0.22	1.43%	1116.31
Metal Sub-total	145.50	75.10	102.40	96.50	419.50	1.40	0.45	2.87%	2241.17
Plastics									
PET #1	23.35	18.80	22.45	21.20	73.95	0.25	0.08	0.51%	395.08
HDPE #2 (small mouth)	25.90	12.95	20.05	17.50	76.00	0.25	0.08	0.52%	406.03
PS #6	38.30	14.95	25.65	28.75	107.65	0.36	0.11	0.74%	575.12
HDPE #2 (large mouth)	7.60	3.20	9.55	7.65	28.00	0.09	0.03	0.19%	149.59
PVC #3	3.85	1.65	3.15	3.70	12.35	0.04	0.01	0.08%	65.98
LDPE #4	3.35	1.65	2.55	3.30	10.85	0.04	0.01	0.07%	57.97
PP #5	14.05	8.50	11.10	12.55	46.20	0.15	0.05	0.32%	246.82
Other Plastic #7	112.35	72.90	99.15	69.80	354.20	1.18	0.38	2.42%	1892.30
Plastic Film	224.70	116.95	167.60	171.95	681.20	2.27	0.73	4.66%	3639.29
Plastics Sub-total	453.45	251.00	361.30	336.60	1401.95	4.67	1.50	9.59%	7489.87
Organics									
Kitchen Scraps (produce)	1123.20	543.75	802.65	833.70	3303.30	11.01	3.52	22.59%	17647.77
Kitchen Scraps (meat, dairy & m)	597.10	301.40	491.65	545.90	1936.05	6.45	2.07	13.24%	10343.28
Yard Waste (leaf & brush)	196.00	99.35	104.75	278.75	678.85	2.26	0.72	4.64%	3626.73
Yard Waste (grass)	12.10	38.90	42.85	55.00	148.85	0.50	0.16	1.02%	795.23
Organics Sub-total	1928.40	983.40	1441.90	1713.35	6067.05	20.22	6.47	41.49%	32413.02
Miscellaneous									
Disposable Diapers	277.25	51.60	72.20	197.90	598.95	2.00	0.64	4.10%	3199.87
Rubber Products	29.15	5.55	27.00	10.15	71.85	0.24	0.08	0.49%	383.86
Textiles	153.75	63.35	164.80	87.40	469.30	1.56	0.50	3.21%	2507.22
Construction & Demolition	128.05	114.40	59.90	165.65	468.00	1.56	0.50	3.20%	2500.27
Wood	123.65	34.40	40.65	69.85	268.55	0.90	0.29	1.84%	1434.72
Electronics	17.35	10.15	20.75	25.80	74.05	0.25	0.08	0.51%	395.61
Unclassifiable Items	539.40	370.20	293.90	300.60	1228.10	4.09	1.31	8.40%	6561.08
Other Sub-total	1268.60	599.20	649.30	817.70	3334.80	11.12	3.56	22.80%	17816.06
HHW	45.15	19.85	32.80	18.95	116.75	0.39	0.12	0.80%	623.73
Municipal Total	4938.45	2515.50	3339.15	3831.80	14624.50			100.00%	78130.92
Municipal Weight/House (Kg)	12.35	10.48	13.91	11.97	12.19	12.19			
Municipal Weight/Person (Kg)	4.07	3.37	4.44	3.72	3.90		3.90		
*Weight/dwelling and weight/capita are based on a week of garbage generation, divide by 7 to get a per day value.									
*Category % as well as weights/house and weights/person are based on the Regional totals.									
*Wt/Year is the estimated total category weight in tonnes going to landfill, not including IC&I weights.									

The actual weight of residential garbage sent to the Halton Waste Management Site in 2000 was 78130.92 tonnes and can be found in table 3. The initial January sampling period showed an estimated total weight of 78042.30 tonnes, a difference of 0.11% from the real 2000 total. The January estimate was calculated using the following equation, where the average weight was adjusted by the activity variable in order to make it more representative of the true estimated weight for the year 2000. The activity variable was derived from historical monthly averages.

$$\text{Estimated Weight in Tonnes} = \text{weight/person/day} \times \text{activity variable} \times 365 \text{ days} \times \text{population}$$

3.2 Composition of Residential Garbage

3.2.1. Primary Waste Classification Percent Breakdown

Figure 1 illustrates the percent breakdown of the primary waste classifications for the region as well as for each municipality for all four sampling periods combined. Results for the individual sampling periods can be found in appendix E. The municipal waste classification breakdowns are all comparable to the Regional percentages, with a few exceptions. Although there were some variation among the individual municipalities for the individual sample periods there was no significant difference between the four sampling periods or between the clusters on a Regional level.

The results of the study are only statistically significant on a Regional level, therefore only the Regional figures have been used to illustrate the percent breakdown of the sub-categories within each of the primary waste classifications.

3.2.2. Glass (1-0)

Figure 2. The Regional Percent Breakdown by Weight of Glass Year 2000

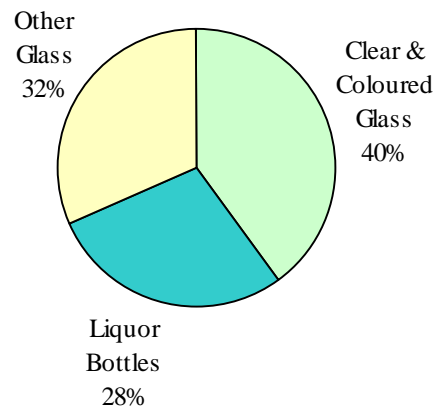
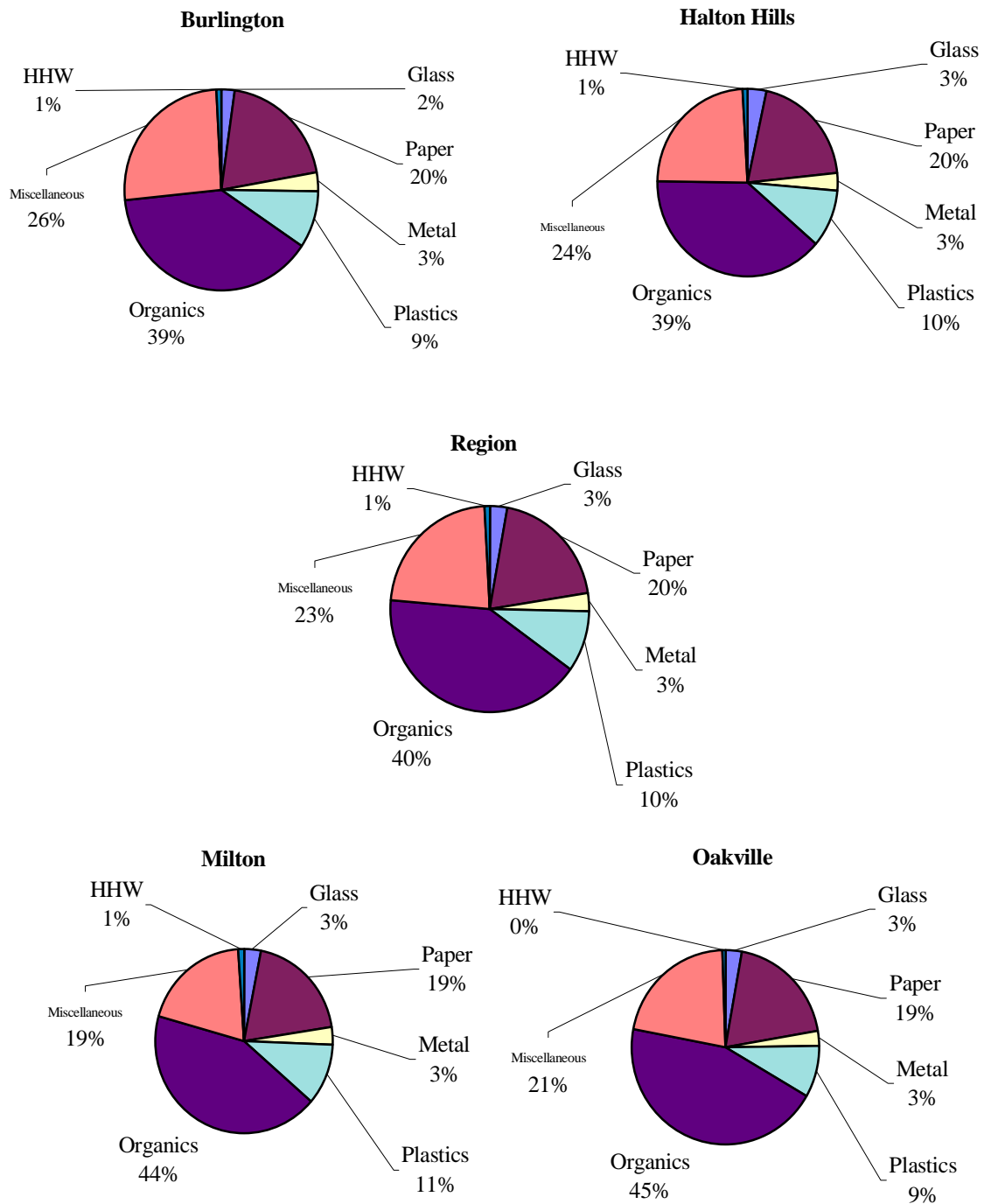


Figure 1. Percent Breakdown by Weight of the Primary Waste Classifications Year 2000



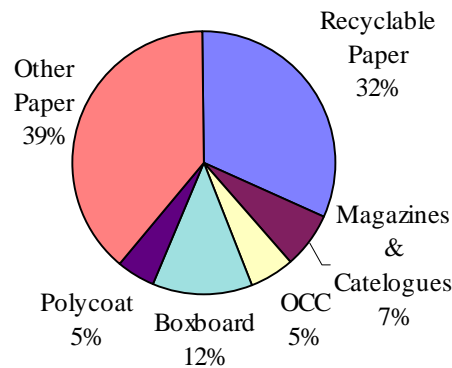
*Note: All percentages have been rounded to the nearest whole number. A value of 0% represents a number less than 0.5%.

Glass was separated into three sub-categories – clear and coloured glass, liquor bottles and other glass. Glass made up roughly 3% of total weight going to landfill, but there was no consistency of glass weight amongst the clusters and the actual volume to weight ratio was very small. For example, in many cases the total weight of clear and coloured glass for one cluster came from a few jars thrown out in a cluster of 10 houses. The other glass sub-category contained several different glass types including dishware, clay and ceramic items and a noticeably high amount of light bulbs.

The results are variable for each municipality for all four sampling periods, however the Regional breakdowns are consistent for all four sampling periods.

3.2.3. Paper (2-0)

Figure 3. The Regional Percent Breakdown by Weight of Paper Year 2000



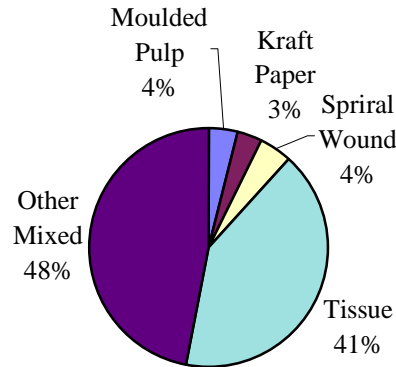
Paper was split into six sub-categories – recyclable paper, magazines and catalogues, old corrugated cardboard (OCC), boxboard, polycoat, and other paper. Approximately three fifths of the paper weight consisted of recyclable fibre material. The other two fifths of all the paper weight was composed of polycoat and the other paper sub-category.

Recyclable paper consisted of large amounts of newsprint as well as smaller amounts of fine paper and envelopes that could have easily been recycled. The recyclable paper sub-category consistently filled at least one 77 L garbage container during each 10 house sort. The magazines and catalogue sub-category was generally in lower volume and only half filled or filled a regular size blue box.

Boxboard, OCC and polycoat were consistently high volumes and made up 12%, 5% and 5% of the total paper category weight respectively. The high volumes to weight ratios were generally due to the packaging and containers not being broken down. Therefore most of the volume consisted of air, more so for boxboard and polycoat rather than for OCC.

The paper category always consisted of high volumes of other paper, such as paper towels and tissues, as well as small pieces of paper and coated paper. Due to such high volumes of other paper, the sub-category was broken down further for the November sampling period. For the fourth sampling period other paper consisted of 39% of the paper category. Approximately half of the paper category consisted of mixed paper and about 40% were tissues and towelling. The other paper breakdown for the November sampling period was representative of all four sampling periods and is illustrated in figure 4.

Figure 4. The Regional Percent Breakdown by Weight of Other Paper November 2000



3.2.4. Metal (3-0)

As with glass, the metal category (figure 5) only made up approximately 3% of the total weight, however unlike glass, metal had a higher volume compared to weight. The volumes of the two recyclable metal sub-categories were comparable to the volume of magazines and catalogues. The steel sub-category consisted almost entirely of food containers, whereas the aluminium sub-category was made-up of foil wrap, trays and pop cans.

Aerosol cans made up 8% of the total metal weight class and during the last three sampling periods they were also categorized into empty or partially full. Figure 6 shows the exact number of aerosol cans found in the garbage for the May/June, September and November sampling periods. As can be seen in figure 6 over 75% of the aerosol cans put in the garbage were empty.

Other metal consisted of various materials ranging from pieces of wire to pots to a bathroom medicine cabinet and was highly variable. The high variability of the other metal sub-category was evident in all four sampling periods.

Figure 5. The Regional Percent Breakdown by Weight of Metal Year 2000

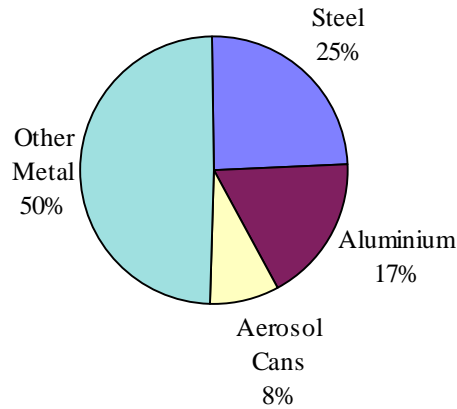
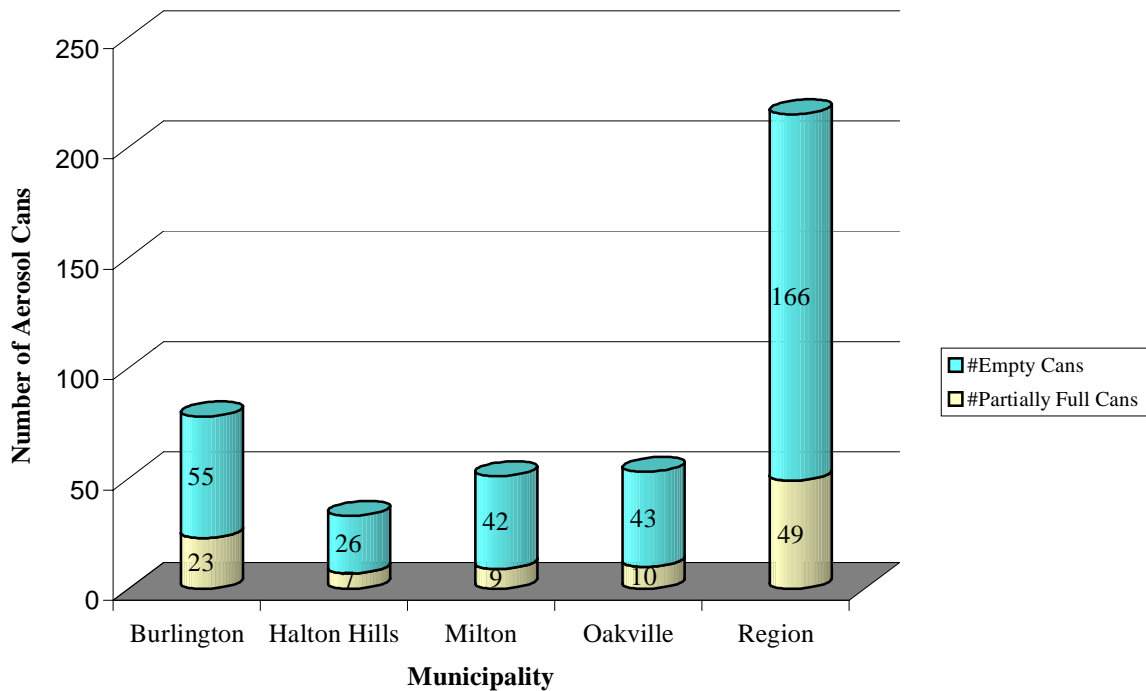


Figure 6. The Number of Aerosol Cans Put Out in the Garbage Year 2000

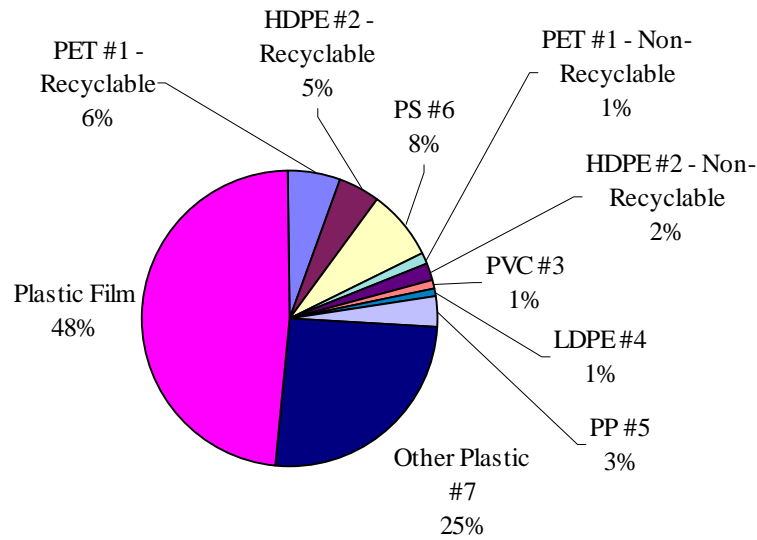


Note: The number of aerosol cans found in the garbage was calculated from data obtained in the May/June, September and November sampling periods.

3.2.5. Plastic (4-0)

Plastics were originally divided into nine different sub-categories, three of which were the recyclable plastic material in Halton – polyethylene terephthalate (PET #1), high density polyethylene (HDPE #2, small mouth containers) and polystyrene (PS #6). Overall plastics made up 10% of the total sample weight, and the ratios for each category remained fairly constant for each sampling period.

Figure 7. The Regional Percent Breakdown by Weight of Plastic Year 2000



The relative volume to weight was very high. For example the amount of PS usually filled a 77 L garbage bin for every cluster sort, as with recyclable paper, however the average weight of recyclable paper per cluster was 7.68 kg whereas the average weight of PS per cluster was 0.90 kg.

PET was composed of water and pop bottles (which can be recycled) and large amounts of packaging (which are not traditionally considered recyclable). PET was broken down into two separate waste classes - bottles (4-1-1) and packaging (4-1-2) for the second, third and fourth sampling periods. It should be noted that PET bottles, which are recycled in Halton Region make up over 75% of all the PET, this means that 4-5% of the total plastics are PET recyclable bottles.

PS was largely made up of take-out containers, other packaging and the typical ‘Styrofoam’ cups and plates. HDPE was split up into two sub-categories – small mouth containers and large mouth containers, the latter is not collected for recycling in Halton, and both were found in relatively small volumes.

Very little polyvinyl chloride (PVC #3) and low density polyethylene (LDPE #4) were found in the waste stream and the LDPE that was found was almost entirely from plastic container lids (LDPE grocery bags were part of the film plastic class).

Polypropylene (PP #5) was noticeable in the waste (it was comparable to HDPE – small mouth containers) and consisted mostly of yoghurt, margarine and take-out containers. The other plastic category contained plastic material that was not readily identifiable, had the #7 on the bottom, was a composite plastic or plastic toys, etc.

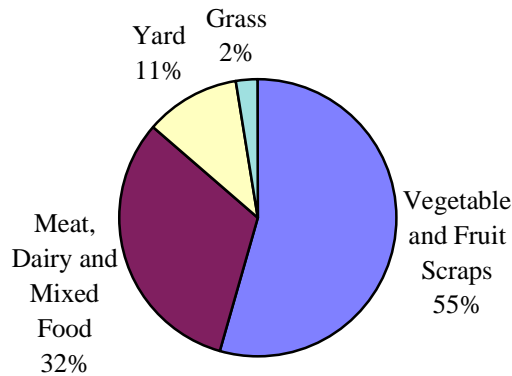
Plastic film made up about half of the weight for plastic (4.8% of the total weight of garbage). Film plastic consisted of grocery bags, plastic wrap, produce bags, food wrappers as well as garbage bags. Due to the quantity of plastic film found during the January

sampling period, plastic film was separated into grocery bags (4-9-1), outer garbage bags (4-9-2) and other plastic film (4-9-3) (such as chip bags, plastic wrap, etc.). The quantities found in the garbage filled three garbage containers for each cluster sort. The breakdown of the plastic film sub-category was as follows: grocery bags made up about 22%; other plastic film made up the largest portion of the sub-category at 57%; and outer garbage bags made up the remaining 21%.

3.2.6. Organics (5-0)

Organics made up about 40% of the total sample weight. Kitchen waste was separated into two separate sub-categories - kitchen waste that could be readily composted in a backyard composter (vegetable and fruit scraps) and organics that could not be readily composted in a backyard composter (meat, dairy and mixed food waste). Yard waste that was present in the garbage was also separated into two categories - leaf/brush and grass.

Figure 8. The Regional Percent Breakdown by Weight of Organics Year 2000



Food waste was generally emptied into the waste bins if it were found in containers or plastic bags and the packaging deposited into the proper category. However, if it was noticed that the food waste was rotting, the container or bag was not opened and the whole package was thrown out as kitchen waste. The weight of the container was considered to be negligible.

Due to the nature of the waste, it was sometimes difficult to separate the kitchen organics into the two sub-categories, however from the year data approximately only 32% is not considered readily compostable in the current Halton program. Therefore 68% of the organics could have been diverted through backyard composting or the Region's curbside yard waste program.

Tables 4 and 5 show the percent capture of the yard waste as well as the breakdown of the yard waste that was set out for yard waste collection. The capture rate of yard waste was significantly lower for Oakville than for the other three municipalities. The actual amount per household of yard waste put out for yard waste collection in Oakville was between one quarter and one third the amount put out by the sample households in the other three

municipalities. As well, the total yard waste put to the curb for both garbage and yard waste collection was about half of the total yard waste put out by the other three municipalities.

Table 4. The Regional Percent Capture of Yard Waste Year 2000

Municipality	% Capture
Burlington	85.04
Halton Hills	88.85
Milton	87.99
Oakville	49.83
Region	81.71

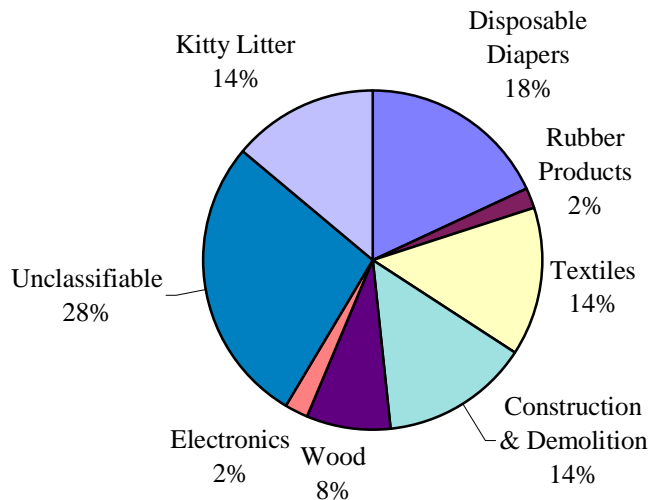
Table 5. The Regional Percent Breakdown by Weight of Curbside Yard Waste Year 2000

Municipality	Leaves	Grass	Brush	Mixed
Burlington	36.97%	45.65%	6.47%	10.91%
Halton Hills	41.38%	26.33%	15.00%	17.28%
Milton	32.98%	39.96%	7.42%	19.64%
Oakville	55.03%	22.18%	1.66%	21.14%
Region	40.31%	34.39%	8.31%	17.00%

*Although grass was set out for collection and included in this study for Oakville, the waste collection contractor was instructed not to collect any grass in Oakville.

3.2.7. Miscellaneous (6-0)

Figure 9. The Regional Percent Breakdown by Weight of Miscellaneous Waste Year 2000



Miscellaneous waste was initially made up of seven different sub-categories – diapers, rubber, textiles, construction/demolition, wood, electronics and unclassifiable items.

The diapers sub-category was highly variable and depended on if one of the households in the cluster had a very small child in diapers, which resulted in a large amount of diapers by weight as well as volume. Rubber waste was also highly unpredictable and generally only small amounts were found, typical items were foam, hose, belting and under-padding for carpeting.

As seen in figure 9, approximately 14% of the miscellaneous category and 3% of the total overall waste consisted of textile material. Textile material was separated into 2 categories - reusable and non-reusable textiles for the September and November sampling periods. It was noticed that for the two sampling periods 38% of the textiles were classified as reusable and 62% were non-reusable.

Construction and demolition waste was mainly plaster and drywall materials (high weight to a relatively low volume) and greatly fluctuated for each sampling period and was inconsistent for each municipality.

Wood waste also fluctuated, however it is interesting to note that a large portion of the wood waste was made up from Clemintine crates during the January and November sampling periods. Electronics composed of anything that was electrical, however for the most part only small items were found with the exception of one small television during the September sampling period.

Unclassifiable items made up the largest portion of the miscellaneous waste class, approximately 42%. The unclassifiable sub-category incorporated any item that could not be placed into any of the other sub-categories, this included animal waste, medical waste, ashes, etc. Animal waste, specifically kitty litter, which has a considerable weight, made up the bulk of all the unclassifiable items. Due to the quantity of kitty litter in the garbage it was segregated into its own waste class for the last three sampling periods.

3.2.8. Household Hazardous Waste (7-0)

Household hazardous waste (HHW) consisted of the occasional partially full paint can, household batteries, automotive oil, glues, small propane tanks, pharmaceuticals, etc., however none were over abundant and the only item that was found on a regular basis were household batteries.

Over the four sampling periods, 13 out of the 120 cluster sorts did not record a value for the weight of HHW and 91 out of the 120 cluster sorts reported a value of less than 1 kg. Batteries were the most frequent item found under the HHW class and made up 15% of the total HHW weight. Oil and paint were rarely found during the sorts but they recorded a high weight due to the nature of the products (41% and 11% of the total HHW weight respectively). The amount of HHW found in the garbage Regionally was 0.80% and ranged from 0.49% in Oakville to 0.98% in Milton.

3.3 Recyclable Material

Table 6 shows the percent capture of recyclable material from the entire waste stream. The capture rate is the percentage of recyclable material set out for recycling at the curb out of all the possible recyclable material found in the entire waste stream (recycling and garbage).

$$\text{Capture Rate} = (\text{weight of recycling set out} / \text{weight of all possible recycling in waste}) \times 100$$

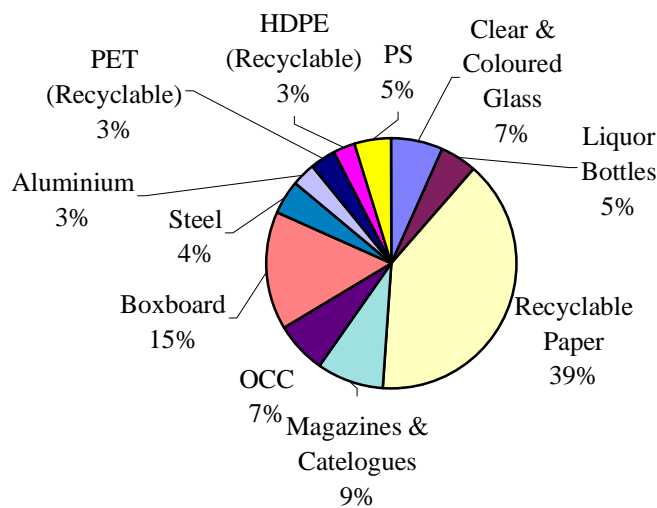
The total capture rate of recyclable material for the four sampling periods fluctuated seasonally. Table 6 details those fluctuations. Burlington shows the highest capture rate of 69% and Halton Hills the lowest at 59%, the overall capture rate for the Region is approximately 66%. This shows that for the four sampling periods combined about two thirds of the recyclable material in the waste stream was recycled for those sample households.

Table 6. The Percent Capture of Recyclable Material Year 2000

Municipality	% Capture				
	January	May/June	September	November	2000
Burlington	58.35	75.93	70.31	68.22	68.98
Halton Hills	41.73	68.22	60.20	63.65	59.40
Milton	54.69	67.79	62.60	75.21	65.44
Oakville	51.14	60.49	72.05	66.77	64.42
Region	53.43	69.70	67.74	68.57	65.61

As illustrated in figure 10, most of the recyclable material that was found in the garbage stream was paper fibre (70% by weight), over half of which was recyclable paper (newsprint and fine paper).

Figure 10. The Regional Percent Breakdown by Weight of Recyclable Materials Found in the Garbage Stream Year 2000



3.4 Set Out Frequencies

Table 7 shows the percent of waste set out for the four municipalities and the Region for all four sampling periods. The number of houses with waste set out at the curb divided by the number of houses in the study multiplied by 100 shows the percent of waste set out.

One could assume that all houses participate in garbage collection and those that did not have their garbage out at the curb during the course of the study would have set it out later that day or the following week. Set out fluctuated according to season and weather. In general, if the weather was not "nice" then there was less waste out at the curb. It is interesting to note that out of the 89% of homes that set out their garbage for collection about 87% of those homes also set out blue boxes and almost 62% of the homes set out blue bags. The January sampling period saw the lowest set out of all types of waste and the other three sampling periods were all relatively equal with respect to set out frequencies.

Table 7. Percent Set Out of Garbage and Recycling Year 2000

%Set Out	Region	Burlington	Halton Hills	Milton	Oakville
Garbage	89.08	89.00	90.83	93.33	84.69
Blue Box	79.83	83.00	79.17	82.50	74.38
Blue Bag	43.50	54.00	48.33	39.17	30.00

Some other interesting statistics related to garbage and recycling set out tendencies are that Regionally, only 15% of the houses set out containers for garbage collection. As well, out of the houses that put garbage out for collection the average number of garbage bags per household was 2.44 with a standard deviation of 1.67, but the most common number of bags found at the curb (the mode) was actually only one (see table 8). In addition, out of the houses that set out blue boxes, approximately 60% set out only one and most blue boxes at the curb were full.

Table 8. The Average Number of Garbage Bags Set Out for Collection/Household Year 2000

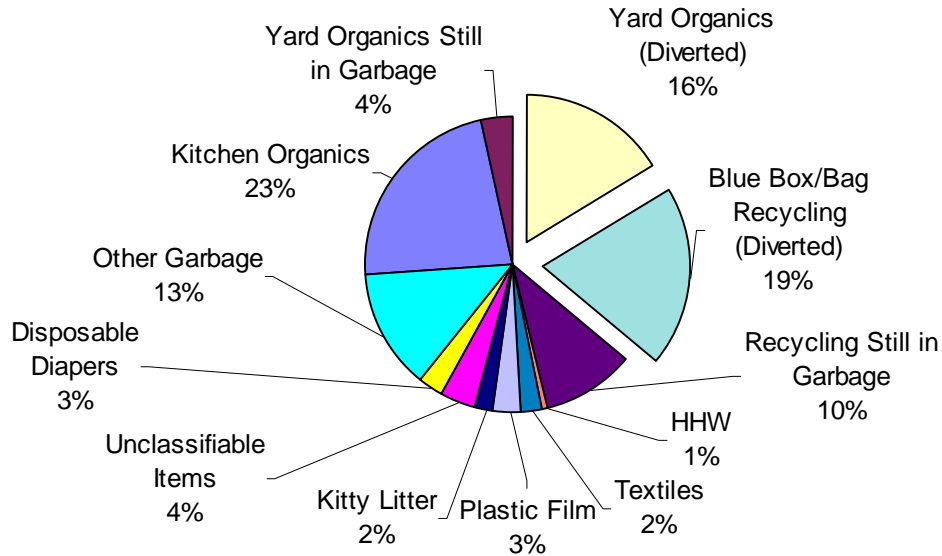
Municipality	All Sample Households	*Set out Adjusted	Mode Bags
Burlington	2.22	2.49	1.00
Halton Hills	1.98	2.18	1.00
Milton	2.46	2.64	2.00
Oakville	2.04	2.41	1.00
Region	2.17	2.44	1.00

*Only the sample households that set out garbage were included

3.5 Waste Diversion

Figure 11 is an overview of the entire waste stream from the sample households. It includes the weight of waste from the garbage, recycling and yard waste streams and illustrates the amount of recyclables and yard waste diverted from landfill by the sample households (19% and 16% respectively). Figure 11 shows that approximately 50% diversion is possible if all recycling, yard waste and household hazardous waste is removed from the residential waste going to landfill. This diversion estimation does not include the diversion of organic materials or additional materials added to the blue box program, nor does it include waste diversion through other waste reduction initiatives.

Figure 11. The Regional Percent Breakdown by Weight of the Total Waste Stream Year 2000



* Other garbage refers to the waste such as miscellaneous waste sub-categories and non-recyclable paper, plastics, metals and glass etc. that did not fall under the identified categories in this figure.

4.0 Conclusions and Recommendations

4.1 Recycling

4.1.1. Capture Rate

The blue box recycling program captured approximately 66% of the available material currently recycled in Halton Region in 2000 according to the data collected from the sample households. Data from other municipalities suggest that a maximum capture rate of 80% could be attained. If Halton could raise its capture rate of the current recyclable materials to approximately 80% it could see a 23.2% diversion of curbside recyclable waste from landfill exclusive of the addition of new materials based on sample data.

The capture rate of recycling fluctuates with season and weather, poor weather shows a poor capture rate. In addition to weather lack of knowledge as to what can and cannot be recycled in Halton influences the capture of recyclable material. Although weather cannot be controlled increasing residents knowledge as to what can and cannot be recycled should be continually explored. Targeted marketing with a positive message that reinforces the idea that residents are making a difference and shows the results of their efforts may be something to look at.

4.1.2. Plastic Film

In the initial January report for "WasteWatch" it was stated that the diversion of plastic film could reduce approximately 2-3% of the total waste going to landfill (assuming a capture rate of between 53-80% of all plastic film). Further investigation was done to assess the feasibility of that statement by dividing the sub-class further for the remaining three sampling periods.

Grocery bags are the common type of plastic film that is recycled in municipal recycling programs. If Halton were to institute the collection of grocery bags in their recycling program it would result in approximately 0.5-1% diversion from the total waste stream. Other plastic film makes up close to 2% of the total waste stream, therefore other promotional and educational techniques should be used to encourage residents to produce less plastic film waste.

If it is feasible to institute a collection program for plastic film careful consideration should be taken to determine the types of film that could be collected and marketed in Halton Region. For example collecting only grocery bags or collecting additional types of plastic film such as plastic wrap and produce bags are some of the issues that would have to be addressed.

4.1.3. Aluminium

Although increased diversion of aluminium from landfill would not substantially impact the amount of waste going to landfill, it would impact the amount of revenue received. It may be advantageous to Halton's recycling program if more intensive promotion of this material was undertaken for both cans and foil products. In addition, the promotion of one product would likely result in the higher capture of other materials.

4.2 Organics

Organics represent the largest waste category in the residential waste stream and has one of the largest environmental impacts on the landfill due to leachate production and carbon dioxide and methane emissions. In 2000 approximately 5800 tonnes of organic material was diverted through backyard composting, however about 26% of residential garbage collected curbside could still be diverted through backyard composting which would substantially reduce garbage collection costs.

According to the 2000 Halton Region Waste Reduction Report the two main barriers to backyard composting are that there is not enough room in the yards of residents and that it is too inconvenient. The move to smaller lot size and the increase of medium and high density homes reduces the flexibility for home composting, however increasing both awareness in composting and accessibility to composters may help to overcome some of the known barriers to home composting. Approximately 34% of homes in Halton are medium or high density housing, therefore curbside collection of kitchen organics (and additional compostable material) would significantly impact waste diversion in Halton Region by

allowing residents who are unable to home compost to divert their organic material from landfill.

A pilot study done by Ottawa-Carleton on organic diversion showed the potential of curbside collection of all organic wastes including traditional backyard composting materials (such as fruit and vegetable scraps) as well as meats, dairy, meal scraps, paper, cold ashes and even kitty litter. The study was done using an open windrow composting system and the results showed that the grade of compost was within the acceptable MOE guidelines.

If a curbside organics collection program was instituted and included additional materials such as those used in the Ottawa-Carleton study, a waste diversion potential of about 21-25% could be achieved at a recovery rate of 66-80% from the total waste stream. Therefore a reduction of the amount of garbage at the curbside by 32-38% would also be realized.

4.3 Household Hazardous Waste

HHW represents less than 1% of the garbage sent to landfill. In 2000 approximately 22000 vehicles used the Regional HHW depot and disposed of about 800 000 L of HHW waste properly. These figures are encouraging, however due to the harmful nature of the material further education and promotion is necessary to ensure safe disposal of the material.

4.4 Bag Limits

The average number of garbage bags set out each week per household was consistent throughout each sampling period and identifies that the current garbage bag limit of six bags per week per household is much higher than necessary. As stated in the initial "WasteWatch" report a lower bag limit of four would satisfy approximately 90% of the residents of Halton and thus possibly encourage residents to recycle and compost more frequently. Recently large urban centres such as Hamilton and Peel Region have moved to implement lower bag limits in order to increase waste diversion.

4.5 In Closing

A waste diversion potential of 65% could be achieved under the current recycling program with the addition of plastic film and a kitchen organics collection program depending on the capture rate and the nature of the organics collected. A higher diversion from landfill is possible with the addition of new recyclable materials to the current program. The potential or actual waste diversion through reduction efforts was not considered for this report, although it would show that waste diversion from the Regional landfill would be higher than what has been stated.

Any changes made to the current waste management programs should be carefully implemented to ensure that residents are well educated about any such changes in order to aid in the acceptance of the new programs.

This report is meant to be a starting point in the review of the current waste reduction programs in Halton Region. The “WasteWatch” Program methodology is not meant to be a static procedure but rather a flexible one that allows for questions to be asked and meaningful results to be obtained in order to further review and revise current and future programs. Future waste studies should break down waste sub-classes further in order to assess the feasibility of adding additional materials to the recycling, household hazardous waste or organics collection programs.

5.0 References

The following Documents were use to assist in the development of the Halton “WasteWatch” Study.

5.1 Works Cited

Gorre and Storrie Limited, Waste Management Branch Ontario Ministry of the Environment. *Procedures for the Assessment of Solid Waste Residential and Commercial, Volume 3 of the Ontario Waste Composition Study*. July 1991: 2-7 & 8-4.

Proctor and Redfern Limited. *Peterborough Demonstration Project: Collection of Plastic Film in the Blue Box – Final Report*. Ontario Ministry of the Environment and Environment and Plastics Institute of Canada. August 1991.

5.2 Works Consulted

Centre and South Hastings Recycling Board. *Blue Box 2000 Breaking 50*. August 1995.

Chubb, N, The Regional Municipality of Peel. *Regional Municipality of Peel, 1993 Backyard Composter Program and Survey Final Report*. July 22, 1994: 10.

Crow, EL, Davis, FA, Maxfield, MW. *Statistics Manual*. New York, USA: Dover Publications, Inc., 1960.

Hassard, TH. *Understanding Biostatistics*. Missouri, USA: Mosby-Year Book, Inc., 1991.

McKenzie-Mohr Associates and Lura Consulting. *Towards Enhanced Waste Reduction and Collection in Halton Region*. April 2000.

Ottawa-Carlton. *Organic Pilot Abstract – the next step...organic diversion*. March 3, 2000. http://www.rmoc.on.ca/Enviro/e_organics_abstract.htm – Internet document.

RMOC – Solid Waste Diversion, Ottawa-Carlton. *Terms of Reference, Residential Waste Characterization Project – 1999*. August 1999. – Faxed document.

Proctor and Redfern Limited. *St. Lawrence Cement Fuel Cost Reduction Study/Environmental Assessment, Addendum to Final Report on Relationship: RDF Project – 3R’s Waste Management Programs*. March 1992 and October 1992.

Regional Municipality of Peel. *Residential Waste Composition Study, Across Four Seasons for the Municipalities of Brampton and Mississauga, August 1993-June 1994*. 1994.

Smith, PD and Gross, RS, The City of Barrie. *Waste Audit Report*. October 5, 1995. – Faxed document.

The Town of Markham and the Ministry of the Environment. *Model Community Demonstration Project Final Report, Volumes 1 and 2.* July 1996.

Appendix A
Classification Key

Waste Classification Key

Glass

Recyclable

- Clear and Coloured Glass – food and beverage containers, not liquor bottles
- Liquor Bottles - any LCBO bottle

Non-Recyclable

- Other Glass – i.e. plate glass (windows, mirrors, automotive), dishware, clay/ceramic material, light bulbs, composite glass

Paper

Recyclable

- Recyclable Paper – i.e. newsprint, fine paper (ledger, envelopes)
- Magazines, catalogues, telephone books
- Old Corrugated Cardboard (OCC) – i.e. layered cardboard with a ripple between the layers, clean pizza boxes
- Boxboard – i.e. cereal, detergent, tissue boxes

Non-Recyclable

- Polycoat – i.e. aseptic drink boxes, juice and milk containers
- Other paper:
 - Moulded Pulp - i.e. egg cartons
 - Kraft Paper - i.e. brown paper bags
 - Spiral Wound - i.e. juice containers, Pringles containers
 - Tissue and Towelling - i.e. tissues, napkins and hand-towels
 - Other Mixed – i.e. highly coloured paper, construction paper, wallpaper, frozen food containers, coated paper, composite paper

Metal

Recyclable

- Steel – food and beverage containers
- Aluminium – food and beverage containers, foil and trays

Non-Recyclable

- Aerosol Cans
 - A count of empty vs full (or partially full) cans
- Other Metal – i.e. nails, wire, pots and pans, composite metal

Plastics

Recyclable

- PET - #1 - Polyethylene Terephthalate - i.e. pop bottles, water bottles, bottles with no handles, dot on the bottom
- HDPE - #2 - High-Density Polyethylene - small mouth containers - i.e. bleach, detergent, line on the bottom
- PS - #6 – Polystyrene - i.e. “Styrofoam”, meat trays, coffee cups, plastic clothes hangers, fragile clear plastic cups, cutlery

Non-Recyclable

- PET - #1 - Polyethylene Terephthalate - packaging
- HDPE - #2 - High Density Polyethylene - large mouth containers - i.e. margarine and ice cream containers
- PVC - #3 - Polyvinyl Chloride - i.e. bottles and jugs with handles, sewer and water pipes, some house siding, floor and wall covering
- LDPE - #4 - Low Density Polyethylene - i.e. flexible and hard container lids
- PP - #5 - Polypropylene - i.e. food tubs, margarine and yogurt containers
- Other - #7 - Waste Plastics - i.e. composite plastics, predominantly plastic or mixed plastic, toys, laundry hampers
- Film Plastic Bags – i.e. grocery bags, fruit and vegetable bags
- Grocery bags
- Outer garbage bags
- Other plastic film

Organics

- Kitchen Scraps - vegetable and fruit scraps
- Kitchen Scraps - meat and dairy products and mixed food wastes
- Yard Waste - leaf and brush
- Yard Waste - grass

Other

- Disposable Diapers
- Rubber Products – i.e. tires, hose, belting, foam, rigid, sheet, other and mixed
- Textiles – Reusable - i.e. leather, clothes, shoes, bags
- Textiles – Non-reusable
- Construction and Demolition – i.e. drywall, plaster, concrete, gravel, asphalt
- Wood
- Electronics – i.e. t.v.'s, stereos, motors
- Unclassifiable Items – i.e. fines, rugs, lint bags, ashes, bandages, feminine hygiene products, sharps
- Kitty Litter and animal waste

Household Hazardous Waste (count/list content/type)

- Household batteries, automotive batteries, partially full paint cans, waste oils (including containers), antifreeze, pharmaceuticals, solvents, propane tanks, glues, etc.

Appendix B
Data Sheets

Classification Record Sheet

Cluster Area: A B C D E F G H I J K L M N O

Date: _____

Number of Bags _____

Total Weight of Cluster _____

Code	Major Category	Sub-Category	Example	Weight (Kg)
1.0	Glass			
1.1	Recyclable	Clear and Coloured Glass	food and beverage containers, not liquor bottles	
1.2		Liquor Bottles	any LCBO bottle	
Sub-total				
1.3	Non-Recyclable	Other Glass	i.e. plate glass (windows, mirrors, automotive) dishware, clay/ceramic material, light bulbs composite glass	
Sub-total				
2.0	Paper			
2.1	Recyclable	Recyclable Paper	newsprint, fine paper (ledger and envelopes)	
2.2		Magazines, catalogues, telephone books		
2.3		OCC	i.e. layered cardboard with a ripple between the layers, clean pizza boxes	
2.4		Boxboard	i.e. cereal, detergent, tissue boxes, etc.	
Sub-total				
2.5	Non-Recyclable	Polycoat	i.e. aseptic drink boxes, juice and milk containers	
2.6		Other paper		XXX
2.6.1		Moulded Pulp	i.e. egg cartons	
2.6.2		Kraft Paper	i.e. brown paper bags	
2.6.3		Spiral Wound	i.e. juice containers, Pringles containers	
2.6.4		Tissue and Towelling	i.e. tissues, napkins and hand-towels	
2.6.5		Other Mixed	i.e. highly coloured paper, construction paper, wallpaper, frozen food containers, coated paper, composite paper	
Sub-total				
3.0	Metal			
3.1	Recyclable	Steel	food and beverage containers	
3.2		Aluminium	food and beverage containers, foil and trays	
Sub-total				
3.3	Non-Recyclable	Aerosol Cans	(DO A COUNT AT END OF SHEET)	
3.4		Other Metal	i.e. nails, wire, pots and pans, composite metal, empty paint cans	
Sub-total				
4.0	Plastics			
4.1.1	Recyclable	PET - #1	i.e. pop bottles, water bottles, bottles with no handles, dot on bottom	
4.2		HDPE - #2	small mouth containers- i.e. bleach, detergent, line on bottom	
4.3		PS - #6	i.e. Styrofoam, meat trays, coffee cups, plastic clothes hangers, fragile clear plastic cups	
Sub-total				
4.1.2	Non-Recyclable	PET - #1	i.e. packaging	
4.4		HDPE - #2	large mouth containers- i.e. margarine and ice cream	
4.5		PVC - #3	bottles and jugs with handles, sewer and water pipes, some house siding, floor and wall covering	

4.6		LDPE - #4	flexible and hard container lids	
4.7		PP - #5	i.e. food tubs, margarine and yogurt containers	
4.8		Other - #7	Waste Plastics- i.e. composite plastics, predominantly plastic or mixed plastic, toys, laundry hampers	
4.9		Film Plastic Bags	broken down into following groups	XXX
4.9.1		Grocery bags		
4.9.2		Outer Garbage bags		
4.9.3		Other Plastic Film		
Sub-total				
5.0	Organics			
5.1		Kitchen Scraps	vegetable and fruit scraps	
5.2		Kitchen Scraps	meat and dairy products and mixed food wastes	
5.3		Yard Waste	leaf and brush	
5.4		Yard Waste	grass	
Sub-total				
6.0	Other			
6.1		Disposable Diapers		
6.2		Rubber Products	i.e. tires, hose, belting, foam, rigid, sheet, other	
6.3.1		Textiles - Reusable	i.e. leather, clothes, shoes, bags	
6.3.2		Textiles - Non-reusable	i.e. scrap material, worn out clothing	
6.4		Construction/Demolition	i.e. drywall, plaster, concrete, gravel, asphalt	
6.5		Wood		
6.6		Electronics	t.v.'s, stereos, motors	
6.7		Unclassifiable Items	i.e. fines, rugs, lint bags, ashes, bandages, feminine hygiene products, sharps, animal waste	
6.7.1		Kitty Litter	including cage material	
Sub-total				
7.0	Household Hazardous Waste		(SORT HHW INTO SMALLER CLASSES, HHW SHEET)	
7.1		Batteries, partially full paint/solvent cans, waste oils (including containers), glues		
Sub-total				
Total				

3.3 Aerosol Cans	Count
# of Partially Full Cans	
# of Empty Cans	

Appendix C
Required Resources

Required Resources

Field Crew

- 2 people to collect and record data at the curb
- 5 people to sort material at facility
- over a 2 week period totalling to 10 days

Vehicles

- 1 truck for collection of garbage

Safety Equipment

- Safety Glasses
- PVC coated heavy duty waterproof gloves
- Coveralls
- Rubber aprons
- Particle masks
- Safety Vests
- Hard Hats
- Green Patch Safety Boots (not supplied)
- Anti-bacterial soap for gloves, hands, face

Sorting Equipment

- 100 kg Bench Scale
- 23 kg Hand Held Scale
- Curved knives to open bags
- Garbage bags
- Sorting Containers - garbage cans/large blue boxes/regular blue boxes
- Shovel, broom and dust pan for clean up
- Magnets
- Tongs
- Tags
- Sharps Container

Appendix D
Health and Safety Issues

Health and Safety Issues for “WasteWatch” Field Staff

The following applies to all temporary employed individuals working on the “WasteWatch” Program.

A. Responsibilities

1. Workers will be required to assist in:
 - a) collecting and sorting residential curbside garbage;
 - b) bagging any loose garbage at the curb;
 - c) weighing recyclables and yard waste at the curb;
 - d) sorting residential garbage into specific classifications at the landfill;
 - e) cleaning up work areas after every sort and at the end of each day.
2. Lifting will be required.
3. All temporary employees must have received WHMIS training prior to the start-up of the project and provide proof of this training.

B. Personal Protective Equipment

The following personal protective equipment should be worn at all times:

1. Grade 1 “Green triangle patch” safety boots
2. Must wear long pants and long sleeve shirts or coveralls
3. Safety glasses, clear and grey lens - supplied
4. PVC coated heavy duty waterproof gloves - supplied
5. Rubber apron – supplied
6. Particulate respirator – supplied
7. Safety Vest (when outside the maintenance building) - supplied

8. Hard Hat (when outside the maintenance building) - supplied.
9. Anti-bacterial soap for gloves, hands, face - supplied
10. Vaccinations – Tetanus booster, diphtheria booster and Hep B are recommended

C. Safety Procedures

1. All workers will be given a site safety orientation and instructed on safety procedures that pertain to their duties. Workers will also be given information about biohazards and how they can protect themselves from risk of exposure.
2. Use tongs to sort through garbage, removing material from the top of pile. Gloves may be used to remove garbage only after the contents are clearly visible and have been checked for sharp objects.
3. Be watchful of sharp and pointed objects when lifting bags. Avoid dragging bags against your legs. Request assistance, if required.
4. Use tongs to remove syringes and place them in sharps container provided. Never pick up a syringe with your hands. Do not try to retrieve a syringe once it is in the sharps container. Refer to Operations Practice 5.07.S (Disposal of Syringes) for more information.
5. All chemicals found in the garbage should be handled with caution. Chemicals with labels should be handled according to instructions on the label and separated into groups of similar products. Chemicals without labels should be handled with extreme caution, separated and not stored or mixed with other chemicals.
6. Caution should be used when potential disease carrying objects such as dead animals, insects, medical waste, faeces are discovered.
7. Maintain personal hygiene during sorting in order to reduce possible disease transmission. Avoid contact with eyes, ears and mouth until face and hands have been thoroughly washed with anti-bacterial soap.
8. All injuries must be reported immediately to the supervisor in charge.
9. It is recommended that if you have any health concerns, you should make arrangements to receive the appropriate vaccinations prior to the start-up of the project.

D. Rules for Temporary Workers (From Landfill)

All temporary workers must follow these site rules:

1. Wear safety boots bearing “green triangle patch”, no exceptions
2. Wear personal protective equipment
3. Wear long pants and long sleeve shirt or coveralls
4. Park your car in parking lots B and C
5. Report to the office upon arrival
6. Sign in and out on required form
7. Do not start work unless you have properly signed in at our office
8. Inform our office when leaving site during work hours
9. Observe ½ hour unpaid lunch period and two paid 15-minute breaks
10. Secure your belongings and valuables against theft
11. Bring your own lunch (no cafeteria)
12. Lunch Wagon arrives around 10:30 and 3:00, but is not guaranteed to show
13. Keep lunch room and washroom clean
14. Bottled water provided
15. Wash your own dishes immediately after use
16. Return all tools and equipment
17. Work safely
18. No foul language
19. No horseplay
20. No smoking in non-designated areas
21. Do not drive our vehicle unless you have clear approval from Manager

Appendix E
Results of Individual Sampling Periods

Table E1. Waste Generation in Garbage Stream January 2000

Municipality (Weight in Kg)									
Category	Burlington	Halton Hills	Milton	Oakville	Region	Wt/Dwelling	Wt/Capita	% Comp.	Wt/Year (Tonnes)
Glass									
Clear & Coloured Glass	10.15	8.2	11.6	10.1	40.05	0.13	0.04	1.18%	924.28
Liquor Bottles	2.75	9.3	12.7	5.1	29.85	0.1	0.03	0.88%	688.88
Other Glass	4.45	8.35	7.3	7.95	28.05	0.09	0.03	0.83%	647.34
Glass Sub-total	17.35	25.85	31.6	23.15	97.95	0.32	0.1	2.90%	2260.51
Paper									
Recyclable Paper	77.35	39.1	51.2	42.5	210.15	0.7	0.22	6.21%	4849.88
Magazines & Catalogues	24.2	10.25	10.65	15.45	60.55	0.2	0.06	1.79%	1397.38
OCC	23.15	5.15	10.2	7.1	45.6	0.15	0.05	1.35%	1052.36
Boxboard	39.75	25.15	30.25	28.65	123.8	0.41	0.13	3.66%	2857.08
Polycoat	14.35	4.85	9.65	8.7	37.55	0.13	0.04	1.11%	866.59
Other Paper	82.15	46	70.85	69.75	268.75	0.9	0.29	7.95%	6202.26
Paper Sub-total	260.95	130.5	182.8	172.15	746.4	2.49	0.79	22.07%	17225.55
Metal									
Steel	13.7	5.95	5.9	5.8	31.35	0.1	0.03	0.93%	723.50
Aluminium	7.55	4.1	4.55	4.85	21.05	0.07	0.02	0.62%	485.80
Aerosol Cans	2.5	0.9	2.3	1.1	6.8	0.02	0.01	0.20%	156.93
Other Metal	10	8.6	4.45	2.7	25.75	0.09	0.03	0.76%	594.26
Metal Sub-total	33.75	19.55	17.2	14.45	84.95	0.28	0.09	2.51%	1960.49
Plastics									
PET #1	5.85	5.6	7.6	5.85	24.9	0.08	0.03	0.74%	574.65
HDPE #2 (small mouth)	6.25	2.6	5.3	2.15	16.3	0.05	0.02	0.48%	376.17
PS #6	8.6	3.7	8.15	8.05	28.5	0.1	0.03	0.84%	657.73
HDPE #2 (large mouth)	2.95	1.2	2.7	1.95	8.8	0.03	0.01	0.26%	203.09
PVC #3	1	0.3	1.4	1.05	3.75	0.01	0	0.11%	86.54
LDPE #4	1.05	0.8	0.85	1.15	3.85	0.01	0	0.11%	88.85
PP #5	4.2	2.55	3.9	3.7	14.35	0.05	0.02	0.42%	331.17
Other Plastic #7	18.7	8.15	20.55	10.8	58.2	0.19	0.06	1.72%	1343.15
Plastic Film	48	23.65	42.2	40.6	154.45	0.51	0.16	4.57%	3564.42
Plastics Sub-total	96.6	48.55	92.65	75.3	313.1	1.03	0.33	9.26%	7225.78
Organics									
Kitchen Scraps (produce)	199.05	135.5	179.5	131.05	645.1	2.15	0.69	19.08%	14887.73
Kitchen Scraps (meat, dairy & mixed)	156.6	91.2	182	154.95	584.75	1.95	0.62	17.29%	13494.96
Yard Waste (leaf & brush)	8.8	0	4.7	2.4	15.9	0.05	0.02	0.47%	366.94
Yard Waste (grass)	0	0	0	0	0	0	0	0.00%	0.00
Organics Sub-total	364.45	226.7	366.2	288.4	1245.75	4.15	1.33	36.84%	28749.63
Miscellaneous									
Disposable Diapers	103.9	5.65	18	32.2	159.75	0.53	0.17	4.72%	3686.74
Rubber Products	9.35	0.4	1.55	4.65	15.95	0.05	0.02	0.47%	368.10
Textiles	46.9	15.65	31.95	15.3	109.8	0.37	0.12	3.25%	2533.98
Construction & Demolition	33.8	16.45	19.55	8.5	78.3	0.26	0.08	2.32%	1807.02
Wood	45.9	2.95	17.35	33.7	99.9	0.33	0.11	2.95%	2305.51
Electronics	2.85	2.35	11.35	0.95	17.5	0.06	0.02	0.52%	403.87
Unclassifiable Items	115.25	112	78.4	57.4	363.05	1.21	0.39	10.74%	8378.53
Other Sub-total	357.95	155.45	178.15	152.7	844.25	2.81	0.91	24.97%	19483.75
HHW	28.95	3.7	6.15	10.45	49.25	0.16	0.05	1.46%	1136.60
Municipal Total	1160	610.3	874.75	736.6	3381.65			100.00%	78042.30
Municipal Weight/House (Kg)	11.6	10.17	14.58	9.21	11.27	11.27			
Municipal Weight/Person (Kg)	3.8	3.27	4.63	2.85	3.59		3.59		

*Weight/dwelling and weight/capita are based on a week of garbage generation, divide by 7 to get a per day value.

*Category % as well as weights/house and weights/person are based on the Regional totals.

*Wt/Year is the estimated total category weight in tonnes going to landfill, not including IC&I weights.

Note: Municipal total weight was an estimation based historical activity variables. The actual weight for residential garbage in 2000 was 78130.92.

Table E2. Waste Generation in Garbage Stream May/June 2000

Municipality (Weight in Kg)									
Category	Burlington	Halton Hills	Milton	Oakville	Region	Wt/Dwelling	Wt/Capita	%Comp.	Wt/Year (tonnes)
Glass									
Clear & Coloured Glass	18.80	5.65	10.05	13.40	47.90	0.16	0.05	1.36%	1098.12
Liquor Bottles	3.55	2.65	13.85	0.70	20.75	0.07	0.02	0.59%	475.70
Other Glass	9.75	2.35	3.60	7.20	22.90	0.08	0.02	0.65%	524.99
Glass Sub-total	32.10	10.65	27.50	21.30	91.55	0.31	0.10	2.60%	2098.80
Paper									
Recyclable Paper	84.05	36.75	57.85	78.50	257.15	0.86	0.27	7.29%	5895.22
Magazines & Catalogues	7.60	1.65	13.20	8.45	30.90	0.10	0.03	0.88%	708.39
OCC	11.65	3.90	6.00	6.75	28.30	0.09	0.03	0.80%	648.78
Boxboard	20.45	11.55	20.40	15.90	68.30	0.23	0.07	1.94%	1565.79
Polycat	14.45	5.75	10.60	10.05	40.85	0.14	0.04	1.16%	936.49
Other Paper	102.25	63.45	65.85	79.15	310.70	1.04	0.33	8.81%	7122.86
Paper Sub-total	240.45	123.05	173.90	198.80	736.20	2.45	0.79	20.88%	16877.54
Metal									
Steel	6.00	3.05	5.70	5.80	20.55	0.07	0.02	0.58%	471.11
Aluminium	6.05	2.25	4.25	3.10	15.65	0.05	0.02	0.44%	358.78
Aerosol Cans	3.10	1.50	1.50	3.15	9.25	0.03	0.01	0.26%	212.06
Other Metal	27.15	6.95	10.70	16.85	61.65	0.21	0.07	1.75%	1413.34
Metal Sub-total	42.30	13.75	22.15	28.90	107.10	0.36	0.11	3.04%	2455.29
Plastics									
PET #1 (bottles)	6.30	3.20	4.50	5.25	19.25	0.06	0.02	0.55%	441.31
HDPE #2 (small mouth)	6.55	2.75	3.65	4.85	17.80	0.06	0.02	0.50%	408.07
PS #6	11.00	4.30	5.85	6.45	27.60	0.09	0.03	0.78%	632.74
PET #1 (packaging)	2.85	0.40	2.10	1.35	6.70	0.02	0.01	0.19%	153.60
HDPE #2 (large mouth)	1.50	0.75	2.20	1.20	5.65	0.02	0.01	0.16%	129.53
PVC #3	0.60	0.75	0.45	0.85	2.65	0.01	0.00	0.08%	60.75
LDPE #4	0.65	0.40	0.50	0.80	2.35	0.01	0.00	0.07%	53.87
PP #5	3.65	1.85	2.60	3.20	11.30	0.04	0.01	0.32%	259.05
Other Plastic #7	27.65	17.20	31.55	22.45	98.85	0.33	0.11	2.80%	2266.16
Plastic Film	61.35	31.90	39.05	44.20	176.50	0.59	0.19	5.01%	4046.30
Plastics Sub-total	122.10	63.50	92.45	90.60	368.65	1.23	0.39	10.45%	8451.38
Organics									
Kitchen Scraps (produce)	297.30	102.25	160.30	235.05	794.90	2.65	0.85	22.54%	18223.24
Kitchen Scraps (meat, dairy & mixed)	150.00	37.45	58.25	97.15	342.85	1.14	0.37	9.72%	7859.91
Yard Waste (leaf & brush)	90.45	47.75	64.40	148.10	350.70	1.17	0.37	9.95%	8039.87
Yard Waste (grass)	2.30	23.85	28.05	36.55	90.75	0.30	0.10	2.57%	2080.46
Organics Sub-total	540.05	211.30	311.00	516.85	1579.20	5.26	1.68	44.78%	36203.48
Miscellaneous									
Disposable Diapers	57.10	5.55	4.50	47.95	115.10	0.38	0.12	3.26%	2638.69
Rubber Products	5.00	0.35	2.85	1.40	9.60	0.03	0.01	0.27%	220.08
Textiles	32.90	11.70	35.85	27.80	108.25	0.36	0.12	3.07%	2481.65
Construction & Demolition	3.55	55.55	26.20	14.75	100.05	0.33	0.11	2.84%	2293.67
Wood	10.90	4.50	4.80	17.15	37.35	0.12	0.04	1.06%	856.26
Electronics	1.05	3.90	2.95	5.25	13.15	0.04	0.01	0.37%	301.47
Unclassifiable Items	46.40	16.85	25.95	24.65	113.85	0.38	0.12	3.23%	2610.03
Kitty Litter	41.50	32.00	23.10	22.65	119.25	0.40	0.13	3.38%	2733.83
Other Sub-total	198.40	130.40	126.20	161.60	616.60	2.06	0.66	17.49%	14135.68
HHW	6.30	5.40	13.00	2.25	26.95	0.09	0.03	0.76%	617.83
Municipal Total	1181.70	558.05	766.20	1020.30	3526.25			100.00%	80840.00
Municipal Weight/House (Kg)	11.82	9.30	12.77	12.75	11.75	11.75			
Municipal Weight/Person (Kg)	3.89	2.99	4.07	3.96	3.76		3.76		

*Weight/dwelling and weight/capita are based on a week of garbage generation, divide by 7 to get a per day value.

*Category % as well as weights/house and weights/person are based on the Regional totals.

*Wt/Year is the estimated total category weight in tonnes going to landfill, not including IC&I weights.

Note: The total municipal weight was derived from historical mid year totals. The actual total for residential garbage was 78130.92 tonnes for 2000.

Table E3. Waste Generation in Garbage Stream September 2000

Municipality (Weight in Kg)									
Category	Burlington	Halton Hills	Milton	Oakville	Region	Wt/Dwelling	Wt/Capita	% Comp.	Wt/Year (tonnes)
Glass									
Clear & Coloured Glass	11.40	5.90	12.15	10.75	40.20	0.13	0.04	1.04%	843.74
Liquor Bottles	1.15	8.55	6.40	6.15	22.25	0.07	0.02	0.58%	467.00
Other Glass	16.90	4.90	7.70	6.75	36.25	0.12	0.04	0.94%	760.84
Glass Sub-total	29.45	19.35	26.25	23.65	98.70	0.33	0.11	2.56%	2071.58
Paper									
Recyclable Paper	86.25	38.70	46.20	51.95	223.10	0.74	0.24	5.79%	4682.57
Magazines & Catalogues	13.00	10.70	12.00	13.75	49.45	0.16	0.05	1.28%	1037.89
OCC	11.80	7.35	7.40	15.90	42.45	0.14	0.05	1.10%	890.97
Boxboard	24.20	15.90	23.40	21.65	85.15	0.28	0.09	2.21%	1787.19
Polycoat	10.65	4.75	6.80	7.70	29.90	0.10	0.03	0.78%	627.56
Other Paper	88.30	47.55	73.55	80.70	290.10	0.97	0.31	7.53%	6088.82
Paper Sub-total	234.20	124.95	169.35	191.65	720.15	2.40	0.77	18.70%	15115.00
Metal									
Steel	8.10	5.40	4.95	6.95	25.40	0.08	0.03	0.66%	533.11
Aluminium	7.30	3.60	3.15	4.45	18.50	0.06	0.02	0.48%	388.29
Aerosol Cans	4.00	1.40	1.95	2.00	9.35	0.03	0.01	0.24%	196.24
Other Metal	20.75	10.80	26.45	20.25	78.25	0.26	0.08	2.03%	1642.36
Metal Sub-total	40.15	21.20	36.50	33.65	131.50	0.44	0.14	3.41%	2760.01
Plastics									
PET #1 (bottles)	5.25	5.15	5.35	4.85	20.60	0.07	0.02	0.53%	432.37
HDPE #2 (small mouth)	4.70	2.90	4.75	5.40	17.75	0.06	0.02	0.46%	372.55
PS #6	10.50	4.55	7.20	7.10	29.35	0.10	0.03	0.76%	616.02
PET #1 (packaging)	1.70	1.80	1.15	0.85	5.50	0.02	0.01	0.14%	115.44
HDPE #2 (large mouth)	1.95	0.55	2.30	3.30	8.10	0.03	0.01	0.21%	170.01
PVC #3	0.55	0.45	0.85	1.10	2.95	0.01	0.00	0.08%	61.92
LDPE #4	0.90	0.40	0.70	1.15	3.15	0.01	0.00	0.08%	66.11
PP #5	2.25	2.15	1.90	2.80	9.10	0.03	0.01	0.24%	191.00
Other Plastic #7	43.55	22.90	30.50	16.25	113.20	0.38	0.12	2.94%	2375.92
Plastic Film	61.85	31.85	44.55	47.75	186.00	0.62	0.20	4.83%	3903.89
Plastics Sub-total	133.20	72.70	99.25	90.55	395.70	1.32	0.42	10.27%	8305.22
Organics									
Kitchen Scraps (produce)	317.50	158.55	229.45	258.55	964.05	3.21	1.03	25.03%	20234.14
Kitchen Scraps (meat, dairy & mixed)	145.45	90.45	120.85	130.45	487.20	1.62	0.52	12.65%	10225.68
Yard Waste (leaf & brush)	72.90	17.85	8.50	21.05	120.30	0.40	0.13	3.12%	2524.94
Yard Waste (grass)	9.80	5.25	14.80	18.45	48.30	0.16	0.05	1.25%	1013.75
Organics Sub-total	545.65	272.10	373.60	428.50	1619.85	5.40	1.73	42.06%	33998.51
Miscellaneous									
Disposable Diapers	80.10	31.95	18.95	49.40	180.40	0.60	0.19	4.68%	3786.36
Rubber Products	3.90	1.50	5.45	2.55	13.40	0.04	0.01	0.35%	281.25
Textiles	40.30	14.50	54.35	19.05	128.20	0.43	0.14	3.33%	2690.75
Construction & Demolition	20.75	0.65	14.10	55.50	91.00	0.30	0.10	2.36%	1909.97
Wood	14.65	2.30	15.20	4.05	36.20	0.12	0.04	0.94%	759.79
Electronics	10.45	0.75	4.65	0.60	16.45	0.05	0.02	0.43%	345.26
Unclassifiable Items	97.45	22.45	20.30	56.50	196.70	0.66	0.21	5.11%	4128.47
Kitty Litter	85.65	54.15	37.70	23.95	201.45	0.67	0.21	5.23%	4228.17
Other Sub-total	353.25	128.25	170.70	211.60	863.80	2.88	0.92	22.43%	18130.02
HHW	6.85	2.00	9.80	3.25	21.90	0.07	0.02	0.57%	459.65
Municipal Total	1342.75	640.55	885.45	982.85	3851.60			100.00%	80840.00
Municipal Weight/House (Kg)	13.43	10.68	14.76	12.29	12.84	12.84			
Municipal Weight/Person (Kg)	4.42	3.43	4.71	3.81	4.11		4.11		

*Weight/dwelling and weight/capita are based on a week of garbage generation, divide by 7 to get a per day value.

*Category % as well as weights/house and weights/person are based on the Regional totals.

*Wt/Year is the estimated total category weight in tonnes going to landfill, not including IC&I weights.

Note: The total municipal weight was derived from historical mid year totals. The actual total garbage was 78130.92 tonnes for 2000.

Table E4. Waste Generation in Garbage Stream November 2000

Category	Municipality (Weight in Kg)					Wt/Dwelling	Wt/Capita	%Comp.	Wt/Year (tonnes)
	Burlington	Halton Hills	Milton	Oakville	Region				
Glass									
Clear & Coloured Glass	9.40	3.40	7.15	7.80	27.75	0.09	0.03	0.72%	560.97
Liquor Bottles	8.80	12.00	4.70	11.60	37.10	0.12	0.04	0.96%	749.98
Other Glass	8.25	10.00	3.25	14.20	35.70	0.12	0.04	0.92%	721.67
Glass Sub-total	26.45	25.40	15.10	33.60	100.55	0.34	0.11	2.60%	2032.62
Paper									
Recyclable Paper	92.20	29.20	37.60	71.90	230.90	0.77	0.25	5.97%	4667.64
Magazines & Catalogues	21.80	15.90	2.55	16.40	56.65	0.19	0.06	1.47%	1145.18
OCC	12.40	10.70	7.50	5.80	36.40	0.12	0.04	0.94%	735.83
Boxboard	26.60	17.85	13.15	17.70	75.30	0.25	0.08	1.95%	1522.19
Polycoat	10.75	3.25	5.65	8.10	27.75	0.09	0.03	0.72%	560.97
Other Paper	92.65	50.30	58.50	64.50	265.95	0.89	0.28	6.88%	5376.18
Paper Sub-total	256.40	127.20	124.95	184.40	692.95	2.31	0.74	17.93%	14007.97
Metal									
Steel	8.35	4.05	5.65	7.65	25.70	0.09	0.03	0.66%	519.53
Aluminium	5.05	5.10	4.00	3.60	17.75	0.06	0.02	0.46%	358.82
Aerosol Cans	3.55	1.50	2.55	1.60	9.20	0.03	0.01	0.24%	185.98
Other Metal	12.35	9.95	14.35	6.65	43.30	0.14	0.05	1.12%	875.31
Metal Sub-total	29.30	20.60	26.55	19.50	95.95	0.32	0.10	2.48%	1939.63
Plastics									
PET #1 (bottles)	3.95	3.40	4.00	4.15	15.50	0.05	0.02	0.40%	313.33
HDPE #2 (small mouth)	3.85	2.10	3.10	2.90	11.95	0.04	0.01	0.31%	241.57
PS #6	8.20	2.40	4.45	7.15	22.20	0.07	0.02	0.57%	448.77
PET #1 (packaging)	2.00	0.90	1.05	1.30	5.25	0.02	0.01	0.14%	106.13
HDPE #2 (large mouth)	1.20	0.70	2.35	1.20	5.45	0.02	0.01	0.14%	110.17
PVC #3	1.70	0.15	0.45	0.70	3.00	0.01	0.00	0.08%	60.64
LDPE #4	0.75	0.05	0.50	0.20	1.50	0.01	0.00	0.04%	30.32
PP #5	3.95	1.95	2.70	2.85	11.45	0.04	0.01	0.30%	231.46
Other Plastic #7	22.45	24.65	16.55	20.30	83.95	0.28	0.09	2.17%	1697.05
Plastic Film	53.50	29.55	41.80	39.40	164.25	0.55	0.18	4.25%	3320.31
Plastics Sub-total	101.55	65.85	76.95	80.15	324.50	1.08	0.35	8.40%	6559.76
Organics									
Kitchen Scraps (produce)	309.35	147.45	233.40	209.05	899.25	3.00	0.96	23.27%	18178.33
Kitchen Scraps (meat, dairy & mixed)	145.05	82.30	130.55	163.35	521.25	1.74	0.56	13.49%	10537.06
Yard Waste (leaf & brush)	23.85	33.75	27.15	107.20	191.95	0.64	0.20	4.97%	3880.27
Yard Waste (grass)	0.00	9.80	0.00	0.00	9.80	0.03	0.01	0.25%	198.11
Organics Sub-total	478.25	273.30	391.10	479.60	1622.25	5.41	1.73	41.97%	32793.76
Miscellaneous									
Disposable Diapers	36.15	8.45	30.75	68.35	143.70	0.48	0.15	3.72%	2904.89
Rubber Products	10.90	3.30	17.15	1.55	32.90	0.11	0.04	0.85%	665.07
Textiles	33.65	21.50	42.65	25.25	123.05	0.41	0.13	3.18%	2487.45
Construction & Demolition	69.95	41.75	0.05	86.90	198.65	0.66	0.21	5.14%	4015.71
Wood	52.20	24.65	3.30	14.95	95.10	0.32	0.10	2.46%	1922.45
Electronics	3.00	3.15	1.80	19.00	26.95	0.09	0.03	0.70%	544.79
Unclassifiable Items	92.00	41.55	62.10	52.35	248.00	0.83	0.26	6.42%	5013.32
Kitty Litter	61.15	40.75	16.45	23.45	141.80	0.47	0.15	3.67%	2866.49
Other Sub-total	359.00	185.10	174.25	291.80	1010.15	3.37	1.08	26.14%	20420.17
HHW	3.05	8.75	3.85	3.00	18.65	0.06	0.02	0.48%	377.01
Municipal Total	1254.00	706.20	812.75	1092.05	3865.00			100.00%	78130.92
Municipal Weight/House (Kg)	12.54	11.77	13.55	13.65	12.88	12.88			
Municipal Weight/Person (Kg)	4.13	3.78	4.32	4.24	4.12		4.12		

*Weight/dwelling and weight/capita are based on a week of garbage generation, divide by 7 to get a per day value.

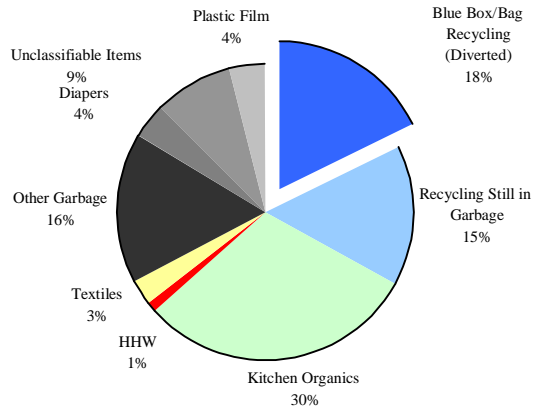
*Category % as well as weights/house and weights/person are based on the Regional totals.

*Wt/Year is the estimated total category weight in tonnes going to landfill, not including IC&I weights.

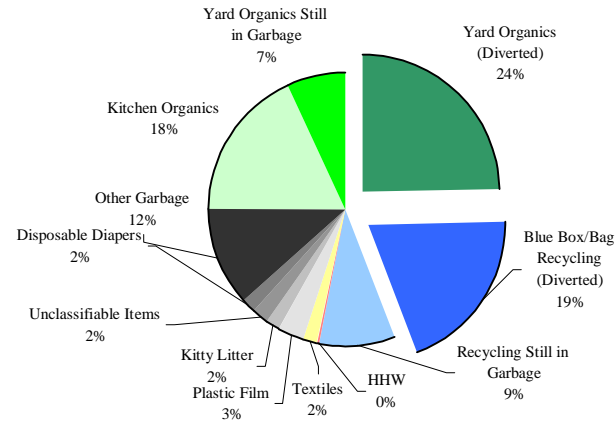
Note: The total municipal weight was the actual total for residential garbage was 78130.92 tonnes for 2000.

Figure E1. The Regional Percent Breakdown by Weight of the Total Waste Stream

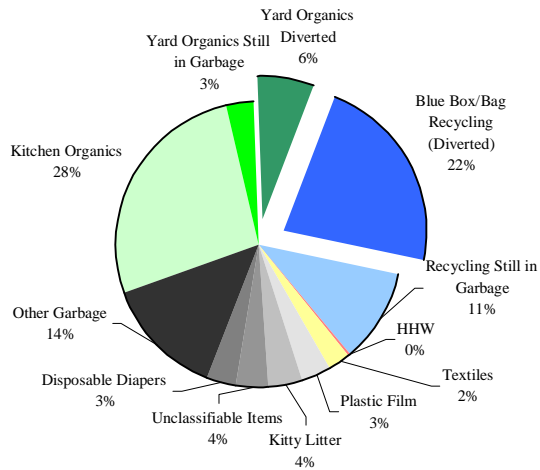
January 2000



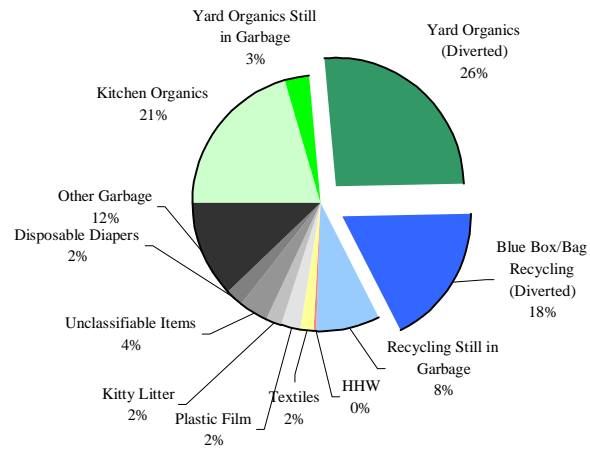
May/June 2000



September 2000



November 2000

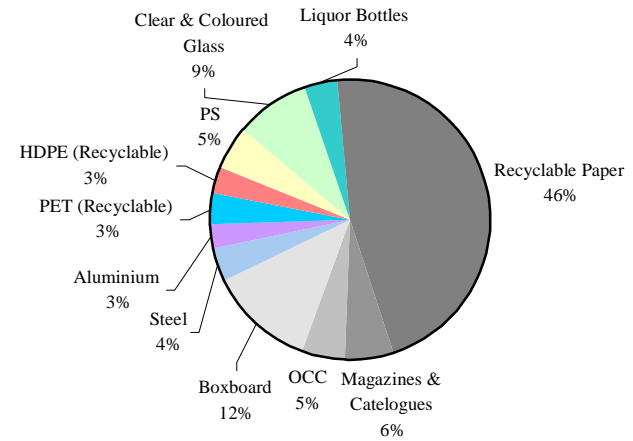
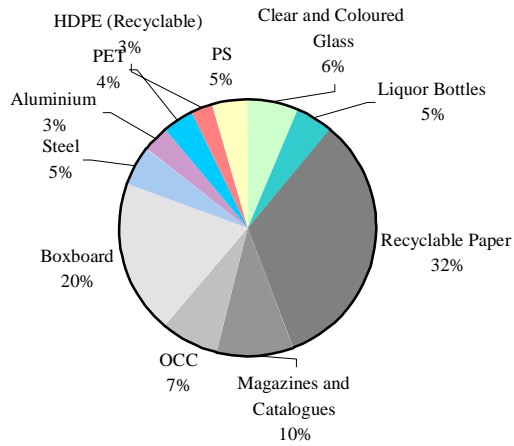


Note: Yard waste composition changed for each season and therefore affected the percent composition. All percentages have been rounded to the nearest whole number. A value of 0% represents a number less than 0.5%.

Figure E2. The Regional Percent Breakdown by Weight of Recyclable Materials Found in the Garbage Stream

January 2000

May/June 2000



September 2000

November 2000

