Report of the Results of the Second 2016 Material Characterization Study and Processing Diversion Study

City of Oakland, California Residential Recycling Program

Conducted For

CALIFORNIA WASTE SOULTIONS, INC.

Study Dates: November 14 - 18, 2016

Report Date: November 24, 2016

Study Conducted by

MDM ANALYTICS

TABLE OF CONTENTS

1. Summary

The purpose of these studies was to collect the data required to determine California Waste Solution's (CWS) compliance with the material diversion standard described in Article 8 and illustrated in Exhibit 7, Attachment A of the Residential Recycling Collection Services Contract between CWS and the City of Oakland. Samples for the material characterization study were randomly collected from loads received at CWS's Wood Street facility from Monday, November 14, 2016 through Friday, November 18, 2016. The material for the processing diversion study was collected from randomly selected loads received at the facility from Monday, November 14 through Thursday, November 17, 2016.

For the material characterization study, 52 samples were selected from trucks serving routes in West Oakland, East Oakland, hard-to-serve areas, and multifamily units. The samples were sorted into eleven (11) recyclable material categories. The residual/non-recyclable materials were sorted into three (3) categories—bulky items removed prior to table sorting, large items and film plastic remaining on the sorting table after all of the recyclable materials had been removed, and small pieces of paper, plastic, and glass remaining on the sorting table after all of the recyclable materials and other non-recyclable materials had been removed.

A total of 8,907 pounds of materials were sorted for the material characterization study. The percentage composition of these materials was as follows:

Recycling program materials	65.4%
Other materials recycled by CWS	0.9%
Total recyclable materials from samples	66.3%
Residual/non-recyclable materials	33.7%

The materials accumulated for the processing diversion study were processed at the beginning of the shift on Friday, November 18. The results of this study were as follows:

Materials processed	134,640 lbs, 67.3 tons	
Recyclable materials recovered	89,140 lbs	66.2%
Glass fraction recovered	30,600 lbs	22.7%
All materials recovered	119,740 lbs	88.9%
Residual/trash	14,900 lbs	11.1%

2. Material Characterization Study

2.1 Objective

The objective of this study was to characterize the composition of the materials collected by CWS from single and multifamily units in the City of Oakland by sorting a sufficient number of randomly-selected samples such that the results can be stated as being representative of the characteristics of all materials collected by CWS with a 90% confidence level. The composition of the samples were classified into three primary categories:

a. Program materials
b. Non-program materials recovered by CWS

c. Non-recyclable materials
   - Bulky items removed from samples prior to table sorting (soiled cardboard, pizza boxes, tarps and large pieces of film plastic, large non-recyclable items, bags of household trash)
   - Table residuals - large: film plastic, large items, contaminated paper and plastic >2 inches
   - Table residual - small: food waste, small non-recyclable materials, paper and plastic 2 inches or less

2.2 Methodology

2.2.1 Sampling and sorting location: Wood Street Processing Facility

2.2.2 Sampling days: November 14 - 18, 2016

2.2.3 Selection of routes sampled:

The objective was to sample at least 50 loads for the sampling week and to distribute these loads among the collection areas and days of the week in proportion to average quantity of materials received at CWS from each area on each day of the week. CWS's collection records for the period February 1 to October 28 were analyzed and the incoming load tons were sorted by area and day of the week. The distribution among the areas was as follows:

West Oakland..... 32.8%
East Oakland..... 49.4%
Multifamily units.... 15.3%
Hard to serve..... 2.6%

For all sources, the largest percent of weekly tons was received on Mondays. Using the distribution of tons by day for each of the areas, the required number of samples from each area and day were established.

Table 1: Required Number of Samples—by Area and Day

Area	Mon	Tues	Wed	Thurs	Fri	Week Samples
West Oakland	4	4	3	3	3	17
East Oakland	5	5	5	5	5	25
Multifamily	2	2	1	1	2	8
Hard-to-serve	1	0	1	0	0	2
Total samples	12	11	10	9	10	52

The loads from each area to be sampled daily were selected by assigning a random number to the routes in each area for each of the sampling days, and then sorting the daily route lists by the random numbers. The sort order for the routes for each day are shown in Appendix 1.

Table 2: Weekly Sampling Plan—Daily Routes by Area

Area	Monday	Tuesday	Wednesday	Thursday	Friday
West Oakland	3W	1W	3W	6W	2W
	5W	5W	4W	9W	7W
	8W	8W	8W	11W	8W
	11W	9W			
East Oakland	3E	1E	2E	1E	3E
	8E	2E	8E	10E	4E
	10E	5E	9E	11E	7E
	12E	9E	13E	12E	8E
	16E	16E	15E	13E	14E
Multi- Family	703	702	702	705	703
	705	704			704
Hard to Serve	706		707		
Number of Samples	12	11	10	9	10

2.2.4 Selection of loads to be sampled:

The daily dispatch logs were used to identify the trucks that would be serving the routes to be sampled each day. If a route designated for sampling was an "open" route on a particular day (meaning that it would be served by multiple trucks), the next route in the random order for that day was selected as a substitute.

Each day, a list of the routes and trucks designated for sampling was prepared and copies were distributed to the CWS yard master and the city's representative from ESA. The daily lists included the randomly assigned cell number for each load from which the sample would be selected.

When a load designated for sampling arrived at the facility and had been dumped in the facility tipping area, the sorting supervisor summoned the operator of the small front loader and directed him on the location from which the sample should be selected. The target weight for samples was 150 to 200 pounds. In most cases, one loader scoop was sufficient to obtain an adequate sample size. However, in a few cases, the loader operator was directed to return to the load and secure additional material from the same cell.

The loader operator transported the sample material to the sorting area and dropped it onto a tarp.

2.2.5 Sorting of Samples: Each sample was photographed before being sorted. A 4-person crew (the sorters) separated the samples into the designated categories.

The method of sorting was as follows:

a. After the sample was photographed, the sorters removed large recyclable materials, such as cardboard and rigid plastics, and placed those materials in totes labeled for those materials.

b. Large non-recyclable items, such as garden hoses, contaminated cardboard, film plastic, or bags of household trash, were removed from the tarp and placed in a tote labeled "Residual - Bulk".

c. The tarp with the remaining materials was then moved to the sorting table.

d. The sort crew removed the recyclable materials from the sample, placing them in labeled totes, and leaving non-recyclable materials on the table.

e. When all of the recyclable materials had been removed from the sort table, the totes for the collection of residual materials were brought to the sort table. Film plastic, large non-recyclable materials, and pieces of contaminated paper and plastic were placed in totes labeled "Table Residual - Large". After these residual materials had been removed, the remaining residual materials (small pieces of paper, plastic, and glass, and food waste) were placed in totes labeled "Table Residual - Small".

f. All totes with recyclable materials and residual materials were weighed, and the weights recorded. The weight of the bulky non-recyclable materials removed from samples prior to table sorting were recorded separately from the weight of the residual from the table sorting. The large and small residual materials were also weighed separately.

g. The scale used to record all weights had a 500 pound capacity, displayed weights in one-tenth pound increments, and had been calibrated according to ISO standards (see Appendix 2).

2.3 Material Categories: The categories into which materials were sorted were as follows.

Table 3: Program Materials

Material	Notes and Examples
Newspaper	Newspaper and advertising inserts
Mixed paper	White and colored paper, magazines, telephone books, chipboard, junk mail, high grade paper, egg cartons, shopping bags
Corrugated cardboard	Uncontaminated
Glass bottles and jars	Uncontaminated and empty, broken pieces greater than 2"
Metals cans	Ferrous, non-ferrous, bi-metal containers, empty aerosol containers
Aluminum foil and trays	Uncontaminated
Aseptic food containers	Milk and juice cartons, soup and juice boxes
Plastics	Rigid food and beverage containers, non-bottle rigid plastics

Table 4: Additional Materials Recycled by CWS

Material	Notes and Examples
Metals	Miscellaneous ferrous metals, pots and pans, propane tanks, helium tanks, fire extinguishers
Large rigid plastics	Water bottles, milk crates

Table 5: Non-recyclable Materials

Material	Notes and Examples
Non-recyclable materials	Recyclable materials contaminated with food, oil, or other materials, hangers, film plastic, polystyrene, etc. (see section 2.4)

2.4 Guidelines for Classifying Materials as "non-recyclable"

The guidelines used to determine whether a particular piece of material was considered to be recyclable are provided in Appendix 3.

2.5 Sample Weights and Composition

The weight of all samples was 8,907.1 lbs. The weight of the 52 samples ranged from 150.6 lbs. to 197.8 lbs., and the average sample weight was 171.3 lbs.

The composition of all materials sorted is provided in Table 6 and Figure 1. Table 7 and Figure 2 provide sub-sorts of the sampling results. However, because the characterization study was not designed around these sub-sorts, the results are not necessarily statistically representative.

Table 6: Composition of Sorted Materials

Material	Composition
Mixed Paper	23.8%
Corrugated	15.1%
Glass Containers	11.2%
Plastics	7.2%
Newspaper	5.1%
Metal Cans	2.4%
Aseptic Containers	0.6%
Al Foil & Trays	0.1%
Subtotal Program Materials	65.45%
Rigid Plastics	0.6%
Metals	0.2%
Wood	0.0%
Subtotal Other Recyclable Materials	0.88%
Subtotal All Recyclable Materials	**66.33%**
Residual Bulk	12.3%
Residual Table Large	10.5%
Residual Table Small	11.0%
Subtotal Residual	**33.67%**

Figure 1: Composition of Sorted Materials

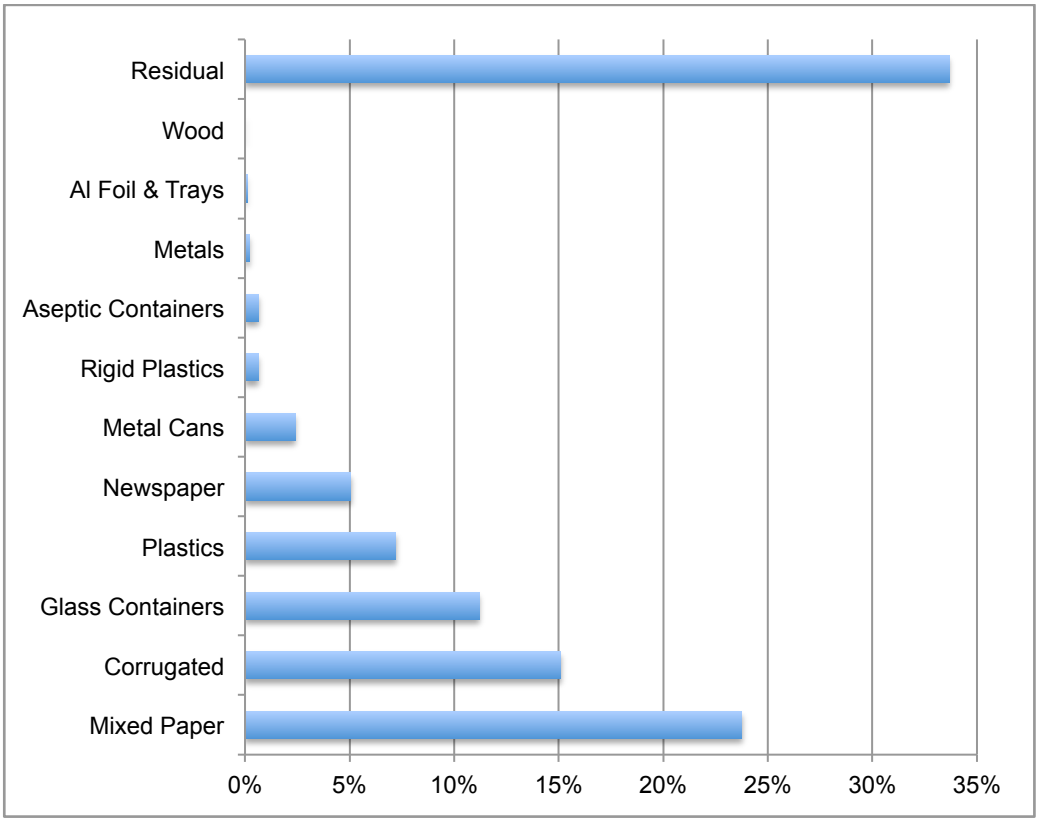
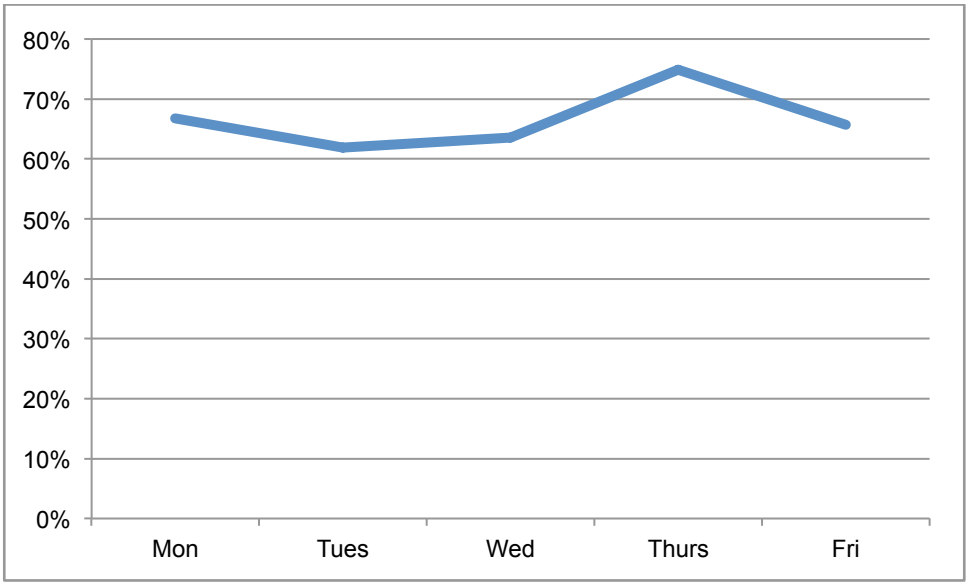


Table 7: Composition of Sorted Materials - By Collection Area

Material	West Oakland	East Oakland
Al Foil & Trays	0..6%	0.11%
Aseptic Containers	0.74%	0.59%
Corrugated	13.58%	15.43%
Glass Containers	11.34%	9.95%
Metal Cans	2.13%	2.47%
Mixed Paper	30.92%	19.01%
Newspaper	5.83%	4.16%
Plastics Containers	6.29%	8.93%
All Program Materials	70.89%	60.64%
Other Recyclable Materials	0.28%	1.43%
All Recyclable Materials	71.17%	62.07%
Residual/Non-recyclable Materials	28.83%	37.93%

Figure 2: Recyclable Percent of Sorted Materials – By Day of the Week



2.6 Sample Standard Deviation and Confidence Interval

The standard deviation for a sample is a measure of the variability of the sample values around the mean (average value) for all samples. For this study, the standard deviation of the percent composition of each material type was calculated across all 52 samples.

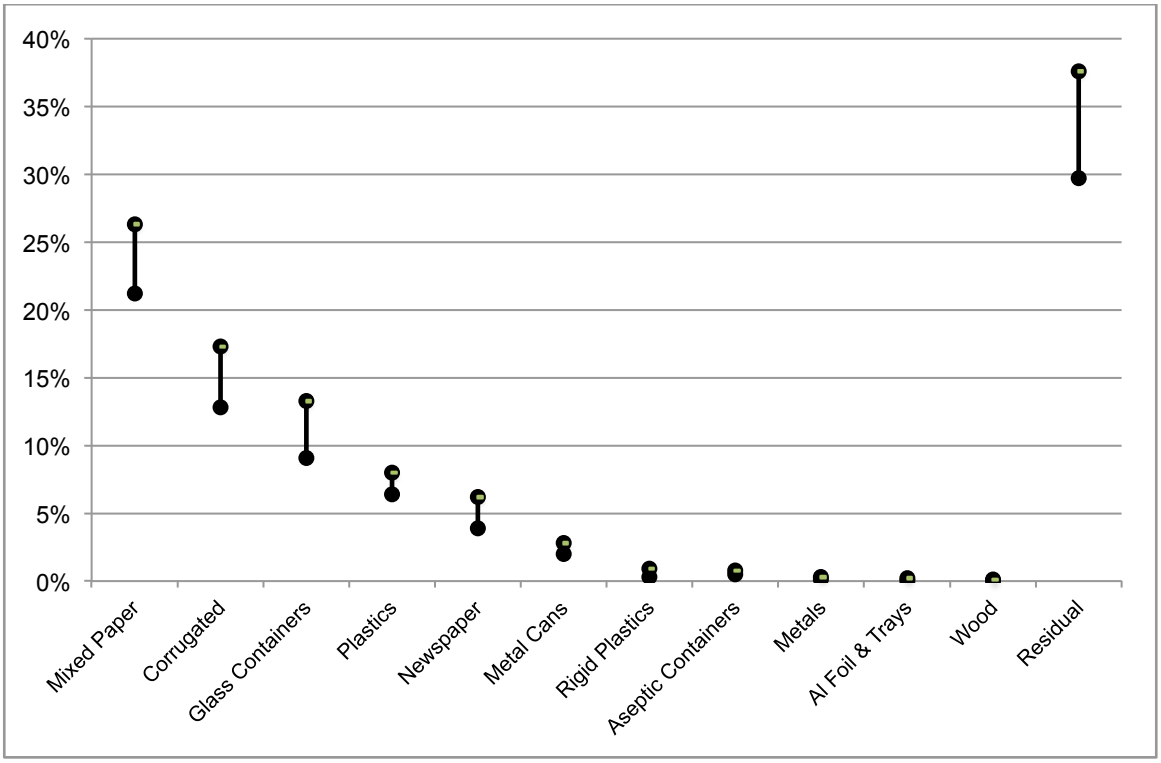
The confidence interval for a set of sample values is used to provide an estimate of how closely the results of the study approximate the actual mean (average) in the population from which the samples were taken. It is based on the standard deviation of the sample values and a desired confidence level. The actual percent composition of each material type in all materials collected from the City of Oakland residential recycling program is a fixed, but unknown value. The purpose of this material characterization study was to provide a valid estimate of those values. The confidence intervals calculated for each material type is an estimate of the actual percent composition in all materials based on the composition of the 52 samples sorted and a 90% confidence level.

The standard deviation and confidence intervals for each material type are shown in Table 8. Figure 3 is an illustration of the confidence intervals.

Table 8: Standard Deviation and Confidence Intervals for Sorted Materials

Material	Standard Deviation	Confidence Interval	Lower Limit of Mean	Upper Limit of Mean
Newspaper	0.042	0.012	3.91%	6.21%
Mixed Paper	0.094	0.026	21.19%	26.32%
Corrugated	0.082	0.022	12.85%	17.32%
Glass Containers	0.076	0.021	9.14%	13.27%
Metal Cans	0.014	0.004	2.03%	2.78%
Al Foil & Trays	0.002	0.001	0.04%	0.16%
Aseptic Containers	0.004	0.001	0.52%	0.76%
Plastics	0.030	0.008	6.38%	8.01%
Program Materials	**0.148**	**0.040**	**61.42%**	**70.37%**
Rigid Plastics	0.011	0.003	0.33%	0.94%
Metals	0.005	0.001	0.08%	0.34%
Wood	0.002	0.001	0.00%	0.09%
Other Recyclables	**0.013**	**0.004**	**0.52%**	**1.25%**
Residual Bulk	0.086	0.023	9.93%	14.57%
Residual Table Lg	0.079	0.022	8.38%	12.69%
Residual Table Sm	0.072	0.019	8.93%	12.83%
Residual	**0.145**	**0.039**	**29.74%**	**37.59%**

Figure 3: Confidence Intervals of the Average Percent Composition for Sorted Materials



2.7 Summary

The estimated composition of all of the materials received at CWS's Wood Street facility from the City of Oakland Residential Recycling Program, based on the composition of the 52 samples sorted and expressed with a confidence level of 90%, is shown in Table 9.

Table 9: Estimated Composition of All Materials from the City of Oakland Residential Recycling Program

Component	Average Percent	Estimated Range	
		Lower	Upper
Program Materials	65.45%	61.42%	70.37%
Other Materials Recovered by CWS	0.88%	0.52%	1.25%
All Recyclable Materials	66.33%	62.41%	70.26%
Residual/Non-recyclable Materials	33.67%	29.74%	37.59%

3. Processing Diversion Study

3.1 The objective of this study was to estimate the percent of the materials processed by CWS that is diverted from landfill disposal by processing a known quantity of materials through the facility and then measuring the quantity of residual/non-recyclable materials remaining after the recyclable materials had been recovered. The study was designed to capture at least 60 tons of material from randomly selected loads received from each of the four collection areas in the city.

3.2 Selection of Materials for the Study

During the sampling week, randomly-selected loads received on Monday – Thursday were unloaded in a designated area of the facility tipping yard. The percentages of materials received at CWS from each area from February 1 to October 28 were used to estimate the quantity of materials that should be selected from each zone for the study. The distribution of the tons received from each area, the average load weight from each area, and the tons and loads required for the study are shown in Table 10.

Table 10: Data Used to Design the Processing Diversion Study

Area	Percent of All Materials Received at CWS (Feb – Oct)	Average Load Weight	Tons Required for the Study	Loads Required for the Study (rounded up)
West Oakland	32.8%	5.30	19.7	4
East Oakland	49.4%	5.36	29.6	6
Multifamily	15.3%	6.00	9.2	2
Hard-to-service	2.6%	2.16	1.6	1
Total	100%		60.1	13

The loads for the study were selected by assigning random numbers to the Monday - Thursday routes from each zone, and then sorting each list of routes by the random

numbers. The results from the July 2016 material characterization study indicated that the difference in the percent of recyclable materials in the Monday - Thursday samples and the Friday samples was only one tenth of one percent (0.01%). Therefore, selecting loads from the Monday - Thursday routes for the processing diversion study provided an adequate basis for conducting this study.

For the West Oakland routes, the first four (4) loads in the sort order were selected. For the East Oakland routes, the first six (6) loads in the sort order were selected. For the multifamily routes, the first two loads in the sort order were selected, and for the loads from the hard-to-serve areas, the first load in the sort order was selected.

Appendix 4 includes the list of weekly loads from each area and the random numbers that were assigned. The loads selected for the study are indicated in red.

Some of the loads selected for this study were also selected for the material characterization study. Because the loads for the processing diversion study would be tipped in a separate section of the yard, it would have been difficult to retrieve samples from the loads also selected for the material characterization study. Therefore substitute loads for the processing diversion study were selected by picking the next route in the random number sequence from the same collection day.

Table 11: Routes Selected for the Tons Required for the Processing Diversion Study

Route	Day	Avg Load Wt
704	Mon	6.00
2E	Mon	5.36
9W	Mon	5.30
706	Tues	2.16
12E	Tues	5.36
3W	Tues	5.30
4E	Tues	5.36
7E	Tues	5.36
4E	Wed	5.36
5E	Wed	5.36
703	Thurs	6.00
10W	Thurs	5.30
5W	Thurs	5.30
Estimated week total tons		67.52

3.3 Loads Received for the Processing Diversion Study

When loads designated for the study arrived at the facility, the gross weight of the trucks was recorded. The trucks then unloaded in the back corner of the tipping yard. After unloading, the trucks returned to the scale so that the tare weight could be recorded.

The weight of the loads selected for the processing diversion study are shown in Table 12.

Table 12: Material Accumulated for the Processing Diversion Study

Date	Truck	Route	Gross Wt	Tare Wt	Net Wt
11/14/16	131	5E	48,980	35,600	13,380
11/14/16	140	9W	50,380	36,740	13,640
11/14/16	305	704	45,800	34,120	11,680
11/15/16	108	3W	47,400	37,160	10,240
11/15/16	124	12E	45,560	35,360	10,200
11/15/16	126	4E	45,800	35,660	10,140
11/15/16	128	7E	49,820	35,900	13,920
11/15/16	307	706	16,940	14,540	2,400
11/16/16	126	4E	45,940	35,680	10,260
11/16/16	131	5E	46,100	35,680	10,420
11/17/16	108	3W	50,320	36,860	13,460
11/17/16	128	7E	45,020	35,480	9,540
11/17/16	304	703	39,620	34,260	5,360
			Total pounds accumulated		134,640
			Total tons accumulated		67.3

3.4 Processing of Accumulated Materials

The materials accumulated for the study were processed as a batch at the beginning of the shift on Friday, November 18. Prior to beginning the processing, the conveyors and hoppers of the facility were cleared and the bins used to accumulate the glass fraction and any residual materials were emptied.

While the sample materials were being processed, the facility was staffed at normal levels. Eight (8) individuals were assigned to the facility pre-sort conveyor. The speed settings of the conveyors and screens were recorded. These values are provided in Appendix 5.

3.5 Data Collected

Table 13: Data Recorded and Calculated From the Processing Diversion Study

	Lbs	Percent
Material Processed	134,640	
Glass Fraction	30,600	22.73%
Residual Bales	14,780	10.98%
Residual Loose	120	0.09%
Residual Total	14,900	11.07%
Total Materials - measured	45,500	66.21%
Recovered Materials - calculated	89,140	88.93%

4. Data Analysis

4.1. Comparison of the Study Results

The results of the November 2015 and July 2016 studies revealed that the results of the material characterization study and processing diversion study could not be used in the way intended in the City/CWS franchise agreement. CWS recovers a glass fraction that includes small pieces of broken glass, paper, plastic, and food waste that would normally be classified as residual in a material characterization study.

The small table residual category designated for the latest material characterization study was an attempt to capture a fraction of the sampled materials that approximated the glass fraction recovered at the Wood Street facility. This attempt was only partially successful since the manual sorting of these materials that occurred during table sorting was not as efficient as the mechanical processing that occurs in the facility. However, for illustration purposes, the following re-categorization of the study results is suggested:

a. Include Table Residual-small from the November 2016 material characterization study as a recyclable material.

b. There was only one table residual category sorted for the July 2016 study. The Table Residual-small category from the November 2016 study was 32.3% of all residual recovered from the November samples. Apply this percent to the total residual recovered from the July 2016 samples so that the results of the two studies can be compared.

4.2 Suggested Calculation of the Material Diversion Rate

Table 14: Combined Adjusted Results from the July and November 2016 Material Characterization Studies (Weight in pounds)

	July	November	Combined
Newspaper	318.10	450.70	768.80
Mixed Paper	1,493.80	2,115.88	3,609.68
Corrugated	1,457.80	1,343.80	2,801.60
Glass bottles & jars	961.30	998.37	1,959.67
Metal cans	198.00	213.89	411.89
Aluminum foil & trays	15.40	8.75	24.15
Aseptic containers	63.20	57.39	120.59
Plastics containers	590.20	640.88	1,231.08
Rigid plastics	88.40	56.30	144.70
Textiles	34.30	0.00	34.30
Metals	67.20	18.82	86.02
Wood	0.00	3.71	3.71
Table residual-small	777.97	969.15	1,747.12
Total Recoverable Material Weights	6,065.67	6,877.63	12,943.30
Total Sample Weights	7,694.80	8,907.11	16,601.91
Percent Recoverable	78.83%	77.22%	77.96%

Table 15: Combined Results of the July and November 2016 Processing Diversion Studies (Weight in pounds)

	July	November	Combined
Processed	130,274	134,640	264,914
Recovered	84,134	89,140	173,274
Glass Fraction	31,700	30,600	62,300
Total Materials Recovered	115,834	119,740	235,574
	88.9%	88.9%	88.9%

Applying the compliance calculation as illustrated in Exhibit 7, Attachment A of the City/CWS agreement yields the following result:

a. Percent of collected materials diverted 88.9%

b. Percent of collected materials that are recyclable 78.0%

c. Percent diverted divided by percent recyclable 114%

This result suggests that the example provided in Exhibit 7 Attachment A of the agreement anticipated that the quality (recyclability) of the collected materials would be greater than that which has been recorded thus far, and that CWS is diverting a greater percent of the collected materials than anticipated.

California Waste Solutions
Collection Routes for November 2016 Characterization Study

West Oakland Routes

Monday	Tuesday	Wednesday	Thursday	Friday
8	9	8	11	2
5	8	3	9	7
11	1	4	6	8
3	5	5	7	5
6	3	10	2	9
10	4	6	1	1
2	10	9	10	10
1	6	7	4	4
7	2	11	3	11
9	7	1	8	3
4	11	2	5	6

East Oakland Routes

Monday	Tuesday	Wednesday	Thursday	Friday
8	16	8	12	3
16	9	9	13	7
3	1	2	1	8
10	2	13	10	14
12	5	15	11	4
9	14	10	16	11
2	12	12	8	10
13	7	7	2	5
5	11	4	3	6
11	15	1	7	16
15	4	3	5	1
4	13	5	14	12
7	6	16	6	9
1	10	11	15	13
14	8	6	9	2
6	3	14	4	15

Multifamily Routes

Monday	Tuesday	Wednesday	Thursday	Friday
703	704	702	705	703
705	702	704	703	704
704	703	705	702	702
702	705	703	704	705

Hard to Service Routes

Monday	Tuesday	Wednesday	Thursday	Friday
706		707		

Routes selected for sampling are indicated in Red.

Bay City Scale Calibration Report

25352A Cypress Ave, Hayward, CA 94544 510-266-0607

ISO 9001:2008

SCALE MODEL	INDICATOR SERIAL#	DATE
TRINER TS- 700SS	AC120528057	11.14.16
CAPACITY/RESOLUTION	**BASE SERIAL#**	**TYPE**
500 LBS X .1 LBS	N/A	BENCH RENTAL

CUSTOMER	STREET ADDRESS
MDM ANALYTICS / CALIFORNIA WASTE	3300 WOOD ST.

CITY	STATE	ZIP
OAKLAND	CA	

TESTING Check Boxes to signify work performed **MINOR ADJUSTMENTS**

✓ o Set scale to zero	o Span Test	o Zero	o Span	✓ o Sign-Off and Date Calibration Sticker
✓ o Corner Test	o Tare Test	o Corner	o Tare	

TEST RESULTS
CORNER TEST

CORNER POSITIONS

1 2

3 4

	AS FOUND			AFTER ADJUSTMENTS
POSITION	WEIGHT*	INDICATION	ERROR	INDICATION
1	50 LBS	50 LBS	0	
2	50 LBS	50 LBS	0	
3	50 LBS	50 LBS	0	
4	50 LBS	50 LBS	0	

SPAN TEST

AS FOUND			AFTER ADJUSTMENTS
WEIGHT*	INDICATION	ERROR	INDICATION
100 LBS	100LBS	0	
250 LBS	250LBS	0	
500 LBS	500LBS	0	

***Equals cumulative weight total.**

Scale calibrated to tolerances specified by United States Department of Commerce, Technology Administration, National Institute of Standards and Technology, Handbook 44, Section 2.20, NIST

TEST WEIGHT _____ **TEST WT CERT. # 14991-16/15025-16/15028-16 AVOIRDUPOIS**

TEST WEIGHT _____ **TEST WT CERT. # _I443 – 14993-16 AVOIRDUPOIS**

TEST WEIGHT _____ **TEST WT CERT. # _R948 – 14988-16 AVOIRDUPOIS**

TEST WEIGHT _____ **TEST WT CERT. # _OMM6 – 15026-16 AVOIRDUPOIS**

NEXT CALIBRATION SCHEDULED FOR _____

TECHNICIAN SIGNATURE 7329/0638 ID# CUSTOMER SIGNATURE

FORM 4.10.1.1.B-1 10/10

Guidelines for Classifying Materials as "non-recyclable"

The following guidelines will be used to determine whether a particular piece of material from the above list will be considered to be recyclable.

1. Material is recyclable only if any contamination on the material is easy to wash away without destroying the piece of recyclable material itself. Examples of contamination that cannot be washed away easily include oil contamination on paper, paint contamination on any material, presence of any toxic material, or dried-out solids inside a glass or plastic bottle.

2. Material is not recyclable if 10% or more of its weight is composed of contaminant rather than the primary recyclable material itself. For example, bottles or plastic containers containing food or other material in more than trace amounts will not be considered to be recyclable.

3. Material is not recyclable if it is shredded in such a way that it is impractical to process it for recycling. For example, finely shredded office paper will not be considered to be recyclable.

4. Material is not recyclable if it arrives mixed with other materials (recyclable or not) and it is impractical or difficult to separate them. For example, if aluminum cans arrive packed inside a closed tin can, neither the aluminum cans nor the tin cans will be considered recyclable.

Any piece of material that is rejected from being considered recyclable will be counted as garbage. In addition, the particular materials listed below will be counted as non-recyclable.

Non-recyclable Paper: Blueprint paper, Carbon paper, Contaminated newspaper (with grease, pet waste, or paint), Facial tissue, Foil gift wrap, Foil-wrapped beverage containers, Frozen food packaging, Frozen juice cartons (cardboard portion), Hard cover books, Padded, plastic or Tyvek™ envelopes, Paper napkins, Paper take-out containers, Paper towels, Personal hygiene products, Photographs and photo paper, Pizza boxes, Stickers (in sheets or rolls), Thermal fax paper, Wax paper.

Non-recyclable Plastic: Bubble wrap, Cellophane or snack food bags (e.g. pasta, bagged salad, candy, cookies), Credit Cards, Disposable razors, Frozen-food bags or pouches, Hoses (e.g. car, garden, appliance), Microwave trays, Ointment tubes, Plastic or wax liners from food packaging, Plastic utensils, Plastic wrap, Plastics without numbers 1-7, PVC pipes or tubing, Straws, Swimming pools, Syringes (sharps), Tarps, Toothpaste tubes, Toys, Webbing from lawn furniture.

Non-recyclable Metal: Aerosol cans not empty, Bolts, Car parts with hazardous waste, Contaminated cans (with dirt, rocks, or food), Engine parts, Gas tanks, Hangers, Keys, Metal hoses, Nails, Nuts, Screws.

Non-recyclable Glass: Blue glass, Ceramics, Coffee mugs, Cookware (e.g. Pyrex™), Dishware, Drinking glasses, Glass art, Light bulbs (fluorescent or electronic), Lead wrapping and corks from wine bottles, Mirrors, Windows.

APPENDIX 4

California Waste Solutions
Selection of Loads for November 2016 Processing Diversion Study

West Oakland Routes

Load #	Route	Day
	5W	Tues
1	5W	Thurs
2	9W	Mon
3	3W	Tues
	8W	Tues
4	10W	Thurs
	7W	Wed
	6W	Wed
	3W	Mon
	7W	Thurs
	9W	Tues
	7W	Tues
	4W	Wed
	3W	Thurs
	2W	Thurs
	11W	Tues
	1W	Mon
	2W	Wed
	10W	Wed
	2W	Tues
	4W	Tues
	5W	Wed
	4W	Mon
	5W	Mon
	10W	Tues
	1W	Tues

Route	Day
11W	Thurs
6W	Thurs
9W	Wed
10W	Mon
11W	Mon
6W	Tues
7W	Mon
8W	Mon
8W	Thurs
4W	Thurs
1W	Wed
1W	Thurs
8W	Wed
2W	Mon
11W	Wed
6W	Mon
3W	Wed
9W	Thurs

Routes selected for sampling are indicated in Red

East Oakland Routes

Load #	Route	Day
1	2E	Mon
2	4E	Wed
3	5E	Wed
	5E	Tues
4	4E	Tues
	2E	Wed
5	7E	Tues
6	12E	Tues
	3E	Tues
	15E	Wed
	9E	Tues
	1E	Tues
	14E	Thurs
	2E	Tues
	10E	Mon
	14E	Tues
	9E	Thurs
	13E	Thurs
	1E	Thurs
	12E	Wed
	12E	Mon
	6E	Wed
	1E	Mon
	3E	Thurs
	15E	Tues
	16E	Thurs
	13E	Wed
	10E	Thurs
	8E	Tues
	7E	Mon
	16E	Wed
	6E	Thurs

Route	Day
14E	Mon
8E	Thurs
8E	Wed
8E	Mon
7E	Thurs
5E	Mon
11E	Tues
2E	Thurs
1E	Wed
14E	Wed
11E	Mon
15E	Mon
10E	Wed
4E	Thurs
16E	Mon
4E	Mon
13E	Mon
11E	Wed
12E	Thurs
13E	Tues
11E	Thurs
7E	Wed
9E	Wed
5E	Thurs
3E	Mon
6E	Mon
9E	Mon
6E	Tues
3E	Wed
16E	Tues
10E	Tues
15E	Thurs

Multifamily Routes

Load #	Route	Day
1	703	Thurs
	705	Mon
2	704	Mon
	704	Tues
	705	Tues
	704	Wed
	704	Thurs
	703	Wed
	705	Wed
	702	Mon
	703	Tues
	702	Thurs
	703	Mon
	705	Thurs
	702	Wed
	702	Tues

Hard-to-serve Routes

Route	Route	Day
1	706	Tues
	707	Mon
	706	Mon
	707	Wed
	706	Wed
	707	Tues
	707	Thurs
	706	Thurs

CWS City of Oakland Recycling Program: Processing Diversion Study

Checklist

1. Staging area cleared and marked	X
2. Primary feed conveyor empty	X
3. Pre-sort conveyor (#3) empty	X
4. Newspaper sort line (#10) empty	X
5. Newspaper sort line (#6) empty	X
6. Container sort line (#18) empty	X
7. Glass fraction line (#13) empty	X
8. Return conveyor (#15) empty	X
9. Residual bunker empty	X
10. Bin for glass fraction empty	X
11. Baler feed conveyor & baler empty	X
12. Transition points & chutes empty	X

Date: November 18, 2016

Processing Start: 5:32 AM

Break Start: _____

Break Finish: _____

Processing Finish: 9:10 AM

	Weight	Number
Residual Bales	14,780	9
Residual Loose	120	#1
Total	14,900	

13. Conveyor & screen settings

ID	Baseline
C-2	60%
C-3	60%
C-6	40%
C-10	35%
C-18	45%
S 9A	65%
S 9B	65%
S 5A	65%
5B	45%
5C	65%
5D	x
12A	x
12B	x
12C	x
12D	x

Glass Bin Tare Weights

Bin 1	660
Bin 2	420

Glass Fraction

Bin #	Gross Wt	Net Wt
2	2,860	2,440
1	3,660	3,000
2	2,420	2,000
1	3,100	2,440
2	2,320	1,900
1	2,860	2,200
2	2,100	1,680
1	3,000	2,340
1	3,120	2,460
2	2,460	2,040
2	2,460	2,040
1	3,480	2,820
2	2,800	2,380
1	1,520	860
	Total	30,600