Oregon's Rigid Plastic Container Recycling Rate for 2005 and Determination of the Recycling Rate for Compliance Purposes for 2007
Supplement issued June 20, 2007

Summary

In December 2006, the Oregon Department of Environmental Quality (DEQ) determined that the recycling rate for rigid plastic containers for compliance purposes for 2007 would be below 25%. As Oregon's Rigid Plastic Container law requires, DEQ based that determination on data and trend information available at that time.

Since December, DEQ has received new information that prompted us to revise that earlier determination. DEQ has now determined that the recycling rate for rigid plastic containers for compliance purposes will be above 25% in 2007. This revised determination is based on the following sources of new information:

1) Data submitted in February and March of 2007 by major plastic recyclers and recycling processors for the 2006 Oregon Material Recovery Survey show substantial increases in the amount of rigid plastic containers being collected for recycling through curbside recycling programs and by specialty plastics recyclers when compared to 2005 recycling tonnages.

2) A number of cities have recently reported implementation or plans to implement changes to their recycling programs that are expected to increase significantly the amount of rigid plastic containers being collected for recycling in 2007 and beyond. These changes include moving from bin collection systems to roll-cart collection systems and adding tubs, pails, and other types of rigid plastic container collection programs.

3) DEQ has received and analyzed new data on the contamination levels of plastic containers being recycled, and these new data show a contamination level slightly below that of earlier samples. Reduced contamination means that more of what was collected for recycling was actually recyclable containers. DEQ also found and corrected an error in data for one recycler in 2004 and 2005 in which rigid plastic containers were mistakenly reported or recorded as being other plastic. This correction increased the recycling rate for rigid plastic containers in those years.

This revised determination means that all rigid plastic container manufacturers and product manufacturers who package products in rigid plastic containers are in compliance with Oregon's rigid plastic container laws in 2007 by means of using plastic that meets the aggregate recycling rate for compliance purposes for 2007.

In addition, DEQ has determined the recycling rates for compliance purposes for the major individual plastic resins. For 2007, the recycling rate for polyethylene terephthalate (#1 PET) is above 25%, the rate for high density polyethylene (#2 HDPE) is 25%, and the rates for all other major resins are less than 25%.

Background

On December 29, 2006, the Department of Environmental Quality (DEQ) issued the report "Oregon's Rigid Plastic Container Recycling Rate for 2005 and Determination of the Recycling Rate for Compliance Purposes for 2007." In that report, DEQ determined that the aggregate recycling rate for compliance purposes for RPCs had fallen below 25% for 2007. This determination did not trigger any immediate compliance requirements for companies that package their products in rigid plastic containers since the law provides a one-year period for companies to come into compliance. If the aggregate recycling rate for compliance purposes were to remain below 25% in 2008, some product manufacturers would need to use recycled content in their plastic containers or meet the law's requirements in some other way. However, new plastics recycling data and other information

received by DEQ in the past four months indicate that the recycling rate for rigid plastic containers in 2007 is higher than determined earlier by DEQ.

2006 Recycling Shows Increases

Although DEQ will not complete analysis and publish results of the 2006 Oregon Material Recovery Survey until later this year, almost all the surveys for 2006 have been submitted. This allows DEQ to directly compare 2005 and 2006 recycling tonnages for the major processors and recyclers of rigid plastic containers. DEQ has looked at year-to-year changes in recycling tonnage for major bottle bill recyclers, curbside recycling processors, and other specialized recyclers.

Overall, the amount of plastic bottles recycled by bottle bill distributors fell slightly in 2006. Most beverage distributors reported small decreases in plastic recycled. After taking into account material sold between distributors, the totals for the major bottle bill distributors was some 200 to 300 tons less than in 2005. This is in line with recent trends showing declining sales in soft drinks, as waters and juices (not covered under the Oregon Bottle Bill) become more popular.

For curbside programs, the amount of plastics collected and sold increased in 2006. All processors who sort commingled material reported more plastic in 2006 than in 2005, and the total increase was close to 1,500 tons. This increase was unexpectedly large and might be partly the result of new recycling programs coming on line, discussed later in this report.

For specialized recyclers, it appears that two companies showed significant increases in rigid plastic containers recycled. However, evaluating these companies is more difficult because these companies also purchase plastic from other recyclers, and it will take more analysis and cross-checking to determine how much of an increase did occur. At this time though, it appears that the specialty recyclers collected at least 800 tons more in 2006 than in 2005, and the amount could be higher.

Overall, the tons of rigid plastic containers recycled in 2006 appear to be higher by at least 2,000 tons than the amount recycled in 2005. However, some of this tonnage includes lids, residue of contents, and other contaminants. Taking into account the estimated contamination rate of about 10% for rigid plastic containers, this yields close to 1,800 additional tons of clean, dry plastic being recycled in 2006 as compared to 2005. The average increase in plastics recycling in recent years has only been 400 to 500 tons per year, so this is a substantial increase.

New Plastic Recycling Collection Programs

A number of Oregon jurisdictions have made or plan to make changes to their recycling collection programs in 2007 that should result in increases in rigid plastic container collection:

- Most of Clackamas County began accepting plastic tubs in addition to plastic bottles in their curbside programs
- Forest Grove, Wood Village, and Molalla began using large roll carts instead of bins to collect residential curbside recyclables.
- Hillsboro, Bend, and Gresham are planning to change from bin collection to roll-cart collection later in 2007. However, Hillsboro and Bend will at the same time cut back from weekly to every-other-week collection, which is expected to partially offset the increase in recycling that comes from changing from bins to roll-carts for collection.

In 2004 and 2005, DEQ conducted a study of recycling programs that quantified the amount of material picked up by different curbside programs throughout Oregon. By comparing different types of programs, DEQ developed estimates of how many pounds per person per year different types of program changes would produce. These results are shown in Table 1 below:

Table 1: Extra rigid plastic container recycling based on program changes

Program change	Additional lbs/person per year
Weekly bins to biweekly roll-carts - no tubs	**1.3**
Weekly bins to biweekly roll-carts - with tubs	**1.8**
Weekly bins to biweekly roll-carts - add tubs	**2.2**
Weekly bins to weekly roll-carts - no tubs	**3.1**
Weekly bins to weekly roll-carts - add tubs	**3.6**
Add tubs to existing program	**0.5**

The estimates in Table 1 are based on the total population of a city - not just the people with curbside recycling. The recycling pounds per person per year are thus diluted by the approximately 28% of people who live in apartments and other multifamily housing that do not have curbside recycling. The pounds per person are also reduced by the estimated loss of 18% of rigid plastic containers at sorting facilities and another estimated 6% loss due to lids and contents residue.

Table 2: Changes in Oregon collection programs since 2004

Area	Pop. 06	Date	Change	Factor lbs/ person	Tons/ year
Sandy	7,070	May 05	Bins to roll-carts - no tubs	3.1	11.0
Lake Oswego & Rivergrove	36,700	Jun 05	Bins to roll-carts - no tubs	3.1	56.9
Turner	1645	2005	To roll-carts - drop to biweekly - tubs	1.8	1.5
8 Yamhill County cities	47,600	Oct. 05	To roll-carts - drop to biweekly - no tubs	1.3	30.9
Dundee	3,010	Nov. 05	To roll-carts - drop to biweekly - no tubs	1.3	2.0
Sherwood & Tigard	62,415	Jan. 06	Bins to roll-carts - no tubs	3.1	96.7
Mt. Angel	3,665	Jan. 06	To roll-carts - drop to biweekly - tubs	1.8	3.3
Beaverton	84,270	Mar. 06	Bins to roll carts plus add tubs	3.6	151.7
Mill City	1,585	2006	To roll-carts - drop to biweekly - tubs	1.8	1.4
Damascus & Happy Valley	18,880	Oct. 06	Bins to roll-carts - no tubs	3.1	29.3
Almost all Clackamas County	364,460	Jan. 07	Add tubs to almost all existing programs	0.5	91.1
Wood Village	2,965	Jan. 07	Bins to roll-carts - no tubs	3.1	4.6
Forest Grove	20,380	Feb. 07	Bins to roll-carts - no tubs	3.1	31.6
Woodburn	22,615	Feb. 07	To roll-carts - drop to biweekly - tubs	1.8	20.4
Molalla	6,830	Apr. 07	Bins to roll-carts - no tubs	3.1	10.6
Stayton	7,700	2007	To roll-carts - drop to biweekly - tubs	1.8	6.9
Hillsboro	84,445	Aug. 07	To roll-carts- drop to biweekly - add tubs	2.2	92.9
Bend	75,290	Sept 07	To roll-carts- drop to biweekly - add tubs	2.2	82.8
Gresham	97,745	Sept 07	Bins to roll-carts - add tubs	3.6	175.9

A number of large cities have implemented or will implement changes in their recycling collection programs in 2007. Based on the factors shown in Table 1, these new programs should add more than 500 tons of additional rigid plastic container collection per year when fully implemented. This is a conservative estimate since it only accounts for increases in residential curbside recycling collection and does not take into account improvements in multifamily and commercial recycling collection which are also taking place. In addition, the City of Portland will likely move to weekly roll-cart collection and include plastic tubs in their program starting in 2008.

Revised Recycling Estimates for 2005 and Before

2005/2007 Rigid Plastic Container Recycling Rates Supplement

Two additions or corrections to data have changed DEQ's estimate of the tons of rigid plastic containers recycled for 2005 and some previous years. The first change comes from additional data that has been collected on the contamination rate of plastics being recycled. The second comes from an error in reporting and in data compilation discovered when DEQ was compiling data on resin-specific recycling.

DEQ has been conducting a composition study to determine the contamination rate of rigid plastic containers that are being recycled in Oregon and also to determine the composition of these containers by resin. The study involves collecting 40+ pound samples of rigid plastic containers from bottle bill distributors/processors, material recovery facilities that sort commingled containers, and other plastics recyclers; removing and weighing all contaminants; cleaning and drying the containers if necessary; and then sorting and weighing the containers by resin. By comparing the initial weight of each sample with the weight of the clean, dry plastic containers at the end, DEQ can estimate how much of the material sold is clean, dry plastic from rigid plastic containers and how much is other types of plastic, lids, residue of contents, and other contaminants. DEQ then applies this "contamination factor" to the total tons of rigid plastic containers reported to have been recycled, in order to estimate the clean, dry weight of the recycled plastic. The methodology is described in more detail in the resin-specific recycling rate section on page 5. This methodology is similar to the methodology DEQ used to determine the clean, dry weight of plastics being disposed.

In the 2005-07 report published on December 29, 2006, DEQ used the preliminary results of an ongoing contamination study to estimate the amount of plastics being disposed. Since then, DEQ has finished analyzing new samples in this study. The newer samples were cleaner on average than the older samples, although the difference was not statistically significant. The contamination level based on the original samples was estimated at 10.92%. Applying that figure to the 15,495 tons of plastic containers originally reported as being recycled gives a clean, dry weight of 13,803 tons of rigid plastic containers recycled. However, including the new samples that DEQ just finished analyzing, the contamination rate is now estimated at 9.11% instead of 10.92%. Applying this to the originally-reported 15,495 tons gives a new clean, dry tonnage of 14,083 tons of rigid plastic containers. This adjustment alone raised the 2005 recycling rate of plastic containers to 24.7% from the previously-announced 24.3%.

The other correction involved data submitted by one private recycler. While reviewing data for calculating resin-specific recycling rates, DEQ found that it had recorded as "Other Plastic" tons that should have been recorded as rigid plastic containers. DEQ then consulted with the recycler over all its plastic data, conducted a site visit to verify the information, and determined that the recycler has also mis-classified other tons as being "other plastic" that should have been classified as rigid plastic containers. The net result was to move 552 tons from the "other plastic" material category to "rigid plastic containers," raising the total RPC tonnage to 16,047 tons in 2005. Applying the 9.11% contamination factor results in a total clean, dry tonnage of 14,584 tons recycled in 2005. The disposal of RPCs for 2005 remains unchanged at 43,035 tons, so the 2005 recycling rate was 25.3% (14,584/(14,584+43,035)). A similar but much smaller error was found for this same recycler in 2004. The net result for 2004 was to move 120 tons from "other plastic" to "rigid plastic containers" prior to deducting for contamination.

Projecting the Recycling Rate for Compliance Purposes

For the first few years after the 1991 passage of the rigid plastic container law, many new curbside, depot, and other recycling programs were beginning to come online. To project the recycling rate for the coming year, DEQ and its contractor did an extensive evaluation of all the new recycling programs in order to estimate how many tons they would collect. This information was combined with national trends on plastic resin sales and other information to determine the recycling rate for the coming year. For the first few years, the rigid plastic container recycling rate climbed quickly as these programs came on line. These original projections turned out to be only slightly high when the true recycling rate was eventually calculated two years later.

After 1995, very few new programs were getting started, as most programs matured and became stable. Recycling rates tended to decline slowly as the increase in easily-recycled plastic bottles did not keep up with

even greater increases in other more difficult to recycle plastic containers. With few new programs coming online, DEQ changed the way it projected recycling rates for the coming year and began using existing trends in recycling and disposal to help determine the rate for the coming year. From 2000 to 2004, a few new programs came online, and some major programs (much of the Salem and Eugene areas) switched to using roll-carts to collect recyclables. However, these new programs did not provide enough of an increase in recycling to counter the other factors decreasing the recycling rate. Part of this may be that many Eugene and Salem programs dropped back to every-other-week collection when they moved to roll-carts, which partially reversed the increased plastics collection expected when moving to roll carts.

Since 2005, however, the number of new/improved programs has increased greatly, and based on recent announcements and recently-passed legislation, plastic collection programs are expected to continue increasing through at least 2009. As new programs come online, past trends are less reliable for determining future recycling rates.

This supplemental report takes the underlying trend information for rigid plastic recycling and disposal tonnage and adds to it extra tons based on newly-announced recycling collection programs plus new preliminary recycling estimates for 2006. Table 3 is a summary table that includes these new tonnage estimates, applies the updated information on plastic contamination rates back through the early years, and also incorporates data corrections for 2004 and 2005.

Table 3: Revised recycling and disposal of rigid plastic containers 1993-2005

Year	Disposed	Recycled	Generated	Recycling rate
1993	22,635	8,107	30,742	26.4%
1994	23,825	9,007	32,832	27.4%
1995	23,684	9,813	33,497	29.3%
1996	25,793	10,494	36,287	28.9%
1997	27,584	10,596	38,180	27.8%
1998	29,058	11,076	40,134	27.6%
1999	31,400	11,843	43,243	27.4%
2000	33,879	12,873	46,752	27.5%
2001	34,395	14,897	49,292	30.2%
2002	35,808	12,192	48,000	25.4%
2003	37,698	13,840	51,538	26.9%
2004	40,425	13,106	53,531	24.5%
2005	43,035	14,584	57,619	25.3%
projected 2006	43,711	16,368	60,079	27.2%
projected 2007	45,529	17,114	62,643	27.3%

Resin-Specific Recycling Rates.

When DEQ published the 2005/2007 Rigid Plastic Container Recycling Report in December 2006, DEQ did not have the needed data on recycling quantities for individual resins. As part of its Material Recovery Survey, DEQ asks companies to report only the tons of rigid plastic containers they recycle and not the tons of individual resins. Unlike recycling, DEQ does have adequate disposal tonnage estimates by resin based on waste composition studies. Although DEQ is conducting a composition study for recycled containers, as of the end of 2006 DEQ felt that there were too few samples available to make a good determination of recycling by resin type.

At this time, DEQ has completed analysis of 21 samples of rigid plastic containers taken from different plastics recyclers throughout the state. This is enough to provide a preliminary estimate of the recycling tonnage by resin, but by the end of 2007 DEQ intends to have collected and analyzed a total of at least 40 samples.

The method for calculating recycling rates for individual resins is similar to the method for calculating overall plastics recycling rates. For each resin, the recycling rate equals the total tons of resin recycled divided by the total tons generated, where generation equals the tons recycled plus the tons disposed. Data are presented below for three major resins:

#1 PET (Polyethylene terephthalate) Clear plastic used for soft drink and water bottles and also many deli clamshells and trays.

#2 HDPE (High density polyethylene) Plastic used for milk jugs, many detergent bottles, 5-gallon pails, and many other packaging uses.

#5 PP (Polypropylene) Fewer bottles are made of polypropylene, but many tubs, trays, and flower pots are made of this plastic.

Resins that are not included below, except in summary, are:

#3 PVC (Polyvinyl chloride). This plastic is considered a serious contaminant to PET recycling. PVC has largely been replaced in certain packaging applications by PET, so relatively few PVC bottles are used by consumers. Although many curbside programs collect mixed bottles, and PVC bottles are a small part of that mixture, it is not clear that any of these bottles are being sorted out and recycled back into PVC products since they are so rare in the recycling stream.

#4 LDPE (Low density polyethylene). This is the common plastic used in bags and film sheeting, but it is rarely used for rigid plastic containers. Some squeezable food containers are made with LDPE.

#6 PS (Polystyrene). This plastic is used in a variety of packaging but is rarely used for plastic bottles and very few programs will accept polystyrene tubs or trays for recycling.

#7 Other. This is a catch-all category for all other plastic resins and for containers that are made from mixed resins. Some containers that could not be identified by resin were added to this category for analysis.

Disposal By Resin:

Based on data from the 2005 waste composition study, the total amount of each plastic resin disposed in Oregon in 2005 is shown in Table 4 below.

Table 4: Rigid plastic container disposal by resin, 2005

	Percent of RPCs	Percent of garbage	Total tons disposed *
1 PET	34.60%	0.491%	14,890
2 HDPE	38.42%	0.546%	16,534
5 PP	7.09%	0.101%	3,050
All else	19.90%	0.282%	8,562
Total	100.00%	1.420%	43,035

* Tonnages are based on applying the "percent of garbage" to the 3,030,908 tons of disposed waste for the year

Recycling By Resin:

As part of the annual Material Recovery Survey, DEQ collects data on the total tons of rigid plastic containers collected and sold by each recycler in Oregon, but generally these recyclers do not report their plastic container data separated by plastic resin. In order to estimate the amount of each plastic resin being recycled, DEQ has been conducting a composition study on the recycled containers collected for recycling.

The first step in the recycling composition study was to divide all of the major recyclers into three categories:

1) Bottle bill distributors/processors

2) Material recovery facilities (MRFs) that sort commingled recyclable materials and separate out plastic containers

3) Other specialty recyclers, such as AgriPlas, Northwest Polymers, Clayton Ward, and Weyerhaeuser that handle separate types of plastics from a wide range of generators or recyclers.

Next, samples of market-ready rigid plastic containers were collected from recyclers in each class. Each sample consisted of at least 40 pounds of plastic that was about to be baled for market. These samples were taken back to a facility where the containers were sorted by resin; all contaminants such as lids, non-container plastics and container contents were separated and weighed; and the containers were washed and air-dried where necessary. Doing this allowed DEQ to determine the clean, dry weight for each plastic resin and also determine the percentage of contamination coming from each class of recyclers. Some of the MRFs sort out more than one type of plastic from their commingled mix. For example, it is common for a MRF to separate out their rigid plastic containers into three grades: PET, "natural" (clear) HDPE, and all other plastic. In these cases, DEQ collected subsamples from each of the separate grades, and then combined the results of these subsamples back together based on the total tonnage of each plastic grade separated by that facility. For the Bottle Bill processors and the MRFs, sampling was pretty straightforward. However, for the specialty recyclers, it was usually not possible to collect representative samples at the facility because each handles many separate grades of plastic from many different sources. Unlike the bottle bill processors who only handle one type of plastic, or the MRFs that have all their plastics blended together, the specialty recyclers may have very diverse loads. For example, one load of plastics might consist of pots and trays from a plant retailer, another load containers from a warehouse, and another load only 5-gallon buckets from a food service. For most of these facilities, it would be very difficult to devise a sampling protocol that would accurately determine the tons being recycled of each resin. However, many of these facilities track sales by resin since they sell the resins separately. For these specialty recyclers, sampling was needed only to determine estimates of contamination, rather than to estimate the tonnage of each resin recycled. Results are shown in Table 5 below.

Table 5: Contamination rates for recyclers in each class.

	"Dirty, Wet" tons sold	Contaminants, water, residue %	"Clean, Dry" tons
Bottle Bill	4,753	6.42%	4,448
MRFs from Curbside	9,446	10.84%	8,422
Other Sources	1,847	7.22%	1,714
Total	16,047		14,584

Based on the results of the plastic container recycling composition study, the recycling tonnages for major resins were calculated as shown in Table 6 below.

Table 6: 2005 Recycling and recycling rates for major plastic resins

	Bottle Bill tons	MRF tons	Other sources tons	Total RPC recycled	Tons disposed (Table 2)	% recycling rate
1 PET	4,448	3,581	10	8,039	14,890	35.06%
2 HDPE	0	4,293	1,056	5,350	16,534	24.45%
5 PP	0	160	434	594	3,050	16.29%
all other and unknown	0	388	214	602	8,562	6.57%
Total	4,448	8,422	1,714	14,584	43,035	

Based on these results, the recycling rate for PET is clearly greater than 25%, the rate for HDPE is very close to 25%, and all other major resins are under 25%.

Much of the increase in recycling has been coming from curbside programs and specialty recyclers - both of which handle higher proportions of HDPE than PET. DEQ has used projections of changes in the different sources of recycled plastic to project recycling rates for major resins for 2007. There is considerable uncertainty in these projections, but the results are shown in Table 7 below.

Table 7: 2007 Projected recycling and recycling rates for major plastic resins

	Bottle Bill tons	MRF tons	Other sources tons	Total RPC recycled	Tons disposed	% recycling rate
1 PET	4,074	4,457	14	8,545	16,383	34.3%
2 HDPE	0	5,344	1,461	6,805	16,986	28.6%
5 PP	0	199	600	799	3,162	20.2%
all other and unknown	0	483	482	965	8,998	9.7%
Total	4,074	10,483	2,557	17,114	45,529	27.3%

Based on these projections, DEQ has determined that the recycling rate for compliance purposes for #1 PET is above 25%, the rate for #2 HDPE is just above 25%, and the rates for other major resins are below 25%. However, since the aggregate rate for all resins combined is above 25%, all plastic container manufacturers and product manufacturers who package in rigid plastic containers are in full compliance with Oregon's rigid plastic container requirements for 2007.

Future Recycling Rates

The initial determination at the end of 2006 that the rigid plastic container recycling rate for compliance purposes had fallen below 25% created a fair amount of attention for plastics recycling and may have helped influence a number of major changes that should help increase plastic recycling rates. Among these changes are the following:

- A number of cities and counties have announced or carried out changes in their recycling collection programs that should help increase plastics recycling. The largest change should occur in 2008 when the City of Portland moves to roll-cart recycling and includes plastic tubs and pails in its collection programs.
- The Oregon Legislature has amended the Bottle Bill to include plastic water bottles, which should add thousands of more tons of plastic to recycling after these provisions go into effect in 2009.

- Recycling processing operators, with some assistance from the plastics industry, continue to look into ways to improve their sorting of materials so that less plastic gets lost in with the newspaper going to paper mills, where the plastic is discarded.

With these changes in the works, DEQ expects that over the near-term, the recycling rate for rigid plastic containers should remain above 25%.

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