

Final Report
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Recycling Public Advisory Council
c/o DNREC
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State of Delaware Assessment of Municipal Solid Waste Recycling For Calendar Year 2013



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TABLE OF CONTENTS

PREFACE	i
ACKNOWLEDGEMENTS AND LIMITATIONS.....	ii
Introduction	1
Residential versus Commercial Recycling Categories.....	1
Disposal Estimates	1
Material Categories	1
Project Approach.....	4
Survey Methodology.....	4
<i>Excluded and Included Material Types</i>	<i>6</i>
<i>Potential for Use as Energy Recovery.....</i>	<i>6</i>
<i>Potential for Off-Site Disposal.....</i>	<i>6</i>
<i>Import and Export.....</i>	<i>7</i>
Description of Final Material Categories.....	7
<i>Automotive Wastes</i>	<i>7</i>
<i>Commercial Waste.....</i>	<i>8</i>
<i>Food Waste.....</i>	<i>9</i>
<i>Green Waste</i>	<i>10</i>
<i>Pallets and Clean Wood.....</i>	<i>11</i>
<i>Scrap Metal.....</i>	<i>11</i>
<i>Other Wastes.....</i>	<i>12</i>
Study Limitations.....	12
Results	13
Paper Recycling.....	0
Other Packaging Waste	1
Scrap Metal.....	2
Green Waste.....	2
Food Waste.....	3
Vehicle Waste.....	3

Summary 4
Residential vs. Commercial Recycling Activity..... 5
Calculating the Recycling Rate for Delaware..... 8
Calculating the Denominator 8
Calculating the Recycling Rate 9

APPENDIX

A: Scope of Materials and Activities including in the Standard MSW Recycling Rate (Source EPA, 1996)

B: DNREC Letter on Annual Recycling Reporting, and DSM Reporting Form

PREFACE

DSM Environmental Services, Inc. (DSM) first surveyed and reported on recycling activity in Delaware in 2005 for the Delaware Solid Waste Authority (DSWA), attempting to quantify all types of materials being recycled or recovered for beneficial use in Delaware from all sources.

Since that time, the Recycling Public Advisory Council (RPAC) Subcommittee on Measurement and Reporting (M&R Subcommittee) worked to differentiate between materials classified as municipal solid waste (MSW) following the United States Environmental Protection Agency (EPA) definition, and all other materials. Starting in CY 2007, DSM followed the M&R Subcommittee's charge to survey and report on recycling in Delaware, and concentrate only on materials included in the EPA MSW definition.

This report represents CY 2013 MSW recycling activity. However during this reporting period DSM has been concurrently collecting data on other (non MSW) solid waste recycling activity in Delaware in order to report on the State's progress toward broader Solid Waste Management and diversion goals in addition to the MSW recycling rate.

While in previous years, DSWA reported directly to RPAC on their recycling activities and the volume of material disposed at each DSWA facility, and RPAC calculated the MSW recycling rate using DSM's and DSWA's information, starting with CY 2011 reporting, DSM collected all information on recycling and disposal and included a calculation of the MSW recycling rate in the report.

The original 2005 study entailed on-the-ground surveys of most large generators and processors of recyclable material in Delaware and focused on materials recovery from the commercial and industrial sector. Subsequent assessments built on the original 2005 database, relying on the internet, email, mail, faxing, and telephone calls to collect the information, update contacts and eliminate organizations no longer operating in Delaware. During this time, organizations that generated (and diverted) non MSW materials or recycled small amount of MSW materials or that used handlers that regularly reported to DSM were excluded from the reporting request.

This year, an effort has been made to reach back out to all organizations – those that generate MSW and those that generate all other non-hazardous solid waste, as well as many that in the past generated and recycled only small amounts of MSW materials. In addition, an extra effort has been made to identify any companies that may have been missed or have grown. This report is the first of two reports. This reports the MSW recycling rate. A subsequent report will report on all materials recycled in Delaware including the MSW recycling.

ACKNOWLEDGEMENTS AND LIMITATIONS

DSM Environmental Services, Inc. would again like to thank the many Delaware organizations, facilities and individuals who voluntarily participated in the first few annual surveys. With their regular participation, the State's recycling rate report's accuracy has been greatly improved.

In CY 2011, reporting on recycling activity in Delaware became mandatory. For CY 2013, the increased participation along with the added reporting detail requested provided better information on material quantities and flow which has continued to improve the accuracy of reporting on Delaware's recycling rate.

Roughly 270 organizations and recyclers have been identified by DSM this year that potentially generate large quantities of or handle recycled materials generated in Delaware. Roughly 220 of these handle material that might be classified as *municipal solid waste (MSW)* recycling, with the balance handling construction and demolition wastes, agricultural wastes, industrial wastes, non-municipal scrap metal or other non-hazardous solid wastes that are not covered by the annual MSW recycling reporting protocol followed in Delaware.

To date, DSM has obtained complete surveys from 210 of these 270 organizations.¹ Because an effort was made to identify and reach out to first time reporters as well as organizations handling and recycling solid wastes not classified as municipal solid waste, final figures may be adjusted on MSW recycling as DSM completes that larger recycling report. DSM expects to complete this report during the first quarter of 2015 at which point final figures will be available.

Despite DSM's concerted effort to identify all firms required to report, DSM does not represent that the list of generators and handlers identified by DSM is a complete list of organizations that are subject to the new recycling reporting requirement. The goal has been and continues to be to target reporting from those generators and handlers whose information is critical to making accurate reports on recycling activity and the MSW recycling rate. For example, reporting by small recycling haulers or large generators who exclusively use recycling facilities located in Delaware that regularly report to DSM is not essential to develop accurate information. However, reports from large generators of recycled materials that use out-of-state recyclers who do not report can be essential. Identifying these circumstances and providing adequate exemptions will be an ongoing challenge to carrying out the annual reporting.

DSM's focus has continued to be to gain participation from all of the larger recyclers in the State, although with the new reporting requirement, smaller recyclers are also subject to reporting, and many have done a good job at complying as well.

Finally, recycling represents an important source of economic activity in Delaware, as well as a strategic source of materials for the United States manufacturing base. As such, the annual survey of recycling activity provides critical data to municipal and state government, and private industry in their attempts to increase recycling in Delaware.

¹ Note that some of the completed surveys represent multiple individual generator locations in Delaware such as retailers or grocery chains who report through their corporate headquarters after consolidating information from multiple stores located in Delaware. Conversely some reporters that could have consolidated data instead completed a single report form for each location and was counted as such.

INTRODUCTION

This is the third year that the State of Delaware Universal Recycling Law has mandated reporting on recycling activity. As a result, DSM has received reports from several first time reporters, and reports submitted have been more complete.

As in the previous assessments, DSM has attempted to identify any new recyclers in Delaware to include in the survey, and also has attempted to disaggregate recycling by residential versus commercial sources.

However, as in previous years, the results are only as good as the data provided. DSM relies on reporters to submit accurate data on the types and volume of materials recycled, and on the end users of their material to ensure all materials recycled are counted but that materials are not double counted.

RESIDENTIAL VERSUS COMMERCIAL RECYCLING CATEGORIES

Each year that DSM has reported on recycling in Delaware we have attempted to distinguish between household (residential) and commercial (business, industry and institutional) recycling. For this reason DSM relies on the surveys not only to calculate an overall recycling rate but to distinguish between residential and commercial recycling activity. In some cases where it is not clear whether recyclables should be classified as residential or commercial, materials have been allocated to residential or commercial based on previous decisions made by the M&R Subcommittee. These decisions have been carried forward for CY 2013 to maintain consistency in reporting.

The resulting report is intended to provide baseline, CY 2013 data on all residential and commercial materials being recycled from Delaware generators that meet the US EPA definition of MSW.

DISPOSAL ESTIMATES

This report includes MSW disposal estimates for 2013. DSM has reviewed detailed data from DSWA on incoming vehicles and waste classifications. These data are used to estimate total residential, commercial and C&D waste deliveries for disposal for CY 2013. In addition, DSM has attempted to identify and estimate any MSW disposed out of state. These totals enable a CY 2013 MSW recycling rate calculation to be made for Delaware for use by RPAC in measuring progress toward State goals.

MATERIAL CATEGORIES

This assessment encompasses all material identified by the EPA as Municipal Solid Waste (MSW) and defined in the EPA document, *Measuring Recycling, A Guide for State and Local Governments* (September 1997) as:

“Wastes such as durable goods, nondurable goods, containers and packaging, food scraps, yard trimmings, and miscellaneous inorganic wastes from residential, commercial, institutional, and industrial sources such as appliances, automobile tires, old newspapers, clothing, disposable tableware, office and classroom paper, wood pallets and cafeteria wastes.” MSW “excludes solid waste from other sources, such as construction and demolition debris, auto bodies, municipal sludges, combustion ash, and industrial process wastes that might also be disposed of in MSW landfills or incinerators. (US EPA1996b)”

The EPA guidance document further defines what is and what is not MSW (Table A, Appendix A of this report), and what counts as recycling and what does not count as recycling (Table B, Appendix A). While the EPA guidance document is helpful in delineating what materials to include in the measurement of MSW recycling, it is often the case that recycling generators, brokers and processors do not report, or keep records, sufficient to differentiate between materials that would be included or excluded from EPA’s definition of recycling.

DSM’s approach for this 2013 assessment is consistent with previous years, surveying and reporting on residential, commercial and industrial activities that would be expected to generate and recycle materials that fall into EPA’s definition of MSW and recycling as shown in Table 1 below (in column 3 titled “EPA’s MSW”). In some cases it was necessary to survey generators or recyclers who manage both included and excluded materials, in which case the generator/recycler was asked to estimate the quantity of included material(s) only.

For example, DSM has asked scrap metal recyclers to report on all types of metal recycling, but to estimate those metals included as MSW recycling – appliances, lead acid batteries and aluminum cans.²

Table 1 lists each material type included in the first column of Table 1 consistent with the way the EPA reports materials recycling. Check marks in Columns 3 (EPA’s MSW), 4 (Industrial) and 5 (C&D) identify which waste (or recycling) stream the material is most likely to be generated from. In the case where a material is classified as both “EPA’s MSW”, and therefore included, and as “Industrial” (e.g. industrial process waste) or “C&D” (e.g. construction and demolition waste), and therefore excluded, the items excluded are noted in the second column.

DSM’s survey and reporting methodology, including a description of all material categories, follows Table 1. This includes the assumptions associated with allocating these materials to excluded or included categories. The final recycling numbers reported for CY 2013 can be found in Table 2.

Finally, in the case of metals the checkmark is centered between columns indicating that in most cases there is no way of determining the source of the material. For this reason, metals except for appliances and packaging containers have been excluded from further consideration. This approach results in the calculation of a lower recycling rate than if metals (other than appliances) were counted toward MSW recycling.

² While durable goods such as furniture and other household products could also be counted toward the MSW recycling rate, scrap metal dealers do not track incoming or outgoing volumes by these types of categories and it would be extremely difficult for them to make reliable estimates.

TABLE 1: TYPE OF MATERIALS INCLUDED IN DELAWARE RECYCLING STUDY, AND GENERATOR CATEGORY³

Material Category	EPA Exclusion from MSW	Delaware Generators of Recycled Materials		
		EPA's MSW	Industrial	C&D
Paper, and Paper Packaging				
Corrugated Cardboard (OCC)	C&D corrugated recycling	√		√
Newspaper (ONP)	Print overruns	√	√	
Sorted Office Paper		√		
Mixed Paper (includes junk mail)	Print overruns and over issue	√		
Non Paper Packaging				
Plastic Film and Shrink Wrap	Pre-consumer plastic waste	√		√
Plastic Bottles and Containers		√		√
Mixed Plastics/Other Plastics	Pre-consumer plastic waste	√	√	√
Aluminum Cans		√		√
Glass Bottles and Jars		√		
Scrap Metal				
Aluminum			√	
White Goods / Appliances	Nonferrous metals from industrial or construction sources, ferrous metals	√		
All other Nonferrous Metals	from transportation equipment or C&D waste.		√	
All other Ferrous Metals			√	
All other Metals			√	
Automotive Wastes				
Oil Filters		√		
Waste Oil	Excluded from MSW	√	√	
Lead Acid batteries	Batteries from large equipment, boats, heavy duty trucks and tractors, and from industrial applications.	√	√	
Tires	Bus and heavy farm and construction equipment tires; tire derived fuel.	√		
Organic Waste				
Food Waste	Food processing waste	√		
Fats, Oils, Grease		√		
Leaf and Yard Waste		√		
Tree Waste	C&D stumps and trees and wood used for biomass.	√		√
Clean Wood	Wood used for biomass.	√		√
Pallets	Wood used for biomass and pallet repair and reconstruction.	√		√
Textiles	Reuse of apparel	√		
Poultry Wastes, Sludges	Excluded from MSW		√	
Municipal Biosolids	Excluded from MSW		√	
Food Processing Waste	Excluded from MSW		√	
Bottom and Fly Ash	Excluded from MSW		√	
Special Wastes				
Electronics		√		
Florescent Bulbs	C&D debris	√		
Other Batteries		√	√	
Carpet		√		√
Other Construction Wastes				
Asphalt	Excluded from MSW			√
Concrete and Brick	Excluded from MSW			√
Soils and Stones	Excluded from MSW			√

³ A single check mark used for metals, except appliances, indicates that it is impossible to disaggregate quantities reported by generator type (e.g. residential/commercial, industrial and/or C&D) which is required to classify recycled metals as MSW.

PROJECT APPROACH

SURVEY METHODOLOGY

The CY 2013 assessment followed the survey methodology described below. Beginning in CY 2011, DNREC posted information on recycling reporting requirement and assisted the Contractor (DSM) in notifying potential generators, haulers and processors of recyclable material of the new requirement. This included drafting a letter from DNREC for DSM to use to accompany DSM's introductory letter and the annual survey form.

DNREC also provided follow up in October 2013 to those non-responders notifying them of their reporting responsibility. This resulted in an additional 23 surveys submitted to DSM by November 10.

The survey methodology is described in detail as follows:

First, DSM used the database of recycling contacts developed originally during the 2005 survey and updated for the 2006 – 2012 surveys to ensure all materials discussed with the M&R Subcommittee were included, and that all of the major recyclers (and/or handlers/brokers) identified in previous years were included. As in the past, the 2013 survey was augmented by contacting many of the largest generators of recyclable material in Delaware to verify where their recyclable material was being sent. This assisted our effort to eliminate double counting.

For CY 2013, DSM also researched the largest employers and any industry that were not already in the database to ensure that a more comprehensive approach to those impacted by the reporting requirement was followed for this reporting year.

The types of facilities included in DSM's database fall into the following major categories:

- **Recycling haulers** that collect recyclables from small and large generators.
- **Processing facilities, brokers and end users** that either handle, process or buy recovered fiber, plastics, metals, glass, pallets and textiles.
- **Large retailers and grocers** that generate large quantities of corrugated cardboard, film, pallets, appliances, and/or lead acid batteries and who tend to backhaul these materials to internal central distribution centers for processing and marketing. This is especially critical for corrugated containers because many of the national and regional grocers and retail chains (e.g. Wal-Mart, Food Lion, Acme/Sav-A-Lot) organize backhauling of baled corrugated cardboard from their retail stores to a central warehouse, rather than rely on local waste haulers or paper brokers. Therefore, recycling of corrugated containers would be under-counted if the survey only relied on reports from waste haulers and paper brokers.
- **Financial institutions and insurance companies** that are large employers in Delaware and are likely to generate large quantities of paper waste for shredding and recycling. DSM attempted to contact these large financial institutions to ensure that most of the large shredding operations were identified and contacted, and, similar to retailers, that national accounts for shredding and recycling of Delaware materials were reported and accounted for, even if they were located outside of Delaware.

- **Large generators and processors of leaf and yard waste and natural wood waste** such as major landscaping companies, tree companies, land clearing companies and mulchers, who grind the material for resale, were contacted to attempt to allocate tree waste, especially, between MSW and non-MSW categories.
- **Large Employers not listed above, including Institutions and Industry** that may either generate paper, plastics, metals or other recyclable materials in sufficient quantities to utilize out of state handlers, or brokers that may not report.

In all cases survey respondents were offered the opportunity to request that the data be kept confidential. As such, data on quantities by individual firms are not included in this report and will not be available to the RPAC, although the totals reported include all these materials.

Second, letters from DNREC and DSM were sent electronically, including an updated survey form, to all recyclers and large generators that reported in 2012, as well as all contacts in our database for which DSM had a valid e-mail address. An increased reliance on e-mail to carry out the survey has helped to increase the efficiency and accuracy of the survey process. A copy of the survey form was also made available for download on the DSM web site and reporting guidance was available on the DNREC website. Additionally, recyclers and large generators were given the option to fill out and submit the survey form directly from their computer using an online forms central database to manage responses and verify that the form had been received.

In cases where DSM had no e-mail address or if the e-mail sent by DSM was returned, DSM made one or more telephone attempts to the contact person to try to obtain the e-mail address and discuss the survey, and then followed up by e-mail or using facsimile or in some cases the U.S.P.S. mail service to send both the DSM and the DNREC letter along with the survey form.

Finally DSM followed up the e-mails sent with telephone calls and subsequent e-mails to try to solicit survey responses. A copy of the letter from DNREC, the DSM letter and the updated CY 2013 survey form are all attached as Appendix B.

Third, DSM updated our database with any new companies and recyclers found using internet searches, identified during telephone interviews or identified in the completed surveys. DSM also updated our database to remove any companies that had closed, merged or were no longer operating in the State of Delaware. DSM also updated our database with new contact names as applicable.

Fourth, DSM attempted to collect the following information from each survey participant:

- Types of materials handled or recycled;
- Names of facilities or brokers used for processing in CY 2013 (to ensure double counting did not occur);
- Quantities recycled by material type for CY 2013;
- Whether the material was classified as residential or commercial; and,
- Specific end uses of some materials to ensure that uses such as tire derived fuel, wood for biomass, and shredded paper to waste to energy facilities would be excluded from the totals reported.

As the State of Delaware continues to work toward enforcement of the mandatory reporting requirement DSM has also been actively working with potential responders to emphasize corporate responsibility and accountability for both the reporting deadline as well as the accuracy of the data being provided. To increase accountability for the information being provided, DSM has discontinued the practice of allowing survey information to be collected over the telephone by a DSM consultant filling in the survey form on behalf of the responder. During both the 2012 and 2013 reporting period DSM requested that all responders complete the required survey form and provide DSM a copy of the completed survey form. This has helped to push accountability for all data back on the representative who provided the data, and helps to compare respondents' data from one year to the next year, also helping to verify accuracy.

Fifth, DSM collected all data from DSWA on recyclable materials handled through DSWA facilities, including the assumed source of the material (e.g. residential vs. commercial) and end users to ensure double counting of materials from other recyclers and buyers reporting did not occur.

Finally, on a case-by-case basis, if a relatively large generator of recyclables failed to respond to the 2013 survey, data from 2012 was used as a placeholder, but only if DSM expected that no major changes to that company had occurred during 2013. It should be noted that these decisions do impact quantities recycled, and can impact the recycling rate. DSM has attempted to be consistent with respect to this procedure to allow for a consistent methodology over time. It also should be noted that excellent participation was achieved from the larger recyclers for 2013. The need to utilize this procedure was important when reporting was voluntary, but has been significantly reduced going forward as most recyclables generators recognize their legal responsibility to report under the Universal Recycling law.

EXCLUDED AND INCLUDED MATERIAL TYPES

This recycling rate report concentrates on materials recycled from municipal solid wastes (MSW) only. Construction and demolition wastes as well as industrial process wastes are excluded. In addition, gaseous and liquid wastes, infectious wastes, and RCRA Sub-title C hazardous wastes are excluded. It should be noted here however, that to the extent that included materials, especially corrugated cardboard generated from construction and demolition activities but collected for recycling are included in reports from brokers and processors, they would be included in the totals reported.

POTENTIAL FOR USE AS ENERGY RECOVERY

Materials that were recovered but directly sent, or processed and sent for energy recovery were excluded. Examples of materials include tires processed for tire derived fuel or that went to waste to energy, and wood and oil sent for fuel use. In addition, because end uses for most oil reported could not be determined, oil recycling was not reported.

POTENTIAL FOR OFF-SITE DISPOSAL

Consistent with EPA guidelines, only those materials which would be disposed off-site if they were not beneficially reused or recycled, and therefore could potentially be delivered to a Delaware landfill, are included in the assessment. Examples include:

- Wood chips and stumps that are disposed on site are excluded while wood waste, including trees and stumps, that must be removed from the site are included. However, wood waste

that would be disposed of with C&D waste was excluded in cases where DSM could confirm that this was the case.

- Plastic wastes reused on-site in a manufacturing process are excluded, but plastic wastes sent off-site for reclamation are included.
- Pallets that are reused or rebuilt on-site (or off-site) are excluded, but pallets that are shipped off-site for grinding for mulch are included in the totals.

IMPORT AND EXPORT

In all cases the assessment excludes materials that are generated outside of Delaware but imported into the State for either recycling or beneficial reuse. Similarly, this report attempts to include recyclables generated in Delaware but exported for recycling, although in some cases this may not be possible because it is not clear whether out-of-state processors are subject to the reporting requirement. For example, recycled materials backhauled or transported from large generators in Delaware directly to out-of-state warehouses or recyclers are included (e.g., grocery stores that backhaul cardboard to an out-of-state, central distribution facility) and any out-of-state material consolidated at a Delaware warehouse/recycler is excluded.

DESCRIPTION OF FINAL MATERIAL CATEGORIES

A detailed description of the material categories tracked, the specific data gathering approach and the recycling process, if any, is described below.

AUTOMOTIVE WASTES

Automotive wastes include the byproducts from operating cars and trucks, such as oil filters, waste oil, lead acid batteries and tires. DSM excluded antifreeze and other cleaning solvents from these estimates.

- **Oil Filters:** DSM obtained data on oil and oil filter recycling from large generators (manufacturers), processors (e.g. Safety Kleen), and collectors (DSWA) which are reported here. DSM believes oil filter recycling continues to be underestimated because not all of the handlers of oil filters were identified and surveyed. In addition, scrap metal recyclers who may handle oil filters that are properly drained are not able to report this material separately so it would be included in their aggregate estimate of ferrous metals and therefore not reported to DSM as the totals cannot be disaggregated.
- **Waste Oil:** DSM was not able to confirm waste oil recovery for re-refining (which would be counted as recycling), as opposed to energy recovery; therefore waste oil continues to be excluded for CY 2013, as it was in previous years.
- **Lead Acid Batteries:** DSM surveyed vendors, generators and collectors of lead acid batteries because they are included as MSW recycling under the EPA definition. In 2006,



DSM contacted one regional smelter to confirm lead battery recycling processes and determine if statewide estimates could be made for Delaware. However, the outcome was that they were unable to break down their supply by source, forcing DSM to collect reports from vendors and large generators. As in past years, DSM believes that the CY 2013 survey results continue to underestimate battery recycling in Delaware because of the difficulty in identifying all companies handling lead acid batteries. Using EPA's per capita estimate of lead acid battery generation and recovery, Delaware's population would account for roughly 9,000 tons recovered. In contrast, 3,470 tons (rounded) were reported for 2013 and as in past years, included in these estimates are batteries from large equipment, boats and tractors because recyclers could not break out counts by generator type. (Note that the total amount of material recycled includes both lead and the polypropylene battery casing.)

- **Tires:** DSM surveyed several large handlers of tires (including DSWA) to confirm 2013 total quantities recovered. End uses for tires recovered are found to be mainly Tire Derived Fuel (TDF) chips, which are excluded, although some have gone to landscaping, drainage and other engineering products, which are included in the EPA recycling definition. DSM also believes that reported data on tire recycling underestimates total quantities recycled because data on tires that are retreaded are not included in this report and because DSM suspects not all handlers of tires have been identified. (See discussion on tires in Results for more information on this.)

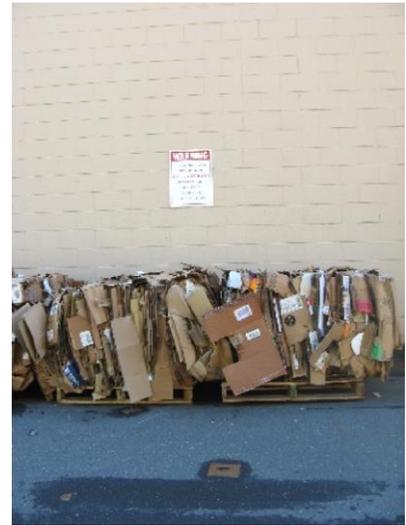


COMMERCIAL WASTE

The commercial waste stream includes a number of materials that are traditionally recycled such as corrugated cardboard, mixed paper, office paper, plastic film and pallets. For this year, DSM concentrated our survey effort on large employers and large commercial generators to ensure that material going to distribution centers and out of state recycling facilities was captured. DSM also made numerous telephone calls to brokers and end users to attempt to account for any material bypassing processing facilities located in Delaware that may have been missed from our survey effort.

The types of business surveyed by DSM and the materials that they typically recycle include:

- **Professional Offices**, including government offices and large employers in the banking, finance and insurance industries such as JP Morgan Chase, Bank of America and Blue Cross Blue Shield, generate large quantities of office paper waste typically destined for shredding or secure document destruction.
- **Secure Document Destruction Firms** that service the banking, finance, health care and insurance industries. As in previous surveys, DSM attempted to verify the end users and reported only tonnage recycled (as opposed to tons incinerated or sent to waste to energy



facilities) in this report. DSM also reviewed the major sources (generators) of paper waste to ensure double counting did not occur. Because some document destruction industry consolidation has occurred in the region over the last 2-3 years, DSM continued to experience some difficulty in identifying all current handlers of materials as some new haulers now operate from out-of-state offices.

- **Groceries/Supermarkets**, including most of the major supermarket chains in Delaware such as Acme/Save-A-Lot, Food Lion, Safeway, Shop-Rite, and Supervalu/Pathmark who typically backhaul corrugated cardboard, and more recently shrink wrap, to central distribution facilities for consolidation for recycling end markets. In addition, separation of food waste for composting that was noted in the 2011 and 2012 reports has continued and grew in 2013.
- **Retailers**, including Wal-Mart (which also sells groceries), Lowe's, Home Depot, Sears and other "big box" department stores such as Target and Costco, as well as major chains located in Delaware such as Wawa's, PepBoys and Staples.
- **Restaurants**, DSM interviewed representatives of some of the large restaurant chains in 2005 to obtain data on corrugated cardboard recycling and contact information on the rendering facility taking the grease. DSM contacted the major recyclers serving these restaurants in 2013 to obtain statewide quantities.

Note that while DSM asked about container recycling (e.g. beverage containers, cans, jars, jugs and other bottles), these materials were typically not recycled by commercial businesses in 2005 with the exception of those covered under the state bottle deposit legislation. More recently with the availability of single stream recycling collection, these materials are now included in those utilizing single stream collection by major haulers.

All of these materials, with the exception of fats, oil and grease are clearly categorized as MSW and are included in the EPA definition of recycling. (See discussion of fats, oils, and grease in "Food Waste" below.)

FOOD WASTE

This includes expired and waste meats and vegetables from grocery stores and slaughterhouses, and oil and grease from restaurants. Waste meats and oil and grease are recovered and used in feed while waste vegetables and fruits are sent for organics composting in-state at the Wilmington Organics Recycling Center and Blue Hen Organics. DSM did not attempt to estimate backyard composting, which is excluded from EPA's definition of recycling.

For 2013, there was an increase in food waste separation by commercial generators for composting, including some large restaurants and grocery stores beginning pilot and permanent programs in hopes to increase diversion at all stores.



It should be noted here that fats, oils and grease collected from restaurants are not explicitly addressed in the EPA Guidance Document. DNREC agreed with DSM's proposal in 2004 to include this material. EPA's definition of food scraps includes liquid fats so DSM has included fats, oil and grease recovered from food preparation, mainly restaurants, in the MSW totals.

GREEN WASTE

This category has been sub-divided into three categories of organic wastes: (1) yard waste or landscaping waste – primarily leaf waste and grass clippings; (2) tree company waste; and (3) tree waste from site clearing.

- **Yard waste:** This category is primarily from professional landscapers who typically remove yard waste materials from a job and bring it to a central site for grinding and mulching. This material is reported and counted at the point of processing (grinding). DSM attempted to gain participation from all of the large mulching operations in the state. DSM also included estimates from municipal yard waste collection programs, data from the yard waste sites operated by DNREC, and data on yard waste dropped off at DSWA facilities. All of this material is included in the totals for MSW recycling. Note that this category can include yard waste from commercial sources (e.g. landscaping waste from office parks and shopping malls) as well as from households and residential complexes. DSM attempted to verify all municipalities and other large yard waste collectors/handlers that were sending material to the WORC facility so that this material was not double counted.
- **Trees and branches:** This category is for wood waste generated from tree companies and includes tree removal (including some stumps) and branches from trimming. This material is generally delivered to processors for grinding and mulching, but is also delivered to some end users for fuel. DSM surveyed the processors or consolidation points as to the quantities processed and the end use of this material, and attempted to report on only those quantities of trees and branches that were delivered to grinding operations for mulching.
- **Trees and stumps:** This category is for tree and stump removal in the process of site clearing for development. This material could be categorized as construction waste (and therefore excluded from MSW recycling), even though most of this material is removed from the site separate from any C&D waste. To the extent possible, DSM has excluded this material, although it is likely that some of this material is ultimately reported as trees and branches or yard waste by the mulchers, or reported as composting (used as a bulking agent), and therefore is reported as MSW recycling.



PALLETS AND CLEAN WOOD

This category includes pallets collected primarily from businesses and industry because they are damaged or otherwise destined for disposal, as well as dimensional lumber that is not treated, stained or painted. Companies that handle pallets either rebuild or reconstruct them for resale, or grind them for mulch. Only the portion ground for mulch is reported in the MSW recycling rate (typically around 10% of all pallets collected for reuse and recycling). DSM surveyed pallet recyclers and mulchers to obtain estimates of annual quantities handled. Some clean wood is included in the pallet category as pallet recyclers will often pick up clean wood along with the pallets from a generator. In addition, mulchers rarely distinguish between pallet wood and other clean wood. As long as it is free of stains or paint, and relatively free of nails, they will grind it for mulch. Whenever possible, DSM attempted to distinguish between pallet and wood waste.



SCRAP METAL

DSM has only included appliances in the assessment of scrap metal counted as municipal recycling. Unfortunately scrap metal businesses typically do not distinguish appliances from other light iron. Therefore, for purposes of this report, DSM specifically asked scrap metal dealers to estimate the percent of light iron represented by appliances, and worked with scrap metal dealers to report appliance tonnages. DSM also reported backhauling of appliances from big box stores who do not use Delaware scrap dealers.

While EPA also includes metals from furniture, tires and miscellaneous durables in the definition of MSW recycling, DSM believes it would be impossible for scrap metal dealers to report and for DSM to accurately estimate the percentage of metals recycled that would be classified as furniture, tires or durables and therefore has excluded these materials from the MSW total. In addition, DSM has excluded other ferrous and non-ferrous metals recycled from the totals to simplify MSW reporting.

Note by excluding all metals but appliances (and aluminum and steel cans and lead acid batteries), MSW recycling rates reported in Delaware will tend to be lower than those reported in states, such as Vermont, that continue to include other metals.



OTHER WASTES

This category is a catch-all for all other materials that are being recovered including electronics, carpet waste, textiles, and universal waste such as fluorescents containing mercury. While DSM has attempted to survey the major recyclers of textiles, carpet, electronics and fluorescents, and this effort is continuing at the time of this report publication. Most of the recyclers who operate transfer, consolidation, and data destruction facilities out of state have been difficult to identify and to obtain reliable numbers from for Delaware generated materials. As result, the numbers continue to be underreported.

However, even if all recyclers reported, the additional quantities are likely to have a small impact on total recycling as compared to other materials surveyed and reported on in this assessment.



STUDY LIMITATIONS

DSM's methodology only counts material reported to be recycled and does not make per capita, per employee, or other estimates based on a materials flow methodology or generation or recycling coefficients. This methodology is more likely to under-report than over-report recycling activity due to the fact that, despite DSM's best efforts, some generators and brokers have not been identified and are therefore not in DSM's database and do not participate in the surveys. However, this method does make year to year comparisons more accurate and informative.

As in past reports, DSM used a few of the prior year's (CY 2012) reported data to compensate for any large generators or processors that did not report for 2013 but were known or suspected to still be active recyclers. However there were only 6 cases where this occurred for 2013 as the survey participation rate for 2013 was high for both repeat reporters and newly identified businesses that had not previously reported.

With the mandatory reporting requirement in effect for its third year during 2013, data accuracy has further increased. Participation by haulers and other collectors/handlers who provided detailed reports enabled better cross checking of data than in the past. However the increased use of waste and recycling brokers (located out of state) by the commercial sector continued to make identifying the appropriate contact for large generators difficult. Where in the past, distribution centers handled corrugated cardboard and other recyclables, often there is now a contracted entity responsible with a different contact person. The broker as well as the contact person at the brokerage business may change year to year and therefore it has become an ongoing struggle to identify the correct contact for reporting purposes.

In addition, the changes in data destruction firm ownership and in paper brokers accounts has made tracking paper more difficult this year.

These limitations may result in reported yearly changes on a material-by-material basis that may, or may not, represent real changes in recycling rates. DSM has made every effort to correct the prior year numbers when irregularities or reporting errors are identified.

RESULTS

Table 2 (on the next page) presents the 2013 results together with the 2010 through 2012 results to enable comparison. Separate numbers are reported for many materials collected by DSWA. However in 2013, DSWA contracted recyclables processing out to a private vendor and therefore mixed recyclables collected by DSWA are no longer reported by DSWA separately, as they are reported by the private processor and aggregated with all other mixed recyclables (mainly single stream materials) reported by other handlers/processors. Because of the large number of material categories, and changes in recycling activity and material flow between years, Table 2 is heavily footnoted, and followed by a detailed discussion of the 2013 Results by material type.

The 2013 survey results indicate that material diverted for recycling increased by 12 percent, or roughly 48,000 tons (rounded) between 2012 and 2013. Although CY 2010 and 2011 tonnages are also shown, they are *not included* in the calculation of the difference.

It is DSM’s opinion that the majority of the increase can be directly attributable to the Universal Recycling Law, combined with better reporting due to the enforcement of the mandatory reporting requirement and some increase in economic activity. A detailed explanation is presented below.

Figure 1 compares the major material category totals for 2009 – 2013, including those recycled through DSWA programs and/or facilities. As illustrated by Figure 1, most of the increase is from single stream recycling (labeled as “Mixed Recyclables”), followed by yard waste composting.

FIGURE 1: COMPARISON OF MATERIAL RECYCLED, CY 2009 – 2013 (TONS BY MATERIAL)

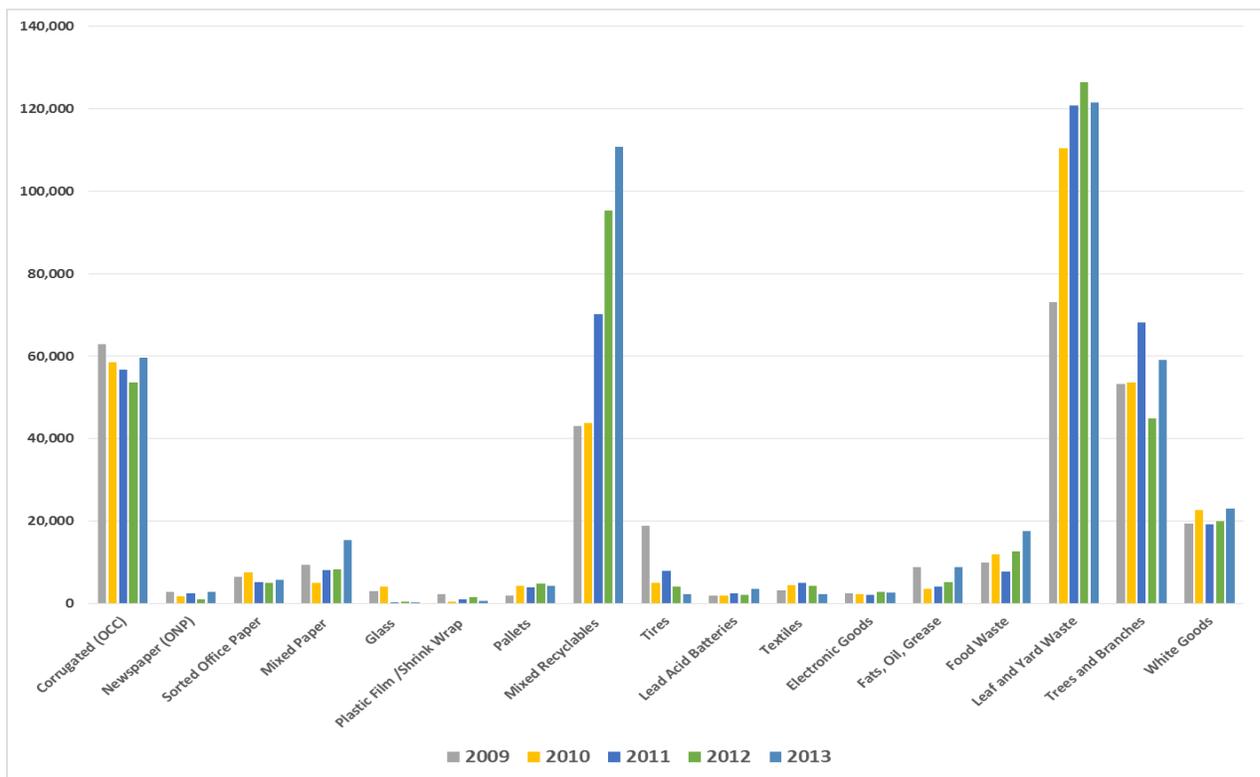


TABLE 2: COMPARISON OF MSW MATERIALS RECYCLED IN DELAWARE, CY 2013, 2012, 2011 AND 2010

Material Category	CY 2013			CY 2012			CY 2011			CY 2010			Difference, 2013 - 2012			
	All Other (tons)	DSWA (tons)	Total (tons)	All Other (tons)	DSWA (tons)	Total (tons)	All Other (tons)	DSWA (tons)	Total (tons)	All Other (tons)	DSWA (tons)	Total (tons)	All Other (tons)	DSWA (tons)	% Diff	Total (tons)
Paper, Paper Packaging																
Corrugated (OCC)	59,684	0	59,684	53,288	252	53,540	53,938	2,858	56,796	50,954	7,553	58,507	6,396	-252	11.48%	6,144
Newspaper (ONP)	2,824		2,824	909		909	2,369		2,369	1,769		1,769	1,915		210.65%	1,915
Sorted Office Paper (1)	5,775		5,775	5,001		5,001	5,078		5,078	7,449		7,449	774		15.48%	774
Mixed Paper (2)	15,328		15,328	8,174		8,174	8,064		8,064	5,041		5,041	7,154		87.52%	7,154
Subtotal:	83,611	0	83,611	67,372	252	67,624	69,449	2,858	72,307	65,212	7,553	72,765	16,239	-252	23.64%	15,987
All Other Packaging																
Glass (3)	170		170	332		332	208		208	4,011		4,011	-162		-48.85%	-162
Plastic Film /Wrap (4)	601		601	1,452		1,452	974		974	425		425	-851		-58.64%	-851
Plastic Containers	118		118	30		30	223		223	37		37	88		294.98%	88
Aluminum Cans (5)	2,277		2,277	696		696	728		728	546		546	1,581		227.13%	1,581
Pallets (6)	4,278		4,278	4,714		4,714	3,842		3,842	4,186		4,186	-436		-9.24%	-436
Mixed Recyclables (7)	110,799	0	110,799	33,079	62,211	95,290	16,002	54,133	70,135	4,755	39,051	43,806	77,720	-62,211	16.28%	15,509
Subtotal:	118,243	0	118,243	40,303	62,211	102,514	21,979	54,133	76,111	13,960	39,051	53,011	77,940	-62,211	15.34%	15,729
Vehicle Waste																
Tires (8)	2,226	0	2,226	3,110	951	4,061	6,831	989	7,820	5,049		5,049	-884	-951	-45.18%	-1,835
Lead Acid Batteries (9)	3,472		3,472	2,052		2,052	2,341		2,341	1,893		1,893	1,420		69.18%	1,420
Oil Filters	452		452	379	0	379	234	58	292	724	425	1,148	73		19.33%	73
Subtotal:	6,150	0	6,150	5,541	951	6,492	9,407	1,047	10,454	4,843	425	5,267	609	-951	-5.27%	-342
Special Wastes																
Carpet	140		140	140		140	742		742	422		422				
Textiles (10)	2,188		2,188	4,284		4,284	4,946		4,946	4,413		4,413	-2,096		-48.92%	-2,096
Florescent Bulbs	19		19	15		15	8		8	7		7	4		29.80%	4
Electronic Goods	903	1,717	2,620	839	1,933	2,772	240	1,883	2,123	241	1,909	2,151	64	-216	-5.49%	-152
Other Batteries	16	71	87	3	44	47	48	48	96	101		101	13	27	85.36%	40
Subtotal:	3,267	1,788	5,055	5,281	1,977	7,258	5,984	1,930	7,914	5,185	1,909	7,094	-2,014	-189	-30.36%	-2,203
Organic Wastes																
Fats, Oil, Grease	8,802		8,802	5,103		5,103	4,029		4,029	3,557		3,557	3,699		72.49%	3,699
Food Waste	17,626		17,626	12,701		12,701	7,624		7,624	11,904		11,904	4,925		38.77%	4,925
Leaf and Yard Waste	121,514		121,514	126,463	0	126,463	116,756	4,111	120,867	95,594	14,865	110,459	-4,949		-3.91%	-4,949
Trees and Branches	59,125		59,125	44,888		44,888	68,157		68,157	53,580		53,580	14,237		31.72%	14,237
Clean Wood	4,756		4,756	5,410		5,410	5,152		5,152	2,371		2,371	-654		-12.10%	-654
Subtotal:	211,822	0	211,822	194,565	0	194,565	201,718	4,111	205,829	167,007	14,865	181,872	17,257	0	8.87%	17,257
Metals																
White Goods (11)	22,178	790	22,968	19,454	458	19,912	18,444	768	19,212	21,676	973	22,649	2,724	332	15.35%	3,056
Subtotal:	22,178	790	22,968	19,454	458	19,912	18,444	768	19,212	21,676	973	22,649	2,724	332	15.35%	3,056
Other																
Mixed Plastics (12)	2,645	6	2,651	3,965		3,965	2,063		2,063	2,705		2,705	-1,320	6	-33.15%	-1,314
Subtotal:	2,645	6	2,651	3,965	0	3,965	2,063	0	2,063	2,705	0	2,705	-1,320	6	-33.15%	-1,314
Total	447,915	2,590	450,499	336,481	65,849	402,330	329,045	64,846	393,891	280,588	64,776	345,364	111,434	-63,265	11.97%	48,169

TABLE 2 NOTES:

- (1) *Sorted Office Paper: Some figures may be included in mixed paper. Note that 2011 figures were corrected (adjusted down) in the 2012 and 2013 report to correct a reporting error in 2011.*
- (2) *Mixed Paper: All mixed paper reported was included as MSW even in cases where processors did not reveal sources.*
- (3) *Glass: Some plate glass was included in totals reported.*
- (4) *Plastic Film / Shrink Wrap: This category includes plastic retail bag recycling as most generators were unable to report on plastic bags separate from film and shrink wrap quantities.*
- (5) *Aluminum Cans: Primarily aluminum cans but may include other aluminum containers reported by scrap metal recyclers.*
- (6) *Pallets: Only pallets composted or ground for mulch are included in the totals shown and reported for MSW recycling.*
- (7) *Mixed Recyclables: Single stream material collected from municipal curbside recycling programs, including Wilmington, and collected by subscription haulers from both households and businesses. Note that residue is estimated at 10% in single stream recycling totals, although has not been subtracted out from the totals reported. See discussion of residue in the section below Other Packaging Waste*
- (8) *Tires: Tons reported for Tires 2012 have been adjusted up to reflect a reporting error made in 2012 and discovered during 2013 reporting.*
- (9) *Lead Acid Batteries: The total reported in 2010 of 14,205 tons was corrected to 1,893 to reflect a data reporting and recording error caught when 2011 reports were filed.*
- (10) *Textiles: Used clothing (including shoes) exported for recycling or reuse. The end uses change based on the condition and changing markets. Typically clothing is sorted into 4 color categories and sold as rags, or bagged as is and sold as clothing. No breakdown of the actual end use is available.*
- (11) *White Goods: 2012 White Goods 'All other' Tons has been adjusted down from 23,454 to 19,454 to correct an error made in a 2012 report and corrected by the reporter in 2013.*
- (12) *Mixed Plastics may include plastic packaging and other waste plastic generated by manufacturers but sent off site but are reported as mixed plastics by the recycler. Roughly 50% are estimated to qualify as "MSW recycling" consistent with the estimates made in prior years.*

As illustrated by Table 2 total recovery, inclusive of DSWA recycling activity, increased by roughly 48,170 tons. That increase was made up predominantly by paper and packaging materials and organic wastes. This increase is the result of a combination of factors, as described by material category below, but primarily is the result of increased single stream recycling and commercial recycling activity stimulated by the Universal Recycling Law, yard waste bans, improvement in the economy, and better reporting due to the mandatory reporting law.

PAPER RECYCLING

CY 2013 data shows a significant increase in the total Paper and Paper Packaging material recycled in the State of Delaware. Overall, paper recycling increased by 15,987 tons (24%, rounded). Mixed paper and OCC had the most dramatic increases at 7,154 tons and 6,144 tons respectively. DSM believes a number of factors have contributed to the increase in the paper material recycling category between CY 2012 and CY 2013 as bulleted below:

- National economic trends continue to impact OCC's use as a packaging material (especially internet shopping with shipment in small boxes to households), which potentially supports higher quantities of OCC, although offset in some cases by substitution of shrink wrap for OCC at the wholesale and retail level.
- Technology has resulted in the migration of office record keeping from paper to digital. While this industry trend would suggest a reduction in sorted office paper, and possibly mixed paper, this was likely counteracted by an increase in economic activity in CY 2013, as well as the migration of some SOP bales to mixed paper bales.
- The 2013 newspaper (ONP) total is consistent with 2011 and older years, indicating that either the 2012 data were wrong or that that significant amounts of ONP was reported as mixed paper in 2012 but sold this year as ONP (or possibly that ONP generated in 2012 was brokered/reported in 2013).
- An increase in participation and in the quality of data received from most paper reporters, many who are reporting paper grades that are included in mixed office paper as opposed to sorted office paper (with the exception of those processors reporting news).
- Better participation from document destruction and paper shredding outfits, many whom have been part of consolidation activity over the last 2 years and have been very difficult to reach for this survey.

OTHER PACKAGING WASTE

Recycling of packaging wastes are up by 15,730 tons (rounded) primarily due to the increase in single stream recycling activity across Delaware. While single stream recycling was up a reported 15,510 tons (rounded) for CY 2013, this figure includes residue as it has in years past. The residue is estimated to be 10 percent and includes both materials that are not accepted for recycling but collected with other recyclables as well as materials that could be recycled but are not due to process inefficiencies. A 10 percent residue rate is fairly typical at single stream materials processing facilities.

Residue has not been subtracted from the totals reported for single stream materials (mixed recyclables) or for any other materials. For example paper bales may have up to 2 percent or more residue, and textiles and appliances (among other materials) may have some residual materials that cannot be recycled and need to be disposed. While residue has not been accounted for in the totals reported, with the increase in single stream recycling, and potential for higher residue rates, the issue of residue bears mentioning, and is important to track as well as employ methods that can work to decrease the residue rate.

Other explanations for changes in packaging waste recycling figures reported include:

- Recycling of glass reported separately decreased again following the trend begun with the large reduction between 2010 and 2011. This was due to single stream recycling including glass combined with the sunset of the mandated beverage container redemption program that required wholesalers and distributors of glass beverage containers to handle return containers. It should also be emphasized that glass material is still being captured and

recycled. The glass tonnage is now captured as part of the single stream material data. However there is no way to confirm how much glass is collected and recycled through single stream for comparison against prior separate collection programs. In addition, the end markets for glass may have changed as a result of the single stream recycling processing.

- There was a decrease in reporting of shrink wrap recycling, which is primarily attributed to one large national broker who has reported regularly but whose company was purchased in 2013, and who did not handle this material for CY 2013.
- There has been an increase in the quantities of aluminum cans reported by scrap metal recyclers. DSM believes that is due to both an increase in small scrappers who collect and consolidate aluminum cans (some likely removing them from curbside bins) and better reporting.
- DSWA began a polystyrene collection program to recycle polystyrene packaging materials and any clean polystyrene foodservice materials. A total of 12 tons of EPS material was collected for recycling in Delaware by DSWA in CY 2013.

SCRAP METAL

White goods (appliances) showed a 3,060 ton (rounded) increase in 2013 over 2012. This increase is primarily due to more accurate reporting by metal recyclers. This may also be due to an improved economy with more consumers purchasing new appliances replacing old ones and scrap yards receiving these discarded appliances.

GREEN WASTE

CY 2013 saw another year of increases in the recovery of green waste. While leaf and yard waste recovery was down by 4,950 tons (rounded) over CY 2012, tree and branch waste recovery was up roughly 14,240 tons (rounded) compared with 2012.

Overall, the difference is likely explained by the following factors:

- Some shifting by reporters in the allocation of material to trees and branch material from leaf and yard material is likely. Handlers of these materials tend to estimate the allocations because they do not track the material in the same way as this survey.
- There were two serious storms (Hurricane Isaac and Hurricane Sandy) during 2012. However, Hurricane Sandy (the most damaging 2012 storm) occurred at the end of October and clean up and counting of some of the debris related to this storm may not have occurred until the beginning of 2013. This could have a significant impact on the volume of trees and branches reported as mulched or composted in 2013.
- A number of large material handlers do not operate with scales. Instead, these handlers measure volume and material handling in cubic yards. The total annual yardage material figure is then split between yard waste and tree waste with the split often approximated as

a 60 percent yard waste and 40 percent tree waste with the densities assigned by DSM if the handler does not report in tons. This process relies heavily on estimates by the material handler for the split and by DSM for the density calculation for the material category, if the handler cannot estimate the density of each material stream.

FOOD WASTE

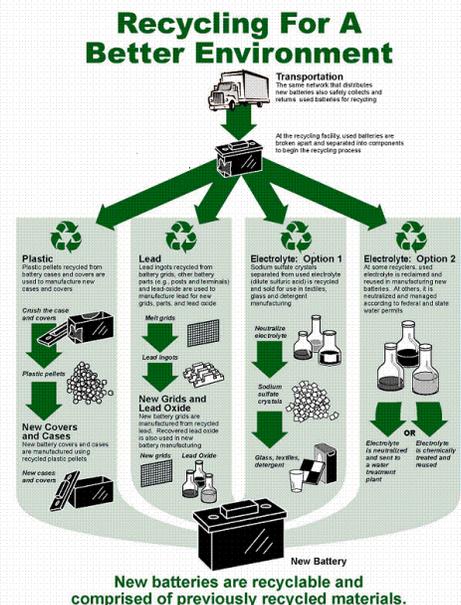
There was an overall increase of 4,925 tons in food waste composting reported for 2013. Fats, oil and grease saw an increase of 3,700 tons (rounded) compared with 2012. An increase in food waste composting for CY 2013 is likely the result of having several facilities offering composting in-state as an alternative to landfilling of these organics, combined with more haulers offering food waste collection services and more businesses (mainly supermarkets and some large restaurants) participating in food waste separation programs. The recent closure of the WORC facility makes it uncertain if longer hauls of food waste generated from businesses in New Castle County to alternative facilities will be feasible next year, or if facilities will have to curtail food waste separation programs until a closer, alternative site is operational.

VEHICLE WASTE

There was decrease in the volume of vehicle waste reported by roughly 340 tons (rounded). This decrease was largely attributable to several critical reporters that provided data for 2013. There was an increase in lead acid battery recycling and a decrease in tire recycling reported.

However tires, lead acid batteries and oil filter recovery continue to be underreported. For example, using national figures from the Rubber Manufacturing Association, waste tire generation for Delaware last year would be roughly 11,000 tons and recovery estimated at 9,000 tons. On a national basis, tire derived fuel uses were roughly 46% of total used tire recovery (excluding retreading). The balance, 54%, goes to construction, engineering and other end uses. Delaware reported 2,230 tons (rounded) for non-tire derived fuel end uses.

Lead acid battery recycling is also underreported. According to the Battery Council International, 98 percent of lead acid battery lead is recovered. In addition, the Council reports that new lead-acid batteries typically contain 60 to 80 percent recycled content (lead and plastic, mainly polypropylene).



TEXTILES AND OTHER SPECIAL WASTES

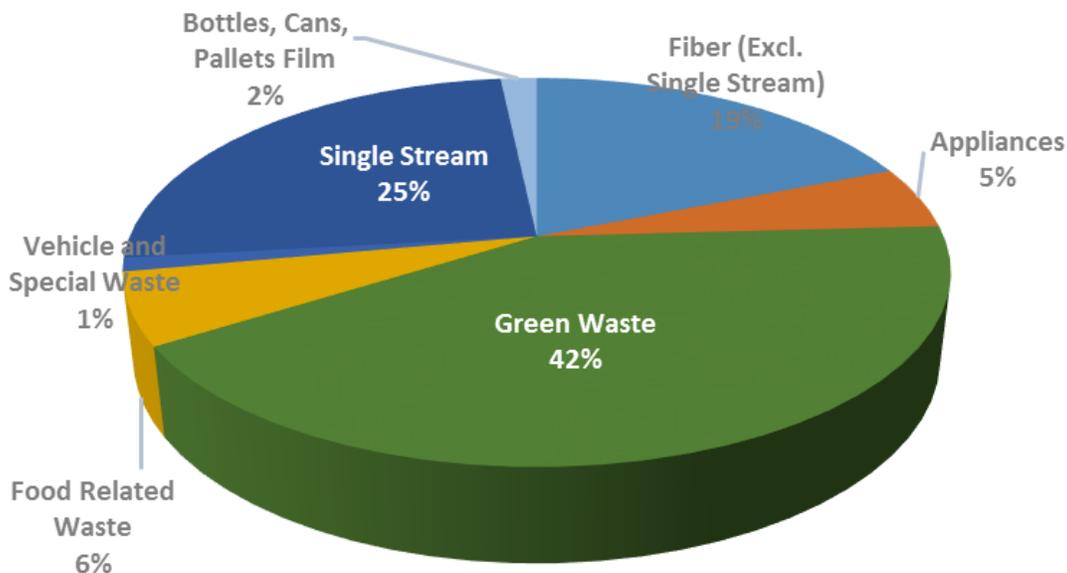
Textile recycling is also underreported in Delaware (and many other states). This is because DSM has relied primarily on the Salvation Army, Goodwill and DSWA for estimates of textile recycling. However from 2000 to 2012 the volume of textile recycling has almost doubled at the national level, with many more players entering the marketplace. The Secondary Materials and Recycled Textiles Assoc. (SMART) represents those businesses that collect, process and market textiles globally. DSM is working with the Executive Director of SMART to attempt to better represent textile recycling in Delaware.

In addition, while carpet recycling was not reported by those businesses that have been involved in this activity in the past, DSM is following up with companies involved in renovations and construction of LEED buildings and in demolition and salvage in order to capture carpet recycling activity that may be occurring outside of MSW recycling activity. In addition, in doing this additional research, DSM has identified one new company that is participating in carpet recycling in CY 2013 that was identified as MSW recycling.

SUMMARY

Figure 2, below illustrates the breakdown of MSW materials recovery, by material type, for Delaware for 2013, including DSWA recycling activity. Figure 2 emphasizes the growing role of single stream recycling and leaf and yard waste composting in materials recycling in Delaware.

FIGURE 2: MATERIALS RECOVERY BY GENERAL MATERIAL CATEGORY INCLUDED IN EPA DEFINITION OF MSW RECYCLING (STATE OF DELAWARE, CY 2013)



RESIDENTIAL VS. COMMERCIAL RECYCLING ACTIVITY

DSM estimated the percentage of each material recycled and classified as MSW generated by a residential as opposed to a commercial source. These allocations are shown in Summary Table 3, below.

While in some cases the source of the material was clear, in others DSM was required to make our best professional judgment as to the source of the material. Since EPA does not attempt to quantify residential and commercial recycling separately, generally acceptable guidelines for allocation of materials recycling to the residential and commercial sector are not available.

In other cases, DSM has worked with RPAC in past years to agree upon acceptable allocations of materials recycling to the commercial and residential sectors. For example, 90 percent of all of white goods are reported as residential recycling.

Leaf and yard waste totals have been allocated as 8 percent commercial with the balance residential consistent with the 2004 survey of yard waste generators and processors.⁴ Trees and branches have been allocated as 11 percent commercial, and the balance residential, consistent with the same 2004 survey.⁵ However, as mulchers and composters have become more accurate in their reports, the allocated percentages consistent with the 2004 survey may no longer be accurate.⁶ This information is expected to be updated through another landscaper and mulcher survey in 2015 and may change the allocations moving forward, as well as can be used to adjust the allocations used in this CY 2013 report if necessary.

It should be noted when reading Table 3 that in the past significant amounts of newspaper, corrugated cardboard and mixed paper generated by residential sources were reported separately by DSWA, while now all paper, with the exception of a declining stream of separated cardboard, collected by DSWA is a single stream of paper and containers and reported under “packaging”. This makes year to year comparisons of paper recycling in this report and in aggregate more difficult.

⁴ This 2004 report surveyed landscapers and other generators or processors of yard waste, brush and tree waste and found roughly 8 percent of leaf and yard waste and 11 percent of tree waste was stated to be from commercial sources.

⁵ Except for one industry reporting tree waste that was clearly commercial and was counted as such.

⁶ The table below compares the allocated percentage used in past years and in CY 2013 to the reported percentages calculated from CY 2013 survey reports. Survey reports from green waste processors may not be accurate because they do not collect information from those that deliver green waste as to the source (residential vs commercial). The difference between the reported and allocated percentage have a significant impact on the residential and commercial recycling rates, but do not impact the overall State Recycling Rate.

Sector	YARD WASTE		TREES AND BRANCHES	
	Allocated	Reported	Allocated	Reported
Residential	92%	57%	89%	17%
Commercial	8%	43%	11%	83%

TABLE 3: ESTIMATE OF RESIDENTIAL VS. COMMERCIAL MSW RECYCLING ACTIVITY (CY 2013)

Material Category	Residential (tons)	Commercial (tons)	Total MSW (tons)
Paper			
Corrugated (OCC)	8	59,676	59,684
Newspaper (ONP)	0	2,824	2,824
Sorted Office Paper	12	5,763	5,775
Mixed Paper	6	15,323	15,328
Subtotal:	25	83,586	83,611
Packaging			
Glass	0	170	170
Plastic Film / Shrink Wrap (1)	0	601	601
Plastic Containers	0	118	118
Aluminum Cans (2)	1,080	1,197	2,277
Pallets	0	4,278	4,278
Mixed Recyclables (3)	88,283	22,515	110,799
Subtotal:	89,363	28,880	118,243
Vehicle Waste (4)			
Tires	1,781	445	2,226
Lead Acid Batteries	2,777	694	3,472
Oil Filters	362	90	452
Subtotal:	4,920	1,230	6,150
Special Wastes			
Carpet	0	140	140
Textiles (5)	2,188	0	2,188
Florescent Bulbs	0	19	19
Other Batteries	78	8.7	87
Electronics (6)	1,202	1,418	2,620
Subtotal:	3,468	1,586	5,055
Food Related Wastes			
Fats, Oil, Grease	0	8,802	8,802
Food Waste	30	17,595	17,626
Subtotal:	30	26,397	26,428
Green Waste			
Leaf and Yard Waste (7)	111,793	9,721	121,514
Trees and Branches (8)	50,033	9,092	59,125
Clean Wood	18	4,738	4,756
Subtotal:	161,843	23,551	185,394
Metals			
White Goods (9)	20,672	2,297	22,968
Subtotal:	20,672	2,297	22,968
Other			
Mixed Plastics (10)	6	2,645	2,651
Subtotal:	6	2,645	2,651
Total:	280,328	170,172	450,499

TABLE 3 NOTES (NUMBERS MAY NOT ADD DUE TO ROUNDING):

- (1) Includes retail bags returned as part of grocery and retail recycling programs.*
- (2) Aluminum can recycling includes those cans reported by scrap dealers at an estimated 50% residential and 50% commercial.*
- (3) Single stream recycling through Wilmington and other municipalities assumed to be 100% residential. All other single stream recycling reported was estimated as residential and commercial by the reporting entity including haulers and processors. Consistent with past reporting, the total tons reported include any residue which has been estimated at 10%.*
- (4) All vehicle wastes recycled are assumed to be 80% residential and 20% commercial. This is consistent with past reporting. Reported source of tires was 80% cars by one major tire recycler.*
- (5) All textiles are considered residential consistent with past reporting. The documented source of textiles is unknown, however DSM assumes most textiles came from residential sources. Also textiles reused are excluded under EPA but included here since reuse versus recycling cannot be determined.*
- (6) Electronics collected by DSWA are assumed to be 70% residential, and all other electronics assumed to be 100% commercial consistent with past reporting.*
- (7) Leaf and Yard waste allocations were made using the same percentage used in previous DSM reports.*
- (8) Trees and branches waste allocations were made using the same percentage used in previous DSM reports, with the exception of one report which was counted as 100% commercial.*
- (9) White goods collected by DSWA assumed to be 90% residential and 10% commercial. All other white goods collected by scrap metal recyclers and retailers assumed to be 100% residential consistent with prior reporting.*
- (10) Mixed plastics are assumed to be 100% commercial consistent with past reports, with the exception of polystyrene which is also included under mixed plastics and assumed to be 100% residential.*

CALCULATING THE RECYCLING RATE FOR DELAWARE

CALCULATING THE DENOMINATOR

To determine total disposal in Delaware for CY 2013, DSM collected data from DSWA and from out of state disposal facilities and instate generators that used WTE as opposed to landfilling.

DSM also reviewed all scale data kept by DSWA on deliveries to the three landfills and three transfer stations during CY 2013.

DSM then followed these steps to disaggregate construction and demolition waste and estimate total municipal solid waste disposal in Delaware as well as to allocate MSW disposed to the residential and commercial sector were as follows:

First, DSM obtained CY 2013 data on deliveries of solid waste to each of DSWA's transfer stations and landfills. This included data on whether the waste was classified as municipal solid waste or construction and demolition wastes (C&D) at each DSWA facility.

Second, DSM obtained data on the quantity of solid waste delivered by vehicle type to each DSWA facility (e.g. front end loader, rear end loader, side loader, roll-off, pick-up truck). Using 2011 survey data on the typical source of waste by vehicle type coming into each facility, DSM allocated total waste tonnage for the year 2013 for each vehicle type to residential, commercial, C&D or self-haul categories.

Third, DSM totaled residential, commercial, C&D and self-haul quantities for each facility calculated by the vehicle type allocations made, and from this calculated total tons of residential, commercial, C&D and self-haul waste delivered statewide for 2013.

Finally, the self-haul total (estimated at 7.6 percent of total deliveries using the vehicle allocation method described above) was allocated equally to residential, commercial and C&D sources consistent with past facility surveys. Table 4-1 and 4-2 show these steps.

TABLE 4-1: SELF-HAUL, RESIDENTIAL, COMMERCIAL, AND C&D WASTE DELIVERIES TO DSWA FACILITIES BASED ON VEHICLE TYPE (CY 2013)

DSWA Facility	Waste, By Generator Type, 2013				Total
	Self Haul (tons)	Res (tons)	Com (tons)	C&D (tons)	
NSWMC	14,517	132,474	144,521	31,153	322,665
CSWMC	6,967	36,262	30,222	6,013	79,464
SSWMC	17,613	23,285	34,980	48,314	124,192
PTCTS	3,405	39,990	31,303	4,233	78,931
MTS	2,244	18,598	10,411	644	31,897
RT5TS	6,988	47,427	18,201	420	73,036
Total:	51,735	298,036	269,637	90,778	710,185

TABLE 4-2: REALLOCATION OF SELF-HAUL WASTE TO RESIDENTIAL, COMMERCIAL, AND C&D SECTOR TO ESTIMATE TOTAL RESIDENTIAL AND COMMERCIAL WASTE DELIVERIES TO DSWA FACILITIES (CY 2013 & CY 2012 COMPARISON)

SECTOR	Total, From Above (tons)	Reallocation of Self- haul Deliveries	TOTAL	From 2012 Report	Reallocation of Self- haul Deliveries	TOTAL
	2013 (tons)	2013 (tons)	2013 (tons)	2012 (tons)	2012 (tons)	2011 (tons)
Residential	298,036	17,245	315,281	279,840	16,879	296,719
Commercial	269,637	17,245	286,882	260,608	16,879	277,487
C&D	90,778	17,245		74,442	16,879	
Self Haul	51,735			50,637		
Totals:	710,185	51,735	602,163	665,527	50,637	574,206

CALCULATING THE RECYCLING RATE

In addition to the estimated 602,163 tons of municipal solid waste disposed, there was another 21,300 of primarily commercial waste was disposed at out-of-state facilities.

Using totals from Table 3 for residential and commercial recycling activity in the numerator and the results of Tables 4-1 and 4-2 in the denominator, and then adding 21,300 tons to the commercial sector, the residential and commercial recycling rates are calculated along with the State's MSW recycling rate as a whole as shown in Table 5.

TABLE 5: CALCULATION OF RESIDENTIAL AND COMMERCIAL RECYCLING RATE, AND THE TOTAL MSW RECYCLING RATE (CY 2013)

Sector	(A) Recycling (tons)	(B) Disposal (tons)	(C) Other Disposal (tons)	(B) + (C) Total Disposal (tons)	A / (A + B + C) Recycling Rate (%)
Residential	280,328	315,281	0	315,281	47.1%
Commercial	170,172	286,882	21,300	308,182	35.6%
Total MSW:	450,499	602,163	21,300	623,463	41.9%

APPENDIX A

SCOPE OF MATERIALS AND ACTIVITIES INCLUDED IN THE STANDARD MSW
RECYCLING RATE SOURCE: EPA, 1996

TABLE A. SCOPE OF MATERIALS INCLUDED IN THE STANDARD MSW RECYCLING RATE

MATERIAL¹	WHAT IS MSW	WHAT IS NOT MSW²
Food Scraps	Uneaten food and food preparation wastes from residences and commercial establishments (restaurants, supermarkets, and produce stands), institutional sources (school cafeterias), and industrial sources (employee lunchrooms).	Food processing waste from agricultural and industrial operations.
Glass Containers	Containers; packaging; and glass found in appliances, furniture, and consumer electronics.	Glass from transportation equipment (automobiles) and construction and demolition (C&D) debris (windows).
Lead-Acid Batteries	Batteries from automobiles, trucks, and motorcycles.	Batteries from aircraft, military vehicles, boats, and heavy-duty trucks and tractors.
Tin/Steel Cans and Other Ferrous Metals	Tin-coated steel cans; strapping; and ferrous metals from appliances (refrigerators), consumer electronics, and furniture.	Ferrous metals from C&D debris and transportation equipment.
Aluminum Cans and Other Nonferrous Metals	Aluminum cans; nonferrous metals from appliances, furniture, and consumer electronics; and other aluminum items (foil and lids from bimetal cans).	Nonferrous metals from industrial applications and C&D debris (aluminum siding, wiring, and piping).
Paper	Old corrugated containers; old magazines; old newspapers; office papers; telephone directories; and other paper products including books, third-class mail, commercial printing, paper towels, and paper plates and cups.	Paper manufacturing waste (mill broke) and converting scrap not recovered for recycling.
Plastic	Containers; packaging; bags and wraps; and plastics found in appliances, furniture, and sporting and recreational equipment.	Plastics from transportation equipment.
Textiles	Fiber from apparel, furniture, linens (sheets and towels), carpets ³ and rugs, and footwear.	Textile waste generated during manufacturing processes (mill scrap) and C&D projects.
Tires	Tires from automobiles and trucks.	Tires from motorcycles ⁴ , buses, and heavy farm and construction equipment.
Wood	Pallets; crates; barrels; and wood found in furniture and consumer electronics.	Wood from C&D debris (lumber and tree stumps ⁵) and industrial process waste (shavings and sawdust).
Yard Trimmings	Grass, leaves, brush and branches, and tree stumps. ⁵	Yard trimmings from C&D debris.
Other	Household hazardous waste (HHW) ⁶ , oil filters, fluorescent tubes ⁷ , mattresses, and consumer electronics.	Abatement debris, agricultural waste, combustion ash, C&D debris, industrial process waste, medical waste, mining waste, municipal sewage and industrial sludges, natural disaster debris ⁸ , used motor oil, oil and gas waste, and preconsumer waste.

TABLE A. NOTES

- ¹ Composite materials are categorized according to their main constituent; however, they can be designated as a separate category under Other MSW if they cannot be otherwise categorized.
- ² These wastes are not considered MSW due to one or more of the following reasons: (1) they are not defined as MSW in EPA's *Characterization of Municipal Solid Waste in the United States*, (2) they have not been historically handled and disposed of as MSW, (3) they are regulated as hazardous waste, and/or (4) they were generated by a preconsumer source. These non-MSW wastes are referred to as Other Solid Waste in this guide and on the survey forms and worksheets.
- ³ Carpets are categorized as Textiles when discarded in MSW and are included in the rate calculation. When carpets are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.
- ⁴ Tires from motorcycles are not defined as MSW because they historically have not been characterized as MSW in EPA's *Characterization of Municipal Solid Waste in the United States*.
- ⁵ Tree stumps are categorized as Yard Trimmings when discarded in MSW and are included in the rate calculation. When tree stumps are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.
- ⁶ HHW includes paints, stains, varnishes, solvents, pesticides, and other materials or products containing volatile chemicals that catch fire, react, explode under certain circumstances, or that are corrosive or toxic. Specific examples include oil-based paint, antifreeze, household cleansers, and bug sprays. Used motor oil is excluded.
- ⁷ Fluorescent tubes are categorized as Other MSW when found in MSW and are included in the rate calculation. When fluorescent tubes are discarded in C&D debris, they are not considered MSW and are excluded from the rate calculation.
- ⁸ Natural disasters include earthquakes, floods, hurricanes, and tornados. Heavy storms are not considered natural disasters.

TABLE B. SCOPE OF ACTIVITIES INCLUDED IN THE STANDARD MSW RECYCLING RATE

RECYCLABLE MATERIAL	WHAT COUNTS AS RECYCLING	WHAT DOES NOT COUNT AS RECYCLING¹
Food Scraps	Composting of food scraps from grocery stores, restaurants, cafeterias, lunchrooms, and private residences, and the use of food scraps to feed farm animals.	Backyard (onsite) composting of food scraps, and the use of food items for human consumption (food banks).
Glass	Recycling of container and packaging glass (beverage and food containers), and recycling of glass found in furniture, appliances, and consumer electronics into new glass products such as containers, packaging, construction materials (aggregate), or fiberglass (insulation).	Recycling of glass found in transportation equipment and construction and demolition (C&D) debris, recycling of preconsumer glass or glass from industrial processes, and reuse of refillable glass bottles.
Lead-Acid Batteries	Recycling of lead-acid batteries found in cars, trucks, or motorcycles into new plastic and lead products.	Recycling of lead-acid batteries used in large equipment, aircraft, military vehicles, boats, heavy-duty trucks and tractors, and industrial applications.
Metals	Recycling of aluminum and tin/steel cans, and recycling of metals found in appliances and packaging into new metal products.	Reuse of metal containers, packaging, furniture, or consumer electronics, and recycling of metals found in transportation equipment (autobodies) and C&D debris.
Paper	Recycling of paper products (old newspapers and office papers) into new paper products (tissue, paperboard, hydromulch, animal bedding, or insulation materials).	Reuse of paper products, recycling of preconsumer or manufacturing waste (trimmings, mill broke, print overruns, and overtissue publications), and combustion of paper for energy recovery.
Plastic	Recycling of plastic products (containers, bags, and wraps), and recycling of plastic from furniture and consumer electronics into new plastic products (fiber fill and plastic lumber).	Reuse of plastic products (storage containers and sporting equipment), recycling of preconsumer plastic waste or industrial process waste, and combustion of plastics for energy recovery.
Textiles	Recycling of textiles into wiper rags, and recycling of apparel and carpet fiber ² into new products such as linen paper or carpet padding.	Reuse of apparel.
Tires	Recycling of automobile and truck tires into new products containing rubber (trash cans, storage containers, and rubberized asphalt), and use of whole tires for playground and reef construction.	Recycling of tires from motorcycles, buses, and heavy farm and construction equipment, retreading of tires, and combustion of tire chips for energy recovery.
Wood	Recycling of wood products (pallets and crates) into mulch, compost, or similar uses.	Repair and reuse of pallets, combustion of wood for energy recovery, recycling of industrial process waste (wood shavings or sawdust), and recycling of wood from C&D debris.
Yard Trimmings	Offsite recycling of grass, leaves, brush or branches ³ , and tree stumps ⁴ into compost, mulch, or similar uses; and landspreading of leaves ⁵ .	Mulching of tree stumps ⁴ from C&D debris, backyard (onsite) composting, grasscycling, landspreading of leaves ⁵ , and combustion of yard trimmings for energy recovery.
Other	Household hazardous waste (HHW) ⁶ , oil filters, fluorescent tubes ⁷ , mattresses, circuit boards, and consumer electronics ⁸ .	Recycling of used oil, C&D debris (asphalt, concrete, and natural disaster debris), transportation equipment (autobodies), municipal sewage sludge, and agricultural, industrial, mining, and food processing waste.

TABLE B. NOTES

- ¹ These activities are not considered recycling due to one or more of the following reasons: (1) they are not defined as recycling in EPA's *Characterization of Municipal Solid Waste in the United States*, (2) they involve the recycling of materials that are not part of MSW, (3) they involve reuse or source reduction, and/or (4) they involve the recycling of preconsumer waste.
- ² Carpeting is categorized as Textiles when discarded in MSW and is included in the rate calculation. When carpets are discarded in C&D debris, they are excluded from the rate calculation.
- ³ Includes woody material such as branches, brush, and whole trees such as Christmas trees.
- ⁴ Tree stumps are categorized as Yard Trimmings when discarded in MSW and are included in the rate calculation. When tree stumps are discarded in C&D debris, they are excluded from the rate calculation.
- ⁵ Landspreading of leaves counts as recycling if the manner of the application allows timely biodegradation of the organic plant material. Landspreading of leaves does not count as recycling if the manner of the application precludes the timely biodegradation of the organic plant material.
- ⁶ HHW includes paints, stains, varnishes, solvents, pesticides, antifreeze products, and other materials or products containing volatile chemicals that catch fire, react, explode under certain circumstances, or that are corrosive or toxic. Specific examples include oil-based paint, antifreeze, household cleansers, and bug sprays. Used motor oil is excluded.
- ⁷ Fluorescent tubes are categorized as Other MSW when discarded in MSW and are included in the rate calculation. When fluorescent tubes are discarded in C&D debris, they are excluded from the rate calculation.
- ⁸ Composite materials are categorized according to their main constituent; however, they can be designated as a separate category under Other if they cannot be otherwise categorized.

APPENDIX B
LETTER FROM DNREC AND
DELAWARE ANNUAL RECYCLING ACTIVITY REPORT FORM
(CY 2013)



STATE OF DELAWARE DEPARTMENT OF
NATURAL RESOURCES
& ENVIRONMENTAL CONTROL
DIVISION OF WASTE AND HAZARDOUS SUBSTANCES
89 KINGS HIGHWAY
DOVER, DELAWARE 19901

OFFICE OF THE
DIRECTOR

TELEPHONE: (302) 739-9400
FAX: (302) 739-1894

January 29, 2014

Subject: Calendar Year 2013 Annual Recycling Report Due February 15, 2014

Dear Recyclables Generator:

This letter serves as a reminder that your company's calendar year **2013** recycling activity data is due February 15, 2014. The Delaware Solid Waste Recycling Law (a.k.a. Universal Recycling Law), specifically *7 Del. C. §6056(1)*, makes reporting the type and quantity of recyclables generated mandatory. The first effective reporting deadline was February 15, 2012 for the recycling activity that took place in calendar year 2011. This is the third year of this mandatory reporting requirement and it continues annually. So each February 15th, the data for the previous calendar year is due.

If you are amongst the majority of respondents that reported recyclables generation data previously, thank you for your response. As Delaware's Recycling Public Advisory Council's (RPAC) responsibilities include advising the legislature on recycling policy for Delaware, accurate information is critical to making practical recommendations. The requested information is also critical to accurately calculate the state's recyclables diversion rate and track progress toward meeting the State's established recycling goals. This cannot be achieved if those persons responsible for managing recyclables fail to report.

If you did not respond previously, **please be aware that reporting is mandatory** and that *7 Del. C. § 6059* affords the Department enforcement authority, inclusive of the ability to impose monetary fines of \$100 to \$500 for each day of violation. While this enforcement option was not exercised during the first year transition period of mandatory reporting, the Department intends to pursue one hundred percent compliance going forward.

DSM Environmental Services, Inc. (DSM) worked with the RPAC to design the survey and has used the survey to collect and aggregate data on an annual basis, under both voluntary and mandatory reporting requirements, for several years now. DSM offers survey participants the option of keeping their report confidential, and has always aggregated the survey data in its annual report to the RPAC to assure that individual company data are not reported. DSM also analyzes the data to ensure double counting does not occur and determines the total quantity of materials recycled in Delaware. This aggregated data is then supplied to the RPAC for the purpose of verifying Delaware's recyclables diversion rate. This process has worked well and for this reason DSM will also manage calendar year 2013 survey data. A copy of

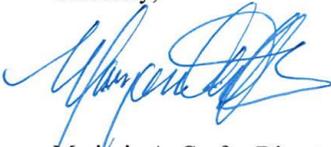
DELAWARE'S GOOD NATURE DEPENDS ON YOU!

last year's report can be found in Appendix C at:

www.dnrec.delaware.gov/dwhs/Recycling/Documents/The%20Twelfth%20Annual%20RPAC%20Report.pdf

Attached to this letter you will find DSM's letter requesting the recycling data and the 2013 reporting form (due February 15, 2014). If you have any questions regarding "completion of the reporting form" please call Natalie Starr or Mike Cammock of DSM at 802-674-2840. If you have questions about the mandatory reporting requirement please contact James Short or Bill Miller of my staff at 302-739-9403 x8. I thank you in advance for your cooperation and commend you for your ongoing recycling efforts.

Sincerely,



Marjorie A. Crofts, Director
Division of Waste and Hazardous Substances

Cc: BJ Vinton, Chair RPAC
Mike Parkowski, DSWA

