What's in California Landfills:

Measuring Single-Use Packaging and Plastic Food Service Ware Disposed (2025)

Preliminary Findings

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Executive Summary and Background

Lawmakers enacted the [Plastic Pollution Prevention and Packaging Producer Responsibility Act](#) (Senate Bill (SB) 54, Allen, Chapter 75, Statutes of 2022) (the Act), establishing an extended producer responsibility (EPR) program to reduce single-use packaging and plastic single-use food service ware (covered material) in California, while ensuring the covered material is recyclable or compostable and that covered material meets certain recycling rates.

The Act requires the California Department of Resources Recycling and Recovery (CalRecycle) to conduct a material characterization study of covered material and determine the approximate amount disposed of in California landfills (see Public Resources Code Section 42061(a) (2-3)). Unless otherwise indicated, all statutory references in this report are to the Public Resources Code (PRC).

CalRecycle contracted with Cascadia Consulting Group (Cascadia) to conduct a statewide material characterization study to characterize and measure the amount of covered materials landfilled in California. Fieldwork, which included hand-sorting samples at California landfills, occurred between February and April 2025. CalRecycle and Cascadia designed a study that incorporated representative, cost-effective sampling and analysis for data gathering that minimized disruption to facility operators.

This preliminary findings report provides estimates of the amount of covered material landfilled in California, by weight (tons) and as a proportion of total material landfilled statewide. It also includes information from additional analyses of resin types of plastic covered materials made of plastic that could not be identified in the field, as well as estimates of the weight of covered material discarded together with food or other goods.

It was estimated that 7,800,136 tons of covered material were disposed of in California in 2024, representing about 19.6% of total landfill disposal in California.

For more detailed findings, refer to the Summary of Findings section. The findings presented are specific to SB 54 covered materials and thus do not provide granular information concerning other materials. Preliminary data on other materials are included in the appendix.

Public Feedback and Next Steps

Section 42061(a)(3)(A) directs CalRecycle to publish preliminary findings of the study and conduct a public meeting to present those findings and receive public comments. CalRecycle plans to conduct additional advanced statistical analyses on the data presented in these findings. Updated preliminary findings will be presented at an informational session and in a published revised preliminary report in Fall 2025. CalRecycle will accept written feedback at any time, plans to hold a public meeting to further solicit public comments, and will finalize the report within 60 days of the public meeting.

All written feedback can be submitted to wastechar@calrecycle.ca.gov with the subject line: SB 54 MCS Preliminary Findings.

Data Records Available Pursuant to the California Public Records Act

Public records related to this report can be requested through the [CalRecycle Public Records Portal](#) and include records documenting analysis steps, often as scripts in the R Statistical Program:

- Estimates of statewide disposal, all materials
- Estimates of statewide disposal, Covered Material
- Percentage composition of each material type within covered material classes
- Composition estimates for material types within sectors

Methods

Overview

To estimate statewide disposal of covered material, two main steps were undertaken. First, sampling was conducted at 16 landfills across California to estimate the composition of landfilled materials by waste-generating sectors. Second, the composition was extrapolated to estimate statewide disposal using data from calendar year 2024 submitted to CalRecycle's Recycling and Disposal Reporting System (RDRS).

A random sampling methodology was used to sample waste from various sectors to develop a waste composition profile for each sector. The four sectors considered in this study included: (1) franchised single-family residential; (2) franchised commercial and multi-family residential; (3) self-hauled; and (4) mixed waste (i.e., material from transfer trailers). The data from each sector were then combined based on their relative contributions to the overall waste stream using RDRS data, thus producing statewide estimates of landfilled material by sorted material category.

For all sectors, only deliveries of waste destined for disposal in landfills were eligible for sampling, including construction and demolition (C&D) debris. Loads of disaster debris (e.g., storm deadfall and soil), universal waste, material sent to be recycled or recovered, biosolids, designated waste, aggregates and soil set aside for beneficial use, alternative daily cover (ADC), and household hazardous waste (HHW) were not sampled and are excluded from the study.

For the purposes of this study and throughout the report, the CalRecycle field team is referred to as "CalRecycle staff," and the Cascadia-contracted field team is referred to as "contractor staff."

The following sections present further information regarding the methodology of each step. Appendix 1: Detailed Methodology (Section 1: Detailed Methodology) presents more detailed study design and methodology.

Estimating Overall Composition of Landfilled Material in California

To gather the data necessary for estimating overall waste composition in the state, samples of waste were collected at California landfills and sorted based on covered material categories.
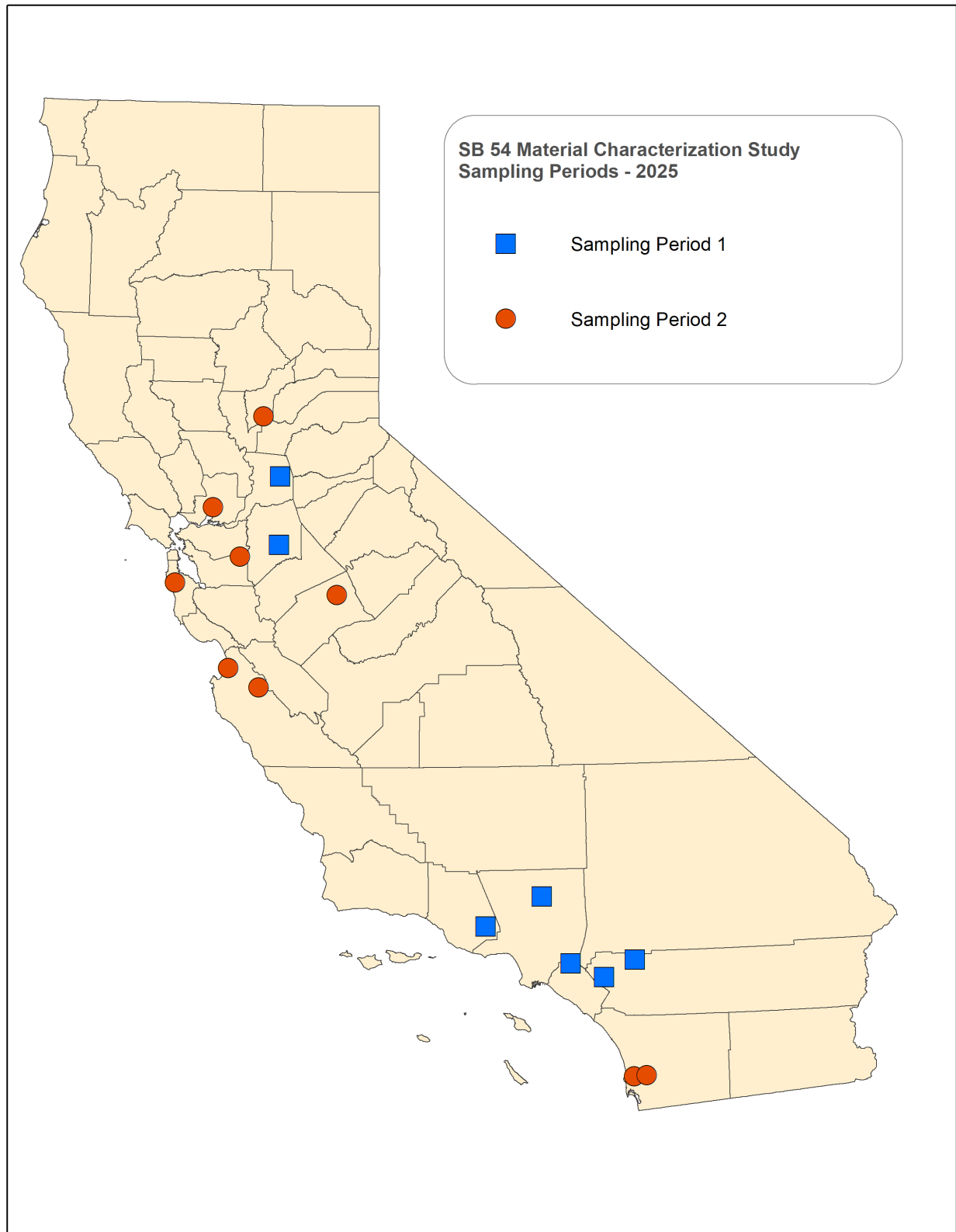
Landfill Selection

To maximize the collection of data representative of California, landfills that dispose of a higher proportion of the state's waste stream were prioritized for inclusion in the study. Furthermore, to capture data across the four sectors, the landfills with the largest annual inflow tonnage that received material from the four sectors were prioritized for inclusion in the study. Participation by landfills in this study was voluntary. In total, 16 landfill sites participated (Table 1; Figure 1). The study was conducted over two sampling periods. Each period spanned roughly 14 calendar days with approximately two days at each site. Appendix 1: Detailed Methodology (Section 1.2: Facility Selection and Sample Allocation) provides additional details.

Table 1. List of Participating Study Landfills

This table provides the facility name, county where the facility is located, and the CalRecycle Solid Waste Information System (SWIS) number.

Facility Name	County	SWIS Number
Altamont Landfill & Resource Recovery	Alameda	01-AA-0009
Antelope Valley Recycling & Disposal Facility	Los Angeles	19-AA-5624
Badlands Landfill	Riverside	33-AA-0006
Corinda Los Trancos Landfill (Ox Mtn)	San Mateo	41-AA-0002
El Sobrante Landfill	Riverside	33-AA-0217
Forward Landfill	Alameda	01-AA-0009
Highway 59 Landfill	Merced	24-AA-0001
Johnson Canyon Sanitary Landfill	Monterey	27-AA-0005
Kiefer Landfill	Sacramento	34-AA-0001
Monterey Peninsula Landfill	Monterey	27-AA-0010
Olinda Alpha Sanitary Landfill	Orange	30-AB-0035
Potrero Hills Landfill	Solano	48-AA-0075
Recology Ostrom Road Landfill	Yuba	58-AA-0011
Simi Valley Landfill & Recycling Center	Ventura	56-AA-0007
Otay Landfill	San Diego	37-AA-0010
West Miramar Sanitary Landfill	San Diego	37-AA-0020

Figure 1. Map of participating study landfills by sampling period

SB 54 Material Characterization Study
Sampling Periods - 2025

■ Sampling Period 1

● Sampling Period 2

Sorting Categories

In accordance with the Act, CalRecycle developed covered material categories (CMC), published July 1, 2024, which categorize single-use packaging and single-use plastic food service ware by material type and form, then added recyclability and compostability determinations for those categories in the January 1, 2025 updated publication. Each CMC is a combination of one material from within one of six classes (ceramic, glass, metal, paper and fiber, plastic, or wood or other organic material) and a particular type and form of that material (e.g. CMC Code 24_M4P identifies Class: Metal, Type: Aluminum, and Form: Aerosol Can). The categories individually apply to each detachable component of covered material. In addition to the six material classes, one additional material class —miscellaneous— was used for this study. It included a category for covered material discarded with a good still inside (e.g., partially filled bottle of lotion, a meal discarded in a plastic takeout container, or sausages discarded in their wrapper).

To identify and sort items based on the covered material categories, 83 material sorting categories were established based on how materials are found at landfills (e.g., broken or contaminated) and feasibility of material identification and sorting in the field. During the study, contractor staff sorted each sample into one of the 83 categories from the Material Characterization Study Sorting List (Table 2) to provide material type composition data for each sample. The complete material sorting list with definitions and examples for each category is provided in Appendix 1 (Section 1.1, Table A1).

Generally, each of the 83 material sorting categories included only one of the following types of materials:

- Covered material (i.e., single-use packaging and single-use plastic food service-ware covered under the Act),
- Potentially reusable alternatives to covered material (e.g., reusable milk jug), and
- All other material that is not covered under the Act.

Materials not covered under the Act were itemized into either a remainder category according to material class or sorted into the miscellaneous class. Remainder categories served as a catch-all for items, specific to class, that were not covered material. The miscellaneous class contained categories for hazardous materials, small items measuring 2 inches or smaller in at least two dimensions (i.e., mixed residue), and discarded covered material with a good (non-food) inside.

Material sorting categories that included covered material not predominantly made of plastic were generally a combination of two CMCs — one for that material type without a plastic component and one for the same material type with a plastic component. For example, "Glass Bottles and Jars that are covered material" was a single sorting category but included two CMCs—one for Glass Bottles and Jars with a plastic component (CMC Code 24_G1P) and one for Glass Bottles and Jars without a plastic component (CMC Code 24_G1N). In these scenarios the combined CMC Code reflected in the material sorting list is a combination of the two CMCs, such as Code 24_G1N/P.

The material types are specifically defined in Appendix 1: Detailed Methodology (Section 1.1: Sorting Categories List and Sorting Guidance, Table A1). Table A1 provides sorting rules used in the field to identify the inclusion or exclusion of each item in the sorting categories. Further details on sample sorting and characterization are provided in Appendix 1: Detailed Methodology (Section 1.7: Sample Characterization).

Table 2. Material Characterization Study Sorting List

The information contained in this table is a complete list of categories used to sort samples for the study. Each sorting category identifies a combination of material class, material type, and form. The first column in the table is a numeric count. The second column describes the material class (glass, ceramic, metal, paper and fiber, plastic, wood and other organic materials). The third column describes the material type, and the fourth column describes the form of the covered materials in that covered material category. The fifth column (Combined CMC Code) containing a code includes which covered material categories are included within each sorting category and refers to the covered material categories (CMCs) list published on July 1, 2024, pursuant to the Act. All sorting categories with a corresponding code starting with the "24_" prefix are categories specific to covered material. Additionally, in the Combined CMC Code column, the alphanumeric material code ends with either an "N" and/or a "P" indicating whether the item contains an inseparable plastic component (P) or contains no plastic component (N). An "N/P" indicates that the material form contains two covered material categories, one with and one without separable plastic components. Entries in the Combined CMC Code column with the following text mean:

- "Mixture": categories in which a covered material was jointly discarded with other material (e.g., food discarded in original packaging),
- "Potential reuse": categories for packaging and food service ware that may be reusable or refillable, and
- "N/a": remainder categories for materials other than covered material.

The complete material sorting list with definitions and examples for each category is provided in Appendix 1 (Section 1.1, Table A1).

Count	Class	Type	Form	Combined CMC Code
1	Glass	Glass	Bottles and Jars	24_G1N/P
2	Glass	Glass	Other Forms	24_G2N/P
3	Glass	Glass	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
4	Glass	Glass	Small – Two or more sides measuring 2" or less	24_G3N/P
5	Glass	Glass	Remainder/Composite Glass	n/a
6	Ceramic	Ceramic	All Forms	24_C1N/P
7	Ceramic	Ceramic	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
8	Ceramic	Ceramic	Small – Two or more sides measuring 2" or less	24_C2N/P

Count	Class	Type	Form	Combined CMC Code
9	Ceramic	Ceramic	Remainder/Composite Ceramic	n/a
10	Metal	Aluminum	Non-aerosol Container	24_M1N/P
11	Metal	Aluminum	Foil Sheets	24_M2N/P
12	Metal	Aluminum	Foil Molded Containers	24_M3N/P
13	Metal	Aluminum	Aerosol Cans	24_M4P
14	Metal	Aluminum	Other Forms	24_M5N/P
15	Metal	Tin/Steel/Bimetal	Non-aerosol Container	24_M6N/P
16	Metal	Tin/Steel/Bimetal	Aerosol Cans	24_M7P
17	Metal	Tin/Steel/Bimetal	Other Forms	24_M8N/P
18	Metal	Other Non-Ferrous	All Other Forms	24_M9N/P
19	Metal	Other Ferrous	All Other Forms	24_M10N/P
20	Metal	Metal	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
21	Metal	Metal	Small – Two or more sides measuring 2" or less	24_M12N/P
22	Metal	Metal	Remainder/Composite Metal	n/a
23	Paper/Fiber	Kraft Paper	All Forms	24_PF1N/P
24	Paper/Fiber	Molded Fiber	All Forms	24_PF14N/P
25	Paper/Fiber	Multi-Material Laminate	Aseptic Cartons	24_PF15P
26	Paper/Fiber	Multi-Material Laminate	Gable-top Cartons	24_PF5P
27	Paper/Fiber	OCC	Waxed Cardboard	24_PF8N/P
28	Paper/Fiber	OCC	Cardboard	24_PF9N/P
29	Paper/Fiber	Multi-Material Laminate	Other Forms	24_PF7P
30	Paper/Fiber	Paperboard	All Forms	24_PF10N/P
31	Paper/Fiber	White Paper	All Forms	24_PF11N/P
32	Paper/Fiber	Other/Mixed Paper	All Forms	24_PF12N/P

Count	Class	Type	Form	Combined CMC Code
33	Paper/Fiber	Other/ Mixed Paper	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
34	Paper/Fiber	Paper/ Fiber	Small – Two or more sides measuring 2" or less	24_PF16N/P
35	Paper/Fiber	Other/Mixed Paper	Remainder/Composite Mixed Paper	n/a
36	Plastic	PET (#1)	Bottles, Jugs, and Jars (Clear/Natural)	24_P1P
37	Plastic	PET (#1)	Bottles, Jugs, and Jars (Pigmented/Color)	24_P2P
38	Plastic	PET (#1)	Other Rigid Containers, Cups, Lids Plates, Trays, Tubs	24_P38P
39	Plastic	PET (#1)	Other Rigid Items	24_P439P
40	Plastic	PET (#1)	Flexible and Film Items	24_P5P
41	Plastic	HDPE (#2)	Bottles, Jugs, and Jars (Clear/Natural)	24_P6P
42	Plastic	HDPE (#2)	Bottles, Jugs, and Jars (Pigmented/Color)	24_P7P
43	Plastic	HDPE (#2)	Pails and Buckets	24_P8P
44	Plastic	HDPE (#2)	Other Rigid Items	24_P40P
45	Plastic	HDPE (#2)	Flexible and Film Items	24_P10P
46	Plastic	PVC (#3)	Rigid Items	24_P11P
47	Plastic	PVC (#3)	Flexible and Film	24_P12P
48	Plastic	LDPE (#4)	Bottles, Jugs, and Jars	24_P13P
49	Plastic	LDPE (#4)	Other Rigid Items	24_P14P
50	Plastic	LDPE (#4)	Clear Non-Bag Film	24_P15P
51	Plastic	LDPE (#4)	Other Flexible and Film Items	24_P16P
52	Plastic	PP (#5)	Bottles, Jugs, and Jars	24_P17P
53	Plastic	PP (#5)	Other Rigid Containers, Cups, Lids, Plates, Trays, and Tubs	24_P41P
54	Plastic	PP (#5)	Utensils	24_P19P
55	Plastic	PP (#5)	Other Rigid Items	24_P20P
56	Plastic	PP (#5)	Clear Non-Bag Film	24_P21P
57	Plastic	PP (#5)	Other Flexible and Film Items	24_P22P
58	Plastic	PS (#6)	Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	24_P23P
59	Plastic	PS (#6)	Other Expanded/Foamed Forms	24_P42P

Count	Class	Type	Form	Combined CMC Code
60	Plastic	PS (#6)	Utensils	24_P27P
61	Plastic	PS (#6)	Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	24_P43P
62	Plastic	PS (#6)	Flexible and Film Items	24_P29P
63	Plastic	Plastics and Polymers Designed for Compostability	Rigid Items	24_P44P
64	Plastic	Plastics and Polymers Designed for Compostability	Flexible and Film Items	24_P45P
65	Plastic	Multi-Material Laminate	Pouches and Envelopes	24_P46P
66	Plastic	Multi-Material Laminate	Other Forms	24_P33P
67	Plastic	Other/ Mixed Plastics	Textiles (non-organic/synthetic)	24_P34P
68	Plastic	Other/ Mixed Plastics	Rigid Items	24_P35P
69	Plastic	Other/ Mixed Plastics	Flexible and Film Items	24_P36P
70	Plastic	Plastic	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
71	Plastic	Plastic	Small – Two or more sides measuring 2" or less	24_P47P
72	Plastic	Plastic	Remainder/Composite Plastic	n/a
73	Wood and Other Organic Materials	Wood	All Untreated Forms	24_WO1N/P
74	Wood and Other Organic Materials	Wood	All Treated or Painted Forms	24_WO2N/P
75	Wood and Other Organic Materials	Other/Mixed Organic	Textiles	24_WO3N/P

Count	Class	Type	Form	Combined CMC Code
76	Wood and Other Organic Materials	Other/Mixed Organic	Other Forms	24_WO4N/P
77	Wood and Other Organic Materials	Other/Mixed Organic	Food Discarded in Original Packaging or Food Service Ware	Mixture
78	Wood and Other Organic Materials	Other/Mixed Organic	Potentially Reusable Packaging and Food Service Ware	Potential Reuse
79	Wood and Other Organic Materials	Wood and Other Organic	Small – Two or more sides measuring 2" or less	24_WO6N/P
80	Wood and Other Organic Materials	Other/Mixed Organic	Remainder/Composite Organic	n/a
81	Miscellaneous	Miscellaneous	Non-Food Discarded in Original Packaging	Mixture
82	Miscellaneous	Miscellaneous	Remainder Miscellaneous	n/a
83	Miscellaneous	Miscellaneous	Mixed Residue	n/a

Vehicle Surveys

As part of data collection, contractor staff conducted surveys at facilities to gather information on the sector of incoming vehicles, select specific vehicles for sampling, and collect additional data on the selected vehicles—such as the net weight of the load. The vehicle survey data were used to estimate the contribution of each waste sector at each participating facility to the overall waste sector throughout the state.

More details on the vehicle surveys, data collected and subsequent analysis, and the vehicle selection process for sampling can be found in Appendix 1: Detailed Methodology (Section 1.5: Vehicle Surveys).

Sample Collection and Sorting

The contractor staff collected 313 waste samples across all sectors at the 16 landfills for composition analysis. An additional four samples were collected that did not meet the specifications for inclusion in the overall waste composition analysis but were still considered in the additional analyses completed by contractor staff (see section Additional Analysis Performed by Contractor Staff).

From randomly identified residential route trucks, commercial route trucks, self-hauled loads, and transfer trailers, the contractor staff collected one sample weighing at least 200 pounds from the selected vehicle. If, during a sampling day, the expected commercial vehicles or transfer trailers was anticipated to be fewer than needed to meet sampling targets, contractor staff collected two samples per vehicle for those types. Double sampling was not allowed from residential route trucks. Table 3 shows the sample distribution among the four sectors.

Table 3. Distribution of Samples by Waste-Generating Sector

Sector	Period 1	Period 2	Total
Franchised Single-family Residential (RES)	36	47	83
Franchised Commercial & Multi-family Residential (COM)	69	71	140
Self-haul (SH)	31	31	62
Mixed Waste (MIX)	14	14	28
Total	**150**	**163**	**313**

Additional Analysis Performed by Contractor Staff

To collect additional data on the amount and type of covered material, contractor staff completed additional analyses on (1) covered material made of plastic of unknown resin type and (2) covered material disposed of with goods inside. This section describes details about the additional analyses.

Covered Material Made of Plastic of Hard-to-Identify Resin Type

Contractor staff sorted covered material made primarily of plastic that could not be readily identified in the field as a plastic resin of type #1 through #6 into one of two categories: (1) Other/Mixed Plastics Rigid Items (Count 68 in the material sorting list). or (2) Other/Mixed Plastics Flexible and Film Items (Count 69 in the material sorting list).

As with other sorting categories, the weights of materials in the corresponding categories were recorded. Throughout the study, contractor staff collected a selection of items that fell into those categories for further analysis. Contractor staff applied the Cone and Quarter method (illustrated in Appendix 1: Section 1.7: Sample Characterization, Figure B2) to generate a random selection of material in those categories for resin identification analysis. Contractor staff sent the items to an off-site lab, Stina Inc., for analysis to identify the plastic resin type using resin spectroscopy: PET (#1), HDPE (#2), PVC (#3), LDPE (#4), PP (#5), PS (#6), and other or unknown resins. A total of 1,090 covered material items of unknown resin types were analyzed.

Due to collection methods and differing methods of nomenclature, the resin analysis results were not associated with a specific sample, facility, or sector. As a result, these results are presented as stand-alone findings. The results of the resin analysis are described in Section Additional Analysis: Spectroscopic Analysis of Hard-to-Identify Resins, Tables 7a and 7b – Resin Composition Among Plastic Samples.

Covered Material Disposed of with the Good Inside (Depackaging Analysis)

Covered material disposed of with the good still inside (e.g., a partially filled bottle of lotion, a meal discarded in a plastic takeout container, or sausages discarded in their wrapper) was sorted into one of two categories: one for food discarded in covered material (Count 77 in the material sorting list), and one for all other goods discarded in covered material (Count 81 in the material sorting list). For a subset of materials in those two categories, contractor staff separated the covered material from the good. Contractor staff brushed, shook, scraped, spooned, and wiped the contaminant materials out of and off the covered packing material, collecting the contaminants in a bin. After separation and dry cleaning, the weight of the covered material was recorded, by material class. That data was used to estimate the proportional weight of the covered material in each of the two original categories.

Additional Analysis Performed by CalRecycle

Quality Control Sort

CalRecycle staff conducted a quality control sort on all Remainder/Composite categories from the material sorting list to assess sorting accuracy. This process was executed as follows: (1) after contractor staff completed the initial sort into the 83 sorting categories, the materials in the Remainder/Composite categories were weighed; (2) next, for a subset of samples, CalRecycle staff conducted another sort of the materials in those categories to identify any covered materials that had been missed. The weights of any additional covered material discovered were later incorporated into the data, as described in the following section.

Calculation of Composition Data

Calculating Final Material Composition

To calculate the final material composition of a given sample (i.e., the percentage of each sorting category in a given sample), the following equation was applied:

$$S = \frac{[M + Q(i) + D(i)]}{T} \times 100$$

- S = percentage by weight of a specific sorting category within a given sample
- M = weight of material within a specific sorting category **from sort**
- Q = weight of a material within a specific material **class** from the **quality control sort**
- i = percentage by weight that a specific sorting category accounts for within a material class (see next subsection for more details)
- D = weight of material within a specific material class from the **depackaging analysis**
- T = Total weight of all material in the sample

Estimating percentage *(i)*

Weight information on covered material disposed of, which was captured as part of the additional analysis on depackaging and the quality control sort, was collected at the material class level. To apply this weight to specific sorting categories, a study-wide estimate was made of the proportion each sorting category represented within its material class. Table A6 (Appendix 1, Section 2: Data Analysis) provides the average (mean) weight that each sorting category accounts for within a material class over the entire study period. To estimate these proportions, the following equation was used to estimate *i* for each sample, which was then averaged across the entire study.

$$i(sample) = \frac{Weight\ of\ a\ material\ type\ and\ form\ in\ the\ sample}{Weight\ of\ the\ sample} \times 100$$

This composition data, along with other information and data gathered during the study period, were used to extrapolate study findings to statewide levels, as detailed in the following subsections.

Extrapolating Composition Data to Statewide Disposal

Sample composition data, vehicle surveys, and CalRecycle's RDRS database were integrated into one dataset to estimate the portion of California's landfilled waste derived from each sector, by sorting category. First, the annual tons of solid waste landfill disposal reported in RDRS were summed to provide an estimate of total landfill disposal in 2024 (RDRS data accessed May 2025). The vehicle survey data were then

used to calculate the proportion of sampled material across the entire study by sector. These sector proportions were then multiplied by sample compositional data to calculate sector-scaled summary statistics (e.g., mean), which were sample compositional data adjusted by sector. These sector-scaled statistics were then multiplied by the total statewide tonnage to calculate estimated statewide disposal summary statistics for each sorting category.

Disposal Estimates by Sorting Category

Material characterization data were analyzed to provide two estimates for each of the sorting categories. This information is provided at the statewide level and for each sector. The two estimates include:

1. The average annual weight of landfilled material, expressed as mean;

2. The proportion of overall disposal (percent-by-weight) of each sorting category, expressed as mean.

Data Considerations

There are multiple methodological factors to consider when interpreting the findings of this study. Due to the nature of waste disposal, some rarer types of covered material (e.g., single-use ceramic packaging) may not have been collected due to the relatively small proportion of material sampled compared to total statewide disposal. Additionally, samples, especially those in the self-haul and commercial sectors, were often mostly homogenous. For example, a single randomly selected self-haul sample consisted almost entirely of concrete. These factors result in a data set with many CMCs that were rarely observed and where some samples were mostly homogenous.

Additional details and explanations of these analyses can be found in Appendix 1: Section 1.

Summary of Findings

This section provides the statewide-level findings from the study. The first subsection presents the primary findings of this study—specifically, estimates of the proportions and amounts of covered material landfilled in California—by sorting category. The second subsection presents the findings from an additional analysis to identify the resin types of covered material for plastic items in which the resin type could not be identified in the field.

The findings in this section, including the data tables, summarize all data collected in the study regarding covered material. Data tables reflecting results from the additional analyses of potentially reusable and Remainder/Composite categories can be found in Appendix 1. During the study, 4,613 pounds of covered material items were collected and sorted as the basis for these estimates. The quality control sort identified additional covered material within a total of 118 samples, totaling 237 pounds of additional characterized covered material. The depackaging analysis identified additional covered material within a total of 93 samples, totaling 173 pounds of additional characterized

covered material. In total, the Remainder/Composite (quality control) sort and depackaging analysis identified an additional 6% of covered material items by weight.

Estimates of Statewide Disposal of All Material

In 2024, an estimated 40,035,648 tons of material were sent for disposal in California landfills. Table 4 shows the disposal estimates for each sector based on vehicle surveys and RDRS statewide total disposal tonnage (RDRS data accessed May 2025). For each sector the percentage of disposal from that sector and the total disposal (tons) for 2024 are shown.

Table 4. Estimates of Statewide Disposal from each Sector

Sector	Percentage of Disposal Tonnage Originating from Sector	2024 Disposal Estimate (Tons)
Franchised Commercial	26.6%	10,629,343
Franchised Residential	12.6%	5,023,433
Mixed	49.8%	19,919,907
Self-Haul	11.2%	4,463,065
Total	**100%**	**40,035,748**

Estimates of Statewide Disposal of Covered Material

In 2024, an estimated 7,800,136 tons of covered material were disposed of in California landfills. Covered material accounted for 19.6% of total statewide disposal. By material class, paper and fiber was the most landfilled covered material, with an estimated 3,896,497 tons disposed of, followed by plastic (see Table 5 for estimates of covered material by material class).

All sorting categories with a corresponding code starting with "24_" are specific to covered material. Additionally, in the code column, the alphanumeric material code ends with either an "N" and/or a "P" indicating whether the item contains an inseparable plastic component (P) or contains no plastic component (N). An "N/P" indicates that the material form contains two covered materials, one with and one without separable plastic components.

Materials within certain covered material categories were rarely found in samples, including: Ceramic all forms (24_C1N/P); Glass Other Forms (24_G2N/P); Plastic LDPE Bottles, Jugs, and Jars (24_P17P); Plastic PS Flexible and Film (24_P29P); Plastic PET Flexible and Film (24_P5P); Other/Mixed Organic Textile (24_WO3N/P); and Other/Mixed Organic Other Forms (24_WO4N/P). Since these items were rarely detected during sampling, it indicates their presence is likely rare in statewide disposal.

Table 5 shows the estimates of covered material, by material class, landfilled in California in 2024, by weight (tons) and proportion of the total waste stream. Table 6 shows estimates of the amounts of covered material, by sorting category, landfilled in California in 2024, by weight (tons), proportion of the total waste stream, and proportion of covered material disposed of.

Table 5. Estimates of Statewide Disposal of Covered Material Classes in 2024

Material Class	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal	Proportion of covered material disposal
Ceramic	10,072	0.03%	0.13%
Glass	116,345	0.29%	1.49%
Metal	268,472	0.67%	3.44%
Plastic	2,641,496	6.60%	33.86%
Paper and Fiber	3,896,497	9.73%	49.95%
Wood and Other Organic Materials	867,253	2.17%	11.12%

Table 6. Estimates of Statewide Disposal of Covered Material in 2024

Each row of the table contains data for each sorting category for covered material. The first four columns of this table identify the sorting category by combined CMC code, material class, material type, and material form. The fifth column is the annual average (mean) statewide disposal estimate in tons. The sixth column is the proportion of total statewide disposal that each sorting category accounts for. All sorting categories with a corresponding code starting with "24_" are categories specific to covered material. Additionally, in the code column, the alphanumeric material code ends with either an "N" and/or a "P" indicating whether the item contains an inseparable plastic component (P) or contains no plastic component (N). An "N/P" indicates that the material form contains two covered materials, one with and one without separable plastic components.

Statistical descriptions of variation and error (e.g., margin of error and standard deviation) are not included in the preliminary findings. Further statistical analysis will be conducted, and statistical descriptions will be provided in the final findings report.

Combined CMC Code	Material Class	Material Type	Material Form	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal
24_C1N/P	Ceramic	Ceramic	All Forms	1,830	0.005%
24_C2N/P	Ceramic	Ceramic	Small - Two or more sides measuring 2" or less	8,242	0.021%
24_G1N/P	Glass	Glass	Bottles and Jars	112,124	0.280%
24_G2N/P	Glass	Glass	Other Forms	1,152	0.003%

Combined CMC Code	Material Class	Material Type	Material Form	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal
24_G3N/P	Glass	Glass	Small - Two or more sides measuring 2" or less	3,069	0.008%
24_M1N/P	Metal	Aluminum	Non-aerosol containers	9,082	0.023%
24_M10N/P	Metal	Other Ferrous	All Forms	6,683	0.017%
24_M12N/P	Metal	Metal	Small - Two or more sides measuring 2" or less	1,605	0.004%
24_M2N/P	Metal	Aluminum	Foil sheets	46,681	0.117%
24_M3N/P	Metal	Aluminum	Foil Molded Containers	15,850	0.040%
24_M4P	Metal	Aluminum	Aerosol can	5,645	0.014%
24_M5N/P	Metal	Aluminum	Other Forms	12,033	0.030%
24_M6N/P	Metal	Tin/Steel/Bimetal	Non-aerosol container	115,576	0.289%
24_M7P	Metal	Tin/Steel/Bimetal	Aerosol can	20,781	0.052%
24_M8N/P	Metal	Tin/Steel/Bimetal	Other Forms	32,041	0.080%
24_M9N/P	Metal	Other Nonferrous	All Forms	2,495	0.006%
24_P1P	Plastic	PET (#1)	Bottles, Jugs, and Jars (Clear/Natural)	59,868	0.150%
24_P10P	Plastic	HDPE (#2)	Flexible and Film Items	28,893	0.072%
24_P11P	Plastic	PVC (#3)	Rigid Items	3,542	0.009%
24_P12P	Plastic	PVC (#3)	Flexible and Film Items	5,079	0.013%
24_P13P	Plastic	LDPE (#4)	Bottles, Jugs, and Jars	495	0.001%
24_P14P	Plastic	LDPE (#4)	Other Rigid Items	4,672	0.012%
24_P15P	Plastic	LDPE (#4)	Clear Non-Bag Film	255,055	0.637%
24_P16P	Plastic	LDPE (#4)	Other Flexible and Film Items	288,682	0.721%
24_P17P	Plastic	PP (#5)	Bottles, Jugs, and Jars	2,792	0.007%
24_P19P	Plastic	PP (#5)	Utensils	11,725	0.029%
24_P2P	Plastic	PET (#1)	Bottles, Jugs, and Jars (Pigmented/Color)	26,392	0.066%
24_P20P	Plastic	PP (#5)	Other Rigid Items	62,472	0.156%

Combined CMC Code	Material Class	Material Type	Material Form	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal
24_P21P	Plastic	PP (#5)	Clear Non-Bag Film	4,640	0.012%
24_P22P	Plastic	PP (#5)	Other Flexible and Film Items	32,124	0.080%
24_P23P	Plastic	PS (#6)	Expanded/Foamed Hinged Containers, Plates, Cups, Tubs, Trays, and Other Foamed Containers	46,972	0.117%
24_P27P	Plastic	PS (#6)	Utensils	11,124	0.028%
24_P29P	Plastic	PS (#6)	Flexible and Film Items	1,148	0.003%
24_P33P	Plastic	Multi-Material Laminate	Other Forms	51,949	0.130%
24_P34P	Plastic	Other/Mixed Plastics	Textiles	10,856	0.027%
24_P35P	Plastic	Other/Mixed Plastics	Rigid Items	96,681	0.241%
24_P36P	Plastic	Other/Mixed Plastics	Flexible and Film Items	646,601	1.615%
24_P38P	Plastic	PET (#1)	Other Rigid Containers, Cups, Lids, Plates, Trays, and Tubs	184,891	0.462%
24_P39P	Plastic	PET (#1)	Other Rigid Items	9,978	0.025%
24_P40P	Plastic	HDPE (#2)	Other Rigid Items	38,782	0.097%
24_P41P	Plastic	PP (#5)	Other Rigid Containers, Cups, Lids, Plates, Trays, and Tubs	356,061	0.889%
24_P42P	Plastic	PS (#6)	Other Expanded/Foamed Forms	55,400	0.138%

Combined CMC Code	Material Class	Material Type	Material Form	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal
24_P43P	Plastic	PS (#6)	Solid Hinged Containers, Plates, Cups, Tubs, Trays, and Other Solid Forms	54,868	0.137%
24_P44P	Plastic	Plastics and Polymers Designed for Compostability	Rigid Items	10,921	0.027%
24_P45P	Plastic	Plastics and Polymers Designed for Compostability	Flexible and Film Items	3,005	0.008%
24_P46P	Plastic	Multi-Material Laminate	Pouches and Envelopes	39,053	0.098%
24_P47P	Plastic	Plastic	Small - Two or more sides measuring 2" or less	29,029	0.073%
24_P5P	Plastic	PET (#1)	Flexible and Film Items	584	0.001%
24_P6P	Plastic	HDPE (#2)	Bottles, Jugs, and Jars (Clear/Natural)	82,024	0.205%
24_P7P	Plastic	HDPE (#2)	Bottles, Jugs, and Jars (Pigmented/Color)	74,985	0.187%
24_P8P	Plastic	HDPE (#2)	Pails and Buckets	50,153	0.125%
24_PF1N/P	Paper and Fiber	Kraft Paper	All Forms	298,529	0.746%
24_PF10N/P	Paper and Fiber	Paperboard	All Forms	467,054	1.167%
24_PF11N/P	Paper and Fiber	White Paper	All Forms	4,724	0.012%
24_PF12N/P	Paper and Fiber	Other/Mixed Paper	All Forms	94,482	0.236%
24_PF14N/P	Paper and Fiber	Molded Fiber	All Forms	171,459	0.428%

Combined CMC Code	Material Class	Material Type	Material Form	Average (mean) annual statewide disposal (tons)	Proportion of total statewide disposal
24_PF15P	Paper and Fiber	Multi-Material Laminate	Aseptic Cartons	38,608	0.096%
24_PF16N/P	Paper and Fiber	Paper and Fiber	Small - Two or more sides measuring 2" or less	1,764	0.004%
24_PF5P	Paper and Fiber	Multi-Material Laminate	Gable-top Cartons	67,412	0.168%
24_PF7P	Paper and Fiber	Multi-Material Laminate	Other Forms	549,577	1.373%
24_PF8N/P	Paper and Fiber	OCC	Waxed Cardboard	110,761	0.277%
24_PF9N/P	Paper and Fiber	OCC	Cardboard	2,092,128	5.226%
24_WO1N/P	Wood and Other Organic Materials	Wood	All Untreated Forms	725,609	1.812%
24_WO2N/P	Wood and Other Organic Materials	Wood	All Treated or Painted Forms	137,818	0.344%
24_WO3N/P	Wood and Other Organic Materials	Other/Mixed Organic	Textiles	1,027	0.003%
24_WO4N/P	Wood and Other Organic Materials	Other/Mixed Organic	Other Forms	1,643	0.004%
24_WO6N/P	Wood and Other Organic Materials	Wood and Other Organic Materials	Small - Two or more sides measuring 2" or less	1,156	0.003%

Additional Analysis: Spectroscopic Analysis of Hard-to-Identify Resins

Resin Composition Among Plastic Samples

This section presents the results from resin analysis performed on covered materials that were sorted but whose dominant plastic type could not be readily distinguished by resin type in the field. Contractor staff sorted a total of 1,090 items from the following categories: Count 68 – Other/Mixed Plastics Rigid Items (527 individual items) and Count 69 – Other/Mixed Plastics Flexible and Film Items (563 individual items). These items were sent to Stina Inc. for identification using resin spectroscopy.

The results from the resin analysis showed that (1) of the Other/Mixed Plastics Rigid items, HDPE (#2) and LDPE (#4) were the most prevalent resin types, accounting for nearly 50% of the 527 items analyzed (Table 7a); and (2) of the Other/Mixed Plastics Flexible and Film items, Other or Unknown Resins and PP (#5) were the most prevalent resin types, accounting for nearly 50% of the 563 items analyzed (Table 7b).

Tables 7a and 7b contain information from the study sort and resin analysis completed on hard-to-identify resins. The first column denotes the resin type; the second column shows the number of instances the resin was found; and the third column indicates the percentage of resin prevalence. The sum of the values in the third column may not equal exactly 100% due to rounding. Within the sort, multiple covered material categories within each resin type are summed for the material forms "Rigid Items (Table 7a)" and "Flexible and Film Items (Table 7b)".

Table 7a. Resin Composition Among Other/Mixed Plastics Rigid Samples

Resin Type	Number of Items in which this Resin was Identified	Percent of Items in which this Resin was Identified
PET (#1)	93	17.7%
HDPE (#2)	108	20.5%
PVC (#3)	10	1.9%
LDPE (#4)	141	26.8%
PP (#5)	100	19.0%
PS (#6)	0	0.0%
Other/Unknown	54	10.3%
Non-Plastic	21	4.0%

Table 7b. Resin Composition Among Other/Mixed Plastics Flexible and Film Samples

Resin Type	Number of Items in which this Resin was Identified	Percent of Items in which this Resin was Identified
PET (#1)	93	16.5%
HDPE (#2)	60	10.7%
PVC (#3)	13	2.3%
LDPE (#4)	19	3.4%
PP (#5)	193	34.3%

PS (#6)	36	6.4%
Other/Unknown	99	17.6%
Non-Plastic	50	8.9%

Glossary of Terms

Additional Analysis: Refers to additional sorting and analysis performed by the contractor for:

- Covered material made primarily of plastic and could not be readily identified in the field as being composed of resin types #1 through #6 was sorted into one of two categories: (1) rigid items (Count 68 in the material sorting list) of other or unidentifiable plastic resin type, and (2) flexible and film items (Count 69 in the material sorting list) of other or unidentifiable plastic resin type. These samples were sent to an offsite laboratory for resin identification.

- Covered material disposed of with the good still inside (Count 81 in the material sorting list) or with food still inside (Count 77 in the material sorting list) were depackaged to obtain the weight of covered material without any contents.

Contractor Staff: Refers to field staff under contract by CalRecycle to perform the sampling and sorting. This includes the primary contractor staff and any sub-contractor staff.

Covered Material: Single-use packaging and single-use plastic food service ware covered under SB 54 (PRC Section 42041 (e)(1)).

Covered Material Categories: Categories that include covered material of a similar type and form. Additional details regarding the Covered Material categories can be found on the main [SB 54 Covered Material Categories List webpage.](#)

Landfilled: Material destined for final deposition in a landfill with no further processing. The following types of material were excluded from the study: (1) disaster debris (e.g., storm deadfall and soil), (2) universal waste, (3) material sent to be recycled or recovered, (4) biosolids, (5) designated waste, (6) aggregates and soil set aside for beneficial use, (7) alternative daily cover, and (8) household hazardous waste.

Mean: Statistical description of the arithmetic average of a set of numbers.

Sectors: A unique portion of the total waste stream that is determined by its particular generation, collection, or composition characteristics. Sectors are identified according to the source, or generator, of the waste (single-family or commercial), as well as how materials are delivered to waste sites (commercially collected or self-hauled).

- **Franchised Commercial and Multi-family Residential (COM)** materials are hauled by contracted or municipally operated vehicles in packer trucks and drop-boxes. At least 80% of the material is generated at institutional, commercial, or industrial buildings such as businesses, schools, government offices, and other institutions, or multifamily residential buildings serviced with dumpsters. This is one of the four sectors of the waste stream collected for this study.

- **Franchised Single-family Residential (RES)** materials are hauled by contracted or municipally operated vehicles in packer trucks. At least 80% of the material is generated at residential buildings serviced with carts. This is one of the four sectors of the waste stream collected for this study.

- **Mixed waste (MIX)** is commingled material either hauled in transfer trailers by contracted or municipally operated vehicles from a transfer station, or as loads of material recovery facility (MRF) residuals. This stream does not include loads from community drop-off locations. These loads do not come directly from a collection route or property; therefore, the generating sector is often unidentifiable. This is one of the four sectors of the waste stream collected for this study.

- **Self-haul (SH)** materials are hauled by vehicles not operated by a franchise or municipality, including waste from residential or non-residential sources. Self-haul customers do not have a permit to operate as waste haulers. Municipal haulers, such as city road crews and parks departments, bringing waste from cleanups, are also included in this stream. This is one of the four sectors of the waste stream collected for this study.

Sort: For this study, material sent to landfills for disposal was categorized based on the study sorting list. The material initially categorized into each of the 83 sorting categories included only one of the following types of materials: (1) Covered material (i.e., single-use packaging and single-use plastic food service ware covered under the Act); (2) Potentially reusable alternatives to covered material (e.g., reusable milk jug); and (3) All other material not covered under the Act, classified as Remainder/Composite. This activity was conducted by the contractor staff. For this study, materials that were in the Remainder/Composite categories from the sort were subject to additional quality control sort by CalRecycle staff.

Material sorting list: For this study, the material sorting list represents the material sorting categories used by contractor staff to conduct the study. The sorting list was aligned to covered material categories.

Abbreviations and Acronyms

ADC – Alternative Daily Cover

CalRecycle – California Department of Resources Recycling and Recovery

C&D – Construction and demolition

CMC – Covered material category

COM – Franchised commercial and multi-family residential

EPR – Extend Producer Responsibility

HDPE – High-density polyethylene

HHW – Household Hazardous Waste

Lbs. - Pounds

LDPE – Low-density polyethylene

MIX – Mixed waste

MRF – Material Recovery Facility

OCC – Old Corrugated Containers or Cardboard

PET – Polyethylene terephthalate

PP – Polypropylene

PRC – Public Resources Code

PS – Polystyrene

PVC – Polyvinyl chloride

RDRS – Recycling and Disposal Reporting System

RES – Franchised single-family residential

SB – California State Senate Bill

SH – Self-haul

SWIS – CalRecycle's Solid Waste Information System

The Act - Senate Bill 54 (SB 54), the Plastic Pollution Prevention and Packaging Producer Responsibility Act (Allen, Chapter 75, Statutes of 2022)

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