Table C-6: Generation Rate of Street Sweeping Waste

		Number of samples (nos.)	Effective number of samples (nos.)	Standard deviation (g/m/day)	95 % reliable value (g/m/day)	Maximum value (g/m/day)	Average value (g/m/day)	Minimum value (g/m/day)
Street sweeping	Dry season	14	14	9.6	5.0	22.7	17.7	12.7
	Rain season	14	14	9.0	4.7	18.8	14.1	9.4
	Overall	**28**	**28**	**9.3**	**3.5**	**19.4**	**15.9**	**12.4**

C.1.2 Waste Composition Survey

a. Objectives

The objective of Waste Composition Survey is to obtain data of physical and chemical properties of wastes generated in the Study Area. The study focused on determining the following:

a) bulk density
b) physical composition (wet base)
c) three contents (combustible matter, water and ash)
d) chemical analysis (carbon, hydrogen, nitrogen, sulfur, chlorine, oxygen and calorific value of combustible matter)

a.1 Bulk Density

The bulk density is necessary to assess the total volume of waste that must be managed. Bulk density is important for planning the type and number of collection vehicles, the number and size of containers, and landfill capacity.

a.2 Physical Composition (wet base)

Physical composition of waste is necessary for current and future planning of SWM. Variations in composition affect the feasibility of the introduction of intermediate treatment technologies.

Composition rates of recyclable materials, such as plastic and metals, are used to assess the feasibility of recycling programs. Also, rate of organic composition is crucial when planning of composting is required.

a.3 Water Content

Water content, along with the bulk density, is important for the design of collection and disposal of municipal solid waste. Further, knowledge of water content of municipal solid waste is necessary when analyzing potential of biological treatments such as composting.

a.4 Chemical Analysis

Information of Chemical Analysis is crucial to plan intermediate treatment such as incineration and biological treatments. Proportion of their contents not only affects activities of microorganisms that decompose waste for biological treatment, also affects to combustion conditions for incineration.

b. Methodology

b.1 Waste Targeted

Wastes of all 6 categories were subjects of bulk density, physical composition, three contents and chemical analyses. Table C-7 shows the waste targeted and the number of samples.

Table C-7: Number of Samples of Waste Composition Survey

Category		Samples (A)	Survey days (B)	Bulk density (A)×(B)	Physical composition (A)×(B)	Water content (A)×(B)	Chemical composition
Residential	High	1	3	3	3	3	1
	Middle	1	3	3	3	3	1
	Low	1	3	3	3	3	1
Commercial	Restaurant	1	3	3	3	3	1
	Others	1	3	3	3	3	1
Institutional		1	3	3	3	3	1
Market		1	3	3	3	3	1
Street sweeping		1	3	3	3	3	1
Collection Vehicle	Panama	3	3	9	9	9	3
	San Miguelito	1	3	3	3	3	1
	Arraijan	1	3	3	3	3	1
Total		-	-	39	39	39	13

b.2 Sampling

The wastes used in the Waste Amount Survey were used for the Waste Composition Survey. Wastes from each source were gathered and mixed by category and one sample was extracted from each category by using waste reduction method.

b.2.1 Reduction Method

Step 1. Mixing: Wastes from each source is mixed every category. When the waste contained large particles (e.g., cardboard, textiles, etc.) those items are cut into smaller pieces and mixed again. Cutting the waste into smaller pieces is carried out to obtain an even mixture.

Step 2. Dividing: Once the waste is mixed well, it is divided into four segments of approximately the same size.

Step 3. Reduction: The two segments of waste diagonally opposite each other are removed and the remaining waste is mixed again.

Step 4. The above steps are repeated till the volume of the remaining waste is reduced in size to approximately 40 liters.

Step 5. The waste sample is then put into a calibrated plastic bucket and dropped 3 times from a height of 30 centimeters. Then, volume and weight are recorded.

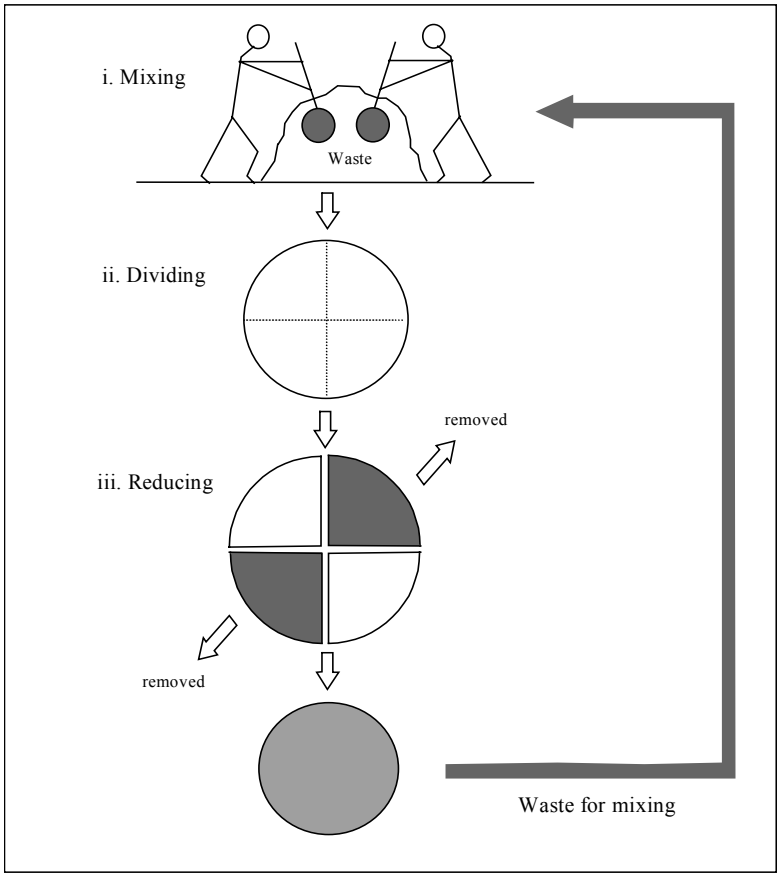

Figure C-1: Mixing, Reduction, and Separation of Waste Samples (Reduction method)

b.2.2 Bulk Density

Subsequently the bulk density of the waste sample was calculated with the following formula.

$$\text{Bulk density} = \frac{\text{Net Weight of Waste}}{\text{Volume of Waste}}$$

b.2.3 Physical Composition (wet base)

The physical composition was measured in the "wet base" (as discarded state, before the waste had a chance to dry). The above samples were divided into the following 10 components, and the weight of each was measured.

- kitchen waste
- papers
- textiles
- grass, wood, bamboo
- plastics
- rubber and leather
- metals
- bottles, glass
- stone and soil
- others

b.2.4 Water Content

After drying out for 5 to 6 days in dryer, the samples were weighed again, and the water content was calculated by the following formula.

$$\text{Water Content}(\%)=\frac{\text{Original Weight}-\text{Dry Weight}}{\text{Original Weight}}\times 100$$

b.2.5 Chemical analysis

Combustible matter (kitchen waste, paper, textile, grass and wood, plastics, rubber and leather) of the dried wastes were mixed and crushed, then samples were taken for the chemical analyses (three contents, elementary analysis and calorific value analysis).

c. Result

c.1 Bulk Density

Table C-8 to Table C-15 shows bulk density of the wastes.

Table C-8: Bulk Density of Household Waste

unit : kg/liter

Category		Dry season			Rain season			Average		
		22 Jan 2002	23 Jan 2002	25 Jan 2002	26 Jun 2002	29 Jun 2002	1 Jul 2002	Dry season	Rain season	Whole season
High income	Kitchen Waste	0.752	0.668	0.422	0.589	0.514	0.395	0.61	0.50	0.56
	Paper	0.164	0.066	0.077	0.082	0.097	0.108	0.10	0.10	0.10
	Textile	0.197	0.365	0.077	NA	NA	0.508	0.21	0.51	0.29
	Grass Wood	0.151	0.035	0.096	0.039	0.099	0.087	0.09	0.08	0.08
	Plastic	0.046	0.046	0.034	0.078	0.130	0.124	0.04	0.11	0.08
	Rubber Leather	NA	0.378	0.255	NA	0.661	NA	0.32	0.66	0.43
	Metal	0.810	0.167	0.115	NA	0.075	0.124	0.36	0.10	0.26
	Bottles Glass	0.569	0.757	1.193	0.983	1.723	0.539	0.84	1.08	0.96
	Soil Stone	NA	NA	NA	0.655	NA	0.692	NA	0.67	0.67
	Others	0.118	NA	NA	NA	NA	NA	0.12	NA	0.12
	Total	**0.21**	**0.13**	**0.08**	**0.14**	**0.15**	**0.14**	**0.14**	**0.14**	**0.14**
Middle income	Kitchen Waste	0.452	0.721	0.795	0.686	0.436	0.805	0.66	0.64	0.65
	Paper	0.137	0.091	0.058	0.128	0.066	0.118	0.10	0.10	0.10
	Textile	0.110	0.332	0.140	2.067	0.062	0.000	0.19	0.71	0.45
	Grass Wood	0.103	0.134	NA	0.148	0.000	0.065	0.12	0.07	0.09
	Plastic	0.059	0.045	0.030	0.049	0.056	0.036	0.04	0.05	0.05
	Rubber Leather	0.000	0.000	NA	0.693	0.000	NA	0.00	0.35	0.17
	Metal	0.117	0.158	0.261	0.034	0.100	0.203	0.18	0.11	0.15
	Bottles Glass	1.061	1.119	1.101	2.387	1.363	1.248	1.09	1.67	1.38
	Soil Stone	0.000	0.850	NA	NA	NA	NA	0.43	NA	0.43
	Others	NA	0.000	0.490	NA	NA	NA	0.25	NA	0.25
	Total	**0.15**	**0.22**	**0.12**	**0.25**	**0.1**	**0.22**	**0.16**	**0.19**	**0.18**
Low income	Kitchen Waste	0.624	0.753	0.663	0.557	0.718	0.599	0.68	0.62	0.65
	Paper	0.070	0.079	0.050	0.140	0.257	0.073	0.07	0.16	0.11
	Textile	0.179	0.489	0.174	0.386	0.386	NA	0.28	0.39	0.32
	Grass Wood	0.096	0.208	0.000	0.263	NA	0.036	0.10	0.15	0.12
	Plastic	0.051	0.044	0.029	0.058	0.052	0.041	0.04	0.05	0.05
	Rubber Leather	NA	NA	NA	1.673	NA	NA	NA	1.67	1.67
	Metal	0.102	0.171	0.174	0.474	0.079	0.099	0.15	0.22	0.18
	Bottles Glass	0.410	0.706	1.471	1.042	2.241	1.187	0.86	1.49	1.18
	Soil Stone	NA	1.441	NA	NA	NA	NA	1.44	NA	1.44
	Others	NA	NA	0.686	NA	NA	NA	0.69	NA	0.69
	Total	**0.18**	**0.22**	**0.07**	**0.23**	**0.22**	**0.12**	**0.16**	**0.19**	**0.17**

Table C-9: Bulk Density of Commercial Waste

unit : kg/liter

Category		Dry season			Rain season			Average		
		6 Feb 2002	7 Feb 2002	8 Feb 2002	7 Jul 2002	10 Jul 2002	12 Jul 2002	Dry season	Rain season	Whole season
Restaurant	Kitchen Waste	0.500	0.349	0.541	0.277	0.644	0.697	0.46	0.54	0.50
	Paper	0.206	0.114	0.156	0.092	0.163	0.196	0.16	0.15	0.15
	Textile	NA	NA	3.123	NA	0.167	NA	3.12	0.17	1.65
	Grass Wood	0.234	NA	NA	NA	NA	NA	0.23	NA	0.23
	Plastic	0.034	0.070	0.039	0.030	0.061	0.038	0.05	0.04	0.05
	Rubber Leather	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Metal	0.080	0.059	0.370	0.106	0.018	0.080	0.17	0.07	0.12
	Bottles Glass	0.180	0.964	0.728	0.679	1.738	0.877	0.62	1.10	0.86
	Soil Stone	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Others	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Total	**0.170**	**0.160**	**0.260**	**0.110**	**0.240**	**0.280**	**0.20**	**0.21**	**0.20**
Commercial	Kitchen Waste	0.505	0.448	0.508	0.363	0.550	0.275	0.49	0.40	0.44
	Paper	0.050	0.052	0.047	0.057	0.069	0.045	0.05	0.06	0.05
	Textile	NA	NA	0.188	0.183	NA	NA	0.19	0.18	0.19
	Grass Wood	0.238	0.137	NA	NA	0.062	NA	0.19	0.06	0.15
	Plastic	0.015	0.019	0.025	0.016	0.031	0.028	0.02	0.03	0.02
	Rubber Leather	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Metal	0.066	0.334	0.372	NA	NA	0.084	0.26	0.08	0.21
	Bottles Glass	0.806	0.964	0.854	NA	NA	NA	0.87	NA	0.87
	Soil Stone	2.938	NA	NA	NA	NA	NA	2.94	NA	2.94
	Others	0.082	0.043	NA	NA	NA	0.345	0.06	0.35	0.16
	Total	**0.070**	**0.060**	**0.060**	**0.030**	**0.060**	**0.060**	**0.06**	**0.05**	**0.06**

Table C-10: Bulk Density of Institutional Waste

unit : kg/liter

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	11 Jul 2002	13 Jul 2002	16 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	0.257	0.249	1.947	0.894	0.289	0.271	0.82	0.48	0.65
Paper	0.037	0.051	0.07	0.041	0.123	0.051	0.05	0.07	0.06
Textile	NA	NA	NA	0.062	0.069	NA	NA	0.07	0.07
Grass Wood	0.068	0.135	NA	NA	NA	NA	0.10	NA	0.10
Plastic	0.008	0.018	0.021	0.02	0.013	0.023	0.02	0.02	0.02
Rubber Leather	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metal	0.068	1.08	0.052	0.087	0.025	0.035	0.40	0.05	0.22
Bottles Glass	0.554	0.822	0.472	0.561	NA	0.997	0.62	0.78	0.68
Soil Stone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Others	NA	NA	NA	0.291	NA	NA	NA	0.29	0.29
Total	**0.04**	**0.07**	**0.07**	**0.04**	**0.07**	**0.06**	**0.06**	**0.06**	**0.06**

Table C-11: Bulk Density of Market Waste

unit : kg/liter

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	10 Jul 2002	13 Jul 2002	15 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	0.560	0.732	0.406	0.430	0.319	0.591	0.57	0.45	0.51
Paper	0.026	0.054	0.068	0.225	0.123	0.119	0.05	0.16	0.10
Textile	NA	NA	NA	NA	0.105	0.452	NA	0.28	0.28
Grass Wood	NA	0.707	NA	NA	NA	0.086	0.71	0.09	0.40
Plastic	0.014	0.078	0.026	0.054	0.056	0.045	0.04	0.05	0.05
Rubber Leather	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metal	0.114	NA	2.039	0.187	0.105	0.136	1.08	0.14	0.52
Bottles Glass	0.847	NA	NA	8.612	NA	0.083	0.85	4.35	3.18
Soil Stone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Others	0.519	NA	NA	NA	NA	NA	0.52	NA	0.52
Total	**0.04**	**0.30**	**0.18**	**0.33**	**0.19**	**0.30**	**0.17**	**0.27**	**0.22**

Table C-12: Bulk Density of Street Sweeping Waste

unit : kg/liter

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	26 Jun 2002	29 Jun 2002	1 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	NA	0.403	0.316	0.414	0.835	0.495	0.36	0.58	0.49
Paper	0.034	0.048	0.090	0.055	0.122	0.099	0.06	0.09	0.07
Textile	0.205	0.234	NA	NA	NA	0.055	0.22	0.06	0.16
Grass Wood	0.050	0.072	0.088	0.141	0.128	0.103	0.07	0.12	0.10
Plastic	0.036	0.033	0.048	0.128	0.047	0.051	0.04	0.08	0.06
Rubber Leather	0.122	NA	NA	0.276	NA	0.493	0.12	0.38	0.30
Metal	0.091	0.082	0.100	0.084	0.160	0.245	0.09	0.16	0.13
Bottles Glass	0.674	NA	0.884	1.659	3.510	0.977	0.78	2.05	1.54
Soil Stone	1.469	1.137	1.135	NA	NA	0.699	1.25	0.70	1.11
Others	NA	NA	NA	NA	NA	NA	NA	NA	NA
Total	**0.05**	**0.11**	**0.10**	**0.11**	**0.10**	**0.12**	**0.09**	**0.11**	**0.10**

Table C-13: Bulk Density of Collection Vehicle Waste form Panama City

unit : kg/liter

Category		Dry season			Rain season			Average		
		26 Jan 2002	28 Jan 2002	30 Jan 2002	15 Jul 2002	17 Jul 2002	19 Jul 2002	Dry season	Rain season	Whole season
High income	Kitchen Waste	0.551	0.39	0.295	0.499	0.653	0.34	0.41	0.50	0.45
	Paper	0.11	0.098	0.018	0.138	0.235	0.169	0.08	0.18	0.13
	Textile	0.426	0.17	0.052	0.134	0.258	0.209	0.22	0.20	0.21
	Grass Wood	0.062	NA	0.256	0.057	0.094	0.063	0.16	0.07	0.11
	Plastic	0.068	0.037	0.031	0.063	0.049	0.044	0.05	0.05	0.05
	Rubber Leather	0.256	0.114	NA	0.313	NA	NA	0.19	0.31	0.23
	Metal	0.122	0.17	0.046	0.169	0.112	0.154	0.11	0.15	0.13
	Bottles Glass	0.938	1.85	1.018	0.663	0.887	1.483	1.27	1.01	1.14
	Soil Stone	NA	NA	NA	NA	NA	NA	NA	NA	NA
	Others	0.284	2.375	NA	NA	NA	NA	1.33	NA	1.33
	Total	**0.19**	**0.16**	**0.07**	**0.15**	**0.17**	**0.17**	**0.14**	**0.16**	**0.15**
Middle income	Kitchen Waste	4.68	0.515	0.435	0.808	0.84	0.832	1.88	0.83	1.35
	Paper	0.949	0.114	0.097	0.116	0.191	0.162	0.39	0.16	0.27
	Textile	2.374	0.454	NA	1.001	0.542	0.227	1.41	0.59	0.92
	Grass Wood	0.323	0.047	0.125	0.059	0.091	0.172	0.17	0.11	0.14
	Plastic	0.619	0.052	0.038	0.065	0.072	0.099	0.24	0.08	0.16
	Rubber Leather	NA	NA	NA	NA	0.172	NA	NA	0.17	0.17
	Metal	1.43	0.066	0.056	0.197	0.136	0.173	0.52	0.17	0.34
	Bottles Glass	9.871	0.91	0.807	0.22	1.106	1.782	3.86	1.04	2.45
	Soil Stone	NA	NA	0.99	NA	0.441	NA	0.99	0.44	0.72
	Others	NA	0.43	NA	4.786	0.453	NA	0.43	2.62	1.89
	Total	**1.28**	**0.18**	**0.11**	**0.2**	**0.26**	**0.29**	**0.52**	**0.25**	**0.39**
Low income	Kitchen Waste	0.466	0.735	0.812	0.77	0.427	0.687	0.67	0.63	0.65
	Paper	0.108	0.162	0.144	0.127	0.13	0.16	0.14	0.14	0.14
	Textile	0.625	0.521	0.26	0.137	0.167	0.575	0.47	0.29	0.38
	Grass Wood	0.34	NA	0.107	NA	NA	0.233	0.22	0.23	0.23
	Plastic	0.049	0.048	0.063	0.043	0.037	0.057	0.05	0.05	0.05
	Rubber Leather	0.162	NA	0.133	NA	NA	NA	0.15	NA	0.15
	Metal	0.246	0.085	0.073	0.136	0.067	0.218	0.13	0.14	0.14
	Bottles Glass	0.765	0.771	1.127	1.149	0.632	1.721	0.89	1.17	1.03
	Soil Stone	NA	NA	1.008	NA	NA	NA	1.01	NA	1.01
	Others	0.285	NA	0.199	NA	NA	NA	0.24	NA	0.24
	Total	**0.21**	**0.23**	**0.33**	**0.25**	**0.16**	**0.28**	**0.26**	**0.23**	**0.24**

Table C-14: Bulk Density of Collection Vehicle Waste form San Miguelito

unit : kg/liter

Item	Dry season			Rain season			Average		
	28 Jan 2002	30 Jan 2002	1 Feb 2002	15 Jul 2002	17 Jul 2002	19 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	0.498	0.155	0.477	1.098	0.745	0.461	0.38	0.77	0.57
Paper	0.061	0.035	0.050	0.554	0.157	0.159	0.05	0.29	0.17
Textile	0.198	0.068	0.097	0.534	0.368	0.255	0.12	0.39	0.25
Grass Wood	0.066	0.078	0.642	0.175	0.048	0.043	0.26	0.09	0.18
Plastic	0.055	0.248	0.032	0.128	0.045	0.040	0.11	0.07	0.09
Rubber Leather	NA	NA	NA	NA	NA	NA	NA	NA	NA
Metal	0.226	0.170	0.094	0.513	0.239	0.168	0.16	0.31	0.24
Bottles Glass	NA	0.184	0.055	1.250	0.890	1.574	0.12	1.24	0.79
Soil Stone	NA	0.873	NA	NA	NA	NA	0.87	NA	0.87
Others	NA	0.184	0.120	NA	NA	NA	0.15	NA	0.15
Total	**0.090**	**0.090**	**0.140**	**0.430**	**0.220**	**0.180**	**0.11**	**0.28**	**0.19**

Table C-15: Bulk Density of Collection Vehicle Waste form Arraijan

unit : kg/liter

Item	Dry season			Rain season			Average		
	28 Jan 2002	30 Jan 2002	4 Feb 2002	15 Jul 2002	17 Jul 2002	20 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	0.165	0.394	0.387	0.946	0.539	0.725	0.32	0.74	0.53
Paper	0.022	0.063	0.057	0.142	0.154	0.229	0.05	0.18	0.11
Textile	0.355	0.206	0.131	0.692	NA	0.000	0.23	0.35	0.28
Grass Wood	0.508	0.185	NA	0.693	0.101	0.262	0.35	0.35	0.35
Plastic	0.050	0.036	0.037	0.123	0.045	0.049	0.04	0.07	0.06
Rubber Leather	NA	NA	NA	0.000	NA	0.000	NA	0.00	0.00
Metal	0.071	0.093	0.512	0.676	0.238	0.316	0.23	0.41	0.32
Bottles Glass	1.242	1.327	0.830	NA	0.000	1.252	1.13	0.63	0.93
Soil Stone	NA	NA	NA	NA	NA	NA	NA	NA	NA
Others	NA	1.904	NA	NA	NA	NA	1.90	NA	1.90
Total	**0.10**	**0.11**	**0.10**	**0.31**	**0.21**	**0.24**	**0.10**	**0.25**	**0.18**

c.2 Physical Composition (wet base)

Results of physical composition survey shows below.

Table C-16: Physical Composition of Household Waste

unit : wet base %

Category and composition		Dry season			Rain season			Average		
		22 Jan 2002	23 Jan 2002	25 Jan 2002	26 Jun 2002	29 Jun 2002	1 Jul 2002	Dry season	Rain season	Whole season
High income	Kitchen Waste	44.3%	38.1%	22.6%	50.0%	19.4%	23.0%	35.0%	30.8%	32.9%
	Paper	28.9%	20.1%	42.1%	13.9%	21.9%	23.0%	30.4%	19.6%	25.0%
	Textile	6.8%	22.2%	6.1%	0.0%	0.0%	9.9%	11.7%	3.3%	7.5%
	Grass Wood	4.8%	4.8%	10.3%	4.2%	9.4%	23.7%	6.6%	12.4%	9.5%
	Plastic	7.7%	9.0%	12.8%	26.4%	29.4%	7.2%	9.8%	21.0%	15.4%
	Rubber Leather	0.0%	0.3%	2.1%	0.0%	6.2%	0.0%	0.8%	2.1%	1.4%
	Metal	0.2%	5.1%	1.6%	0.0%	5.6%	7.2%	2.3%	4.3%	3.3%
	Bottles Glass	7.0%	0.3%	2.6%	4.2%	8.1%	5.3%	3.3%	5.9%	4.6%
	Soil Stone	0.0%	0.0%	0.0%	1.4%	0.0%	0.7%	0.0%	0.7%	0.4%
	Others	0.2%	0.0%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.0%
	Total	99.9%	99.9%	100.2%	100.1%	100.0%	100.0%	100.0%	100.0%	100.0%
Middle income	Kitchen Waste	45.0%	67.1%	47.4%	60.1%	33.0%	67.3%	53.2%	53.5%	53.3%
	Paper	16.4%	17.4%	19.8%	22.4%	30.2%	15.5%	17.9%	22.7%	20.3%
	Textile	3.3%	3.4%	6.0%	2.2%	4.7%	0.0%	4.2%	2.3%	3.3%
	Grass Wood	15.0%	1.7%	7.5%	4.9%	0.0%	0.5%	8.1%	1.8%	4.9%
	Plastic	15.7%	6.0%	10.1%	3.7%	14.1%	7.3%	10.6%	8.4%	9.5%
	Rubber Leather	0.0%	0.0%	0.0%	0.7%	0.0%	0.0%	0.0%	0.2%	0.1%
	Metal	1.2%	0.7%	2.2%	0.7%	7.5%	7.3%	1.4%	5.2%	3.3%
	Bottles Glass	3.5%	3.2%	5.6%	5.2%	10.4%	2.3%	4.1%	6.0%	5.0%
	Soil Stone	0.0%	0.4%	0.0%	0.0%	0.0%	0.0%	0.1%	0.0%	0.1%
	Others	0.0%	0.0%	1.5%	0.0%	0.0%	0.0%	0.5%	0.0%	0.3%
	Total	100.1%	99.9%	100.1%	99.9%	99.9%	100.2%	100.0%	100.0%	100.0%
Low income	Kitchen Waste	56.2%	50.2%	34.2%	31.0%	47.3%	44.4%	46.9%	40.9%	43.9%
	Paper	6.3%	8.2%	35.4%	16.7%	25.4%	14.8%	16.6%	19.0%	17.8%
	Textile	1.9%	13.6%	2.5%	18.4%	8.5%	13.0%	6.0%	13.3%	9.7%
	Grass Wood	6.1%	6.2%	0.0%	6.3%	4.0%	4.6%	4.1%	5.0%	4.5%
	Plastic	10.8%	8.2%	20.3%	9.6%	8.0%	12.1%	13.1%	9.9%	11.5%
	Rubber Leather	6.1%	3.3%	0.0%	8.0%	1.0%	0.0%	3.1%	3.0%	3.1%
	Metal	3.8%	3.2%	2.5%	7.5%	3.5%	5.5%	3.2%	5.5%	4.3%
	Bottles Glass	7.6%	5.2%	4.4%	2.5%	2.5%	5.5%	5.7%	3.5%	4.6%
	Soil Stone	1.3%	1.1%	0.0%	0.0%	0.0%	0.0%	0.8%	0.0%	0.4%
	Others	0.0%	0.8%	0.6%	0.0%	0.0%	0.0%	0.5%	0.0%	0.2%
	Total	100.1%	100.0%	99.9%	100.0%	100.2%	99.9%	100.0%	100.0%	100.0%

Table C-17: Physical Composition of Commercial Waste

unit : wet base %

Category		Dry season			Rain season			Average		
		6 Feb 2002	7 Feb 2002	8 Feb 2002	7 Jul 2002	10 Jul 2002	12 Jul 2002	Dry season	Rain season	Whole season
Restaurant	Kitchen Waste	28.0%	55.6%	47.3%	23.6%	59.2%	64.8%	43.6%	49.2%	46.4%
	Paper	58.2%	16.8%	14.8%	47.2%	33.6%	25.5%	29.9%	35.4%	32.7%
	Textile	0.0%	0.0%	8.9%	0.0%	0.2%	0.0%	3.0%	0.1%	1.5%
	Grass Wood	0.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.3%	0.0%	0.2%
	Plastic	6.3%	19.4%	6.2%	6.9%	5.6%	3.9%	10.6%	5.5%	8.1%
	Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Metal	3.3%	0.9%	1.1%	3.0%	0.4%	2.6%	1.8%	2.0%	1.9%
	Bottles Glass	3.3%	7.3%	21.8%	19.3%	1.0%	3.3%	10.8%	7.9%	9.3%
	Soil Stone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Others	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Total	100.0%	100.0%	100.1%	100.0%	100.0%	100.1%	100.0%	100.0%	100.0%
Commercial	Kitchen Waste	33.4%	21.8%	15.4%	21.4%	19.2%	38.6%	23.5%	26.4%	25.0%
	Paper	35.4%	34.7%	34.6%	31.5%	43.6%	44.1%	34.9%	39.7%	37.3%
	Textile	0.0%	0.0%	5.7%	5.7%	0.0%	0.0%	1.9%	1.9%	1.9%
	Grass Wood	2.2%	1.6%	0.0%	0.0%	10.9%	0.0%	1.3%	3.6%	2.5%
	Plastic	9.7%	14.5%	19.5%	41.4%	26.3%	11.8%	14.6%	26.5%	20.5%
	Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Metal	5.3%	16.3%	7.5%	0.0%	0.0%	3.9%	9.7%	1.3%	5.5%
	Bottles Glass	7.6%	10.5%	17.3%	0.0%	0.0%	0.0%	11.8%	0.0%	5.9%
	Soil Stone	5.3%	0.0%	0.0%	0.0%	0.0%	0.0%	1.8%	0.0%	0.9%
	Others	1.0%	0.6%	0.0%	0.0%	0.0%	1.6%	0.5%	0.5%	0.5%
	Total	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table C-18: : Physical Composition of Institutional Waste

unit : wet base %

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	11 Jul 2002	13 Jul 2002	16 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	6.4%	6.5%	24.8%	2.8%	21.9%	21.3%	12.6%	15.3%	14.0%
Paper	55.3%	47.5%	58.0%	77.7%	65.0%	48.4%	53.6%	63.7%	58.7%
Textile	0.0%	0.0%	0.0%	2.8%	1.3%	0.0%	0.0%	1.4%	0.7%
Grass Wood	12.9%	0.9%	0.0%	0.0%	0.0%	0.0%	4.6%	0.0%	2.3%
Plastic	8.5%	7.0%	7.6%	9.3%	8.1%	9.8%	7.7%	9.1%	8.4%
Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Metal	6.4%	28.2%	6.2%	2.8%	3.7%	7.4%	13.6%	4.6%	9.1%
Bottles Glass	10.5%	10.0%	3.3%	3.7%	0.0%	13.1%	7.9%	5.6%	6.8%
Soil Stone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Others	0.0%	0.0%	0.0%	0.9%	0.0%	0.0%	0.0%	0.3%	0.2%
Total	100.0%	100.1%	99.9%	100.0%	100.0%	100.0%	100.0%	100.0%	100.0%

Table C-19: Physical Composition of Market Waste

unit : wet base %

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	10 Jul 2002	13 Jul 2002	15 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	9.7%	72.9%	80.5%	77.6%	71.2%	72.5%	54.4%	73.8%	64.1%
Paper	35.4%	5.9%	12.9%	13.6%	14.8%	12.9%	18.1%	13.8%	15.9%
Textile	0.0%	0.0%	0.0%	0.0%	5.4%	9.8%	0.0%	5.1%	2.5%
Grass Wood	0.0%	13.2%	0.0%	0.0%	0.0%	0.5%	4.4%	0.2%	2.3%
Plastic	17.6%	8.0%	4.4%	2.8%	6.7%	2.6%	10.0%	4.0%	7.0%
Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Metal	5.9%	0.0%	2.2%	2.4%	1.8%	1.2%	2.7%	1.8%	2.3%
Bottles Glass	29.4%	0.0%	0.0%	3.7%	0.0%	0.4%	9.8%	1.4%	5.6%
Soil Stone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Others	1.9%	0.0%	0.0%	0.0%	0.0%	0.0%	0.6%	0.0%	0.3%
Total	99.9%	100.0%	100.0%	100.1%	99.9%	99.9%	100.0%	100.0%	100.0%

Table C-20: Physical Composition of Street Sweeping Waste

unit : wet base %

Item	Dry season			Rain season			Average		
	6 Feb 2002	7 Feb 2002	8 Feb 2002	26 Jun 2002	29 Jun 2002	1 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	0.0%	30.3%	15.8%	12.7%	12.5%	17.7%	15.4%	14.3%	14.8%
Paper	23.7%	13.8%	18.0%	23.7%	36.5%	31.6%	18.5%	30.6%	24.6%
Textile	4.0%	10.8%	0.0%	0.0%	0.0%	5.9%	4.9%	2.0%	3.5%
Grass Wood	37.9%	15.1%	33.1%	28.8%	7.7%	7.4%	28.7%	14.6%	21.7%
Plastic	10.5%	9.3%	14.4%	26.3%	27.9%	11.8%	11.4%	22.0%	16.7%
Rubber Leather	2.7%	0.0%	0.0%	0.9%	0.0%	4.4%	0.9%	1.8%	1.3%
Metal	1.2%	0.9%	2.4%	0.9%	4.8%	4.4%	1.5%	3.4%	2.4%
Bottles Glass	6.9%	0.0%	9.3%	6.8%	10.6%	4.4%	5.4%	7.3%	6.3%
Soil Stone	13.2%	19.8%	6.9%	0.0%	0.0%	12.5%	13.3%	4.2%	8.7%
Others	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Total	100.1%	100.0%	99.9%	100.1%	100.0%	100.1%	100.0%	100.1%	100.0%

Table C-21: Physical Composition of Collection Vehicle from Panama City

unit : wet base %

Category		Dry season			Rain season			Average		
		26 Jan 2002	28 Jan 2002	30 Jan 2002	15 Jul 2002	17 Jul 2002	19 Jul 2002	Dry season	Rain season	Whole season
High income	Kitchen Waste	36.6%	44.1%	13.8%	35.7%	35.6%	48.7%	31.5%	40.0%	35.8%
	Paper	21.1%	14.2%	8.0%	23.1%	32.1%	28.0%	14.4%	27.7%	21.1%
	Textile	17.0%	27.9%	5.8%	8.0%	7.0%	4.6%	16.9%	6.5%	11.7%
	Grass Wood	2.5%	0.0%	28.7%	7.4%	1.9%	4.9%	10.4%	4.7%	7.6%
	Plastic	10.2%	6.6%	22.4%	12.1%	14.8%	6.3%	13.1%	11.1%	12.1%
	Rubber Leather	1.7%	0.9%	0.0%	4.1%	0.0%	0.0%	0.9%	1.4%	1.1%
	Metal	2.8%	2.6%	2.1%	6.1%	3.8%	3.4%	2.5%	4.4%	3.5%
	Bottles Glass	6.2%	2.9%	19.1%	3.6%	4.8%	4.1%	9.4%	4.2%	6.8%
	Soil Stone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
	Others	1.9%	0.9%	0.0%	0.0%	0.0%	0.0%	0.9%	0.0%	0.5%
	Total	100.0%	100.1%	99.9%	100.1%	100.0%	100.0%	100.0%	100.0%	100.0%
Middle income	Kitchen Waste	34.2%	56.3%	14.8%	44.4%	50.5%	46.5%	35.1%	47.1%	41.1%
	Paper	31.5%	21.0%	31.9%	22.8%	28.7%	23.7%	28.1%	25.1%	26.6%
	Textile	11.6%	3.1%	0.0%	11.0%	2.0%	4.0%	4.9%	5.7%	5.3%
	Grass Wood	2.5%	1.9%	27.1%	1.6%	1.0%	1.2%	10.5%	1.3%	5.9%
	Plastic	15.1%	8.2%	11.6%	12.9%	9.2%	9.7%	11.6%	10.6%	11.1%
	Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.5%	0.0%	0.0%	0.2%	0.1%
	Metal	0.3%	2.7%	0.3%	2.2%	4.1%	2.4%	1.1%	2.9%	2.0%
	Bottles Glass	4.8%	6.2%	11.9%	2.4%	2.9%	12.5%	7.6%	5.9%	6.8%
	Soil Stone	0.0%	0.0%	2.2%	0.0%	0.2%	0.0%	0.7%	0.1%	0.4%
	Others	0.0%	0.6%	0.0%	2.7%	0.9%	0.0%	0.2%	1.2%	0.7%
	Total	100.0%	100.0%	99.8%	100.0%	100.0%	100.0%	99.9%	100.0%	100.0%
Low income	Kitchen Waste	25.5%	52.3%	65.1%	63.2%	50.9%	41.5%	47.6%	51.9%	49.8%
	Paper	12.4%	19.9%	8.3%	16.5%	28.9%	22.9%	13.5%	22.8%	18.2%
	Textile	43.6%	13.6%	6.0%	3.8%	5.3%	21.7%	21.1%	10.3%	15.7%
	Grass Wood	2.1%	0.0%	0.2%	0.0%	0.0%	0.5%	0.8%	0.2%	0.5%
	Plastic	11.0%	9.0%	5.5%	5.9%	8.2%	5.6%	8.5%	6.6%	7.5%
	Rubber Leather	0.7%	0.0%	1.5%	0.0%	0.0%	0.0%	0.7%	0.0%	0.4%
	Metal	2.2%	2.3%	2.0%	2.8%	1.6%	3.3%	2.2%	2.6%	2.4%
	Bottles Glass	1.9%	2.8%	2.2%	7.8%	5.0%	4.5%	2.3%	5.8%	4.0%
	Soil Stone	0.0%	0.0%	7.7%	0.0%	0.0%	0.0%	2.6%	0.0%	1.3%
	Others	0.7%	0.0%	1.5%	0.0%	0.0%	0.0%	0.7%	0.0%	0.4%
	Total	100.1%	99.9%	100.0%	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%

Table C-22: Physical Composition of Collection Vehicle from San Miguelito

unit : wet base %

Item	Dry season			Rain season			Average		
	28 Jan 2002	30 Jan 2002	1 Feb 2002	15 Jul 2002	17 Jul 2002	19 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	28.7%	15.9%	41.2%	48.8%	44.2%	46.4%	28.6%	46.5%	37.5%
Paper	20.5%	20.9%	3.9%	14.8%	29.8%	28.0%	15.1%	24.2%	19.7%
Textile	2.9%	4.6%	5.9%	11.9%	4.4%	9.6%	4.5%	8.6%	6.6%
Grass Wood	21.7%	8.5%	27.7%	9.3%	2.8%	1.9%	19.3%	4.7%	12.0%
Plastic	21.3%	27.1%	9.8%	10.2%	5.4%	7.1%	19.4%	7.6%	13.5%
Rubber Leather	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Metal	4.9%	15.1%	6.5%	2.3%	2.8%	2.1%	8.8%	2.4%	5.6%
Bottles Glass	0.0%	0.8%	0.9%	2.8%	10.5%	4.9%	0.6%	6.1%	3.3%
Soil Stone	0.0%	6.6%	0.0%	0.0%	0.0%	0.0%	2.2%	0.0%	1.1%
Others	0.0%	0.4%	4.1%	0.0%	0.0%	0.0%	1.5%	0.0%	0.8%
Total	100.0%	99.9%	100.0%	100.1%	99.9%	100.0%	100.0%	100.0%	100.0%

Table C-23: Physical Composition of Collection Vehicle from Arraijan

unit : wet base %

Item	Dry season			Rain season			Average		
	28 Jan 2002	30 Jan 2002	4 Feb 2002	15 Jul 2002	17 Jul 2002	20 Jul 2002	Dry season	Rain season	Whole season
Kitchen Waste	12.1%	35.1%	36.8%	63.2%	61.8%	35.4%	28.0%	53.5%	40.7%
Paper	4.5%	15.5%	17.6%	21.7%	17.9%	23.1%	12.5%	20.9%	16.7%
Textile	43.4%	7.6%	7.8%	1.4%	0.0%	15.4%	19.6%	5.6%	12.6%
Grass Wood	3.1%	12.3%	0.0%	0.4%	5.6%	0.6%	5.1%	2.2%	3.7%
Plastic	25.7%	14.2%	16.9%	7.9%	11.2%	8.6%	18.9%	9.2%	14.1%
Rubber Leather	0.0%	0.0%	0.0%	1.2%	0.0%	2.9%	0.0%	1.4%	0.7%
Metal	3.5%	4.1%	6.1%	4.2%	0.3%	8.9%	4.6%	4.5%	4.5%
Bottles Glass	7.7%	8.9%	14.9%	0.0%	3.1%	5.1%	10.5%	2.7%	6.6%
Soil Stone	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%
Others	0.0%	2.2%	0.0%	0.0%	0.0%	0.0%	0.7%	0.0%	0.4%
Total	100.0%	99.9%	100.1%	100.0%	99.9%	100.0%	100.0%	100.0%	100.0%