2012 SOLID WASTE COMPOSITION STUDY

Prepared for

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EXECUTIVE SUMMARY

The Regional District of North Okanagan (RDNO) retained TRI Environmental Consulting Inc. (TRI) to undertake a solid waste composition study in the summer of 2012. The assessment of the overall composition of waste generated within the RDNO was undertaken at the Greater Vernon (GVRDF); Armstrong/Spallumcheen (ASRDF); and Lumby (LRDF) Recycling and Disposal Facilities (RDFs). Samples were also collected from transfer stations including the Kingfisher Transfer Station (disposed at Armstrong/Spallumcheen RDF); the Silver Star Transfer Station (disposed at GVRDF) and the Cherryville Transfer Station (disposed at LRDF).

The Study involved the selection of representative waste samples from industrial, commercial and institutional contracted haulers (ICI), residential contracted haulers (RES), residential self-haul drop-off (RDO) and ICI self-haul drop-off (CDO) sources, and waste was sorted into 71 categories. The monitoring was performed over four weeks from July 9 to August 3, 2012.

A total of one hundred and nineteen (119) waste samples totaling 12,251 kg were collected and sorted, including thirty-nine (39) samples at the ASRDF, sixty-seven (67) samples at the GVRDF, and thirteen (13) samples at the LRDF. The mean sample size was approximately 102.9 kg. For ASRDF, GVRDF , and LRDF combined, the actual distribution of samples collected and sorted for the monitoring events included twenty-six (26) RES, thirty-eight (38) ICI, thirty-nine (39) RDO, seven (7) CDO, and nine (9) transfer station samples. The primary and secondary category data was subjected to statistical analysis using the provincial waste characterization tool to determine the means and standard deviations of each of the categories.

Prior to sorting, all samples were weighed. The samples were sorted into seventy one (71) categories and the mass of each category was determined by weighing individual material types. The waste composition for each of the twelve (12) primary categories and each of the secondary categories for each waste source sector was calculated as the mean for all samples within the sector. The standard deviation for each primary waste category was also calculated.

Compostable Organics constituted the highest percentage of waste (43%, 58%, and 49%) from each RDF (ASRDF, GVRDF, and LRDF respectively) from the RES sector. Food waste and Yard and Garden Waste represented the largest portion of the compostable organics at all of the RDFs. Plastic and Paper constituted the second highest percentage. Collectively, Compostable Organics, Plastic, and Paper constituted at least 71% of the RES waste stream at each RDF. Compostable Organics (the largest being food waste) constituted the highest percentage of waste (30%, 39%, and 41%) from each RDF (ASRDF, GVRDF, and LRDF respectively) from the ICI sector. Compostable Organics were more likely to include clean wood, and the most common Non-Compostable Organics was treated/painted wood.

Paper and Plastic constituted the second highest percentage of waste disposed at each RDF as shown in the chart below. Plastic film represented approximately 13.9% of the total waste composition.   Building Materials (carpet being the largest category at GVRDF at 12.3% and gypsum at LRDF at 25.9%) made up a large portion of the waste generated from renovation activities. Similarly, at the ASRDF, gypsum (8.9%) was the largest portion of the building materials disposed. In general, it was typically smaller loads of waste that included these items that were not sorted into the provided wood and gypsum disposal areas

at the RDFs. In the CDO waste sector, Bulky Objects accounted for 12% of the waste which was mainly furniture.

The following table summarizes the data for the primary categories for the overall RDF and regional waste composition:

Primary	ASRDF	GVRDF	LRDF	RDNO Average
Paper	16.6%	10.8%	8.0%	**12.2%**
Plastic	14.8%	10.8%	17.7%	**12.1%**
Compostable Organics	28.3%	37.1%	24.6%	**34.3%**
Non Compostable Organics	7.9%	9.8%	3.4%	**9.0%**
Metals	4.5%	7.6%	4.9%	**6.7%**
Glass	5.4%	1.8%	2.0%	**2.7%**
Building Material	6.2%	7.7%	16.2%	**7.7%**
Electronic Waste	1.0%	3.6%	1.0%	**2.8%**
Household Hazardous	4.3%	3.1%	1.8%	**3.3%**
Household Hygiene	6.8%	5.4%	2.5%	**5.6%**
Bulky Objects	0.8%	0.5%	5.3%	**0.8%**
Fines	2.2%	1.0%	1.2%	**1.3%**

It was noted by the sorting team that there were consistently household hazardous waste items present in most samples including empty oil containers, empty, or nearly empty paint and aerosol cans, and old and partially full fertilizer or pesticide containers.

As indicated by the standard deviation listed in the Primary Categories there is a high degree of variability in some of the composition values, especially in the ICI and CDO sector. This is due to the high variability in the source and composition of individual samples.

When the 2012 data is compared to the 2005 data at the GVRDF, ASRDF and LRDF there is a significant decrease in the amount of clean wood arriving from all sectors, with the largest decrease seen in the ICI sector. There is also a significant decrease in the quantity of treated and painted wood disposed in 2012 compared to 2005. Other notable decreases in waste percentage include Building Materials at all of the RDFs and Electronic Waste at ASRDF.

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NOTE TO THE READER

The samples collected and audited for this study are "snapshots" in time, meaning the reported quantities are estimates and only represent the conditions for the period of time in which they were collected. Seasonal and annual variability, weather, and other factors can affect the amount and composition of waste and recyclables generated by the various sectors at any given time.

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1   INTRODUCTION

The purpose of the Study was to gain an up-to-date estimate of the composition of the municipal solid waste (MSW) stream within the RDNO. Information obtained from this Study will be extrapolated to determine the overall waste composition for the region and to be used as a tool for Solid Waste Management planning, and to determine how much more effort should be spent on waste reduction programs. The Waste Composition Report[1] prepared by TRI in 2005 will serve as a baseline for comparison. The methodology, as well as the terms and conditions for the Study were described in the Request for Proposal (RFP 2012-17 ENG), dated June 7, 2012.

1.1   Scope of Work

The scope of work for this study is described in our proposal[2] submitted in response to RFP No.2012-17 ENG. The scope of work included the following:

➢ Collect the data necessary for further waste management planning and to determine how much further effort should be spent on waste reduction programs;

➢ Interview representatives of RDF staff, waste haulers, managers, drivers and RDNO staff to assist in organizing the survey and to identify areas of concern;

➢ Provide all resources necessary for successful completion of the Waste Characterization Study;

➢ Provide accurate information on load weights for each vehicle sampled;

➢ Sample waste received at the three (3) RDFs including samples arriving from the three (3) transfer stations.

➢ Quantify, analyse, and report on the composition of the waste.

➢ Compare results to the data reporting in the 2005 study.

1.2   Definitions / Terminology

During the waste composition analysis, the "as received" wet mass of the waste samples and compositions were recorded. In this report, "hauler" refers to the vehicle delivering the waste, "load" refers to the total amount of waste contained in a hauler truck, "sample" refers to the portion of the load that was sorted and weighed, and "load source" refers to the origin of a specific sample. Refer to Appendix I for waste category definitions.

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[1] Technology Resource Inc (TRI), 2005. *North Okanagan Regional District 2005 Solid Waste Composition Study*.

[2] TRI Environmental Consulting Inc. (TRI), June 7, 2012. *Proposal to Undertake a Waste Composition Analysis Services (RFP No. 2012-17 ENG*

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2 METHODOLOGY

2.1 Design of the Sampling Program

The sampling program for the waste composition monitoring was based on industry accepted techniques, [3,4,5] previous experience gained by TRI, and with modifications made according to the requirements of the present Study. The design of the sampling program was consistent with the proposal[6] prepared by TRI, which provided a work plan and a detailed waste source allocation list identifying the number of waste samples to be sorted by source category at each transfer station and RDF. The total number of samples was consistent with the study completed in 2005. Samples were completed from the four waste sectors (ICI, RES, RDO, CDO) at the three RDFs; and additional samples were completed from the 3 transfer stations. The following section 2.2 discusses the waste source allocation list employed following consultation with and approval from the RDNO.

2.2 Load Source and Sample Acquisition

All waste composition samples were sorted at the ASRDF, GVRDF, and LRDF locations. All three locations were either enclosed spaces or a portable tent was set up to prevent any moisture being added via precipitation or from other sources during the Study. Waste samples were classified as originating from one of four sectors, identified as follows:

- ➢ Contract hauled Residential (RES);
- ➢ Contract hauled Industrial, Commercial, and Institutional (ICI);
- ➢ Non-account Residential Drop-Off (RDO);
- ➢ Non-account Commercial Drop-Off (CDO);
- ➢ Transfer Station Roll-Off Bins (TS).

Every effort was made to randomly select loads for sampling while achieving these requirements. However, at times when only a small number of vehicles were arriving at the facilities, any load available was selected for sampling. A discussion of the sampling methodology employed at each of the waste receiving stations is provided in the following sections. The category names used for waste composition monitoring and how the samples were obtained from the waste haulers are outlined in Table 1. Some hauling routes pick up waste from both ICI and multi-family RES sectors. Therefore, haulers were

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[3] SENES Consultants Ltd., April 30, 1999. *Recommended Waste Characterization Methodology for Direct Waste Analysis Studies in Canada*, 39 pp.

[4] Ministry of Water Land and Air Protection (MWLAP), November, 2001. *Procedural Manual for Municipal Solid Waste Composition Analysis*.

[5] TRI Environment Consulting Inc., May 14th 2012 Solid Waste Characterization Studies: Standardized Spreadsheet Tool For Assisting In The Planning, Execution And Reporting For Solid Waste Characterization Studies (Draft Version) prepared for the BC Ministry of Environment.

[6] TRI Environmental Consulting Inc., June 7, 2012. *Proposal to Undertake a Waste Composition Analysis Services (RFP No. 2012-17 ENG)*.

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identified through a pre-screening method. If the hauler indicated the load was "primarily mixed source" (> 40%) the load was not sampled. If the hauler indicated the load was "mostly residential" (>70%) or "mostly commercial" (>70%) the driver was instructed to deliver a sample and the site supervisor confirmed if a RES or ICI sample could be obtained with no significant contamination from other waste sectors.

Table 1: Solid Waste Source Definition and Methodology for Sampling

Solid Waste Source	Category Description and Sampling Method
Contract hauled Residential (RES)	**Definition** • Large municipal haulers with loads from regular residential garbage curbside pick-up routes where waste is collected using garbage cans and bags. • Primarily detached single-family and duplex homes. **Sample Collection** • Haulers identified to meet the definition above were sampled randomly. The Residential (RES) waste sector is derived from waste collected from curbside, residential generators. RES material was delivered to the RDFs in dedicated garbage trucks. At ASRDF, RES waste originated from the City of Enderby, the City of Armstrong, the Township of Spallumcheen, and First Nations Land. At GVRDF, RES waste was received from the City of Vernon and Coldstream (including 2 samples from Clayton Adams Rear Load Truck). At LRDF, RES waste originated from the Village of Lumby and Electoral Areas "D" and "E".
Industrial, Commercial, Institutional (ICI)	**Definition** • Commercial haulers for commercial businesses and industries. • Commercial haulers with loads from city facilities including parks/street landscape bins, offices, schools, and hospitals. **Sample Collection** Haulers were identified by random selection at the RDFs. • If "primarily mixed source" (>40%) the load was not sampled • If the load was "commercial or mostly commercial" (>70%) the RDF load operator was instructed to deliver a sample and the site supervisor confirmed if an IC&I sample could be obtained. Waste from the ICI sector was normally delivered to the RDF by

Solid Waste Source	Category Description and Sampling Method
	contractors collecting garbage from bins or dumpsters located at light industrial, commercial and institutional facilities. At ASRDF, ICI waste originated primarily from the City of Armstrong and the Township of Spallumcheen. However, ASRDF also received some ICI waste from the City of Enderby, as well as a roadside collection truck that begins it route in the City of Vernon and ends in Armstrong. At GVRDF, the ICI waste originated primarily from The City of Vernon. At LRDF, the scheduled ICI waste did not arrive. However, one ICI sample that originated from a camp site near Lumby was obtained.
Self-haul Residential Drop Off (RDO) and Commercial Drop Off (CDO)	**Definition** • Load < (less than) 1,000 kg. • Pick-up trucks. • Vehicles with trailers. • Non-account residential AND non-account commercial drop-off. **Sample Collection** Haulers were identified by random selection at the RDFs. Additionally all drop-off customers were asked the following questions: *Hi, I'm conducting a survey to help the Regional District of North Okanagan implement better waste management programs. Is it ok if I ask you two short questions?* 1. *Was this waste generated at a single-family residential, multi-family residential or commercial property?* 2. *What kind of activity generated the waste (e.g. renovation/demolition, bulky object clean-up, moving clean-up, or special social event – party)?* The waste in this sector is derived from residential sources and, to a lesser extent, from commercial sources delivering renovation/demolition loads. For the Study, Waste from the RDO sector was sampled at all three RDFs, ASRDF, GVRDF, and LRDF. At ASRDF, RDO waste primarily originated from the City of Armstrong and Township of Spallumcheen. At GVRDF, RDO waste originated primarily from the City of Vernon. However, GVRDF also received one RDO waste from as far away as the City of Enderby. At LRDF, RDO waste primarily originated from the Village of Lumby with a lesser amount from the

Solid Waste Source	Category Description and Sampling Method
	District of Coldstream.
	CDO waste is typically classified as DLC (demolition or land clearing), roofing material, construction and land clearing (stumps & logs).
Transfer Station Roll-Off Bins (TS)	**Definition**
	• Load > (greater than) 1,000 kg.
	• Contract haulers with loads from Kingfisher Transfer Station, Silver Star Transfer Station, as well as Cherryville Transfer Station.
	• Waste is from 40 cubic yard roll-off bins located at the respective transfer stations where residents' drop-off waste.
	Sample Collection
	• Haulers carrying waste from the above listed transfer stations were expected to arrive at specified times.
	Scale operators were asked to be aware when haulers carrying waste from the aforementioned transfer stations arrived and to contact the loader operator. Samples were then delivered to the TRI staff. Loads from Kingfisher were delivered to ASRDF and Silver Star to GVRDF. Normally, waste from Cherryville is delivered to the LRDF, but special arrangements were made with the RDNO to deliver it to GVRDF due to logistical constraints.

2.2.1 Armstrong/Spallumcheen RDF

The study was undertaken at the ASRDF from July 9 through July 17, 2012.

At ASRDF, TRI communicated to the Site Scale Operator the load source (RES, TS, or ICI) that was required for sampling. The Site Scale Operator consulted the haulers to determine the load source and relayed the message to the loader operator to deliver the sample. However; it was the responsibility of TRI to confirm the load source and request scale tickets. This approach was utilized as it was not feasible for haulers to dump their load directly at the sampling area which was set up on pavement near the Residential Drop-Off bins. TRI sorters then selected their sample based on whether the sample appeared representative. TRI's assumption on the waste source was based on experience including; observing the type of vehicle delivering the load, consulting with the hauler or municipalities, and examining the contents of the load.

2.2.2 Greater Vernon RDF

The study was undertaken at the GVRDF from July 18 through August 1, 2012.

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At GVRDF, TRI communicated to the Site Scale Operator the load source (RES, TS, or ICI) that was required for sampling. The Site Scale Operator consulted the haulers to determine the load source and relayed to message to the loader operator to deliver the sample. However; it was the responsibility of TRI to confirm the load source and request scale tickets. This approach was utilized as it was not feasible for haulers to dump their load directly at the sampling area which was set up on pavement near the Residential Drop-Off bins. TRI sorters then selected their sample based on whether the sample appeared representative. TRI's assumption on the waste source was based on experience including; observing the type of vehicle delivering the load, consultation with the hauler or municipalities, and examining the contents of the load.

2.2.3 Lumby RDF

The study was undertaken at the LRDF from August 2 through August 3, 2012.

At LRDF, TRI communicated to the Site Scale Operator the load source (RES, TS, or ICI) that was required for sampling. However; it was the responsibility of TRI to confirm the load source and request scale tickets. The LRDF received considerably less waste compared to that of ASRDF and GVRDF, and there was also no paved area for Residential Drop-Off bins. The sampling area was set up next to the face of the landfill and TRI staff was able to select the samples directly from the hauler. TRI's assumption on the waste source was based on experience including; the information provided by the RDF Site Operator, observing the type of vehicle delivering the load, and examining the contents of the load.

2.3 Waste Sorting Method

Waste samples were delivered by the loader operator to the waste sorting area. Loads were first visually inspected by the sort supervisor to confirm load source and ensure there was no contamination from other waste sources in mixed source loads. A sample of 100 kg was randomly collected in a grid pattern from the pile. Large items in a sample were weighed directly on a calibrated electronic weigh scale and then discarded. The rest of the sample was weighed and then spread onto sorting tables. From the tables, the waste was sorted into bins representing seventy-one (71) waste categories. The waste composition categories used for the Study are listed in Appendix I.

The sorting was performed by two sorters and overseen by the sort supervisor. The sorters received training in the sort method so that identification of each waste item on the sort table could be made and the item placed in the appropriate bin. The bins were arranged around the sort table such that they were readily accessible. The sort supervisor watched for items placed into incorrect bins and assisted in categorizing unusual items. After the sample was sorted, the mass of each category was measured using the electronic scale.

The categorization of items was generally straight forward. When possible, food within the containers was separated and sorted accordingly. Items that contained multiple components that could not be separated, such as metal and plastic, were placed into the category of the material with the highest content or significance.

2.3.1 Safety Precautions

The sort supervisor and all sorters received health and safety training to manage hazards associated with sorting waste as well as site-specific hazards. All workers were required to have up-to-date tetanus shots. Sharp objects (*i.e.* straight razors, syringes and broken glass) in the waste presented a significant hazard which were occasionally hidden and mixed with other wastes such as food inside plastic bags. Tongs were used to sort through waste if medical waste or signs of sharps were identified in the samples. Syringes and needles were immediately placed in a medical waste container upon discovery.

The most important safety issue at the facilities was vehicular traffic. Visual contact with drivers was maintained when working around vehicles.

Workers at the site were provided with appropriate personal protective equipment (PPE).

2.4 Data Analysis

Data analysis for the Study was performed at the TRI office. Raw data was entered into a British Columbia Ministry of Environment spreadsheet tool developed by TRI for facilitating waste composition studies. The weighted mean compositions for all categories (primary, secondary, and tertiary) for each waste sector and location (ASRDF, GVRDF, and LRDF) were calculated for the waste. Standard deviations about the means were also determined. Additionally, TRI has employed basic statistical methods to derive quantitative information from the data. Appendix II provides a detailed description of the calculations used to arrive at the results presented in this report.

2.5 Quality Assurance and Quality Control Procedures

In addition to the methods described above, a quality control program was undertaken concurrently with the Study to ensure accurate results. The raw waste composition data was reviewed on a daily basis following the sorts. This review allowed the sort supervisor to determine if items had been omitted from the data sheets. All samples were weighed at the beginning before any sorting occurred, and then again at the end to ensure all material was accounted for. Also, office staff reviewed the accuracy of 50% of the data that was transcribed into spreadsheet format. The accuracy of all data was reviewed by calculating the difference between the sum of the sorted category masses and the unsorted sample mass. Data entry corrections were made as necessary for the samples exhibiting discrepancies greater than 5% of the unsorted sample mass.

3   RESULTS AND DISCUSSION

3.1   Sample Allocation

For ASRDF, GVRDF, LRDF combined, the actual distribution of samples collected and sorted for the Study included twenty-six (26) RES, thirty-eight (38) ICI, thirty-nine (39) RDO, seven (7) CDO and nine (9) TS samples. In total, one hundred and nineteen (119) waste samples having a combined mass of 12,251 kg were sorted during the Study. The mean sample size was approximately 102.9 kg. The mean sample masses are consistent with the recommended sample size of 100 kg. A summary of the sources of waste, number of samples and total mass sorted at each of the facilities is provided in Table 2. The number of samples sorted in the 2012 waste audit at ASRDF, GVRDF, and LRDF is within the waste source allocation requirements specified by the RDNO.

Table 2: Number of Samples and Total Mass Sorted in 2012

Sector	ASRDF		GVRDF		LRDF		Total		
	Samples	Mass (kg)	Samples	Mass (kg)	Samples	Mass (kg)	Samples	Mass (kg)	% of Samples
RES	11	1078	13	1315	2	195	26	2588	22%
ICI	11	1124	26	2593	1	104	38	3821	32%
RDO	12	1232	19	1901	8	840	39	3973	33%
CDO	1	107	5	759	1	100	7	966	6%
TS	4	396	4	406	1	101	9	903	8%
Total	**39**	**3937**	**67**	**6974**	**13**	**1340**	**119**	**12251**	**100%**

3.2   Waste Composition by Sector

All samples were sorted into seventy-one (71) categories. The quantities in each of these categories were then aggregated into twelve (12) primary categories as outlined in Appendix I.

Table 3 through Table 5 presents the waste composition as a percentage by primary category for the RES, ICI and RDO sectors for each RDF. The standard deviation for each percentage is included, and the method for the calculation included in Appendix II.

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Table 3: 2012 RES Waste Compositions by RDF – Primary Categories

Primary Category	ASRDF		GVRDF		LRDF	
	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)
Paper	15%	+/- 6%	8%	+/- 3%	12%	+/- 4%
Plastic	13%	+/- 4%	11%	+/- 4%	16%	+/- 3%
Compostable Organics	43%	+/- 14%	58%	+/- 18%	49%	+/- 16%
Non Compostable Organics	4%	+/- 3%	5%	+/- 3%	4%	+/- 3%
Metals	4%	+/- 3%	3%	+/- 2%	2%	+/- 1%
Glass	2%	+/- 1%	1%	+/- 1%	1%	+/- 1%
Building Material	2%	+/- 3%	4%	+/- 7%	9%	+/- 10%
Electronic Waste	1%	+/- 2%	2%	+/- 2%	<1%	+/- 1%
Household Hazardous	3%	+/- 2%	1%	+/- 1%	<1%	<1%
Household Hygiene	11%	+/- 9%	6%	+/- 5%	3%	+/- 3%
Bulky Objects	<1%	<1%	<1%	<1%	<1%	<1%
Fines	2%	+/- 2%	2%	+/- 1%	4%	+/- 2%

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Table 4: 2012 ICI Waste Compositions by RDF– Primary Categories

Primary Category	ASRDF		GVRDF		LRDF	
	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)*
Paper	21%	+/- 14%	13%	+/- 8%	12%	--
Plastic	18%	+/- 10%	12%	+/- 7%	24%	--
Compostable Organics	30%	+/- 12%	39%	+/- 23%	41%	--
Non Compostable Organics	8%	+/- 10%	6%	+/- 7%	0%	--
Metals	3%	+/- 3%	8%	+/- 14%	2%	--
Glass	7%	+/- 13%	1%	+/- 3%	7%	--
Building Material	2%	+/- 4%	3%	+/- 7%	0%	--
Electronic Waste	1%	+/- 2%	5%	+/- 9%	0%	--
Household Hazardous	3%	+/- 6%	4%	+/- 5%	0%	--
Household Hygiene	3%	+/- 3%	8%	+/- 11%	13%	--
Bulky Objects	0%	+/- 1%	0%	+/- 0%	0%	--
Fines	3%	+/- 3%	1%	+/- 1%	0%	--

*Only one ICI sample arrived and was sorted at LRDF so no standard deviation can be calculated

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Table 5: 2012 RDO Waste Compositions by RDF – Primary Categories

Primary Category	ASRDF		GVRDF		LRDF	
	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)	Weighted Mean (%)	Standard Deviation (+/-)
Paper	7%	+/- 6%	11%	+/- 15%	8%	+/- 7%
Plastic	9%	+/- 5%	8%	+/- 9%	8%	+/- 7%
Compostable Organics	15%	+/- 14%	15%	+/- 25%	14%	+/- 25%
Non Compostable Organics	10%	+/- 10%	23%	+/- 23%	5%	+/- 7%
Metals	8%	+/- 11%	13%	+/- 15%	10%	+/- 15%
Glass	5%	+/- 5%	2%	+/- 6%	2%	+/- 3%
Building Material	18%	+/- 21%	20%	+/- 39%	34%	+/- 43%
Electronic Waste	1%	+/- 2%	4%	+/- 8%	2%	+/- 4%
Household Hazardous	8%	+/- 8%	3%	+/- 9%	4%	+/- 8%
Household Hygiene	15%	+/- 26%	0%	+/- 1%	0%	+/- 0%
Bulky Objects	2%	+/- 6%	0%	+/- 0%	13%	+/- 24%
Fines	1%	+/- 2%	0%	+/- 0%	0%	+/- 0%

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Table 6: 2012 CDO (DLC) Waste Categories - all RDFs Combined – Primary Categories

Primary Category	CDO Waste Composition	
	Weighted Mean (%)	Standard Deviation (+/-)
Paper	3%	+/- 3%
Plastic	23%	+/- 41%
Compostable Organics	9%	+/- 12%
Non Compostable Organics	15%	+/- 23%
Metals	5%	+/- 9%
Glass	7%	+/- 10%
Building Material	23%	+/- 30%
Electronic Waste	1%	+/- 1%
Household Hazardous	3%	+/- 5%
Household Hygiene	0%	+/- 0%
Bulky Objects	12%	+/- 37%
Fines	0%	+/- 0%

Note: The data from all RDFs for CDO samples were combined due to the small number of samples obtained at each RDF during the sorting events.

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Table 7 – Overall RDF and Regional Waste Composition – All Waste Sectors Combined

Primary	ASRDF	GVRDF	LRDF	RDNO Average
Paper	16.6%	10.8%	8.0%	**12.2%**
Plastic	14.8%	10.8%	17.7%	**12.1%**
Compostable Organics	28.3%	37.1%	24.6%	**34.3%**
Non Compostable Organics	7.9%	9.8%	3.4%	**9.0%**
Metals	4.5%	7.6%	4.9%	**6.7%**
Glass	5.4%	1.8%	2.0%	**2.7%**
Building Material	6.2%	7.7%	16.2%	**7.7%**
Electronic Waste	1.0%	3.6%	1.0%	**2.8%**
Household Hazardous	4.3%	3.1%	1.8%	**3.3%**
Household Hygiene	6.8%	5.4%	2.5%	**5.6%**
Bulky Objects	0.8%	0.5%	5.3%	**0.8%**
Fines	2.2%	1.0%	1.2%	**1.3%**

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3.2.1 Single Family Residential (RES)

In 2011, it was recorded that there was 19,117 tonnes disposed from the RES sector (including curbside pick-up and self-hauled residential drop-off) at the RDNO RDFs. For the Study in 2012, a total of twenty-six (26) waste samples were sorted from the RES curbside sector. The percent composition for primary waste categories identified in these samples is provided in Table 3.

The largest quantity of the RES waste stream at all RDFs is Compostable Organics, representing approximately 43%, 58% and 49% at the ASRDF, GVRDF and LRDF respectively. At the ASRDF, 34.5 % of the Compostable Organics was food waste, 8.5 % was yard and garden waste, and 0.2 % was clean wood. Of the food waste at ASRDF 24.5 % is backyard compostable, and 10 % is not backyard compostable. At the GVRDF, 19.5 % of the Compostable Organics was food waste, and 35.9 % was yard and garden waste and 2.1 % was clean wood. Of the food waste at GVRDF, 12% is backyard compostable and 7.5 % is not backyard compostable. The yard and garden waste was typically grass trimmings and trimmings from gardens. At LRDF, 22.1 % of the Compostable Organics was food waste, 25.8 % was yard and garden waste, and 1.0% was clean wood. At the LRDF, 2.6 % of the food waste was backyard compostable and 19.5 % of the food waste was not backyard compostable. The next largest quantities of the waste stream at all the RDFs were Paper, Plastic and Household Hygiene (diapers and pet waste).

It was noted by the sorting team that there were consistently Household Hazardous waste items present in most samples including empty oil containers, empty, or nearly empty paint and aerosol cans, and half-full fertilizer or pesticide containers.

The waste composition for the RES sector was relatively consistent at each RDF and the standard deviation for each waste category is lower than the other waste sources. Typically residential waste is more consistent and does not vary largely within the same area.

3.2.2 Industrial, Commercial and Institutional (ICI)

In 2011, it was estimated that there was 22,166 tonnes disposed from the ICI sector at the RDNO RDFs. For the Study in 2012, a total of thirty-eight (38) waste samples were sorted from the ICI sector. The percent composition for primary waste categories identified in these samples is provided in Table 4.

Compostable Organics made up the largest portion of the waste representing approximately 30%, 39% and 41% at the ASRDF, GVRDF and LRDF respectively. Food waste represented the largest portion of the Compostable Organics at all of the RDFs. Paper and Plastic were the next largest portions of the waste stream at all the RDFs. OCC and/or boxboard was the largest portion of the paper waste stream, and plastic film was the largest portion of the plastic waste stream.

The waste composition for the ICI sector shows a higher standard deviation for all primary waste categories than the residential sector. The higher standard deviations may reflect the more diverse individual source sites, *e.g.* office buildings, restaurants, repair shops, institutions, *etc*. Notably, Compostable Organics, Paper and Plastics were found in almost all waste samples for the ICI sector. All the other primary waste categories would have a variability of 100% as some samples would have a material category, whereas other samples would not have the same material category. Generally in ICI

samples, the contents were variable, depending on the sample's origin as one ICI sample was often shown to have a vastly different waste composition compared to another, depending on the source of the load.

For example, ICI Samples GV-ICI-3 and GV-ICI-5 had high contents of OCC, plastic film, and food waste from sources that appeared to be a grocery store. On the other hand, high amounts of mixed metals and electronic parts were present in ICI Sample GC-ICI-8 from a mechanic shop retailer. The ICI waste composition is highly variable overall as there are many different activities that occur in the ICI sector that generate varying types of waste.

3.2.3 Residential and Commercial Drop-Off

In 2011, it was recorded that there were 19,117 tonnes disposed from the RES sector (including curbside pick-up and self-hauled residential drop-off) at the RDNO RDFs. For the Study in 2012, a total of thirty-eight (38) waste samples were sorted from the RDO sector. The percent composition for primary waste categories identified in these samples is provided in Table 5.

In 2011, it was recorded that there was 1,347 tonnes disposed from the DLC sector at the RDNO RDFs. For the Study in 2012, a total of seven (7) waste samples were sorted from the DLC sector. The composition for primary waste categories identified in these samples is provided in Table 6.

The waste composition was highly variable for the RDO sector; however there are common trends at each RDF. Building Materials made up a large portion of the waste generated from renovation activities. Carpet waste was the largest portion of this waste category at the GVRDF (12.3%) and LRDF (25.9%). At the ASRDF, gypsum (8.9%) was the largest portion of the Building Material waste disposed. Compostable Organics were more likely to include clean wood, and the most common Non-Compostable Organic item was treated/painted wood. In general, it was typically smaller loads of waste that included these items that were not sorted into the provided wood waste and gypsum areas at the RDFs.

In the CDO waste sector Bulky Objects accounted for 12% of the waste from this sector which was mainly furniture. Plastic film also represented approximately 13.9% of the total waste composition in this sector.

According to responses to the questions asked of RDO and CDO customers, renovation, clean-up, and construction activities were the most common activities that generated the waste. The standard deviations for those primary categories contributing significant quantities of waste within the RDO and CDO sector were generally higher than found for the residential and ICI sectors. The higher standard deviation may reflect the more diverse sources of waste. RDO samples are also highly variable, as activities such as construction, renovations and bulky object clean-up can generate many different types of waste. Notably, the waste is heavily weighted to Compostable and Non-compostable Organics and Building Materials. Building Materials include carpet waste, gypsum and rigid asphalt products such as roofing tiles. Compostable Organics mainly comprised of clean wood while, Non-Compostable Organics mainly comprised of painted wood. A significant number of the samples from this sector contained waste from only one or two waste categories.

3.2.4 Overall Waste Composition

Table 7 outlines the calculated combined waste composition for each RDF, and the overall waste composition for the RDNO. These averages are calculated by taking into account the proportion of waste from each sector arriving at each RDF, and the total proportion of waste each RDF contributes to the total amount of waste generated in the RDNO. From these calculations it is estimated that Compostable Organics make up the largest portion of the waste at 34.3% while Paper and Plastic were the second largest at 12.2% and 12.1% respectively. Tables 8 through 11 at the end of this report summarize all of the data at both the primary and secondary level for each RDF.

3.3 Comparison with 2005 Waste Composition Results

The data in Tables 8, 9, 10 and 11 at the end of this report include both the 2005 data and the 2012 data for all the primary and secondary categories for each RDF and TS. Appendix I includes a summary table of all the waste categories used in 2012, and the comparable waste categories that were used in 2005.

At the GVRDF, ASRDF and LRDF there are significant decreases in the amount of clean wood arriving from all sectors, with the largest decrease seen in the ICI sector. There is also a significant decrease in the quantity of treated and painted wood in 2012 compared to 2005. Other notable decreases in waste percentages include Building Materials at all RDFs and Electronic Waste as ASRDF and the amount of Paper at LRDF.

3.4 Limitations: Sources of Error during the Sorts

At the conclusion of a given sort, there can be a small discrepancy between the total sample mass and the sum of the sorted category masses. Sample material falling to the floor and changes in moisture content during the sort would result in a sorted category mass that was different than the total sample mass. Also, errors in the recording of field data are possible reasons for the sum of the category masses being different from the total sample mass. Such errors were minor, and are controlled by our QA/QC procedures for error checking the data.

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4 CONCLUSIONS

A total of one-hundred and nineteen (119) waste samples totaling 12,251 kg were collected and sorted, including thirty-nine (39) samples at the ASRDF, sixty-seven (67) samples at the GVRDF, and thirteen (13) samples at the LRDF.

The overall waste composition for the RDNO taking into account the proportion of waste from each sector arriving at each RDF, and the total proportion of waste each RDF demonstrates that Compostable Organics make up the largest portion of the waste at 34.3% while Paper and Plastic were tied as the second largest at 12.2% and 12.1% respectively. All other categories contributed less than 9% to the total quantity of waste going into the Landfill.

The primary and secondary category data was subjected to statistical analysis using the provincial waste characterization tool to determine the means and standard deviations of each of the categories. The standard deviations of waste within each of the primary categories calculations indicated a fairly good consistency for the RES samples. Each load of RES waste represents several source sites, each of which would be expected to have a similar waste composition. The waste composition for the ICI sector shows a higher standard deviation for all primary waste categories than the residential sector. Higher standard deviations are expected for the ICI sector because the primary sources can be vastly different. In addition, each delivery may contain waste from several primary sources, but the load is not necessarily well mixed. The standard deviations for a majority of the categories of the RDO waste are large. However, on evaluating the composition of RDO waste, we note that a significant number of the samples contained waste from one or two primary categories only.

A large confidence interval does not necessarily indicate that the data is unreliable; instead it can indicate that the data from a particular sector is highly variable depending on the source, with different sub-sectors producing different types of waste.

When the 2012 data is compared to the 2005 data at the GVRDF, ASRDF and LRDF there is a significant decrease in the amount of clean wood arriving from all sectors, with the largest decrease seen in the ICI sector. There is also a significant decrease in the quantity of treated and painted wood in 2012 compared to 2005. Other notable decreases in waste percentage include Building Materials at all of the RDFs and Electronic Waste as ASRDF, and the amount of Paper at LRDF.

Closure and Professional Statement

TRI Environmental Consulting Inc. prepared the foregoing report for the exclusive use and information of the Regional District of North Okanagan. The information and data were collected and compiled in accordance with the general level of care and skill normally exercised by environmental science and engineering professionals practicing under similar circumstances. During the preparation of this report, TRI has relied on reports, data, studies, specifications, documents and other information provided by others. TRI has taken care to verify the information provided where possible, but makes no warranty as to the accuracy of the reports, data, studies, specifications, documents and other information prepared by others and accepts no responsibility for information contained in them.

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TRI Environmental Consulting Inc.

Thank you for choosing TRI for this Project. Should you have questions concerning this report, or if you require additional information, please contact the undersigned at **(604) 436-3384.**

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TABLES

Table 8 – Armstrong/Spallumcheen RDF Waste Composition

Table 9 – Greater Vernon RDF Waste Composition

Table 10 – Lumby RDF Waste Composition

Table 11 – Kingfisher, Silver Star and Cherryville Transfer Station Waste Composition

Table 12 – All CDO (DLC) Waste Composition

Table 8 - Armstrong/Spallumcheen RDF Waste Composition							
Waste Category		**2012 Sectors**			**2005 Sectors**		
Primary	Secondary	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean
Paper		**14.96%**	**21.08%**	**7.49%**	**16.99%**	**9.89%**	**7.88%**
	Fine, office, envelopes	1.91%	1.55%	0.66%	2.03%	0.79%	1.08%
	Newsprint	1.28%	0.61%	1.21%	3.09%	0.78%	1.13%
	OCC - Clean	0.72%	1.64%	1.96%	2.44%	4.25%	2.09%
	OCC - Waxed and other non- rec OCC	0.11%	5.31%	0.05%	1.38%	0.00%	0.08%
	Boxboard	2.96%	1.75%	1.16%	1.02%	0.30%	0.42%
	Bound Paper Products	0.26%	0.42%	0.80%	1.82%	0.70%	0.26%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Dairy or Dairy Substitute	0.30%	0.10%	0.10%	0.09%	0.19%	0.07%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Non-Dairy (refundable)	0.07%	0.01%	0.02%			
	Tissue/Paper Towels	5.30%	3.79%	0.83%	3.75%	0.88%	1.72%
	Other Papers	2.05%	5.90%	0.70%	1.38%	2.00%	1.02%
Plastic		**12.59%**	**18.15%**	**9.32%**	**15.66%**	**10.63%**	**11.76%**
	Film-Retail and Grocery carry out bags (clean)	0.06%	0.56%	0.02%	3.05%	2.69%	1.30%
	Film - Other Film	5.18%	9.65%	2.14%			
	Textiles	1.68%	0.99%	1.56%	1.51%	1.23%	0.39%
	Rigid Beverage Containers - Deposit (juice, pop)	0.23%	0.42%	0.05%	1.70%	1.03%	2.00%
	Rigid Beverage Containers - Non-Deposit (milk, milk substitute)	0.11%	0.11%	0.00%			
	Rigid Non Beverage - #1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	2.14%	3.65%	2.63%	6.08%	4.04%	4.49%
	Rigid Non Beverage - #2 HDPE (milk jugs, detergent bottles, magarine tubs)	0.39%	0.23%	0.19%			
	Rigid Non Beverage - #6 PS (Styrofoam)	0.58%	0.88%	0.40%			
	Rigid Non Beverage - Other rigid plastic packaging or containers no code or lid < 10 cm	0.97%	0.64%	0.77%			
	Other Plastics	1.26%	1.02%	1.56%	3.32%	1.65%	3.59%
Compostable Organics		**43.18%**	**29.96%**	**14.81%**	**33.14%**	**30.75%**	**29.07%**
	Yard and Garden - Small Yard Waste	8.48%	3.59%	3.37%	3.51%	10.01%	10.77%
	Yard and Garden - Large Yard Waste	0.00%	0.00%	0.00%			
	Food Waste - Backyard Compostable	24.52%	7.90%	4.13%	27.80%	15.80%	10.20%
	Food Waste - Backyard Non-Compostable	9.98%	16.24%	3.65%			
*	Clean wood	0.20%	2.24%	3.67%	1.83%	4.94%	8.10%
Non Compostable Organics		**4.47%**	**8.25%**	**10.38%**	**8.44%**	**9.26%**	**4.67%**
	Textiles	1.74%	3.37%	1.44%	6.14%	8.39%	1.92%
	Rubber -Tires	0.00%	1.67%	1.67%	1.35%	0.55%	2.17%
	Rubber - Other	0.28%	0.42%	0.49%			
	Multiple / Composite organic materials	2.04%	1.78%	1.91%	0.80%	0.00%	0.00%
*	Treated/Painted Wood	0.33%	1.01%	4.87%	*	*	*
	Leather	0.08%	0.00%	0.00%	0.15%	0.32%	0.58%
Metals		**3.85%**	**3.46%**	**7.81%**	**7.41%**	**6.21%**	**15.64%**
	Non-Consumables Mixed Metals	1.66%	2.32%	6.33%	1.65%	0.23%	0.41%
	Beverage Containers (alcoholic or not)	0.11%	0.15%	0.12%	0.14%	0.11%	0.14%
	Food Containers, Trays, or Foils - Aluminum, foil, trays etc	0.42%	0.18%	0.08%	3.66%	0.68%	7.98%
	Food Containers, Trays, or Foils - Steel Cans (ferrous)	1.10%	0.56%	0.58%			
	Other Metals	2.08%	1.00%	1.36%	1.96%	5.18%	7.11%
Glass		**1.74%**	**6.59%**	**5.32%**	**2.55%**	**8.86%**	**3.10%**
	Beverage Containers - refundable	0.16%	0.92%	0.41%	0.14%	0.43%	0.28%
	Beverage Containers - non-refundable	0.00%	0.03%	1.01%			
	Food containers	0.92%	0.50%	0.51%	1.72%	0.31%	0.22%
	Ceramics	0.27%	0.25%	1.16%	0.11%	6.78%	0.74%
	Other glass	0.38%	4.89%	2.23%	0.58%	1.34%	1.86%
Building Material		**2.02%**	**2.49%**	**17.91%**	**2.67%**	**13.05%**	**7.79%**
	Gypsum/drywall,plaster	0.19%	0.27%	8.93%	2.67%	13.05%	7.79%
	Masonry (bricks, concrete, etc.)	0.00%	0.00%	2.49%			
	Rock,sand,dirt,ceramic, porcelain	0.88%	0.09%	4.51%			
	Rigid Asphalt Products	0.04%	0.00%	0.00%			
	Carpet Waste (and underlay)	0.73%	0.87%	1.54%			
	Other Inorganics	0.18%	1.25%	0.45%			
Electronic Waste		**1.29%**	**0.79%**	**1.13%**	**1.84%**	**6.55%**	**13.83%**
	Computers and peripherals	0.16%	0.01%	0.00%	1.84%	6.55%	13.83%
	TV & Audio/video equipment	0.00%	0.00%	0.56%			
	Telephones & telecommunications Equipment	0.00%	0.00%	0.00%			
	Small appliances & floor care appliances	0.82%	0.11%	0.00%			
	Electronic or electrical tools, other than large-scale stationary industrial tools	0.11%	0.52%	0.00%			
	Electronic or electrical toys, leisure and sports equipment, including, without limitation, trains, car	0.00%	0.00%	0.00%			
	Smoke Detector	0.00%	0.00%	0.00%			
	Other e-waste	0.20%	0.16%	0.57%			
Household Hazardous		**2.99%**	**3.31%**	**8.06%**	**5.74%**	**2.86%**	**6.24%**
	Batteries	0.13%	0.04%	1.87%	0.22%	0.00%	0.06%
	Medical/Biological	0.79%	0.95%	0.73%	0.10%	0.09%	0.36%
	HHW-Paint	0.28%	1.55%	3.53%	3.33%	2.58%	5.07%
	HHW - Aerosols	0.28%	0.11%	0.29%			
	HHW- Fertilizers/Pesticides	0.83%	0.02%	0.04%			
	HHW- Automotive	0.33%	0.33%	0.74%			
	HHW- Pharmaceuticals	0.07%	0.00%	0.09%			
	HHW- Cosmetics	0.01%	0.02%	0.00%			
	HHW- Propane Tanks	0.00%	0.07%	0.07%			
*	Mercury Containing Items	0.00%	0.01%	0.00%	*	*	*
*	Other HHW	0.20%	0.21%	0.71%	2.09%	0.19%	0.76%
Household Hygiene		**11.20%**	**2.56%**	**14.87%**	**5.62%**	**0.71%**	**2.47%**
	Biological - pet waste	5.79%	0.32%	9.71%	5.62%	0.71%	2.47%
	Biological - diapers, sanitary napkins, tampons	5.40%	2.25%	5.16%			
Bulky Objects		**0.00%**	**0.46%**	**1.74%**	**0.84%**	**0.00%**	**0.00%**
	White goods	0.00%	0.00%	0.00%	0.84%	0.00%	0.00%
	Furniture	0.00%	0.46%	1.74%			
Fines		**1.72%**	**2.89%**	**1.17%**	**0.00%**	**0.00%**	**0.00%**

Note: 2005 totals may not add up to exactly to 100% due to rounding and categories overlaping compared to 2012 data
*Refer to Waste Categories in Appendix

Table 9 - Greater Vernon RDF Waste Composition							
Waste Category		2012 by Sector			2005 by Sector		
Primary	Secondary	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean
Paper		**8.43%**	**12.74%**	**11.24%**	**9.96%**	**9.70%**	**6.35%**
	Fine, office, envelopes	1.46%	1.82%	0.15%	0.52%	0.79%	0.93%
	Newsprint	1.47%	1.00%	0.01%	1.82%	1.61%	0.71%
	OCC - Clean	0.50%	0.57%	4.26%	2.15%	2.82%	1.54%
	OCC - Waxed and other non- rec OCC	0.26%	3.21%	0.10%			
	Boxboard	1.07%	0.72%	0.43%	1.17%	0.62%	0.63%
	Bound Paper Products	0.25%	0.12%	5.02%	1.02%	0.74%	0.82%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Dairy or Dairy Substitute	0.12%	0.12%	0.00%	0.07%	0.15%	0.03%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Non-Dairy (refundable)	0.01%	0.07%	0.00%			
	Tissue/Paper Towels	1.75%	3.67%	0.58%	2.09%	1.58%	0.80%
	Other Papers	1.54%	1.44%	0.68%	1.12%	1.38%	0.90%
Plastic		**10.53%**	**12.05%**	**8.18%**	**9.82%**	**10.16%**	**9.12%**
	Film-Retail and Grocery carry out bags (clean)	0.00%	0.00%	0.00%	2.37%	2.80%	1.43%
	Film - Other Film	3.63%	5.39%	0.81%			
	Textiles	2.47%	1.67%	1.40%	1.69%	1.52%	1.66%
	Rigid Beverage Containers - Deposit (juice, pop)	0.17%	0.20%	0.15%	0.79%	0.74%	0.77%
	Rigid Beverage Containers - Non-Deposit (milk, milk substitute)	0.03%	0.01%	0.00%			
	Rigid Non Beverage - #1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	1.95%	1.38%	0.52%	3.33%	2.65%	2.55%
	Rigid Non Beverage - #2 HDPE (milk jugs, detergent bottles, magarine tubs)	0.38%	0.13%	0.07%			
	Rigid Non Beverage - #6 PS (Styrofoam)	0.45%	0.57%	0.76%			
	Rigid Non Beverage - Other rigid plastic packaging or containers no code or lid < 10 cm	0.34%	0.40%	0.04%			
	Other Plastics	1.11%	2.29%	4.44%	1.64%	2.45%	2.72%
Compostable Organics		**57.51%**	**38.97%**	**14.96%**	**53.04%**	**54.04%**	**39.96%**
	Yard and Garden - Small Yard Waste	35.90%	12.29%	1.91%	24.41%	4.00%	22.32%
	Yard and Garden - Large Yard Waste	0.00%	0.00%	0.00%			
	Food Waste - Backyard Compostable	12.07%	12.81%	0.75%	20.03%	16.18%	9.09%
	Food Waste - Backyard Non-Compostable	7.45%	10.56%	1.00%			
*	Clean wood	2.08%	3.31%	11.30%	8.60%	33.86%	8.55%
Non Compostable Organics		**4.63%**	**6.41%**	**23.03%**	**4.65%**	**3.32%**	**4.17%**
	Textiles	1.50%	0.42%	0.89%	2.32%	1.26%	1.36%
	Rubber -Tires	0.00%	0.12%	0.00%	1.92%	1.35%	2.80%
	Rubber - Other	0.98%	0.77%	0.21%			
	Multiple / Composite organic materials	1.21%	1.01%	0.81%	0.28%	0.37%	0.00%
*	Treated/Painted Wood	0.94%	4.08%	20.98%	*	*	*
	Leather	0.00%	0.00%	0.14%	0.13%	0.34%	0.01%
Metals		**2.73%**	**8.12%**	**12.61%**	**2.88%**	**3.02%**	**4.28%**
	Non-Consumables Mixed Metals	1.81%	7.21%	12.55%	0.10%	0.03%	0.30%
	Beverage Containers (alcoholic or not)	0.08%	0.11%	0.00%	0.06%	0.06%	0.01%
	Food Containers, Trays, or Foils - Aluminum, foil, trays etc	0.27%	0.10%	0.00%	2.59%	2.68%	3.10%
	Food Containers, Trays, or Foils - Steel Cans (ferrous)	0.55%	0.67%	0.06%			
	Other Metals	0.84%	0.79%	0.06%	0.13%	0.24%	0.86%
Glass		**1.38%**	**1.43%**	**2.34%**	**2.04%**	**1.92%**	**1.87%**
	Beverage Containers - refundable	0.25%	0.11%	0.14%	0.24%	0.20%	0.26%
	Beverage Containers - non-refundable	0.02%	0.08%	0.00%			
	Food containers	0.37%	0.32%	0.07%	0.88%	0.26%	0.54%
	Ceramics	0.20%	0.10%	2.12%	0.49%	0.15%	0.33%
	Other glass	0.54%	0.83%	0.02%	0.43%	1.30%	0.73%
Building Material		**4.09%**	**3.27%**	**19.67%**	**7.89%**	**9.82%**	**22.07%**
	Gypsum/drywall,plaster	0.20%	0.03%	0.06%	7.89%	9.82%	22.07%
	Masonry (bricks, concrete, etc.)	0.00%	0.24%	6.66%			
	Rock,sand,dirt,ceramic, porcelain	0.17%	1.46%	0.25%			
	Rigid Asphalt Products	1.82%	0.00%	0.20%			
	Carpet Waste (and underlay)	1.75%	1.33%	12.27%			
	Other Inorganics	0.16%	0.21%	0.23%			
Electronic Waste		**1.64%**	**4.52%**	**4.21%**	**1.68%**	**1.66%**	**3.38%**
	Computers and peripherals	0.47%	0.03%	0.00%	1.68%	1.66%	3.38%
	TV & Audio/video equipment	0.16%	0.06%	0.57%			
	Telephones & telecommunications Equipment	0.00%	0.00%	0.00%			
	Small appliances & floor care appliances	0.90%	1.95%	3.27%			
	Electronic or electrical tools, other than large-scale stationary industrial tools	0.00%	0.57%	0.00%			
	Electronic or electrical toys, leisure and sports equipment, including, without limitation, trains, car	0.00%	0.00%	0.00%			
	Smoke Detector	0.00%	0.00%	0.00%			
	Other e-waste	0.11%	1.90%	0.37%			
Household Hazardous		**1.34%**	**3.88%**	**3.12%**	**0.97%**	**2.42%**	**2.81%**
	Batteries	0.10%	0.00%	0.06%	0.32%	0.03%	0.41%
	Medical/Biological	0.13%	1.63%	0.00%	0.05%	0.06%	0.04%
	HHW-Paint	0.55%	0.65%	0.20%	0.59%	2.33%	2.18%
	HHW - Aerosols	0.20%	0.40%	0.12%			
	HHW- Fertilizers/Pesticides	0.00%	0.81%	0.22%			
	HHW- Automotive	0.02%	0.02%	0.00%			
	HHW- Pharmaceuticals	0.07%	0.00%	0.00%			
	HHW- Cosmetics	0.00%	0.00%	0.00%			
	HHW- Propane Tanks	0.03%	0.10%	2.44%			
*	Mercury Containing Items	0.00%	0.18%	0.06%	*	*	*
*	Other HHW	0.24%	0.08%	0.02%	0.02%	0.00%	0.18%
Household Hygiene		**5.98%**	**7.61%**	**0.47%**	**5.82%**	**3.81%**	**3.37%**
	Biological - pet waste	2.80%	2.36%	0.36%	5.82%	3.81%	3.37%
	Biological - diapers, sanitary napkins, tampons	3.18%	5.25%	0.11%			
Bulky Objects		**0.00%**	**0.00%**	**0.00%**	**0.00%**	**0.00%**	**1.77%**
	White goods	0.00%	0.00%	0.00%	0.00%	0.00%	1.77%
	Furniture	0.00%	0.00%	0.00%			
Fines		**1.75%**	**0.99%**	**0.16%**	**0.85%**	**0.54%**	**0.40%**

Note: 2005 totals may not add up to exactly to 100% due to rounding and categories overlaping compared to 2012 data

*Refer to Waste Categories in Appendix

Table 10 - Lumby RDF Waste Composition						
Waste Category		2012 by Sector			2005 by Sector		
Primary	Secondary	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean	RES Weighted Mean	ICI Weighted Mean	RDO Weighted Mean
Paper		**11.68%**	**12.10%**	**7.75%**	**22.59%**	**16.75%**	**6.33%**
	Fine, office, envelopes	1.90%	0.00%	1.95%	2.70%	3.34%	0.56%
	Newsprint	0.90%	1.25%	0.55%	6.09%	3.12%	0.55%
	OCC - Clean	1.87%	0.05%	0.56%	2.36%	3.74%	1.25%
	OCC - Waxed and other non- rec OCC	0.00%	0.00%	0.00%			
	Boxboard	0.98%	4.85%	0.64%	3.05%	1.14%	0.76%
	Bound Paper Products	0.26%	0.00%	2.60%	3.24%	0.40%	0.67%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Dairy or Dairy Substitute	0.08%	0.00%	0.01%	0.12%	0.06%	0.21%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Non-Dairy (refundable)	0.03%	0.10%	0.03%			
	Tissue/Paper Towels	4.34%	2.98%	0.35%	3.65%	3.44%	1.06%
	Other Papers	1.33%	2.88%	1.07%	1.37%	1.52%	1.26%
Plastic		**15.83%**	**24.11%**	**8.15%**	**17.55%**	**18.84%**	**10.74%**
	Film-Retail and Grocery carry out bags (clean)	0.00%	0.00%	0.00%	2.34%	6.28%	2.56%
	Film - Other Film	9.01%	17.53%	1.27%			
	Textiles	0.74%	2.02%	2.01%	4.15%	0.19%	1.48%
	Rigid Beverage Containers - Deposit (juice, pop)	0.10%	1.10%	0.46%	2.18%	3.94%	2.21%
	Rigid Beverage Containers - Non-Deposit (milk, milk substitute)	0.05%	0.00%	0.00%			
	Rigid Non Beverage - #1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	1.41%	1.30%	0.67%	6.65%	6.31%	3.81%
	Rigid Non Beverage - #2 HDPE (milk jugs, detergent bottles, magarine tubs)	1.39%	0.00%	0.16%			
	Rigid Non Beverage - #6 PS (Styrofoam)	0.51%	1.87%	0.08%			
	Rigid Non Beverage - Other rigid plastic packaging or containers no code or lid < 10 cm	0.28%	0.29%	0.01%			
	Other Plastics	2.34%	0.00%	3.48%	2.22%	2.12%	0.68%
Compostable Organics		**48.94%**	**40.63%**	**13.65%**	**40.27%**	**35.47%**	**47.14%**
	Yard and Garden - Small Yard Waste	25.84%	0.00%	0.00%	12.46%	16.50%	13.27%
	Yard and Garden - Large Yard Waste	0.00%	0.00%	0.00%			
	Food Waste - Backyard Compostable	2.57%	14.60%	1.37%	27.81%	15.75%	12.08%
	Food Waste - Backyard Non-Compostable	19.53%	26.03%	3.13%			
*	Clean wood	1.00%	0.00%	9.15%	0.00%	3.22%	21.79%
Non Compostable Organics		**4.23%**	**0.10%**	**5.34%**	**4.57%**	**11.81%**	**1.84%**
	Textiles	0.56%	0.10%	0.70%	3.88%	0.65%	1.42%
	Rubber -Tires	0.00%	0.00%	2.51%	0.20%	11.16%	0.38%
	Rubber - Other	0.00%	0.00%	0.05%			
	Multiple / Composite organic materials	1.31%	0.00%	0.15%	0.00%	0.00%	0.00%
*	Treated/Painted Wood	2.36%	0.00%	1.93%	*	*	*
	Leather	0.00%	0.00%	0.00%	0.49%	0.00%	0.04%
Metals		**2.46%**	**2.45%**	**9.63%**	**2.92%**	**5.75%**	**3.52%**
	Non-Consumables Mixed Metals	0.77%	0.67%	9.37%	0.00%	0.00%	0.00%
	Beverage Containers (alcoholic or not)	0.62%	0.96%	0.02%	0.04%	0.12%	0.07%
	Food Containers, Trays, or Foils - Aluminum, foil, trays etc	0.51%	0.82%	0.00%	2.73%	3.05%	3.32%
	Food Containers, Trays, or Foils - Steel Cans (ferrous)	0.56%	0.00%	0.25%			
	Other Metals	1.08%	0.82%	0.25%	0.14%	2.58%	0.13%
Glass		**1.13%**	**7.01%**	**1.90%**	**2.60%**	**3.72%**	**2.55%**
	Beverage Containers - refundable	0.49%	6.15%	0.36%	0.28%	1.26%	1.28%
	Beverage Containers - non-refundable	0.00%	0.00%	0.00%			
	Food containers	0.36%	0.24%	0.08%	0.88%	2.46%	0.63%
	Ceramics	0.28%	0.62%	1.41%	0.62%	0.00%	0.28%
	Other glass	0.00%	0.00%	0.05%	0.81%	0.00%	0.36%
Building Material		**8.85%**	**0.00%**	**33.90%**	**1.95%**	**0.94%**	**16.90%**
	Gypsum/drywall,plaster	0.00%	0.00%	0.31%	1.95%	0.94%	16.90%
	Masonry (bricks, concrete, etc.)	2.16%	0.00%	0.00%			
	Rock,sand,dirt,ceramic, porcelain	0.00%	0.00%	7.56%			
	Rigid Asphalt Products	0.00%	0.00%	0.00%			
	Carpet Waste (and underlay)	6.70%	0.00%	25.87%			
	Other Inorganics	0.00%	0.00%	0.15%			
Electronic Waste		**0.36%**	**0.00%**	**2.27%**	**0.34%**	**0.00%**	**4.74%**
	Computers and peripherals	0.00%	0.00%	0.15%	0.34%	0.00%	4.74%
	TV & Audio/video equipment	0.00%	0.00%	0.01%			
	Telephones & telecommunications Equipment	0.36%	0.00%	0.00%			
	Small appliances & floor care appliances	0.00%	0.00%	2.07%			
	Electronic or electrical tools, other than large-scale stationary industrial tools	0.00%	0.00%	0.00%			
	Electronic or electrical toys, leisure and sports equipment, including, without limitation, trains, car	0.00%	0.00%	0.00%			
	Smoke Detector	0.00%	0.00%	0.00%			
	Other e-waste	0.00%	0.00%	0.04%			
Household Hazardous		**0.36%**	**0.19%**	**4.01%**	**0.46%**	**0.05%**	**1.71%**
	Batteries	0.00%	0.00%	0.00%	0.00%	0.00%	0.06%
	Medical/Biological	0.00%	0.00%	3.38%	0.07%	0.00%	0.03%
	HHW-Paint	0.21%	0.00%	0.10%	0.39%	0.05%	1.62%
	HHW - Aerosols	0.00%	0.10%	0.00%			
	HHW- Fertilizers/Pesticides	0.05%	0.05%	0.00%			
	HHW- Automotive	0.08%	0.00%	0.10%			
	HHW- Pharmaceuticals	0.03%	0.05%	0.00%			
	HHW- Cosmetics	0.00%	0.00%	0.00%			
	HHW- Propane Tanks	0.00%	0.00%	0.40%			
*	Mercury Containing Items	0.00%	0.00%	0.00%	*	*	*
*	Other HHW	0.00%	0.00%	0.04%	0.00%	0.00%	0.00%
Household Hygiene		**2.62%**	**13.26%**	**0.09%**	**7.94%**	**7.05%**	**6.34%**
	Biological - pet waste	1.59%	1.68%	0.09%	7.94%	7.05%	6.34%
	Biological - diapers, sanitary napkins, tampons	1.03%	11.58%	0.00%			
Bulky Objects		**0.00%**	**0.00%**	**12.99%**	**0.00%**	**0.00%**	**0.00%**
	White goods	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%
	Furniture	0.00%	0.00%	12.99%			
Fines		**3.54%**	**0.14%**	**0.33%**	**1.34%**	**0.25%**	**0.52%**

Note: 2005 totals may not add up to exactly to 100% due to rounding and categories overlaping compared to 2012 data
*Refer to Waste Categories in Appendix

Table 11 - Kingfisher, Silver Star and Cherryville Transfer Station Waste Composition

Waste Category		Kingfisher		Silver Star		Cherryville	
		2012	2005	2012	2005	2012	2005
Primary	Secondary	Weighted Mean	Weighted Mean	Weighted Mean	Weighted Mean	Weighted Mean	Weighted Mean
Paper		**19.68%**	**9.36%**	**14.30%**	**6.53%**	**10.88%**	**7.81%**
	Fine, office, envelopes	4.42%	0.77%	0.86%	0.35%	0.36%	0.23%
	Newsprint	0.78%	0.66%	1.01%	1.12%	0.10%	0.20%
	OCC - Clean	1.07%	1.69%	1.87%	1.36%	2.54%	4.47%
	OCC - Waxed and other non- rec OCC	0.28%		0.00%		0.00%	
	Boxboard	3.64%	1.65%	2.69%	0.54%	0.00%	1.21%
	Bound Paper Products	0.25%	1.28%	1.64%	1.35%	0.00%	0.02%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Dairy or Dairy Substitute	0.08%	0.04%	0.07%	0.19%	0.05%	0.03%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Non-Dairy (refundable)	0.14%		0.10%		0.20%	
	Tissue/Paper Towels	4.20%	1.86%	1.85%	1.18%	5.29%	1.11%
	Other Papers	4.82%	1.41%	4.21%	0.43%	2.34%	0.55%
Plastic		**15.34%**	**20.11%**	**10.93%**	**8.02%**	**36.76%**	**13.21%**
	Film-Retail and Grocery carry out bags (clean)	0.01%	3.77%	0.00%	0.97%	0.00%	1.78%
	Film - Other Film	7.36%		4.95%		6.56%	
	Textiles	0.82%	1.24%	0.90%	1.01%	0.00%	7.06%
	Rigid Beverage Containers - Deposit (juice, pop)	0.46%	3.73%	0.68%	0.43%	0.25%	1.58%
	Rigid Beverage Containers - Non-Deposit (milk, milk substitute)	0.01%		0.02%		0.00%	
	Rigid Non Beverage - #1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	2.72%	11.37%	2.83%	5.17%	2.39%	2.45%
	Rigid Non Beverage - #2 HDPE (milk jugs, detergent bottles, magarine tubs)	0.56%		0.26%		2.39%	
	Rigid Non Beverage - #6 PS (Styrofoam)	1.48%		0.39%		0.76%	
	Rigid Non Beverage - Other rigid plastic packaging or containers no code or lid < 10 cm	0.16%		0.31%		8.39%	
	Other Plastics	1.77%	0.00%	0.58%	0.44%	18.00%	0.34%
Compostable Organics		**36.83%**	**28.50%**	**46.35%**	**61.15%**	**17.03%**	**27.30%**
	Yard and Garden - Small Yard Waste	5.22%	2.68%	6.73%	3.41%	0.00%	0.68%
	Yard and Garden - Large Yard Waste	0.00%		0.00%		0.00%	
	Food Waste - Backyard Compostable	10.36%	24.63%	12.85%	7.22%	8.74%	14.27%
	Food Waste - Backyard Non-Compostable	20.83%		26.18%		8.24%	
*	Clean wood	0.42%	1.19%	0.59%	50.52%	0.05%	12.35%
Non Compostable Organics		**5.23%**	**3.19%**	**3.95%**	**0.32%**	**0.36%**	**13.13%**
	Textiles	0.37%	2.13%	0.94%	0.29%	0.36%	1.49%
	Rubber -Tires	0.00%	0.78%	0.26%	0.03%	0.00%	11.27%
	Rubber - Other	1.12%		0.06%		0.00%	
	Multiple / Composite organic materials	0.44%	0.00%	0.69%	0.00%	0.00%	0.00%
*	Treated/Painted Wood	3.30%	*	2.01%	*	0.00%	*
	Leather	0.00%	0.28%	0.00%	0.00%	0.00%	0.37%
Metals		**3.37%**	**5.49%**	**4.77%**	**1.74%**	**6.96%**	**2.28%**
	Non-Consumables Mixed Metals	1.55%	1.14%	3.52%	0.44%	5.13%	0.00%
	Beverage Containers (alcoholic or not)	0.08%	0.33%	0.34%	0.25%	0.15%	0.55%
	Food Containers, Trays, or Foils - Aluminum, foil, trays etc	0.43%	2.83%	0.18%	0.94%	0.81%	1.65%
	Food Containers, Trays, or Foils - Steel Cans (ferrous)	1.24%		0.71%		0.86%	
	Other Metals	1.74%	1.19%	0.90%	0.12%	1.68%	0.08%
Glass		**3.63%**	**5.02%**	**1.68%**	**4.71%**	**2.44%**	**10.79%**
	Beverage Containers - refundable	0.66%	0.92%	0.76%	0.55%	0.61%	1.36%
	Beverage Containers - non-refundable	0.00%		0.15%		0.00%	
	Food containers	0.87%	2.87%	0.37%	0.38%	1.58%	0.45%
	Ceramics	0.96%	0.66%	0.00%	2.55%	0.00%	0.35%
	Other glass	1.14%	0.57%	0.39%	1.23%	0.25%	8.64%
Building Material		**2.74%**	**21.55%**	**5.62%**	**6.41%**	**0.00%**	**17.09%**
	Gypsum/drywall,plaster	1.24%	21.55%	0.00%	6.41%	0.00%	17.09%
	Masonry (bricks, concrete, etc.)	0.00%		2.96%		0.00%	
	Rock,sand,dirt,ceramic, porcelain	1.42%		0.00%		0.00%	
	Rigid Asphalt Products	0.00%		0.00%		0.00%	
	Carpet Waste (and underlay)	0.05%		0.34%		0.00%	
	Other Inorganics	0.04%		2.32%		0.00%	
Electronic Waste		**2.19%**	**4.96%**	**1.42%**	**0.84%**	**0.00%**	**3.16%**
	Computers and peripherals	0.04%	4.96%	0.11%	0.84%	0.00%	3.16%
	TV & Audio/video equipment	1.58%		0.00%		0.00%	
	Telephones & telecommunications Equipment	0.00%		0.00%		0.00%	
	Small appliances & floor care appliances	0.53%		1.20%		0.00%	
	Electronic or electrical tools, other than large-scale	0.00%		0.00%		0.00%	
	Electronic or electrical toys, leisure and sports	0.00%		0.00%		0.00%	
	Smoke Detector	0.04%		0.00%		0.00%	
	Other e-waste	0.00%		0.11%		0.00%	
Household Hazardous		**0.91%**	**4.43%**	**0.65%**	**0.32%**	**6.10%**	**0.56%**
	Batteries	0.24%	0.00%	0.04%	0.00%	0.10%	0.00%
	Medical/Biological	0.00%	0.53%	0.00%	0.00%	2.95%	0.12%
	HHW-Paint	0.18%	2.63%	0.17%	0.32%	0.10%	0.44%
	HHW - Aerosols	0.14%		0.22%		0.25%	
	HHW- Fertilizers/Pesticides	0.00%		0.00%		2.24%	
	HHW- Automotive	0.14%		0.00%		0.31%	
	HHW- Pharmaceuticals	0.04%		0.00%		0.05%	
	HHW- Cosmetics	0.00%		0.00%		0.00%	
	HHW- Propane Tanks	0.00%		0.10%		0.00%	
*	Mercury Containing Items	0.00%	*	0.00%	*	0.00%	*
*	Other HHW	0.18%	1.27%	0.12%	0.00%	0.10%	0.00%
Household Hygiene		**8.43%**	**0.25%**	**8.87%**	**5.35%**	**17.54%**	**2.76%**
	Biological - pet waste	6.02%	0.25%	8.78%	5.35%	13.47%	2.76%
	Biological - diapers, sanitary napkins, tampons	2.41%		0.09%		4.07%	
Bulky Objects		**0.00%**	**0.00%**	**0.00%**	**7.02%**	**0.00%**	**2.83%**
	White goods	0.00%	0.00%	0.00%	7.02%	0.00%	2.83%
	Furniture	0.00%		0.00%		0.00%	
Fines		**1.64%**	**0.00%**	**1.47%**	**0.47%**	**1.93%**	**0.24%**

Note: 2005 totals may not add up to exactly to 100% due to rounding and categories overlaping compared to 2012 data
*Refer to Waste Categories in Appendix

Table 12 - All CDO (DLC) Waste Composition		
Waste Category		**2012**
Primary	**Secondary**	**Weighted Mean (%)**
Paper		**2.74%**
	Fine, office, envelopes	0.18%
	Newsprint	0.03%
	OCC - Clean	1.00%
	OCC - Waxed and other non- rec OCC	0.91%
	Boxboard	0.13%
	Bound Paper Products	0.05%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Dairy or Dairy Substitute	0.01%
	Beverage containers - Drink Box / Aseptic Containers (Tetra) / Gable Top Containers - Non-Dairy (refundable)	0.00%
	Tissue/Paper Towels	0.03%
	Other Papers	0.40%
Plastic		**22.66%**
	Film-Retail and Grocery carry out bags (clean)	0.00%
	Film - Other Film	13.92%
	Textiles	0.51%
	Rigid Beverage Containers - Deposit (juice, pop)	0.01%
	Rigid Beverage Containers - Non-Deposit (milk, milk substitute)	0.00%
	Rigid Non Beverage - #1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	0.11%
	Rigid Non Beverage - #2 HDPE (milk jugs, detergent bottles, magarine tubs)	0.01%
	Rigid Non Beverage - #6 PS (Styrofoam)	5.29%
	Rigid Non Beverage - Other rigid plastic packaging or containers no code or lid < 10 cm	0.01%
	Other Plastics	2.79%
Compostable Organics		**9.38%**
	Yard and Garden - Small Yard Waste	0.57%
	Yard and Garden - Large Yard Waste	0.00%
	Food Waste - Backyard Compostable	0.16%
	Food Waste - Backyard Non-Compostable	0.41%
	Clean wood	8.24%
Non Compostable Organics		**14.57%**
	Textiles	0.12%
	Rubber -Tires	0.00%
	Rubber - Other	0.30%
	Multiple / Composite organic materials	0.11%
	Treated/Painted Wood	14.04%
	Leather	0.00%
Metals		**4.95%**
	Non-Consumables Mixed Metals	1.88%
	Beverage Containers (alcoholic or not)	0.00%
	Food Containers, Trays, or Foils - Aluminum, foil, trays etc	0.01%
	Food Containers, Trays, or Foils - Steel Cans (ferrous)	0.05%
	Other Metals	3.06%
Glass		**6.66%**
	Beverage Containers - refundable	0.04%
	Beverage Containers - non-refundable	0.00%
	Food containers	0.00%
	Ceramics	0.60%
	Other glass	6.02%
Building Material		**23.18%**
	Gypsum/drywall,plaster	0.00%
	Masonry (bricks, concrete, etc.)	5.55%
	Rock,sand,dirt,ceramic, porcelain	7.02%
	Rigid Asphalt Products	0.00%
	Carpet Waste (and underlay)	6.66%
	Other Inorganics	3.95%
Electronic Waste		**0.61%**
	Computers and peripherals	0.00%
	TV & Audio/video equipment	0.02%
	Telephones & telecommunications Equipment	0.02%
	Small appliances & floor care appliances	0.00%
	Electronic or electrical tools, other than large-scale	0.00%
	Electronic or electrical toys, leisure and sports	0.00%
	Smoke Detector	0.00%
	Other e-waste	0.49%
Household Hazardous		**2.93%**
	Batteries	0.00%
	Medical/Biological	0.00%
	HHW-Paint	1.83%
	HHW - Aerosols	0.03%
	HHW- Fertilizers/Pesticides	0.00%
	HHW- Automotive	0.03%
	HHW- Pharmaceuticals	0.01%
	HHW- Cosmetics	0.00%
	HHW- Propane Tanks	0.00%
	Mercury Containing Items	0.97%
	Other HHW	0.07%
Household Hygiene		**0.00%**
	Biological - pet waste	0.00%
	Biological - diapers, sanitary napkins, tampons	0.00%
Bulky Objects		**12.34%**
	White goods	0.00%
	Furniture	12.34%
Fines		**0.00%**
TOTAL		**100.00%**

APPENDIX I

WASTE COMPOSITION CATEGORIES

2012 Waste Category List			Equivalent 2005 Waste Categories	
Paper				
1	Fine, office, envelops		2	Fine/ Ledger
2	Newsprint		0	Newspaper
3	OCC	Clean	1	Cardboard
4		Waxed and other non-rec. OCC	8	Contaminated
5	Boxboard		4	Packaging (example: pop can boxes)
6	Bound paper products		3*	Glossy. In 2005 books went in "other" (Category 7). In 2012 magazines, books, etc went under Bound paper products
7	Beverage containers - Drink Box / Aseptic Containers (Tetra)	Dairy or Dairy Substitute	5	Tetra Pack. In 2012 the category is split into dairy/non-dairy to reflect deposit containers
8		Non-Dairy (refundable)		
9	Tissue / Paper Towels		9	Tissue/ Paper Toweling
10	Other Paper		7	Other/ Multi-Material
Plastics				
11	Film	Retail & Grocery carry out bags (clean)	26	HDPE film (#2)
12		Other Film	27	LDPE (#4)
13	Textiles	Clothing (blends, polyester, Gore-Tex, fleece, nylon, etc.).	46	Synthetic (Went under Textiles Primary Category)
14	Rigid Beverage Containers	Deposit Containers (juice, pop, alcohol)	22	PET Beverage (#1)
15		Non-Deposit (milk/ milk substitute)	24	HDPE Rigid (#2). In 2012, this category was duplicate in the list.
16	Rigid Containers - All Others	#1 PETE; #3 PVC; #4 LDPE; #5 PP; #6 Non-Foam; #7 Mixed Resin Plastic; Lids >10 cm with code 1-7	23+25+28+30+33	Other PET (Category 23), LDPE Rigid #4 (Category 25), PVC #3 (Category 28), PP #5 (Category 30), Multi-Resin (#7). 2012 items grouped the same as blue bin recycling program
17		#2 HDPE (milk jugs, detergent bottles, margarine tubs)	24	HDPE Rigid (#2). In 2012, this category was duplicate in the list.
18		#6 PS (Styrofoam)	29	PS (#6). In 2005, included PS #6 Non Foam and Styrofoam
19		Other rigid plastic packaging or containers no code or lid < 10 cm	31	Other Plastics
20	Other Plastics	Durable products, toys, etc.	32	Multi-Resin/ Multi-Materials
Compostable Organics				
21	Yard and Garden	Small yard waste (leaves, branches, grass clippings)	39+40	Yard Waste (Category 39) and Landscaping (Category 40). In 2012 items are grouped, large items added to represent "non-acceptable" items at RDF
22		Large yard wastes (over 15 cm dia. or 1 m long)		
23	Food Waste	Backyard compostable (e.g. fruits, vegetables)	38	Kitchen-Vegetable
24		Backyard Non-compostable (Meat, bones, breads, non-liquid dairy, fats)	37	Kitchen-Animal
25	Clean Wood		41*	treated/painted wood, as these sources would need to be dealt with differently
Non Compostable Organics				
26	Treated/Painted Wood		41*	Wood. 2012 category is split to both clean and treated/painted wood, as these sources would need to be dealt with differently
27	Textiles	Natural Fiber Clothing	45	Natural (Went under Textiles Primary Category)
28	Rubber	Tires	35	Used Tires
29		Other Rubber	36	Other Rubber
30	Leather		34	Leather
31	Multiple / Composite organic materials		42	Other/ Multi-Material (Under Organic Primary Category)
Metals				
32	Beverage Containers (alcoholic or not)		15	Aluminum Beverage Refundable
33	Food Containers, Trays or Foil Wraps	Aluminum, foil, trays, etc.	17	Other Aluminum
34		Steel Cans (ferrous)	19	Other Ferrous
35	Non-consumables Mixed Metals >75%		20	Non-Ferrous
36	Other Metals		21	Other/ Multi-Material (Under Metal Primary Category)

2012 Waste Category List			Equivalent 2005 Waste Categories	
Glass				
37	Beverage containers	refundable	10	Beverage Refundable (under Glass Primary Category)
38		non-refundable	11	Beverage Non-Refundable (under Glass Primary Category)
39	Food containers		12	Food
40	Ceramics		14	Ceramic
41	Other glass	Broken, windows, regular light bulbs, etc.	13	Other/ Multi-Material (Under Glass Primary Category)
Building Material				
42	Gypsum/drywall, plaster		47	Construction. Categories in 2012 are more descriptive than 2005 and broken down into 6 categories
43	Masonry (bricks, blocks, concrete)			
44	Rock, sand, dirt, ceramic, porcelain			
45	Rigid asphalt Products			
46	Carpet Waste (and underlay)			
47	Other Inorganics			
Electronic Waste				
48	Computers and peripherals		43	Electrical and electronic appliances and toys. Categories in 2012 are more descriptive than 2005 and broken down into 8 categories
49	Audio/Video equip.			
50	Phones & telecomm.			
51	Small appliances & floor care appliances			
52	Electronic or electrical tools			
53	Electronic toys			
54	Smoke Detectors			
55	Other e-waste			
Household Hazardous				
56	Batteries		57+58	Batteries -Lead Acid (Car) (Category 57) and Batteries - Dry Cell (Category 58).2012 categories combined, note will be inlcluded if car battery found
57	Medical/Biological		54	carcasses
58	HHW (product &/or container)	Paint	50	Paint/ Decorative
59		Aerosols	55	Aerosol
60		Fertilizers/Pesticides	52	Garden/ Pool/ Septic
61		Automotive	49	Automotive
62		Pharmaceuticals	NEW	new EPR category - was included in "Other" (62) in 2005
63		Cosmetics	56	Cosmetics/Personal Products
64		Propane Tanks	61	Propane Tank
65	Hg Containing Items		NEW	New Hazardous Waste - was included in "other" (62) in 2005
66	Other HHW		62*	Categories in 2012 are more descriptive than 2005, any items not captured will have a note and placed here
Household Hygiene				
67	Biological	diapers, sanitary napkins, tampons	60*	Diapers. In 2005 the category did not include other hygiene products and was included in "Other" (62); diapers typically make up the vast majority of the weight
68		pet waste	59	Animal Litter
Bulky Objects				
69	White Goods		44	Office and Household Furniture. Categories in 2012 are more descriptive than 2005 and broken down into 2 categories
70	Furniture		44	
Fines				
71	Fines		48	Small Unidentified Material and Fines

APPENDIX II

CALCULATION METHODOLOGY

Waste Composition Estimation

1. The weighted mean of a particular category or subcategory was calculated by first summing the weights of that particular category across all the samples.

2. Next, the weights of each sample were summed to obtain the total weight for all samples within that set (eg. Round 1 of SF-RES sector).

3. The weighted mean is finally calculated by dividing the first sum by the second.

This method was chosen to calculate the mean compositions because not every sample is exactly the same weight. This method ensures that the average gives more emphasis to those samples that contain a greater weight.

A simple illustration is provided for the sample calculation for the weighted mean of newsprint.

	RES-1	RES-2	RES-3	RES-4
Newsprint (weight)	2	1.5	1.4	3
Boxboard (weight)	1.1	2	3	1.2
Total Weight of Sample	3.1	3.5	4.4	4.2

Following Step 1, the sum is of the weights is taken across all samples of newsprint.

$$2 + 1.5 + 1.4 + 3 = \textbf{7.9}$$

Step 2 entails summing the total weights of each sample across all samples.

$$3.1 + 3.5 + 4.4 + 4.2 = \textbf{15.2}$$

Finally, the weighted mean of newsprint is calculated by dividing the two sums.

$$7.9 / 15.2 = \textbf{0.52}$$

Mathematically, the calculations of the weighted mean can be shown as follows:

Let
i represent an individual sample
j represent the waste category
k_{ij} represent the weight of waste category j in sample i
w_i represent the weight of sample i

Then,
Weight Mean of Waste Category j = $\Sigma_i\, k_{ij} / \Sigma_i\, w_i$

Standard Deviation Calculations

The non-biased standard deviation method was applied to the Study to estimate how much the waste in a particular category varies about the average from sample to sample.

1. All data was converted from weight in kilograms to percentage of sample weight. For example, Sample 1 has a total mass is 100.2 kg. Suppose 1.65 kg out of 100.2 kg consisted of Fine Office Paper then in terms of percentages, 1.65/100.2 or 1.65 percent of Sample 1 consisted of Fine Office Paper.

2. The non-biased, or "n-1" equation for standard deviation was then applied to the percentages of a particular waste category across all samples.

Using the above example, the weights are converted to percentages to obtain the following table.

	RES-1	RES-2	RES-3	RES-4
Newsprint (%)	65%	43%	32%	71%
Boxboard (%)	35%	57%	68%	29%
Total % of Sample	100%	100%	100%	100%

Then, applying the non-biased equation for standard deviation to newsprint,
(values 65%, 43%, 32%, and 71%) the standard deviation of newsprint is obtained to be 18.47%.

SD$_{newsprint}$ = sqrt((4((65%)^2 + (43%)^2 + (32%)^2 + (71%)^2) − (65% + 43% + 32% + 71%)^2) / 4(3)) = 18.34 %

Mathematically, the calculations of the standard deviation can be shown as follows:

$$SD_j = \sqrt{\frac{n\sum_i x_{ij}^2 - (\sum_i x_{ij})^2}{n(n-1)}}$$

Where i represents an individual sample
j represents the waste category
n is the number of samples
x$_{ij}$ is the percentage waste in the waste category j of sample i

*Note

The standard deviations for Primary Waste Categories were calculated by first calculating the standard deviations for Secondary Categories using the above method, and then summing those standard deviations to obtain standard deviations for the Primary Categories.

For the Study, the same methods for calculating weighted averages and standard deviations of waste categories in one particular facility have been extended to calculating weighted averages and standard deviations across data sets of an entire sector or round.

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APPENDIX III

SELECTED SITE PHOTOS

ASRDF – Sorting Station

Acquiring a ICI sample

Household Hazardous Fertilizers/Pesticides (from one sample)

Household Hazardous Pharmaceuticals (from one sample)

Newspapers

Household Hazardous Fertilizers/Pesticides (from one sample)

Household Hazardous Automotive (from one sample)

Metal Beverage Containers

Typical RES sample

Yard Waste

Building Materials Carpet Waste

Household Hazardous Propane Cylinders