Supplemental Information: Recyclability of Paper Cans

Dec. 13, 2022

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DEQ is a leader in restoring, maintaining and enhancing the quality of Oregon's air, land and water.

State of Oregon
Department of Environmental Quality

At the Oct. 20, 2022 meeting of the Oregon Recycling System Advisory Council, the Council discussed the potential of including paper "cans" in Oregon's future commingled recycling system. Oregon DEQ shared summary information regarding the likely outcome of such inclusion, noting, based on information provided by Sonoco, that most cans would flow to the container line (vs. the paper line) and from there, many (although not all) would be picked up by magnets along with all-steel cans. From there, they would either be marketed directly to a steel mill, or to an intermediate processor, who would shred the cans, with most paper fractions going to disposal. In either case, any remaining paper fraction received at the steel mill would be burned off, while the steel fraction would be recovered at yield rates similar to those of steel cans.

Several Council members asked for documentation regarding the behavior of these materials in MRFs, as well as the willingness of steel end markets to accept the material.

In this document, DEQ provides three sets of information provided to it by Sonoco, which claims to be the largest domestic manufacturer of this packaging format.

First is Sonoco's initial response to a Request for Information that DEQ published in February of this year. This response initiated a series of conversations and email exchanges between DEQ and Sonoco, many of which were summarized and shared with DEQ's Technical Workgroup in meetings earlier this year.

The second set of responses involve studies of material flow or bale outputs at three different MRFs (Columbia County, SC; Jacksonville, FL; and Mecklenburg County, NC). A 2021 RRS study at a fourth MRF (in Texas) is not publicly available, but Sonoco reports that its results are included in summary information that Sonoco provided to DEQ (and which DEQ re-calculated and provided to the Council in October).

The final set of responses involve seventeen letters of acceptance from steel recyclers in the US, Canada, Australia, and elsewhere.

March 18, 2022

David Allaway
Senior Policy Analyst
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Subject: Response to the request for information for Oregon statewide recycling collection list

Dear Mr. Allaway:

Sonoco is committed to creating sustainable products, services and programs for our customers, employees, and communities. A $5.6 billion company with more than 300 operations in 32 countries and 25,000 employees, Sonoco produces rigid and flexible paper and plastics consumer products, metal consumer products, healthcare and protective packaging and industrial wood and paper products. See Picture 1 for examples of Sonoco products today.

As a top10 domestic recycler and as one of the country's largest consumers of recovered paper, Sonoco appreciates the challenges faced by today's recycling systems. We are supportive of the transparent process Oregon has created to help define their statewide recycling collection list. In the following pages is 1) a description of Sonoco's Paper Can with Steel Bottom, 2) a general summary of the pathways to recyclability and 3) specific responses to the statutory criteria listed in the Request For Information for Oregon statewide recycling collections list. By providing this information, Sonoco seeks to have the paper can with steel bottom included on the Oregon statewide recycling collection list of materials.

Package Description – Paper Can with Steel Bottom

The paper can, feature in Picture 2 below, is an assembled package comprised of a multi-layer can body, metal bottom, top closure with removable panel, and a plastic lid for reclose. At the time of collection for recycling, both the top closure's removable panel and the plastic lid will have been removed by the consumer for separate recycling so only the can body, bottom end and top closure ring will remain assembled together. See Picture 3 below.

The multi-layer can body is made of paperboard with 100% recycled fiber, an inner barrier liner and a printed outer paper label. That entire multi-layer can body is approximately 90% fiber, and the bottom end and top ring are both 100% steel with 10% recycled content today.

Picture 2

Picture 3

Pathways to Recyclability

There are two pathways to recycling paper cans with steel bottoms: cans may be recycled 1) through the steel stream or 2) through the paper fiber stream. In the steel stream, the steel bottoms and steel top closure rings are recovered and recycled, and the can body is consumed as a source of energy for the high energy steel recycling process. Alternatively, when recycling the paper can through the fiber stream, the fiber is recycled in the pulping process, and the steel components and inner barrier liner are recovered for further processing and recycling.

Sonoco began increasing the recycling rates of paper cans with the launch of their Recyclability Program in 2021. The program uses trial data, technical partnerships, and communication to prove the paper can is able to be processed through the steel streams and the paper recycling streams across North America. This program has shown that up to 135,000 tons of paper containers with steel bottoms could be diverted from landfill. Recycling the paper container with steel bottom in the steel and/or paper stream has a lower climate change impact compared to landfilling at end of life, and recycling steel and/or paper contributes to reductions in greenhouse gas emissions across the affected industries.

Responses to the Statutory Criteria as stated in the RFI

Climate Impact

The paper can is currently a product of the recycling system with a can body comprised of paperboard produced from 100% recycled fiber and with 10% of the steel end composed of post-consumer recycled steel. By ensuring the paper can packages are collected in the recycling stream and not sent to landfill, Oregon can help reduce its carbon impact on the climate and support circularity.

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There is a 46% reduction in GHG emissions when using recycled steel versus virgin steel. Additionally, a third party European PIQET analysis[1] shown in Figure 1 shows the paper can has the lowest GHG emissions when compared to alternative rigid packaging material formats. Finally, the extended shelf life provided by these paper cans for food products results in a minimization of food waste and related CO_2 emissions.

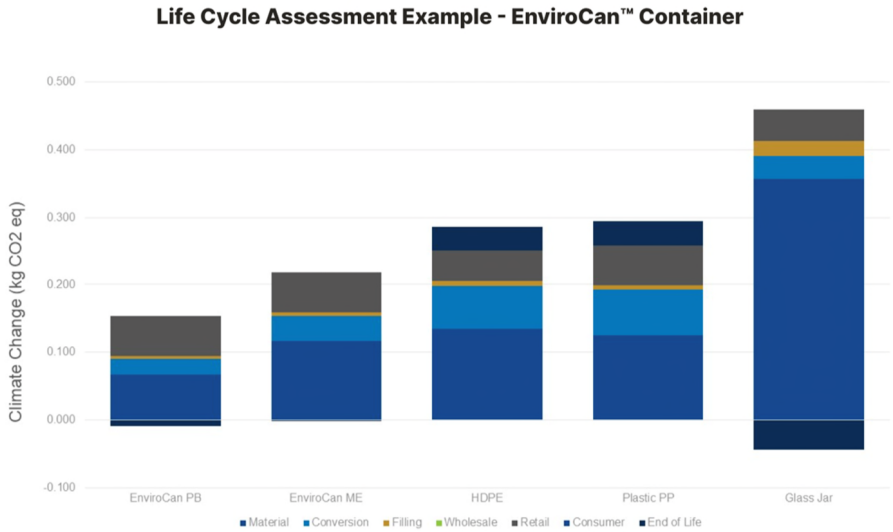


Figure 1: (EnviroCan PB is paper can with paper bottom. EnviroCan ME is paper can with metal end.)

Stability, Maturity, Accessibility and Viability of Responsible End Markets: Steel Mill Recycling

As mentioned earlier, both the paper and steel material streams support the recycling of the paper can with steel bottoms. Recycling of paper cans in steel mills is a decades-long practice that could be leveraged in any mills that currently process steel cans. On a national scale, Sonoco has received letters from major steel recyclers in the US, some who operate in the state of Oregon. See Pictures 4 and 5 showing steel can bales with paper cans baled today.

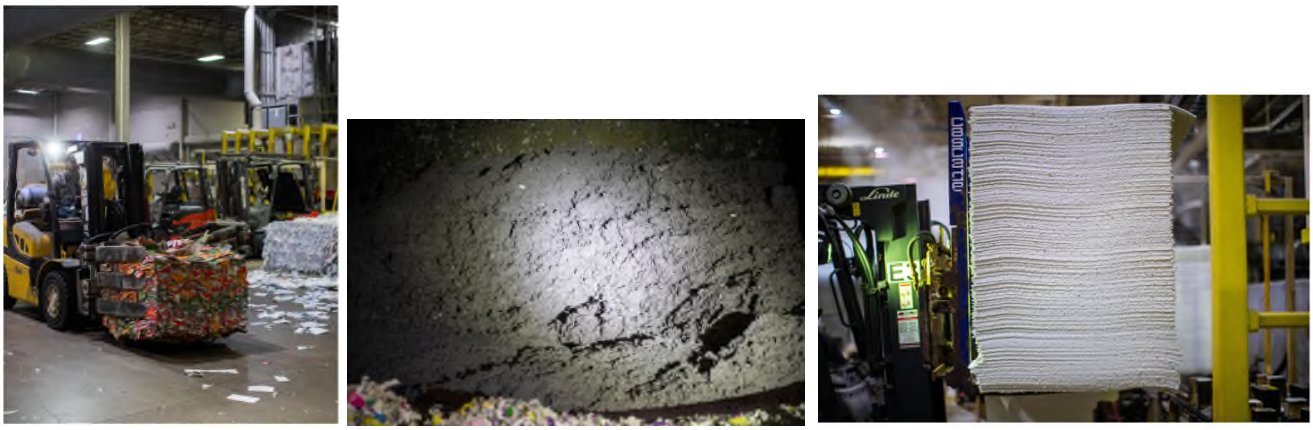
Picture 4

To support the recycling of the paper can in Oregon, there are four (4) major steel mills in Oregon, Washington, and northern California. They are Enraz Oregon Steel, Cascade Steel, USS Posco, Nucor Steel, and SteelScape. Bales of steel cans with a percentage of steel bottom paper cans are recycled by following the normal steps of shredding, media separation, melting and reshaping. Recycled steel can be used for the same applications as steel produced from virgin material. Products that are made of recycled steel include: electrical appliances, automobiles and other vehicles, office supplies, hardware, construction materials, and containers[2] and steel ends for cans. By using the tonnage of paper cans produced today, steel cans recycled today and steel composition in the paper can, an estimate of the composition of the steel can bale is calculated. Sonoco estimates that less than 1% of any steel can bale will contain non-steel components from the paper can.

Stability, Maturity, Accessibility and Viability of Responsible End Markets: Paper Mill Recycling

Recycling at paper mills is also a viable pathway to recyclability. There are several paper mills that source recycled content in Oregon or surrounding areas such as Willamette Falls, Georgia Pacific, and Norpac Paper. After several mill trials in 2021, Sonoco has announced that ten (10) Sonoco paper mills throughout the US will accept paper cans in the mixed paper bales including the Sumner mill in Washington and City of Industry mill in California.[3]

These are long standing operations with stable markets and products. The paper can is able to be repulped successfully where fiber is recovered and easily separated from the non-fiber components of the can. Furthermore, the barrier layer and the steel ends are recaptured by screens that exist in today's facilities. From there, new recycled paper products of high quality are produced, the steel components can be recycled at steel mills and as advanced chemical recycling technologies continue to scale up, the barrier liner material is available for recycling into new products. A video is provided in the accompanying materials to show an actual pulping trial with paper cans that was conducted in December 2021 at the Sustana paper mill in Wisconsin. See picture below from the Sustana paper mill trial showing a bale of paper cans being process with other paper products and used to product high quality paper sheets.



Picture 5

Environmental Health and Safety Considerations – N/A

There are no associated hazards in collecting, sorting, or processing the paper cans.

The Anticipated Yield Loss for the Material During the Recycling Process

Paper cans are 40-60% steel are collected by magnet for steel can baling. Steel maintains its structural integrity during the recycling process and can be recycled infinitely. When recycled, steel components yield 99.9% material.[4]

Alternative, cans with up to 80% fiber are collecting for processing in the paper mills and the steel ends are recyclable downstream. Repulpability and recyclability tests show that more than 85% of the can body structure is recovered during pulping and converted into new paper products. The third-party repulpability report is enclosed.

The Material's Compatibility with Existing (Oregon) Infrastructure & The Practicalities of Sorting and Storing the Material

No adjustments to the existing Oregon infrastructure are required to recycle the paper can. The can is collected today in residential curbside programs by being placed in standard bins. The MRFs sort the paper cans either into the steel can bin or with paper products. In addition, to the magnet recovery of the cans, Sonoco has verified that the paper cans is identified by Near Infrared (NIR) technology and robotic technologies such as AMP Robotics as well. The paper cans flow to these types of equipment and sort on par with poly coated paperboard materials. See link to press release

speaking to Sonoco's progress in recycling by partnering with the technology leaders.

The Amount of the Material Available

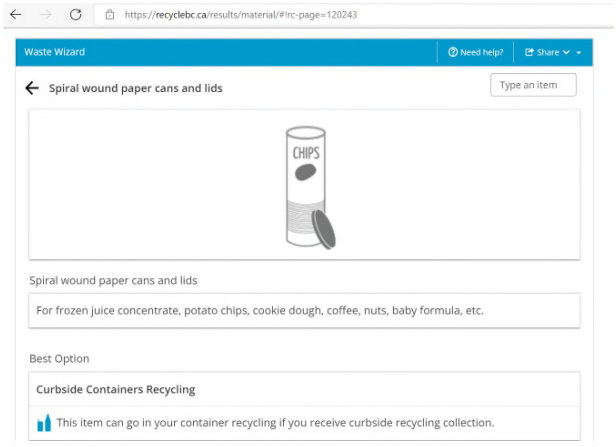
The estimated amount of paper cans available for recycling in Oregon is 1,700 - 1800 tons. This estimate is based on Oregon population relative to the US and Sonoco's national distribution of paper cans.

Contamination

Paper cans are predominately used to package dry products and therefore there are little to no issues with contamination from the paper cans or the residual product inside the can. The repulpability and recyclability tests performed by Sonoco have shown they are appropriate for the paper recycling process where high quality paper products were produced from the pulp which included paper cans. The previously mentioned repulpability report which is enclosed speaks directly to the quality of the paperboard produces from recycled cans. That report showed adequate board strength, visual appearance and moisture content.

The Ability for Waste Generators to Easily Identify and Properly Prepare the Material

As stated above, paper cans are predominately used to package dry products. In addition, paper cans are easily identified with the use of specific graphics or descriptions on municipal material collection sites. The paper can is a program material for RecycleBC with instructions to be placed in curbside recycling collection[6]. (See Picture 6 below.) The paper can is also accepted in Multi-Material Stewardship Manitoba programs[7] as well as programs in Stewardship Ontario,[8] including Toronto.



Picture 6

Additionally, for ease and simplicity of communication from the MRF or municipality to the residential consumer, sample text and graphics to describe the paper can package to consumers on list for accepted items to recycle are provided by Sonoco. Below is an example how Sonoco supports the municipalities for increased recyclability and collection with flyers and website content:

A paper canister with steel bottom, also known as a spiral wound container, cardboard can, and paperboard canister, is a multilayer paper canister commonly used to package coffee, dough, snacks, nuts, powdered drinks, and supplements.

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Graphic 1

Economic Factors

By adding paper cans to the MRF collection, additional revenue is available for the increased material flow into recycling streams. There is no disruption to the steel or paper recycling processes. The steel recycling process is up to 74% more energy-efficient than virgin steel production. The demand for recycled steel far exceeds supply, making it a highly valuable material that is very cost-effective to collect and recycle.[9] Recycling paper products also has energy-related cost savings with that recycling process requiring 45% less energy.[10]

Environmental Factors from a Life Cycle Perspective

Steel components can be recycled indefinitely without losing any of its properties. Recycling 1 ton of steel helps to save 1.8 barrels of oil, 10.9 million BTUs of energy, 642 kWh of energy, and 2.3 m^3 of landfill space.[11] Additionally, for every ton of steel recycled, 2500 pounds of iron ore, 1400 pounds of coal and 120 pounds of limestone are conserved.[12] Making a food can from recycled steel means 75 percent less greenhouse gas emissions and energy use compared to using virgin steel.[13]

Utilizing PIQET Life Cycle Analysis software Sonoco compared recycling a paper can to landfilling a paper can. As seen below, there is a 45% reduction in GHG gases when the paper can is recycled instead of landfilled.

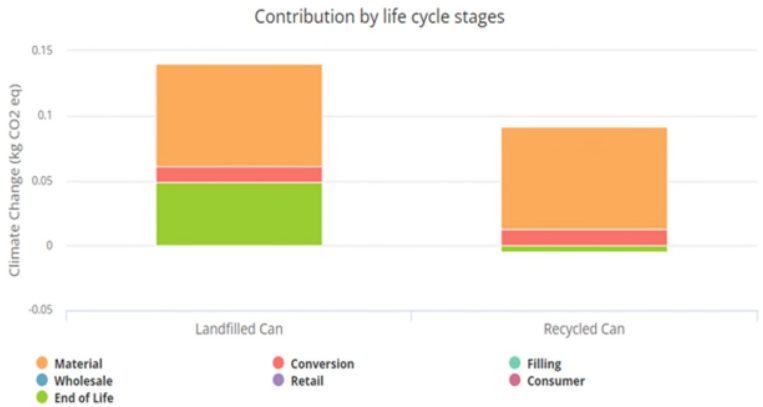

Figure 2:

And, as mentioned earlier, the environmental benefits of paper cans compared to other rigid packaging formats is significant.

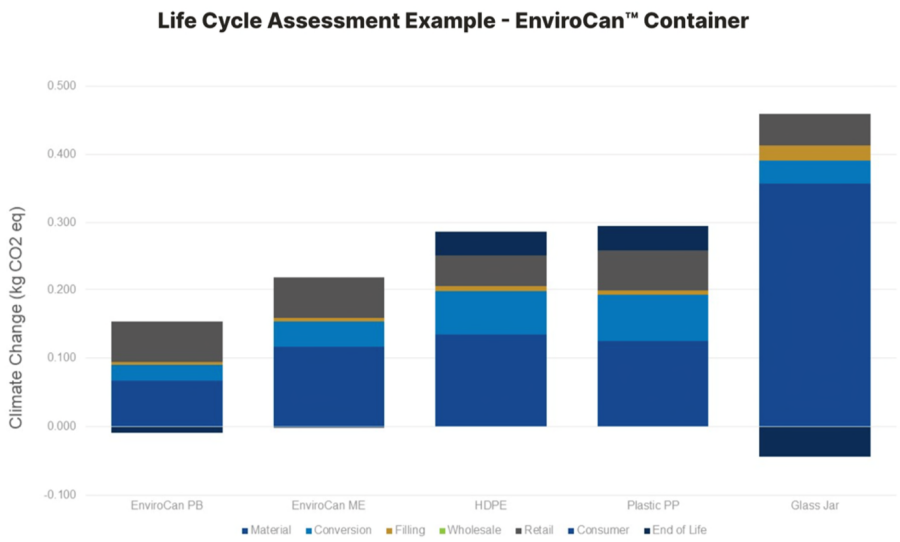

Figure 3: (EnviroCan PB is paper can with paper bottom. EnviroCan ME is paper can with metal end.)

Policy expressed in Oregon Revised Statutes 459.015 (2)(a) to (c), as amended by Section 46 of the Recycling Modernization Act

Recycling the rigid paper can fulfills the policy expressed in Oregon Revised Statutes 459.015 (2)(a) to (c). The paper can is a packaging format that utilizes a high percentage of post-consumer recycled content, which lowers its life cycle impact on human health and the environment.[14] The paper can also utilizes less materials when compared to alternatives.[15]

While the paper can is not designed to be reused, it is a packaging format that can be recycled utilizing infrastructure available in nearly all MRFs. Sonoco is dedicated to educating the recycling value chain about the benefits of recovering the paper can and will continue to invest in both lowering the environmental impact of the package and ensuring positive end of life outcomes.

Summary

Sonoco is committed to advancing the recycling of all packaging and especially paper cans. Although this package has multiple components, the existing infrastructure is suitable for recycling the can effectively efficiently with significant positive impacts on the environment. Sonoco has used and will continue to use its integration with material recovery facilities and paper mills and steel can manufacturing to support circularity in paper and steel streams.

We look forward to answering any questions you may have around the viability of including the paper can with steel bottom on the Oregon Statewide Recycling Collection list. Please feel free to reach out to me at sabrina.dixon-ridges@sonoco.com with any questions. I look forward to hearing from you. Thank you.

Sincerely,

Sabrina Dixon-Ridges

Sabrina Dixon-Ridges
Global Sustainability Manager

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Sources

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[13] Home page - worldsteel.org
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[15] Third party validate European PIQET analysis

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Paperboard Can Materials Recovery Facility Flow Study

Prepared by:

Commissioned by: Sonoco

June 2021

Circular Matters

Contents

Figures

Tables

Introduction

Consumer packaged goods (CPG) companies are increasingly requesting precise information on how the consumer-facing packaging they purchase from suppliers is managed at end of life. This includes rigid paperboard cans that Sonoco and other companies manufacture for CPGs. Currently, only anecdotal information exists regarding the extent to which these cans are accepted in consumer recycling programs, the percentage of paperboard cans that consumers separate for recycling, and flows in materials recovery facilities (MRFs) for successful sorting into product bales.

Circular Matters conducted this study for Sonoco to document the proportion of paperboard cans in single-family home recyclables from one representative curbside collection route and to verify how its paperboard cans flow in MRFs.

A typical construction for paperboard cans (also referred by some as paper cans, spiral wound cans, composite canisters, etc.) is shown in Figure 1.

Figure 1: Example Paperboard Can Construction

The composition of paperboard cans varies. Some are made completely of paperboard with no metal components, others made with steel components, and others with aluminum components. The choice of whether the cans are made with metal or not and what type of metal affects how paperboard cans are sorted by equipment in MRFs. Sonoco's paperboard cans evaluated in this study vary in metal content from 19 to 59 percent by weight.

Examples of paperboard cans made by Sonoco are shown in Figure 2.

Figure 2: Sonoco Paperboard Cans

According to Sonoco, the company supplies approximately 145,000 tons of paperboard cans to the North American market and is the largest supplier of this type of packaging to the marketplace.

Unfortunately, many municipally sponsored residential recycling programs either exclude these cans from their collection programs or fail to positively identify them as recyclable, resulting in confusion with recycling program participants. Sonoco reports that less than 23 percent of the U.S. population is serviced by municipal recycling programs that explicitly list these containers as recyclable.

There is a hesitancy by municipalities and MRFs to accept paperboard cans in residential recycling streams, often relating to lack of information and misunderstanding. These concerns include:

- Questions around whether these are accepted or considered contaminants by steel can markets (in single-stream collection programs a majority of these cans are sorted into the steel can stream due to the steel bottoms); and
- Uncertainty over where these cans ultimately flow in MRFs.

Sonoco has confirmation that steel can markets value the steel from the cans in their recycling processes and that the amount of paper at typical paperboard can generation and recycling rates is not concerning (remember also that steel cans have paper labels).[1] The point of this study therefore was to focus on where paperboard cans of various constructions flow in residential single-stream MRFs. The focus was on single-stream MRFs since over 90 percent of residential recyclables are collected single stream in the U.S. Where paperboard cans ultimately flow

[1] Only the steel portion would be recycled, with the paper and plastic portions being used for energy or as a chemical agent to reduce oxidized iron.

depends on consumer preparation (e.g., flattening), package design, collection compaction, and MRF design. Different can types were expected to be sorted into a variety of product streams or residue.

The results of this study can be used by:

- **Packaging producers and CPGs**, including Sonoco and its customers, to better understand package design features and their impacts on MRF sortability into target recyclable commodity grades;
- **MRF operators** to consider officially accepting paperboard cans as an approved recyclable material rather than classify them as contamination, and consider MRF design elements to improve the sorting of paperboard cans into preferred commodity grades;
- **Communities** to better engage with their MRFs on acceptability of paperboard cans in the recycling stream, as well as to improve promotion and education materials geared to residential recycling program participants; and
- **Other interested parties,** such as the Federal Trade Commission, Sustainable Packaging Coalition, The Recycling Partnership, Greenpeace, and others as they consider consumer-facing labeling on the recyclability of this type of packaging.

Study Approach

Paperboard cans are generated at relatively low levels compared to other types of household recyclables. In recycling programs where they are accepted for recycling, they may average approximately 1.3 percent of the incoming recyclables stream, which can be as few as 100 paperboard cans per truckload of residential recyclables. For a MRF materials flow study, more than this amount of paperboard cans are desired in order to have more observations of where cans flow so that more precise data can be obtained. Furthermore, Sonoco also desired to evaluate different design features for its paperboard cans including features such as percentage of steel in different packages, can size (e.g., tall and thin or short and squat), and barrier materials. For these reasons, the study approach included seeding additional Sonoco paperboard cans into single family residential recyclables for the flow study.

Approximately 90 percent of residential recyclables in the U.S. are collected single stream and sorted at single-stream MRFs. The first decision therefore was to identify a single-stream MRF at which to conduct the study, and a representative community that includes paperboard cans in their accepted list of recyclables. For this study Sonoco's Columbia, South Carolina MRF was chosen, and a representative curbside collection route in Irmo S.C. was selected as the source for the residential recyclables.

Table 1 lists the supplemental packaging materials that were seeded in addition to the packaging materials already included by residents in their recyclables. As can be seen from Table 1, a steel can control was also included in the seeded materials.

Table 1: Summary of Seeded Packaging Materials

Package Variation	Diameter	Height	Top end	Bottom end	Ratio of steel to overall package	Number seeded
Steel bottom – 1	401	406	Steel ring	Steel	48%	100
Steel bottom – 2	502	410	Steel ring	Steel	51%	100
Steel bottom – 3	603	408	Steel ring	Steel	55%	100
Steel bottom – 4	401	214	Steel ring	Steel	59%	100
Steel bottom – 5	401	512	Steel ring	Steel	44%	100
Snack can – 1	300	307	N/A	Steel	38%	100
Snack can – 2	300	413	N/A	Steel	31%	100
Snack can – 3	300	903	N/A	Steel	19%	100
Steel can	300	407	N/A	Steel	100%	100

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

Most curbside collection trucks compact recyclables along the route as they are collected. Although some other MRF flow studies have blended seed materials into delivered recyclables at the MRF tip floor, we wanted to ensure that seed materials for this study were compacted to the same degree that occurs on an actual collection route. This is important because the MRF technologies used to separate paper from containers during the sorting process rely on shape – flat (or flattened due to compaction) materials are sorted into paper and three-dimensional materials continue on to the container sorting part of the plant for further sorting.

Before introducing the seed materials to the collection route, we prepared them by giving them a light coat of high-visibility spray paint in order to distinguish them from unseeded cans and facilitate sorting. We then loaded them into the selected collection truck and route on a normal collection day at two points on route – approximately 1/3 into the route and later at the 2/3 point. The collection vehicle that was used was a rear-load packer truck with a moving compaction wall that moves backward as the route progresses, providing somewhat consistent compaction pressures over the course of the route.

When the collection route was completed, the truck tipped its load at the MRF in a different area than normal so that its recyclables would not be mixed with those of other trucks. A loader mixed the pile of recyclables to ensure the seed materials were evenly distributed throughout. The MRF then emptied bunkers of previously sorted recyclables so that the recyclables processed for the flow test would not be mixed with that of previously processed materials.

The flow test entailed loading the complete truckload of recyclables into the processing line and operating the MRF normally. Manual quality control personnel were instructed to not interfere with the flow of the seed materials. Once the load of materials was processed, we visually inspected several areas where paperboard cans were not forecasted to flow to verify that they were not sorted into those streams by accident in appreciable numbers. These streams, which

were not sorted through but only visually inspected, included glass and old corrugated containers (OCC).

Finally, the processed material was sorted by output stream to find and separate out the seeded materials.

The design and operation of a MRF can impact where materials flow. Sonoco's Columbia SC MRF operates at approximately 18 tons per hour and sorts materials in the following order:

- OCC screen;
- Glass breaker/screen;
- Newspaper screen;
- Mixed paper screen;
- PET single-eject optical sorter;
- Manual HDPE bottles positive sort;
- Overhead magnet;
- Mixed plastics robotic sorter;
- Aluminum eddy current separator; and
- Container line residue.

A processing flow diagram for the MRF at the time of this study is included in the Appendix. The results of the MRF flow trial follow.

Results

Although the intent of the flow analysis was to find and verify the flows of all seeded package varieties, invariably some are not found. A few may:

- Not be picked up by the loader and left on the tip floor (this happened to two paperboard cans in this study);
- Get caught in the drum feeder;
- Fall into an empty box that has not been flattened in the collection truck or tip floor and be sorted into OCC;
- Get hung up at conveyor belt or screen edges and not come loose until the next load of recyclables is processed; and
- Be hidden by other recyclables so that they are not found when we sort through output commodities; the output grades that we did not fully sort (meaning place on a sort table and fully sort through) include ONP, MP, PET, and Aluminum.

Table 2 provides a summary of lost seeded packages.

Table 2: Count of Lost Seeded Packages

Package Variation	Diameter	Height	Top end	Bottom end	Seeded	Found	Lost
Steel bottom – 1	401	406	Steel ring	Steel	100	91	9%
Steel bottom – 2	502	410	Steel ring	Steel	99[1]	89	10%
Steel bottom – 3	603	408	Steel ring	Steel	100	93	7%
Steel bottom – 4	401	214	Steel ring	Steel	99[1]	87	12%
Steel bottom – 5	401	512	Steel ring	Steel	100	96	4%
Snack can – 1	300	307	N/A	Steel	100	83	17%
Snack can – 2	300	413	N/A	Steel	100	92	8%
Snack can – 3	300	903	N/A	Steel	100	87	13%
Steel can	300	407	N/A	Steel	100	91	9%
Average							10%

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

[1] Although seeded into the collection truck, one can of this type was left on the tip floor by the loader.

As the table shows, we ultimately did not find 10 percent of the seeded containers on average. Rather than sort aluminum from the bunker, the aluminum quality control person picked seeded cans off the conveyor belt at the quality control station and dropped them into a hip-side container. This person was observed to be doing a very good job separating out the seeded containers, so it is likely that few if any were lost to the aluminum bunker. The most voluminous stream was PET and there is the potential that more were in the PET stream that was carefully inspected and picked through but not fully sorted due to manpower constraints.

Table 3 shows how the seeded containers that were found flowed through the MRF. The results are shown based on counts of containers.

Table 3: Seeded Container Flows

Package Variation	Diameter	Height	% Steel	ONP	MP	PET	Steel	Alum.	Residue	Total
Steel bottom – 1	401	406	48%	0%	0%	4%	93%	0%	2%	100%
Steel bottom – 2	502	410	51%	0%	0%	2%	98%	0%	0%	100%
Steel bottom – 3	603	408	55%	0%	0%	11%	88%	0%	1%	100%
Steel bottom – 4	401	214	59%	0%	0%	1%	99%	0%	0%	100%
Steel bottom – 5	401	512	44%	0%	0%	2%	97%	0%	1%	100%
Snack can – 1	300	307	38%	0%	1%	5%	88%	0%	6%	100%
Snack can – 2	300	413	31%	0%	4%	10%	60%	0%	26%	100%
Snack can – 3	300	903	19%	0%	2%	3%	9%	0%	85%	100%
Steel can	300	407	100%	0%	0%	4%	96%	0%	0%	100%

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

As the table shows, very few paperboard cans were sorted into the paper streams. The rigid can bottoms appeared to help them retain their cylindrical shape, especially for cans with metal bottoms that were four inches in diameter or greater. The PET optical sorter was next and on average 4.4 percent of the seeded cans were mistakenly sorted by the machine into PET. These accidental sorts come either from air turbulence or from lying under or touching a PET container so that the cans are carried with the target PET container down the PET chute. The magnet that sorts steel came next in the sorting order. If paperboard cans had over 31 percent steel by weight, 88-98 percent of the paperboard cans were sorted with steel cans. The following graphs show the results of Table 3 in visual form.

Figure 3: Steel Bottom – 1, 401d 406h

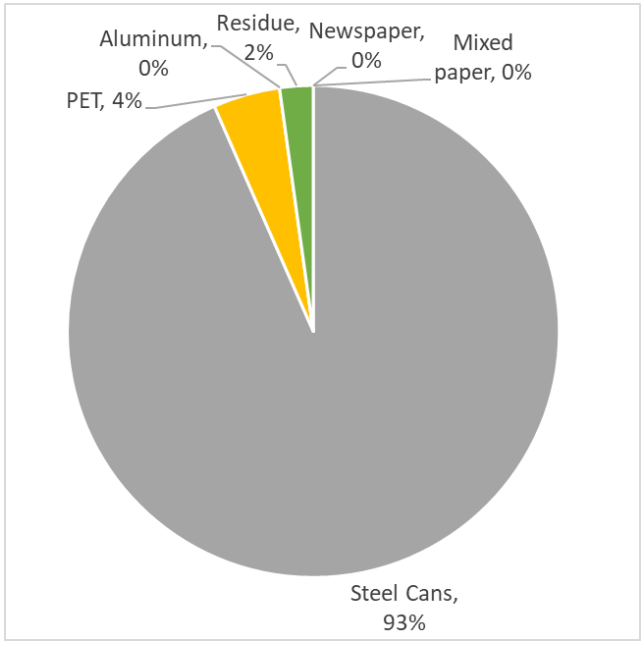


Figure 4: Steel Bottom – 2, 502d 410h

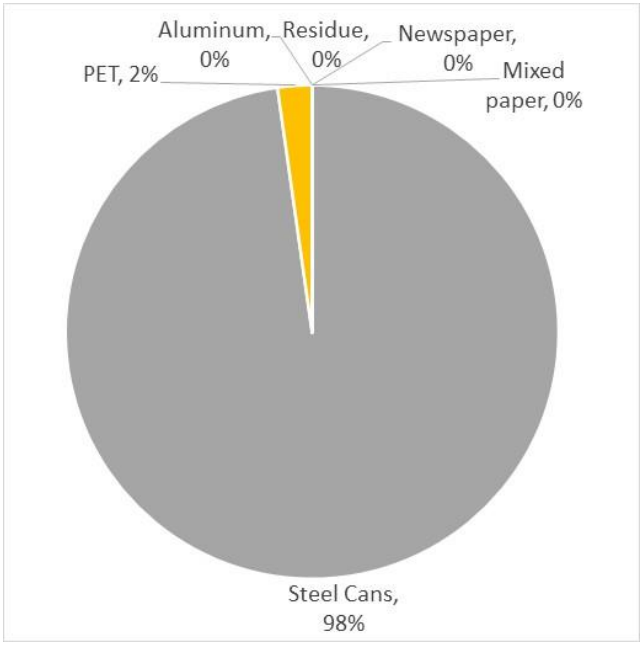


Figure 5: Steel Bottom – 3, 603d 408h

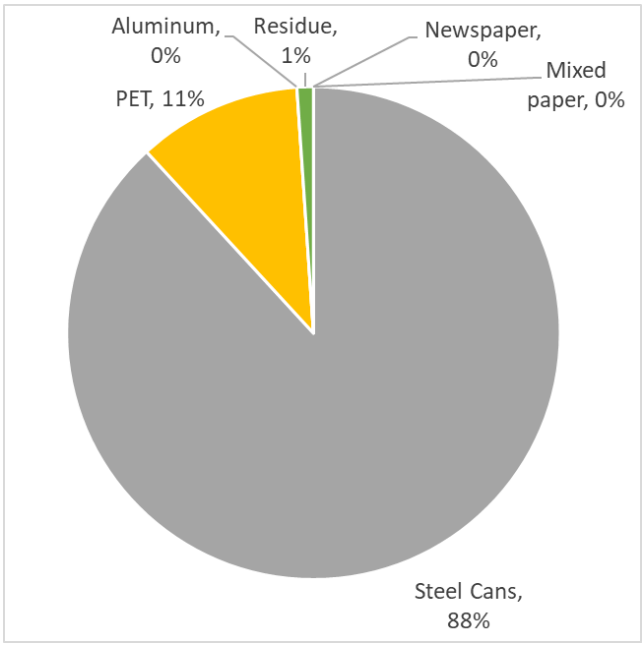


Figure 6: Steel Bottom – 4, 401d 214h

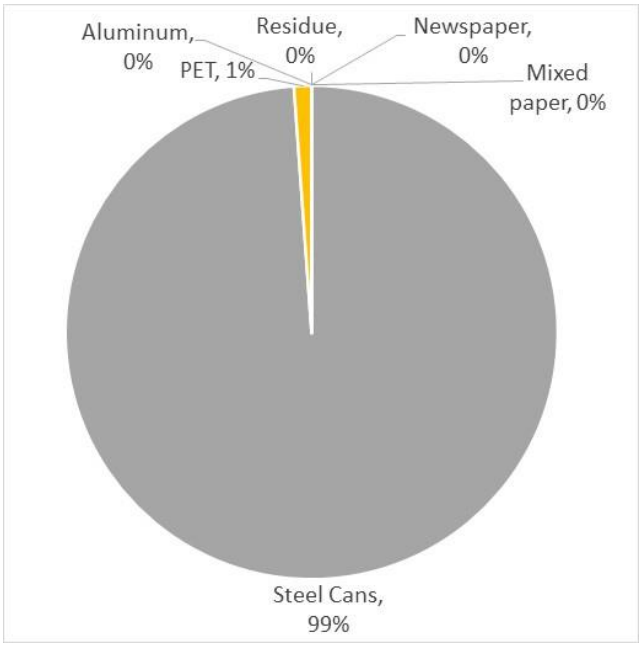


Figure 7: Steel Bottom – 5, 401d 502h

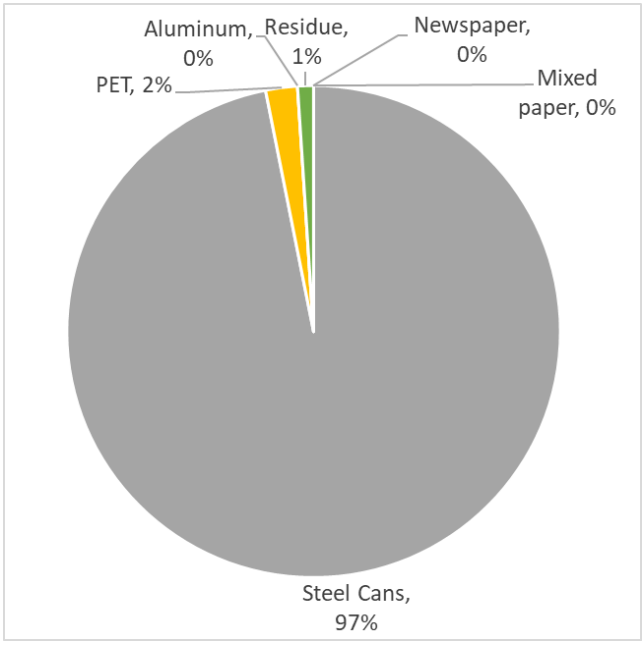


Figure 8: Snack Can – 1, 300d 307h

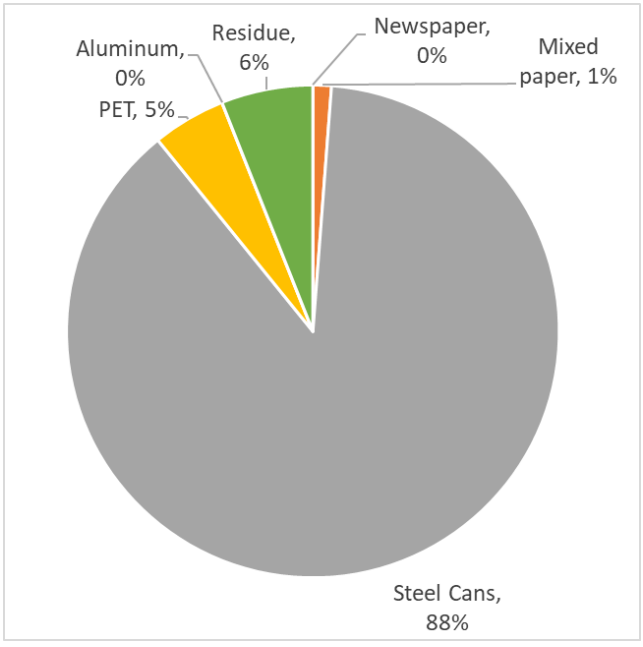


Figure 9: Snack Can – 2, 300d 413h

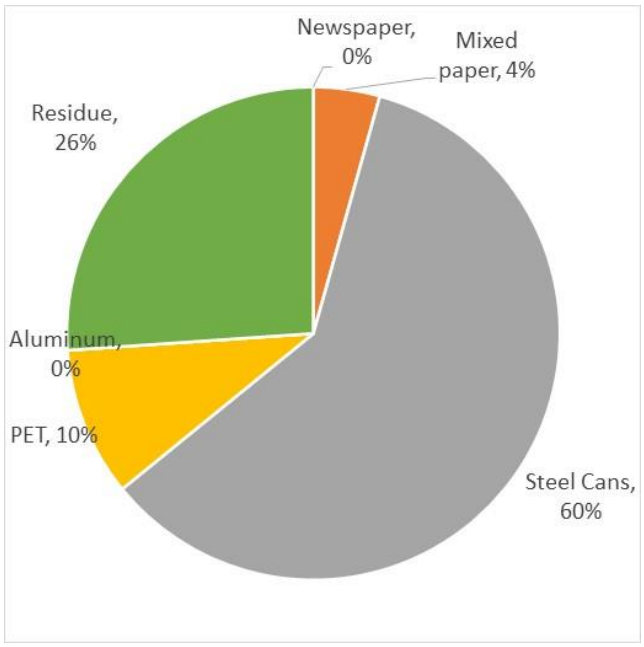


Figure 10: Snack Can – 3, 300d 903h

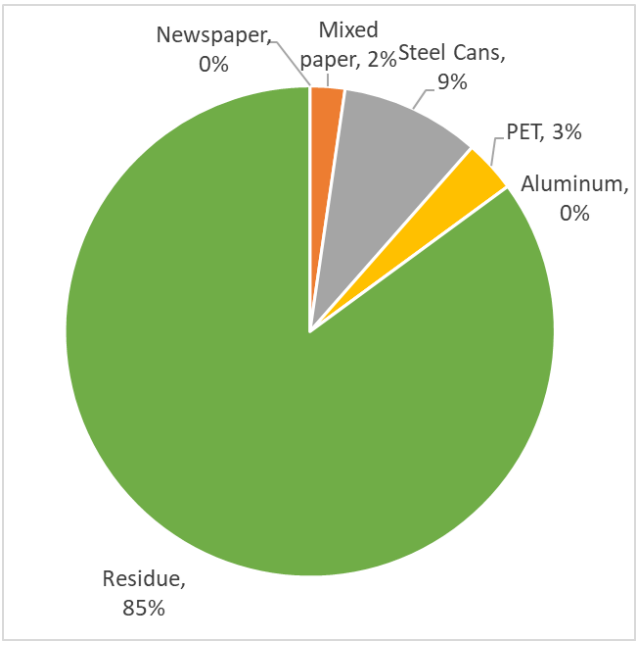
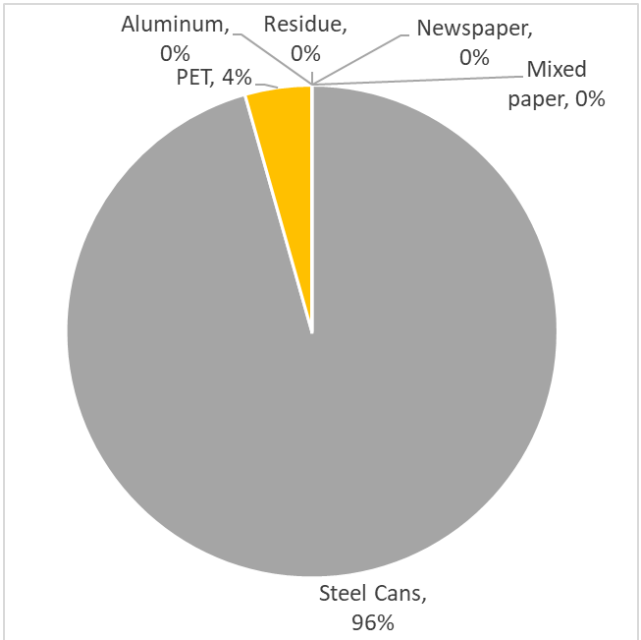


Figure 11: Steel Can, 300d 407h



Conclusions

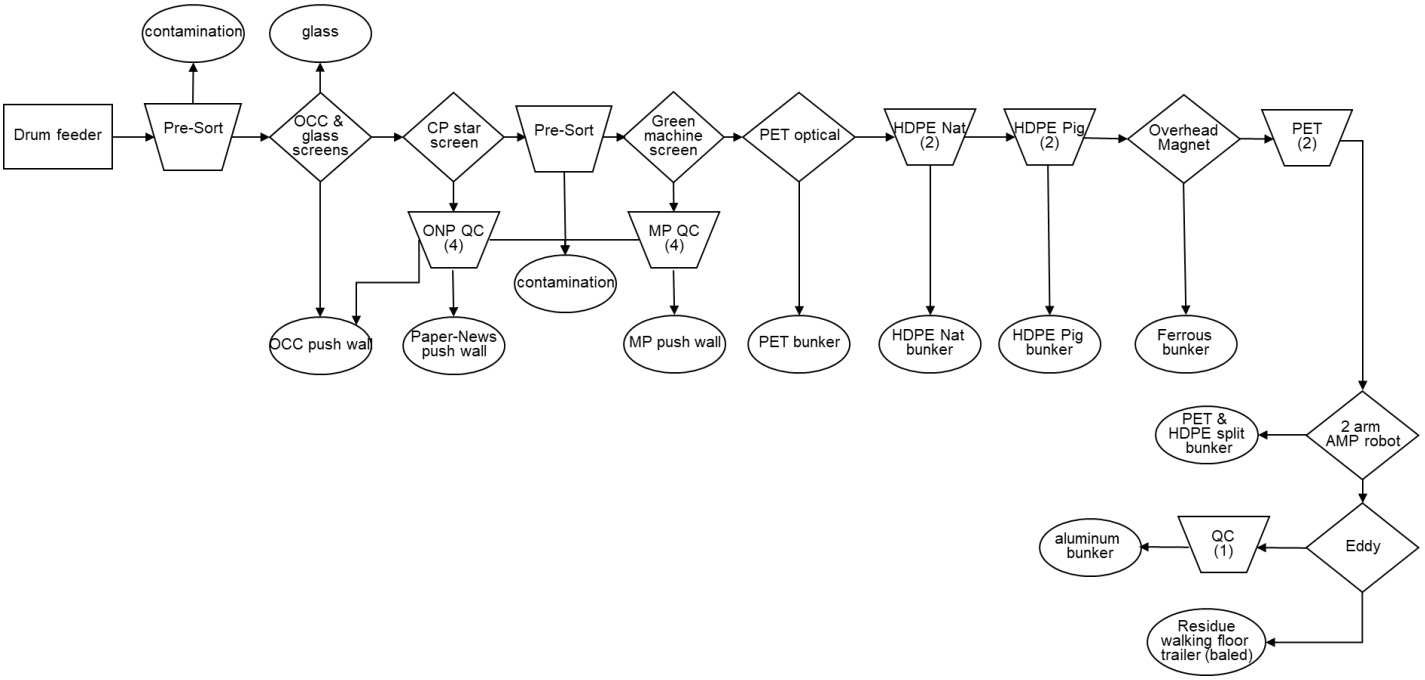
Although the preferred commodity for paperboard cans to flow to in a MRF would be mixed paper, the rigid ends mean that the vast majority of paperboard cans maintain a three-dimensional shape and flows to the container side of a single-stream MRF where 88-98 percent of those with at least 31 percent steel by weight were sorted with steel cans. Approximately 4.4 percent of paperboard cans were sorted into PET by accident by the optical sorter – if the magnet were before the optical sorter the percentage would likely be less.

The results in this report come from a flow study at one MRF. There are over 450 MRFs in the United States, each equipped and operated differently. For this reason, it is recommended that additional flow studies be performed to develop statistics that are representative of the diversity of recyclables processing by MRFs in the United States.

APPENDIX

Circular Matters

Sonoco Columbia SC MRF Process Flow Diagram



Paperboard Can Materials Recovery Facility Flow Study – Jacksonville, North Carolina

Prepared by:

Circular Matters

Commissioned by: Sonoco

June 2021

Circular Matters

Contents

Figures

Tables

Introduction

Consumer packaged goods (CPG) companies are increasingly requesting precise information on how the consumer-facing packaging they purchase from suppliers is managed at end of life. This includes rigid paperboard cans that Sonoco and other companies manufacture for CPGs. Currently, only anecdotal information exists regarding the extent to which these cans are accepted in consumer recycling programs, the percentage of paperboard cans that consumers separate for recycling, and flows in materials recovery facilities (MRFs) for successful sorting into product bales.

Circular Matters conducted this study for Sonoco to document the proportion of paperboard cans in single-family home recyclables from one representative curbside collection route and to verify how its paperboard cans flow in MRFs.

A typical construction for paperboard cans (also referred by some as paper cans, spiral wound cans, composite canisters, etc.) is shown in Figure 1.

Figure 1: Example Paperboard Can Construction

The composition of paperboard cans varies. Some are made completely of paperboard with no metal components, others made with steel components, and others with aluminum components. The choice of whether the cans are made with metal or not and what type of metal affects how paperboard cans are sorted by equipment in MRFs. Sonoco's paperboard cans evaluated in this study vary in metal content from 19 to 59 percent by weight.

Examples of paperboard cans made by Sonoco are shown in Figure 2.

Figure 2: Sonoco Paperboard Cans

According to Sonoco, the company supplies approximately 145,000 tons of paperboard cans to the North American market and is the largest supplier of this type of packaging to the marketplace.

Unfortunately, many municipally sponsored residential recycling programs either exclude these cans from their collection programs or fail to positively identify them as recyclable, resulting in confusion with recycling program participants. Sonoco reports that less than 23 percent of the U.S. population is serviced by municipal recycling programs that explicitly list these containers as recyclable.

There is a hesitancy by municipalities and MRFs to accept paperboard cans in residential recycling streams, often relating to lack of information and misunderstanding. These concerns include:

- Questions around whether these are accepted or considered contaminants by steel can markets (in single-stream collection programs a majority of these cans are sorted into the steel can stream due to the steel bottoms); and
- Uncertainty over where these cans ultimately flow in MRFs.

Sonoco has confirmation that steel can markets value the steel from the cans in their recycling processes and that the amount of paper at typical paperboard can generation and recycling rates is not concerning (remember also that steel cans have paper labels).[1] The point of this study therefore was to focus on where paperboard cans of various constructions flow in residential single-stream MRFs. The focus was on single-stream MRFs since over 90 percent of residential recyclables are collected single stream in the U.S. Where paperboard cans ultimately flow

[1] Only the steel portion would be recycled, with the paper and plastic portions being used for energy or as a chemical agent to reduce oxidized iron.

depends on consumer preparation (e.g., flattening), package design, collection compaction, and MRF design. Different can types were expected to be sorted into a variety of product streams or residue.

The results of this study can be used by:

- **Packaging producers and CPGs**, including Sonoco and its customers, to better understand package design features and their impacts on MRF sortability into target recyclable commodity grades;
- **MRF operators** to consider officially accepting paperboard cans as an approved recyclable material rather than classify them as contamination, and consider MRF design elements to improve the sorting of paperboard cans into preferred commodity grades;
- **Communities** to better engage with their MRFs on acceptability of paperboard cans in the recycling stream, as well as to improve promotion and education materials geared to residential recycling program participants; and
- **Other interested parties,** such as the Federal Trade Commission, Sustainable Packaging Coalition, The Recycling Partnership, Greenpeace, and others as they consider consumer-facing labeling on the recyclability of this type of packaging.

Study Approach

Paperboard cans are generated at relatively low levels compared to other types of household recyclables. In recycling programs where they are accepted for recycling, they may average approximately 1.3 percent of the incoming recyclables stream, which can be as few as 100 paperboard cans per truckload of residential recyclables. For a MRF materials flow study, more than this amount of paperboard cans are desired in order to have more observations of where cans flow so that more precise data can be obtained. Furthermore, Sonoco also desired to evaluate different design features for its paperboard cans including features such as percentage of steel in different packages, can size (e.g., tall and thin or short and squat), and barrier materials. For these reasons, the study approach included seeding additional Sonoco paperboard cans into single family residential recyclables for the flow study.

Approximately 90 percent of residential recyclables in the U.S. are collected single stream and sorted at single-stream MRFs. The first decision therefore was to identify a single-stream MRF at which to conduct the study, and a representative community that includes paperboard cans in their accepted list of recyclables. For this study Sonoco's Jacksonville, North Carolina MRF was chosen, and a representative curbside collection route serviced by city collection crews in Jacksonville was selected as the source for the residential recyclables.

Table 1 lists the supplemental packaging materials that were seeded in addition to the packaging materials already included by residents in their recyclables. As can be seen from Table 1, a steel can control was also included in the seeded materials.

Table 1: Summary of Seeded Packaging Materials

Package Variation	Diameter	Height	Top end	Bottom end	Ratio of steel to overall package	Number seeded
Steel bottom – 1	401	406	Steel ring	Steel	48%	100
Steel bottom – 2	502	410	Steel ring	Steel	51%	100
Steel bottom – 3	603	408	Steel ring	Steel	55%	100
Steel bottom – 4	401	214	Steel ring	Steel	59%	100
Steel bottom – 5	401	512	Steel ring	Steel	44%	100
Snack can – 1	300	307	N/A	Steel	38%	100
Snack can – 2	300	413	N/A	Steel	31%	100
Snack can – 3	300	903	N/A	Steel	19%	100
Dough can no ends	214	509	Removed	Removed	n/a	100
Dough can, 2 ends	214	509	Steel	Steel	44%	100
Steel can	300	407	N/A	Steel	100%	100

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

Most curbside collection trucks compact recyclables along the route as they are collected. Although some other MRF flow studies have blended seed materials into delivered recyclables at the MRF tip floor, we wanted to ensure that seed materials for this study were compacted to the same degree that occurs on an actual collection route. This is important because the MRF technologies used to separate paper from containers during the sorting process rely on shape – flat (or flattened due to compaction) materials are sorted into paper and three-dimensional materials continue to the container sorting part of the plant for further sorting.

Before introducing the seed materials to the collection route, we prepared them by giving them a light coat of high-visibility spray paint in order to distinguish them from unseeded cans and facilitate sorting. We then loaded them into the selected collection truck and route on a normal collection day at two points on route – approximately 1/3 into the route and later at the 2/3 point. The collection vehicle that was used was a rear-load packer truck with a compaction wall that moves as the route progresses, providing somewhat consistent compaction pressures over the course of the route.

When the collection route was completed, the truck tipped its load at the MRF in a different area than normal so that its recyclables would not be mixed with those of other trucks. A loader mixed the pile of recyclables to ensure the seed materials were evenly distributed throughout. The MRF then emptied bunkers of previously sorted recyclables so that the recyclables processed for the flow test would not be mixed with that of previously processed materials.

The flow test entailed loading the complete truckload of recyclables into the processing line and operating the MRF normally. Manual quality control personnel were instructed to not interfere

with the flow of the seed materials as directed by equipment. Seed materials were removed from the sort belt at quality control stations prior to dropping into bunkers, and material in bunkers was also sorted through to pick out any seed materials that may have been missed. We also visually inspected several areas where paperboard cans were not forecasted to flow to verify that they were not sorted into those streams by accident in appreciable numbers. These streams, which were not sorted but only visually inspected, included old corrugated containers (OCC) and HDPE.

The design and operation of a MRF can impact where materials flow. Sonoco's Jacksonville, North Carolina MRF operates at approximately 10 tons per hour and sorts materials in the following order:

- OCC screen;
- Glass breaker/screen;
- Mixed paper screen followed by a paper line optical sorter to remove contaminants;
- PET single-eject optical sorter;
- Manual HDPE bottles positive sort;
- Overhead magnet;
- Aluminum eddy current separator; and
- Container line residue.

A processing flow diagram for the MRF at the time of this study is included in the Appendix. The results of the MRF flow trial follow.

Results

Although the intent of the flow analysis was to find and verify the flows of all seeded package varieties, invariably some are not found. A few may:

- Get caught in the drum feeder;
- Fall into an empty box that has not been flattened in the collection truck or tip floor and be sorted into OCC;
- Get hung up at conveyor belt or screen edges and not come loose until the next load of recyclables is processed; and
- Be hidden by other recyclables so that they are not found when we sort through output commodities.

Table 2 provides a summary of lost seeded packages.

Table 2: Count of Lost Seeded Packages

Package Variation	Diameter (1/100")	Height (1/100")	Top end	Bottom end	Seeded	Found	Lost
Steel bottom – 1	401	406	Steel ring	Steel	100	99	1%
Steel bottom – 2	502	410	Steel ring	Steel	100	101[1]	0%
Steel bottom – 3	603	408	Steel ring	Steel	100	98	2%
Steel bottom – 4	401	214	Steel ring	Steel	100	96	4%
Steel bottom – 5	401	512	Steel ring	Steel	100	101[1]	0%
Snack can – 1	300	307	N/A	Steel	100	94	6%
Snack can – 2	300	413	N/A	Steel	100	96	4%
Snack can – 3	300	903	N/A	Steel	100	100	0%
Unraveled dough can with ends	214	509	Steel	Steel	100	97	3%
Unraveled dough can without ends	214	509	N/A	N/A	100	92	8%
Steel can	300	407	N/A	Steel	100	99	1%
Average							3%

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

[1] This is likely due to an error in counting.

As the table shows, very few seeded containers were lost.

Table 3 shows how the seeded containers that were found flowed through the MRF. The results are shown based on counts of containers.

Table 3: Seeded Container Flows

Package Variation	Diameter	Height	% Steel	Mixed Paper	Glass	PET	Steel	Alum.	Residue	Total
Steel bottom – 1	401	406	48%	0%	0%	0%	96%	0%	4%	100%
Steel bottom – 2	502	410	51%	0%	0%	0%	99%	0%	1%	100%
Steel bottom – 3	603	408	55%	0%	0%	1%	97%	0%	2%	100%
Steel bottom – 4	401	214	59%	1%	0%	1%	98%	0%	0%	100%
Steel bottom – 5	401	512	44%	0%	0%	2%	89%	0%	9%	100%
Snack can – 1	300	307	38%	1%	0%	3%	81%	0%	15%	100%
Snack can – 2	300	413	31%	1%	0%	6%	63%	0%	30%	100%
Snack can – 3	300	903	19%	0%	0%	1%	35%	0%	64%	100%

Package Variation	Diameter	Height	% Steel	Mixed Paper	Glass	PET	Steel	Alum.	Residue	Total
Unraveled dough can with ends	214	509	44%	1%	0%	3%	90%	0%	6%	100%
Unraveled dough can without ends	214	509	0%	3%	0%	3%	0%	10%	85%	100%
Steel can	300	407	100%	0%	0%	2%	97%	0%	1%	100%

Note: the first digit of can dimensions is the number of whole inches. The last two digits are the number of sixteenths of an inch. For example, 502 means 5 and 2/16 inches, or 5.125 inches.

As the table shows, very few paperboard cans were sorted into the mixed paper streams. The rigid can bottoms appeared to help them retain their cylindrical shape, especially for cans with metal bottoms that were four inches in diameter or greater. Also the paper quality control optical sorter was equipped with sensitive metal sensors and was very effective in ejecting and redirecting paperboard cans with metal ends or coatings to the container sorting part of the MRF. The PET optical sorter was next and on average 2 percent of the seeded cans were mistakenly sorted by the machine into PET. These accidental sorts come either from air turbulence or from lying under or touching a PET container so that the cans are carried with the target PET container down the PET chute. The magnet that sorts steel came next in the sorting order. If paperboard cans had over 31 percent steel by weight, 81-99 percent of the paperboard cans were sorted with steel cans. Finally, the proportion of aluminum barrier material in the unraveled dough can without ends was enough to propel 10 percent of them into the aluminum can stream (the ones with ends were heavier and weren't sorted into aluminum by the eddy current separator. The following graphs show the results of Table 3 in visual form.

Figure 3: Steel Bottom – 1, 401d 406h

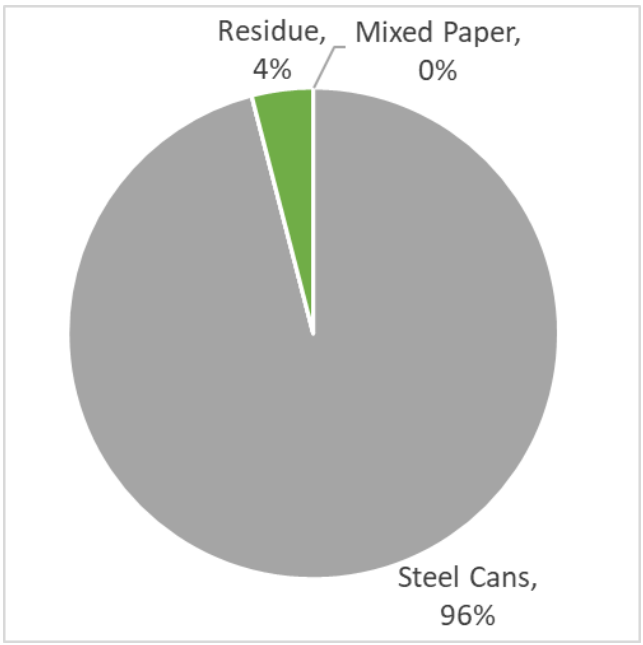


Figure 4: Steel Bottom – 2, 502d 410h

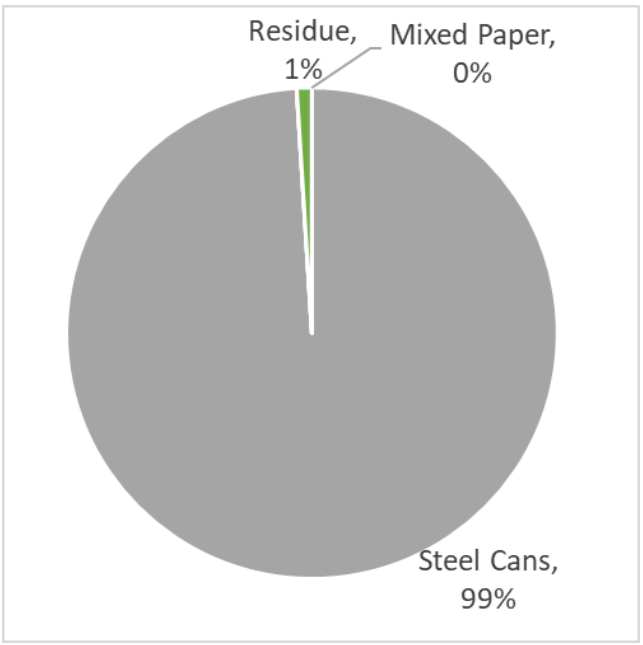


Figure 5: Steel Bottom – 3, 603d 408h

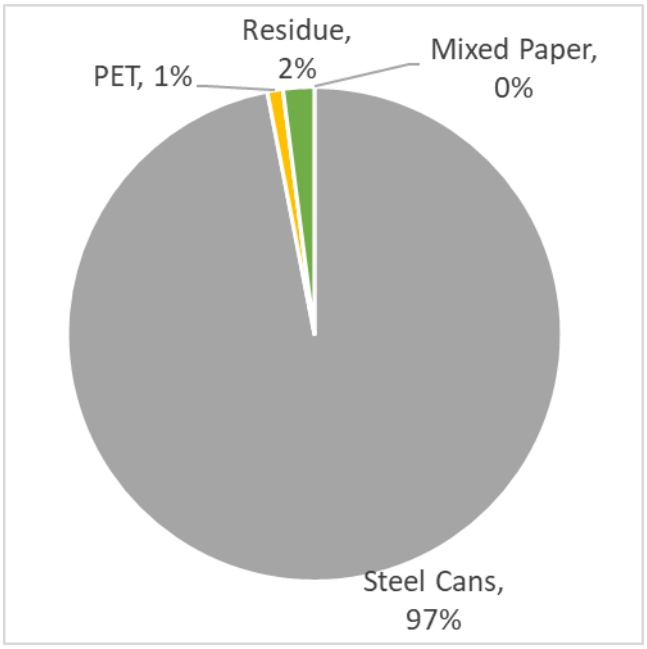


Figure 6: Steel Bottom – 4, 401d 214h

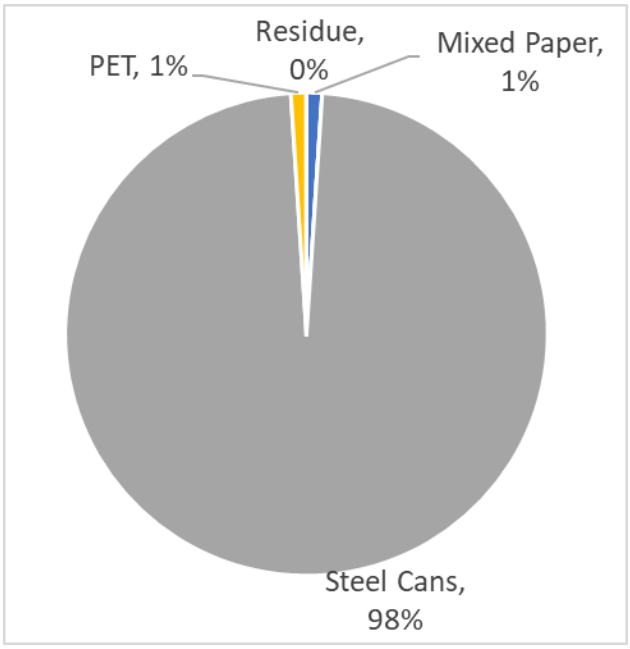


Figure 7: Steel Bottom – 5, 401d 512h

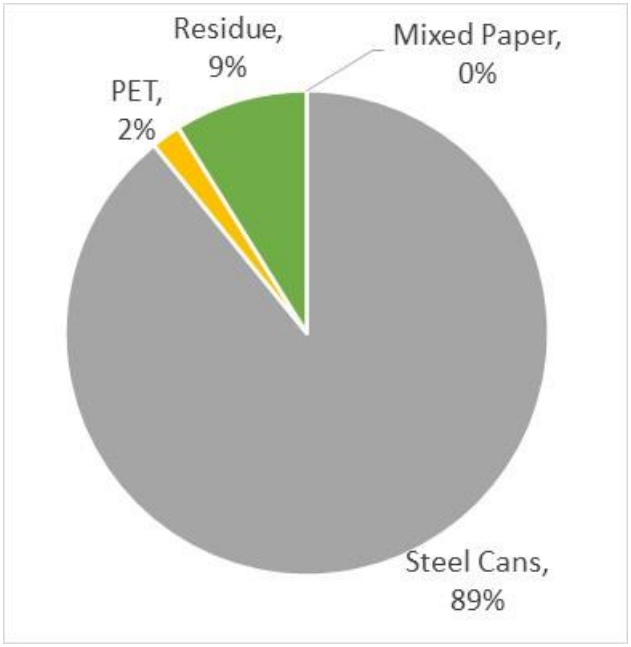


Figure 8: Snack Can – 1, 300d 307h

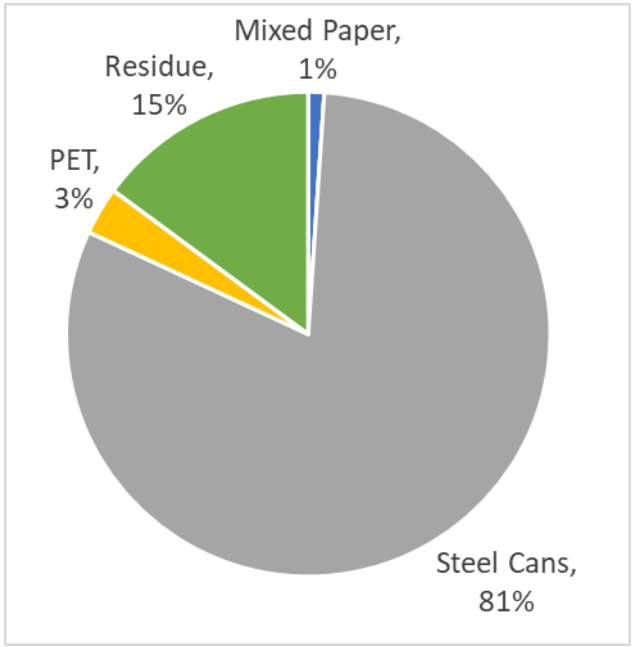


Figure 9: Snack Can – 2, 300d 413h

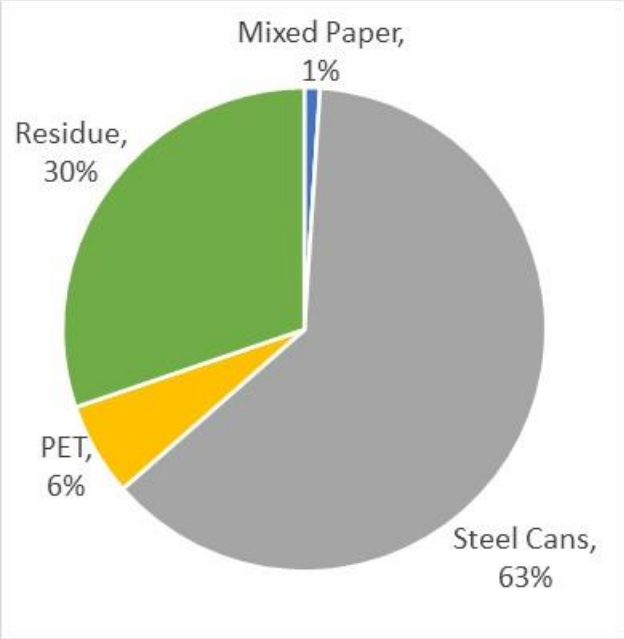


Figure 10: Snack Can – 3, 300d 903h

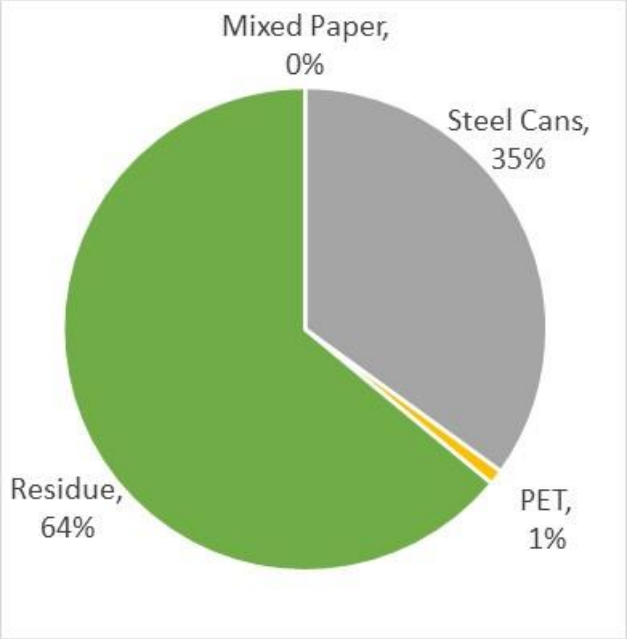


Figure 11: Unraveled Dough Can with Ends

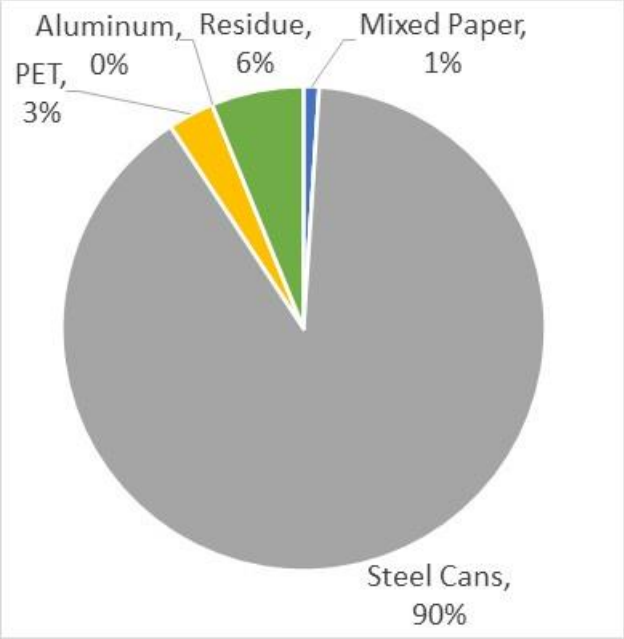


Figure 12: Unraveled Dough Can without Ends

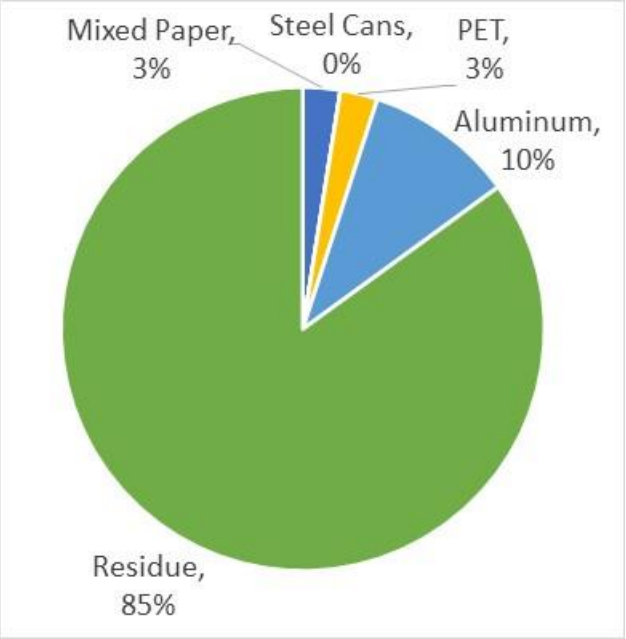
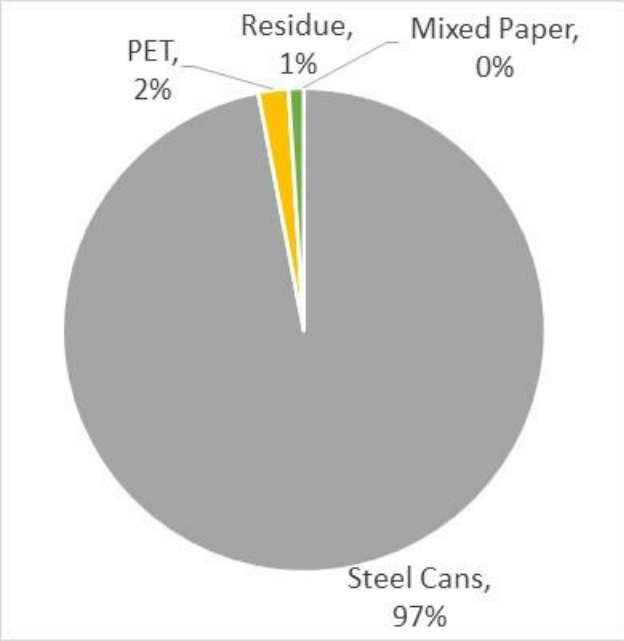


Figure 13: Steel Can, 300d 407h



Conclusions

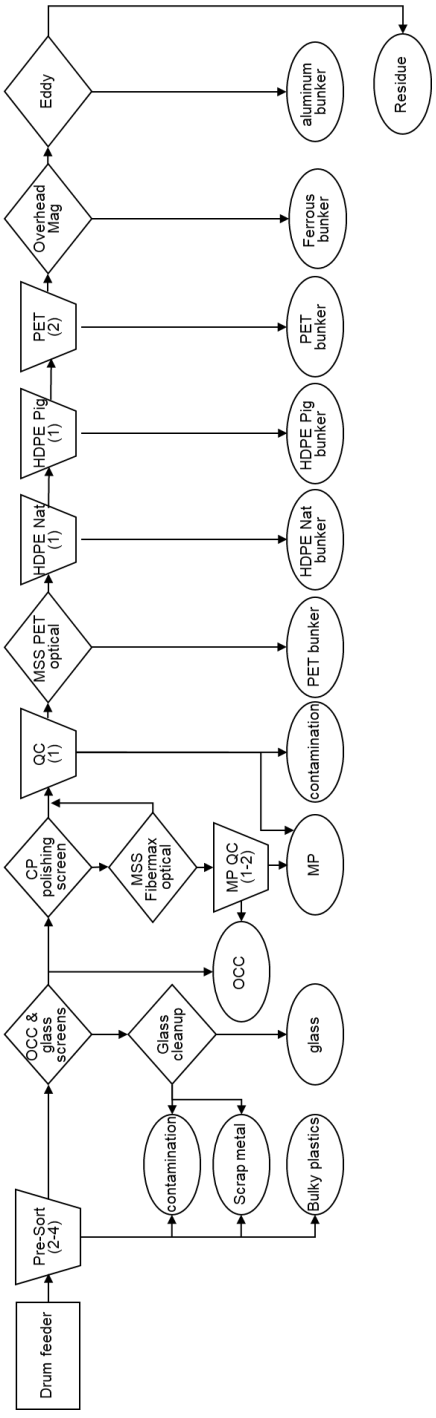
Although the preferred commodity for paperboard cans to flow to in a MRF would be mixed paper, the rigid ends and use of a paper optical sorter mean that the vast majority of paperboard cans flows to the container side of a single-stream MRF where 81-99 percent of those with at least 31 percent steel by weight were sorted with steel cans. Approximately 2 percent of paperboard cans were sorted into PET by accident by the PET optical sorter – if the magnet was before the optical sorter the percentage would likely be less.

The results in this report come from a flow study at one MRF. There are over 450 MRFs in the United States, each equipped and operated differently. For this reason, it is recommended that additional flow studies be performed to develop statistics that are representative of the diversity of recyclables processing by MRFs in the United States.

APPENDIX

Circular Matters

Sonoco Jacksonville NC MRF Process Flow Diagram



MIXED PAPER AND STEEL BALE AUDITS SPIRAL WOUND CONTAINERS

Audit Report for Sonoco

PURPOSE

The goals of the study are:

- To better understand the quantity of spiral wound containers of various formats that are recovered through the residential curbside recycling system in communities that accept them
- To document the relative prevalence of these items in the stream
- To provide an updated snapshot of the prevalence of study materials in mixed paper and steel bales for comparison to other studies

METHODOLOGY

APPROACH

- A team led by RRS sorted mixed paper and steel bales produced at the Mecklenburg County MRF (operated by Republic Services).
- The Mecklenburg County MRF processes material from the City of Charlotte.
- Mecklenburg County produces County-wide education tools that are made available for residents in the City of Charlotte.
- The City of Charlotte also uses an independent Waste Wizard on their recycling website.
- “Cardboard Cans” are listed on the Charlotte Waste Wizard and directed to recycling.
- The MRF was chosen based on acceptance of spiral wound containers and certain other target items in residential recycling programs.
- The bales, procured in August 2022, included:
  - three mixed paper bales
  - three steel bales
- Sorting was conducted in September 2022 at Sonoco’s Charlotte material recovery facility.

SORT METHODOLOGY

- The six bales were received at the MRF and stored for auditing. No pre-sort of the bales was conducted by the MRFs prior to audit by the RRS team.
- Sequentially, the bales were moved into an isolated area by Sonoco staff for wires to be removed and the bales to be broken.
- Bales were broken and three samples of approximately 150 lbs. were taken from discrete sections of each bale to ensure sorted materials were representative of bale composition.
- Bale samples were spread onto specialized sorting tables
- Under the direction and instruction of RRS staff, the samples were sorted into the categories defined by the RRS team and sponsors.
- Determination of sort categories was done through visual inspection, based on brand or package format (e.g., Snack Can). Surface appearance and package format were used for determination of poly-coat vs. non-poly-coat. Examples of packages found within each sort category were listed for the sort team in advance for use as a reference during sorting.

Figure 1: Steel bale broken for sorting

Figure 2: Mixed paper bale sorting

SORT CATEGORIES

Steel bale

Item Category	Description & Further Breakdown
Snack Cans	N/A
Cans with a Diameter Wider than a Snack Can	Broken into two subsets: specifically nuts or coffee
Unwound Spiral Cans	Broken into two subsets: dough or juice

Figure 3: steel bale

Mixed paper bale

Item Category	Description & Further Breakdown
Snack Cans	N/A
Cans with a Diameter Wider than Snack Cans	Broken into two subsets: nuts or coffee cans
Unwound Spiral Cans	Broken into two subsets: dough or juice cans
Paper Bottom Cans	N/A

Figure 4: mixed paper bale

RESULTS AND ANALYSIS

CATEGORIES BY WEIGHT %, BY BALE

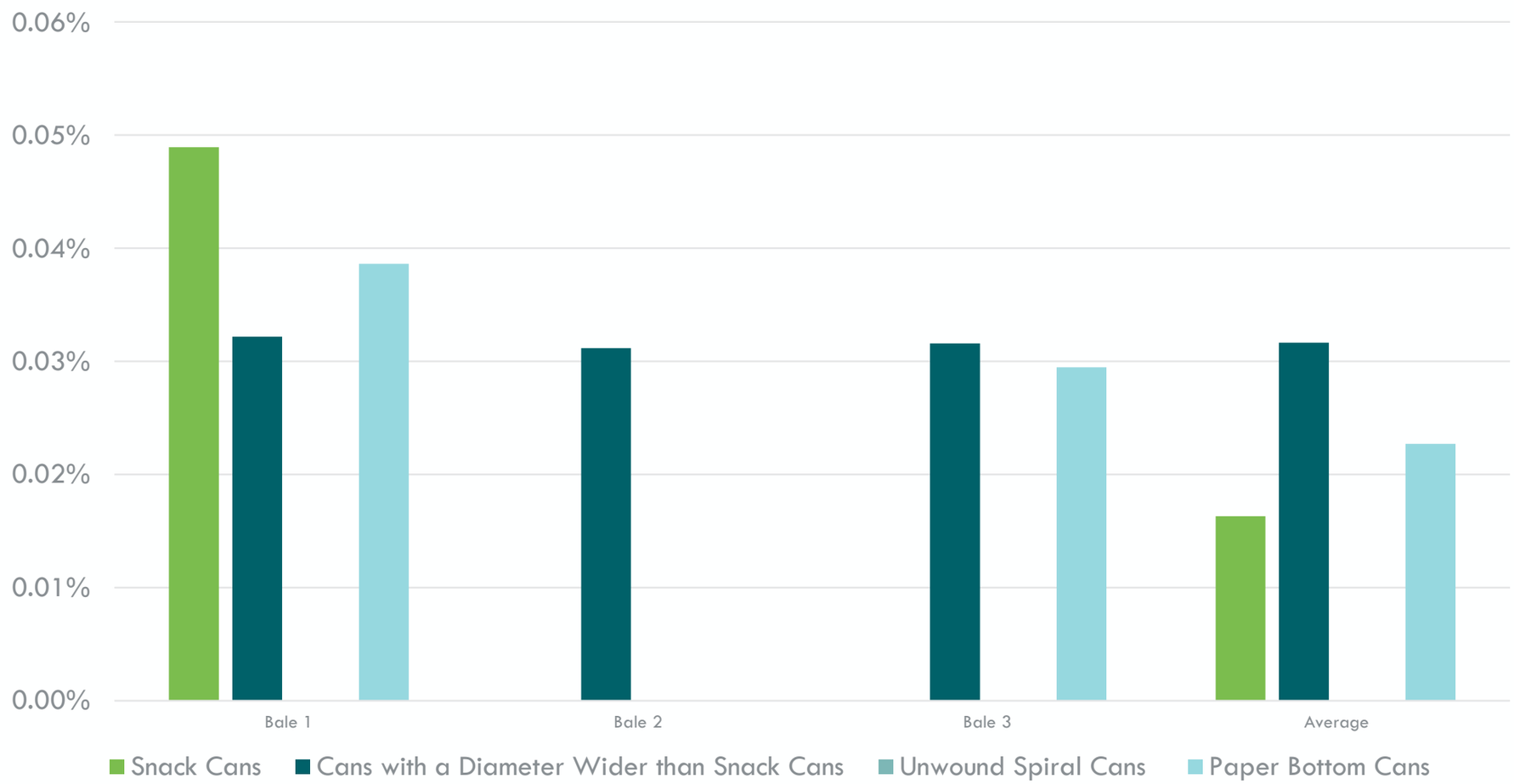
	Mixed Paper				Steel			
	Bale #1	Bale #2	Bale #3	**Avg**	Bale #1	Bale #2	Bale #3	**Avg.**
Snack Cans	0.049%	0.0000%	0.0000%	**0.016%**	0.1%	0.047%	0.1%	**0.086%**
Cans with a Diameter Wider than Snack Cans	0.032%	0.031%	0.032%	**0.032%**	0.79%	0.34%	0.75%	**0.63%**
Unwound Spiral Cans	0.000%	0.000%	0.000%	**0.000%**	0.097%	0.48%	0.041%	**0.20%**
Paper Bottom Cans	0.039%	0.000%	0.03%	**0.023%**	N/A	N/A	N/A	**N/A**
TOTAL	**0.12%**	**0.031%**	**0.061%**	**0.071%**	**0.99%**	**0.86%**	**0.90%**	**0.92%**

CATEGORIES BY COUNT, BY BALE SAMPLES*

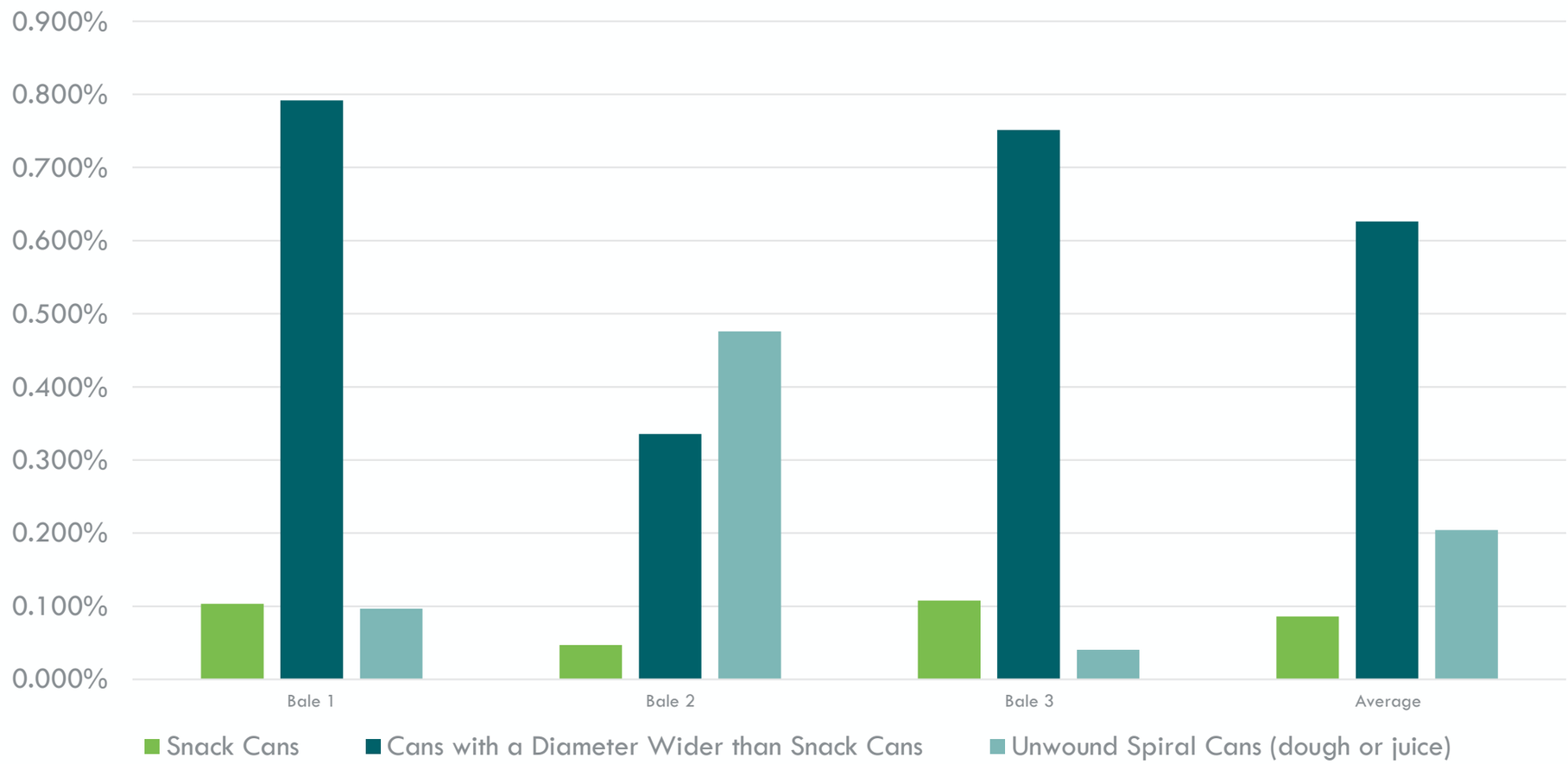
	Mixed Paper			Steel		
	Bale #1 Samples	Bale #2 Samples	Bale #3 Samples	Bale #1 Samples	Bale #2 Samples	Bale #3 Samples
Snack Cans	2	0	0	8	4	8
Cans with a Diameter Wider than Snack Cans	0	1	1	33	11	22
Unwound Spiral Cans	1	0	0	8	16	4
Paper Bottom Cans	1	0	1	N/A	N/A	N/A
TOTAL	**4**	**1**	**2**	**49**	**31**	**34**

* For whole bale count estimates (vs. samples), multiply the mixed paper numbers by 5.8 and the steel bale numbers by 4.7

SORT CATEGORIES AS % OF MIXED PAPER BALE



SORT CATEGORIES AS % OF STEEL BALE



SUMMARY – SPIRAL WOUND CANS

- Spiral wound cans make up a very small percentage of both bale types
- Spiral wound cans were more prevalent in the steel bales (0.92%) than in mixed paper bales (0.071%).
- "Cans with a diameter wider than a Snack Can" made up a majority of the can formats sorted as part of the steel bale (0.63%).
- The average number of spiral wound cans in each steel bale is approximately 181, with a range from the three bales sampled of 146 on the low end to 230 on the high end.
- The average number of spiral wound cans in each mixed paper bale is approximately 14, with a range from the three bales sampled of 6 on the low end to 23 on the high end.

RRS recycle.com

Matt Todd
Senior Consultant
mtodd@recycle.com

Max Babits
Analyst
rbabits@recycle.com

Marcus Coleman
Analyst
mcoleman@recycle.com

Catherine Goodall
Senior Consultant | Managing Principal
cgoodall@recycle.com

Algoma Steel Inc.
105 West Street
Sault Ste. Marie, Ontario
P6A 7B4

July 12, 2007

Mr. Jerry L. Hayes
HAYES LLC
Representing
Sonoco Canada
112 Crickentree Dr.
Blythewood, SC 29016
USA

Subject: Composite Can Recycling

Dear Mr. Hayes:

Algoma Steel has reviewed your initiative to include "Spiral Wound Paper Containers with Steel Bottoms" in the current Blue Box Recycling Program. Our Scrap Purchasing Team, which includes steelmaking operators, metallurgists and purchasing personnel, agrees that under controlled charging conditions this material would not be detrimental to current steelmaking practices. The product "Composite Cans" has like characteristics to Post Consumers can collections, currently within the blue box system and being consumed here at Algoma.

Algoma Steel is committed to maximizing resource efficiency with an emphasis on energy and water conservation, and waste management. As such, we support environmentally sustainable initiatives like the one you propose. Indeed, Algoma has long supported community initiatives involving the recycling of steel units including the development of contracts, both locally and with municipalities beyond a 200 mile radius, for consumption of their consumer can generation.

Algoma considers this project for recycling the Composite Can, with 20% steel bottom, a worthy endeavor and we wish to acknowledge our support for its program completion.

Thank you for including Algoma in your study. We look forward to working with you in achieving your goal to have this product added to current steel scrap consumables.

Regards

D. M. Pitts
Supv. Raw Material Purchases
ALGOMA STEEL INC.

B. Stenta
Manager Corporate Communications
ALGOMA STEEL INC.

ArcelorMittal Dofasco Scrap Specifications & Requirements

Rev Date: January 2017

Type of Scrap: Post-Consumer Steel Can Bundles

Material Description:

Clean, hydraulically compacted, 100% post-consumer steel cans (beverage and food). May contain empty aerosol cans void of product. May contain paint cans with their lids removed and no liquid paint present. May include spiral wound paper containers with steel bottoms.
Bundle must maintain its form when handled multiple times.

Sizing: 36" x 36" x 36" Max

Density: 75 lb/ft^3 Min

Exclusions (must not contain):

- Non Ferrous material and Non Metallic parts
- Mill Scale, Grinding Swarf, Ammunition, Nuts, Bolts, Grinding Balls, Nails, Rebar, Dirt, Wood, Oil, Grease, Rags, Plastics, Insulation, Municipal Scrap, Excessive Rust/Corrosion, Sealed Containers
- Copper coated material; Tin bearing scrap

Chemistry:

Minimum Fe Yield in Use:	78%
Cu	0.15 Max
Sn	0.3 Max
P	0.04 Max
Pb	0.005 Max
S	0.04 Max

AMG RESOURCES PACIFIC CORPORATION

FACSIMILE TRANSMITTAL SHEET

TO: DAVE KEELING
FROM: Jim Orendorff
COMPANY:
DATE:
FAX NUMBER: 480-460-4863
TOTAL NO. OF PAGES INCLUDING COVER: 2
PHONE NUMBER: 480-460-4862
SENDER'S REFERENCE NUMBER:
RE:
YOUR REFERENCE NUMBER:

☐ URGENT ☐ FOR REVIEW ☐ PLEASE COMMENT ☐ PLEASE REPLY ☐ PLEASE RECYCLE

NOTES/COMMENTS:

FW D: TO DAVE KEELING

Thanks,
Jim Orendorff

{CLICK HERE AND TYPE RETURN ADDRESS}

AMG
RESOURCES CORPORATION

430 W. Desert Flower Ln. • Phoenix, Arizona 85045 • 480-460-4862 • FAX: 480-460-4863

May 24, 2021

Elizabeth Rhue
Vice President, Global Sustainability
Sonoco
1 North Second Street
Hartsville, S.C. 29550

Ms. Rhue:

AMG Resources is committed to maximizing resource efficiency with an emphasis on energy, water conservation and waste reduction. In so doing, we support all efforts to maximize the recycling of obsolete steel products in residential, commercial and industrial recycling collection programs across North America. Therefore, we support Sonoco's continuing ambition to include "Special Wound Paper Containers with Steel Bottoms" as an acceptable component of the "clean densified steel can" bales that our company purchases.

Based on our experience and that of other members of the North American steel industry when consuming hydraulically compressed steel can bales the inclusion of spiral wound composite containers will not be detrimental to the steel making process. The steel bottom of the container provides a minor amount of "iron units" to our melting process. Based on past inclusion rates, the fiber portion of these containers is within the acceptable amount of non metalic component of the steel can bales, like the paper labels allowed to remain on the steel cans. The fiber portion may provide a small exothermic benefit to the melting process. We look forward to working with you in achieving your goal to have this product added to residential recycling programs across North America.

Sincerely,

James F. Orendorff
President, AMG Resources Pacific Corporation

STEEL FOR PACKAGING

To Mr. Jerry L. Hayes
Hayes LLC
Representing Sonoco Europe
112 Crickentree Drive
Blythewood, SC 29016
USA

Dear Mr. Hayes,

Spiral Wound Can Recycling

Following our recent telephone conversation and the various email correspondence, APEAL now has a better understanding of your project to increase the awareness and recycling rate of spiral wound cans here in Europe.

APEAL, representing the European Steel for Packaging Industry is very interested in ensuring that all steel packaging is recycled, and after reviewing your specific issue of including the spiral wound paper container with steel bottoms in kurbside programs, we fully support your efforts to include these containers in kurbside programs throughout Europe. APEAL fully endorse programs such as yours and look forward to material recovery facilities across Europe hydraulically- bailing your composite cans into densified steel post-consumer can bundles.

Based on the correspondence from other worldwide steel recycling companies supporting the program and the evaluations and the initiatives undertaken by the various steel companies, APEAL will support the inclusion of Sonoco's spiral wound container with steel bottom in programs that we operate. As an environmentally responsible organization we believe in supporting the effort to include these containers in the kurbside programs throughout Europe. As we have experienced previously, some of these containers are currently included in our system and expanding the program fits our forward strategy and our commitment to environmental sustainability.

APEAL believes that working together with the various communities and Sonoco, we will be successful in moving this project forward and I look forward to working with you. Should you need any additional information, please do not hesitate to contact me.

Regards

Philip Buisseret, Managing Director

The Association of European Producers of Steel for Packaging (APEAL)

APEAL

APEAL - The Association of European Producers of Steel for Packaging
Avenue Ariane, 5 - BE-1200 Brussels - Belgium
Tel: +32 (2) 537 91 51 - Fax: +32 (2) 537 86 49
Email: info@apeal.be

From: Davy, Josh K [mailto:josh.davy@arcelormittal.com]
Sent: Wednesday, February 24, 2021 9:25 AM
To: Jerry Hayes
Subject: ArcelorMittal Dofasco Scrap Specification discussion

Hi Jerry,

Pursuant to our recent conversation, ArcelorMittal Dofasco's Scrap Specification allows for inclusion of spiral wound paperboard container with steel bottom in Post-Consumer Steel Can Bundles that we purchase, with no downgrade in price.
This Scrap Specification can be found at: https://dofasco.arcelormittal.com/what-we-do/online-services/scrap-specifications.aspx

Regards,

Joshua Davy | Procurement Leader, Raw Materials - Scrap
ArcelorMittal Dofasco

Purchasing & Logistics | Box 2460, 1330 Burlington St. E.
Hamilton, Ontario L8N 3J5

T 905-548-4270 | **C** 905-979-7027 | **F** 905-548-4062
www.arcelormittal.com | http://dofasco.arcelormittal.com/

BlueScope Steel Limited
Mellor Centre
Five Islands Road, Port Kembla NSW 2505
PO Box 1854, Wollongong NSW 2500
P +61 2 4240 2364 | **M** +61 417 306 791
E Natasha.Porteous@bluescope.com

10 September 2020

John McEvoy
Sales Manager - Australia
17-25 Templestowe Road
Bulleen
Victoria 3105

Dear John

Composite Can Recycling

BlueScope Steel is a steel manufacturing company, with scrap steel an essential ingredient in the integrated steelmaking process at Port Kembla Steelworks. Currently, finished steel is derived from about 25% scrap steel and the steel products produced are 100% recyclable into equivalent or higher quality products.

BlueScope Steel, as a major part of the Australian steel industry, supports high rates of recycling in the communities in which we operate. After reviewing your specific issue of including spiral wound paper containers with steel bottoms as an incidental part of the overall steel can recycling stream, we fully support your efforts to include these containers in community recycling programs throughout Australia.

BlueScope Steel uses mixed sourced recycled steel and is satisfied that the small amount of cardboard in these composite cans would not be an issue for use in our steelmaking process.

Should you need any additional information, please do not hesitate to contact me.

Yours sincerely

Natasha Porteous
Environment and Sustainability Manager
Australian Steel Products - BlueScope

THE CONTI GROUP
1661 46TH STREET
BROOKLYN, NY 11204
TEL: 718-435-8600

12/4/2020

To: Sonoco Industries
Re: Pringle Cans
Att: Lezlie Weaver

Hi Lezlie,

With regard to the addition of Pringles Containers into the Steel Can bales - The Conti Group, as purchaser would advise Sonoco that as a small percentage of the total volume (< 2%) the aforementioned containers are allowable, but the inclusion should be presented judiciously (not obvious on the outside of the bale)

Sincerely,

Nate Alter

The Conti Group

DOFASCO

Dofasco Inc., P.O. Box 2460, Hamilton, Ontario, Canada L8N 3J5
'Telephone: (905) 544-376. 1-800363-2726 Fax (905) 548-4252

June 5, 2006

Mr. Jerry L. Hayes
HAYES LLC
Representing
Sonoco Canada
112 Crickentree Dr
Blythewood, SC 29016
USA

Dear Jerry:

Composite Can Recycling

Our Scrap Strategy Committee has met recently following our discussion to review the issue of including the spiral wound paper container with steel bottom in hydraulically densified steel Post Consumer Can Bundles. Our group feels that we can support the effort to include these containers in the Blue Box Collection System.

Based on the projected recovery rate (20%) of the aforementioned product, the total fraction of this material in the Blue Box Collection System would be negligible and hence would not be detrimental to our Steelmaking Operation.

As you are aware, Dofasco conducted an evaluation of this container several years back. Our analysis revealed that the bales containing the composite can would be an acceptable product for re-melt at our Steelmaking Operations. As a result, Dofasco had no objection to having the composite can included in the steel fraction of the Blue Box tonnage.

In our go forward strategy to ensure quality compliance, Dofasco's Scrap Specification for Baled Post Consumer Cans would be amended to reflect the inclusion of spiral wound paper containers with steel bottoms.

Dofasco is very interested in working with Sonoco and the various municipalities in getting the container included in the curbside recycling programs as part of our corporate responsibility to environmental sustainability and our support and commitment to improve the overall environmental climate in Canada. This project is one of many we've initiated and/or supported over the years and feel it can be accomplished very effectively by working together with responsible companies like Sonoco.

Dofasco looks forward to working with Sonoco in successfully moving this project forward.

I appreciate both your patience and participation and I look forward to working with you.

Yours truly,

Michael Bondarenko

Friday 25 September 2020

Dear John,

Liberty Primary Steel is a steel manufacturing company, with scrap steel an essential ingredient in the integrated steelmaking process at the Whyalla Steelworks.
We mainly receive recycled scrap from liberty recycling in form of HMS which falls in the category which you are referring to , So in essence although, the total scrap charge ratio is higher but , as an approximation for total scrap percentage belonging to this category will be 1.7% in 1 Tonnes of accept steel.

Liberty Primary Steel, as a major part of the Australian Steel Industry, supports high rates of recycling in the communities in which we operate. After reviewing your specific issue of including spiral wound paper containers with steel bottoms as an incidental part of the overall steel can recycling stream, we fully support your efforts to include these containers in community recycling programs throughout Australia.

Should you need any additional information, please do not hesitate to contact me.

Yours sincerely,

AsMangat

Amrit Mangat
Manager of Steelmaking

8th September 2020

Mr John Irwin
Managing Director
Irwin Packaging
8-10 Yulong Close
Moorebank NSW 2170

Dear John

Composite Can Recycling

Molycop is an Electric Arc Furnace steelmaker based in Newcastle NSW. We produce in excess of 230,000 tonnes of steel each year and our feed source is 100% recycled steel scrap. This steel scrap is sourced predominately within NSW with some requirements coming in from Queensland and Victoria. Molycop is an environmentally conscious steelmaker and we also support renewable energy and source 55% of our electricity requirements via an agreement with a renewable energy provider.

The steel scrap used in our arc furnace comes from varying sources and we consider the use of composite cans containing a percentage of wound cardboard as a viable scrap product for use in our arc furnace.

Molycop fully supports all public recycling initiatives and we consider composite cans as a recyclable product and would contribute to our already advanced recycling practises.

Kind Regards

Lindsay Reid

General Manager

1902 Marine View Drive, Tacoma, WA 98422
Phone: 253-572-4000 Fax: 253-383-2178
www.schnitzersteel.com

December 7, 2011

Mr. Jerry .Hayes
HAYES LLC
Representing Sonoco Canada
112 Crickentree Dr
Blythewood, SC 29016

Regarding: Inclusion of Spiral Wound Containers in Steel Can Bales

Dear Mr. Hayes

Schnitzer Steel believes Sonoco's spiral wound container with steel bottom will be acceptable in bales of containers that we receive and thus we can support the effort to include these containers in the curbside programs.

As an environmentally responsible organization we believe in supporting the effort and will accept these containers in SSI locations for ultimate shipment into our Cascade Mill; the bales are not a viable product for international sale.

We look forward to working with you.

Sincerely,

Matthew Parker
NNW Regional Director

CC: David F. Keeling, General Manager
Steel Recycling Institute
Unit of American Iron & Steel Institute

William M Heenan, Jr.
President

E-mail: BHeenanSRI@aol.com

September 25, 2007

Mr. Jerry L. Hayes
HAYES LLC
Representing Sonoco
112 Crickentree Drive
Blythewood, SC 29016

Re: Composite Can Recycling

Dear Jerry:

The U.S. steel industry is very interested in ensuring that all steel is recycled, and after reviewing your specific issue of including the spiral wound paper container with steel bottoms in curbside programs as well as drop-offs, we fully support your efforts to include these containers in curbside programs throughout the United States.

The Steel Recycling Institute and- the American steel industry fully endorse programs such as yours and look forward to material recovery facilities across the United States hydraulically-bailing your composite cans into densified steel post-consumer can bundles. Our members have evaluated bails containing composite cans and have found them to be an acceptable product for re-melt at their steelmaking operations.

We look forward to working with Sonoco in successfully moving this project forward. Should you need any additional information, please do not hesitate to contact me.

Sincerely,

680 Andersen Dr.
Foster Plaza 10
Pittsburgh, PA 15220
800.876.7274
412.922.2772
fax 412.922.3213
sri@recycle-steel.org
www.recycle-steel.org

Steel Recycling Institute

Gregory L. Crawford
Executive Director

E-mail: gcrawford@steel.org

January 2, 2013

Via email: jerryhayes@sc.rr.com

Mr. Jerry L. Hayes
HAYES LLC
Representing Sonoco
5 Stonegate Drive
Hilton Head, SC 29926

Re: Composite Can Recycling

Dear Jerry:

The U. S. steel industry wishes to insure that all steel is recycled, and after reviewing your specific issue of including spiral wound paper containers with steel bottoms as an incidental part of the overall steel can recycling stream, we fully support your efforts to include these containers in community recycling programs throughout the United States.

The Steel Recycling Institute and the American steel industry look forward to material recovery facilities across the United States including incidental quantities of your composite cans into densified steel post-consumer can bundles. Various members have evaluated steel can bales containing incidental quantities of composite cans and have found them to be an acceptable product for re-melt at their steelmaking operations.

Should you need any additional information, please do not hesitate to contact me.

Sincerely,

Gregory L. Crawford

680 Andersen Dr.
Foster Plaza 10
Pittsburgh, PA 15220
800.876.7274
412.922.2772 x206
fax 412.922.3213
www.recycle-steel.org

Stelco Inc.
386 Wilcox Street
P.O. Box 2030
Hamilton, Ontario
Canada L8N 3T1

www.stelco.ca

T 905 528 2511
1 800 263 9305

Mr. Jerry L. Hayes
HAYES LLC
Representing Sonoco Canada
112 Crickentree Dr
Blythewood, SC 29016
USA

Dear Jerry:

Composite Can Recycling

Stelco Inc. has reviewed using the separated steel bottom from spiral wound paper containers in hydraulically densified steel Post Consumer Can (PCC) Bundles. Its impact on our steelmaking operations would be negligible based on the projected recovery rate (20%) of the aforementioned product (~200MT/year). Moderate use of PCC bundles are currently being charged into our operation. We will support the effort to include these containers in the Blue Box Collection System.

Stelco Inc. is interested in working with Sonoco and the various municipalities in recovering the containers from the curbside recycling programs. This reiterates Stelco's priority to the environment.

I appreciate your patience and participation and I look forward to working with you.

Regards,

Lloyd Estrabillo
Materials Manager
Stelco-Lake Erie Steel

Lezlie A. Weaver
W48
Sonoco Recycling
Non-Fiber & Field Procurement Representative
1 North Second Street
Hartsville, SC 29550

Re: Composite Can Recycling

Dear Lezlie:

The U.S. steel industry is very interested in ensuring that all steel is recycled, and after reviewing your specific issue of including the spiral wound paper container with steel bottoms in curbside programs as well as drop-offs, we fully support your efforts to include these containers in curbside programs throughout the United States.

The American steel industry fully endorse programs such as yours and look forward to material recovery facilities across the Unites States hydraulically-bailing your composite cans into densified steel post-consumer can bundles. Our members have evaluated bails containing composite cans and have found them to be an acceptable product for re-melt at their steelmaking operations.

We look forward to working with Sonoco in successfully moving this project forward. Should you need any additional information, please do not hesitate to contact me.

Sincerely,

Lori T. Smith
Trader
TMS International, LLC

Cc: David Aronson
Cc: Aaron Thomas

TMS INTERNATIONAL
Southside Works, Building One, Third Floor
2835 East Carson Street
Pittsburgh, PA 15203
P: 412.678.6141 F: 412.675.8295
www.tmsinternational.com

Jerry Hayes

From: Brad Masters <bmasters@triplemmetal.com>
Sent: Monday, February 22, 2021 3:18 PM
To: Jerry Hayes
Subject: Acceptance of spiral wound paperboard container with metal bottom

Jerry,

Pursuant to our recent conversation Triple M Metal accepts your spiral wound paperboard container with metal bottom in bales we purchase with no downgrading of pricing as long as it remains below the 2% level we've discussed. Therefore, the letter you previously obtained from Triple M Metal several years back is still active and accepted by us.

Regards,

Brad Masters

Brad Masters
Manager, Post Consumer Materials

Triple M Metal LP
61 Balzer Road
Kitchener, ON N2C 1X5

P: 519-894-1360 x 228
F: 519-465-9466
C: 519-465-9466

bmasters@triplemmetal.com
www.triplemmetal.com

TRIPLE M METAL LP

June 3, 2010

Mr. Jerry L. Hayes
Hayes LLC
Representing Sonoco Canada
112 Crickentree Drive
Blythewood, SC 29016
USA

RE: Spiral Wound Can Recycling

Dear Jerry,

Following our telephone conversation, and the various internal evaluations and the initiatives undertaken by Arcelor Mittal, US Steel, Gerdau Ameristeel and Algoma, Triple M Metal LP will accept Sonoco's spiral wound container with the steel bottom in bales of containers that we receive. As an environmentally responsible company we believe in supporting the effort to include these containers in the curbside programs in Ontario and throughout Canada.

As with the steel companies, it is our projection that the total amount of this container in the collection system would be negligible and hence would not be detrimental to our on-going operation.

As we have experienced previously, some of these containers are currently included in our system and expanding the program fits our forward strategy and our commitment to environmental sustainability.

Triple M Metal LP believes that working together with the steel companies and Sonoco, we will be successful in moving this project forward and I look forward to working with you.

Sincerely,

Brad Masters
Account Manager
Triple M Metal LP

670 Strathearne Avenue North, Hamilton, Ontario L8H 7N7 • Tel: (905) 547-8888 • Fax: (905) 547-9994
ISO 9001 • ISO 14001