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**PETE**

**2007 REPORT ON POST CONSUMER  
PET CONTAINER RECYCLING ACTIVITY**

**FINAL REPORT**

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**INTRODUCTION**

2007 marks the thirteenth year that NAPCOR has issued this report in its current format.<sup>1</sup> 2007 also marks the third year that the National Association for PET Container Resources (NAPCOR) and the Association of Post Consumer Plastic Recyclers (APR) have worked together to produce this report. Without APR's support and the cooperation of its members, this report would not have been 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 2007. Information contained in this report was obtained through surveys conducted by HDR Inc. and Moore Recycling Associates, combined with data generated internally by the National Association for PET Container Resources (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**

Growth of PET bottles and jars sold in the U.S. slowed during 2007. Double-digit growth in units sold continued for still water containers (including flavored and vitamin water), but was somewhat offset by significant lightweighting efforts most evident toward the end of the year. Isotonic drinks, tea, and the energy drink segments also continued to perform well, offsetting the negative growth in carbonated soft drinks. Better than average growth was reported by the food and non-food segments reflecting ongoing conversions out of glass and other plastic packaging. 2007 also saw the first introductions of more "upscale" wine offered in PET bottles. Not only were 375 ml bottles used to access away-from-home markets (e.g., festivals, events, and airplanes), but 750 ml bottles were introduced at retail, primarily by Australian vineyards selling in North America. Bottle performance, customer acceptance and dramatic system-wide cost savings were cited as reasons for the conversion. The net result of these variously performing product categories was market growth of about 4.8% for PET bottles and jars for sale in the U.S., down from 6.9% in 2006.

NAPCOR determined that the total number of pounds of PET bottles and jars available in the United States for recycling in 2007 was 5.683 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

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<sup>1</sup> 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 <http://www.napcor.com/plastic/bottles/reports.html>.

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.

**POST CONSUMER PET BOTTLE PURCHASES**

The amount of post consumer PET bottles collected for recycling and sold in the U.S. was 1.396 billion pounds in 2007. The breakdown of categories in millions of pounds is as follows:

641	- Purchased by U.S. Reclaimers
710	- Purchased by Export Markets
45	- PET bottle component of mixed bales exported
1,396	- Total Amount of Post Consumer Bottles (mmlbs)

For the fourth straight year, the post-consumer PET bottle recycling rate has increased. As in 2006, the increase can be partially attributed to a number of factors, including:

- A 44 mmlb increase in California collections;
- The incremental increase from additional bottles sales;
- Over 22 new collection programs, 15 program expansions and 21 program expansions / conversions to single stream affecting over 2.5 million households;
- Additional new commercial recovery efforts.

While much of this increase was exported, U.S. reclaimers reported purchasing 641.5 mmlbs of post consumer bottles from U.S. intermediate processors in 2007, an increase of 22.5 mmlbs over 2006. Canadian reclaimers increased their purchases from 46 to 69.7 mmlbs and other, predominantly Chinese buyers, bought a total of 685 mmlbs. Destinations for this material included India, Hong Kong, Vietnam as well as mainland China.

In turn, U.S. reclaimers continued to supplement their domestic purchases by importing 99.8 mmlbs of post consumer bottles predominantly from Canada, Mexico, South and Central America. U.S. reclaimers also reported buying 31.7 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 773 mmlbs of scrap material, virtually the same as in 2006.

In 2007, PET bottles were again exported as part of mixed bottle bale shipments. PET bottles made up different fractions of mixed bottle or mixed rigid bales; totals are calculated accordingly and contributed to slightly more than 45 mmlbs of PET bottles sold in these forms. The small amount of dirty PET flake used directly in applications without being cleaned was included this year in the U.S. reclaimer purchases total.

<b>POST CONSUMER BOTTLES</b>										
Gross Weight Purchases (mmlbs.)	<u>1998</u>	<u>1999</u>	<u>2000</u>	<u>2001</u>	<u>2002</u>	<u>2003</u>	<u>2004</u>	<u>2005</u>	<u>2006</u>	<u>2007</u>
A. Purchased by U.S. Reclaimers	656	588	599	600	522	520	631	681	619	641
B. Purchased by Exporters *	89	183	170	234	275	321	372	489	653	755
C. Total U.S. Material Recycled (A+B)	<b>745</b>	<b>771</b>	<b>769</b>	<b>834</b>	<b>797</b>	<b>841</b>	<b>1,003</b>	<b>1,170</b>	<b>1,272</b>	<b>1,396</b>
D. Post Consumer Bottle Imports	101	60	69	70	57	62	106	109	97	100
E. Total Post Consumer Bottles used by U.S. Reclaimers (A+D)	<b>757</b>	<b>648</b>	<b>668</b>	<b>670</b>	<b>579</b>	<b>582</b>	<b>737</b>	<b>790</b>	<b>716</b>	<b>741</b>

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

**2007 GROSS RECYCLING RATE**

$$\frac{\text{Total U.S. Bottles Collected and Sold for Recycling} = 1,396 \text{ mmlbs.}}{\text{Total U.S. Bottles Available for Recycling} = 5,683 \text{ mmlbs.}} = \mathbf{24.6\%}$$

Year	Total U.S. Bottles Collected (mmlbs.)	Bottles on U.S. Shelves (mmlbs.)	Gross Recycling Rate
<b>1996</b>	697	2,198	31.7%
<b>1997</b>	691	2,551	27.1%
<b>1998</b>	745	3,006	24.8%
<b>1999</b>	771	3,250	23.7%
<b>2000</b>	769	3,445	22.3%
<b>2001</b>	834	3,768	22.1%
<b>2002</b>	797	4,007	19.9%
<b>2003</b>	841	4,292	19.6%
<b>2004</b>	1,003	4,637	21.6%
<b>2005</b>	1,170	5,075	23.1%
<b>2006</b>	1,272	5,424	23.5%
<b>2007</b>	1,396	5,683	24.6%

**PET BOTTLE BALE MARKETS**

Bale prices climbed steadily throughout the year reflecting both the strong demand in the U.S. and China, and the steady increase in the price of crude oil. For much of 2007, the market displayed a two-tiered price structure for curbside bottles with exporters posting prices often \$.02 - .03 per pound higher than U.S. and Canadian buyers. This was primarily due to the diminished demand of U.S. buyers caused by the closings of Wellman and SE PET Resin Recyclers in fourth quarter 2006. For most of the year, it appeared that there was enough material available from suppliers that do not have an export option. This allowed U.S. reclaimers to meet their supply needs without having to overreact as exporters bid on bales. However, tight inventories and cold weather volumes late in the year forced U.S. buyers to be more competitive resulting in the sharp price hikes by year end with bales selling at \$.23 - .24/lb on the east coast and \$.30 on the west coast FAS. Dirty flake continued to command a \$.10 premium over bales.

**EAST COAST, NON DEPOSIT PET BOTTLE BALE PRICES**  
(Picked up, Truckload quantities, Seller's dock)

<b>2007</b>	<b>LOW</b>	<b>HIGH</b>
<b>JANUARY</b>	\$.13/LB	\$.19/LB
<b>FEBRUARY</b>	.14	.19
<b>MARCH</b>	.16	.19
<b>APRIL</b>	.16	.20
<b>MAY</b>	.16	.20
<b>JUNE</b>	.16	.20
<b>JULY</b>	.16	.21
<b>AUGUST</b>	.17	.21
<b>SEPTEMBER</b>	.17	.22
<b>OCTOBER</b>	.17	.22
<b>NOVEMBER</b>	.18	.22
<b>DECEMBER</b>	.18	.24

**RECLAMATION CAPACITY**

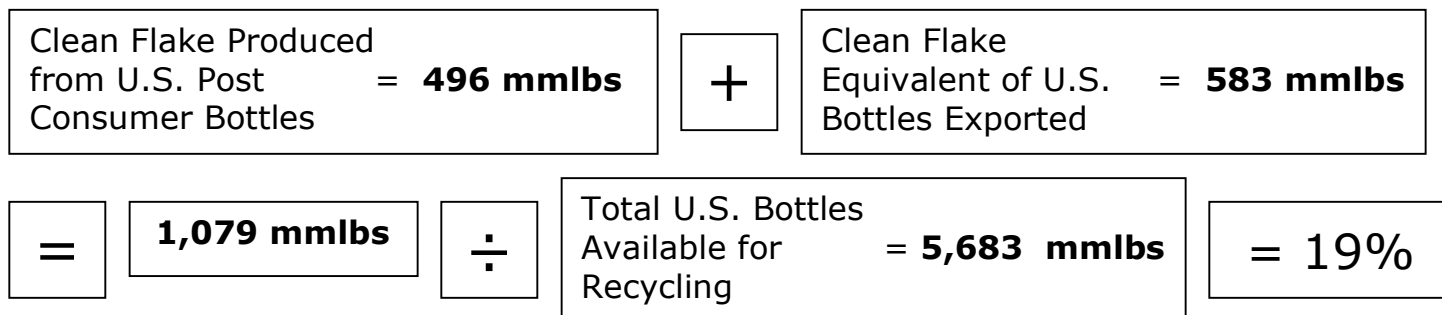
At the end of 2006, there were 14 reclamation plants producing clean flake from post consumer bottles or dirty flake in the United States, with a total capacity of 817 mmlbs gross weight in. By the end of 2007, the same 14 plants were operating with an increased total capacity of 842 mmlbs, the result of some minor de-bottlenecking. Three others operated sporadically and are not included in the above. Of the 842 mmlbs

capacity, about 66% was vertically integrated, producing material for internal company consumption in the manufacture of carpet, strapping, bottles or sheet; the remainder was made available to the merchant market. Five reclaimers have the ability to manufacture FDA LNO RPET suitable for direct contact in food and beverage bottles.

The reclamation plant utilization rate based on the use of all feedstock was around 90% for the year.

<b>RPET Production Summary (mmlbs.)</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
A. RPET Produced by U.S. Reclaimers from U.S. Bottles	513	457	476	476	401	412	505	558	523	496
B. RPET Produced by U.S. Reclaimers from Imported Bottles	75	47	51	44	46	49	83	85	69	82
C. Total RPET Production U.S. Reclaimers (A+B)	<b>588</b>	<b>504</b>	<b>527</b>	<b>520</b>	<b>447</b>	<b>461</b>	<b>588</b>	<b>643</b>	<b>592</b>	<b>578</b>
D. Clean Flake Equivalent from U.S. Bottles Exported	75	154	143	184	212	255	298	401	529	583
E. Total Clean Flake from U.S. Bottles (A+D)	<b>588</b>	<b>611</b>	<b>619</b>	<b>660</b>	<b>613</b>	<b>667</b>	<b>803</b>	<b>959</b>	<b>1,052</b>	<b>1,079</b>

**PET UTILIZATION RATE**



The utilization rate measures the sum of clean flake produced by U.S. reclaimers, plus the equivalent amount of clean flake expected to be produced from exported bottles, taken as portion of total U.S. bottles available for recycling. Reclaimers reported yield losses of 22.75% for 2007, much worse than the 19% yield loss reported in 2006. This directly reflects the higher contamination levels that reclaimers have been experiencing, mostly in curbside bales. This yield loss of 22.75% was applied to gross weight exported to obtain the clean flake equivalent of 583 mmlbs. Yields reported on imports were reported to be around 81% probably due to the fact that most of this material was purchased as dirty granulate.

Year	Clean Flake Equivalent (mmlbs.)	Bottles on U.S. Shelves (mmlbs.)	Utilization Rates
1996	572	2,198	26.0%
1997	578	2,551	22.7%
1998	588	3,006	19.6%
1999	611	3,250	18.8%
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%

**2007 RPET MARKET**

The use of RPET in the primary conversion categories totaled 862 mmlbs for 2007. In addition, U.S. reclaimers sold 38 mmlbs to secondary markets, including exporters, for a total of 900 mmlbs of RPET end use consumption—making 2007 RPET end use the highest ever. U.S. and Canadian reclaimers supplied about 744 mmlbs; 698 mmlbs of this was produced from post consumer bottles. The remaining 156 mmlbs was imported from reclaimers all over the world, including France, Italy, India, China, Mexico, Brazil, Peru and other Central and South American countries.

Despite the closing of the Wellman fiber and reclamation assets in Johnsonville, SC, total RPET demand was never stronger. While RPET use in fiber applications was reduced somewhat, additional demand in most other categories more than offset the loss. Sheet converters were particularly aggressive in sourcing RPET, increasing their purchases 73% over 2006. This increased demand was a result of both favorable economics and strong customer preference for recycled content in their products, a preference that extended through all end use categories.

The use of RPET in industrial strapping continued to grow, posting a 9% gain in 2007 while RPET use in bottles also increased but at a much lower rate.

U.S. and Canadian reclaimers continued to take advantage of aggressive Chinese buyers and sold about 35 mmlbs of off-spec material and byproducts, with an additional three mmlbs sold into unconventional market applications

**RPET Product Categories  
RPET used (mmlbs)**

<b>Product Category</b>	<b>1998</b>	<b>1999</b>	<b>2000</b>	<b>2001</b>	<b>2002</b>	<b>2003</b>	<b>2004</b>	<b>2005</b>	<b>2006</b>	<b>2007</b>
<b>Fiber</b>	415	417	452	435	344	296	479	463	422	383
<b>Sheet &amp; Film</b>	89	68	65	37	18	32	58	71	74	128
<b>Strapping</b>	67	80	101	82	83	77	116	131	132	144
<b>Engineered Resin</b>	30	26	27	24	10	10	12	8	9	11
<b>Food &amp; Beverage Bottles</b>	52	68	54	77	86	106	126	115	139	136
<b>Non-Food Bottles</b>	47	50	40	44	43	24	63	63	49	60
<b>Other</b>	7	9	5	2	4	7	24	13	30	38
<b>TOTAL U.S. CONVERTER CONSUMPTION</b>	<b>707</b>	<b>718</b>	<b>744</b>	<b>701</b>	<b>588</b>	<b>552</b>	<b>878</b>	<b>864</b>	<b>855</b>	<b>900</b>



**2007 YEAR END SUMMARY**

In many ways 2007 closely resembled 2006 for the PET bottle recycling industry. PET bottles experienced steady, but not spectacular, growth in unit sales which was somewhat offset by significant light-weighting efforts made by converters and brand owners. Forecasts of dramatic virgin PET (VPET) price decreases once again did not materialize. Collection of post consumer bottles increased, and other than a surge at the end of the year, bale prices remained stable in the \$.20 per pound range providing good revenue for intermediate processors. Reclaimers ran at 90% utilization rates and sold almost every pound of RPET produced at margins that many would argue were unprecedented.

However, by year's end it became clear that an array of market forces were beginning to significantly affect the industry and appeared likely to continue to do so. Among them were:

**1) Energy Pricing:** A dramatic increase in energy prices kept VPET prices high and widened the potential price advantage for RPET. By the end of the year, the price of crude oil had increased over 50% to almost \$100 per barrel, dragging VPET prices with it. This forced many converters not previously using recycled material to re-examine the economics, particularly if their competitors had taken an RPET position.

**2) Corporate Policy:** By the end of the year it became clear that a significant portion of the business world had embraced the concept of sustainability as a core business principle, or at very least business leaders were taking a look at what it meant both with regard to internal efficiencies and external consumer messaging. This led to a greater examination of all of the environmental impacts of a package – from the manufacturing of the raw material to end-of-life scenarios – through the use of Life Cycle Analyses. As a result, PET with its superior recyclability continues to benefit from conversions from other materials in both the bottle and thermoformed packaging market segments. This interest in sustainability resulted in increased demand for RPET from companies that had already been using it, as well as from a range of new converters throughout all end use applications. It also accelerated package light-weighting and downsizing for which PET is particularly well suited. But perhaps most importantly for the PET recycling industry, it reinforced the inherent role of recycling in sustainability, i.e. that there is no true sustainability without recycling.

**3) Public Policy:** 2007 saw a distinct increase in new publicly initiated collection programs, as well as program upgrades and expansions. In the broad sense this reflected citizens' demand and public desire to be able to do something proactive about the environment, but it was certainly aided by the excellent market conditions for all commodities. There was also increased realization on the part of policy makers tasked with addressing the issue of climate change that increasing recycling is one of the

easiest and most cost effective ways to reduce greenhouse gas emissions. All of these factors brought new energy and context to the debate on how best to increase collection of recyclables – factors that are essential to reinvigorating the PET recycling industry.

**4) China:** 2007 marked the first year in which Chinese traders purchased more U.S. post consumer PET bottles than did U.S. reclaimers. The impacts of this are of no small consequence. U.S. reclaimers have had to look to other countries, particularly in Central and South America, for the additional bottles they need to be able to run their plants at high utilization rates. U.S. bale contamination increased sharply in 2007 with correspondingly lower yields, a direct reflection of the fact that Chinese buyers do not have, or enforce, strict bale specifications. However, the most significant impact is the stifling of investment in U.S. assets, resulting in less U.S. reclamation capacity in 2007 than in 2003, coupled with a general lack of technical advancement. While this lack of (re)investment is generally attributed to the fear of not being able to compete with Chinese buyers for bales, the fact that most US RPET buyers refused to make any long term commitments also played a major role in inhibiting the growth of reclamation capacity. This lack of investment in reclamation capacity is, without question, the most critical issue facing the industry as it moves forward.

Nevertheless, despite the negative impacts of the Chinese market, 2007 ended with the prospects for significant new collection and unprecedented and increasing demand for RPET flake and pellet. Perhaps most importantly, 2007 provided a reaffirmation as to the importance of PET recycling by the public and private sectors alike.