



**National Mixed Rigid Plastic Bale Composition Study**  
*Executive Summary – Summer 2015*

**Overview of the APR Rigid Plastics Recycling Committee**

The Association of Post Consumer Plastics Recyclers (APR), North America’s largest alliance of plastics reclaimers, represents companies totaling over 94% of the post-consumer plastic recycling processing capacity. APR is constantly seeking new ways to strengthen the economically viable and environmentally responsible recycling of post-consumer plastics.

In 2008 APR created the Rigid Plastics Recycling Program to increase the recycling rate of rigid plastics beyond #1 and #2 bottles. Rigid plastic recycling “stakeholders” - collectors, recyclers, brand users, resin producers and public policy makers - are openly discussing the issues, concerns and problems towards creating non-bottle rigid plastic recycling solutions.

**Purpose of Study**

This study, and its 2011 predecessor, were undertaken by the APR Rigids Committee to determine the composition of the various types of mixed rigid plastic bales generated in North America, and to foster the expansion of plastic recycling. Understanding the type and tonnage of rigid plastic available for recycling in North America will strengthen and advance investment in non-bottle rigid recycling.

**Overview of Study**

In the marketplace, bale content varies from generator to generator and bale to bale. This study’s conclusions are what can be drawn from the sample size evaluated. APR would appreciate knowing of other studies to advance industry’s collective knowledge base of non-bottle plastic recycling.

A total of 23 bales were sorted in the fall of 2014 and early 2015. Bales from North America were sorted at four facilities: two locations in California, Alabama and Canada. Representative samples of each of 10 bale types (see descriptions below) were sorted by resin and product type: a total of 400 to 1,500 pounds per bale category. The 23 bale samples were sorted into the ten categories listed below.

<b>Bottles</b>	<b>Nursery Pots</b>
<b>Cups</b>	<b>Cup and Container Lids</b>
<b>Tubes</b>	<b>Clamshells, Trays, Domes, Blister, Produce Containers</b>
<b>Containers</b>	<b>Bulky Items</b>
<b>Buckets/Lids</b>	<b>Other</b>



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The above product categories were subsequently sorted by the following resins, where present:

<b>PET</b>	<b>HDPE</b>
<b>HDPE Compatible</b>	<b>PVC</b>
<b>LDPE</b>	<b>PP</b>
<b>PP Compatible</b>	<b>Mixed PE/PP</b>
<b>PS</b>	<b>PLA/Bio</b>
<b>PC</b>	<b>Other</b>

A handheld resin ID unit was used to spot check for items that were not easily identified by sight, feel or sound. Two product categories were sorted by color: HDPE Bottles and Cups. HDPE Bottles were sorted into Natural and Color Bottles. Cups were sorted by: Clear (Printed vs. Minimal Print), White (Printed vs. Minimal Print) and Colored. A date stamp or less printing was considered Minimal Print.

Once the resin and color sorts were complete each resin/product category was weighed and recorded. Samples of product categories were photographed. All report percentages are weight based. In total, between product categories and resin type, baled material was divided into 90 sorts.

## Destination: Domestic vs. Export

According to the data gathered for the *2013 National Postconsumer Non-Bottle Rigid Plastic Recycling Report* prepared by Moore Recycling for the American Chemistry Council (Full report available at <http://plastics.americanchemistry.com/Education-Resources/Publications/2013-National-Report-on-Post-Consumer-Non-Bottle-Rigid-Plastic-Recycling.pdf>), 54% of mixed rigid bales are sold to domestic buyers, the remaining material is purchased by the export market, primarily China. According to the survey, Pre-Picked Rigid Plastic bales are the highest volume category of mixed rigid postconsumer plastic generated (61%), they also have the second lowest percentage of exports.

<b>Sold Domestic</b>	<b>2009</b>	<b>2013</b>
<b>All Rigid Plastic</b>	30%	61%
<b>Pre-Picked Plastic</b>	38	56
<b>Tubs &amp; Lids</b>	26	8
<b>Bulky Rigid Plastic</b>	72	42

The non-bottle marketplace has changed considerably since 2013. Current dynamics may still result in the exportation of the majority of Bulky Rigid Plastic; however the marketing of container bales may be considerably different, with a far greater volume being consumed domestically.

## Results of Bale Sort

Overall, the bales contained less trash than found in the 2010/11 Bale Sort. It is uncertain why this was found but perhaps it is due in part to the important work APR has done to promote the importance of bale quality and potentially as a result of China's Green Fence requirements. In all bales containing bulky plastics, the data also shows a higher percentage of Plastic with Metal than in the previous sort.

Once again it was noted that when MRFs bale large items with small, the small items get stuck in the larger



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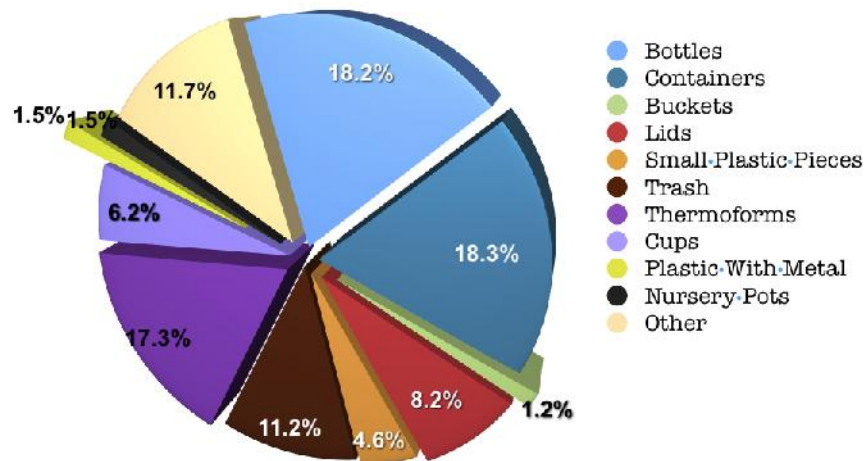
items and crushed together, for example buckets with bottles or containers inside of them. This illustrates one advantage of pulling the buckets and other bulky rigid plastic at the front end of the MRF

The study showed that Household Container bales and Bulky Rigid bales have the lowest contamination levels and recover the most plastic.

## 1. Prepicked Rigid Plastic Bale: No Bulky

**Definition:** From MRFs that pull PET and HDPE bottles and bale all remaining plastic bottles and containers together, but do not have (or separately bale) bulky rigid plastic. Bales contain: all non-bottle containers, non PET/HDPE bottles but no bulky rigid plastic.

**Sort Results:** Since this is the highest volume of non-bottle rigid plastic bales produced in North America, this bale category had the greatest number of bales - a total of six. The *highest product category* found was containers followed by bottles. The *highest resin type* found was PP followed by PET. A high percentage of Bottles, Containers and Thermoforms were found in these bales. However, the percentage range of key items was quite wide. This illustrates the complexity of this—and some other—mixed resin bale categories; the variability makes it difficult to plan for, which has a tendency to drive down their value.



## 2. Bulky Rigid Bale

**Definition:** From MRFs that pull large plastic items, usually at the front end. Bales contain: all large items predominantly PE and PP.

**Sort Results:** Three Bulky Rigid Bales were sorted. As expected, all had a large percentage of buckets and bulky items. The *highest product category* found was bulky items followed by buckets. The *highest resin type* found was HDPE followed by PP. The 2014/2015 sorted bales were very similar to the bales sorted in 2010/11. The most significant change over time was the amount of “plastic with metal”, which increased considerable since the last bale sort.



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### **3. PP Bottles & Containers Bale** (from Auto Sort)

**Definition:** From MRFs that auto-sort for PP. Bales contain: PP bottles, non-bottle containers and other non-containers - may also contain PP bulky rigid items.

**Sort Results:** Three PP bales were sorted. The *highest product category* found was containers followed by bottles. The *highest resin type* found was PP followed by PET. All three bales were relatively consistent with each other.

### **4. All Rigids Bale: No Bulky**

**Definition:** From MRFs that mix plastic bottles and containers together, but do not have (or separately bale) bulky rigid plastics. Bales contain: all bottles and non-bottle containers, but no bulky rigid plastics.

**Sort Results:** Two All Rigid Plastic No Bulky bales were sorted. The *highest product category* found was bottles followed by thermoforms. The *highest resin type* found was HDPE followed by PET. Very little trash was present in these bales.

### **5. HDPE Injection – Bulky Bale**

**Definition:** From MRFs that pull large plastic items, usually at the front end and segregate the PE items and bale them together. Bales contain: HDPE bulky rigid plastic (includes buckets, totes, crates, lawn furniture, carts, storage bins), may include some bulky PP and LDPE.

**Sort Results:** Two HDPE Injection Bulky Bales were sorted. The *highest product category* found was buckets followed by bulky items. The *highest resin type* found was HDPE followed by PP. These bales contained predominantly PE and PP plastics and very little metal or other contaminants.

### **6. HDPE Bottles & Containers Colored Bale** (from Auto-Sort)

**Definition:** From MRFs that auto sort for HDPE and the HDPE jars/containers flow with the colored HDPE bottles. Bales contain: Colored HDPE bottles and jars/containers.

**Sort Results:** Two HDPE Bottled & Containers bales were sorted. The *highest product category* found was bottles followed by containers. The *highest resin type* found was HDPE followed by PP. This bale category reflected a change in container packaging since the last sort. A similar bale from the 2010/11 sort had a higher percentage of HDPE containers. The reduced amount of HDPE containers is likely due to the shift in container resin to PP from HDPE. There was also a reduced amount of PP containers which also demonstrates the change in bale type, from olefin containers to only HDPE. Basically, the PP portion grew too large to “hide” in these bales and became a material with value separate from HDPE.

### **7. Tubs & Lids Bale**

**Definition:** From MRFs that pull PET and HDPE bottles, then pull and bale tub and lid containers. Bales contain: PP bottles (some PE), PP and PE household, non-bottle containers.

**Sort Results:** Two Tubs & Lids bales were sorted. The *highest product category* found was containers followed by bottles. The *highest resin type* found was PP followed by PET. Containers and Bottles made up the majority of these bales.



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### **8. Pre-Picked Rigid Plastic With Bulky**

**Definition:** From MRFs that pull PET and HDPE bottles and bale all remaining rigid plastics. Bales contain: all non-bottle containers, bulky rigid plastic and non-PET & HDPE bottles.

**Sort Results:** Two Pre-picked Rigid Plastic with Bulky bales were sorted. The *highest product category* found was bulky items followed by plastic with metal. The *highest resin type* found was HDPE followed by PP. This bale category contained a higher percentage of trash than any other average bale category (and more than all but two bales sorted), and the highest average percentage of plastic with metal (one *Bulky Rigid Plastic* bale had a slightly higher percentage of plastic with metal).

### **9. All Rigid Plastic With Bulky**

**Definition:** From MRFs that combine all bottles, containers and bulky plastics into a single bale. Bales contain: all bottles, non-bottle containers and bulky rigid plastic.

**Sort Results:** One All Rigid Plastic with Bulky bale was sorted. The *highest product category* found was bottles followed by bulky items. The *highest resin type* found was HDPE followed by PET. It had a high percentage of bulky items and bottles and a fairly low amount of trash. The percentage of HDPE bottles was notably higher in the 2014 sorted bale compared to the 2010/2011 sort.

***The full 51 page study is available to purchase from the APR. It contains a breakout of each type of bale, sorted by product and resin categories and shows average percentage of each category in the bale. In addition, Appendix' includes detailed sort data broken down both by bale type/product category and by bale type/ resin. The report also includes comparative data from the 2010/2011 National Mixed Rigid Plastic Bale Composition Study & Analysis of Non-Bottle Rigid Plastic Available for Recycling. Contact [Kara Pochiro](#) to purchase the full report.***