Minneapolis
City of Lakes

2018 Recycling Contamination Evaluation

Effectiveness of cart checking and door knocking

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Minneapolis Department of Public Works
Division of Solid Waste & Recycling

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Introduction & Background

In June 2015, the City of Minneapolis established a zero waste goal to recycle and compost 50 percent of its overall waste stream by 2020, 80 percent by 2030, and achieve a zero percent growth rate in the total waste stream from 2010 levels. Achieving this goal requires many strategies carried out by multiple sectors. Within the residential sector, one such strategy is to develop "robust, effective, and adequately funded education and outreach campaigns" that "maximize participation rates and encourage proper use of services" (Minneapolis Zero Waste Plan 2016, p. 20). Outreach and research carried out May through August of 2018 sought to contribute to proper use of service.

The present context of fluctuating recycling markets centered around issues of high contamination rates made it clear that education concentrating on contaminants was necessary. Feedback from the City's recycling processor emphasized that large numbers of plastic bags and films were being found in the local recycling stream. Plastic bags and films are especially problematic because they get tangled in the Material Recovery Facility (MRF) and force the shutdown of machinery for up to two hours daily during their removal. This called for extra education about plastic bags and film specifically.

To increase understanding of recycling contamination, staff updated the City's recycling educational tag and piloted a picture based tag. The City is fortunate to have 2-person collection crews for its recycling service. Every cart is manually moved from curb or alley to the collection truck and placed on the cart flipper. This gives the crew the opportunity to look into every cart, and opt to not empty a cart if contamination is found. Standard operating procedure is for crews to leave an educational tag on recycling carts containing contamination. Tags have two parts. The upper portion is left for the customer and the crews record the service address and contamination found on the bottom portion. The bottom portion is turned in to customer service staff in Solid Waste & Recycling. The tags are entered into a database which keeps a record of all interactions with property that has City SW&R service. When a resident receives their first educational tag, a letter is sent to the property and utility bill payer informing them that if their recycling is contaminated a second time, their cart will be taken away and only returned upon resident's request after 3 months or a $15 fee.

Unfortunately, educational tags are not consistently left by collection crews for a variety of reasons, including the extra time needed to write a tag, inconsistency with messaging, and inconsistent follow through with recycling carts actually being removed after repeat contamination. Often time, crews have felt that tags have not been effective at reducing contamination. One reason these educational tags might not have been effective is because they are text-heavy and do not contain many images, possibly making it difficult for residents to understand and respond to the tag.

The 2018 summer project focused on comparing educational strategies, educating residents about contamination (particularly plastic bags and film), and piloting a newly developed picture-based educational tag.

The first educational strategy was to manually check recycling carts for contamination, and when contamination was found, to leave the new educational tag on those carts. The new educational tag, referred to as an "Oops tag" (Figure 8) has multiple graphics on either side and significantly less text than the previous educational tag. The second strategy was to knock on doors and share information with residents about the most common items that should not be placed in recycling carts, particularly plastic bags. Door knocking was included in the project because it is a method of reaching residents not included in other communication channels, such as those who do not attend community events or receive newsletters from the City or neighborhood organizations. It provides the opportunity for residents to be connected on a more individualized level with city services and to assist residents with SW&R matters beyond what to recycle, such as ordering or repairing of carts, providing information about special disposal and providing contact information to address future questions and concerns (From ORG DK Report 2017). In addition, surveys conducted in 2016 and 2018 found that 50% and 35% of Minneapolis residents respectively reported that they heard about the City's Organics Recycling Program through one-on-one interaction. No recent research exists about the efficacy of door-knocking for decreasing traditional recycling contamination.

Methods

The project was carried out on 131 blocks within the Lind-Bohanon, Willard-Hay, Central, Bryant, Phillips, and Corcoran neighborhoods. Figures 1 and 2 show the neighborhoods that were chosen and the criteria used to determine why they were chosen.

The 131 blocks were divided into three intervention groups:

Group 1: Received educational "Oops" tags on contaminated carts and door-to-door education.

- 103 blocks.
- Recycling carts set out for collection during three consecutive collection cycles were checked and their contamination level ranked. An educational "Oops" tag was left on recycling carts when contamination was present. Homes received door-to-door education one time where additional recycling messaging and educational materials were given face-to-face. A door hanger was left if the resident was not home.
- This group was the largest to pilot the new educational "Oops" tag and received the most education to residents.

Group 2: Door-to-door education only.

- 22 blocks.
- Recycling carts set out for collection during three consecutive collection cycles were checked and their contamination level ranked. An educational "Oops" tag was never left. Homes received door-to-door education one time where additional recycling messaging and educational materials were given face-to-face. A door hanger was left if resident was not home.

Group 3: Control

- 6 blocks.
- Recycling carts set out for collection during three consecutive collection cycles were checked and their contamination level ranked without any face-to-face interactions.

The project lasted 12 weeks, broken into two six-week cycles. A minimum of 6 blocks were cart checked each day. As recycling is collected every other week in Minneapolis, each block is collected either during an "ABE week" or a "CD week". Each cycle had two sets of blocks – one for ABE weeks and one for CD weeks. Table 1 and 2 illustrate how blocks were divided by intervention type.

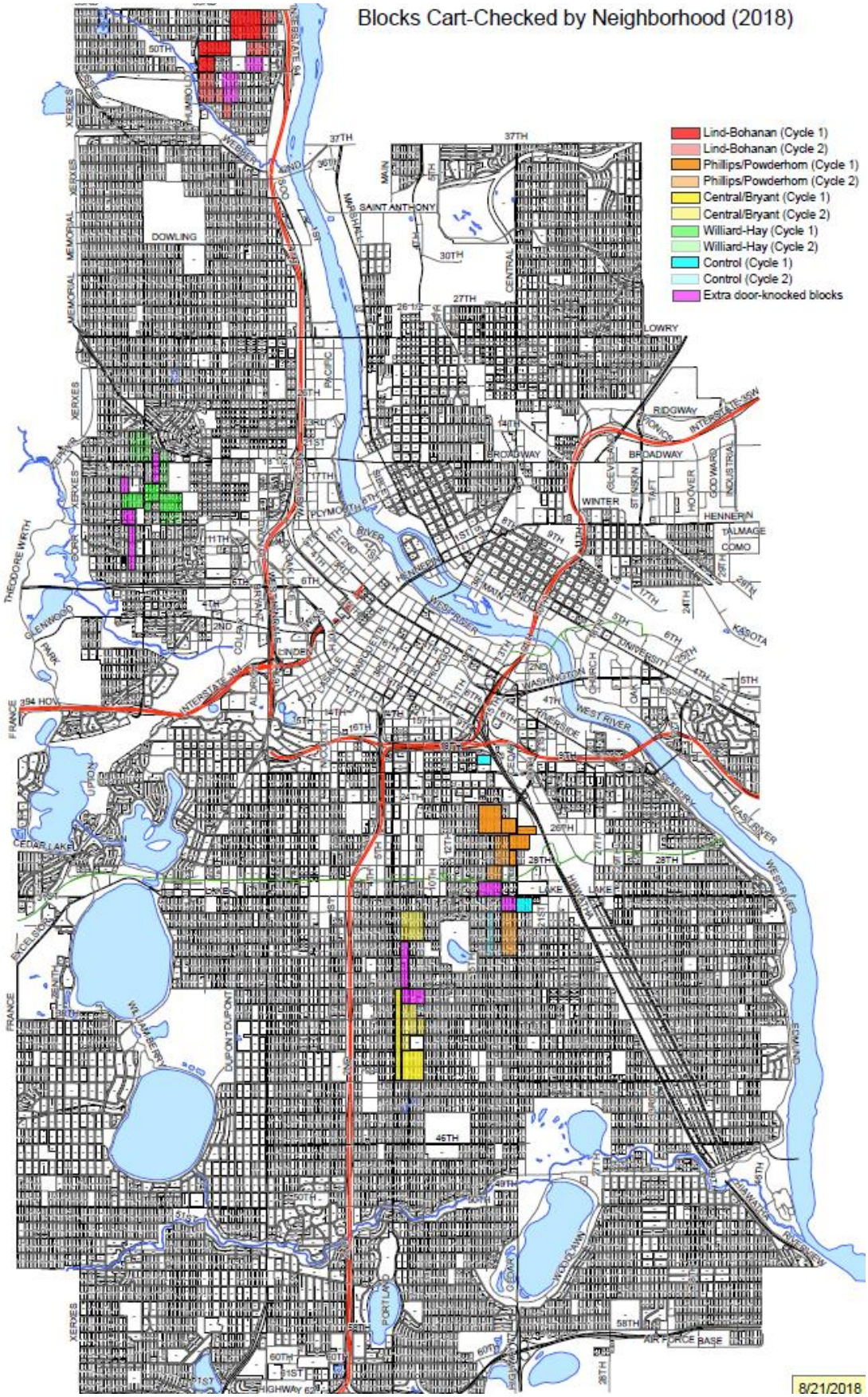
Table 1: Cycle 1 – Daily Schedule

CYCLE 1	Week 1 & 2			Week 3 & 4			Week 5 & 6		
Block and route	**Cart check**	**Cart tag**	**Door knock**	**Cart check**	**Cart tag**	**Door knock**	**Cart check**	**Cart tag**	**Door knock**
Block 1ABE & Block 1CD	X	X	X	X	X		X	X	
Block 2ABE & Block 2CD	X	X	X	X	X		X	X	
Block 3ABE & Block 3CD	X	X	X	X	X		X	X	
Block 4ABE & Block 4CD	X	X		X	X	X	X	X	
Block 5ABE & Block 5CD	X	X		X	X	X	X	X	
Block 6ABE & Block 7CD	X	X		X	X	X	X	X	

Table 2: Cycle 2 – Daily Schedule

CYCLE 2	Week 7 & 8			Week 9 & 10			Week 11 & 12		
Block and route	**Cart check**	**Cart tag**	**Door knock**	**Cart check**	**Cart tag**	**Door knock**	**Cart check**	**Cart tag**	**Door knock**
Block 7ABE & Block 7CD	X	X	X	X	X		X	X	
Block 8ABE & Block 8CD	X	X	X	X	X		X	X	
Block 9ABE & Block 9CD	X	X		X	X	X	X	X	
Block 10ABE & Block 10CD	X	X		X	X	X	X	X	
Block 11ABE & Block 11CD	X		X	X			X		
Block 12ABE &Block 12CD	X		X	X			X		

Figure 1: Blocks visited, sorted by neighborhood and cycle and control blocks.

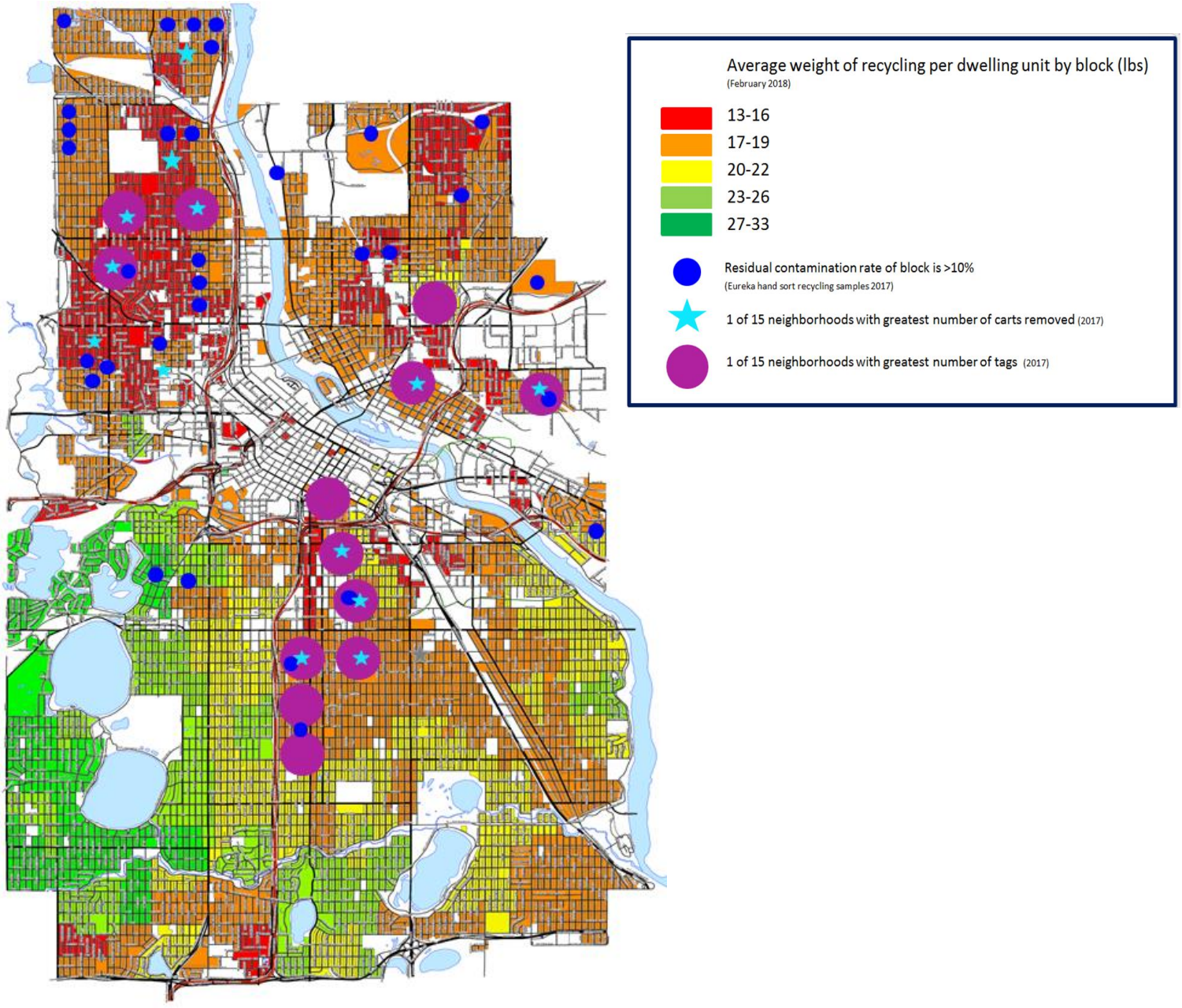


Neighborhood Selection

Neighborhoods and blocks were chosen based on a combination of the following criteria:

1. Blocks with a recycling contamination rate of 10% or higher, as found by sample hand sort(s) of recyclables collected by different recycling routes in Minneapolis (conducted by the City's recycling processor, Eureka Recycling).
2. Neighborhoods with the lowest weight of recyclables generated per dwelling unit in 2017.
3. Feedback from recycling crews on areas that need the most education about recycling. (not shown on map)
4. Neighborhoods with a high number of recycling carts removed due to non-participation or contamination.
5. Neighborhoods with carts that received a high number of educational tags for contaminated recycling in 2017.

Figure 2: Minneapolis with Neighborhood Selection Criteria Applied



Timing

The research and outreach was carried out Monday through Thursday between 6/11/18 - 7/19/18 (Cycle 1) and 7/23/18 - 9/30/2018 (Cycle 2). Cart checking was generally completed before 12:00 p.m. and door-knocking was generally completed between 12:30 and 3:30 p.m. Recycling carts were checked for contamination the day before their regularly scheduled recycling collection day. Monday collections were excluded.

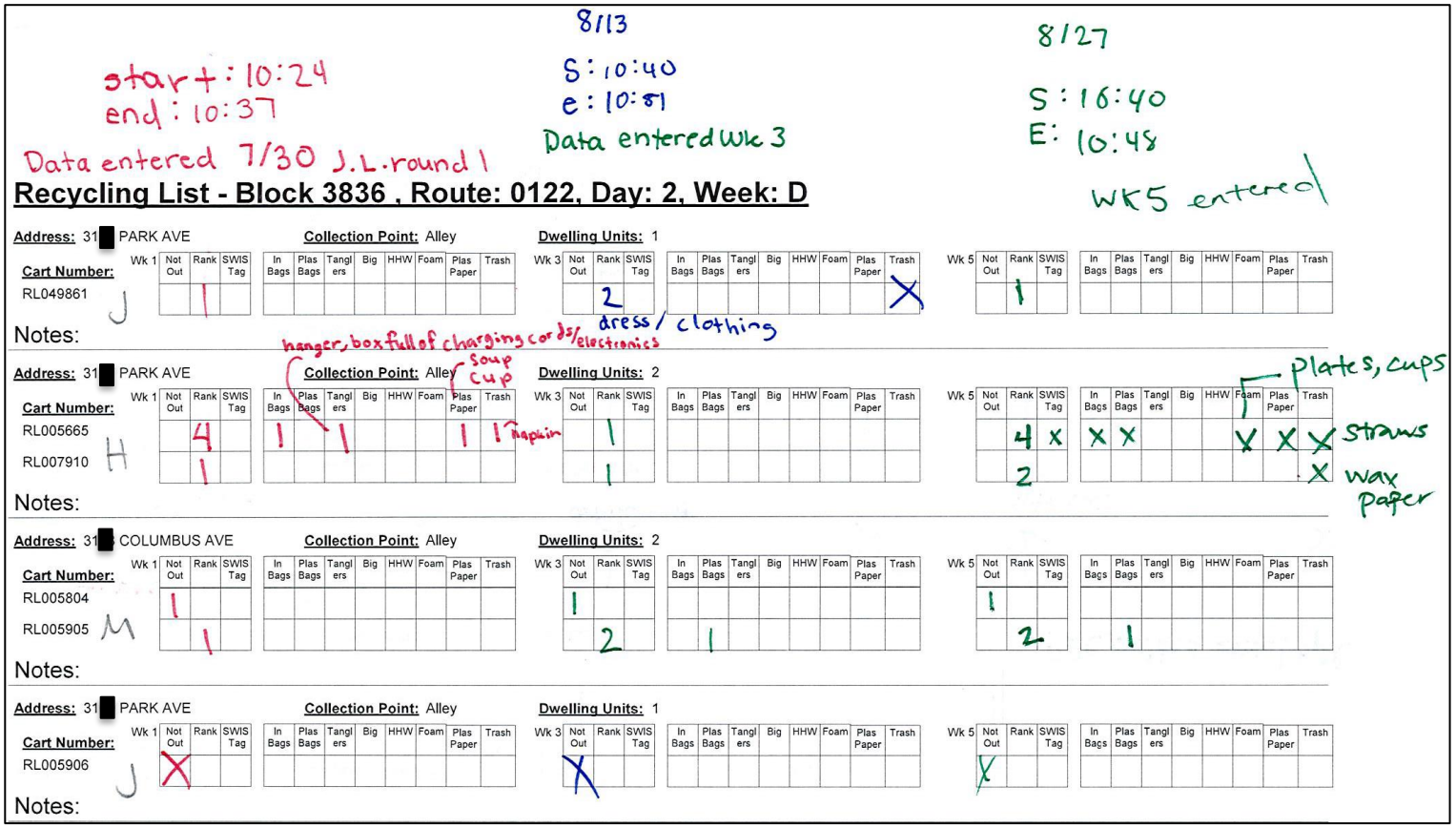
Average cart checking time pretagged blocks: 12.58 min
Average door knocking time per block: 19.68 min
Average cart checking time per untagged blocks): 7.78 min

Cart Checking

When cart checking, items inside the cart were not moved or touched, but rather ranked only by what was already visible. For consistency and time management, carts were ranked only from the most accessible side rather than looking in from every angle. The rankings of each cart were recorded on a printed document that listed each address and the corresponding recycling cart(s) for each property on each block. Categories of contamination were indicated on the tracking sheet, and additional notes were recorded. Figure 3 shows the cart checking sheet.

Figure 3: Recycling Cart Checking Block Sheet

An example of a completed recycling cart checking block sheet for a portion of Block 3836. The block was split into three by first initial (J, H, M) in order for three crew members to check an alley together. At the end each day all blocks sheets were compiled into one complete sheet. One crew member was always responsible for keeping track of start and end times.

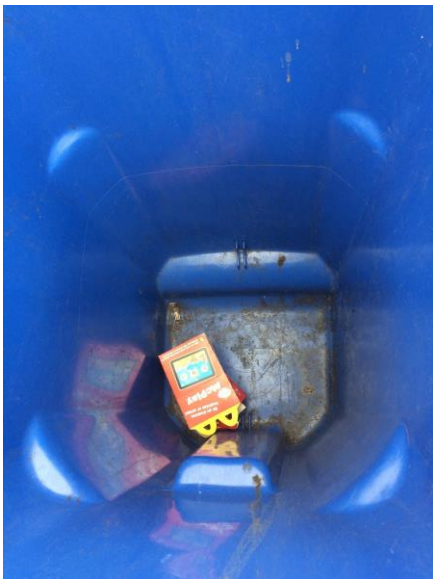


Cart Ranking

***X**:* Carts were designated as "X" if the property did not have a registered recycling cart listed (see Figure 3).

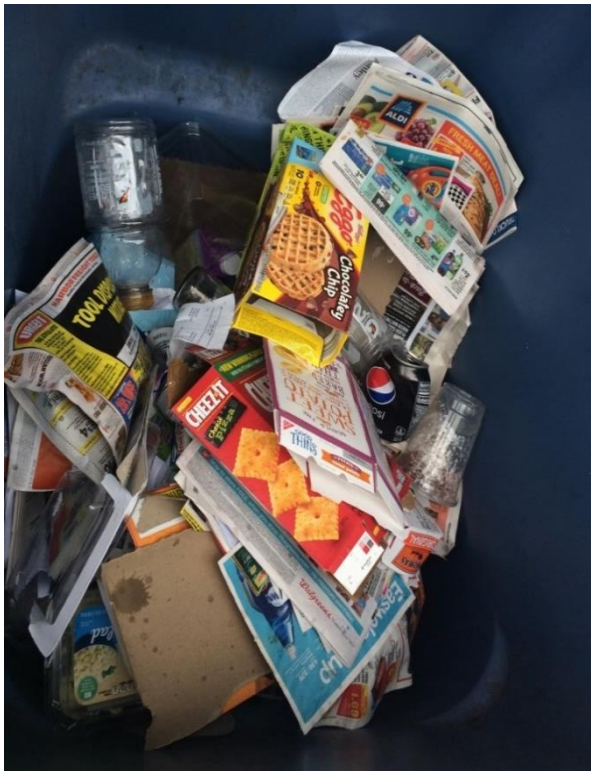
N/O: Carts were designated as "not out" if they could not be found, stored inside garage or fence, or were too far from the alleyway or street to be easily or respectfully accessed.

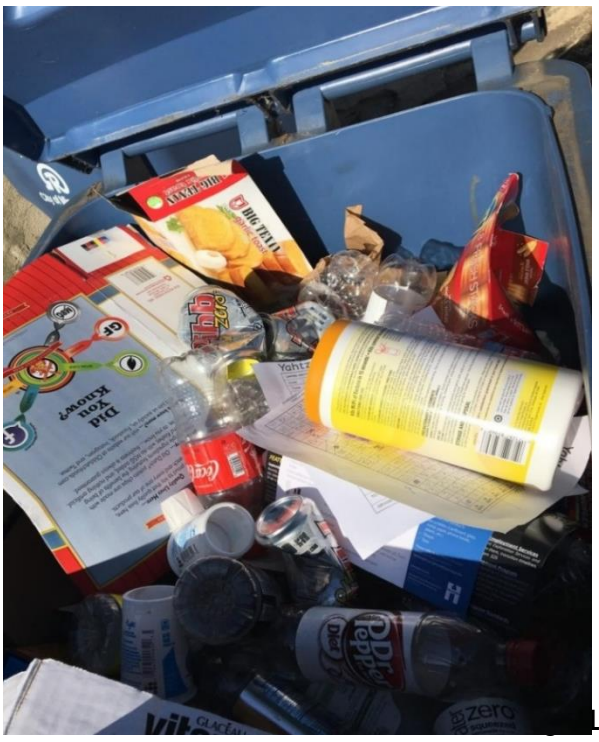
E: Carts were designated as "empty" if less than or equal to two items were found in the cart. Carts with more than two items inside stuck to the cart and not able to be easily dumped were also included in the "empty" category.



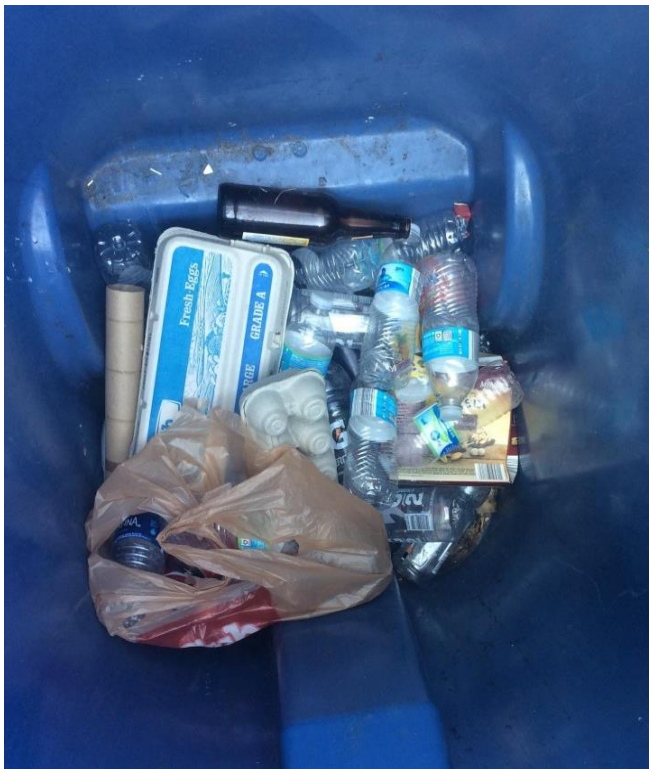
R: Carts were designated as “repeats/not collected last week” if the material was the same material in the cart the last week. Repeats were determined by looking at the comments left the previous week to identify if the contents of the cart were the same as the previous week. Repeats would occur when a cart was given an Oops tag the first cycle and was marked by the crew too contaminated to pick up. Residents have until their next collection day to fix the problem, if it was not corrected it would be collected as garbage. Due to the extra time for this process, repeat material in carts occurred.

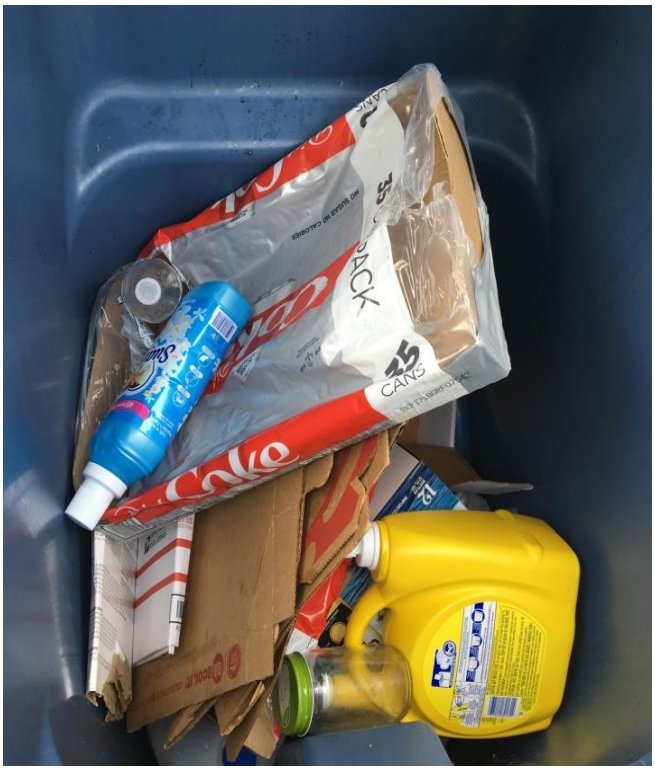
1: Carts were designated as “1” if no non-recyclable items or only one small non-recyclable item (two inches or less) was visible in the cart.



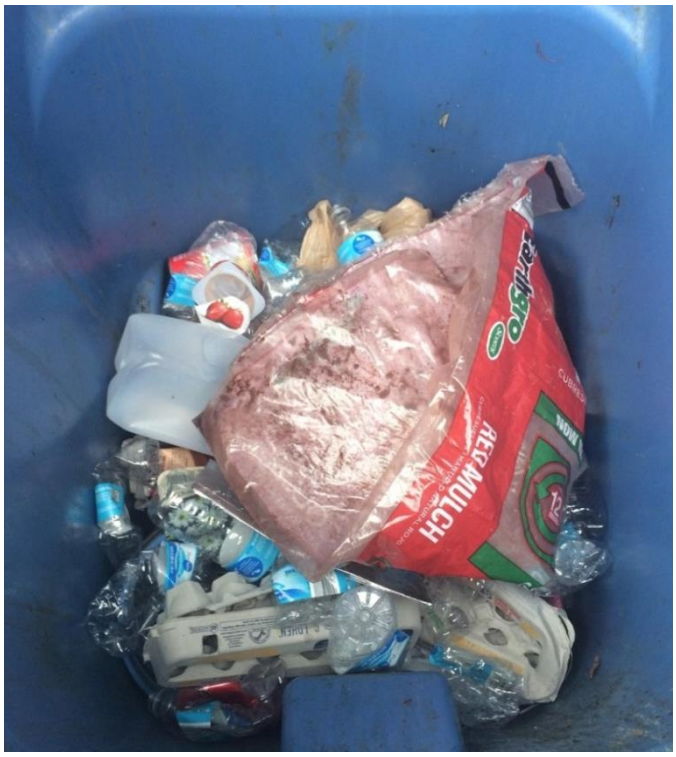


2: Carts were designated as “2” if one to three non-recyclable items were seen in the cart. Small items (two inches or less) were included in the count of one to three items, as long as a small item was not the only piece of contamination. Multiple of the same piece of contamination were counted as separate items (Figure 5).

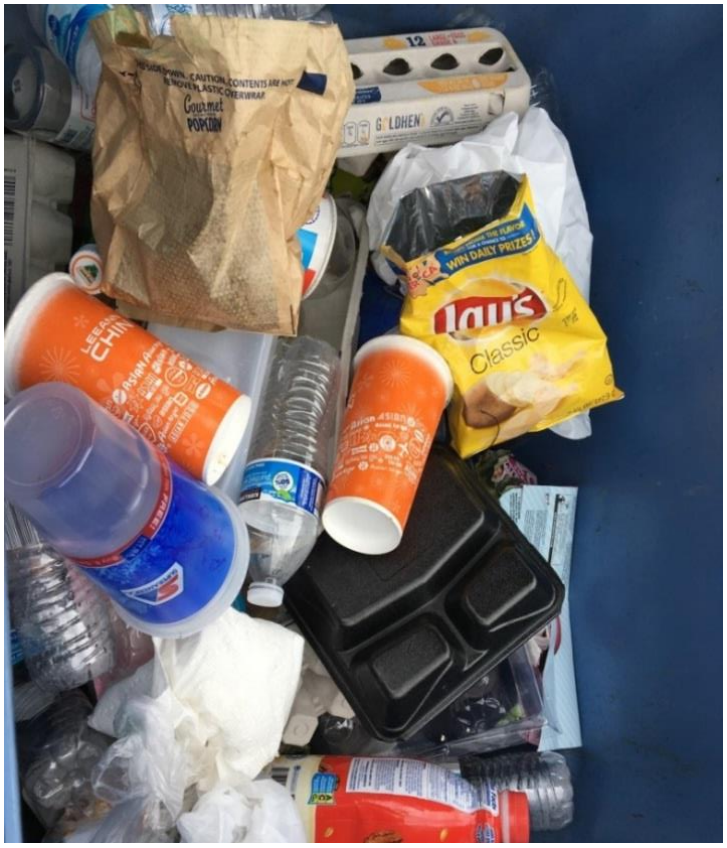




3: Carts were designated as “3” if more than three non-recyclable items were seen in the carts, but less than fifty percent (50%) of the items in the cart were non-recyclable.



4: Carts were designated as “4” if greater than or equal to fifty percent (50%) of visible items were non-recyclable.



Confidence in Ranking Ratings

As the ranking criteria can be subjective, an inter-rater reliability calculation was determined by finding the percent of ratings in agreement, relative to the total number of ratings. This calculation used rankings of every cart on one block by all four people (“rankers”) participating in cart checking during the summer project, carried out once during the first cycle and once during the second. If the percentage of agreement amongst rankers was 90% or greater, it meant that ranking criteria was not subjective to each ranker and a high degree of confidence was applied to the results. The inter-rater reliability calculations were tested twice, once before each cycle began. The first percentage of agreement found before Cycle 1 was 90.56% and the second percentage of agreement tested before Cycle 2 was 88.89%. Based on these results, a moderately high degree of confidence can be applied to the ranking results.

Tracking of Contamination by Type

Along with a ranking, the type of contamination visible in each cart was recorded (see Figure 3) by category as follows.

In bags: Carts were marked as “In bags” if full or partially-full plastic bags were seen inside. If bags were clear, items that could be seen were counted in the ranking process.

Plastic bags: Carts were marked “Plastic bags” if they contained items such as Ziploc™ styled bags; bubble wrap; plastic grocery shopping bags; empty trash bags; fruit/lettuce bags; saran wrap; and plastic case wrap around items like single use beverages, food and other household goods.

Tanglers: Carts were marked as containing “tanglers” if they contained non-recyclable items (other than plastic bags) that consistently get tangled in recycling processing facility… Common tanglers found included: charging cords, hangers, window blinds, and polyester cord strapping (frequently used for packaging and found around cardboard boxes).

Big: Carts were marked as containing “Big” items if they contained treated wood, large plastic items (such as a storage tote), scrap metal, appliances, and furniture. Items designated as “big” were not always necessarily big items, as this category was labeled. For example, this category was used for small amounts of scrap metal or small pieces of treated wood. Following the summer project, this category was renamed durable goods to account for the varying size of non-recyclable items found in carts.

HHW (Household Hazardous Waste): Carts containing household items such as chemicals, polishes, paints, yard and garden supplies, automotive and recreational products, batteries, and light bulbs were marked “HHW.”

Foam: Carts marked “foam” indicates it was contaminated with Styrofoam™ items such as meat trays, packaging, cups, plates, etc.

Plastic-Lined Paper: If materials such as paper cups, plates, and to-go boxes were found in the cart, “Plastic-LinedPaper” was marked. These items are lined with a thin plastic that make the paper non-recyclable (and non-compostable).

Trash: This category was used for other items that are not included in the other categories that cannot be recycled in One-Sort carts. Common trash found in carts included molded pulp paper, paper towels, straws, chip bags, and snack wrappers. (Ordered by most to least common). Food waste was designated as trash. Yard waste (tree branches, leaves, grass clippings) was also included in this category, but noted in the comments section and later separated out from the trash category into its own category of contaminant, as it is illegal to dispose of yard waste as trash in Minnesota.

Cart Tagging

When an item noted on the Oops tags was seen in a cart, this was marked on the front for the tag using the correct check box. Then, the tag was flipped over and an “X” was marked beside the non-recyclable item. Tags were secured to the cart and flipped over so the “Please leave these items out of your cart” side was visible to crews the next day. If raining or scheduled to rain, a portion of the tag was tucked into the cart to prevent the ink from bleeding.

Figure 4: Photo of contaminated cart and the educational "Oops" tag that was left.

This cart was given a ranking of 2, as it as three items of contamination. One padded envelope and two paper egg cartons.

Figure 5: Piloted Educational "Oops" Tag

The bottom portion of the tag is perforated for office use.

Your recycling ☐ was ☐ was not collected today. Please correct items marked below and we will collect your recycling next time.

41 Recycling cart was not out at the alley or curb line. Cart must be out by 6 a.m.

42 Non-recyclable items were in your cart. See back side

44 Extra cardboard should be flattened & bundled with string less than 3 feet by 3 feet and less than 40 pounds. Place Styrofoam™ in trash.

45 Cart was overflowing, causing litter problems.

48 Area around carts was not clear of snow and ice.

49 EXTRA Extra recycling. Cart should usually hold all recyclables.

50 Other: _____

Thank you for recycling!

minneapolismn.gov/recycling

Questions about your recycling service?

612-673-2917

Spanish: 612-673-2700 Hmong: 612-673-2700

Somali: 612-673-3500 Alternative format: 612-673-3000

Route #_____ Date: _____

Address: _____

Recycling picked up? Yes No

Not out on time: _____ a.m. or p.m.

41	42	44	45	48	49	50
If 42, circle issue:	Recyclables were bagged Loose plastic bags	Tanglers (cords, hoses, lights) Paper cups, plates, ice cream cartons. Styrofoam™.		Big items (wood, plastic, metal, toys, appliances)		Regular garbage Other

Comments: _____ 05/2018

Please leave these items out of your recycling cart!

Do not bag recyclables

No plastic bags or bubble wrap

No tanglers, cords, string lights, window blinds, or garden hoses

No paper cups, plates or ice cream cartons
No Styrofoam ™

No big items (wood, plastic, metal, toys, appliances, or furniture)

YUCK

No general garbage (place in garbage cart)

Correct this and we will collect next time.

NOTES

minneapolismn.gov/recycling

Questions about your recycling service?

612-673-2917

Division of Solid Waste & Recycling 05/2018

Figure 6: Old Recycling Education Tag

This tag was used until the pilot tag was evaluated, updated, and printed. This tag also has a bottom perforated portion that is not shown.

Minneapolis
City of Lakes

ONE-SORT RECYCLING

One-Sort

Your Recycling ☐ was ☐ was not collected today. We appreciate your effort to make recycling work! Please correct the items circled below, and we will continue service on the next scheduled pickup day.

☐ 41. **Recycling cart(s) were not at the alley or curb line. Must be out by 6 a.m.**

☐ 42. **GARBAGE FOUND IN RECYCLING CART**
- **Only** include glass bottles & jars, cans & aluminum foil, cartons, cardboard cans and plastic bottles, jugs, or tubs.
- **Only** include newspaper & inserts, magazines & catalogs, phone books, cardboard, and boxboard such as: dry food, refrigerated food, gift, shoe and tissue boxes.

☐ 43. **NON-RECYCLABLE MATERIALS** were found in the recycling cart. **DO NOT include** items such as plastic bags, bubble wrap, Styrofoam™, electronics, garden hoses, window blinds, clothing or shoes.

☐ 44. **CARDBOARD**
Place inside the cart. Flatten and bundle extra cardboard with string or twine, and place next to cart. Bundles must weigh less than 40 pounds.

☐ 45. **RECYCLABLES** were not contained, causing litter problems. See **Extra Recycling** on the other side.

☐ 46. **HOUSEHOLD BATTERIES ONLY**
Place in a clear plastic bag **on top of the recycling cart.**

☐ 47. **RECYCLING CART** is overweight. Cart and contents must not weigh more than 200 pounds.

☐ 48. **SNOW SEASON** – Snow and/or ice must be removed from your recycling collection point.

☐ 49. **Thank you for the extra Recycling!**

☐ 50. **Other** _____

Questions? Call **612-673-2917** or visit our website at **www.minneapolismn.gov/recycling**

PLASTICS Rinse and include all bottles, jugs, cups, containers, or packaging.
Do not include: plastic bags, Styrofoam™, bubble wrap, garden hoses, or bottles that held hazardous substances.

PAPER Include items such as:
mail, office and school papers, magazines and catalogs newspaper and inserts, phone books, shredded paper in closed paper bags.
Do not include: egg cartons.

BOXES Flatten and include items such as:
cardboard, cereal and cracker, refrigerated food, shoe, gift, and electronics, toothpaste, medication and other toiletry boxes.

CARTONS Rinse and include items such as:
milk cartons, juice boxes, soup, broth or wine cartons.
Do not include: egg cartons.

CARDBOARD CANS Rinse and include items such as cardboard cans from chips, nuts, frozen juices, refrigerated dough, powdered drink mixes, baby formula and powdered cleaners.
Do not include: cans that held automotive grease or wax.

GLASS Rinse and include all glass bottles or jars.
Do not include: drinking glasses, window glass, ceramics, mirrors, or lightbulbs.

METALS Rinse and include items such as:
food and beverage cans, aluminum foil and trays.
Do not include: paint cans, aerosol cans or containers that held hazardous products.

BATTERIES Include household batteries only. **Place in clear plastic bag on top of your recycling cart.** Tape the positive (+) terminal of lithium or lithium-ion batteries to prevent fires.
Do not include: automotive batteries.

EXTRA RECYCLING Your cart should hold your recycling. If you often have more recycling that your cart can hold, call 612-673-2917 to request another cart. There is no charge for an extra recycling cart. Occasional extra recycling may be placed in a box or paper bag next to your cart. Bags and boxes must weigh less than 40 pounds.

Questions? Call 612-673-2917 or visit our website at www.minneapolismn.gov/recycling

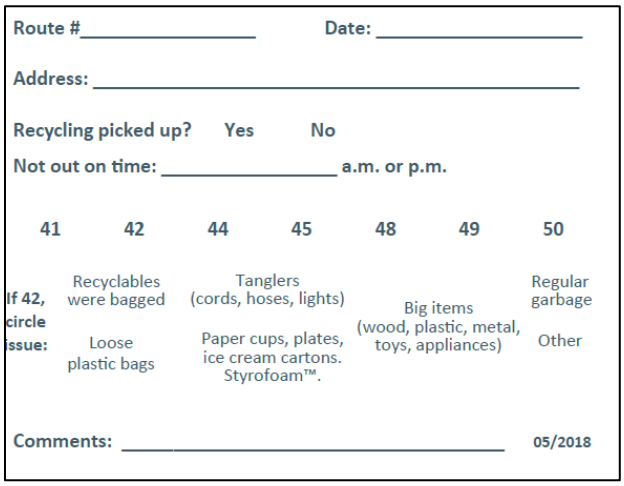
Hearing impaired can use a relay service to call 3-1-1 at 612-673-3000.
TTY users call 612-673-2157 or 612-673-2626
Para asistencia 612-673-2700
Rau kev pab 612-673-2800
Hadii aad Caawimaad u baahantahay 612-673-3500

Cart SWIS Tags

Generally, when an educational tag is left on a recycling cart, a record is noted in the Division's Solid Waste Information System (SWIS) that keeps a record of each property and its solid waste and recycling history. When a property receives an educational cart tag, a letter is mailed to the property and the utility bill payer notifying them the cart was contaminated. If a cart is tagged twice in a given time period, the cart may be removed by the recycling crew. The property can request for the cart to be returned for free after a three-month period, or for $15 fee the cart can be returned earlier. For purposes of this project, a ranking of a 2 (only 1-3 items contaminants found in cart) did not generate a SWIS tag. Only carts ranked 3 and 4 generated SWIS tags for contamination. On collection day, the crews were instructed to check if the resident corrected the issue listed on the Oops tag. If the issue was corrected, they emptied the cart. If not, they left the cart unemptied. If a SWIS tag was filled out two consecutive recycling days in a row, the residents' recycling cart was taken away.

Figure 5: SWIS Tag

This is the attached on the bottom of the educational "Oops" tag with perforation. When the recycling crew places a tag on the cart, they tear off the bottom portion (the SWIS tag), fill in the information and bring it into the office. The information is then submitted into SWIS database.



Route #_____ Date: _____

Address: _____

Recycling picked up? Yes No

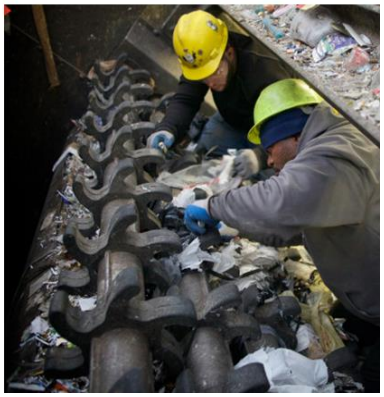
Not out on time: _____ a.m. or p.m.

41	42	44	45	48	49	50
If 42, circle issue:	Recyclables were bagged	Tanglers (cords, hoses, lights)		Big items (wood, plastic, metal, toys, appliances)		Regular garbage
	Loose plastic bags	Paper cups, plates, ice cream cartons. Styrofoam™.				Other

Comments: _____ 05/2018

Door-to-Door Education

When door-knocking, the first topic brought up when speaking with residents was plastic bags and film. Images (see below), were used to provide residents with a visual of the way plastic bags get tangled in the sorting equipment at the recycling facility and how workers must climb inside the equipment to remove plastic. Residents were also asked if they had a recycling cart, would like to sign up for a "Recycling Reminder" email service, were interested in Organics



Door-to-Door Education (continued)

Recycling, or if they would like a recycling guide, magnet or "No sheet," and if they had any further questions.

Below is an example script staff were asked to follow when door knocking:

"Hi, my name is ____, and I work for the City. I'm in the neighborhood checking in with residents about recycling. Do you have a recycling cart?"

If yes -- "That's great to hear! We've been seeing a lot of plastic bag in recycling carts, and we want to make sure people understand that plastic bags cannot be put in carts. They get tangled in our sorting machines, and workers actually spend up to two hours a day pulling plastic bags out of the machines."

If no or unsure -- "Ok. Would you be interested in getting a recycling cart for your house?"

"Are you interested in taking a refrigerator magnet or a guide to help you know what you can and can't put in your recycling cart?"

"Are you aware of the City's Organics recycling program?"

"Lastly, we send out emails every two weeks to remind residents when to put out their recycling cart. The email also includes some tips and other information about solid waste and recycling - are you interested in receiving the emails?"

If a resident seemed to be struggling to follow the conversation at the door, or called one of their kids or housemates to help translate, they were offered resources in Spanish, Hmong, or Somali.

If no one answered the door, an educational door hanger was left on the handle or slid inside the door. The door hanger outlined items often found that do not belong in recycling carts, and includes the information in English, Somali, Hmong, and Spanish.

In addition to intentional door-knocking, residents were also often encountered in alleys while carts were being checked. When this occurred, staff would invite the resident to look in their recycling cart with them and provide an overview of the contamination found in the resident's specific cart and offer a recycling guide magnet and a "No-sheet." The data does not differentiate between these conversations and typical conversations carried out while door-knocking. Conversations carried out through video-capable door bells are also counted as conversations within the data. Houses with locked fences, unleashed dogs, or threatening atmosphere were not door-knocked.

Figure 7: Door hanger

This door hanger was left at homes that did not answer the door during attempt to reach them with door-to-door education. The door hanger included the information in English, Spanish (front), and Hmong, and Somali (back).

Minneapolis Recycling

Minneapolis Recycling staff were in the neighborhood talking with residents about recycling. We are reminding residents to please leave these items out of blue One-Sort recycling carts:

Do not bag recyclables

No plastic bags

No tanglers (cords, string lights, hoses or electronics)

No big items (wood, plastic, metal, appliances, or furniture)

No paper or foam cups, plates or ice cream cartons.

No Styrofoam™

Thank you for recycling!

minneapolismn.gov/recycling

Questions about your recycling service?

612-673-2917

Minneapolis Recycling

Shaqaalaha Minneapolis ee dib-u-warshadaynta qashinka waxay ku jireen xaafadaha oo aay kala hadleen dadka dib-u-warshadaynta qashinka. Waxaan xasuusineynaa dadka deegaanka in ay ku ridin waxyaalahan garigacanka dib-u-warshadaynta qashinka ee OneSort:

Ha bacaynin kuwa dib-u-warshadaynta

Hakuridin bacaha balastiga

Hakuridin xarkaha, korantada ama aydhka, tuubooyinka ama elektaroonikada

Hakuridin wax wayn sida alwaax, balastik, bir, qalabka jikada ama guriga

Hakuridin waraaqo, koobab, saxano ka samysan foam

Hakuridin Styrofoam™

Waad ku mahadsan tahay dib u warshadaynta!

minneapolismn.gov/recycling

Wax su'aalaha ku saabsan adeegga dib-u-warshadaynta?

Somaaliga: 612-673-3500

Minneapolis Recycling

El personal de reciclamiento de Minneapolis estuvo en el vecindario hablando con la comunidad sobre reciclamiento. Estamos recordando a los residentes que por favor dejen estos artículos fuera de los botes azules One-Sort de reciclamiento:

No ponga los reciclables en bolsas

No bolsas ó envoltura de plastico

No cables, mangueras o luces de navidad

No artículos grandes (madera, plastico, metal, muebles o electrodomésticos)

No papel o vasos de unicel o cartones de helado

No estereofon

!Gracias por reciclar!

minneapolismn.gov/recycling

Tiene preguntas sobre su servicio de reciclamiento?

Español : 612-673-2700

Minneapolis Recycling

Lub nroog Minneapolis cov neeg ua hauj lwm rau txoj kev pab hu ua Minneapolis Recycling tau nrog cov neeg zej zog sib tham hais txog muab tej khoom seem tsis siv lawm coj mus nyoj siv dua. Peb thov hais qhia rau sawvdaw kom tsis txhob muab khib nyiab raw li hauv qab no tso rau lub thoob xim xiav uas yog cia rau khoom nyoj xwb hu ua OneSort:

Tsis txhob muab cov khoom uas nyoj tau ntim rau hnab khib nyiab

Tsis pub muaj hnab yas los yog ntaub yas qhwv

Tsis pub muaj hlua khaub zig (xws li hlua yas, hlua teeb, hlua dej los yog hlua fais fab)

Tsis pub muaj hlua khaub zig (xws li hlua yas, hlua teeb, hlua dej los

Tsis pub muaj ntawv los yog khob yas, tai yas los yog plhaub tai rau "ice cream"

Tsis pub muaj khoom yas

Us tsuag rau koj pab muab koj cov khoom xaiv coj mus nyoj dua!

minneapolismn.gov/recycling

Puas muaj lus nug txog kev pab hais txog xaiv khoom coj mus nyoj dua?

Hmoob: 612-673-2800

Figure 8: Door-to-Door Education Field Note Sheet

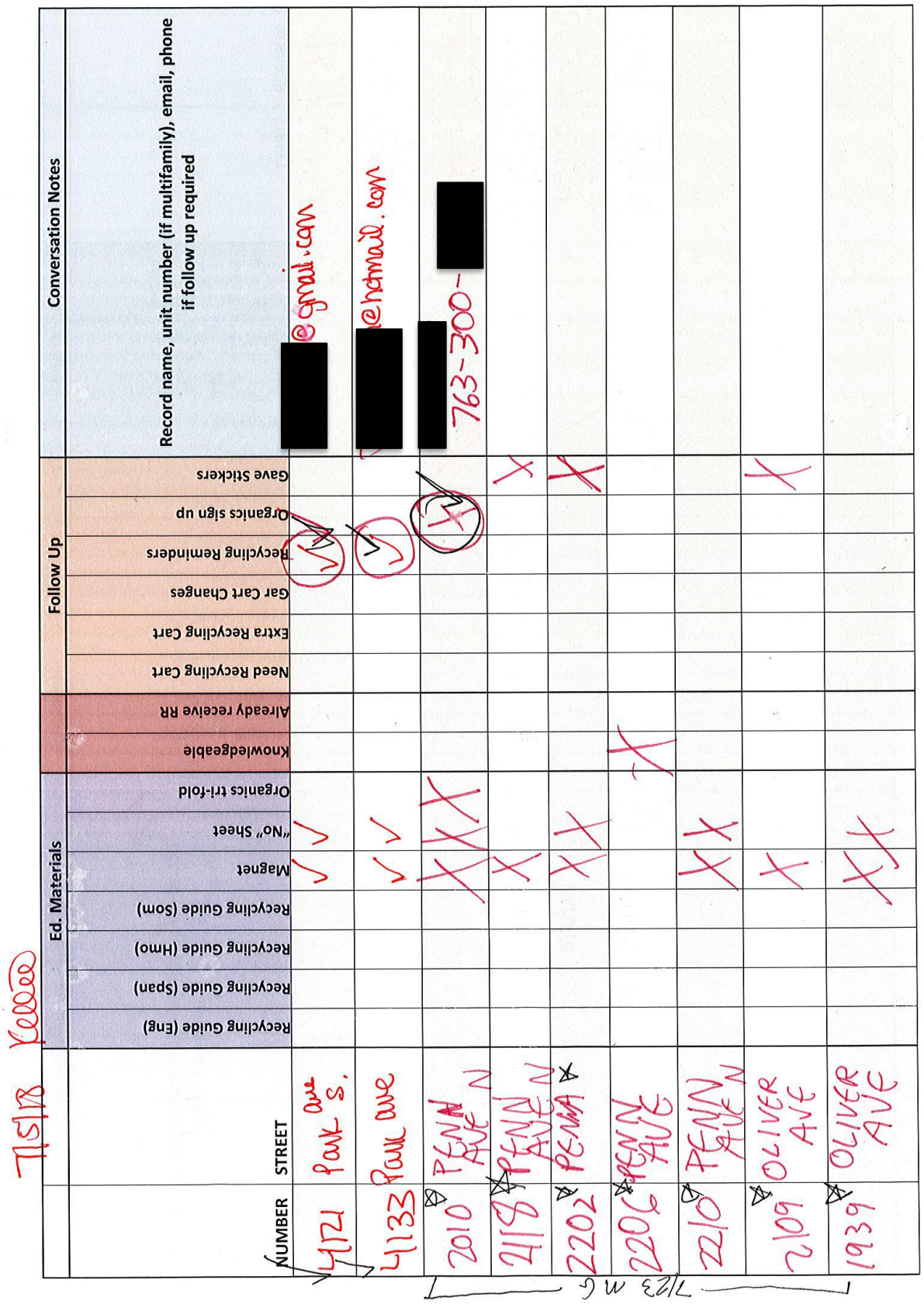


Figure 9: Recycling education piece distributed while door knocking

Items that are not accepted recycling carts. The reverse side of this handout was either Spanish, Hmong or Somali.

Figure 10: Recycling education piece distributed while door knocking

Recycling guide and magnet developed by Hennepin County

Recycling Guide

Paper

- Mail, office and school papers
- Magazines and catalogs
- Newspapers and inserts
- Phone books

Boxes:

- Cardboard
- Cereal and cracker boxes
- Shoe boxes, gift boxes and electronics boxes
- Toothpaste, medication and other toiletry boxes

Cartons

- Milk cartons
- Juice boxes
- Soup, broth and wine cartons

Glass

- Food and beverage bottles and jars

Plastic

Bottles and jugs:

- Water, soda and juice bottles
- Milk and juice jugs
- Ketchup and salad dressing bottles
- Dishwashing liquid bottles and detergent jugs
- Shampoo, soap and lotion bottles

Cups and containers:

- Yogurt, pudding and fruit cups
- Clear disposable cups and bowls
- Margarine, cottage cheese, and other containers
- Produce, deli and take out containers

Packaging:

- Clear, rigid packaging from toys and electronics

Metal

- Food and beverage cans

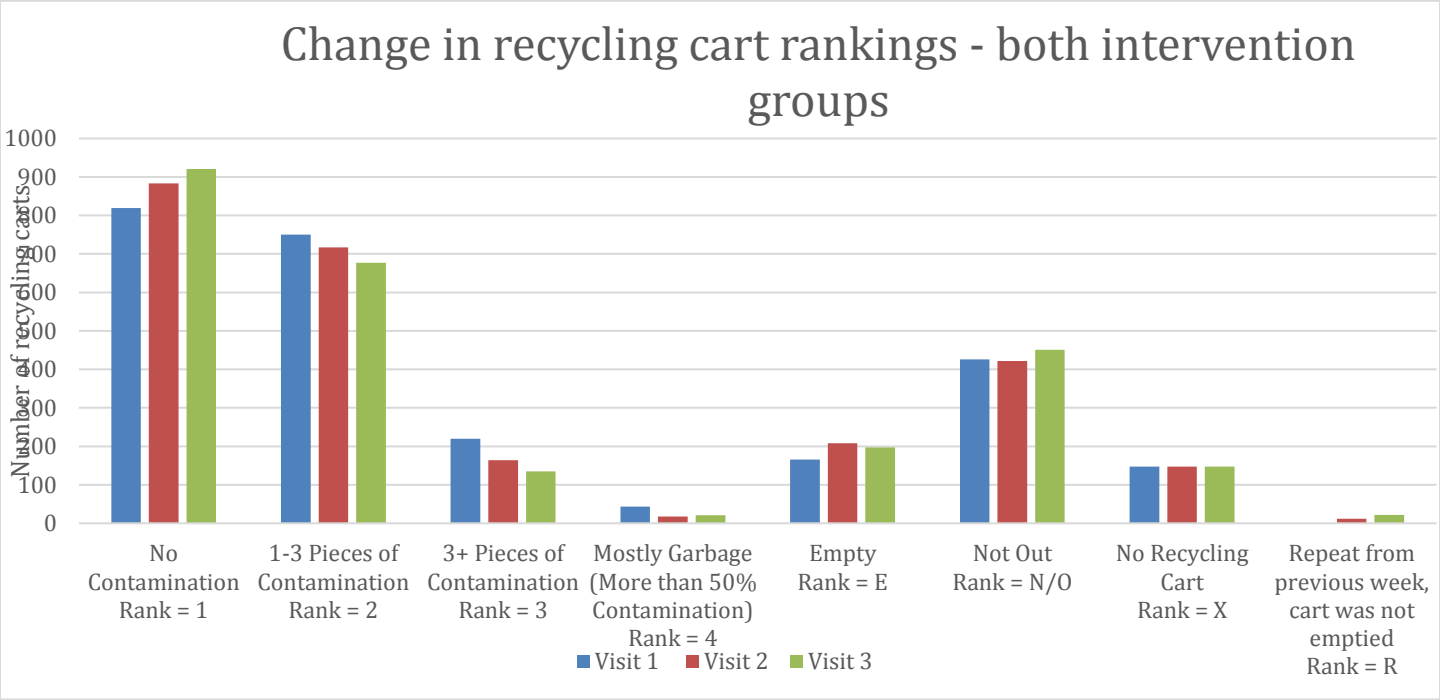
Not accepted: plastic bags, film, and wrap • plastic foam (Styrofoam™) • food waste • paper cups and plates • glass dishes, drinking glasses, window glass, and ceramics • garbage • containers that held hazardous products

Results

Figure 11 illustrates the overall change in recycling cart contamination found throughout the outreach period. Recycling cart contamination was ranked 1-4, as described in the Methods section. From Visit 1 (baseline) to Visit 3 (after outreach was performed) carts with no contamination (Rank = 1) increased by 12.5%, carts with 1-3 pieces of contamination decreased by 9.7% (Rank = 2), carts with 3 or more pieces of contamination but less than 50% contaminated decreased by 38.6% (Rank = 3) and carts that were more than 50% contaminated (Rank = 4) decreased by 51.2%.

Figure 11: Overall change in contamination throughout outreach period

The figure below includes all 2,571 carts that received outreach (Intervention Group 1 & 2). This does not include the carts in the control group.

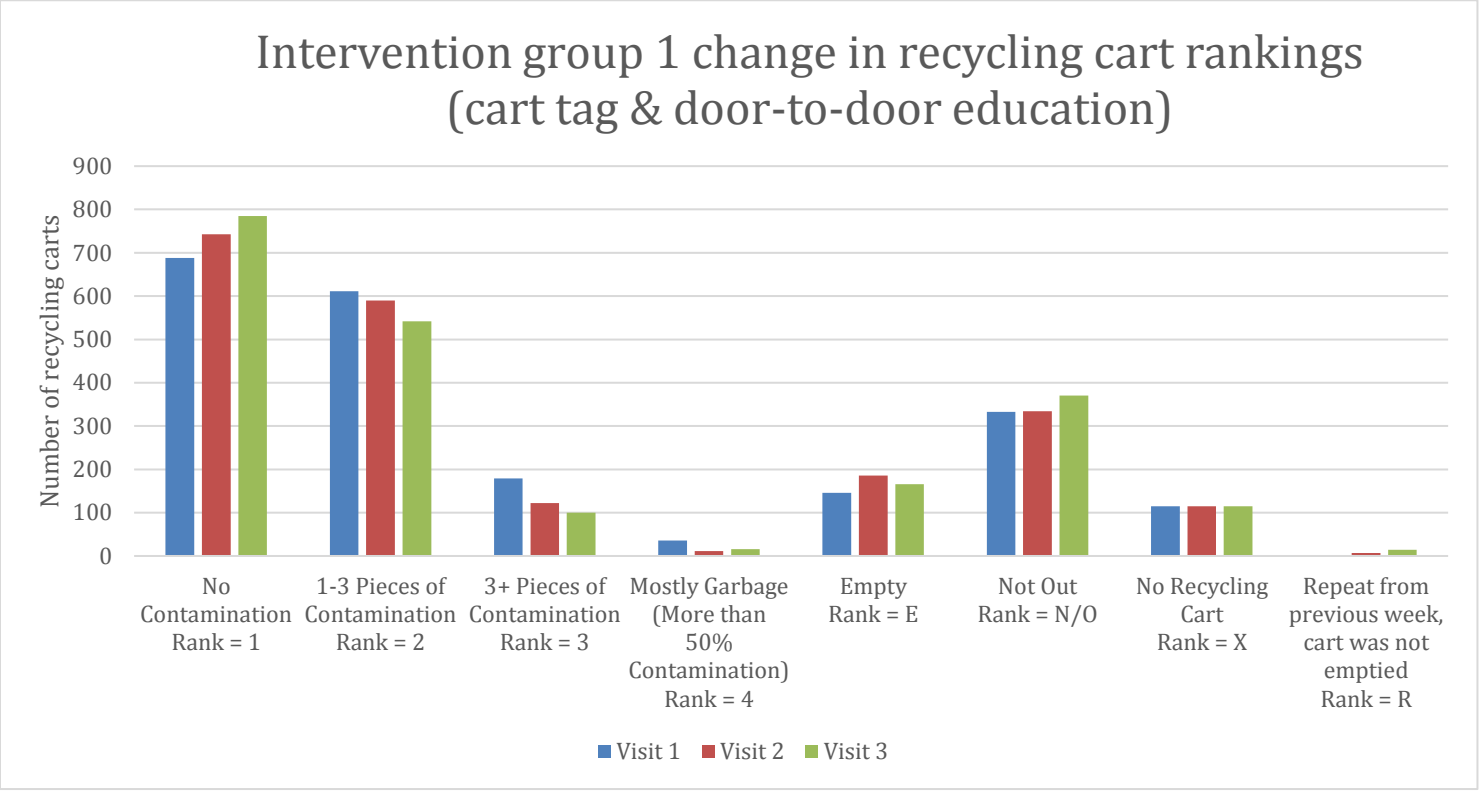


Intervention Group 1: Cart tag and door-to-door education

For this group, a cart tag was left the day before recycling collection for 3 collection periods in a row if contamination was found. The main goal of the research this summer was to pilot the effectiveness of the new cart tag, and to continue to do door-to-door outreach. Therefore, the majority of the homes targeted over the summer received cart tags and were door knocked.

Figure 12 illustrates the change in recycling cart contamination found throughout the outreach period for Intervention Group 1. Recycling cart contamination was ranked 1-4, as described in the Methods section. From Visit 1 (baseline) to Visit 3 (after outreach was performed) carts with no contamination (Rank = 1) increased by 14.1%, carts with 1-3 pieces of contamination decreased by 11.3% (Rank = 2), carts with 3 or more pieces of contamination but less than 50% contaminated decreased by 44.1% (Rank = 3) and carts that were more than 50% contaminated (Rank = 4) decreased by 55.6%.

Figure 12: Change in contamination throughout outreach period for Intervention Group 1 (received "Oops" tags and door-to-door education)



Number of blocks: 103

- Number of recycling carts: 1,479
- Dates visited:
    - 62 blocks in Cycle 1 (June – July 2018)
    - 41 blocks in Cycle 2 (July – August 2018)

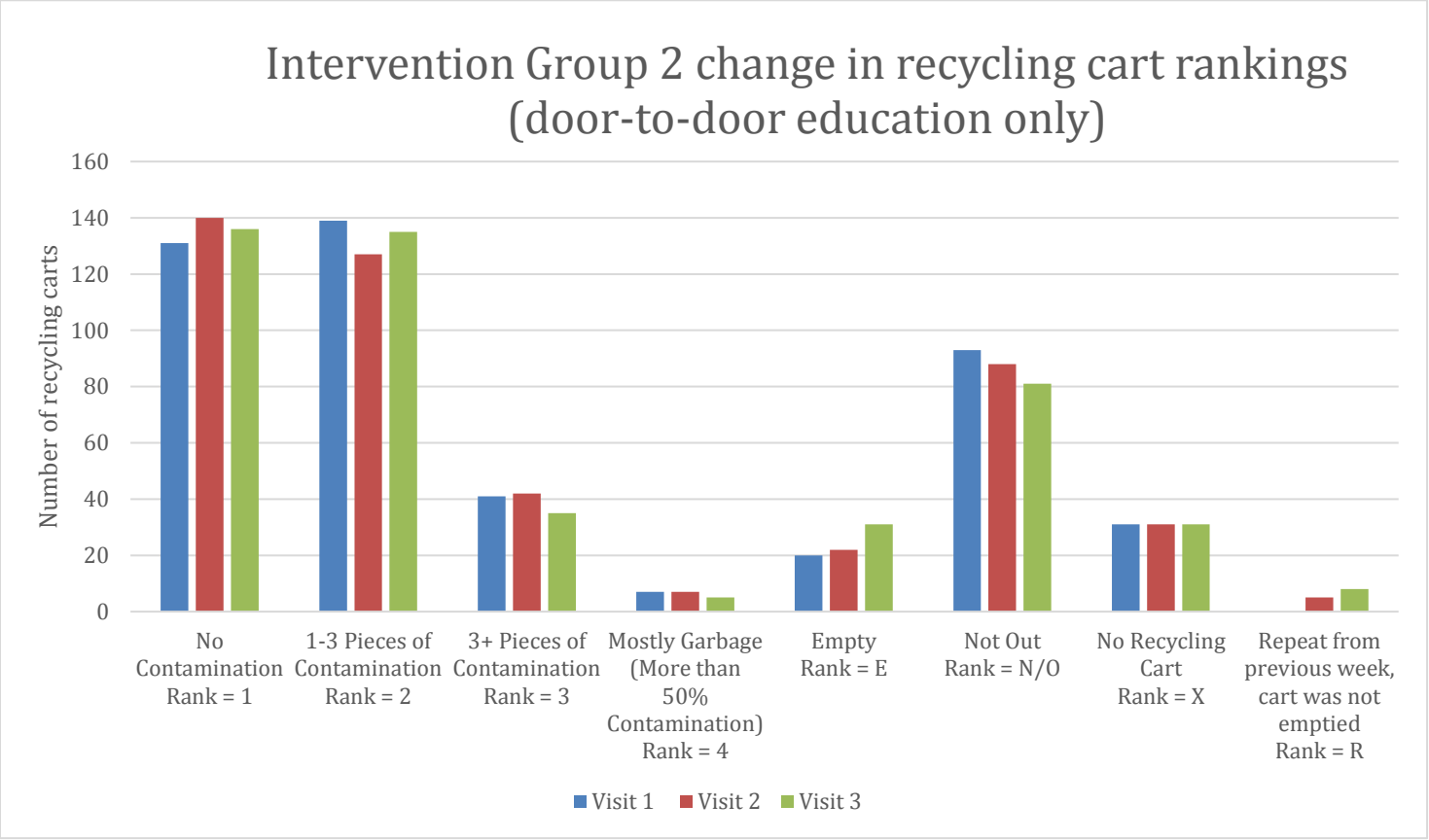
Intervention Group 2: Door-to-door education only

For this group, homes received only door-to-door education, and only one attempt to visit the home. The carts were still monitored throughout the three consecutive recycling collection periods to collect data on the possible effects of door-to-door communication. No cart tags were left. This method was used to understand the effects of door knocking by itself.

- Number of blocks: 122
- Number of recycling carts: 309
- Dates visited:
  - 22 blocks in Cycle 2 (July – August 2018)

Figure 13 illustrates the change in recycling cart contamination found throughout the outreach period for Intervention Group 2. Recycling cart contamination was ranked 1-4, as described in the Methods section. From Visit 1 (baseline) to Visit 3 (after outreach was performed) carts with no contamination (Rank = 1) increased by 3.8%, carts with 1-3 pieces of contamination decreased by 2.9% (Rank = 2), carts with 3 or more pieces of contamination but less than 50% contaminated decreased by 14.6% (Rank = 3) and carts that were more than 50% contaminated (Rank = 4) decreased by 28.6%.

Figure 13: Change in recycling cart contamination throughout outreach period for Intervention Group 2 (door-to-door education only)



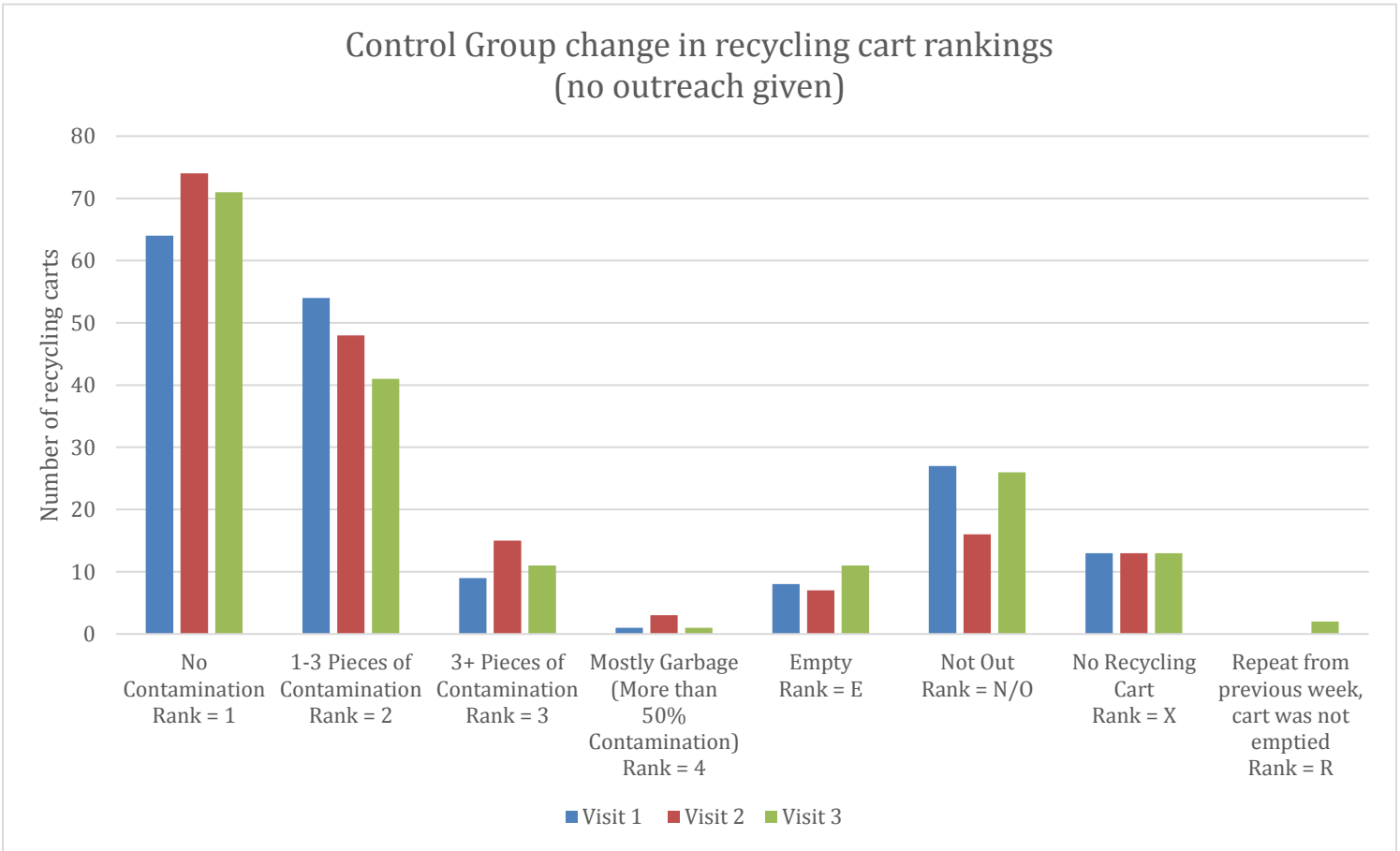
Control Group

For this group, carts were monitored throughout the three consecutive recycling collection periods to collect data on the normal fluctuations in cart cleanliness when no recycling education treatments were applied.

- Number of blocks: 6
- Number of recycling carts: 122
- Dates visited:
    - 3 blocks in Cycle 1(June – July 2018)
    - 3 blocks in Cycle 2 (Jul y– August 2018)

Figure 14 illustrates the change in recycling cart contamination found throughout the outreach period for the control group. Recycling cart contamination was ranked 1-4, as described in the Methods section. From Visit 1 (baseline) to Visit 3 (after outreach was performed) carts with no contamination (Rank = 1) increased by 10.9%, carts with 1-3 pieces of contamination decreased by 24.1% (Rank = 2), carts with 3 or more pieces of contamination but less than 50% contaminated increased by 22.2% (Rank = 3) and carts that were more than 50% contaminated (Rank = 4) remained the same.

Figure 14: Change in recycling cart contamination for the control group



Comparison of Outreach Types

Each intervention group was subdivided based on whether or not a conversation took place while door knocking. This was done to better understand the impact of an actual conversation because often while door knocking no one would answer the door. Figure 15 below displays the average cart rankings per Visit 1 (baseline), Visit 2 and Visit 3 (after outreach had been performed) for each intervention group, and also each intervention group divided by whether a conversation took place or not. Figure 16 displays the average cart rankings based on the percent change in rankings from Visit 1 (baseline) to Visit 3.

Figure 15 and Figure 16 illustrate that Intervention Group 1 (cart tagged and door-to-door education) had the biggest change in cart ranking reduction (a lower cart ranking means less contamination in recycling), not including the control group. Looking at Visit 3, which illustrates the post-intervention results, when a conversation occurred during Intervention 1, the average cart ranking was lower (cleaner) than when a conversation did not occur. When a conversation occurred during Intervention 2, the average cart ranking was also lower (cleaner) than when a conversation did not occur.

Figure 15: Average Cart Ranking Comparison Between Intervention Types

Average Cart Ranking Scale 1 -4

1 = No contamination 2 = 1-3 pieces contamination 3= 3+ pieces 4 = more than 50% contamination

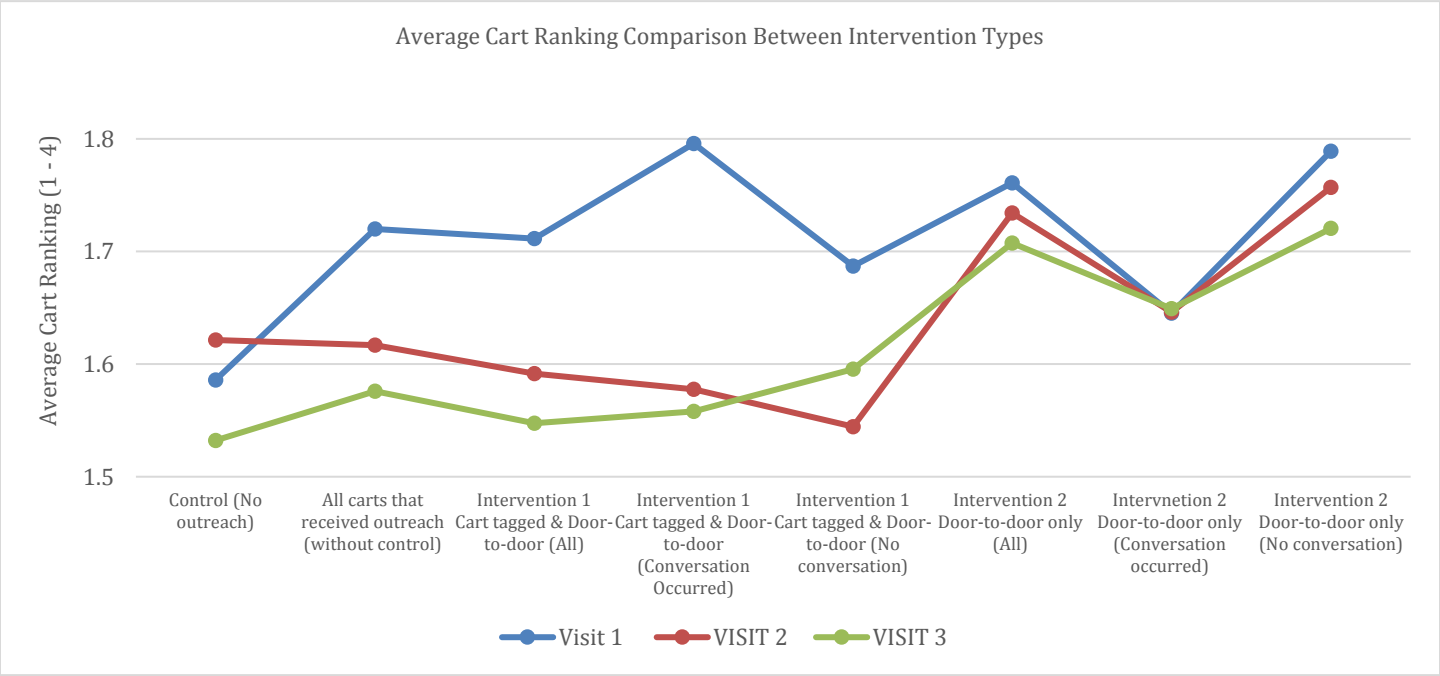
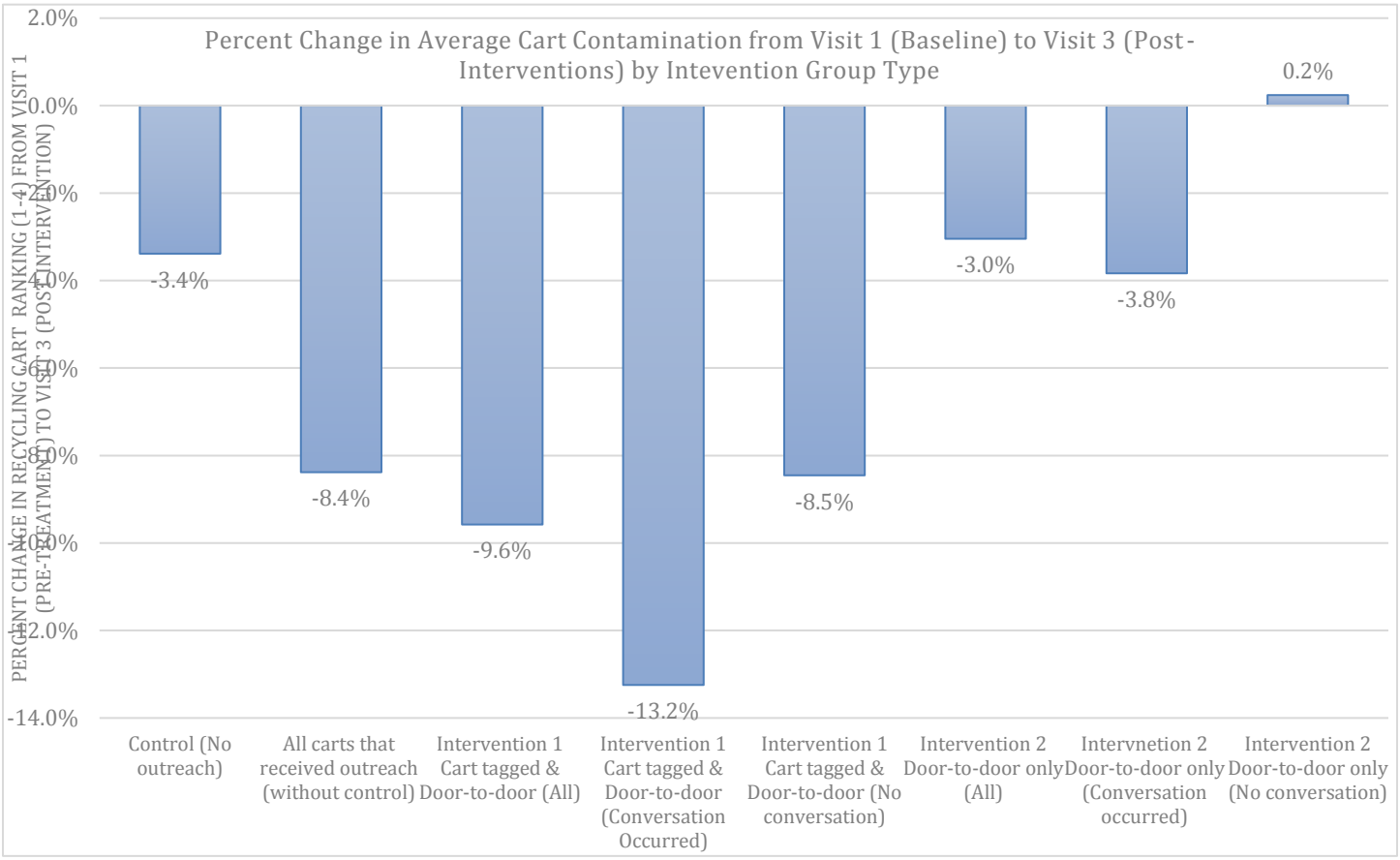


Figure 16: Percent Change in Average Cart Ranking Comparison Between Intervention Types

A negative percent change indicates that carts became cleaner, as the ranking scale was from 1 (clean) to 4 (more than 50% contaminated).



Retention Tests

To determine if education received during project was retained by residents after the project ended, carts were checked and ranked again three months later. In total, 1,252 carts or 45.6% of all carts included in the project, were checked for retention; 1,076 of these were carts in which an intervention occurred and 176 were control carts.

Figure 17 and 18 illustrate that overall, the retention test found that carts were less contaminated than they were before the outreach began (Visit 1), but more contaminated than they were when the outreach ended (Visit 3).

Figure 17: Average Cart Ranking Comparison Between Intervention Types, Including Retention Test Visit

Average Cart Ranking Scale 1 -4

1 = No contamination 2 = 1-3 pieces contamination 3= 3+ pieces 4 = more than 50% contamination

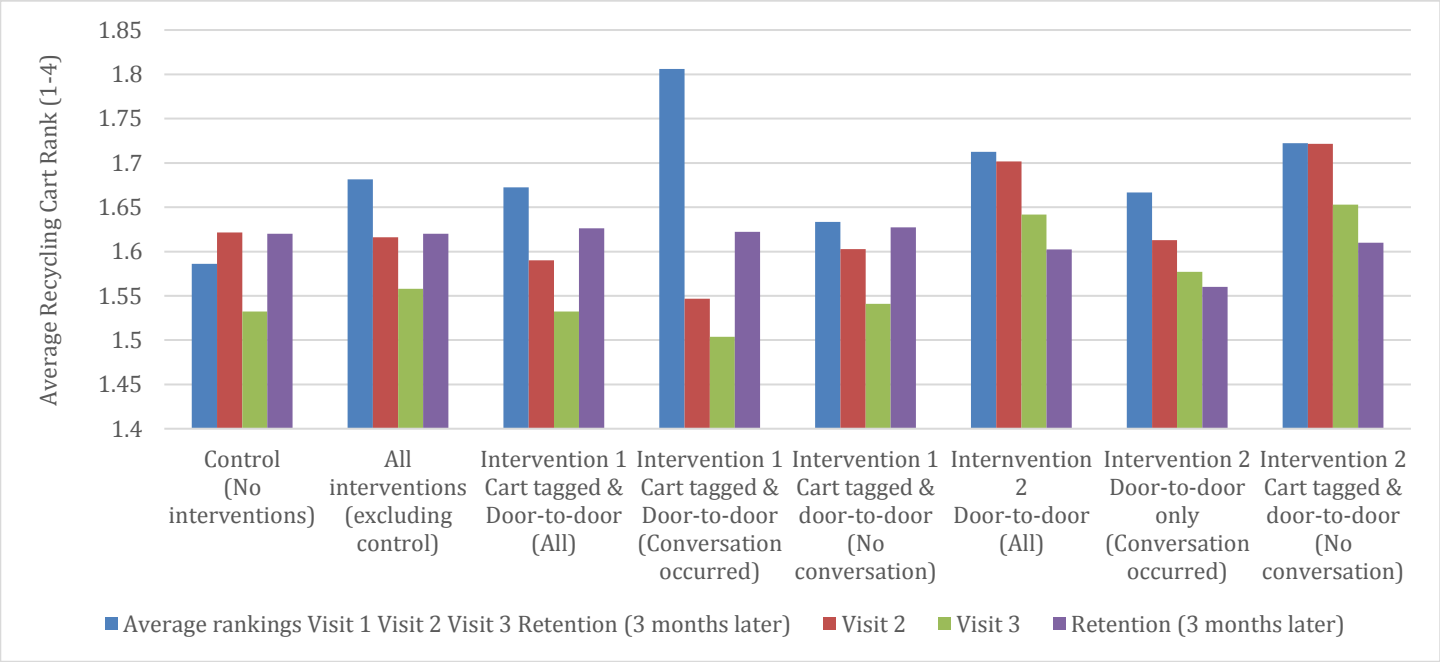
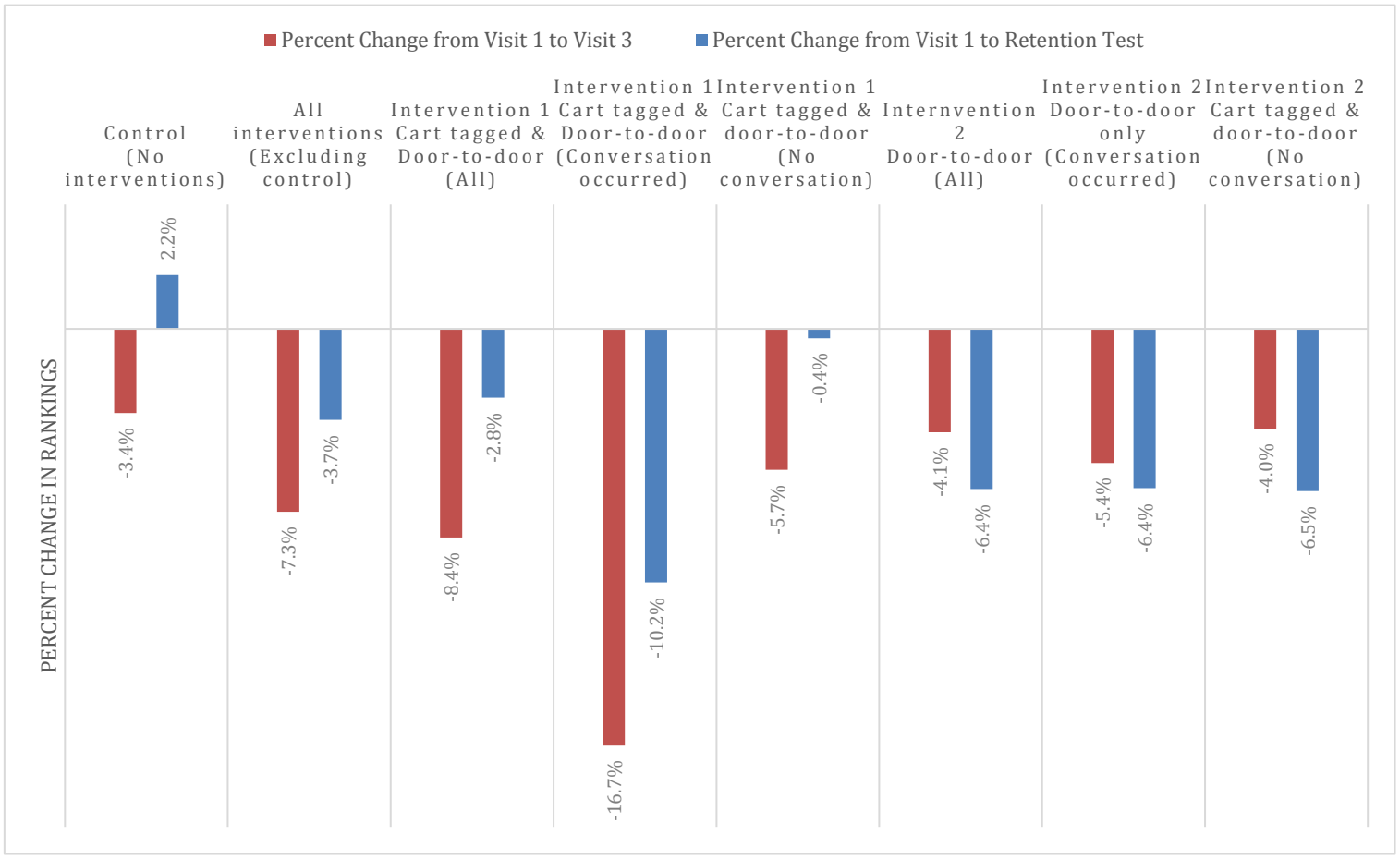


Figure 18: Percent Change in Average Cart Ranking Comparison Between Intervention Types and Retention Test Visit

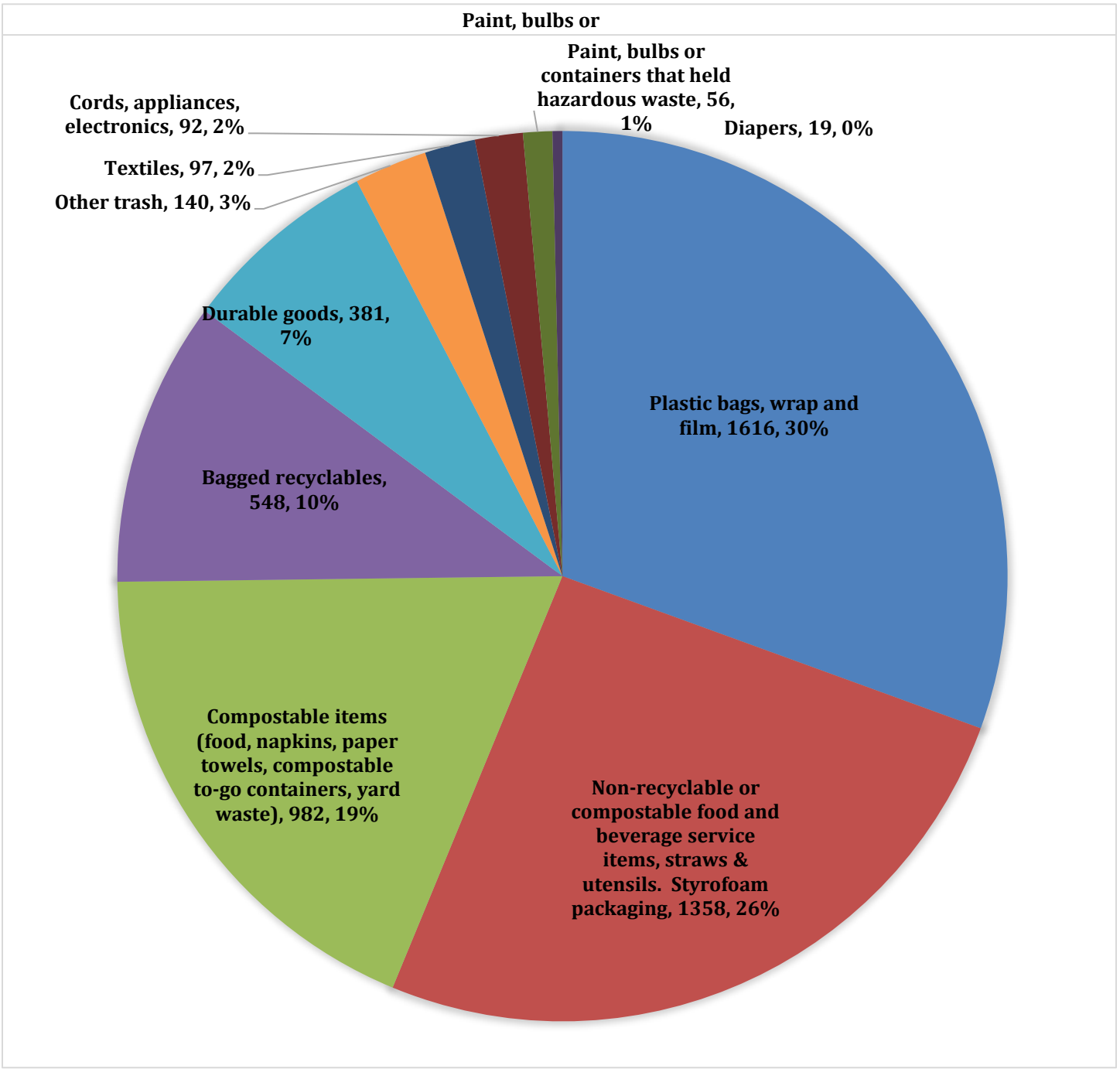
A negative percent change indicates that carts became cleaner, as the ranking scale was from 1 (clean) to 4 (mostly garbage).



Types of Contamination Found in Recycling Carts

Figure 19 displays the type of contamination found in recycling carts. If several of the same contaminant was found in one cart, it was only counted once. For example, if 3 plastic bags were found in one cart, plastic bags as a contaminant was only counted once for that cart. After categorizing all the hand-written comments, the figure below shows the types of contamination found in recycling carts.

Figure 19: Contamination Found in Recycling Carts, Broad Categories



Figures 20 – 24 further break down the broad categories to explain the specific contaminants found.

Figure 20: Plastic Bags, Wrap and Film

Plastic bags, wrap and film made up 30% of the total contamination found (1,616 occurrences). The types of plastic bags, wrap and film found are displayed in below.

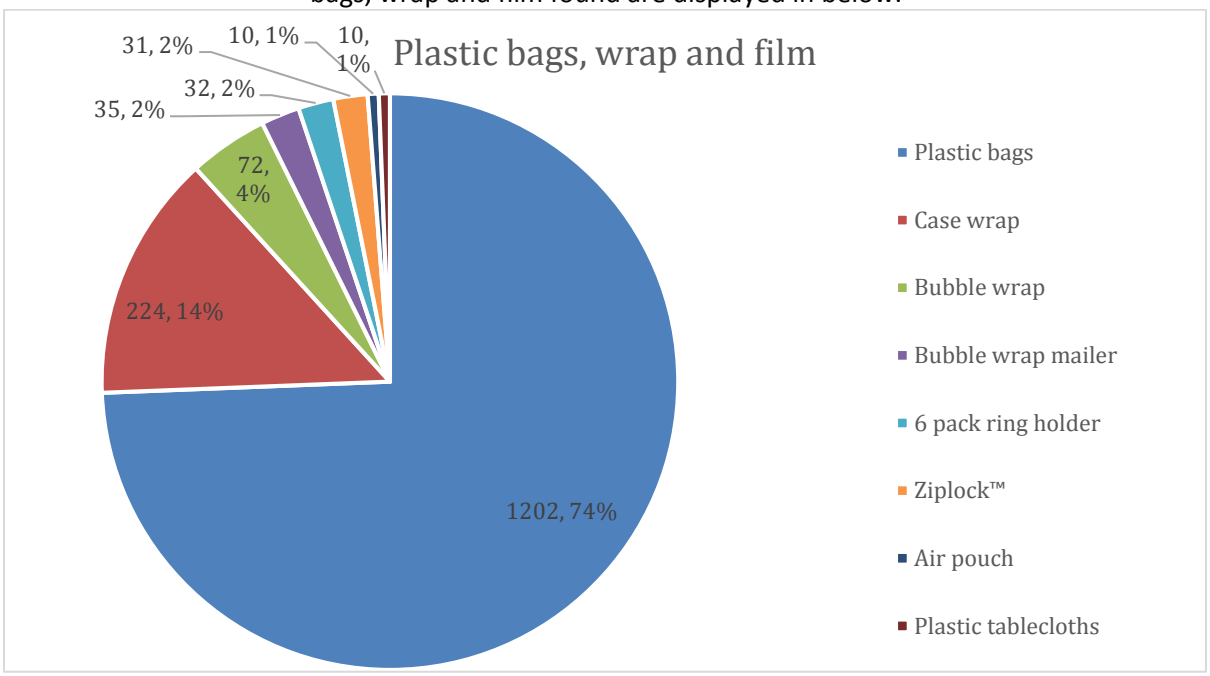


Figure 21: Non-recyclable or compostable food and beverage service items and packaging

Non-recyclable or compostable food and beverage service items and packaging made up 26% of the contamination found (1,358 occurrences). The types of items found are displayed below.

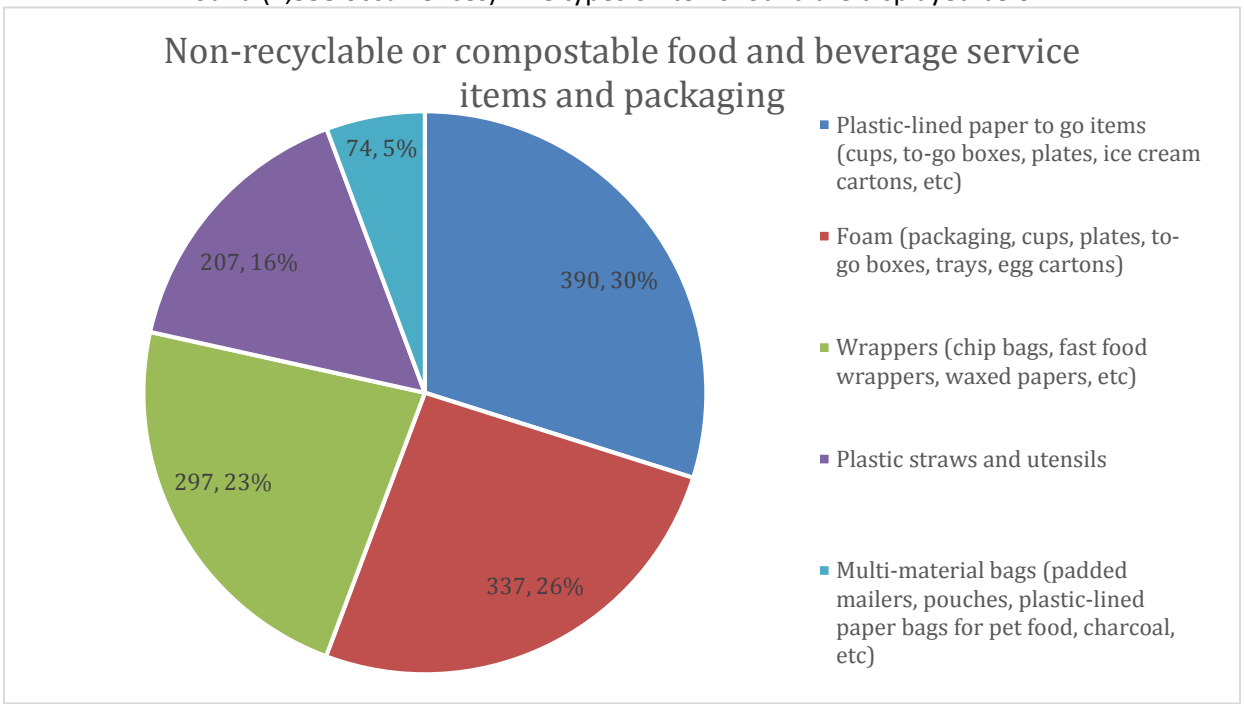


Figure 22: Compostable items

Items that can be composted made up 19% of the total contamination found (982 occurrences). The types of items found are displayed in this figure.

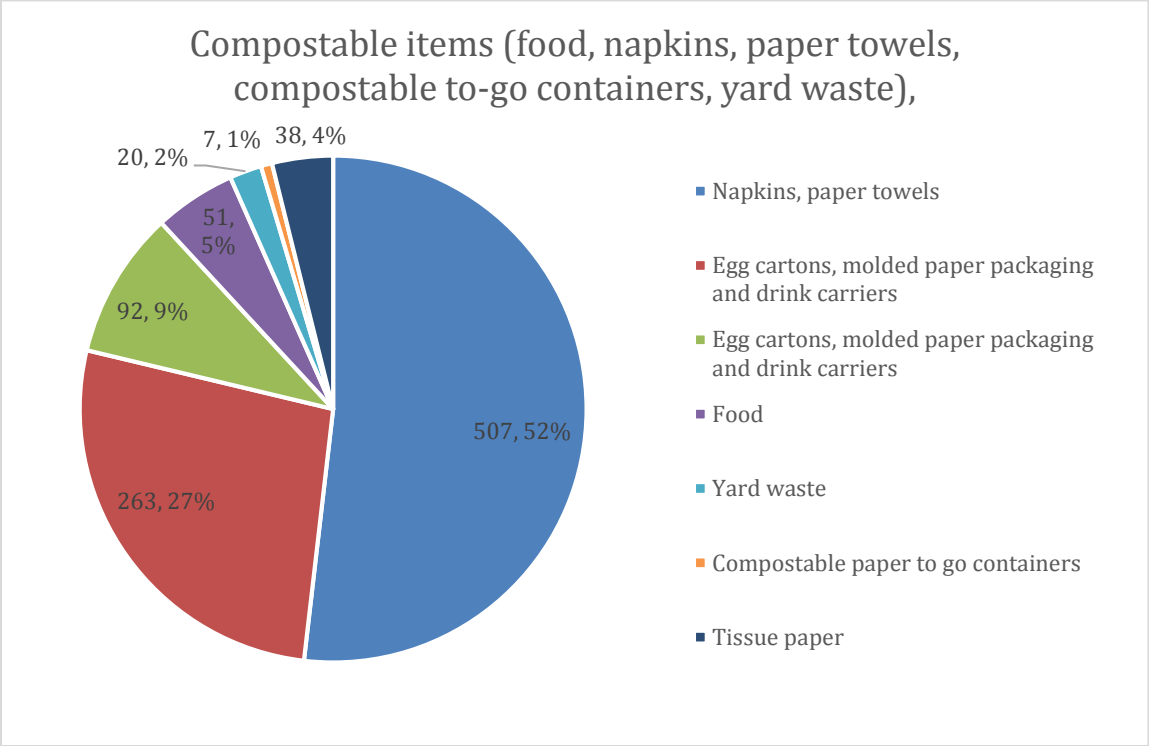


Figure 23: Cords, Appliances and Electronics

Cords, appliances and electronics made up 2% of the total contamination found (92 occurrences). The types of items found are displayed below.

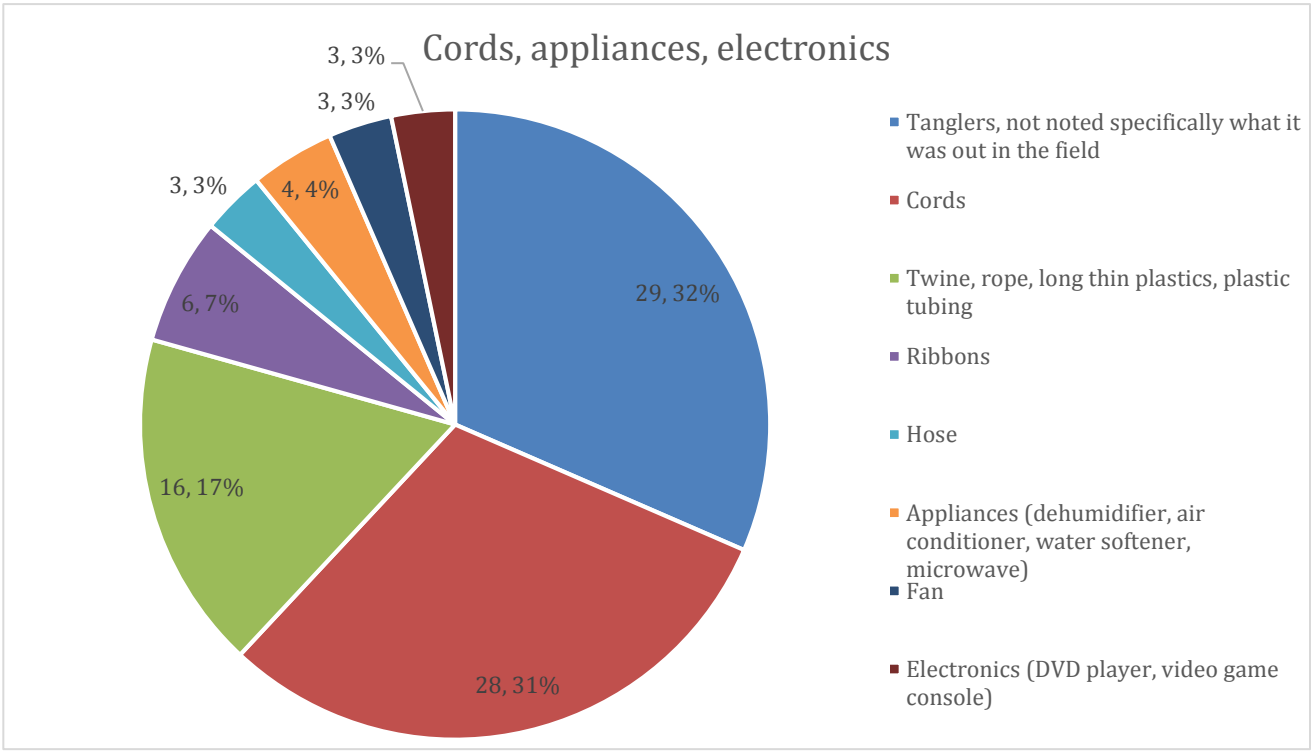


Figure 24: Durable Goods

Durable goods, or items that were not designed to be single use, made up 7% of the contamination found (381 occurrences). The types of items found are displayed Below.

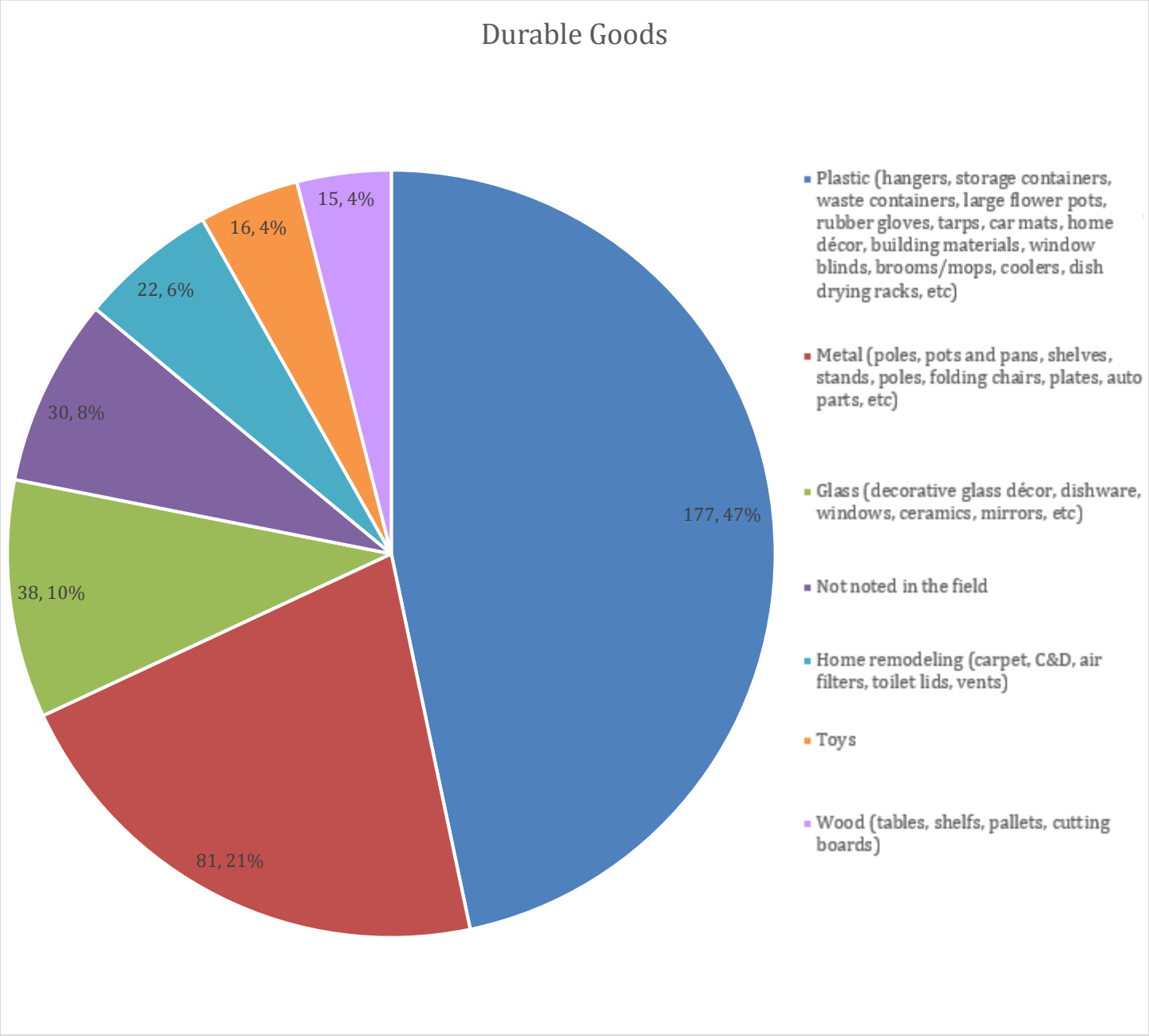


Figure 25: List of All Contamination Types in Order of Most Common Occurrence

Contamination Sub-category	Quantity	Broad Category
Plastic bags	1,233	Plastic bags, wrap and film
Bagged recyclables	548	Bagged recyclables
Napkins, paper towels	507	Organics
Plastic-lined paper to go items	390	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Egg cartons, molded paper packaging and drink carriers	355	Organics
Foam	337	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Wrappers	297	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Case wrap	224	Plastic bags, wrap and film
Plastic straws and utensils	207	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Big (durable good) - plastic (hangers, storage totes, flower pots, gloves, tarps, mats, décor, and more)	177	Durable goods
Bubble wrap, air pouches and bubble wrap mailers	117	Plastic bags, wrap and film
Trash, not noted specifically what it was out in the field	113	Other trash
Textiles	97	Textiles
Cords and other tangler	82	Cords, appliances, electronics
Big (durable good) - metal (poles, décor, pots and pans, other)	81	Durable goods
Multi-material bags (padded mailers, pouches, plastic-lined paper bags for pet food, charcoal, etc)	74	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Food	51	Organics
Other plastic films (6 pack ring & plastic tablecloths)	42	Plastic bags, wrap and film
Big (durable good) - glass, mirrors, ceramics	38	Durable goods
Tissue paper	38	Plastic-lined paper food service items. Straws & utensils. Styrofoam packaging.
HHW	37	Paint, bulbs or containers that held hazardous waste
Big (durable good) - not noted specifically in the field	30	Durable goods
Big (durable good) - home remodeling	22	Durable goods
Yard waste	20	Organics
Diapers	19	Diapers
Big (durable good) - toy	16	Durable goods
Dryer sheets	15	Non-recyclable or compostable food and beverage service items, straws & utensils. Styrofoam packaging.
Big (durable good) - wood	15	Durable goods
Compostable plastic to go containers	11	Organics
Big (durable good) - electronics and appliances	10	Cords, appliances, electronics
Cigarette butts	8	Other trash
CD	2	Durable goods
Battery	1	Paint, bulbs or containers that held hazardous waste
TOTAL	**5,214**	

Door-to-Door Conversation Topics and Materials Given

Results below are represented by each house that was door knocked.

- Total people talked to: 720

Frequent conversation topics - brought up by residents

- Questions about how better to set up Organics Recycling
- Complaints about the difficulty of knowing what to recycle
- Questions about China's increasingly strict regulations for accepting US recyclables
- How to dispose of various special items
- How to receive other waste-related services (e.g. large item pickup, additional garbage or recycling carts, lid or cart repair).

Figure 26: Total Materials Given, Request, and Already Educated

Residents were offered various educational materials through door-to-door education as described in Methods.

Total Materials Given	
Recycling Guide in English	59
Recycling Guide in Spanish	15
Recycling Guide in Hmong	10
Recycling Guide in Somali	11
Magnet	387
"No Sheet"	206
Organics Trifold	72
Indoor Waste Container Labels	55

Requests	
Need a Recycling Cart	30
Need an Extra Recycling Cart	2
Garbage Cart Changes	4
Recycling Reminder Sign Up	43
Organics Recycling Sign Up	30

Already Educated	
Knowledgeable	178

Total Materials Given

Staff encouraged every resident to take the "No sheet" and a recycling guide or magnet. All other resources were brought up based upon interest of the resident in the conversation and/or their questions for staff. Other educational materials may have been requested (such as yard waste container labels). These items were mailed out to the resident but not tracked separately for reporting.

Requests

"Need a Recycling Cart" refers to those who did not currently have a cart. This could mean they never had a cart or had a cart but it was removed due to contamination. Typically, to return a recycling cart at no charge, residents must wait three months to get their cart back. Residents can pay $15 if they want it back before the three-month waiting period. The waiting period and fee was waived for resident's who spoke with staff through door-to-door education.

"Garbage Cart Changes" typically consisted of resident's either needing an additional cart or choosing to downsize their current cart.

"Recycling Reminder Sign Up" refers to resident's who wished to be signed up for the City's electronic newsletter subscription.

"Organics recycling sign up" refers to signing the property for the Organics Recycling program.

Already Educated

"Knowledgeable" meant that the individual was already knowledgeable that plastic bags should not be placed in recycling carts.

Discussion

Several uncontrolled variables should be taken into account when considering the results of the project:

1. There was no standard procedure for staff contamination comments. Sometimes items were specified further (e.g. the box for foam was checked *and* a comment written that said "foam plate"). Other times, further specifications were not recorded. Due to the inconsistency, the comment data can only be used to make broad generalizations about contamination types that do not fall within the pre-selected categories.
2. Although tags were tucked into carts when it was raining or rain was expected, handwritten checks and notes on tags often bled and may have become unreadable. Tucked tags may have been less noticeable to residents.
3. Data was recorded on the same block sheets (see Figure 3) for all three visits to a cart. Staff could see the cart rankings for the previous week and may have been bias in their ranking.
4. Holidays, bad weather, and time specific events could have had an impact on cart rankings and type of contamination seen over time. For example, it is anecdotally believed that residents generate more waste around major holidays, such as Independence Day (July 4th).
5. Many carts were only filled with specific categories of recycling (e.g. only aluminum cans or glass bottles), and this was not recorded. Although the study intentionally focused on decreasing contamination, rather than increasing recycling quantity or participation, it is possible that outreach efforts discouraged residents from recycling some items that are actually recyclable.
6. Although leaving educational tags is the responsibility of the collection crew, it is not always done consistently. Blocks cart checked through this project may have received more consistent and continued education than standard procedure for collection crews.

Recommendations

Two major categories of non-recyclable items were not included in the piloted educational tag - short fiber paper (e.g. egg cartons, paper towels, drink cup holders) and snack/chip packaging. The addition of these to the educational tag should be considered.

1. The current tag does not leave room for much positive reinforcement, or for
2. Using a green (waterproof) pen would work well for use on the Oops tag.
3. At least 5 Nepalese, non-English speakers were encountered during door-knocking, and a Nepalese translation of all or some of the educational material would be useful. education about smaller things. An additional "nice improvement" tag or "almost" tag could be considered, so residents are less discouraged by "scary" or "picky" educational tags.
4. Before initiating a similar project, more time should be spent on a standard operating procedure for recording additional comments.
5. The "big item" category was used for multiple items that are not big items. Rephrasing this category may be helpful for clarity.

Conclusion

The cart checking results showed a decrease in the amount of contamination found in recycling carts throughout the study period. The most commonly found contaminants contradicted or did not always match feedback from collection crews and the material recovery facility. Continued and consistent education and outreach are necessary to help increase knowledge of residents and reduce contamination.

Additional findings of this project include:

- Outreach and education in the form of educational tags left on carts and door-to-door education have a direct positive impact on resident behaviors and contamination in recycling carts.
- Multiple intervention methods (Intervention Group 1: cart tagging and door knocking) resulted in a higher change in behavior (reduced contamination resulting in a greater number of clean recycling carts).
- Intervention Group 1 (cart tagging and door-to-door education) resulted in a higher retention in behavior change over time.
- Fluctuations on the amounts of contamination found in the control blocks help validate the positive results found in the intervention groups.
- Plastic bags and other plastic films, non-recyclable or compostable food-service items (straws, utensils, foam and plastic-lined paper packaging), and compostable items (napkins, paper towels, food) made up 75% of contamination found in recycling carts. The top item found by category is as follows:
    - Plastic bags, wrap and film: Plastic bags 74%
    - Non-recyclable or compostable food-service items: Plastic lined paper items 3%
    - Organics Napkins and paper towels 52%
    - Cords, appliances and electronics Tanglers (not specified) 32%
    - Durable goods Plastic items (47%)
- The Recycling Guide magnet was the most popular item to residents during door-to-door education.

Next Steps

Following the initial development of this report, Solid Waste & Recycling staff modified the contamination side of the recycling educational tag piloted during the project. Updates to the educational tag were based on feedback from staff and the quantity and type of contamination identified in recycling carts. The “big items” category was replaced with the phrase “durable goods” and the “yuck” category was replaced with household hazardous waste icon (paint, bulbs or containers that held hazardous waste) and a textiles icon. In addition, the descriptions of the items were updated to better reflect the category. The updated educational tag was implemented citywide in January 2019. The contamination side of the educational tag that was piloted and the one that is now used citywide is shown in Figure 26.

Figure 26: Updated educational tag that began to be used citywide in January 2019.

Results from this project, along with results from an online resident survey conducted February – April 2018, were used to develop a recycling contamination reduction outreach and education plan for 2019.