

Plastics Recovery and Disposal in Oregon

DRAFT for Plastic Recovery Assessment Advisory Workgroup Meeting—May 8, 2014

Oregon's Department of Environmental Quality and the Metro regional government are seeking to identify how more plastic can be recovered from Oregon's waste stream and directed to its highest and best use. To help meet these goals, DEQ and Metro convened the Plastics Recovery Assessment Advisory Workgroup. This draft document is intended to provide an overview and summary of existing data sources regarding plastics recovery, disposal, and generation in Oregon to support the Workgroup's deliberations. It also draws on data from studies in other states to provide additional estimates regarding types and quantities of plastics disposed and recovered in various sectors and waste streams.

Data Sources and Methods

This analysis reviewed existing data from DEQ, including the following statewide studies:

- *2012 Oregon Material Recovery and Waste Generation Rates Report* (November 2013)
- *Background Paper: Plastic Recovery Assessment Project—Overview of Plastic Recycling and Disposal Information* (May 2013)
- *Composition of Commingled Recyclables Before and After Processing* (March 2011)
- *Oregon's Rigid Plastic Container Recycling Rate for 2007 and Determination of the Recycling Rate for Compliance Purposes for 2009* (2008)
- *2009/2010 Waste Composition Study, data tables*
- *Trends in Oregon Waste Generation 1993–2010* (October 2011)

In particular, the May 2013 [*Background Paper: Plastic Recovery Assessment Project*](#) provides extensive information regarding plastic recycling and disposal in Oregon. Rather than replicating that information here, we direct the reader to the existing background paper. This summary document draws on different data sources, particularly those from outside of Oregon, to provide additional information to expand on and supplement the background paper.

The analysis examined data on material recovery and disposal from the following jurisdictions outside of Oregon:

- California (2006)
- Los Angeles, California (2007)
- New York City (2012–2013)
- Ontario, Canada (2001, 2011)
- Vermont (2013)
- Washington State (2009)
- Wisconsin (2009)

Overview of Recovery and Disposal

Table 1 provides summary estimates of plastics recycling, disposal, generation, and recycling rates for three major groups of “traditional” plastics in Oregon’s recycling and disposal streams. (Note that the “composite plastic” category—which consists largely of polyurethane foam materials, including carpet pad, packing materials, and furniture foam—is not included in this group.)

Rigid plastic containers have a recycling rate estimated at 35 percent, while recycling rates are much lower for **plastic film** (16%) and **other plastic** (13%). The overall recycling rate across these three plastics categories is 21 percent.

As shown in Figure 1 and Table 2, recycling for all three categories of plastics has increased since 2007, a 35 percent increase overall. **Rigid plastic containers** represent the largest category and have shown significant increases since the addition of water bottles to Oregon’s bottle bill in 2009. **Plastic film** has shown the largest percent increase, with more than 50 percent growth since 2007.

Recycling data are reported in DEQ’s *2012 Oregon Material Recovery and Waste Generation Rates Report* (November 2013), and plastics **disposal** data are estimated based on Oregon’s *2009/2010 Waste Composition Study* and the *2012 Material Recovery and Waste Generation Rates Report*. **Generation** figures are the sum of recycling and disposal, and the **recycling rate** is the portion of total generation that was recycled, by material and for the sum of these plastic categories.

Table 1. Estimated Plastics Recycling, Disposal, Generation, and Recycling Rates in Oregon (2012)

Plastics Type	Recycling (tons)	Disposal (tons)	Generation (tons)	Recycling Rate (%)
Rigid plastic containers	29,541	53,774	83,315	35%
Plastic film	14,869	78,014	92,883	16%
Other plastic	10,922	76,349	87,271	13%
Plastic subtotal*	55,332	208,136	263,468	21%

**These figures exclude the “composite plastic” category, which consists largely of foam materials—including carpet pad, packing materials, and furniture foam—that are not readily recyclable.*

Figure 1. Plastic Recycling in Oregon, by Material Type, 2007–2012

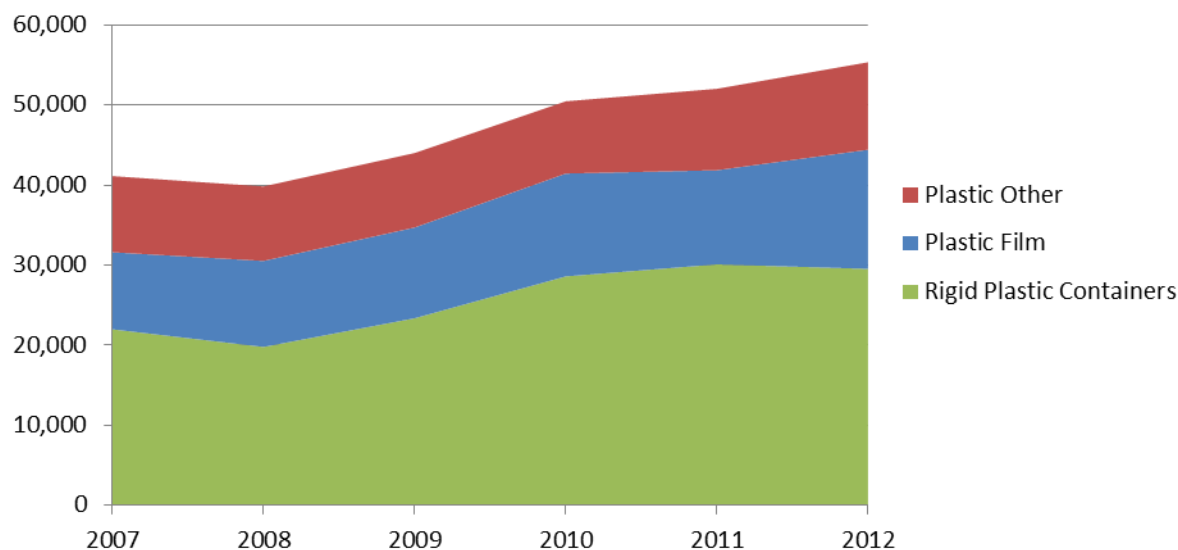


Table 2. Plastic Recycling in Oregon, by Material Type, 2007–2012

	2007	2008	2009	2010	2011	2012	Increase (2007-2012)
Plastic Film	9,625	10,739	11,327	12,839	11,747	14,869	54%
Plastic Other	9,500	9,302	9,299	9,019	10,167	10,922	15%
Rigid Plastic Containers	21,990	19,790	23,377	28,599	30,100	29,542	34%
Total	41,116	39,831	44,004	50,456	52,014	55,332	35%

Material Definitions¹

Rigid plastic containers: Any container or package made predominantly of plastic resin that has a relatively inflexible finite shape or form with a minimum capacity of 8 ounces and a maximum of 5 gallons and that is capable of maintaining its shape while holding other products. Also includes most plastic plant pots, except for decorative pots, which are included in the “other plastic” category. *Excludes film plastic and plastic products such as toys (which are included in the “other plastic” category).*

Plastic film: Flexible plastic film, bags, sheeting, tarps, shrink wrap, strapping, and plastic baling twine.

¹ *Material Recovery Survey, “Attachment A: Recovered Materials Definitions,”* www.deq.state.or.us/lq/pubs/docs/sw/MRAttachmentA.pdf; personal communication with Peter Spendelow, DEQ, May 1, 2014.

Other plastic: Any other plastic not meeting the definition of rigid plastic container or plastic film. Includes all rigid plastic items that are products rather than packaging and rigid plastic packaging that does not contain at least 8 ounces; includes plastic products, plastic totes and pallets, and polystyrene “peanuts.”

Composite plastic: Composite plastic and foam—carpet pad, packing materials, and furniture foam.

Figure 2. Plastic Recycling and Disposal by Material Type (2012)

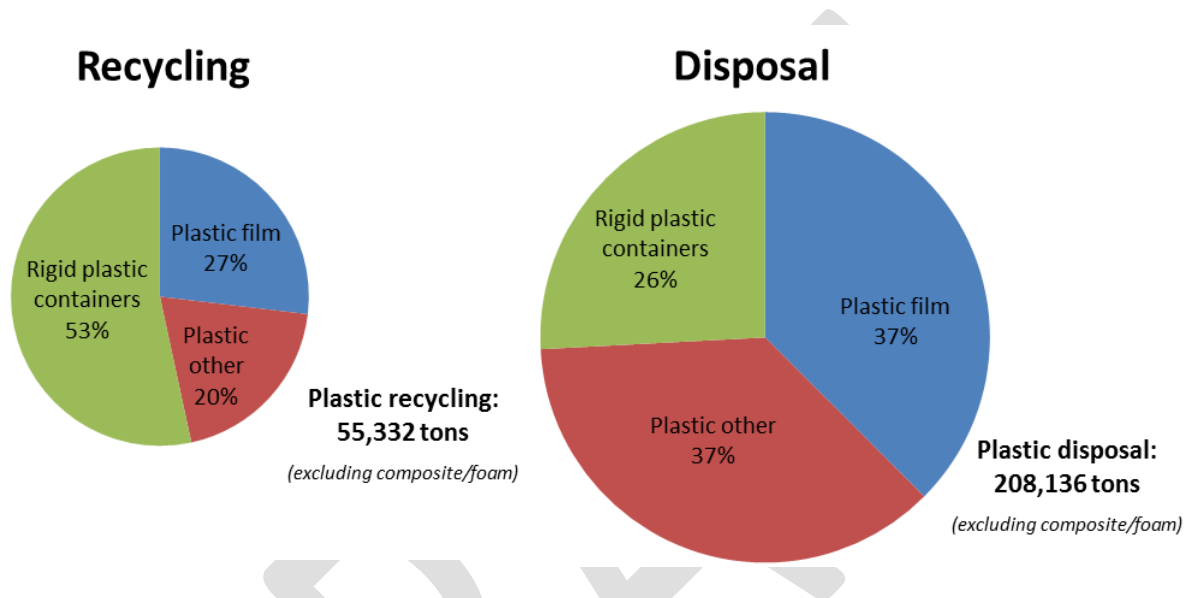
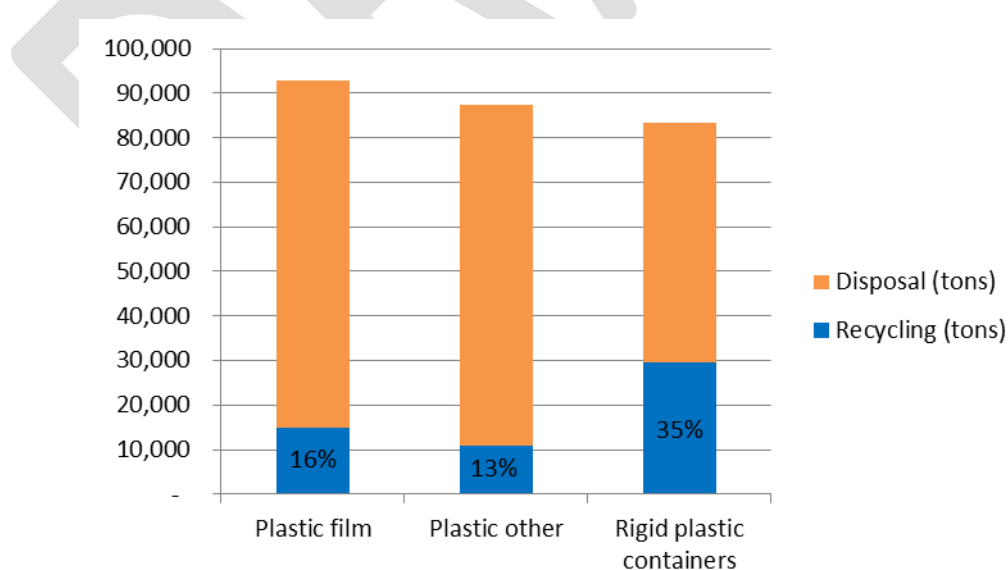


Figure 3. Plastic Recycling and Disposal Tonnages, with Material Recycling Rates (2012)



Disposal Estimates by Waste Stream

Table 3 provides more detail on the types of plastics contained in Oregon's disposed waste stream based on source, including single-family, multifamily, commercial as well as some collection streams, drop boxes and self-haul. These source designations were determined from waste collection profiles, U.S. Census information for Oregon, and data from other statewide studies. This adapted composition by source was applied to disposal figures from 2012 to create Table 2. Oregon's material definitions appear at the end of this document.

Table 3. Estimated Statewide Plastic Disposal Composition and Tonnage by Waste Stream (2012)

	OVERALL		Residential Single-Fam.		Residential Multifam.		Commercial		Drop Box		Self-haul	
	% Total Disposal	Tons	% Total Disposal	Tons	% Total Disposal	Tons	% Total Disposal	Tons	% Total Disposal	Tons	% Total Disposal	Tons
TOTAL DISPOSAL TONS		2,248,715		513,611		178,780		744,690		226,246		519,879
TOTAL PLASTIC	10.17%	228,757	10.07%	51,720	10.20%	18,228	11.57%	86,145	10.04%	22,723	7.26%	37,738
Plastic Packaging	4.65%	104,470	5.69%	29,209	5.55%	9,925	5.91%	44,025	3.44%	7,776	1.97%	10,228
Rigid Plastic Containers (RPCs)	1.56%	35,108	2.04%	10,478	2.09%	3,733	1.98%	14,717	1.07%	2,425	0.55%	2,838
Deposit plastic bottles	0.05%	1,175	0.05%	245	0.07%	131	0.08%	605	0.03%	61	0.02%	100
Plastic deposit water	0.07%	1,527	0.08%	406	0.09%	156	0.10%	744	0.05%	108	0.02%	86
No-deposit plastic beverage bots.	0.25%	5,551	0.28%	1,452	0.31%	545	0.31%	2,319	0.32%	732	0.07%	380
Other plastic bottles	0.41%	9,241	0.63%	3,251	0.59%	1,060	0.47%	3,519	0.11%	239	0.17%	886
Plastic tubs, curb-OK 8oz to 5gal	0.33%	7,471	0.32%	1,633	0.38%	681	0.44%	3,272	0.34%	763	0.16%	848
Other RPCs - tubs, trays, etc.	0.45%	10,144	0.68%	3,492	0.65%	1,159	0.57%	4,257	0.23%	523	0.10%	539
Other plastic packaging	3.08%	69,362	3.65%	18,731	3.46%	6,191	3.94%	29,309	2.37%	5,351	1.42%	7,390
Other rigid plastic packaging	0.83%	18,665	1.16%	5,947	0.99%	1,775	0.96%	7,138	0.49%	1,116	0.39%	2,033
Plastic bev. bots. <8oz or >5 gal	0.00%	90	0.01%	29	0.01%	14	0.00%	35	0.00%	3	0.00%	7
Small tubs 6+oz but <8oz	0.03%	636	0.05%	252	0.04%	77	0.03%	239	0.02%	36	0.00%	24
Other rigid plastic packaging	0.80%	17,940	1.10%	5,666	0.94%	1,684	0.92%	6,864	0.48%	1,076	0.38%	2,001
Plastic film packaging - estimated	2.25%	50,697	2.49%	12,784	2.47%	4,416	2.98%	22,171	1.87%	4,235	1.03%	5,358
Plastic Products	5.53%	124,287	4.38%	22,511	4.64%	8,304	5.66%	42,119	6.61%	14,947	5.29%	27,511
Rigid plastic products	4.31%	96,969	3.04%	15,628	3.31%	5,925	4.05%	30,173	5.60%	12,663	4.74%	24,620
Other rigid plastic products	3.40%	76,349	2.21%	11,353	2.45%	4,380	3.21%	23,927	3.79%	8,573	4.09%	21,246
Mixed plastic / materials	0.92%	20,620	0.83%	4,275	0.86%	1,544	0.84%	6,246	1.81%	4,090	0.65%	3,374
Plastic film products - estimated	1.21%	27,317	1.34%	6,883	1.33%	2,379	1.60%	11,946	1.01%	2,284	0.56%	2,891
Plastic film - combined	3.47%	78,014	3.83%	19,667	3.80%	6,795	4.58%	34,117	2.88%	6,519	1.59%	8,248
Plastic film - recyclable	0.97%	21,833	0.56%	2,898	0.66%	1,186	1.25%	9,338	1.40%	3,163	0.76%	3,965
Plastic film - non-recyclable	2.50%	56,181	3.26%	16,769	3.14%	5,609	3.33%	24,779	1.48%	3,356	0.82%	4,283
Plastic beverage pouches	0.00%	106	0.01%	38	0.01%	11	0.01%	47	0.00%	5	0.00%	4
Plastic film- other nonrecyclable	2.49%	56,075	3.26%	16,731	3.13%	5,598	3.32%	24,732	1.48%	3,350	0.82%	4,279
Plastic beverage containers	0.38%	8,448	0.42%	2,169	0.48%	857	0.50%	3,750	0.40%	909	0.11%	577
All recyclable plastic	2.11%	47,524	1.98%	10,165	2.15%	3,851	2.70%	20,072	2.26%	5,105	1.21%	6,295
All curbside plastic bottles	0.78%	17,583	1.05%	5,383	1.07%	1,906	0.97%	7,222	0.50%	1,142	0.28%	1,458
All curbside plastic tubs	0.36%	8,107	0.37%	1,885	0.42%	758	0.47%	3,512	0.35%	799	0.17%	872
Plastic acceptable at the curb	1.14%	25,690	1.41%	7,267	1.49%	2,665	1.44%	10,734	0.86%	1,941	0.45%	2,330

Sources: DEQ, 2012 Material Recovery and Waste Generation Rates Report, November 2013
 DEQ, Oregon 2009/2010 Waste Composition Study: Excel results files
 U.S. Census Bureau, 2008-2012 American Community Survey 5-Year Estimates, 2012

Detailed Disposal Estimates by Plastic Type

Vermont Waste Characterization Study

Vermont (2013) conducted a waste characterization study with more detailed subtypes of plastics. This study was used as a basis to estimate the types of plastics in Oregon's waste stream in more detail. To take into account different disposal profiles, the Vermont study was scaled to Oregon's plastic disposal composition using several material groupings. For example, the grouping of "Bottle Bill Bottles" included two plastic categories from the Oregon list (bottle bill plastics and plastic deposit water) and seven plastic categories on the Vermont list, including #1 PET, #7 HDPE, and #3-#7 beverage bottles. The Vermont study was used to determine the material composition of these multiple groupings, which was then applied to Oregon's corresponding annual tons of disposal. This methodology was applied individually to the plastics produced by Single-family, Multifamily, and Commercial sources.

The Vermont study includes two composition lists: *Residential* and *ICI (Industrial, Commercial, and Institutional)*. The Vermont *Residential* composition was referenced for the Oregon *Residential* streams, and the Vermont ICI data was used for the *Commercial* stream.

Definitions for Vermont and Oregon plastic categories are found at the end of this document.

Table 4 shows estimated residential and commercial plastic disposal composition in Oregon (2012) for Vermont's extended list of plastic types.

Table 4. Estimated Residential and Commercial Plastic Disposal Composition and Tonnages for Oregon with Extended Material List (based on Vermont waste composition study)

	Residential Single-Family			Residential Multifamily			Commercial		
	%TotDisp	%Plastics	Tons	%TotDisp	%Plastics	Tons	%TotDisp	%Plastics	Tons
Total Stream Disposal			513,611			178,780			744,690
1a #1 PET Bottles EBB	0.1%	0.8%	388	0.1%	0.9%	171	0.1%	1.2%	1,032
1b #1 PET Bottles BB	0.0%	0.1%	57	0.0%	0.1%	25	0.0%	0.2%	198
1c #1 PET Bottles PLA	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
2 #1PET Food and Dairy Bottles and Jars	0.3%	3.1%	1,599	0.3%	3.0%	547	0.2%	1.5%	1,335
3a #2 HDPE Beverage Bottles EBB	0.0%	0.1%	69	0.0%	0.2%	30	0.0%	0.0%	40
3b #2 HDPE Beverage Bottles BB	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
4 HDPE Food and Dairy and Detergent	0.5%	5.4%	2,799	0.5%	5.3%	958	0.5%	4.5%	3,871
5a # 3 - 7 Bottles EBB	0.0%	0.2%	126	0.0%	0.3%	55	0.0%	0.1%	79
5b # 3 - 7 Bottles BB	0.0%	0.0%	11	0.0%	0.0%	5	0.0%	0.0%	-
5c # 3 - 7 Bottles Non	0.0%	0.4%	200	0.0%	0.4%	68	0.1%	0.6%	534
5d # 3 - 7 Bottles PP	0.0%	0.3%	133	0.0%	0.3%	46	0.0%	0.2%	133
6a Plastic Cups PET	0.0%	0.2%	129	0.0%	0.2%	38	0.0%	0.4%	327
6b Plastic Cups PP	0.2%	1.5%	773	0.1%	1.3%	230	0.2%	1.5%	1,307
6c Plastic Cups PS	0.1%	1.4%	706	0.1%	1.4%	262	0.0%	0.4%	326
6d Plastic Cups Keurig	0.1%	1.3%	673	0.2%	1.5%	271	0.1%	0.6%	527
6e Plastic Cups Other	0.0%	0.4%	217	0.0%	0.4%	81	0.0%	0.4%	326
7a Tubs and Lids PE	0.0%	0.2%	90	0.0%	0.2%	36	0.0%	0.4%	351
7b Tubs and Lids PP	0.2%	1.9%	987	0.2%	2.2%	397	0.3%	2.6%	2,283
7c Tubs and Lids PS	0.1%	1.1%	543	0.1%	1.1%	201	0.0%	0.3%	244
7d Tubs and Lids PLA	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
7e Tubs and Lids Other	0.1%	0.8%	435	0.1%	0.9%	161	0.1%	0.5%	407
8a Bulky Rigid >1 Gallons PE	0.1%	1.2%	597	0.1%	1.2%	221	0.0%	0.3%	244
8b Bulky Rigid >1 Gallons PP	0.0%	0.0%	-	0.0%	0.0%	-	0.1%	0.5%	407
8c Bulky Rigid >1 Gallons Other	0.6%	6.0%	3,096	0.6%	6.3%	1,147	0.8%	7.0%	6,023
8d Bulky Rigid >1 Gallons PE Buckets	0.2%	1.7%	869	0.2%	1.8%	322	0.0%	0.1%	81
9a Thermoforms PET	0.4%	3.7%	1,932	0.3%	3.2%	574	0.3%	2.7%	2,288
9b Thermoforms PS	0.2%	1.7%	901	0.1%	1.5%	268	0.1%	1.1%	981
9c Thermoforms PVC	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
9d Thermoforms PP	0.2%	2.2%	1,159	0.2%	1.9%	345	0.1%	0.8%	654
9e Thermoforms PLA	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
9f Thermoforms Other	0.2%	1.5%	773	0.1%	1.3%	230	0.2%	1.5%	1,307
10 Film, Retail Bags	0.5%	4.6%	2,402	0.5%	4.6%	830	0.2%	1.6%	1,418
11 Film, Other Bags	0.9%	9.1%	4,713	0.9%	8.9%	1,628	0.6%	5.3%	4,554
12 Film, Wrap	0.6%	5.7%	2,946	0.6%	5.6%	1,018	2.3%	19.8%	17,096
13 Film, Garbage	1.3%	13.0%	6,707	1.3%	12.7%	2,317	1.2%	10.1%	8,660
14a Film, Other	0.5%	5.3%	2,719	0.5%	5.2%	939	0.3%	2.6%	2,240
14b Film, Other Metalized	0.1%	0.6%	326	0.1%	0.7%	121	0.1%	0.5%	407
15a Ag Pots PE	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
15b Ag Pots PP	0.0%	0.3%	135	0.0%	0.3%	54	0.0%	0.4%	351
15c Ag Pots PS	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.1%	81
15d Ag Pots Other	0.0%	0.1%	54	0.0%	0.1%	20	0.0%	0.2%	163
16a Pouches EBB	0.0%	0.4%	181	0.0%	0.3%	63	0.0%	0.1%	75
16b Pouches BB	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.0%	-
16c Pouches Other	0.0%	0.0%	-	0.0%	0.0%	-	0.0%	0.1%	75
17a Other Plastic Blister	0.1%	0.5%	272	0.1%	0.6%	101	0.0%	0.3%	244
17b Other Plastic All Other	2.3%	23%	12,004	2.5%	24%	4,448	3.4%	30%	25,476
Plastics Totals	10%	100%	51,720	10%	100%	18,228	12%	100%	86,145

Materials representing 1-2% of plastics in collection stream

Materials representing more than 2% of plastics in collection stream

Sources: DEQ, 2012 Material Recovery and Waste Generation Rates Report, November 2013

DEQ, Oregon 2009/2010 Waste Composition Study: Excel results files

State of Vermont, Department of Environmental Conservation, State of Vermont Waste Composition Study, May 2013

The Vermont ICI composition, U.S. Census information, California commercial disposal data, and Oregon waste composition study were used to estimate plastics disposal for 16 business sectors representing commercial activities in state of Oregon. Construction work, which contributes to the Construction and Demolition waste stream (C&D), is not included in these figures. Table 5 shows the results, with the top ten plastic materials in each sector highlighted in green.

Table 5. Estimated Plastics Disposal by Commercial Sector (based on Vermont 2013 and California 2006)

	Agriculture/ Fisheries		Educational Services		Financial Services		Food Stores		Government Facilities		Accommodation		Information		Manufacturing		Medical Services		Other Misc Services		Professional Services		Recreation		Restaurants		Retail Trade		Transportation and Warehousing		Wholesale Trade	
Plastics Types	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons	%Plastics	Tons
Total Sector Disposal		19,742		44,762		23,374		35,707		26,456		17,395		3,815		121,585		87,360		56,927		58,518		1,227		85,605		94,470		42,645		25,103
1a #1 PET Bottles EBB	0.4%	11	4.2%	194	10.3%	600	1.2%	41	4.4%	155	4.0%	56	0.7%	8	2.0%	310	1.9%	192	3.0%	180	2.5%	144	7.7%	15	2.2%	195	1.6%	167	2.2%	63	1.1%	36
1b #1 PET Bottles BB	0.1%	2	0.8%	37	2.0%	115	0.2%	8	0.8%	30	0.8%	11	0.1%	2	0.4%	60	0.4%	37	0.6%	35	0.5%	28	1.5%	3	0.4%	38	0.3%	32	0.4%	12	0.2%	7
1c #1 PET Bottles PLA	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
2 #1PET Food and Dairy Bottles and Jars	0.2%	4	1.6%	75	4.0%	231	0.4%	16	1.7%	60	1.5%	22	0.3%	3	0.8%	119	0.7%	74	1.2%	69	1.0%	56	3.0%	6	0.8%	75	0.6%	64	0.9%	24	0.4%	14
3a #2 HDPE Beverage Bottles EBB	0.1%	2	0.1%	4	0.0%	2	0.2%	6	0.1%	3	0.2%	3	0.0%	0	0.2%	24	0.2%	16	0.4%	24	0.2%	12	0.1%	0	0.2%	20	0.1%	10	0.3%	8	0.1%	4
3b #2 HDPE Beverage Bottles BB	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
4 HDPE Food and Dairy and Detergent	1.8%	50	2.6%	119	1.2%	69	4.5%	160	2.5%	89	7.1%	99	0.2%	2	4.5%	689	4.6%	460	11.6%	696	5.8%	337	1.5%	3	6.4%	582	2.8%	302	8.6%	242	3.8%	130
5a #3 - 7 Bottles EBB	1.1%	29	0.2%	9	0.1%	5	0.0%	2	0.1%	4	0.1%	1	0.0%	0	0.0%	3	0.2%	21	0.1%	4	0.1%	4	0.2%	0	0.1%	5	0.0%	4	0.2%	6	0.0%	1
5b #3 - 7 Bottles BB	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
5c #3 - 7 Bottles Non	2.1%	59	0.4%	19	0.2%	9	0.1%	3	0.2%	8	0.2%	3	0.0%	0	0.0%	7	0.4%	41	0.1%	9	0.2%	9	0.3%	1	0.1%	11	0.1%	9	0.4%	11	0.0%	1
5d #3 - 7 Bottles PP	0.5%	15	0.1%	5	0.0%	2	0.0%	1	0.1%	2	0.0%	1	0.0%	0	0.0%	2	0.1%	10	0.0%	2	0.0%	2	0.1%	0	0.0%	3	0.0%	2	0.1%	3	0.0%	0
6a Plastic Cups PET	0.0%	0	0.2%	7	0.4%	23	0.0%	2	0.2%	6	0.2%	2	0.0%	0	0.1%	12	0.1%	7	0.1%	7	0.1%	6	0.3%	1	0.1%	8	0.1%	6	0.1%	2	0.0%	1
6b Plastic Cups PP	2.1%	59	0.4%	19	0.2%	9	0.1%	3	0.2%	8	0.2%	3	0.0%	0	0.1%	7	0.4%	41	0.1%	9	0.2%	9	0.3%	1	0.1%	11	0.1%	9	0.4%	11	0.0%	1
6c Plastic Cups PS	2.1%	59	0.4%	19	0.2%	9	0.1%	3	0.2%	8	0.2%	3	0.0%	0	0.0%	7	0.4%	41	0.1%	9	0.2%	9	0.3%	1	0.1%	11	0.1%	9	0.4%	11	0.0%	1
6d Plastic Cups Keurig	1.6%	44	0.3%	14	0.1%	7	0.1%	2	0.2%	6	0.1%	2	0.0%	0	0.0%	5	0.3%	31	0.1%	7	0.1%	7	0.2%	0	0.1%	8	0.1%	7	0.3%	9	0.0%	1
6e Plastic Cups Other	2.1%	59	0.4%	19	0.2%	9	0.1%	3	0.2%	8	0.2%	3	0.0%	0	0.0%	7	0.4%	41	0.1%	9	0.2%	9	0.3%	1	0.1%	11	0.1%	9	0.4%	11	0.0%	1
7a Tubs and Lids PE	0.1%	3	0.2%	8	0.1%	5	0.3%	11	0.2%	6	0.5%	7	0.0%	0	0.3%	48	0.3%	32	0.8%	48	0.4%	23	0.1%	0	0.4%	40	0.2%	21	0.6%	17	0.3%	9
7b Tubs and Lids PP	6.9%	191	1.3%	60	0.5%	30	0.3%	10	0.8%	27	0.6%	8	0.1%	2	0.1%	22	1.3%	135	0.5%	28	0.5%	29	1.0%	2	0.4%	36	0.3%	28	1.3%	37	0.1%	5
7c Tubs and Lids PS	1.6%	44	0.3%	14	0.1%	7	0.1%	2	0.2%	6	0.1%	2	0.0%	0	0.0%	5	0.3%	31	0.1%	7	0.1%	7	0.2%	0	0.1%	8	0.1%	7	0.3%	9	0.0%	1
7d Tubs and Lids PLA	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
7e Tubs and Lids Other	2.6%	73	0.5%	23	0.2%	12	0.1%	4	0.3%	11	0.2%	3	0.1%	1	0.1%	8	0.5%	52	0.2%	11	0.2%	11	0.4%	1	0.2%	14	0.1%	11	0.5%	14	0.1%	2
8a Bulky Rigid >1 Gallons PE	0.2%	5	0.3%	12	0.1%	7	0.5%	17	0.3%	9	0.7%	10	0.0%	0	0.5%	71	0.5%	48	1.2%	72	0.6%	35	0.2%	0	0.7%	60	0.3%	31	0.9%	25	0.4%	13
8b Bulky Rigid >1 Gallons PP	2.6%	73	0.5%	23	0.2%	12	0.1%	4	0.3%	11	0.2%	3	0.1%	1	0.1%	8	0.5%	52	0.2%	11	0.2%	11	0.4%	1	0.2%	14	0.1%	11	0.5%	14	0.1%	2
8c Bulky Rigid >1 Gallons Other	39.1%	1,086	7.5%	344	3.0%	172	1.6%	56	4.4%	156	3.4%	47	0.5%	9	0.8%	123	7.6%	766	2.7%	160	2.8%	162	5.8%	11	2.2%	202	1.5%	161	7.5%	211	0.7%	26
8d Bulky Rigid >1 Gallons PE Buckets	0.1%	2	0.1%	4	0.0%	2	0.2%	6	0.1%	3	0.2%	3	0.0%	0	0.2%	24	0.2%	16	0.4%	24	0.2%	12	0.1%	0	0.2%	20	0.1%	10	0.3%	8	0.1%	4
9a Thermoforms PET	0.1%	3	1.1%	52	2.8%	161	0.3%	11	1.2%	42	1.1%	15	0.2%	2	0.5%	84	0.5%	52	0.8%	49	0.7%	39	2.1%	4	0.6%	53	0.4%	45	0.6%	17	0.3%	10
9b Thermoforms PS	1.6%	44	0.3%	14	0.1%	7	0.1%	2	0.2%	6	0.1%	2	0.0%	0	0.0%	5	0.3%	31	0.1%	7	0.1%	7	0.2%	0	0.1%	8	0.1%	7	0.3%	9	0.0%	1
9c Thermoforms PVC	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
9d Thermoforms PP	1.1%	29	0.2%	9	0.1%	5	0.0%	2	0.1%	4	0.1%	1	0.0%	0	0.0%	3	0.2%	21	0.1%	4	0.1%	4	0.2%	0	0.1%	5	0.0%	4	0.2%	6	0.0%	1
9e Thermoforms PLA	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
9f Thermoforms Other	2.1%	59	0.4%	19	0.2%	9	0.1%	3	0.2%	8	0.2%	3	0.0%	0	0.0%	7	0.4%	41	0.1%	9	0.2%	9	0.3%	1	0.1%	11	0.1%	9	0.4%	11	0.0%	1
10 Film, Retail Bags	0.5%	14	1.7%	77	1.9%	112	2.4%	86	1.9%	66	1.7%	23	0.3%	3	1.7%	261	1.6%	166	1.9%	113	2.0%	118	1.7%	3	2.2%	201	1.6%	166	1.9%	53	2.0%	70
11 Film, Other Bags	1.6%	43	5.4%	249	6.2%	359	7.8%	277	6.0%	211	5.3%	75	0.9%	10	5.5%	837	5.3%	533	6.1%	364	6.5%	378	5.5%	10	7.1%	644	5.0%	534	6.0%	170	6.5%	224
12 Film, Wrap	5.9%	163	20.4%	934	23.2%	1,347	29.4%	1,042	22.5%	792	20.0%	282	3.3%	39	20.5%	3,141	19.9%	1,999	22.8%	1,365	24.6%	1,419	20.6%	39	26.8%	2,417	18.8%	2,005	22.6%	639	24.4%	843
13 Film, Garbage	3.0%	83	10.3%	473	11.7%	682	14.9%	528	11.4%	401	10.1%	149	1.7%	20	10.4%	1,591	10.1%	1,013	11.5%	719	12.4%	719	10.4%	20	13.6%	1,225	9.5%	1,016	11.5%	324	12.4%	427
14a Film, Other	0.8%	21	2.7%	122	3.0%	176	3.9%	136	2.9%	104	2.6%	37	0.4%	5	2.7%	411	2.6%	262	3.0%	179	3.2%	186	2.7%	5	3.5%	317	2.5%	263	3.0%	84	3.2%	110
14b Film, Other Metalized	0.1%	4	0.4%	20	0.5%	29	0.6%	23	0.5%	17	0.4%	6	0.1%	1	0.4%	69	0.4%	44	0.5%	30	0.5%	31	0.4%	1	0.6%	53	0.4%	44	0.5%	14	0.5%	18
15a Ag Pots PE	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-	0.0%	-
15b Ag Pots PP	0.1%	29	0.2%	9	0.1%	5	0.0%	2	0.1%	4	0.1%	1	0.0%	0	0.0%	3	0.2%	21	0.1%	4	0.1%	4	0.2%	0	0.1%	5	0.0%	4	0.2%	6	0.0%	1
15c Ag Pots PS	0.5%	15	0.1%	5	0.0%	2	0.0%	1	0.1%	2	0.0%	1	0.0%	0	0.0%	2	0.1%	10	0.0%	2	0.0%	2	0.1%	0	0.0%	3	0.0%	2	0.1%	3	0.0%	0
15d Ag Pots Other	1.1%	29	0.2%	9	0.1%	5	0.0%	2	0.1%	4	0.1%	1	0.0%	0	0.0%	3	0.2%	21	0.1%	4	0.1%	4	0.2%	0	0.1%	5	0.0%	4	0.2%	6	0.0%	1
16a Pouches EBB	0.0%	1	0.1%	4	0.1%	6	0.1%	5	0.1%	3	0.1%	1	0.0%	0	0.1%	14	0.1%	9	0.1%	6	0.1%	6	0.1%	0	0.1%	1						

New York City Residential Recycling and Waste Characterization Study

A recent study conducted in New York City in 2012–2013 (unpublished data, 2014) covers more than 350 categories of plastics in residential recycling and disposed waste. The application to Oregon focused on the composition of disposed materials. The raw data are also available as needed for future analysis in this Oregon project. The top 20 plastic types that represent more than 85 percent of disposed residential plastic waste are shown below in Table 6.

Table 6. Detailed Plastic Subclass Estimates for Oregon—Top 20 Materials (based on New York City 2014)

Residential Plastic Disposal			Annual Total Disposal		692,391
			Annual Plastic Disposal		69,948
Subclass	Resin Container Type	Resin Subsort Category	%Total Disp	%Plastic Disposal	Tons
#1 PET Clear/Green Bottles-Food	Plastic Bottles	#1 PET Clear/ Green	0.1%	1.3%	881
#2 HDPE Natural Bottles-Milk/Soy/Dairy	Plastic Bottles	#2 HDPE Natural	0.2%	1.8%	1,226
#2 HDPE Pigmented Bottles-Non-Food/Non-Beverage	Plastic Bottles	#2 HDPE Pigmented	0.2%	1.5%	1,047
#1 PET Thermoforms	#1 PET Thermoforms	#1 PET Clear/ Green	0.5%	5.4%	3,798
Tubs/Lids Excluding #6 Polystyrene-#5 PP Rigid	Tubs/Lids Excluding #6 Polystyrene	#5 PP Rigid	0.2%	1.6%	1,106
Tubs/Lids Excluding #6 Polystyrene-Unlabeled Resin	Tubs/Lids Excluding #6 Polystyrene	Unlabeled Resin	0.2%	2.2%	1,570
#6 Rigid Polystyrene Containers/Packaging	#6 Rigid Polystyrene Containers/Packaging	#6 PS Rigid	0.1%	1.3%	930
#6 EPS Containers/Packaging	#6 EPS Containers/Packaging	#6 PS Expanded	0.4%	4.0%	2,819
Other Rigid Containers/Packaging-Unlabeled Resin	Other Rigid Containers/Packaging	Unlabeled Resin	0.3%	2.9%	2,005
Film Plastic: Retail Bags and Sleeves	Film Plastic: Retail Bags and Sleeves	Polyethylene Film (HD/LD/LLD)	0.4%	4.4%	3,059
Film Plastic: Garbage Bags	Film Plastic: Garbage Bags	Polyethylene Film (HD/LD/LLD)	2.2%	21.5%	15,047
Film Plastic: Other #2/#4 Polyethylene-Polyethylene Film (HD/LD/LLD)	Film Plastic: Other #2/#4 Polyethylene	Polyethylene Film (HD/LD/LLD)	0.1%	1.5%	1,026
Film Plastic: Other Non-PE/Contaminated-Non-PE Film	Film Plastic: Other Non-PE/Contaminated	Non-PE Film	1.0%	10.4%	7,262
Single Use Plates/Cups/Cutlery-#5 PP Rigid	Single Use Plastic Plates/Cups/Cutlery	#5 PP Rigid	0.1%	1.0%	709
Single Use Plates/Cups/Cutlery-#6 PS Rigid	Single Use Plastic Plates/Cups/Cutlery	#6 PS Rigid	0.2%	2.1%	1,456
Single Use Plates/Cups/Cutlery-#6 PS Expanded	Single Use Plastic Plates/Cups/Cutlery	#6 PS Expanded	0.5%	4.7%	3,318
Single Use Plates/Cups/Cutlery-Unlabeled Resin	Single Use Plastic Plates/Cups/Cutlery	Unlabeled Resin	0.3%	2.7%	1,856
Appliances: Unlabeled Resin	Appliances: Plastic	Unlabeled Resin	0.2%	2.3%	1,612
Bulk/Rigid: Toys/Housewares-Unlabeled Resin	Bulk/Rigid Plastic: Toys/Housewares	Unlabeled Resin	0.5%	5.4%	3,754
Other Plastics-Unlabeled Resin	Other Plastics	Unlabeled Resin	0.9%	8.5%	5,914
Portion these plastics represent:			8.7%	86.3%	60,395

Plastic Type Definitions

Vermont Plastic Definitions

PET Bottles means clear or colored PET bottles, including “VT” deposit containers. When marked for identification, it bears the number “1” in the center of the triangular recycling symbol and may also bear the letters “PETE” or “PET”. The color is usually transparent green or clear. A PET container usually has a small dot left from the manufacturing process, not a seam. It does not turn white when bent. This category is to be set aside for sub-sorting by DSM.

PET Food and Dairy Bottles and Jars (which originally contained non-hazardous material) means food and rice milk, soy milk, milk and dairy bottles and jars (e.g., peanut butter, mayonnaise) but excluding PET tubs and lids – see below.

HDPE Beverage Bottles means natural and colored HDPE containers that contained beverages, excluding rice milk, soy milk, milk and dairy. When marked for identification, it bears the number “2” in the triangular recycling symbol and may also bear the letters “HDPE. This category is to be set aside for sub-sorting by DSM.

HDPE Food, Dairy and Detergent Bottles, means all HDPE bottles that would not be subject to either the current VT deposit or an expanded deposit, including food bottles, rice milk, soy milk, milk and dairy and laundry detergent bottles.

Plastic Bottles #3-#7 (which originally contained non-hazardous material) means plastic bottles made of types of plastic other than HDPE or PET. Items may be made of PVC, PP, or PS. When marked for identification, these items may bear the number 3, 4, 5, 6, or 7 in the triangular recycling symbol. This subtype also includes unmarked plastic bottles. This category is to be set aside for sub-sorting by DSM.

Plastic Cups means all plastic cups, no matter what resin used for drinking beverages including iced coffee, solo cups, etc. This category also includes Keurig cups used to brew cups of coffee. This category is to be set aside for sub-sorting by DSM.

Tubs and Lids means all plastic containers used for food items that are not a bottle or a jar. Examples include yogurt and butter containers, no matter what resin type. This category is to be set aside to be sub-sorted by DSM.

Bulky Rigids (and containers greater than 1 gallon) means plastic pails, large bottles holding kitty litter and bulk water, and plastic objects other than disposable package items. These items are usually made to last for a few months up to many years. These include 5 gallon pails, and the plastics used in children toys, furniture, plastic landscape ties; plastic railroad ties, mop buckets, sporting goods, etc. This category does not include agricultural pots which are to be separately sorted. These items are to be set aside for sub-sorting by DSM.

Thermoforms means typically clear plastic packaging used for lettuce, berries, deli foods, which is sometimes called a “clamshell”, no matter which resin it is. Excludes extruded polystyrene foam (EPS). These items are to be set aside for sub-sorting by DSM.

Film, Retail Bags means all plastic bags used to carry groceries and other items purchased at retail stores.

Film, Other Bags means all plastic bags that are not retail bags or garbage bags, including bread bags, bags used in cereal boxes, non-metalized chip and snack bags, sandwich bags, dry cleaning bags, etc.

Film, Wrap means film plastic used for large-scale packaging or transport packaging. Examples include shrink-wrap, mattress bags, furniture wrap, and film bubble wrap.

Film, Garbage Bags means bags made specifically to store garbage. Note that bags containing garbage that were once retail bags should be classified as retail bags once the garbage has been emptied out of them.

Other Film means plastic film that is contaminated or otherwise non-recyclable. Examples include painting tarps, food wrappers such as candy-bar wrappers, mailing pouches, bank bags, X-ray film, metalized film including metalized chip and snack bags, and plastic food wrap. This category is to be set aside for sub-sorting by DSM.

Agricultural Pots means all pots no matter the resin type that are used for agricultural purposes including pots, flats and trays. This category is to be set aside for sub-sorting by DSM.

Pouches means plastic and metalized plastic pouches used to store food and beverages. This category is to be set aside for sub-sorting by DSM.

Remainder/Other Plastic means plastic that cannot be put in any other type or subtype. This type includes items made mostly of plastic but combined with other materials. Examples include auto parts made of plastic attached to metal, plastic drinking straws, produce trays, foam packing blocks, foamed polystyrene (including meat trays), plastic strapping, new plastic laminate (e.g., Formica), vinyl, linoleum, plastic lumber, imitation ceramics, handles and knobs, plastic lids, some kitchen ware, toys, plastic string (as used for hay bales), and CD's. This category is to be set aside for sub-sorting by DSM.

Oregon Plastic Definitions

Deposit beer and soft drink plastic beverage bottles. Any beverage container up to 3 liters in size with an Oregon deposit for beer, soft drink, carbonated water and juice. Does not include out-of-state bottles or soft drink syrup containers.

Deposit plastic water bottles. Only includes still waters and flavored waters added to the bottle bill as of 2009, up to 3 liters in size. Does not include out-of-state bottles.

No-deposit plastic beverage bottles (RPCs). 8-ounce to 5-gallon plastic beverage bottle without an Oregon deposit such as milk, juice, alcohol, wine, smoothie, coffee, tea. Includes beer, soft drink, and water bottles that are over 3 liters in size or that are from out-of-state that are not marked with the Oregon refund value. Does not include cream, half & half, syrups, and powdered beverages.

No-deposit very small, large beverage bottles. Plastic Bottles less than 8 ounces or larger than 5 gallons that hold ready-to-drink beverages. Mainly small liquor bottles.

Other plastic bottles. All non-beverage bottles 8 ounces to 5 gallons used for non-beverage food, medicines, vitamins, hair and bath products, laundry supplies, antifreeze, oil.

Plastic tubs, pails acceptable in curbside. Tubs, pails (buckets), flowerpots 4 inches or larger, from 8 ounces to 5 gallons in size made from plastic and meeting the definition in Oregon Revised Statute 459A.650 for Rigid Plastic Container. Does not include trays or clamshells.

Other plastic tubs, pails, and trays that meet Rigid Plastic Container definition but are not acceptable in curbside. Plastic packages of finite shape with a capacity of from 8 ounces to 5 gallons. Includes cookie trays, trays with sidewalls that can contain at least 8 ounces, clamshells, flower pots less 4 inches that are greater than 8 ounces. Does not include lids, unless the lid is attached or is itself a rigid plastic container. Includes plastic cups used commercially to package food, but not plastic cups sold as a product for home or office use (usually unmarked - included in "rigid plastic products"). Does not include tubs/pails that are acceptable in curbside, or any bottles. Does not include flexible tubes like bathroom caulk, toothpaste.

Small Plastic Tubs acceptable in curbside. Includes the plastic tubs and yogurt containers that are at least 6 ounces in size, but less than 8 ounces.

Other rigid plastic packaging. Includes expanded polystyrene packaging and food trays (holding less than 8 ounces), urethane foam packaging, containers larger than 5 gallons, plastic bottle and container lids and lids from glass, metal, or paper containers. Amended in 2000 to include "small rigid plastic containers" - plastic containers such as yogurt cups that are less than 8 ounces in size.

Other rigid plastic products. Dishware and utensils, including expanded polystyrene cups and plates when originally sold for home use (non-packaging), plastic household items, all-plastic furniture, and toys. Includes thermoset plastic products and "fiberglass" (mainly plastic) boat parts, corrugated roofing, and similar products. Includes polyurethane foam products, such as urethane foam carpet padding.

Mixed plastics/materials. Items whose predominant material is plastic, but is combined with other material, such as kitchen ware, toys, plastic pens, car parts with other components, non-vinyl floor tiles and coverings that have canvas, paper, or other types of backing material or significant non-plastic components, etc.

Plastic beverage pouches. Includes ready-to-drink beverages only.

“Recyclable” polyethylene film plastic. Includes plastic grocery bags, retail bags, newspaper bags, dry cleaner bags, pallet-wrap, shrink wrap, clear and black polyethylene plastic sheeting, hay sleeves and silage bags, fertilizer/peat/feed bags from nurseries and agricultural operations, furniture and mattress wrap, bubble wrap, woven lumber wrap, roofing material wrap, insulation wrap, commercial bags and liners, commercial parts packaging, and building wrap. Excludes any film that is not polyethylene or other polyolefin, any film that is laminated to other materials (tape/labels are OK), any bag used as a garbage bag (can liners and tied-off garbage bags), bags contaminated with food and other sticky/contaminating materials on the inside, food and household product packaging such as frozen vegetable bags, diaper packaging, bread bags, zip lock and similar household use bags, and plastic sheeting used for ground cloths or masking, if contaminated.

Other film plastic. All other plastic bags and flexible plastic film including garbage bags, plastic strapping, and other flexible plastic items. Any plastic bag used as a garbage bag goes here.