CURBSIDE RECYCLING AUDIT
BENCHMARK AND POST BENCHMARK STUDIES

FINAL REPORT

Prepared for
The Twin Cities Metropolitan Council
and Lynch Jarvis Jones Advertising

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KEY CONCLUSIONS AND OBSERVATIONS

The greatest potential opportunities to increase the volume of recycling material are in the issues of adding more types of materials to be collected at curbside, encouraging households to add more materials to that already recycled, and developing more frequent, or consistent, curbside recycling behavior among households.

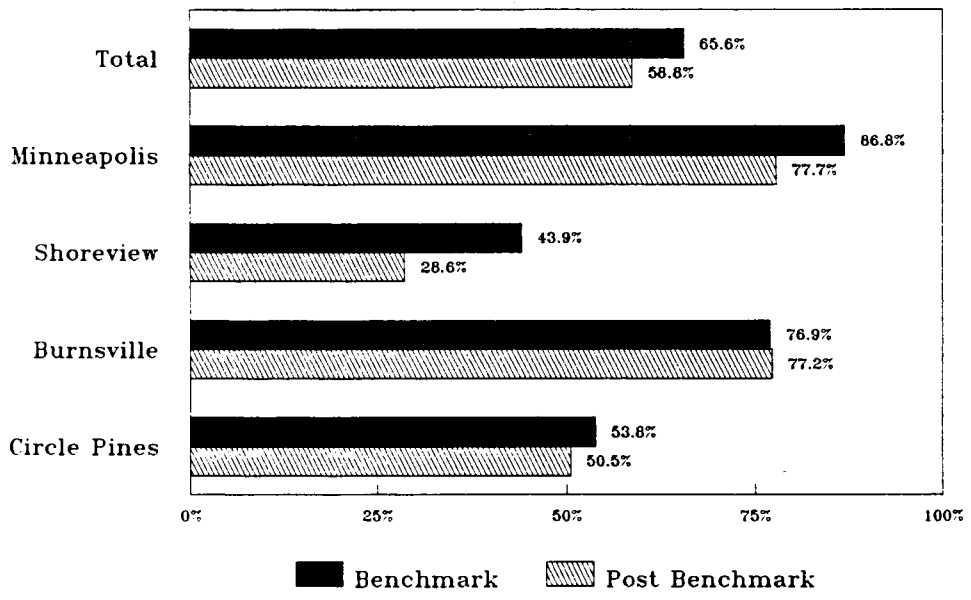
The analysis suggests that the potential payoff from recycling advertising and public awareness programs in the future will not come from encouraging recycling participation, but from encouraging better recycling behavior.

The data from both studies suggests that the motivation to recycle - to recycle at all - has peaked in the market, and what remains is to increase the consistency -the repetitiveness or frequency - of recycling behavior in order to increase the volume of recycling material out of the waste stream. Increased consistency is best developed in the near term by encouraging households to add more materials to their current recycling activity.

Long term the consistency issue appears to center upon developing more efficient daily recycling behavior, and these behavioral issues need further clarification and understanding. It is clear from the research that households that recycle more frequently also recycle a higher volume of material, but it is not clear as to the reasons why this occurs.

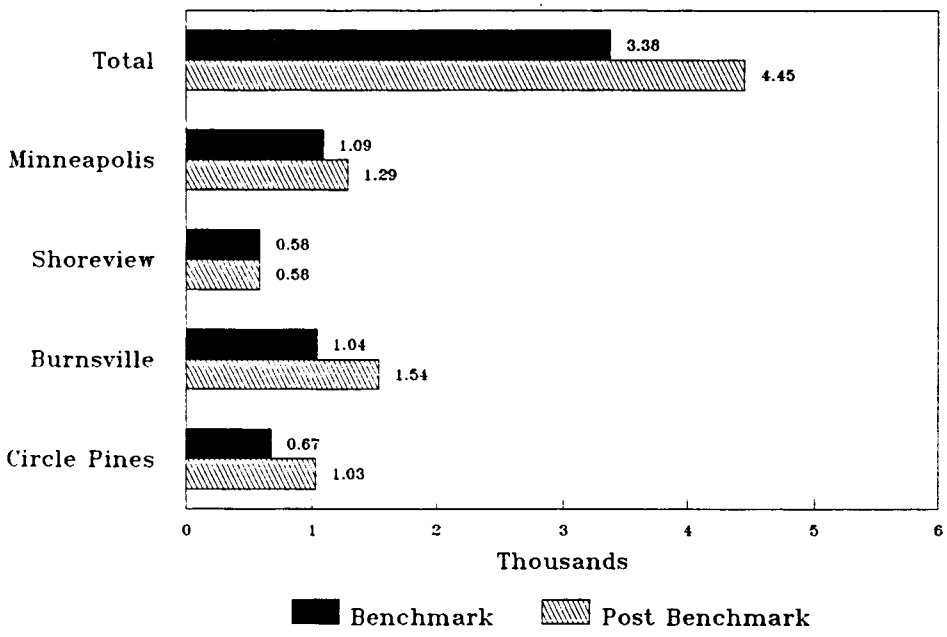
The majority of households did participate in curbside recycling programs. There was an overall decline in participation between the two studies - from 65.6% to 58.8% - with the Shoreview site contributing the most to this decline. With the exception of Shoreview, and accounting for measurement error due to the nature of the study design, this observed decline was not significant.

HOUSEHOLD PARTICIPATION RATES
Percent Recycling Any Material



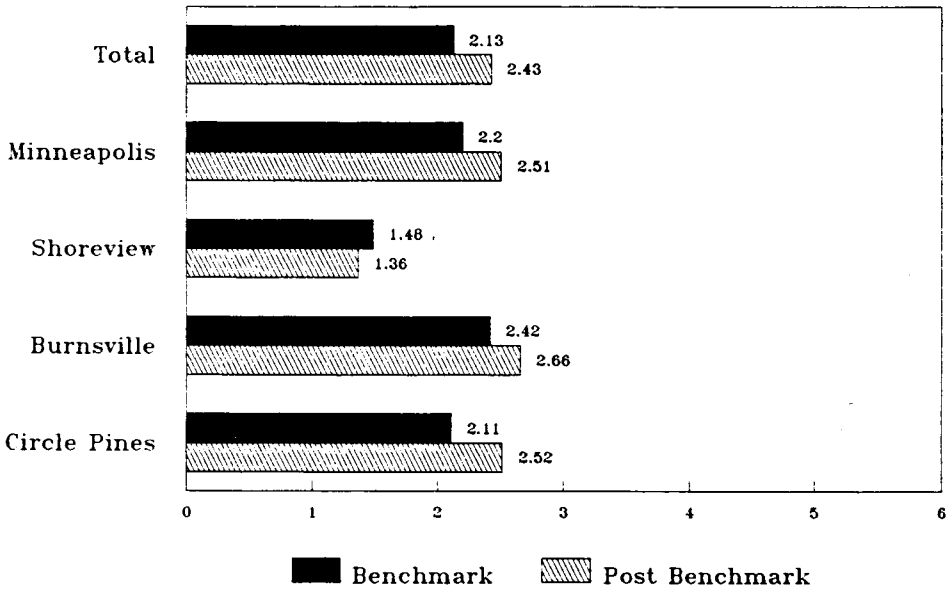
Total recycling volume increased 32% from a benchmark study level of 3,380 cubic feet to 4,454 cubic feet. Except for Shoreview all sites showed recycling volume increases.

TOTAL CUBIC FEET RECYCLED



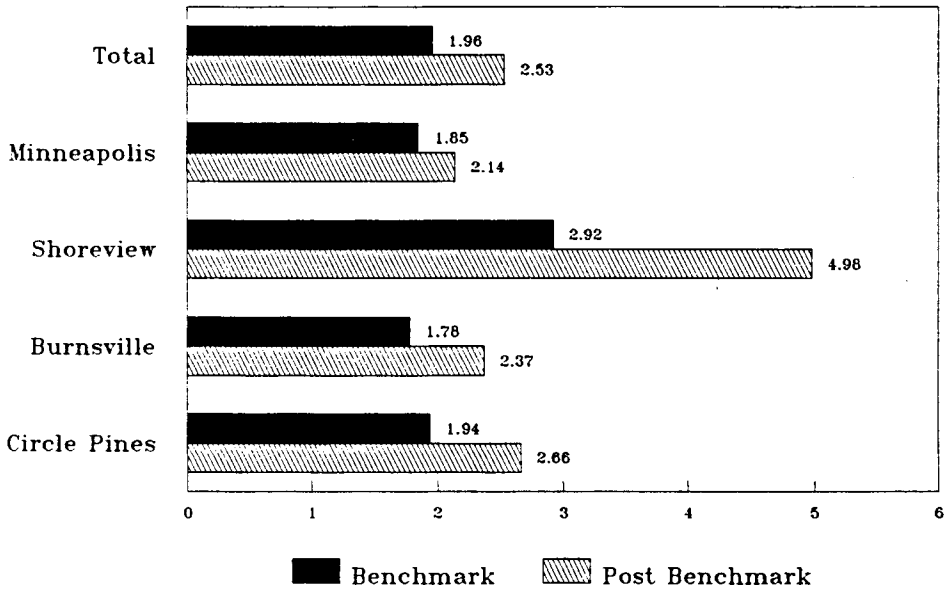
Household recycling frequency increased slightly from the benchmark study. The average number of times a household recycled increased to just under 2.5 times, out of a potential 3 times for a bi-weekly and 6 times for a weekly pickup site. On balance, there was relatively little difference in the average frequency of pickup between bi-weekly and weekly pickup sites.

HOUSEHOLD RECYCLING FREQUENCY
Average Number of Pickups per Household



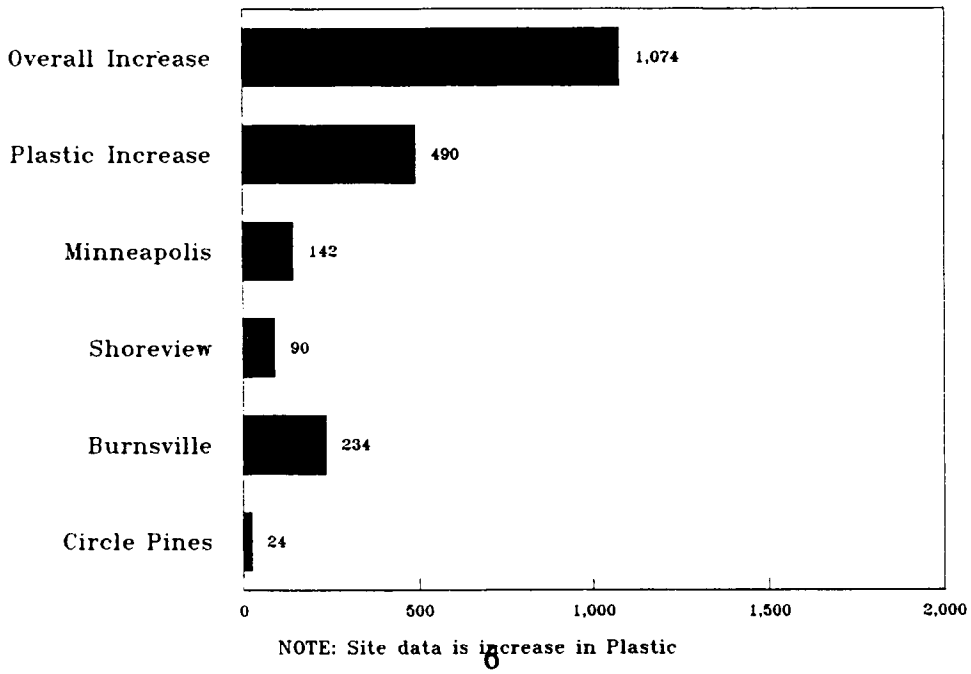
Households that recycled placed at the curb, on average, 3 grocery bags of material in the post benchmark study, compared to an average of just under 2.5 bags observed in the benchmark study. Shoreview had a significantly higher average in the post benchmark study which offset the site's substantial decline in participation, and kept the volume of recycling material in the site at equal levels between the two studies.

HOUSEHOLD PICKUP AVERAGE
Cuft. of Material Recycled per Pickup



The single largest contributor to the increase in recycling volume over the study period was due to the addition of plastic, and a subsequent substantial increase in the recycling participation of plastic, as an additional curbside recycling material at three of the four sites studied.

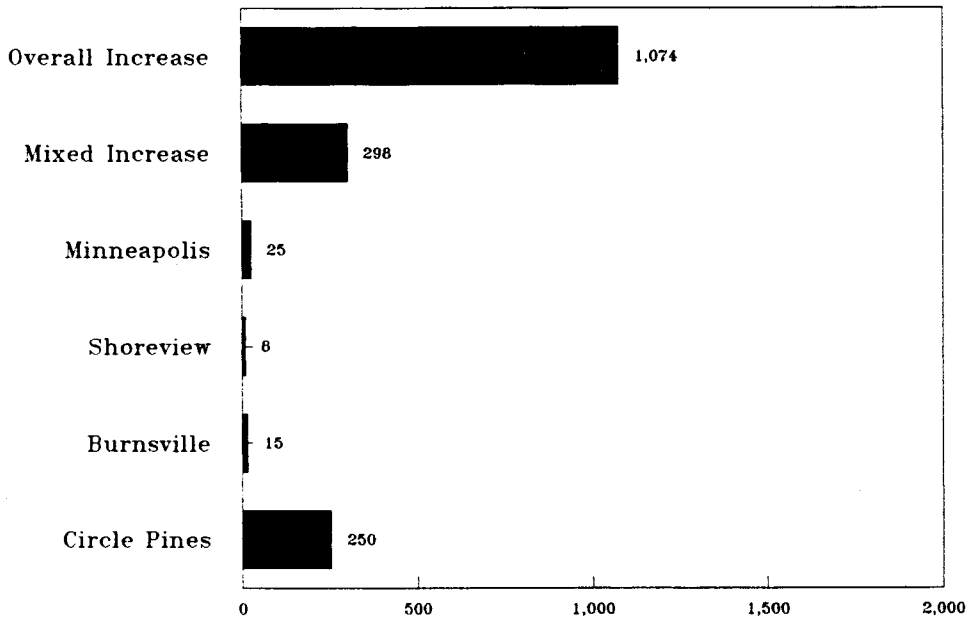
GROWTH IN PLASTIC RECYCLING ACTIVITY
Change in Cu.ft. of Plastic Recycled



NOTE: Site data is increase in Plastic

The second most significant factor contributing to the growth in recycling volume was an increase in the recycling participation, and subsequent increase in volume, of Mixed recycling material in the Circle Pines site. This category, which reflects material which is mixed together rather than sorted for pickup at the curb, is unique to the Circle Pines curbside recycling program among the four sites in the study.

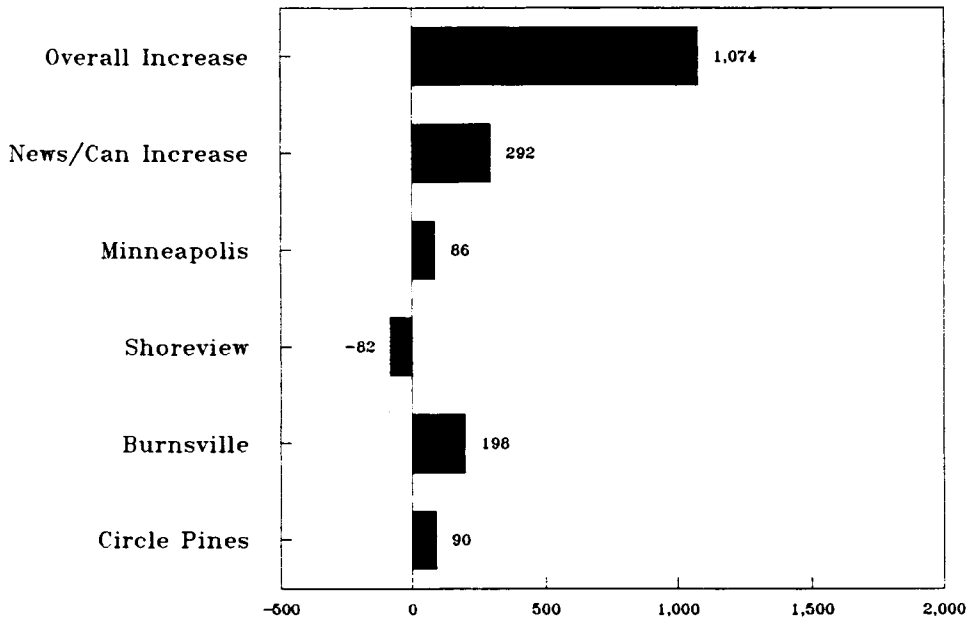
GROWTH IN MIXED RECYCLING ACTIVITY
Change in Cu.ft. of Mixed Recycled



NOTE: Site data is increase in Mixed

Newspaper and Metal Cans accounted for the remainder of the increase in recycling volume.

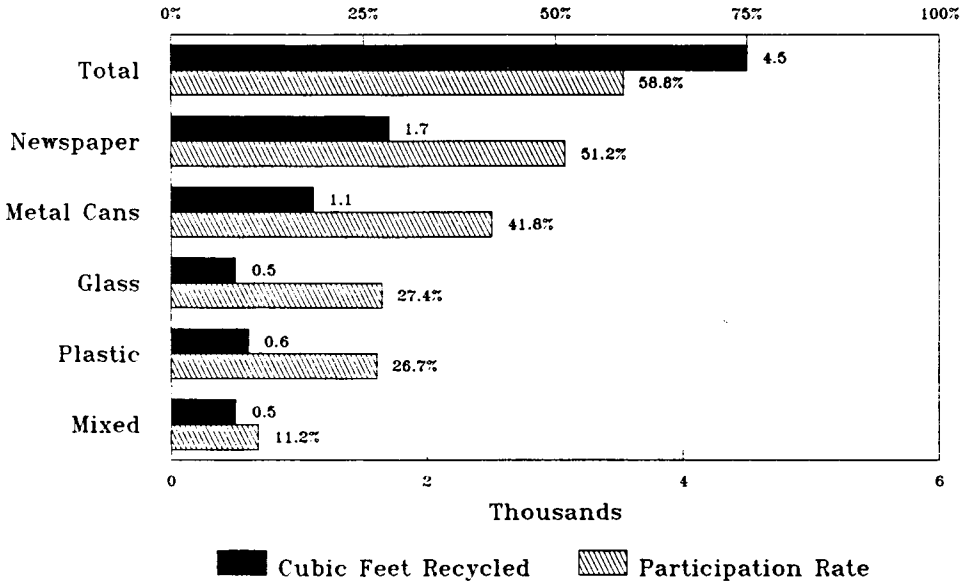
GROWTH IN NEWSPAPER/METAL CAN RECYCLING
Change in Cu.ft. of Both Materials



NOTE: Site data is change in Both Mat'ls

Newspaper and Metal Cans are by far the most prevalent materials recycled, with significantly higher participation rates and volumes than other categories of material.

RECYCLING ACTIVITY BY MATERIAL
Post Benchmark Study



The increase in Newspaper recycling volume was attributable an increase in the frequency of recycling by households, while the increase in Metal Can volume was due to an increase in the amount recycled per curbside pickup.

PICKUP FREQUENCY

Number of Curbside Pickups per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Newspaper	1.92	2.33	0.41	21%
Metal Cans	1.92	1.99	0.07	4%

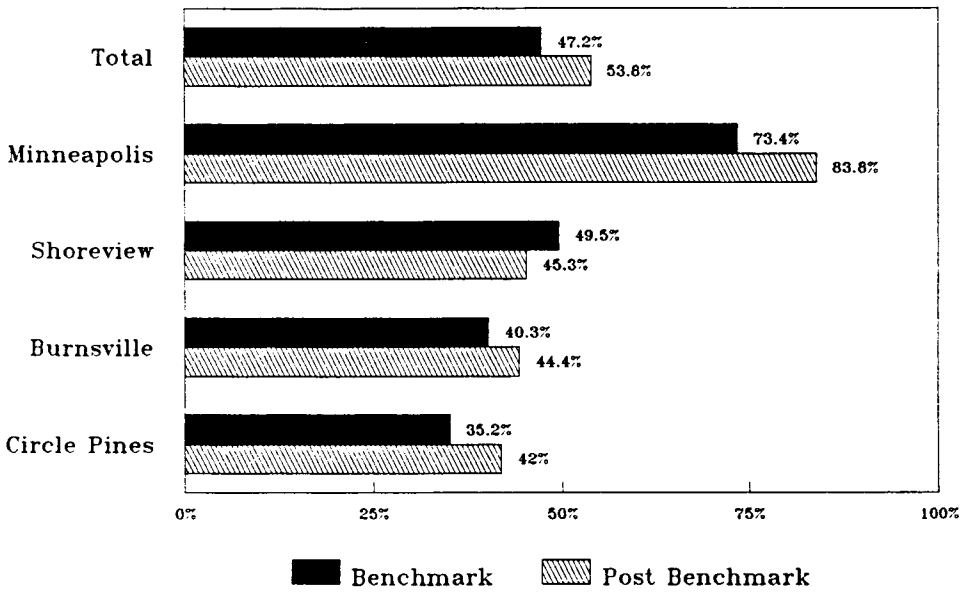
PICKUP AVERAGE

Cubic Feet Recycled per Recycling Pickup

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Newspaper	1.20	1.18	(0.02)	(2)%
Metal Cans	.92	1.12	0.20	22%

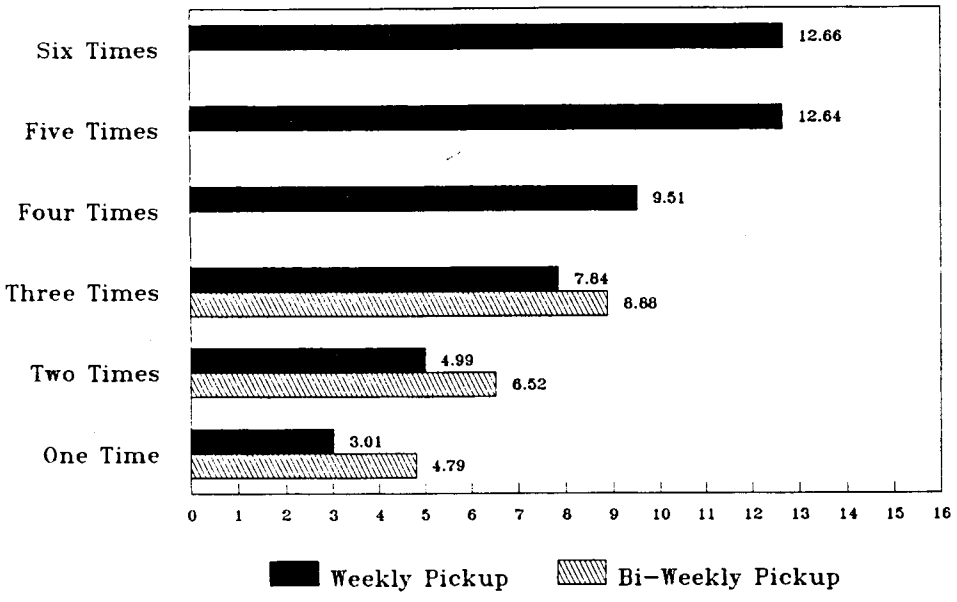
Curbside recycling pickup schedules appeared to be greatly underutilized, with approximately half of the potential pickups among recycling households going unused in both studies. The exception was Minneapolis, a bi-weekly pickup site, where utilization averaged approximately 80% in both studies.

PERCENT OF ALL PICKUP DAYS
USED BY RECYCLING HOUSEHOLDS



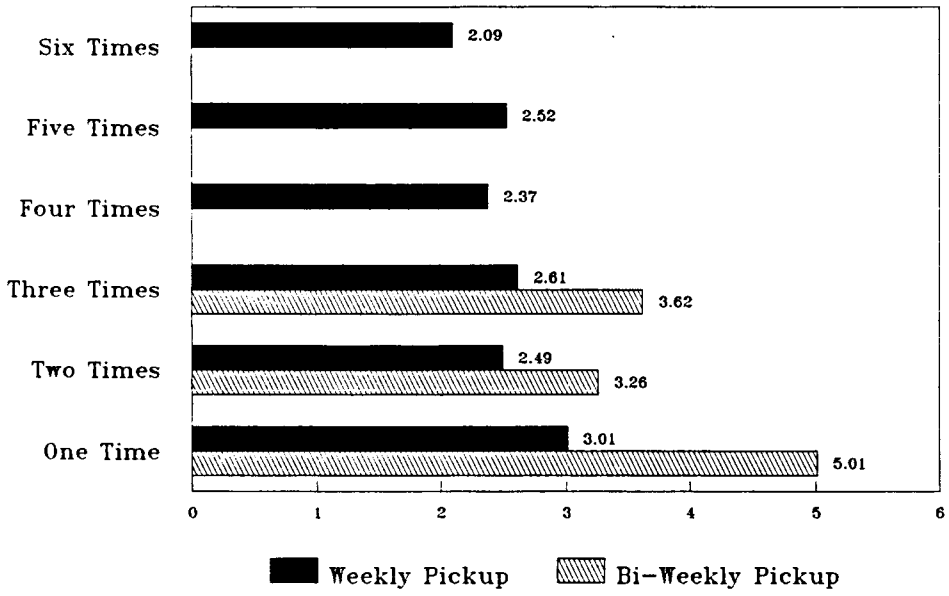
Although this might suggest no need for weekly pickups, there was evidence that a potential does exist among households to more fully utilize a weekly schedule. Those households nearly or fully utilizing a weekly schedule had a substantially higher recycling volume than other households in the study.

AVERAGE CU.FT. RECYCLED PER HOUSEHOLD
BY NUMBER OF TIMES CURBSIDE PICKUP USED



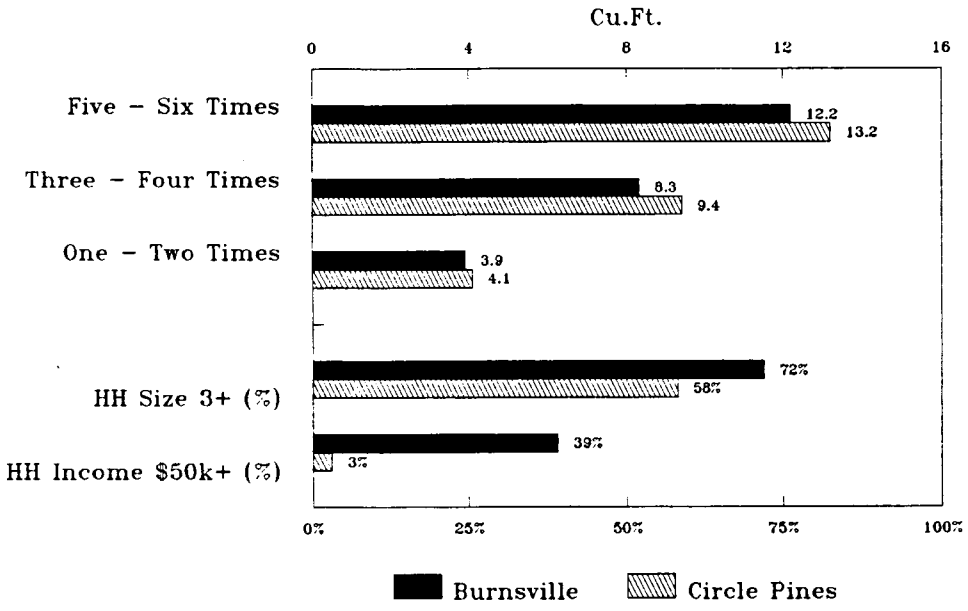
The amount of material placed at each curbside pickup was relatively equal across the different number of times households used curbside pickup. Thus, higher levels of recycling volume per household was observed at more frequent, or consistent, curbside usage levels.

AVERAGE CU.FT. RECYCLED PER PICKUP
BY NUMBER OF TIMES CURBSIDE PICKUP USED

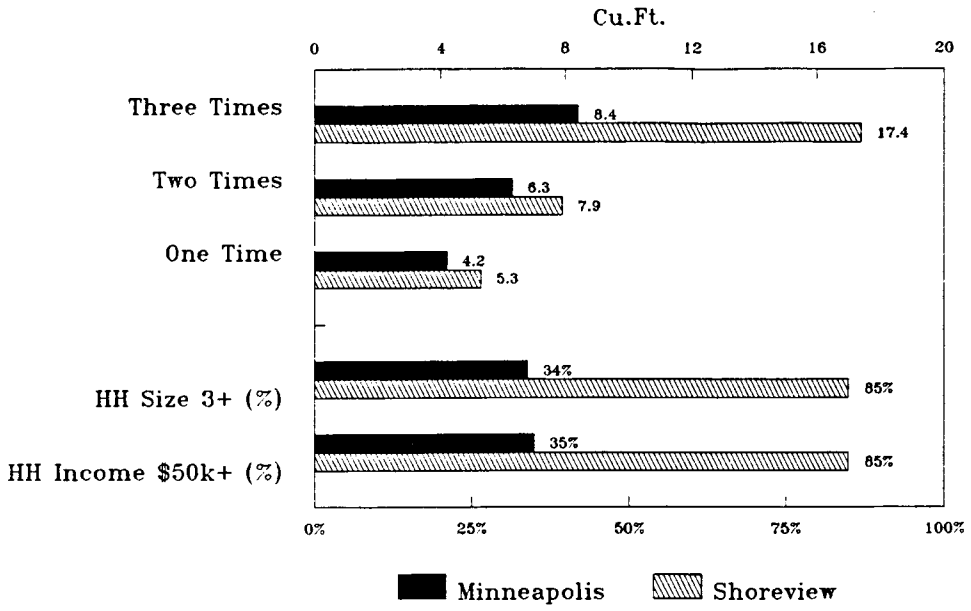


There was little evidence that demographic factors explain these differences between high and low volume recycling households. Higher household income and size are factors presumed to contribute to higher levels of recycling. However, a comparison between the two weekly pickup sites - Burnsville, with relatively high income and household size, and Circle Pines, with relatively low income and household size - shows little or contradictory evidence to this relationship. A comparison between the two bi-weekly pickup sites - Minneapolis and Shoreview - yielded similar results.

AVERAGE CU.FT. RECYCLED PER HOUSEHOLD
BY NUMBER OF TIMES CURBSIDE PICKUP USED

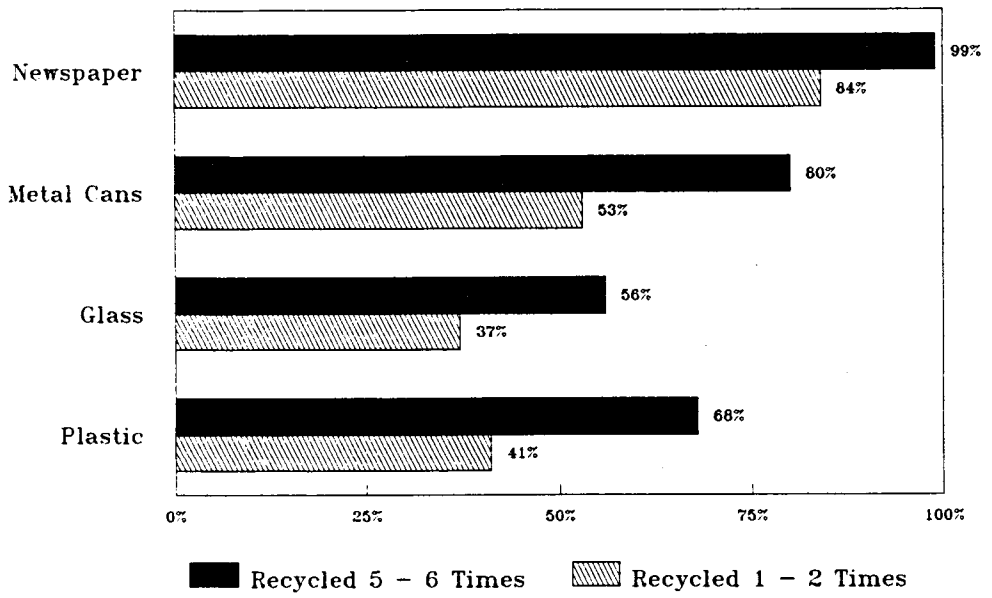


AVERAGE CU.FT. RECYCLED PER HOUSEHOLD BY NUMBER OF TIMES CURBSIDE PICKUP USED

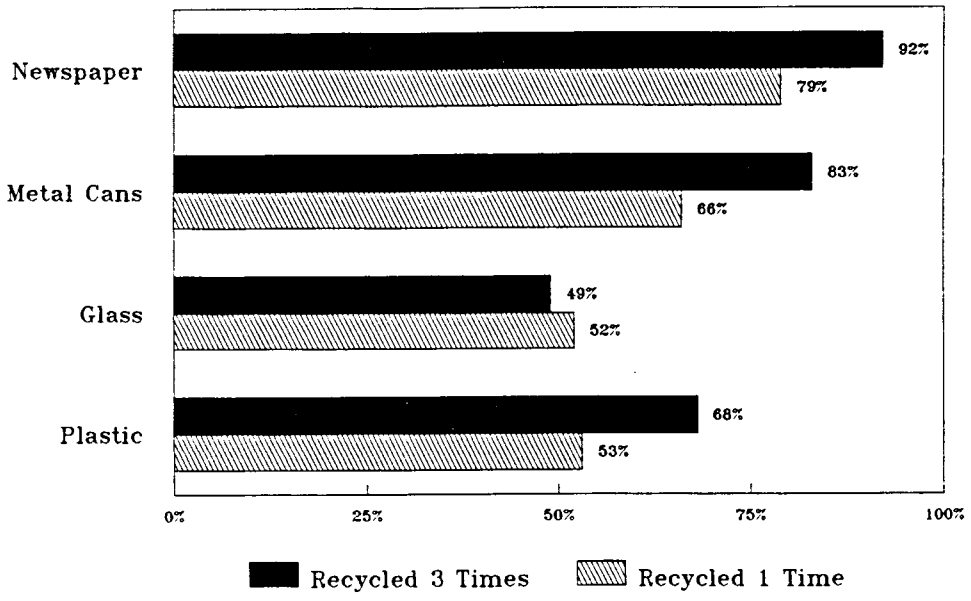


Those recycling more frequently were also recycling more types of material, and this was the major distinguishing factor found in the research between high and low frequency recycling households. Recycling behavior inside each household is most probably the key driving recycling volume. Recycling behavior was remarkably consistent from site to site, as evidenced by nearly equal levels of average cubic feet of material recycled per recycling household despite differences in recycling programs, pickup schedules and household composition.

PARTICIPATION RATES IN WEEKLY SITES
BY FREQUENT AND INFREQUENT RECYCLERS

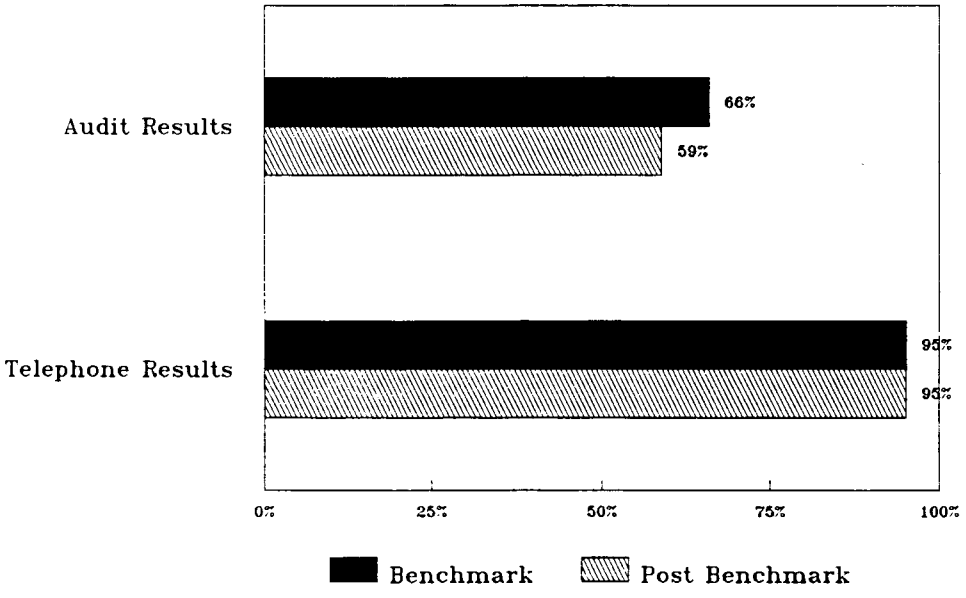


PARTICIPATION RATES IN BI-WEEKLY SITES BY FREQUENT AND INFREQUENT RECYCLERS

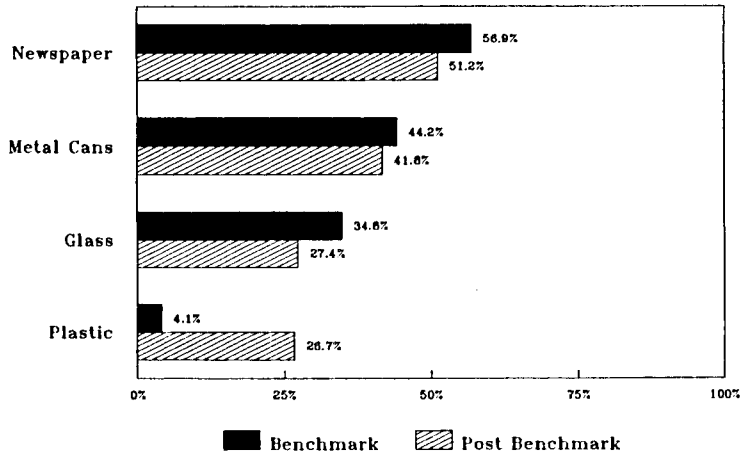


There is evidence that gaining higher levels of recycling participation may be very difficult. The public's perception of their recycling involvement - what they believe they are recycling and how often it is recycled - is at very high levels (90%+), significantly higher than observed recycling behavior, and did not change between the two studies despite a slight decline in observed participation rates.

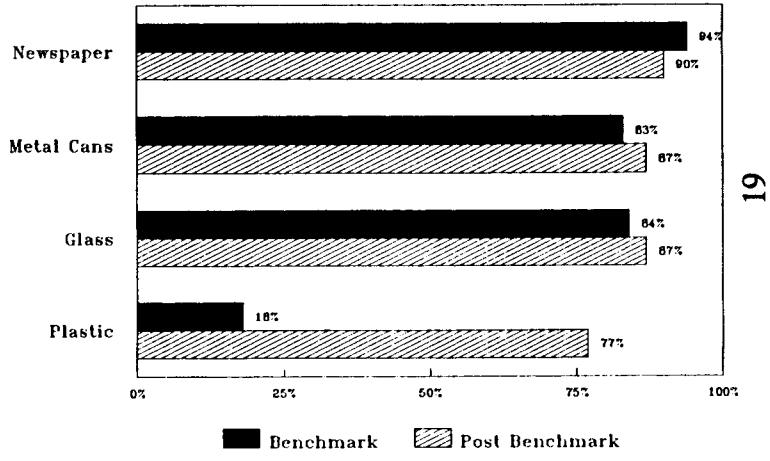
OVERALL PARTICIPATION RATES
Telephone and Audit Studies



PARTICIPATION RATES BY CATEGORY
Audit Survey

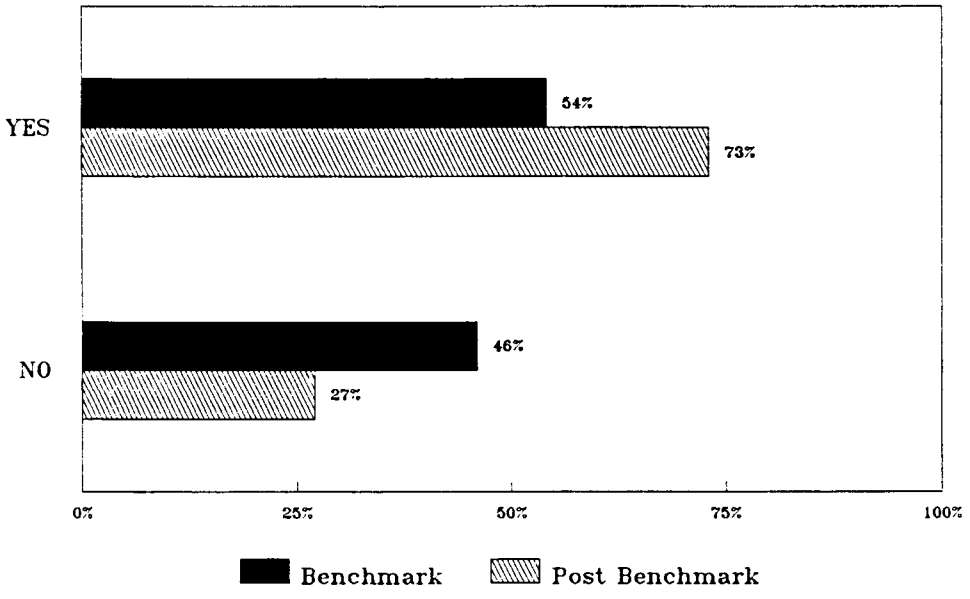


PARTICIPATION RATES BY CATEGORY
Telephone Survey

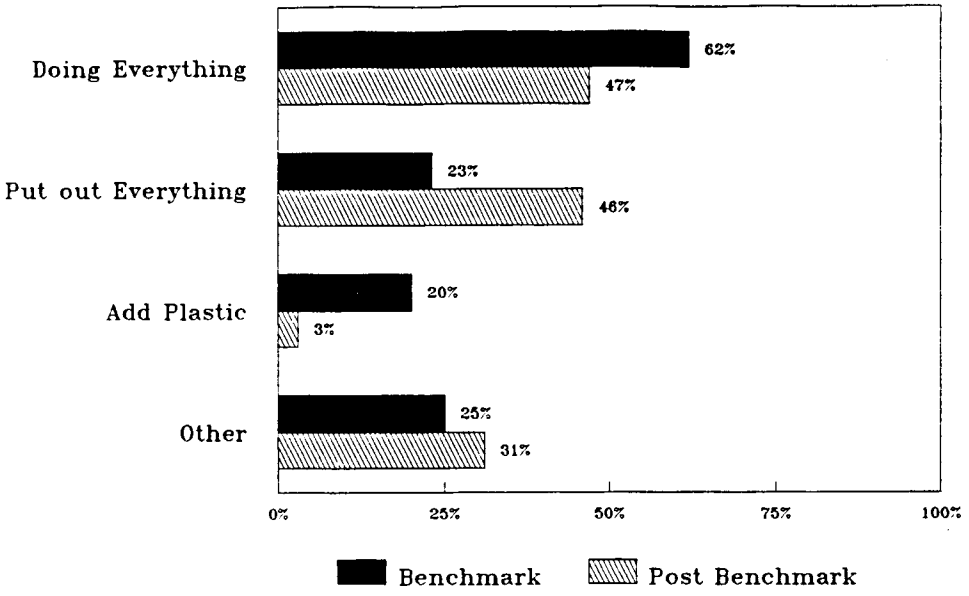


What opportunities do exist center upon getting households to add materials to current recycling activities or maintaining more consistency in their recycling efforts. The majority of the public believes that they are recycling as much as possible, and this belief increased significantly in magnitude between the two studies. Among the minority that believe they could recycle more, reasons centered on a lack of consistency or to add more materials to that which they already recycle.

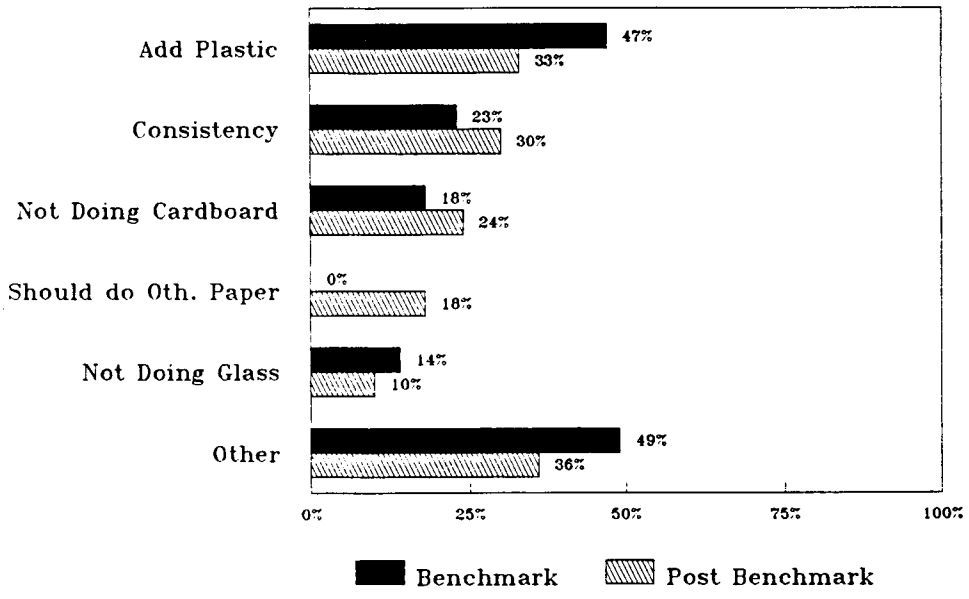
PERCEPTION OF RECYCLING EFFORT
Recycling as Much as Possible



RECYCLING AS MUCH AS POSSIBLE
Reasons Given



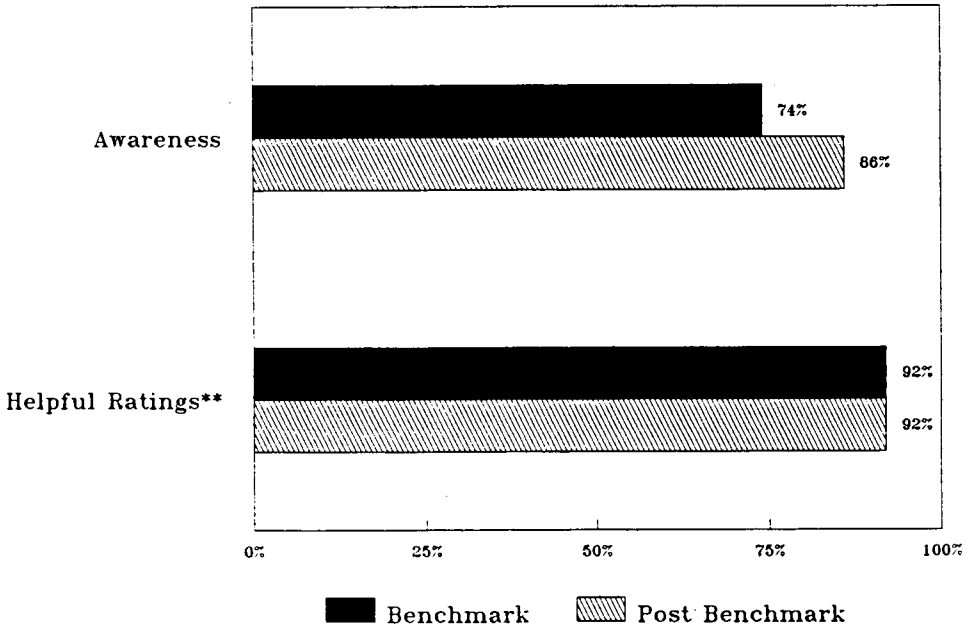
NOT RECYCLING AS MUCH AS POSSIBLE
Reasons Given



Awareness of recycling advertising or public awareness programs was very high (80%+) and increased significantly between the two studies. The majority of the public aware of this advertising rate it helpful, and increasingly more so because it informs them on what, when and how to recycle.

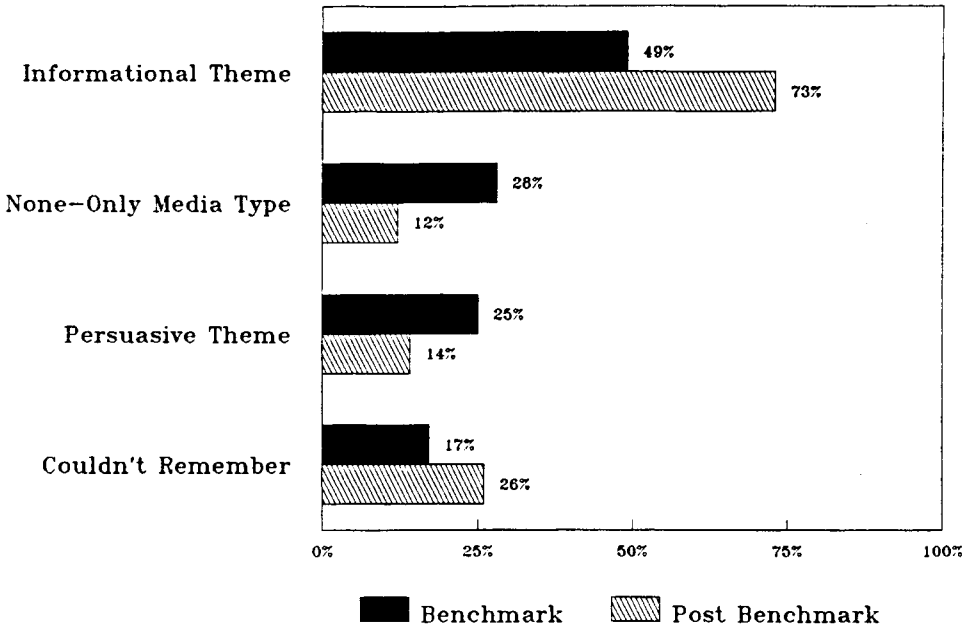
The dominant message understood and valued in the marketplace from recycling advertising and public awareness programs is the "nuts and bolts" of recycling, that is the what, when and how to recycle. The opportunity in advertising exists in delivering a clear and consistent message focusing upon showing how to be <u>better</u> recyclers.

AWARENESS OF ADVERTISING/PUBLIC PROGRAMS

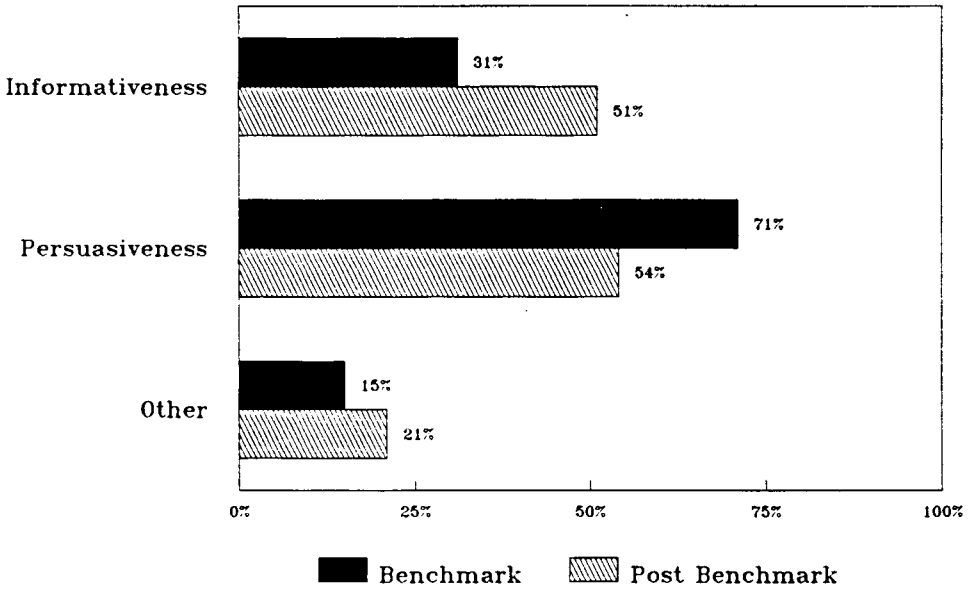


**Percent rating advertising helpful

ADVERTISING CONTENT RECALLED



REASONS GIVEN FOR THE HELPFULNESS OF ADVERTISING



OBJECTIVES

The overall purpose of this study was to develop an understanding of the effect public education programs have on recycling behavior. The design and execution of the research used three specific objectives as guidelines:

1. Measure changes in consumer recycling behavior over a test period. Key areas of interest were:

   - Participation rates
   - Frequency of participation
   - Types of material recycled
   - Volume of material recycled

2. Measure changes in recycling awareness, attitudes and perceived behavior over a test period.

3. Measure the difference between perceived and actual recycling behavior over a test period.

RESEARCH DESIGN

The research design consisted of a study conducted twice over approximately a one year time period within four geographic sites across the Twin Cities area. Each geographic site contained approximately 300 households. Each study, a benchmark and a post benchmark, was conducted over a six week observation period and consisted of two basic elements:

1. An ***audit survey***, or on-site visual measurement, of each household's curbside recycling participation and the approximate volume of each material recycled over the six week period. Audit survey observations occurred in each site on recycling pickup days.

2. A randomly administered ***telephone survey*** of 200 households, 50 within each site, conducted immediately after the completion of the on-site audit survey.

The purpose of the audit was to collect *actual* curbside recycling behavior information at a household level, while the purpose of the telephone survey was to collect *perceived* recycling behavior, awareness and attitudinal information.

Because the design covers four small geographies the data in total is not representative of the Twin Cities metropolitan area or any of the four cities. Results from the study are representative and projectable only for the specific geographies studied, individually or as a group.

The benchmark audit was conducted over a six week period from mid-July to August of 1990. The post benchmark study was conducted over a six week period from Mid-April through May of 1991.

The four geographic sites are located in the cities listed below. Each community selected the specific site for study and more detail on the selection of these cities is found in Appendix B.

1. Burnsville. Large suburban area, high average volume, weekly pickup schedule and Dakota County representation.

2. Shoreview. Mid-size suburban area, high average volume, bi-weekly pickup schedule and Ramsey County representation.

3. Circle Pines. Small suburban area, low average volume, weekly pickup schedule and Anoka County representation.

4. Minneapolis. Large urban area, low average volume, bi-weekly pickup schedule and Hennepin County representation.

All on-site audit data was collected in terms of number of bins or grocery bags of recyclable material and converted into a cubic foot equivalent for analysis and presentation purposes. Conversion formulas for each of the sites can be found in Appendix C. The data collection instrument used in the audit survey is shown in Appendix D.

All on-site field observations and telephone interviewing were conducted by C.J. Olson Research of Minneapolis. The telephone questionnaire is shown in Appendix E.

A random sample of 200 yields a maximum error of + or - 5% on any proportion from the telephone survey data in total at a 90% level of confidence. A random sample of 50 yields a maximum error of + or -10% on any proportion in the telephone survey data for any given site at a 90% level of confidence. A 90% level of confidence is interpreted to mean that there is a 1 in 10 chance that the actual, or true, proportion lies somewhere outside of this maximum error range.

DESCRIPTION OF RECYCLING PROGRAMS AT EACH SITE

Minneapolis. Minneapolis accepts Newspaper, Glass, Metal Cans and Cardboard in its recycling program. Plastic was added as a material between the benchmark and post benchmark studies. Bins are provided to residents. Materials must be sorted in order to be picked up, and pickup occurs twice per month, or bi-weekly. Minneapolis provides an incentive to recycle, which is a credit against the trash pickup bill.

Shoreview. Shoreview accepts Newspaper, Metal Cans, Glass and Cardboard. Plastic was added as a material between the two studies. Shoreview does provide bins to residents for a nominal fee and materials must be sorted. Curbside pickup is provided on a bi-weekly basis.

Burnsville. Burnsville accepts Newspaper, Metal Cans, and Glass. Plastic was added as a material between the two studies. Bins are provided to residents and materials must be sorted. Burnsville has an open hauling system with seven operators in total. Customers of Quality Waste Control, the largest, were used in the site chosen for the research. Burnsville is on a weekly pickup schedule.

Circle Pines. Circle Pines accepts Newspaper, Metal Cans, Glass, Plastic and Cardboard. Metal Cans, Glass and Plastic can be mixed together for pickup and bins are provided. Circle Pines is on a weekly pickup schedule.

RECYCLING ACTIVITY TERMS

HOUSEHOLD PARTICIPATION: *Number of households recycling a material divided by the total number of households in the sites.* Households recycling a material are defined as *recycling households* for that material and this statistic presents these households as a percent of all households in the sites.

TOTAL CUBIC FEET RECYCLED: *Number of bags and bins of recyclable material observed at the curb on pickup days times their equivalent volume in cubic feet.* Bags (grocery bags) were evaluated at .83 cubic feet. Bins were given the following values by site:

Minneapolis - 3.20 cubic feet
Burnsville - 3.30 cubic feet
Circle Pines - 3.30 cubic feet
Shoreview - 1.98 cubic feet

HOUSEHOLD AVERAGE: *Cubic feet of material recycled divided by the number of recycling households.* This statistic shows the average volume of material recycled by recycling households.

NUMBER OF CURBSIDE PICKUPS: *Number of times recycling material was left at the curb for pickup by recycling households.*

PICKUP AVERAGE: *Cubic feet of material recycled divided by the number of curbside pickups for that material.* This statistic shows the average volume of material recycled by recycling households each time that material is collected at the curb.

PICKUP FREQUENCY: *Number of curbside pickups divided by the number of recycling households.* This statistic describes the average number of times recycling material was placed at the curb for pickup by recycling households.

PICKUP UTILIZATION:

Number of curbside pickups divided by the number of total available pickups among recycling households. Available pickups are simply what the number of curbside pickups would be if each recycling household recycled on every pickup day. For example, if only one household recycled three times in a weekly pickup site, the number of curbside pickups are 3 out of a total of 6 available pickups, for a Pickup Utilization of 50%.

This statistic is useful for evaluating how much recycling households are using the schedule available to them. A rate of 100% would mean that the schedule is being fully utilized by recycling households. A rate of 50%, however, would mean that recyclers are using, or perhaps only need, half of schedule available to them.

PICKUP USAGE:

Number of curbside pickups divided by the number of total available pickups among all households. Similar statistic to Pickup Utilization only computed over *all households in the sites,* and thus includes nonrecycling households.

This statistic is useful when evaluated in conjunction with Pickup Utilization. For example, if Pickup Utilization and Pickup Usage were both below 50%, this might imply that the pickup frequency of the schedule is twice that of what households are willing to use. This is because that less than half of the schedule is being used, even among recycling households.

However if Pickup Utilization was close to 100% in the previous example this would imply a different conclusion. This is because that even though only half of the schedule is being used overall, those that are recycling are fully utilizing it. A reduction in the schedule might reduce recycling volume by discouraging those that are currently fully utilizing the schedule.

RECYCLING ACTIVITY MODEL USED FOR ANALYSIS

During the course of the research design and subsequent execution and analysis of both studies, it became necessary to develop a generalized model of recycling behavior. This was necessary to both meet the study objectives and to clarify the presentation of the large amount of data collected. Conceptually this model focuses upon the *Total Cubic Feet of Material Recycled* as the key measurement of recycling activity between the two study periods.

Although recycling activity in the Twin Cities is most commonly measured in terms of tonnages, cubic feet as a key measure was chosen principally because it served as the most calculable and reliable measure, given the constraints and challenges of data collection. This allowed the analysis to be performed at minimal levels of measurement error. Secondarily, this measure is easily converted into a grocery bag or recycling bin equivalent. Once converted, the resulting statistics, when expressed at a household level, are conceptually easier to work with in making observations and drawing conclusions about recycling behavior.

This cubic foot measure is then broken into, or a function of, three components: the percent of households that recycled - *Household Participation*; at what level of volume - the *Household Average*; across how many households - the *Number of Households*. Specifically this relationship is expressed as follows:

Total Cubic Feet Recycled	=	Household Participation	X	Household Average	X	Number of Households

Between the two study periods the research design called for the *Number of Households* to remain constant. At constant levels between the studies this measure would have no impact on changes in the levels of recycling and thus was left out of the model and subsequent analysis.

The *Household Average* is a function of two other recycling measures, which are how many times households recycled - the *Pickup Frequency* - and how much was recycled each time - the *Pickup Average*. This relationship is shown below.

Household Average	=	Pickup Frequency	X	Pickup Average

After substituting the final two measures just shown for the *Household Average* the final model used for the analysis became:

Total Cubic Feet Recycled	=	Household Participation	X	Pickup Frequency	X	Pickup Average

This model serves three purposes in the analysis of the data.

1. Illustrates the factors which drive the key measurement in the study - cubic feet recycled - in a conceptual framework that is easily understood.

2. Enables the most complete comparison between audit survey and telephone survey data. Both the *Household Participation* and *Pickup Frequency* measures can be directly compared between both surveys.

3. Breaks the key measurement into components that are relatively independent of one another.

The third purpose served is probably the most important. The three measures shown on the right side of the equation above can be viewed as separate (but not mutually exclusive) variables which work independently to influence the levels of recycling volume. *Household Participation* is a function of the willingness or motivation to recycle at all. This can be viewed separately from the *Pickup Frequency* - where recycling is occurring - but where the issue is how often recycling occurs. The *Pickup Average* addresses the issue of how much is recycled each time recycling occurs, a variable which also can be examined separately.

Certainly there are exceptions to this general model of analysis. However, this model breaks the overall measurement of recycling activity into three components which, although not totally independent of one another, do address three actionable issues of recycling from a management perspective: **motivation, consistency** and **capacity**. In this model these equate to ***Household Participation, Pickup Frequency*** and ***Pickup Average***.

METHOD OF ANALYSIS

For purposes of analysis the data collected from the two studies was organized along three dimensions:

1. Type of material recycled.
2. Type of survey (audit or telephone).
3. Recycling model measures.

The data collected in the research was not comprehensive across all three dimensions. Between the audit and telephone surveys there were logistical problems in collecting or converting data on some of the categorical items. This made a comprehensive analysis across all three dimensions not possible. The table below summarizes the dimensions upon which the data collected could be examined.

Type of Material	Household Participation		Pickup Frequency		Pickup Average	
	Audit	Telephone	Audit	Telephone	Audit	Telephone
Newspaper	YES	YES	YES	YES	YES	**NO**
Metal Cans	YES	YES	YES	YES	YES	**NO**
Glass	YES	YES	YES	YES	YES	**NO**
Plastic	YES	YES	YES	YES	YES	**NO**
Mixed	YES	**NO**	YES	**NO**	YES	**NO**
Cardboard	YES	YES	YES	YES	**NO**	**NO**

NOTE: The **Mixed** type of material refers to those cases where recyclables were mixed together, rather than sorted, when placed at the curb. This was observed at all the sites in the audit. Circle Pines was the only community which accepted mixed recyclables and accounted for the vast majority of this category in the research.

The analysis on recycling model measures was performed across all types of material except for cardboard. In this category only the number of cardboard "bundles" was noted in the audit survey

observations, and no cubic foot estimation was made upon the resulting data. Cardboard recycling activity was relatively low in the two studies and given the absence of a cubic foot measure the category was left out of the main body of the analysis.

Comparisons between the audit and telephone survey results were not possible in two cases:

1. Across the Mixed recycling category. This category, unique to the Circle Pines site, comprised a significant category in the study. However, it was not logistically possible to collect this data in the telephone survey. When comparisons are shown by the other types of material recycled between the audit and telephone surveys, it is important to note that the data from the telephone survey is understated, due to the lack of a mixed recyclable category, relative to data from the audit survey.

   As will be shown in the analysis, this understatement of data in the telephone survey did not pose any significant problems in the interpretation of the research results.

2. Across the Pickup Average measure. Cubic foot measures were not considered a reliable measure to collect through a telephone survey methodology.

Analysis focused on breaking apart the levels of and changes in the recycling model measures due to categorical (type of material) and site specific influences. Comparisons between the audit and telephone survey data were made when appropriate.

DETAILED FINDINGS

RECYCLING ACTIVITY

PARTICIPATION RATES

The majority of households did participate in curbside recycling programs. There was an overall decline in participation between the two studies - from 65.6% to 58.8% - with the Shoreview site contributing the most to this decline.

Overall curbside Participation Rates declined from a benchmark level of 65.6% to a post benchmark level of 58.8%. The major recycling categories - Newspaper, Metal Cans and Glass - had decreases between 2 to 8 percentage points. Considering that benchmark levels of participation in these major recycling categories ranged from 35% to 50%, these declines are not particularly significant given that the observation periods ran only six weeks and at different seasons of the year. The Mixed recyclable category, unique and nearly confined to the Circle Pines site, had a modest increase in participation.

HOUSEHOLD PARTICIPATION RATES
Percent of All Households Recycling any Material

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change
Total	65.6%	58.8%	(6.8)
Newspaper	56.9	51.2	(5.7)
Metal Cans	44.2	41.8	(2.4)
Glass	34.8	27.4	(7.4)
Plastic	4.1	26.7	22.6
Mixed	7.4	11.2	3.8

Plastic showed a significant increase, from 4.1% to 26.7%, and was a result of this material being added to three of the four sites for curbside pickup between the studies. Minneapolis, Shoreview and Burnsville added Plastic for curbside pickup after the benchmark study was taken. Although this significant increase in Plastic recycling was observed, the fact that overall recycling participation declined modestly indicates that this increase in plastic recycling came from existing recycling

households. Thus, the addition of a new material did not bring into the market any new recycling households.

Overall Participation Rates varied greatly between the sites, but the relative levels of participation between the recycling categories within each site followed the general pattern as discussed above. By site, levels of and changes in overall participation rates from benchmark to post benchmark studies were:

- Minneapolis decreased modestly, from 86.8% to 77.7%.
- Burnsville was nearly equal in both studies at 76.9% to 77.2% respectively.
- Circle Pines declined slightly, from 53.8% to 50.5%.
- Shoreview had a significant decline, from 43.9% to 28.6%.

Shoreview's decline in Participation Rates contributed to the majority of the overall decline.

The notable exception to the overall pattern of changes in participation rates by recycling category occurred in Burnsville. In this site all significantly recycled materials showed strong increases in participation, with the exception of Newspaper which was virtually unchanged from the benchmark study. Since Burnsville's *overall* participation remained nearly unchanged from the benchmark study, this observation lends itself to the conclusion reached with the increase in Plastic participation across the sites - that there were no new recycling households in the market between the studies, but that those that were recycling were recycling more materials.

TOTAL CUBIC FEET RECYCLED

Total recycling volume increased 32% from a benchmark study level of 3,380 cubic feet to 4,454 cubic feet. Except for Shoreview all sites showed recycling volume increases.

The single largest contributor to the increase in recycling volume over the study period was due to the addition of plastic, and a subsequent substantial increase in the recycling participation of plastic, as an additional curbside recycling material at three of the four sites studied.

The second most significant factor contributing to the growth in recycling volume was an increase in the recycling participation, and subsequent increase in volume, of Mixed recycling material in the Circle Pines site. This category, which reflects material which is mixed together rather than sorted for pickup at the curb, is unique to the Circle Pines curbside recycling program among the four sites in the study.

Newspaper and Metal Cans accounted for the remainder of the increase in recycling volume.

Newspaper and Metal Cans are by far the most prevalent materials recycled, with significantly higher participation rates and volumes than other categories of material.

Total Cubic Feet Recycled increased 32% from a benchmark level of 3,380 to a post benchmark level of 4,454. Newspaper and Metal Cans accounted for the majority of the volume in both study periods, but not the increase. The Plastic and Mixed categories grew significantly and accounted for 73% of the 1,074 cubic foot volume change between the study periods. Plastic accounted for 490 cubic feet, or 46%, of this increase while Mixed contributed 298 cubic feet, or 28%. Mixed recyclables are a material category unique to the Circle Pines site.

TOTAL CUBIC FEET RECYCLED

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	3,380	4,454	1,074	32%
Newspaper	1,618	1,729	111	7%
Metal Cans	964	1,145	181	19%
Glass	480	474	(6)	(1)%
Plastic	82	572	490	Over 100%
Mixed	236	534	298	Over 100%

It should be noted, however, that as a material it takes relatively few plastic items to make up a cubic foot compared to other materials, and therefore Plastic volume is overstated relative to its weight as compared to the other recycling categories. Thus, if measured in weight the growth in Plastic was probably not nearly as dramatic as indicated in the research.

Burnsville had the largest increase in Total Cubic Feet Recycled, followed by Circle Pines and Minneapolis. Shoreview remained at nearly equal levels. By site:

- Minneapolis increased 19% to a level of 1,296 cubic feet.
- Shoreview remained flat with a post benchmark level of 583 cubic feet.
- Burnsville increased 48% to a level of 1,542 cubic feet.

- Circle Pines increase 54% to a level of 1,033 cubic feet.

Cubic feet of Plastic recycled, the most significant contributor to the overall increase in volume, had significant recycling volume increases in the Minneapolis, Shoreview and Burnsville sites, which reflects these communities adding this material to their recycling programs since the benchmark study was conducted. For all three of these sites Plastic had the largest increases in recycling volume across all the categories, and became equal to or greater than Glass as a recycling activity as measured by volume. Specific increases in Plastic at each site were:

- A 234 cubic foot increase in Burnsville to account for 48% of the overall Plastic growth.
- A 142 cubic foot increase in Minneapolis to account for 29% of the overall Plastic growth.
- 90 and 24 cubic foot increase, respectively, in Shoreview and Circle Pines to account for the remainder of the Plastic growth.

The growth in Mixed recyclables was confined entirely to the Circle Pines site. Circle Pines was the only community to accept this category of material, which reflects material that is mixed together rather than sorted for pickup at the curb. Mixed recyclables more than doubled in cubic feet of volume in Circle Pines and accounted for 250 cubic feet, or 84%, of the overall growth in this category across the sites. Although this material is not accepted at the curb in the other three sites, it was observed at small levels and accounts for the remainder of both the levels of and growth in this type of material.

Newspaper and Metal Cans accounted for the remainder of the increase in volume, growing 292 cubic feet to account for 28% of the overall growth. By far the majority of this increase was attributable to the Burnsville site. By site:

- Burnsville grew 198 cubic feet to account for 68% of the growth in both categories.
- Circle Pines and Minneapolis grew 90 and 86 cubic feet, respectively, to account for the remainder of the increase.
- Shoreview declined 82 cubic feet.

Newspaper and Metal Cans are by far the most prevalent materials recycled. The participation rate and volume of material recycled are significantly higher in these two categories compared to other materials, and this pattern was consistent across all the sites and between the benchmark and post benchmark studies.

RECYCLING ACTIVITY SUMMARY

ALL SITES Number of Households = 1,232	Cubic Feet Recycled	Participation Rate
Total	4,454	58.8%
Newspaper	1,729	51.2%
Metal Cans	1,145	41.8%
Glass	474	11.2%
Plastic	572	27.4%
Mixed	534	26.7%

A significant - and the only exception - to this pattern was in Circle Pines. The Mixed recyclable category ranked highest in volume and second in participation. On-site observations, however, confirmed that the majority of the material mixed together in this site was newspaper and metal cans.

HOUSEHOLD RECYCLING FREQUENCY AND PICKUP AVERAGES

Household recycling frequency increased slightly from the benchmark study. The average number of times a household recycled increased to just under 2.5 times, out of a potential 3 times for a bi-weekly and 6 times for a weekly pickup site. On balance, there was relatively little difference in the average frequency of pickup between bi-weekly and weekly pickup sites.

Households that recycled placed at the curb, on average, 3 grocery bags of material in the post benchmark study, compared to an average of just under 2.5 bags observed in the benchmark study. Shoreview had a significantly higher average in the post benchmark study which offset the site's substantial decline in participation, and kept the volume of recycling material in the site at equal levels between the two studies.

Both the Pickup Frequency (the number of curbside pickups per recycling household) and the Pickup Average (the cubic feet recycled per curbside pickup) increase from the benchmark to the post benchmark study. In percentage terms the Pickup Average had the greater increase, rising 29% from 1.96 cubic feet (about 2 1/3 grocery bags) to 2.53 cubic feet (3 grocery bags). This increase, relative to a smaller increase in the Pickup Frequency and a decline in the Participation Rate, was the factor which contributed most to increased levels of recycling volume. As has been discussed

earlier, this increase in the Pickup Average is due to recycling households adding more types of material to their recycling efforts.

PICKUP AVERAGE
Cubic Feet Recycled per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	1.96	2.53	0.57	29%
Newspaper	1.20	1.18	(0.02)	(2)%
Metal Cans	.92	1.12	0.20	22%
Glass	.66	.80	0.14	21%
Plastic	1.11	.98	(0.13)	(12)%
Mixed	1.72	1.98	0.26	15%

Materials contributing most to the increased level of Pickup Average were Metal Cans and Glass, both rising just over 20% between the two studies to levels of 1.12 and .80 cubic feet respectively. Newspaper, at a post benchmark level of 1.18 cubic feet, was down only slightly. Plastic had the largest percentage decline, at 12%, to a post benchmark level of .98 cubic feet. The Mixed recyclable Pickup Average was up 15% to a post benchmark level of 1.98 cubic feet, and was the highest average among the recycling material categories. Again, the bulk of this category is concentrated in Circle Pines.

Pickup Frequency was up 14% to a post benchmark level of 2.43, which means that on average those households recycling placed material at the curb for pickup almost 2.5 times. By recycling material the Pickup Frequency ranged from 1.76 to 2.33, not a particularly significant range and indicates that, on average, most households used curbside pickup relatively the same number of times. The majority of recycling households in weekly areas (75%) recycled three times or less, while in bi-weekly areas nearly 50% recycled three times. In Minneapolis, a bi-weekly area, two thirds of recycling households recycled three times. In contrast just over 70% of recycling households in Shoreview, the other bi-weekly area, recycled only once.

PICKUP FREQUENCY

Number of Curbside Pickups per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	2.13	2.43	0.30	14%
Newspaper	1.92	2.33	0.41	21%
Metal Cans	1.92	1.99	0.07	4%
Glass	1.70	1.76	0.06	4%
Plastic	1.45	1.76	0.31	21%
Mixed	1.51	1.95	0.44	29%

By site, Pickup Frequencies from benchmark to post benchmark were:

- Minneapolis - 2.13 to 2.43.
- Shoreview - 1.46 to 1.36.
- Burnsville - 2.42 to 2.66.
- Circle Pines - 2.11 to 2.52.

Overall the Pickup Frequencies were relatively equal across the sites with the exception of Shoreview, which had significantly lower frequencies.

Shoreview's lower frequency of recycling by recycling households was offset by significantly higher Pickup Averages. By site, Pickup Averages from benchmark to post benchmark studies were:

- Minneapolis - 1.85 to 2.14 cubic feet.
- Shoreview - 2.92 to 4.98 cubic feet.
- Burnsville - 1.76 to 2.37 cubic feet.
- Circle Pines - 1.94 to 2.66 cubic feet.

As with the Pickup Frequency, Pickup Averages were relatively equal across the sites with the exception of Shoreview. The significantly higher Pickup Averages in Shoreview offset the site's substantial decline in participation, and kept the volume of recycling material from the site at equal

levels between the two studies. A note of caution, however, with the Shoreview data. In the post benchmark study there were a few households with abnormally large volumes of recycling material. With the relatively low participation rates within the site, these few households had the effect of skewing the average upward compared to other households in the site, and the resulting cubic foot measures in the post benchmark study should be viewed with some skepticism.

In the two major recycling categories - Newspaper and Metal Cans - growth in volume of cubic feet recycled occurred for opposite reasons. Newspaper volume growth was attributable to an increase in the *Pickup Frequency* across the sites, while Metal Can volume was attributable to an increase in the *Pickup Average* across the sites. Reasons for this are unclear from the data, but what it does mean is that recycling households placed the same amount of newspaper at the curb more often, and a larger amount of Metal Cans at the curb as often from the benchmark study.

PICKUP FREQUENCY

Number of Curbside Pickups per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Newspaper	1.92	2.33	0.41	21%
Metal Cans	1.92	1.99	0.07	4%

PICKUP AVERAGE

Cubic Feet Recycled per Recycling Pickup

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Newspaper	1.20	1.18	(0.02)	(2)%
Metal Cans	.92	1.12	0.20	22%

UTILIZATION OF PICKUP SCHEDULES

Curbside recycling pickup schedules appeared to be greatly underutilized, with approximately half of the potential pickups among recycling households going unused in both studies. The exception was Minneapolis, a bi-weekly pickup site, where utilization averaged approximately 80% in both studies.

Although this might suggest no need for weekly pickups, there was evidence that a potential does exist among households to more fully utilize a weekly schedule. Those households nearly or fully utilizing a weekly schedule had a substantially higher recycling volume than other households in the study.

The amount of material placed at each curbside pickup was relatively equal across the different number of times households used curbside pickup. Thus, higher levels of recycling volume per household was observed at more frequent, or consistent, curbside usage.

Those recycling more frequently were also recycling more types of material, and this was the major distinguishing factor found in the research between high and low frequency recycling households. Recycling behavior inside each household is most probably the key driving recycling volume. Recycling behavior was remarkably consistent from site to site, as evidenced by nearly equal levels of average cubic feet of material recycled per recycling household despite differences in recycling programs, pickup schedules and household composition.

There is evidence that gaining higher levels of recycling participation may be very difficult. The public's perception of their recycling involvement - what they believe they are recycling and how often it is recycled - is at very high levels (90%+), significantly higher than observed recycling behavior, and did not change between the two studies despite a slight decline in observed participation rates.

Pickup Day Utilization, the percent of all available pickups used by recycling households - was approximately 50% or less across the sites in both studies. In other words, those households that did recycle only used, or needed, half of the pickup schedule available to them. When adding to this ratio those households that recycled nothing - Pickup Day Usage - this percent dropped to around 30% in both studies. This means that across the sites recycling trucks stopped at approximately every third house to pick up material during the six weeks in each study period.

Any potential increases in Pickup Day Usage are largely a function of increasing Participation Rates. Thus, by site and recycling material category differences in this ratio were reflective of Participation Rates by site and material. Increases in Pickup Day Utilization, which is calculated across only those households that did recycle, are a function of increasing the Pickup Frequency, and by getting recycling households to recycle additional materials.

Pickup Day Utilization varied across the recycling material categories from approximately 40% to 50%. By category and from benchmark to post benchmark studies:

- Newspaper increased 9.0 percentage points to 51.6%.
- Metal Cans increased 1.4 percentage points to 44.0%
- Glass increased 1.4 percentage points to 39.1%.
- Plastic increased 6.9 percentage points to 39.1%.
- Mixed increased 9.8 percentage points to 43.2%.

By site Pickup Day Utilization was relatively equal with the exception of Minneapolis. Minneapolis had a Pickup Day Utilization of over 80% in the post benchmark study, and this is a reflection of this site having high Participation Rates and comparable Pickup Frequencies to the other sites (especially those with a weekly pickup), and a bi-weekly schedule. By site and from the benchmark to the post benchmark studies:

- Minneapolis increased from 73.4% to 83.8%.
- Shoreview decreased from 49.5% to 45.3%.
- Burnsville increased from 40.3% to 44.0%.
- Circle Pines increased from 35.2% to 42.0%.

Although this analysis might suggest no need for weekly pickups, there is evidence that the potential exists in the marketplace to more fully utilize pickup schedules, especially weekly schedules. Household Averages were higher at higher levels of Pickup Frequency across the sites, and significantly higher among those households in weekly pickup sites recycling five or six times.

Those recycling five to six times in weekly sites had a Household Average (Cubic feet recycled per recycling household over the six week study period) of 12.6 cubic feet, twice the overall average of 6.1 cubic feet for all recycling households. In bi-weekly pickup sites the Household Average for those recycling three times - the highest possible frequency - was 8.9 cubic feet, still under the Household Average for frequencies of five to six times, and only slightly greater than the Household Average of 8.5 cubic feet for a frequency of three times in weekly pickup sites.

There was no consistent pattern of higher or lower Pickup Averages at different recycling frequencies. Pickup Averages by recycling frequency were, in fact, relatively equal across the sites, with bi-weekly sites exhibiting somewhat higher averages than weekly pickup sites. If all households were recycling relatively the same amount of material over the study period, the Pickup Averages should have declined as Pickup Frequency increased. As this was not true, nor expected, the data

then points out that higher levels of recycling volume per household were observed at higher recycling frequencies, and the hypothesis that the frequency of recycling is a major factor driving recycling volume.

HOUSEHOLD AVERAGE BY NUMBER OF TOTAL CURBSIDE PICKUPS

ALL SITES Number of Households = 724	Total	Weekly Sites	Bi-Weekly Sites
One Time	4.16	3.01	4.79
Two Times	5.81	4.99	6.52
Three Times	8.47	7.84	8.88
Four Times	9.51	9.51	—
Five Times	12.64	12.64	—
Six Times	12.66	12.66	—

PICKUP AVERAGE BY NUMBER OF TOTAL CURBSIDE PICKUPS

ALL SITES Number of Households = 724	Total	Weekly Sites	Bi-Weekly Sites
One Time	3.95	3.01	5.01
Two Times	2.48	2.49	3.26
Three Times	3.27	2.61	3.62
Four Times	2.37	2.37	—
Five Times	2.52	2.52	—
Six Times	2.09	2.09	—

There was some evidence that one factor contributing to, or a result of, higher recycling volumes at higher recycling frequencies was the number of materials recycled. Participation rates generally rose as the recycling frequency increased. Thus, households recycling more frequently were generally recycling more types of material. This pattern was best seen when examining the data at the extremes of recycling frequency, that is comparing participation rates between those recycling one or two times to those recycling five or six times in weekly sites, and those recycling once or three times in bi-weekly sites. In the "middle" frequencies this pattern of higher participation was not as clear, or sometimes contradictory.

PARTICIPATION RATES BY NUMBER OF TOTAL CURBSIDE PICKUPS

WEEKLY SITES Number of Households = 398	Newspaper	Metal Cans	Glass	Plastic
One Time	78.9%	45.3%	27.3%	34.4%
Two Times	89.4	60.6	47.1	48.1
Three Times	96.8	61.9	60.3	52.4
Four Times	89.7	71.8	48.7	56.4
Five Times	100.0	77.8	51.9	59.3
Six Times	97.3	81.1	59.5	75.7

BI-WEEKLY SITES Number of Households = 357	Newspaper	Metal Cans	Glass	Plastic
One Time	79.2%	66.3%	52.1%	53.2%
Two Times	85.8	62.2	46.1	60.9
Three Times	92.3	82.9	48.8	68.0

Certainly a major contributing factor to different levels of recycling volume at a household level are differences in household composition and buying behavior. The issue of buying behavior was one not examined in this study, but demographic composition was collected in the telephone survey and subsequently examined on a site to site comparison level.

The two factors presumed to drive differences between households in recycling capacity, that is the potential amount of material available to recycle, are household size and household income. A comparison between the Burnsville and Circle Pines sites is shown below. Both are weekly pickup areas, accept the same materials (with the exception of Mixed in Circle Pines), and have relatively high participation rates (77% and 51% respectively).

HOUSEHOLD AVERAGES BY RECYCLING FREQUENCY - WEEKLY PICKUP SITES

WEEKLY SITES Number of Households = 398	Burnsville	Circle Pines
One Time	12.3	13.3
Two Times	12.1	13.2
Three Times	9.2	10.1
Four Times	7.4	8.6
Five Times	5.0	4.9
Six Times	2.8	3.3
Household Size 3+ (%)	72%	58%
Household Income $50,000+ (%)	39%	3%

Despite demographic differences between the two sites, recycling behavior measured in Household Averages by recycling frequency were nearly identical. Burnsville, with significantly higher income levels and larger household sizes, was expected to have been higher in Household Averages overall, or have higher Household Averages as recycling frequency increased (presumably because the higher income and size households that are recycling would need, or want, to recycle a higher volume of material more frequently).

A very plausible explanation might be the existence of the Mixed recyclables in Circle Pines, which serves to make the recycling effort easier and more convenient for the household. Thus, this

category served to "boost" recycling behavior among recycling households in Circle Pines and made up for any differences in household composition, or recycling capacity between the two sites. This effect is not measurable with the data from the research. However, given the remarkable similarities in household averages across recycling frequencies it seems unlikely that the demographics or Mixed recyclable category were major factors explaining the higher averages at higher frequencies.

A comparison between the two bi-weekly sites yielded similar, but less conclusive, results. Shoreview, with significantly higher household incomes and sizes, did exhibit higher Household Averages than Minneapolis at all recycling frequencies. The gap between these averages was significantly greater at recycling frequencies of three times. However, in the Shoreview site only 7 households recycled three times and at abnormally high volumes, which indicates that something unusual occurred and the data should be viewed with skepticism.

HOUSEHOLD AVERAGES BY RECYCLING FREQUENCY - WEEKLY PICKUP SITES

BI-WEEKLY SITES Number of Households = 357	Minneapolis	Shoreview
One Time	4.2	5.3
Two Times	6.3	7.9
Three Times	8.4	17.4
Household Size 3+ (%)	34%	85%
Household Income $50,000+ (%)	35%	85%

At the other two frequencies, one and two times, Shoreview did have higher averages and the gap between the two sites increased as the frequency went from once to twice. This tends to reflect what was to be expected - that Shoreview should have higher averages - with the site's stronger demographics. The issue, however, is how much higher should the averages be given the differences in household composition between the sites. Looking at those recycling once or twice, Shoreview households recycled, on average, about 1.4 more grocery bags of material, or about 25% more material, than those in Minneapolis. Remember also that this difference was measured over a six week period. The Shoreview site, however, has nearly 50% more people per household, on average, and a buying power (as measured in average household income) 23% higher than Minneapolis. It is not inconceivable that the recycling capacity among Shoreview households, that is the potential amount of recyclable material consumed, is twice that of a Minneapolis household.

It is entirely possible that the differences in Household Averages at different levels of recycling frequency occurred because of different demographic composition of the households at different levels of recycling frequency within each site. That is, household income and size increased as recycling frequency increased, and presumably because there is a larger amount to recycle. Sample size in the telephone survey was too small to make this detailed of an analysis.

However, there is some evidence to the contrary. If the relationship above were the case, and we assume recycling participation occurs relatively at equal levels among demographic groups, we would expect the recycling frequency distribution to fairly mirror the household size and income distribution. In Minneapolis, the majority of the households were at smaller sizes - 66% at one or two - however the majority of the recycling frequency (66%) occurred at three times - the highest possible frequency. If a visual correlation between household size and frequency were made in the Minneapolis site, one might try to say that frequency *declines* as household size increases since this was the observed pattern between these two variables. If this were true, given the observation that average volumes increase as frequency increases, it says that smaller households recycle significantly more material than larger households.

A similar pattern occurs in the Shoreview site. The majority of households (85%) have household sizes of 3 or more, however the majority of the recycling frequency (72%) among recycling households occurred only once.

What the preceding analysis points out is that most likely there is a diversity of demographic groups recycling at each level of frequency, and given that average volumes increase at higher frequencies something *behavioral* explains, or drives, this relationship. One of these behavioral aspects found from the research is that more types of material are being recycled at higher recycling frequencies.

RECYCLING AWARENESS AND ATTITUDES

PERCEIVED RECYCLING PARTICIPATION

There is evidence that gaining higher levels of recycling participation may be very difficult. The public's perception of their recycling involvement - what they believe they are recycling and how often it is recycled - is at very high levels (90%+), significantly higher than observed recycling behavior, and did not change between the two studies despite a slight decline in observed participation rates.

Awareness of recycling advertising or public awareness programs was very high (80%+) and increased significantly between the two studies. The majority of the public aware of this advertising rate it helpful, and increasingly more so because it informs them on what, when and how to recycle.

Nearly all households reported having recycled material, either through a curbside program or otherwise, throughout the sites in the telephone survey. This level of reported participation was identical between the benchmark and post benchmark studies, with no significant variation between the sites.

OVERALL RECYCLING PARTICIPATION

QUESTION: Has your household recycled any material in the last six weeks?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	96%	96%	0	
NO	4	4	0	

CURBSIDE RECYCLING PARTICIPATION

QUESTION: Have you recycled an material using a curbside pickup recycling program?

BASE: All households.

The vast majority reported recycling Newspaper, Metal Cans, Glass and Plastic in the post benchmark study, with a significant increase noted from the benchmark study in Plastic from 18% to 77%. By site, the only notable variation from the overall level of response was in Circle Pines, where reported Plastic participation was significantly higher at 90%.

MATERIAL RECYCLED THROUGH CURBSIDE PICKUP

QUESTION: Which of the following materials have you recycled through a curbside program in the last six weeks?
BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Newspaper	94%	90%	(4)%	
Metal Cans	83	87	4	
Glass	84	87	3	
Plastic	18	77	59	at 99%
Cardboard	28	42	14	at 99%

Compared to observed recycling participation from the Audit survey, these reported Participation Rates were significantly higher across all categories. Overall, 95% of telephone respondents reported some curbside recycling participation compared to a 59% participation found in the audit survey. The only significant corroborating relationship between the audit and telephone surveys was in the change in Plastic recycling participation, where levels rose significantly between the two studies. However, telephone survey Participation Rates were significantly higher than audit survey rates in the Plastic category.

Reported levels of recycling frequency were also substantially higher in the telephone survey. Across the recycling material categories telephone survey respondents reported significantly higher levels of recycling frequency, with a majority reporting recycling at the highest curbside frequencies. This contrasts with the audit survey results, where the majority were observed to be recycling at generally the lowest curbside recycling frequencies. This pattern of telephone survey response was consistent from site to site, despite wide variations in recycling frequencies (if nonrecycling households are included) from the audit survey from site to site.

To some extent the Participation Rates and recycling frequencies from the telephone survey can be said to be artificially high due to non-sampling bias as a result of the nature of the survey. People are more generally inclined to tell an interviewer what he or she thinks you want to know, especially if there is doubt in their minds as to exactly what recycling behavior has occured in the last six weeks. In such cases, the tendency is to either to respond with "average" responses, that is choose

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	95%	95%	0	
NO	5	5	0	

a "middle-of-the-road," or choose responses which overstate reality, that is to "play it safe."

Despite such potential bias, it is clear from the results that there are wide gaps between what people perceive they are recycling and what they are actually recycling. In contrast to the audit results, where there was a relatively low usage of the available recycling pickup schedules, the telephone survey suggests that people perceive themselves to be making the best possible use of these schedules.

PARTICIPATION RATES
COMPARISON BETWEEN TELEPHONE AND AUDIT SURVEYS

ALL SITES	Telephone Benchmark	Telephone Post Benchmark	Audit Benchmark	Audit Post Benchmark
Newspaper	94%	90%	57%	51%
Metal Cans	83	87	44	42
Glass	84	87	35	27
Plastic	18	77	4	27

Other than through curbside recycling, 22% of the households reported recycling materials through other means (such as recycling centers or for cash) in the post benchmark study, which is virtually equal to the level reported in the benchmark study. The majority of this activity - 53% - was in Metal Cans, however this activity declined significantly from the 70% level found in the benchmark study. Plastic was recycled by 7%, down from 17% in the benchmark study but not at a statistically significant level. Two categories emerged among this group in the post benchmark study. Oil was reported by 20% and batteries by 13%.

In the post benchmark study there were no significant variations between the sites or among demographic groups regarding noncurbside recycling activity . This contrasts with the benchmark findings, where lower income households and those in the Circle Pines site tended to be the segments most likely to recycle material other than through curbside pickup.

RECYCLING ACTIVITY OTHER THAN CURBSIDE PICKUP

QUESTION: Has your household recycled material in some other way besides curbside pickup?

BASE: All households.

ALL SITES Total Responding =204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	23%	22%	(1)%	
NO	77	78	1	

PERCEIVED RECYCLING EFFORT

What opportunities do exist center upon getting households to add materials to current recycling activities or maintaining more consistency in their recycling efforts. The majority of the public believes that they are recycling as much as possible, and this belief increased significantly in magnitude between the two studies. Among the minority that believe they could recycle more, reasons centered on a lack of consistency or to add more materials to that which they already recycle.

There was a significant increase between the two studies in the belief that households are doing all they can in their recycling efforts. In the post benchmark study 73% of those respondents having recycled anything in the past six weeks (96% of all households) believed that their household was recycling as much as possible, compared to a benchmark level of 54%. Among this group, the reasons given for this perception were overwhelmingly either Doing everything I Can or We put out everything (cited by 93%). Compared to the benchmark study, there was a significant rise in We put out everything with corresponding significant declines in Doing everthing I can and Should do Plastic. These observations correspond roughly to observations seen in the research overall, where Plastic recycling increased dramatically due largely to the addition of this material to three of the four sites. Among the sites the only significant variation from this pattern was in Shoreview, where significantly fewer respondents cited Doing everything I can as a response.

Among the minority saying their household was not recycling as much as possible in the post benchmark study, the reasons concentrated in the need to add materials to their efforts (cardboard, other paper, glass and other cans) - cited by 60%, Should do Plastic - cited by 33% (an awareness problem since all sites accept Plastic), or Not consistent/careless - cited by 30%. Should do Plastic declined significantly as a reason from the benchmark study, while Should recycle other paper (cited by 18%) emerged as a new category.

REASONS GIVEN FOR RECYCLING AS MUCH AS POSSIBLE

QUESTION: Why do you say that your household is recycling as much as possible?

BASE: Those saying their household is recycling as much as possible who have recycled any material in the last six weeks.

ALL SITES Total Responding = 105/141 Percent Responding = 52%/70%	Benchmark	Post Benchmark	Change	Significant Change
Doing everything I can/Recycling everything	62%	47%	(15)%	at 99%
We put out everything	23	46	23	at 99%
Should recycle other paper	0	4	4	at 90%
Should do/Be able to do Plastic	20	3	(17)	at 99%
Purchase only recyclable materials	0	3	3	at 90%
Should recycle cardboard	5	7	2	
Not consistent/Careless	1	7	6	at 95%
Should recycle other cans	1	0	(1)	
Other	18	10	(8)	at 90%

NOTE: Data will total over 100% due to multiple response.

REASONS GIVEN FOR NOT RECYCLING AS MUCH AS POSSIBLE

QUESTION: Why do you say that your household is not recycling as much as possible?

BASE: Those saying their household is not recycling as much as possible that have recycled any material in the last six weeks.

ALL SITES Total Responding = 89/51 Percent Responding = 44%/25%	Benchmark	Post Benchmark	Change	Significant Change
Should do/Be able to do plastic	47%	33%	(14)%	at 99%
Not consistent/Careless	23	30	7	
Should recycle cardboard	18	24	6	
Should recycle other paper	0	18	18	at 99%
Should recycle glass	14	10	(4)	
Should recycle other cans	9	8	(1)	
We put out everthing	3	2	(1)	
Purchase only recyclable material	0	2	2	
Do everything I can/Recycle everything	7	0	(7)	at 90%
Other	30	24	(6)	

NOTE: Data will total over 100% due to multiple response.

RECYCLING ADVERTISING AWARENESS

Awareness of recycling advertising or public awareness programs was very high (80%+) and increased significantly between the two studies. The majority of the public aware of this advertising rate it helpful, and increasingly more so because it informs them on what, when and how to recycle.

Awareness of recycling advertising or other public awareness programs rose significantly between the two studies, from 74% to 86%. Awareness levels were relatively equal across the sites.

Content of the advertising recall concentrated into three general categories:

- Informational - what, when or how to recycle. This was cited by 73% in the post benchmark study, a significant increase over the 49% level in the benchmark study.

- Media - could only remember media, not content or message. This was cited by 12% in the post benchmark study, a significant decrease from the 28% level in the benchmark study.

- Persuasive - encouragement or reminder to recycle. This was cited by 14% in the post benchmark study, a significant decrease from the 25% level in the benchmark study.

A notable proportion - 26% - of the post benchmark respondents could not recall the content, a significant increase from the 17% level in the benchmark study. Among the sites Shoreview respondents cited When to recycle significantly more times and What or How to recycle significantly fewer times than average in both studies.

The vast majority of respondents in both studies cited the source of the advertising recall from local community or county efforts. Only 2% mentioned television in the post benchmark study, down from 9% in the benchmark study. A significant proportion could not recall the source (31% and 36% respectively) in both studies.

The implications of these patterns of advertising recall are two-fold:

- The only clear and dominant message understood by the market is on the "nuts and bolts" of reycling, that is the what, when and how to recycle, and this is being delivered rather effectively at a community or county level.

- Any other messages sent to marketplace are lost in the clutter, or not received at all.

ADVERTISING CONTENT RECALLED

QUESTION: What particular advertisement or public awareness program stands out in your mind?

BASE: Those recalling any advertising or public awareness program.

ALL SITES Total Responding = 150/173 Percent Responding = 74%/86%	Benchmark	Post Benchmark	Change	Significant Change
What/How to recycle	21%	40%	19%	at 99%
When to recycle	18	23	5	
Encouragement to recycle	15	8	(7)	at 95%
Yard waste	3	7	4	
Save environment	10	6	(4)	
Something on TV	7	6	(1)	
Something in paper	12	3	(9)	at 99%
Pamphlet/Brochure	9	3	(6)	at 95%
Hazardous materials	7	3	(4)	
Other	19	7	(12)	at 99%
Can't recall	17	26	9	at 90%

NOTE: Data will total over 100% due to multiple response.

The majority of respondents recalling advertising rated it either Very or Somewhat helpful, with only a small minority rating the advertising Not at all helpful. Sixty-one percent rated the advertising Very helpful and 31% Somewhat helpful in the post benchmark study, nearly equal to levels exhibited in the benchmark study. Reasons given for the helpfulness of the advertising fell into two principal categories:

- Informational - what, when and how to recycle. This reason was cited by 51% in the post benchmark study, up significantly from 31% in the benchmark study.

- Persuasive - encouragement and awareness to recycle. This reason was cited by 54% in the post benchmark study, down significantly from 71% in the benchmark study.

This switching in the perception of the helpfulness of advertising between the two studies is significant and results from other observations seen in the research. Perceived participation rates were very high and perceived recycling effort had a significant increase between the two studies. It would make sense, therfore, that the public's perception of how helpful the advertising is in

relation to their recycling activity would shift away from persuasive themes, since in their minds the majority think they are already doing as much as possible and need no "reminders" to recycle.

REASONS GIVEN FOR HELPFULNESS OF ADVERTISING

QUESTION: Why do you say that the advertising was very/somewhat helpful?

BASE: Those rating advertising or public awareness programs recalled as very or somewhat helpful.

ALL SITES Total Responding = 138/160 Percent Responding = 68%/80%	Benchmark	Post Benchmark	Change	Significant Change
Tells what/when/how to recycle	31%	51%	20%	at 99%
Makes us more aware/Encouraged us to recycle	44	28	(16)	at 99%
Makes us more aware/That's how we found out about it	17	15	(2)	
Serves as reminder	10	11	1	
Been recycling a long time	5	11	6	
Other	10	10	0	
Don't know	2	3	1	

NOTE: Data will total over 100% due to multiple response.

DEMOGRAPHICS

AGE

Age of the telephone survey respondents across the sites did not vary significantly between the two study periods. The majority of respondents were between the ages 35 to 44, followed by the ages 25 to 34. The age groups 45 to 54, 55 to 64 and 65 and over were the next largest groups and at relatively equal levels between the two studies.

AGE OF RESPONDENT

QUESTION: In which of the following age groups are you?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
18 - 24	2%	3%	1%	
25 - 34	22	25	3	
35 - 44	36	33	(3)	
45 - 54	16	11	(5)	
55 - 64	13	11	(2)	
65 and over	11	15	4	

Specific site differences were:

- Minneapolis had almost an equal representation of all age groups.
- Shoreview was the youngest site, with a significant majority of respondents between the ages 35 to 44.
- Burnsville had a "normal" distribution of ages, with the majority between the ages 35 to 54.
- Circle Pines had a dichotomous distribution of ages, with the majority at younger (ages 25 to 44) and older (Over age 55) ages.

EDUCATION

Educational levels did not change significantly among respondents between the two studies in the telephone survey, with the two largest categories, at equal levels, College or High School Degree. Respondents with Some College were the next largest category followed closely by Graduate/Professional Degree. The smallest categories were Less than High School and Technical School, both at nearly equal levels.

EDUCATION OF RESPONDENT

QUESTION: What is the highest level of education you have completed?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Less than High School	10%	8.5%	(2)%	
High School	26	25	(1)	
Technical School	9	10	1	
Some College	18	15	(3)	
College Degree	27	31	4	
Graduate/Professional Degree	14	10	(4)	

By site:

- Minneapolis generally mirrored the overall pattern of educational levels.
- Shoreview had the highest educational levels, with significantly higher proportions of respondents with College Degree or Graduate/Professional Degree.
- Burnsville also generally mirrored the overall pattern, with a somewhat less representation of respondents with Graduate/Professional Degree.
- Circle Pines was the least educated of the sites, with a significant minority having no college degrees.

HOUSEHOLD SIZE

There were no significant changes in sizes of households between the two study periods, with the majority at sizes of three to four people. Two people comprised the next largest category, followed by one person or five or more people, both at relatively equal levels.

HOUSEHOLD SIZE

QUESTION: How many people, including yourself, currently live in your household?
BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
One	11%	7%	(4)%	
Two	27	28	1	
Three to Four	48	46	(2)	
Five or more	15	17	2	

Variations among the sites were:

- Minneapolis had the majority of its households with two people or less.
- Shoreview had the largest household sizes, with the majority of its households with three people or more.
- Burnsville generally mirrored the overall pattern of household sizes.
- Circle Pines had no one dominant category of household size. All sizes were significantly represented.

HOUSEHOLD INCOME

Income levels did not change significantly among respondents from benchmark to post benchmark studies. The majority of households were in the $50,000 or greater category, followed by $35,000 to $49,999. Both the $25,000 to $34,999 and Under $25,000 categories were third in size and approximately equal.

HOUSEHOLD INCOME

QUESTION: Which of the following categories best describe your total annual household income?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Under $25,000	16%	12%	(4)%	
$25,000 to $34,999	11	13	2	
$35,000 to $49,999	22	22	0	
$50,000 or more	36	30	(6)	
Refused	15	23	8	

In generalities by site:

- Minneapolis was third in income levels.
- Shoreview was first in income levels, with a substantially majority falling in the $50,000 or greater category.
- Burnsville was second in income levels.
- Circle Pines was last in income levels, with a substantial number in the Under $25,000 category.

APPENDICES

APPENDIX A: DATA TABLES - SITES COMBINED

TABLE DIRECTORY

AUDIT DATA TABLES

TABLE A-1: TOTAL CUBIC FEET RECYCLED

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	3,380	4,454	1,074	32%
Newspaper	1,618	1,729	111	7%
Metal Cans	964	1,145	181	19%
Glass	480	474	(6)	(1)%
Plastic	82	572	490	Over 100%
Mixed	236	534	298	Over 100%

TABLE A-2: HOUSEHOLD PARTICIPATION RATES

Percent of All Households Recycling any Material

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change
Total	65.6%	58.8%	(6.8)
Newspaper	56.9	51.2	(5.7)
Metal Cans	44.2	41.8	(2.4)
Glass	34.8	27.4	(7.4)
Plastic	4.1	26.7	22.6
Mixed	7.4	11.2	3.8

TABLE A-3: HOUSEHOLD RECYCLING AVERAGES

Cubic Feet Recycled per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	4.18	6.14	1.96	47%
Newspaper	2.31	2.74	0.43	19%
Metal Cans	1.77	2.22	0.45	25%
Glass	1.12	1.40	0.28	25%
Plastic	1.61	1.74	0.13	8%
Mixed	2.59	3.86	1.27	49%

TABLE A-4: TOTAL NUMBER OF CURBSIDE PICKUPS

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	1,721	1,761	40	2%
Newspaper	1,346	1,468	122	9%
Metal Cans	1,045	1,022	(23)	(2)%
Glass	730	595	(135)	(18)%
Plastic	74	581	507	Over 100%
Mixed	137	270	133	97%

TABLE A-5: PICKUP FREQUENCY

Number of Curbside Pickups per Recycling Household

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	2.13	2.43	0.30	14%
Newspaper	1.92	2.33	0.41	21%
Metal Cans	1.92	1.99	0.07	4%
Glass	1.70	1.76	0.06	4%
Plastic	1.45	1.76	0.31	21%
Mixed	1.51	1.95	0.44	29%

TABLE A-6: PICKUP AVERAGE

Cubic Feet Recycled per Recycling Household Pickup

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change	Percent Change
Total	1.96	2.53	0.57	29%
Newspaper	1.20	1.18	(0.02)	(2)%
Metal Cans	.92	1.12	0.20	22%
Glass	.66	.80	0.14	21%
Plastic	1.11	.98	(0.13)	(12)%
Mixed	1.72	1.98	0.26	15%

TABLE A-7: PICKUP DAY UTILIZATION

Percent of Available Pickup Days Used by Recycling Households

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change
Total	47.2%	53.8%	6.6
Newspaper	42.6	51.6	9.0
Metal Cans	42.6	44.0	1.4
Glass	37.7	39.1	1.4
Plastic	32.2	39.1	6.9
Mixed	33.4	43.2	9.8

TABLE A-8: PICKUP DAY USAGE

Percent of Available Pickup Days Used by All Households

ALL SITES Number of Households = 1,232	Benchmark	Post Benchmark	Change
Total	31.0%	31.7%	0.7
Newspaper	24.2	26.4	2.2
Metal Cans	18.8	18.4	(0.4)
Glass	13.1	10.7	(2.4)
Plastic	1.3	10.5	9.2
Mixed	2.5	4.9	2.4

RECYCLING FREQUENCY AT WEEKLY SITES

TABLE A-9: RECYCLING FREQUENCY - TOTAL

Percent of All Households Using Curbside Pickup Schedule

WEEKLY PICKUP SITES Number of Households = 621	Benchmark	Post Benchmark	Change
None	34.7%	36.2%	1.5
One Time	23.9	20.6	(3.3)
Two Times	18.6	16.7	(1.9)
Three Times	9.6	10.1	0.5
Four Times	8.2	6.3	(1.9)
Five Times	3.7	4.4	0.7
Six Times	1.5	5.9	4.4

TABLE A-10: RECYCLING FREQUENCY - NEWSPAPER

Percent of All Households Using Curbside Pickup Schedule

WEEKLY PICKUP SITES Number of Households = 621	Benchmark	Post Benchmark	Change
None	44.1%	43.5%	(0.6)
One Time	21.2	20.7	(0.5)
Two Times	18.1	18.1	0.0
Three Times	7.7	8.4	0.7
Four Times	5.9	4.2	(1.7)
Five Times	2.0	4.2	2.2
Six Times	.5	4.7	4.2

TABLE A-11: RECYCLING FREQUENCY - METAL CANS

Percent of All Households Using Curbside Pickup Schedule

WEEKLY PICKUP SITES Number of Households = 621	Benchmark	Post Benchmark	Change
None	65.1%	61.9%	(3.2)
One Time	12.6	16.9	4.3
Two Times	11.8	9.7	(2.1)
Three Times	5.9	5.0	(0.9)
Four Times	2.2	3.2	1.0
Five Times	1.6	1.8	0.2
Six Times	.8	1.8	1.0

TABLE A-12: RECYCLING FREQUENCY - GLASS

Percent of All Households Using Curbside Pickup Schedule

WEEKLY PICKUP SITES Number of Households = 621	Benchmark	Post Benchmark	Change
None	67.2%	71.2%	(4.0)
One Time	9.8	14.1	4.3
Two Times	8.9	8.1	(0.8)
Three Times	3.2	2.6	(0.6)
Four Times	2.4	1.8	(0.6)
Five Times	.7	1.3	0.6
Six Times	0.0	.5	0.5

TABLE A-13: RECYCLING FREQUENCY - PLASTIC

Percent of All Households Using Curbside Pickup Schedule

WEEKLY PICKUP SITES Number of Households = 621	Benchmark	Post Benchmark	Change
None	92.3%	69.1%	(23.2)
One Time	5.3	15.1	9.8
Two Times	1.7	7.5	5.8
Three Times	.5	4.5	4.0
Four Times	.4	2.4	2.0
Five Times	0.0	1.0	1.0
Six Times	0.0	.5	0.5

RECYCLING FREQUENCY - BI-WEEKLY SITES

TABLE A-14: RECYCLING FREQUENCY - TOTAL

Percent of All Households Using Curbside Pickup Schedule

BI-WEEKLY SITES Number of Households = 611	Benchmark	Post Benchmark	Change
None	34.7%	46.9%	12.2
One Time	23.6	16.0	(7.6)
Two Times	20.1	11.0	(9.1)
Three Times	21.0	26.1	5.1

TABLE A-15: RECYCLING FREQUENCY - NEWSPAPER

Percent of All Households Using Curbside Pickup Schedule

BI-WEEKLY PICKUP SITES Number of Households = 611	Benchmark	Post Benchmark	Change
None	42.6%	54.8%	12.2
One Time	25.1	17.1	(8.0)
Two Times	18.8	7.4	(11.4)
Three Times	13.6	20.7	7.1

TABLE A-16: RECYCLING FREQUENCY - METAL CANS

Percent of All Households Using Curbside Pickup Schedule

BI-WEEKLY PICKUP SITES Number of Households = 611	Benchmark	Post Benchmark	Change
None	47.0%	55.2%	8.2
One Time	23.1	17.2	(5.9)
Two Times	19.6	12.7	(6.9)
Three Times	10.4	14.9	4.5

TABLE A-17: RECYCLING FREQUENCY - GLASS

Percent of All Households Using Curbside Pickup Schedule

BI-WEEKLY PICKUP SITES Number of Households = 611	Benchmark	Post Benchmark	Change
None	55.5%	73.8%	18.3
One Time	25.7	14.6	(11.1)
Two Times	13.8	8.0	(5.8)
Three Times	5.1	3.6	(1.5)

TABLE A-18: RECYCLING FREQUENCY - PLASTIC

Percent of All Households Using Curbside Pickup Schedule

BI-WEEKLY PICKUP SITES Number of Households = 611	Benchmark	Post Benchmark	Change
None	100.0%	77.8%	(22.2)
One Time	0.0	14.1	14.1
Two Times	0.0	5.6	5.6
Three Times	0.0	2.5	2.5

TABLE A-19: HOUSEHOLD AVERAGE BY NUMBER OF TOTAL CURBSIDE PICKUPS

ALL SITES Number of Households = 724	Total	Weekly Sites	Bi-Weekly Sites
One Time	4.16	3.01	4.79
Two Times	5.81	4.99	6.52
Three Times	8.47	7.84	8.88
Four Times	9.51	9.51	—
Five Times	12.64	12.64	—
Six Times	12.66	12.66	—

TABLE A-20: PICKUP AVERAGE BY NUMBER OF TOTAL CURBSIDE PICKUPS

ALL SITES Number of Households = 724	Total	Weekly Sites	Bi-Weekly Sites
One Time	3.95	3.01	5.01
Two Times	2.48	2.49	3.26
Three Times	3.27	2.61	3.62
Four Times	2.37	2.37	—
Five Times	2.52	2.52	—
Six Times	2.09	2.09	—

PARTICIPATION RATES BY PICKUP FREQUENCY

TABLE A-21: PARTICIPATION RATES BY NUMBER OF TOTAL CURBSIDE PICKUPS

ALL SITES Number of Households = 724	Newspaper	Metal Cans	Glass	Plastic
One Time	79.0%	55.2%	39.0%	43.3%
Two Times	87.4	61.5	46.6	54.9
Three Times	93.9	75.8	52.7	62.7
Four Times	89.7	71.8	48.7	56.4
Five Times	100.0	77.8	51.9	59.3
Six Times	97.3	81.1	59.5	75.7

TABLE A-22: PARTICIPATION RATES BY NUMBER OF TOTAL CURBSIDE PICKUPS

WEEKLY SITES Number of Households = 398	Newspaper	Metal Cans	Glass	Plastic
One Time	78.9%	45.3%	27.3%	34.4%
Two Times	89.4	60.6	47.1	48.1
Three Times	96.8	61.9	60.3	52.4
Four Times	89.7	71.8	48.7	56.4
Five Times	100.0	77.8	51.9	59.3
Six Times	97.3	81.1	59.5	75.7

TABLE A-23: PARTICIPATION RATES BY NUMBER OF TOTAL CURBSIDE PICKUPS

BI-WEEKLY SITES Number of Households = 357	Newspaper	Metal Cans	Glass	Plastic
One Time	79.2%	66.3%	52.1%	53.2%
Two Times	85.8	62.2	46.1	60.9
Three Times	92.3	82.9	48.8	68.0

TELEPHONE SURVEY DATA TABLES

TABLE A-24: OVERALL RECYCLING PARTICIPATION

QUESTION: Has your household recycled any material in the last six weeks?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	96%	96%	0	
NO	4	4	0	

TABLE A-25: CURBSIDE RECYCLING PARTICIPATION

QUESTION: Have you recycled an material using a curbside pickup recycling program?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	95%	95%	0	
NO	5	5	0	

TABLE A-26: MATERIAL RECYCLED THROUGH CURBSIDE PICKUP

QUESTION: Which of the following materials have you recycled through a curbside program in the last six weeks?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Newspaper	94%	90%	(4)%	
Metal Cans	83	87	4	
Glass	84	87	3	
Plastic	18	77	59	at 99%
Cardboard	28	42	14	at 99%

TABLE A-35: RECYCLING ACTIVITY OTHER THAN CURBSIDE PICKUP

QUESTION: Has your household recycled material in some other way besides curbside pickup?

BASE: All households.

ALL SITES Total Responding =204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	23%	22%	(1)%	
NO	77	78	1	

TABLE A-36: RECYCLING ADVERTISING AWARENESS

QUESTION: Do you recall hearing, seeing or reading any advertising or other public awareness program on recycling?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
YES	74%	86%	12%	at 99%
NO	26	14	(12)	at 99%

TABLE A-37: ADVERTISING CONTENT RECALLED

QUESTION: What particular advertisement or public awareness program stands out in your mind?

BASE: Those recalling any advertising or public awareness program.

ALL SITES Total Responding = 150/173 Percent Responding = 74%/86%	Benchmark	Post Benchmark	Change	Significant Change
What/How to recycle	21%	40%	19%	at 99%
When to recycle	18	23	5	
Encouragement to recycle	15	8	(7)	at 95%
Yard waste	3	7	4	
Save environment	10	6	(4)	
Something on TV	7	6	(1)	
Something in paper	12	3	(9)	at 99%
Pamphlet/Brochure	9	3	(6)	at 95%
Hazardous materials	7	3	(4)	
Other	19	7	(12)	at 99%
Can't recall	17	26	9	at 90%

NOTE: Data will total over 100% due to multiple response.

TABLE A-38: HELPFULNESS OF ADVERTISING

QUESTION: How helpful was this advertising for your household to learn more about recycling, begin recycling or recycle more?

BASE: Those recalling any advertising or public awareness programs.

ALL SITES Total Responding = 150/173 Percent Responding = 74%/86%	Benchmark	Post Benchmark	Change	Significant Change
Very helpful	57%	61%	4%	
Somewhat helpful	35	31	(4)	
Not at all helpful	5	7	2	
Don't know	4	1	(3)	

TABLE A-39: REASONS GIVEN FOR HELPFULNESS OF ADVERTISING

QUESTION: Why do you say that the advertising was very/somewhat helpful?
BASE: Those rating advertising or public awareness programs recalled as very or somewhat helpful.

ALL SITES Total Responding = 138/160 Percent Responding = 68%/80%	Benchmark	Post Benchmark	Change	Significant Change
Tells what/when/how to recycle	31%	51%	20%	at 99%
Makes us more aware/Encouraged us to recycle	44	28	(16)	at 99%
Makes us more aware/That's how we found out about it	17	15	(2)	
Serves as reminder	10	11	1	
Been recycling a long time	5	11	6	
Other	10	10	0	
Don't know	2	3	1	

NOTE: Data will total over 100% due to multiple response.

TABLE A-40: RECYCLING AS MUCH AS POSSIBLE

QUESTION: Do you think your household is recycling as much as possible?
BASE: Those recycling any material in the last six weeks.

ALL SITES Total Responding = 196/193 Percent Responding = 96%/96%	Benchmark	Post Benchmark	Change	Significant Change
YES	54%	73%	19	at 99%
NO	46	27	(19)	at 99%

TABLE A-41: REASONS GIVEN FOR RECYCLING AS MUCH AS POSSIBLE

QUESTION: Why do you say that your household is recycling as much as possible?

BASE: Those saying their household is recycling as much as possible who have recycled any material in the last six weeks.

ALL SITES Total Responding = 105/141 Percent Responding = 52%/70%	Benchmark	Post Benchmark	Change	Significant Change
Doing everything I can/Recycling everything	62%	47%	(15)%	at 99%
We put out everything	23	46	23	at 99%
Should recycle other paper	0	4	4	at 90%
Should do/Be able to do Plastic	20	3	(17)	at 99%
Purchase only recyclable materials	0	3	3	at 90%
Should recycle cardboard	5	7	2	
Not consistent/Careless	1	7	6	at 95%
Should recycle other cans	1	0	(1)	
Other	18	10	(8)	at 90%

NOTE: Data will total over 100% due to multiple response.

TABLE A-42: REASONS GIVEN FOR NOT RECYCLING AS MUCH AS POSSIBLE

QUESTION: Why do you say that your household is not recycling as much as possible?

BASE: Those saying their household is not recycling as much as possible that have recycled any material in the last six weeks.

ALL SITES Total Responding = 89/51 Percent Responding = 44%/25%	Benchmark	Post Benchmark	Change	Significant Change
Should do/Be able to do plastic	47%	33%	(14)%	at 99%
Not consistent/Careless	23	30	7	
Should recycle cardboard	18	24	6	
Should recycle other paper	0	18	18	at 99%
Should recycle glass	14	10	(4)	
Should recycle other cans	9	8	(1)	
We put out everthing	3	2	(1)	
Purchase only recyclable material	0	2	2	
Do everything I can/Recycle everything	7	0	(7)	at 90%
Other	30	24	(6)	

NOTE: Data will total over 100% due to multiple response.

TABLE A-43: AGE OF RESPONDENT

QUESTION: In which of the following age groups are you?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
18 - 24	2%	3%	1%	
25 - 34	22	25	3	
35 - 44	36	33	(3)	
45 - 54	16	11	(5)	
55 - 64	13	11	(2)	
65 and over	11	15	4	

TABLE A-44: EDUCATION OF RESPONDENT

QUESTION: What is the highest level of education you have completed?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Less than High School	10%	8.5%	(2)%	
High School	26	25	(1)	
Technical School	9	10	1	
Some College	18	15	(3)	
College Degree	27	31	4	
Graduate/Professional Degree	14	10	(4)	

TABLE A-45: HOUSEHOLD SIZE

QUESTION: How many people, including yourself, currently live in your household?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
One	11%	7%	(4)%	
Two	27	28	1	
Three to Four	48	46	(2)	
Five or more	15	17	2	

TABLE A-46: HOUSEHOLD INCOME

QUESTION: Which of the following categories best describe your total annual household income?

BASE: All households.

ALL SITES Total Responding = 204/201 Percent Responding = 100%/100%	Benchmark	Post Benchmark	Change	Significant Change
Under $25,000	16%	12%	(4)%	
$25,000 to $34,999	11	13	2	
$35,000 to $49,999	22	22	0	
$50,000 or more	36	30	(6)	
Refused	15	23	8	

APPENDIX B: SITE SELECTION BACKGROUND

Background

The first step of the recycling audit was to identify demonstration sites within the Twin Cities area. Within the selected areas, the audit consisted of on-site visual estimates of household recycling participation by trained observers. Telephone interviews with a random sample of households within each site also occurred to assess levels of awareness, attitudes and perceived behavior. The audit will be conducted three times over the next year with the objective of measuring changes in consumer recycling behavior, levels of awareness and attitudes, differences between perceived and actual recycling behavior, and an understanding of the effect that public education programs have on recycling behavior.

Approach

Several criteria were developed and prioritized by Lynch Jarvis Jones in conjunction with the Metropolitan Council staff. Data on city recycling programs in the Twin Cities were analyzed against these criteria to create logical groupings of programs from which sites could be selected. The key desire in this analysis was to array the sites along a continuum representing relatively high to low levels of recycling participation.

CRITERIA CONSIDERED

1. Volume (by weight) recycled per household.
2. Curbside pickup frequency per month.
3. Use of incentives.
4. Use of bins.
5. Single or multiple haulers.
6. Urban, suburban or rural location.

Audit Design

Analysis of the data and review of budget constraints led to a design using four sites, one each from using recycling volume per household and curbside pickup frequency as criteria. Budget constraints allowed for only four sites, and it was the consensus of the Metropolitan Council staff and Lynch Jarvis Jones that these two criteria best differentiate recycling programs on high to low levels of recycling participation.

Each site consisted of approximately 300 households. A target of 50 telephone interviews was set within each site. Audits were conducted over a six week period with the telephone survey conducted the week immediately following the last audit week.

Target Sites

A review of the data on recycling programs against these two criteria resulted in a target list of cities for each of the sites. Final city and site selections were dependent upon a number of factors, but final selections were made subjectively. Preliminary selections and rationales were:

SITE #1 - **Burnsville** - Large suburban, Dakota County representation
SITE #2 - **Shoreview** - Mid-size suburban, Ramsey County representation
SITE #3 - **Circle Pines** - Small suburban, Anoka County representation
SITE #4 - **Minneapolis** - Large urban, Hennepin County representation

In addition, sites selected used bins as this greatly enhanced the accuracy of visual measurement of recycling volume by household. To achieve the principal objective of the study, however, it was important that cities and the sites selected had no recent or planned major changes to their recycling programs that might materially affect recycling behavior.

Target cities for all sites considered are shown below. Communities with less than 500 households were excluded from consideration, as were all communities in Scott County due to lack of data at a city level.

TARGET DEMONSTRATION SITE CITIES

SITE #1 - Volume above average
Weekly pickup

Burnsville
Farmington
Hastings
Champlin
Edina
Golden Valley
Apple Valley

SITE #2 -Volume above average
Bi-weekly pickup

Corcoran
Hassan Twp.
Shoreview

SITE #3 - Volume below average
Weekly pickup

Circle Pines
White Bear Lake
Excelsior

SITE #4 -Volume below average
Bi-weekly pickup

Minneapolis
St. Paul
Inver Grove Heights
Spring Lake Park
Mounds View

APPENDIX C: CUBIC FEET CONVERSION FORMULAS

CURBSIDE RECYCLING AUDIT
CUBIC FEET CONVERSION FORMULAS

Bags

1 bag = .83 cubic feet

Bins

Shoreview = 1.98 cubic feet

Circle Pines = 3.30 cubic feet

Minneapolis = 3.20 cubic feet

Burnsville = 3.30 cubic feet

NOTE: All measures above are to be used for uncrushed cans. Crushed and mixed can measures are to be converted to an uncrushed can equivalent using the formulas below.

Crushed and Mixed Cans

1 unit of crushed cans (bag or bin) = 1.89 units of uncrushed cans.

1 unit of mixed cans (bag or bin) = 1.42 units of uncrushed cans.

Cardboard measures are not converted. These are reported as number of bundles.

APPENDIX D: AUDIT SURVEY DATA COLLECTION INSTRUMENT

AUDIT DATA COLLECTION SURVEY
CANS/GLASS/PLASTIC SEPERATED AREA

SITE:_____ ADDRESS:_____

PRE-TEST	WEEK 1	WEEK 2	WEEK 3	WEEK 4	WEEK 5	WEEK 6
NEWSPAPER #_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2
CANS #_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3
GLASS #_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2
PLASTIC #_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags....1 Bins....2	#_____ Bags...1 Bins...2	#_____ Bags...1 Bins...2
CARDBOARD (bundles) #_____	#_____	#_____	#_____	#_____	#_____	#_____
CANS/ GLASS/ PLASTIC MIX #_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags....1 Bins....2 Cr.....1 Uncr....2 Mix.....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3	#_____ Bags...1 Bins...2 Cr.....1 Uncr...2 Mix....3

APPENDIX E: TELEPHONE SURVEY QUESTIONNAIRE

C.J. OLSON MARKET RESEARCH, INC. RECYCLING
AUGUST 1990 PROJECT #9081

START TIME: _____ END TIME: _____

RESPONDENT NAME: _____

ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

PHONE: _____

GENDER: MALE 1

FEMALE 2

INTERVIEWER: _____ DATE: _____

Hello, my name is _____ and I'm calling from Olson Research and today we are talking with people about recycling. We're not selling anything. May I speak to the male or female head of household who is most knowledgeable about your household recycling activities. (IF THEY SAY THEY DON'T RECYCLE SKIP TO Q.7)

1. Has your household recycled any material other than yard waste in the last six weeks, or not? (CIRCLE CODE)

YES ..... 1 -- (CONTINUE)

NO ..... 2 -- (SKIP TO Q.7)

DON'T KNOW ..... 3 -- (ASK FOR SOMEONE ELSE MORE KNOWLEDGEABLE ABOUT RECYCLING)

2. Have you recycled any of this material using a curbside pickup recycling program provided by your city? (CIRCLE CODE)

YES ..... 1 -- (CONTINUE)

NO ..... 2 } (SKIP TO Q.5)

DON'T KNOW ..... 3 }

(IF NECESSARY GIVE FOLLOWING DESCRIPTION OF CURBSIDE PICKUP RECYCLING PROGRAM):
This is a recycling program where you may place your recycled materials out on the curb or behind your house to be picked up in the same way that your trash is, usually weekly or bi-weekly. Many of these programs provide bins for you to keep your recycled materials in between pickups.

3. Which of the following materials have you recycled through a curbside pickup program in the past six weeks? (READ EACH ITEM AND CIRCLE CODE UNDER Q.3 LAST SIX WEEKS)

4. How many times during the last six weeks did your household put out (READ ITEMS CIRCLED) to be picked up? (READ EACH ITEM AND CIRCLE CODE UNDER Q.4)

	Q.3 LAST SIX WEEKS	Q.4 NUMBER OF TIMES							DK
a. newspaper	1	6	5	4	3	2	1		7
b. aluminum cans/ other cans/metal ..	2	6	5	4	3	2	1		7
c. glass	3	6	5	4	3	2	1		7
d. plastic	4	6	5	4	3	2	1		7
e. cardboard	5	6	5	4	3	2	1		7

5. Except for yard waste, has your household recycled material through a collection center or some way other than curbside pickup in the last six weeks? (CIRCLE CODE)

YES ..... 1 -- (CONTINUE)

NO ..... 2 -- (SKIP TO Q.7)

DON'T KNOW ..... 3 -- (SKIP TO Q.7)

6. Do you recall what was recycled? (CIRCLE CODE)

	Q.6	Q.6a HOW RECYCLED
Newspaper	1	_____
Aluminum cans/ other metal cans ...	2	_____
Glass	3	_____
Plastic	4	_____
Cardboard	5	_____
Other (WRITE IN)....	6	_____

_____

6a. Could you please tell me briefly how the (READ ITEMS IN Q.6) was recycled? (WRITE IN ABOVE UNDER Q.6a, "HOW RECYCLED")

7. Cities, counties and other organizations have been sponsoring advertising and other public awareness programs over the last year to encourage people to recycle. Do you recall hearing, seeing or reading any of this advertising? (CIRCLE CODE)

YES ..... 1 -- (CONTINUE)

NO ..... 2 -- (GO TO INSTRUCTION BEFORE Q.10)

DON'T KNOW ..... 3 -- (GO TO INSTRUCTION BEFORE Q.10)

8. What one particular advertisement or public awareness program regarding recycling stands out in your mind? (RECORD WORD FOR WORD, PROBE AND CLARIFY, PROBE FOR ADVERTISING/PROGRAM CONTENT AND SPONSOR)

CONTENT	SPONSOR

9. How helpful would you say this advertising, and other public awareness programs, have been for your household, either to learn more about recycling, begin recycling or recycle more? Would you say ..... (READ LIST AND CIRCLE CODE)

Very helpful 1

Somewhat helpful 2

Not at all helpful 3

DON'T KNOW ..... 4 -- (SKIP TO INSTRUCTION ABOVE Q.10)

9a. Why do you say that? (RECORD WORD FOR WORD, PROBE AND CLARIFY)

(ASK Q.10 OF THOSE WHO HAVE NOT RECYCLED IN THE PAST 6 WEEKS -- REFER TO Q.1)

(ASK Q.11 OF THOSE WHO HAVE RECYCLED IN THE PAST 6 WEEKS -- REFER TO Q.1)

10. What, if anything, would be helpful to you to begin recycling? (RECORD WORD FOR WORD, PROBE AND CLARIFY)

(SKIP TO Q.12)

11. Do you think your household is recycling as much as possible? (CIRCLE CODE)

YES 1

NO 2

DON'T KNOW ... 3

11a. Why do you say that? (RECORD WORD FOR WORD, PROBE AND CLARIFY)

Now, just a few final questions to group your answers .....

12. In which of the following age groups are you?
(READ LIST AND CIRCLE CODE)

18 - 24 1

25 - 34 2

35 - 44 3

45 - 54 4

55 - 64 5

Over 65 6

REFUSED 7

13. What was the highest level of education you have completed?
(READ LIST AND CIRCLE CODE)

Less than high school 1

Some high school 2

High school graduate 3

Some technical school 4

Technical school graduate 5

Some college 6

2 year college degree 7

4 year college degree 8

Graduate school/
Professional degree 9

REFUSED 10

14. How many people, including yourself, currently live in your household? (READ LIST AND CIRCLE CODE)

One 1

Two 2

Three to four 3

Five or more 4

15. And lastly, which of the following categories best describes your total annual household income. Would it be under $15,000, ... $15,000 to $25,000.... $25 to $30,000..... $30 to $35,000..... $35 to $40,000..... , $40,000 to $50,000....., $50,000 to $60,000 or over $60,000? (CIRCLE CODE)

UNDER $15,000 1

$15,000 to $24,999 2

$25,000 to $29,999 3

$30,000 to $34,999 4

$35,000 to $39,999 5

$40,000 to $49,999 6

$50,000 to $59,999 7

OVER $60,000 8

REFUSED/DON'T KNOW 9

THANK RESPONDENT, FILL OUT ALL INFORMATION ON FRONT PAGE AND TERMINATE.