

# Conducting a Recyclables Materials Composition Study

An audit process helps provide consistent baselines and measures for improvements in a community's recycling program.

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The composition of recyclable materials can vary significantly due to variations in collection methods, consumer preferences and the success of the recycling education program to minimize contamination. In recent years with changes in recycling markets, many local solid waste agencies and MRF operators have conducted recyclables composition studies, either as part of initial contract negotiations or at regular intervals during the contract term. The following article describes the results of a recent recyclables composition study conducted for the City of Pensacola (City), which is currently in contract negotiations to deliver its residential, single-stream recyclables to the new MRF operated by the Emerald Coast Utility Authority (ECUA). A baseline recyclables composition study was a contractual requirement for the City.

Pensacola is the westernmost city in the Florida Panhandle and the county seat of Escambia County, FL. As of the 2010 census, the city had a total population of 51,923. The City provides a variety of sanitation core services including once a week, automated collection of single-family homes (18,480 customers) and 640 commercial businesses. These accounts are serviced using City-provided rolling carts. In addition, residential customers are provided once a week, single-stream recycling, yard waste and bulk waste collection. Other important services provided include the following: container maintenance, Mayor's neighborhood cleanups, event recycling, and storm cleanup and

management. Current monthly charges (residential and commercial) include the following:

Container charges	\$18.36
Disposal charges	\$4.44
Fuel surcharge	\$1.30

### Approach

The City runs four weekly recycling routes, Monday, Tuesday, Thursday and Friday. Trucks usually dump at the City's Transfer Station twice per day, once in the morning and once when their route is complete. The City generates approximately 4,400 tons of recyclables per year or an average of 21 tons per day. Two samples from each route (one sample per truckload) were collected on each day of the field activities, resulting in eight samples per day. Samples were collected using a front end loader. The collection vehicle would dump a portion of the load on the tipping floor and a front end loader would collect a scoop-full of recycling materials for sorting.

A SCS Engineers Field Manager supervised the sampling operation, which took place on four days, from October 10 through October 14, 2016. The Field Manager interviewed the drivers of the incoming vehicles to determine the route number of each vehicle. Given the limited size of the data set (eight samples sorted per day), it was important



Set-up of Sorting Area.  
Photos courtesy of SCS Engineers.



Above and Right: View of Sample Collection Area.



Material Category	Examples
Mixed Paper	Copy paper, computer printouts, junk mail, notebooks, magazines, telephone books, shredded paper, brown paper bags, kraft paper, catalogs, boxboard, dry pet food bags
Newspaper	Wood pulp/plant fiber derived paper
Corrugated Containers	Packing/shipping boxes, pizza boxes
Aluminum Cans/Foil	Cans (e.g. soda cans, beer cans), aluminum foil, baking pans
Steel Cans	Cans (e.g. pet food cans, soup cans), tin cans
#1 PET	Water bottles, soda bottles
#2 HDPE Natural	Milk, water, and juice jugs
#2 HDPE Colored	Opaque bottles and containers, laundry detergent containers
Comingled Plastics #3-7	Plastic produce clamshells, hard plastics, Styrofoam
Bulk Rigid Plastics	Plastics that don't fall into the numbered category
Glass (3-Mix)	Glass, any color (e.g. beer and wine bottles)
Mixed Metals	Metal pots, pans, and cookie sheets, metal parts
Rejects	Unacceptable materials including: plastic bags, ice cream cartons, waxy/paper milk cartons, aerosol cans, food, garbage, yard waste, carpeting, construction materials, clothes, diapers, garden hoses

**Table:** Material categories.

that unrepresentative data be avoided. Therefore, brief interviews were necessary to assess the “representativeness” and origin (route) of each load.

If a load was deemed suitable for analysis, the driver was directed to discharge a portion of the load in a clear area of the floor. The sort sample was subsequently obtained via a backhoe loader. Samples were hand sorted to into the material categories noted in **Table 1**.

Consistent with good practice in such sampling programs, efforts

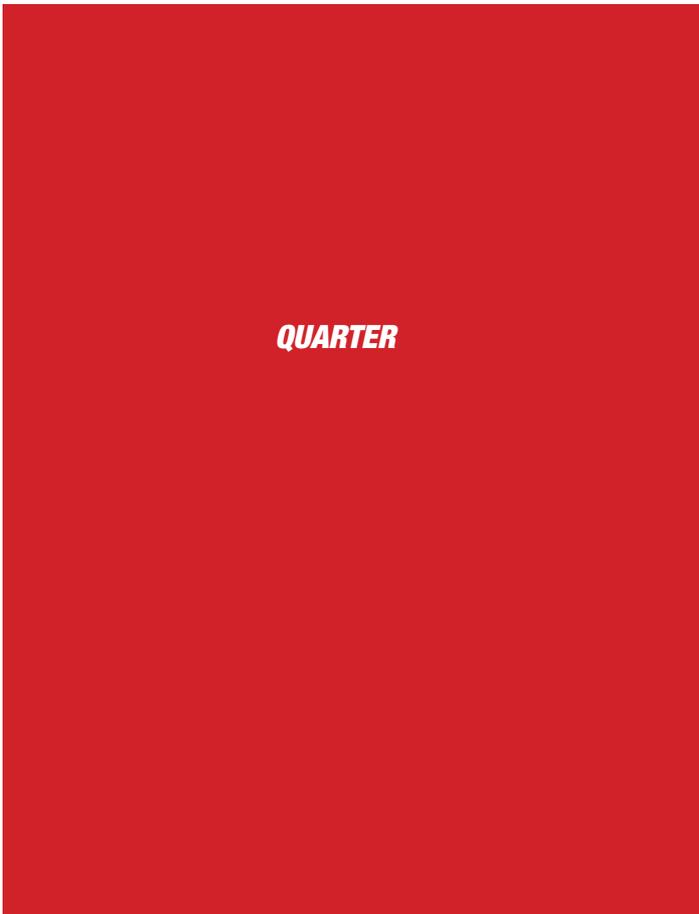
were made to minimize the sampling bias or other impacts on the integrity of the database. To this end, field sampling had been coordinated to avoid holidays and other out-of-ordinary events. During actual sampling, the SCS Field Manager kept records of weather (particularly moisture) encountered and any other relevant factors. Rain and moisture can affect the weights of certain materials; for example, paper tends to absorb more moisture than plastic and metal.



View of Sorting Activity.

Material Category	Percent By Weight
Mixed Paper	27.4%
Newspaper	12.6%
Corrugated Containers	11.5%
Aluminum Cans/Foil	1.3%
Steel Cans	1.6%
#1 PET	4.1%
#2 HDPE Natural	0.7%
#2 HDPE Colored	1.4%
Comingled Plastics #3-7	1.6%
Bulk Rigid Plastics	1.8%
Glass (3-Mix)	11.5%
Mixed Metals	2.4%
Rejects	22.1%

Table 2: Mean composition by weight.



## Results

Thirty-two samples were collected during the sampling event. The mean composition by weight is presented in Table 2, which is the average of the 32 separate samples that were collected.

The recyclables composition study provided the City with an initial baseline for a proposed agreement with ECUA, a basis for negotiating any consequent changes in operations, as well as data on where improvements could be made to its public education program to help minimize contaminants in the setouts on specific collection routes.

## Conclusions

A recent white paper jointly issued by the Solid Waste Association of North America and the National Waste and Recycling Association suggests that similar waste audits should be conducted by solid waste agencies before the start of a procurement process and then at regular intervals throughout the contract term of a materials processing agreement. This audit process helps in providing consistent baselines and measures for improvements in the community’s recycling program. The recycling composition study highlighted in this article is a good illustration of the type of measurement program.

Further, municipalities that have contracts to accept/process recyclables should monitor their composition to better understand the pricing. Various grades of plastic are continually increasing in the residential recyclables stream while aluminum and paper are decreasing. Also, contamination is usually higher than a municipality expects. | **WA**

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