2022 City of Salina Waste and Recyclables Characterization Study Final Report

City of Salina
Public Works Department
Salina, Kansas

SCS ENGINEERS

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1.0 EXECUTIVE SUMMARY

The City of Salina, Kansas (City) contracted with SCS Engineers (SCS) to perform a Waste and Recyclables Characterization Study in 2022 (2022 Study). The purpose of the 2022 Study was to provide the City with important information concerning the types of materials being disposed and recycled, and to compare historical waste study results (2004 and 1996-1997) to track possible waste disposal trends. The 2022 Study provides meaningful data for the City to evaluate the impact of existing waste diversion programs, identify opportunities for further targeted waste diversion efforts, and develop program and policy strategies to expand waste diversion and recycling initiatives.

SCS worked with City staff to develop a work plan that established the methodologies for selecting and sorting samples. The work plan was designed to conform to the City's previous studies to facilitate the comparison and tracking of waste disposal trends. The 2022 Study's work plan established methodologies for physically sorting samples of municipal solid waste (MSW), visually sorting construction and demolition (C&D) materials received at the City of Salina Municipal Solid Waste Landfill (MSWLF), and selecting and physically sorting recyclable material samples from the Salina Drive-Thru Recycling Center (SDRC).

Below are summaries of the 2022 Study results for the following sort activities:

- MSW Physical Sort;
- C&D and Industrial Waste Visual Sort; and
- Recyclable Material Physical Sort.

MSW Physical Sort Summary

SCS physically sorted MSW received at the MSWLF March 21, 2022 through March 25, 2022 for the following waste generator sectors:

- **Residential (RES)** – Encompasses MSW generated from single-family and multi-family (up to three units) residential households.

- **Commercial and Institutional (CI)** – Includes waste generated from commercial and institutional entities.

A total of 50 samples (37 RES and 13 CI) were physically sorted into 42 material categories. The top five material groups found in the physical sorts combining RES and CI generators includes the following:

1. Paper (21.6%)
2. Plastic (16.4%)
3. Food Waste (14.0%)
4. Yard Waste (8.0%)
5. Textiles, Rubber, and Leather (7.1%)

Figure 1 below presents a summary of the sixteen material groups that make up the composition of waste from the physical sort which included the RES and CI waste. Table 1 (following page) provides a more detailed breakdown of the MSW characterization results for all material categories measured.

Figure 1. Overall Residential and Commercial and Institutional Waste Composition

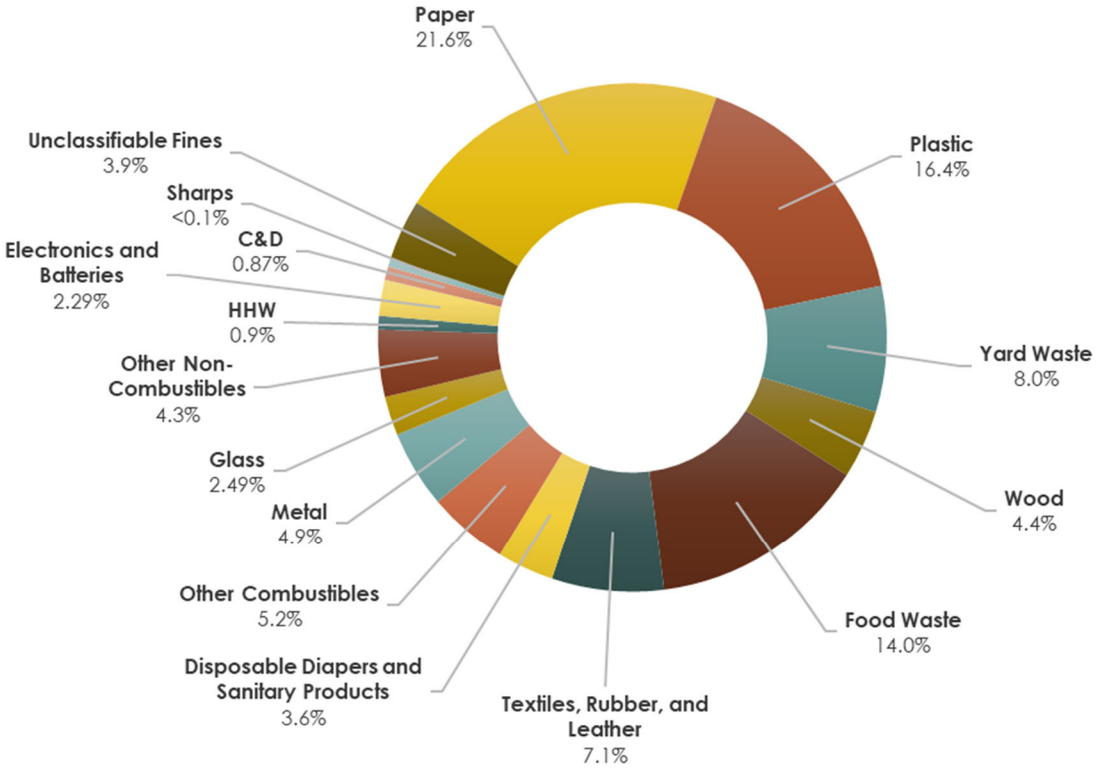


Table 1. Overall Residential and Commercial and Institutional Waste Composition

Material Group		Material Category	Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper
Paper	1	Corrugated cardboard and kraft paper	9.2%	12.3%	6.3%	12.0%
	2	Chipboard	3.9%	2.0%	3.5%	4.4%
	3	Newspaper	0.4%	0.8%	0.2%	0.6%
	4	High grade paper	0.9%	1.7%	0.5%	1.3%
	5	Magazines and other glossy paper	1.1%	1.6%	0.8%	1.5%
	6	Other paper	6.0%	2.9%	5.4%	6.7%
		Total Paper	**21.6%**			
Plastic	7	Clear HDPE containers	0.5%	0.4%	0.4%	0.6%
	8	Colored HDPE containers	0.6%	0.5%	0.5%	0.7%
	9	PET bottles and jars	2.1%	1.0%	1.9%	2.4%
	10	Plastics #3 #5 and #7	1.6%	0.8%	1.4%	1.8%
	11	Retail shopping bags	0.8%	0.7%	0.7%	1.0%
	12	Polystyrene	1.1%	0.6%	0.9%	1.2%
	13	Plastic film	6.1%	3.3%	5.3%	6.9%
	14	Other plastic containers (non-recyclable)	1.3%	5.6%	<0.1%	2.6%
	15	Other plastic products	2.2%	2.0%	1.8%	2.7%
		Total Plastics	**16.4%**			
Yard Waste	16	Grass clippings	<0.1%	0.2%	<0.1%	<0.1%
	17	Leaves and other yard waste	8.0%	14.7%	4.6%	11.4%
		Total Yard Waste	**8.0%**			
Wood	18	Wood	**4.4%**	6.2%	2.9%	5.8%
Food Waste	19	Food waste	**14.0%**	7.8%	12.2%	15.8%
Textiles, Rubber, and Leather	20	Textiles, rubber, and leather	**7.1%**	7.5%	5.4%	8.9%
Disposable Diapers and Sanitary Products	21	Disposable diapers and sanitary products	**3.6%**	4.2%	2.6%	4.6%
Other Combustibles	22	Other combustibles	**5.2%**	2.6%	4.6%	5.8%
Metal	23	Aluminum food and beverage containers	1.2%	0.8%	1.0%	1.4%
	24	Steel & bimetal food and beverage containers	0.9%	0.7%	0.7%	1.0%
	25	Ferrous metal	0.9%	1.4%	0.5%	1.2%
	26	Other recyclable metal	1.8%	3.6%	1.0%	2.6%
	27	Nonrecyclable metal	0.2%	0.6%	<0.1%	0.4%
		Total Metals	**4.9%**			
Glass	28	Clear glass containers	1.6%	1.4%	1.3%	2.0%
	29	Brown glass containers	0.7%	1.1%	0.4%	0.9%
	30	Green/blue glass containers	0.2%	0.4%	<0.1%	0.3%
		Total Glass	**2.5%**			
Other Non-Combustibles	31	Other non-combustibles	**4.3%**	4.1%	3.3%	5.2%
Household Hazardous and Special Waste (HHW)	32	Household hazardous and special waste	**0.9%**	2.0%	0.4%	1.3%
Electronics and Batteries	33	Electronics	2.2%	7.2%	0.5%	3.9%
	34	Batteries	0.1%	0.2%	<0.1%	0.1%
	41	Lithium batteries and products containing lithium ion batteries	<0.1%	0.1%	<0.1%	<0.1%
		Total Electronics and Batteries	**2.3%**			
Construction and Demolition (C&D) Waste [4]	35	Roofing materials	0.3%	1.2%	<0.1%	0.5%
	36	Poured concrete	0.1%	0.6%	<0.1%	0.3%
	37	Bricks	0.2%	1.2%	<0.1%	0.5%
	38	Blocks	<0.1%	0.0%	<0.1%	<0.1%
	39	Gypsum board and plaster	0.2%	1.5%	<0.1%	0.6%
		Total Construction and Demolition Waste	**0.9%**			
Sharps [5]	42	Sharps	**<0.1%**	0.0%	<0.1%	<0.1%
Unclassifiable Fines	40	Unclassifiable Fines [3]	**3.9%**	2.4%	3.3%	4.4%
		Total Residential and CI Waste Sorted	**100%**			

1. Based off of 50 hand-sorted waste samples.
2. Confidence interval is based off of a normal distribution. The confidence limits are determined by the mean percentage + or - the confidence interval
3. Visual Observation of % of Fines Shown in Table below
4. C&D Waste is reflective of C&D waste found in the waste samples physically sorted from the residential and CI waste generators only.
5. Sharps is reflective of sharps waste found in the waste samples physically sorted from the residential and CI waste generators only; it does not include sharps from collection units within City.

Figure 2 (below) and Figure 3 (following page) present individual summaries of the sixteen material groups that make up the composition of waste from the physical sort for the RES waste and CI waste separately.

Figure 2. Residential Waste Composition

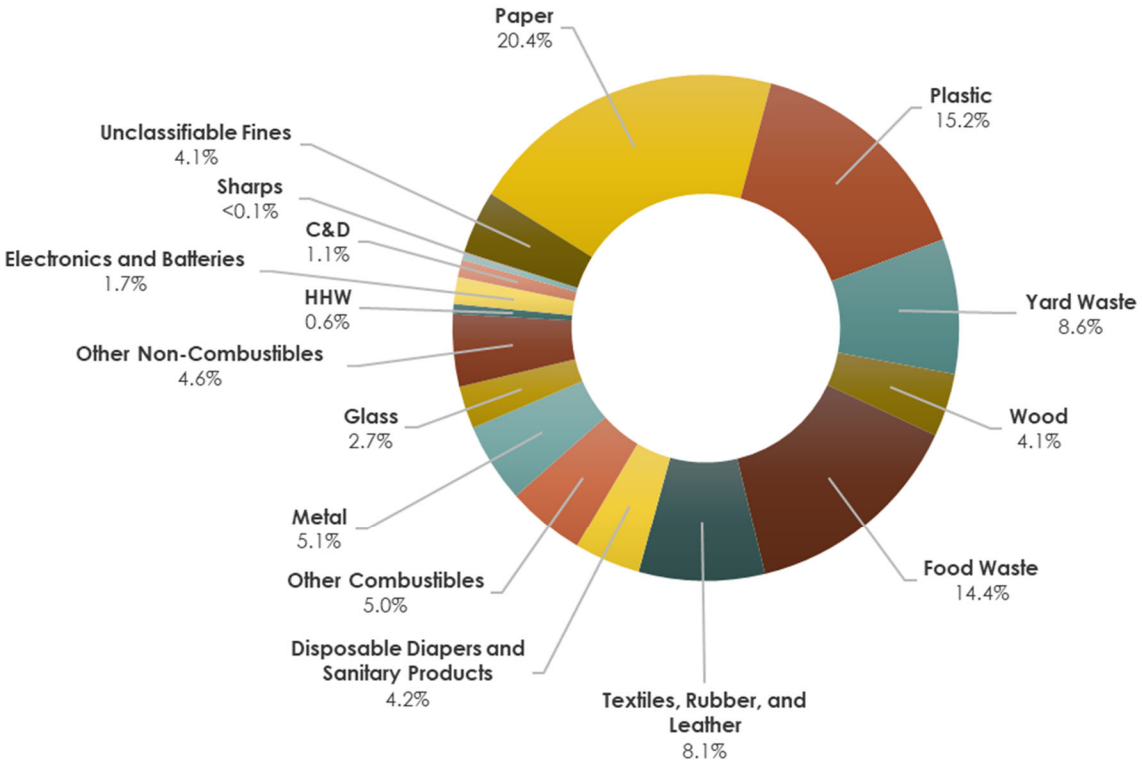


Figure 3. Commercial and Institutional Waste Composition

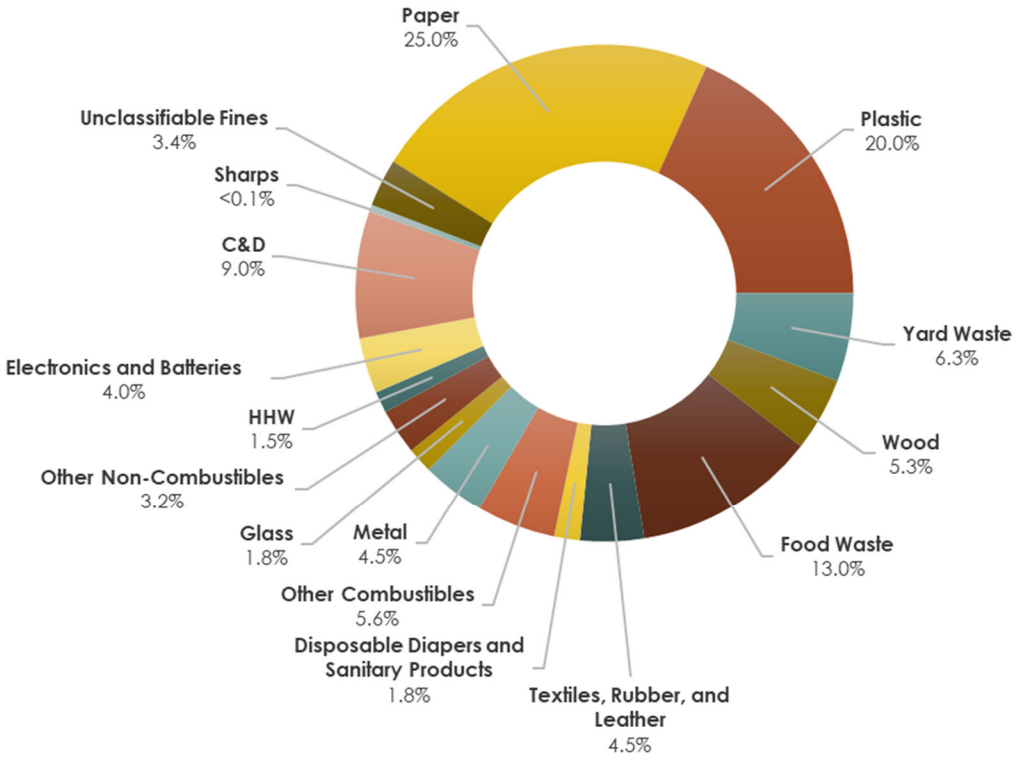


Table 2 shows the top five material groups identified in the physical sorts by generator type.

Table 2. Top Five Material Groups by Generators

Rank No.	RES and CI Composite	RES	CI
1	Paper (21.6%)	Paper (20.4%)	Paper (25.0%)
2	Plastic (16.4%)	Plastic (15.2%)	Plastic (20.0%)
3	Food Waste (14.0%)	Food Waste (14.4%)	Food Waste (13.0%)
4	Yard Waste (8.0%)	Yard Waste (8.6%)	C&D (9.0%)
5	Textiles, Rubber, and Leather (7.1%)	Textiles, Rubber, and Leather (8.1%)	Yard Waste (6.3%)

The table above shows consistent ranking of top materials groups, with the exception of the C&D material group in the CI generator category. The C&D material group included roofing materials, poured concrete, bricks, blocks, and gypsum board and plaster found within the CI waste stream.

One of the goals of the 2022 Study was to compare historical waste study results to track possible waste disposal trends. Tables 3 and 4 below compare the top five material categories for each study period.

Table 3. Historical Comparison of Top Five Material Groups - Residential Waste Stream (Mean Composition %)

Rank No.	Spring/Summer 1997	Annual 1996-97	2004 Study	2022 Study
1	Paper (30.9%)	Paper (33.5%)	Paper (32.4%)	Paper (20.4%)
2	Yard Waste (23.3%)	Yard Waste (15.9%)	Plastic (16.0%)	Plastic (15.2%)
3	Plastic (10.2%)	Food Waste (12.2%)	Yard Waste (15.5%)	Food Waste (14.4%)
4	Food Waste (9.0%)	Plastic (9.7%)	Food Waste (6.8%)	Yard Waste (8.6%)
5	Textiles, Rubber, and Leather (5.6%)	Textiles, Rubber, and Leather (5.0%)	Metals (5.4%)	Textiles, Rubber, and Leather (8.1%)

The table above indicates a general decrease in the amount of paper and yard waste identified in the RES waste stream over the compared years. The table also indicates a general increase in the amount of plastic and food waste in the RES waste stream.

Table 4. Historical Comparison of Top Five Material Groups – CI Waste Stream (Mean Composition %)

Rank No.	Spring/Summer 1997	Annual 1996-97	2004 Study	2022 Study
1	Paper (35.0%)	Paper (37.0%)	Paper (37.4%)	Paper (25.0%)
2	Food Waste (14.5%)	Food Waste (14.0%)	Plastic (18.2%)	Plastic (20.0%)
3	Plastic (12.5%)	Plastic (14.0%)	Yard Waste (11.6%)	Food Waste (13.0%)
4	Metals (6.0%)	Metals (7.5%)	Food Waste (8.7%)	C&D (9.0%)
5	Other Inorganics (5.5%)	Wood (5.0%)	Metals (5.1%)	Yard Waste (6.3%)

The table above indicates a general decrease in the amount of paper waste identified in the CI waste stream over the compared years. The table also indicates a general increase in the amount of plastic waste in the CI waste stream.

C&D and Industrial Waste Visual Sort Summary

SCS visually estimated the waste composition received at the MSWLF March 21, 2022 through March 25, 2022 for the following waste generator sectors:

- **Industrial** – Includes waste generated from industrial facilities and arriving in open-top containers.

- **Construction and Demolition (C&D) –** Includes waste generated as a result of demolition and/or construction activities and arriving in open-top containers.

SCS performed a total of 26 visual waste estimates for C&D and industrial waste materials. SCS visually estimated the percentage by volume of the materials in sample loads and then used industry volume to weight conversion methods to estimate the weight of the received materials. The purpose of performing the visual waste estimates was to evaluate the amount by type of material being disposed for these materials that are impractical to physically sort.

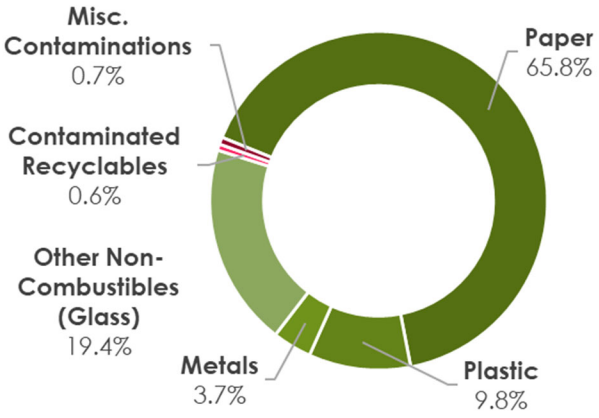
The top four categories found in the visual waste estimates included the following:

1. Wood pallets (21%)
2. Gypsum board (19%)
3. Untreated dimensional lumber (14%)
4. Roofing materials (8%)

Recyclable Material Physical Sort Summary

Recyclable materials were collected from customers that used the SDRC on March 18, 23, and 24, 2022. These recyclable materials were physically sorted on March 26, 28, and 29, 2022. The figure below illustrates the composition of the SDRC recyclables.

Figure 4. SDRC Recyclables Composition



The contamination rate of the recyclables accepted at the SDRC was approximately 1.3% which included approximately 0.6% of contaminated recyclables (e.g., food container with food residue) and 0.7% of miscellaneous contaminations (e.g., trash, Styrofoam, etc.).

Pre-Consumer Organics Waste Surveys

In addition to the sorts, pre-consumer organics waste surveys for a local grocery store and local restaurant were conducted to help gather additional information about organics management in the community. Copies of these are included in Appendix E.

2.0 INTRODUCTION AND PURPOSE

This report provides the results of the City of Salina Kansas 2022 Waste and Recyclables Characterization Study (2022 Study) as well as the methods used to obtain the data contained in this report. The waste and recyclables sort for the 2022 Study includes:

- A **physical waste sort** for residential, commercial, and institutional waste incoming to the City of Salina Municipal Solid Waste Landfill (Salina MSWLF).

- A **visual waste estimate** for industrial and construction and demolition (C&D) waste incoming to the Salina MSWLF.

- A **physical recyclables sort** for recyclables dropped off at the Salina Drive-Thru Recycling Center (SDRC).

In addition to the sorts, **pre-consumer organics waste surveys** for a local grocery store and local restaurant were conducted to help gather additional information about organics management in the community.

2.1 PURPOSE

The purpose of the 2022 Study was to provide the City with important information concerning the types of materials being disposed and recycled, and to compare historical waste study results (2004 and 1996-1997) to track possible waste disposal trends. This information is necessary to evaluate the impact of existing waste diversion programs, identify opportunities for further targeted waste diversion efforts, and develop program and policy strategies to expand waste diversion and recycling initiatives.

2.2 REPORT ORGANIZATION

The report is organized in the following sections:

- **Background and Objectives (Section 3.0) –** The background section of the report includes background information regarding waste and recycling programs and policies at the City of Salina (City). This section also includes the objectives of the study and the guiding principles used to complete all activities.

- **Waste Study Design and Methods (Sections 4.0 and 5.0) –** These sections describe the design aspects of the study including material categories, sampling plan, project timing, schedule, and description of general methodology for performing analysis calculations. Section 4.0 is for the physical waste sort and Section 5.0 is for the visual waste estimate.

- **Recyclables Study Design and Methods (Section 6.0)** – This section describes the developed methodologies including material categories, sampling plan, project timing, schedule, and description of general methodology for performing analysis calculations.

- **Results and Observations (Section 7.0) –** This section provides detailed results on the composition of waste and recyclables by generating sector. Results are presented graphically as well as in tables for a more detailed presentation of the data.

- Comparison to Previous Waste Characterization Studies (Section 8.0) – This section provides a comparison of waste composition between the 2022 Study, 2004 Study, and 1996-1997 Study.

- Pre-Consumer Organics Management Surveys (Section 9.0) – This section provides information related to the surveys conducted.

- Summary and Conclusions (Section 10.0) – This section summarizes what the City intends to do with this data.

3.0 BACKGROUND AND OBJECTIVES

The City of Salina (City) is located in Saline County, Kansas. The Salina MSWLF and the SDRC are an important part of the City's integrated solid waste management (ISWM) services provided to residents.

The City has a history of tracking the amount and types of materials of municipal solid waste (MSW) disposed at the Salina MSWLF. These efforts have helped the City better understand their waste stream, develop policies and programs that reduce waste, encourage recycling, and facilitate sustainable materials management (SMM). The City recognizes there are additional opportunities for continued waste reduction and recycling in addition to their current programs.

Over the last two decades, the City has commissioned three waste characterization studies to quantitatively and qualitatively measure waste disposal. The historical studies were conducted in 1996-1997 and 2004. The goal of the 2022 Study is to provide the City with a deeper understanding of its waste streams, enabling data-driven and evidence-based decisions that result in efficient use of resources and progress toward increased waste reduction, and allow for a comparison to historical studies. The following are guidance principals SCS Engineers (SCS) used for planning and executing the 2022 Study:

- For the waste at the Salina MSWLF:
    1. Develop a waste characterization profile (by weight) for the MSW currently disposed at the Salina MSWLF.
    2. Select waste samples bound for disposal that are statistically representative of the incoming MSW.
    3. Compare the 2022 Study to historical studies for a general understanding of how the waste streams may have changed over time.
- For the recyclables at the SDRC:
    1. Develop a recyclables characterization profile (by weight) for recyclables currently dropped off at the SDRC.
    2. Select recyclable samples that are statistically representative of the incoming recyclables.
    3. Understand the type of contamination found by the City staff.
    4. Understand the type of contamination that remains in the accepted recyclables.
- Provide data to the City for use in development of future waste reduction strategies.

The 2022 Study was completed by SCS with the assistance of the City and the staff at the Salina MSWLF, SDRC, and the Sanitation Work Group. The Kansas Department of Health and Environment (KDHE) provided grant funding to help support this project.

4.0 WASTE STUDY DESIGN AND METHODS – PHYSICAL SORT

Development of a sound study design is critical for laying the foundation of a successful project that yields reliable and statistically valid data. Careful planning went into developing the sampling plan, identifying and screening waste streams, completing field activities, and analyzing data.

This section summarizes the procedures used to identify and select specific loads for the physical waste sort, including sampling, sorting, and methods for data collection; these procedures are described in more detail in the Work Plan developed by SCS (Appendix A). These generally conform to ASTM D5231 - 92 (Revised 2016) Standard Test Method for the Determination of the Composition of Unprocessed Solid Waste.

The following sections describe the study design and methods as they relate to the physical waste sort.

4.1 WASTE GENERATING SECTORS

For the physical waste sort, SCS targeted waste generators from the following sectors:

- Residential – Encompasses MSW generated from single-family and multi-family (up to three units) residential households.

- Commercial and Institutional (CI) – Includes waste generated from commercial and institutional entities.

4.2 WASTE CATEGORIES – PHYSICAL SORT

The samples were sorted into the categories shown in Table 5; these categories were originally established in the Work Plan, and further adjusted during the development of this report based upon conversations with the City and their data needs. The waste sort group and category lists for the 2022 Study included those from the 2004 Study and eight additional categories. More information regarding the similarities and differences to the 2004 Study is provided in Section 8.0. Detailed descriptions of the categories are provided in Appendix B.

Please note, in Table 5 below:

- Category number 42 (sharps) reflects the sharps found within the residential and CI waste streams. It does not include sharps disposed at the landfill through sharps collection points throughout the City.

- Categories 35 through 36 are included in a C&D group. This is reflective of the select C&D materials (roofing materials, poured concrete, bricks, blocks, and gypsum board and plaster) found within the residential and CI waste streams only. It does not include C&D waste from C&D or industrial waste generators.

Table 5. Physical Sort - Waste Characterization Group and Category List

Group	No.	Material Category	Group	No.	Material Category
Paper	1	Corrugated cardboard and Kraft paper	**Other Combustibles**	22	Other combustibles
	2	Chipboard*	**Metal**	23	Aluminum food and beverage containers
	3	Newspaper		24	Steel & bimetal food and beverage containers
	4	High grade paper		25	Ferrous metal
	5	Magazines and other glossy paper		26	Other recyclable metal
	6	Other paper		27	Non-recyclable metal
Plastic	7	Clear HDPE containers	**Glass**	28	Clear glass containers
	8	Colored HDPE containers		29	Brown glass containers
	9	PETE bottles and jars		30	Green/blue glass containers
	10	Plastics #3 - #5 and #7*	**Other Non-Combustibles**	31	Other non-combustibles
	11	Retail shopping bags*	**Household Hazardous and Special Waste (HHW)**	32	Household hazardous and special waste (HHW)
	12	Polystyrene*	**Electronics and Batteries**	33	Electronics
	13	Plastic film*		34	Batteries
	14	Other plastic containers (non-recyclable)		41	Lithium batteries and products containing lithium ion batteries*
	15	Other plastic products*	**Construction and Demolition (C&D)**	35	Roofing materials
Yard Waste	16	Grass clippings		36	Poured concrete
	17	Leaves and other yard waste		37	Bricks
Wood	18	Wood		38	Blocks
Food Waste	19	Food waste		39	Gypsum board and Plaster
Textiles, Rubber, and Leather	20	Textiles, rubber, and leather	**Sharps**	42	Sharps*
Disposable Diapers and Sanitary Products	21	Disposable diapers and sanitary products	**Unclassifiable Fines**	40	Unclassifiable Fines

*Denotes material categories added to the 2022 Study.

4.3 TIMING AND SCHEDULE

Waste composition is impacted by numerous factors including events, holidays, and seasons. When scheduling the field activities for this study, SCS prioritized completing the fieldwork at a time when the Salina MSWLF was operating under presumed typical conditions. The physical waste sort took place March 21, 2022 through March 25, 2022.

4.4 SAMPLING PLAN

SCS developed a detailed sampling plan for the 2022 Study that aimed to proportion the number of samples obtained and characterized for each waste generating sector by the amount of waste disposed at the Salina MSWLF. This was further broken down by major haulers. A total of 50 samples were targeted for the physical waste sort.

As described in the Work Plan located in Appendix A, SCS evaluated historical tonnage data to determine how many samples should be collected from each generating category and each hauler. The evaluation determined that for these generator categories, approximately 74% of disposed tonnage was from the residential category, and approximately 26% was from the commercial and institutional category. As a result, in order to represent the waste for these categories in a total of 50 samples, 37 samples were analyzed from the residential generating sector, and 13 samples were analyzed from the commercial and institutional generating sector. This was further broken down into a target number of samples to be collected from each major hauler. These targets were generally met, with a couple exceptions, as shown in Table 6. The exceptions were generally due to absence of targeted waste receipt or timing of the arrival of the hauler to the Salina MSWLF.

Table 6. Number of Samples Collected by Hauler – Residential & CI

Generating Sector	Major Hauler	Sample Collection Targets	Actual Samples Collected
Residential (RES)	City of Salina	14	15
	Salina Waste Systems	11	10
	Hometown Disposal	7	7
	Ottawa County	2	2
	Sletcha	2	2
	Lincoln	1	1
	TOTAL	**37**	**37**
Commercial and Institutional (CI)	Hometown Disposal	8	8
	Salina Waste Systems	4	4
	Sletcha	1	1
	TOTAL	**13**	**13**

4.5 SAMPLE SELECTION

Each sample selected weighed between 200 to 250 pounds. SCS staff were responsible for identifying vehicles for sampling, screening loads, and obtaining the sample. The sampling procedure targeted random and representative waste materials and remained consistent throughout the study. The following steps were completed to obtain each waste sample for the physical sort:

1. Truck Selection – The SCS Sampling Manager used the sampling plan (discussed in Section 4.4 and in Work Plan in Appendix A) and coordinated with Salina MSWLF facility staff as needed to identify trucks delivering waste to the Salina MSWLF from targeted haulers. Details of the waste delivery were recorded, including waste sector, vehicle type, approximate time of material delivery, and weather conditions, to track samples and confirm the proper number of samples were obtained.

2. Driver Interview – When a truck carrying waste from the targeted hauler and waste sector was identified, SCS staff briefly interviewed the driver to confirm the waste origin and collection location of the waste to confirm it represented the targeted waste generating sector. If SCS staff concluded the load was not representative, it was not sampled. If SCS concluded the load was representative, the hauler was directed to tip the waste load in a designated area.

3. Sample Screening – SCS personnel then inspected the load by walking around the material and noting any unusual characteristics or material present.

4. Sample Acquisition – After a waste load was visually inspected and deemed suitable for sorting, SCS personnel visually divided the waste pile into six equally sized segments and used a random number generator table (1-6) to select the location of where the sample should be collected. Then, an equipment operator collected the identified segment attempting to obtain 200 to 250-pounds of waste. The equipment operator then transported the sample to the maintenance building where the waste sort was taking place. The waste was then placed into large garbage cans and weighed until the appropriate amount of material was obtained. The process of acquiring the sample did not alter the apparent composition.

5. Sample Identification and Recording - Each sample was then assigned a unique identifying number and recorded, along with other sample information (i.e., hauler, truck number, weather conditions, date/time collected, unusual characteristics, etc.).

4.6 PHYSICAL WASTE SORTING

Following the sample selection, the waste was physically sorted. The physical waste sorting process was led by experienced SCS personnel with the support of a six to ten-person crew. A consistent, methodical, statistically valid sorting program that was repeated for each sample was fundamental for this task. The SCS Sorting Manager along with SCS personnel were actively conducting quality

control measures to ensure materials were sorted and weighed properly. The basic procedures and objectives for waste sorting were identical for each waste sample physically sorted as described in the systematic approach in Table 7 below.

Table 7. Physical Waste Characterization Protocol

Step #	Action
1	SCS staff worked with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers were properly set.
2	Samples were transferred from the containers to the sort table. SCS staff took pictures of the samples before sorting activities began. Large or heavy items were visually examined and placed directly into the appropriate container for subsequent weighing. If the item was too large for the container, it was individually weighed and recorded by SCS staff.
3	Plastic bags containing materials were opened, materials were manually segregated according to the sort group and category list (Table 5 and Appendix B), and placed in the appropriate container. This process continued until the remaining materials for the sample had a particle size of approximately 2 inches or less as visually estimated by the SCS Sorting Manager. SCS staff oversaw operations and provided continual quality control of the sorted material categories.
4	SCS staff weighed individual containers with the segregated materials and performed additional quality control measures to ensure the purity of each sorted material category. Weights were recorded on the material sample data form to the nearest 0.05 pound. Tare weights of the containers were obtained and recorded prior to the start of each day of the waste sort or as deemed necessary by the SCS Sorting Manager.
5	While materials were weighed, a visual estimate of the small items (approximately 2 inches or less) remaining on the sort table was conducted to understand the waste within waste Category 40, Unidentifiable Fines. Based on judgement of the SCS staff, the composition of the remaining small items was visually estimated. This material was then collected, placed in the "Unidentifiable Fines" waste category, and weighed. A summary of the composition by visual estimate of the unidentifiable fines category is included at the end of Table D1.
6	Once weights were recorded, containers were emptied into a waste container or packer truck. City staff was then responsible for emptying the waste container or packer truck at the working face as necessary.

4.7 DATA RECORDING AND ANALYSIS

SCS followed a rigid protocol for collecting, recording, and safeguarding data for the study. SCS collected detailed information on the waste samples in the field on pre-prepared forms (see Work Plan in Appendix A). This information is important to document for each sample and can be useful to consult if unusual composition data is obtained. Data recording occurred at key times in the field as follows:

- Sample Acquisition – Detailed information such as hauler name, vehicle type, sector type, date/time of waste delivery, and weather conditions were recorded on the waste sample record. This information was briefly confirmed with the driver for accuracy. This waste sample record was transferred with the waste sample to the sorting area.

- Sample Sorting and Weights – Upon characterization of each waste sample, the Sorting Manager used the waste sample record to record the weights of each sorted material category along with the unique container identifier that was used during data analysis to subtract the container tare weight from the combined container/material weight to obtain the net weight of the material. The waste sample record was also used to record information or special notes about the waste sample or material categories sorted for the sample. When all data for a waste sample was recorded, the SCS Sorting Manager took a picture of the waste sample record in order to provide digital back-up of the data in case the physical form were to become damaged or lost. Data recorded on each sheet was reviewed for completeness at the end of each day.

Daily quality control reviews were performed by SCS personnel to ensure sample targets were met and the daily tare weights were obtained for sort containers.

Data from the field forms was transcribed to master spreadsheets setup specifically for the City of Salina. The raw data was recorded and standard statistical analysis was completed. The analysis included the following calculations:

- Percent Composition – Conversion of net weights of each material for each sample (after subtracting container weight) to a percent composition based on the total weight of the sample.
- Mean Percent Composition by Waste Sector – Aggregation of all sample data by waste sector.
- Standard Deviation of Composition – Calculated the standard deviation to determine the variance compared to the mean percent composition.
- Confidence Intervals – Calculated the approximate 90 percent confidence interval.

5.0 WASTE STUDY DESIGN AND METHODS - VISUAL ESTIMATE

As described in Section 4.0, the development of study is critical and similar planning went into the development of the visual estimate portion of the 2022 Study. This section summarizes the procedures used for the visual estimate to identify and select specific loads for sampling, sorting, and methods for data collection; these procedures are described in more detail in the Work Plan developed by SCS prior to initiating sort activities (Appendix A).

Due to the size, material types, and bulkiness, visual estimates were deployed in lieu of physical sorts for the industrial or C&D waste sectors. The Work Plan (Appendix A) specifies that loads entirely consisting of concrete, or containing special waste acceptance number (SWAN) waste, were to be included with the visual estimate as relevant.

5.1 WASTE GENERATING SECTORS

For the visual waste estimate, SCS targeted waste generators from the following sectors:

- Industrial – Includes waste generated from industrial facilities and arriving in open-top containers.

- Construction and Demolition (C&D) – Includes waste generated as a result of demolition and/or construction activities and arriving in open-top containers.

5.2 WASTE CATEGORIES – VISUAL ESTIMATE

The City's historical waste sorts utilized the same waste categories for the physical sort as the visual sort. SCS worked with City staff to develop a new set of categories that focus on the expected waste streams from the target waste sectors. The waste categories used for the visual estimate for the 2022 Study are new and shown on Table 8 below.

Table 8. Visual Estimate - Waste Characterization Category List

No.	Material Category	No.	Material Category
1	Concrete	12	Untreated wood
2	Brick	13	Untreated dimensional lumber
3	Dirt/Sand	14	Wood pallets
4	Roofing materials	15	Gypsum board
5	Yard waste	16	Composite metal (wires)
6	Carpet	17	Appliances
7	Glass	18	Ferrous scrap
8	Insulation	19	Non-ferrous scrap
9	Plastic piping	20	Bulky Items
10	Plastic products	21	Cardboard
11	Painted/stained wood	22	Other

5.3 TIMING AND SCHEDULE

The timing for the visual estimate was selected with the same criteria as the physical sort described in Section 4.3. The visual estimate of the waste was completed over the same 5-day period as the physical waste sort, March 21, 2022 through March 25, 2022.

5.4 SAMPLING PLAN

SCS developed a detailed sampling plan for the study that aimed to proportion the number of samples obtained and characterized for each waste generating sector by the amount of waste disposed at the Salina MSWLF. This was further broken down by major haulers. A total of 25 samples were targeted for the visual estimate.

As described in the Work Plan (Appendix A), SCS evaluated historical tonnage data to set targets for the number of samples to be analyzed from each hauler for these waste sectors; these targets were generally met, with a few exceptions as shown in Table 9.

Table 9. Number of Samples Analyzed from Each Hauler – C&D and Industrial

Major Hauler	Sample Analysis Targets	Actual Samples Analyzed
Salina Waste Systems	10	11
Hometown Disposal	6	7
American Roll-off	2	2
Salina Tree	2	3
Bird Construction*	2	0
Ponton Construction	2	2
Sletcha	1	1
TOTAL	**25**	**26**

* Bird construction trucks did not come through during the week of the waste sort. Therefore, additional samples were analyzed from other major haulers to compensate.

5.5 SAMPLE SELECTION

SCS staff were responsible for identifying vehicles for sampling, screening loads, and obtaining the sample. The sampling procedure targeted random and representative waste materials and remained consistent throughout the study. The follow steps were completed to obtain each waste sample for the visual estimate:

1. Truck Selection – The SCS Sampling Manager used the sampling plan (discussed in Section 5.4 and in the Work Plan in Appendix A) and coordinated with Salina MSWLF facility staff as needed to identify trucks delivering waste to the landfill from targeted haulers. Details of the waste delivery were recorded, including waste sector, vehicle type, approximate time of material delivery, and weather conditions, to track samples and confirm the proper number of samples were obtained.

2. Driver Interview – When a truck carrying waste from the targeted hauler and waste sector was identified, SCS staff briefly interviewed the driver to confirm the waste origin and collection location of the waste to confirm it represented the targeted waste generating sector. If SCS staff concluded the load was not representative, it was not sampled. If SCS concluded the load was representative, the hauler was directed to tip the waste load in a designated area.

3. Sample Screening – SCS personnel then inspected the load by walking around the material and noting any unusual characteristics or material present. SCS personnel did not manually handle the visually estimated waste loads. Haulers were able to sufficiently spread out the waste for a reliable visual characterization.

4. Sample Identification and Recording – Each sample was then assigned a unique identifying number which was recorded, along with other sample information (hauler, truck number, weather conditions, date/time collected, unusual characteristics, etc.).

5.6 VISUAL WASTE ESTIMATION

Following the sample selection, waste composition was visually estimated by SCS personnel. SCS personnel estimated the volume of specific material types in each load. The protocol is described in Table 10.

Table 10. Visual Waste Estimation Protocol

Step #	Action
1	SCS staff interviewed the driver of the selected sample load and recorded key information for each load on the field sampling form. This information included waste category, origin of waste, approximate volume of the container, and weight of load if the vehicle was tared with Salina MSWLF and the driver had the ticket available.
2	Once the driver dumped the load onto the ground, SCS staff walked around the load (to the extent possible) and indicated on the sampling form what material types were present in the load.
3	Beginning with the largest major material type present by volume, SCS staff began to estimate the volumetric percentage of the material type and recorded it on the form. This process was repeated for the next most common material type, and so forth, until the volumetric percentage of each material type had been estimated. SCS staff then rechecked to make sure the percentage estimates for the major material classes added up to 100 percent.
4	SCS staff took photos of the sample load.
5	SCS staff communicated with Salina MSWLF staff that the visual evaluation of the sample load was completed and the material was incorporated into the working face.

5.7 DATA RECORDING AND ANALYSIS

Data collected during the visual estimate was recorded on field forms (see Work Plan in Appendix A). Daily quality control reviews were performed by SCS personnel to ensure sample targets were met.

Data from the field forms was transcribed to master spreadsheets setup specifically for the City of Salina. The raw data was recorded and standard statistical analysis was completed. The analysis included the following calculations:

- Convert to Percent by Weight - Conversion of percent by volume to percent by weight utilizing industry accepted volume to weight conversions for material categories.
- Mean Percent Composition by Waste Sector – Aggregation of all sample data by waste sector.

Due to the approximations typical of visual estimates, standard deviation and confidence intervals were not calculated.

6.0 RECYCLABLES STUDY DESIGN AND METHODS

This section summarizes the procedures used for the physical recyclables sort to identify and select specific loads for sampling, sorting, and methods for data collection; these procedures are described in more detail in the Work Plan developed by SCS prior to initiating sort activities (Appendix A).

The following sections describe the study design and methods as they relate to the physical recyclables sort.

6.1 RECYCLABLES SECTORS

Customers drop off their recyclables at the SDRC. While unloading, the SDRC staff visually screen the incoming recyclables for non-recyclable material or other contaminates. If non-acceptable materials are found during customer unloading, this material is rejected and given back to the customer with information as to why a material is not accepted at the SDRC and other options for disposal or diversion.

For the purposes of this study, non-acceptable materials found during customer unloading were collected and set aside for sorting, separate from other collected recyclables. This information was relayed to customers when non-acceptable materials were found.

As a result, the recyclables were broken out into two sectors for the recyclables sort:

- Accepted Recyclables – Includes the material the SDRC staff accepted and sends to the recycling center.
- Non-Acceptable Material – Includes the material the SDRC staff rejects from customers.

6.2 RECYCLABLES CATEGORIES

The 2004 Study did not perform a sort of recyclables; therefore, SCS worked with City staff to develop categories of recyclables to be included in the 2022 Study (Table 11). Detailed descriptions of the categories are provided in Appendix C.

Table 11. 2022 Salina Recyclables Characterization Group and Category List

Group	No.	Material Category	Group	No.	Material Category
Paper	1R	Uncoated corrugated cardboard & pasteboard	Contaminated Recyclables	17R	Contaminated paper
	2R	Chipboard		18R	Contaminated shredded paper
	3R	Newspaper		19R	Contaminated plastic
	4R	Mixed paper		20R	Contaminated metals
	5R	White office paper		21R	Contaminated other non-combustibles
	6R	Shredded Paper		34R	Contaminated chipboard
Plastic	7R	#1 PET bottles and jars		35R	Contaminated OCC
	8R	#2 Clear HDPE containers	Miscellaneous Contamination	22R	Organic waste
	9R	#2 Colored HDPE containers		23R	Manufactured products
	10R	#3 - #7 Plastics		24R	Aseptic containers
Metals	11R	Aluminum		25R	Medical waste
	12R	Steel		26R	Aerosol cans
	13R	Tin		27R	Refuse
Other Non-combustible	14R	Clear glass containers		28R	Retail plastic bags
	15R	Brown glass containers		29R	Plastic film and wrapping
	16R	Green/blue glass containers		30R	Household chemical containers with cleaning agent remaining
				31R	Plastic plant containers
				32R	Rigid containers
				33R	Polystyrene

These categories were used for both the accepted recyclables and non-acceptable materials. Category numbers 1R through 16R are related to recyclables (paper, plastic, metals, glass). The remaining category numbers 17R through 35R included various contaminates broken into either contaminated recyclables (e.g., recyclable food container with food residue) or miscellaneous contaminants (e.g., trash, Styrofoam, etc.).

6.3 TIMING AND SCHEDULE

The same considerations for the waste sort were also considered for the recyclables sort. It was determined to collect the recyclables around the same time as the waste sort activities occurred in order to understand the types of recyclables being generated during approximately the same time as the waste was generated. Recyclables at the SDRC were collected over three days on March 18, March 23, and March 24, 2022.

6.4 SAMPLING PLAN

Based on a historical review of materials accepted at the SDRC, it was determined at least 48 cubic yards would be suitable for a representative sample of recyclables. In order to obtain at least a 48 cubic yard sample over three days, at least 16 cubic yards, which equated to approximately the first 75 customers each day, were collected each of the 3 days. During material collection, acceptable materials were accepted along with non-acceptable materials, which were segregated from the acceptable materials as described in Section 6.1.

6.5 SAMPLE SELECTION

During the sample collection period performed by the SDRC, information such as date of sample collection, start and end time of sample collection period, number of customers, and notes concerning any unique loads was recorded on the SDRC Recyclables Sample Collection form.

After collection at the SDRC, sample materials were transported to the maintenance building at the Salina MSWLF and placed on a tarp separate from the waste sort area. Non-acceptable materials received during the collection period were kept separate from other recyclable materials. Shredded paper received during the collection period was also kept separate from other recyclable materials. The sample selection for the recyclables generally included:

1. Collection at the SDRC and Transport to Sorting Location – Accepted recyclables and non-acceptable material were collected at the SDRC for the sort and were transported to the maintenance building at the Salina MSWLF by City personnel. Material was then dumped onto a tarp on the maintenance building floor.

2. Sample Screening – Once the materials were dumped onto the tarp, SCS personnel visually observed the materials.

3. Sample Acquisition – For each sample, SCS filled approximately five 90-gallon containers with recyclables. The recyclables were visually estimated to be representative of the total recyclables on the tarp. The process of acquiring the sample did not alter the apparent composition.

4. Sample Identification and Recording – Each sample was then assigned a unique identifying number which was recorded, along with other sample information.

Shredded paper was received in bags and was recorded independent of the other materials. The non-acceptable materials were sorted separate of the other materials.

6.6 PHYSICAL RECYCLABLES SORT

The physical sort for the recyclables was completed March 26, 28, and 29, 2022.

6.6.1 Accepted Recyclables Sort

SCS and City personnel sorted through 24 recyclable samples each consisting of approximately 2 CY of material plus shredded paper. The recyclables sorting process was led by experienced SCS personnel with the support of a six to ten-person crew. SCS personnel were actively conducting quality control measures to ensure materials were sorted and weighed properly. The procedures used for recyclables sorting are provided in Table 12.

Table 12. Recyclable Characterization Protocol

Step #	Action
1	SCS staff worked with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers were properly set.
2	The sample, consisting of at least 2 CY of materials, was loaded into containers to obtain the desired volume, then unloaded on the recycling sort table. Large or heavy items were visually examined and placed directly into the appropriate container for subsequent weighing. If the item was too large for the container, it was individually weighed and recorded by SCS staff.
3	Materials were loose and not in plastic bags. Materials were manually segregated according to the sort group and category list (Table 11), and placed in the appropriate container. This process continued until the recyclable material sample was characterized down to a particle size of approximately 2 inches or less. SCS staff oversaw operations and provided continual quality control of the sorted material categories.
4	SCS staff weighed individual containers with the segregated materials and performed additional quality control measures to ensure the purity of each sorted material category. Weights were recorded to the nearest 0.05 pound on the material sample data form. Tare weights of the containers were recorded prior to the start of the sort
5	Once materials were weighed and recorded, containers were emptied into a rear-load truck. City staff were responsible for delivering sorted recyclables to the processor as necessary as well as ensuring a rear-load truck was available for sorted recyclable materials.

6.6.2 Non-Acceptable Materials Sort

The materials typically rejected from the SDRC were also sorted. This sorting process was led by experienced SCS personnel with the support of a six to ten-person crew. SCS personnel were actively conducting quality control measures to ensure materials were sorted and weighed properly. The procedures used for non-acceptable materials sorting are provided in Table 13.

Table 13. Non-Acceptable Materials Characterization Protocol

Step #	Action
1	SCS staff worked with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers were properly set.
2	Materials were transferred from the containers to the sort table. Large or heavy items were visually examined and placed directly into the appropriate container for subsequent weighing. If the item was too large for the container, it was individually weighed and recorded by SCS staff.
3	Plastic bags (if present) containing materials were opened, materials were manually segregated according to the sort group and category list (Table 11), and placed in the appropriate container. This process continued until the remaining materials had a particle size of approximately 2 inches or less. SCS staff oversaw operations and provided continual quality control of the sorted material categories.
4	SCS staff weighed individual containers with the segregated materials and performed additional quality control measures to ensure the purity of each sorted material category. Weights were recorded to the nearest 0.05 pound on the material sample data form. Tare weights of the containers were recorded prior to the start of the sort.
5	Once materials were weighed and recorded, containers were emptied into a waste container. City staff was responsible for emptying the waste container as necessary and ensuring a waste container was available to accept sorted waste materials.

6.7 DATA RECORDING AND ANALYSIS

Data collected during the recyclables sort was recorded on the field forms (see Work Plan in Appendix A). Daily quality control reviews were performed by SCS personnel to ensure sample targets were met and daily tare weights were obtained for sort containers.

Data from the field forms was transcribed to master spreadsheets setup specifically for the City of Salina. The raw data was recorded and standard statistical analysis was completed. The analysis included the following calculations:

- Percent Composition – Conversion of net weights of each material for each sample (after subtracting container weight) to a percent composition based on the total weight of the sample.
- Mean Percent Composition by Category – Aggregation of all sample data by recyclables category.
- Standard Deviation of Composition – Calculated the standard deviation to determine the variance compared to the mean percent composition.
- Confidence Intervals – Calculated the approximate 90 percent confidence interval.

7.0 RESULTS AND OBSERVATIONS

This section provides detailed results of the 2022 Study. The results presented in this section include:

- **Physical Waste Sort** Composition for Residential and CI Waste (Section 7.1).
- **Visual Waste Estimate** Composition for C&D and Industrial (Section 7.2).
- **Physical Recyclables Sort** Composition for Accepted and Non-Acceptable Materials (Section 7.3).

7.1 PHYSICAL SORT WASTE COMPOSITION

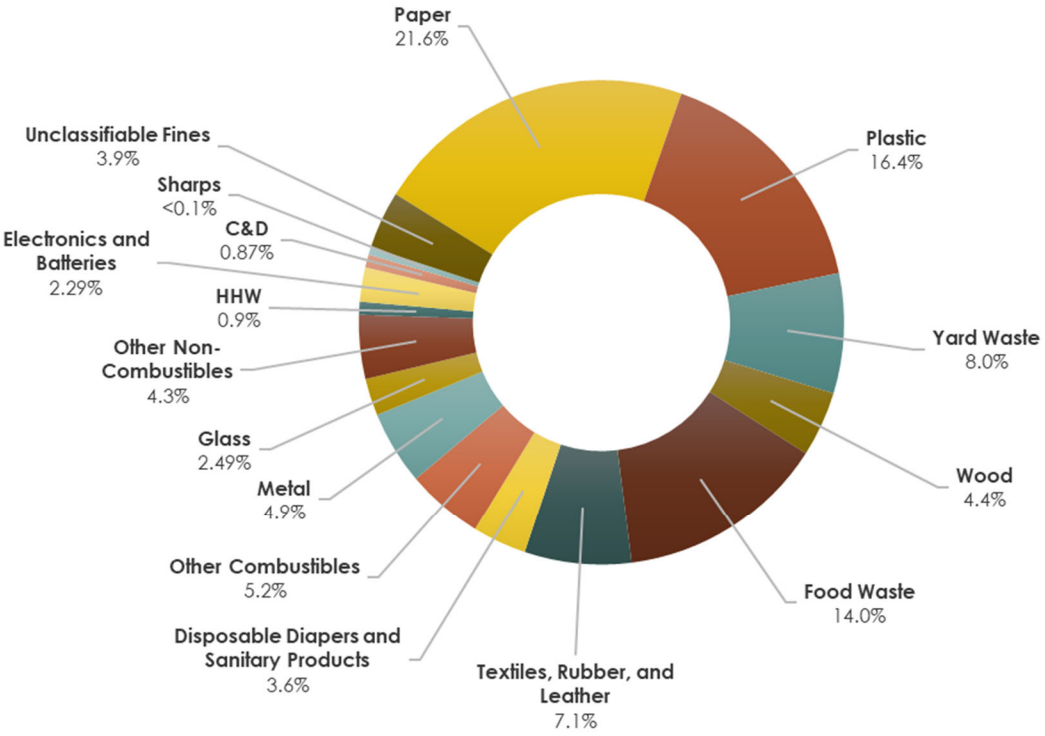
The physical waste sort included a hand sort of waste received from residential and CI waste generators as described in Section 4.0. Results are summarized in the following sections for combined residential and CI waste (Section 7.1.1), residential only waste for both City and non-City routes (Section 7.1.2), and CI only waste (Section 7.1.3).

7.1.1 Residential & CI Waste Composition Combined

Figure 5 presents a summary of the sixteen material groups that make up the composition of waste from the physical sort which included the residential waste (from both City and non-City customers), and CI waste.

Note this waste composition includes waste from the residential and CI generating sectors only; other generating sectors were captured via visual estimation (discussed in Section 5.3, results in Section 7.2).

Figure 5. Residential and CI Waste Composition (Physical Sort)



The top three material groups make up 52% of the waste stream. The largest percentage is paper at 21.6%; second is plastic at 16.4%; third is food waste at 14.0%.

Table D1 in Appendix D provides a detailed profile of the residential and CI waste delivered to the Salina MSWLF, which includes all 42 individual material categories. For each group and category, the mean percent, standard deviation, and ninety-percent confidence intervals are listed. The composition of unclassifiable fines (smaller than 2-inches) was visually estimated and is also included in Table D1 in Appendix D.

Table 14 summarizes the top five material groups that comprise the largest portions of the residential and CI combined waste stream.

Table 14. Top Five Material Groups of Combined Residential and CI Waste

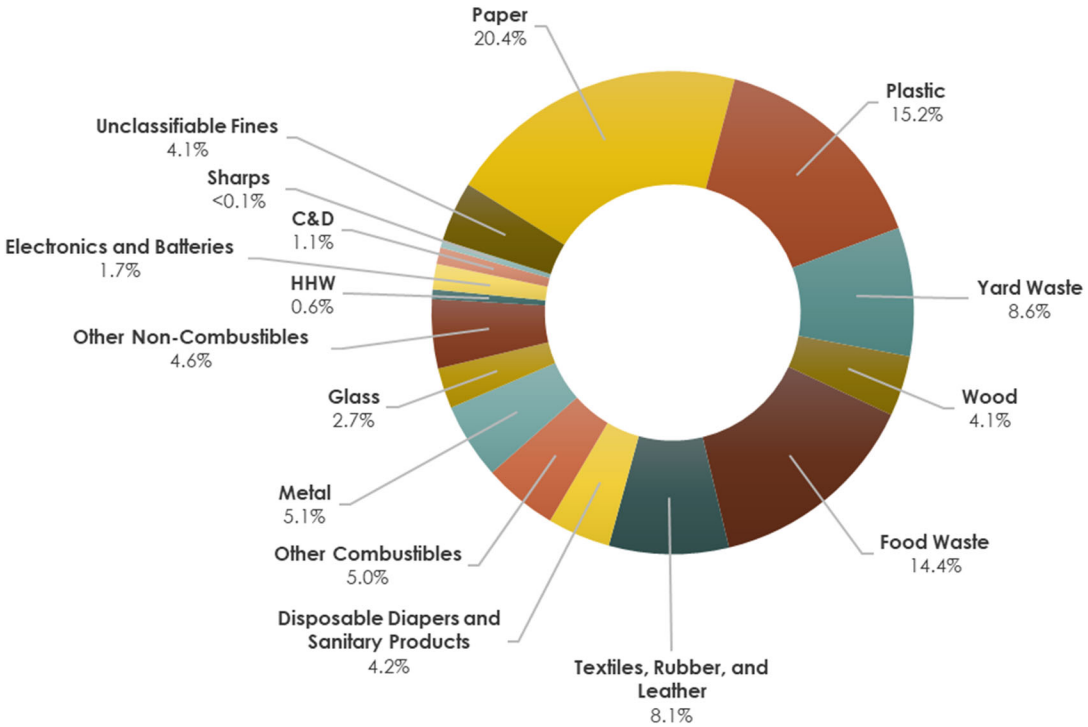
Rank No.	Material Group*	Largest Material Categories within Group*
1	**Paper** 21.6%	**Corrugated cardboard and kraft paper** (9.2%) **Other paper** (6.0%)
2	**Plastic** 16.4%	**Plastic film** (6.1%) **Other plastic products** (2.2%)
3	**Food Waste** 14.0%	**Food waste** (14.0%)
4	**Yard Waste** 8.0%	**Leaves and other yard waste** (8.0%)
5	**Textiles, Rubber, and Leather** 7.1%	**Textiles, rubber, and leather** (7.1%)
TOTAL	**67.1%**	

* Percentages based off of 50 hand-sorted waste samples.

7.1.2 Residential Waste Composition

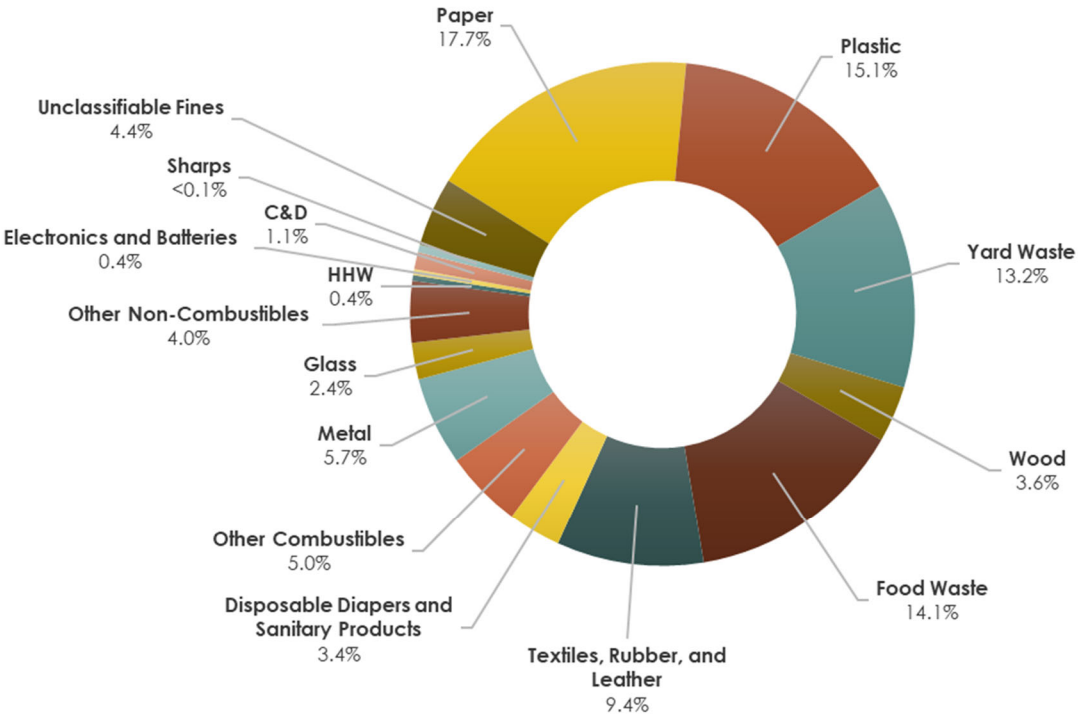
Figure 6 presents a summary of the sixteen material groups that make up the composition of waste from the residential component of the physical waste sort for the combined City and Non-City Customers.

Figure 6. Residential Waste Composition (City and Non-City Routes)



Of the 37 residential waste samples sorted, 15 samples were from City of Salina collection routes. Figure 7 presents a summary of the sixteen material groups that make up the composition of waste from the residential component of the physical sort for the City routes (this excludes the non-city customers).

Figure 7. Residential Waste Composition City Routes



The remaining 22 residential waste samples sorted were from non-city collection routes. Figure 8 presents a summary of the sixteen material groups that make up the composition of waste from the residential component of the physical waste sort for the non-city customers (this excludes the waste from the City's routes).

Figure 8. Residential Waste Composition Non-City Routes

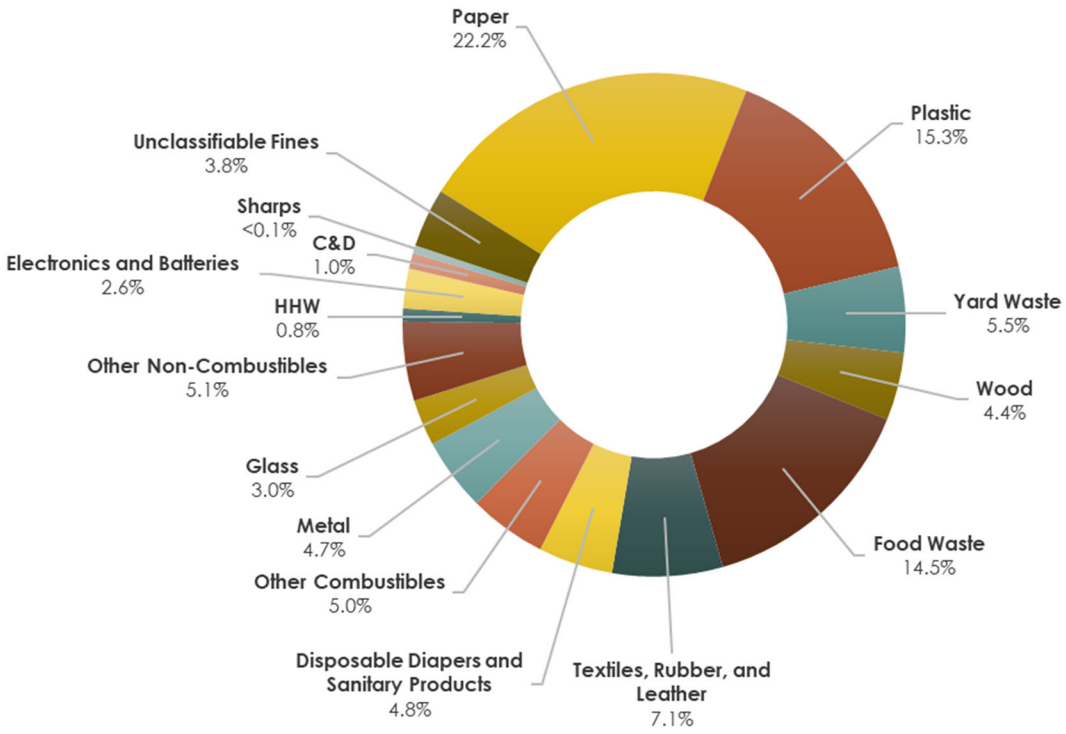


Table 15 summarizes the top five material groups that comprise the largest portions of the residential waste stream for the combined and individual City and Non-City Routes.

Table 15. Top Five Material Groups Comprising Residential Waste

Rank No.	Residential [1] **City and Non-City Routes**	Residential [2] **City Routes Only**	Residential [3] **Non-City Routes Only**
1	**Paper** 20.4%	**Paper** 17.7%	**Paper** 22.2%
2	**Plastic** 15.2%	**Plastic** 15.1%	**Plastic** 15.3%
3	**Food Waste** 14.4%	**Food Waste** 14.1%	**Food Waste** 14.5%
4	**Yard Waste** 8.6%	**Yard Waste** 13.2%	**Textiles, Rubber, and Leather** 7.1%
5	**Textiles, Rubber, and Leather** 8.1%	**Textiles, Rubber, and Leather** 9.4%	**Yard Waste** 5.5%
TOTAL	**66.7%**	**69.5%**	**64.6%**

1. Percentages based off of 37 hand-sorted waste samples.
2. Percentages based off of 15 hand-sorted waste samples.
3. Percentages based off of 22 hand-sorted waste samples.

Review of the results from the waste samples collected from the city versus non-city haul routes are generally consistent with the following exceptions:

- Yard waste averages at approximately 8% of the total weight for the residential waste samples. For the residential city haul routes, yard waste was 13.2% compared to the non-city routes at 5.5%. There are several factors that could explain these differences, such as seasonal weather, availability to dispose or stockpile yard waste, and yard waste management habits of the residents.

- Paper averages at approximately 20% of the total weight of the residential waste samples. For the residential city haul routes, paper was 17.7% compared to the non-city routes at 22.2%. The approximately 4.5% difference is predominately found in the corrugated cardboard and kraft paper category. One possible explanation for this could be accessibility of diversion through the use of the SDRC for city residents.

Table D2 in Appendix D provides a detailed profile of the residential waste from both City and Non-City Customers delivered to the Salina MSWLF, which includes all 42 individual material categories. For each category the mean percent, standard deviation, and ninety-percent confidence intervals are listed.

7.1.3 CI Waste Composition

Figure 9 provides a summary of the sixteen material groups that comprise commercial and institutional waste delivered to the Salina MSWLF. Data is provided for each group as a percentage of the total.

Figure 9. CI Waste Composition

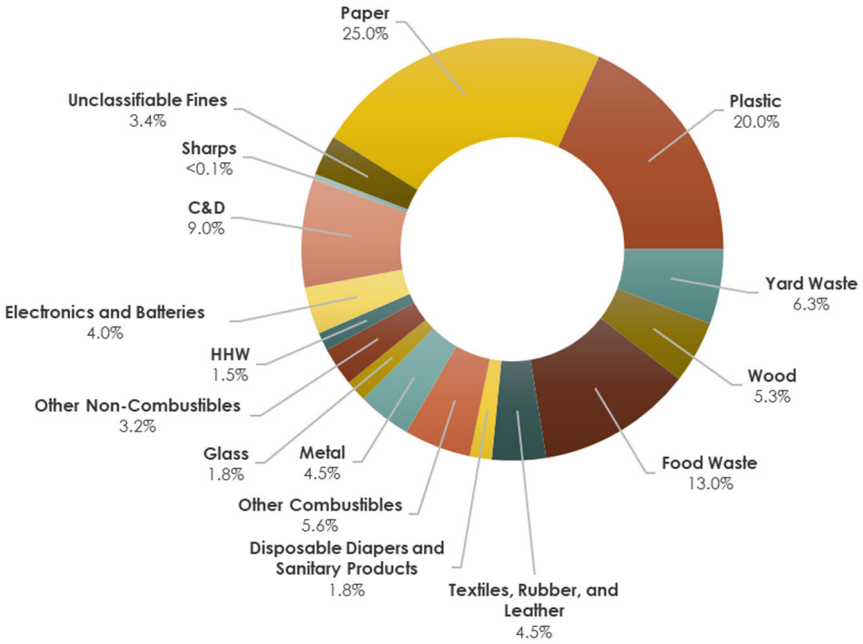


Table 16 summarizes the top five material groups that comprise the largest portions of the overall CI waste stream.

Table 16. Top Five Material Groups Comprising CI Waste

Rank No.	CI*
1	**Paper** 25.0%
2	**Plastic** 20.0%
3	**Food Waste** 13.0%
4	**C&D** 9.0%
5	**Yard Waste** 6.3%
TOTAL	**73.3%**

* Overall CI percentages based off of 13 hand-sorted waste samples.

Table D3 in Appendix D provides a detailed profile of the CI waste delivered to the Salina MSWLF, which includes all 42 individual material categories. For each category, the sorted weight, mean percent, standard deviation, and ninety-percent confidence intervals are listed.

7.2 VISUAL WASTE COMPOSITION ESTIMATES – C&D AND INDUSTRIAL

As detailed in Section 5.0, C&D and industrial wastes were visually characterized only (not hand sorted) and weights were estimated. Data provided is an estimation of what was observed in the field during the time of the 2022 Study.

Figure 10 below and Table D4 in Appendix D provide a summary of the 22 material categories that comprise the waste from C&D and industrial waste generating sectors. Data is provided for each category as a percentage of the total.

Initial observations include:

- Wood pallets (~21%) and untreated dimensional lumber (~14%) made up approximately 35% of the waste samples.
- Gypsum made up approximately 19% of the waste samples.

Figure 10. Visual Waste Composition Estimates – C&D & Industrial Waste

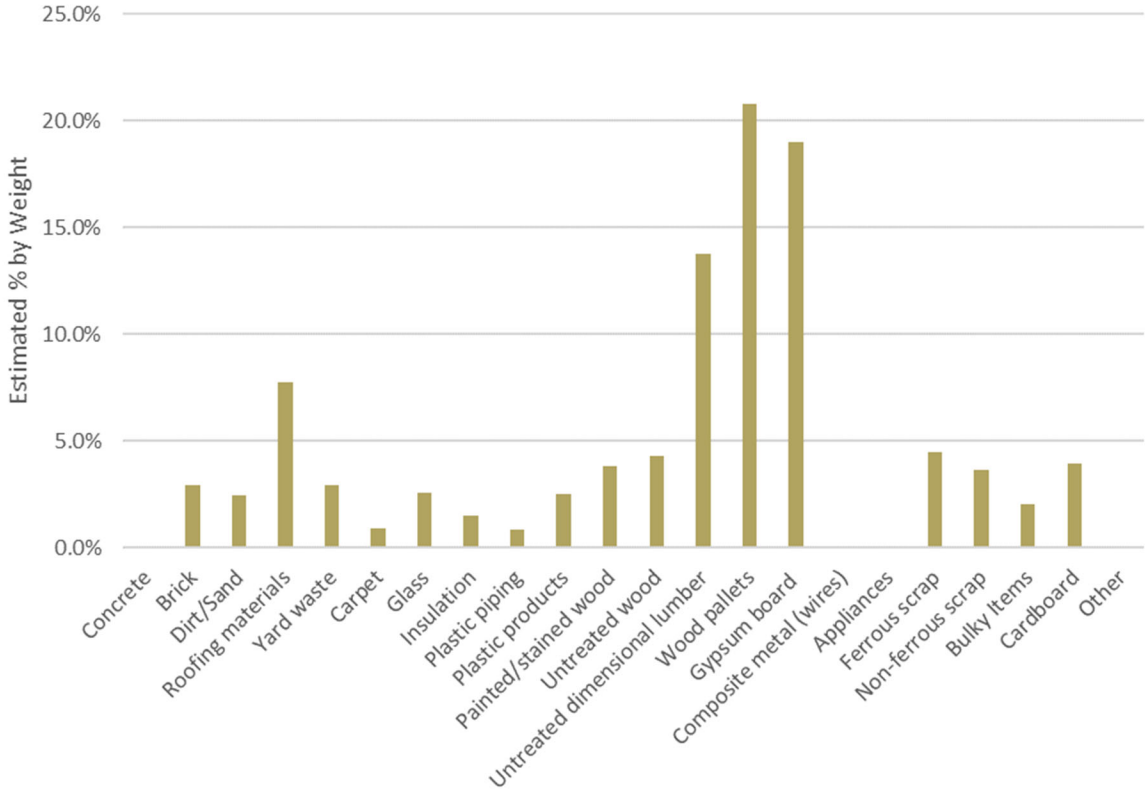


Table 17 shows the top four material categories observed (by estimated weight) from the visual waste estimate.

Table 17. Top Four Material Categories from Visual Waste Estimate

Rank No.	C&D& Industrial Waste
1	**Wood Pallets** 21%
2	**Gypsum Board** 19%
3	**Untreated Dimensional Lumber** 14%
4	**Roofing Materials** 8%
TOTAL	**62%**

7.3 RECYCLABLES COMPOSITION

The physical recyclables sort include a hand sort of both the accepted materials and non-accepted materials as described in Section 6.0.

As detailed in Section 6.0, the recyclables were physically sorted and included physical sorts of both the accepted materials and non-acceptable materials received at the SDRC. Results are summarized in the following sections.

7.3.1 Accepted Materials

Figure 11 (next page) provides a summary of the six material groups, including contaminated recyclables and miscellaneous contaminations, which comprise the overall recyclables delivered to the SDRC. Data is provided for each category as a percentage of the total.

Observations include:

- The contamination rate of the recyclables accepted at the SDRC was approximately 1.3%. This includes contaminated recyclables (e.g. food container with food residue) and miscellaneous contaminates (e.g. trash, Styrofoam, etc.)

- Paper products made up the majority of the recyclables stream at 65.8% of which 26.4% was uncoated corrugated cardboard and pasteboard and 20.7% was mixed paper.

- Glass was the next highest material category at 19.4%.

Figure 11. Recyclables Composition

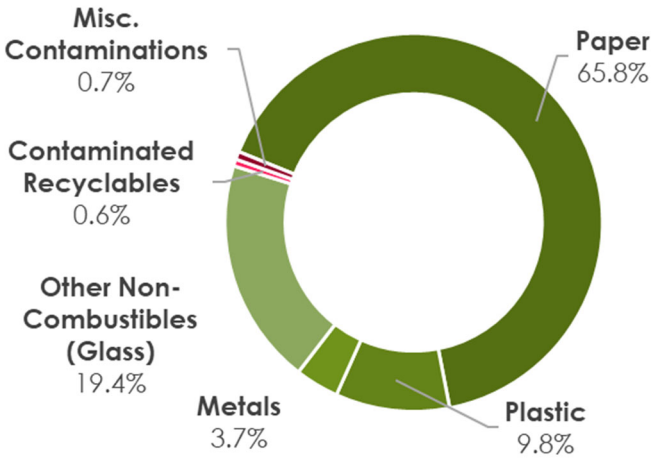


Figure 12 shows the recyclables versus contaminants found and Figure 13 shows the breakdown of contaminants identified in the accepted recyclables samples. As indicated, the overall contaminates comprised 1.3 percent of the overall recyclables sorted. For comparison, the national average inbound recycling contamination rate is approximately 17 percent (The Recycling Partnership, 2020).

Figure 12. Recyclables vs. Contaminants

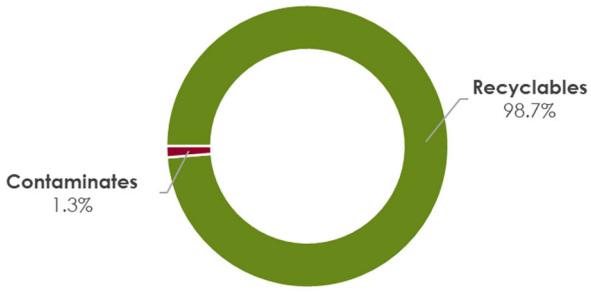


Figure 13. Contaminant Breakdown

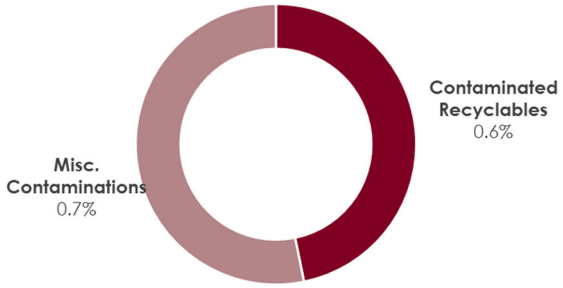


Table D5 in Appendix D provides a detailed profile of the accepted recyclables delivered to the SDRC. Data is provided for each category as a percentage of the total. For each category, the sorted weight, mean percent, standard deviation, and ninety-percent confidence intervals are listed.

7.3.2 Non-Acceptable Materials

The SDRC provided 37.20 pounds of materials deemed non-acceptable obtained from customers during the study collection period. Figure 14 below shows the composition of the rejected materials from the SDRC. Contaminants made up 83.7% of the non-acceptable materials. Of the 83.7% of contaminants, 47.7% was miscellaneous contaminants and 36.0% was contaminated recyclables. The 47.7% of miscellaneous contaminants were primarily refuse (26.9%), plastic film and wrapping (7.8%), and aseptic containers (7.5%). The 36.0% contaminated recyclables were predominately contaminated plastic (17.7%) and contaminated metals (9.4%). The top four categories of contaminants is shown in Table 18.

Figure 14. Non-acceptable Materials Composition

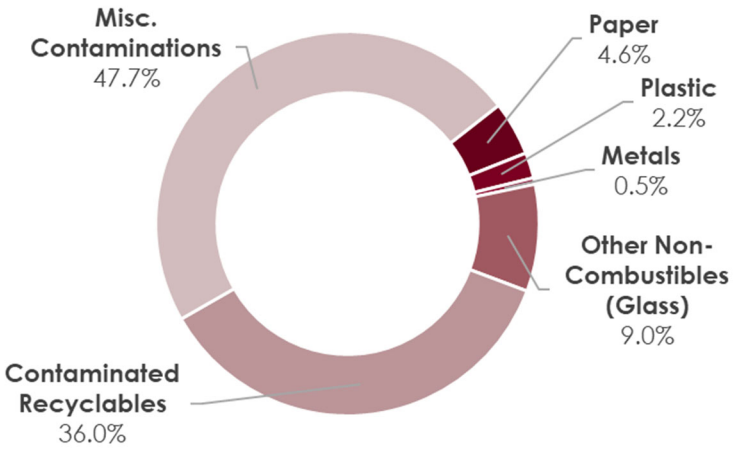


Table 18. Top 4 Categories of Contaminants found by the SDRC

Rank No.	Contaminated Recyclables 36.0%	Miscellaneous Contaminants 47.7%
1	**Contaminated Plastic** 17.7%	**Refuse** 26.9%
2	**Contaminated Metals** 9.4%	**Plastic Film and Wrapping** 7.8%
3	**Contaminated OCC** 4.0%	**Aseptic containers** 7.5%
4	**Other Contaminated Recyclables** 4.9%	**Other Miscellaneous Contaminants** 5.5%

Table D6 in Appendix D provides a detailed profile of the contaminations identified by SDRC staff at the time of drop-off at the SDRC. Data is provided for each category as a percentage of the total. This profile does not include the additional contaminations discovered during the recyclables sort.

8.0 COMPARISON TO PREVIOUS WASTE CHARACTERIZATION STUDIES

A goal for the 2022 Study was to use similar protocols and approaches as were used in the 1996-1997 and 2004 studies to facilitate a review of how the waste streams have changed over time. When reviewing this section, please keep in mind that waste streams will have natural variability due to various factors such as time of year and season, weather conditions, hauler schedules, construction, events, holidays, and school calendars among others. A waste characterization study reflects a "snapshot" of the waste stream at a point in time. Additionally, comparisons are done on a percent basis that totals 100%, so if one waste category drops, another one will likely rise to balance out the total.

Study timing is also important to consider when doing a comparison to previous waste characterization studies, particularly with seasonally dependent categories. The 2022 Study was completed in March 2022 compared to the field work of the previous characterization studies, which occurred in Fall 1996, Winter 1997, Spring/Summer 1997, and May 2004. For example, the timing of the 2022 Study being earlier in the spring compared to the 2004 Study in May could be a contributor to lower percentages of seasonally dependent categories such as yard waste and roofing materials.

The key challenge complicating the execution of this 2022 Study was the COVID-19 global pandemic. The COVID-19 global pandemic significantly changed the way society operated beginning in March 2020 and continued throughout the 2022 Study. The State of Kansas implemented stay at home orders and many commercial establishments, including restaurants, had to close for a period of time, which was followed by reduced operating capacity restrictions. These actions resulted in an increase in generation and disposal of single-family residential waste and a corresponding decrease in the amount of commercial waste generated. Given this major event, it is expected this will likely have impacted the 2022 Study.

The following provides some comparison information related to the 2022 Study and previous waste characterization studies.

8.1 PREVIOUS WASTE CHARACTERIZATION STUDIES

In 1996 and 1997, Camp Dresser & McKee, Inc. (CDM), conducted a three-season waste characterization study within Salina County and Salina MSWLF. This information is included in the *City of Salina Solid Waste Characterization Study, Final Report* dated August 1997 prepared by CDM. Data from this report is referred to as the **Spring/Summer 1997 Study** and the **Annual 1996-1997 Study.** The Annual 1996-1997 Study includes the Spring/Summer 1997 sort along with the sorts from Fall 1996 and Winter 1997.

In May 2004, CDM conducted another waste characterization study with an emphasis on the Salina MSWLF. The results of this **2004 Study** are included in the *Saline County 2004 Solid Waste Characterization Study Summary Report* dated May 20, 2005 prepared by CDM. The 2004 Study included summary tables from the Spring/Summer 1997 Study and the Annual 1996-1997 Study.

The information related to the historical information came from the 2004 Study by CDM.

Please note the SDRC was not in operation during the prior waste characterization studies. Therefore, no comparisons can be done for the recyclables sort, only the physical waste sort and visual waste estimate.

8.2 PHYSICAL WASTE SORT – RESIDENTIAL AND CI

The categories for the physical waste sort were selected based off of the 2004 Study. Eight additional categories were added, as discussed in Section 4.2. SCS and the City determined the addition of these categories would be beneficial to better understand the landfill's waste stream from residential and CI waste haulers with today's challenges in mind.

Tables 19 and 20 below compare the top five material groups of wastes for each comparison period. Please note that these are reported as a percent of the total, so as one group decreases another group will see an increase to equal 100 percent.

Table 19. Historical Comparison of Top Five Material Groups – Residential Waste Stream (Mean Composition %)

Rank No.	Spring/Summer 1997	Annual 1996-97	2004 Study	2022 Study
1	Paper (30.9%)	Paper (33.5%)	Paper (32.4%)	Paper (20.4%)
2	Yard Waste (23.3%)	Yard Waste (15.9%)	Plastic (16.0%)	Plastic (15.2%)
3	Plastic (10.2%)	Food Waste (12.2%)	Yard Waste (15.5%)	Food Waste (14.4%)
4	Food Waste (9.0%)	Plastic (9.7%)	Food Waste (6.8%)	Yard Waste (8.6%)
5	Textiles, Rubber, and Leather (5.6%)	Textiles, Rubber, and Leather (5.0%)	Metals (5.4%)	Textiles, Rubber, and Leather (8.1%)

Table 20. Historical Comparison of Top Five Material Groups – CI Waste Stream (Mean Composition %)

Rank No.	Spring/Summer 1997	Annual 1996-97	2004 Study	2022 Study
1	Paper (35.0%)	Paper (37.0%)	Paper (37.4%)	Paper (25.0%)
2	Food Waste (14.5%)	Food Waste (14.0%)	Plastic (18.2%)	Plastic (20.0%)
3	Plastic (12.5%)	Plastic (14.0%)	Yard Waste (11.6%)	Food Waste (13.0%)
4	Metals (6.0%)	Metals (7.5%)	Food Waste (8.7%)	C&D (9.0%)
5	Other Inorganics (5.5%)	Wood (5.0%)	Metals (5.1%)	Yard Waste (6.3%)

8.3 VISUAL WASTE ESTIMATE – C&D AND INDUSTRIAL

The C&D and industrial categories for the visual waste estimate were revised in the 2022 Study to better capture the types of waste expected to be found in the C&D and industrial waste categories. The following table shows the industrial and C&D comparison for the top categories for the 2004 Study and the 2022 Study.

Table 21. Mean Composition (%) Historical Comparison of Top C&D & Industrial Waste Streams

Rank No.	2004 Study	2022 Study
1	**Wood** 31%	**Wood** 43% Includes: Painted/stained wood (4%), Untreated wood (4%), Untreated dimensional lumber (14%), and wood Pallets (21%)
2	**Roofing Material** 11%	**Gypsum Board** 19%
	Corrugated & Kraft Paper 11%	
	Food Waste 11%	
3	**Other Plastic** 8%	**Roofing Materials** 8%
Total	**72%**	**70%**

Wood remained the top component of the C&D waste for the 2022 Study. Gypsum board increased from approximately 3% in the 2004 study to an approximately 19% in the 2022 Study.

9.0 PRE-CONSUMER ORGANICS MANAGEMENT SURVEYS

One of the goals of the 2022 Study was to gather information that would eventually help the City with waste diversion or waste reduction strategies. One aspect of interest to the City was information pertaining to pre-consumer organics from local businesses. While not typical with waste and recycling sorts, this aspect was included with this 2022 Study in order to understand existing techniques and current challenges for businesses in the community.

The City identified types of facilities and coordinated days and times for SCS to interview the facility. Of the businesses contacted by the City, two businesses responded and chose to participate.

A summary of the surveys is included in Appendix E.

10.0 SUMMARY AND CONCLUSION

This 2022 Study has collected valuable information pertaining to the City's integrated solid waste management services as it relates to the waste stream of the Salina MSWLF and the recyclables going through the SDRC. The City plans to utilize this information to make recommendations and action-plans that are data-driven and provide tangible results related to the City's solid waste services. This includes working with stakeholders and citizens to evaluate opportunities for service improvement and other waste reduction strategies and goals.

Appendix A

Work Plan

2022 City of Salina Waste and Recyclables Characterization Study Work Plan

City of Salina
Public Works Department
Salina, Kansas

SCS ENGINEERS

27220089.16 | November 2021
Revised March 2022

8575 West 110th Street, Suite 100
Overland Park, Kansas 66210
(913) 681-0030

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Tables

Attachments

1.0 INTRODUCTION

The City of Salina (City) completed waste characterization studies in 1996-1997 and in 2004 for the incoming waste stream at the City's landfill. The 2004 study included a hand sort of 52 residential and commercial waste samples and visual observation of 32 industrial and construction and demolition loads in May 2004. This data was then used for a calculation of the 2004 annual composition and a comparison to the results for the 1996-1997 composition.

The City retained the services of SCS Engineers (SCS) to perform a 2022 Waste and Recyclables Characterization Study (2022 Study) with the following project objectives:

- Evaluate the current waste composition compared to 1996-1997 and 2004 historical data;
- Develop a better understanding of the types and percentages of waste the City is currently accepting;
- Understand waste compositions that cause the City to have a higher per capita waste generation rate than the state average; and
- Determine other material streams that could be recycled or reused.

In addition, the City is interested in evaluating the material being accepted at their drive-through recycling facility to determine the characterization of the facility's incoming and outgoing recycling stream and both the percent and make-up of contamination.

This document is considered the Work Plan for this 2022 Study and identifies the procedures used to identify and select specific loads for sampling, sorting, and methods for data collection.

2.0 GENERATING SECTORS

2.1 WASTE CHARACTERIZATION STUDY

For the waste characterization study at the Salina Municipal Solid Waste Landfill (Salina MSWLF), SCS will target waste generators from the following sectors:

- Residential – includes municipal solid waste (MSW) generated in single-family and multi-family (up to three units) residential households. This was will be physically sorted.
- Commercial and Institutional (CI) – includes waste generated from commercial and institutional entities. This was will be physically sorted.
- Industrial – includes waste generated from industrial facilities and arriving in open-top containers (these loads will be visually evaluated). This will be visually estimated.
- Construction and Demolition (C&D) – includes waste generated as a result of demolition and/or construction activities and arriving in open-top containers (these loads will be visually evaluated). This will be visually estimated.

2.2 RECYCLABLES CHARACTERIZATION STUDY

For the recyclables characterization study, SCS will target recyclables received at the Salina Drive-Thru Recycling Center (SDRC). It is assumed these materials are primarily generated by residents and small businesses.

Customers drop off their recyclables at the SDRC. While unloading, the SDRC staff visually screen the incoming recyclables for non-recyclable material or other contaminates. If non-acceptable materials are found during customer unloading, this material is rejected and given back to the customer with information as to why a material is not accepted at the SDRC and other options for disposal or diversion.

For the purposes of this study, non-acceptable materials found during customer unloading will be collected and set aside for sorting, separate from other collected recyclables. This information will be relayed to customers when non-acceptable materials were found.

As a result, the recyclables were broken out into two sectors for the recyclables sort:

- Accepted Recyclables – Includes the material the SDRC staff accepts and sends to the recycling center.
- Non-Acceptable Material – Includes the material the SDRC staff rejects from customers.

3.0 WASTE CHARACTERIZATION SORT PLAN

3.1 MATERIAL SORT GROUPS AND CATEGORIES FOR PHYSICAL WASTE SORT

The waste sort group and category lists for the 2022 Study will include those that were included in the 2004 study to ensure compatibility for comparison. The 2022 Study will also include the additional categories listed and described below. The addition of these categories will help capture more representative data of the materials in the waste stream which may help provide greater detailed information for potential future integrated solid waste management (ISWM) program modifications.

- Chipboard – Non-corrugated, single layer cardboard. Examples include food containers such as cereal or spaghetti boxes. Material category added to help evaluate how much chipboard is being disposed of versus recycled.

- Plastics #3 - #5 and #7 – Examples include detergent and cleaning product bottles, personal care product bottles, food containers, frozen food containers and bags, ketchup bottles, egg cartons, cups and plates, yogurt cups, syrup bottles, microwave trays, clamshell fast food containers, vitamin bottles, etc. Material category added to help evaluate quantity of #3 - #5 and #7 plastics potentially in the waste stream.

- Retail Shopping Bags – Single-use plastic bags used to carry purchased products. Material category added to help evaluate quantity of retail plastic bags potentially in the waste stream.

- Polystyrene – Examples include Styrofoam™, packaging peanuts, and carryout containers. Material category added to help evaluate quantity of polystyrene potentially in the waste stream.

- Plastic Film – Examples include product and packaging wrap, newspaper bags, food storage bags, and produce and bread bags. Material category added to help evaluate quantity of plastic film potentially in the waste stream.

- Other Plastic Products – Examples include toys, pens, staplers, cutting boards, etc. Material category added to help capture plastic products that do not fit into other plastic categories and are not containers.

- Lithium Ion Batteries and Products Containing Lithium Ion Batteries – Examples include cordless power tools, laptops, vaping devices, electric toothbrushes, hoverboards, etc. Material category added to help evaluate the amount of materials that may contain lithium ion batteries which pose a significant fire risk to material management facilities (i.e., landfills, recycling centers, etc.).

- Sharps – Hypodermic needles. Material category added to help evaluate quantity of hypodermic needles potentially in the waste stream.

A complete list of the material categories for the waste sort are identified in the table below. Product examples for each material category are included in Attachment A.

Table 1. 2022 Salina Waste Characterization Group and Category List

Group	No.	Material Category	Group	No.	Material Category
Paper	1	Corrugated cardboard and kraft paper	Metals	23	Aluminum food and beverage containers
	2	Chipboard		24	Steel & Bimetal food and beverage containers
	3	Newspaper		25	Ferrous metal
	4	High grade paper		26	Other recyclable metal
	5	Magazines and other glossy paper		27	Nonrecyclable metal
	6	Other paper	Other Noncombustibles	28	Clear glass containers
Plastic	7	Clear HDPE containers		29	Brown glass containers
	8	Colored HDPE containers		30	Green/blue glass containers
	9	PETE bottles and jars		31	Other inorganic/ noncombustibles
	10	Plastics #3 - #5 and #7	Miscellaneous	32	Household hazardous and special waste
	11	Retail shopping bags		33	Electronics
	12	Polystyrene		34	Batteries
	13	Plastic film		35	Roofing materials
	14	Other plastic containers		36	Poured concrete
	15	Other plastic products		37	Bricks
Yard Waste	16	Grass clippings		38	Blocks
	17	Leaves and other yard waste		39	Gypsum board and Plaster
Other Combustibles	18	Wood		40	Unclassifiable Fines
	19	Food waste		41	Lithium batteries and products containing lithium ion batteries
	20	Textiles, Rubber, and Leather		42	Sharps
	21	Disposable diapers and sanitary products			
	22	Other organics/combustibles			

3.2 WASTE SAMPLING PLAN – PHYSICAL SORT

SCS will sort a combined total of 50 samples from the residential, commercial, and institutional waste generator categories. The samples will be sorted into the categories previously identified in Table 1. Methods used to select loads for the physical sort are discussed in Section 6 of this report.

SCS evaluated historical tonnage data provided by the City to establish the total number of samples to be sorted for each waste generator category. This evaluation determined that approximately 74% of disposed tonnage by these generator categories was from the residential category and approximately 26% was from the commercial and institutional category. Based on this evaluation, SCS proposes performing waste sort activities for 37 samples from the residential category and 13 samples from the commercial and institutional category.

The table below shows the results of this evaluation as well as the number of samples to be sorted by specific haulers within each of the generator categories. The number of loads to sample from specific haulers was determined by the average total percentage of tons the individual haulers delivered to the Salina MSWLF for the specific category between 2019 and 2020.

Table 2. Physical Waste Sort Sampling Plan Evaluation Results

RESIDENTIAL MSW			COMMERCIAL AND INSTUTITIONAL		
%	2019 – 2020 Avg Total Tons	Generating Sector	%	2019 – 2020 Avg Total Tons	Generating Sector
100%	47,385	Residential MSW	100%	16,995	Commercial and Institutional
	74%	**% Total**		**26%**	**% Total**
		64,380 Tons	**TOTAL Residential MSW, Commercial, and Institutional Tons**		
SAMPLING PLAN					
	37	**# of samples**		**13**	**# of samples**
# Samples	**2019 - 2020 Avg % of Total Category Tons**	**Major Haulers**	**# Samples**	**2019 - 2020 Avg % of Total Category Tons**	**Major Haulers**
14	37.3%	City of Salina	8	63.7%	Hometown Disposal
11	29.6%	Salina Waste Systems	4	30.3%	Salina Waste Systems
7	19.6%	Hometown Disposal	0*	1.8%	Sletcha
2	4.8%	Ottawa County	0*	1.0%	Lincoln
2	5.0%	Sletcha	0*	0.9%	Salina Tree
1	2.7%	Lincoln	0*	0.8%	Minneapolis Refuse
37	**99.0%****	**TOTAL**	**13**	**98.5%****	**TOTAL**

*The City will select (or allow SCS to select) which hauler should be selected for 1 sample total in this category.
**Due to haulers delivering small tonnages in these categories, the 2019 – 2020 Average percentage of total category tons does not add up to 100% in this table.

SCS will work with the City to select residential samples that are representative of each of the residential collection routes serviced by the City as well other haulers providing residential waste collection services. The City collects residential waste according to the schedule and geographic areas identified in the City's collection route map (see Attachment B).

3.3 WASTE SORT CATEGORIES AND SAMPLING PLAN – VISUAL WASTE ESTIMATE

Due to the nature of some of the material accepted at the Salina MSWLF for disposal, it is not viable to physically sort through the material into the previously established waste categories. Therefore, SCS will perform a visual evaluation of wastes considered construction and demolition (C&D), concrete, industrial, or special waste acceptance number (SWAN). SCS will perform 25 visual waste evaluations and will estimate the percentage of volume for each of the waste categories identified in Table 3. Product examples for each material category are included in Attachment A.

These will then be converted to weight estimates using Volume to Weight Conversion Tables by the Environmental Protection Agency's (EPA) or California Integrated Waste Management Board (CIWMB).

Table 3. Visual Estimate – Waste Characterization Category List

No.	Material Category	No.	Material Category
1	Concrete	12	Untreated wood
2	Brick	13	Untreated dimensional lumber
3	Dirt/Sand	14	Wood pallets
4	Roofing materials	15	Gypsum board
5	Yard waste	16	Composite metal (wires)
6	Carpet	17	Appliances
7	Glass	18	Ferrous scrap
8	Insulation	19	Non-ferrous scrap
9	Plastic piping	20	Bulky Items
10	Plastic products	21	Cardboard
11	Painted/stained wood	22	Other

Methods used to select loads for visual evaluation are discussed in Section 7 of this report.

The table below shows the results of an evaluation to determine the number of samples from specific haulers to be visually evaluated based on their average percentage of total tons in this category between 2019 and 2020.

Table 4. Visual Waste Sort Sampling Plan Evaluation Results

C&D; CONCRETE; INDUSTRAL; AND SWAN		
%	**2019 – 2020 Average Total Tons**	**Generating Sector**
100%	4,912	C&D, Concrete, Industrial and SWAN
SAMPLING PLAN		
	25	**# of samples**
# Samples	**2019 - 2020 Avg %**	**Major Haulers**
10	40.8%	Salina Waste
6	22.6%	Hometown Disposal
2	9.6%	American Rolloff
2	9.3%	Salina Tree
2	8.6%	Bird Construction
2	6.0%	Ponton Construction
1	2.5%	Sletcha
25	**99.4%***	**TOTAL**

*Due to haulers delivering small tonnages in these categories, the 2019 – 2020 Average percentage of total category tons does not add up to 100% in this table.

4.0 RECYCLABLES CHARACTERIZATION SORT PLAN

4.1 MATERIAL SORT GROUPS AND CATEGORIES

SCS staff will perform a recyclables characterization sort for materials received at the SDRC. It is assumed recyclables received at the SDRC are generated primarily by residents and small businesses.

The 2004 Study did not perform a sort of recyclables. Therefore, SCS worked with City staff to develop categories of recyclables to be included in the 2022 Study. A complete list of the material categories for the recyclables sort are identified in the table below. Product examples for each material category are included in Attachment A.

Table 5. 2022 Salina Recyclables Characterization Group and Category List

Group	No.	Material Category	Group	No.	Material Category
Paper	1	Uncoated corrugated cardboard & pasteboard	Contaminated Recyclables	17	Contaminated Paper
	2	Chipboard		18	Contaminated Shredded Paper
	3	Newspaper		19	Contaminated Plastic
	4	Mixed paper		20	Contaminated Metals
	5	White office paper		21	Contaminated Other Noncombustibles
	6	Shredded Paper	Miscellaneous Contamination	22	Organic waste
Plastic	7	#1 PETE bottles and jars		23	Manufactured products
	8	#2 Clear HDPE containers		24	Aseptic containers
	9	#2 Colored HDPE containers		25	Medical waste
	10	#3 - #7 Plastics		26	Aerosol cans
Metals	11	Aluminum		27	Refuse
	12	Steel		28	Retail plastic bags
	13	Tin		29	Plastic film and wrapping
Other Non-combustible	14	Clear glass containers		30	Household chemical containers with cleaning agent remaining.
	15	Brown glass containers		31	Plastic plant containers
	16	Green/blue glass containers		32	Rigid containers
				33	Polystyrene

4.2 RECYCLABLES SAMPLING PLAN

SCS will sort a total of 24 samples with each sample consisting of approximately 2 cubic yards (CY) of recyclables. SDRC staff will collect approximately 16 CY of recyclable materials per day received at the SDRC over a three-day period. The total amount collected for sorting will be a minimum of 48 CY of recyclables. Methods used to collect recyclables are discussed in Section 8 of this report.

Recyclables will be delivered to the maintenance building at the Salina MSWLF and will be tipped inside on a tarp(s). Non-acceptable materials delivered to the SDRC by customers delivering them while recyclables are being collected to be sorted will be kept separate from the recyclables inside the maintenance building.

5.0 SCHEDULE

Scheduling the waste and recyclables characterization study is an important consideration for obtaining representative material composition data. To this end, field sampling will be coordinated to avoid holidays and out-of-ordinary events (i.e., festivals) that may affect the types of wastes or recyclables generated.

Table 6 details the schedule for this study. Where appropriate, this table also indicates when upstream sampling and sorting will occur at the landfill. Work will take place Monday through Friday primarily during the operating hours of the facility.

Table 6. Waste and Recyclables Sort Schedule

Sort Type and Sort Dates	Sort Location
Waste Sort March 21-25, 2022	Salina Municipal Solid Waste Landfill • Samples for physical and visual sorting to be collected and observed each day.
Recyclables Sort March 26, 28, & 29, 2022	Salina Municipal Solid Waste Landfill • Samples for physical sorting will be captured by SDRC staff starting the week before the scheduled sort.

6.0 FIELD COLLECTION METHODS – PHYSICAL WASTE SORT

This section describes the procedures and protocols to be applied by SCS staff while conducting field activities for physical sorting waste from the residential and commercial and institutional generators.

6.1 LOAD SELECTION

Selecting the right waste samples is important for safeguarding the integrity of the data. The load selection process consists of three-parts:

1. Stratification of the loads,
2. Driver interviews, and
3. Visual inspection of the waste materials.

The first step, stratification of the waste loads is based on the site-specific information provided by the City. This identifies which haulers to target for sampling residential, commercial and institutional, industrial, or mixed waste and at what frequency (see Table 2). SCS staff will coordinate with the Salina MSWLF scalehouse staff to identify and select trucks for targeted sampling.

When a vehicle targeted for sampling enters the facility, the SCS staff will coordinate with the Salina MSWLF scalehouse staff to instruct the driver to talk with the SCS staff at the working face for further instructions and to complete the interview. The purpose of the interview is to obtain details on the origin and collection location of the waste to confirm its representativeness of a targeted waste generating sector. If the SCS staff concludes the load is not representative, it will not be sampled. If the load is identified as being representative the hauler will be directed to dump their waste load in a designated area (exact process to be coordinated with the Salina MSWLF staff on site). Once the waste is unloaded from the collection vehicle, the SCS staff will inspect the sample by walking around the material and noting any unusual characteristics or materials present.

6.2 COLLECTING SAMPLES

If a targeted waste load is deemed suitable for sampling and sorting, the SCS staff will summon an equipment operator from the Salina MSWLF to obtain a 200 to 250-pound sample of the waste.

SCS will visually divide the waste pile into six equally sized segments and use a random number generator table (1-6) to select the location of where the sample should be collected. This information will be communicated to the equipment operator obtaining the sample. If the sample does not appear to be more 200 pounds, SCS will work with the operator to obtain materials from adjacent quadrants as necessary. The sample will be transported to the sort location, and weighed to ensure the selected sample is between 200 to 250 pounds. Excess waste not needed for the waste sample will either be returned to the working face by Salina MSWLF staff or placed in a waste container in or by the maintenance building.

Each sample will be assigned a unique identifying number which will be recorded, along with other sample information (hauler, truck number, weather conditions, date/time collected, unusual characteristics, etc.), on a sample data collection form. SCS anticipates obtaining only one sample per truck.

6.3 PHYSICAL WASTE SORTING

The physical waste sorting process and protocol will be led by an experienced SCS staff with the support of a six to eight-person sort crew. Fundamental to this task is a consistent, methodical, statistically valid sampling program that will be repeated for each sample. SCS staff will oversee the process and will be actively conducting quality control measures to make sure materials are sorted and weighed properly. Each member of the sort crew will be assigned certain material categories for sorting. This improves the efficiency and accuracy of the sorting process as sort crew members specialize and become experts in sorting the material components they are assigned.

The basic procedures and objectives for sorting will be identical for each sample. The protocol is described in Table 7.

Table 7. Physical Waste Characterization Protocol

Step #	Action
1	SCS staff will work with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers are properly set.
2	Samples will be transferred from the containers to the sort table. SCS staff will take pictures of the samples before sorting activities begin. Large or heavy items will be visually examined and placed directly into the appropriate container for subsequent weighing. If the item is too large for the container, it will be individually weighed and recorded by SCS staff.
3	Plastic bags containing materials will be opened, materials will be manually segregated according to the sort group and category list (Table 1), and placed in the appropriate container. This process continues until the remaining materials for the sample have a particle size of 2 inches or less. SCS staff will oversee operations and provide continual quality control of the sorted material categories.
4	SCS staff will weigh individual containers with the segregated materials and perform additional quality control measures to ensure the purity of each sorted material category. Containers with the materials are recorded on the material sample data form (see Attachment C) that is unique for every sample; weights will be recorded to the nearest 0.02 pound. Tare weights of the containers will be recorded prior to sort activities begin for the day and as needed.
5	While materials are weighed, small items (2 inches or less) remaining on the sort table will be visually examined and allocated to the appropriate categories based on the best judgement of the SCS staff. This material will be collected and weighed.

Step #	Action
6	Once materials are weighed and recorded, containers will be emptied into a waste container. City staff will be responsible for emptying the waste container as necessary and ensuring a waste container is available to accept sorted waste materials.

6.4 DATA RECORDING

The SCS staff will be responsible for overseeing the weighing of each material category and recording the weights on the sample data collection forms. A separate data collection form will be kept for each sample (see Attachment C). Each container of sorted material components will be carried to a digital scale by the sort crewmembers and the SCS staff will record the weights on the data collection form corresponding to the sample being weighed. The form also contains information on the sample's waste generating sector, hauler, truck number, and origin recorded by the SCS staff when the driver interview is conducted.

Before the end of the workday, the SCS staff will perform the following:

- Work with Salina MSWLF scalehouse staff to obtain data necessary pertaining to waste loads accepted that day. This information should include at least the following:
    - Date and time load accepted
    - Customer and vehicle identification information
    - Assigned waste category
    - Scale in and scale out weights
    - Tare weights of vehicle if Salina MSWLF used a tare weight
- Discuss sample activities and desired loads to be selected for sampling with the Salina MSWLF scalehouse staff.
- Review forms for completion and accuracy.
- Create a digital file of the completed sample data collection forms.
- Record the tare weights of containers.

7.0 FIELD COLLECTION METHODS – VISUAL WASTE ESTIMATE

This section describes the procedures and protocols to be applied by SCS staff while conducting field activities for visual waste estimates for C&D and Industrial waste generators.

7.1 LOAD SELECTION

As with the physical waste sort, selecting the right waste samples is important for safeguarding the integrity of the data. The load selection process consists of three-parts:

1. Stratification of the loads,
2. Driver interviews, and
3. Visual inspection of the waste materials.

The first step, the stratification of the waste loads, is based on the site-specific information provided by the City. This identifies what haulers to target for sampling C&D, concrete, industrial, and SWAN wastes and at what frequency (see Table 4). The SCS staff will coordinate with the Salina MSWLF scalehouse staff to identify and select trucks for targeted sampling.

When a vehicle targeted for sampling pulls up to the scale house, an SCS staff will confirm with the scale operator the classification for the type of waste and type of vehicle. If the vehicle is within a targeted category and vehicle type, the SCS representative will coordinate with Salina MSWLF staff to meet the delivery driver at the working face to conduct an interview with the driver. The purpose of the interview is to obtain details on the origin and collection location of the waste to confirm its representativeness of a targeted waste generating sector. If the SCS staff concludes the load is not representative, it will not be sampled.

7.2 COLLECTING SAMPLES

If the load is identified as representative, the hauler will be directed to dump their waste load in a designated area, gradually moving forward as the load is dispelled from the vehicle to spread the material out. Once the waste is unloaded from the collection vehicle, the SCS staff will inspect the sample by walking around the material and noting any unusual characteristics or materials present.

7.3 VISUAL WASTE ESTIMATION

If a targeted waste load is deemed suitable for a visual waste estimation, the SCS staff will use a visual characterization method to estimate the volume of specific material types in each waste load. The basic procedures and objectives for visual waste estimation will be identical for each sample. The protocol is described Table 8.

Table 8. Visual Waste Estimation Protocol

Step #	Action
1	SCS staff will interview the driver of the selected sample load and record key information for each load on the field sampling form (see Attachment D). This information will include waste category, origin of waste, estimated volume of the tipped material, and weight of load if the vehicle is tared with Salina MSWLF and the driver has the ticket available.
2	Once the driver has dumped the load onto the ground, the SCS staff will walk around the load (to the extent possible) and indicate on the sampling form what material types are present in the load.
3	Beginning with the largest major material type present by volume, the SCS staff will begin to estimate the volumetric percentage of the material type and record it on the form. This process will be repeated for the next most common material type, and so forth, until the volumetric percentage of each material type has been estimated. SCS staff will then recheck to make sure the percentage estimates for the major material classes add up to 100 percent.
4	The SCS staff will take photos of the sample load.
5	The SCS staff will communicate with Salina MSWLF staff that the visual evaluation of the sample load has been completed and the material can be incorporated into the working face. SCS staff will also notify the scalehouse if the load was selected for sampling or rejected.

7.4 DATA RECORDING

The SCS staff will use the field sampling form (see Attachment D) to record information gathered from the interview with the driver of the selected load and the visual estimation observations.

Before the end of the workday, the SCS staff will perform the following:

- Work with Salina MSWLF scalehouse staff to obtain data necessary to determine weight of observed sample loads (in-going weights and out-going weights; in-going weights and vehicle tare weights, etc.).
- Discuss sample activities and desired loads to be selected for sampling with the Salina MSWLF scalehouse staff.
- Review forms for completion and accuracy.
- Create a digital file of the completed field sampling forms.

Data from the field sampling forms will be entered into a customized spreadsheet, and accepted density conversion factors will be used to develop estimates of the weight of each material type in each load. The calculated weight of each waste load observed will be compared to the actual measured weight from scalehouse records. The calculated weight will be modified proportionally so the calculated weight equals the measured weight of the waste load.

Please note that the SCS visual estimator will not manually handle waste materials. Based on our experience, the drivers are typically able to spread the waste out sufficiently for a reliable visual characterization.

8.0 FIELD COLLECTION METHODS – PHYSICAL RECYCLABLES SORT

This section describes the procedures and protocols to be applied by the SCS staff while conducting field activities for physical sorting recyclables from the SDRC for both the accepted materials and the non-acceptable materials (rejected by the City Staff).

8.1 LOAD SELECTION

SCS will sort a total of 24 samples with each sample consisting of approximately 2 CY of recyclables. SDRC staff will capture approximately 48 CY of recyclable materials received at the SDRC over a three-day period.

Per City staff, between 2019 and 2020 the SDRC had an average of 47,500 customers and received an average total mixed recyclables (excluding shredded paper) of 578 tons. Based on this data, it is estimated the average SDRC customer drops-off approximately 24.4 pounds (lbs) of recyclables. The Environmental Protection Agency's Volume to Weight Conversion Factors (April 2016) indicates commingled recyclables is approximately 111 lbs per CY. Therefore, to help ensure the desired CY of recyclables are collected per day, SDRC staff should collect recyclables from approximately 75 customers per day to achieve the 16 CY of recyclables per day.

Shredded paper received will be kept separate (i.e., in bags as delivered or in separate containers) from the other recyclables. Customers delivering shredded paper will count towards the daily allotment of 75 customers.

Since the recyclables characterization study will also include an evaluation of contamination, SDRC staff will also collect received contaminated or non-acceptable items found by City staff. These materials are to be placed in containers and should remain separate from the acceptable recyclable materials.

SDRC staff will accept recyclable materials as well as non-acceptable materials (i.e., found contaminated recyclables) from the first 75 customers for a period of three-days. Since the SDRC is a drop-off recycling program versus a curbside collection program (i.e., materials collected from a specific route areas), it is not necessary to keep the collected recyclable samples separate from each other. However, collected materials for the samples must be kept separate from other materials. After the SDRC staff have collected recyclables from 75 customers (or have obtained the required per day CY of recyclables), they may resume normal operations.

In regards to customers delivering non-acceptable materials during the period of sample collection, SDRC staff will inform the customer as to the reason the material is prohibited from being accepted by the recycling program. They should also notify the customer that SDRC would typically return the material for the customer to properly manage, but for the purposes of this study, the materials are being collected for evaluation and will be properly managed.

During the sample collection period, SDRC staff should make note of customers that deliver a large load of single recyclables (i.e., cardboard from a business). SRDC staff should document the time of the delivery, the total approximate amount (by CY) of materials delivered and the approximate amount (by CY) of each material type. This information should be documented on the SDRC Recyclables Sample Collection form (see Attachment E).

NOTE: SDRC staff should not accept any hazardous or dangerous materials.

8.2 ACCEPTED MATERIALS – SAMPLING AND SORTING

8.2.1 Collecting Samples

SDRC staff will place collected recyclable samples in a rear-load truck and non-acceptable materials received during the collection period in totes. These materials must be kept separate from each other, as well as separate from any additional material the SDRC may accept beyond the first 16 CY (or approximately 75 customers) per day.

Recyclables will be delivered to the maintenance building at the Salina MSWLF and will be tipped inside on a tarp(s). Non-acceptable materials received during the collection period will be delivered to the maintenance building at the Salina MSWLF and will be kept separate from other materials.

Shredded paper collected during the recyclables collection period will be accepted and kept separate from other materials and delivered to the maintenance building at the Salina MSWLF.

8.2.2 Physical Accepted Materials Sorting

The recyclables sorting process and protocol will be led by an experienced SCS staff with the support of a four to six-person sort crew. Fundamental to this task is a consistent, methodical, statistically valid sampling program that will be repeated for each sample. SCS staff will oversee the process and will be actively conducting quality control measures to make sure materials are sorted and weighed properly. Each member of the sort crew will be assigned certain material categories for sorting. This improves the efficiency and accuracy of the sorting process as sort crew members specialize and become experts in sorting the material components they are assigned.

The basic procedures and objectives for sorting will be identical for each sample. The protocol is described Table 9.

Table 9. Recyclable Characterization Protocol

Step #	Action
1	SCS staff will work with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers are properly set.
2	2 CY of recyclable materials will be loaded into containers and unloaded on the recycling sort table. 2 CY of recyclables constitutes 1 sample. SCS staff will take pictures of the sample before sorting activities begin. Large or heavy items will be visually examined and placed directly into the appropriate container for subsequent weighing. If the item is too large for the container, it will be individually weighed and recorded by SCS staff.
3	Plastic bags containing materials will be opened, materials will be manually segregated according to the sort group and category list (Table 4), and placed in the appropriate container. This process continues until the recyclable material sample is characterized down to a particle size of 2 inches or less. SCS staff will oversee operations and provide continual quality control of the sorted material categories.

Step #	Action
4	SCS staff will weigh individual containers with the segregated materials and perform additional quality control measures to ensure the purity of each sorted material category. Containers with the materials are recorded on the material sample data form (see Attachment F) that is unique for every sample; weights will be recorded to the nearest 0.02 pound. Tare weights of the containers will be recorded prior to sort activities beginning for the day and as needed.
5	While materials are weighed, small items (2 inches or less) remaining on the sort table will be visually examined and allocated to the appropriate categories based on the best judgement of the SCS staff. This material will be collected and weighed.
6	Once materials are weighed and recorded, containers will be emptied into a rear-load truck. City staff will be responsible for delivering sorted recyclables to the processor as necessary as well as ensuring a rear-load truck (or other appropriate container) is available for sorted recyclable materials.

8.2.3 Data Recording

The SCS staff will be responsible for overseeing the weighing of each material category and recording the weights on the sample data collection forms (see Attachment F). A separate data collection form will be kept for each sample. Each container of sorted material components will be carried to a digital scale by the sort crewmembers and the SCS staff will record the weights on the data collection form corresponding to the sample being weighed.

Before the end of the workday, the SCS staff will perform the following:

- Review forms for completion and accuracy.
- Create a digital file of the completed sample data collection forms.
- Record the tare weights of the containers.

8.3 NON-ACCEPTABLE MATERIALS – SAMPLING AND SORTING

8.3.1 Collecting Samples

SDRC staff will place collected non-acceptable recyclable materials in separate containers to keep materials separate from other materials accepted. Non-acceptable materials will be delivered to the maintenance building at the Salina MSWLF and kept separate from other materials.

8.3.2 Non-Acceptable Recyclable Materials Sorting

The non-acceptable materials sorting process and protocol will be led by an experienced SCS staff with the support of a four to six-person sort crew. Fundamental to this task is a consistent,

methodical, statistically valid sampling program that will be repeated for each sample. SCS staff will oversee the process and will be actively conducting quality control measures to make sure materials are sorted and weighed properly. Each member of the sort crew will be assigned certain material categories for sorting. This improves the efficiency and accuracy of the sorting process as sort crew members specialize and become experts in sorting the material components they are assigned.

The basic procedures and objectives for sorting will be identical for each sample. The protocol is described in Table 10.

Table 10. Non-Acceptable Materials Characterization Protocol

Step #	Action
1	SCS staff will work with the sort crew to inspect the sorting area for potential safety hazards and to ensure the material category containers are properly set.
2	Materials will be transferred from the containers to the sort table. SCS staff will take pictures of the material before sorting activities begin. Large or heavy items will be visually examined and placed directly into the appropriate container for subsequent weighing. If the item is too large for the container, it will be individually weighed and recorded by SCS staff.
3	Plastic bags containing materials will be opened, materials will be manually segregated according to the sort group and category list (Table 1), and placed in the appropriate container. This process continues until the remaining materials have a particle size of 2 inches or less. SCS staff will oversee operations and provide continual quality control of the sorted material categories.
4	SCS staff will weigh individual containers with the segregated materials and perform additional quality control measures to ensure the purity of each sorted material category. Containers with the materials are recorded on the material sample data form unique for the non-acceptable materials; weights will be recorded to the nearest 0.02 pound. Tare weights of the containers will be recorded prior to sort activities beginning for the day or as needed.
5	While materials are weighed, small items (2 inches or less) remaining on the sort table will be visually examined and allocated to the appropriate categories based on the best judgement of SCS staff. This material will be collected and weighed.
6	Once materials are weighed and recorded, containers will be emptied into a waste container. City staff will be responsible for emptying the waste container as necessary and ensuring a waste container is available to accept sorted waste materials.

8.3.3 Data Recording

The SCS staff will be responsible for overseeing the weighing of each material category and recording the weights on the Non-Acceptable Recyclable Materials collection form. Each container of sorted material components will be carried to a digital scale by the sort crewmembers and the SCS staff will record the weights on the Non-Acceptable Recyclable Materials collection form.

Before the end of the workday, the SCS staff will perform the following:

- Review form for completion and accuracy.
- Create a digital file of the completed data collection form.
- Record the tare weights of the containers.

9.0 WASTE AND RECYCLABLES CHARACTERIZATION REPORT

SCS will prepare a final report that presents the City's waste and recyclables characterization profile, and compares the results from the 2022 waste sort activities with the 2004 and 1996-1997 waste stream characterizations.

SCS will complete a comprehensive final report that will include the following information:

- Executive summary
- Introduction and background for the study
- Discussions of the methods used
- Summary of the waste sampling and sorting plan
- Summary of the recycling sampling plan
- Data collection and analytical techniques deployed
- Summary of number of samples characterized
- City of Salina waste characterization profile from physical waste sort
- City of Salina waste characterization profile from visual waste estimate
- City of Salina recyclables characterization profile from physical recyclables sort
- Summary of findings and conclusions
- Comparison of previous waste characterization studies in 2004 and 1996-1997

Attachment A

Example Descriptions of Materials for Characterization

- Physical Waste Sort Characterization Material Categories
- Visual Waste Characterization Material Categories
- Recyclables Characterization Material Categories

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
Paper	Corrugated cardboard and kraft paper	Cardboard with a rippled inner layer that creates small tube-like passages through the cardboard. Includes waxed corrugated cardboard and corrugated cardboard with a glossy outer layer. Also includes kraft paper, a heavy brown paper of the type used to construct corrugated cardboard (primarily grocery bags).
	Chipboard	Non-corrugated, single layer cardboard. Food containers such as cereal or spaghetti boxes.
	Newspaper	Anything printed on the type of paper generally used for newspapers, including advertising inserts printed on newspaper.
	High grade paper	White and colored uncoated bond paper and computer printout paper including photocopy/printer paper and ledger paper. Includes canceled checks. (Does not include envelopes with plastic windows, carbon paper, or paper used in multi copy carbonless forms.)
	Magazines and other glossy paper	Magazines, catalogs, and books with glossy pages and soft covers, and similar high-grade glossy paper.
	Other paper	All paper that does not fit any of the paper categories defined above.
Plastic	Clear HDPE containers	Translucent plastic milk, water and juice containers, and certain personal hygiene products.
	Colored HDPE containers	Pigmented (white or colored) HDPE containers for beverages, cleaning products such as detergents, cleaning products, and certain personal hygiene products. (Does not include 5-gallong buckets.)
	PETE bottles and jars	Clear and green plastic carbonated soft drink bottles, plus plastic bottles and jars identifiable as PETE based on labeling or mold-mark in the center of the bottom of the container. (Does not include “beer balls”.)
	Plastics #3 - #5 and #7	Detergent and cleaning product bottles, personal care product bottles, food containers, frozen food containers and bags, ketchup bottles, egg cartons, cups and plates, yogurt cups, syrup bottles, microwave trays, clamshell fast food containers, vitamin bottles, etc.
	Retail shopping bags	Single-use plastic bags used to carry purchased products.
	Polystyrene	Styrofoam™ materials, packaging peanuts, food carryout containers, plates, bowls, beverage cups, utensils, straws, packaging peanuts, egg cartons, meat/poultry trays.
	Plastic film	Product and packaging wrap, newspaper bags, food storage bags, and produce and bread bags.
	Other plastic containers	All plastic other plastic containers that are not defined above. Includes plastic clothing such as unlined vinyl raincoats.
	Other plastic products	Toys, pens, staplers, cutting boards, etc.
Yard Waste	Grass clippings	Clipping from mowing lawns and fields.
	Leaves and other yard waste	Leaves, shrubs and garden trimmings, uprooted plants and shrubs, weeds, grasses pulled up with the roots, pine needles and cones, tree branches and twigs, vegetative ground litter, and dirt that cannot readily be

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
		separated from the plant material. Also includes indoor plants and cut flowers.
Other Combustibles	Wood	Most forms of wood not included in the definition of "other yard waste" above. Includes wood that has been processed for use in a structure or manufactured product, plus wood waste generated during wood processing or woodworking. Includes both lumber and reconstituted wood such as plywood, particle board, and composition board. Includes packing crates and pallets, Also includes sawdust, wood shavings, cork, and wicker.
	Food waste	All items produced or gathered for use as food, including the inedible portions. Includes bones and shells if interspersed with other food waste. In practice, some food waste becomes part of the fines category. Food waste includes coffee grounds, but a substantial portion of coffee grounds are found in the fines category. (Does not include cooking oils when discarded separately).
	Textiles, Rubber, and Leather	All clothing and fabrics. Includes rugs and carpeting, drapes, towels, and bedding. Natural and synthetic rubber and leather, plus some materials that are technically plastics but have rubber-like characteristics and are commonly thought of as rubber, such as polyurethane foam. This category includes most shoes.
	Disposable diapers and sanitary products	Infant and adult disposable diapers, sanitary absorbent pads, and tampons.
	Other organics/combustibles	Organic/combustible materials not included in any other category including soap, ceiling tile, and charcoal. Includes animal feces not mixed with cat litter. Also includes composite objects with substantial combustible/organic components, such as mattresses and box springs, roofing shingles, vinyl flooring, automotive air filters and filters in heating and air-conditioning systems.
Metals	Aluminum food and beverage containers	Food and beverage cans made entirely of aluminum. Includes most soda and beer cans as well as aluminum pet food cans. (Does not include aluminum aerosol spray cans or bimetal cans.)
	Steel & Bimetal food and beverage containers	Food and beverage containers with steel sides, including those commonly called "tin cans". Includes detached tops if made of steel. Also includes cans with steel sides and attached aluminum tops, such as some soda cans.
	Ferrous metal	All iron based objects other than tin-steel and bimetal cans as defined above. Includes steel trash cans, steel furniture, wire hangers, the steel parts of electrical and electronic devices, and a large number of other items, Includes paint cans, steel aerosol spray cans, and the type of can in which paint thinner is typically sold.
	Other recyclable metal	Metal not included in the definitions of "aluminum food and beverage containers" and "steel and bitmetal food and beverage containers" above, or the definition of "batteries" below, for which a substantial and reliable

Group	Material Category	Examples
		recycling market exists. Generally includes any significant object consisting of aluminum, brass, or copper, but usually not a mixture of these metals. Includes steel and aluminum cans not included in the metal container categories above or the "household hazardous and special waste" category below. Includes most metal cookware, aluminum catering trays, clean aluminum foil, and clean aluminum oven pans.
	Nonrecyclable metal	All metal not included in the four metal categories above or in the "batteries" or "household hazardous and special waste" below. Includes significantly contaminated aluminum foil and over pans. Includes many items that are composites of different metals such as electric motors, lawn mowers, and bicycles.
Other Noncombustibles	Clear glass containers	Glass containers with no color or tint in the glass. Includes caps left on empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ash trays, decorative glass containers, vases, perfume bottles, or containers for cosmetic products.)
	Brown glass containers	Glass containers with brown or amber color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Green/blue glass containers	Glass containers with blue, green or emerald color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Other inorganic/ noncombustibles	Inorganic/noncombustible materials not included in any of the categories above, or in "batteries" or "household hazardous and special waste" below. Includes fiberglass insulation, flat glass, cat litter and associated materials, light bulbs, ceramics, dirt, ash, sand, stones, and gravel.
Miscellaneous	Household hazardous and special waste	Materials that are toxic and/or require special handling, and are not included in any other category such as "batteries" or "electronics" below. Includes toxic liquids and powders and their containers. Also includes tires and asbestos shingles. (Does not include metal objects containing lead, which are included in "other recyclable metal" above.)
	Electronics	All objects containing a circuit board of significant size relative to the size of the object.
	Batteries	All batteries not included in the "lithium batteries" category below.
	Roofing materials	All roof covering materials that do not fall within one of the other categories. Includes asphalt roofing shingles and roofing felt (often called tap paper). Also includes plywood and any kind of composition board if coated with rap for use as a roofing covering.

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
	Poured concrete	All concrete except concrete blocks.
	Bricks	Bricks and associated mortar.
	Blocks	Concrete blocks, cinder blocks, cement blocks, and associated mortar.
	Gypsum board and Plaster	Includes loose plaster and gypsum based wallboard commonly referred to by the trade names “sheetrock” or “drywall”.
	Unclassifiable Fines	Materials that not readily able to be classified and are less than 2 inches.
	Lithium batteries and products containing lithium ion batteries	Cordless power tools, laptops, vaping devices, electric toothbrushes, hoverboards, etc.
	Sharps	Hypodermic needles.

Visual Waste Characterization Material Categories

Material Category	Examples
Concrete	Includes pieces of building foundations, concrete paving, and cinder blocks.
Brick	Includes masonry brick, landscaping, or walkway brick.
Dirt/sand	Includes soil and clay, solid minerals, and loose granular substances.
Roofing materials	Composite shingles and other roofing material made with asphalt, examples includes asphalt shingles and attached roofing tar, and tar paper.
Yard waste	Debris such as grass clippings, leaves, garden waste, brush, tree stumps, and trees.
Carpet	Flooring applications consisting of various natural or synthetic fibers which may be bonded to some type of backing material, and plastic, foam, felt, or other material used under carpet to provide insulation and padding.
Glass	Examples include Pyrex, Corning ware, crystal, plate glass, window and door glass, ceramics, porcelain, and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Also includes beverage containers.
Insulation	Refers to any material used to reduce heat loss or heat gain by providing a barrier between the inside of a building and the significantly different temperature outside. Includes fiberglass, mineral wool, cellulose, natural fibers, polystyrene, polyisocyanurate, polyurethane, and perlite.
Plastic piping	Plastic pipe is a tubular section, or hollow cylinder, made of plastic.
Plastic products	Includes products made of plastic that are not classified elsewhere. Plastic film and bottles are included.
Painted/stained wood	Wood that has an external coating applied, such as paint or varnish in more than small amounts. Includes treated wood.
Untreated wood	Refers to any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative. Includes such items as skids, spools, packaging materials, bulky wood waste or scraps from newly build wood products, does not include land clearing debris or yard waste pruning and trimmings.
Untreated dimensional lumber	Refers to any wood fiber cut to a specific size (thickness/width/length) based on pre-defined standardized sizes which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative. Common examples of dimensional lumber include two-by-fours (2x4s) and four-by-fours (4x4s).
Wood pallets	Wood pallets and crating material commonly used for industrial and commercial packaging and shipping.
Gypsum board	Painted or unpainted interior wall covering made of a sheet of gypsum sandwiched between paper layers; examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypsum board, and wallboard.
Composite metal (wires)	Metal drawn out into the form of a thin flexible thread or rod.
Appliances	Household and commercial devices such as refrigerators, freezers, kitchen ranges, air-conditioning units, dehumidifiers, gas water heaters, furnaces, clothes washers, clothes dryers, dishwashers, microwave ovens, and commercial coolers.

Visual Waste Characterization Material Categories

Ferrous scrap	Any iron or steel that is magnetic. Examples include empty or dry paint cans, structural steel beams, boilers, clothes hangers, pipes, some cookware, security bars, scrap ferrous items, and galvanizes items such as nails and flashing.
Non-ferrous scrap	Metal items that are not magnetic including copper, brass, lead, zinc, etc.
Bulky items	Large household durable goods including upholstered furniture and mattresses, tables, and chairs used to make a house or office a suitable place for living or working. Includes ceiling fans, couches, and mattresses.
Cardboard	Corrugated boxes or paper bags made from Kraft paper. Old corrugated cardboard (OCC) has a wavy center layer and is sandwiched between the two outer layers; examples include 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. Examples of Kraft paper include paper, grocery bags, un-soiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.
Other	Items not classified elsewhere.

Recyclable Characterization Material Categories

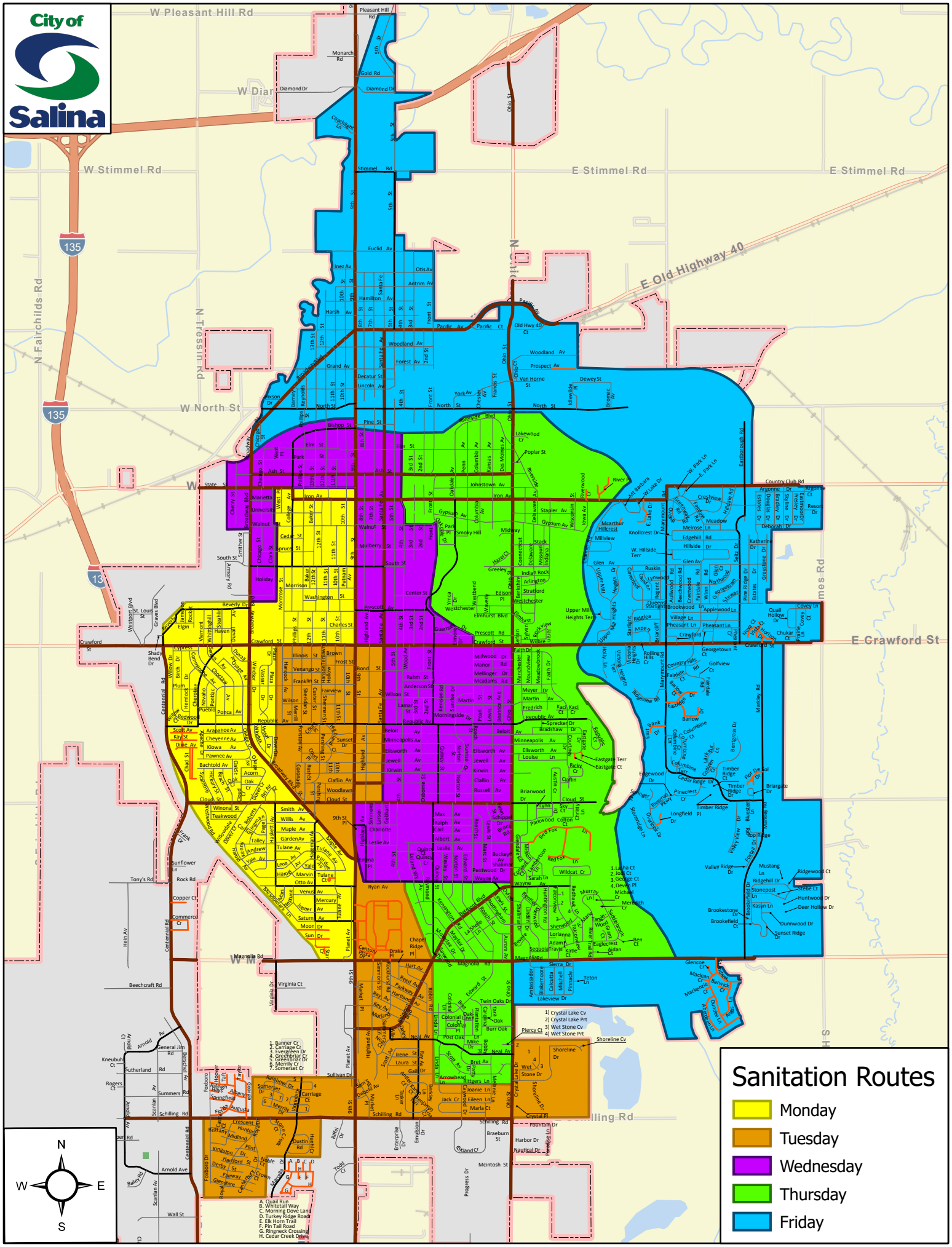
	Material Category	Examples
Paper	Uncoated corrugated cardboard & pasteboard	Non-waxed shipping/moving boxes, 3-layers.
	Chipboard	Non-corrugated, single layer cardboard. Food containers such as cereal or spaghetti boxes.
	Newspaper	Anything printed on the type of paper generally used for newspapers, including advertising inserts printed on newspaper.
	Mixed paper	Paper bags, phone books, magazines and catalogs, food/detergent boxes, junk mail
	White office paper	White office and computer paper.
	Shredded Paper	Shredded paper.
Plastic	#1 PET bottles and jars	Soda and water bottles, juice containers, salad dressing bottles, and cooking oil.
	#2 Clear HDPE containers	Hand and dish soap containers, and cleaning products.
	#2 Colored HDPE containers	Detergent bottles, some hair-care bottles, some margarine and yogurt tubs, clamshell packaging, empty motor oil, empty anti-freeze, and other empty vehicle and equipment fluid containers
	#3 - #5 and #7 Plastics	Detergent and cleaning product bottles, personal care product bottles, food containers, frozen food containers and bags, ketchup bottles, egg cartons, cups and plates, yogurt cups, syrup bottles, microwave trays, clamshell fast food containers, vitamin bottles, etc.
Metals	Aluminum	Food and beverage cans made entirely of aluminum. Includes most soda and beer cans as well as aluminum pet food cans. (Does not include aluminum aerosol spray cans or bimetal cans.)
	Steel	Food and beverage containers with steel sides. Includes detached tops if made of steel. Also includes cans with steel sides and attached aluminum tops, such as some soda cans.
	Tin	Food and beverage containers.
Other Non-combustible	Clear glass containers	Glass containers with no color or tint in the glass. Includes caps left on empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ash trays, decorative glass containers, vases, perfume bottles, or containers for cosmetic products.)
	Brown glass containers	Glass containers with brown or amber color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Green/blue glass containers	Glass containers with blue, green or emerald color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)

Recyclable Characterization Material Categories

Contaminated Recyclables	Contaminated Paper	Materials covered in liquid, oil, or other substance making the material unacceptable for recycling.
	Contaminated Shredded Paper	
	Contaminated Plastic	
	Contaminated Metals	
	Contaminated Other Noncombustibles	
Miscellaneous Contamination	Organic waste	Food, yard waste, animal waste.
	Manufactured products	Toys, sporting equipment, etc.
	Aseptic containers	Food or drink related containers made of layered paper and contain aluminum foil and/or plastic. Juice boxes, chicken/beef/veggie broth boxes, soup containers, wine containers.
	Medical waste	PPE, bandages, syringes, etc.
	Aerosol cans	Pressurized steel/aluminum containers. Spray paint, hairspray, room deodorizers.
	Refuse	Municipal solid waste that is not otherwise captured in other categories.
	Retail plastic bags	Single-use plastic bags used to carry purchased products.
	Plastic film and wrapping	Product and packaging wrap, newspaper bags, food storage bags, and produce and bread bags.
	Household chemical containers with cleaning agent remaining.	Cleaning products, pesticide products, etc.
	Plastic plant containers	Plant flats or pots.
	Rigid containers	Totes, baby pools, Tupperware.
	Polystyrene	Styrofoam™ materials, packaging peanuts, food carryout containers, plates, bowls, beverage cups, utensils, straws, packaging peanuts, egg cartons, meat/poultry trays.
	Tetra Pak	Same as aseptic containers.

Attachment B

City of Salina Residential Waste Collection Route Map and Schedule


City of Salina
W Pleasant Hill Rd
W Diam
W Stimmel Rd
E Stimmel Rd
E Old Highway 40
N Fairchilds Rd
N Ohio St
W North St
E Crawford St
Sanitation Routes
Monday
Tuesday
Wednesday
Thursday
Friday
N
W
E
S

Attachment C

Waste Sample Record

SCS ENGINEERS

WASTE SAMPLE RECORD

2022 CITY OF SALINIA WASTE AND RECYCLABLES CHARACTERIZATION STUDY

SAMPLE INFORMATION: # OF CANS:

FACILITY: Salina Municipal Solid Waste Landfill SAMPLE #:

VEHICLE INFORMATION: DATE/TIME: WEATHER:

SOURCE_____ HAULER_____ VEHICLE TYPE_____VEHICLE # _____

WASTE TYPE: RES ICI BULKY/UNUSUAL ITEMS SEGMENT

SORT DATA

WASTE COMPONENTS	GROSS WEIGHTS	CONTAINER #	COMMENTS
PAPER			
1 Corrugated cardboard and kraft paper			
2 Chipboard			
3 Newspaper			
4 High grade paper			
5 Magazines and other glossy paper			
6 Other paper			
PLASTIC			
7 Clear HDPE contiainers			
8 Colored HDPE containers			
9 PET bottles and jars			
10 Plastics #3 #5 and #7			
11 Retail shopping bags			
12 Polystyrene			
13 Plastic film			
14 Other plastic containers			
15 Other plastic products			
YARD WASTE			
16 Grass clippings			
17 Leaves and other yard waste			
OTHER COMBUSTIBLES			
18 Wood			
19 Food waste			
20 Textiles, Rubber, and Leather			
21 Disposable diapers and sanitary products			
22 Other organics/combustibles			
METALS			
23 Aluminum food and beverage containers			
24 Steel & Bimetal food and beverage containers			
25 Ferrous metal			
26 Other recyclable metal			
27 Nonrecyclable metal			
OTHER NONCOMBUSTIBLES			
28 Clear glass containers			
29 Brown glass containers			
30 Green/blue glass containers			
31 Other inorganic/ noncombustibles			
MISCELLANEOUS			
32 Household hazardous and special waste			
33 Electronics			
34 Batteries			
35 Roofing materials			
36 Poured concrete			
37 Bricks			

SORT DATA (continued)

WASTE COMPONENTS	GROSS WEIGHTS	CONTAINER #	COMMENTS
38 Blocks			
39 Gypsum board and Plaster			
40 Unclassifiable Fines			
41 Lithium batteries and products containing lithium ion batteries			
42 Sharps			

COMMENTS/OBSERVATIONS:

Attachment D

Waste Sample Record – Visual Estimation

WASTE SAMPLE RECORD - C&D WASTE VISUAL ESTIMATION

SCS ENGINEERS

2022 CITY OF SALINIA WASTE AND RECYCLABLES CHARACTERIZATION STUDY

SAMPLE INFORMATION: # OF PHOTOS:

FACILITY: Salina Municipal Solid Waste Landfill VISUAL SAMPLE #:

VEHICLE INFORMATION: DATE/TIME: WEATHER:

SOURCE_____ HAULER_____ VEHICLE TYPE_____VEHICLE # _____

WASTE TYPE: RES ICI BULKY/UNUSUAL ITEMS

SORT DATA

WASTE COMPONENTS	% OF VOLUME	COMMENTS
C&D Waste		
1 Concrete		
2 Brick		
3 Dirt/Sand		
4 Roofing shingles		
5 Yard Waste		
6 Carpet		
7 Glass		
8 Insulation		
9 Plastic piping		
10 Plastic products		
11 Painted/stained wood		
12 Untreated wood		
13 Untreated dimmensional lumber		
14 Wood pallets		
15 Gypsum board		
16 Composite metal (wires)		
16 Applicances		
18 Ferrous scrap		
19 Non-ferrrous scrap		
20 Bulky Items (furniture)		

COMMENTS/OBSERVATIONS:

Attachment E

SDRC Recyclables Sample Collection Form

SDRC Recyclables Sample Collection Form

Date:	Time Collection Started:	Time Collection Ended:

Number of Customers:

☐ 1	☐ 9	☐ 17	☐ 25	☐ 33	☐ 41	☐ 49	☐ 57	☐ 65	☐ 71
☐ 2	☐ 10	☐ 18	☐ 26	☐ 34	☐ 42	☐ 50	☐ 58	☐ 66	☐ 72
☐ 3	☐ 11	☐ 19	☐ 27	☐ 35	☐ 43	☐ 51	☐ 59	☐ 67	☐ 73
☐ 4	☐ 12	☐ 20	☐ 28	☐ 36	☐ 44	☐ 52	☐ 60	☐ 68	☐ 74
☐ 5	☐ 13	☐ 21	☐ 29	☐ 37	☐ 45	☐ 53	☐ 61	☐ 69	☐ 75
☐ 6	☐ 14	☐ 22	☐ 30	☐ 38	☐ 46	☐ 54	☐ 62	☐ 70	
☐ 7	☐ 15	☐ 23	☐ 31	☐ 39	☐ 47	☐ 55	☐ 63		
☐ 8	☐ 16	☐ 24	☐ 32	☐ 40	☐ 48	☐ 56	☐ 64	TOTAL:	

Customer Notes:

Attachment F

Recyclable Materials Sample Record

SCS ENGINEERS

RECYCLABLE MATERIALS SAMPLE RECORD

2022 CITY OF SALINIA WASTE AND RECYCLABLES CHARACTERIZATION STUDY

SAMPLE INFORMATION: # OF CANS:

FACILITY: Salina Drive Through Recycling Center (SDRC) SAMPLE #:

SORT DATA

RECYCLABLE MATERIAL COMPONENTS	GROSS WEIGHTS	CONTAINER #	COMMENTS
PAPER			
1R Uncoated corrugated cardboard & pasteboard			
2R Chipboard			
3R Newspaper			
4R Mixed paper			
5R White office paper			
6R Shredded paper			
PLASTIC			
7R #1 PET bottles and jars			
8R #2 Clear HDPE containers			
9R #2 Colored HDPE containers			
10R #3 - #7 Plastics			
METALS			
11R Aluminum			
12R Steel			
13R Tin			
OTHER NONCOMBUSTIBLES			
14R Clear glass containers			
15R Brown glass containers			
16R Green/blue glass containers			
CONTAMINATED RECYCLABLES			
17R Contaminated Paper			
18R Contaminated shredded paper			
19R Contaminated Plastic			
20R Contaminated Metals			
21R Contaminated Other Noncombustibles			
MISCELLANEOUS CONTAMINATIONS			
22R Organic waste			
23R Manufactured products			
24R Aseptic containers			
25R Medial waste			
26R Aerosol cans			
27R Refuse			
28R Retail plastic bags			
29R Plastic film and wrapping			
30R Household chemical containers with cleaning agent remaining.			
31R Plastic plant containers			
32R Rigid containers			
33R Polystyrene			

COMMENTS/OBSERVATIONS:

Attachment G

Sort Container Tare Weights

Waste Characterization Containers

Container #	Materials	Tare Weight						
		20-Mar	21-Mar	22-Mar	23-Mar	24-Mar	25-Mar	25-Mar
1	Corrugated cardboard and kraft paper							
2	Chipboard							
3	Newspaper							
4	High grade paper							
5	Magazines and other glossy paper							
6	Other paper							
7	Clear HDPE contiainers							
8	Colored HDPE containers							
9	PET bottles and jars							
10	Plastics #3 #5 and #7							
11	Retail shopping bags							
12	Polystyrene							
13	Plastic film							
14	Other plastic containers							
15	Other plastic products							
16	Grass clippings							
17	Leaves and other yard waste							
18	Wood							
19	Food waste							
20	Textiles, Rubber, and Leather							
21	Disposable diapers and sanitary products							
22	Other organics/combustibles							
23	Aluminum food and beverage containers							
24	Steel & Bimetal food and beverage containers							
25	Ferrous metal							
26	Other recyclable metal							
27	Nonrecyclable metal							
28	Clear glass containers							
29	Brown glass containers							
30	Green/blue glass containers							
31	Other inorganic/ noncombustibles							
32	Household hazardous and special waste							
33	Electronics							
34	Batteries							
35	Roofing materials							
36	Poured concrete							
37	Bricks							
38	Blocks							
39	Gypsum board and Plaster							
40	Unclassifiable Fines							
41	Lithium batteries and products containing lithium ion batteries							
42	Sharps							
A								
B								
C								
D								
E								
F								
G								
H								
I								
J								
K								
L								
M								
N								
O								
P								
Q								
R								
S								
T								

Recyclable Characterization Containers

Container #	Materials	Tare Weight		
		26-Mar	28-Mar	29-Mar
1R	Uncoated corrugated cardboard & pasteboard			
2R	Chipboard			
3R	Newspaper			
4R	Mixed paper			
5R	White office paper			
6R	Shredded paper			
7R	#1 PET bottles and jars			
8R	#2 Clear HDPE containers			
9R	#2 Colored HDPE containers			
10R	#3 - #7 Plastics			
11R	Aluminum			
12R	Steel			
13R	Tin			
14R	Clear glass containers			
15R	Brown glass containers			
16R	Green/blue glass containers			
17R	Contaminated Paper			
18R	Contaminated shredded paper			
19R	Contaminated Plastic			
20R	Contaminated Metals			
21R	Contaminated Other Noncombustibles			
22R	Organic waste			
23R	Manufactured products			
24R	Aseptic containers			
25R	Medial waste			
26R	Aerosol cans			
27R	Refuse			
28R	Retail plastic bags			
29R	Plastic film and wrapping			
30R	Household chemical containers with cleaning agent remaining.			
31R	Plastic plant containers			
32R	Rigid containers			
33R	Polystyrene			

New Containers

Container #	New Container Information		
	Tare Weight	Date	Notes

Appendix B

Waste Characterization Material Categories

Physical Sort: Residential and CI Waste
Visual Sort: C&D and Industrial Waste

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
Paper	Corrugated cardboard and kraft paper	Cardboard with a rippled inner layer that creates small tube-like passages through the cardboard. Includes waxed corrugated cardboard and corrugated cardboard with a glossy outer layer. Also includes kraft paper, a heavy brown paper of the type used to construct corrugated cardboard (primarily grocery bags).
	Chipboard	Non-corrugated, single layer cardboard. Food containers such as cereal or spaghetti boxes.
	Newspaper	Anything printed on the type of paper generally used for newspapers, including advertising inserts printed on newspaper.
	High grade paper	White and colored uncoated bond paper and computer printout paper including photocopy/printer paper and ledger paper. Includes canceled checks. (Does not include envelopes with plastic windows, carbon paper, or paper used in multi copy carbonless forms.)
	Magazines and other glossy paper	Magazines, catalogs, and books with glossy pages and soft covers, and similar high-grade glossy paper.
	Other paper	All paper that does not fit any of the paper categories defined above.
Plastic	Clear HDPE containers	Translucent plastic milk, water and juice containers, and certain personal hygiene products.
	Colored HDPE containers	Pigmented (white or colored) HDPE containers for beverages, cleaning products such as detergents, cleaning products, and certain personal hygiene products. (Does not include 5-gallong buckets.)
	PETE bottles and jars	Clear and green plastic carbonated soft drink bottles, plus plastic bottles and jars identifiable as PETE based on labeling or mold-mark in the center of the bottom of the container. (Does not include “beer balls”.)
	Plastics #3 - #5 and #7	Detergent and cleaning product bottles, personal care product bottles, food containers, frozen food containers and bags, ketchup bottles, egg cartons, cups and plates, yogurt cups, syrup bottles, microwave trays, clamshell fast food containers, vitamin bottles, etc.
	Retail shopping bags	Single-use plastic bags used to carry purchased products.
	Polystyrene	Styrofoam™ materials, packaging peanuts, food carryout containers, plates, bowls, beverage cups, utensils, straws, packaging peanuts, egg cartons, meat/poultry trays.
	Plastic film	Product and packaging wrap, newspaper bags, food storage bags, and produce and bread bags.
	Other plastic containers	All plastic other plastic containers that are not defined above. Includes plastic clothing such as unlined vinyl raincoats.
	Other plastic products	Toys, pens, staplers, cutting boards, etc.
Yard Waste	Grass clippings	Clipping from mowing lawns and fields.
	Leaves and other yard waste	Leaves, shrubs and garden trimmings, uprooted plants and shrubs, weeds, grasses pulled up with the roots, pine needles and cones, tree branches and twigs, vegetative ground litter, and dirt that cannot readily be

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
		separated from the plant material. Also includes indoor plants and cut flowers.
Other Combustibles	Wood	Most forms of wood not included in the definition of "other yard waste" above. Includes wood that has been processed for use in a structure or manufactured product, plus wood waste generated during wood processing or woodworking. Includes both lumber and reconstituted wood such as plywood, particle board, and composition board. Includes packing crates and pallets, Also includes sawdust, wood shavings, cork, and wicker.
	Food waste	All items produced or gathered for use as food, including the inedible portions. Includes bones and shells if interspersed with other food waste. In practice, some food waste becomes part of the fines category. Food waste includes coffee grounds, but a substantial portion of coffee grounds are found in the fines category. (Does not include cooking oils when discarded separately).
	Textiles, Rubber, and Leather	All clothing and fabrics. Includes rugs and carpeting, drapes, towels, and bedding. Natural and synthetic rubber and leather, plus some materials that are technically plastics but have rubber-like characteristics and are commonly thought of as rubber, such as polyurethane foam. This category includes most shoes.
	Disposable diapers and sanitary products	Infant and adult disposable diapers, sanitary absorbent pads, and tampons.
	Other organics/combustibles	Organic/combustible materials not included in any other category including soap, ceiling tile, and charcoal. Includes animal feces not mixed with cat litter. Also includes composite objects with substantial combustible/organic components, such as mattresses and box springs, roofing shingles, vinyl flooring, automotive air filters and filters in heating and air-conditioning systems.
Metals	Aluminum food and beverage containers	Food and beverage cans made entirely of aluminum. Includes most soda and beer cans as well as aluminum pet food cans. (Does not include aluminum aerosol spray cans or bimetal cans.)
	Steel & Bimetal food and beverage containers	Food and beverage containers with steel sides, including those commonly called "tin cans". Includes detached tops if made of steel. Also includes cans with steel sides and attached aluminum tops, such as some soda cans.
	Ferrous metal	All iron based objects other than tin-steel and bimetal cans as defined above. Includes steel trash cans, steel furniture, wire hangers, the steel parts of electrical and electronic devices, and a large number of other items, Includes paint cans, steel aerosol spray cans, and the type of can in which paint thinner is typically sold.
	Other recyclable metal	Metal not included in the definitions of "aluminum food and beverage containers" and "steel and bitmetal food and beverage containers" above, or the definition of "batteries" below, for which a substantial and reliable

Group	Material Category	Examples
		recycling market exists. Generally includes any significant object consisting of aluminum, brass, or copper, but usually not a mixture of these metals. Includes steel and aluminum cans not included in the metal container categories above or the "household hazardous and special waste" category below. Includes most metal cookware, aluminum catering trays, clean aluminum foil, and clean aluminum oven pans.
	Nonrecyclable metal	All metal not included in the four metal categories above or in the "batteries" or "household hazardous and special waste" below. Includes significantly contaminated aluminum foil and over pans. Includes many items that are composites of different metals such as electric motors, lawn mowers, and bicycles.
Other Noncombustibles	Clear glass containers	Glass containers with no color or tint in the glass. Includes caps left on empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ash trays, decorative glass containers, vases, perfume bottles, or containers for cosmetic products.)
	Brown glass containers	Glass containers with brown or amber color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Green/blue glass containers	Glass containers with blue, green or emerald color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Other inorganic/ noncombustibles	Inorganic/noncombustible materials not included in any of the categories above, or in "batteries" or "household hazardous and special waste" below. Includes fiberglass insulation, flat glass, cat litter and associated materials, light bulbs, ceramics, dirt, ash, sand, stones, and gravel.
Miscellaneous	Household hazardous and special waste	Materials that are toxic and/or require special handling, and are not included in any other category such as "batteries" or "electronics" below. Includes toxic liquids and powders and their containers. Also includes tires and asbestos shingles. (Does not include metal objects containing lead, which are included in "other recyclable metal" above.)
	Electronics	All objects containing a circuit board of significant size relative to the size of the object.
	Batteries	All batteries not included in the "lithium batteries" category below.
	Roofing materials	All roof covering materials that do not fall within one of the other categories. Includes asphalt roofing shingles and roofing felt (often called tap paper). Also includes plywood and any kind of composition board if coated with rap for use as a roofing covering.

Physical Waste Sort Characterization Material Categories

Group	Material Category	Examples
	Poured concrete	All concrete except concrete blocks.
	Bricks	Bricks and associated mortar.
	Blocks	Concrete blocks, cinder blocks, cement blocks, and associated mortar.
	Gypsum board and Plaster	Includes loose plaster and gypsum based wallboard commonly referred to by the trade names “sheetrock” or “drywall”.
	Unclassifiable Fines	Materials that not readily able to be classified and are less than 2 inches.
	Lithium batteries and products containing lithium ion batteries	Cordless power tools, laptops, vaping devices, electric toothbrushes, hoverboards, etc.
	Sharps	Hypodermic needles.

Visual Waste Characterization Material Categories

Material Category	Examples
Concrete	Includes pieces of building foundations, concrete paving, and cinder blocks.
Brick	Includes masonry brick, landscaping, or walkway brick.
Dirt/sand	Includes soil and clay, solid minerals, and loose granular substances.
Roofing materials	Composite shingles and other roofing material made with asphalt, examples includes asphalt shingles and attached roofing tar, and tar paper.
Yard waste	Debris such as grass clippings, leaves, garden waste, brush, tree stumps, and trees.
Carpet	Flooring applications consisting of various natural or synthetic fibers which may be bonded to some type of backing material, and plastic, foam, felt, or other material used under carpet to provide insulation and padding.
Glass	Examples include Pyrex, Corning ware, crystal, plate glass, window and door glass, ceramics, porcelain, and other glass tableware, mirrors, non-fluorescent light bulbs, auto windshields, laminated glass, or any curved glass. Also includes beverage containers.
Insulation	Refers to any material used to reduce heat loss or heat gain by providing a barrier between the inside of a building and the significantly different temperature outside. Includes fiberglass, mineral wool, cellulose, natural fibers, polystyrene, polyisocyanurate, polyurethane, and perlite.
Plastic piping	Plastic pipe is a tubular section, or hollow cylinder, made of plastic.
Plastic products	Includes products made of plastic that are not classified elsewhere. Plastic film and bottles are included.
Painted/stained wood	Wood that has an external coating applied, such as paint or varnish in more than small amounts. Includes treated wood.
Untreated wood	Refers to any wood which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative. Includes such items as skids, spools, packaging materials, bulky wood waste or scraps from newly build wood products, does not include land clearing debris or yard waste pruning and trimmings.
Untreated dimensional lumber	Refers to any wood fiber cut to a specific size (thickness/width/length) based on pre-defined standardized sizes which does not contain an adhesive, paint, stain, fire retardant, pesticide or preservative. Common examples of dimensional lumber include two-by-fours (2x4s) and four-by-fours (4x4s).
Wood pallets	Wood pallets and crating material commonly used for industrial and commercial packaging and shipping.
Gypsum board	Painted or unpainted interior wall covering made of a sheet of gypsum sandwiched between paper layers; examples include used or unused, broken or whole sheets of sheetrock, drywall, gypsum board, plasterboard, gypsum board, and wallboard.
Composite metal (wires)	Metal drawn out into the form of a thin flexible thread or rod.
Appliances	Household and commercial devices such as refrigerators, freezers, kitchen ranges, air-conditioning units, dehumidifiers, gas water heaters, furnaces, clothes washers, clothes dryers, dishwashers, microwave ovens, and commercial coolers.

Visual Waste Characterization Material Categories

Ferrous scrap	Any iron or steel that is magnetic. Examples include empty or dry paint cans, structural steel beams, boilers, clothes hangers, pipes, some cookware, security bars, scrap ferrous items, and galvanizes items such as nails and flashing.
Non-ferrous scrap	Metal items that are not magnetic including copper, brass, lead, zinc, etc.
Bulky items	Large household durable goods including upholstered furniture and mattresses, tables, and chairs used to make a house or office a suitable place for living or working. Includes ceiling fans, couches, and mattresses.
Cardboard	Corrugated boxes or paper bags made from Kraft paper. Old corrugated cardboard (OCC) has a wavy center layer and is sandwiched between the two outer layers; examples include 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. Examples of Kraft paper include paper, grocery bags, un-soiled fast food bags, department store bags, and heavyweight sheets of Kraft packing paper.
Other	Items not classified elsewhere.

Appendix C

Recyclable Characterization Material Categories

Recyclable Characterization Material Categories

	Material Category	Examples
Paper	Uncoated corrugated cardboard & pasteboard	Non-waxed shipping/moving boxes, 3-layers.
	Chipboard	Non-corrugated, single layer cardboard. Food containers such as cereal or spaghetti boxes.
	Newspaper	Anything printed on the type of paper generally used for newspapers, including advertising inserts printed on newspaper.
	Mixed paper	Paper bags, phone books, magazines and catalogs, food/detergent boxes, junk mail
	White office paper	White office and computer paper.
	Shredded Paper	Shredded paper.
Plastic	#1 PET bottles and jars	Soda and water bottles, juice containers, salad dressing bottles, and cooking oil.
	#2 Clear HDPE containers	Hand and dish soap containers, and cleaning products.
	#2 Colored HDPE containers	Detergent bottles, some hair-care bottles, some margarine and yogurt tubs, clamshell packaging, empty motor oil, empty anti-freeze, and other empty vehicle and equipment fluid containers
	#3 - #5 and #7 Plastics	Detergent and cleaning product bottles, personal care product bottles, food containers, frozen food containers and bags, ketchup bottles, egg cartons, cups and plates, yogurt cups, syrup bottles, microwave trays, clamshell fast food containers, vitamin bottles, etc.
Metals	Aluminum	Food and beverage cans made entirely of aluminum. Includes most soda and beer cans as well as aluminum pet food cans. (Does not include aluminum aerosol spray cans or bimetal cans.)
	Steel	Food and beverage containers with steel sides. Includes detached tops if made of steel. Also includes cans with steel sides and attached aluminum tops, such as some soda cans.
	Tin	Food and beverage containers.
Other Non-combustible	Clear glass containers	Glass containers with no color or tint in the glass. Includes caps left on empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ash trays, decorative glass containers, vases, perfume bottles, or containers for cosmetic products.)
	Brown glass containers	Glass containers with brown or amber color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)
	Green/blue glass containers	Glass containers with blue, green or emerald color or tint in the glass, however faint. Includes caps left of empty containers by the consumer. (Does not include ceramics, drinking glasses, glass plates, cooking utensils, ask trays, decorative containers, vases, perfume bottles, or containers for cosmetic products.)

Recyclable Characterization Material Categories

Contaminated Recyclables	Contaminated Paper	Materials covered in liquid, oil, or other substance making the material unacceptable for recycling.
	Contaminated Shredded Paper	
	Contaminated Plastic	
	Contaminated Metals	
	Contaminated Other Noncombustibles	
Miscellaneous Contamination	Organic waste	Food, yard waste, animal waste.
	Manufactured products	Toys, sporting equipment, etc.
	Aseptic containers	Food or drink related containers made of layered paper and contain aluminum foil and/or plastic. Juice boxes, chicken/beef/veggie broth boxes, soup containers, wine containers.
	Medical waste	PPE, bandages, syringes, etc.
	Aerosol cans	Pressurized steel/aluminum containers. Spray paint, hairspray, room deodorizers.
	Refuse	Municipal solid waste that is not otherwise captured in other categories.
	Retail plastic bags	Single-use plastic bags used to carry purchased products.
	Plastic film and wrapping	Product and packaging wrap, newspaper bags, food storage bags, and produce and bread bags.
	Household chemical containers with cleaning agent remaining.	Cleaning products, pesticide products, etc.
	Plastic plant containers	Plant flats or pots.
	Rigid containers	Totes, baby pools, Tupperware.
	Polystyrene	Styrofoam™ materials, packaging peanuts, food carryout containers, plates, bowls, beverage cups, utensils, straws, packaging peanuts, egg cartons, meat/poultry trays.
	Tetra Pak	Same as aseptic containers.

Appendix D

Detailed Waste and Recyclables Composition

Table D1 - Residential and Institutional and Commercial (CI) Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper
Paper	1	Corrugated cardboard and kraft paper	9.2%	12.3%	6.3%	12.0%
	2	Chipboard	3.9%	2.0%	3.5%	4.4%
	3	Newspaper	0.4%	0.8%	0.2%	0.6%
	4	High grade paper	0.9%	1.7%	0.5%	1.3%
	5	Magazines and other glossy paper	1.1%	1.6%	0.8%	1.5%
	6	Other paper	6.0%	2.9%	5.4%	6.7%
		Total Paper	**21.6%**			
Plastic	7	Clear HDPE containers	0.5%	0.4%	0.4%	0.6%
	8	Colored HDPE containers	0.6%	0.5%	0.5%	0.7%
	9	PET bottles and jars	2.1%	1.0%	1.9%	2.4%
	10	Plastics #3 #5 and #7	1.6%	0.8%	1.4%	1.8%
	11	Retail shopping bags	0.8%	0.7%	0.7%	1.0%
	12	Polystyrene	1.1%	0.6%	0.9%	1.2%
	13	Plastic film	6.1%	3.3%	5.3%	6.9%
	14	Other plastic containers (non-recyclable)	1.3%	5.6%	<0.1%	2.6%
	15	Other plastic products	2.2%	2.0%	1.8%	2.7%
		Total Plastics	**16.4%**			
Yard Waste	16	Grass clippings	<0.1%	0.2%	<0.1%	<0.1%
	17	Leaves and other yard waste	8.0%	14.7%	4.6%	11.4%
		Total Yard Waste	**8.0%**			
Wood	18	Wood	**4.4%**	6.2%	2.9%	5.8%
Food Waste	19	Food waste	**14.0%**	7.8%	12.2%	15.8%
Textiles, Rubber, and Leather	20	Textiles, rubber, and leather	**7.1%**	7.5%	5.4%	8.9%
Disposable Diapers and Sanitary Products	21	Disposable diapers and sanitary products	**3.6%**	4.2%	2.6%	4.6%
Other Combustibles	22	Other combustibles	**5.2%**	2.6%	4.6%	5.8%
Metal	23	Aluminum food and beverage containers	1.2%	0.8%	1.0%	1.4%
	24	Steel & bimetal food and beverage containers	0.9%	0.7%	0.7%	1.0%
	25	Ferrous metal	0.9%	1.4%	0.5%	1.2%
	26	Other recyclable metal	1.8%	3.6%	1.0%	2.6%
	27	Nonrecyclable metal	0.2%	0.6%	<0.1%	0.4%
		Total Metals	**4.9%**			
Glass	28	Clear glass containers	1.6%	1.4%	1.3%	2.0%
	29	Brown glass containers	0.7%	1.1%	0.4%	0.9%
	30	Green/blue glass containers	0.2%	0.4%	<0.1%	0.3%
		Total Glass	**2.5%**			
Other Non-Combustibles	31	Other non-combustibles	**4.3%**	4.1%	3.3%	5.2%
Household Hazardous and Special Waste (HHW)	32	Household hazardous and special waste	**0.9%**	2.0%	0.4%	1.3%

Table D1 - Residential and Institutional and Commercial (CI) Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper
Electronics and Batteries	33	Electronics	2.2%	7.2%	0.5%	3.9%
	34	Batteries	0.1%	0.2%	<0.1%	0.1%
	41	Lithium batteries and products containing lithium ion batteries	<0.1%	0.1%	<0.1%	<0.1%
		Total Electronics and Batteries	**2.3%**			
Construction and Demolition (C&D) Waste [4]	35	Roofing materials	0.3%	1.2%	<0.1%	0.5%
	36	Poured concrete	0.1%	0.6%	<0.1%	0.3%
	37	Bricks	0.2%	1.2%	<0.1%	0.5%
	38	Blocks	<0.1%	0.0%	<0.1%	<0.1%
	39	Gypsum board and plaster	0.2%	1.5%	<0.1%	0.6%
		Total Construction and Demolition Waste	**0.9%**			
Sharps [5]	42	Sharps	**<0.1%**	0.0%	<0.1%	<0.1%
Unclassifiable Fines	40	Unclassifiable Fines [3]	**3.9%**	2.4%	3.3%	4.4%
		Total Residential and CI Waste Sorted	**100%**			

1. Based off of 50 hand-sorted waste samples.
2. Confidence interval is based off of a normal distribution. The confidence limits are determined by the mean percentage + or - the confidence interval
3. Visual Observation of % of Fines Shown in Table below
4. C&D Waste is reflective of C&D waste found in the waste samples physically sorted from the residential and CI waste generators only.
5. Sharps is reflective of sharps waste found in the waste samples physically sorted from the residential and CI waste generators only; it does not include sharps from collection units within City.

Category #40: Visual Observation Estimate of % Unclassifiable Fines for Residential and CI Waste			
Paper	4	High grade paper	1.2%
	6	Other paper	4.6%
			5.9%
Plastic	11	Retail shopping bags	0.8%
	12	Polystyrene	0.2%
	13	Plastic film	3.1%
	15	Other plastic products	4.9%
			9.1%
Yard Waste	17	Leaves and other yard waste	**24.7%**
Wood	18	Wood	**0.2%**
Food Waste	19	Food waste	**48.7%**
Other Combustibles	22	Other combustibles	**8.3%**
Metal	27	Nonrecyclable metal	**0.1%**
Glass	28-30	Glass containers	**0.7%**
Other Non-Combustibles	31	Other non-combustibles	**2.3%**
			100.0%

Table D2 - Residential Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	All Routes (City and Non-City)				City of Salina Routes				Non-City Routes			
			Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]		Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]		Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper			Lower	Upper			Lower	Upper
Paper	1	Corrugated cardboard and kraft paper	7.8%	7.6%	5.8%	9.9%	5.1%	2.4%	4.0%	6.1%	9.7%	9.2%	6.5%	12.9%
	2	Chipboard	4.2%	1.9%	3.7%	4.8%	4.4%	2.3%	3.4%	5.4%	4.1%	1.6%	3.6%	4.7%
	3	Newspaper	0.5%	0.9%	0.2%	0.7%	0.3%	0.4%	0.1%	0.4%	0.6%	1.2%	0.2%	1.0%
	4	High grade paper	0.8%	1.7%	0.3%	1.2%	0.4%	0.5%	0.2%	0.6%	1.0%	2.2%	0.3%	1.8%
	5	Magazines and other glossy paper	1.0%	1.3%	0.7%	1.4%	1.2%	1.5%	0.6%	1.9%	0.9%	1.2%	0.5%	1.3%
	6	Other paper	6.0%	2.5%	5.3%	6.7%	6.3%	2.5%	5.2%	7.4%	5.8%	2.6%	4.9%	6.7%
		Total Paper	**20.4%**				**17.7%**				**22.2%**			
Plastic	7	Clear HDPE containers	0.5%	0.4%	0.4%	0.6%	0.6%	0.5%	0.4%	0.8%	0.5%	0.4%	0.3%	0.6%
	8	Colored HDPE containers	0.6%	0.4%	0.5%	0.7%	0.6%	0.4%	0.5%	0.8%	0.5%	0.4%	0.4%	0.7%
	9	PET bottles and jars	2.2%	0.9%	2.0%	2.5%	2.1%	1.0%	1.7%	2.6%	2.3%	0.8%	2.0%	2.6%
	10	Plastics #3 #5 and #7	1.7%	0.8%	1.5%	1.9%	2.0%	0.7%	1.7%	2.3%	1.5%	0.8%	1.2%	1.8%
	11	Retail shopping bags	0.9%	0.7%	0.7%	1.1%	0.9%	0.8%	0.6%	1.3%	0.9%	0.7%	0.7%	1.2%
	12	Polystyrene	0.9%	0.6%	0.8%	1.1%	1.0%	0.6%	0.8%	1.3%	0.9%	0.5%	0.7%	1.1%
	13	Plastic film	5.4%	2.9%	4.6%	6.1%	4.4%	1.9%	3.6%	5.2%	6.0%	3.3%	4.9%	7.2%
	14	Other plastic containers (non-recyclable)	0.6%	0.8%	0.4%	0.8%	0.6%	0.8%	0.2%	0.9%	0.6%	0.8%	0.3%	0.9%
	15	Other plastic products	2.3%	2.3%	1.7%	3.0%	2.8%	2.5%	1.7%	3.8%	2.0%	2.1%	1.3%	2.8%
		Total Plastics	**15.2%**				**15.1%**				**15.3%**			
Yard Waste	16	Grass clippings	<0.1%	0.2%	<0.1%	<0.1%	<0.1%	0.3%	<0.1%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
	17	Leaves and other yard waste	8.6%	11.8%	5.4%	11.8%	13.1%	12.3%	7.9%	18.3%	5.5%	10.7%	1.8%	9.3%
		Total Yard Waste	**8.6%**				**13.2%**				**5.5%**			
Wood	18	Wood	**4.1%**	0.2%	4.0%	4.1%	**3.6%**	5.9%	1.1%	6.1%	**4.4%**	4.6%	2.7%	6.0%
Food Waste	19	Food waste	**14.4%**	11.8%	11.2%	17.6%	**14.1%**	5.8%	11.7%	16.6%	**14.5%**	7.9%	11.7%	17.3%
Textiles, Rubber, and Leather	20	Textiles, rubber, and leather	**8.1%**	5.1%	6.7%	9.4%	**9.4%**	10.3%	5.1%	13.8%	**7.1%**	5.5%	5.2%	9.0%
Disposable Diapers and Sanitary Products	21	Disposable diapers and sanitary products	**4.2%**	7.1%	2.3%	6.2%	**3.4%**	4.1%	1.7%	5.1%	**4.8%**	5.0%	3.0%	6.6%
Other Combustibles	22	Other organics/combustibles	**5.0%**	7.8%	2.9%	7.1%	**5.0%**	2.4%	4.0%	6.0%	**5.0%**	2.5%	4.1%	5.9%
Metal	23	Aluminum food and beverage containers	1.3%	0.9%	1.1%	1.6%	1.5%	1.1%	1.0%	2.0%	1.2%	0.7%	0.9%	1.4%
	24	Steel & Bimetal food and beverage containers	1.0%	0.7%	0.8%	1.2%	1.0%	0.6%	0.8%	1.3%	1.0%	0.7%	0.8%	1.3%
	25	Ferrous metal	0.7%	1.3%	0.3%	1.0%	0.5%	0.8%	0.1%	0.8%	0.8%	1.5%	0.3%	1.4%
	26	Other recyclable metal	1.8%	3.9%	0.8%	2.9%	2.2%	4.9%	0.2%	4.3%	1.5%	3.2%	0.4%	2.6%
	27	Nonrecyclable metal	0.3%	0.7%	<0.1%	0.5%	0.4%	1.1%	<0.1%	0.9%	0.1%	0.2%	<0.1%	0.2%
		Total Metals	**5.1%**				**5.7%**				**4.7%**			
Glass	28	Clear glass containers	1.8%	1.4%	1.4%	2.2%	1.7%	1.1%	1.2%	2.1%	1.9%	1.6%	1.4%	2.5%
	29	Brown glass containers	0.7%	1.2%	0.3%	1.0%	0.5%	0.5%	0.3%	0.7%	0.8%	1.5%	0.3%	1.4%
	30	Green/blue glass containers	0.2%	0.5%	<0.1%	0.4%	0.2%	0.3%	<0.1%	0.3%	0.3%	0.6%	<0.1%	0.5%
		Total Glass	**2.7%**				**2.4%**				**3.0%**			
Other Non-Combustibles	31	Other non-combustibles	**4.6%**	3.9%	3.6%	5.7%	**4.0%**	3.0%	2.7%	5.2%	**5.1%**	4.4%	3.6%	6.7%
Household Hazardous and Special Waste (HHW)	32	Household hazardous and special waste	**0.6%**	1.2%	0.3%	1.0%	**0.4%**	1.0%	<0.1%	0.8%	**0.8%**	1.3%	0.4%	1.3%

Table D2 - Residential Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	All Routes (City and Non-City)				City of Salina Routes				Non-City Routes			
			Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]		Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]		Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper			Lower	Upper			Lower	Upper
Electronics and Batteries	33	Electronics	1.6%	3.6%	0.6%	2.6%	0.4%	0.9%	<0.1%	0.8%	2.4%	4.5%	0.9%	4.0%
	34	Batteries	0.1%	0.2%	<0.1%	0.1%	<0.1%	0.1%	<0.1%	<0.1%	0.1%	0.2%	<0.1%	0.2%
	41	Lithium batteries and products containing lithium ion batteries	<0.1%	0.1%	<0.1%	<0.1%	<0.1%	0.1%	<0.1%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
		Total Electronics and Batteries	**1.7%**				**0.4%**				**2.6%**			
Construction and Demolition (C&D) Waste [4]	35	Roofing materials	0.3%	1.4%	<0.1%	0.7%	0.1%	0.3%	<0.1%	0.2%	0.5%	1.7%	<0.1%	1.1%
	36	Poured concrete	0.2%	0.7%	<0.1%	0.3%	0.3%	1.1%	<0.1%	0.8%	<0.1%	0.1%	<0.1%	<0.1%
	37	Bricks	0.3%	1.4%	<0.1%	0.7%	0.7%	2.2%	<0.1%	1.6%	<0.1%	0.3%	<0.1%	<0.1%
	38	Blocks	<0.1%	0.0%	<0.1%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%	<0.1%	0.0%	<0.1%	<0.1%
	39	Gypsum board and Plaster	0.3%	1.8%	<0.1%	0.8%	<0.1%	0.0%	<0.1%	<0.1%	0.5%	2.3%	<0.1%	1.3%
		Total Construction and Demolition Waste	**1.1%**				**1.1%**				**1.0%**			
Sharps [5]	42	Sharps	**<0.1%**	0.0%	<0.1%	<0.1%	**<0.1%**	0.0%	<0.1%	<0.1%	**<0.1%**	0.0%	<0.1%	<0.1%
Unclassifiable Fines	40	Unclassifiable Fines [3]	**4.1%**	2.2%	3.5%	4.6%	**4.4%**	2.1%	3.5%	5.3%	**3.8%**	2.2%	3.0%	4.6%
		Total Sorted	**100%**				**100%**				**100%**			

1. Number of hand sorted samples for each category: All residential (City and Non-City Routes together) = 37, City of Salina Routes = 15, Non-City Routes = 22
2. Confidence interval is based off of a normal distribution. The confidence limits are determined by the mean percentage + or - the confidence interval
3. Visual Observation of % of Fines Shown in Table below
4. C&D Waste is reflective of C&D waste found in the waste samples physically sorted from the residential waste generators only.
5. Sharps is reflective of sharps waste found in the waste samples physically sorted from the residential waste generators only; it does not include sharps from collection units within City.

Table D3 - Institutional and Commercial (CI) Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper
Paper	1	Corrugated cardboard and kraft paper	13.0%	20.6%	3.6%	22.3%
	2	Chipboard	3.1%	2.1%	2.1%	4.0%
	3	Newspaper	0.2%	0.3%	<0.1%	0.4%
	4	High grade paper	1.2%	1.6%	0.4%	1.9%
	5	Magazines and other glossy paper	1.4%	2.2%	0.4%	2.5%
	6	Other paper	6.1%	3.9%	4.4%	7.9%
		Total Paper	**25.0%**			
Plastic	7	Clear HDPE containers	0.4%	0.4%	0.2%	0.5%
	8	Colored HDPE containers	0.7%	0.8%	0.4%	1.1%
	9	PET bottles and jars	1.9%	1.4%	1.3%	2.5%
	10	Plastics #3 #5 and #7	1.4%	0.9%	1.0%	1.8%
	11	Retail shopping bags	0.6%	0.5%	0.3%	0.8%
	12	Polystyrene	1.4%	0.8%	1.1%	1.8%
	13	Plastic film	8.2%	3.7%	6.5%	9.8%
	14	Other plastic containers (non-recyclable)	3.5%	10.9%	<0.1%	8.5%
	15	Other plastic products	1.9%	0.5%	1.7%	2.2%
		Total Plastics	**20.0%**			
Yard Waste	16	Grass clippings	<0.1%	0.0%	<0.1%	<0.1%
	17	Leaves and other yard waste	6.3%	21.5%	<0.1%	16.1%
		Total Yard Waste	**6.3%**			
Wood	18	Wood	**5.3%**	8.9%	1.2%	9.3%
Food Waste	19	Food waste	**13.0%**	9.7%	8.6%	17.5%
Textiles, Rubber, and Leather	20	Textiles, rubber, and leather	**4.5%**	6.2%	1.7%	7.3%
Disposable Diapers and Sanitary Products	21	Disposable diapers and sanitary products	**1.8%**	1.8%	1.0%	2.6%
Other Combustibles	22	Other combustibles	**5.6%**	3.3%	4.1%	7.1%
Metal	23	Aluminum food and beverage containers	0.8%	0.6%	0.6%	1.1%
	24	Steel & Bimetal food and beverage containers	0.4%	0.4%	0.2%	0.6%
	25	Ferrous metal	1.4%	1.7%	0.6%	2.2%
	26	Other recyclable metal	1.8%	2.5%	0.6%	2.9%
	27	Nonrecyclable metal	0.1%	0.2%	<0.1%	0.2%
		Total Metals	**4.5%**			
Glass	28	Clear glass containers	1.1%	1.5%	0.4%	1.8%
	29	Brown glass containers	0.6%	0.6%	0.3%	0.8%
	30	Green/blue glass containers	0.1%	0.2%	<0.1%	0.2%
		Total Glass	**1.8%**			
Other Non-Combustibles	31	Other non-combustibles	**3.2%**	4.6%	1.2%	5.3%
Household Hazardous and Special Waste (HHW)	32	Household hazardous and special waste	**1.5%**	3.5%	<0.1%	3.1%

Table D3 - Institutional and Commercial (CI) Waste Composition
Salina Municipal Solid Waste Landfill

Material Group		Material Category	Mean Composition (%) [1]	Standard Deviation (%)	90% Confidence Limits [2]	
					Lower	Upper
Electronics and Batteries	33	Electronics	3.8%	13.0%	<0.1%	9.8%
	34	Batteries	0.1%	0.2%	<0.1%	0.2%
	41	Lithium batteries and products containing lithium ion batteries	<0.1%	0.0%	<0.1%	<0.1%
		Total Electronics and Batteries	**4.0%**			
Construction and Demolition (C&D) Waste [4]	35	Roofing materials	<0.1%	0.1%	<0.1%	<0.1%
	36	Poured concrete	0.1%	0.2%	<0.1%	0.2%
	37	Bricks	<0.1%	0.0%	<0.1%	<0.1%
	38	Blocks	<0.1%	0.0%	<0.1%	<0.1%
	39	Gypsum board and plaster	<0.1%	0.0%	<0.1%	<0.1%
		Total Construction and Demolition Waste	**9.0%**			
Sharps [5]	42	Sharps	**<0.1%**	0.0%	<0.1%	<0.1%
Unclassifiable Fines	40	Unclassifiable Fines [3]	**3.4%**	3.1%	2.0%	4.8%
		Total CI Waste Sorted	**100%**			

1. Based off of 13 hand-sorted waste samples.
2. Confidence interval is based off of a normal distribution. The confidence limits are determined by the mean percentage + or - the confidence interval
3. Visual Observation of % of Fines Shown in Table below
4. C&D Waste is reflective of C&D waste found in the waste samples physically sorted from the CI waste generators only.
5. Sharps is reflective of sharps waste found in the waste samples physically sorted from the CI waste generators only; it does not include sharps from collection units within City.

Table D4 - C&D and Industrial Waste Composition

Salina Municipal Solid Waste Landfill

	Material Components	Mean Composition (%) *
1	Concrete	<0.1%
2	Brick	3%
3	Dirt/Sand	2%
4	**Roofing materials**	**8%**
5	Yard waste	3%
6	Carpet	1%
7	Glass	3%
8	Insulation	1%
9	Plastic piping	1%
10	Plastic products	2%
11	Painted/stained wood	4%
12	Untreated wood	4%
13	**Untreated dimensional lumber**	**14%**
14	**Wood pallets**	**21%**
15	**Gypsum board**	**19%**
16	Composite metal (wires)	<0.1%
17	Appliances	<0.1%
18	Ferrous scrap	4%
19	Non-ferrous scrap	4%
20	Bulky Items	2%
21	Cardboard	4%
22	Other	<0.1%
	Total C&D and Industrial Waste	**100%**

* Composition based on visual estimation of 26 loads of C&D, concrete, industrial, and SWAN waste loads. Percentages are estimated percent by weight and shown rounded to nearest whole number.

Table D5 - Recyclables Composition
Salina Drive-Thru Recycling Center (SDRC)

Material Components			Mean Composition (%) *	90% Confidence Limits **	
				Lower	Upper
Recyclables	**Paper**				
	1R	Uncoated corrugated cardboard & pasteboard	26.4%	20.6%	32.1%
	2R	Chipboard	8.1%	6.8%	9.4%
	3R	Newspaper	5.2%	4.3%	6.0%
	4R	Mixed paper	20.7%	16.2%	25.2%
	5R	White office paper	2.8%	1.4%	4.2%
	6R	Shredded paper	2.6%	<0.1%	11.8%
		Total Paper	**65.8%**		
	Plastic				
	7R	#1 PET bottles and jars	5.4%	4.8%	6.0%
	8R	#2 Clear HDPE containers	1.3%	1.1%	1.6%
	9R	#2 Colored HDPE containers	1.2%	1.0%	1.4%
	10R	#3 - #7 Plastics	1.9%	1.6%	2.1%
		Total Plastic	**9.8%**		
	Metals				
	11R	Aluminum	0.9%	0.8%	1.1%
	12R	Steel	2.7%	2.4%	3.1%
	13R	Tin	<0.1%	<0.1%	<0.1%
		Total Metals	**3.7%**		
	Other Non-Combustibles (Glass)				
	14R	Clear glass containers	7.4%	5.9%	8.8%
	15R	Brown glass containers	3.9%	3.1%	4.8%
	16R	Green/blue glass containers	8.1%	5.5%	10.6%
		Total Other Non-Combustibles (Glass)	**19.4%**		
		Total Recyclables	**98.7%**		
Contaminates	**Contaminated Recyclables**				
	35R	Contaminated OCC	0.2%	<0.1%	0.3%
	34R	Contaminated Chip Board	<0.1%	<0.1%	<0.1%
	17R	Contaminated Paper	0.1%	<0.1%	0.2%
	18R	Contaminated shredded paper	<0.1%	<0.1%	<0.1%
	19R	Contaminated Plastic	0.2%	0.2%	0.3%
	20R	Contaminated Metals	<0.1%	<0.1%	<0.1%
	21R	Contaminated Other Noncombustibles	<0.1%	<0.1%	<0.1%
		Total Contaminated Recyclables	**0.6%**		
	Misc. Contaminations				
	22R	Organic waste	<0.1%	<0.1%	<0.1%
	23R	Manufactured products	0.2%	0.2%	0.3%
	24R	Aseptic containers	<0.1%	<0.1%	<0.1%
	25R	Medial waste	<0.1%	<0.1%	<0.1%
	26R	Aerosol cans	<0.1%	<0.1%	<0.1%
	27R	Refuse	0.2%	<0.1%	0.4%
	28R	Retail plastic bags	<0.1%	<0.1%	<0.1%
	29R	Plastic film and wrapping	<0.1%	<0.1%	<0.1%
	30R	Household chemical containers with cleaning agent remaining.	<0.1%	<0.1%	<0.1%
	31R	Plastic plant containers	<0.1%	<0.1%	<0.1%
	32R	Rigid containers	<0.1%	<0.1%	<0.1%
	33R	Polystyrene	0.1%	<0.1%	0.2%
		Total Misc. Contaminations	**0.7%**		
		Total Contaminates	**1.3%**		
		Total Recyclables & Contaminants Sorted	**100.0%**		

* Based on 24 samples of recyclables (~2.33 cubic yards each) and 2 samples of shredded paper

** Confidence interval is based off of a normal distribution

Table D6 - Non-Acceptable Materials Composition
Salina Drive-Thru Recycling Center (SDRC)

Material Components			Mean Composition (%) *
Recyclables	**Paper**		
	1R	Uncoated corrugated cardboard & pasteboard	<0.1%
	2R	Chipboard	1.3%
	3R	Newspaper	<0.1%
	4R	Mixed paper	<0.1%
	5R	White office paper	<0.1%
	6R	Shredded paper	3.2%
		Total Paper	**4.6%**
	Plastic		
	7R	#1 PET bottles and jars	<0.1%
	8R	#2 Clear HDPE containers	<0.1%
	9R	#2 Colored HDPE containers	1.2%
	10R	#3 - #7 Plastics	0.9%
		Total Plastic	**2.2%**
	Metals		
	11R	Aluminum	0.1%
	12R	Steel	0.4%
	13R	Tin	<0.1%
		Total Metals	**0.5%**
	Other Non-Combustibles (Glass)		
	14R	Clear glass containers	<0.1%
	15R	Brown glass containers	<0.1%
	16R	Green/blue glass containers	9.0%
		Total Other Non-Combustibles (Glass)	**9.0%**
		Total Recyclables	**16.3%**
Contaminates	**Contaminated Recyclables**		
	35R	Contaminated OCC	4.0%
	34R	Contaminated Chip Board	1.1%
	17R	Contaminated Paper	3.8%
	18R	Contaminated shredded paper	<0.1%
	19R	Contaminated Plastic	17.7%
	20R	Contaminated Metals	9.4%
	21R	Contaminated Other Noncombustibles	<0.1%
		Total Contaminated Recyclables	**36.0%**
	Misc. Contaminations		
	22R	Organic waste	1.6%
	23R	Manufactured products	<0.1%
	24R	Aseptic containers	7.5%
	25R	Medial waste	<0.1%
	26R	Aerosol cans	1.7%
	27R	Refuse	26.9%
	28R	Retail plastic bags	0.9%
	29R	Plastic film and wrapping	7.8%
	30R	Household chemical containers with cleaning agent remaining.	<0.1%
	31R	Plastic plant containers	<0.1%
	32R	Rigid containers	<0.1%
	33R	Polystyrene	1.2%
		Total Misc. Contaminations	**47.7%**
		Total Contaminates	**83.7%**
		Total Non-Acceptable Materials Sorted	**100.0%**

* Based on the materials SDRC staff rejected during the recyclables sample collection from the SDRC. Non-acceptable materials are normally returned to the customer.

Appendix E

Pre-Consumer Organics Waste Surveys

Dillon's Food Store

Martinelli's Little Italy

PRE-CONSUMER ORGANIC WASTE SURVEY

Client:	City of Salina, Kansas	**Survey Date:**	November 15, 2021
Project:	Salina Waste Sort – 27220089.16	**Performed By:**	Krista Long, SCS Engineers
Site:	Dillon's Food Store 1201 West Crawford Street Salina, Kansas		

1 PURPOSE AND OBJECTIVE

The City is looking at how businesses in the community currently manage organic waste. As such pre-consumer organic waste surveys were completed from participating businesses. This pre-consumer organic waste survey was to help obtain information from a regionally-operated grocery store to better understand their current management of pre-consumer organic waste.

2 SUMMARY OF SURVEY STEPS

The following steps were taken to conduct the survey:

1. The City selected Dillon's Food Store (Dillon's) for this survey due to its wide variety of waste diversion and recycling programs.
2. The City contacted Dillon's to schedule an in-person interview between Dillon's management personnel and SCS Engineers (SCS) personnel.
3. SCS contacted Dillon's to confirm the date and time of the scheduled interview.
4. On the day of the interview, an SCS personnel, Krista Long, met with a store manager, Greg Moore, at the Dillon's store located at 1201 West Crawford Street in Salina (the Crawford Store).
5. Mr. Moore and Ms. Long discussed various survey questions related to organics at the store.
6. Toured the different areas of the store that generate organic waste.
7. With permission and as appropriate, photos were taken of waste receptacles and areas pertaining to the survey.
8. Following the interview, SCS compiled notes from the survey.
9. Follow-up questions were emailed to Mr. Moore following the interview.
10. Ms. Long performed a follow-up phone interview with Mr. Moore on January 6, 2022 and compiled notes from this interview.
11. Follow-up questions were emailed to Corporate Affairs Manager, Ms. Sheila Regehr, on January 14, 2022. No response was received.

3 GENERAL FACILITY INFORMATION

The Kroger Company owns Dillon's Food Stores. As of November 2021, there were 81 Dillon's Food Stores. The survey was conducted at the store located at 1201 West Crawford Street in Salina, Kansas (the Crawford Store). This store is open Sunday through Saturday from 7:00 AM to 11:00 PM.

4 EXISTING WASTE REDUCTION ACTIVITIES

Dillon's general procedure for preventing organic waste generation is as follows:

1. Reduce the price of the item to promote its sale in-store
2. Donate the item to the food bank
3. Compost the item

PRE-CONSUMER ORGANIC WASTE SURVEY

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Site:	Dillon's Food Store 1201 West Crawford Street Salina, Kansas		

The following describe various management techniques used by Dillions to help manage their organics inventory and reduce generation of waste.

Inventory Management System

Dillon's utilizes a constantly revolving, computer-assisted inventory management program. This program calculates forecasted purchases for any given product based upon previous 3.5 years of sales. Orders are made automatically by the system based upon these forecasts.

Red Bag Sale

"Ugly" produce is managed via a Red Bag Sale where customers can fill up a red bag with ugly produce for $0.99.

Reclamation Program

Expired and recalled dry goods, and dented cans, are returned to the Dillon's Hutchinson Distribution Center. From there, they are returned to the manufacturer for reimbursement. See Photo 1.

Photo 1. Reclaimed product area.

Photo 2. Label instructing storage of meat products for donation to food bank.

Donations to Food Bank

The store works with the local food bank to donate food items prior to becoming inedible. The food bank picks up items that are still consumable Monday through Friday at 9:30 AM. This includes meat products, which are stored in a freezer when nearing expiration. Additionally, milk products that are within 10 days of expiration are donated to the food bank. The food bank will not take any item that is over 30 days expired, or any dented cans. Other Dillon's stores in the Salina area have similar donation programs. See Photo 2 for example of labeling instructions.

PRE-CONSUMER ORGANIC WASTE SURVEY

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Site:	Dillon's Food Store 1201 West Crawford Street Salina, Kansas		

Compost Program

A robust compost program was established at Dillon's 1.5 years ago, beginning in a pilot program in a store off of Ohio Street in Salina, Kansas. Greg Moore worked at that store at the time, and assisted with the pilot program. The pilot program resulted decrease trash generation and it reduced the frequency of dumpster emptying from once every 8 or 9 days to once every 20 days or so. A reduction in landfill disposal costs were observed, although these costs may be offset by the costs to transport composted materials.

Almost all Dillon's stores have begun to roll-out the program, except for some of the smaller stores in more rural areas. At the time of the survey, the Crawford Store was still in the process of rolling out its organics program. The store has already seen benefits from the program, such as the required frequency of emptying the trash dumpster being reduced from once every 7 to 8 days to once every 14 to 15 days.

Prior to the establishment of the compost program, all waste (including food) went into the trash compactor or down the garbage disposal. The compost program at the Crawford Store includes an approximately 270-gallon compost bin located indoors toward the back of the store. Acceptable materials for the compost bin include:

- Food (produce, dry goods, meat, bones)
- Incidental plastics (i.e. plastic film on vegetables, plastic containers for vegetables)
- Paper products
- Floral products
- Incidental cardboard/chipboard (i.e. cardboard boxes for dry goods)

Unacceptable materials for the compost bin include:

- Liquids (these are poured down the drain)
- Glass or metal (i.e. food contained in glass or metal jars)

To promote usage of the compost bin, garbage disposals were removed from all sinks in the store. The compost bin is stored in a refrigerated room kept at between 55 to 60 degrees Fahrenheit. The compost bin is lined with a compostable liner. Once full, it is sealed with a plastic lid. See Photo 3.

Photo 3. Compost bin with biodegradable liner and plastic lid sitting behind the bin.

The compost bin is picked up five days per week on refrigerated trucks and transported to the Hutchinson Distribution Center. From there, it is transported to Lee's Summit, Missouri for final management by a third-party company. A surplus of empty compost bins are kept at the store so

there is always a bin available for use. Typically, an empty bin is dropped off each time a full bin is picked up from the store.

Larger stores have an additional container in the freezer for protein storage. This reduces odors, and is better for transport in the summertime because the materials are solidified.

Once received by the third-party company, plastics are melted off and sent to another company in Missouri to be used for energy generation.

The goal is to eventually sell the finished compost at Dillon's stores. At one of the Dillon's stores in Salina in the summer of 2021, finished compost was given away at no cost.

Returned Items

Returned items that meet the acceptable criteria listed above are composted. Returned food items in glass or metal containers are disposed of as it would be too time-consuming to dump the contents of individual glass and metal containers into the compost bin.

Pop Can Recycling

There is a pop can recycling container in the break room. An employee is responsible for taking its contents to a local pop can recycler.

Cardboard Recycling

Cardboard boxes are collected, compacted, and bailed and then sent to a cardboard recycler in Hutchinson. The cardboard recycler pays the store for its cardboard.

Plastic Film Recycling

Large plastic film, such as from incoming pallets, is collected and sent to the Hutchinson Distribution Center for recycling. Approximately two to three large, approximately 55-gallon bags are filled up per day with plastic film. See Photo 4.

Photo 4. Plastic film collection.

5 GENERATION ESTIMATIONS

Generation estimations are included below to better understand how much waste is generated within various departments and whether it is sent to a landfill or composted. Please note this is focused on pre-consumer organics, other waste is generated within this facility and information is not available to include within this survey.

Bakery Department

- One rectangular cardboard box used for bakery scraps; size varies depending on what is available, but at the time of the survey, box size was approximately 20" L x 9" W x 13" H (~1.5 gallons). See Photo 5 for example boxes.
    - Emptied approximately **once per day** when **100 percent full**
    - Contents are **composted**
    - Resulting compost generation rate:
        - 1.5 gallons x 1 per day x 100% full = ***1.5 gallons per day***
        - 1.5 gallons per day x 7 days per week = ***10.5 gallons per week***
        - 10.5 gallons per week x 52 weeks per year = ***546 gallons per year***

- One cylindrical 55-gallon trash container used for everyday trash and ice buckets.
    - Emptied approximately **once per day** when **90 to 100 percent full**
    - Contents are emptied into the trash compactor, and ultimately **landfilled**
    - Resulting waste generation rate:
        - 55 gallons x 1 per day x 100% full = ***55 gallons per day***
        - 55 gallons per day x 7 days per week = ***385 gallons per week***
        - 385 gallons per week x 52 weeks per year = ***20,020 gallons per year***

Deli Department

See photo 6 for general Deli area.

- One rectangular cardboard box used for meat scraps; size varies depending on what is available, but at the time of the survey, box size was approximately 20" L x 9" W x 13" H (~1.5 gallons). See Photo 5 for example boxes.
    - Emptied approximately **once per day** when **100 percent full**
    - Contents are **composted**
    - Resulting compost generation rate:
        - 1.5 gallons x 1 per day x 100% full = ***1.5 gallons per day***
        - 1.5 gallons per day x 7 days per week = ***10.5 gallons per week***
        - 10.5 gallons per week x 52 weeks per year = ***546 gallons per year***

PRE-CONSUMER ORGANIC WASTE SURVEY

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Site:	Dillon's Food Store 1201 West Crawford Street Salina, Kansas		

- One cylindrical 55-gallon trash container used for everyday trash and ice buckets.
  - Emptied approximately **once per day** when **90 to 100 percent full**
  - Contents are emptied into the trash compactor, and ultimately **landfilled**
  - Resulting waste generation rate:
    - 55 gallons x 1 per day x 100% full = ***55 gallons per day***
    - 55 gallons per day x 7 days per week = ***385 gallons per week***
    - 385 gallons per week x 52 weeks per year = ***20,020 gallons per year***

Photo 5. Example boxes used for bakery and deli scraps.

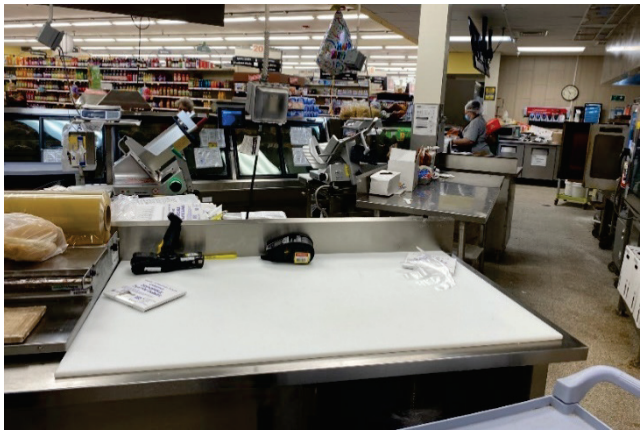

Photo 6. Deli area.

Photo 7. Bin used for meat scraps.

Meats Department

- One rectangular plastic bin used for meat scraps; approximately 24" L x 13" W x 8" H (~10 gallons). See Photo 7.
  - Emptied approximately **once per day** when **100 percent full**
  - Contents are **composted**
  - Resulting compost generation rate:
    - 10 gallons x 1 per day x 100% full = ***10 gallons per day***
    - 10 gallons per day x 7 days per week = ***70 gallons per week***
    - 70 gallons per week x 52 weeks per year = ***3,640 gallons per year***

- One cylindrical 55-gallon trash container used for everyday trash and ice buckets.
  - Emptied approximately **once per day** when **90 to 100 percent full**
  - Contents are emptied into the trash compactor, and ultimately **landfilled**
  - Resulting waste generation rate:
    - 55 gallons x 1 per day x 100% full = ***55 gallons per day***
    - 55 gallons per day x 7 days per week = ***385 gallons per week***
    - 385 gallons per week x 52 weeks per year = ***20,020 gallons per year***

PRE-CONSUMER ORGANIC WASTE SURVEY

Client:	City of Salina, Kansas	**Survey Date:**	November 15, 2021
Project:	Salina Waste Sort – 27220089.16	**Performed By:**	Krista Long, SCS Engineers
Site:	Dillon's Food Store 1201 West Crawford Street Salina, Kansas		

Produce Department

- Compostable produce materials placed directly into compost bin; see "Compost Bin" section below.

- One cylindrical 55-gallon trash container used for everyday trash and ice buckets.
  - Emptied approximately **once per day** when **90 to 100 percent full**
  - Contents are emptied into the trash compactor, and ultimately **landfilled**
  - Resulting waste generation rate:
    - 55 gallons x 1 per day x 100% full = ***55 gallons per day***
    - 55 gallons per day x 7 days per week = ***385 gallons per week***
    - 385 gallons per week x 52 weeks per year = ***20,020 gallons per year***

Summary of Compost Bin Generation Rates – To be Composted

The compost bin consists of consolidated materials from each of the departments listed above. Additionally, returned and expired food items may be placed into the compost bin, as well as floral and other organic items (i.e. pumpkins). See Photo 8. The generation rate is estimated below:

- Approximately 4' L x 3' W x 34" H (~270 gallons)
  - Emptied approximately **5 days per week** when **100 percent full**
  - Contents are transported to Hutchinson Distribution Center, and then to a third-party company for final management as compost
  - Resulting generation rate:
    - 270 gallons per day x 100% full x 5 days per week = ***1,350 gallons per week***
    - 1,350 gallons per week x 52 weeks per year = ***70,200 gallons per year***

Photo 8. Contents of compost bin.

Summary of Waste Generation Rates – To be Landfilled

The estimated waste generation rates sent to the landfill from each of the departments are summarized as follows:

- Bakery: 55 gal/day
- Deli: 55 gal/day
- Meats: 55 gal/day
- Produce: 55 gal/day
- **TOTAL: 220 gal/day (1,540 gal/week; 80,080 gal/year)**

Other waste is generated throughout the store and brought directly to the trash compactor; with the current data available, these quantities are unknown.

6 BARRIERS TO INCREASING WASTE DIVERSION EFFORTS

Mr. Moore indicated the main barrier to increasing waste diversion efforts at the store was untrained staff. With the nationwide workforce shortage due to COVID-19, it is hard to retain employees and have enough employees working at any given time to facilitate thorough training efforts. Because of this, untrained staff do not know to put food waste into the compost bin and instead throw it in waste bins throughout the departments.

PRE-CONSUMER ORGANIC WASTE SURVEY

Client:	City of Salina, Kansas	**Survey Date:**	November 15, 2021
Project:	Salina Waste Sort – 27220089.16	**Performed By:**	Krista Long, SCS Engineers
Site:	Martinelli's Little Italy 158 South Santa Fe Avenue Salina, Kansas		

1 PURPOSE AND OBJECTIVE

The City is looking at how businesses in the community currently manage organic waste. As such pre-consumer organic waste surveys were completed from participating businesses. The purpose of this pre-consumer organic waste survey was to obtain information from a popular City of Salina restaurant to better understand their current management of pre-consumer organic waste.

2 SUMMARY OF SURVEY STEPS

The following steps were taken to conduct the survey:

1. The City selected Martinelli's Little Italy (Martinelli's) restaurant for this survey due to its popularity and local ownership.
2. The City contacted Martinelli's to schedule an in-person interview between Martinelli's management personnel and SCS Engineers (SCS) personnel.
3. SCS contacted Martinelli's to confirm the date and time of the scheduled interview.
4. On the day of the interview, an SCS personnel, Krista Long, met with the restaurant owner, Tony Dong at Martinelli's.
5. Mr. Dong gave Ms. Long a brief tour of the restaurant.
6. During the tour, discussed survey questions related to organics at the store.
7. With permission as appropriate, photos were taken of waste receptacles and areas pertaining to the survey.
8. Following the interview, SCS compiled notes from the survey.
9. Follow-up questions were emailed to Mr. Dong following the interview.
10. Ms. Long performed a follow-up phone interview with Mr. Dong on January 6, 2022.

3 GENERAL FACILITY INFORMATION

Martinelli's Little Italy is an Italian restaurant located in the heart of downtown Salina, Kansas at 158 South Santa Fe Avenue. Martinelli's has been open since September of 2001. Martinelli's is locally owned and operated by Mr. Tony Dong and family. The restaurant is open Monday through Saturday from 11:00 AM to 10:00 PM.

4 EXISTING WASTE REDUCTION ACTIVITIES

The following describe various management techniques used by Martinelli's to help manage their organics and waste generation.

Used Oil Recycling

For 20 years, Martinelli's has recycled its used oil via a third-party company, Darling Ingredients, who uses it to make biofuel. Used cooking oil is collected from the kitchen and transferred to a used oil

container located behind the restaurant. Once a month, this container is emptied by Darling Ingredients.

Minimizing Food Scraps

Martinelli's works hard to utilize all parts of the foods in their recipes, including "ugly" produce. For example, a lot of their vegetable scraps are used in their steak soups. They also pay close attention to expiration dates, and work hard to use food before it expires.

Weekly Usage System

Martinelli's utilizes a weekly food usage system for food ordering, which incorporates both recent amounts of dishes ordered by customers and food used in the kitchen. Typically, there is not much variation in the quantities of food ordered. Food is delivered to the restaurant twice per week. This usage system helps minimize over-ordering.

Food Donation Programs

When carry out orders are not picked up, Martinelli's donates them to the Rescue Mission or similar organizations. This helps avoid cooked, edible food from being thrown away.

5 GENERATION ESTIMATIONS

Generation estimations are included below to better understand how much waste is generated in the kitchen. Martinelli's does not currently separate organics from other waste generated at the restaurant. All generated waste, excluding used cooking oil, is disposed of in waste receptacles throughout the kitchen area, see Photo 1. At the time of the survey, the following waste receptacles were observed in the kitchen and bar areas:

- Seven rectangular 30-gallon containers, approximately 19" L x 11" W x 30" H (black)
- One cylindrical 55-gallon container (gray)

Waste receptacles are emptied at a frequency of three times per day into a dumpster located behind the restaurant, managed by HomeTown Disposal. According to Mr. Dong, waste receptacles are approximately 80-percent full when emptied.

Photo 1. General waste receptacles in kitchen.

The approximate daily waste generation rate from the restaurant is calculated as follows:

Total waste receptacle volume: (7 x 30-gallons) + (1 x 55-gallons) = 265 gallons

Waste generated per day: 265 gallons x 80% x 3 empties per day = **636 gallons per day**

Waste generated per week: 636 gallons per day x 6 days per week = **3,816 gallons per week**

Waste generated per year: 3,816 gallons per week x 52 weeks per year = **198,432 gallons per year**

6 BARRIERS TO INCREASING WASTE DIVERSION EFFORTS

Mr. Dong listed the following as the main barriers to increasing waste diversion efforts at the restaurant:

- Lack of space for additional containers;
- Inefficiencies related to separating organic waste from other waste; and
- Challenges with maintaining waste separation amidst the fast-paced restaurant environment.