

# 2014 National Postconsumer Plastic Bag & Film Recycling Report

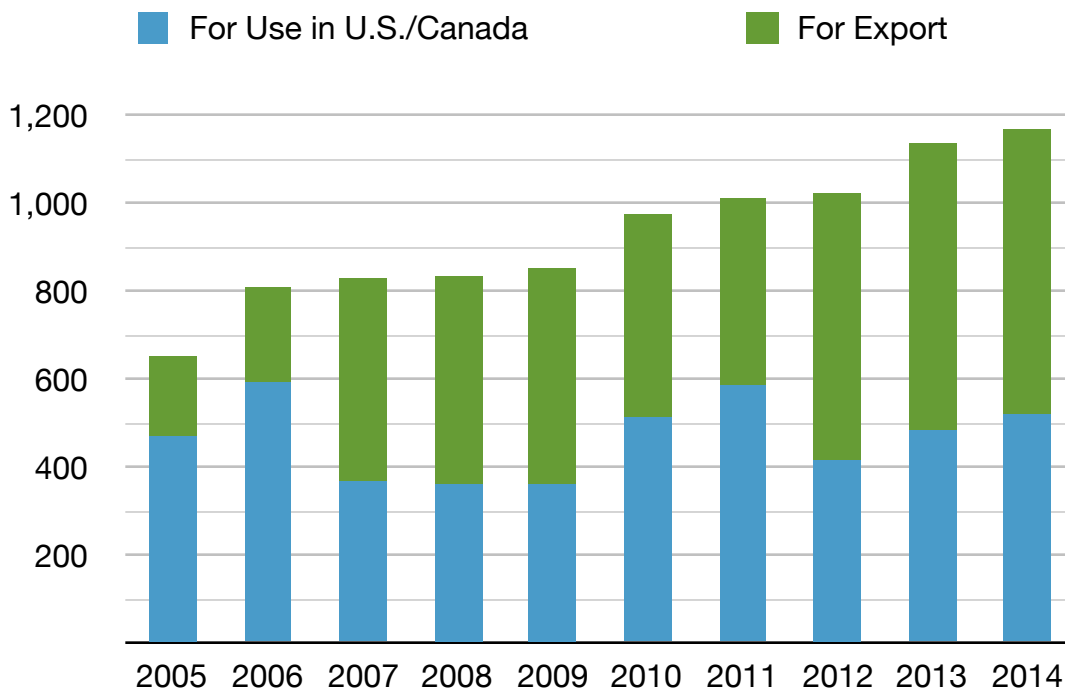
Prepared by Moore Recycling Associates Inc. for the  
American Chemistry Council

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## Introduction

This 2014 National Postconsumer<sup>1</sup> Plastic Bag and Film Recycling Report is the tenth annual report on the amount of plastic bags and film<sup>2</sup> recovered in the United States for recycling. Research was conducted and the report finalized by Moore Recycling Associates Inc. for the Plastics Division of the American Chemistry Council (ACC).

### U.S Postconsumer Film Recovered For Recycling (Millions of pounds)



<sup>1</sup> The Environmental Protection Agency (EPA) defines “postconsumer” as a material or a finished product that has served its intended use and then is diverted or recovered before it is disposed. It is the material consumers and businesses recycle; it does not include manufacturers’ waste that is commonly reused in the original manufacturing process. EPA defines “preconsumer” on the EPA Web Site as material that is recycled before it is used by a consumer (EPA Home. Pacific Southwest. Waste. Solid Waste. Reduce, Reuse, Recycle, Buy Recycled, Oct. 15, 2015. <<http://www3.epa.gov/region9/waste/solid/reduce.html#br4>>). This study uses EPA’s definition; throughout this report “postconsumer” refers to plastics that have been used for their intended purpose by consumers and by businesses. Commercial materials that have met their intended use are often recovered outside of curbside or drop-off collection programs and include items such as totes, pallets, crates, and other commercial packaging. This report does not cover the recycling of postindustrial (preconsumer) materials. An example of postindustrial material is scrap and trimmings that are generated in manufacturing and converting processes.

<sup>2</sup> In this report plastic bags and film will generally be referred to as “film.” Film is thin, flexible sheets of plastic. The majority of plastic films are made from polyethylene resins such as high density polyethylene (HDPE), low density polyethylene (LDPE), and linear low density polyethylene (LLDPE).

## Executive Summary

A minimum of 1.17 billion pounds of postconsumer film (which includes plastic bags and packaging) was recovered for recycling in 2014, an increase of 79 percent since 2005. In 2014, U.S. and Canadian processors recycled approximately 45 percent of the postconsumer film recovered for recycling; the remainder was exported. Domestic purchases of postconsumer film increased eight percent while export purchases decreased around two percent compared to 2013. The result was an overall three percent increase over 2013 in postconsumer film recovered for recycling.

Commercial Clear Film (see page 4 for film category definitions) continued to make up the largest category of film recovered for recycling with an estimated 540 million pounds. Commercial Mixed Color Film is now the second largest category of film recovered for recycling at 230 million pounds (a 3 percent drop compared to 2013). Mixed Film, the category that includes postconsumer bags and packaging recovered for recycling, decreased to 221 million from 248 million pounds. Other Film and Curbside Film make up a very small portion of what is collected.

Scrap film prices recovered in the first quarter of 2014 after a low stretch in 2013. Strong prices remained steady throughout 2014 for contaminant-free polyethylene film (see [Discussion and Recommendations](#) for more discussion on the film marketplace).

To arrive at an estimate of pounds of postconsumer plastic recovered for recycling in 2014, Moore Recycling surveyed both domestic and export markets for all postconsumer plastic (as well as some key players within the value chain such as MRFs, brokers, and end users). This report's findings are based on reported data for the recovery of U.S.-sourced, postconsumer material. Moore Recycling received responses from 17 U.S. and Canadian plastic reclaimers<sup>3</sup> and 28 exporters. The 2014 results are representative of reporting from one less reclaimer and one less exporters than in 2013.

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<sup>3</sup> Moore Recycling surveys and counts material from reclaimers, defined as companies that wash postconsumer material or otherwise process unwashed material into a clean feedstock or end product.

## Methodology

Data on recovered postconsumer plastic is collected during a voluntary, annual plastic recycling survey, which also gathers data on plastic bottles, non-bottle rigid plastics and other plastics.

To prepare the report:

- Moore Recycling continually updates its markets database to include current exporters, reclaimers, and other handlers of plastic scrap;
- Moore conducts an electronic survey of market participants in plastic recycling to collect data; and
- Moore provides a verification step for survey-collected data, checking the accuracy of the data through follow-up calls, conversations with industry contacts, and reviews of other sources of recycling industry information.

### Data Collection and Analysis

Moore Recycling continually updates a proprietary database of plastic exporters, processors, reclaimers, and key brokers to ensure that the survey reaches the key plastic scrap buyers from North America.<sup>4</sup>

Moore Recycling uses a custom-designed, web-based survey system to gather data. Although the overall methodology has not changed since the first report, Moore Recycling continually seeks ways to improve the completeness and timeliness of survey responses. These changes allow for better material flow tracking and assist with avoidance of double counting. A key change for 2014 includes an expanded section for post industrial plastic. Also the report now combines Dirty Ag and Clean Ag Film because there was not enough distinction between the two categories. To reduce confusion and inaccurate reporting, the survey now requests data for only one agricultural category—Agricultural Film.

An email with a unique link and message is sent to each contact in Moore Recycling's database. After an adequate amount of response time has passed, Moore Recycling employees send follow-up emails and make telephone calls to retrieve data. This follow-up process can take weeks or months depending on responses. Data are entered in the online survey tool, either directly by the company being surveyed, or by Moore Recycling staff. Incoming data are reviewed

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<sup>4</sup> Through Moore Recycling's project work in the industry and web sites it manages—[PlasticsMarkets.org](http://PlasticsMarkets.org), [RecycleMorePlastic.org](http://RecycleMorePlastic.org) and [PlasticFilmRecycling.org](http://PlasticFilmRecycling.org)—Moore Recycling regularly receives requests from new contacts for information on material and markets. Moore also identifies potential buyers through published market databases and conversations with suppliers, such as materials recovery facilities (MRFs) and key reclaimers.

for accuracy, and follow-up calls are made as needed. After data collection is complete, the data are compiled and categorized based on the detail reported.<sup>5</sup>

The final data totals are reviewed and analyzed, then reported with as much detail as possible without compromising confidentiality. In order to determine trends and identify anomalies that may require further vetting of data, the analysis includes year-to-year comparisons of totals, material categories, and buying trends among export and domestic buyers. Describing how the data are collected, and what is and is not included in the survey, provides readers of this report with the transparency they need to cross-reference results with other recycling data.

### Film Categories

The 2014 survey used the following material categories:

- Commercial Clear Film - Clear, clean PE (polyethylene) film, including stretch wrap and poly bags
- Commercial Mixed Color Film - Mixed color PE film, including stretch wrap; no postconsumer bags
- Mixed Film - Mixed color, clean PE film, including stretch wrap and retail collected postconsumer bags, sacks, and wraps
- Curbside Film - Mixed PE film generated at MRFs
- Agricultural Film - Dirty Ag Film, or film that has been in contact with the ground with up to 50% contamination, including mulch film; as well as Clean Ag Film, or dry film and in applications that do not involve contact with the ground with up to 10% contamination, including greenhouse film
- Other Film - A catchall for film that does not fit in any of the categories above; mostly non-PE films such as polyvinyl chloride (PVC), boat wrap film, and bags collected through bottle redemption programs

### Data Gaps and Assumptions

Participation in the survey is voluntary and the data reported are based on responses received. Many companies have limited resources to put towards participation in the survey and some companies may choose not to respond due to their confidentiality policies. Therefore, as there is not 100 percent participation, the totals presented represent the minimum amount of plastic recovered for recycling and sold into the marketplace. For example, we know of at least 2 reclaimers that may have recycled postconsumer film that did not respond to the 2014 survey. Only data provided by North American reclaimers—predominantly U.S. and Canadian—and exporters selling directly overseas are included in the totals reported, unless it is determined that data is

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<sup>5</sup> Moore Recycling conducts the survey and maintains confidentiality of individual responses; no individual company data are released, nor any specific data that do not have at least three companies reporting.

missing in areas where substantive information from other reliable resources is available. Data provided by brokers and material recovery facilities (MRFs) are primarily used as reference to better understand the flow of material, but Moore Recycling may include their data if enough information is provided that would enable us to attribute material sold to a non-responder.

Except for the largest exporters, players in the export market come and go, and may frequently change the materials purchased. This can make the export market difficult to track. Moore Recycling tracks exporters handling plastic through a number of industry resources and most of the large exporters respond to the survey.

Again, since participation in the survey is voluntary, Moore Recycling sometimes receives responses from existing companies that did not previously respond. Increases in year-over-year recovery rates are often a combination of increased collection along with material that was recycled in previous years but not reported. When Moore Recycling can conclude the nature of an increase (or decrease), the reasoning is indicated; although, it can be difficult to make a solid determination in any given year, depending on the depth of information Moore Recycling receive from plastic handling companies for previous years and taking into account confidentiality concerns.

Often, Moore Recycling must follow up with responders due to inconsistent placement of data in survey categories. Quality control is essential to determine if there has been an actual shift or just an entry error. Clarification is often needed to determine if material reported can be counted as postconsumer commercial or is in fact industrial scrap.

Postconsumer commercial material can be difficult to track because it is often purchased by companies also handling industrial scrap. The survey now specifically includes a detailed section on post industrial plastic recycling to encourage responses from industrial/commercial scrap recyclers. Having an additional focus on post industrial recycling, enables us to engage these recyclers about material handled that they may not realize is considered postconsumer—that is, it has met its intended use.

Determining the amount of postconsumer bags recovered for recycling is not straightforward. Most retailers combine bags with other film for transport to markets that can reclaim a mixture of polyethylene film. These bales containing bags are reported by reclaimers and exporters in the Mixed Film category. Moore Recycling estimates recovery of postconsumer bags and packaging by adding a percentage of the Mixed Film total to the total for Curbside Film. The percentage used is based on on-going bale audits (see more explanation of the postconsumer bags and packaging total on page 7).

## Findings

### Volume

In 2014, the amount of plastic bags and film reported as recovered in the U.S. for domestic and overseas recycling was 1.17 billion pounds, an increase of 79 percent since 2005.

Approximately 45 percent was reclaimed in the United States or Canada, and the remainder was exported overseas, primarily to China. The amount of material reported as recycled by domestic processors went up eight percent over 2013. Because participation in the survey is voluntary and not all market players report activities, the data in the report do not reflect 100 percent of the film recovered for recycling.

### U.S. Postconsumer Film Recovered for Recycling (pounds)

Year	Exported	Acquired for use in US or Canada	TOTAL
2005	183,701,000	468,776,000	652,477,000
2006	221,082,000	590,928,000	812,010,000
2007	462,611,000	367,569,000	830,180,000
2008	469,968,000	362,426,000	832,394,000
2009	490,718,000	363,659,000	854,377,000
2010	455,984,000	515,823,000	971,807,000
2011	426,738,000	583,023,000	1,009,761,000
2012	601,890,000	418,641,000	1,020,531,000
2013	656,347,000	479,710,000	1,136,057,000
2014	645,658,000	519,426,000	1,165,084,000

Depending on how and where it is collected, recovered film may contain combinations of HDPE, LDPE, and LLDPE resins or it may be a single resin. For example, stretch film (e.g., pallet wrap) is either collected separately and marketed as Commercial Clear Film, or it may be mixed with other polyethylene film—including postconsumer bags and wraps—and marketed as Mixed Film. Stretch film represents a significant majority of the postconsumer film recovered.

The following categories increased in 2014 compared to 2013: Commercial Clear Film, Curbside Film, and Agricultural Film. Most of the increase in purchases came from domestic buyers. Domestic buyers also reported more Mixed Film purchased for recycling in 2014 over 2013, but export buyers reported nearly 36 million pounds less in 2014 resulting in an overall

### 2014 Percentage of Pounds Recovered Film by Category



decrease of 11 percent. Curbside Film purchases increased in 2014 but only by 1.5 million pounds and fewer responders reported this category compared to previous years. Five exporters that participated in the 2014 survey and provided Curbside Film data in previous years, reported zero pounds of Curbside Film in 2014. The amount of Commercial Mixed Color Film reported by domestic buyers decreased by nearly 20 million pounds. Other Film also decreased overall by 9 million pounds with most of the decrease occurring in export totals.

### 2014 Pounds of Recovered Film by Category

Recovered Film Category	Pounds Recovered in 2014	Change Over 2013
Commercial Clear	539,553,000	5%
Commercial Mixed Color	230,038,000	-3%
Mixed (incl. retail)	220,988,000	-11%
Agricultural	160,231,000	40%
Curbside	9,724,000	18%
Other	4,550,000	-67%

### Determining Total Postconsumer Bags and Packaging

Plastic bags are commonly commingled with stretch film wrap and other retailer-generated scrap film for efficient collection at retail locations; therefore “bag only” bales are rare. Thus, as indicated in the [Data Gaps and Assumptions](#) section, to determine the total amount of recovered postconsumer bags and packaging, this study adds a specific percentage of the Mixed Film bale to all of the Curbside Film.

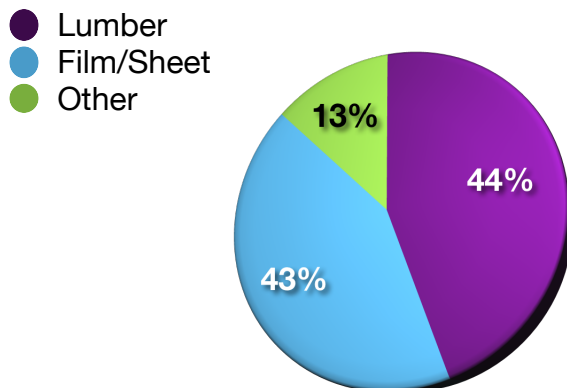
Using available data, Moore estimates that 136 million pounds of postconsumer bags and wraps were recovered for recycling. The curbside total increased 1.5 million pounds and domestic buyers reported 9 million more pounds of Mixed Film. As mentioned above, export buyers decreased purchases of Mixed Film by nearly 36 million pounds. These shifts in the Curbside and Mixed Film reported resulted in a nine percent drop in postconsumer bags and wraps recovered for recycling (see the [Discussion and Recommendations](#) section for more information about decrease in consumer-returned bags and wraps).



Since the 2012 Report, an on-going private national bale audit in the retail sector provides the percentage of bags in Mixed Film bales.<sup>6</sup> The bale audit study<sup>7</sup> is conducted by members of the [Flexible Film Recycling Group](#) (FFRG), which represents more than half of the domestic processing capacity for postconsumer film. Based on the findings of the bale audit study, this report assumes 57 percent of Mixed Film bales are bags and wraps. Given the historical variability in percentages, this is a rough estimate of consumer-returned bags and wraps recovered for recycling and also conservative. Retail bags (grocery or carryout) make up approximately 20-25 percent of these bales, consumer-returned packaging wrap and other bags about 35-40 percent, and stretch wrap accounts for most of the remainder.

### Domestic Capacity and End Markets

#### **Reclaimed U.S. Postconsumer Film: 2014 End Uses**



Moore Recycling estimates there is approximately 836 million pounds per year of plastic film reclamation capacity<sup>8</sup> in the U.S. that includes washing or processing unwashed material directly into regrind, agglomerate, pellets, or end products. Based on survey data, there are at least 36 million more pounds of capacity for 2014 compared to 2013.

The utilization rate<sup>9</sup> was approximately 62 percent in 2014, which is up nearly four percent from 2013.

The increase in capacity is due mostly to the addition of two newly included film reclaimers (one new market and one new responder) as well as

<sup>6</sup> Prior to the 2012 Report, Moore Recycling used an average of the percentages of bags in Mixed Film bales reported by reclaimers.

<sup>7</sup> In addition to the private bale audit study, the FFRG conducted bag audits on material recovered during Wrap Recycling Action Program's (WRAP) educational campaigns in Milwaukee, WI and Vancouver, WA to assess the impacts of specific signage and education at the retail level on the quality and volume of recovered film. More information about WRAP reports including bag audits are available on [PlasticFilmRecycling.org](http://PlasticFilmRecycling.org) (see the [Recommendations](#) section for information about WRAP).

<sup>8</sup>Capacity for processing postconsumer film often overlaps with capacity to process post industrial film and in some cases bottles and non-bottle rigid plastics. The annual United States National Postconsumer Plastic Bottle Recycling Report and the annual National Postconsumer Non-bottle Rigid Plastic Recycling Report likely report some capacity that is also reported here. Thus, adding the non-bottle rigid, bottle and film capacities from this report and the others could result in some double counting.

<sup>9</sup> Utilization, or the rate at which potential production levels are being met, can be determined by dividing the total pounds reported as acquired for recycling by the estimated capacity.

some expanding capacity for existing companies. Even with the two new companies participating in the survey, there were fewer companies included in the total capacity estimate. The decrease in total reclaimers contributing to the total capacity is the result of closing film recycling operations as well as reclaimers that did not respond with 2014 data.

Most of the U.S. film processing capacity is for clean LDPE and HDPE film that can be used to make a new product without washing or for single resin film (e.g, LDPE only). Very few companies have wash capacity, as it a very costly phase in reprocessing.

The primary domestic end uses for plastic film are composite lumber, film and sheet, and “other” uses including marine products, agricultural products, crates, buckets, and pallets. Of the U.S. recycled material, composite lumber manufacturers used 209 million pounds (a four percent decrease ); the film and sheet market used 203 million pounds (a four percent increase); and around 60 million pounds were used in “other” end uses beyond film/sheet and lumber.

The survey asked responders to make a historical characterization of supply and demand in 2014 as compared to previous years. The drop in virgin resin pricing the fourth quarter of 2014 had an impact on the scrap film market according to most respondents. Additionally, larger buyers reported managing more inventory than desired towards the end of 2014.

**Note:** *The remaining sections of this Report present Discussion and Recommendations, which reflect Moore Recycling’s expertise and industry knowledge.*

## Discussion

The “Green Fence,” the Chinese government’s initiative to control all postconsumer scrap imports, began in February 2013 and has had an on-going impact on U.S. plastic film recycling. Exporters continued to source material from the United States in 2014 at about the same rate as 2013 based on pounds reported, but there was a shift away from postconsumer film and an increase in Commercial Mixed Color. Conversely, domestic buyers increased purchases for nearly all categories of recovered film except Commercial Mixed Color. Overall the marketplace was generally healthy for clean polyethylene film.

In 2014, the fewest number of exporters since 2005 contributed data to the Curbside Film total. Curbside Film reported by export buyers did increase by a negligible amount, however, most of the Curbside Film increase came from domestic buyers.

The 36 million pound drop in export totals for Mixed Film, the category that includes consumer-returned bags and wrap, was significant. While it is likely Moore Recycling is missing data from a few exporters, several exporters reported significantly lower totals in 2014 compared to 2013 for Mixed Film. There is no definitive way to know the precise reason for the decline. It could be due to bag bans and a subsequent decline in retail collections bins available for recycling, or it may be that consumers are assuming, if bags and wrap are recyclable, they can go in curbside recycling programs. Many MRF operators have expressed concern because they are

seeing more film in the curbside stream. Most film that ends up in the curbside stream does not make it to market; there is little to no value for Curbside Film. For film to be successfully recycled through curbside programs, demand, sufficient to absorb the potential volume of Curbside Film, will likely require significant investment, including research and development into new end products. Many MRFs need to modify their processes for optimal sorting and handling. Technology may exist to handle the contaminated film, however, many in the industry continue to question whether curbside film recycling is cost effective.

Virgin resins prices dropped in the fourth quarter of 2014, demand started to weaken, and margins grew a little tighter for most reclaimers. As always, tough market conditions require emphasis on quality, efficient collection and consolidation, and lean operations. With declining demand from the export market, domestic suppliers are going to need more domestic markets that can handle an ever changing stream of postconsumer resin (PCR).

## Recommendations

### WRAP Engagement

While many large chain stores have collected film and bags for over two decades because they derive revenue from the scrap material, avoid disposal costs, and garner community goodwill,<sup>10</sup> collection is less common among small to medium-sized businesses. The Wrap Recycling Action Program, a national public outreach and education initiative, was created to increase film recycling through engaging key stakeholders (i.e., Champions) to improve education and activate collection networks. WRAP needs far more engagement from key stakeholders such as brand companies, packaging manufacturers, retailers, the public sector in order to affect a broader market.

### Outreach and Education

Some amount of film including mixed resin film material will end up in MRFs, even with significant improvement in consumer education.<sup>11</sup> Solutions are needed on several levels, but strong unified messaging on how and what to recycle should be institutionalized throughout the value chain so confusion and lack of information are no longer a primary barrier to recycling.

With broad adoption by retailers of the Wrap Recycling Action Program (WRAP) signage<sup>12</sup> and by brand companies of the How2Recycle label, the amount of usable postconsumer bags and wraps could increase; the WRAP fieldwork campaigns provide evidence to support this approach.

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<sup>10</sup> Reports from WRAP campaigns provide evidence about customer appreciation or goodwill earned through providing recycling to customers.

<sup>11</sup> Vancouver, WA, a WRAP Partner, measured a decline in bags in the curbside stream after extensive education.

<sup>12</sup> Free signage and other educational material are available at [PlasticFilmRecycling.org](http://PlasticFilmRecycling.org)

## Design Guidelines and PCR Demand

The Association of Postconsumer Plastic Recyclers, GreenBlue's Sustainable Packaging Coalition and the American Chemistry Council's Flexible Film Recycling Group are supporting design for recyclability through the development of design guidelines and use of the How2Recycle label. Packaging designed for recyclability and a robust demand for postconsumer resin are two critical elements of a sustainable plastic recycling industry. Moore Recycling recommends greater focus on creating demand for PCR.

## Additional Information

The Plastics Division of the American Chemistry Council, which provided funding to Moore Recycling Associates to prepare this report, provides resources to assist communities, businesses and consumers in increasing awareness and education on the recycling of plastic bottles, containers, bags, and film. Moore Recycling is a recognized expert in the field of plastics recycling and has been conducting recycling studies for over 26 years. This work has been conducted and evaluated in an objective manner by persons qualified to do so, using procedures generally accepted in the profession to yield accurate and reliable results. Visit [www.PlasticFilmRecycling.org](http://www.PlasticFilmRecycling.org) for updates on WRAP programs including results from campaigns. Moore Recycling provides technical support for WRAP, which is primarily funded by ACC's Flexible Film Recycling Group. Also, visit [www.PlasticsMarkets.org](http://www.PlasticsMarkets.org), maintained by Moore Recycling Associates, for additional markets and information on handling guidelines. This report and others on plastic recycling can be found at [www.MooreRecycling.com](http://www.MooreRecycling.com).

## Disclaimer

The 2014 National Report on Postconsumer Plastic Bag and Film Recycling has been prepared to provide information to parties interested in the recycling of plastics, in particular plastic bags and film. Facilities developing a recycling process and all entities involved in the chain of collection, processing, distribution, and sale of recycled products have an independent obligation to ascertain that their plans, actions, and practices meet all relevant laws and represent sound business practices for their particular operations. Facilities may vary their approach with respect to particular operations, products, or locations based on specific factual circumstances, the practicality and effectiveness of particular actions and economic and technological feasibilities. This report is not designed or intended to define or create legal rights or obligations. ACC does not make any warranty or representation, either express or implied, with respect to the accuracy or



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