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2010 REPORT ON POST CONSUMER PET CONTAINER RECYCLING ACTIVITY

FINAL REPORT

INTRODUCTION

2010 marks the sixteenth year that the National Association for PET Container Resources (NAPCOR) has issued this report in its current format, and the sixth year that NAPCOR and The Association of Postconsumer Plastic Recyclers (APR) have worked together to produce it.[1] Without the APR's support and the cooperation of its members, this report would not be possible. As such, it is intended to provide the reader with a detailed overview of the recycling of injection stretch blow molded PET containers in the United States during 2010. Information contained in this report was obtained through surveys conducted by HDR Inc. and Moore Recycling Associates, combined with data generated internally by NAPCOR, the PET Resin Association (PETRA), and the International Bottled Water Association (IBWA). In order to present as accurate a picture of these activities as possible, additional data and information were obtained through discussions with individual collectors, intermediate processors, reclaimers, converters, brokers, exporters, resin producers, bottle manufacturers, public recycling officials, consultants, and key industry members.

PET BOTTLES AVAILABLE FOR COLLECTION

The negative growth in PET bottles and jars sold in the United States (U.S.) during 2008 and 2009 ended with a rebound more robust than many anticipated. All beverage categories posted positive growth with juice, juice drinks, and ready-to-drink tea leading the way with double digit increases. Carbonated beverages also saw growth before tailing off during the last two months of the year. These increases were somewhat offset by continued light-weighting efforts that continued in 2010 and will continue for at least the next couple of years as every fraction of a gram used in a bottle is scrutinized.

NAPCOR determined that the total number of pounds of PET bottles and jars available in the United States for recycling in 2010 was 5.350 billion. This number reflects the total amount of PET bottle resin used by U.S. bottle manufacturers from U.S., foreign, and recycled sources, less scrap generated and not reused, exported bottles and pre-forms, and bottles less than eight ounces in size. This number is used in this report as the denominator in determining both the recycling and utilization rates, and includes the use of 274 MMlbs of post consumer PET recyclate.

[1] It has become cumbersome to continue to provide all of the historical data so this report will generally show data for only the last 10 years. Those who are interested in previous reports can access them at www.napcor.com/PET/pet_reports.html.

POST CONSUMER PET BOTTLE PURCHASES

The amount of post consumer PET bottles collected for recycling and sold in the United States in 2010 was 1,557.2 million pounds. The breakdown of this total, by purchaser, expressed in millions of pounds (MMlbs), is as follows:

775.9	- Purchased by U.S. Reclaimers
719.6	- Purchased by Export Markets
61.7	- PET bottle component of mixed bales exported
1,557.2	- Total Amount of Post Consumer Bottles *(MMlbs)*

This represents a 113 MMlb increase in the amount of bottles collected, resulting in an increase in the overall PET bottle recycling rate to 29.1%. There were a number of factors, both positive and negative, that impacted collections in 2010:

- An increase in the amount of bottles available for recycling (the denominator);
- A more than 50 MMlb increase in deposit program collections, a result of expansions in Oregon, Connecticut and New York;
- New curbside program recycling opportunities for at least 3,836,400 people;
- Additional new commercial recovery efforts.

This progress was countered by:

- A 5.3 MMlb drop in bottles collected in California
- Publicly initiated collection programs being discontinued or curtailed in various parts of the country due to budget concerns;
- Light weighting

United States reclaimers increased their purchases by 134.1 MMlbs from 2009 levels, absorbing all of the additional 113 MMlbs collected in 2010 and then some. The 775.9 MMlbs is by far the highest volume purchased by U.S. reclaimers in any year to date, the result of massive new investment in reclamation capacity. Canadian reclaimer purchases dropped 10 MMlbs to 44 MMlbs, while other export purchases of PET bottle bales, predominantly by Chinese buyers, also dropped by 50 MMlbs to 675.6 MMlbs.

United States reclaimers continued to supplement their domestic purchases by importing 89.5 MMlbs of post consumer bottles, predominantly from Canada, Mexico, South and Central America. Domestic reclaimers also reported buying 20.3 MMlbs of alternative feedstock, including pre-consumer bottles, post consumer strapping, and other unprocessed industrial scrap. All total, U.S. reclaimers purchased a total of 885.7 MMlbs of scrap material, an increase of 112.2 MMlbs over 2009.

In 2010, PET bottles were again exported as part of mixed plastic bottle bale and mixed rigid plastic packaging bale shipments. PET bottles made up different fractions of mixed bottle or mixed rigid bales; totals are calculated accordingly and contributed to about 61.7 MMlbs of PET bottles sold in these forms.

POST CONSUMER BOTTLES Gross Weight Purchases *(MMlbs)*	**2000**	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
A. Purchased by U.S. Reclaimers	599	600	522	520	631	681	619	641	615	642	776
B. Purchased by Exporters *	170	234	275	321	372	489	653	755	836	802	781
C. Total U.S. Material Recycled (A+B)	**769**	**834**	**797**	**841**	**1,003**	**1,170**	**1,272**	**1,396**	**1,451**	**1,444**	**1,557**
D. Post Consumer Bottle Imports	69	70	57	62	106	109	97	100	98	98	89
E. Total Post Consumer Bottles used by U.S. Reclaimers (A+D)	**668**	**670**	**579**	**582**	**737**	**790**	**716**	**741**	**713**	**740**	**865**

* As of 2005, this number includes the amount of PET sold in mixed bottle bale shipments.

2010 GROSS RECYCLING RATE

$$\frac{\text{Total U.S. Bottles Collected and Sold for Recycling} = 1{,}557 \text{ MMlbs.}}{\text{Total U.S. Bottles Available for Recycling} = 5{,}350 \text{ MMlbs.}} = \mathbf{29.1\%}$$

Year	**Total U.S. Bottles Collected** *(MMlbs.)*	**Bottles on U.S. Shelves** *(MMlbs.)*	**Gross Recycling Rate**
1999	771	3,250	23.7%
2000	769	3,445	22.3%
2001	834	3,768	22.1%
2002	797	4,007	19.9%
2003	841	4,292	19.6%
2004	1,003	4,637	21.6%
2005	1,170	5,075	23.1%
2006	1,272	5,424	23.5%
2007	1,396	5,683	24.6%
2008	1,451	5,366	27.0%
2009	1,444	5,149	28.0%
2010	1,557	5,350	29.1%

PET BOTTLE BALE MARKETS

Bale prices rose steadily during the early part of the year, leveled off during the warm weather months, and then rose again during the last quarter. Where Chinese buyers drove prices on the West Coast, domestic buyers were the price setters on the East Coast. This was the result of substantial new investments made in both new and existing U.S. reclamation plants, combined with inconsistent buying by the Chinese, particularly on the East Coast. Had it not been for the substantial new volumes generated by expansions of deposit programs in Oregon, Connecticut, and New York, and sluggish demand from some of the vertically integrated reclaimers still impacted by the economy, prices could have gone higher as buyers strove to fill these new assets. As it was, bale prices by year's end were about the same on both coasts with West Coast bales around $.30 per pound, FAS, and East Coast curbside commanding about $.28 per pound, picked up.

As always, good quality bales, dirty granulate material, and deposit bottle bales continued to be in high demand and short supply, and all commanded a premium of at least $.10 per pound over curbside bales.

EAST COAST, NON-DEPOSIT PET BOTTLE BALE PRICES

(Picked Up, Truckload Quantities, Seller's Dock)

2010	LOW	HIGH
JANUARY	$.11/LB	$.16/LB
FEBRUARY	.13	.21
MARCH	.18	.24
APRIL	.20	.25
MAY	.18	.22
JUNE	.16	.20
JULY	.15	.19
AUGUST	.16	.19
SEPTEMBER	.17	.19
OCTOBER	.17	.20
NOVEMBER	.20	.24
DECEMBER	.22	.28

RECLAMATION CAPACITY

A reclamation plant is defined as an operation that can take dirty post consumer plastic packaging and process it into a clean flake suitable for remanufacture. At the beginning of 2010, there were 18 U.S. PET reclamation plants in operation with a combined total capacity of 1.247 billion pounds, gross weight input. These plants employed a wide range of technology, from the rudimentary to systems capable of

producing RPET approved for direct contact food and beverage packaging. By year's end, there were 19 plants operating in the U.S. with a total annual capacity of 1.465 billion pounds; this total takes into account two plant closures and three new start-ups that occurred during the course of the year. As referred to above, ten of these plants have the capacity to produce Food and Drug Administration (FDA) Letter of No Objection (LNO) direct contact recyclate suitable for food and beverage contact.

The reclamation plant utilization rate for U.S. reclaimers, based on the use of all feedstock, was around 73% for the year. This takes into account plants that were semi-operational, those that were shut down, and new plants that were operational for any portion of the year.

Recycled PET (RPET) Production Summary *(MMlbs.)*	**2001**	**2002**	**2003**	**2004**	**2005**	**2006**	**2007**	**2008**	**2009**	**2010**
A. RPET Produced by U.S. Reclaimers from U.S. Bottles	476	401	412	505	558	523	496	477	477	558
B. RPET Produced by U.S. Reclaimers from Imported Bottles	44	46	49	83	85	69	82	87	84	71
C. Total RPET Production U.S. Reclaimers (A+B)	**520**	**447**	**461**	**588**	**643**	**592**	**578**	**564**	**561**	**629**
D. Clean Flake Equivalent from U.S. Bottles Exported	184	212	255	298	401	529	583	647	601	557
E. Total Clean Flake from U.S. Bottles (A+D)	**660**	**613**	**667**	**803**	**959**	**1,052**	**1,079**	**1,124**	**1,078**	**1,115**

PET UTILIZATION RATE

Clean Flake Produced from US Post Consumer Bottles = **558 MMlbs**

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Clean Flake Equivalent of U.S. Bottles Exported, Canada and all other = **557 MMlbs**

=

1,115 MMlbs

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Total U.S. Bottles Available for Recycling = **5,350 MMlbs**

= 20.8%

The PET utilization rate measures the sum of clean flake produced by U.S. reclaimers, plus the amount of clean flake produced by Canadian reclaimers from U.S. bottles, plus the amount of clean flake expected to be produced from exported bottles (assuming U.S. yield losses as detailed below), taken as a portion of total U.S. bottles available for recycling. United States reclaimers reported yield losses ranging from 24.4% for deposit bottles to 32.2% for curbside material. This is significantly higher than in 2009 and is consistent with what was heard from reclaimers throughout the year. The higher contamination levels drove reclaimers to recover value from the byproducts of PET recycling wherever possible. They increased their marketing of both non-PET byproducts, such as aluminum, as well as PET byproducts such as fines and "kick-out." The yield loss on exported PET other than Canada was calculated as 28.1%, which takes into account the difference between the curbside, California CRV, and traditional deposit streams. As a result, the clean flake equivalent for the 781.3 MMlbs of bottles exported was determined to be 557 MMlbs. As calculated above, the resulting utilization rate was 20.8%, slightly lower than the 2009 rate.

Year	Clean Flake Equivalent *(MMlbs)*	Bottles on U.S. Shelves *(MMlbs)*	Utilization Rates
2000	619	3,445	18.0%
2001	660	3,768	17.5%
2002	613	4,007	15.3%
2003	667	4,292	15.5%
2004	803	4,637	17.3%
2005	959	5,075	18.9%
2006	1,052	5,424	19.4%
2007	1,079	5,683	19.0%
2008	1,124	5,366	20.9%
2009	1,078	5,149	20.9%
2010	1,115	5,350	20.8%

2010 RPET MARKET

As mentioned in the 2009 Report, the RPET end use data now reflects RPET consumption by converters in both the U.S. and Canada (see table on page 9). In earlier Reports, the end use product category data indicated only U.S. converter consumption totals, however in 2010 it's estimated that no less than 8% of the total consumption was RPET purchased by Canadian converters. This percentage is likely to increase as the Canadian consumer continues to react favorably to content products and packaging.

Use of RPET in the primary conversion categories in the U.S. and Canada totaled 1,002 MMlbs for 2010, an increase of 7%. United States and Canadian reclaimers also sold 68 MMlbs of PET byproducts to secondary markets for a total amount of RPET consumed of 1,070 MMlbs. This represents the highest converter consumption figure to date. Of this total, U.S. and Canadian reclaimers supplied about 789 MMlbs of flake and pellet produced from all sources of feedstock, in addition to the 68 MMlbs of secondary material. The remaining 213 MMlbs was either provided by U.S. RPET "upgraders" (a category of companies that purchase dirty PET flake, have it toll washed, then pelletize or solid state it for resale), or imported from reclaimers in countries all over the world, including France, Italy, India, Israel, Taiwan, China, Mexico, Brazil, Peru, and other Central and South American countries.

2010 saw a continued strong demand from most segments of the RPET market, particularly from package converters. Overall, RPET use in bottles increased 6 MMlbs reflecting a 13 MMlb increase in food and beverage applications and a 7 MMlb decrease in non-food bottles. A marked surge in RPET use for packaging applications was seen in the sheet/thermoformed category where a 23% increase over 2009 volumes pushed total usage to 195 MMlbs.

The most interesting dynamics took place in RPET fiber applications where carpets made from Bulk Continuous Filament (BCF) started to replace those made from PET staple fiber. While the future for BCF looks bright, utilizing RPET in this application will be more difficult than utilizing it for staple fiber, and will generally require higher quality RPET. Other fiber applications were strong, particularly for those that could advertise the RPET pedigree to consumers for items such as apparel, accessories, paint rollers, filters, and even scrubbing pads. All of this contributed to a 37 MMlb boost in RPET usage in the fiber category over 2009, the most aggressive increase after packaging.

RPET Product Categories
RPET used *(MMlbs)*

Product Category	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010
Fiber	435	344	296	479	463	422	383	391	344	381
Sheet & Film	37	18	32	58	71	74	128	153	159	195
Strapping	82	83	77	116	131	132	144	137	114	127
Engineered Resin	24	10	10	12	8	9	11	7	10	9
Food & Beverage Bottles	77	86	106	126	115	139	136	141	203	216
Non-Food Bottles	44	43	24	63	63	49	60	55	65	58
Other	2	4	7	24	13	30	38	31	42	16
TOTAL CONVERTER CONSUMPTION	**701**	**588**	**552**	**878**	**864**	**855**	**900**	**915**	**937**	**1,002**

2010 YEAR END SUMMARY

After two years of declining sales, the 2010 PET bottle market recovered to the 2008 level, in units if not by weight. The incremental recovery from this increase, along with deposit expansions taking hold in Oregon, Connecticut and New York, contributed to an additional 113 MMlbs of PET bottles being collected in 2010. Domestic reclaimers became the price setters for this material on the East Coast while Chinese exporters continued to dominate the West Coast. Exporters and domestic reclaimers alike complained throughout the year of declining bale quality and higher yield losses. While bale prices spiraled upward at both the beginning and end of the year, margins between bale and clean flake pricing remained adequate if not healthy, indicating that both export and domestic buyers were getting roughly what they needed.

Reclamation capacity continued to increase in both the U.S. and Canada, the result of expansions to existing plants and new plant openings, with more scheduled to start up in 2011. While forecasts of domestic reclamation capacity being in equilibrium with total PET collection by the end of 2010 fell short, additional investments continued to be made and announced. The primary driver of these investments is the short supply of RPET flake and pellet. This has prompted end users that anticipate a long-term need for RPET supply to either quietly back new merchant reclaimers, or to do it themselves, operating on the premise that they have a better chance of procuring and processing bales than they do chasing supply of merchant flake.

NAPCOR calculates that in order to meet RPET demand from publicly announced brand owner recycled content commitments, as well as current and projected demand from all other RPET applications, the PET bottle recycling rate would need to be at least 48% by 2013. While U.S. and Canadian reclaimers produced more RPET than ever,

complemented by imports, this overhanging demand has created a dynamic that is both interesting and troubling. Over the past six quarters, up until the end of 2010, there were arguably less expensive virgin alternatives available to all RPET end users, particularly for packaging applications. While this has occurred periodically in the past, it was generally the result of a market aberration reducing buyers' options. In this case, it appears that between the aforementioned brand owner commitments and a significant percentage of consumers continuing to buy "green," end users are reluctant to stop buying recycled despite often paying a premium over virgin. While some in the market argue that the greater environmental benefits derived from using RPET more than justify the potential additional cost, the larger market continues to question the sustainability of this dynamic. Of course, a doubling of the amount of bottles collected would eliminate this concern.

Also contributing to this price dynamic is the continued deterioration of bale quality, resulting in greater yield loss and increased costs that are borne by the reclaimer or passed along to the end user where possible. This deterioration is a result of increased amounts of non-PET and trash in the curbside bales produced by MRFs (an argument can certainly be made that this, at least in part, is an unintended consequence of single-stream recycling), and brand owners not adhering to Design for Recycling guidelines. Interestingly enough, many of these offending bottles are being used by the companies that have publicized their recycling "commitments" and are pushing reclaimers for high quality RPET at below virgin prices.

Up to this point, the primary concerns of this industry – collection, Design for Recycling principles, and use of recycled content – have been addressed voluntarily and inconsistently. The question is whether that sort of approach can support the current infrastructure and allow for the growth that will be necessary to make this a sustainable industry.

Addendum: PET Thermoform Recycling *(October 2011)*

In an addendum to last year's "Report on Post Consumer PET Container Recycling Activity" (2009), NAPCOR announced that the recycling of PET thermoformed packaging was a top priority, and that NAPCOR was actively working with all segments of the recycled material chain to overcome the obstacles preventing PET thermoforms from being recycled on a wide scale. In 2010, NAPCOR continued that work with public program operators, intermediate processors, reclaimers, and end users. This effort fostered a much better understanding of the technical and logistical issues involved, and ultimately led to the breakthrough on end market options for recycled PET thermoform material that are emerging now in 2011. Rather than risk confusion about the progress of this project by summarizing only the work performed back in 2010 (the year of this Report), the reader is encouraged to visit the links below for the most recent updates.

It is anticipated that the 2011 Report will include pertinent data for PET thermoform recycling activity, in addition to that for bottles.

NAPCOR would again like to acknowledge the strong support of this effort by Stewardship Ontario, Waste Diversion Ontario, The Association of Postconsumer Plastic Recyclers, the Canadian Plastic Industry Association, and more recently, that of SPI: The Plastics Industry Trade Association, without whose collective assistance the progress achieved to date would not have been possible.

Links:

Resource Recycling magazine, "Moving Forward on PET Thermoform Recycling" (Sept. 2011) http://www.napcor.com (see "News" column)

NAPCOR Project Background & Position on Recycling of PET Thermoform Packages (July 2011) http://www.napcor.com/PET/positions.html

SPI/NAPCOR $100K RFP for model PET thermoform recycling project in the U.S. (July 2011) http://www.napcor.com/PET/thermoRFP.html

Joint Press Release: "Retail Council of Canada Announces Support for New PET Thermoform Adhesive and Label Protocol" (June 30, 2011) http://www.napcor.com/PET/announcements.html