October 6, 2011

Ms. Debra Kaufman
StopWaste.Org
1537 Webster Street
Oakland, CA, 94612

Subject: **Cost of Mandatory Recycling in Alameda County**

Dear Ms. Kaufman,

HF&H is pleased to present this report to StopWaste.Org that estimates the cost of mandatory recycling in Alameda County. This report presents our findings and recommendations and is organized into four sections:

1. Executive Summary

2. Methodology

3. Limitations

4. Findings

EXECUTIVE SUMMARY

The four mandatory recycling approaches are:

1. Traditional Recycling, 4 cubic yard generation threshold. Under this scenario, commercial and multi-family generators of more than four cubic yards of solid waste per week would be required to recycle traditional recyclable materials.

2. Traditional Recycling, no threshold. Under this scenario all commercial and multi-family generators would be required to recycle traditional recyclable materials.

3. Traditional Recycling and Organics, 4 cubic yard generation threshold. Under this scenario, commercial and multi-family generators of more than four cubic yards of solid waste per week would be required to recycle traditional recyclable materials and organic materials (food waste, green waste, and food soiled/compostable paper).

4. Traditional Recycling and Organics, no generation threshold. Under this scenario, all commercial and multi-family generators would be required to recycle traditional recyclable materials and organic materials.

The total countywide net annual cost savings to the waste management and recycling system resulting from this regulation is estimated to range from $3.3 million, or 2.04% (Scenario 1 – Traditional

Recyclables, 4 cubic yard threshold) to $11.7 million, or 7.09% (Scenario 4 – Traditional Recyclables and Organics, no threshold). Figure 1, below, presents the estimated system costs of the proposed scenarios, and costs relative to the baseline scenario.

Figure 1 - Estimated Costs of the Proposed Scenarios

	ESTIMATED COST EFFECTIVENESS			
	Estimated Gross System Costs	Estimated Commodity Sales	Estimated Net System Costs	Increase/ (Decrease) From Baseline
Baseline – Current Disposal	$168,673,873	($3,623,679)	$165,050,193	N/A
Scenario 1 – Traditional Recyclables, 4 CY Threshold	$179,259,275	($17,574,793)	$161,684,482	($3,365,711)
Scenario 2 – Traditional Recyclables, No Threshold	$182,634,593	($21,062,571)	$161,572,022	($3,478,172)
Scenario 3 – Traditional Recyclables, Organics, 4 CY Threshold	$174,709,354	($17,574,793)	$157,134,561	($7,915,633)
Scenario 4 – Traditional Recyclables, Organics, No Threshold	$174,413,897	($21,062,571)	$153,351,325	($11,698,868)

Each of the four scenarios assumes the management of 577,112 tons of disposed commercial and multi-family material. The difference between the scenarios is the mix of tons recovered.

Cost-effectiveness of recycling systems is typically measured as the cost per diverted ton. Figure 2 below demonstrates the cost per ton diverted based on each scenario.

Figure 2 - Estimated Cost-Effectiveness

	ESTIMATED COST EFFECTIVENESS				
	Estimated Net System Cost	Estimated Net Cost Savings	Assumed Tons Diverted	Assumed Percentage Diverted	Cost per Diverted Ton
Baseline – Current Disposal	$165,050,193	N/A	49,512	8.58%	N/A
Scenario 1 – Traditional Recyclables, 4 CY Threshold	$161,684,482	($3,365,711)	104,451	18.10%	($32.22)
Scenario 2 – Traditional Recyclables, No Threshold	$161,572,022	($3,478,172)	118,186	20.48%	($29.43)
Scenario 3 – Traditional Recyclables, Organics, 4 CY Threshold	$157,134,561	($7,915,633)	211,380	36.63%	($37.45)
Scenario 4 – Traditional Recyclables, Organics, No Threshold	$153,351,325	($11,698,868)	251,847	43.64%	($46.45)

Depending on the mix of programs used to comply with this regulation, the cost-effectiveness of this measure may range from ($32.22) to ($46.45) per recovered ton. As the tons of commercial organics diverted increases, so does the estimated net cost savings. Composting of organic material is more expensive than processing of recyclables; however, it is comparable to the cost of disposal once transfer/transport costs are included. The cost-effectiveness is also influenced by material density; the denser the material, the greater the estimated collection cost savings.

The study performed for CalRecycle identified more significant savings during the early years of the phased implementation period (2012 – 2020) due to underutilized collection and processing system

capacity. This underutilized capacity resulted from the significant reduction in tonnage between 2008 and 2011 resulting from general economic conditions. If a similar analysis of a phased implementation were done for Alameda County, it is possible that greater cost savings could be identified than are presented here.

METHODOLOGY

Background

HF&H performed this cost estimate using the modeling tool developed for CalRecycle's mandatory commercial recycling cost study. Detailed cost calculations and the methodology used to develop that model are shown in HF&H's report to CalRecycle titled *Cost Study of Commercial Recycling Contractor's Report,* dated June 2010.

HF&H utilized the cost model to estimate the relative impact of implementing a mandatory recycling program in Alameda County. The cost estimates are for Alameda County as a whole and are not specific to any agency or sub-region of the county. HF&H reviewed the cost, operational, and productivity data that forms the basis of the inputs used in the CalRecycle model for the region that encompasses Alameda County and removed any data points which were not reflective of the conditions in Alameda County.

Data Gathering and Analysis

To determine the baseline system-wide cost, HF&H used the data from the 2008 Alameda County Waste Characterization Study, prepared by R.W. Beck for StopWaste.Org, to form the basis of the material quantity and composition for materials currently destined for landfill.

HF&H collected franchise fee information reported by the jurisdictions for the most recent fiscal year available; this information was used to estimate the gross system revenue by jurisdiction. To calculate the per ton revenue, HF&H then divided the calculated gross system revenue by the sum of the residential, commercial, multi-family, and roll-off tons from the Waste Characterization Study. For the eight jurisdictions which the franchise fee information was not available, HF&H estimated the system revenue based on the weighted average system revenue per ton reported by the other agencies.   The weighted average was based on the gross system revenue per ton for the eight jurisdictions for which data was available. The weighted average system revenue per ton disposed resulting from those eight data points is $332.00 per ton. For purposes of estimating commercial recycling, information provided for the City of Piedmont was not included as the City does not possess a significant commercial base.

HF&H then estimated the revenue associated with commercial tons by multiplying the calculated system revenue per ton disposed for each jurisdiction by its respective commercial, multi-family and roll-off

tons. This resulted in estimated system-wide revenue of approximately $165 million from commercial and multi-family tons, and served as the baseline for our model.

This baseline represents all current disposal tonnage and any amount of tonnage that could be quantified for existing commercial and multi-family recycling and organics collection programs in the County. This baseline is not reflective of the vast quantity of private recycling and self-haul recycling that occurs in the County, but which cannot be quantified because data is not available.

HF&H received from StopWaste staff information documenting: 1) number of routes, 2) volumes of recyclable materials and organic materials collected from the commercial and multi-family sector, and 3) indicators of current total revenues collected under the franchise systems. This data was used to validate and correct the results of the cost modeling. HF&H then modified the operational and productivity assumptions used in the baseline analysis to estimate the relative cost impact associated with each of the four scenarios described above.

The data for the value of materials sold at market was gathered from SecondaryMaterialsPricing.com and SecondaryFiberPricing.com, both published by Waste & Recycling News, using values reported for the Southwestern United States. Commodity prices entered in the model were the most recent calendar year 2011 values available.

Assumptions

The volumes of recyclable materials and organic materials collected from the commercial and multi-family sector were used to establish the baseline tons that are being diverted from the landfill through franchise programs. Based on that data, the model assumes that 31,368 commercial organic and 18,144 recyclable tons are diverted in Alameda County each year.

To establish the appropriate recovery rate estimates for each scenario, HF&H worked with StopWaste staff to modify the material-specific recovery rates used in the CalRecycle version of the model to make them appropriate to Alameda County. Figure 3 below summarizes the recovery rates assumed for each material type, by scenario:

Figure 3 - Summary of Recovery Rates

Material Type	Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4
HDPE	0%	64%	80%	64%	80%
PET	0%	64%	80%	64%	80%
Other Plastics	0%	0%	0%	0%	0%
Aluminum Cans & Nonferrous Metals	0%	72%	90%	72%	90%
Steel Cans & Ferrous Metals	0%	60%	75%	60%	75%
Glass Containers	0%	64%	80%	64%	80%
Cardboard & Paper Bags	0%	60%	75%	60%	75%
Magazines & Catalogs	0%	48%	60%	48%	60%
Newsprint	0%	56%	70%	56%	70%
Office Paper	0%	56%	70%	56%	70%
Phone Books	0%	48%	60%	48%	60%
Compostable Paper	0%	0%	0%	48%	60%
Dimensional Lumber	0%	0%	0%	0%	0%
Food	0%	0%	0%	48%	60%
Yard Waste	0%	0%	0%	72%	90%
Carpet	0%	0%	0%	0%	0%
Concrete	0%	0%	0%	0%	0%
Tires	0%	0%	0%	0%	0%
All Other Materials	0%	0%	0%	0%	0%

LIMITATIONS

Every project is subject to various factors that constrain the project; this project is no different. The most significant limitations of this project are described below.

- HF&H conducted this cost estimate using the modeling tool developed for CalRecycle's mandatory commercial recycling cost study. This cost modeling tool has certain inherent limitations which this project attempted to correct for (e.g., material specific recovery rates, target emissions reductions, accounting for existing recycling infrastructure, etc.). However, there are a number of other limitations inherent in the design of the modeling tool which will remain as part of this project (e.g., cart-based collection programs, availability of data, reliance on third-party data, regional aggregation of data, imperfect knowledge of future conditions, etc.) For a full list and description of these limitations, please review Section 1 of the CalRecycle Report.

- Due to the proprietary nature of that cost estimation model, HF&H has not provided the model itself or any of the detailed productivity, operating, or cost assumptions or calculations used to

determine the cost impact. HF&H has reviewed the model and inputs with StopWaste staff to help them understand how the cost model works and the support for the assumptions. HF&H has produced summary schedules identifying the overall system cost estimates for the baseline (current condition) and each of the four scenarios in the 'Findings' section of this letter.

- The estimates do not assume the adoption of any pending or future regulation or legislation (other than Mandatory Recycling) that may impact the costs, savings, and net costs estimated in the model.

FINDINGS

As illustrated in Figure 4 below, HF&H estimates that the countywide baseline commercial system costs (i.e., to collect and dispose of all 577,112 tons) total approximately $165 million annually and that the proposed regulation would result in a savings of $3.3 million (Scenario 2) to $11.7 million (Scenario 4) per year. This represents a countywide system cost decrease of 2.04% to 7.09%.

Figure 4 - Summary of Results

	Baseline	Scenario 1	Scenario 2	Scenario 3	Scenario 4
Annual Collection Subtotal	$ 136,349,435	$ 144,286,547	$146,999,792	$139,515,766	$138,503,022
Annual Processing Subtotal	$2,904,868	$ 7,901,401	$9,150,534	$12,178,567	$14,496,992
Annual Transportation Subtotal	$727,138	$ 1,366,645	$1,526,522	$3,125,459	$3,725,040
Annual Disposal Subtotal	$ 28,692,431	$ 25,704,682	$24,957,745	$19,889,561	$17,688,843
Annual Commodity Subtotal	($3,623,679)	($17,574,793)	($21,062,571)	($17,574,793)	($21,062,571)
TOTAL Annual Cost/(Savings)	**$ 165,050,193**	**$ 161,684,482**	**$161,572,022**	**$157,134,561**	**$153,351,325**
Annual Cost Increase					
Collection Increase	$-	$ 7,937,112	$10,650,357	$3,166,332	$2,153,587
Processing Increase	$-	$ 4,996,533	$6,245,666	$9,273,699	$11,592,123
Transportation Increase	$-	$ 639,507	$799,384	$2,398,321	$2,997,902
Disposal Increase	$-	($2,987,749)	($3,734,687)	($8,802,870)	($11,003,588)
Commodity Increase	$-	($13,951,114)	($17,438,892)	($13,951,114)	($17,438,892)
TOTAL Increase/(Savings)	**$-**	**($3,365,711)**	**($3,478,172)**	**($7,915,633)**	**($11,698,868)**
Total Tons Managed	577,112	577,112	577,112	577,112	577,112
Total Tons Recovered	49,512	104,451	118,186	211,380	251,847
Cost per Ton Managed	$ 285.99	$ 280.16	$ 279.97	$272.28	$ 265.72
Additional Cost per Ton Recovered	n/a	($32.22)	($29.43)	($37.45)	($46.45)

The "cost per ton managed" shown in Figure 3 equals the "total annual cost" divided by the "total tons managed". This measure depicts the total system-wide cost-effectiveness. The "additional cost per ton recovered" equals the "total increase/(savings)" divided by the "total tons recovered". This measure depicts the incremental cost-effectiveness of recovery operations under each scenario.

<p style="text-align:center">*   *   *   *</p>

We would like to express our appreciation to StopWaste staff for their assistance. Should you have any questions, please call Rob Hilton at 925-977-6959 or me directly at 925-977-6952.

Very truly yours,
HF&H CONSULTANTS, LLC

Robert D. Hilton, CMC   Robert C. Hilton
President   Senior Project Manager