Committee Members

Shelia Young, **Chair**
Oro Loma Sanitary District

Jerry Pentin, **Vice Chair**
City of Pleasanton

Keith Carson, County of Alameda

Kriss Worthington, City of Berkeley

Dave Sadoff, Castro Valley Sanitary District

Melissa Hernandez, City of Dublin

Vinnie Bacon, City of Fremont

Bob Carling, City of Livermore

Mike Hannon, City of Newark

Dan Kalb, City of Oakland

Deborah Cox, City of San Leandro

Lorrin Ellis, City of Union City

Wendy Sommer, Executive Director

AMENDED AGENDA

ALAMEDA COUNTY WASTE MANAGEMENT AUTHORITY MEETING OF THE PROGRAMS AND ADMINISTRATION COMMITTEE

Thursday, September 13, 2018

9:00 A.M.

StopWaste Offices
1537 Webster Street
Oakland, CA 94612
510-891-6500

Teleconference
Lorrin Ellis
Long Beach Convention Center
300 E Ocean Blvd
Long Beach, CA 90802
510-675-5621

1. Convene Meeting

2. Public Comments
Open public discussion from the floor is provided for any member of the public wishing to speak on any matter within the jurisdiction of the Programs & Administration Committee, but not listed on the agenda. Each speaker is limited to three minutes unless a shorter period of time is set by the Chair.

Page		
1	3.	**Approval of the Draft Minutes of the July 12, 2018 meeting (Pat Cabrera)**
5	4.	**ReThink Disposable Update (Cassie Bartholomew)** This item is for information only.
7	5	**Discards Behavior and Markets (Tom Padia)** This item is for information only.
11	6.	**Waste Characterization Study 2017-18 (Meghan Starkey)** This item is for information only.
27	7.	**What Happens to E-Scrap? (Tom Padia)** This item is for information only.

8. Member Comments

9. Adjournment

The Programs & Administration Committee is a Committee that contains more than a quorum of the Board. However, all items considered by the Committee requiring approval of the Board will be forwarded to the Board for consideration at a regularly noticed board meeting.

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DRAFT

MINUTES OF THE ALAMEDA COUNTY WASTE MANAGEMENT AUTHORITY MEETING OF THE PROGRAMS AND ADMINISTRATION COMMITTEE

Thursday, July 12, 2018

9:00 A.M.

StopWaste Offices
1537 Webster Street
Oakland, CA 94612
510-891-6500

Members Present:

Castro Valley Sanitary District	Dave Sadoff
City of Berkeley	Kriss Worthington
City of Livermore	Bob Carling
City of Oakland	Dan Kalb
City of Newark	Mike Hannon
Oro Loma Sanitary District	Shelia Young
City of Pleasanton	Jerry Pentin
City of San Leandro	Deborah Cox

Absent:

County of Alameda	Keith Carson
City of Dublin	Melissa Hernandez
City of Fremont	Vinnie Bacon
City of Union City	Lorrin Ellis

Staff Present:
Wendy Sommer, Executive Director
Pat Cabrera, Administrative Services Director
Tom Padia, Deputy Executive Director
Justin Lehrer, Senior Program Analyst
Arliss Dunn, Clerk of the Board

1. Convene Meeting

Chair Shelia Young called the meeting to order at 9:00 a.m.

2. Public Comments

There were none.

3. Approval of the Draft Minutes of June 14, 2018 (Pat Cabrera)

Board member Cox made the motion to approve the draft minutes of June 14, 2018 with the following correction. Board member Sadoff seconded and the motion carried 7-0 (Ayes: Carling,

Cox, Hannon, Pentin, Sadoff, Worthington, Young. Nays: None. Abstain: None. Absent: Bacon, Carson, Ellis, Hernandez, Kalb).
Correction: Replace Board member Oddie with Board member Sadoff for the vote count in items 3&5.

4. Food Service Packaging, Litter and Marine Debris (Justin Lehrer)
This item is for information only.

Justin Lehrer provided an overview of the staff report and presented a PowerPoint presentation. A link to the report and the presentation is available here: Food-Service-Packaging-Litter-Presentation-07-12-18. A link to the topic brief is available here: Food-Packaging-Topic-Brief-July-2018
(Board member Kalb arrived during the presentation).

Board member Pentin commented with respect to the top three challenges (reduction of plastics production, alternatives to toxics in plastics, and proper recycling), in what areas can the agency have the greatest impact. Mr. Lehrer stated that that local governments as well as other countries are leading the charge on single use plastics reduction policy, and with respect to toxics, although local efforts may not move the needle with the manufacturers of these products, local groundswell leads to influence and allows us to have a seat at the table. With regard to proper recycling, we can have an impact at the local level and working with the member agencies. Mr. Lehrer added the City of Berkeley is considering a broad-reaching foodware ordinance that would not only affect straws but all types of foodware packaging. Feedback from local businesses was supportive in theory but cautioned that the cost on wages and labor would create an adverse effect on the businesses. Board member Worthington commented that developing an effective campaign for bringing your own take-out container similar to the reusable bag campaign could affect behavior change. Board member Worthington added there have been conversations with several chain entities regarding building a brand for take-out containers that could not only be profitable for the business but also contribute to the mission of reusable foodware. Mr. Lehrer stated that voluntary approaches can be leveraged with broader approaches. Ms. Sommer inquired if there was any discussion regarding liability issues when using your own containers. Board member Worthington stated the local store manager forwarded the issue to counsel and will report back on information regarding the issue of liability. Ms. Sommer added perhaps this could be one of the areas amenable to legislation similar to the Good Samaritan law for food donation.

Board member Carling thanked Mr. Lehrer and staff for the presentation and accompanying articles. Board member Hannon stated that as we start moving initiatives forward as a Board we may want to consider doing something county-wide that would send a message not only locally but state-wide that we are moving forward as a Board. Board member Pentin stated that as we look at priority setting we should as a Board focus on waste reduction and toxics and the impact that we could have on a local and regional scale. Ms. Sommer commented on the importance of the circular economy and the upcoming VERGE conference and strongly encouraged Board members to attend in order to learn how we can apply these principles to our programs. Mr. Lehrer added with respect to the circular economy that it ensures that recycling is happening in a way that creates new products without toxics. Chair Young inquired about what happens to electronics. Mr. Padia stated that he is consulting with various entities to find out what is happening with electronics recycling and will put together a brief presentation at a future meeting. Chair Young added that our biggest challenge is the rest of the country and added the information presented today may not even reach the residents of Alameda County and inquired if there is an opportunity to make a video to share

with other groups and boards to reach a broader audience. Chair Young inquired about the restrictions/bans that China has placed on our materials. Mr. Padia stated that China had placed a moratorium for a month on all scrap materials but are now accepting double sorted commercial corrugated loads from warehouses in the US but nothing from mixed commercial or residential recycling centers. They have announced intent to cease all scrap imports within a few years – fibers, plastics and metals - and the overlay of the trade wars is not helping things as well. Mr. Padia added all of our scrap materials from the municipal markets are not going to China, they are going elsewhere.

Chair Young thanked Mr. Lehrer for a very informative discussion and asked that the presentation be made available on the agency website. Board member Kalb requested that the six bills mentioned in the staff report be sent to the Board. Board member Pentin inquired if staff would be willing to make a presentation to city councils. Mr. Lehrer stated yes.

5. Member Comments

Chair Young congratulated Mr. Padia on his impending award for Recycler of the Year. Ms. Sommer stated that the award is given by the California Resource Recovery Association (CRRA) and will be presented at the CRRA Conference on Saturday, July 28 at the Oakland Marriot. Ms. Sommer stated that she would forward an invitation to the Board. Mr. Padia added that he is a co-awardee with Susan Kattchee, former StopWaste staffer and recently retired Deputy Public Works Director, City of Oakland.

6. Adjournment

The meeting adjourned at 9:42 a.m.

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DATE: September 13, 2018

TO: Programs & Administration Committee
Planning Committee/Recycling Board

FROM: Tom Padia, Deputy Executive Director

BY: Cassie Bartholomew, Program Manager

SUBJECT: ReThink Disposable Update

SUMMARY

In partnership with StopWaste, ReThink Disposable is actively seeking businesses to participate in our 2018 program. At the September Programs & Administration Committee meeting, staff will share a new video developed by Clean Water Fund designed to build awareness about the Alameda Theater's transition from disposables to reusable trays, cups and utensils.

DISCUSSION

StopWaste has partnered with ReThink Disposable, a program of Clean Water Fund, to reduce single use disposable food service ware and packaging distributed and used by food businesses and institutions in Alameda County. ReThink Disposable is a technical assistance program that helps food businesses implement voluntary best management practices to reduce waste and cut costs by minimizing the use of disposable products. With StopWaste's support since 2014, the Rethink Disposable campaign (www.rethinkdisposable.org) has reached over 430 Alameda County businesses, with 50 sites implementing measures that reduced over 11,000 lbs. of disposable single-use food ware products. The Alameda Theater, a current ReThink participant, recently launched a "how to" pre-roll video showing movie attendees the impact of the program and how to properly sort their reusables at the end of each feature.

RECOMMENDATION

This item is for information only.

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DATE: September 13, 2018

TO: Programs & Administration Committee
Planning Committee/Recycling Board

FROM: Tom Padia, Deputy Director

SUBJECT: Discards Behavior and Markets

SUMMARY

This is the latest in the series of informational briefings for the Boards as background and updates in preparation for the priority setting process. Focus for this presentation will be on "end of life" for discarded materials (or what is still landfilled), contamination issues with materials in the recycling and composting streams and how we measure progress in these areas. Results from the 2017/2018 Waste Characterization Study (WCS), describing what is still being "wasted," will be presented as a separate agenda item, given the large amount of content in that report.

DISCUSSION

This agenda item will cover trends in overall landfill volumes, international and domestic recycling markets (i.e. "National Sword"), and other end-of-life concerns such as illegal dumping.

Trends in Landfill Volumes

Landfill disposal volumes throughout the Bay Area and the state have been trending up during the most recent sustained economic expansion. Statewide, total landfill disposal increased 27.5% from 2012 to 2017. San Francisco daily landfill volumes had increased from 1,222 tons per workday in December 2013 to 1,582 average tons per workday in June 2018, for an increase of 29.5%. In Alameda County, our landfill volumes have increased approximately 20% from 2012 to 2017. In-county landfill volumes for the first six months of 2018 appear to be relatively flat compared to the same months of 2017.

Recycling Markets Update

Changes in international markets for secondary materials over the last year, and specifically to new policies and practices adopted by China – tightened contamination standards, increased inspections, restricted

import licenses and outright bans on categories of scrap imports (including mixed paper and mixed plastics) - have left recycling processors and brokers scrambling to secure markets in other countries, many of whom have been overwhelmed beyond their capacity to accept materials. Locally, MRF operators have reported being able to market all processed recyclables, although some mixed paper and plastics at negative pricing at times (i.e. paying someone to accept your loads of baled recyclables, instead of getting paid for them). Local MRF operators also report increased levels of "residuals" sent to landfill as a result of efforts to clean up the processed recyclables to meet the newer, stricter contamination standards. Local processors have fared better than many in other regions of the U.S. and in other countries, where recycling collections have been shut down altogether or loads of collected recyclables have been redirected to the landfill.

The overall international market situation does not appear to have yet achieved a stable "new normal" although two things do appear clear at this point – tightened contamination standards are here to stay; and the net cost of municipal recycling has increased.

Concurrent with the upheaval in recycling markets has been a new level of scrutiny of contamination levels in organics collected for composting and in the finished compost product itself, especially in light of looming state mandates requiring major increases in diversion of organics from landfills (SB 1383). For the first seven years since the adoption of the current Strategic Plan in 2010, Agency focus has been on reducing the amount of "good stuff in the garbage;" we are now equally focused on reducing the amount of garbage in the good stuff, in order to preserve the usefulness and marketability of diverted materials.

Market and regulatory forces have been combining for several years to steadily erode the statewide demand for wood chips to fuel biomass power plants, which historically has constituted the major market for scrap wood in the state – from orchards and tree maintenance, forest enterprises, commercial manufacturers, construction and demolition, and other urban sources. Urban wood waste from construction and demolition recycling is the lowest quality feedstock for these plants and the first to lose out when the market constricts. We are at a point now where some major C&D recycling plants are no longer separating wood for biomass fuel. Limited quantities of clean dimensional lumber and pallets continue to supply the mulch markets.

China's ban on the import of mixed paper and mixed plastics for recycling and the severe reduction in the biomass markets for scrap wood are the type of developments that may require StopWaste to revisit what constitutes "good stuff" in the garbage at some point. If a material no longer has any viable market outlet, or can be marketed only at a cost multiple times higher than landfill disposal (and requiring large rate increases to sustain), it may not be reasonable to continue categorizing it as "readily recyclable."

<u>Other Discards Issues</u>

An issue gaining increasing attention locally and statewide is that of illegal dumping. While there might be an opportunity to recover certain illegally dumped materials for recycling – white goods, mattresses, tires,

etc. –exposure to the elements and concerns about biohazards (e.g. needles, human waste, bedbugs, etc.) often render such materials unfit for recovery. StopWaste has no power to enforce against illegal dumping nor to provide for bulky waste collections or dropoffs through local franchises, and enforcement efforts by local jurisdictions (who do have such powers) have not proven effective or financially feasible, for the most part. StopWaste regularly promotes free drop-off events for bulky items and HHW materials across social media. Aside from assisting with outreach messaging, we are not proposing that the WMA adopt any new policies, ordinances or fees to create any such role.

RECOMMENDATION

This item is for information only.

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DATE: September 13, 2018

TO: Programs & Administration Committee
Planning Committee/Recycling Board

FROM: Tom Padia, Deputy Director

BY: Meghan Starkey, Senior Management Analyst

SUBJECT: Waste Characterization Study 2017-18

SUMMARY

A waste characterization study is a valuable snapshot in time of the materials that comprise our waste stream, and can contribute to priority setting by highlighting the largest components of the landfill. It also provides high-level measurement of progress towards goals by comparing current results to previous studies. It's important to note that the study only shows *what* and *how much* is in the waste stream, but not necessarily *why*.

The waste characterization study uses industry-standard sampling techniques and statistical analysis to estimate the composition of the waste stream and tonnages by material type and generating sector.

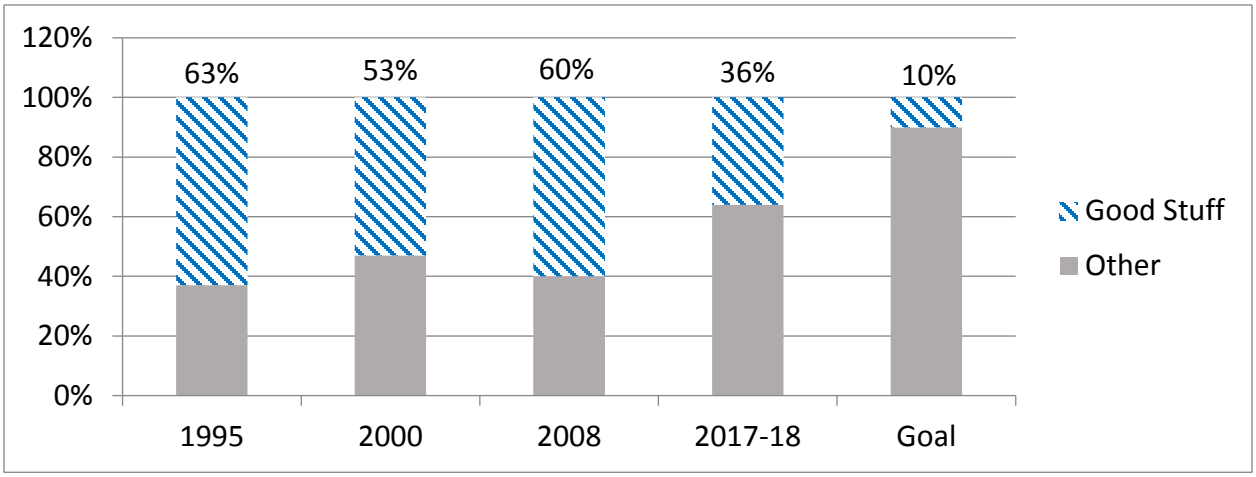
DISCUSSION

Countywide Results

The 2008 Waste Characterization Study (2008 Study) found that "good stuff" – readily recyclable materials such as cardboard, plastic, metal, glass bottles and cans, food and food-soiled paper, as well as untreated lumber, gypsum board, and crushable inerts – comprised 60% of the waste stream. The 2017-18 Waste Characterization Study (2017-18 Study) found that "good stuff" comprised 36% of the waste stream, meaning that we are over halfway towards our aspirational goal. The figure on the next page shows the decrease over time in the proportion of readily recyclable materials (represented with diagonal stripes), with the 10% goal represented in the last bar. Visually, a decrease in size of the striped segment and a corresponding increase in the size of the solid segment indicates progress towards goals.

When looking more closely at specific materials, compostable organics (food, food soiled paper and plant debris) show the greatest decreases in overall composition and tonnages, while simultaneously remaining the greatest proportion of readily recoverable materials. Dry recyclables such as paper, bottles and cans have decreased as a proportion of total materials, although less steeply than organics. Readily recyclable construction and demolition debris (untreated wood, crushable inerts, and gypsum board) have decreased as a percent of the whole. (See Table 1 in the Executive Summary for more detail.)

"Good Stuff" in Garbage over Time



The table below shows the countywide total tons of materials by sectors. The study was conducted on a countywide basis only, as all previous studies showed no significant statistical difference between the county as a whole and individual jurisdictions, therefore not justifying the significant extra cost for sampling.

Countywide Tonnages by Material Type Across All Sectors

Waste Stream	Other	Plant Debris	Food Scraps	Food Soiled Paper	Recyclable	Total
Single Family	144,600	1,500	33,800	37,000	14,200	231,000
Multi-Family	66,700	1,000	10,600	16,300	8,500	103,000
Commercial	97,300	4,600	41,800	18,200	33,200	195,000
Roll-Off	143,000	4,400	9,400	900	9,300	167,000
Self-Haul	280,900	7,600	1,800	100	5,700	296,000
MRF Residuals	40,800	200	200	2,300	12,300	55,800
Countywide Total	**773,300**	**19,300**	**97,600**	**74,900**	**83,100**	**1,047,800**

Analysis by Sector

Reporting results by sector is important for targets and program design, since materials are handled very differently depending on how they are collected and delivered for processing, and different programmatic approaches are required to capture materials for diversion.

Residential

Both single family and multifamily sectors demonstrated significant progress towards countywide goals. Changes in food scraps and plant debris are the main drivers of overall decrease in "good stuff" and the corresponding increase in "Other." (See Tables 1 and 2 in the Executive Summary for residential composition and tonnages.)

Commercial

When comparing progress over time in the commercial sector, results are mixed. There are significant *increases* in proportion and tonnages for cardboard, plastic bottles and containers, plastic bags, and clean dimensional lumber. Significant *decreases* in proportion and tonnages were found for recyclable paper, steel food/beverage containers, yard waste, food, food soiled paper. Total tonnage has also dropped remarkably over time as well. (For more detail, see Table 3 in the Executive Summary that follows.)

Roll Off and Self Haul

In the roll off sector, large and significant decreases in proportion and tons are found for many material types, as seen in Table 4 of the Executive Summary. Particularly noticeable is the large drop off in plant debris. The agency's yard debris ban was enacted in 2009. Treated wood waste shows another remarkable decline. The self-haul sector similarly sees drops in these materials (see Table 5 in the Executive Summary). Yard waste in this sector in the 2017-18 Study is 30% of the tons disposed in 2008 Study, and less than 10% of the tons disposed in 1995.

The 2017-18 Study sampled Material Recovery Facility (MRF) residuals for the first time, since StopWaste staff believe this is an important and growing segment of the waste stream. Table 6 in the Executive Summary shows the MRF residual composition by major material classification.

Conclusions

There are several significant conclusions that can be made with confidence based on the data contained in the study. Most importantly, progress towards goals is significant and real.

Other conclusions include:

- Organic materials are by far the main drivers of change across all sectors.
- Residential sectors show significant decreases in all curbside recyclables materials, especially food.
- Commercial results show mixed results for progress, with both increases and decreases in dry recyclable materials, and decreases in food, food soiled paper and plant debris.
- Roll off and self-haul sectors show very remarkable declines in both tonnages and composition of recyclable materials.

In terms of informing priority setting going forward, these results need to be understood in the context of current challenges such as the implementation of SB 1383 (Short Lived Climate Pollutant Act) and National Sword. Given the maturity of diversion programs, continued progress is more likely to require focusing upstream. In addition, contamination in recycling and organics recycling streams can compromise the quality of materials, thereby negatively impacting markets and undermining the programs' overall success.

While the results of the 2017-18 Study do show significant progress, it also illuminates both significant opportunities and challenges for the future.

The full study may be found at: 2017-18-Waste-Characterization-Study.pdf

RECOMMENDATION
This item is for information only.

Attachment: Waste Characterization Study 2017-18 Executive Summary

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Alameda County
2017-18 Waste Characterization Study

StopWaste
1537 Webster Street
Oakland, CA 94612

01217129.00 | September 5, 2018

SCS ENGINEERS

7041 Koll Center Parkway, #135
Pleasanton, CA 94566
707-546-9461

StopWaste is a public agency governed by the Alameda County Waste Management Authority, the Alameda County Source Reduction and Recycling Board, and the Energy Council.

1.0 EXECUTIVE SUMMARY

StopWaste conducts periodic waste characterization studies to understand better the types and quantities of materials disposed of in Alameda County. Using sampling techniques, this study measured the composition of the waste stream by generating sector and material type. This study provides a valuable snapshot in time of the materials that comprise our waste stream and can contribute to priority setting and evaluation of progress towards goals. The study was designed to be comparable with previous countywide waste characterization studies conducted in 2008, 2000, 1995, and 1990 to facilitate tracking of waste disposal trends.

1.1 RESULTS

Data gathered from StopWaste's Benchmark Study and fieldwork were summarized to develop waste composition estimates for each waste sector and the overall countywide waste stream. Waste compositions were compared to the 2008 waste characterization study conducted for Alameda County as well as the 2015 CalRecycle Statewide Waste Characterization Study.

1.1.1 Single Family Residential Waste

The composition of single family residential waste is presented in **Table 1**. The relative proportions and annual tons of recyclable and compostable materials have decreased significantly since 2008. Food Soiled Paper represents a greater proportion of single family residential waste in Alameda County than statewide; however, the proportion of Recyclable materials, Plant Debris, and Food Scraps are significantly lower than statewide.

Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gympsum board (which were sampled in Commercial, Roll off and Self-Haul waste) are included in the "Other" material for residential and countywide tables There's a longer, clearer explanation in the main portion fo the study.

Table 1. 2017-18 Single Family Residential Waste Composition

Material Components	Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits	
				Lower	Upper
Recyclable	14,200	6.1%	12.3%	5.7%	6.5%
Plant Debris	1,500	0.6%	5.1%	0.5%	0.8%
Food Scraps	33,800	14.6%	21.5%	13.9%	15.3%
Food Soiled Paper	37,000	16.0%	20.3%	15.4%	16.7%
Other *	144,600	62.6%	28.6%	61.7%	63.5%
TOTAL	**231,000**	**100.0%**			

Note: Waste composition based on sorting refuse in 2,605 carts.

* Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gympsum board are included as "Other."

1.1.2 Multi-Family Residential Waste

The composition of multi-family residential waste is presented in Table 2. The relative proportion and annual tonnage of recyclable and compostable materials have decreased significantly since 2008. Food Soiled Paper represents a greater proportion of multi-family residential waste in Alameda County than statewide; however, the proportion of Recyclable materials, Plant Debris, and Food Scraps are significantly lower than statewide.

Table 2. 2017-18 Multi-Family Residential Waste Composition

Material Components	Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits	
				Lower	Upper
Recyclable	8,500	8.3%	11.4%	7.2%	9.4%
Plant Debris	1,000	0.9%	5.8%	0.4%	1.5%
Food Scraps	10,600	10.3%	14.1%	8.9%	11.7%
Food Soiled Paper	16,300	15.8%	16.4%	14.2%	17.4%
Other *	66,700	64.7%	21.3%	62.6%	66.8%
TOTAL	**103,000**	**100.0%**			

Note: Waste composition based on sorting refuse in 2,605 carts.

* Since the benchmark study only included materials that were collected at the curb, divertable materials such as dimension lumber and gypsum board are included as "Other."

1.1.3 Commercial Waste

The composition of commercial waste is presented in Table 3. The symbols indicate significant differences between the current 2017-18 study and both the the 2008 study and the 2015 CalRecycle Statewide Waste Characterization Study. A "+" indicates a significant increase and a "-" indicates a significant decrease in the material compared to the 2008 study. A ">" indicates a significant increase and a "<" indicates a significant decrease compared to the statewide study.

Table 3. 2017-18 Commercial Waste Composition

Material Components		Annual Tonnage		Mean Composition			Standard Deviation	90% Confidence Limits Lower	Upper
Paper		**19,800**		**10.1%**			**0.0%**	**7.6%**	**9.3%**
	Uncoated Corrugated Cardboard / Kraft Paper	7,300	+	3.7%	+		0.0%	3.8%	3.3%
	Recyclable Paper (no food/liquid contamination)	12,500	-	6.4%			0.0%	6.1%	5.7%
Plastic		**14,600**		**7.5%**			**0.0%**	**5.1%**	**6.9%**
	Bottle and Plastic Container	8,600	+	4.4%	+	>	0.0%	2.9%	4.1%
	Plastic Bags	4,400	+	2.3%	+	>	0.0%	3.1%	1.9%
	Other Film	1,600	-	0.8%	-		0.0%	2.5%	0.5%
Glass	Recyclable Glass Bottles/Containers	**3,100**	-	**1.6%**			**0.0%**	**1.8%**	**1.4%**
Metal		**6,000**		**3.1%**			**0.0%**	**4.1%**	**2.6%**
	Aluminum Cans	700		0.3%		>	0.0%	1.3%	0.2%
	Steel Food/Beverage Containers	1,100	-	0.6%	-		0.0%	0.8%	0.5%
	Other Non-Ferrous	1,800		0.9%	+		0.0%	2.8%	0.6%
	Other Ferrous	2,400	-	1.2%	-		0.0%	2.9%	0.9%
Compostable Organics		**64,500**		**33.1%**			**0.0%**	**21.0%**	**30.8%**
	Yard Waste	4,600	-	2.3%	-	<	0.0%	5.5%	1.7%
	Food Waste	41,800	-	21.4%	-		0.0%	20.3%	19.2%
	Compostable Paper	18,200	-	9.3%	-		0.0%	8.0%	8.4%
Compostable Organics - Wood		**12,900**		**6.6%**			**0.0%**	**13.4%**	**5.2%**
	Clean Dimensional Lumber	6,600	+	3.4%	+		0.0%	8.8%	2.4%
	Clean Engineered Wood	5,900		3.0%			0.0%	8.6%	2.1%
	Pallets	500	-	0.3%	-	<	0.0%	2.4%	0.0%
Textiles/Other		**8,100**		**4.1%**			**0.0%**	**5.3%**	**3.6%**
	Textiles/Leather	7,400		3.8%			0.0%	5.2%	3.2%
	Carpet	700	-	0.3%	-		0.0%	1.4%	0.2%
Inerts		**8,100**		**4.1%**			**0.0%**	**7.8%**	**3.3%**
	Crushable Inerts	5,200		2.7%			0.0%	6.1%	2.0%
	Gypsum Boards	1,200		0.6%			0.0%	3.4%	0.3%
	Treated Wood Waste	1,600	-	0.8%	-		0.0%	4.0%	0.4%
Electronics		**2,900**		**1.5%**			**0.0%**	**4.4%**	**1.0%**
	Brown Goods / White Goods	2,000	+	1.0%	+		0.0%	4.3%	0.5%
	Computer Related Electronics	400		0.2%			0.0%	1.0%	0.1%
	Other Small Consumer	400		0.2%		>	0.0%	0.5%	0.2%
HHW		**900**		**0.4%**			**0.0%**	**2.8%**	**0.1%**
	Paints/Adhesives & Vehicle/Equipment Fluids	100	-	0.1%	-		0.0%	0.1%	0.0%
	Universal Hazardous Waste	300		0.2%			0.0%	2.4%	-0.1%
	Medical Waste	400		0.2%			0.0%	1.3%	0.1%
	Other Hazardous Waste	<100		0.0%			0.0%	0.1%	0.0%
Special	Tires	**800**		**0.4%**		>	**0.0%**	**2.3%**	**0.1%**
Other	Materials not specified above	**53,500**	+	**27.4%**	+		**0.0%**	**15.1%**	**25.8%**
TOTAL		**195,000**		**100.0%**					

Note: Waste composition based on 250 samples.

Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study

Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study

- \- Indicates a significant decrease from the 2008 study
- \+ Indicates a signficiant increase from the 2008 study
- < Indicates a significant decrease from the 2015 CalRecycle Statewide Waste Characterizaton Study
- > Indicates a significant increase from the 2015 CalRecycle Statewide Waste Characterizaton Study

1.1.4 Roll Off Containers

The composition of roll off container waste is presented in **Table 4**. The symbols indicate significant differences between the current 2017-18 study and the the 2008. A "+" indicates a significant increase and a "-" indicates a significant decrease in the material compared to the 2008 study. Waste disposed in roll-off containers was not characterized as a separate sector in the CalRecycle Statewide Waste Characterization Study in 2015; therefore, there are no comparisons to statewide results.

Table 4. 2017-18 Roll Off Container Waste Composition

Material Components		Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits Lower	90% Confidence Limits Upper
Paper		**8,700**	**5.2%**	**9.4%**	**4.3%**	**6.2%**
	Uncoated Corrugated Cardboard / Kraft Paper	3,200 -	1.9% -	4.7%	1.5%	2.4%
	Recyclable Paper (no food/liquid contamination)	5,500 -	3.3% -	7.5%	2.6%	4.1%
Plastic		**400**	**0.2%**	**1.1%**	**0.1%**	**0.3%**
	Bottle and Plastic Container	100 -	<0.1% -	0.3%	<0.1%	0.1%
	Plastic Bags	<100 -	<0.1% -	0.1%	<0.1%	<0.1%
	Other Film	200 -	0.1% -	0.9%	<0.1%	0.2%
Glass	Recyclable Glass Bottles/Containers	**400 -**	**0.2% -**	**1.2%**	**<0.1%**	**0.3%**
Metal		**1,400**	**0.8%**	**3.3%**	**0.5%**	**1.1%**
	Aluminum Cans	<100 -	<0.1% -	0.1%	<0.1%	<0.1%
	Steel Food/Beverage Containers	<100 -	<0.1% -	0.2%	<0.1%	<0.1%
	Other Non-Ferrous	400	0.2%	1.2%	<0.1%	0.3%
	Other Ferrous	900 -	0.5% -	3.1%	0.2%	0.9%
Compostable Organics		**14,700**	**8.8%**	**18.3%**	**7.0%**	**10.6%**
	Yard Waste	4,400 -	2.6% -	12.4%	1.4%	3.8%
	Food Waste	9,400 -	5.7% -	13.4%	4.3%	7.0%
	Compostable Paper	900 -	0.5% -	1.3%	0.4%	0.6%
Compostable Organics - Wood		**10,300**	**6.1%**	**17.1%**	**4.4%**	**7.9%**
	Clean Dimensional Lumber	3,500	2.1%	8.6%	1.2%	2.9%
	Clean Engineered Wood	2,400	1.4%	7.4%	0.7%	2.2%
	Pallets	4,400	2.6% -	13.2%	1.3%	3.9%
Textiles/Other		**1,900**	**1.1%**	**8.1%**	**0.3%**	**1.9%**
	Textiles/Leather	1,000 -	0.6% -	6.1%	<0.1%	1.2%
	Carpet	1,000	0.6%	5.4%	<0.1%	1.1%
Inerts		**11,800**	**7.0%**	**19.8%**	**5.1%**	**9.0%**
	Crushable Inerts	6,100	3.7%	13.6%	2.3%	5.0%
	Gypsum Boards	3,100	1.8%	11.0%	0.7%	2.9%
	Treated Wood Waste	2,600 -	1.5% -	10.0%	0.6%	2.5%
Electronics		**200**	**0.1%**	**2.0%**	**<0.1%**	**0.3%**
	Brown Goods / White Goods	200 -	0.1%	2.0%	<0.1%	0.3%
	Computer Related Electronics	<100	<0.1%	0.3%	<0.1%	<0.1%
	Other Small Consumer	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
HHW		**<100**	**<0.1%**	**<0.1%**	**<0.1%**	**<0.1%**
	Paints/Adhesives & Vehicle/Equipment Fluids	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Universal Hazardous Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Medical Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Other Hazardous Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
Special	Tires	**<100 -**	**<0.1% -**	**<0.1%**	**<0.1%**	**<0.1%**
Other	Materials not specified above	**117,400 +**	**70.3% +**	**28.2%**	**67.5%**	**73.1%**
TOTAL		**167,000**	**100.0%**			

Note: Waste compposition based on 274 visually characterized waste loads
Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study
Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study
- Indicates a significant decrease from the 2008 study
+ Indicates a signficiant increase from the 2008 study

1.1.5 Self Haul Waste

The composition of self haul waste is presented in **Table 5**. The symbols indicate significant differences between the current 2017-18 study and both the the 2008 study and the 2015 CalRecycle Statewide Waste Characterization Study. A "+" indicates a significant increase and a "-" indicates a significant decrease in the material compared to the 2008 study. A ">" indicates a significant increase and a "<" indicates a significant decrease compared to the statewide study.

Table 5. 2017-18 Self Haul Waste Composition

Material Components		Annual Tonnage	Mean Composition	Standard Deviation	90% Confidence Limits Lower	90% Confidence Limits Upper
Paper		**5,300**	**1.8%**	**6.5%**	**1.3%**	**2.3%**
	Uncoated Corrugated Cardboard / Kraft Paper	3,100 -	1.0% -	4.4%	0.7%	1.4%
	Recyclable Paper (no food/liquid contamination)	2,200 -	0.7% -	4.2%	0.4%	1.1%
Plastic		**400**	**0.1%**	**1.0%**	**<0.1%**	**0.2%**
	Bottle and Plastic Container	200 -	<0.1% -	0.5%	<0.1%	<0.1%
	Plastic Bags	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Other Film	200 -	<0.1% -	0.9%	<0.1%	0.1%
Glass	Recyclable Glass Bottles/Containers	**100 -**	**<0.1% -**	**< 0.6%**	**<0.1%**	**<0.1%**
Metal		**3,200**	**1.1%**	**6.7%**	**0.6%**	**1.6%**
	Aluminum Cans	<100	<0.1%	0.2%	<0.1%	<0.1%
	Steel Food/Beverage Containers	<100	<0.1%	< 0.2%	<0.1%	<0.1%
	Other Non-Ferrous	500 -	0.2% -	1.0%	<0.1%	0.2%
	Other Ferrous	2,600 -	0.9% -	6.6%	0.4%	1.4%
Compostable Organics		**9,500**	**3.2%**	**17.9%**	**1.8%**	**4.6%**
	Yard Waste	7,600 -	2.6% -	< 16.0%	1.3%	3.8%
	Food Waste	1,800 -	0.6% -	8.2%	<0.1%	1.2%
	Compostable Paper	100 -	<0.1% -	< 0.7%	<0.1%	<0.1%
Compostable Organics - Wood		**17,100**	**5.8%**	**17.4%**	**4.5%**	**7.1%**
	Clean Dimensional Lumber	10,600	3.6%	15.4%	2.4%	4.7%
	Clean Engineered Wood	3,000	1.0%	< 6.5%	0.5%	1.5%
	Pallets	3,600	1.2%	5.4%	0.8%	1.6%
Textiles/Other		**10,000**	**3.4%**	**15.7%**	**2.2%**	**4.6%**
	Textiles/Leather	1,900 -	0.6% -	< 3.3%	0.4%	0.9%
	Carpet	8,000	2.7%	15.5%	1.5%	3.9%
Inerts		**52,500**	**17.7%**	**25.7%**	**15.8%**	**19.7%**
	Crushable Inerts	27,500	9.3%	18.3%	7.9%	10.7%
	Gypsum Boards	12,600	4.3%	14.5%	3.2%	5.4%
	Treated Wood Waste	12,400 -	4.2% -	12.7%	3.2%	5.2%
Electronics		**300**	**0.1%**	**1.0%**	**<0.1%**	**0.2%**
	Brown Goods / White Goods	200 -	<0.1% -	0.7%	<0.1%	0.1%
	Computer Related Electronics	<100	<0.1%	< 0.3%	<0.1%	<0.1%
	Other Small Consumer	100 -	<0.1% -	0.6%	<0.1%	<0.1%
HHW		**<100**	**<0.1%**	**0.4%**	**<0.1%**	**<0.1%**
	Paints/Adhesives & Vehicle/Equipment Fluids	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Universal Hazardous Waste	<100 -	<0.1% -	0.4%	<0.1%	<0.1%
	Medical Waste	<100 -	<0.1% -	<0.1%	<0.1%	<0.1%
	Other Hazardous Waste	<100 -	<0.1% -	0.2%	<0.1%	<0.1%
Special	Tires	**<100**	**<0.1%**	**0.2%**	**<0.1%**	**<0.1%**
Other	Materials not specified above	**197,500 +**	**66.7% +**	**> 33.9%**	**64.1%**	**69.3%**
TOTAL		**296,000**	**100.0%**			

Note: Waste compposition based on 463 visually characterized waste loads
Clean Dimensional Lumber and Clean Engineered Wood are merged in the 2008 study
Computer Related Electronics and Other Small Consumer Electronics are merged in the 2008 study
- Indicates a significant decrease from the 2008 study
+ Indicates a signficiant increase from the 2008 study
< Indicates a significant decrease from the 2015 CalRecycle Statewide Waste Characterizaton Study
> Indicates a significant increase from the 2015 CalRecycle Statewide Waste Characterizaton Study

1.1.6 MRF Residuals

The composition of MRF Residuals from both C&D and MSW (collected as garbage or single stream recyclables) is presented in Table 6.

Table 6. 2017-18 MRF Residuals Composition

Material Components		Annual Tonnage	Mean Composition
Paper		**7,280**	**13.0%**
	Uncoated Corrugated Cardboard / Kraft Paper	3,070	5.5%
	Recyclable Paper (no food/liquid contamination)	4,200	7.5%
Plastic		**5,780**	**10.4%**
	Bottle and Plastic Container	4,580	8.2%
	Plastic Bags	830	1.5%
	Other Film	370	0.7%
Glass	Recyclable Glass Bottles/Containers	**110**	**0.2%**
Metal		**750**	**1.3%**
	Aluminum Cans	150	0.3%
	Steel Food/Beverage Containers	150	0.3%
	Other Non-Ferrous	250	0.5%
	Other Ferrous	190	0.3%
Compostable Organics		**2,740**	**4.9%**
	Yard Waste	200	0.4%
	Food Waste	210	0.4%
	Compostable Paper	2,330	4.2%
Compostable Organics - Wood		**3,240**	**5.8%**
	Clean Dimensional Lumber	2,330	4.2%
	Clean Engineered Wood	910	1.6%
	Pallets	<100	<0.1%
Textiles/Other		**2,560**	**4.6%**
	Textiles/Leather	1,660	3.0%
	Carpet	900	1.6%
Inerts		**5,050**	**9.0%**
	Crushable Inerts	1,370	2.5%
	Gypsum Boards	120	0.2%
	Treated Wood Waste	3,550	6.4%
Electronics		**360**	**0.6%**
	Brown Goods / White Goods	130	0.2%
	Computer Related Electronics	<100	0.1%
	Other Small Consumer	160	0.3%
HHW		**<100**	**<0.1%**
	Paints/Adhesives & Vehicle/Equipment Fluids	<100	<0.1%
	Universal Hazardous Waste	<100	<0.1%
	Medical Waste	<100	<0.1%
	Other Hazardous Waste	<100	<0.1%
Special	Tires	**<100**	**<0.1%**
Other	Materials not specified above	**27,940**	**50.1%**
TOTAL		**55,800**	**100.0%**

Note: Compositions based on sorting over 16,000 pounds of sampled materials.

1.1.7 Countywide

By design, the Benchmark Study limited the number of material types for sampled residential waste (both from single family and multi-family sources) to five classifications, which are described below. In contrast, field activities for this study targeted waste from the commercial, roll off, self haul, and MRF sectors and sorted waste samples into 30 material types. To combine waste compositions from the six waste sectors into a countwide waste composition, the material types from the field-sampled waste sectors were condensed to match the five material classifications of the Benchmark Study as follows:

- Recyclable- materials that can be recycled through curbside collection services including uncoated corrugated cardboard/Kraft paper, recyclable paper (without food contamination), plastic bottles and containers, glass bottles and containers, aluminum cans, and steel food/beverage containers.
- Plant Debris – plant material including leaves, grass, plants, pruning, trimmings, branches, and stumps.
- Food Scraps – food including meat, fruit, and egg shells, etc. and containerized liquids.
- Food Soiled Paper – paper contaminated with food/wax/moisture, waxed corrugated cardboard, napkins, pizza boxes, paper towels, fast food wrappers, egg cartons, paper plant pots, take-out food containers, paper plates, tissues, and newspaper with pet waste.
- Other – Primarily garbage, but also includes other materials, some of which could be diverted from landfill disposal, including plastic bags, other ferrous and non-ferrous metal, clean wood, textiles, leather, carpet, crushable inerts (e.g., stone, rock, cement, tile, etc), electronics, HHW, and tires. Also includes materials such as other plastic film, treated wood, polystyrene, etc.

Table 7 presents the countywide waste composition as well as the contributing waste sector compositions.

Table 7. Detailed 2017-18 Countywide Composition

Waste Sector	Recyclable	Plant Debris	Food Scraps	Food Soiled Paper	Other	Total
Single-Family Residential	6.1%	0.6%	14.6%	16.0%	62.6%	37.4%
Multi-Family Residential	8.3%	0.9%	10.3%	15.8%	64.7%	35.3%
Commercial	17.0%	2.3%	21.4%	9.3%	49.9%	50.1%
Roll-Off	5.6%	2.6%	5.7%	0.5%	85.6%	14.4%
Self-Haul	1.9%	2.6%	0.6%	0.0%	94.9%	5.1%
MRF Residuals	22.0%	0.4%	0.4%	4.2%	73.1%	26.9%
Countywide	7.9%	1.8%	9.3%	7.1%	73.8%	26.2%

Figure 1 presents the countywide waste composition graphically.

Figure 1. 2017-18 Countywide Waste Composition

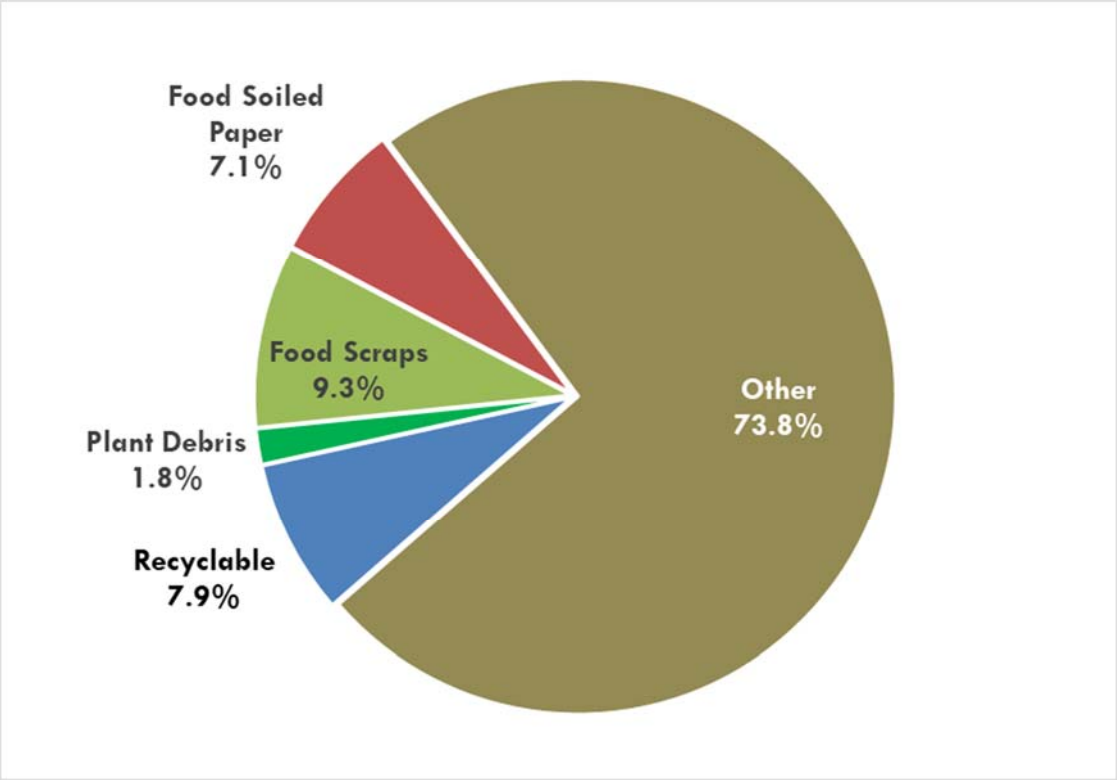

Table 8 presents the annual tonnage of waste by sector and Benchmark Study classification.

Table 8. 2017-18 Waste Quantity by Sector

Waste Stream	Recyclable	Plant Debris	Food Scraps	Food Soiled Paper	Other	Total
Single-Family Residential	14,200	1,500	33,800	37,000	144,600	231,000
Multi-Family Residential	8,500	1,000	10,600	16,300	66,700	103,000
Commercial	33,200	4,600	41,800	18,200	97,300	195,000
Roll-Off	9,300	4,400	9,400	900	143,000	167,000
Self-Haul	5,700	7,600	1,800	100	280,900	296,000
MRF Residuals	12,300	200	200	2,300	40,800	55,800
Countywide Total	83,100	19,300	97,600	74,900	773,300	1,047,800

1.2 STUDY DESIGN

Multiple sources of information were used to estimate the annual waste quantity disposed within Alameda County by sector, which included the 2016 and 2017 Jurisdiction Quarterly Tonnages Reports and communication with each franchised hauler operating in Alameda County. Similar to the 2000 and 2008 waste characterization studies, this study classified waste generated and disposed of in Alameda County as originating from the following sectors: 1) Single Family Residential, 2) Multi-Family Residential, 3) Commercial, 4) Roll-Off Containers, 5) Self Haul. Unlike the previous studies, this study added a sixth sector, MRF Residuals.

As shown in **Table 9,** the annual quantity of waste disposed for each sector has a decreasing trend since 1990. Self Haul waste is the only sector that increased, albeit slightly, since 2008.

Table 9. Reported In-County Waste Disposal Quantities

Waste Sector	1990	1995	2000	2008	2017-18
Single-Family Residential	499,150	333,030	332,700	275,080	231,000
Multi-Family Residential	*	112,090	122,870	132,080	103,000
Commercial	666,300	264,530	354,400	237,320	195,000
Roll-Off	264,500	339,250	406,470	273,420	167,000
Self-Haul	428,550	465,560	336,240	269,210	296,000
MRF Residuals	NA	NA	NA	NA	55,800
Total Countywide	1,858,500	1,514,460	1,552,680	1,187,110	1,047,800

Note: Multi-family residential waste quantities included in commercial quantities for 1990.
MRF Residuals not quantified 1990 through 2008.

A variety of data was utilized and collected to estimate the types and quantities of materials disposed of as garbage for each of the waste sectors. Data from StopWaste's benchmark services (year-round waste characterization of individual carts and dumpsters located at single family residences and multi-family properties) was used to characterize residential waste. Field sampling and sorting activities were used to characterize waste disposed of by the commercial, roll off, self haul, and MRF residuals sectors.

Residential waste was characterized into five material types: recyclable (through curbside collection programs), plant debris, food scraps, food soiled paper, and other (primarily garbage but also including other materials separately classified in the remaining sectors). Commercial, roll off, self haul, and MRF residuals were characterized into 11 material classifications and 30 material types.

1.3 FIELD METHODS

Fieldwork was completed at six host facilities (two landfills and four transfer stations) over two seasons. Season One fieldwork was conducted in August and September 2017; Season Two was conducted in January and February 2018. Manual sorting was used to characterize commercial waste samples and MRF residuals. Visual characterization of entire waste loads was used to characterize roll off containers and self haul waste.

Table 10 summarizes the characterization method, number of samples, and number of material types into which the samples were sorted.

Table 10. Summary of Waste Characterization Methods and Number of Samples By Waste Sector

Waste Sector	Characterization Method	Number of Samples	Number of Material Types
Single Family Residential	Data from Benchmark Services	2,605 carts	5
Multi-Family Residential	Data from Benchmark Services	665 carts/dumpsters	5
Commercial	Manual (Hand Sorting)	250 samples	30
Roll Off Containers	Visual Characterization	274 waste loads	30
Self Haul	Visual Characterization	463 waste loads	30
MRF Residuals	Manual (Hand Sorting)	16,000 pounds	30

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DATE: September 13, 2018

TO: Programs & Administration Committee

FROM: Tom Padia, Deputy Director

SUBJECT: What Happens to E-Scrap?

SUMMARY

Committee members have asked recently for a discussion of what happens to electronic scrap turned in for recycling. Staff have interviewed the General Manager of a large local e-scrap recycling company located in Hayward and spoken with the Program Manager of the Alameda County Household Hazardous Waste (HHW) program which accepts e-scrap along with other HHW materials.

DISCUSSION

The era of console TV's and rotary dial telephones that last for 25 years or more is long gone. Technological innovation and design changes have resulted in a proliferation of consumer electronics that are more powerful, smaller, lighter, cheaper and more quickly made obsolete by the next round of technological advances than ever before. The presence of heavy metals and sometimes other materials have caused these electronics, once discarded, to be considered hazardous or universal wastes, in a similar category to batteries (which many of them have), paint, used oil, mercury lamps (which some of them also have), etc. New electronic products are continually introduced into the marketplace, including items like the public use bikes and scooters which have batteries, circuit boards and other electronic components.

Exposé videos, articles and photos by groups like the Basel Action Network (BAN – see http://www.ban.org/) of horrific environmental pollution and human health impacts of primitive e-scrap recycling practices at locations in the developing world have given rise to growing levels of concern about impacts from recycling this stream of materials. Third party certification organizations have arisen, such as R2 (https://sustainableelectronics.org/r2-standard) and e-Stewards (http://e-stewards.org/) in an effort to provide guidance to consumers and generators wishing to recycle their e-scrap in a responsible manner. There are also third party certifications for destruction of sensitive data contained in electronic devices (see National Association for Information Destruction - http://www.naidonline.org/).

The Alameda County HHW program uses an RFP process to select one master vendor who subs out whatever materials they can't handle directly, subject to standards established in the RFP, such as e-Stewards certification for e-scrap, and subject to County approval of all subcontractors. Attached to this memo are downstream vendors flowcharts from the new subcontractor, ERI Direct (www.eridirect.com), showing the flow of different e-scrap components to various processors.

Russ Caswell, General Manager of e-Recycling of California's Hayward plant (www.erecyclingofca.com) explained that his company primarily receives e-scrap from haulers, institutions and businesses but does accept drop-off from consumers. The largest units normally accepted are up to the size of microwaves, printers and faxes, but not large appliances. Once batteries and potentially hazardous components like old PCB capacitors and mercury switches have been removed from incoming scrap, most materials are sent for further dismantling and to a shredder for size reduction and separation of precious metals, aluminum, copper, various grades of plastics and other materials. A small amount of dismantling for reuse does occur. In California, there is very little involvement by manufacturers and retailers, although there is more in some other states due to legislation. Most materials are processed domestically.

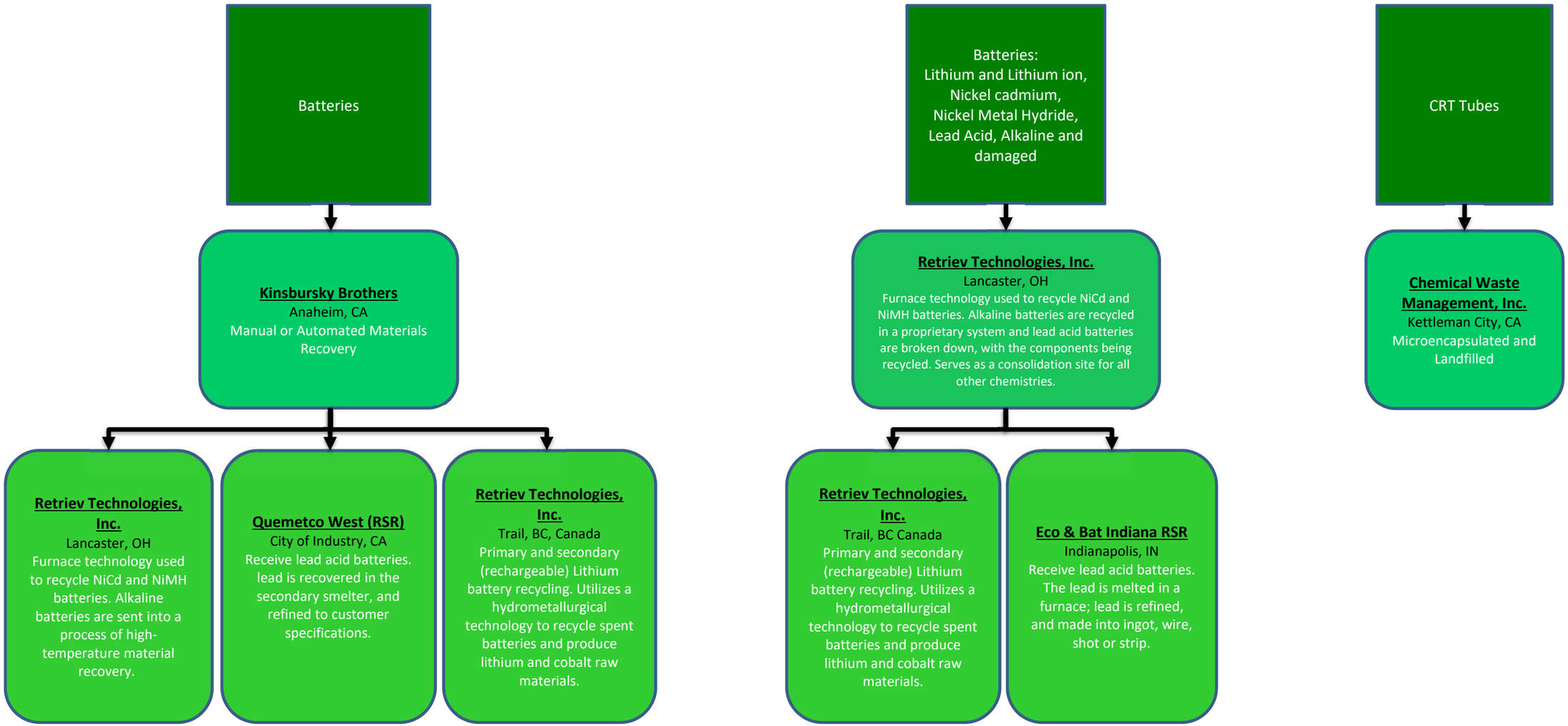
RECOMMENDATION

This item is for information only.

Attachments: ERI Downstream Vendors Flowchart

E-Scrap article

ERI 7815 North Palm Avenue, Suite 140 ▯ Fresno, CA 93711 Corporate Headquarters www.eridirect.com Green Is Good™	Downstream Vendors Flowchart			
	Document ID: ERIFORMEQHS-058S-CA	Version No: 3	Effective Date: 10/1/2016	Department: EQHS
	Last Revised By: Brandi Miller	Revision No: 4	Revision Date: 1/16/2018	Facility/Building: Fresno, CA



Un-shredded : Assorted Boards, Scrap Memory, Processors, Cell Phone Scrap, Gold Connectors, PDAs

MRP, Co.
Hunt Valley, MD
Consolidator &
Broker

DOWA
Kosaka, Japan
Precious Metals
Refining

Shredded Material: LG Cu, LG/MG PM, HG PM, PM Fines, Boards, MG Cu PMC, MG Cu PME

LS Nikko
Ulsan, Korea
Smelter

Boards, Cell Phones Scrap, PDAs, Processors, Gold Connectors

Abington Reldan Metals, LLC
Philadelpha, PA
Metals Recycling

Universal Waste Lamps

Waste Management Lamp Tracker
Phoenix, AZ
Count & repackage if necessary
Glendale, AZ
Materials Recovery

WM Mercury Waste Solutions
Union Grove, WI
CP Powder, Spent Carbon & HID ampoules for mercury recovery

Legend

LG - Low Grade
MG - Medium Grade
HG - High Grade
Cu - Copper
PM - Precious Metals
PMC - Precious Metals Computer
PME - Precious Metals E-Scrap

WE KNOW THE WRONG WAY TO DEAL WITH E-WASTE. BUT WHAT SHOULD WE DO INSTEAD?

A handful of firms around the world are working to develop environmentally responsible recycling and disposal strategies. Here's what they have to teach the rest of us.


Photo © iStockphoto.com/baranozdemir

WRITER
Fred Pearce

British environment journalist and author

August 22, 2018 — Rajesh was just 10 years old when we met. His days were spent standing on tiptoe to dunk computer circuit boards into big vats of hot acid. He had gloves but no goggles, and the acid splashed his shirt. He had an incessant cough and drank alcohol at night to ward off dizziness caused by the fumes.

Rajesh had moved with his older brother from the Indian countryside to work in Mandoli, a suburb of the Indian capital New Delhi, which has become a charnel house of the digital world. The vats of acid that he tended removed the copper from

the circuit boards so it could then be sold to a nearby factory that made copper wire. Somebody made a profit. But in the acrid air and with local well water contaminated by toxic metals, Rajesh's future looked bleak

This scene in Mandoli is a disturbing face of a vast global business in recycling electronic waste. Between 20 and 50 million metric tons (22 and 55 million tons) of used computers, TVs, air conditioners, mobile phones, refrigerators, light bulbs and other e-waste is produced every year around the world. All of it has to go somewhere, and all of it contains valuable metals — including toxic lead, cadmium and mercury — that are worth reclaiming for future use.

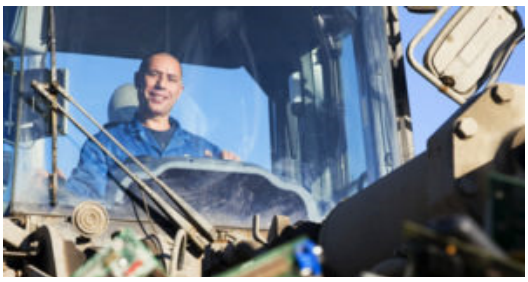
Right now the "urban mining" of precious metals from e-waste is largely an environmental and social nightmare, polluting landscapes and poisoning its practitioners.

But it needn't be like this.

Contrast Mandoli with the scene at Skellefteå, a neat Swedish gold-mining town close to the Arctic Circle with a famous hockey team. Here a giant industrial smelter operated by Boliden, one of the world's largest e-waste recycling companies, last year smelted almost 80,000 metric tons (88,000 tons) of scrap e-waste, much of it circuit boards cut from European computers and mobile phones, to extract copper, gold, silver and other precious metals. No vats of acid; no acrid fumes; no 10-year-old workers.

The automated process operates to European environmental and health and safety standards. It is equipped with systems to clean process gases and prevent dust releases. Waste heat generated during smelting is circulated to heat local buildings; and the scant leftovers from smelting are buried in purpose-build stores under the site.

Could this bode a better future for e-waste? Perhaps so. Mainstream metals refining companies are now



sniffing profits from e-waste and touting for business from the U.S. to China.

Belgian refiner Umicore is increasingly tapping e-waste as a source of metals and other valuable materials. Photo courtesy of Umicore

China's Mixed Bag

Umicore in Hoboken, Belgium, a longstanding European metals refiner, is getting ever more of its raw materials from e-waste. The company's director of European Union government affairs, Christian Hagelüken, says its smelters can extract 400 grams (14 ounces) of gold from a metric ton (1.1 tons) of mobile phones, along with copper, silver, lead, tin and indium. After smelting, the metals in the waste stream are chemically separated. The plastic casings go into the smelter, where they are burned to provide most of the fuel for the facility.

"Over 95 percent of the feed is turned into useful products," Hageluken says. The final 5 percent includes toxic elements like mercury and cadmium that have to be disposed of "in a safe way," plus slag that is used for constructing flood-protection dikes along the Belgian coast.

Materials that can be extracted from mobile phones include gold, copper, silver, lead, tin and indium. Photo courtesy of Umicore

Such advanced processing plants are also turning up in the developing world. China in particular is keen to replace its notorious e-waste villages with high-tech e-waste metals recovery. Its flagship company, GEM Co. Ltd., says on its website that it aims "to become the world leader in green enterprises."

Not every Chinese company is so fastidious as GEM claims to be, however. When Thai police raided the Chinese-owned Wai Mei Dat Recycling complex east of Bangkok in May this year, they found illegal workers burning waste in the open and spewing dioxin from plastics into the air. The surreptitious site had been found by the Basel Action Network (BAN), a non-governmental organization that researches international trade in waste, using tracking devices attached to e-waste.

U.S. Initiatives

In the United States, most e-waste is landfilled. A study five years ago paid for by the U.S. Environmental Protection Agency estimated that 8.5 percent of collected e-waste was exported, with Mexico, Venezuela, Paraguay and China among the most popular destinations.

Some of that trade is legitimate. California-based ERI collects hundreds of thousands of tons of e-waste a year across the U.S., which it shreds and sells either to its partner Alcoa's smelter in Massena, New York, or to LS Nikko, an established copper-smelting giant in South Korea.

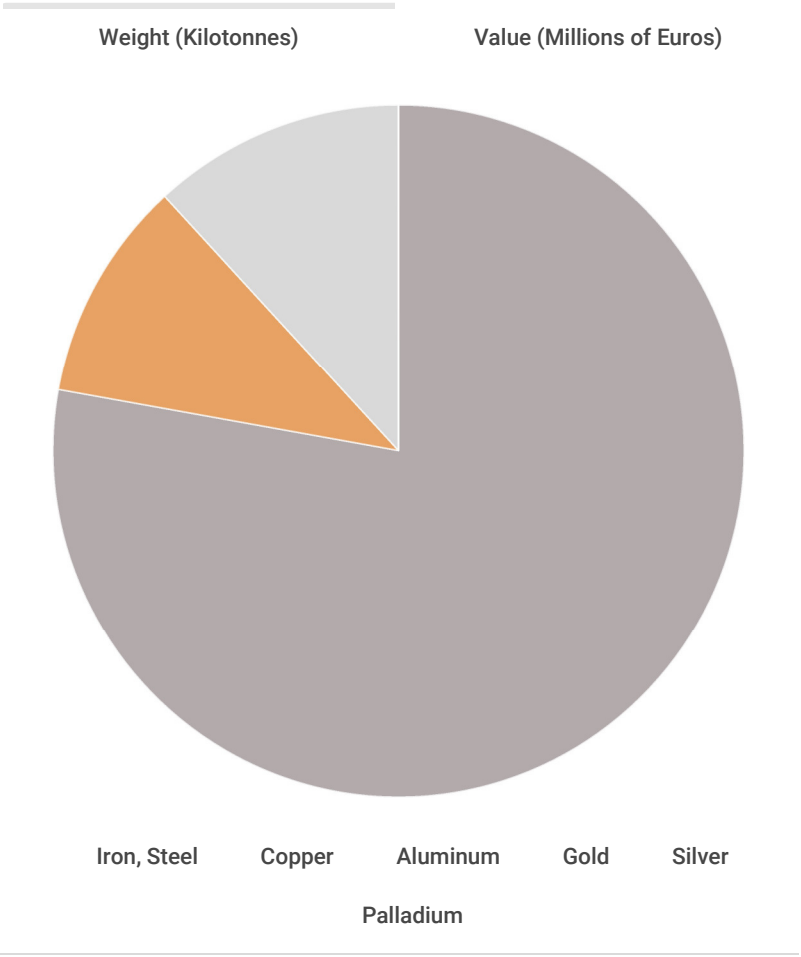
But the BAN has accused several American companies of "scam recycling" — that is, advertising recycling services that simply export to places such as Pakistan and the Philippines where the waste is "smashed, burned or treated with dangerous chemicals" by migrant workers.

Some electronics manufacturers are taking the initiative to improve practice, however. Dell has been collecting old equipment for a decade to pass on to recyclers for the extraction of precious metals. Apple recently rolled out a robot able to dismantle iPhones, sorting components for ease of recycling "so we can recover materials that traditional recyclers can't," according to the company's 2018 environmental responsibility report.

The company claims to recover aluminum, cobalt, copper, tungsten, tin, silver, tantalum, gold, palladium and various rare earths. It intends to install the robot, known as Daisy, in many consumer countries, with the eventual aim of using only recycled materials in its production processes.

Good Business

E-waste recycling is about more than good housekeeping. What is really driving the industry is the discovery that, in a world where the prices of metals are rising and most conventional mines are in distant countries with poor-grade ores, urban mining of e-waste is good business.



Electronic Waste Recycled Metals
Infogram

Estimated weight and potential value of select raw materials in e-waste, 2016. Estimated total weight of materials listed is 20,921 kilotonnes, with an estimated value of nearly €40 billion. From Baldé, C.P., Forti V., Gray, V., Kuehr, R., Stegmann,P. : The Global E-waste Monitor – 2017, United Nations University (UNU), International Telecommunication Union (ITU) & International Solid Waste Association, Bonn/Geneva/Vienna.

Copper and gold, which make up more than half the value in e-waste, are now often cheaper to obtain from jettisoned products, says Xianlai Zeng, an associate professor of solid waste management at Tsinghua University in Bejing, China. "Urban mining of e-waste is becoming more cost-effective than virgin mining," he concluded in a recent paper, after studying the economics of eight recycling plants in the country.

This is not so surprising. There is more gold in a ton of mobile phones than in a ton of ore from a gold mine. One estimate is that all the e-waste discarded annually round the world contains more than 300 tons of gold.

Zeng's analysis concluded that, with some government subsidies, urban mining in China could recover copper at less than US$2 a kilogram (2 pounds), which is less than a third of the international market price.

"The total value of all raw materials present in e-waste is estimated at approximately US$55 billion in 2016, which is more than the 2016 gross domestic product of most countries in the world," says Cornelis Balde, a researcher with the United Nations University to Tokyo.

Huge Opportunities

Some fear that the potential profits from urban mining will lead to an upsurge in rogue operators, with escalating environmental and safety hazards. But more likely — just as poor regular miners soon get muscled out by big corporations when a new geological seam provides rich pickings — urban mines will soon be the preserve of the big operators.

"There are huge business opportunities in e-waste recycling, especially in the big countries of e-waste generation." – Xianlai Zeng

Yet they have a ways to go. Zeng estimates only 20 percent of e-waste is currently handled by the "clean" sector of big companies using largely automated processes. About 40 percent ends up in places like Mandoli, in China's notorious villages around Guiyu in Guangdong province, or in Agbogbloshie, a

district in Accra, the capital of Ghana, which some say is currently the world's largest e-waste dump. The remaining 40 percent is uncharted, often stored in drawers or attics or disposed of in landfills.

"There are huge business opportunities in e-waste recycling, especially in the big countries of e-waste generation," says Zeng. So sending our e-waste to the back streets of India and China is not only ethically unacceptable, it is also a missed business opportunity at home.

Many ethically concerned consumers are conflicted about recycling e-waste. They applaud the virtues of recycling, but fear the stuff they are done with may end up polluting a Chinese village or poisoning Indian children. With increased awareness of the opportunities in urban mining, that dilemma could soon end.