

# Waste Composition Studies 2000 City of Peterborough



Submitted to:

Ontario Waste Diversion Organization

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## **Executive Summary**

This report documents the results of two baseline waste composition studies conducted in the summer and fall of 2000, and provides some anecdotal interpretation of the results.

Waste and recycling materials were collected from 30 typical middle-income single-family households for two separate three-week periods in August and November 2000. The materials were sorted, categorized, and weighed at the City's compost site.

The results indicate that organics represent almost half of the material in the stream. While much of this material is already captured through the yard waste program diversion could be increased further through an expanded organics collection program, particularly if the program included all kitchen waste, non-recyclable fibres and pet waste.

The Blue Box program also appears to be very successful, with both a high participation rate (92%) and a high overall diversion of recyclable materials (84%).

## **1.0 Introduction**

The City of Peterborough is committed to ongoing monitoring and improvement of its waste diversion program. As part of this, two waste composition studies have been undertaken to measure the participation in the various waste diversion programs. The information from these studies can also be used to plan future waste diversion programs and enhance current programs through targeted promotion and education.

This report documents the results of the baseline waste composition studies, and provides some anecdotal interpretation of the results.

## **2.0 Methodology**

### **2.1 Household Selection**

Collection of materials was undertaken from 30 households for two separate three-week periods. The collection periods were chosen to avoid holidays, and ran from August 15<sup>th</sup> until August 29<sup>th</sup>, 2000 and from November 7<sup>th</sup> to November 21<sup>st</sup>, 2000.

The 30 households were chosen to be typical middle-income housing types and included a duplex and a triplex.

Five contingency homes were also identified to allow for substitution of one of the study homes, should there be problems collecting or sorting the materials from the designated study home (due to non-willingness of household to participate and/or the presence of hazardous medical wastes).

The collection area included both sides of a street over a two-block area. The groups of households were also selected to be as close to the start of the collection route as possible, so that collection and sorting could start early in the day.

## **2.2 Collection**

Collection of materials from the selected households was completed using a rented 16-ft cube-van and a four-person collection crew (one driver and three staff at the curb). The collection crew arrived in the study area ahead of the regular waste haulers to ensure no materials were collected inadvertently by the regular collection vehicles.

The driver recorded the set outs of waste, organic material, and Blue Boxes on a record sheet. An estimation was made for the equivalent number of standard sized bags or boxes per set out (i.e. 1/2 box or 1 1/2 bags) and the curbside crew loaded materials into the cube van. Any waste that was set out in containers as well as Blue Box materials were emptied into clear garbage bags before loading into the cube van.

In order to prevent altered waste generation behavior, contact with residents was avoided as much as possible, and collection was handled efficiently in order to minimize interaction with residents.

During the course of the studies, there were no problems collecting Blue Box organic or waste materials. There were no incidences of haulers inadvertently collecting material from the study homes.

## **2.3 Sorting**

The sorting area was located in the City's compost site. This location proved to be quite suitable.

The sorting area was prepared by setting up a sorting table (of plywood and/or scaffold platforms set on top of 45-gallon drums). Various sorting containers were placed on, under, and beside the table to accommodate the primary sort categories, which were as follows:

### **Current Recyclables**

- OCC
- boxboard and brown paper
- ONP & OMG and phone books
- mixed household paper
- recyclable glass (further sorted into clear and coloured)
- recyclable metals (further sorted down into ferrous and aluminum)
- recyclable rigid plastics (further sorted down into their final categories)
- recyclable plastic film
- gable cartons and tetrapaks (further sorted down into their final categories)
- paint cans
- aerosols

### **Other Garbage**

- possible recyclable plastics
- possible recyclable textiles
- non-recyclable glass
- non-recyclable rigid plastics
- non-recyclable film plastics
- non-recyclable textiles and footwear
- non-recyclable metals
- HHW
- diapers and sanitary wastes
- animal waste including kitty litter
- treasures (potentially reusable items, such as small appliances, toys, etc.)
- building and renovation wastes
- multi-materials
- other non-recyclables

### **Organics**

- compostable kitchen organics (materials suitable for backyard composting)
- non-compostable kitchen organics (materials not suitable for backyard composting, such as meats, bones, fats, dairy, liquids, bulk quantities, etc.)
- compostable, non-recyclable fibres (primarily paper towels, tissues, and some coated boxboard)
- yard wastes (greens and browns)
- yardwaste (brush)

Containers provided by the City were well suited for the waste sort. Materials were always sorted into the same container type, such that the tare weight for each material remained constant throughout sorting and weighing. The tare weight for each sort category was recorded on the sort weights record sheet.

Bags of materials were opened individually, with materials being removed and scattered along the sorting table. The materials were sorted into the various primary sort categories, and when containers were full there was a sub-sort where necessary. They were then weighed with gross and tare weights recorded on the record sheet, and then set aside for refuse or recycling collection.

Containers used for kitchen organics were lined with a plastic bag to prevent the alteration of the tare weight. Most other containers were also lined to keep the containers clean.

All bags of a particular stream (waste, BB, or organics) were sorted before starting on the next stream in order to avoid any confusion.

The sorting crew was equipped with appropriate safety gear, consisting of one-piece Tyvek suits, heavy-duty waterproof gloves. Hypodermic needles from an insulin user were found in bags from one household. These bags were sorted with great care.

### 3.0 Results

#### 3.1 Household Setouts

##### 3.1.1 Yard Waste

Residents of Peterborough are requested to set out yard waste in separate kraft bags or designated yard waste containers. Over the two three-week studies, there were few set outs with yard waste in mixed garbage. The vast majority (99%) of yard waste was set out as specified by the City.

	Aug.	Nov.
Households setting out 0 times in three weeks:	17	19
Households setting out 1 time in three weeks:	3	6
Households setting out 2 times in three weeks:	7	5
Households setting out 3 times in three weeks:	3	0
Households setting out at least once in 3 weeks:	43%	37%
Average setout per 30 households (bags/hhld/week):	.58	.57
Average weight per 30 households (kg/hhld/week):	4.9	3.1
Highest number of bags recorded in one set out:	14	9
Capture rate of all brush:	100%	96%
Capture rate of all greens and browns:	96%	99%
Capture rate of all yard waste:	98%	99%

On the average day over the 6 weeks of the study:

- 77% of households did not set out any yardwaste for collection
- 23% of households set out yardwaste for pick-up
  - 11% of households set out 1 bag or bundle for pick-up
  - 5% of households set out 2 bags or bundles for pick-up
  - 2% of households set out 3 bags or bundles for pick-up
  - 2% of households set out 4 bags or bundles for pick-up
  - 4% of households set out 5 or more bags or bundles for pick-up

##### 3.1.2 Household Waste

The total volume of standard bags of waste collected for sorting over the 2 three-week periods was 208.5 bags. The average number of bags of waste set out by households was thus found to be 1.16 bags/hhld/wk. All households put out waste at least once over each of the three-week periods.

The total weight collected over the 2 three-week periods was 1382.4 kg of waste. Over the six weeks there were 157 household garbage set outs, for 8.8 kg. per set out. The average bag weight was 6.6 kg. Counting all the households, including the non-set-outs,

the average household set out was 7.7 kg/hhld/week for the 30 households over the six weeks.

On an average day over the 6 weeks of the study:

- 13% of households did not set out any garbage for collection
- 87% of households set out garbage for pick-up
  - 50% of households set out 1 bag for pick-up
  - 34% of households set out between 1 and 2 bags for pick-up
  - 2% of households set out 2 to 3 bags for pick-up
  - 1% of households set out more than 3 bags for pick-up

### 3.1.3 Blue Box Materials

The participation rate, defined as the percentage of households setting out a Blue Box at least once during the three-week period, was found to be 93% in August and 90% in November.

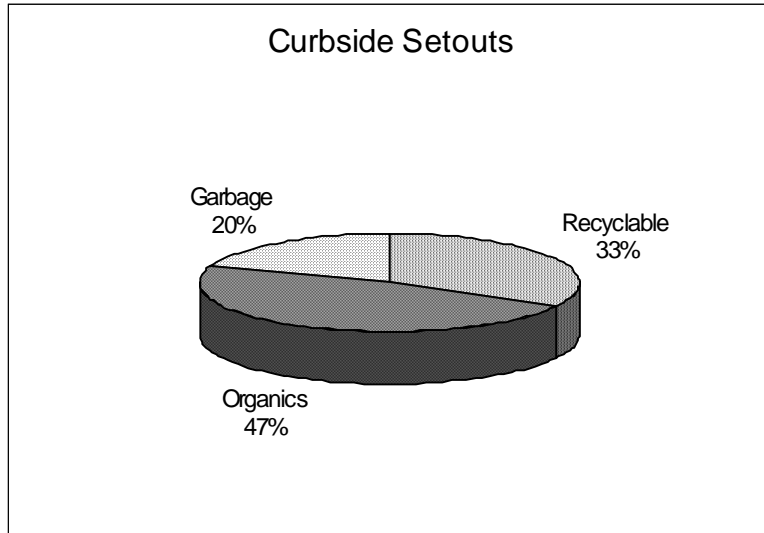
Blue box setouts were further quantified in terms of 'equivalent Blue Boxes'. The volume of recyclables set out by each household was estimated in terms of the number of regular Blue Boxes, to the nearest half box, that it would fill (to account for materials setout next to the Blue Boxes or set outs in other types of containers).

The total number of equivalent Blue Boxes collected was an average setout of 1.04 BB/hhld/week, as an average across all study area households. Few households set out Blue Boxes which were found to be half or less than half full. The weekly set out rate ranged from 70% to 90%.

The total weight of blue box material collected over the three weeks was 825 kg. from 145 set outs in the six weeks. This represents an average of 5.7 kg. per set out or 4.6 kg/hhld/week for all households.

On the average day over the 6 weeks of the study:

- 19% of households did not set out a blue box for collection
- 81% of households set out a blue box
  - 47% of households set out 1 box for pick-up
  - 31% of households set out between 1 and 2 boxes for pick-up
  - 2% of households set out between 2 and 3 boxes for pick-up
  - 1% of households set out 4 boxes for pick-up



### 3.2 Composition of Material Streams

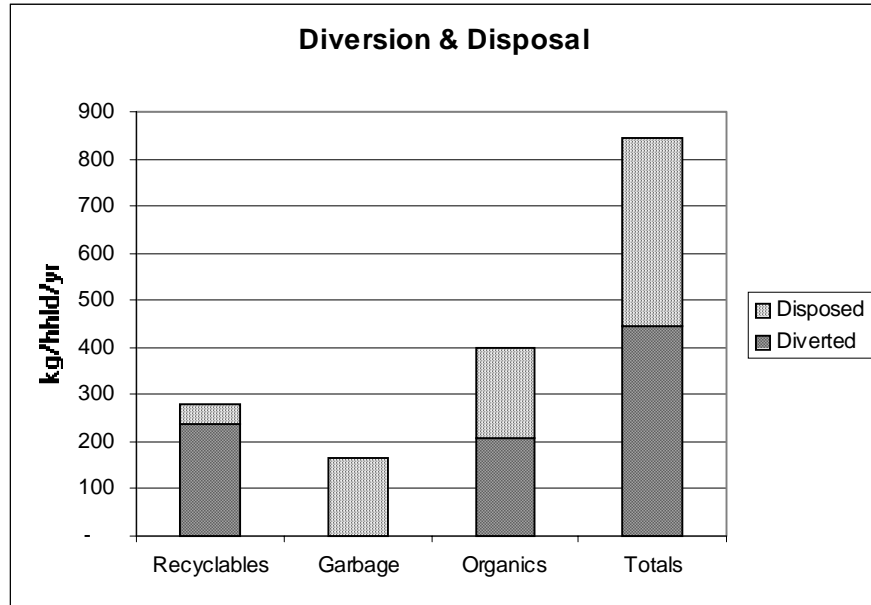
#### 3.2.1 Household Waste - Overview

The total weight of materials sorted over the two three-week periods was 2,931 kg. The average amount of waste setout out per household was thus 16.3 kg/hhld/wk, or 846 kg/hhld/yr on an annualized basis. This was divided among the three primary fractions as follows:

Household Waste - Composition of Fractions

<i>Materials Found in Waste Stream</i>	<i>Diverted (kg/hhld/yr)</i>	<i>Disposed (kg/hhld/yr)</i>	<i>Generated (kg/hhld/yr)</i>	<i>% of total waste</i>	<i>Capture Rate</i>
<b>Recyclables</b>	236	45	281	33%	84%
<b>Garbage</b>	0	166	166	20%	0%
<b>Organics</b>	209	191	399	47%	52%
<b>Totals</b>	445	401	846	100%	53%

As can be seen from the above, one third of the waste stream consists of recyclables currently collected by the curbside program. Almost one half (47%) consists of potentially compostable material. Approximately 60% of the compostable fraction could be composted in a backyard (the greens/browns yard waste plus the vegetable peelings), the rest in a centralized facility. The remainder of the waste stream, only 20%, is made up of materials that are not compostable or recyclable through the blue box.



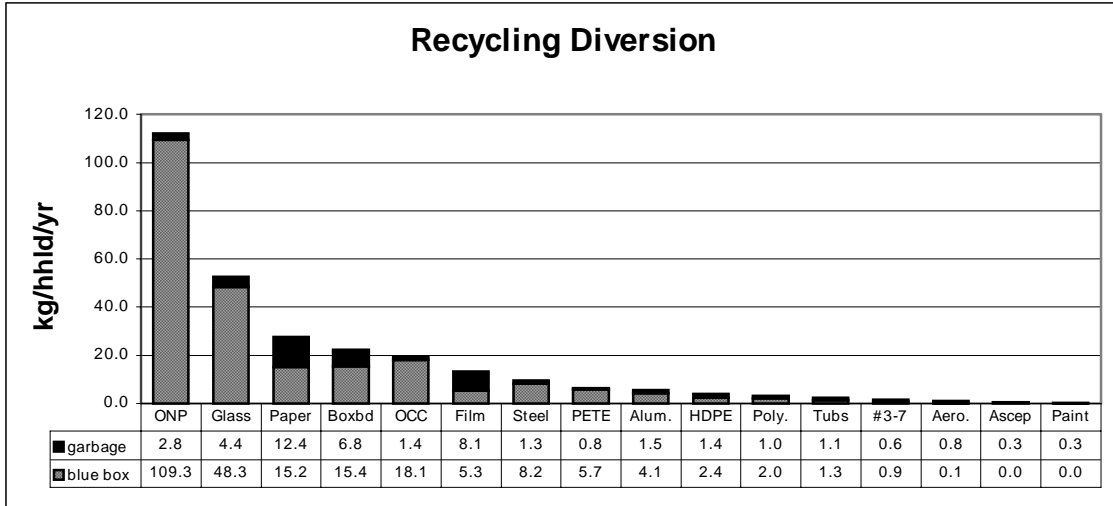
### 3.2.2 Detailed Material Categories

The breakdown of the various fractions into the detailed material categories is presented on page 12 for the Blue Box, waste, and organic streams. Note that the ‘% of category’ column refers to the proportion of the material that is present in the relevant category (current recyclables, potential compostables, or other wastes). The ‘% of Whole’ refers to the material that is present in the entire stream (household waste, organics, and Blue Box).

#### *Current Recyclables*

In general, the capture rate for recyclable materials is very high, with an average of 84%. It can be seen that the traditional fibres (ONP, OMG and OCC) and glass have a high capture rate (up to 98%). These items are thus well integrated into the recycling program.

For some materials, the recycled capture rate is below 50%. This includes film plastics (39%), aseptic containers (11%) and aerosols (13%). This may indicate a need for greater public education and promotion programs.



*Potential Compostables*

The largest proportion of the current waste stream is by far the compostables fraction, representing 47% of current waste stream. Note that the quantity of compostables will vary significantly over the year, peaking during the yard waste months in the spring and fall, and dropping off over the winter. The studies showed a high level of “greens & browns”, even in mid-summer during the August study. It could be expected that yard waste is generated at a rate of 250 kg/hhld/yr. A survey of the households in the study area could be conducted to determine the extent of back yard composting of both kitchen and yard waste.

Note that the absence of yard waste in the household waste suggested that residents are aware of and participating in the yard waste collection program.

Typically, it would be anticipated that the generation of kitchen organics would be approximately 250 kg/hhld/yr. This number would be significantly reduced with a good backyard composting program, such as exists in Peterborough. In fact, the measured average of kitchen organics was 165 kg/hhld/year. This suggests that an average of 85 kg/hhld/year of kitchen waste is diverted through backyard composters.

**Household Waste - Composition of Fractions including Backyard Composting**

<i>Materials Found in Waste Stream</i>	<i>Diverted (kg/hhld/yr)</i>	<i>Disposed (kg/hhld/yr)</i>	<i>Generated (kg/hhld/yr)</i>	<i>% of total waste</i>	<i>Diversion Rate</i>
<b>Totals</b>	530	401	931	100%	57%

When backyard composting is taken into consideration, the overall diversion percentage increases to 57% diversion. The above chart is an estimation of the total diversion of household waste. It adds to the Diversion column the kitchen waste that goes into backyard composters (BYC) — an additional 85 kg/hhld/year. Based on these

assumptions, the total household diversion is 530 kg/hhld/year, or 57% of the residential waste stream.

### *Other Garbage*

The breakdown of Other Garbage by material category is listed in the chart. This fraction amounts to 20% of the total household waste stream, and represents those wastes that are neither recyclable through the blue box nor compostable at this time.

This fraction consists mainly of animal waste (42%), sanitary wastes (8%), building and renovation wastes (9%), and multi-material waste (9%).

The presence of HHW in the waste stream represents about 2% of the “Other Garbage” stream.

Note that the treasures category consisted mostly of marginally reusable items (stuffed toys, knick knacks, decorations, and other household items). Some of these items could potentially be diverted to a reuse program.

### *What’s in the Garbage Stream*

The chart below summarizes the material that is currently put out in the garbage stream for curbside collection. 11% is recyclable through the current blue box program, while 1% could be collected through the current yardwaste collection program.

The majority of the garbage (65% or 259 kg/hhld/year) could be captured with an organics collection program. 40% of this (103 kg/hhld/yr) could be captured through backyard composters, but 156 kg/hhld/yr could only be captured through a curbside collection program.

	<b>Material in the Garbage</b>	
	kg/ hhld/ yr	% of Garbage
<b>Recyclable</b>	45	11%
<b>Organics</b>	259	65%
<i>Pet Waste</i>	69	17%
<i>BYC kitchen</i>	103	26%
<i>Other kitchen</i>	62	15%
<i>NR fibres</i>	22	5%
<i>Yardwaste</i>	3	1%
<b>Other Garbage</b>	97	24%
<b>Total</b>	401	100%

	August		November		Average		%	
Recyclable Material	Available kg/hhld/yr	Average Capture	Available kg/hhld/yr	Average Capture	Available kg/hhld/yr	Average Capture	% of ate gory	% of W hole
OCC	27.31	93%	11.55	93%	19.43	93%	7%	2%
Boxboard & Brown paper	21.92	70%	22.39	69%	22.15	69%	8%	3%
ONP/OMG/Phone books	92.88	97%	131.30	98%	112.09	98%	40%	13%
Household Paper	24.40	46%	30.63	62%	27.51	55%	10%	3%
<b>Glass</b>								
clear	32.95	93%	29.28	90%	31.11	91%	11%	4%
coloured	19.88	84%	23.26	99%	21.57	92%	8%	3%
<b>Sub Total</b>	52.83	90%	52.54	94%	52.68	92%	19%	6%
<b>Ferrous</b>	7.81	82%	11.25	89%	9.53	86%	3%	1%
<b>Aluminum</b>	4.98	82%	6.24	66%	5.61	73%	2%	1%
<b>Plastics</b>								
PETE screw-top	6.22	87%	6.62	90%	6.42	88%	2%	1%
HDPE screw-top	4.08	69%	3.62	55%	3.85	62%	1%	0%
Tubs	2.52	55%	2.22	55%	2.37	55%	1%	0%
Other narrow-neck	1.33	63%	1.51	58%	1.42	61%	1%	0%
sub total plastic containers	14.15	74%	13.97	72%	14.06	73%	5%	2%
Film	15.40	35%	11.26	45%	13.33	39%	5%	2%
<b>Sub Total Plastics</b>	29.55	54%	25.23	60%	27.39	57%	10%	3%
<b>Polycoat</b>	3.01	69%	3.06	64%	3.03	67%	1%	0%
<b>Aseptics</b>	0.26	0%	0.51	17%	0.39	11%	0%	0%
<b>Paint cans</b>	0	0%	0.66	0%	0.33	0%	0%	0%
<b>Aerosols</b>	0.81	21%	1.09	8%	0.95	13%	0%	0%
<b>Total Recyclables</b>	265.74	82%	296.44	86%	281.09	84%	100%	35%
<b>Contamination in B. Box</b>	3.73	1.4%	1.20	0.4%	2.46	0.9%	-	0.3%
<b>Other Garbage</b>		<b>Generated kg/hhld/yr</b>		<b>Generated kg/hhld/yr</b>		<b>Generated kg/hhld/yr</b>	<b>% of ate gory</b>	<b>% of W hole</b>
Possible R Plastics	4.74		1.55		3.15		2%	0%
Possible R Textiles	6.35		4.31		5.33		3%	1%
NR Glass	5.89		5.45		5.67		3%	1%
NR Rigid Plastics	6.24		5.60		5.92		4%	1%
NR Film Plastics	5.38		5.92		5.65		3%	1%
NR Textiles & Footwear	6.99		7.16		7.08		4%	1%
NR Metals	3.93		2.39		3.16		2%	0%
HHW	3.21		2.99		3.10		2%	0%
Diapers & Sanitary	9.01		16.21		12.61		8%	1%
Animal Waste (+ K Litter)	71.67		66.44		69.06		42%	8%
Treasures	9.84		4.28		7.06		4%	1%
Building & Reno	20.81		10.36		15.58		9%	2%
Multi-Materials	12.33		16.97		14.65		9%	2%
Misc./Sweepings	10.06		5.17		7.62		5%	1%
<b>Total Garbage</b>	171.07		148.89		165.63		100%	20%
<b>Organics</b>	Available kg/hhld/yr	Average Capture	Available kg/hhld/yr	Average Capture	Average kg/hhld/yr	Average Capture	% of ate gory	% of W hole
<b>Kitchen Organics</b>								
BYC Compostable	117.80	0%	88.49	0%	103.14	0%	26%	12%
Central Compostable	51.40	0%	72.51	0%	61.96	0%	16%	7%
Compostable NR fibres	22.84	0%	20.95	0%	21.89	0%	5%	3%
<b>Sub Total</b>	192.04	0%	181.95	0%	187.00	0%	47%	22%
<b>Yard Waste</b>								
Greens/Browns	149.85	96%	150.54	99%	150.19	98%	38%	18%
Brush	112.38	100%	12.19	96%	62.28	100%	16%	7%
<b>Sub Total</b>	262.22	98%	162.73	99%	212.48	98%	53%	25%
<b>Total Compostable</b>	454.27	56%	344.68	47%	399.47	52%	100%	47%

## **4.0 Conclusions**

This study has documented the composition of the organics, household waste and Blue Box streams. Overall, there is a high compliance rate with the current diversion systems offered to residents in the study area.

It was found that the organics fraction represents almost half of the current waste stream. While a large percentage of this is currently being diverted through the yard waste program, there is the potential of greatly increasing diversion through an expanded organics collection program, particularly if the program includes all kitchen waste, non-recyclable fibres and pet waste.

The Blue Box program also appears to be very successful, with both a high participation rate (92%) and a high overall diversion of recyclable materials (84%). Some materials, notably household paper and, film plastic, could have a targeted campaign to increase their capture rate.