



California Department of  
Resources Recycling and Recovery

$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$

## Processing Fee and Handling Fee Cost Surveys

### Processing Fee Final Report

$$PP_{\$/t} = (NHFR_{\$/t} + RR) - SV_{\$/t}$$

February 22, 2010

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

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	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1



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February 22, 2010

Mr. Graham Johnson  
California Department of Resources Recycling and Recovery  
Division of Recycling  
Financial Management Branch  
801 K Street, 19th Floor  
Sacramento, California 95814

Regarding: **Processing Fee Final Report**

Dear Mr. Johnson:

On behalf of all the team members who worked on the Processing Fee and Handling Fee Cost Surveys, NewPoint Group is pleased to submit this Processing Fee Final Report. The Cost Survey was performed under contract by NewPoint Group for the California Department of Conservation. On January 1, 2010, the Department of Conservation, Division of Recycling, and the Integrated Waste Management Board, were merged into a single entity, the Department of Resources Recycling and Recovery.

The processing fee cost survey was a major primary–data, economic cost survey of California certified recycling centers. This survey was used to estimate California statewide, weighted–average, 2008 certified recycler costs per ton, for ten beverage container types. Recycler center costs were surveyed in 2009, using recycler center calendar year 2008 financial statements. Recycler center costs measured by this survey were used for the processing fee calculation, effective January 1, 2010.

This Processing Fee Final Report describes the tasks conducted by NewPoint Group in completing the processing fee cost survey. The Final Report includes a description of (1) the cost survey methodology, (2) cost per ton calculations and results, and (3) processing fee and processing payment calculations.

The NewPoint Group team appreciates the opportunity to conduct this major economic cost survey for the Division of Recycling. Formulating processing fees is a large cost–accounting and statistical challenge, rivaling the technical requirements of state–of–the–art, activity–based costing techniques and statistical survey methodologies, used by private industry.

A project of this magnitude requires a high degree of communication and collaboration by all involved. We wish to thank the Division of Recycling management and staff for their tremendous support and cooperation throughout this entire project. If you have any questions concerning this draft report, please feel free to contact either myself, or Ms. Wendy Pratt, at (916) 442-0189.

Very truly yours,

NewPoint Group®



James A. Gibson, Ph.D.  
Director



$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$



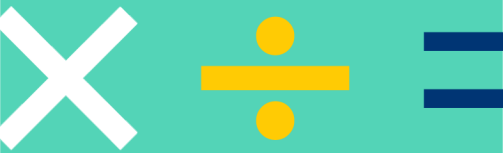
## Executive Summary

$$PP_{\$/t} = \left( NHFR_{\$/t} + RR \right) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1





# Executive Summary

The processing fee and handling fee cost surveys were performed under contract by NewPoint Group Management Consultants, for the California Department of Conservation (Department), Division of Recycling (DOR). This Processing Fee Final Report provides estimates of the cost per ton to recycle aluminum, bi-metal, glass, and plastic (for seven different resin types) beverage containers. This report also summarizes the tasks NewPoint Group, and their subcontractors, conducted in order to obtain the final, statewide, weighted-average, processing fee recycler costs per ton.

## A. Processing Fee Cost Survey Background

This processing fee cost survey was used to estimate California statewide, weighted-average, 2008 certified recycler costs per ton, for ten beverage container material types, for recycling centers that did not obtain handling fees (referred to as processing fee recyclers). Recycler center costs were surveyed in 2009 (April through October), using recycler center calendar year 2008 financial statements. Recycler center costs measured by this survey were used for the processing payment and processing fee calculation, effective January 1, 2010.

This processing fee cost survey was the largest cost survey (198 unique sites) ever undertaken by the Department of Conservation. The NewPoint Group team completed 198 recycler site visits to obtain the cost survey results. This processing fee cost survey was one of the most detailed and complex (one stratified random sample, two simple random samples, and one census survey) of any prior Department cost survey, in terms of quantitative information obtained. Finally, this cost survey was generally the most accurate cost survey undertaken to-date by the Department. This survey generally exceeds the already high level of accuracy obtained in prior cost surveys.

## B. Processing Fee Cost Survey Results

The statewide recycler costs per ton for the ten material types in the beverage container recycling program are presented in **Table ES-1**, on the following page. The 2008 costs per ton are compared to 2006, 2004, and 2002 costs per ton, the three most recent cost surveys in which recycler costs were measured by the Department of Conservation.

As compared to 2006 costs per ton, aluminum increased 8 percent, glass decreased 14 percent, and PET #1 decreased by 11 percent. The aluminum trend line is consistent with the historical trend of aluminum costs per ton steadily rising. PET #1 costs per ton have historically been decreasing with increasing volumes, as market share shifts from aluminum to PET #1. Reflecting a 24 percent volume increase, the recycling cost per ton for glass decreased 14 percent. Glass cost per ton, now \$81.60 per ton, is similar to

$$n = \frac{(\sum N_i S_i)}{D + \sum N_i}$$

$$= (NHFR_{\$/t} +$$

$$F_{\$/c} = HFR_{\$/c} - NH$$

	NHFR	HFR
	10	N/A
	1	1

**Table ES-1**  
**Statewide Recycler Costs per Ton**  
**(2008, 2006, 2004, and 2002)**

	Material Type	2008 Statewide Costs per Ton	2006 Statewide Costs per Ton	2004 Statewide Costs per Ton	2002 Statewide Costs per Ton	Two-Year Percentage Change (2006 to 2008)	Two-Year Percentage Change (2004 to 2006)	Two-Year Percentage Change (2002 to 2004)
1	Aluminum	\$ 559.23	\$ 516.13	\$ 465.90	\$ 418.95	+8%	+11%	+11%
2	Bi-Metal	632.22	883.55	607.03	508.18	-28%	+46%	+19%
3	Glass	81.60	94.98	82.45	79.81	-14%	+15%	+3%
4	PET #1	426.76	477.73	493.31	479.63	-11%	-3%	+3%
5	HDPE #2	501.67	500.64	671.73	645.91	0%	-25%	+4%
6	PVC #3	789.16	731.37	1,583.72	1,064.52	+8%	-54%	+49%
7	LDPE #4	1,125.80	1,858.09	1,889.50	3,324.89	-39%	-2%	-43%
8	PP #5	1,009.99	787.83	809.42	1,478.77	+28%	-3%	-45%
9	PS #6	625.60	623.11	3,051.82	6,137.30	0%	-80%	-50%
10	Other #7	685.44	741.93	1,264.47	759.32	-8%	-41%	+67%

what it was in 2004 (\$82.45 per ton) and 2002 (\$79.81 per ton). Glass costs per ton continue to be relatively stable.

Costs per ton for the other seven materials were calculated for the fourth time in 2008, thus the 2008 results represent the first four-year comparison of costs per ton between sequential cost surveys. Costs per ton for HDPE #2 essentially remained unchanged, a no cost change that occurred in light of significant (+63 percent) volume increases in HDPE #2 recycling. Increases in HDPE #2 recycling volumes are now moving this former minority material to a new “sub majority” material status. As compared to 2006, bi-metal costs per ton decreased 28 percent, following a huge 115 percent increase in bi-metal volumes. Increases in bi-metal recycling volumes are now creating a “super minority” material status for bi-metal.

Costs per ton for the five minority plastic resin types fluctuated widely between 2006 and 2008, with costs per ton increasing by up to +28 percent (PP #5), and decreasing by up to -39 percent

(LDPE #4). In general, costs per ton for three (PVC #3, PS #6, and Other #7) of the five minority plastic resin types all converged on the \$600 to \$800 cost range. Costs per ton for the other two (LDPE #4 and PP #5) minority plastic resin types converged on the \$1,000 to \$1,100 cost range.

The high degree of variation in plastics #3 to #7 costs per ton between the four cost surveys is in large part due to the extremely small sample size and minimal volume recycled for each of these resins. Although the 2008 plastics #3 to #6 costs per ton were based on a complete census of eligible sites recycling these resins, there were still very few sites in the overall sample, as illustrated in **Table ES-2**, on the next page. Just one site with particularly high or low overall plastics costs could skew the cost per ton results for a minority resin. A continued trend in the plastics #3 to #7 costs per ton seen in 2008, is that the final cost results fall into a narrower range. In 2006, there was a “delta” of \$1,234.98 per ton between the highest and lowest cost resins. In 2008, this same delta is now approximately half that amount, at “only”\$500.20.

**Table ES-2**  
**Sample Sizes and Sample Method by Material Type**  
**(2008)**

Material Type	2008 Sample Size	2008 Sample Method
1. Aluminum	116	Stratified Random Sample
2. Bi-Metal	40	Simple Random Sample
3. Glass	112	Stratified Random Sample
4. PET #1	115	Stratified Random Sample
5. HDPE #2	110	Stratified Random Sample
6. PVC #3	11	Census
7. LDPE #4	20	Census
8. PP #5	21	Census
9. PS #6	32	Census
10. Other #7	40	Simple Random Sample

**Table ES-3**  
**Sample Error Rates**  
**(2008, 2006, 2004, and 2002)**

Material Type	2008 Error Rate (90% CI)	2006 Error Rate (90% CI)	2004 Error Rate (90% CI)	2002 Error Rate (90% CI)
1. Aluminum	<b>5.66%</b>	6.61%	5.55%	7.82%
2. Bi-Metal	<b>6.89%</b>	8.31%	9.83%	7.57%
3. Glass	<b>6.19%</b>	8.17%	7.35%	9.21%
4. PET #1	<b>6.39%</b>	8.05%	7.33%	9.77%
5. HDPE #2	<b>8.27%</b>	8.97%	7.47%	9.78%
6. PVC #3	100% Sample	100% Sample	100% Sample	100% Sample
7. LDPE #4	100% Sample	100% Sample	100% Sample	100% Sample
8. PP #5	100% Sample	100% Sample	100% Sample	100% Sample
9. PS #6	100% Sample	100% Sample	100% Sample	100% Sample
10. Other #7	<b>9.53%</b>	9.95%	100% Sample	100% Sample

**Table ES-3**, above, provides the 2008, 2006, 2004, and 2002 error rates for the ten material types. Because the costs per ton for plastics #3 to #6 are based on the entire population of recyclers, there are no error rates for those materials. This 2008 cost survey generally achieved a higher degree of statistical confidence than any prior cost survey. In no case did 2008 error rates exceed 10 percent at the 90 percent confidence level.

Table ES-2 also provides the 2008 sample size and sample method for each of the ten material

types. The costs per ton for the four major materials, aluminum, glass, PET #1, and HDPE #2, were calculated from a stratified random sample. The costs per ton for bi-metal and plastics #7, which are recycled by a much smaller percentage of recyclers overall, were calculated from simple random samples of 40 sites that recycled each of the two materials in 2008. Each of the plastics #3 to #6 recycler costs per ton was calculated from a census of the full population of eligible sites recycling the resin type.

## C. Processing Fee Cost Survey Tasks

Below we summarize seven of the major tasks that the NewPoint Group team conducted for the processing fee cost survey.

- Developed and documented the sample design framework, and selected recycling centers for the cost survey. NewPoint Group determined the number of recycling centers to be selected in each of three sample categories: (1) a stratified random sample used to measure the costs of aluminum, glass, PET #1, and HDPE #2 recycling; (2) two simple random samples used to measure the costs of bi-metal and plastics #7 recycling; and (3) a complete census of all sites handling plastics #3 to #6. Following the sample design, NewPoint Group selected recycling sites to participate in the cost survey.
- Updated and calibrated the Labor Allocation Cost Survey Model, an 18-worksheet, Excel-based computer model that was used to allocate recycling center costs to beverage container material types based on labor. NewPoint Group updated the model to reflect 2008 container per pound (CPP) and CRV payment information, as well as procedural changes to the cost survey. In addition, we calibrated the Indirect Cost Allocation Sub-Models for Aluminum/Bi-Metal and All-Plastics with 2008 survey information. These sub-models, now incorporated into the Labor Allocation Cost Survey Model, ensured proper allocation of costs and labor to plastic resins HDPE #2, PVC #3, LDPE #4, PP #5, PS #6, Other #7, and bi-metal.
- Updated the Cost Survey *Training Manual*. The *Training Manual* (approximately seven hundred (700) pages of reference material) consisted of sixteen (16) modules, each with detailed descriptions of cost survey background information, procedures, practice exercises, and case studies. We updated the *Training Manual* to reflect our practical experience in conducting the 2006 cost survey, as well as procedural changes that occurred since the *Training Manual* was updated at the beginning of the 2002 cost survey.
- Conducted (1) a 64-hour training session for fourteen (14) new members of the cost survey team and four (4) veteran members of the team; and (2) a 24-hour refresher training for five (5) returning members of the cost survey team. This training for twenty-three (23) team members, conducted in Division of Recycling and Perry-Smith LLP training rooms, included lectures, reading materials, sample exercises, and practical problem-solving. Division of Recycling staff also participated in the training sessions.
- Scheduled, conducted, and completed 198 recycler site visits during the seven months, between April and October 2009, using the statistical sample frame developed by NewPoint Group. Throughout the scheduling and site visits, the NewPoint Group team built on the field working relationships established in 2009, with the program's recyclers. These on-site working relationships were important to the success of this cost survey, and should carry over into future cost surveys. All of the cost surveys were conducted by a team of two auditors, including either an accountant or recycling expert. A summary of the completed number of processing fee sites is shown in **Table ES-4**, on the next page.
- Developed and implemented an intensive quality control procedure that included thirteen (13) hours, and five (5) different levels of review (site team review, independent manager review, CPA partner review, business analyst review, and project director review) for each site file. This review took place before site files were released for processing. These quality assurance steps ensured that each site file was complete and accurate, and that all results from the labor allocation model and the indirect cost allocation sub-models were accurate. In total, over 30 hours were usually incurred for each completed site for the site team hours and quality control hours.

**Table ES-4**  
**Processing Fee Recycler Completed Sites**  
**(2008)**

Processing Fee Recycler Site Category	Number of Unique Site Visits
Stratified Random Sample Sites	116
Plastics #3 to #6 Census Sites	25
Plastic #7 Random Sample Sites	33
Bi-Metal Random Sample Sites	24
<b>Total Completed Sites (Some sites had multiple designations)</b>	<b>198</b>

**Table ES-5**  
**Processing Payments and Processing Fees**  
**January 1, 2010**

Material	Processing Payment (per Ton)	Processing Fee (per Container)
1 Glass	\$66.87	\$0.01373
2 PET #1	249.44	0.00569
3 HDPE #2	207.77	0.01821
4 PVC #3	834.62	0.02768
5 LDPE #4	1,189.57	0.00982
6 PP #5	1,068.99	0.10857
7 PS #6	650.27	0.00176
8 Other #7	724.40	0.05009
9 Bi-Metal	654.52	0.04526

- Determined final costs per ton. Using an automated process, NewPoint Group extracted results from each of the 198 completed cost models. NewPoint Group developed an Excel workbook to calculate total costs by material type, total volumes by material type, and costs per ton, for each of the ten beverage container material types. Calculations used one of three different methods, depending on the material and sample characteristics: (1) weighted-average by strata (aluminum, glass, PET #1, and HDPE #2), (2) simple weighted-average (bi-metal and Other #7), or (3) population weighted-average (PVC #3, LDPE #4, PP #5, and PS #6). Using defined and

documented statistical procedures, NewPoint Group calculated sample error rates at a 90 percent confidence interval for the six relevant material types (error rates were not calculated for the four census material types).

## D. Processing Payments and Processing Fees

The processing payment is defined as the difference between the statewide, weighted-average cost of recycling (as determined by this survey), multiplied by a reasonable financial return, and the average scrap value paid to recyclers. The processing payment is paid by the DOR to processors, who then pass the payment on to recyclers, based on the weight of material redeemed.

The processing fee, earlier in the history of the beverage recycling program, was equal to the processing payment, and was paid to the DOR by beverage manufacturers on every container sold. Over time, the processing fee has been modified, and currently, when adequate funds are available in the Beverage Container Recycling Fund, the amount of processing fee paid by beverage manufacturers is reduced, based on the recycling rate of the material. However, as of July 1, 2009, the DOR implemented a proportional reduction in program funding due to unavailability of funds. Currently, beverage manufacturers are required to pay the maximum processing fee allowed in statute, equal to 65 percent of the processing payment to recyclers. When funds are available, the difference between the processing fee paid to the Department, and the processing payment paid to recyclers, is made up with funds from the California Beverage Container Recycling Fund (Fund), essentially from CRV paid on unredeemed containers.

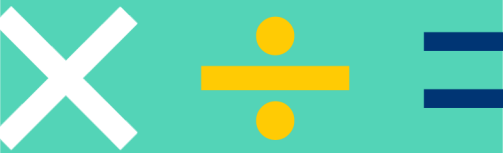
**Table ES-5**, left, illustrates the January 1, 2010, per ton processing payments, and per container processing fees.

These January 1, 2010, processing payments decreased for five material types, as compared to the January 1, 2008, processing payments, which were based on the 2006 cost survey. The five materials with decreased processing payments were: glass, HDPE #2, LDPE #4, PS #6, and bi-metal.

The January 1, 2010, processing fees paid by beverage manufacturers reflect the proportional reduction in processing fee subsidies, resulting in several-fold increases in processing fees for glass, PET #1, and HDPE #2, as compared to the

January 1, 2008 processing fees. For these three materials, beverage manufacturers now pay 65 percent of the processing payment, as compared to the 12 to 14 percent that manufacturers paid in 2008.

Processing payments and processing fees for the minority materials are highly volatile. The volatility is amplified because the values for both components of the processing payment equation, (1) recycling costs and (2) scrap values, are highly volatile and based on small volumes and few recycling sites.



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$$n = \frac{(\sum N_i S_i)}{D + \sum N_i}$$

$$= (NHFR_{\$/t} +$$

$$F_{\$/c} = HFR_{\$/c} - NH$$

	NHFR	HFR
	10	N/A
	1	1

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$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$



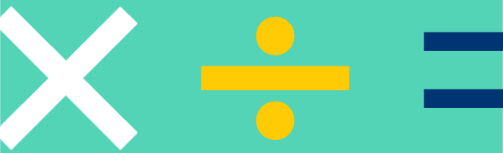
## Section 1 Introduction

$$PP_{\$/t} = \left( NHFR_{\$/t} + RR \right) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1





# 1. Introduction

This *Processing Fee Final Report* presents results of a major primary data, economic cost survey of California certified recycling centers (cost survey). The cost survey was used to estimate California statewide, weighted-average, 2008 certified recycler costs per ton, for ten beverage container material types. The cost survey was performed under contract by NewPoint Group Management Consultants (NPG), for the California Department of Conservation (Department), Division of Recycling (DOR).

This report summarizes the methodologies used for the processing fee cost survey; presents results of the cost survey calculations; and discusses processing payments and processing fees.

This introductory section is organized as follows:

- A. *Processing Fee Cost Survey Background*
- B. *Processing Fee Cost Survey Objectives*
- C. *Processing Fee Cost Survey Tasks.*

## A. Processing Fee Cost Survey Background

In 1986, the California State Legislature enacted the California Beverage Container Recycling and Litter Reduction Act (AB 2020). This “bottle bill” program is the only one of its kind in the nation in terms of this unique program structure.

A major subprogram within AB 2020 is processing fees on beverage manufacturers, which are paid to recyclers as processing payments to help cover costs of recycling. Processing fees are arguably one of the more complex aspects of AB 2020.

Most recyclers in the AB 2020 program are required to redeem all beverage container material types. Scrap values of glass, plastics, and bi-metal are not sufficient to cover their cost of recycling. These non-aluminum beverage container recycling costs are subsidized by paying recyclers a processing payment. The cost to recycle beverage containers is determined by a processing fee cost survey.

Public Resource Code Section 14575 directs the DOR to calculate processing payments and fees. Processing payments are defined as the difference between the statewide, weighted-average cost of recycling a beverage container material in the AB 2020 program, including a reasonable financial return, and the scrap value for the material. The processing fee is imposed on beverage manufacturers, and along with supplemental funds from unredeemed containers, these two sources of funds are used to make processing payments to recyclers.

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	NHFR	HFR
	10	N/A
	1	1

If an AB 2020 material scrap value is high enough to cover recycling costs, including a reasonable financial return, no processing fee is imposed. If a material scrap value is less than the statewide, weighted-average recycling costs, including a reasonable financial return, then a processing fee is supposed to make up this difference, or net cost.

Since their inception, processing fees, and calculated recycler costs, have been controversial. Processing fees have been the subject of numerous studies, task forces, and legislation.

Originally, processing fees were to be automatically equal to the net cost of recycling the subject beverage containers, as measured by studies. Instead, processing fees have fluctuated from year-to-year, depending on legislative, legal, and regulatory policy decisions.

The study approach to calculating the cost of recycling has evolved significantly since inception of the AB 2020 program, as the DOR has continually improved recycler costing methodologies. The current labor allocation cost survey methodology was last formally refined in approximately 1995, (*Labor Allocation Cost Model*, in Microsoft Excel Template).

Formulating the cost of recycling to determine processing payments and fees is a large cost accounting and statistical challenge, rivaling technical requirements of state-of-the-art, activity-based costing and statistical survey techniques used by private industry. The DOR has been innovative in meeting the intent of AB 2020, measuring recycler costs for a system that does not systematically track and measure these costs.

Between 1992 and 2001, processing fees and processing payments were based on legislatively set costs of recycling, as compared to actual measured costs for recycling centers (excluding those

receiving handling fees) of receiving, handling, storing, transporting, and maintaining equipment for each container sold using a statistically significant sample of certified recycling centers. SB 332 (Statutes of 1999) required the DOR to conduct cost surveys every third year (starting in year 2000, for the 2001 processing fees).

The DOR conducted a processing fee cost survey in year 2000, using 1999 calendar year costs, for the January 1, 2001 processing fees. This was the first of the “every three year” processing fee cost surveys under SB 332. The second, “every third year” processing fee cost survey under SB 332 was conducted in 2003, using 2002 calendar year recycling costs, and was used to determine January 1, 2004, processing fees.

Assembly Bill 28 (Statutes of 2003) became effective January 1, 2004. AB 28 moved the measurement of actual recycling costs for processing payments and fees from every three years, to every two years. AB 28 required the DOR to determine the actual costs for certified recycling centers, on and after January 1, 2004, every second year. This current cost survey is the third of the “every second year” surveys to determine the costs of recycling. The next cost survey after this report will have recycler center costs surveyed in 2011 (using 2010 financial statements), for a processing fee effective January 1, 2012.

Assembly Bill 3056 (Statutes of 2006) added a new cost survey, the handling fee cost survey. The handling fee cost survey is to be implemented in conjunction with the processing fee cost survey, to determine statewide, weighted-average costs per container to recycle for recycling centers that do not receive handling fees (processing fee recyclers), and recycling centers that do receive handling fees (handling fee recyclers). Results of the handling fee cost survey are discussed in a separate report.

## B. Processing Fee Cost Survey Objectives

This cost survey was used to estimate statewide, weighted-average costs to recycle aluminum, bi-metal, glass, and plastic (for seven different resin types) beverage containers. Recycler center costs were surveyed in 2009, using recycler center calendar year 2008 financial statements. Recycler center costs measured by this survey were used for the processing fee calculation, effective January 1, 2010.

The recycler costs per ton presented in this report culminate nine intensive months (March through November, 2009) of research, development, and implementation effort on a primary data economic cost survey of California certified recycling centers. The actual cost survey field work was performed over the seven month time period, from April through October, 2009.

Historically, processing fees have been imposed on bi-metal, glass, and PET (# 1 resin type) plastic materials. When additional plastic resin types were incorporated into the AB 2020 program in year 2000, a processing fee was established for six additional (# 2 through #7) plastic resin types, based on the costs of recycling PET #1 plastics. In 2003, actual costs of recycling plastics #2 through #7 were determined for the first time, with the results used to determine the January 1, 2004 processing fees and processing payments. **Figure 1-1**, at the top of the next column, describes plastic beverage container resin types.

The cost survey summarized in this report is the fourth, and final, time that actual recycling costs will be determined for bi-metal beverage containers, and five of the new plastic material type containers added to the AB 2020 program since January 1, 2000 (i.e., plastic resins PVC #3, LDPE #4, PP #5, PS #6, and Other #7).

**Figure 1-1**  
Plastic Resin Types

Plastic Resin	Abbreviation
Polyethylene terephthalate	PET #1
High density polyethylene	HDPE #2
Polyvinyl chloride (vinyl)	PVC #3
Low density polyethylene	LDPE #4
Polypropylene	PP #5
Polystyrene	PS #6
Other plastic resins/blended resins	Other #7

Senate Bill 1357 (Padilla, Statutes of 2008), eliminates the requirement to calculate material specific costs per ton for recycling of materials that comprise less than 5 percent of all CRV containers recycled. In future cost surveys, the cost to recycle for these minority materials will be based on the cost per ton calculated in this current cost survey, indexed to the cost per ton for recycled HDPE #2 in future cost surveys.

This processing fee cost survey was the largest cost survey (198 unique sites) ever undertaken by the DOR to-date. The NewPoint Group team completed 198 unique recycler cost surveys to obtain these processing fee cost survey results.

This processing fee cost survey is also one of the most detailed and complex (one stratified random sample, two simple random samples, and one census survey) of any prior cost survey, in terms of quantitative information obtained. Finally, this cost survey was generally the most accurate cost survey undertaken to-date by the Department. This survey exceeded the already high level of accuracy obtained in 2006.

### C. Processing Fee Cost Survey Tasks

Below, we summarize seven major tasks that the NewPoint Group team conducted for the processing fee cost survey.

**1. Developed and documented the sample design framework, and selected processing fee recycling centers for the cost survey.**

NewPoint Group determined the number of recycling centers to be selected in each of three sample categories: (1) a stratified random sample used to measure the costs of aluminum, glass, PET #1, and HDPE #2 recycling; (2) two simple random samples used to measure the costs of bi-metal and plastics #7 recycling; and (3) a complete census of all sites handling plastics #3 to #6. Following the sample design, NewPoint Group identified recycling centers selected to participate in the cost survey.

**2. Updated and calibrated the Labor Allocation Cost Survey Model, an 18-worksheet, Excel-based computer model that was used to allocate recycling center costs to beverage container material types based on labor. NewPoint Group updated the model to reflect 2008 container per pound and CRV payment information, as well as procedural changes to the cost survey. In addition, we calibrated the Indirect Cost Allocation Sub-Models for Aluminum/Bi-Metal and All-Plastics with 2008 survey information. These sub-models, now incorporated into the Labor Allocation Cost Survey Model, ensure proper allocation of costs and labor to plastic resins HDPE #2, PVC #3, LDPE #4, PP #5, PS #6, Other #7; and bi-metal.**

**3. Updated the Cost Survey Training Manual.** The *Training Manual* (approximately seven hundred (700) pages of reference material) consisted of 16 modules, each with detailed descriptions of cost survey background information, procedures, practice exercises, and case studies. NewPoint Group also updated

two additional supporting volumes to the *Training Manual*. We updated the *Training Manual* to reflect our practical experience in conducting the 2006 cost survey, as well as procedural changes that have occurred since the *Training Manual* was last updated at the beginning of the 2002 cost survey.

**4. Conducted a 64-hour training session for fourteen (14) new members of the cost survey team and four (4) veteran members of the team; and a 24-hour refresher training for five (5) returning members of the cost survey team.**

This training for twenty-three (23) team members, included lectures, reading materials, sample exercises, and practical problem-solving. Division of Recycling staff also participated in the training sessions.

**5. Scheduled, conducted, and completed 198 recycler site visits during the seven months, between April and October 2009, using the statistical sample frame developed by NewPoint Group. Throughout the scheduling and site visits, the NewPoint Group team built on the working relationships established in 2007 with the program's recyclers. These on-site working relationships were important to the success of this cost survey, and should carry over into future cost surveys. All of the cost surveys were conducted by a team of two auditors, including either an accountant or recycling expert. It typically took between two to four hours to complete the on-site survey. In addition to the on-site time, usually the site team spent an additional eight hours to analyze data and follow-up with each recycler to obtain complete financial and labor information.**

**6. Developed and implemented an intensive data quality control procedure that included thirteen (13) hours and five (5) different levels of review (site team review, independent manager review, CPA partner review, business analyst review, and project director review) for each site**

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file. This review took place before site files were released for processing. These quality assurance steps ensured that each site file was complete and accurate, and that all results from the labor allocation model and the indirect cost allocation sub-models were accurate. In total, over 30 hours were generally spent for each completed site for the site team and quality control hours.

- 7. Determined final costs per ton.** Using an automated process, NewPoint Group extracted results from each of the 198 completed cost models. NewPoint Group developed an *Excel* workbook to calculate total costs by material type, total volumes

by material type, and statewide, weighted-average costs per ton, for each of the ten beverage container material types. Calculations used one of three different methods, depending on the material and sample characteristics: (1) statewide, weighted-average by strata (aluminum, glass, PET #1, and HDPE #2), (2) statewide, simple weighted-average (bi-metal and Other #7), or (3) statewide, population weighted-average (PVC #3, LDPE #4, PP #5, and PS #6). Using defined and documented statistical procedures, NewPoint Group calculated error rates at a 90 percent confidence interval for the six relevant material types.

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$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$

## Section 2 Processing Fee Cost Survey Methodologies

$$PP_{\$/t} = (NHFR_{\$/t} + RR) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1



## 2. Processing Fee Cost Survey Methodologies

This section describes the cost survey methodologies, from establishing the survey sample frame, to the quality control procedures, and all the supporting tasks in between. There are nine key tasks described in this section:

- A. Survey Design
- B. Survey Scheduling, Logistics, and Confidentiality
- C. Training Manual Updates
- D. Surveyor Training
- E. Cost Model Updates
- F. Calibration of the Indirect Cost Allocation Sub-Models
- G. Site and Survey Tracking
- H. Cost Survey Procedures
- I. Quality Control and Confidentiality Procedures.

### A. Survey Design

NewPoint Group, for the third time, developed the survey design for the cost survey. NewPoint Group utilized the survey design methodology that we developed for the previous cost survey.

The purpose of the survey design was to identify the specific recycling centers surveyed during 2009, to estimate California, statewide weighted-average, 2008 certified recycler center costs per ton, for ten beverage container material types. Recycler center costs were surveyed in 2009, using recycler center calendar year 2008 financial statements. Recycler center costs measured by the cost survey were used for the processing payment and processing fee calculations, effective January 1, 2010.

The population of recycling centers eligible for the cost survey was defined as all recycling centers (1) not receiving handling fees between January 2008 and December 2008, and (2) certified and operational on or before March 1, 2008. There were 729 recycling centers in this total traditional recycling center population.

To measure calendar year 2008 costs, the survey design consisted of four components:

- A statistically defensible, stratified random sample, drawn from the 729 qualifying recycling centers. Three strata were defined by the total annual volume (tons) of glass handled by a site. This stratified random sample was used to measure the costs of CRV aluminum, glass, PET #1, and HDPE #2 recycling
- A complete census of all 51 recycling centers that handled CRV plastics #3 to #6 containers in 2008. This sample was used to measure the costs of CRV plastics #3 to #6 recycling

$$n = \frac{(\sum N_i S_i)}{D + \sum N_i}$$

$$= \left( NHFR_{\$/t} + \right)$$

$$F_{\$/c} = HFR_{\$/c} - NH$$

	NHFR	HFR
	10	N/A
	1	1

**Table 2-1**  
Stratum Definitions for Processing Fee Recyclers (2008)

Stratum	Annual Glass Volume
1	Greater than, or equal to, 550 tons
2	Greater than, or equal to 150 tons, up to 549 tons
3	Less than 150 tons

**Table 2-2**  
Recycler Completed Sites for Processing Fee Recyclers (2008)

Processing Fee Recycler Site Category	Number of Unique Site Visits
Stratified Random Sample Sites	116
Plastics #3 to #6 Census Sites	25
Plastic #7 Random Sample Sites	33
Bi-Metal Random Sample Sites	24
<b>Total Completed Sites (Some sites had multiple designations)</b>	<b>198</b>

- A statistically defensible, simple random sample, drawn from 169 recycling centers that handled plastic resin Other #7 containers. This simple random sample was used to measure the costs of CRV Other #7 recycling
- A statistically defensible, simple random sample, drawn from 251 recycling centers that handled bi-metal containers. This simple random sample was used to measure the costs of CRV bi-metal recycling.

The above four cost survey components were treated equivalently in terms of scheduling, site visits, and quality control. It was only in the statistical calculations that a distinction was made between the four survey groups. As a result of this survey design, the cost survey conducted for 2008 costs, was the third time that the DOR formally treated all ten CRV material types with equal statistical rigor.

To increase precision, and confidence in random sample results for all recycling centers, while minimizing overall sample size, the traditional recycling center population was divided into three strata, based on glass volume, as shown in **Table 2-1**, above. These strata

definitions were identical to the strata definitions for the previous processing fee cost survey.

Departmental regulations require that the cost per ton be estimated at an 85 percent confidence interval, and Division of Recycling policy further specifies a 10 percent error rate. For the third time, the sampling plan (for the three random samples) was based on a more accurate and statistically conventional and accepted, 90 percent confidence interval, with a 10 percent error rate.

### Sample Design Results

**Table 2-2**, above, provides a summary of the completed survey sites. NewPoint Group scheduled, conducted, and completed 198 recycler site visits and cost analyses. Many sites in Table 2-2 had multiple designations. For example, some plastic census sites were de facto chosen in the stratified random sample, plastic Other #7 random sample, and/or the bi-metal random sample. Likewise, some bi-metal and Other #7 random sample sites were de facto chosen in the stratified random sample and the plastic census.

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This processing fee cost survey was the largest cost survey (198 unique sites) undertaken by the Department of Conservation. This cost survey was also an accurate cost survey, generally exceeding the already high levels of accuracy obtained in 2002, 2004, and 2006.

**Table 2-3**, on the next page, provides a comparison of the error rates for the ten material types. Because the costs per ton for plastics #3 to #6 were based on the entire population of recyclers, there were no error rates for those materials. This 2008 cost survey generally achieved a higher degree of statistical confidence than the three previous cost surveys. In no case did 2008 error rates exceed 10 percent at the 90 percent confidence level. This degree of accuracy reflects experience of the survey teams, in addition to the extensive quality control processes built into this cost survey.

**Table 2-4**, on the next page, provides the sample size and method for each of the ten material types. The costs per ton for the four materials – aluminum, glass, PET #1, and HDPE #2, were calculated from a stratified random sample. The bi-metal cost per ton was calculated from a simple random sample, as was the plastics #7 cost per ton. Both of these two materials were recycled by a much smaller percentage of recyclers overall. Each of the plastics #3 to #6 recycler costs per ton was calculated from the full population of sites recycling that resin type. Very few recyclers reported handling #3 to #6 plastic materials; however the number of recyclers handling these materials was higher than in 2006.

Aluminum had the most number of non-unique sites surveyed, with a total of 116 sites. PVC #3 had the least number of non-unique sites surveyed, with a total of only 11 sites.

## B. Survey Scheduling, Logistics, and Confidentiality

A significant component of the cost survey involved scheduling site visits and the communication interface with recyclers chosen from the sample frame. Two staff-people at NewPoint Group were employed part-time during the project start-up and survey months (March through October) to coordinate scheduling, and communicate with recyclers.

Because conducting a cost survey fundamentally entails the collection of proprietary financial information, sensitivity to stakeholder relations is highly important. Without willing and active cooperation from the selected recycling center operators, determining the real costs of beverage container recycling would be exceptionally difficult, and the results would be hard to support.

Our approach was to communicate with site operators and managers from the start of the process to help them understand what the cost survey entailed, what information we were seeking to obtain, and, perhaps most importantly, to correct misunderstandings about the purpose of the cost survey.

The first stage of recycler communication was a letter, on Department letterhead, informing the recycler that they were selected to participate in the processing fee cost survey. The letter also identified the expectations of the recycler, and introduced NewPoint Group as the DOR cost survey contractor. Introduction letters were sent to all selected recyclers starting in early April, 2009.

In the second stage of communication, a NewPoint Group scheduling coordinator established telephone contact with the recyclers to schedule site visits. Sites were initially prioritized based on location and complexity of sites.

## 2. Processing Fee Cost Survey Methodologies

**Table 2-3**  
**Sample Error Rates for Processing Fee Recyclers**  
**(2008, 2006, 2004 and 2002)**

Material Type	2008 Error Rate (90% CI)	2006 Error Rate (90% CI)	2004 Error Rate (90% CI)	2002 Error Rate (90% CI)
1. Aluminum	5.66%	6.61%	5.55%	7.82%
2. Bi-Metal	6.89%	8.31%	9.83%	7.57%
3. Glass	6.19%	8.17%	7.35%	9.21%
4. PET #1	6.39%	8.05%	7.33%	9.77%
5. HDPE #2	8.27%	8.97%	7.47%	9.78%
6. PVC #3	100% Sample	100% Sample	100% Sample	100% Sample
7. LDPE #4	100% Sample	100% Sample	100% Sample	100% Sample
8. PP #5	100% Sample	100% Sample	100% Sample	100% Sample
9. PS #6	100% Sample	100% Sample	100% Sample	100% Sample
10. Other #7	9.53%	9.95%	100% Sample	100% Sample

**Table 2-4**  
**Sample Sizes and Sample Method by Material Type for Processing Fee Recyclers**  
**(2008)**

Material Type	2008 Sample Size	2008 Sample Method
1. Aluminum	116	Stratified Random Sample
2. Bi-Metal	40	Simple Random Sample
3. Glass	112	Stratified Random Sample
4. PET #1	115	Stratified Random Sample
5. HDPE #2	110	Stratified Random Sample
6. PVC #3	11	Census
7. LDPE #4	20	Census
8. PP #5	21	Census
9. PS #6	32	Census
10. Other #7	40	Simple Random Sample

The survey team contacted the recycler directly, one or two days before the site visit, for final visit confirmation. Site visits were conducted by a team of two surveyors, including either an accountant or a recycling expert. Survey teams made their own travel arrangements.

The scheduling coordinators conducted many behind the scenes tasks to ensure overall success of the project. For example, to reduce travel expenses,

the coordinators utilized specialized mapping software to efficiently schedule consecutive site visits first within regions, and then within nearby locations. In addition, the coordinators were tasked to optimize site visit efficiency, matching the varying schedules of over twenty site survey team personnel, diverse geographic locations, and the availability of the 198 recycling centers. During any given week, up to six different survey teams were

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simultaneously in the field. In most cases, one site visit, with some telephone follow-up, was sufficient to obtain all the information needed to complete the survey of each site. A few sites required repeated telephone follow-up.

The coordinators maintained a secure File Transfer Protocol (FTP) server as a single point of distribution for confidential cost model templates, scheduling information, and cost model forms. To ensure confidentiality of recyclers' proprietary information, every NewPoint Group and subcontractor employee that worked on the processing fee cost survey contract signed individual Confidentiality Agreements warranting that they would not disclose any information made available by each certified recycler. Also, each company contractor – NewPoint Group, Inc. (Prime Contractor), Perry-Smith, LLP (Subcontractor), Geiss Consulting (Subcontractor), and Leon E. Tuttle, CPA (Disabled Veteran Business Enterprise Subcontractor) - also signed company Confidentiality Agreements.

## C. Training Manual Updates

The first *Processing Fee Cost Survey Training Participant Manual* was prepared by NewPoint Group in 1995 to support the cost survey training provided to DOR staff at that time. This manual contained hundreds of example case studies, problem sets, quizzes, sample financial documents, handouts, reading assignments, and procedures to develop skills needed to conduct successful processing fee cost surveys.

Because the training manual was originally prepared in 1995, it required extensive revisions and adjustments, which were made prior to the 2002 cost survey. For the current cost survey, NewPoint Group reviewed the training modules, and when appropriate, revised work assignments needed to support the in-classroom and self-study training modules.

The updated training manual consisted of three volumes:

- *Participant Manual, Volume 1* (the primary training manual, approximately 700 pages in length)
- *Supplemental Materials Manual, Volume 2* (background reading and support materials)
- *Field Manual, Volume 3* (a summary version of the site visit procedures).

## D. Surveyor Training

Successfully completing the processing fee cost survey site visits required knowledge of recycling, recycling practices, the beverage container recycling program, the specific procedures of site visits, auditing, and financial cost-accounting. The NewPoint Group trained surveyor team consisted primarily of accountants and recycling experts.

Nine of the twenty-three individuals who conducted site visits for this survey had previous experience in the 2002, 2004, and/or 2006 processing fee cost surveys, had completed the full 64-hour training session, and in some cases also completed a 24-hour refresher training in prior years. These surveyors already had extensive experience in auditing and financial accounting procedures, as well as practical site-visit and recycling program experience. Five of these returning team members still completed another 24-hour refresher course in 2009. The remaining four returning, and fourteen new, survey team members completed the full 64-hour training program in 2009.

Classroom training consisted of 56 hours of in-class lectures, reading materials, study exercises, and problem solving. In 2009, for the first time, we included an additional eight hours of field training, as part of the 64 total hours of training. The classroom training was held at the DOR and Perry-Smith offices, and all training was conducted over a three-week period, during April 2009.

### E. Cost Model Updates

The labor allocation cost model (cost model) was an *Excel* workbook consisting of 18 worksheets. The model was first developed by NewPoint Group to improve the methodology of the 1995 cost surveys. Since that time it has been updated and revised to accommodate legislative and regulatory changes, as well as upgrades of *Excel*. In 2000, NewPoint Group and the DOR conducted a significant model revision to add plastic resins #2 to #7 to the model, and to upgrade to *Excel 1997*, which replaced old *Excel* macros with *Visual Basic* programming.

The current version of the cost model represents several legacy generations (and layers) of modifications and updates, including a significant number of improvements that were made immediately following the 2002, 2004, and 2006 cost surveys. Prior to conducting the current cost survey, NewPoint Group reviewed and updated the cost model to reflect 2008 container per pound and CRV payment information, as well as procedural changes to the cost survey.

### F. Calibration of the Indirect Cost Allocation Sub-Models

As a result of the introduction of new containers to the Beverage Container Recycling Program in 2000, this cost survey was the fourth time that the cost per ton was calculated for different plastic resins, other than PET #1, and the fourth time that actual costs for bi-metal were determined. A key task of the 2002 cost survey project was to develop a costing methodology for plastics #2 to #7. For this 2008 cost survey, we applied this same indirect cost allocation sub-model procedure to determine costs per ton for the minority material types that was developed in 2002, and used again in 2004 and 2006.

The purpose of the two sub-models, the Indirect Cost Allocation Sub-Model for All Plastics, and the Indirect Cost Allocation Sub-Model for Aluminum/Bi-Metal, was to separate the individual majority and minority material costs from the larger indirect cost categories, all plastics and aluminum/bi-metal. Using operational and material handling factors, the sub-models provide a consistent, site-specific, and sub-material specific approach, for determining the costs per ton for both the high-volume majority materials, and low-volume minority materials.

Four operational/material handling factors (weight of containers, number of containers, volume (size) of containers, and commingled rate), along with a weighting allocation across these factors, formed the basis of the indirect cost allocation sub-models for the two majority, and seven minority, materials (glass does not require a sub-model). The sub-models were integrated into the Labor Allocation Cost Model for each site.

### G. Site and Survey Tracking

For this cost survey, NewPoint Group developed and utilized a *Google Documents* Site Status Reporting System. This secure reporting system was password protected, and utilized by only four project team members (the two scheduling coordinators, a Perry-Smith partner, and a NewPoint Group business analyst) to monitor and track sites.

The reporting system included a row of descriptive information on each of the 351 surveyed, and twelve dropped, processing fee and handling fee recycling sites. Information in the reporting system included: RC and PR numbers; recycler name; county; recycler type; recycler sample(s) and strata; site survey team members; and entry dates and initials for each of nine stages of the survey process, from mailing the initial letter, to scheduling, to final review approval.

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## H. Cost Survey Procedures

There were three phases of an individual cost survey:

- **Pre-site visit** – model population, data review, and travel logistics
- **On-site visit** – site tour, cost survey, and labor interviews
- **Post-site visit** - data entry, analysis, and follow-up.

### Pre-Site Visit

Before conducting the on-site cost survey, the survey team obtained all available information about that site. NewPoint Group entered recycling volumes for 2008 into the cost model *Excel* files for each site. The survey team evaluated the volume information to identify the approximate size and scope of the survey. Much of the pre-site visit time was spent on travel logistics and mapping.

### On-Site Visit

Each site visit typically lasted from two to four hours, depending on the size and complexity of the site. The primary data-gathering effort took place during the site visit. Survey teams carefully followed procedures outlined in the *Training Manual*. The survey team first toured the site with site management to view and inquire about the site's operations, including materials handled, equipment, recycling procedures, material shipping, etc.

Another key on-site task was reviewing the financial information with site management, or a financial officer, to identify and categorize allowable and non-allowable costs for calculating processing fees, direct and indirect costs, and beverage container indirect (BCI) and all materials indirect (AMI) costs.

The next key task was conducting structured labor allocation interviews to determine the allocation of each employee's time first to recycler, processor, or other business, then to direct yard labor or all other labor, and finally by CRV material type or other non-CRV material type. The cost model used this labor allocation information to allocate indirect costs and wages.

### Post-Site Visit

After the site visit, the survey team spent from four to ten or more hours further compiling the site data, entering information into the cost model, completing the site memorandum and site file, and reviewing the site file. In many cases, site managers did not have all the necessary information available at the site visit, and the survey team had to telephone the recycler to request additional information, or to ask specific questions about the data.

Following the site visit, the team entered the labor information for each employee, as well as the cost summary and direct cost information into the cost model. Once the data were entered into the cost model, the model calculated costs per ton for each of the CRV material categories recycled at the site. Finally, the survey team compiled and checked all workpapers, and conducted a reasonableness check of survey results before passing the site file on to a manager for the first of several independent office review steps.

## I. Quality Control and Confidentiality Procedures

Data quality control (QC) was a primary focus of the cost survey project. Quality control procedures included five separate levels of review, and totaled on-average 13 hours per site. These data QC procedures were essential to ensure that the cost survey results were fair, equitable, accurate, reasonable, justifiable, and defensible.

This extensive quality control process, with five different individuals or staff teams, ensured that each site file was complete and accurate. Site files that did not meet all the quality control criteria were returned to the original survey team for corrections, if appropriate. NewPoint Group approved data for the final cost per ton calculations described in Section 3, after this extensive series of quality control reviews was complete.

Confidentiality was important for the cost survey. The data from each recycling site were not to be disclosed, as release of the data could potentially be compromising to a recycling business. As a result, NewPoint Group developed

formal policies regarding confidentiality. Each project team member signed an Employee Confidentiality statement, and in addition, each project team firm signed a similar statement. Records from each site were maintained securely at the NewPoint Group offices after they were completed, and financial printouts and worksheet drafts with site-specific information were shredded. The final site files were delivered to the DOR for their secure record retention. Computers were protected against unauthorized access through use of project passwords. All electronic files related to site visits were stored on a secure server, accessible by password only, to survey team members.



$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$

### Section 3 Processing Fee Cost Calculations and Results

$$PP_{\$/t} = (NHFR_{\$/t} + RR) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1



### 3. Processing Fee Cost Calculations and Results

This section describes the calculations used, and the final results for, the statewide, weighted-average cost per ton for recycling each of the ten beverage container material types in the California Beverage Container Recycling program. This section is organized as follows:

- A. Cost Calculations
- B. Cost Results
- C. Comparison of Cost Results.

#### A. Cost Calculations

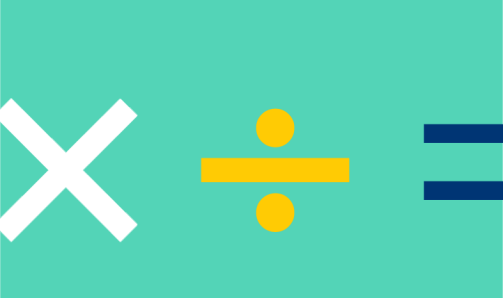
The statewide statistical methodology (stratified weighted-average cost, simple weighted-average cost, or population weighted-average cost) used for the cost per ton calculations was pre-determined by sample design.<sup>1</sup> NewPoint Group utilized three different types of sample designs in the processing fee cost survey: (1) stratified random sample, (2) simple random sample, and (3) population census.

For our stratified random sample, we used a weighted-average by strata calculation to determine cost per ton. For our simple random samples, we used a simple weighted-average calculation. For our population census, we used a population weighted-average. **Figure 3-1**, on the next page, illustrates the three calculation approaches we used for determining processing fee recycler costs per ton for ten beverage container material types.

*Approach A: Aluminum, Glass, PET #1, and HDPE #2* – most recyclers in the total population accept and recycle these four material types.<sup>2</sup> As a result, for these materials, we used a weighted (by stratum) average statewide cost per ton. There were 116 recyclers in the random sample, divided into three strata. Within each of the three sample strata, we determined the total sample costs and the total sample volumes. The DOR provided the 2008 volume data for both the sample and population. The next step was to calculate the average cost per ton by stratum, equal to the sample stratum cost divided by the sample stratum volume. Next, we multiplied this figure by the stratum population volume, to determine the total population costs for each stratum, for each material type. Finally, we determined the statewide, weighted-average cost per ton by summing the three strata total population costs, then dividing by the total population volume. The approach is illustrated in *Figure 3-1A*.

<sup>1</sup> The Beverage Container Recycling Act specifies that cost per ton calculations be based on a statewide, weighted-average. This eliminated a third option for the calculation, a simple average (taking the average of each site, and dividing by the total number of sites).

<sup>2</sup> Somewhat fewer recyclers accept HDPE #2, but the number of HDPE #2 recyclers was still quite large, although the volumes were significantly less than for the other three materials, aluminum, glass, and PET #1.



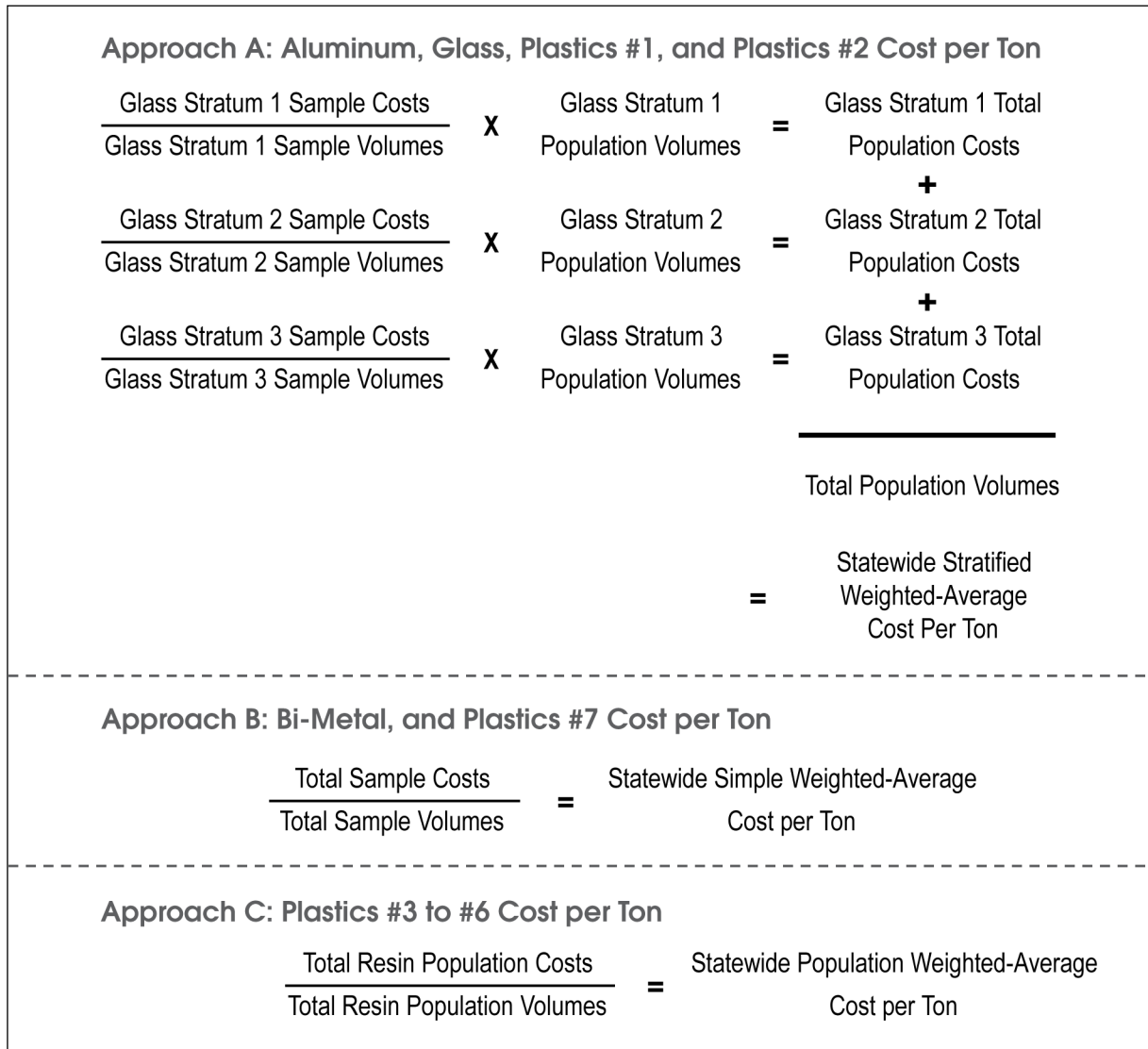
$$n = \frac{(\sum N_i S_i)}{D + \sum N_i}$$

$$= \left( NHFR_{\$/t} + \right)$$

$$F_{\$/c} = HFR_{\$/c} - NH$$

	NHFR	HFR
	10	N/A
	1	1

**Figure 3-1**  
**Cost per Ton Calculations for Processing Fee Recyclers**  
**(2008)**



*Approach B: Bi-Metal and Plastic Other #7* – bi-metal was recycled by only 251 out of the 729 recyclers in the total population for calendar year 2008. The bi-metal random sample consisted of 40 of the 251 sites that recycled bi-metal in 2008. The cost per ton for bi-metal was determined by summing the sample costs and sample volumes for all 40 sites in the random bi-metal sample, then dividing the sample cost by the sample volume

from those sites, for a simple weighted-average cost per ton. Plastic resin Other #7 was recycled by 169 of the 729 recyclers in the total eligible population for calendar year 2008. This represented significantly more Other #7 recyclers than in either 2002 and 2004, and more recyclers than in 2006. For the second time, Other #7 required a simple random sample, rather than a census. The Other #7 random sample consisted

**Table 3-1**  
**Statewide Costs per Ton to Recycle for Processing Fee Recyclers**  
**(2008)**

Material	Cost per Ton without Financial Return	Cost per Ton with Financial Return <sup>a</sup>	N = Sample Number of Sites <sup>b</sup>
1. Aluminum	\$ 559.23	\$ 591.44	116
2. Bi-Metal	632.22	668.64	40
3. Glass	81.60	86.30	112
4. PET #1	426.76	451.34	115
5. HDPE #2	501.67	530.57	110
6. PVC #3	789.16	834.62	11
7. LDPE #4	1,125.80	1,190.65	20
8. PP #5	1,009.99	1,068.17	21
9. PS #6	625.60	661.63	32
10. Other #7	685.44	724.92	40

<sup>a</sup> The RFR is 5.76%.

<sup>b</sup> Overall, 198 sites were completed to obtain these results.

of 40 of the 169 recyclers that recycled Other #7 in 2008. The cost per ton for Other #7 was determined by summing the sample costs and sample volumes for all 40 sites in the Other #7 random sample, then dividing the sample cost by the sample volume from those sites, for a simple weighted-average cost per ton. The approach is illustrated in *Figure 3-1B*.

*Approach C: Plastics #3 to #6* – only 51 sites out of the 729 recyclers in the total eligible population recycled any plastic #3 to #6 resins in 2008. As a result, NewPoint Group surveyed the entire population of recyclers reporting each of the four resin types. We calculated the cost per ton by summing the total cost for each resin, and dividing by the total volume for each resin, for a simple weighted-average cost per ton. The approach is illustrated in *Figure 3-1C*.

## Financial Return

By statute, recycling costs per ton used to determine the processing fees and payments are to include a reasonable financial return. DOR regulations require that the financial return figure,

which is multiplied by the cost per ton, is the “average return on costs for the Scrap and Waste Materials Industry (SIC 5093), as determined from data contained in the most recent Dun and Bradstreet Standard Three Year Norm Report” (California Code of Regulations, §2975).

The reasonable financial return (RFR) used for this cost survey was 5.76 percent, based on an average (median) return on costs for SIC 5093 in 2008, as determined by Dun & Bradstreet. This RFR falls in between the RFRs of the past two years (5.60 percent in 2008 and 6.45 percent in 2009).

## B. Cost Results

The costs per ton to recycle for each of the ten material types, with, and without the reasonable financial return, are summarized in **Table 3-1**, above. Table 3-1 also shows the 2008 survey sample size for each of the ten material types.

**Table 3-2**, on the next page, provides the costs per ton (without financial return) in rank order. The costs per ton fall into five general cost ranges. Glass has the lowest cost, less than \$100 per ton. PET #1,

**Table 3-2**  
**Statewide Costs per Ton in Rank Order**  
**for Processing Fee Recyclers**  
**(2008)**

Material	Cost per Ton without Financial Return
1. Glass	\$ 81.60
2. PET #1	426.76
3. HDPE #2	501.67
4. Aluminum	559.23
5. PS #6	625.60
6. Bi-Metal	632.22
7. Other #7	685.44
8. PVC #3	789.16
9. PP #5	1,009.99
10. LDPE #4	1,125.80

HDPE #2, and aluminum costs are in the next range, \$400 to \$500 per ton. Three of the minority materials, PS #6, bi-metal, and Other #7, are in the next cost range, \$600 to \$700 per ton. PVC #3 is in its own cost range, just under \$800 per ton. Finally, PP #5 and LDPE #4 are in the highest cost range, at over \$1,000 per ton.

### Error Rates and Confidence Intervals for Costs per Ton

The California Beverage Container Recycling and Litter Reduction Act, §14575, requires the DOR to conduct “a survey of a statistically significant sample of certified recycling centers, excluding those receiving a handling fee.” In the California Code of Regulations, a “statistical sample” is defined as an estimate with an 85 percent confidence level (§2000 (a) (47)). Internal DOR policy further establishes a 10 percent error rate.

In developing the sample design, NewPoint Group determined that, rather than set the sample to achieve an 85 percent confidence interval and then add oversample, it would be more statistically

accurate to set the confidence interval higher, at 90 percent. Thus, the sample size was developed, based on 2002 cost survey results, to achieve a 90 percent confidence interval with a 10 percent error rate. Only after the survey was complete could we determine whether the actual specification of a 90 percent confidence interval, and the target of a 10 percent error rate, were met.

The analysis of the final data shows that, for the fourth time, the processing fee cost survey met and exceeded all a priori statistical requirements (the surveys of 2002, 2004, and 2006 recycler costs also met and exceeded these requirements). In all cases the error rate at the 90 percent confidence level was below 10 percent. The error rate at the 90 percent confidence interval for each of the six relevant materials is provided in **Table 3-3**, on the next page. For comparison, Table 3-3 also provides the error rates at the 90 percent confidence interval for each of the five (or six) relevant material types from the 2002, 2004, and 2006 processing fee cost surveys.<sup>3</sup>

The 2008 cost survey generally achieved a higher degree of statistical confidence than any of the three previous cost surveys. In no case did 2008 error rates exceed 10 percent at the 90 percent confidence level. This degree of accuracy reflects extensive experience of the survey team, in addition to extensive quality control processes built into this cost survey. The NewPoint Group methodology continued to include substantial site file oversight and quality control review. Five levels of review were conducted for each site, and many site files were sent back to the original survey team for additional investigation, and often times revisions, before they were finally approved.

<sup>3</sup> The bi-metal error rate at the 90 percent confidence interval is slightly higher in 2004, as compared to 2002. However, for the first time, the 2004 bi-metal sample was a statistically valid random sample drawn specifically for bi-metal, as opposed to the “hybrid” sample of available sites that was used in 2002 to determine bi-metal costs per ton. Since 2004, the bi-metal sample has consisted of a statistically valid random sample drawn specifically for bi-metal. The 2006 cost survey was the first time that we utilized a random sample (rather than a census) for Other #7, and thus the first time that we calculated error rates for this plastic resin. We again utilized a random sample for Other #7 in this 2008 cost survey.

**Table 3-3**

Sample Error Rates for Processing Fee Recyclers  
(2002, 2004, 2006, and 2008)

Material Type	2002 Error Rate at 90% Confidence Interval	2004 Error Rate at 90% Confidence Interval	2006 Error Rate at 90% Confidence Interval	2008 Error Rate at 90% Confidence Interval
Aluminum	7.82%	5.55%	6.61%	<b>5.66%</b>
Bi-Metal	7.57	9.83	8.31	<b>6.89</b>
Glass	9.21	7.35	8.17	<b>6.19</b>
PET #1	9.77	7.33	8.05	<b>6.39</b>
HDPE #2	9.78	7.47	8.97	<b>8.27</b>
Other #7	NA	NA	9.95	<b>9.53</b>

**Table 3-4**

Summary Comparison of Cost Survey Results for Processing Fee Recyclers  
(2002, 2004, 2006, and 2008)

Material Type	2002 Statewide Cost per Ton <sup>a</sup>	2004 Statewide Cost per Ton <sup>a</sup>	2006 Statewide Cost per Ton <sup>a</sup>	2008 Statewide Cost per Ton <sup>a</sup>
1 Aluminum	\$418.95	\$465.90	\$516.13	<b>\$559.23</b>
2 Bi-Metal	508.18	607.03	883.55	<b>632.22</b>
3 Glass	79.81	82.45	94.98	<b>81.60</b>
4 PET #1	479.63	493.31	477.73	<b>426.76</b>
5 HDPE #2	645.91	671.73	500.64	<b>501.67</b>
6 PVC #3	1,064.52	1,583.72	731.37	<b>789.16</b>
7 LDPE #4	3,324.89	1,889.50	1,858.09	<b>1,125.80</b>
8 PP #5	1,478.77	809.42	787.83	<b>1,009.99</b>
9 PS #6	6,137.30	3,051.82	623.11	<b>625.60</b>
10 Other #7	759.32	1,264.47	741.93	<b>685.44</b>

<sup>a</sup> Without RFR

## C. Comparison of Cost Results

**Table 3-4**, above, provides a summary comparison of the cost per ton results for the 2002, 2004, 2006, and 2008 cost surveys.

As compared to 2006 costs per ton, aluminum increased 8 percent, glass decreased 14 percent, and PET #1 decreased by 11 percent. The aluminum trend line is consistent with the historical trend of aluminum costs per ton steadily rising. PET #1 costs per ton have historically been decreasing with increasing volumes, as market share shifts from aluminum to PET #1. Reflecting a 24 percent volume increase, the recycling cost per ton for

glass decreased 14 percent. Glass cost per ton, now \$81.60 per ton, is similar to what it was in 2004 (\$82.45 per ton) and 2002 (\$79.81 per ton). Glass costs per ton continue to be relatively stable.

Costs per ton for the other seven materials were calculated for the fourth time in 2008, thus the 2008 results represent the first four-year comparison of costs per ton between sequential cost surveys. Costs per ton for HDPE #2 essentially remained unchanged, a no cost change that occurred in light of significant (+63 percent) volume increases in HDPE #2 recycling. Increases in HDPE #2 recycling volumes are now moving this former

### 3. Processing Fee Cost Calculations and Results

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minority material to a new “sub majority” material status. As compared to 2006, bi-metal costs per ton decreased 28 percent, following a huge 115 percent increase in bi-metal volumes. Increases in bi-metal recycling volumes are now creating a “super minority” material status for bi-metal.

Costs per ton for the five minority plastic resin types fluctuated widely between 2006 and 2008, with costs per ton increasing by up to +28 percent (PP #5), and decreasing by up to -39 percent (LDPE #4). In general, costs per ton for three (PVC #3, PS #6, and Other #7) of the five minority plastic resin types all converged on the \$600 to \$800 cost range. Costs per ton for the other two (LDPE #4 and PP #5) minority plastic resin types converged on the \$1,000 to \$1,100 cost range.

The high degree of variation in plastics #3 to #7 costs per ton between the four cost surveys is in large part due to the extremely small sample size and minimal volume recycled for each of these resins. Although the 2008 plastics #3 to #6 costs per ton were based on a complete census of eligible sites recycling these resins, there were still very few sites in the overall sample. Just one site with particularly high or low overall plastics costs could skew the cost per ton results for a minority resin. A continued trend in the plastics #3 to #7 costs per ton seen in 2008, is that the final cost results fall into a narrower range. In 2006, there was a “delta” of \$1,234.98 per ton between the highest and lowest cost resins. In 2008, this same delta is now approximately half that amount, at “only”\$500.20.



$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$

## Section 4 Processing Payments and Processing Fees

$$PP_{\$/t} = (NHFR_{\$/t} + RR) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1



## 4. Processing Payments and Processing Fees

This section describes how processing payments and processing fees are calculated. The section is organized as follows:

- A. *Processing Payment and Processing Fee Calculations*
- B. *Scrap Values.*

### A. Processing Payment and Processing Fee Calculations

Section 14575(a) of the California Beverage Container Recycling and Litter Reduction Act specifies that: “if any type of empty beverage container with a refund value established pursuant to Section 14560 has a scrap value less than the cost of recycling, the Department shall, on January 1, 2000, and on or before January 1 annually thereafter, establish a processing fee and a processing payment for the container, by the type of the material of the container.”

The original intent of the processing payments and processing fees was that each container type should cover its own cost of recycling. For example, if the scrap value for glass was not enough to cover the cost of recycling glass, then the processing fee, paid by beverage manufacturers and passed through to recyclers, would cover that additional cost. Thus, the processing fee would, in theory, create an incentive for beverage manufacturers to use material types that were less costly to recycle, and/or that did not have a processing fee. At the same time, the recycler, who was required to accept these materials because of the beverage container program, would not suffer a loss.

The processing payment is defined as the difference between the statewide, weighted-average cost of recycling (as determined by this cost to recycle survey), multiplied by a reasonable financial return, and the average scrap value paid to recyclers (for the period October through September of the previous year). The equation is as follows:

$$\text{Processing Payment} = (\text{Cost of Recycling} \times \text{Reasonable Financial Return}) - (\text{Scrap Value})$$

The processing payment is paid by the Department to processors, who then pass the payment on to recyclers, based on the weight of material redeemed.

The processing fee, earlier in the history of the beverage recycling program, was equal to the processing payment, and was paid to the Department by beverage manufacturers on every container sold. Over time, the processing fee has been modified, and currently, when adequate funds are available in the Beverage Container Recycling Fund, the amount of processing fee paid by manufacturers is reduced, depending on the recycling rate of the material. However, as of November 1, 2009, beverage manufacturers are

Decorative sidebar containing mathematical formulas and a table:

$$n = \frac{(\sum N_i S_i)}{D + \sum N_i}$$

$$= (NHFR_{\$/t} +$$

$$F_{\$/c} = HFR_{\$/c} - NH$$

	NHFR	HFR
	10	N/A
	1	1

**Table 4-1**  
**Processing Fee Reduction Factors**  
**With Adequate Funds**

Recycling Rate	Percent of Processing Payment
75 percent or above	10 percent
65 to 74 percent	11 percent
60 to 64 percent	12 percent
55 to 59 percent	13 percent
50 to 54 percent	14 percent
45 to 49 percent	15 percent
40 to 44 percent	18 percent
30 to 39 percent	20 percent
Less than 30 percent	65 percent

**Table 4-2**  
**Processing Fee Reduction Factors**  
**for January 1, 2010 Processing Fees**

Material	FY 08/09 Recycling Rate	Percent of Processing Payment	Actual Percent of Processing Payment
Glass	78 Percent	10 Percent	65 Percent
PET #1	68 Percent	11 Percent	65 Percent
HDPE #2	100 Percent*	10 Percent	65 Percent
PVC #3	3 Percent	65 Percent	65 Percent
LDPE #4	1 Percent	65 Percent	65 Percent
PP #5	1 Percent	65 Percent	65 Percent
PS #6	2 Percent	65 Percent	65 Percent
Other #7	11 Percent	65 Percent	65 Percent
Bi-Metal	14 Percent	65 Percent	65 Percent

\* The DOR is currently investigating CRV claims for HDPE #2, which was over 100 percent for this time period. One factor in the high HDPE recycling rate is likely the inclusion of plastics #3 to #7 in HDPE loads.

required to pay the maximum processing fee allowed in statute, equal to 65 percent of the processing payment to recyclers. When funds are available, the difference between the processing fee paid to the Department, and the processing payment paid to recyclers, is made up with funds from the California Beverage Container Recycling Fund (Fund), essentially from CRV paid on unredeemed containers.

In 2003, AB 28 established the current system whereby unredeemed funds, when available, are used to subsidize the processing fee by a minimum of 35 percent, up to 90 percent, depending on the recycling rate (and availability of funds).

Under current statutory requirements, the processing fee for a given container type is equal to a specified percentage of the processing payment, depending on the recycling rate in the previous fiscal year, as shown in **Table 4-1**, left. The fiscal year 2008/2009 recycling rates were used to determine the maximum processing fee reduction factors for glass, bi-metal, and the seven plastic resins, as shown in **Table 4-2**, left. Table 4-2 also shows the actual percent of processing payment for each material type, at 65 percent.

The percent of processing payment is multiplied by the processing payment for each material to determine the amount of processing fee paid by beverage manufacturers. Currently, all of the processing payment (at a reduced level for glass, PET #1, and HDPE #2) is covered by processing fees.

**Table 4-3**, on the next page, is a copy of the 2010 Processing Fees notice, published by the DOR on December 15, 2009. The table provides components of the processing payment calculations, as well as the processing payments per ton, per pound, and per container; and the processing fees per container. The table provides the processing fee that would be implemented with the manufacturers' percent reduction, and the actual processing fee to be paid by manufacturers after the 100 percent proportional reduction put in place by the DOR on November 1, 2009. With the 100 percent proportional reduction, beverage manufacturers pay the maximum processing fee allowed by law, equal to 65 percent of the calculated processing payment.

**Table 4-4**, on the next page, is a copy of the 2010 Processing Payment notice, also published by the DOR on December 15, 2009. The table provides

**Table 4-3**  
**Processing Fees Public Notice**  
**(December 15, 2009)**

<b>Table I</b> <b>2010 Processing Fees</b> <b>Effective January 1, 2010</b> <b>Glass, Bimetal and Plastic</b>									
	Glass	Plastic							Bimetal
		PET	HDPE	Vinyl	LDPE	PP	PS	Other	
Cost of Recycling per Ton with Reasonable Financial Return	\$86.30	\$451.34	\$530.57	\$834.62	\$1,190.65	\$1,068.17	\$661.63	\$724.92	\$668.64
Scrap Value per Ton	\$6.06	\$188.95	\$199.97	\$0.00	\$1.08	(\$0.82)	\$11.36	\$0.52	\$14.12
<b>Processing Payments to Recyclers</b>									
Processing Payment Per Ton Redeemed	\$80.24	\$262.39	\$330.60	\$834.62	\$1,189.57	\$1,068.99	\$650.27	\$724.40	\$654.52
Processing Payment Per Pound Redeemed	\$0.04012	\$0.13120	\$0.16530	\$0.41731	\$0.59479	\$0.53450	\$0.32514	\$0.36220	\$0.32726
Containers Per Pound	1.90	15.0	5.9	9.8	39.4	3.2	120.2	4.7	4.7
Processing Payment Per Container	\$0.02112	\$0.00875	\$0.02802	\$0.04258	\$0.01510	\$0.16703	\$0.00270	\$0.07706	\$0.06963
<b>Processing Fees to be Paid by Beverage Manufacturers</b>									
Manufacturers' Percentage of Processing Payment	10%	11%	10%	65%	65%	65%	65%	65%	65%
Processing Fee Pursuant to Section 14575(f)	\$0.00211	\$0.00096	\$0.00280	\$0.02768	\$0.00981	\$0.10857	\$0.00176	\$0.05009	\$0.04526
<b>Processing Fee to be Paid by Beverage Manufacturers after 100% Proportional Reduction (Processing Payment Per Container x 65%)</b>	<b>\$0.01373</b>	<b>\$0.00569</b>	<b>\$0.01821</b>	<b>\$0.02768</b>	<b>\$0.00982</b>	<b>\$0.10857</b>	<b>\$0.00176</b>	<b>\$0.05009</b>	<b>\$0.04526</b>

**Table 4-4**  
**Processing Payments Public Notice**  
**(December 15, 2009)**

<b>Table I</b> <b>2010 Processing Payments</b> <b>Effective January 1, 2010</b> <b>Glass, Bimetal and Plastic</b>									
	Glass	Plastic							Bimetal
		PET	HDPE	Vinyl	LDPE	PP	PS	Other	
Cost of Recycling per Ton with Reasonable Financial Return	\$86.30	\$451.34	\$530.57	\$834.62	\$1,190.65	\$1,068.17	\$661.63	\$724.92	\$668.64
Scrap Value per Ton	\$6.06	\$188.95	\$199.97	\$0.00	\$1.08	(\$0.82)	\$11.36	\$0.52	\$14.12
<b>Processing Payments to Recyclers</b>									
Processing Payment Per Ton Redeemed	\$80.24	\$262.39	\$330.60	\$834.62	\$1,189.57	\$1,068.99	\$650.27	\$724.40	\$654.52
Processing Payment Per Ton Redeemed after 100% Proportional Reduction	\$66.87	\$249.44	\$207.77	\$834.62	\$1,189.57	\$1,068.99	\$650.27	\$724.40	\$654.52
<b>Processing Payment Per Pound Redeemed (To be used on DR6)</b>	<b>\$0.03344</b>	<b>\$0.12472</b>	<b>\$0.10388</b>	<b>\$0.41731</b>	<b>\$0.59478</b>	<b>\$0.53449</b>	<b>\$0.32514</b>	<b>\$0.36220</b>	<b>\$0.32726</b>

the processing payment per ton before, and after, the 100 percent proportional reduction. With the proportional reduction, processing payments for glass, PET, and HDPE are reduced 17 percent, 5 percent, and 37 percent, respectively. These reductions are based on the amount of processing fee revenue, and the projected recycling rate. Because recycling rates for bi-metal and plastics #3 to #7 are low, the actual processing payment is equal to the calculated processing payment for these materials.

### B. Scrap Values

The DOR is required to calculate the average scrap values paid to recyclers for the twelve months between October 1, and September 30, directly preceding the year for which processing payments and fees are calculated. For example, for the January 1, 2010, processing payments and fees, the average scrap value used for the calculation covers the time period from October 1, 2008, to September 30, 2009.

**Table 4-5**  
**Statewide Average Scrap Values for the January 1, 2010, Processing Payment and Processing Fee Calculations**

Material	Scrap Value (per Ton)
Aluminum	\$1,014.86
Glass	6.06
Bi-Metal	14.12
PET #1	188.95
HDPE #2	199.97
PVC #3	0.00
LDPE #4	1.08
PP #5	-0.82
PS #6	11.36
Other #7	0.52

The annual average scrap values for the ten beverage container material types from October 1, 2008, through September 30, 2009 are shown in **Table 4-5**, above. These were the values used for the January 1, 2010, processing payment and processing fee calculations.



$$n = \frac{(\sum N_i S_i)^2}{D + \sum N_i S_i^2}$$

$$PP_{\$/t} = (NHFR_{\$/t} + RR) - SV_{\$/t}$$

$$HF_{\$/c} = HFR_{\$/c} - NHFR_{\$/c}$$

	NHFR	HFR
$\$/t$	10	N/A
$\$/c$	1	1