

RESIDENTIAL BLUE CART WASTE CHARACTERIZATION STUDY CITY OF MANTECA, CALIFORNIA

FEBRUARY 14, 2019



CONDUCTED BY INTERNATIONAL ENGINEERING SERVICES, INC.

Prepare By: _____

Larry T. Buckle, P.E.
International Engineering Services, Inc.



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February 21, 2019

Mr. Mark Houghton, PE
Director of Public Works
1001 W. Center Street
Manteca, CA 95337

Subject: Blue Cart Characterization Study

Dear Mr. Houghton:

Attached is a short report showing the results of the February 14, 2019 characterization study for Blue cart materials. The result of this study is very similar to the September 2014 study where the Blue, Black, and Green carts were analyzed.

We look forward to conducting the next Blue cart study after you make adjustments to the Blue cart collection program.

Please let me know if you have any questions.

Sincerely:

A handwritten signature in black ink, appearing to read "Larry T. Buckle", is written over a horizontal line.

Larry T. Buckle, PE
International Engineering Services, Inc.

CC: Peni Basalusu
Rexie LeStrange

**City of Manteca
Residential Blue Cart Characterization Study
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INTRODUCTION

International Engineering Services, Inc. (IES) conducted this **Residential Blue Cart Characterization Study** of residential solid waste for the City of Manteca. This Study was conducted on February 14, 2019. The site of the study was the San Joaquin County, Lovelace Transfer Station, located at 2323 Lovelace Rd, Manteca, CA 95336.



The study identified the types and percentages of materials contained in one standard residential collection vehicle (6,360 pounds). For this study the city opted to sample the entire vehicle rather than collecting a number of smaller samples.

Picture #1: February 14, 2019 Blue Cart Characterization Study

The Blue cart material sampled was collected on the day of sampling. Blue carts in Manteca are collected every other week, so this material represents material generated from January 31st to February 13th. This does include Super Bowl Sunday. The impact of the Super Bowl on the categorization of material is unknown.

Larry T. Buckle P.E. led the study with assistance of C. Frank Bradham, P.E. In addition, assistance from Rexie LeStrange from the City of Manteca, Solid Waste Division was indispensable and greatly appreciated.

BACKGROUND

Manteca conducted, with the assistance of IES a waste characterization study in September of 2014. This study included Blue, Black, and Green residential carts. In that study 45 residential carts were sampled, totaling 1,013 pounds of material, which were segregated into 28 categories. A copy of the 2014 Blue cart results is included in the **Appendix** of this report.

Recycle markets internationally are in a crisis state due primarily to import restrictions imposed by the Chinese government. Manteca has been caught in the

crisis, resulting in significant increases in Blue cart processing costs. The city is exploring new options for material landfill diversion.

OBSERVATIONS

Over the two-week period Blue cart samples were generated the area experienced significant wind and rain. The collection vehicle driver (Jeff) reported that many of the Blue carts were blown over, and/or had the lids blown open such that rain could get the material wet. When the load was dumped on the Lovelace Transfer Station tip floor, free water flowed out of the pile. Fiber (paper products) was in many cases wet if not saturated.



Picture #2: A Large Number of Pizza Boxes Were Observed

In the September 2014 Blue cart study materials were divided into 28 categories. With this study materials were divided into only six categories. Below is a table showing how categories from the September 2014 study were combined in the February 14, 2019 study.

2014, 2019 Blue Cart Study Sampling Comparison	
September 2014	February 2019
OCC	OCC
Aluminum Cans	Aluminum Cans
PET Plastic #1	PET Plastic #1
HDPE Color Plastic #2 CRV, HDPE No Color Plastic #2 CRV, HDPE Natural Plastic #2	HDPE Plastic #2
Mixed Ferrous	Steel Cans
Mixed paper, #3-7 plastics, Film Plastic, Glass CRV, Glass other, Textiles/Fabric, Mixed Non-Ferrous, Copper & Brass, Stainless Steel, Wood, Inert Materials, Food Waste, Green/Yard waste, Fines < 1", E-Waste, Hazardous Waste, Diapers, Kitty Litter, Water, Vinyl	Residue

Table #1: Study Category Comparison



Picture #3: Sorting Large Bulky Materials Including OCC

As was the case in 2014, a large portion of the total old corrugated cardboard (OCC) was used pizza boxes. Grease residue on OCC makes the material unrecyclable, this material is considered residue in the 2019 study. Pizza boxes could be composted with green and food waste, if the city elects to go in that direction.

There was a considerable volume of glass bottles observed but not categorized. Most of the glass was beer bottles. Beer bottles have CRV with the associated value. The observed high volume of glass could have been a result of the Super Bowl. In this study glass was included in residue.

BLUE CART CHARACTERIZATION RESULTS

The delivered truck of Blue cart materials totaled 6,360 pounds from Thursday Residential Route #9. In sampling the material 5,335 pounds was segregated and categorized. The unaccounted 1,025 pounds included water that ran out of the material when dumped, evaporation of water, and a small quantity of material that was left unsorted at the end of the time period



Picture #4: Weighing and Documenting Material

where we had available sorting staff.

Blue Cart Recyclables Based on 2019 Study Criteria						
	#1 Plastic	#2 Plastic	Steel	Aluminum	OCC	Residue
2019 Study %	2.9%	3.8%	1.7%	0.5%	22.2%	68.9%
2019 Pounds	153.1	205.4	93.2	25.8	1183.6	3674.6
2014 Study %	1.7%	2.0%	4.2%	0.5%	18.2%	73.4%

Table #2: Results of February 14, 2019 Blue Cart Characterization Study

The results of the 2014 and 2019 studies are similar. There appears to be a greater volume of OCC due to greater Amazon shipments. However some the greater OCC weight is due to the moisture of the material. The increase in #1 plastic (soda bottles) could be tied to Super Bowl consumption. The decrease in steel is more of an anomaly in that the 2014 study had a few pieces of structural steel that skewed the results.

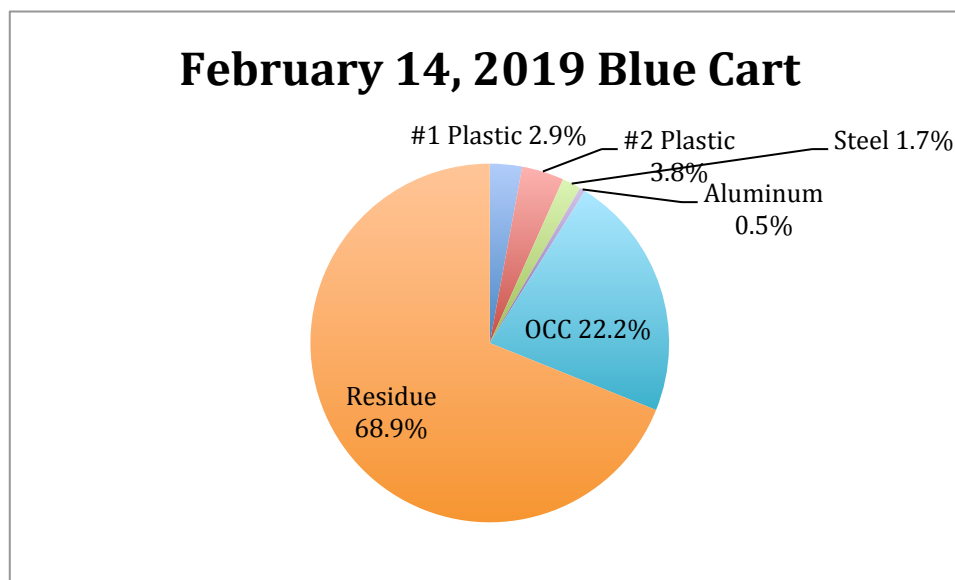


Chart #1: February 14, 2019 Blue Cart Characterization Results

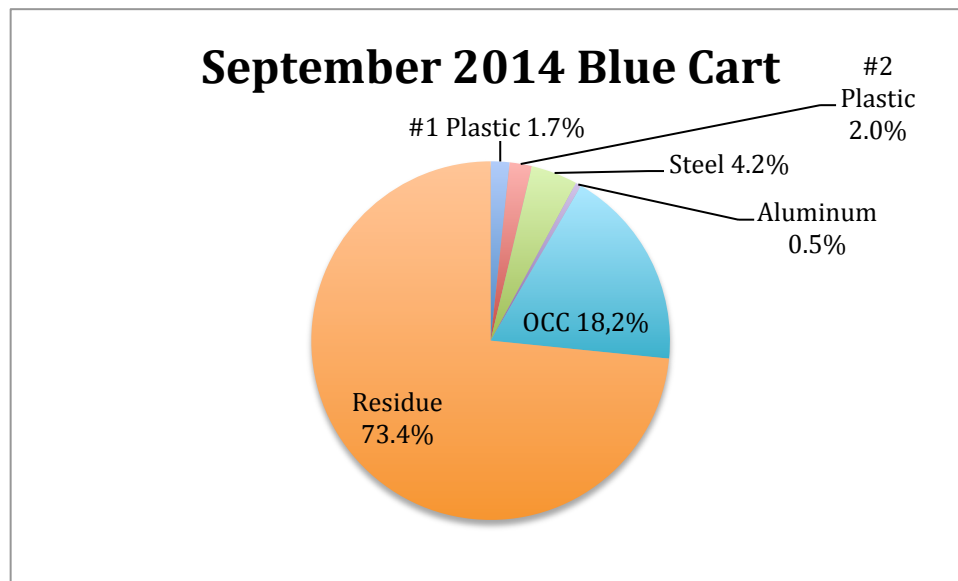


Chart #2: September 2014 Blue Cart Characterization Results
Normalized to the 2019 Criteria



Picture #5: Starting Pile of 6,360 Pounds of Unsorted Blue Cart Material

METHODOLOGY

After the Blue cart material was collected from Thursday Residential Route #9 it was driven to the Lovelace Transfer Station where it was weighed, assuming a tare weight for the truck, then the material was dumped on the floor of the transfer station.

Segregation of material started with removal of large bulky materials such as OCC and some residue. With this material being removed the remaining was primarily paper and three-dimensional materials. The three-dimensional materials comprised the target materials such as cans and bottles. The three-dimensional materials could be separated from the two-dimensional material with the use of garden rakes.

California Conservation Corp personnel performed most of the labor required to segregate materials. When materials were segregated they were weighed then disposed.

Staff wore appropriate personal protective equipment. There were no safety issues to note.



Picture #6: Remaining Unsorted Material

Appendix

1. Data Collection Forms

2. 2014 Blue Cart Data

Data Collection Forms

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT	COMMODITY TOTAL
1	0921	59.6	36.4	23.2	23.2
2	0939	46.8	37.0	9.8	33.0
3	1035	51.2	36.4	14.8	47.8
4	1107	53.4	37.8	15.6	63.4
5	1114	53.0	37.0	16.0	79.4
6	1229	50.4	35.6	14.8	94.2
7	1257	57.8	37.8	20.0	114.2
8	1407	57.9	37.8	20.1	134.3
9	1500	56.6	37.8	18.8	153.1
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25					
SUBTOTAL					

NOTES:

(PET)

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT (LBS)	COMMODITY TOTAL (LBS)
1	0839	50.8	37.0	13.8	13.8
2	0849	51.2	37.8	13.4	27.2
3	0937	55.4	37.8	17.6	44.8
4	0949	53.8	37.8	16.0	60.8
5	0957	52.4	35.6	16.8	77.6
6	1017	53.6	37.8	15.8	93.4
7	1039	55.2	37.8	17.4	110.8
8	1111	53.2	35.6	17.6	128.4
9	1247	56.4	37.0	19.4	147.8
10	1340	56.2	37.0	19.2	167.0
11	1411	56.0	37.0	19.0	186.0
12	1505	55.4	37.0	18.4	204.4
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SUBTOTAL					

NOTES:

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT	COMMODITY TOTAL
1	1326	94.6	36.4	58.2	58.2
2	1503	71.4	36.4	35.0	93.2
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SUBTOTAL					

NOTES:

Tom

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT (LBS)	COMMODITY TOTAL (LBS)
1	1303	33.8	23.8	10.0	10.0
2	1356	35.2	23.8	11.4	21.4
3	1501	28.2	23.8	4.4	25.8
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25					
SUBTOTAL					

NOTES:

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT (LBS)	COMMODITY TOTAL (LBS)
1	0804	59.4	34.2/0.0	25.2	25.2
2	0810	57.6 57.6	" "	23.4	48.6
3	0814	57.8	" "	23.6	72.2
4	0817	50.6	" "	16.4	88.6
5	0822	57.6	" "	23.4	112.0
6	0857	60.8	34.2	26.6	138.6
7	0901	60.4	34.2	26.2	164.8
8	0905	54.6	34.2	20.4	193.4
9	0906	66.8	35.6	31.2	224.6
10	0909	55.2	35.6	19.6	244.2
11	0910	36.0	37.0	19.0	263.2
12	0914	53.0	34.2	18.8	282.0
13	0915	78.6	35.6	43.0	325.0 325.0
14	0918	58.2	34.2	24.0	349.0 349.0
15	0923	55.0	34.2	20.8	369.8 369.8
16	0928	63.4	34.2	29.2	399.0
17	0933	54.4	34.2	20.2	419.2
18	0938	64.4	34.2	30.2	449.4
19	0941	61.6	34.2	27.4	476.8
20	0946	61.8	34.2	27.6	504.4
21	0952	66.0	34.2	31.8	536.2
22	0955	58.2	34.2	24.0	560.2
23	0959	59.0	34.2	24.8	585.0
24	1014	55.8	34.2	21.6	606.6
25	1018	61.8	34.2	27.6	634.2
SUBTOTAL					

NOTES:

34.2 - Plywood
Tare cut

36.4
37.0
37.8
35.6

TOTE
Tare cut

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT	COMMODITY TOTAL
426	1010	56.0	34.2	21.8	634.2 from ^{PI}
27	1018	60.2	37.0	23.2	656.0
28	1027	71.2	34.2	37.0	679.2
29	1033	66.4	34.2	32.2	716.2
8 30	1039	57.2	34.2	23.0	748.2
8 31	1044	51.2	34.2	17.0	771.2
7 32	1047	43.0	34.2	8.8	788.2
8 33	1050	56.2	34.2	22.0	797.0
8 34	1053	67.2	34.2	33.0	819.0
10 35	1100	60.2	34.2	26.0	852.0
11 36	1104	59.2	34.2	25.0	878.0
12 37	1109	60.0	34.2	25.8	903.0
13 38	1115	53.0	34.2	18.8	928.8
14 39	1120	64.4	34.2	30.2	947.6
15 40	1128	62.4	34.2	28.2	977.8
16	1137	66.8	34.2	38.6	1,006.0
17	1140	54.6	34.2	20.4	1,044.6
18	1149	69.2	34.2	35.0	1,065.0
19	1156	67.8	34.2	23.6	1,100.0
20	1502	61.2	34.2	27.0	1,123.6
21	1505	67.0	34.2	32.8	1,150.6
22					1,183.4
23					
24					
25					
SUBTOTAL					

NOTES:

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT (LBS)	COMMODITY TOTAL (LBS)
1	0830	57.4	36.4	21.0	21
2	0831	59.6	35.6	24.0	45
3	0833	69.0	37.8	31.2	76.2
4	0836	68.6	36.4	32.2	108.4
5	0842	70.6	37.8	32.8	141.2
6	0847	81.2	37.0	44.2	185.4
7	0848	70.2	36.4	33.8	219.2
8	0854	98.4	36.4	62.0	281.2
9	0900	97.8	35.6	62.2	343.4
10	0903	84.2	37.0	47.2	390.6
11	0908	73.0	37.8	35.2	425.8
12	0909	64.0	36.4	27.6	453.4
13	0919	111.2	37.8	73.4	526.8
14	0930	91.2	37.0	54.2	581.0
15	0934	96.8	35.6	61.2	642.2
16	0944	97.0	35.6	61.4	703.6
17	0951	76.4	37.0	69.4	773.0
18	0953	62.0	36.4	30.6	803.6
19	1020	76.0	36.4	39.6	843.6
20	1022	71.4	37.8	33.6	877.6
21	1031	74.8	35.6	59.2	936.8
22	1035	90.8	35.6	55.2	992.0
23	1046	74.4	36.4	38.0	1,030.0
24	1047	87.4	35.6	51.9	1,081.9
25	1055	79.4	35.6	43.8	1,125.7
SUBTOTAL					

NOTES: OVERCAST - 60°

Sprinkly Rain - early

International Engineering Services, Inc.
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916-549-0868 Buckle@IES-ENG.com

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019



LOCATION: Lovelace Transfer Station

#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT (LBS)	COMMODITY TOTAL (LBS)
				1,125.7 201 = 1,125.7	
X26	1058	83.4	36.4	47.0	1,172.7
X27	1107	79.2	36.4	42.8	1,215.5
X28	1121	88.6	37.8	50.8	1,266.3
X29	1131	126.2	36.4	89.8	1,356.1
X30	1142	85.2	36.4	48.8	1,404.9
X31	1153	137.6	36.4	101.2	1,506.1
X32	1222	129.8	36.4	93.4	1,599.5
X33	1243	151.8	36.4	115.4	1,714.9
X34	1249	100.4	35.6	64.8	1,779.7
X35	1255	95.2	35.6	59.6	1,839.3
X36	1302	87.0	35.6	51.4	1,890.7
X37	1307	73	35.6	37.4	1,928.1
X38	1312	63.2	35.6	27.6	1,955.7
X39	1316	71.6	35.6	36.0	1,991.7
X40	1319	89.1	35.6	53.5	2,045.2
X41	1346	130.0	35.6	94.4	2,139.6
X42	1332	127.8	35.6	92.2	2,231.8
X43	1336	119.4	35.6	83.8	2,315.6
X44	1341	70.0	35.6	34.4	2,350.0
X45	1345	93.2	35.6	57.6	2,407.6
X46	1349	114.0	35.6	78.4	2,486.0
X47	1353	114.2	35.6	78.6	2,564.6
X48	1357	96.4	35.6	60.8	2,625.4
X49	1402	90.4	35.6	54.8	2,680.2
X50	1407	83.4	35.6	47.8	2,728.0
SUBTOTAL					

NOTES:

~1600# by 10 - bene 10-1020
~2500# by 1130

COMMODITY (Circle): Aluminum, #1 Plastic, #2 Plastic, OCC,
Steel Cans, Residue

DATE: February 14, 2019

LOCATION: Lovelace Transfer Station



#	TIME	GROSS WEIGHT (LBS)	TARE WEIGHT (LBS)	COMMODITY WEIGHT	COMMODITY TOTAL
				Ep2 → 2,728	
X51	1410	802.2	35.6	44.6	2,772.6
X52	1413	105.2	35.6	69.6	2,842.2
853	1417	134.0	35.6	98.4	2,940.6
454	1422	85.6	35.6	50.0	2,990.6
855	1426	122.6	35.6	87.0	3,077.6
656	1432	112.0	35.6	76.4	3,154.0
757	1438	133.4	35.6	97.8	3,251.8
858	1441	79.4	35.6	43.8	3,295.6
859	1445	82.2	35.6	46.6	3,342.2
1060	1449	109.6	35.6	74.0	3,416.2
1161	1453	96.4	35.6	60.8	3,477.0
1262	1455	109.0	35.6	73.4	3,550.4
1363	1459	94.0	35.6	58.4	3,608.8
1464	1508	102.2	35.6	66.6	3,675.4
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SUBTOTAL					

NOTES:

1510-200K

2014 Blue Cart Data

TABLE 4 - SUMMARY OF RESULTS, BLUE BIN

Material	Total Weight all Samples	Sample Maximum Weight	Sample Minimum Weight	Moisture Adjustment	Final Adjusted Weight	%
OCC	163.9	17.0	0		146.9	18.2%
Mixed Paper/Fiber	257.7	19.6	0.2		237.9	29.5%
News Print	40.3	9.2	0		31.1	3.9%
HDPE Color CRV	26.2	4.0	0		22.2	2.7%
HDPE Color no CRV	6.47	3.0	0		3.47	0.4%
HDPE Natural	14.6	2.0	0		12.6	1.6%
PETE	17.6	4.0	0		13.8	1.7%
#3-7 Plastic	88.6	9.4	0		79.2	9.8%
Film Plastic	12.5	1.8	0		10.7	1.3%
Glass CRV	65.5	7.4	0		58.1	7.2%
Glass Other	51.0	6.9	0		44.1	5.5%
Textiles/Fabric	12.5	4.6	0		7.9	1.0%
Mixed Ferrous	64.6	30.8	0		33.8	4.2%
Aluminum UBC	5.4	1.3	0		4.1	0.5%
Mixed Non-Ferrous	11.8	6	0		5.8	0.7%
Copper & Brass	0					0.0%
Stainless Steel	1.2	1.0	0		0	0.0%
Wood	0.0	0.8	0		0.0	0.0%
Inert Materials	11.8	5.2	0		6.6	0.8%
Food Waste	7.2	3.2	0		4	0.5%
Green/Yard Waste	0.0					0.0%
Fines < 1"	93.4	26.6	0		66.8	8.3%
E-Waste	16.3	6.2	0		10.1	1.3%
Hazardous Waste	7.8	6.8	0		1.0	0.1%
Diapers	20.3	14.8	0		5.5	0.7%
Kitty Litter	0.0	0.0	0		0.0	0.0%
Water	16.4	14.9	0		1.5	0.2%
Vinyl	0.0					0.0%

Figure 2 - BLUE BIN SUMMARY OF RESULTS