St. Lucia Solid Waste Management Authority

Waste Characterization Study 2008

WASTE CHARACTERISATION STUDY

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WASTE CHARACTERISATION STUDY - 2008

1.0 INTRODUCTION

The Saint Lucia Solid Waste Management Authority was established by an Act of Parliament in 1996 with a mandate to provide coordinated and integrated systems for the collection, treatment, recycling and disposal of solid waste, including hazardous waste and to establish and manage sanitary landfills.

Consistent with its mandate, the Authority is responsible for the collection of solid waste generated from residential properties, government/public offices and institutions including school, hospitals and other health care establishments, prisons, etc.

In addition, the Authority has the mandate to provide for the disposal of solid waste, and in this respect operates two waste disposal facilities, the Deglos Sanitary Landfill in the north of the island and the Vieux Fort Solid Waste Management Facility in the south.

The Authority, cognizant of the importance of waste characterisation in planning solid waste management systems and their operations and performance (health and safety, environmental and technical aspects) undertook the first ever Characterisation of Municipal Solid Waste (MSW) in St. Lucia in 2002. Municipal Solid Waste refers to waste generated from residential, commercial, institutional and industrial properties.

Waste characterisation is generally defined to include descriptions of the composition and quantities of solid waste and the materials that comprise it. Characterisation of waste is a fundamental aspect of solid waste management since management entails the handling, processing and conversion of materials.

The composition of waste is usually described as the percentage of each component present as a part of the total waste mass usually expressed in kilograms per capita per day (kg/capita/day). Due to this heterogeneity and the variability of Municipal Solid Waste it was necessary to carry out a statistically designed sampling survey by which the composition of waste could be accurately estimated.

2.0 METHODOLOGY

Inherent in the concept of quantities and properties is the need for methods and procedures of determining them. The methods must be structured to produce accurate

and reliable results and to be repeatable. It should be noted that seldom in waste management is the total population (in the statistical sense) measured. Therefore, representative sampling is a very important aspect of accurately determining waste quantities and properties. The St. Lucia Solid Waste Management Authority has kept accurate records of waste quantities since its inception, consequently this study focused only on the composition of Municipal Solid Waste and not the quantities. However, quantitative data accumulated over the past 4 years is presented in this report.

The Waste Characterisation study utilized the test method from the American Society for Testing and Materials (ASTM). This method describes procedures for measuring the composition of unprocessed Municipal Solid Waste by employing manual sorting. It applies to the determination of the mean composition of Municipal Solid Waste based on the collection and manual sorting of a number of samples of waste over a period of five (5) days i.e. from Monday to Friday.

The recommended sample weight of approximately 200 lb was used for the study because it has been found through various studies that measurements made on a sample size of about 200 lb vary insignificantly from measurements made on samples of up to 1700 lb taken from the same waste.

In order to obtain reliable results from the waste characterisation survey, it was necessary to determine the minimum number of samples that should be analyzed and evaluated to get data with reasonable accuracy. To meet this statistical requirement, the number of samples was determined by first selecting a required accuracy of 90%.

For the purpose of this study, nine (9) waste categories were selected for sampling. These categories were further broken down into 44 waste components. A waste component is a constituent of the solid waste stream composed of materials of similar properties and chemical composition (see Appendix 1). The nine major categories are as follows:

- Paper and Paperboard
- Glass
- Metal
- Plastic
- Textiles
- Organics
- Construction and Demolition (C & D) Wastes
- Special Care Wastes
- Other Wastes

2.1 Determination of the Number of Samples

The number of samples for the survey was determined using the following formula based on a confidence level of 90% and a precision of 10%. The number of sorting samples (vehicle loads) *(n)* required to achieve a desired level of measurement precision is a function of the component(s) under consideration and the confidence level. The governing equation for *n* is as follows:

$$n=[t^* s/(e\bar{x})]^2$$

where:

t^* = student *t* statistic corresponding to the desired level of confidence,

s = estimated standard deviation,

e = desired level of precision, and

x = estimated mean.

Suggested values of s and $\bar{x}$ for waste components are given in Appendix 3 and values for t^* in Appendix 2 for 90 and 95% level of confidence respectively. The number of samples (*n'*) for the selected conditions (i.e. precision and level of confidence) and components was determined using the above equation. For the purpose of estimation, the t^* value for $n = \infty$ was chosen for the selected level of confidence. The component that is chosen to govern the precision of the composition measurement (and therefore the number of samples required for sorting) is termed the *"governing component"* for the purpose of this method of sampling. For this survey plastic was chosen as the governing component.

The number of samples was determined as follows:

1. Plastic is selected as the governing component.
2. A 90% confidence level is selected.
3. A precision of 10% is desired.
4. Therefore:

s = 0.03 (from Table 2)

x = 0.14 (from Table2)

e = 0.10, and

t^* ($n = \infty$) = 1.645 (from Table 4)

Using the above equation:

$$n = \left[\frac{1.645\ (0.03)^2}{0.1\ (0.09)}\right] = 30$$

Therefore n_o = 30.

In accordance with the ASTM methodology, after determining the governing component and its corresponding number of samples (n_o), student t statistic (t^*_o) corresponding to n_o is selected. The number of samples i.e., n' using t^*_o is recalculated as follows:

Referring to Table 3, for $n = 30$, and using the equation above
$t^*_{90}(n = 30) = 1.699$.

$$\left[\frac{1.699\ (0.03)}{0.1\ (0.09)}\right]^2 = 32.07$$

$$n' = 32.07$$

Since 32 (i.e. n') is less than 10% of 30 (i.e., n_o) therefore 32 samples (the larger value) was selected for sampling in accordance with ASTM.

2.2 Summary of Methodology

1. The number of samples to be sorted based on the statistical criteria as stated above is **thirty-two (32).**

2. Vehicle loads of waste are designated for sampling, and a sorting sample of approximately 200 lb is collected from the discharged vehicle load.

3. The sample is sorted manually into waste components. The weight fractions of each component in the sorting sample is calculated from the weights of the components.

4. The mean waste composition is calculated using the results of the composition of the sorting samples.

3.0 EQUIPMENT

The equipment used to conduct the survey included an Electronic Bench Scale with a capacity of 220 lbs (100 kg) and a precision of 0.1 lb (0.045 kg), a Crane Scale with a capacity of 250 lbs (125 kg) and a precision of 0.1 lb (0.045 kg), Heavy-Duty Tarps, Shovels, Rakes, Push Brooms, Dust Pans, Hand Brooms, First Aid Kit, Traffic Vests, Leather Gloves, Latex Gloves, Hardhats, Safety Glasses, Rubber Boots, Coveralls, Disposable Aprons, and Disposable Face Mask (see Appendix 1).

4.0 PROCEDURE

1. Forty-four (44) storage containers were labeled with the waste components selected for sampling. These containers were arranged under a covered area and the tare weight recorded.

2. The bench scale was placed in the vicinity of the storage containers on a clean, flat surface. The accuracy of the scale was determined with a known (reference) weight.

3. A flat and level area for discharge of the vehicle load was identified next to the tipping cell. A clean heavy-duty tarpaulin was placed in this area for discharge of the sorting sample.

4. Vehicles for sampling were selected at random. Every 6th Refuse Collection Vehicle (RCV) entering the Deglos Sanitary Landfill was selected while every other RCV at Vieux-Fort Solid Waste Management Facility was selected. (The variation between the selection of vehicles was based on the volume of traffic at the two facilities).

5. Information on the sampled RCV obtained from the operator on entering the site was recorded by a clerk on the prescribed pro forma. This information included the collection area, name of contractor, type and capacity of vehicle, date and time (See appendix 2).

6. The RCV operator was then directed to discharge the load onto the clean surface in one pile.

7. Using a wheeled loader, a sample was removed from the discharged load and placed onto the tarpaulin following coning of the waste. A 200-lb sample was obtained from the load and weighed using a crane scale.

8. This sorting sample was then transported to the sampling area for sorting. Sorting personnel began sorting the sample almost immediately.

9. All containers from the sorting sample were emptied of their contents, such as capped jars, paper bags, and plastic bags. Each waste item was segregated and placed in the appropriately labeled storage container.

10. In the case of composite items found in the waste, the individual materials were separated where practical and the individual materials placed in the appropriate storage containers.

11. Sorting continued until the maximum particle size of the remaining waste particles was approximately 0.5 in. (12.7 mm). At this point, the remaining particles were apportioned into the storage containers corresponding to the waste components represented in the remaining mixture.

12. The gross weights of the storage containers were then recorded on the prescribed pro forma including waste items sorted but not stored in the containers.

13. Following the weighing of the wastes from the sorting area, it was then removed by the excavator and loader for preparation of the next sorting sample.

14. Thirty-two (32) samples were sorted over the five-day sample period (i.e. approximately 6 samples per day) at both disposal sites.

5.0 HEALTH AND SAFETY

Because of the hazards associated with the sorting of solid waste, the Authority undertook measures to ensure the protection of the members of the sorting team. These measures included the provision of personal protective equipment and the review of hazards likely to be encountered during sorting.

Sorters were instructed on the dangers posed by projectiles that may issue from the waste during the process of unloading waste from collection vehicles. These projectiles may include flying glass particles from breaking glass containers and metal lids from plastic and metal containers that burst under pressure when run over by heavy equipment.

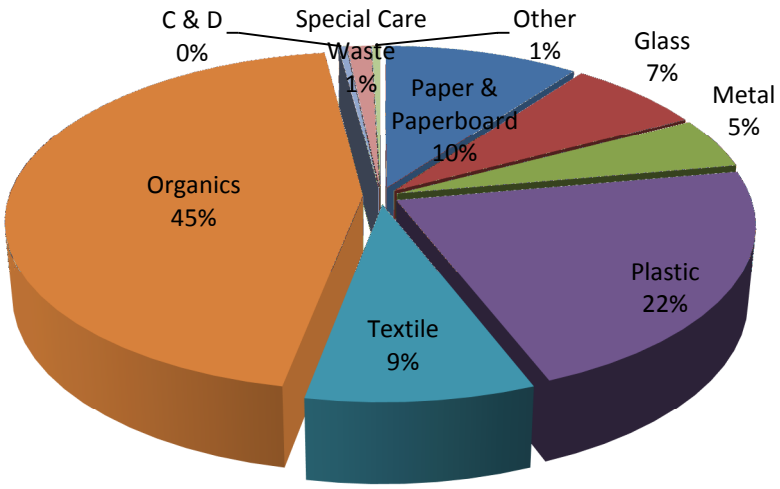
Also, the dangers posed by sharp objects, such as nails, razor blades, hypodermic needles and pieces of glass, which are present in solid waste were also stressed. Enforcement Officers from the Authority who supervised the study ensured that sorting personnel adhered to all health and safety measures and precautions.

6.0 SURVEY RESULTS

The Waste Characterisation study conducted at both waste management facilities revealed the following observations.

Organic materials represented the single largest component of the MSW stream in St. Lucia accounting for approximately 45% by weight (see Figure 1). This compares with 58% for the 2002 waste characterisation study, representing a decrease of approximately 13% of organics.

Figure 1
Components of Municipal Solid Waste in St. Lucia

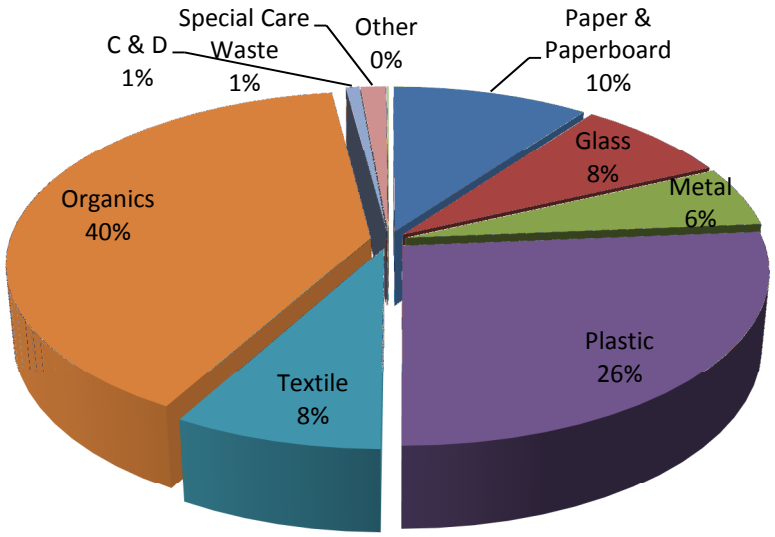


The plastics category accounted for the largest percentage increase from 13% in 2002 to 22%. The paper and paperboard category decreased by 3 %, while there were marginal increases in Glass from 6% to 7%, metal from 4% to 5% and textile from 4% to 9%.

With respect to the waste received at the Deglos Sanitary Landfill, organics accounted for 40% of the waste received, followed by plastics with 26%, paper & paperboard 10%,

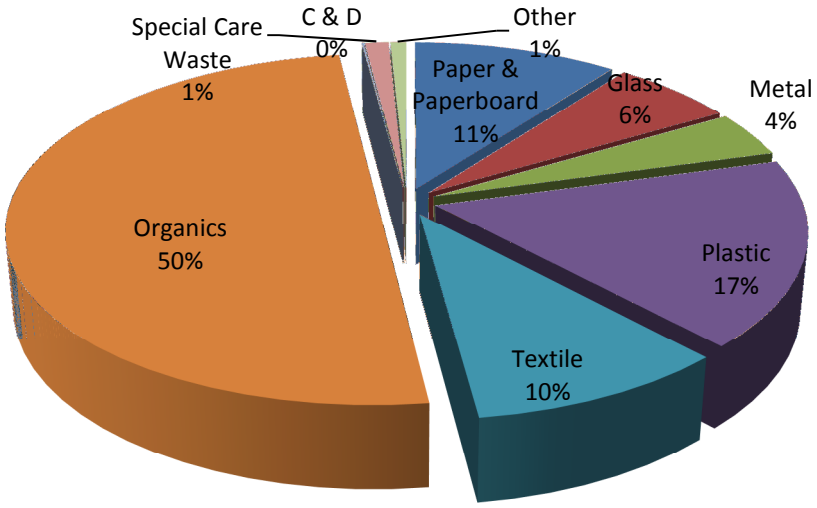
glass and textiles both accounting for 8%, metal 6% and special care waste and construction and demolition waste 1% respectively (see Figure 2).

Figure 2
Components of MSW Disposed at Deglos Sanitary Landfill



With respect to waste received at the Vieux Fort Solid Waste Management Facility, organics accounted for 50% of all waste received followed by plastics with 17%, paper & paperboard 11%, textile 10%, glass 6%, metal 4% and special care waste 1% (see Figure 3).

Figure 3
Components of MSW Disposed at Vieux Fort Solid Waste Management Facility



The results indicated that for the waste management facilities individually and the national situation organics represents the largest waste component disposed of followed by plastics, paper & paperboard products, textile, glass, metal and special care waste in that order. In addition, the proportions of the waste categories at both disposal facilities did not vary to any significant extent.

Major Waste Components

Organics

Further examination of the components which comprise each waste category revealed that food waste and yard waste accounted for 92 % of all organics disposed. This appears consistent with the figure of 89% from the 2002 study. Agricultural crop residue accounted for approximately 8% of organics (see Figure 4).

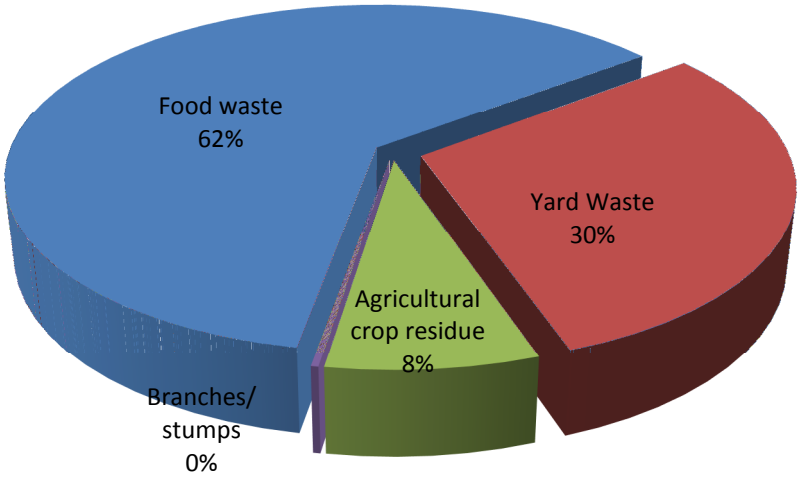


Figure 4
Components of Organics in MSW in St. Lucia

With respect to the waste arriving at the Vieux Fort Solid Waste Management Facility, the food waste component of the organics category accounted for 55% while at Deglos Sanitary Landfill it accounted for 69 percent. Yard waste accounted for 36% at the Vieux Fort facility while it represented 24% at Deglos Sanitary Landfill (see figures 5 and 6).

Figure 5
Components of Organics in MSW at Vieux Fort Solid Waste Management Facility

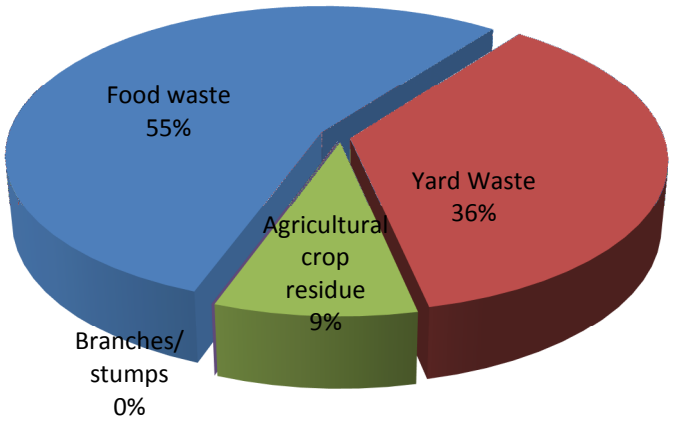
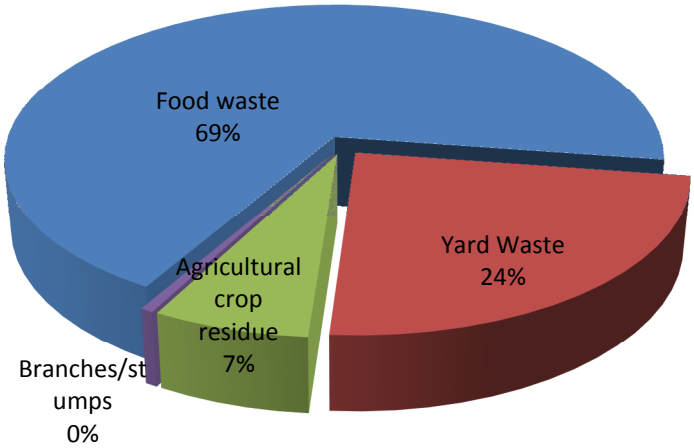


Figure 6
Components of Organics in MSW at Deglos Sanitary Landfill



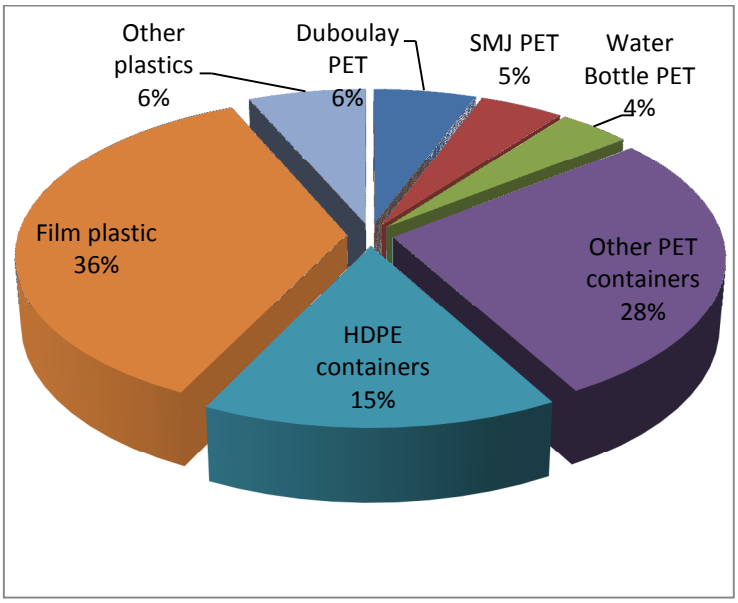
Plastics

Plastics represented the second largest category of waste disposed of in the island by weight, accounting for 22 percent. In the 2002 waste characterisation study, it tied with paper & paperboard for second place at 13 percent. In 2008, it accounted for 21.9% of the waste disposed at both landfills in the island. Compared to the 2002 Waste Characterisation Study, this category increased by approximately 9 percent.

Plastics disposed of in the north of the island almost doubled from 13.9 % in 2002 to 26.4% in 2008 (see Figure 7), while in the south of the island, the figure increased by approximately 5% from 12.8% to 17.4 percent (see Figure 8).

A comparison of the components of the plastics category indicated that at the two waste management facilities, PET bottles accounted for 42% of the plastics disposed, followed by film plastic accounting for 36% and HDPE accounting for 15% (see Figure 9). Compared to the previous study in 2002, the percentage of film plastic reduced by 26% while that of PET increased by 28 percent.

Figure 9
Components of Plastics in MSW in St. Lucia



The 2008 study sought to further determine the components of PET which the 2002 study did not. The study found out that the two major carbonated drinks manufacturers in the island represented 11% of all plastics and 25% of all PET disposed (Figure 9). A comparison of the plastics disposed at the two waste management facilities is presented in Figures 10 and 11.

Figure 10
Components of Plastics in MSW at Vieux Fort Solid Waste Management Facility

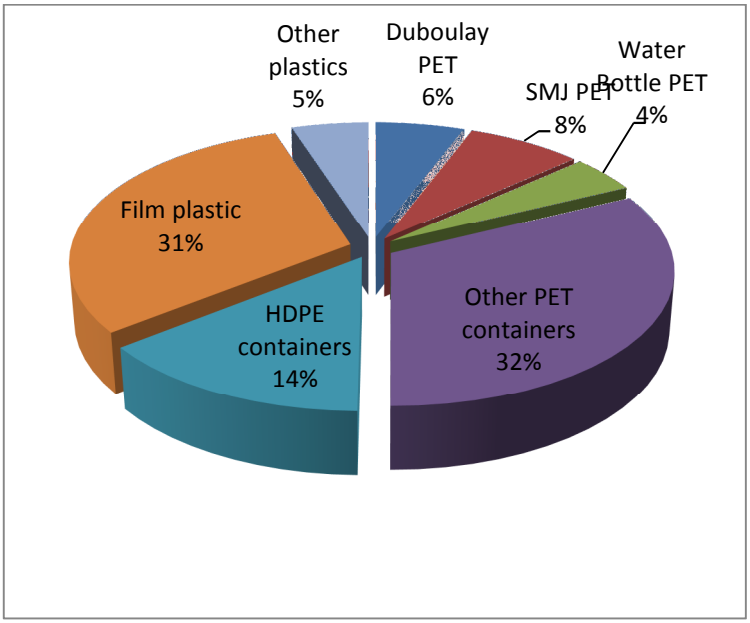
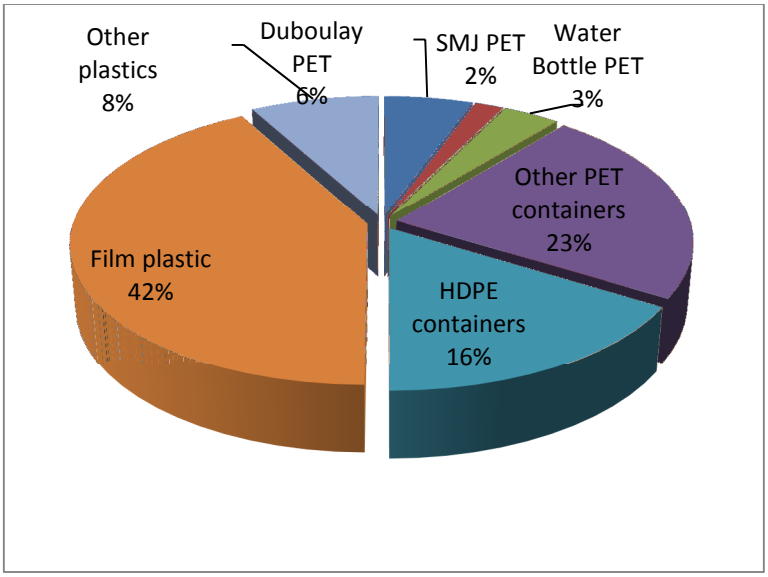


Figure 11
Components of Plastics in MSW at Deglos Sanitary Landfill



Paper and Paperboard

The paper and paperboard category represents the third largest category of waste disposed of in the island. Cardboard and boxboard represented the largest component within this category at 57% followed by other paper products.

Magazines/catalogues represented 11% followed by newspapers accounting for 7 percent (see Figure 12).

Figure 12
Components of Paper in MSW in St. Lucia

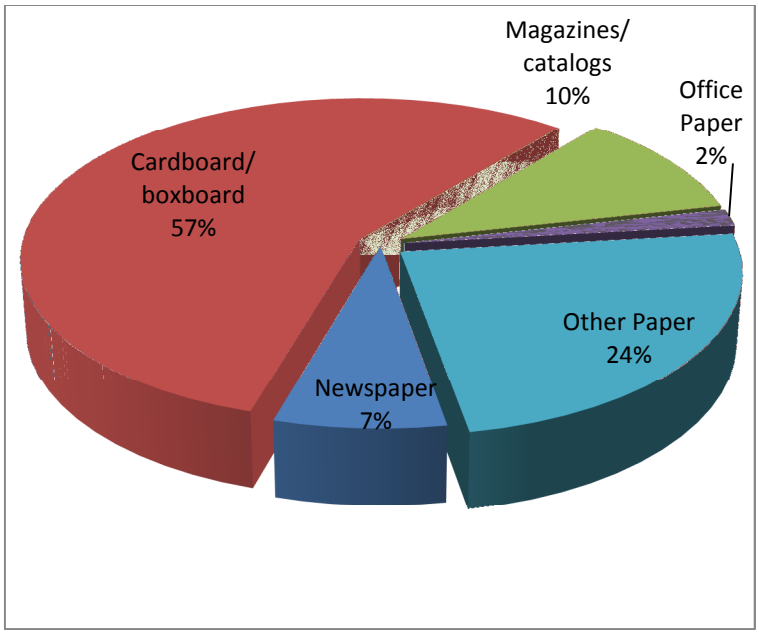
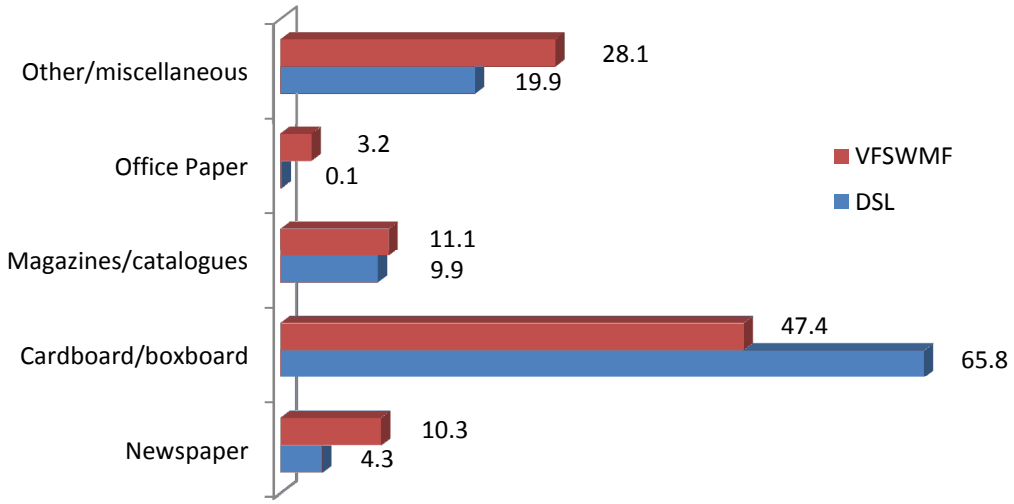


Figure 13 shows the differences in this category between the waste management facilities in Castries and Vieux-Fort.

Figure 13
Comparison of Components of Paper (%) in MSW in St. Lucia



7.0 WASTE QUANTITIES

At the time of the 2002 waste characterisation study, the Authority operated the now-closed Ciceron Solid Waste Disposal site in the north and the Vieux Fort Solid Waste Disposal Site. From 2003 the Deglos Sanitary Landfill became operational and the disposal site at Vieux Fort was upgraded with the introduction of weighbridges to accurately quantify the waste deposited at the facilities. The following table presents the waste quantities disposed at both facilities between the financial years 2005 and 2008.

Waste Disposal Quantities

Year	Waste Quantity (tons)		
	DSL	VFSWMF	Total
2004/05	49,885	23,130	73015
2005/06	59,426	22,191	81617
2006/07	58,663	20,173	78836
2007/08	64,691	19,836	84527

From the above table, waste quantities received at the Deglos Sanitary Landfill have increased by approximately 30% since 2004/05 while for the Vieux Fort facility, waste quantities have decreased by approximately 16%. However for the island as a whole, waste quantities disposed of have increased by an average of 4% each year.

8.0 CONCLUSION

The study showed that organic materials represented the single largest component of the MSW stream in St. Lucia, accounting for approximately 45% by weight, followed by plastics (22%) and paper & paperboard at 10 percent. The findings are similar to that of the Waste Characterisation Study undertaken in 2002. The major change was observed in the plastics category which represented 22% of all waste disposed compared to 13 % in 2002 indicating an almost doubling of this waste category.

The study also showed that there are insignificant differences between materials disposed at the Deglos Sanitary Landfill in the north and the Vieux-Fort Solid Waste Management Facility in the south.

The study points to the need for the Authority to promote waste recovery/recycling initiatives as a means of minimizing the amount of waste going to the landfills thereby

increasing the life span of these facilities. These initiatives will also serve to provide employment opportunities and will result in a cleaner environment.

In 2001/02, the per capita waste generation rate was 1.32 kg per person per day. In 2007/08 this rate increased to 1.45 kg per person per day. Based on the current trend it is anticipated that the projected rate of increase in the waste quantities for the next 5 to 10 years will be approximately 4% per year. However, this figure should only be used as a guide as a number of factors can contribute to an increase or decrease in the waste generation waste rate for any given period e.g. the state of the economy/construction industry, the tourist arrivals, etc. In this regard, the total waste disposed of in the island in 2013 and 2018 is estimated to be approximately 102,000 tons and 125,000 tons respectively.

TABLE 1

List of Equipment for Waste Characterisation Study

Tarpaulins	Knives
Shovels	20-Litre Sorting Bins
Rakes	Dust Pans
Hand Rakes	First Aid Kit
Disposable Face Masks	Traffic Vests
Disposable Aprons	Leather/Latex Gloves
Rubber Boots	Safety Glasses
Bench Scale	Coveralls
Crane Scale	Raincoats

TABLE 2

Values of t Statistics (*t) as a Function of Number of Samples and Confidence Interval**

No. of Samples, *n*	90 %	95 %
2	6.314	12.706
3	2.920	4.303
4	2.353	3.182
5	2.132	2.776
6	2.015	2.571
7	1.943	2.447
8	1.895	2.365
9	1.860	2.306
10	1.833	2.262
11	1.812	2.228
12	1.796	2.201
13	1.782	2.179
14	1.771	2.160
15	1.761	2.145
16	1.753	2.131
17	1.746	2.120
18	1.740	2.110
19	1.734	2.101
20	1.729	2.093
21	1.725	2.086
22	1.721	2.080
23	1.717	2.074
24	1.714	2.069
25	1.711	2.064
26	1.708	2.060
27	1.706	2.056
28	1.703	2.052
29	1.701	2.048
30	1.699	2.045
31	1.697	2.042
36	1.690	2.030
41	1.684	2.021
46	1.679	2.014
51	1.676	2.009

61	1.671	2.000
71	1.667	1.994
81	1.664	1.990
91	1.662	1.987
101	1.660	1.984
121	1.658	1.980
141	1.656	1.977
161	1.654	1.975
189	1.653	1.973
201	1.653	1.972
∞	1.645	1.960

TABLE 3

Values of Mean $\bar{x}$ and Standard Deviation(s) for Within Week Sampling to Determine MSW Component Composition[A]

Waste Category		
Component	Standard Deviation(s)	Mean $\bar{x}$
Newsprint	0.14	0.10
Corrugated	0.09	0.14
Plastic	0.04	0.09
Yard Waste	0.10	0.04
Food Waste	0.06	0.10
Wood	0.05	0.06
Other Organics	0.05	0.05
Ferrous	0.01	0.05
Aluminum	0.08	0.01
Glass	0.06	0.08
Other Inorganics	1.00	0.06
		1.00

APPENDIX 1

Descriptions of Waste Components/Categories

PAPER AND PAPERBOARD

1 "Newspaper" means paper used in newspapers. This type includes newspaper and all items made from newsprint, such as free advertising guides.

2 "Cardboard" usually has three layers. The center wavy layer is sandwiched between the two outer layers. It does not have any wax coating on the inside or outside. This type does not include chipboard. This type includes entire cardboard containers, such as shipping and moving boxes, computer packaging cartons, and sheets and pieces of boxes and cartons. This type does not include chipboard.

3 "Magazines and Catalogues" means items made of glossy coated paper. This paper is usually slick, smooth to the touch, and reflects light. This type includes glossy magazines, catalogues, brochures, and pamphlets.

4."Office Paper" means paper generated in an office setting and includes computer paper, white envelopes white window envelopes, notebook paper, ground wood computer paper, carbonless forms, goldenrod coloured paper and school construction paper.

5 "Other Miscellaneous Paper" means items made mostly of paper that do not fit into any of the other paper types. This includes telephone books and directories, items made of chipboard, ground wood paper, and deep-toned or fluorescent dyed paper. Examples includes unused paper plates and cups, perforated edge (fan-fold) computer paper, manila folders, manila envelopes, index cards, white envelopes, butcher paper, and hard cover and soft cover books, waxed corrugated cardboard, aseptic packages, plastic-coated paper milk cartons, waxed paper, tissue, paper towels, blueprints, sepia, onion skin, fast food wrappers, carbon paper, self adhesive notes, and photographs.

GLASS

6 "Clear (Glass) Beverage Containers" means clear glass beverage containers. This type includes whole or broken clear soda, beer, fruit juice, liquor bottles, etc.

7 "Green (Glass) Beverage Containers" means green, glass beverage containers. This type includes whole or broken green soda and beer bottles.

8 "Amber (Glass) Beverage Containers" means amber glass beverage containers. This type includes whole or broken brown soda and beer bottles.

9 "Clear (Glass) Food Containers" means clear glass food containers. This type includes whole or broken clear fruit, jam, mayonnaise, peanut butter jars etc.

10 "Green (Glass) Food Containers" means green, glass food containers. This type includes whole or broken green glass food jars.

11 "Amber (Glass) Food Containers" means amber glass food containers. This type includes whole or broken brown glass food jars.

12 "Remainder/Composite Glass" means glass that cannot be put in any other type or type. It includes flat (pane) glass as well as items made mostly of glass but combined with other materials. This type includes window glass, Pyrex, Corning ware, crystal and other glass tableware, mirrors, light bulbs, and auto windshields.

METAL

13 "Tin/Steel Beverage Containers" means rigid containers made mainly of steel. These items will stick to a magnet and may be tin-coated. This type is used to store beverage. This type includes beverage containers including bimetal containers with steel sides and aluminum ends.

14 "Tin/Steel Food Containers" means rigid containers made mainly of steel. These items will stick to a magnet and may be tin-coated. This type is used to store food. This type includes food containers including bimetal containers with steel sides and aluminum ends.

15 "Aluminum Beverage Containers" means any beverage container made mainly of aluminum. This type includes aluminum soda or beer cans. This type does not include bi-metal containers with steel sides and aluminum ends.

16 "Aluminum Food Containers" means any food container made mainly of aluminum. This type includes aluminum human and pet food containers. This type does not include bi-metal containers with steel sides and aluminum ends.

17 "Other Ferrous Metal" means any other ferrous metal items not mentioned above.

18 "Other Non-Ferrous Metal" means any other non-ferrous metal items not mentioned above.

19 "Major Appliances" means discarded major appliances of any colour. These items are often enamel-coated. Examples: This type includes washing machines, clothes dryers, hot water heaters, stoves, and refrigerators. This type does not include electronics, such as televisions and stereos.

PLASTICS

20 "Duboulay PET Beverage Containers" means clear or coloured PETE (polyethylene trephthelate) beverage containers sold by the manufacturer Duboulay Manufacturing Company Limited. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The colour is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This type includes juice, soft drink and water bottles and some liquor bottles.

21 "SMJ PET Beverage Containers" means clear or coloured PETE (polyethylene trephthelate) beverage containers sold by the manufacturer SMJ Limited. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The colour is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This type includes juice, soft drink and water bottles and some liquor bottles

22 "Water Containing PET Containers" means clear or coloured PETE (polyethylene trephthelate) containers containing water. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The colour is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This type includes juice, soft drink and water bottles and some liquor bottles

23 "Other PET Containers" means clear or coloured PETE (polyethylene trephthelate) containers not including the above three categories. When marked for identification, it bears the number "1" in the center of the triangular recycling symbol and may also bear the letters "PETE" or "PET". The colour is usually transparent green or clear. A PETE container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This type includes cooking oil containers and aspirin bottles.

24 "HDPE Containers" means natural and coloured HDPE (high-density polyethylene) containers. This plastic is usually either cloudy white, allowing light to pass through it (natural) or a solid colour, preventing light from passing through it (coloured). When marked for

identification, it bears the number "2" in the triangular recycling symbol. This type includes milk jugs, water jugs, detergent bottles, some hair-care bottles, empty motor oil, empty antifreeze, and other empty vehicle and equipment fluid containers.

25 "Film Plastic" means flexible plastic sheeting. It is made from a variety of plastic resins including high-density polyethylene (HDPE) and low-density polyethylene (LDPE). It can be easily contoured around an object by hand pressure. This type includes plastic garbage bags, agricultural film, food bags, dry cleaning bags, grocery store bags, packaging wrap, and food wrap. This type does not include rigid bubble packaging.

26 "Other Plastic Items" means plastic items not mentioned above. This includes containers made of types of plastic other than HDPE (high-density polyethylene) or PETE (polyethylene terephthelate). Items may be made of PVC (polyvinyl chloride), LDPE (low-density polyethylene), PP (polypropylene), PS (polystyrene), or mixed resins. When marked for identification, these items may bear the number "3", "4", "5", "6", or "7" in the triangular recycling symbol. This type includes food containers such as bottles for salad dressings and vegetable oils, flexible and brittle yogurt cups, syrup bottles, margarine tubs and microwave food trays. This type also includes some shampoo containers and vitamin bottles, plastic outdoor furniture, plastic toys and sporting goods, and plastic housewares, such as mop buckets, dishes, cups, and cutlery. It also includes building materials such as house siding, window sashes and frames, housings for electronics such as computers, televisions and stereos, and plastic pipes and fittings.

TEXTILES

27 "Textiles" means items made of thread, yarn, fabric, or cloth. This type includes clothes, fabric trimmings, draperies, carpets, carpet padding and all natural and synthetic cloth fibers. This type does not include cloth-covered furniture, mattresses, leather shoes, leather bags, or leather belts.

ORGANICS

28 "Food Waste" means food material resulting from the processing, storage, preparation, cooking, handling, or consumption of food. This type includes material from industrial, commercial, or residential sources. This type includes discarded meat scraps, dairy products, eggshells, fruit or vegetable peels, and other food items from homes, stores, and restaurants. This type includes processed residues or material from canneries, distilleries, breweries, or other industrial sources.

29 "Yard Waste" means non-food organic materials resulting from property landscaping and maintenance. This type includes leaves, trees, grass cuttings.

30 "Agricultural Crop Residue" means food organic materials resulting from agricultural harvesting and vegetable. This type includes prunings, shrubs, branches, stumps, tree trunks.

31 "Branches/Stumps" means non-food organic materials resulting from property maintenance and construction activity. This type includes branches, stumps, and tree trunks.

32 "Remainder/Composite Organic" means organic material that cannot be put in any of the above categories. This includes items made mostly of organic materials, but combined with other material types. This type includes leather items, cork, hemp rope, garden hoses, rubber items, hair, cigarette butts, diapers, feminine hygiene products, small wood products (such as Popsicle sticks and tooth picks), agricultural manures and animal feces.

CONSTRUCTION AND DEMOLITION (C & D) MATERIALS

33 "Concrete " means a hard material made from sand, aggregate gravel, cement mix and water as well as masonry bricks and mortar. This type includes pieces of building foundations, concrete paving, concrete blocks and clay bricks.

34 "Lumber" means processed wood for building, manufacturing, landscaping, packaging, and processed wood from demolition. This type includes dimensional lumber, lumber cutoffs, engineered wood such as plywood and particleboard, wood scraps, pallets, wood fencing, wood shake roofing, and wood siding.

35 "Remainder/Composite Construction and Demolition" means construction and demolition material that cannot be put into any of the above categories. This type may include items from different categories combined, which would be very difficult to separate. This type includes ceramics, tiles, toilets, sinks, and fiberglass insulation, rock, stones, and sand, clay, soil and other fines. This type may also include demolition debris that is a mixture of items such as plate glass, wood, tiles, gypsum board, and aluminum scrap, shingles and other roofing material.

SPECIAL CARE WASTES

36 "Paint" means containers with paint in them. Examples: This type includes latex paint, oil based paint, and tubes of pigment or fine art paint. This type does not include dried paint, empty paint cans, or empty aerosol containers.

37 "Hazardous Materials" means containerized liquids, solids and gases that are potentially hazardous to human health or the environment. This type includes acids, bases, oxidizers and flammable materials used in domestic and industrial applications. This type includes aerosol cleaners and lubricants, drain cleaner, paint solvent, anti-freeze, brake fluid and pressurized propane cylinders.

38 "Biomedical" means waste materials specifically associated with hospital and health care services and requiring specialized management. This type includes syringes, lab glass, heavily soiled dressings, tissue samples and pharmaceutical wastes. This type does not include non-hazardous health-care facility wastes generated through food preparation, building maintenance and administrative functions.

39 "Batteries" means any battery. This includes lead acid batteries, dry cell batteries, etc. from all sources.

40 "Oil Filters" means oil filters from automobiles.

41 "Remainder/composite Special Care Waste" ” means material that cannot be put in any other type in the above categories.

OTHER WASTES

42 "Tires" means vehicle tires. This type includes tires from trucks, automobiles, motorcycles, heavy equipment, and bicycles.

43 "Furniture" means includes household and office furnishings not defined separately. This type includes all sizes and types of furniture, including mattresses, box springs, tables and chairs.

44 "Other” means material that cannot be put in any of the categories listed above. This category includes mixed residue that cannot be further sorted.

APPENDIX 2

ST. LUCIA SOLID WASTE MANAGEMENT AUTHORITY
Waste Characterisation Study Proforma

Date: _____ **Time:** _____ **Vehicle Type:** _____

Contractor: _____ **Zone:** _____

	MATERIAL TYPE	Gross (lbs)	Tare (lbs)	Net (lbs)	% of Total
	PAPER & PAPERBOARD				
1	Newspaper				
2	Cardboard/boxboard				
3	Magazines/catalogues				
4	Office paper				
5	Other/miscellaneous paper				
	GLASS				
5	Clear beverage containers				
6	Green beverage containers				
7	Amber beverage containers				
8	Clear food containers				
9	Green food containers				
10	Amber food containers				
11	Remainder/composite glass				
	METAL				
12	Tin/steel beverage containers				
13	Tin/steel food containers				
14	Aluminum beverage containers				
15	Aluminum food containers				
16	Other ferrous metal				
17	Other non-ferrous metal				
18	Major appliances				
	PLASTICS				
19	Duboulay PET				
20	SMJ PET				
21	Water Bottle PET				
22	Other PET containers				
23	HDPE containers				
24	Film plastics				
25	Other plastics				
26	**TEXTILE**				
	ORGANICS				
27	Food waste				
28	Yard/ waste/				
29	Agricultural crop residue				
30	Branches & stumps				
31	Remainder/composite organics				
	CONSTRUCTION & DEMOLITION MATERIAL				
32	Concrete				
33	Lumber				
34	Remainder/composite C & D				
	SPECIAL CARE WASTES				
35	Paint				
36	Hazardous materials				
37	Biomedical				

38	Batteries				
39	Tires				
40	Oil filters				
41	Remainder/composite SC Waste				
	OTHER WASTE				
42	Tires				
43	Furniture				
44	Other				

Data Recorder: _____