Stewardship Ontario

Blue Box Materials Cost Allocation Study

Final Report

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MacViro

Stewardship Ontario Blue Box Materials Cost Allocation Study
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1. Introduction

Packaging and Printed Paper Stewards pay fees as calculated by the Stewardship Ontario Pay In Model. Payments to Ontario municipalities for the net cost of the municipal Blue Box Program represent the major component of the Stewards' fees. Two of the three factors in the approved funding formula, the Net Cost Factor and Equalization Factor require the net cost for managing each of the following materials within the municipal Blue Box stream:

Printed Materials	Packaging Materials	
Newspaper	Old Corrugated Containers	Polyethylene Terephthalate
Magazines and Catalogues	Old Boxboard	High Density Polyethylene
Telephone Directories	Gabletop Cartons	Polystyrene
Other Printed Paper	Aseptic Containers	Plastic Film
	Paper Laminants	Plastic Laminants
	Steel Cans	Other Plastics
	Steel Aerosols	Clear Glass
	Steel Paint Cans	Coloured Glass
	Aluminum Cans	LCBO Clear Glass
	Aluminum Foil	LCBO Coloured Glass

To determine the net cost of managing each material, material-specific gross collection and processing costs are established, from which material-specific sales revenue is subtracted. The purpose of this study was to determine the gross collection and processing costs for each of the above materials.[1]

1.1 Programs Reviewed

In order to be successful, the project needed the cooperation of a number of program operators. Each of the operators had to be willing to permit MacViro access to their MRF specifically and be open to discussing the costs of operating their programs in general. Most importantly, the programs chosen, combined, had to as closely as possible represent the province as a whole. After discussion with Stewardship Ontario staff, the following programs were put forward for study:

- Quinte/Centre and South Hastings;
- Essex Windsor Solid Waste Authority;
- Region of Peel;
- Haldimand-Norfolk; and
- Recyclage Alexandria Recycling Equipe (RARE).

Each of the above programs was contacted by Stewardship Ontario and each agreed to have MacViro conduct a cost allocation audit.

[1] Because of the manner in which some materials are managed, it was not possible to determine a cost for magazines and catalogues (marketed with newspaper), aluminum foil (marketed with aluminum cans), steel aerosols and paint cans (marketed with steel cans) and LCBO clear and coloured glass (marketed with non-LCBO clear and coloured glass).

In each of the above instances, the authority or municipality own their MRFs, which made it easier to obtain actual costs that could be more accurately assigned to specific, individual materials.

Since the information required is generally considered to be of a commercially sensitive nature, the project team agreed that MacViro would not share any of the program specific costs with the other participants of the study or with the project Steering Committee (i.e. MPAC members). It was agreed that in fulfillment of the deliverables for this study, any and all results submitted to Stewardship Ontario would be aggregated such that individual programs could not be identified. For the purposes of this study and any reporting put forth for use in the Pay In Model, aggregated numbers for individual materials were considered sufficient.

However, to ensure consistency with the protocol for the allocation of costs, the consultant met with representatives of Stewardship Ontario to review the results from the individual programs. Program numbers were shared only at the time of the meeting and only through visual confirmation (i.e., no hardcopy results were provided). MacViro will retain the data for future reference by Stewardship Ontario as required to ensure the integrity of the dataset and consistency with future data.

2. Project Methodology

After Stewardship Ontario made arrangements with the identified programs, contact was made ahead of meeting directly with the program operators, to collect background data on the program, including, but not limited to:

- Program population and number of households;
- Specific materials collected and tonnages;
- Description of the collection system (type of truck, collection frequency, expectations of residents, number of trucks used, etc.); and
- Description of the processing system (equipment used, number of sorters, hours of operation, etc.). Information from the recently completed tonnage and financial datacalls were used where possible to provide details on the programs.

For each material, the gross cost of both collection and processing were determined.

2.1 Collection

With each of the program operators, three collection runs were identified that were considered representative of the entire program area. In all but one instance, the consultant staff person sat on the truck to record the activities of the operator. Health and safety limitations in the final program meant that the staff person followed behind the truck. A mirror system was set up in the car to enable a better view of the operator's activities. Every 30 seconds for the entire day, readings were taken of the activity being undertaken at the time of the reading and recorded onto the sheet shown in Figure 2-1. The sheets were customized for the specific program (e.g., changes in the number of compartments on the truck).

Figure 2-1
Time and Motion Study Data Collection Sheet

TIME AND MOTION STUDY DATA COLLECTION SHEET

Location: _____ Date: _____
Route: _____ Measured by: _____
Weather: _____ Reading Times: Every 30 seconds

Start time _____ am Time finished at day end _____ pm
Time to route in a.m. _____ am Total distance driven _____ km

	1st time	2nd time	3rd time
Time off-route	_____ am / pm	_____ am / pm	_____ am / pm
Time to MRF	_____ am / pm	_____ am / pm	_____ am / pm
Time dumping C1	_____ min	_____ min	_____ min
Time dumping C2	_____ min	_____ min	_____ min
Time dumping C3	_____ min	_____ min	_____ min
Time dumping C4	_____ min	_____ min	_____ min
Tonnes collected	_____ tonnes	_____ tonnes	_____ tonnes
Time going back to route	_____ am / pm	_____ am / pm	_____ am / pm
Time back on route	_____ am / pm	_____ am / pm	_____ am / pm

Km Readings
Depot/MRF _____
On route _____
Off-route _____
MRF _____
On route _____
Off-route _____
Depot _____
On route _____
Off-route _____
MRF _____
Depot/MRF _____

On-route Activities

Driving between stops _____

Loading truck *Materials*	C1	C2	Other
(if possible by compartment) (if not count total)			

Getting out of truck _____

Getting into truck _____

Picking up setout _____

Setting down blue box or other container _____

Decontamination _____ **Cycling the Hopper** _____

Other (note/record on back by number) _____ **Speaking with Public** _____ **Coffee/lunch break** _____

Number of stops _____

Total time **Total ticks**

From the above collected data, working with the available data on the cost for collection vehicles (capital and operating), labour and administrative costs (or collection contract costs)[2], the costs for the management of each material were determined. In all instances, the protocol established as outlined in Appendix IX of the approved Blue Box Program Plan (BBPP) for collection was strictly used. Where costs for individual materials were identified, they were so allocated. For common costs, the protocol was followed. In no program were there any deviations, nor were any noted as being required in the future. The allocated collection costs were added to the costs determined for the processing for each material.

2.2 Processing

The purpose of this review was to determine the cost for the management of each material within the MRF. Strictly adhering to the cost allocation protocol, the following measurements were undertaken:

- Time and motion studies of each of the sorters to assign their time to individual materials (This is done at least twice for each sorter for each shift. The time watching and recording the activities of each sorter is a function of the number of materials each sorter is sorting; changes to the configuration of the sorting lines (e.g., different morning and afternoon shifts); quality of the incoming material (i.e., "poor" material quality (e.g., as may occur due to moisture content) observations require more time, and more observation periods to find a balance of "good" material sorting observations); and times of the day (i.e., early shift sorting functions are different than late shift sorting functions); and changes to number of sorters on a line. At a minimum, ten minutes of recordings are required per sorter (e.g., if the sorter is doing only one or two materials) and two recordings per shift for a minimum of two days (i.e., four observations at four different times of the day);
- Material inbound, temporary (e.g., bunkers), and final storage areas within the MRF building, separate storage building, trailers or on the site property (including a drawing of the facility);
- Process equipment relative to each material (e.g., sorting belt lengths that are to be assigned to each material); and
- Baling times for each material and total bales by material (for allocation of baler and rolling stock).

In addition to the above measurements, a list of equipment – both fixed and rolling stock, hours of operation as may vary in different time of the year (e.g., more time post-Christmas to handle paper rush), a list of all staff, including functions and all capital and operating costs for the facility were gathered.[3] Where possible, working with the facility's staff, costs specific to each piece of equipment (e.g., capital, operating, maintenance, etc., were gathered. This permitted a better allocation of costs relative to the protocol, which, where specific data are not available, has more generic approaches to allocating the costs to individual materials.

For the primary labour activity of sorting, the time and motion information was used to determine the percentage of time spent by each sorter for each stream of material. The amount of time was converted into a labour cost based on the sorters' wage rates. A similar activity is undertaken for the rolling stock, baler and supervisory personnel. Following the protocol, the data were used to allocate the costs to the individual materials.[4] The final step is to ensure that all allocated costs are calibrated to the cost of the program as reported. Where there were variances during the allocation processes, individual line items of costs were reviewed to ensure all costs were accurately recorded and allocated.

[2] The data collection sheets for collection operations are included in Appendix A.
[3] The data collection sheets for the processing operations are included in Appendix B.
[4] A copy of the protocol for collection and processing is included in Appendix C.

3. Results and Material Specific Observations

Descriptions of each of the programs reviewed are provided in Table 3-1. To arrive at the averages for the province, the results of each program were assigned a percentage reflecting the quantity of material (tonnes) managed by programs in the province of a similar nature.

Table 3-1
Program Descriptions and Provincial Percentage Representation

Program; Tonnes; Percentage Representation	**Description**
Region of Peel 77,400 tpy **50%**	***Collection:*** Two compartments, weekly: fibres, containers ***Materials Collected:*** Newspaper, Old Corrugated Containers, Old Boxboard, Residential Mixed Paper, Polyethylene Terephthalate, High Density Polyethylene, Polystyrene, #3-#7 Plastics, Plastic Film, Gabletop Cartons, Aseptics, Steel Cans, Aluminum Cans, Clear Glass, Coloured Glass ***Processing:*** Two lines: Fibres Line – ONP screen and manual sorting Containers Line – Glass screen, Ferrous magnet, Air classifier, Eddy Current Separator and Manual sorting
Essex-Windsor Solid Waste Authority 20,000 tpy **25%**	***Collection:*** Two compartments, biweekly: fibres, containers ***Materials Collected:*** Newspaper, Old Corrugated Containers, Old Boxboard, Residential Mixed Paper, Polyethylene Terephthalate, High Density Polyethylene, #3-#7 Bottles, Steel Cans, Aluminum Cans, Clear Glass, Coloured Glass ***Processing:*** Two lines: Fibres Line – Manual sorting Containers Line – Ferrous magnet, Eddy Current Separator and Manual sorting
Quinte/Centre and South Hastings 11,000 tpy **15%**	***Collection:*** Four compartments, weekly: fibres, containers, clear glass, coloured glass ***Materials Collected:*** Newspaper, Old Corrugated Containers, Old Boxboard, Residential Mixed Paper, Polyethylene Terephthalate, High Density Polyethylene, Polystyrene, #3-#7 Plastics, Plastic Film, Gabletop Cartons, Aseptics, Steel Cans, Aluminum Cans, Clear Glass, Coloured Glass ***Processing:*** Two lines: Fibres Line – Manual sorting Containers Line – Ferrous magnet, Eddy Current Separator and Manual sorting

Table 3-1 continued
Program Descriptions and Provincial Percentage Representation

Program; Tonnes; Percentage Representation	Description
Haldimand-Norfolk County 5,200 tpy **5%**	***Collection:*** Haldimand: Five compartments, weekly: ONP/RMP, OCC, containers, clear glass, coloured glass Norfolk: Four compartments, weekly: fibres, containers, clear glass, coloured glass ***Materials Collected:*** Newspaper, Old Corrugated Containers, Old Boxboard, Residential Mixed Paper, Polyethylene Terephthalate, High Density Polyethylene, Polystyrene, #3-#7 Plastics, Plastic Film, Gabletop Cartons, Aseptics, Steel Cans, Aluminum Cans, Aluminum Foil, Clear Glass, Coloured Glass ***Processing:*** Two lines: Fibres Line – Manual sorting Containers Line – Ferrous magnet, Eddy Current Separator and Manual sorting
Recyclage Alexandria Recycling Equipe (RARE) 980 tpy **5%**	***Collection:*** Alexandria: Two compartments, weekly: All materials; OCC North/South Glengarry: Four compartments, weekly: fibres, containers, clear glass, coloured glass Port Hawkesbury: Fully commingled ***Materials Collected:*** Newspaper, Old Corrugated Containers, Old Boxboard, Residential Mixed Paper, Polyethylene Terephthalate, High Density Polyethylene, #3-#7 Plastics, Plastic Film, Gabletop Cartons, Aseptics, Steel Cans, Aluminum Cans, Aluminum Foil, Clear Glass, Coloured Glass ***Processing:*** One Line: ½ time Fibres Line – Manual sorting ½ time Containers Line – Ferrous magnet, Eddy Current Separator and Manual sorting

3.1 Material Costs

With the following exceptions, all of the costs shown in Table 3-2 are based on sampling from all five programs:

Material	Number of Programs; Percentage Representation (from Table 3-1)
Polystyrene	Three Programs (Peel, Quinte, Haldimand-Norfolk) 70%
Plastic Film	Four Programs (Peel, Quinte, Haldimand-Norfolk, RARE) 75%
Other Plastics	Four Programs (Peel, Quinte, Haldimand-Norfolk, RARE) 75%
Gabletop Cartons/Aseptics	Four Programs (Peel, Quinte, Haldimand-Norfolk, RARE) 75%

With the negotiated net cost of the Blue Box Program increasing by about one third between 2001 and 2002, increases in the material-specific gross costs were anticipated. However, because of changes in the means by which some materials are managed, and a better approach to the collection and allocation of the costs, cost increases were not universal. Outlined below are brief explanations for the changes seen in each of the fourteen materials in Table 3-2.

As well, since some of the initial planning estimates of the cost of management of materials in 2001 were based on similar but older studies and datasets, the costs identified through this study are considered much more accurate and can serve as a strong basis for the fees in 2004 and likely future years.

Table 3-2
Gross Costs for the Blue Box Materials

Material	ONP	OCC	OBB	Residential Mixed Paper	Plastic Film	PS	PET
Gross Cost Per Tonne (1)	$ 90.00	$ 372.00	$ 340.00	$ 159.00	$ 1,338.00	$ 1,613.00	$ 930.00
2001 BBPP Gross Cost	$ 85.00	$ 270.00	$ 400.00	$ 85.00	$ 900.00	$ 870.00	$ 700.00
Percentage Change	5.9%	37.8%	-15.0%	87.1%	48.7%	85.4%	32.9%

Material	Aluminum	Ferrous	HDPE	Other Plastic	Gabletop/ Aseptic	Clear Glass	Coloured Glass
Gross Cost Per Tonne (1)	$ 733.00	$ 240.00	$ 877.00	$ 866.00	$ 728.00	$ 144.00	$ 137.00
2001 BBPP Gross Cost	$ 550.00	$ 230.00	$ 770.00	$ 870.00	$ 350.00	$ 190.00	$ 190.00
Percentage Change	33.3%	4.3%	13.9%	-0.5%	108.0%	-24.2%	-27.9%

(1) Rounded to the nearest dollar.

3.1.1 Old Newspaper (ONP)

The gross cost allocated to ONP increased by slightly less than 6% between 2001 and 2002. The manner in which ONP is being managed did not change between 2001 and 2002. Therefore, most of the cost increase can be attributed to general increases in the negotiated and approved net cost of the municipal

system as a whole. With the change in collection systems to fully commingled (e.g., Toronto, Peel), ONP costs could increase in the future as there will be a cost associated with separating the fibres and containers streams and with cleaning the ONP to meet end market specifications.

3.1.2 Old Corrugated Containers (OCC)

The gross cost allocated to OCC for 2002 increased by almost 38% (over the cost for 2001. There was no increase in the quantity of OCC recovered in that period. Part of the reason for the cost increase is attributable to a better measurement of OCC managed in the blue box system that is from residential, rather than industrial, commercial and institutional (IC&I) sources. This check of the tonnage datacall, as undertaken by the Ministry of Environment, Association of Municipalities of Ontario and Stewardship Ontario, resulted in a lowering of the reported OCC tonnages to better reflect generation rates in the province (as defined by waste audits). A second reason for an increase in the allocated costs can be attributed to the reference programs that were used to determine the cost for OCC last year. Two of the programs were much better than average at managing the OCC (only confirmed after reviewing the results of the financial datacall), which resulted in a lower cost than what would be seen by "average" programs in the province. Combining this with the general increase in the negotiated and approved net cost of the municipal Blue Box Program, combined with a lowering in the number of tonnes managed, results in a higher per tonne cost.

3.1.3 Old Boxboard (OBB)

The gross cost allocated to OBB decreased by approximately 15% in 2002 over 2001. This is primarily because of the manner in which the cost is calculated. In 2001, in assigning costs to OBB, there was no provision for the fact that part of the cost for the management of OBB rests in the cost to manage ONP. This is because part of the OBB is "sorted" with the ONP, as ONP (which contains both OBB and Residential Mixed Paper) is a negatively sorted material and, it carries a lower cost per tonne to manage. In 2002, part of the OBB cost is based on the cost to manage ONP. This had the effect of lowering the cost per tonne managed.

3.1.4 Residential Mixed Paper (RMP)

In 2001, a lack of data precluded identifying a separate management cost for RMP. As much of the paper is managed in the ONP stream, it was assigned the same cost per tonne. In the work completed for this study, it was possible to identify a separate cost for the management of RMP. Therefore, the cost for 2002 is considered the first estimate that more closely represents the actual cost of managing the material.

3.1.5 Plastic Film

The cost for the management of plastic film is high primarily because of the nature in which it is managed. Because it can cause problems with automated sorting systems and covers other materials, making it difficult to sort them, it is necessary that the plastic film be completely (or as close as possible) removed from the system. The very slow sorting rates associated with the material means that there is a lot of labour assigned to the material. The quantity of plastic film managed in 2002 increased by more than 95% over 2001. Larger quantities lead to more sorting requirements (i.e., more staff) and more time assigned for baling. Limited markets for the material has also meant that the material is taking up more space in the MRFs as it is being stored until a market can be secured.

3.1.6 Polystyrene (PS)

The cost assigned to PS in 2001 was based on a limited dataset. Therefore, the cost determined in 2002 is considered to be the establishment of a better base number. The high cost associated with PS can be attributed to a very slow sorting rate, the long time it takes to bale the material and its storage requirements (as end markets are limited).

3.1.7 Polyethylene Terephthalate (PET)

The cost allocated to PET in 2002 increased by almost 33% over 2001. Much of this cost increase is a result of increased sorting requirements associated with the proliferation of single serve PET. Although the number of pieces of PET that can and are being sorted per hour are consistent with past observations, because the weight per piece is lower, the quantity sorted per sorter per hour is lower, resulting in a higher sorting cost. The increase in the overall quantity of PET (up over 15% from 2001) has forced an increase in the space assigned both on the sorting line and in the bunkers for PET (otherwise the bunker fills too quickly, disrupting baling schedules). One other reason why PET costs are increasing is because of the confusion over plastics types on the line by sorters, most of whom are temporary staff who cannot identify PET by brand (a common approach used by full time staff to ensure proper separation and increased recovery of dissimilar PET packaging types). For example, frosted white PET used in two product lines is confusing to sorters. It was observed being sorted with PET, HDPE and with other bottles.

3.1.8 High Density Polyethylene (HDPE)

The cost allocated to HDPE in 2002 increased by approximately 14% over 2001. The primary reasons for the increase in costs are the increase in the sorting requirements (as the quantities have increased – up about 13% in 2002) and the fact that programs are now devoting more permanent space to the storage of the sorted bottles (i.e., as compared to past ABC studies which found only limited space was allocated to HDPE).

3.1.9 Other Plastics

The cost per tonne managed for other plastics in 2001 was based on a very limited dataset. Only recently have more municipalities added all other plastic containers to the recycling programs. Therefore, the cost per tonne identified for 2002 is considered a more realistic current approximation of the actual cost for the management of the stream of materials.

3.1.10 Aluminum

Only one cost was identified for aluminum. Although aluminum foil was being managed by two of the programs, in only one was it a separate stream, baled and marketed separately. The quantity of aluminum managed in 2002 did not increase compared to 2001. Because of the value of the aluminum and the tight market specifications for the material, facilities are now assigning increased staff to ensure both as much of the aluminum as economically possible is being recovered (as municipalities try to get every can) and more importantly, to clean up the aluminum.

3.1.11 Steel Cans

It was not possible to identify separate costs for the management of steel food and beverage containers, steel paint cans and steel aerosols. Therefore, the number shown represents all steel containers. As the

management method for steel has not changed much, it did not see much of a change in the cost per tonne managed.

3.1.12 Gabletop and Aseptics

Managed as a single stream, it is not possible to identify a separate cost for the two materials. The per-tonne cost allocated to these materials increased for 2002 over 2001 more than for any other material (approximately 108%). In reality, the cost per tonne for these materials in 2001 was an estimation with very limited, older data. In past analyses of facilities managing the materials, gabletop containers and aseptics were only recovered if there was time after sorting all other materials from the containers line. This is no longer the case. As gabletops and aseptics are recognized as a material requiring management, they are being allotted both more sorters and dedicated space in the MRFs. This has resulted in more fixed and variable costs being assigned to the materials.

3.1.13 Clear Glass and Coloured Glass

Glass, both clear and coloured, has become a material where little effort is put forth to positively sort a clean stream for end markets. With three mix glass accounting for up to 50% of the glass being managed by municipalities, as it requires no sorting and minimal infrastructure it, along with coloured glass, which is the negative sort, has a low cost per tonne to manage. The higher cost for clear glass can be attributed to the costs associated with the sorters, which positively sort the clear glass.

4. Conclusions

As the costs identified in 2001 for the management of some of the materials were based on older studies and datasets, with the benefit of willing participants who all provided excellent data to supplement the financial datacall information, combined with the information on equipment costs garnered through discussions with equipment suppliers, the new dataset is considered quite robust and the costs identified through this study much more accurate. As such, the results of this work will provide a very sound basis for future reference.

With changing collection and processing systems, specifically the move by Toronto, York and Peel Regions to single stream collection and processing, the costs identified through this study will require yearly updates to ensure they accurately reflect the current systems. These additional studies (i.e., additional municipalities) will add to the strength and integrity of the dataset with respect to its ability to accurately reflect current gross costs for the management of individual materials within the Blue Box.

Ongoing work on clearly identifying exactly what is being recovered by municipalities through their curbside and depot collection programs is also important, as the total cost assigned to each material is dependent on the gross cost, total tonnes managed and the revenues received for those tonnes. Properly accounting for all three aspects is critical as an accurate portrayal of the net cost of the management of each material is critical to correctly assigning stewards fees through the Stewardship Ontario Pay In Model.

The protocol developed by the Materials and Packaging Advisory Committee worked very efficiently. No changes were made to the protocol. At this time, no changes are being anticipated as being needed to properly allocate the costs in the future, even under changing program approaches (e.g., single stream collection and processing).

Appendix A: Collection Data Collection Sheets

Table A-1a
Cost Allocation Checklist

Collection System

Equipment Capital - Collection

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate	Leased Vehicles Number	Leased Vehicles Annual Cost
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$
		$		%		$

Only include vehicles over the past seven years

Drivers

Pay Scales	Pay Rate ($/hr)
1	$
2	$
3	$
4	$
5	$
6	$
7	$
8	$
9	$
10	$
11	$
12	$
13	$
14	$
15	$
16	$
17	$
18	$
19	$
20	$

Supervisors

1	$
2	$
3	$
4	$

Supervisory Vehicles - Purchased

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%

Supervisory Vehicles - Leased

Description	Number	Annual Cost
		$
		$
		$

Table A-1b
Cost Allocation Checklist

Collection System

Equipment Operating		Administration	
Fuel - Collection Vehicles	$	Permanent Salaries	$
Fuel - Supervisory Vehicles	$	Benefits	$
Licensing	$	Contract Workers	$
Insurances	$	Benefits	$
Equipment rental	$	Employee Training/Education	$
Equipment leasing	$	Occupancy Costs (rent)	$
Equipment repair/maintenance - CV	$	Communications (e.g., telephone)	$
Tires - CV	$	Office Supplies	$
Equipment repair/maintenance - SV	$	Office Equipment	$
Tires - SV	$	Office Equipment Rental	$
Supplies	$	Office Equipment Leasing	$
Communications (e.g., cell phones)	$	Travel Expenses	$
Travel expenses	$	Advertising and Promotion	$
Advertising/promotion	$	Fees/Dues	$
Fees/dues	$	Insurances	$
Safety Equipment	$	Property/Business Taxes	$
Training/Education	$	Professional Services	$
Uniforms	$	Bad Debts	$
Bad debts	$	Bank Charges and Interest	$
Bank charges and interest	$	Research and Development	$
Professional services	$	Seminars, Conferences, etc.	$
Research and development	$	Miscellaneous Administration Costs	$
Depreciation	$	Other: _____	$
Miscellaneous expenses	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$
Other: _____	$	Other: _____	$

Appendix B: Processing Data Collection Sheets

Table B-2a
Cost Allocation Checklist

Processing System

Equipment Capital - Common Line

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%

Sorters

Station	Materials Sorted/Duties	Pay Rate ($/hr)
1		$
2		$
3		$
4		$
5		$
6		$
7		$
8		$
9		$
10		$
11		$
12		$
13		$
14		$
15		$
16		$
17		$
18		$
19		$
20		$

Rolling Stock - Purchased

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%

Rolling Stock - Leased

Description	Number	Annual Cost
		$
		$
		$
		$
		$

Table B-2b
Cost Allocation Checklist

Processing System

Equipment Capital - Fibres Line

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%

Sorters

Station	Materials Sorted/Duties	Pay Rate ($/hr)
1		$
2		$
3		$
4		$
5		$
6		$
7		$
8		$
9		$
10		$
11		$
12		$
13		$
14		$
15		$
16		$
17		$
18		$
19		$
20		$

Rolling Stock - Purchased

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%

Rolling Stock - Leased

Description	Number	Annual Cost
		$
		$
		$
		$
		$

Table B-2c
Cost Allocation Checklist

Processing System

Equipment Capital - Containers Line

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%
		$		%

Sorters

Station	Materials Sorted/Duties	Pay Rate ($/hr)
1		$
2		$
3		$
4		$
5		$
6		$
7		$
8		$
9		$
10		$
11		$
12		$
13		$
14		$
15		$
16		$
17		$
18		$
19		$
20		$

Rolling Stock - Purchased

Description	Number	Cost Per Unit	Amortization Period	Amortization Rate
		$		%
		$		%
		$		%
		$		%
		$		%

Rolling Stock - Leased

Description	Number	Annual Cost
		$
		$
		$
		$
		$

Table B-2d
Cost Allocation Checklist

Materials Recovery Facility

Capital - Building

Description	Dimensions Length	Dimensions Width	Total Area	Purchase Price	Amortization Rate
				$	%

Drawing of the Building

Table B-2e
Cost Allocation Checklist **Materials Recovery Facility**

Equipment Operating

Raw/secondary materials purchases	$
Occupancy costs (rent, mortgage)	$
Utilities	$
Fuel	$
Building maintenance and cleaning	$
Equipment rental	$
Equipment leasing	$
Equipment repair/maintenance	$
Freight out	$
Sub-contracts	$
Supplies	$
Communications (e.g., telephone)	$
Travel expenses	$
Advertising/promotion	$
Fees/dues	$
Insurances	$
Property/business tax	$
Professional services	$
Bad debts	$
Bank charges and interest	$
Garbage haulage/disposal fees	$
Tipping fees	$
Research and development	$
Depreciation	$
Miscellaneous expenses	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$

Administration

Permanent Salaries	$
Benefits	$
Contract Workers	$
Benefits	$
Employee Training/Education	$
Occupancy Costs (rent)	$
Communications (e.g., telephone)	$
Office Supplies	$
Office Equipment	$
Office Equipment Rental	$
Office Equipment Leasing	$
Travel Expenses	$
Advertising and Promotion	$
Fees/Dues	$
Insurances	$
Property/Business Taxes	$
Professional Services	$
Bad Debts	$
Bank Charges and Interest	$
Research and Development	$
Seminars, Conferences, etc.	$
Miscellaneous Administration Costs	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$
Other: _____	$

Appendix C: Collection and Processing Activity Based Costing Protocol

Collection and Processing Activity Based Costing Principles (from Appendix IX of the approved Blue Box Program Plan)

Starting with the Municipal Recycling Cost Allocation Task Group collection and processing principles established in 1997 by a Committee of municipal and industry representatives, the Activity Based Costing Subcommittee of the Materials and Packaging Advisory Committee (MPAC) developed a series of collection and processing costing principles to be used to determine the cost for the management of each material within the blue box program. Wherever possible, the principles are based on identifying and then determining costs relative to specific activities undertaken in the collection and processing of recyclables.

These principles ensure that there is minimal allocation of costs on an arbitrary basis, i.e., costs being assigned that are not related to how costs are actually incurred relative to activities undertaken in the program. The principles cover all aspects of the programs including capital, operating and administration, under the assumption of full cost accounting. In total there are 11 collection cost principles and 48 processing cost principles. The principles are not meant to be taken in isolation, rather applied together.

The output from the application of these principles applied across a range of programs in the province is estimates of the actual gross cost to handle each material in the program.

Cost Allocation Assumptions – Collection

Collection (C) Assumption	Cost Driver(s)
C.1: The total collection cost should be allocated to each collection activity based upon the relative time spent on each activity.	1st – time by individual material
C.2: The time (and associated capital, labour and operating cost) attributed to loading segregated recyclables (or streams of recyclables) into individual compartments should be allocated to those segregated materials.	1st – time by individual material
C.3: The time (and associated capital, labour and operating cost) attributed to all non-sorting functions of collection, including morning inspection; driving to and from the route; entering and exiting the cab; picking up and setting down blue boxes; inspecting/quality control at the curb; emptying the hopper; talking to residents; coffee and lunch breaks; driving back to the depot at the end of the day should be apportioned to materials on the same basis as applied in C.2, where costs for curbside activities can be apportioned to individual materials.	1st – time by individual material
C.4: Where C.2 cannot be applied to all materials, but rather where only limited splitting of sorting/loading times can be determined, the capital and labour costs associated with all curbside functions (as outlined in C.2 and C.3) should first be allocated on the time identified for each compartment (if possible) and then by the volume of the material within each compartment.	1st – time by stream of materials 2nd – volume within the stream
C.5: The cost of unloading individual materials should be allocated first on the basis of the time to unload each compartment and then, if necessary, based on the relative volumes of recyclables within that compartment.	1st – time by individual compartment 2nd – volume
C.6: The fuel costs should first be allocated on the time identified for each compartment and then, 10% of total fuel cost should be allocated to recyclables collected based on relative weights and 90% by onboard volume.	1st – time by individual compartment 2nd – 10% by weight; 90% by volume
C.7: The maintenance costs should first be allocated on the time identified for each compartment and then, 10% of total fuel maintenance should be allocated to recyclables collected based on relative weights and 90% by onboard volume.	1st – time by individual compartment 2nd – 10% by weight; 90% by volume
C.8: Administration costs directly attributable to specific materials should be allocated to those materials based on the time spent administering those materials. Administration costs that cannot be attributed to a specific material should be allocated equally across all materials.	1st – individual materials 2nd – equally

Collection (C) Assumption	Cost Driver(s)
C.9: General operating costs should be assigned to individual material as an additive cost based on the percentage cost allocations in total determined through the application of principles C.1 to C.8. This approach will not make any material change to the total percentage allocation of costs to individual materials.	1st – additive cost based on allocations of all costs for C.1 to C.8
C.10: Promotion and education costs directly attributable to specific materials should be allocated to those materials based on the time spent administering those materials, with remaining costs allocated equally to all materials.	1st – individual materials 2nd – equally
C.11: Collection containers costs should be allocated to all materials based on the onboard volume of materials.	1st – onboard volume

Cost Allocation Assumptions – Processing

Processing (P) Assumption	Cost Driver(s)
P.1: Floor space (m^2) is the driver that can best be used to allocate the MRF building cost to each of the five functional areas (receiving, processing, storage and shipping, general/transportation aisles, administration).	1st – floor space
P.2: The cost of the receiving area shall be allocated to individual materials based on the relative tipping floor space (m^2) taken up and dedicated to each material in a single or commingled stream and then by volume.	1st – floor space 2nd – volume
P.3: The cost of storage and shipping space shall be allocated to individual materials based on the relative floor space (m^2) taken up and dedicated to each material shipped.	1st – floor space
P.4: Where different pieces of equipment overlap each other in vertical space, the cost of the processing floor space shall be allocated by first dividing the floor space by the number of layers of equipment and then, where there are multiple materials processed in that layer, by the relative volumes of material on each layer.	1st – floor space divided by the # of layers of equipment 2nd – volumes
P.5: The cost of the processing floor space that can be attributed to a single material shall be allocated to that single material.	1st – material specific floor space
P.6: The cost of the processing floor space under any equipment, where equipment is shared by more than one stream of materials, shall first be allocated on the basis of the time spent processing each stream. This principle applies to any function within the facility where a sharing of resources, on a time basis, is undertaken. Where there are multiple materials in the stream, further allocation shall be done on the basis of volume within the stream.	1st – time 2nd – volume
P.7: The cost of the processing floor space under the presort conveyoring system(s) shall be allocated on the basis of the volume processed of each material (assuming commingling of materials).	1st – volume
P.8: The cost of the processing floor space under excess (defined as conveyors over bunkers that are not used in the sorting process) conveyoring equipment shall not fall to the last material, but shall be shared on the basis of the space taken up on the tipping floor (m^2) by each material utilizing the entire conveyoring system.	1st – volume
P.9: The cost of the processing floor space in general/transportation aisles shall be allocated first on the basis of the time each material utilizes the space and then, where shared time is seen (e.g., moving mixed paper), on the basis of the relative volumes of each material within the stream.	1st – time 2nd – volume
P.10: The cost of administration floor space (m^2) shall be allocated first to those materials which cause the cost directly and then, the balance shall be allocated equally to all materials.	1st – material specific 2nd – equally to all materials

Processing (P) Assumption	Cost Driver(s)
P.11: The annualized capital cost of a feed conveyor used to transport commingled materials shall first be allocated by the relative time the conveyor is used for each stream. Then for each stream of mixed materials, the cost shall be allocated based on the relative volume of each recyclable material in the commingled stream	1st – time 2nd – volume
P.12: Similar allocation to that used in P.5. The annualized amortized capital cost of the conveyor belt is equated to the length of the bunker in which the material is held and that section is apportioned to the individual materials.	1st – length
P.13: Similar allocation to that used in P.8. For bunkers not in use, the annualized capital cost for the equivalent length of conveyor shall be assigned equally to all materials on the belt on a volume basis.	1st – length 2nd – volume
P.14: The negatively sorted material shall be assigned the annualized capital cost for the length of conveyor past the last filled bunker. If more than one material is within the negative sort, the apportionment shall then be by volume. If residue is the material removed and placed into the bunker immediately prior to the negative sort (i.e., into the last filled bunker), that cost should be assigned to the negatively sorted material.	1st – length 2nd – volume
P.15: The annualized capital cost for stationary equipment that in place to the primary benefit of one material (e.g., ferrous magnet, eddy current separator) shall be assigned in whole to that material.	1st – primary benefit material
P.16: The annualized capital cost for stationary equipment that is in place to the primary benefit of many materials (e.g., flats-rounds separator; air classifier) shall be assigned to each material benefiting from that equipment on the basis of the volume of each material processed by that equipment.	1st – volume
P.17: The amortized capital cost of a baler shall be allocated based on the relative times required to bale each material.	1st – time
P.18: The amortized capital cost of rolling stock shall first be allocated based on the time the equipment is used to handle individual materials. Allocation within a material stream should then be based on the volume of individual recyclables handled within each stream.	1st – time 2nd – volume
P.19: Similar allocation to that used in P.12. The annualized amortized capital cost of the structural platforms is equated to the area of the bunker in which the material is held and that platform area shall be apportioned to the individual materials across the time the line is used for that stream of materials.	1st – time 2nd – individual material bunker footprint
P.20: The annualized capital cost of the structural steel and platforms in use for the movement of commingled materials shall first be allocated by the relative time the steel structure and platforms are used for each stream. Then for each stream of mixed materials, the cost shall be allocated based on the relative volume of each recyclable material in the commingled stream.	1st – time 2nd – volume

Processing (P) Assumption	Cost Driver(s)
P.21: The amortized capital cost of a weighscale (and associated house, computer equipment, etc.) shall be apportioned based on the number of loads across the scale for specific materials. The cost apportioned to inbound trips shall be allocated based on the annual onboard density based volumes of materials. The cost apportioned to outgoing trips shall be allocated to individual materials based on the number of annual shipping loads for those materials. Where there are split loads, the load shall be apportioned by the relative percentage of the load for each material.	1st – number of loads 2nd – onboard volume of inbound and outbound vehicles
P.22: The cost of the annualized land value shall be allocated to individual materials based on the relative land space (m^2) taken up and dedicated to each material.	1st – land space
P.23: The annual amortized capital cost of the paved or paved-equivalent areas of the MRF property shall be apportioned based on the number of loads inbound and outbound for each specific material, using volume for split loads where necessary.	1st – number of loads 2nd – volume
P.24: The annual amortized capital cost of all other ancillary land of the MRF property shall be apportioned in the same amounts to that of the interior footprint of the building as determined through the application of P.1 through P.10.	1st – Application of P.1 to P.10.
P.25: Labour costs for sorters shall be allocated based on the percentage of time spent sorting each material. Time is determined by counting the number of pieces of each material and converting the piece counts by material to a percentage of time per hour.	1st – time via piece counts
P.26: Labour costs for front end loader and skid steer operators shall be allocated based on time spent handling each material. Where commingled streams are managed, the time by stream shall then be apportioned by the volume of each material within the stream.	1st – time 2nd – volume
P.27: Labour costs for fork lift truck operators shall be allocated based on time spent handling each material.	1st – time
P.28: Labour costs for baler operators shall be allocated based on time spent handling each material. Where there are blended bales, further allocations shall be done on the basis of the relative volumes of each material within the bale.	1st – time 2nd – volume
P.29: Labour costs for weighscale operators should be allocated based on the same principles as applied to the weighscale itself, i.e., number of loads inbound apportioned by onboard volumes and number of loads outbound, apportioned by load equivalents.	1st – inbound and outbound load volumes 2nd – volume
P.30: Labour costs for shift managers should be allocated based the allocations of all staff for each material, under the assumption that the shift manager manages people and people are there relative to the specific materials.	1st – time by sorters

Processing (P) Assumption	Cost Driver(s)
P.31: The cost of administration staff shall be allocated first to those materials which cause the cost directly (based on time spent) and then, the balance should be allocated equally to all materials.	1st – material specific – time 2nd – equally to all materials
P.32: Labour costs for supervisory staff shall be allocated first to those materials which cause the cost directly and then secondly on the basis of the number of materials processed at the facility. This is based on the premise that the supervisor is responsible for the delivery of the program and, as such, as materials are part of the program, they should share in the delivery cost equally.	1st – material specific 2nd – number of materials
P.33: The cost of maintenance staff shall be allocated first to those materials which cause the cost directly and then by volume.	1st – material specific 2nd – volume
P.34: The cost of general labour staff shall be allocated first to those materials that cause the cost directly and then, the balance should be allocated equally to all materials.	1st – material specific 2nd – equally to all materials
P.35: If a stream is bag based, the costs of bag opening and removal shall be apportioned to that stream only and then on the basis of the volume of each material within that stream. In a commingled collection program, where some materials show up in bags in some proportion, the cost of any preprocessing for the removal of materials from bags shall be allocated to all materials in the stream on the basis of volume.	1st – volume
P.36: Common labour time and costs incurred by sorters doing their cleanup at the end of the shift (i.e., not general janitorial cleaning) shall be allocated first to those materials that cause the cost, if known, and then to materials based on the volumes of each material processed.	1st – material specific 2nd – volume
P.37: If equipment is used to process more than one material at different times during the operating cycle, maintenance costs should first be allocated based on the relative times the equipment is used for those materials.	1st – time
P.38: Whenever possible, general maintenance costs (or the portion of maintenance costs) directly attributable to an individual material shall be allocated to that material.	1st – material specific

Processing (P) Assumption	Cost Driver(s)
P.39: Remaining equipment maintenance costs shall be allocated to individual materials using the same approach as the capital cost allocation for that equipment. Refer to P.11 to P.21.	1st – material specific 2nd – see P.11 to P.21
P.40: The fuel cost of rolling stock shall first be allocated based on the time the equipment is used to handle individual materials. Allocation within a material stream shall then be based on the volume of individual materials handled within each stream.	1st – material specific 2nd – volume
P.41: The cost of baling wire shall be allocated to individual materials baled based on the number of bales of each material marketed and the appropriate wire usage per bale.	1st – material specific
P.42: All electrical costs shall be allocated to each piece of processing equipment based on the calculated electrical usage for that equipment. These costs then should be allocated according to the equipment capital cost allocation. Refer to P.11 to P. 21.	1st – material specific 2nd – see P.11 to P.21
P.43: Where there is the removal of residue in the last bunker preceding the negative sort, all costs associated with that removal shall be allocated to the negative sort material(s). Where there are multiple materials in the negative sort, the cost of residue removal is shared by all materials in the final stream on the basis of the volume of each material in that stream.	1st – material specific 2nd – volume
P.44: The cost for the removal of residues in the pre-sort area of a MRF shall be allocated to all materials in that stream on the sorting line based on the relative volume of each material in that stream.	1st – all materials 2nd – volume
P.45: The cost for the removal of residues (capital and operating) at any point after a major break in the sorting function as a result of a piece of equipment (defined as air classifier, flats-rounds separator, OCC screen, ONP screen) that produces two (or more) streams of materials, shall be allocated to only those materials downstream of the piece of equipment and on the basis of the relative volume of each material in that stream.	1st – downstream materials 2nd – volume
P.46: The cost for the removal of residues at any location in a manual sorting system (i.e., no automated separation equipment, as may occur in smaller facilities) shall be allocated to all materials downstream of the point of removal of residues (into a bunker or dumpster (not residue removal to a garbage can or small bin on the sorting platform) in that stream on the sorting line based on the relative volume of each material in that stream.	1st – all materials 2nd – volume
P.47: The shipping and disposal costs for the management of residues shall be allocated to each material on the basis of the weight of the material managed.	1st – weight

Processing (P) Assumption	Cost Driver(s)
P.48: General operating costs should be assigned to individual material as an additive cost based on the percentage cost allocations in total determined through the application of principles P.1 to P.48. This approach will not make any material change to the total percentage allocation of costs to individual materials.	1st – additive cost based on allocations of all costs for P.1 to P.48