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Metro Supplement to the 2023 Oregon Waste Composition Studies



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Abbreviations used in this report:

FSW = Food Serviceware

USCL = Uniform Statewide Collection List, defined in Oregon Revised Statues 459A.914

Metro is the regional government serving a service district that includes 24 cities and parts of the unincorporated areas of Clackamas, Multnomah, and Washington Counties in the greater Portland area.

Metro Wasteshed includes all of the cities and unincorporated areas within Clackamas, Multnomah, and Washington Counties, including areas outside of the Metro service district.

2023 Oregon Solid Waste Composition Metro Supplement

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The Oregon Waste Composition Study for 2023 is a combination of three state-wide studies of:

- disposed waste generated in Oregon,
- commingled recycling collected in Oregon, and
- outbound recycling commodities and waste streams after being sorted at commingled recycling processing facilities.

To supplement the statewide emphasis of the study, Metro, Deschutes County, Lane County, and Marion County all participated in and contributed to the study to obtain more detailed information about the wastes within each of their respective jurisdictions.

This report is a supplement to the overall 2023 Oregon Waste Composition Study report. Aspects such as study methodology and statewide results will be covered briefly here and will be presented in more detail in the overall 2023 statewide study report. This supplement will concentrate on the results from the Metro samples, as well as present quantity information for the waste generated in the Metro Wasteshed (the greater Portland area including all of Clackamas, Multnomah, and Washington Counties).

The disposal study was conducted by obtaining samples of disposed waste directly from route trucks, drop boxes, self-haul vehicles, and residue from mixed solid waste processing facilities, sorting the waste into 152 different material categories, weighing each component, and then combining these results with disposal tonnage reported by landfills and energy recovery facilities to determine the total amount of each material being disposed that was generated in Oregon. Similar methodology was used for the inbound commingled recycling study, with the large majority of samples coming from recycling route trucks and relatively few from depots or separate loads from individual businesses.

Disposal study

The statewide disposal composition study includes municipal solid waste and construction and demolition debris disposed at landfills, transfer stations, and incinerators in Oregon or transported out-of-state for disposal. The study excluded whole loads of sewage sludge, industrial waste, inert rock, dirt, asphalt, and similar material specified in Oregon Revised Statutes 459A.010 (3)(d), matching the waste streams that are excluded from counting in Oregon’s annual material recovery survey. The intent of the Metro study was to determine the composition of disposed waste generated in the Metro Wastshed by sampling the relevant points of disposal in the Metro Wastshed in proportion to the amount of each waste stream directly received at each facility listed in Table 1. Sampling was conducted eight times at intervals of about 45 days from March 2023 to January 2024.

Metro participated by paying to have 239 additional disposal site samples collected and sorted from within the region. DEQ also contributed 121 samples, with a goal of obtaining at least 360 samples from the Metro Wastshed. Table 1 summarizes the number of samples from each facility across the various load types (substreams).

Table 1: Number of disposal samples collected for each different waste substream and waste facility.

Location	Residential Route Truck	Mixed Route Truck	Commercial Route Truck	Compacting Drop Box	Loose Drop Box	Self-Haul	Mixed Solid Waste Processing Facility	Total
Canby TS	3	0	2	2	2	0	0	9
City of Roses TS	5	8	1	2	0	0	6	22
ECR	0	0	0	0	0	0	14	14
Forest Grove TS	5	2	3	6	2	2	0	20
Greenway Recycling	0	0	0	0	0	0	6	6
Gresham Sanitary TS	5	3	1	3	0	0	0	12
Hillsboro Garbage TS	2	1	1	1	0	0	0	5
Metro Central TS	17	9	7	11	13	25	0	82
Metro South TS	11	6	4	10	18	46	0	95
Pioneer Recycling	0	0	0	0	0	0	1	1
Pride Disposal TS	8	3	3	6	6	0	0	26
Recology Suttle Rd	0	0	0	0	0	0	3	3
Sandy TS	0	0	0	0	0	4	0	4

Troutdale TS	5	4	1	4	5	0	0	19
TVWR	0	0	0	0	0	0	15	15
Willamette Resources	5	2	4	4	4	0	8	27
Total	66	38	27	49	50	77	53	360

Very little Metro Wasteshed waste is directly disposed at a landfill or incinerator. Instead, route trucks, drop boxes, and self-haul vehicles unload at transfer stations or mixed solid waste processing facilities, and then the waste is transferred to landfills, with small amounts taken to the Covanta Energy Recovery Facility in Marion County until that facility closed in December 2024. For each of the substreams listed in the header row of Table 1, we collected samples from transfer stations and mixed waste processing facilities roughly in proportion to the total tonnage of that substream directly disposed at that facility.

While Table 1 is based on the tons directly disposed at transfer stations and other facilities, Table 2 shows the tons of Metro-area waste subsequently received by landfills or exported out-of-state. Table 3 shows DEQ's estimates of the total tons of Metro-area waste disposed by substream and quarter. Approximately 99% of the waste shown in Table 2 comes from the facilities listed in Table 1 where we collected samples. For the one percent that is directly disposed at landfills, all of which are distant from the Metro area, it would have been impractical to collect samples as loads arrive irregularly. However, these direct disposal tons at distant landfills are included in the appropriate substream tons shown in Table 3.

Table 2: Waste disposed from the Metro area, as reported by the facilities where the waste ends up (Bolded rows are those where we sampled waste at the transfer station or mixed waste processing where the waste was originally unloaded)

Facility	Source	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Total
Browns Island Demo LF	Private Vehicle	49	109	162	93	413
Coffin Butte Landfill	Hauler Compacted	380	1,533	386	3,731	6,030
Coffin Butte Landfill	Hauler Uncompacted	67	67	80	1,618	1,833
Coffin Butte Landfill	Private Vehicle	0	4	1	2	7
Coffin Butte Landfill	Transfer Station	49,041	49,093	45,198	45,285	188,617
Columbia Ridge Landfill	Transfer Station	160,198	169,334	168,306	162,980	660,819
COR Recycling (exporter)	Transfer Station	954	0	27	0	981
Crook County Landfill	Private Vehicle	0	0	0	1	1
Finley Buttes Landfill	Private Vehicle	993	481	402	0	1,877
Finley Buttes Landfill	Transfer Station	0	0	31	0	31
Hillsboro LF - Corrected	Transfer Station	49,222	62,147	61,117	52,916	225,403
Suttle Road - Recology	Transfer Station	3,952	4,258	3,420	0	11,630
Regional Disposal	Exported	649	825	272	512	2,256

Wasco County Landfill	Hauler Compacted	0	12	61	0	73
Wasco County Landfill	Hauler Uncompacted	0	0	0	4,382	4,382
Wasco County Landfill *	Private Vehicle	0	0	150	45	194
Wasco County Landfill *	Transfer Station	74,163	70,338	75,205	69,071	288,777
Total waste		339,669	358,202	354,817	340,637	1,393,325

* Wasco Landfill reported 20,157 tons of waste as received from private vehicles for the first quarter of 2023 and 19,189 as from private vehicles in the second quarter. Almost all of this waste was actually from transfer stations or mixed solid waste processing facility residue, and so in this table we moved those tons to the transfer station row.

Table 3: Estimated tons of Metro-area waste disposed by tons and substream

Substream	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Total
Route truck total	159,687	161,080	158,043	161,546	640,355
<i>Residential Route</i>	76,690	77,359	75,900	77,582	307,530
<i>Commercial Route</i>	45,907	46,307	45,434	46,441	184,089
<i>Mixed Route</i>	37,090	37,414	36,709	37,522	148,735
Compacting drop box	26,560	26,615	27,683	27,041	107,899
Loose drop box	28,706	28,216	26,836	27,447	111,205
Self-haul	45,486	53,327	52,209	43,281	194,302
Mixed waste processing residue	79,230	88,964	90,047	81,323	339,564
Total	339,669	358,202	354,817	340,637	1,393,325

There were two specific substreams of “counting waste” that were purposefully not sampled as part of this study, and whose tonnage is not included in Table 2 or Table 3:

- Whole loads of shredded tires sent to disposal by tire processors were not sampled since that consist of just tires.
- The crew was not allowed to get samples of what the Covanta Energy Recovery in Marion County calls “supplemental waste.” A significant portion of this supplemental waste is material that need to be documented as being securely destroyed, such as old criminal evidence data that is past its retention date.

Table 4 shows these tons. Landfills reporting disposal of tires to DEQ generally attributed the tires just to the wasteshed where the tire processing facility is located that sent the tires, but DEQ uses data from the annual material recovery surveys to allocate these tires back to the county or wasteshed or other state where the tires were originally generated. A substantial portion of the tires processed and disposed in Oregon came from out of state.

Table 4: "Counting" tons of waste not sampled in the disposal study

Facility	Material	Q1 2023	Q2 2023	Q3 2023	Q4 2023	Total
Covanta "Supplemental Waste"	"Supplemental Waste"	787	636	519	597	2,539
Finley Buttes Landfill	Separate tire loads	695	502	385	372	1,954
Hillsboro Landfill	Separate tire loads	436	0	187	0	623
Delta Sand and Gravel Landfill	Separate tire loads	1,415	1,711	1,412	1,625	6,162
Wasco County Landfill	Separate tire loads	706	75	0	0	781
Regional Disposal Co.	Separate tire loads	273	364	497	303	1,438
Liberty Tire	Separate tire loads	400	484	539	496	1,919
Total tires		3,925	3,136	3,019	2,796	12,877
Total not sampled		4,712	3,772	3,538	3,393	23,799

Disposed waste results

The [Oregon Waste Composition Studies page](#) on the DEQ website includes a link to the file [A02-Metro-2023Semifinal-WC2023.xlsx](#), which contains the disposed waste composition results for the Metro Tri-County area, as well as results for the different substreams of waste listed in Table 3 above for Metro. Table 5 below gives a summary of those results for Metro as a whole. The results shown here are the results of composition as measured in the field, but that means that absorbent materials such as paper or light thin materials such as film plastic and aluminum foil include not only the material itself, but also water absorbed into the material and sticky materials such as food waste contaminating the material. In the past, DEQ has done studies to produce contamination correction factors to determine the "clean, dry" weight of materials as opposed to the "dirty, wet" weight of materials as measured in the field. The Excel file on the website is labelled "Semifinal" because DEQ intends to do additional work applying contamination correction factors from the past studies to come up with a better estimate of the clean, dry weight of materials disposed. The "final" contamination-corrected disposal data will likely result in increases in disposed food due to food residue in containers and other packaging, and decreases in disposed paper, film plastic, and aluminum foil.

Table 5: Summary of Metro disposed waste composition

Material	Field Results Percent (90% conf. interval)	Field Results Tons (90% conf. interval)
Total paper	16.09% (15.05 - 17.14%)	224,184 (209,726 - 238,847)
Printing, packaging, and FSW Paper	11.74% (10.74 - 12.70%)	163,612 (149,672 - 176,929)
Printing and writing paper	2.19% (1.85 - 2.57%)	30,549 (25,777 - 35,817)
Cardboard/Brown bags	4.88% (4.31 - 5.54%)	68,027 (59,991 - 77,145)
Other paper packaging, FSW	4.67% (4.10 - 5.28%)	65,036 (57,185 - 73,577)
Paper products	4.35% (3.92 - 4.76%)	60,571 (54,657 - 66,390)
<i>All recyclable paper</i>	<i>9.60% (8.69 - 10.47%)</i>	<i>133,770 (121,031 - 145,865)</i>
<i>All nonrecyclable paper</i>	<i>6.49% (5.95 - 7.04%)</i>	<i>90,414 (82,883 - 98,074)</i>
Total plastic	13.81% (12.97 - 14.69%)	192,484 (180,662 - 204,699)
Rigid plastic containers (RPCs)	2.10% (1.92 - 2.31%)	29,226 (26,694 - 32,146)
Other Rigid Plastic Packaging, FSW	1.32% (1.15 - 1.52%)	18,458 (16,038 - 21,231)
Rigid Plastic Products Excluding FSW	3.78% (3.26 - 4.31%)	52,679 (45,462 - 60,081)
Recyclable polyethylene film	1.87% (1.57 - 2.22%)	26,052 (21,850 - 30,984)
Nonrecyclable plastic film	4.74% (4.33 - 5.20%)	66,069 (60,394 - 72,482)
Yard Debris	1.37% (0.98 - 1.82%)	19,118 (13,686 - 25,328)
Leaves and grass	0.71% (0.38 - 1.10%)	9,881 (5,243 - 15,296)
All Prunings and Stumps	0.66% (0.49 - 0.86%)	9,237 (6,859 - 12,048)
All Wood	19.64% (18.10 - 21.27%)	273,669 (252,225 - 296,311)
Clean Lumber & Hogged Fuel	10.18% (9.06 - 11.32%)	141,858 (126,169 - 157,748)
Painted & Treated Lumber	5.92% (5.11 - 6.83%)	82,520 (71,213 - 95,211)
Wood pallets, crates	2.23% (1.60 - 2.95%)	31,110 (22,287 - 41,102)
Wood furniture + other products	2.00% (1.34 - 2.71%)	27,813 (18,662 - 37,790)
Mixed wood/materials	1.20% (0.80 - 1.65%)	16,748 (11,174 - 22,949)
All Food	11.96% (10.99 - 12.98%)	166,573 (153,112 - 180,877)
All edible food	8.70% (7.88 - 9.54%)	121,181 (109,816 - 132,969)
All non-edible food	3.26% (2.91 - 3.63%)	45,393 (40,495 - 50,614)
Tires	0.05% (0.01 - 0.12%)	749 (84 - 1,725)
Other rubber products	0.66% (0.45 - 0.90%)	9,212 (6,334 - 12,513)
Disposable diapers	2.04% (1.73 - 2.38%)	28,384 (24,061 - 33,207)
Carpet, Rugs, Carpet Pads	1.51% (1.09 - 1.99%)	21,002 (15,209 - 27,785)
Textiles and mixed materials	4.07% (3.61 - 4.59%)	56,776 (50,271 - 63,965)
Asphalt roofing & tarpaper	2.11% (1.50 - 2.79%)	29,463 (20,830 - 38,838)
Furniture + mattresses	2.68% (1.88 - 3.58%)	37,406 (26,165 - 49,865)
Other carbon-containing materials	3.27% (2.60 - 3.99%)	45,615 (36,227 - 55,649)
Glass	1.32% (1.12 - 1.54%)	18,385 (15,590 - 21,451)
Glass containers	0.74% (0.62 - 0.87%)	10,259 (8,605 - 12,191)
Nonrecyclable glass	0.58% (0.45 - 0.72%)	8,125 (6,326 - 10,073)
Metal	4.65% (4.13 - 5.20%)	64,726 (57,514 - 72,515)

Material	Field Results Percent (90% conf. interval)	Field Results Tons (90% conf. interval)
Aluminum	0.45% (0.39 - 0.51%)	6,250 (5,442 - 7,124)
Other nonferrous metal	0.37% (0.29 - 0.46%)	5,201 (3,987 - 6,457)
Steel (tinned) cans	0.38% (0.30 - 0.48%)	5,290 (4,248 - 6,684)
Other ferrous metal	2.20% (1.84 - 2.60%)	30,664 (25,698 - 36,275)
Mixed ferrous/non-ferrous	0.05% (0.02 - 0.09%)	711 (330 - 1,188)
Mixed metal/materials	1.19% (0.95 - 1.47%)	16,609 (13,229 - 20,526)
Electronics + small appliances	0.74% (0.55 - 0.97%)	10,347 (7,705 - 13,563)
Rock, dirt, litter	7.51% (6.37 - 8.76%)	104,595 (88,781 - 122,103)
Gypsum wallboard	4.25% (3.39 - 5.29%)	59,183 (47,227 - 73,733)
Other miscellaneous inorganics	1.57% (1.25 - 1.91%)	21,874 (17,381 - 26,619)
Total medical waste	0.23% (0.13 - 0.34%)	3,228 (1,829 - 4,673)
Hazardous materials	0.46% (0.33 - 0.61%)	6,352 (4,633 - 8,490)

Inbound recycling study

The Oregon Waste Composition Studies for 2023 also includes a statewide study of the composition of inbound commingled recyclable material going to recycling facilities. Metro in the past had done separate studies of commingled recycling from households (2014), from multifamily residences (2017), and from commercial recycling (2020). Because Metro had not measured the contamination rate of residential recycling since 2014, Metro participated in this study by paying to have 28 additional residential-only samples collected, to add to the 151 randomly selected residential, commercial, and mixed route inbound commingled recycling samples that DEQ was collecting and paying for as part of the statewide study, with a goal of having at least 100 residential samples. Of the 151 DEQ samples that were randomly selected as outlined in Appendix A of the [2023 Oregon Inbound Commingled Recycling Composition Study](#), 98 ended up meeting the criteria of being from residential route trucks (at least 90% residential), as shown in Table 6 below.

Table 6: Metro samples by location and substream

Location	Residential Route Truck	Mixed Route Truck	Commercial Route Truck	Self-haul (depot)	Metro special single-family residential	Total
Canby TS	2	0	0	0	0	2
Environmental Fibers	15	9	1	0	7	32
Far West Hillsboro	19	6	5	1	9	40
Far West Portland	14	9	3	0	3	29
KB Recycling	5	2	3	0	7	17
Pioneer	17	3	2	0	1	23
Pride Recycling	10	0	0	0	0	10
WestRock	12	2	2	0	0	16
Willamette Resources	4	4	1	0	1	10
Total	98	35	17	1	28	179

Samples for the Metro part of the inbound recycling study were collected at the facilities listed in Table 6 during eight periods spaced roughly 45 days apart throughout 2023, plus 3 make-up samples collected in January 2024. Recyclers in the Metro area reported collecting a total of 178,272 tons of commingled recycling in 2023, based on reports recyclers submitted to DEQ as part of the annual Oregon material recovery survey.

Table 7 gives a summary of the composition of commingled recycling collected in the Metro Wasteshed. Full results for Metro samples are located in the tab labelled "02Metro" of the [2023 Inbound Commingled Recycling Study Results](#) file, available on the [DEQ waste composition webpage](#).

Table 7: Composition of Metro commingled recycling composition

Material	Percent	95% conf. interval	Tons	95% conf. interval
Cardboard	48.52%	(46.24-50.74%)	86,491	(82,439-90,454)
Other cart-acceptable paper	25.60%	(24.15-27.16%)	45,631	(43,047-48,417)
Plastic Bottles 6 oz to 5 gallons	3.52%	(3.29-3.76%)	6,269	(5,857-6,711)
Plastic tubs, pails: cart-acceptable	0.87%	(0.61-1.19%)	1,543	(1,087-2,115)
Aluminum beverage cans	0.43%	(0.38-0.48%)	763	(683-850)
Aluminum foil, pet food cans *	0.19%	(0.17-0.22%)	346	(297-401)
Other aluminum: cart-acceptable	0.02%	(0.01-0.04%)	41	(19-68)
Tinned cans excluding aerosols	2.00%	(1.82-2.20%)	3,572	(3,245-3,915)
Other scrap metal cart-acceptable	0.84%	(0.66-1.03%)	1,491	(1,179-1,837)
Paper not cart-acceptable	4.35%	(3.56-5.39%)	7,753	(6,354-9,615)
Rigid plastic not cart-acceptable	3.25%	(3.00-3.52%)	5,799	(5,349-6,267)
Film plastic	1.21%	(1.02-1.47%)	2,154	(1,814-2,622)
Empty aerosol cans	0.12%	(0.07-0.20%)	214	(125-360)
Other scrap metal not cart-acceptable	0.71%	(0.45-1.02%)	1,266	(807-1,819)
All glass	2.26%	(1.81-2.75%)	4,026	(3,225-4,910)
Food, yard debris, and wood	1.50%	(1.15-1.89%)	2,679	(2,056-3,376)
Disposable diapers	0.08%	(0.05-0.12%)	142	(87-206)
Cloth textiles	0.69%	(0.53-0.87%)	1,229	(941-1,547)
Other non-hazardous nonrecyclables	0.96%	(0.70-1.26%)	1,708	(1,255-2,240)
Medical waste	0.01%	(0.00-0.02%)	11	(1-27)
Sharps	0.00%	(0.00-0.00%)	1	(0-3)
All batteries	0.02%	(0.01-0.05%)	43	(16-87)
All other hazardous materials	0.03%	(0.00-0.06%)	45	(7-107)
Bagged garbage	2.84%	(2.14-3.69%)	5,055	(3,813-6,572)
All acceptable in cart (USCL)	81.88%	(80.31-83.40%)	145,974	(143,175-148,676)
All acceptable in cart (2023 list)	82.95%	(81.53-84.37%)	147,876	(145,338-150,405)
All not acceptable in cart (USCL)	18.12%	(16.60-19.69%)	32,298	(29,595-35,094)
All not acceptable in cart (2023 list)	17.05%	(15.63-18.47%)	30,396	(27,863-32,933)

Contaminant rows are shaded gray

* Aluminum foil and pet food cans are a single material category in the study. However, aluminum foil and foil-form containers were cart-acceptable (Metro) in 2023 but not on the USCL, while aluminum pet food cans are on both lists. Lacking data for the rows showing USCL results, half was included in "cart acceptable" and the other half in "not acceptable."

Empty aerosol cans were acceptable on the 2023 but not on the USCL list. Only shredded paper in plastic bags was listed as not acceptable in 2023, but all shredded paper is not on the USCL list.

What is acceptable in commingled recycling

During field work for the commingled recycling study, the crew used the Metro definition of what materials are acceptable in commingled recycling when sorting each load, with one exception – scrap metal was considered acceptable only if items weighed less than 10 pounds and were less than 18 inches long. The standard Metro had used for years was that scrap metal up to 30 pounds or 30 inches long would be acceptable. DEQ used the Metro list as we believed it would be very close in definition to the Uniform Statewide Collection List which at the time had not been defined under Oregon’s Recycling Modernization Act.

After field work was completed, Oregon finalized what materials are on the uniform statewide collection list and thus would be acceptable in commingled recycling. Generally, the USCL is very similar to the lists already used in the Metro area, but there were some differences, and DEQ made the following adjustments as an approximation to what are contaminants under the USCL:

- All shredded paper and all empty aerosol cans were reclassified as contaminants
- For the category of aluminum pet cans and aluminum foil and foil-formed containers, we did not have data on what percentage was cans vs. foil, but estimated that each made up a substantial share, assigning 50% as acceptable (the pet food cans) and 50% contamination (the foil).
- There were differences in the smallest size and of resins of rigid plastic containers that would be acceptable in commingled recycling. DEQ did not make any adjustment for these differences, and they partially cancelled each other out, with the USCL allowing slightly smaller sizes but fewer acceptable resins.

In Table 7, DEQ estimates the contamination rate using the USCL definition of acceptable material as well as the original definition (referred to as the 2023 list).

Methodology

The general methodology for the Oregon Disposed Waste Composition Study involves the following steps:

1. **Select samples:** Select loads being directly disposed at landfills, transfer stations, and solid waste incinerators. The selection protocol is designed to accurately represent all of the municipal solid waste being disposed from Oregon, or in this case, from the Metro Wasteshed. The definition for solid waste that is included in this study is the same as is

used in [Oregon's material recovery survey and calculation of Oregon and wasteshed material recovery rates](#).

2. **Sort into categories:** Sort the selected load into [152 material categories as specified in the categories definition document](#), and then weigh each material category.
3. **Determine substreams:** Use the sorted sample weight data to determine the composition of each different substream of wastes, such as residential and commercial route truck garbage, loose drop box garbage, and self-haul garbage.
4. **Compile composition:** Combine the different substream compositions to produce the overall composition for Oregon or for the specific jurisdiction.

The goal of the study was to provide the most precise estimate of waste composition for the Metro Wasteshed as a whole, as well as the composition of the different substreams, given the total budget of the study. To achieve this, the study oversampled self-haul and drop box substreams relative their total portion of the wasteshed's solid waste, for two reasons.

- Self-haul and drop box samples are far more variable than samples from route trucks, since they represent waste from only a single family or business, whereas route trucks mix together wastes from many different generators.
- Self-haul and drop box samples are usually much easier and cheaper to sort than route truck samples, and so more samples could be collected and sorted for the same amount of money.

When combining the substreams to produce the overall Metro waste composition, each substream was weighted by the total tons in that substream.

The methodology for the inbound commingled recycling study was very similar to that used in the disposed waste composition study, and is described in more detail in Appendix A of the report [2023 Oregon Inbound Commingled Recycling Composition Study](#). One difference though was that in the Metro Wasteshed, we specifically selected 28 residential route trucks to sample instead of using the random route truck selection method we used in the disposal study and in all other route trucks included in the inbound commingled recycling study. We combined these 28 samples with the 98 residential route samples chosen from randomly-selected trucks, and then weighted the composition of that substream by the total estimated amount of commingled residential recycling tonnage when combining it with the composition of the other substreams.

Estimating substream tonnage

For total disposal tonnage, DEQ adds up the data reported by the ultimate disposal facilities (landfills, exporters, and energy recovery facilities) for each wasteshed to determine the total tons disposed that was generated in each wasteshed, but much of the waste received at these ultimate disposal facilities comes from transfer stations, and the landfills have no way of knowing how much of that transferred waste came from route trucks, drop boxes, self-haul, or

other substreams. As such, DEQ needs to go back to the original transfer stations to be able to allocate the waste they transfer to the landfills and other ultimate disposal facilities into the different substreams. Usually the total tons that landfills report receiving do not exactly match what the transfer stations report collecting for the following reasons, among others:

- In between the time waste is dumped at a transfer station and when the waste is transferred to a landfill, the waste could dry out and become lighter.
- Conversely, if the transfer station sprays water to keep dust down when vehicles unload, the garbage could be wetter and heavier when received at the landfill.
- Liquids in the garbage may end up in the drainage system of the transfer station rather than at the landfill.
- A transfer station may record just volume for some or all of its loads and use a weight conversion factor to estimate the tonnage they receive. The landfills generally use scales for all waste.
- Some waste may be received at a transfer station in one quarter but not shipped to the landfill until the following quarter.
- Some wastes may be unofficially salvaged before they make into a transfer trailer.

DEQ tries to reconcile the transfer station and landfill data in the following way:

- First, add up all the substreams tonnages of waste received at the transfer station, and compare to what the weight is reported by landfills.
- If there are large differences, we would look for errors in reporting, such as landfills that reported some transfer station waste in the column for private vehicles, or landfills that reported residue from mixed solid waste processing facilities as being industrial waste rather than a counting waste.
- After resolving any errors in reporting, we would multiply all the substream tonnages by a factor needed to make the total of all substream tonnages reported by the transfer stations exactly match the tonnages that the landfills report receiving from transfer stations.

For the Metro Wasteshed, DEQ makes extensive use of the Metro transaction databases to help reconcile differences. However, the data DEQ asks for from landfills and transfer stations does not break substream tonnage down to the level of individual substreams in the detail that we can use directly in the composition study. Most DEQ reports ask facilities to break down the waste they receive into the following 3 or 4 categories:

- Collection service provider compacted waste
- Collection service provider uncompacted waste
- Private vehicles waste

- Waste from transfer stations and mixed solid waste processing facilities (landfills only)

For the “Collection Service Provider compacted waste,” that category could include route truck waste as well as compacting drop box waste. For the two Metro transfer stations, we use the Metro transaction database to separate these two. We sometimes had data at other facilities we could use to separate the two, but for many, we used a formula based on the split at locations where we do know the ratio of route trucks to compacting drop boxes or compacting drop boxes to loose drop boxes.

Although we can know or closely estimate the total amount of route truck garbage based on sources such as the Metro transaction database or other reports to DEQ, we have no direct data from facility reports that allows us to split route truck waste into residential, commercial, and mixed route garbage tonnage. To do that for the Metro Wasteshed, we used two sources of data:

- The ratio of residential to commercial to mixed route trucks that we collected samples from, and
- The same sort of data from previous waste composition studies in the Metro region.

The methodology for selecting route trucks for sampling is outlined in Appendix A of the [2023 Oregon Inbound Commingled Recycling Composition Study](#), and should result in a ratio of the different type of route trucks that fairly closely approximates the tons of solid waste collected by each type of route truck.

For the current study, the ratio of residential to commercial to mixed route tonnage was calculated as a straight average of the ratio of samples from the current study and the ratio calculated of tonnage for each type of route truck in the 2016-2017 waste composition study. That 2016/2017 tonnage was itself calculated in a similar manner, taking the ratio of route truck samples in that study and averaging that with the ratio of tonnage developed for the 2009/2010 waste composition study, and similar methodology was used in all the past studies. Thus, the estimated ratio of residential to commercial to mixed route trucks in the current study is essentially a rolling average of the current and past estimates of this ratio.

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- Hillsboro Garbage – Chris Ridgeway, Tony Rinck
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- Sandy Transfer Station
- Troutdale Transfer Station – Tom Nino, Kathleen Borgun
- Tualatin Valley Waste Recovery – John Cunningham
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- Clackamas Garbage – Keith Miller
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- Heiberg Garbage Service – Jessi Heiberg
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