

# Final Report

## Pilot Program for Recycling Cash Redemption Value Beverage Containers at 20 Multi-family Complexes



Report for  
The California Department of Conservation



On behalf of  
The City of Concord



By



June 30, 2004

**City of Concord and Science Applications International Corporation**  
 Final Report for Fiscal Year 2003-2004  
 6.30.2004

**Executive Summary**

This was the second year of a two-year pilot program to implement recycling programs in multi-family complexes in the City of Concord (City), California. The City, Concord Disposal and Science Applications International Corporation (SAIC) rolled out recycling programs to 15 additional multi-family complexes, building on the 5 complexes set up in the 2002-2003 fiscal year. After surveying all complexes with more than 5 units in the City and rolling out programs to the 15 that met the team’s selection criteria, Concord Disposal gathered three to six months of recycling diversion data. Data highlights are summarized in Table 1.

Table 1: *Diversion summary data for pilot complexes*

<b>Name of Complex</b>	<b>Units</b>	<b>Units Contacted (%)</b>	<b>Diversion Rate (%)<sup>1</sup></b>
<b>2003-2004 Fiscal Year</b>			
Cypress Gardens	6	100	24.00
1630 Frisbie	6	100	22.35
Marvin Remmich	7	29	33.69
Chestnut Gardens	20	60	16.36
Diablo Terrace	24	58	16.54
Deborah Gee	27	37	21.63
Sun Terrace	30	63	15.48
Huntington Arms	32	50	12.59
Adelaide Pines	38	60	21.75
Paramount Arms	38	34	20.62
Amador Heights	46	50	16.81
Galindo Woods	61	43	12.12
Monterey Club	64	53	14.23
City Walk	80	53	27.33
The Corners	141	11	8.48
<i>Mean Diversion Rate</i>			18.93
<b>2002-2003 Fiscal Year</b>			
Palm Plaza I	20	N/A	10.96
Palm Plaza II	27	N/A	12.46
Vista Del Lago	84	N/A	3.27
Laguna Ellis Apts	44	N/A	13.41
Palace Apts	33	N/A	12.98
<i>Mean Diversion Rate</i>			10.62

<sup>1</sup> Concord Disposal calculated this diversion rate by dividing the total weight of recyclables by the total weight of garbage.

SAIC ran regression analyses of the data collected and developed the following conclusions: adequate Toter availability is paramount, there may be a relationship between complex size and diversion rates, and there is no relationship between rent (and associated socio-economic status) and diversion rates.

## **I. Introduction**

During the first pilot year of the City of Concord Multi-family Residential Complex Recycling Outreach program (2002-2003), the team learned some valuable lessons.

- Property manager leadership on recycling is essential to the success of the program.
- Garbage chutes complicate recycling programs
- Optimal placement of 96-gallon recycling Toters is next to garbage dumpsters
- Picture-based tenant education materials were memorable

With a follow-on grant from the California Department of Conservation, the City of Concord partnered with Science Applications International Corporation (SAIC) and the City's franchise waste hauler Concord Disposal to incorporate these lessons, and expand recycling program availability to 15 additional multi-family complexes for the 2003-2004 fiscal year. This year's program allowed the team to study variations in recycling rates between 20 different complexes (including 5 from last year) and start to draw conclusions.

## **II. Data Collection**

The 2003-2004 pilot year kicked off with a meeting between a Senior Administrative Analyst for the City, a Building Inspector for the City's Building & Neighborhood Services (B&NS) and the Program Manager for SAIC. City staff related helpful information about the largest rental property owners and the complexes that may be most open to starting recycling programs then made a request to the Finance Department to share their multi-family complex database including the names, addresses, sizes, contact names and phone numbers for all multi-family complexes in Concord with five or more units.

SAIC created a Microsoft Access survey database as a repository for information about multi-family complexes in Concord. The team loaded data about 221 complexes into the survey database. Team members called all 221 complexes at least once. They left at least one message for 29% of the complexes and spoke with the property manager or assistant property manager at 71% of the complexes. The complexes surveyed varied widely in size, location, average monthly rent and demographics. See the Access survey database file in Appendix A for data.

Surveyors asked multi-family complex managers questions about the following topics:

- rent for a 2 bedroom unit
- if there are garbage chutes

- garbage dumpsters: number, size, pick-up frequency, cost per month
- overall level of recycling at the complex (rated on a 1-5 scale: 1=poor, 5=excellent)
- overall willingness of tenants to recycle at the complex (1-5 scale)
- if there is space for recycling containers
- if no recycling program: is the manager interested in setting up a recycling program
- perceived barriers to recycling
- if recycling is in place: number of bins, size, pick-up frequency, cost per month, materials collected

Surveyors logged the answers in the Access database for 157 complexes. The survey data yielded the following trends:

- 17% of complexes already had recycling programs
- 5% of property managers said their recycling program was going well
- 4% of complexes had garbage chutes
- Common barriers to recycling identified by the managers included
  - scavenging
  - tenants not interested
  - already tried to set one up with no success
  - no space for recycling containers
  - concern about possible wear and tear on parking lot by additional trucks driving through the property

Based on what the team learned in the 2002-2003 pilot program as well as data from the surveys, the team set criteria that would assist in the selection of viable candidates for this year's expanded pilot program. These criteria were:

- Property manager wants to set up a recycling program
- In the property manager's judgment, tenants are willing to recycle
- There are no garbage chutes
- There is room inside and outside for recycling containers

Concerning the sample set used in the statistical analysis, it is important to note that this was not a random sample per se. The selection criteria used yielded pilot participants that offered the best chance for successful recycling programs.

The Scope of Work for this project set a goal of rolling out recycling programs that would serve a total of 600 multi-family units. Interestingly, the 20 complexes that met the criteria above contained 688 units, more than was needed to meet the program goal. Ultimately, the team received confirmation from 15 property managers, representing 620 total units, that were interested in joining the pilot program and started planning for the recycling rollouts.

### III. Preparing for the roll-outs

Ordering apartment recycling bins and coordinating rollout logistics with property managers took a few months. SAIC ordered two different styles of apartment bins for a total of 600 bins: a flexible walled bin from Busch Systems and a rigid walled bin from Rehrig Pacific. Both had a relatively small footprint to minimize the amount of floor space needed within the units.



Busch Systems  
Dimensions: 10.5" x 14.5" x 18"H  
Volume: 6 gallons  
Weight: 1.2 lbs.



Rehrig Pacific  
Dimensions: 13" x 13" x 12" H  
Volume: 6 gallons  
Weight: 2.2 lbs.

An SAIC team member and the program manager for Concord Disposal met with each of the 15 property managers to develop rapport, determine program logistics and obtain a signed commitment form. (See Appendix C for a copy.)

One team member coordinated the tenant education process according to the following timeframe.

- 2 weeks ahead of the rollout: the team gave door hangers to the property manager to distribute
- 1 week ahead: SAIC mailed refrigerator magnets to all tenants

- 1 day before: Concord Disposal delivered 96-gallon Toters to the complexes



On the agreed upon rollout day, team members visited each complex and attempted to speak with tenants between 5 and 8pm, the time frame identified by all property managers as the optimal time window to reach most tenants. Team members adhered Toter stickers, delivered interior bins, offered chocolate chip cookies, briefly explained the recycling program to tenants and answered questions. These rollouts took place between January and March 2004.



For those tenants who were not home, the team distributed flyers reminding them that the program had started and explaining which materials could be recycled through the new program.

#### **IV. Statistical Analysis**

Appendix B contains data collected during the survey and outreach portion of the project as well as detailed statistical analysis. This statistical analysis allows us to draw a few important conclusions from the roll-out process.

- **Adequate toter availability is paramount.** There was a relationship between the total volume of toter space per unit and the resulting diversion rate. Reasons for this relationship could include 1) that underproviding toters results in overflowing and diversion of recyclables into the waste stream, and 2) the presence of readily available, empty toters encourages recycling. The complexes with the highest toter volume per unit ratios almost uniformly had the highest diversion rates.
- **There may be a relationship between complex size and diversion rates.** Regression #1 indicates that there may be a relationship between recycling rates and complex size, showing that we can expect rates to fall for larger and larger complexes. Reasons for this could include the increased anonymity of living in large complexes or increased distances to the toters resulting from the larger layout of the complexes.
- **There is no relationship between rent (and associated socio-economic status) and diversion rates.** Regression #3 shows conclusively that among the complexes sampled, there is no significant relationship between rental rates (and real or perceived differences in socio-economic status) and diversion rates.

One important limitation on our data analysis has to do with scavenging, where a third-party removes recyclables with deposit value. A few property managers reported frequent scavenging. If the toters being emptied had already been scavenged we would then be underestimating the impact of the program since we would not be including in our statistics the true amount of diversion. A review of studies into the impact of scavenging on diversion rates could be helpful in estimating the impact of this unknown.

## V. Results: Qualitative

Over the course of this year's expanded pilot program, the team thought about the ultimate goal of expanding multi-family complex recycling programs to all complexes in the City. These thoughts led to questions. What did we learn? What works well that should be replicated? What resources are available in the future to raise awareness, educate tenants, incentivize property managers, and foster enthusiasm for recycling? Which issues warrant further study? These questions are addressed in the following three lists of bullets.

### Lessons Learned

- **Property manager support:** Reaffirmation that property management leadership is essential
- **Communication:** Clarity in every communication is important (Questions came up as we conducted roll-out presentations about "glass only" written on side of half of the Toters. Did that mean they could recycle only glass in that Toter?)

- **Speaking Spanish:** Tenants appreciated that the team made an effort to speak Spanish.
- **Restricted Access:** Gated communities sometimes have recycling service problems due to restricted access.
- **Commitment:** The commitment letter was helpful because it set the rollout date, outlined what the team would do and what we needed the property manager needed to do. One potential tenant was tentatively moving forward but refused to sign it. This may have saved the team time and effort later on.

### **Ideas for expanding multi-family recycling program in the future.**

- **Raise awareness:** Distribute the attached marketing brochure through the City of Concord's residential recycling program, the City's B&NS department and Concord Disposal.
- **Roll-out labor:** Consider using Americorps to do the property manager and/or tenant education in the future. For more information, look at [www.americorps.org](http://www.americorps.org) and click on "Start a Program" or call Christine Corodimas at (510) 273-0172.
- **Rate structure:** Consider rolling recycling collection costs into garbage fees (like single-family homes)
- **Selling points:** Adjust working with property managers to adjust garbage dumpster service levels so dumpsters do not overflow with trash. This will create an incentive to recycle more.
- **Training property managers:** Invite property managers to an evening training at which recycling program logistics will be explained. Offering a meal is generally a strong incentive to attend.
- **Design for recycling:** Can the City building permits department ask architects to design recycling programs into their complexes? Garbage chutes appear to be gaining in popularity and complicate the recycling process.
- **Educational materials:** Continue to distribute educational materials when rolling out new programs. While we have now rolled multi-family complex recycling programs out to over 900 units, there are still many magnets, door hangers, and bin stickers left.

### **Issues for further study**

- **Higher recycling rate:** Why the mean recycling rate this year (19%) was higher than last year (11%). The team hypothesizes that it was due to the fact that we chose program participants from a larger pool than last year and that we asked property managers to sign commitment letters.
- **Scavenging:** What percentage of beverage containers were scavenged and how much this depressed recycling diversion numbers.

## **Appendix A**

Access survey database  
(see separate file)

## **Appendix B**

Recycling data about 20 multi-family complexes

Table 2: Detailed data for 20 complexes, year 1 and year 2

Name of Complex	Units	Units Contacted (%)	Rent (2BR)	Lbs Waste Per Unit Per Week	Lbs Containers Per Unit Per Week	Lbs Mixed Paper Per Unit Per Week	Total Recycled Per Unit Per Week	Diversion Rate (%)	Available Recycling Per Unit (gals)
<b>2003-2004</b>									
Cypress Gardens	6	100	\$850	66.09	10.00	10.87	20.87	24.00	32.00
1630 Frisbie	6	100	\$925	100.80	15.12	13.89	29.01	22.35	32.00
Marvin Remmich	7	29	\$825	20.13	2.83	7.40	10.23	33.69	27.43
Chestnut Gardens	20	60	\$950	28.24	2.88	2.65	5.52	16.36	9.60
Diablo Terrace	24	58	\$1,025	26.42	2.53	2.71	5.23	16.54	8.00
Deborah Gee	27	37	\$900	24.89	3.43	3.43	6.87	21.63	7.11
Sun Terrace	30	63	\$995	29.06	2.68	2.64	5.32	15.48	6.40
Huntington Arms	32	50	\$840	24.76	1.46	2.10	3.57	12.59	6.00
Adelaide Pines	38	60	\$1,125	17.39	2.50	2.33	4.83	21.75	5.05
Paramount Arms	38	34	\$1,100	26.09	3.13	3.65	6.78	20.62	10.11
Amador Heights	46	50	\$1,025	37.52	3.29	4.29	7.58	16.81	12.52
Galindo Woods	61	43	\$925	27.77	1.78	2.05	3.83	12.12	6.30
Monterey Club	64	53	\$1,100	27.24	2.18	2.34	4.52	14.23	3.00
City Walk	80	53	\$1,125	22.02	4.25	4.03	8.28	27.33	9.60
The Corners	141	11	\$1,195	35.59	1.43	1.87	3.30	8.48	4.09
<b>2002-2003</b>									
Palm Plaza I	20	N/A	N/A	75.79	4.86	4.47	9.33	10.96	9.60
Palm Plaza II	27	N/A	N/A	56.14	3.58	4.42	7.99	12.46	7.11
Laguna Ellis Apts	44	N/A	N/A	56.92	4.22	4.59	8.81	13.41	8.73
Vista Del Lago	84	N/A	N/A	59.63	0.64	1.37	2.02	3.27	9.14
Palace Apts	33	N/A	N/A	75.13	5.34	5.86	11.20	12.98	11.64

## Statistical Analysis

### A. Methodology

Using the survey data and diversion data, the team conducted the following statistical analyses.

#### I. T-Tests

Simply put, a t-test is a method of statistical analysis where one determines if two groups are different. Most statistical surveys or studies use t-tests in some capacity. A common application for a t-test is determining differences between control and treatment groups in an experiment.

The  $H_0$  hypothesis is **always** that the program or experiment will have no effect, or, that whatever statistic we are measuring will be **equal** from one group to another. The  $H_A$  hypothesis is always that there will be some difference (or, that the program **did** have some effect).

#### II. Correlation/Regression

Whereas t-tests try to determine simply if there is a difference between two groups, a correlation or regression tries to put a number on that relationship. A correlation is a test that shows if one variable can be used to explain or predict another.

#### III. One-Way ANOVA

A one-way analysis of variance (ANOVA) attempts to determine the combined effect of all the different factors (% of units talked to, complex size, income, etc.) in one test instead of conducting many individual t-tests to study differences among 2 specific groups. The result is a test statistic that allows us to say whether there are significant differences in diversion rates among various groups and in which groups there were the “largest” differences.

### B. Results: Quantitative

Appendix B contains detailed analysis based on three to six months of diversion data reported by Concord Disposal. With this data, the team ran a number of statistical tests to determine what, if anything, accounted for differences in recycling diversion rates among the various complexes. This section describes four regressions and one t-test used to analyze the data.

#### 1. Regression #1

A simple linear regression model (least squares estimation) was used to determine if there is a relationship between the recycling diversion rate and the size of the apartment complex (as measured by the number of units in a complex).

*Null Hypothesis ( $H_0$ ):* There is no relationship between the size of an apartment complex (in number of units) and its diversion rate (the slope of the regression line is zero).

*Alternative ( $H_a$ ):* There is a relationship between the size of an apartment complex and its diversion rate (i.e., the slope of the line is not equal to zero).

*Analysis:* The regression analysis was set up with apartment complex size (in units) as the independent or explanatory variable, and diversion rate as the dependent variable. The results of the regression are given below.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.469 <sup>a</sup>	.220	.176	6.31720

a. Predictors: (Constant), UNITS

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	202.411	1	202.411	5.072	.037 <sup>a</sup>
	Residual	718.326	18	39.907		
	Total	920.737	19			

a. Predictors: (Constant), UNITS

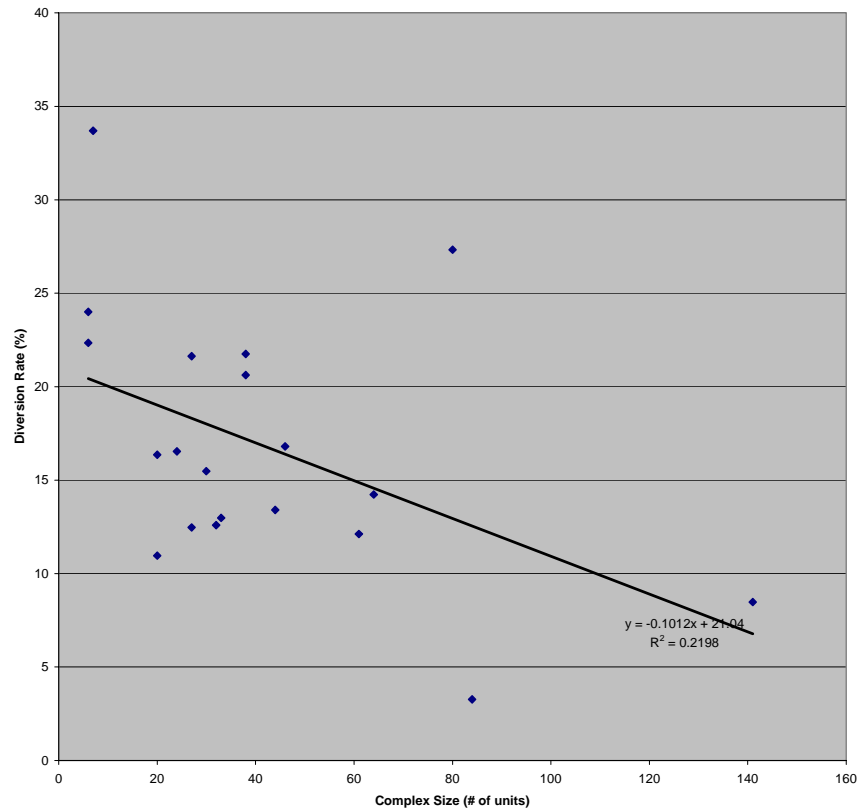
b. Dependent Variable: DIVERT

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	21.040	2.335		9.010	.000
	UNITS	-.101	.045	-.469	-2.252	.037

a. Dependent Variable: DIVERT

Figure 1. Regression Analysis of Complex Size (x) and Diversion Rate (y)



*Results:* For a two-tailed test with  $\alpha = .05$  and  $df = 19$ , we reject  $H_0$  if  $|t| > 2.093$ . Since  $|t| = 2.252$ , we can reject  $H_0$  in favor of  $H_a$  and conclude that there is a relationship between the size of an apartment complex and its diversion rate. The negative slope ( $-0.101$ ) suggests that as complex size increases, the overall diversion rate of the complex as a whole goes down.

The coefficient of determination,  $R^2$ , is  $.220$ , and the adjusted  $R^2$  is  $.176$ . (The  $R^2$  and adjusted  $R^2$  provide a good overall measure of the fit of the regression line to the sample data and to the population, respectively.) Thus, only 22% of the variability in  $y$  (the diversion rate) is accounted for by  $x$  (the complex size).

## 2. T-Test #1

*Null Hypothesis ( $H_0$ ):* There is no difference between the average recycling diversion rate between large and small apartment complexes (i.e.,  $\mu_{\text{large}} - \mu_{\text{small}} = 0$ ).

*Alternative ( $H_a$ ):* Small apartment complexes have higher average diversion rates than large apartment complexes (i.e.,  $\mu_{\text{large}} - \mu_{\text{small}} < 0$ ).

*Analysis:* To further verify the results of Regression #1, we performed a one-tailed, directional t-test on the data. A new, categorical variable was created (“Large”) to

describe those apartment complexes larger than 40 units. The large complexes were assigned a value of “1.” Smaller complexes, with less than 20 units (“Small”) were assigned a value of “0”. The t-test then tests the difference in mean diversion rates among these two groups. The results are listed below.

**Group Statistics**

	LARGE	N	Mean	Std. Deviation	Std. Error Mean
DIVERT	1.00	5	13.0854	8.98212	4.01692
	.00	5	21.4728	8.55945	3.82790

**Independent Samples Test**

		Levene's Test for Equality of Variances		t-test for Equality of Means						
		F	Sig.	t	df	Sig. (2-tailed)	Mean Difference	Std. Error Difference	95% Confidence Interval of the Difference	
									Lower	Upper
DIVERT	Equal variances assumed	.001	.979	-1.512	8	.169	-8.3873	5.54874	-21.18275	4.40808
	Equal variances not assumed			-1.512	7.981	.169	-8.3873	5.54874	-21.18792	4.41325

*Results:* For  $\alpha = .05$ , the critical t-value for a one-tailed test with df 8 is 1.860. We should reject  $H_0$  if  $t < -1.860$ . Since the observed value of t, -1.512, does not fall in the rejection region, we have insufficient evidence to reject the null hypothesis. While the estimates of the mean diversion rates between the large complexes and the small complex are different (the “large” had a mean diversion rate of 13% while “small” complexes had a mean diversion rate of 21%), the t-test cannot, at the 95% confidence level, prove that this difference is statistically significant. This result is undoubtedly due to the very small sample size (the “large” group had 6 samples and the “small” group had just 5).

### 3. Regression #2

A simple linear regression model (least squares estimation) was used to determine if there is a relationship between the diversion rate and the capacity for receipt of materials for recycling.

*Null Hypothesis ( $H_0$ ):* There is no relationship between the diversion rate and the recycling capacity (measured in volume per week).

*Alternative ( $H_a$ ):* There is a relationship between the diversion rate and the recycling capacity (i.e., the slope of the line is not equal to zero).

*Analysis:* This regression seeks to show a relationship between the amount of recycling capacity available to the complexes and their resulting diversion rate. The amount of recycling capacity available was provided (in gallons) by Concord Disposal. By multiplying the available total volume by the number of pick-ups per week, we arrived at a total volume of recycling capacity available per week at each complex. Standardizing

this volume across all complexes involves dividing by the number of units, yielding the final test variable of recycling volume (gals) per unit per week.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.579 <sup>a</sup>	.335	.298	5.83185

a. Predictors: (Constant), VOL2

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	308.549	1	308.549	9.072	.007 <sup>a</sup>
	Residual	612.188	18	34.010		
	Total	920.737	19			

a. Predictors: (Constant), VOL2

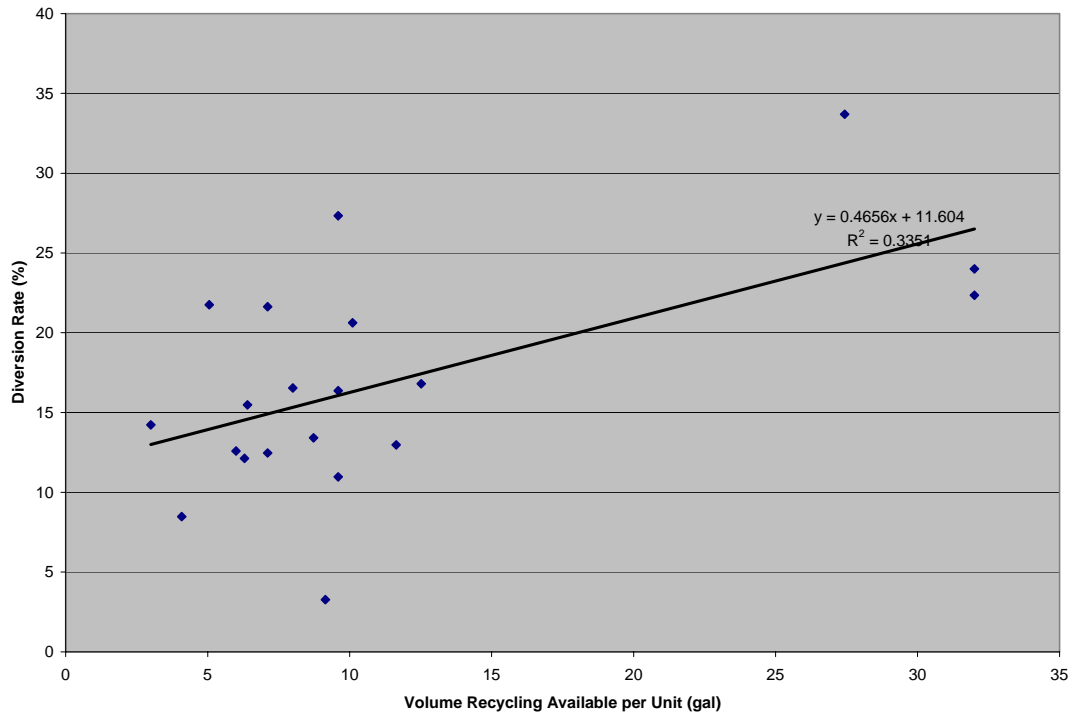
b. Dependent Variable: DIVERT

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	11.604	2.176		5.332	.000
	VOL2	.466	.155	.579	3.012	.007

a. Dependent Variable: DIVERT

Figure 2 – Regression Analysis of Total Volume Recycling Capacity Available Per Unit (x) and Diversion Rate (y)



Results: For a two-tailed test with  $\alpha = .05$  and  $df = 19$ , we reject  $H_0$  if  $|t| > 2.093$ . Since  $|t| = 3.012$ , we can reject  $H_0$  in favor of  $H_a$  and conclude that there is a relationship between the volume of recycling available and the diversion rate. The positive slope (0.46) suggests that as volume of recycling capacity increases, so does the overall diversion rate. This may be because residents are more likely to recycle if there are more available totes, or that complexes regularly fill up their totes when capacity is inadequate to serve demand and recyclables are being sent into the waste stream.

The regression indicates that there is only a mild correlation ( $R^2$  of .335) between the volume of recycling provided per unit of the apartment complex and diversion rate.

#### 4. Regression #3

Hypothesis: A simple linear regression model (least squares estimation) was used to determine if there is a relationship between rent rate (dollars per month) at an apartment complex and the recycling diversion rate. Rental rate was used as an indicator of socio-economic status.

*Null Hypothesis ( $H_0$ ):* There is no relationship between the rental rate and the diversion rate (i.e., the slope of the regression line is not statistically different from zero).

*Alternative (H<sub>a</sub>):* There is a relationship between the rental rate and the diversion rate (i.e., the slope of the line is not equal to zero).

*Analysis:* Using rental rates (dollars per month) provided by the property managers, we ran a regression to test the relationship between rent and recycling diversion rate. Based on comments by some property managers, there was some question as to whether tenants in lower income complexes would be as interested in recycling. The results of this analysis are included below.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.361 <sup>a</sup>	.130	.072	6.13333

a. Predictors: (Constant), RENT

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	84.558	1	84.558	2.248	.155 <sup>a</sup>
	Residual	564.266	15	37.618		
	Total	648.823	16			

a. Predictors: (Constant), RENT

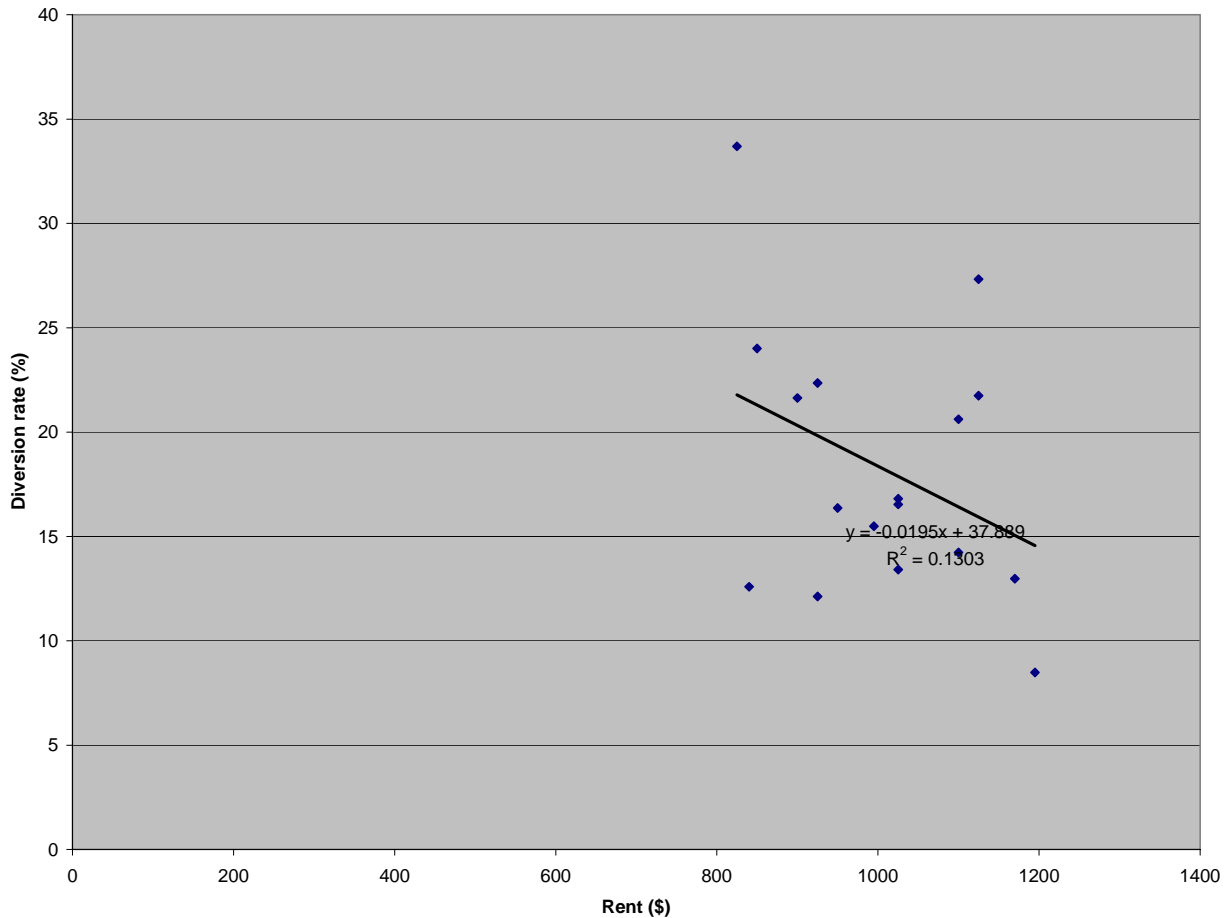
b. Dependent Variable: DIVERT

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	37.889	13.179		2.875	.012
	RENT	-1.95E-02	.013	-.361	-1.499	.155

a. Dependent Variable: DIVERT

Figure 3 – Regression Analysis of Rent (x) and Diversion Rate



*Results:* For a two-tailed test with  $\alpha = .05$  and  $df = 16$ , we reject  $H_0$  if  $|t| > 2.120$ . Since  $|t| = 1.499$ , we have insufficient evidence to reject  $H_0$  and conclude that there is no relationship between rental rate and the recycling diversion rate. The regression indicates that there is no significant relationship between rent and diversion rate. The  $R^2$  is only .13 and the significance of the regression as a whole is only .159.

### 5. Regression #4

*Hypothesis:* A simple linear regression model (least squares estimation) was used to determine if there is a relationship between the diversion rate and the percentage of units contacted as part of the outreach during roll-out.

*Null Hypothesis ( $H_0$ ):* There is no relationship between the diversion rate for a complex and the percentage of units contacted (i.e., the slope of the regression line is not statistically different from zero).

*Alternative (H<sub>a</sub>):* There is a relationship between the diversion rate for a complex and the percentage of units contacted (i.e., the slope of the line is not equal to zero).

*Analysis:* This regression is based on the theory that the success of the roll-out program (measured by diversion rate) is related to the personal one-on-one approach employed in the roll-out. During the course of each roll-out, the team kept track of how many units in each complex were spoken to. Using this “% Contacted” indicator, we ran the following regression.

**Model Summary**

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate
1	.214 <sup>a</sup>	.046	-.028	6.58386

a. Predictors: (Constant), PERCENT

**ANOVA<sup>b</sup>**

Model		Sum of Squares	df	Mean Square	F	Sig.
1	Regression	27.084	1	27.084	.625	.443 <sup>a</sup>
	Residual	563.514	13	43.347		
	Total	590.598	14			

a. Predictors: (Constant), PERCENT

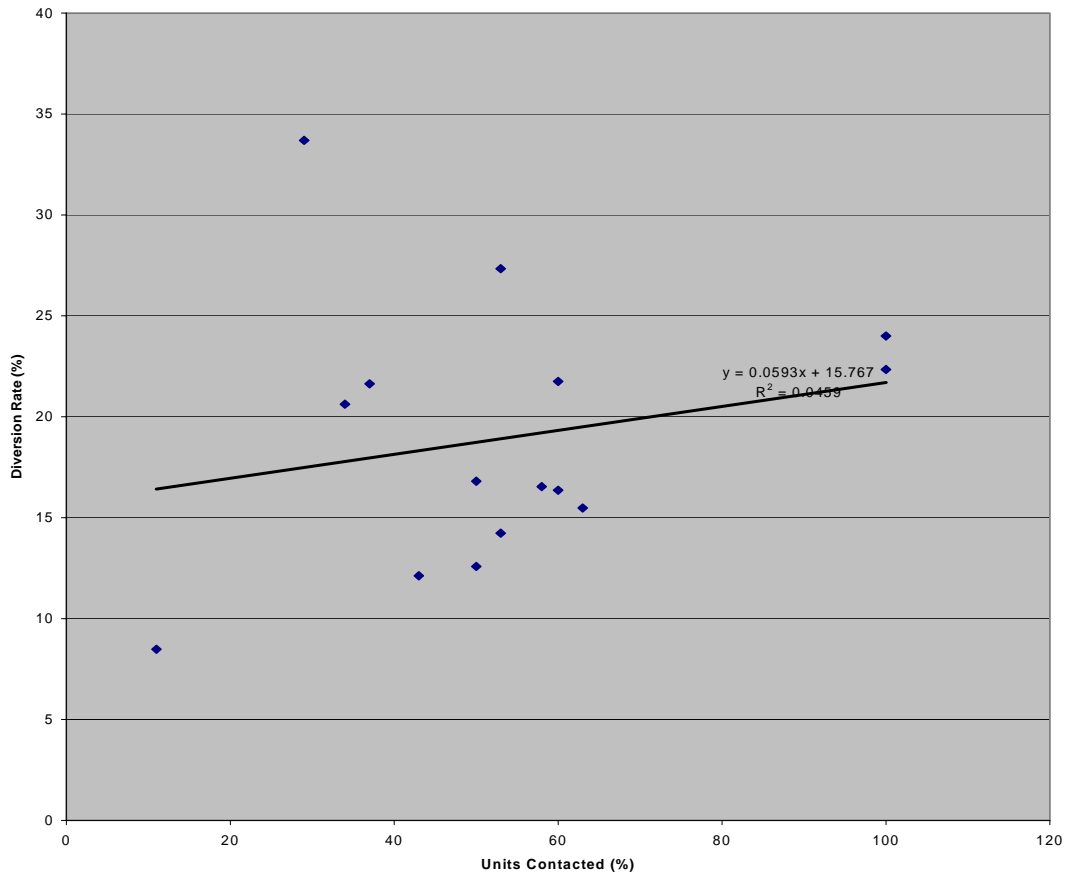
b. Dependent Variable: DIVERT

**Coefficients<sup>a</sup>**

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	15.767	4.349		3.625	.003
	PERCENT	5.926E-02	.075	.214	.790	.443

a. Dependent Variable: DIVERT

Figure 4 – Regression Analysis of Units Contacted (x) and Diversion Rate (y)



**Results:** For a two-tailed test with  $\alpha = .05$  and  $df = 14$ , we reject  $H_0$  if  $|t| > 2.145$ . Since  $|t| = 0.790$ , we have insufficient evidence to reject  $H_0$  and conclude that there is no relationship between percentage of units spoken to and the resulting diversion rate. The  $R^2$  is only .046 and the regression as a whole has a significance of .459.

**Appendix C**  
Commitment Form



## COMMITMENT FORM

Thank you for your interest in setting up a recycling program. The City of Concord, Concord Disposal and Science Applications International Corporation (SAIC), with grant funding from the California Department of Conservation (DOC), are working with multi-family residential complexes to set up recycling programs. Goals of this pilot project<sup>2</sup> include:

- Collecting beverage containers, mixed paper, and cardboard
- Realizing a high participation rate by tenants
- Creating a lasting program

**Complex Name:** \_\_\_\_\_ **Property Manager:** \_\_\_\_\_

**Number of Units:** \_\_\_\_\_ **Roll Out Date:** \_\_\_\_\_

**Roll Out Times:** between \_\_\_\_\_ and \_\_\_\_\_

**SAIC Coordinator:** \_\_\_\_\_ **Phone Number:** \_\_\_\_\_

**Will accompany SAIC coordinator during roll out:** \_\_\_\_\_

### Roll Out Process:

- Two weeks before -- Deliver door hangers on \_\_\_\_\_
  - Property Manager (PM) will distribute door hangers (SAIC will mail to PM) OR
  - SAIC will mail door hangers to tenants
- One week before -- Distribute refrigerator magnets to tenants on \_\_\_\_\_
  - SAIC will mail magnets to tenants OR
  - PM will distribute magnets to tenants (SAIC will mail to PM)
- One day before -- Drop off 96-gallon Toters on \_\_\_\_\_
  - Concord Disposal will deliver sets of 96-gallon outside recycling collection Toters (blue for mixed paper, black for beverage containers)
  - City of Concord will drop off \_\_\_\_\_ sets of interior recycling bins on \_\_\_\_\_
- Day of Rollout
  - SAIC will bring cookies and beverages
  - SAIC will adhere recycling labels to outside Toter recycling bins
  - SAIC will hang signage (as needed)
  - SAIC will set up a display in the mailroom to engage tenants about new recycling program OR
  - SAIC will visit tenants door to door escorted by \_\_\_\_\_ OR
  - SAIC will perform recycling presentations in \_\_\_\_\_
- Other Details: \_\_\_\_\_

**Concurrence:** \_\_\_\_\_ **Date:** \_\_\_\_\_

<sup>2</sup> After a 6 month pilot program, a \$1/unit/month charge for recycling will be levied.