JULY | 2019

Plastic Squeeze Tubes Consumer Outreach Pilot

REPORT

RECYCLEBC

MORE RECYCLING

OVERVIEW

More Recycling (MORE) is working with stakeholders to research and address barriers to plastic squeeze tube recycling. Plastic tubes are typically defined as having a semi-flexible body, pinched off at one end and covered on the other by a rigid head or cap. They are used for household personal care products, food, and other non-food applications.

Many programs in North America accept plastic bottles and containers, but questions have remained about plastic squeeze tubes and their compatibility with existing recycling streams. Previous work toward answering these questions, included inquiry into the estimated quantity and makeup of tube packaging, as well as testing of non-toothpaste tubes recycled today for compatibility with the HDPE bottle stream. Although present in most households, tubes, if added to the colored high-density polyethylene (HDPE) bottle stream, would make up approximately 1-2% of the HDPE bottles available for recycling at current generation rates. The compatibility testing showed that inclusion of tubes at 25% of the HDPE bottle stream with current design (not including the caps), did not significantly change the resulting recycled pellet or parts. Toothpaste tubes were not included in the compatibility testing, given most toothpaste tubes are not yet designed for compatibility with the colored HDPE stream. However, efforts are underway toward designing toothpaste tubes for recycling and there has been progress toward design that is compatible and meets the package function required. Given the potential opportunity to include tubes with bottles for recycling, MORE is collecting information to determine the potential value or challenges they may create for the existing recycling stream. Product residue was highlighted in previous project work as an area to address.

The primary goals of this Consumer Outreach Pilot were to gauge the impact of simple education—"empty tube and replace cap"— to decrease the amount of product residue remaining in each tube as a result of the outreach, and to gather broad market share information on size and type of products packaged in tubes. MORE partnered with Recycle BC, the not-for-profit organization responsible for residential packaging and paper recycling in British Columbia, to lead the education to residents and provide access to their post-collection facility for testing.

METHODOLOGY

The pilot collected qualitative market share data and quantitative data on product residue for the tubes collected during both the baseline and pilot periods. The qualitative data included documenting tube size[1] and product type, as well as estimating the fullness (amount of product remaining in tube) of each tube. The quantitative data are the results from wash/grind testing performed at the Plastic Forming Enterprises (PFE) lab.

The City of Coquitlam and the Village of Anmore (together referred to as "Coquitlam") located in British Columbia, Canada, were chosen for the consumer education pilot because of the manageable number of households (roughly 30,000), resident demographics, and good recycling participation history. Tubes collected from audits of residential

1 MORE used tube volume to be a marker for overall tube size based on results from flow studies, which indicate that tube size is an important factor in whether tubes sort properly in a recycling facility.

packaging and paper product recycling throughout the rest of the Province of British Columbia were used as a control (referred to as “province-wide”).

MORE and Recycle BC chose to use both “squeeze” as a descriptor word and graphics of sample tubes to help communicate what type of plastic tubes were the focus of the pilot. A timeline for the pilot and examples of outreach provided to the residents in the Coquitlam are displayed in Appendix B.

Data Collection

For the pre-pilot baseline period, Recycle BC worked with their post-collection partner Green by Nature (GBN) to collect at least 50 pounds of “province-wide” tubes and at least 5 pounds of tubes from the Coquitlam area for testing. This baseline collection period ran from October 2017 until April 2018 and collected tubes from audits. The material was shipped to MORE staff to document the qualitative information, and then the tubes were sent to PFE for wash/grind testing and weighing[2].

For the pilot, Coquitlam residents received sealable pink plastic bags with printed instructions communicating how to prepare and include tubes for recycling (see Appendix B). The pilot period ran from May 7, 2018 until July 31, 2018; and, during this time Recycle BC and GBN continued to collect control samples from audits from around the province for comparison to the tubes collected in the pink bags from Coquitlam. Staff at the Container Recovery Facility (CRF) continued to look for pink bags until the end of August 2018 to ensure that no bags were missed. Roughly 18 pounds of tubes were collected in pink bags from Coquitlam and another 77 pounds were collected from the province-wide audits. This material was again shipped to MORE to collect qualitative data, and then to PFE for testing.

Consistent with testing in previous phases of work, toothpaste tubes were not included in the PFE wash/grind testing (and therefore not in the quantitative data results) because of the known differences between currently marketed toothpaste tubes and other plastic squeeze tubes previously tested for compatibility with the HDPE bottle stream. Additionally, caps were removed and weighed separately but were not included in PFE wash/grind testing.

RESULTS

The qualitative data logged by MORE provides important market share information about tubes within the recycling stream and can be used along with market data from brand companies to better understand the landscape of plastic tubes sold into the marketplace and available for recycling. The qualitative results indicate a positive trend toward a greater number of empty tubes from the pilot area. The percentage of tubes that the MORE team was able to consider as “empty”[3] from Coquitlam tubes grew from 75% in the baseline sample to 93% in the pilot sample. Meanwhile, the percentage of tubes that were deemed “empty” from the province-wide samples fell slightly, from 85% to 83.8%, during the same time period. MORE attributes the shift in the number of empty tubes in Coquitlam to the education in the outreach pilot to “empty tube and replace cap.”

2 The resulting HDPE flake from the tubes collected will be recycled by a reclaimer in Ontario after the potential for additional testing has passed, at the end of 2019.
3 This was a qualitative assessment and MORE staff determined a tube to be “empty” if no additional product could be removed from the tube when it was squeezed. Toothpaste tubes were included in this qualitative assessment but were not included in the lab testing.

The MORE team also analyzed market share data for the size and contents of the tubes collected. From the four sample data sets (Coquitlam baseline, Coquitlam pilot, province-wide baseline, and province-wide pilot), a total of 3,074 tubes, including toothpaste, were collected. MORE logged the size and product type for each tube. The averages of the two sets of data for both product type and size are below (see Appendix A). The data from both sets of samples show that 60-70% of the total were either shampoos and soaps (surfactants) or lotions, creams, and non-wash hair products. Toothpaste tubes were about 25% of the total and the remainder was a mix of products like sunscreen, pastes, food, or non-plastic tubes. The market share data also shows that about 65% of the tubes are at least 2 ounces, with an additional 21-24% in the 1-1.99-ounce range. This is important because 2-ounce tubes are very likely to flow over the glass screens based on the flow test conducted in 2018.[4] The results were somewhat mixed for the tubes between 1 and 1.99 ounces, with some tubes not passing the screens well in this size range. The full data on size breakout is provided in Appendix A.

The PFE testing found that, of 100% of the weight of the pilot phase sample tubes (excluding toothpaste[5]) with caps removed from Coquitlam, only 46% of that weight was found to be clean plastic flake after the grind and wash test. The remaining 54% of the weight of the tubes without the caps was product residue still contained within the tubes[6] even though the vast majority of tubes received were characterized as “empty’. The conclusion from these samples is that because of the lightness of the package, particularly without the caps, empty tubes in their current design have a high product residue to tube package weight ratio.

CONCLUSION

This pilot indicates that it is possible to educate residents as to the importance of emptying out their squeeze tubes before recycling them, however even when they do so, the product residue to package ratio is high due to the current design and lightweight nature of most tube packaging. If there were a shift to a HDPE cap, the additional material available from caps could significantly decrease the ratio of residue to recyclable plastic.

The products contained in a package destined to be recycled is an important consideration, particularly in this scenario. The market share data of tubes collected in this study indicate the contents of the tubes are primarily surfactants and wash-off lotions and creams—60-70% of total tubes collected for recycling were for shampoos, soaps, lotions, creams, and non-wash hair products and approximately 25% were toothpaste tubes. The data also show that most tubes are of sufficient size to pass through standard recycling facilities.

These studies were conducted as part of a larger effort[7] toward identifying any barriers to the path forward for plastic squeeze tube recycling. Next steps of the tubes project work included engaging reclaimers and the Association of Plastic Recyclers (APR), an organization that provides guidance on design for recycling, with the information gathered

4 More details about this data is available in the Flow Test study report.
5 Toothpaste was included in the qualitative-observational assessments of this study, but not in the lab testing given the vast majority of toothpaste tubes are not currently designed to be compatible with the HDPE recycling stream.
6 There were unexpected challenges in the lab sampling of the baseline tubes collected from Coquitlam due to the small sample size, therefore a comparison between the baseline and post outreach samples is not available.
7 The tubes recycling project has been a multi-phase project over recent years and has been funded by a collaborative of brand and converters and other stakeholders.

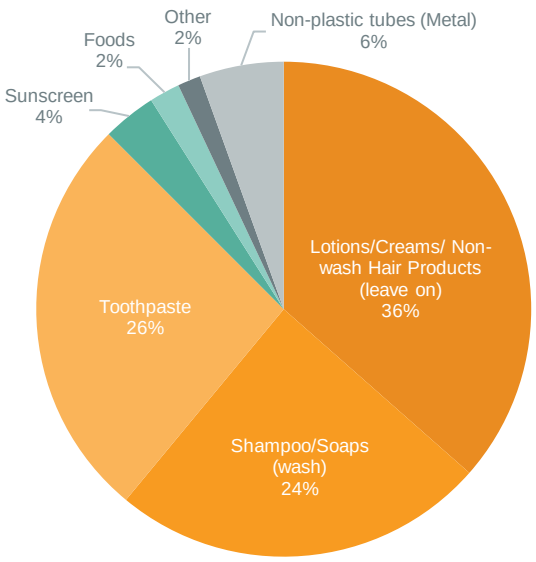
to date, including these pilot study results to determine a responsible path forward for tubes. The APR Olefin Technical Committee approved the convening of a working group to provide amendments to the design guides to provide clear guidance on tube design that is considered technically recyclable.

APPENDIX A

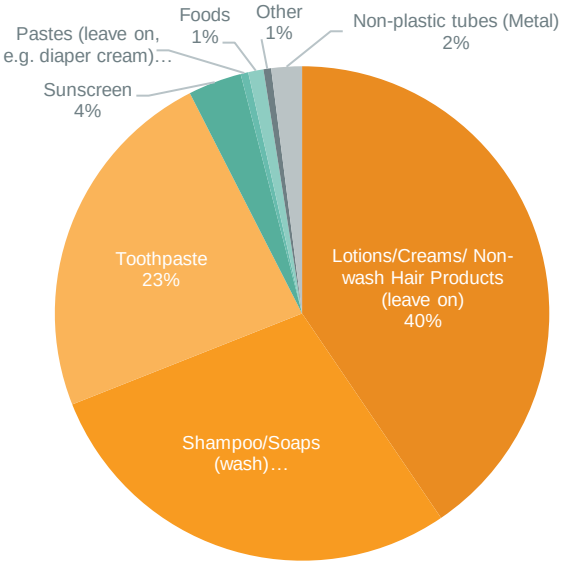
Market Share Graphs

The data provided by these graphs is from a small sample and serves only to indicate trends; they do not provide statistically significant representations of overall market share. Additionally, as this is only from material placed in recycling bins, it does not indicate overall generation data.

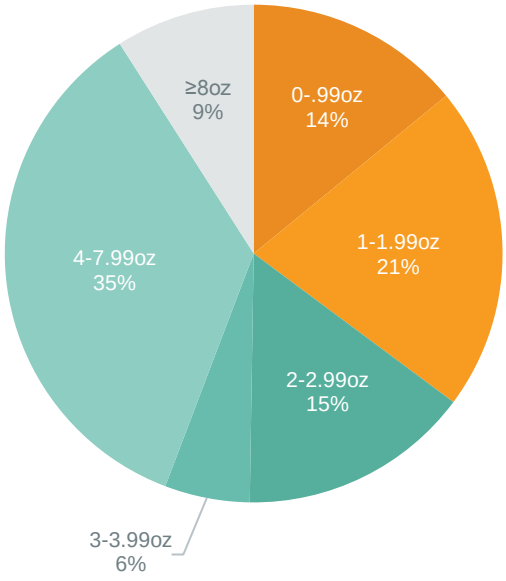
Average Market Share Product Type: Coquitlam



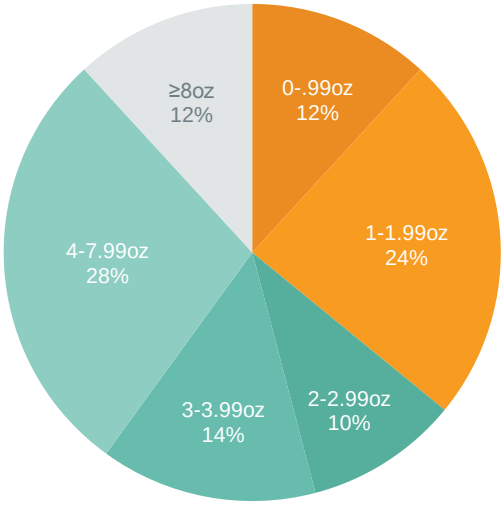
Average Market Share Product Type: Province-wide



Average Market Share Tube Size: Coquitlam



Average Market Share Tube Size: Province-Wide



APPENDIX B

Timeline 2017-2018

October 2017-April 2018: "Baseline" tubes are collected from province-wide material audits ("province-wide") and from the specific area wherein the pilot will occur ("Coquitlam").

Early 2018: MORE and Recycle BC work on graphic designs and messages for the education pilot. The message about recycling tubes is simple, "Empty tube and replace cap."

May 7-July 31: Consumer education pilot begins on May 7. Coquitlam residents receive pink bags and instructions (*see Image 1)* to begin collecting and including tubes in their blue boxes. Recycle BC provides pilot information and reminders to residents via traditional outreach means (i.e. newspaper ads), their webpage, and social media (*see Image 2*) throughout this time period. The pink bags are collected at the recycling facility, and audits continue to collect tube material from the wider control area.

July: Baseline tubes sent to PFE for residue testing.

August 31: Final pink bags are collected at recycling facility and last province-wide audit tubes are collected. Recycle BC provides metrics about engagement with social media posts and other outreach about the pilot.

October: All pilot material and province-wide control samples are sent to MORE for qualitative analysis.

November-December: Second set of samples are sent to PFE for testing. MORE begins data analysis.

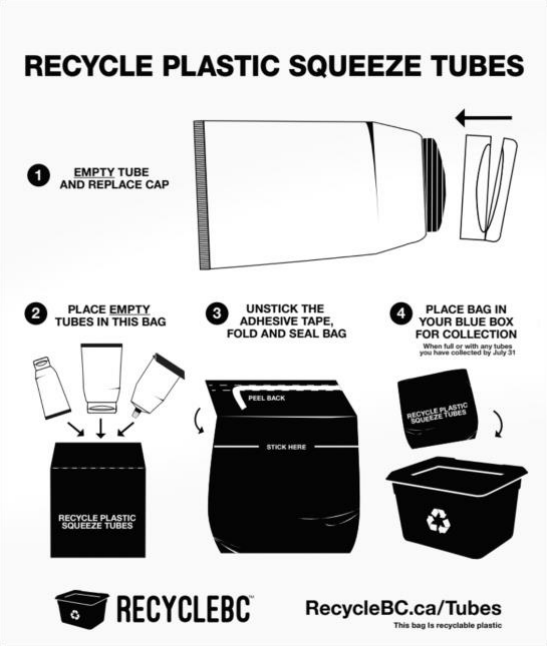


Image 1: Education material provided with pink bags for Coquitlam residents.

Image 2: Sample social media post for pink bag collection.

Image 3 and 4: Photo provided by Recycle BC of pink bag in recycling bin, and when received by MORE for further review.

Image 5: Tubes sorted by MORE for qualitative data collection.

Province-wide (Tubes)

Coquitlam (Tubes)

Image 6 and 7: Non-toothpaste tubes prepared for testing at PFE.

Through Grinder

Images 8-10: Various stages of testing from PFE: image of grinder, material through grinder, and washed and dried flake.

Province-wide (Tubes)

Coquitlam (Tubes)

Image 11 and 12: Toothpaste tubes collected as separated by PFE.

ADDITIONAL INFORMATION

This Consumer Outreach Pilot was funded by the following companies: Berry Global, Colgate-Palmolive, Estee Lauder, Johnson & Johnson, Procter & Gamble, and Unilever.