CalRecycle

SB 343
Material Characterization Study
Revised Preliminary Findings Report

December 2024

State of California

Gavin Newsom
Governor

California Environmental Protection Agency

Yana Garcia
Secretary

Department of Resources Recycling and Recovery (CalRecycle)

Zoe Heller
Director

Public Affairs Office
1001 I Street (MS 22-B)
P.O. Box 4025
Sacramento, CA 95812-4025
www.calrecycle.ca.gov/Publications/
1-800-RECYCLE (California only) or (916) 341-6300

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Executive Summary

Lawmakers enacted Senate Bill 343 (SB 343, Allen, Chapter 507, Statutes of 2021) prohibiting the use of the chasing arrows symbol or any other indicator of recyclability on products and packaging unless certain criteria are met.

SB 343 requires the California Department of Resources Recycling and Recovery (CalRecycle) to conduct and publish a characterization study of materials collected, sorted, sold, or transferred for recycling in California. Although SB 343 does not authorize nor direct CalRecycle to determine the recyclability of products and packaging, or the appropriate use of the chasing arrows or other indicators of recyclability, interested parties must use the information in this report in determining the recyclability and labeling eligibility of products and packaging.

In 2023, CalRecycle completed a material characterization study to meet the statutory requirements of SB 343. CalRecycle contracted with Cascadia Consulting Group to characterize and measure the materials commonly collected, sorted, sold, or transferred for recycling in California. The collected materials were characterized into 91 material types and forms.

CalRecycle and Cascadia designed a study that incorporated representative, cost-effective sampling and analysis for data gathering that minimized disruption to facility operators.

This report provides revised preliminary findings for evaluating whether a product or package is recyclable in California. The findings of this study include:

- Information from local jurisdictions on the materials accepted by their residential curbside recycling programs.
- Survey results detailing the sorting activities at California Large Volume Transfer/Processing facilities (LVTPs).
- Results of material characterization sampling of recyclable materials at LVTPs statewide.

For a brief overview of the tables and pertinent data within this report, refer to the Summary of Findings section.

Note on Recyclability Determinations

SB 343, at Public Resources Code (PRC) 42355.51(d)(2), requires that products and packages meet several criteria to be permitted to include labeling with the chasing arrows symbol or other indicators of recyclability. Criteria include that such materials:

(1) Are accepted for collection by jurisdiction recycling programs.
(2) Are sorted into defined streams by Large Volume Transfer/Processing facilities (LVTPs).

(3) Are sent to a reclaimer and reclaimed consistent with the Basel convention.
(4) Meet specific composition and design requirements.

Although this report provides data only on jurisdiction recycling program collection and the sorting behaviors of LVTPs in California (items (1) and (2) above), it does not provide information on the destination or ultimate disposition of materials sorted and sold by LVTPs (item (3) above). Additionally, this report does not provide information regarding the composition or design of specific products or packages (item (4) above). As such, this report on its own does not contain all the information necessary to determine the recyclability status for any particular product or package. To make such a determination, additional information—in particular, information relevant to PRC sections 42355.51(d)(2)(B)(i) and 42355.51(d)(3)—is necessary.

Public comments received between December 28, 2023, and May 31, 2024, are included in Appendix 2.

Background

SB 343 prohibits the use of the chasing arrows symbol or any other indicator of recyclability on products and packaging unless certain criteria are met. CalRecycle is required to publish data about the material types and forms that are collected, sorted, sold, or transferred by solid waste facilities (PRC 42355.51(d)(1)(B)(i)).

PRC 42355.51(d)(1)(B)(v) directs CalRecycle to publish preliminary findings of the study and conduct a public meeting to present those findings and receive public comments. CalRecycle published the SB 343 Material Characterization Study Preliminary Findings report on December 28, 2023. After receiving and considering public comments, CalRecycle is directed to finalize and publish the findings of the study. This report presents the findings of the study and also includes information regarding jurisdiction residential curbside recycling programs.

As outlined in PRC 42355.51(d)(2), a product or packaging may be considered recyclable in the state if the product or packaging is of a material type and form that is both:

1. Collected for recycling by jurisdiction recycling programs that collectively encompass at least 60% of the population of the state; and
2. Sorted into defined streams for recycling processes by Large Volume Transfer/Processing facilities that:
    a. Process materials and collectively serve at least 60% of recycling programs statewide.
    b. With the defined streams sent to and reclaimed at a reclaiming facility consistent with the requirements of the Basel Convention.

Collecting the information necessary to determine whether a material type and form meets the requirement of being sent to and reclaimed at a reclaiming facility consistent with the requirements of the Basel Convention would require reclaiming facilities located both in and out of the state to report on their acceptance of materials and the ultimate reclamation of those materials. SB 343 does not give CalRecycle the authority to require reclaiming facilities in or out of the state to report on their acceptance of materials and the ultimate reclamation of those materials.

Methods

CalRecycle conducted two primary data collection efforts to provide information on the two criteria outlined in PRC 42355.51(d)(2). Data collection was conducted to:

- Gather information on material types and forms collected for recycling by jurisdiction residential curbside recycling programs.
- Gather information on material types and forms sorted by Large Volume Transfer/Processing Facilities (LVTPs) in California.

The following methods are provided separately for each of the two data collection efforts.

Material Types and Forms List

To standardize unique item descriptions across recycling programs at both the curbside collection and processing stages, CalRecycle first developed the material types and forms list. Candidate items were identified through consultation with internal subject-matter experts, informal survey of common products and disposed items, and interview of staff at LVTPs. Items likely handled by collection and/or sorting activities for recycling in California were assigned to 91 unique material types and forms. Each material type and form has a corresponding material class, alphanumeric code, name, definition, and example items for inclusion or exclusion (Appendix 1, Section 1.6, Table C1).

Collection by Jurisdiction Residential Curbside Recycling Programs

To identify which recyclable materials are being accepted by jurisdiction residential curbside recycling programs across the state, local recycling information was collected for each jurisdiction in California. Using population data combined with information on materials accepted by jurisdiction residential curbside recycling programs, CalRecycle estimated the proportion of the statewide population that has access to jurisdiction residential curbside programs that accept a given material type and form for recycling collection (Table 1).

List and Population of Jurisdictions in California

Jurisdiction names from survey entries were aligned to jurisdiction names in CalRecycle's RDRS (Recycling and Disposal Reporting System) and to city and county names in data from the California Department of Finance (DOF). The DOF publishes Population and Housing Estimates for the State of California each year on its website. The 'Balance of County' sections within the population spreadsheet was used to account for the population of unincorporated areas within a given California county.

Materials Collected by Jurisdiction Residential Curbside Recycling Programs

Jurisdiction Survey

To obtain information on the percentage of the California population with access to residential curbside recycling programs which accept each SB 343 material type and form, CalRecycle administered an online survey sent to all California jurisdictions via listserv from September 18 to October 18, 2024. Staff from CalRecycle's Local Assistance and Market Development (LAMD) followed up with individual jurisdictions after the survey's release. The survey was part of a larger data collection effort to characterize the types and forms of materials accepted for recycling by residential curbside collection programs (not including materials collected for composting or organics recycling). Survey questions addressed information on type of collection program (e.g., number of bins), followed by six sections, organized by material class: (1) glass; (2) ceramic; (3) metal; (4) paper/fiber; (5) plastic; and (6) wood and other organics. For each section, survey questions listed material types and asked respondents to indicate if a jurisdiction did not accept any of those materials in their residential curbside recycling programs (see Appendix 1, Section 1.2 for a full list of survey questions). If a jurisdiction has more than one hauler or the residential curbside recycling program differs within a jurisdiction, respondents were asked to answer in terms of the hauler/collection that serves the largest population.

For jurisdictions who completed the survey, CalRecycle staff conducted data remediation and analysis as described below.

CalRecycle Online Research Secondary Survey

For jurisdictions without recorded survey responses, CalRecycle staff conducted online research and completed a modified version of the survey (see Appendix 1, Section 1.3) based on information provided to the public. The irecyclesmart.com website was used as a starting point to access recycling information for each jurisdiction, provided by a jurisdiction or hauler on materials collected for recycling in local residential curbside recycling programs. The Local Recycling Information webpage lists California jurisdictions and their corresponding recycling guides, which were obtained directly from the websites of the jurisdictions or from those of the haulers partnered with a given jurisdiction. When the Local Recycling Information webpage included an inaccessible link or outdated information, staff used alternative data sources, such as jurisdictions' waste-disposal or recycling webpages found through the jurisdictions' websites and/or the websites of haulers partnered to a jurisdiction.

Remediating Duplication

Staff manually checked jurisdiction names to align each to a known city or unincorporated county. CalRecycle staff checked the survey responses for duplication, in which multiple responses were submitted that cover any individual jurisdiction. Survey entries which were blank for all material acceptance questions, or which could not be identified by respondent or jurisdiction covered, were removed. When a single respondent submitted multiple survey entries, the first submission was removed. When multiple survey entries covered a single jurisdiction, CalRecycle staff combined entries into a single response, described below under Recycling Acceptance Calculations.

All jurisdictions with no responses at the end of the duplication remediation process were added to the CalRecycle online research secondary survey.

Assumptions

This methodology assumes that each response reflects the entire population of a (city or unincorporated county) jurisdiction. For jurisdictions with large populations, this assumption misses some nuance. However, based on current data, CalRecycle does not have sufficient information to accurately scale responses to cover subpopulations or partial material flows within jurisdictions.

Recycling Acceptance Calculations

In the jurisdiction-filled surveys, each material type and form was assigned as "Accepted" or "Not Accepted". In CalRecycle online research secondary surveys, each material type and form could be assigned as "Accepted", "Not Accepted", or "Unknown". "Unknown" was filled when review of the relevant websites did not provide sufficient evidence for or against material acceptance to curbside recycling.

Each "Unknown" was converted to "Accepted" and "Not Accepted" proportional to other acceptance rates for each material type and form within each jurisdiction. If all responses for a given material were "Unknown", this was estimated at 50% acceptance.

Calculating Statewide Acceptance Rates

Analysis was conducted to determine the curbside residential recycling acceptance of each material type and form for each city or unincorporated county jurisdiction. Populations of each jurisdiction served by residential curbside programs accepting each material were then summed and divided by the total state population. This calculated the statewide material acceptance rates.

Alignment with SB 343 Material Types and Forms

Survey material types were converted to material types and forms. Material types surveyed did not uniquely identify SB 343 material types and forms. As such, a crosswalk table was developed and used to translate survey material category responses to SB 343 material type and form results (Appendix 1, Section 1.1).

Further, for some items, several survey material categories were averaged and reported as a single material type and form. For example, X13, Fines and Residuals, is the average of six distinct categories of small items which are unique within the collection survey (Ceramic, Glass, Metal, Organics, Paper, and Plastic) (see Appendix 1, Section 1.1 and Appendix 1, Section 2.1, Table D1 for details). In some cases, material types and forms are more specific than the survey material categories, so multiple MT&Fs correspond to a single survey result. For example, Other Mixed Paper in the survey is the data source for four fiber material types and forms (see Appendix 1, Section 1.1 and Appendix 1, Section 2.1, Table D1 for details).

Materials Sorted by Large Volume Transfer/Processing (LVTP) Facilities

Using a combination of surveys, facility visits, and material sorting at LVTPs, CalRecycle estimated the proportions of the state's recycling programs, at the county level, that are served by LVTPs sorting material types and forms into specified outflows for recycling processing.

Large Volume Transfer/Processing Facility Surveys and Visits

Using information from CalRecycle's Solid Waste Information System (SWIS) and outflow data from CalRecycle's Recycling and Disposal Reporting System (RDRS), CalRecycle generated a list of 50 facilities that were permitted LVTPs with average quarterly potential reuse (AQPR) outflows of over 4,000 tons. In line with statute and to understand outcomes for the majority of materials collected and sorted for recycling statewide, this data collection prioritized the highest volume facilities among LVTPs statewide. The candidate facility list was developed from self-reported data in RDRS. If data was missing or misreported in RDRS, some high-volume LVTP facilities may be excluded from this candidate list.

CalRecycle developed phone and on-site surveys to collect information from LVTPs sorting recyclable materials (Appendix 1, Section 1.4). Questions covered topics including basic facility information, facility capacity, inflows and material origins, outflows and types of material aggregated for sale, and technologies deployed at the facility (see Appendix 1, Section 1.4 for a list of survey questions). CalRecycle performed phone surveys with 37 LVTPs. Eight of the surveyed facilities did not perform material sorting activities on-site and were removed as facilities of interest. The surveyed facilities which do perform material sorting activities on-site serve counties that make up 88.5% of the population of the state (Appendix 1, Section 1.5).

CalRecycle staff conducted more in-depth, in-person surveys with 24 of the 37 facilities, which included tours of the sorting activities and discussions on topics such as contamination, bale destinations and origins of processed material (Appendix 1, Section 1.4). For each facility, information was gathered on the types of materials that were processed and aggregated for sale by LVTPs.

Large Volume Transfer/Processing Facility Material Characterization Study

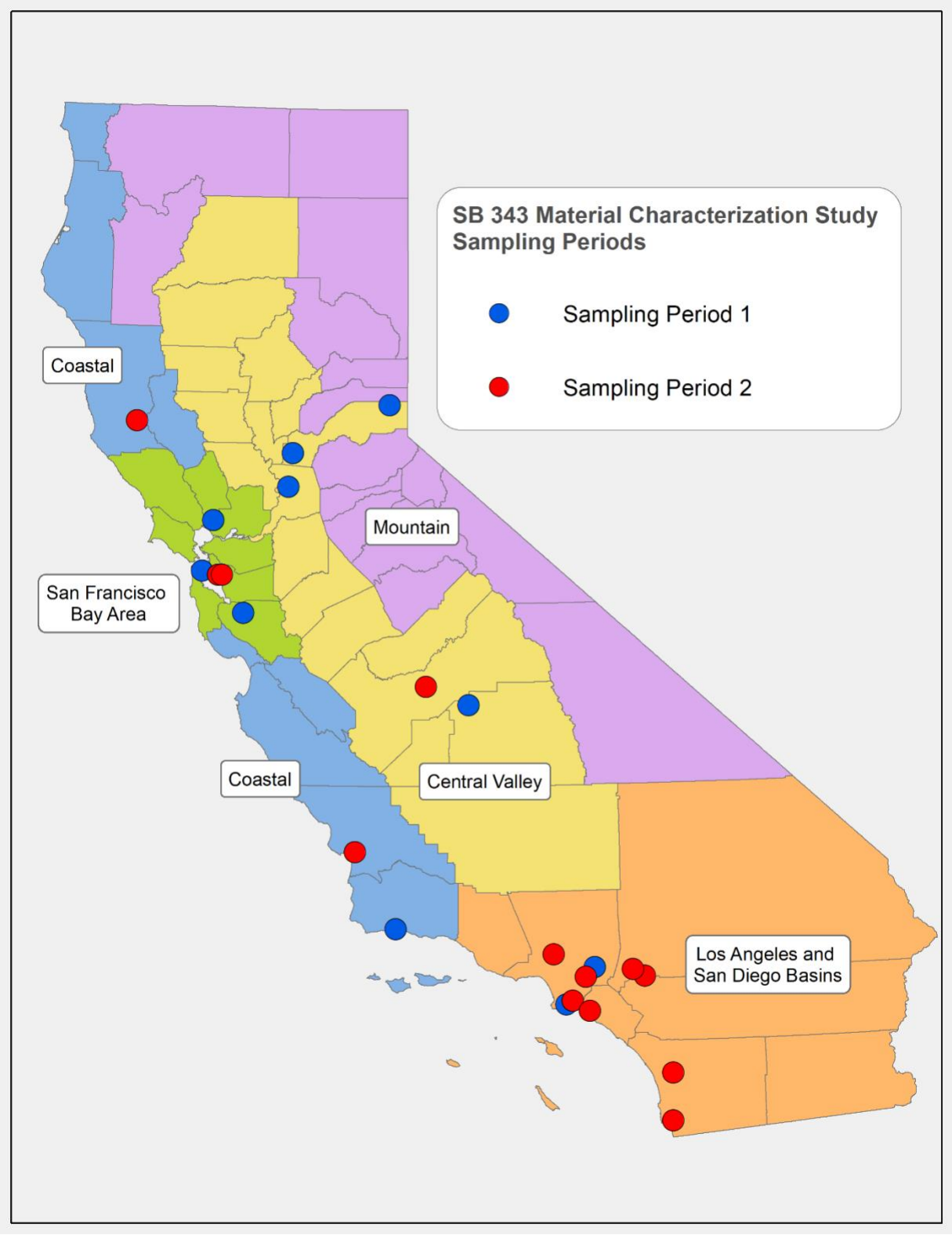
LVTP Facilities Sampled

From the 37 surveyed LVTP facilities, 10 facilities were selected for sampling and sorting in August 2023, and an additional 13 were sampled in January and February 2024. Facilities were classified by five regions (Central Valley, Coastal, Los Angeles and San Diego Basins, Mountain and San Francisco Bay Area) (see Figure 1 and Appendix 1, Section 1.5 for representative sampling of focal regions). Facilities were selected to maximize representative sampling by geography and population density.

The 23 facilities were distributed as follows among the regions of California:

1. Mountain – 1 facility
2. Central Valley – 4 facilities
3. San Francisco Bay Area – 5 facilities
4. Coastal – 3 facilities
5. Los Angeles and San Diego Basins – 10 facilities

Figure 1. Map of Regions of California.



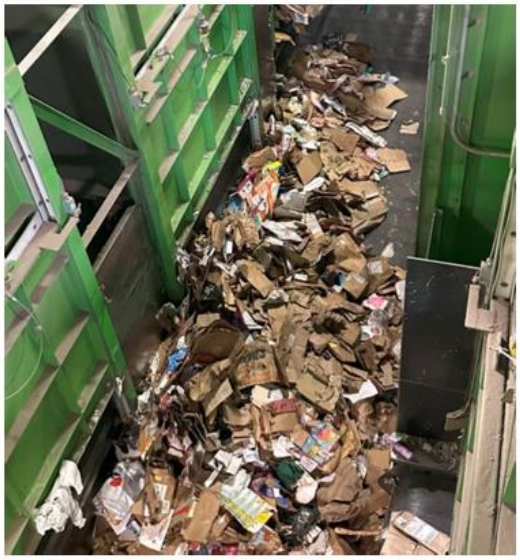
Sampling Logistics

A contracted field team, with oversight from CalRecycle staff, conducted sampling and sorting at the 23 LVTP facilities. The contracted field staff and CalRecycle staff were on-site at each facility for two days. The contracted field team consisted of four to five individuals whose primary roles were sort crew lead, material sorters, and a photographer. They conducted the sample selection, collection, and hand-sorting of material. CalRecycle staff provided on the ground support, oversaw contractor work, communicated with facility managers, and performed visual characterizations of additional recyclable outflows that were not being hand-sorted.

Samples were collected from post-sort outflows, meaning that material would not undergo further processing at that facility. Sampled outflows were materials aggregated for sale or for further processing at another facility. Residual outflow destined for disposal was also sampled. Samples from these outflows were used to determine material sorting into specified outflows, described below.

Figure 2. Excerpt from Contractor's Sampling Plan

Material outflows were identified for collection within each facility with a description of how samples were collected from each outflow.

1. OCC	2. Mixed Paper
	
Sorted material to be ejected from slide conveyor underneath storage container prior to baling	Sorted material to be ejected from slide conveyor underneath storage container prior to baling

Hand-Sorted Characterization

The contracted staff collected material from either loose or baled outflows prepared for sale or transfer by the facility and ensured that sampled material represented the outflows of the target facility. Each sample was measured out to a different weight depending on the material type (see Appendix 1, Section 2.2, Table E2 for further target sample weight details). The contractor determined that the target weight of each sample was representative of the composition of each outflow and supported by peer-reviewed scientific literature. Denser materials such as metal or glass consisted of 15- to 25-pound samples, while samples of low-density materials like cardboard or plastic weighed between 125 and 200 pounds. Each collected sample's weight (in pounds) was measured and recorded. The sorters spread out the collected sample on a sorting table with a grate, allowing for materials smaller than 2 inches to fall through; these materials are too small to be properly processed and sorted by the facility. Then the contracted field staff hand-sorted the remaining materials into 91 material subclasses based on material type and form (see Appendix 1, Section 1.6 for list) to a particle size of 2 inches until non-sortable fine material ("mixed residue") remains.

The sorters then weighed each material type and form sorted from each sample. The weight (in pounds) of the sorted material was recorded. Photos were taken of each sample before sorting, and throughout the sorting process. Raw data was collected through an application created by the Contractor and subject to the application's built-in logic and error checking, and then subject to quality control and quality assurance measures. CalRecycle staff conducted statistical analysis on the collected information.

The contracted field team attempted to characterize a total of 20 samples per facility that included two samples from each 10 specific material type outflows selected (see Appendix 1, Section 2.2, Table E1 for a list of outflows sampled). Samples taken for hand-sorting prioritized outflows likely to contain heterogenous mixes of target items according to the defined material types and forms. Where appropriate to the content of the outflow, CalRecycle staff conducted visual characterizations of additional outflows of baled or piled post-sort material.

Visual Characterization

CalRecycle field staff conducted a visual characterization of materials. The visual characterization process included taking photos of aggregated bales or bunkers to later identify rates of contamination within these outflows. For each site, two to four visual characterizations were conducted per outflow. Characterizations on the same material outflow were distinguished by sampled outflow number and subsample number. A 0.5m x 0.5m quadrat was placed flat on a bale surface as a guide outlining the bounds of each sample. An image of each sample was recorded digitally through encompassing the full quadrat and a placard identifying the site location, date, sample material, sampled outflow number, and sample number. The minimum pictures captured, if safe to do so, were a close-up straight on view, slightly offset to the right view, slightly offset to the left view, and a distant straight on view showing multiple aggregates if applicable.

Any noteworthy information about the outflow materials were discussed and noted with facility operators.

Figure 3. A quadrat used for measured photos of bales and other outflows.

A minimum of two CalRecycle staff per site performed the characterization of all visible items into individual material types listed in the material types and forms list. These characterizations were based on surface area of a flat quadrat sample (Figure 3). First the major material classes (i.e. plastic or metal) were recorded with estimated percentages present by visual area. Then for each major material class, staff determined more granular material types present as listed in the material types and forms list, and approximate percentages. All data was recorded on a tablet as a digital record.

Material Characterization Study

In total, 196 hand-sorted samples and 70 visually characterized samples were taken from 10 facilities in August 2023. In January and February 2024, 263 hand-sorted samples and 36 visually characterized samples were taken from an additional 13 facilities.

CalRecycle used field study sorting data to identify the average makeup of 32 outflow types across 23 LVTPs. This includes hand-sorted and visually characterized samples across 5 fiber outflows, 5 glass outflows, 7 metal outflows, and 14 plastic outflows (see Appendix 1, Section 2.2, Table E1 for details on outflows sampled).

Results of the Material Characterization Study are presented in Table 3A-E.

Additional outflow volume was composed of many material types and forms at low volumes (each material type and form made up under 1% of total composition of each outflow); these are described in the report as rare or low-abundance material types and

forms. In total there were 817 occurrences of rare material types and forms across 24 outflow types (see Appendix 1, Section 2.4 for list).

Estimating Proportions of Material Types and Forms Sorted into Specified Outflows by LVTPs

CalRecycle estimated the percentage of counties statewide served by LVTPs sorting each material type and form into specified outflows for recycling processing. Using survey and sorting data, CalRecycle staff estimated the percentages in terms of the proportion of the state's recycling programs (at the county level) served by those LVTPs.

Data from the sampling and sorting was used to determine whether material types and forms were predominantly ending up in specified outflows, meaning the materials were consistently sorted into outflows destined for sale or further processing. Facilities often describe outflows with terminology unique to their operations. Inclusive alignment of cross-facility outflow information may miss nuance in variation in outflow contents (e.g., PET container vs. PET bottle and container vs. PET; mixed rigid plastic vs. rigid opaque composite plastic).

Hand-sorting data and visual characterization data were used to:

1. Identify which outflows each material type and form was found in; and
2. Estimate the proportion of that material type and form that ends up aggregated for sale/processing compared to disposed of in a residual outflow.

To estimate the information above, criteria were established to identify when the presence of a material type and form in an outflow is acceptable or likely to be a contaminant. For example, plastic items were commonly found in specified outflows for metal and paper. The plastic items are likely a contaminant and not a target material for those specified outflows. To avoid counting a contaminant as material sorted into a specified outflow, the following criteria were developed:

1. High-level material class (paper/fiber, glass, metal, plastic, other/ mixed) for the material type and form must match the material class of the specified outflow;
2. Where applicable, material type and form material subclass (e.g., resin type for plastic, or type of metal) must match the material subclass of the specified outflow;
3. The proportion of the material type and form in a specified outflow at a given facility must exceed the proportion of material type and form in the disposed of residual at that same facility; and
4. The material type and form must be present in that specified outflow for at least two facilities within the study.

If any of these criteria were not met, the presence of that material type and form in the specified outflow was not considered sufficient evidence of valid sortation.

Among the 29 phone-surveyed facilities that perform material sorting activities on-site, 27 facilities reported a comprehensive list of common outflows from sorting of curbside recyclables. Survey data indicated which of the 27 survey facilities had each specified outflow present (Appendix 1, Section 2.2, Table E1). The 32 unique sampled outflows were mapped to the 26 closest-match survey outflows. This was then combined with survey data on which jurisdictions (at the county level) each facility serves. This produced the list of counties served by facilities with specified outflows available for each material type and form. Material sorting into mixed-resin plastic outflows and mixed paper outflows was also analyzed separately, by outflow, as these items may undergo secondary sorting at facilities outside the study parameters (See Appendix 1, Section 2.3, Table F2 for details).

Summary of Findings

The following findings are provided separately for each of the two data collection efforts: (1) Collection by Jurisdiction Residential Curbside Recycling Programs; and (2) Materials Sorted by LVTPs.

Overview of Data/Tables by Data Collection Effort

Survey of Collection by Jurisdiction Residential Curbside Recycling Programs

Jurisdiction Residential Curbside Recycling Program results were obtained through surveys answered either directly from a jurisdiction or by CalRecycle staff using online resources.

- Table 1: displays the estimated percentage of the California population with access to residential curbside recycling programs which accept each SB 343 material type and form.
- Appendix 1, Section 1.1, Table A1: displays the alignment of material subclasses accepted by jurisdictions with residential curbside recycling programs to the SB 343 material types and forms list (see Appendix 1, Section 1.6 for additional information).
- Appendix 1, Section 1.2: displays the survey questions used to obtain information on materials collected by each jurisdiction's recycling program directly from each jurisdiction
- Appendix 1, Section 1.3: displays CalRecycle's internet research secondary survey questions that CalRecycle staff used to obtain information on materials collected by each jurisdiction.
- Appendix 1, Section 2.1, Table D1: displays the results of the jurisdiction survey by both the survey material categories and by SB 343 material types and forms.

Materials Sorted by LVTPs/Material Characterization Study

- Table 2: displays the count and proportion of counties with access to surveyed LVTPs which sort to viable outflows, for each material type and form.
- Table 3A – 3E: displays the composition percentage of a material type and form within a given outflow, as categorized by material class. Results derived from Material Characterization Studies performed at LVTPs (supplementary data: see Appendix 1, Section 2.3).

- Appendix 1, Section 1.4: displays the questions asked of LVTPs by CalRecycle staff via phone and in-person interviews.
- Appendix 1, Section 1.5, Table B1: displays the designation of counties to a focal region.
- Appendix 1, Section 1.6, Table C1: displays the sortation list generated for the Material Characterization Study. The list includes outflow material classes, material type and form codes, material type and form names, and material definitions and examples.
- Appendix 1, Section 2.1, Table E1: displays all outflow names, the corresponding number of samples, and number of facilities sampled in the Material Characterization Study.
- Appendix 1, Section 2.2, Table E2: displays proposed sample weights for common outflows targeted by the contracted field team.
- Appendix 1, Section 2.3, Table F1 – F3: displays information on materials sorted by LVTPs, with data analysis for inflow-scaled partial coverage of counties, and specified outflows.
- Appendix 1, Section 2.4, Table G1 - G5: displays material types and forms rarely observed, as defined as less than 1% of each outflow, during the Material Characterization Study.
- Appendix 1, Section 2.5, Table H1: displays exempted material types and forms and provides the rationale for their exclusion from the study.
- Appendix 1, Section 2.6, Table I1: displays all material types and forms that met criteria to be classified as “sorted for recycling” and were evaluated for county access to sorting in this study.
- Appendix 1, Section 2.6, Table I2: displays all material types and forms that failed to meet criteria to be classified as “sorted for recycling,” and the cause of exclusion. These material types and forms were not further assessed for county access to sorting in this study.

Collection by Jurisdiction Residential Curbside Recycling Programs

Table 1 indicates the results of the statewide jurisdiction survey. Column one lists the material class (Fiber, Glass, Metal, Plastic, and Other). Column two lists the material type and form code. Column three lists the material type and form name. Column four lists the number of jurisdiction survey material categories that were combined for each material type and form result (see Appendix 1, Section 2.1, Table D1 for details by each survey material type). Column five lists the estimated percentage of California’s population with access to residential curbside recycling collection for a given material type and form.

Table 1. Percentage of Statewide Population with Access to a Residential Curbside Recycling Program Which Accepts SB 343 Material Types and Forms

Material Class	MT&F Code	SB 343 Material Type and Form Name (MT&F)	Number of Jurisdiction Survey Material Types	Percent of Population with Collection Access
Fiber	F01	Uncoated Corrugated Cardboard/ Old Corrugated Containers (OCC)	1	99%
Fiber	F02	White Office-Type Paper and Mail	1	99%
Fiber	F03	Newspapers/ Newspaper Inserts	1	97%
Fiber	F04	Magazines and Catalogs	1	97%
Fiber	F05	Paper Bags and Kraft Paper	2	97%
Fiber	F06	Folded Paper Containers and Other Paperboard Packaging	1	98%
Fiber	F07	Other Mixed Paper	1	97%
Fiber	F08	Clean Molded Paper Fiber	1	94%
Fiber	F12	Remainder/ Composite Fiber	1	38%
Fiber	X01	Gable-top Cartons/ Aseptics - CRV	2	73%
Fiber	X02	Gable-top Cartons - Non-CRV	1	74%
Fiber	X03	Aseptic Containers - Non-CRV	1	72%
Glass	G01	Glass Containers - Clear/ Flint - Non-CRV	1	97%
Glass	G02	Glass Beverage Containers - Clear/Flint - CRV	1	97%
Glass	G03	Glass Containers - Green/ Emerald - Non-CRV	1	97%
Glass	G04	Glass Beverage Containers - Green/Emerald – CRV	1	97%
Glass	G05	Glass Containers - Brown/ Amber - Non-CRV	1	97%
Glass	G06	Glass Beverage Containers - Brown/Amber - CRV	1	97%
Glass	G07	Glass Containers - Other Colors - Non-CRV	1	97%
Glass	G08	Glass Beverage Containers - Other Colors - CRV	1	97%
Glass	G09	Remainder/ Composite Glass	1	46%

Material Class	MT&F Code	SB 343 Material Type and Form Name (MT&F)	Number of Jurisdiction Survey Material Types	Percent of Population with Collection Access
Metal	M01	Aluminum Cans and Lids - Non-CRV	1	96%
Metal	M02	Aluminum Beverage Cans - CRV	1	96%
Metal	M03	Aluminum Bottles - Non-CRV	1	96%
Metal	M04	Aluminum Bottles for Beverages - CRV	1	96%
Metal	M05	Aluminum Foil (<3 mm), Sheets	1	81%
Metal	M06	Aluminum Foil (>3 mm), Molded Containers	1	82%
Metal	M07	Tin/Steel Cans, Lids - Non-CRV	1	99%
Metal	M08	Tin/Steel Beverage Containers - CRV	1	99%
Metal	M10	Tin/Steel or Aluminum Aerosol Containers	2	71%
Metal	M12	Other Ferrous Metal	2	77%
Metal	M13	Other Non-Ferrous Metal	2	78%
Other	T01	Textiles and Clothing	2	19%
Other	X04	Mailing Pouches & Shipping Envelopes	1	29%
Other	X05	Other Multi-Material Laminate Single-Use	2	35%
Other	X06	Single-Use Ceramic Packaging	1	7%
Other	X08	Plant Material Food Service Ware	1	37%
Other	X09	Treated Wood	1	7%
Other	X10	Green Material, Clean Wood, and Food Scraps	2	40%
Other	X13	Fines and Residuals	6	46%
Plastic	PL01	PET Clear Bottles - Non-CRV	1	99%
Plastic	PL02	PET Clear Beverage Bottles - CRV	1	99%
Plastic	PL03	PET Pigmented Bottles - Non-CRV	1	96%
Plastic	PL04	PET Pigmented Beverage Bottles - CRV	1	96%
Plastic	PL05	PET Thermoformed Clamshells and Containers	1	88%
Plastic	PL06	Other PET Clear Single-Use Rigids	3	91%

Material Class	MT&F Code	SB 343 Material Type and Form Name (MT&F)	Number of Jurisdiction Survey Material Types	Percent of Population with Collection Access
Plastic	PL07	Other PET Pigmented Single-Use Rigids	3	90%
Plastic	PL08	PET Multi-Use Rigids	1	85%
Plastic	PL09	HDPE Clear Beverage Bottles - Non-CRV	1	99%
Plastic	PL10	HDPE Clear Beverage Bottles - CRV	1	99%
Plastic	PL11	HDPE Buckets: Food	1	88%
Plastic	PL12	HDPE Buckets: Non-Food	1	88%
Plastic	PL13	Other HDPE Clear Single-Use Rigids	3	92%
Plastic	PL14	HDPE Pigmented Single-Use Rigids	3	92%
Plastic	PL15	Other HDPE Multi-Use Rigids	1	88%
Plastic	PL16	PVC Single-Use Rigids	1	52%
Plastic	PL17	PVC Multi-Use	1	52%
Plastic	PL18	LDPE Clear Beverage Bottles	1	75%
Plastic	PL19	LDPE Clear Single-Use Rigids	2	73%
Plastic	PL20	LDPE Pigmented Single-Use Rigids	2	73%
Plastic	PL21	LDPE Multi-Use	1	70%
Plastic	PL22	PP Clear Single-Use Rigids	4	78%
Plastic	PL23	PP Pigmented Single-Use Rigids	4	78%
Plastic	PL25	PS Thermoformed Clamshells and Containers	1	40%
Plastic	PL26	PS Densified: Single-Use Food Service Ware	2	37%
Plastic	PL27	PS Expanded - Packaging	2	35%
Plastic	PL28	PS Expanded - Food Service Ware	1	35%
Plastic	PL29	PS Densified: Multi-Use	1	40%
Plastic	PL30	Other (7) Single-Use Rigids	2	38%
Plastic	PL31	Plastic Wine Bladders	1	26%
Plastic	PL32	Films - Plastic Bags - Compostable	2	23%

Material Class	MT&F Code	SB 343 Material Type and Form Name (MT&F)	Number of Jurisdiction Survey Material Types	Percent of Population with Collection Access
Plastic	PL33	Films - Plastic Bags - Designed for Reuse	7	28%
Plastic	PL34	Films - Plastic Non-Bags - Agricultural and Commercial	9	29%
Plastic	PL35	Films - Plastic Non-Bags - Other Film	9	29%
Plastic	PL36	Films - Plastic Bags - Designed for Disposal	7	28%
Plastic	PL37	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	2	38%
Plastic	PL38	Mixed Plastic Multi-Use	1	51%

Materials Sorted by Large Volume Transfer/Processing Facilities

Data gathered for this study is organized by those material types and forms sorted to each outflow. Supplementary data explores the impact of sorting to specified outflows (Appendix 1, Section 2.3, Table F1) and to mixed material outflows (Appendix 1, Section 2.3, Table F2), as well as inflow-scaled sorting for all outflows (Appendix 1, Section 2.3, Table F3). Surveyed facilities serve 30 out of 58 counties statewide, and the populations of those counties make up 88.53% of the statewide population.

The table below displays the proportion of the counties served by the surveyed LVTPs, with sorting of each material type and form by solid waste inflow tonnage. The first three columns describe the material type and form by unique material type and form code, SB 343 material type and form name, and material type and form class (Glass, Metal, Fiber, Plastic, and Other), respectively. The fourth and fifth columns show the count and percentage of counties served by surveyed LVTPs that sort that material type and form into outflows. Columns four and five assume that partial coverage of a county (at least one facility sorting each material type and form to a validated outflow) is equivalent to complete coverage of a county. Rows with a value of zero for counties served indicate material types and forms for which there was insufficient evidence of effective sorting to specified outflows within this study (see Appendix 1, Section 2.4; Appendix 1, Section 2.5; and Appendix 1, Section 2.6 for details).

NA is applied to Reminder/Composite items; Remainder/Composite categories are not identifiable to the level of material type and form. NA is also applied to items subject to additional programs. This includes SP03 (includes items subject to Business and Professions Code (BPC) 17580 (g)(1)(B)); SP01 (subject to BPC 17580 (g)(1)(C)); G02, G04, G06, G08, M02, M04, M08, PL02, PL04, PL10, X01 (subject to Division 12.1 of the Public Resources Code).

Table 2. Sorting of Material Types and Forms to All Outflows, by Counties Served by Surveyed LVTPs

MT&F Code	Material Type and Form (MT&F)	MT&F Class	Count of Counties Served	Percent of Counties Served
F01	Uncoated Corrugated Cardboard/ Old Corrugated Containers (OCC)	Fiber	30	100
F02	White Office-Type Paper and Mail	Fiber	30	100
F03	Newspapers/ Newspaper Inserts	Fiber	28	93
F04	Magazines and Catalogs	Fiber	28	93
F05	Paper Bags and Kraft Paper	Fiber	28	93
F06	Folded Paper Containers and Other Paperboard Packaging	Fiber	28	93
F07	Other Mixed Paper	Fiber	28	93
F08	Clean Molded Paper Fiber	Fiber	0	0
F09	Uncoated Fiber-Based Food Service Ware	Fiber	0	0
F10	Composite Food Service Paper and Packaging	Fiber	0	0
F11	Uncoated Soiled Fiber Products	Fiber	0	0
F12	Remainder/ Composite Fiber	Fiber	NA	NA
G01	Glass Containers - Clear/ Flint - Non-CRV	Glass	30	100
G02	Glass Beverage Containers - Clear/Flint - CRV	Glass	NA	NA
G03	Glass Containers - Green/ Emerald - Non-CRV	Glass	30	100
G04	Glass Beverage Containers - Green/Emerald – CRV	Glass	NA	NA
G05	Glass Containers - Brown/ Amber - Non-CRV	Glass	30	100
G06	Glass Beverage Containers - Brown/Amber - CRV	Glass	NA	NA
G07	Glass Containers - Other Colors - Non-CRV	Glass	30	100
G08	Glass Beverage Containers - Other Colors - CRV	Glass	NA	NA
G09	Remainder/ Composite Glass	Glass	NA	NA
H01	Household Hazardous Waste	Other	0	0
M01	Aluminum Cans and Lids - Non-CRV	Metal	22	73
M02	Aluminum Beverage Cans - CRV	Metal	NA	NA
M03	Aluminum Bottles - Non-CRV	Metal	22	73
M04	Aluminum Bottles for Beverages - CRV	Metal	NA	NA

MT&F Code	Material Type and Form (MT&F)	MT&F Class	Count of Counties Served	Percent of Counties Served
M05	Aluminum Foil (<3 mm), Sheets	Metal	22	73
M06	Aluminum Foil (>3 mm), Molded Containers	Metal	22	73
M07	Tin/Steel Cans, Lids - Non-CRV	Metal	30	100
M08	Tin/Steel Beverage Containers - CRV	Metal	NA	NA
M09	Tin/Steel Paint Cans	Metal	29	97
M10	Tin/Steel or Aluminum Aerosol Containers	Metal	29	97
M11	Metal Hazardous Waste: Used Oil Filters, Gas Cylinders	Metal	0	0
M12	Other Ferrous Metal	Metal	21	70
M13	Other Non-Ferrous Metal	Metal	21	70
M14	Remainder/ Composite Metal	Metal	NA	NA
PL01	PET Clear Bottles - Non-CRV	Plastic	30	100
PL02	PET Clear Beverage Bottles - CRV	Plastic	NA	NA
PL03	PET Pigmented Bottles - Non-CRV	Plastic	30	100
PL04	PET Pigmented Beverage Bottles - CRV	Plastic	NA	NA
PL05	PET Thermoformed Clamshells and Containers	Plastic	30	100
PL06	Other PET Clear Single-Use Rigids	Plastic	30	100
PL07	Other PET Pigmented Single-Use Rigids	Plastic	30	100
PL08	PET Multi-Use Rigids	Plastic	0	0
PL09	HDPE Clear Beverage Bottles - Non-CRV	Plastic	30	100
PL10	HDPE Clear Beverage Bottles - CRV	Plastic	NA	NA
PL11	HDPE Buckets: Food	Plastic	30	100
PL12	HDPE Buckets: Non-Food	Plastic	30	100
PL13	Other HDPE Clear Single-Use Rigids	Plastic	30	100
PL14	HDPE Pigmented Single-Use Rigids	Plastic	30	100
PL15	Other HDPE Multi-Use Rigids	Plastic	30	100
PL16	PVC Single-Use Rigids	Plastic	0	0
PL17	PVC Multi-Use	Plastic	0	0
PL18	LDPE Clear Beverage Bottles	Plastic	0	0
PL19	LDPE Clear Single-Use Rigids	Plastic	9	30

MT&F Code	Material Type and Form (MT&F)	MT&F Class	Count of Counties Served	Percent of Counties Served
PL20	LDPE Pigmented Single-Use Rigids	Plastic	0	0
PL21	LDPE Multi-Use	Plastic	30	100
PL22	PP Clear Single-Use Rigids	Plastic	27	90
PL23	PP Pigmented Single-Use Rigids	Plastic	30	100
PL24	PP Multi-Use	Plastic	30	100
PL25	PS Thermoformed Clamshells and Containers	Plastic	0	0
PL26	PS Densified: Single-Use Food Service Ware	Plastic	0	0
PL27	PS Expanded – Packaging	Plastic	0	0
PL28	PS Expanded - Food Service Ware	Plastic	0	0
PL29	PS Densified: Multi-Use	Plastic	0	0
PL30	Other (7) Single-Use Rigids	Plastic	9	30
PL31	Plastic Wine Bladders	Plastic	0	0
PL32	Films - Plastic Bags - Compostable	Plastic	0	0
PL33	Films - Plastic Bags - Designed for Reuse	Plastic	0	0
PL34	Films - Plastic Non-Bags - Agricultural and Commercial	Plastic	0	0
PL35	Films - Plastic Non-Bags - Other Film	Plastic	0	0
PL36	Films - Plastic Bags - Designed for Disposal	Plastic	15	50
PL37	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	Plastic	30	100
PL38	Mixed Plastic Multi-Use	Plastic	30	100
PL39	Remainder/ Composite Plastic	Plastic	NA	NA
SP01	Tires	Other	NA	NA
SP02	Bulky Items	Other	0	0
SP03	Mattresses and Foundations	Other	NA	NA
T01	Textiles and Clothing	Other	0	0
X01	Gable-top Cartons/ Aseptics - CRV	Fiber	NA	NA
X02	Gable-top Cartons - Non-CRV	Fiber	9	30
X03	Aseptic Containers - Non-CRV	Fiber	9	30
X04	Mailing Pouches and Shipping Envelopes	Other	0	0

MT&F Code	Material Type and Form (MT&F)	MT&F Class	Count of Counties Served	Percent of Counties Served
X05	Other Multi-Material Laminate Single-Use	Other	0	0
X06	Single-Use Ceramic Packaging	Other	0	0
X08	Plant Material Food Service Ware	Other	0	0
X09	Treated Wood	Other	0	0
X10	Green Material, Clean Wood, and Food Scraps	Other	0	0
X11	Mixed Material Single-Use	Other	0	0
X12	Remainder/ Composite Mixed Material Multi-Use	Other	NA	NA
X13	Fines and Residuals	Other	NA	NA

Material Characterization Study at Large Volume Transfer/Processing Facilities

The tables below display the makeup of each characterized fiber, glass, metal, plastic, or residual outflow by material type and form. For ease of reading, tables are categorized by outflow material class: fiber (Table 3A), glass (Table 3B), metal (Table 3C), plastic (Table 3D), and residual (Table 3E). The residual outflows are samples from material aggregated at the end of the sorting process, destined for disposal. The first column of each table indicates the outflow name, and the second column indicates the total number of samples (hand-sort and visual characterization) of each outflow. Columns three through five describe the material type and form class, SB 343 material type and form name, and material type and form code, respectively. Column six indicates the mean percent composition of the outflow made up by each material type and form, and column seven indicates the standard deviation (SD). All rows with "NA" in the standard deviation column indicate that the material type and form occurred in only one sample of the relevant outflow. A related table of rare material types and forms in each outflow (<1% composition) is provided in Appendix 1, Section 2.4, Tables G1 - G5.

Table 3A. Material Characterization of Fiber Outflows

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Gable Top and Aseptic Carton	15	Fiber	Gable-top Cartons - Non-CRV	X02	67%	25%
		Fiber	Aseptic Containers - Non-CRV	X03	30%	24%
		NA	Other (rare items < 1% each)	NA	3%	NA
OCC	31	Fiber	Uncoated Corrugated Cardboard/ Old Corrugated Containers (OCC)	F01	91%	7%
		Fiber	Folded Paper Containers and Other Paperboard Packaging	F06	3%	3%
		Fiber	Other Mixed Paper	F07	1%	3%
		NA	Other (rare items < 1% each)	NA	6%	NA
ONP and Mixed Paper	44	Fiber	Uncoated Corrugated Cardboard/ Old Corrugated Containers (OCC)	F01	29%	16%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
ONP and Mixed Paper	44	Fiber	Other Mixed Paper	F07	13%	11%
		Fiber	White Office-Type Paper and Mail	F02	10%	11%
		Fiber	Folded Paper Containers and Other Paperboard Packaging	F06	10%	4%
		Fiber	Newspapers/ Newspaper Inserts	F03	9%	7%
		Fiber	Magazines and Catalogs	F04	8%	5%
		Fiber	Composite Food Service Paper and Packaging	F10	4%	4%
		Fiber	Paper Bags and Kraft Paper	F05	2%	2%
		Fiber	Remainder/ Composite Fiber	F12	2%	2%
		Fiber	Uncoated Soiled Fiber Products	F11	2%	2%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	1%	2%
		NA	Other (rare items < 1% each)	NA	9%	NA
Shredded Paper	1	Fiber	White Office-Type Paper and Mail	F02	100%	NA
White Office Paper	3	Fiber	White Office-Type Paper and Mail	F02	100%	0%

Table 3B. Material Characterization of Glass Outflows

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Glass - Brown/Amber	1	Glass	Glass Beverage Containers - Brown/Amber - CRV	G06	57%	NA
		Glass	Glass Containers - Brown/ Amber - Non-CRV	G05	23%	NA
		Glass	Glass Containers - Clear/ Flint - Non-CRV	G01	8%	NA
		Glass	Remainder/ Composite Glass	G09	3%	NA
		Plastic	Films - Plastic Bags - Designed for Disposal	PL36	2%	NA
		Plastic	PP Pigmented Single-Use Rigids	PL23	1%	NA
		Fiber	Other Mixed Paper	F07	1%	NA
		Plastic	Remainder/ Composite Plastic	PL39	1%	NA
		Fiber	Remainder/ Composite Fiber	F12	1%	NA
		NA	Other (rare items < 1% each)	NA	2%	NA
Glass - Clear/Flint	1	Glass	Glass Beverage Containers - Clear/Flint - CRV	G02	65%	NA
		Glass	Remainder/ Composite Glass	G09	15%	NA
		Glass	Glass Containers - Clear/ Flint - Non-CRV	G01	7%	NA

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Glass - Clear/Flint	1	Glass	Glass Containers - Green/ Emerald - Non-CRV	G03	3%	NA
		Metal	Tin/Steel Cans, Lids - Non-CRV	M07	2%	NA
		Plastic	Films - Plastic Bags - Designed for Disposal	PL36	2%	NA
		Plastic	PET Clear Beverage Bottles - CRV	PL02	2%	NA
		Plastic	Films - Plastic Non-Bags - Other Film	PL35	1%	NA
		NA	Other (rare items < 1% each)	NA	4%	NA
Glass - Green/Emerald	1	Glass	Glass Beverage Containers - Green/Emerald - CRV	G04	31%	NA
		Glass	Glass Containers - Green/ Emerald - Non-CRV	G03	28%	NA
		Glass	Glass Beverage Containers - Brown/Amber - CRV	G06	17%	NA
		Glass	Glass Containers - Brown/ Amber - Non-CRV	G05	8%	NA
		Glass	Glass Containers - Clear/ Flint - Non-CRV	G01	5%	NA
		Glass	Glass Beverage Containers - Clear/Flint - CRV	G02	4%	NA
		Glass	Remainder/ Composite Glass	G09	3%	NA
		Plastic	Films - Plastic Bags - Designed for Disposal	PL36	2%	NA

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Glass - Green/Emerald	1	Fiber	Remainder/ Composite Fiber	F12	1%	NA
		NA	Other (rare items < 1% each)	NA	2%	NA
Glass Fines	2	Glass	Remainder/ Composite Glass	G09	100%	0%
Mixed Glass	39	Glass	Remainder/ Composite Glass	G09	43%	29%
		Other	Fines and Residuals	X13	20%	26%
		Glass	Glass Containers - Green/ Emerald - Non-CRV	G03	6%	12%
		Fiber	Remainder/ Composite Fiber	F12	5%	11%
		Fiber	Other Mixed Paper	F07	5%	14%
		Glass	Glass Containers - Clear/ Flint - Non-CRV	G01	5%	9%
		Other	Green Material, Clean Wood, and Food Scraps	X10	4%	4%
		Glass	Glass Containers - Brown/ Amber - Non-CRV	G05	2%	4%
		Glass	Glass Containers - Other Colors - Non-CRV	G07	1%	3%
		Other	Mixed Material Single-Use	X11	1%	2%
		NA	Other (rare items < 1% each)	NA	8%	NA

Table 3C. Material Characterization of Metal Outflows

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Aluminum - UBC	25	Metal	Aluminum Beverage Cans - CRV	M02	94%	1%
		Plastic	PS Thermoformed Clamshells and Containers	PL25	3%	18%
		NA	Other (rare items < 1% each)	NA	3%	NA
Aluminum – Other	11	Metal	Aluminum Foil (>3 mm), Molded Containers	M06	38%	27%
		Metal	Aluminum Cans and Lids - Non-CRV	M01	21%	20%
		Metal	Tin/Steel or Aluminum Aerosol Containers	M10	12%	10%
		Metal	Aluminum Foil (<3 mm), Sheets	M05	8%	7%
		Metal	Other Non-Ferrous Metal	M13	5%	8%
		Metal	Tin/Steel Cans, Lids - Non-CRV	M07	4%	3%
		Metal	Aluminum Beverage Cans - CRV	M02	2%	5%
		Metal	Aluminum Bottles - Non-CRV	M03	2%	3%
		Metal	Aluminum Bottles for Beverages - CRV	M04	2%	3%
		Other	Fines and Residuals	X13	2%	2%
		NA	Other (rare items < 1% each)	NA	3%	NA
Copper	2	Metal	Other Non-Ferrous Metal	M13	100%	0%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Mixed Metal - Ferrous - Steel/ Tin Cans	30	Metal	Tin/Steel Cans, Lids - Non-CRV	M07	63%	22%
		Metal	Other Ferrous Metal	M12	15%	12%
		Metal	Tin/Steel or Aluminum Aerosol Containers	M10	7%	4%
		Metal	Remainder/ Composite Metal	M14	4%	8%
		Metal	Tin/Steel Paint Cans	M09	2%	12%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	2%	5%
		Other	Green Material, Clean Wood, and Food Scraps	X10	1%	4%
		Metal	Other Non-Ferrous Metal	M13	1%	2%
		NA	Other (rare items < 1% each)	NA	5%	NA
Mixed Metal - Large	19	Metal	Other Ferrous Metal	M12	64%	26%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Mixed Metal - Large	19	Metal	Remainder/ Composite Metal	M14	22%	23%
		Metal	Other Non-Ferrous Metal	M13	5%	10%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	4%	10%
		Other	Household Hazardous Waste	H01	2%	5%
		Metal	Tin/Steel Cans, Lids - Non-CRV	M07	1%	2%
		NA	Other (rare items < 1% each)	NA	2%	NA
Mixed Metal - Non-Ferrous	38	Metal	Aluminum Cans and Lids - Non-CRV	M01	25%	23%
		Metal	Aluminum Foil (>3 mm), Molded Containers	M06	21%	24%
		Metal	Aluminum Beverage Cans - CRV	M02	20%	34%
		Metal	Tin/Steel or Aluminum Aerosol Containers	M10	8%	15%
		Metal	Other Ferrous Metal	M12	6%	13%
		Metal	Other Non-Ferrous Metal	M13	4%	12%
		Metal	Tin/Steel Cans, Lids - Non-CRV	M07	3%	9%
		Metal	Remainder/ Composite Metal	M14	3%	6%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Mixed Metal - Non-Ferrous	38	Metal	Aluminum Foil (<3 mm), Sheets	M05	2%	3%
		Metal	Aluminum Bottles for Beverages - CRV	M04	1%	2%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	1%	3%
		NA	Other (rare items < 1% each)	NA	5%	NA
Mixed Metal - Small	6	Metal	Other Ferrous Metal	M12	40%	15%
		Metal	Remainder/ Composite Metal	M14	20%	25%
		Metal	Tin/Steel Cans, Lids - Non-CRV	M07	14%	7%
		Other	Fines and Residuals	X13	11%	16%
		Metal	Other Non-Ferrous Metal	M13	10%	13%
		Other	Household Hazardous Waste	H01	1%	2%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	1%	2%
		NA	Other (rare items < 1% each)	NA	3%	NA
Mixed Metal - Small Ferrous	11	Metal	Tin/Steel Cans, Lids - Non-CRV	M07	60%	16%
		Metal	Other Ferrous Metal	M12	21%	11%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	5%	7%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Mixed Metal - Small Ferrous	11	Metal	Tin/Steel or Aluminum Aerosol Containers	M10	4%	3%
		Other	Mixed Material Single-Use	X11	2%	3%
		Metal	Tin/Steel Paint Cans	M09	2%	4%
		NA	Other (rare items < 1% each)	NA	7%	NA

Table 3D. Material Characterization of Plastic Outflows

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Expanded Polystyrene #6	1	Plastic	PS Expanded - Packaging	PL27	100%	NA
HDPE Mixed Bottle and Container	2	Plastic	HDPE Pigmented Single-Use Rigids	PL14	45%	2%
		Plastic	HDPE Clear Beverage Bottles - Non-CRV	PL09	44%	0%
		Plastic	HDPE Buckets: Non-Food	PL12	2%	2%
		Other	Mixed Material Single-Use	X11	1%	1%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
HDPE Mixed Bottle and Container	2	Plastic	PP Pigmented Single-Use Rigids	PL23	1%	0%
		Plastic	PP Clear Single-Use Rigids	PL22	1%	1%
		NA	Other (rare items < 1% each)	NA	5%	NA
HDPE Natural Bottle and Container	30	Plastic	HDPE Clear Beverage Bottles - Non-CRV	PL09	56%	23%
		Plastic	Other HDPE Clear Single-Use Rigids	PL13	24%	12%
		Plastic	HDPE Pigmented Single-Use Rigids	PL14	9%	18%
		Plastic	HDPE Clear Beverage Bottles - CRV	PL10	6%	6%
		NA	Other (rare items < 1% each)	NA	5%	NA
HDPE Pigmented Bottle and Container	32	Plastic	HDPE Pigmented Single-Use Rigids	PL14	76%	16%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
HDPE Pigmented Bottle and Container	32	Plastic	Other HDPE Clear Single-Use Rigids	PL13	12%	12%
		Plastic	HDPE Clear Beverage Bottles - Non-CRV	PL09	2%	3%
		NA	Other (rare items < 1% each)	NA	10%	NA
Mixed Rigid Plastic	38	Plastic	Other HDPE Multi-Use Rigids	PL15	24%	23%
		Plastic	Mixed Plastic Multi-Use	PL38	22%	21%
		Plastic	HDPE Buckets: Non-Food	PL12	14%	11%
		Plastic	PP Multi-Use	PL24	14%	8%
		Plastic	HDPE Buckets: Food	PL11	4%	6%
		Plastic	HDPE Pigmented Single-Use Rigids	PL14	3%	4%
		Plastic	PP Pigmented Single-Use Rigids	PL23	3%	5%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	3%	9%
		Plastic	Remainder/ Composite Plastic	PL39	3%	7%
		Plastic	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	PL37	3%	5%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Mixed Rigid Plastic	38	Plastic	Other HDPE Clear Single-Use Rigids	PL13	2%	5%
		Plastic	LDPE Multi-Use	PL21	1%	4%
		NA	Other (rare items < 1% each)	NA	5%	NA
PET Bottle	12	Plastic	PET Clear Beverage Bottles - CRV	PL02	55%	12%
		Plastic	PET Clear Bottles - Non-CRV	PL01	23%	6%
		Plastic	Other PET Clear Single-Use Rigids	PL06	6%	5%
		Plastic	PET Thermoformed Clamshells and Containers	PL05	5%	7%
		Plastic	PET Pigmented Beverage Bottles - CRV	PL04	3%	1%
		Plastic	Remainder/ Composite Plastic	PL39	2%	4%
		Plastic	PP Clear Single-Use Rigids	PL22	1%	2%
		NA	Other (rare items < 1% each)	NA	5%	NA
PET Bottle and Container	41	Plastic	PET Clear Beverage Bottles - CRV	PL02	48%	15%
		Plastic	PET Clear Bottles - Non-CRV	PL01	18%	8%
		Plastic	Other PET Clear Single-Use Rigids	PL06	10%	7%
		Plastic	PET Thermoformed Clamshells and Containers	PL05	10%	14%
		Plastic	Remainder/ Composite Plastic	PL39	3%	8%
		Plastic	PET Pigmented Beverage Bottles - CRV	PL04	3%	2%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
PET Bottle and Container	41	Plastic	PET Pigmented Bottles – Non-CRV	PL03	2%	1%
		NA	Other (rare items < 1% each)	NA	7%	NA
PET Thermoform	6	Plastic	PET Thermoformed Clamshells and Containers	PL05	88%	9%
		Plastic	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	PL37	5%	5%
		Plastic	Remainder/ Composite Plastic	PL39	4%	4%
		Plastic	Other PET Clear Single-Use Rigids	PL06	1%	1%
		NA	Other (rare items < 1% each)	NA	2%	NA
Plastic #3-#7	9	Plastic	PP Clear Single-Use Rigids	PL22	33%	6%
		Plastic	PP Pigmented Single-Use Rigids	PL23	27%	5%
		Plastic	Mixed Plastic Multi-Use	PL38	4%	4%
		Plastic	Other HDPE Multi-Use Rigids	PL15	4%	9%
		Plastic	PP Multi-Use	PL24	3%	2%
		Plastic	HDPE Pigmented Single-Use Rigids	PL14	3%	2%
		Fiber	Other Mixed Paper	F07	2%	1%
		Plastic	Other (7) Single-Use Rigids	PL30	2%	1%
		Plastic	Other PET Clear Single-Use Rigids	PL06	2%	2%
		Plastic	Films - Plastic Bags - Designed for Disposal	PL36	1%	1%
		Plastic	PS Expanded - Packaging	PL27	1%	3%
		Plastic	PET Thermoformed Clamshells and Containers	PL05	1%	1%
		Plastic	PET Clear Beverage Bottles - CRV	PL02	1%	1%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Plastic #3-#7	9	Plastic	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	PL37	1%	1%
		Other	Mixed Material Single-Use	X11	1%	2%
		Other	Green Material, Clean Wood, and Food Scraps	X10	1%	2%
		Fiber	Folded Paper Containers and Other Paperboard Packaging	F06	1%	1%
		NA	Other (rare items < 1% each)	NA	11%	NA
Plastic Film	2	Plastic	Films - Plastic Non-Bags - Agricultural and Commercial	PL34	98%	1%
		NA	Other (rare items < 1% each)	NA	2%	NA
Plastic Film - Agricultural and Commercial	1	Plastic	Films - Plastic Non-Bags - Agricultural and Commercial	PL34	100%	NA
Plastic Film - Plastic Bags	3	Plastic	Films - Plastic Bags - Designed for Disposal	PL36	100%	0%
Polypropylene #5	24	Plastic	PP Clear Single-Use Rigids	PL22	29%	12%
		Plastic	PP Pigmented Single-Use Rigids	PL23	25%	14%
		Plastic	Mixed Plastic Multi-Use	PL38	13%	11%
		Plastic	Unknown Plastic Type or Mixture of Multiple Plastic Resins (Single-Use)	PL37	5%	3%
		Plastic	Other (7) Single-Use Rigids	PL30	5%	5%
		Plastic	PP Multi-Use	PL24	4%	6%
		Plastic	HDPE Pigmented Single-Use Rigids	PL14	2%	3%
		Plastic	PET Thermoformed Clamshells and Containers	PL05	2%	4%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	1%	3%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Polypropylene #5	24	Plastic	PET Clear Beverage Bottles - CRV	PL02	1%	1%
		NA	Other (rare items < 1% each)	NA	13%	NA

Table 3E. Material Characterization of Residuals

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Residuals	44	Fiber	Uncoated Corrugated Cardboard/ Old Corrugated Containers (OCC)	F01	10%	9%
		Other	Fines and Residuals	X13	9%	14%
		Other	Textiles and Clothing	T01	8%	12%
		Other	Remainder/ Composite Mixed Material Multi-Use	X12	6%	10%
		Fiber	Other Mixed Paper	F07	6%	5%
		Plastic	Films - Plastic Bags - Designed for Disposal	PL36	5%	4%
		Other	Mixed Material Single-Use	X11	5%	5%
		Fiber	Folded Paper Containers and Other Paperboard Packaging	F06	4%	4%
		Other	Green Material, Clean Wood, and Food Scraps	X10	4%	4%
		Other	Treated Wood	X09	3%	7%
		Fiber	Magazines and Catalogs	F04	3%	6%
		Plastic	Films - Plastic Non-Bags - Other Film	PL35	3%	3%
		Fiber	Remainder/ Composite Fiber	F12	2%	5%

Outflow Name	Samples of Outflow	MT&F Class	Material Type and Form (MT&F)	MT&F Code	Percent of MT&F in Outflow (Mean)	Percent of MT&F in Outflow (SD)
Residuals	44	Plastic	Films - Plastic Non-Bags - Agricultural and Commercial	PL34	2%	7%
		Fiber	Composite Food Service Paper and Packaging	F10	2%	2%
		Fiber	White Office-Type Paper and Mail	F02	2%	4%
		Plastic	Mixed Plastic Multi-Use	PL38	2%	3%
		Fiber	Uncoated Soiled Fiber Products	F11	2%	2%
		Plastic	PP Pigmented Single-Use Rigids	PL23	1%	2%
		Plastic	PP Multi-Use	PL24	1%	2%
		Fiber	Paper Bags and Kraft Paper	F05	1%	2%
		Plastic	HDPE Pigmented Single-Use Rigids	PL14	1%	1%
		Plastic	PET Clear Beverage Bottles - CRV	PL02	1%	1%
		Plastic	PP Clear Single-Use Rigids	PL22	1%	1%
		Plastic	PET Thermoformed Clamshells and Containers	PL05	1%	1%
		Fiber	Newspapers/ Newspaper Inserts	F03	1%	1%
		NA	Other (rare items < 1% each)	NA	13%	NA

Abbreviations and Acronyms

AQPR: Average Quarterly Potential Reuse

BPC: Business and Professions Code

CalRecycle: California Department of Resources Recycling and Recovery

CRV: California Redemption Value

DOF: Department of Finance

HDPE: High Density Polyethylene

Lbs.: Pounds

LDPE: Low Density Polyethylene

LVTP: Large Volume Transfer/Processing Facility

MCS: Material Characterization Study

m: meters

mm: millimeters

MT&F: Material Type and Form

OCC: Old Corrugated Containers

ONP: Old Newspaper

PET: Polyethylene Terephthalate

PP: Polypropylene

PRC: Public Resources Code

PS: Polystyrene

PVC: Polyvinyl Chloride

RDRS: Recycling and Disposal Reporting System

SB 343: Senate Bill 343 (Allen, Chapter 507, Statutes of 2021)

SD: Standard Deviation

SWIS: Solid Waste Information System

Glossary of Terms

Average Quarterly Potential Reuse: Based on self-reported data in the Recycling and Disposal Reporting System (RDRS), the average of outflow tons sent per quarter in all of year 2022. Relevant entities included all reporting Transfer/Processors and Recycler/ Composters in California. Relevant material streams included End Use and Recycling/ Composting. Relevant outflow tons included Glass (all), Metal (all), Mixed (Mixed Recyclables), Mixed Residuals (Other: cardboard, Other: Metal, Processing Residuals), Other (Other Approved Material Type: Carton #52 (~ milk cartons, 5 end markets in USA), Paper (all), Plastic (all).

Jurisdiction: The same definition of jurisdiction was used as that used by California Department of Finance (DOF) in their dataset entitled *E-1 Cities, Counties, and the State Population and Housing Estimates with Annual Percent Change – January 1, 2022, and 2023.* The 'Balance of County' included in the dataset encompasses the unincorporated areas of the California counties listed, which were also considered jurisdictions.

Large Volume Transfer/Processing Facility: From PRC Section 40200, a transfer or processing station includes those facilities utilized to receive solid wastes, temporarily store, separate, convert, or otherwise process the materials in the solid wastes, or to transfer the solid wastes directly from smaller to larger vehicles for transport, and those facilities utilized for transformation. A Large Volume Transfer/Processing Facility transfers or processes greater than 100 tons per day (TPD) of material.

Bibliography

1. State of California, Department of Finance, E-4 Population Estimates for Cities, Counties, and the State, 2021-2024, with 2020 Census Benchmark. Sacramento, California, May 2024. https://dof.ca.gov/wp-content/uploads/sites/352/Forecasting/Demographics/Documents/E-4_2024_InternetVersion.xlsx
2. *"Local Recycling Information," CalRecycle, ND(?),* <Find Your Local Recycling Information - I Recycle Smart> (September 27, 2023).