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**WASTE REDUCTION THROUGH
CONSUMER EDUCATION**

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**WASTE REDUCTION THROUGH
CONSUMER EDUCATION**

Final Report

Prepared for

**THE NEW YORK STATE
ENERGY RESEARCH AND DEVELOPMENT AUTHORITY**

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ABSTRACT

The Waste Reduction through Consumer Education research project was conducted to determine how environmental educational strategies influence purchasing behavior in the supermarket. The objectives were to develop, demonstrate, and evaluate consumer education strategies for waste reduction. The amount of waste generated by packaging size and form, with an adjustment for local recyclability of waste, was determined for 14 product categories identified as having more waste generating and less waste generating product choices (a total of 484 products). Using supermarket scan data and shopper identification numbers, the research tracked the purchases of shoppers in groups receiving different education treatments for 9 months. Statistical tests applied to the purchase data assessed patterns of change between the groups by treatment period. Analysis of the data revealed few meaningful statistical differences between study groups or changes in behavior over time. Findings suggest that broad brush consumer education about waste reduction is not effective in changing purchasing behaviors in the short term. However, it may help create a general awareness of the issues surrounding excess packaging and consumer responsibility. The study concludes that the answer to waste reduction in the future may be a combination of voluntary initiatives by manufacturers and retailers, governmental intervention, and better-informed consumers.

Keywords: Waste Reduction; Consumer Education; Scan Data; Environmental Shopping; Grocery Packaging; Cornell Waste Management Institute; Ulster County Resource Recovery Agency.

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Ellen Harrison, Director of the Cornell Waste Management Institute, provided leadership as the Principal Investigator for the study. The organizational and analytical challenges of data management for this study were ably overseen by Dr. Jeanne Hogarth, formerly Associate Professor in the Department of Consumer Economics and Housing at Cornell University, currently Senior Analyst at the Federal Reserve Board. Joo Ho Kim, Graduate Research Assistant in the Department of Consumer Economics and Housing, managed the enormous data files and conducted the statistical analyses. Rod Hawkes of the Home Study Program in the Department of Agricultural, Resource and Managerial Economics provided valuable assistance with the data collection and analysis.

The waste reduction education strategies in Ulster County were coordinated and implemented in their day-to-day particulars by Emilie Hauser of the Ulster County Resource Recovery Agency and by Andrea Park, formerly of Cornell Cooperative Extension of Ulster County. Manna Jo Greene of the Ulster County Resource Recovery Agency and Lee Reidy of Cornell Cooperative Extension of Ulster County provided valuable insight at the planning stages of this study and in interpreting the results. Mike Reilly, formerly Environmental Manager of Wakefern Food Corporation, currently Vice President of Human Resources for ShopRite of Hunterdon County, New Jersey, played an important role in planning the study, facilitating the educational strategies, and providing access to the scanner data.

Clare Hinrichs and Karen Rollo of the Cornell Waste Management Institute wrote and edited both the Final Report and the Summary Report associated with the study.

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SUMMARY

Everyday purchasing decisions made by consumers at supermarkets have important implications for reducing solid waste, especially since functionally similar products are often packaged differently, with one version generating substantially more waste than another. To determine if environmental educational strategies have an influence on purchasing behavior, the Ulster County Resource Recovery Agency, Cornell University, Cornell Cooperative Extension of Ulster County, and Wakefern Food Corporation joined forces to conduct the Waste Reduction Through Consumer Education research project. The objectives of the project were to develop, demonstrate, and evaluate consumer education strategies for waste reduction.

Five different consumer education strategies were developed: countywide education, in-store shopper education, direct mailings, educational shoppers' tours of supermarkets, and financial incentives (i.e., coupons). Each strategy addressed environmental and energy conservation issues, as well as other consumer concerns such as cost and safety. To guide shoppers to specific actions, educational messages were organized around four central waste reduction principles:

- Large containers generate less packaging per use or serving than smaller containers.
- A lower ratio of packaging waste weight to usable product weight generally indicates a more waste-reducing product form.
- Concentrated versions of a given product generate less packaging per use or serving than dilute versions.
- The more durable the consumer product, the longer it lasts and, thus, the less waste is generated (durable goods vs disposable goods).

The research was conducted at two ShopRite Supermarkets in Ulster County, New York. An innovation was the use of shopper identification numbers (for members of ShopRite's PricePlus Club) and supermarket scan data to track purchases and thereby measure changes in the waste impacts of purchases while maintaining shopper confidentiality.

At the outset of the project, 14 grocery product categories were identified that offered both less waste generating and more waste generating product choices and reflected one or more waste reduction principles. Both weight and volume of solid waste were assessed for all product choices within one brand for each of the product categories. Adjusting for recyclability of some of the packaging materials in Ulster County, an

average weight of waste per unit (i.e., use or serving) destined for disposal was calculated and assigned to each of 484 individual grocery items tracked in the study.

Because early reviews of the stores' scan data revealed insufficient product movement for many of the more waste-generating product choices, a purposive sample, selecting for "bad" purchases, was drawn. During a 5-week baseline period, 1,457 cardholders at the two stores purchased 3 or more of 177 (of the 484 choices) individual grocery items identified as clearly more wasteful choices. The purposive sampling ensured that the study focused on shoppers who tended towards more waste-generating shopping behaviors and who could then be educated towards less waste-generating alternatives.

These 1,457 cardholders were then randomly assigned to one of four equal size groups. Overall, the project tested educational treatments spanning the continuum from general waste reduction background messages received by all shoppers to more targeted, focused approaches. All groups were exposed to the countywide education and in-store education. Three of the groups received different targeted treatments (direct mail, shoppers' tour, or coupons), while a fourth group served as a control. In addition to the purposive sample of cardholders, 1,178 cardholders were randomly selected and tracked for the duration of the project. This group allowed comparison of a random group of shoppers to those selected because of purchasing behavior targeted by the project for change. The random control group, like the purposive control group, received none of the three targeted educational treatments.

Four data sets were collected over a 9-month period: daily scanner sales data; selected demographic data for PricePlus cardholders; weekly price data on the products being tracked; and store data on marketing and product promotions. The scan data were grouped by treatment period and sorted by product category. Various statistical tests were applied to the purchase data for the product categories. These tests sought to assess patterns of change in the average weight of waste per unit of product between treatment groups and by treatment periods.

While average weight of waste for the 14 product categories fluctuated during the 9 months, ultimately no systematically meaningful changes in purchasing behavior could be identified. The expectation had been that successive waves of waste reduction education would lead to growing reductions in the amount of waste associated with shoppers' purchases within the product categories. At the same time, however, it had been assumed that such reductions might vary based on exposure to the different educational treatments or different socio-demographic

characteristics of households. Close analysis of the purchase data revealed virtually no meaningful statistical differences between treatment groups or changes in behavior over time.

These findings suggest that broadly focused consumer education about waste reduction is not effective in the short term at changing waste-related purchase behavior. This outcome is consistent with consumers' tendency to rank price, convenience, and even brand name as more critical than environmental considerations in their purchase decision-making process. An analysis of the costs of conducting this project's education suggests that those costs significantly exceed potential avoided disposal costs. Such an analysis, however, fails to account for the avoided environmental costs associated with the original manufacturing or for any indirect impacts of the education, such as increasing receptivity to other environmentally beneficial practices like home composting. Therefore, in less directly measurable ways, waste reduction education may help to foster general awareness of the issues surrounding excess packaging and consumer responsibility.

This project underscores the significance, and the challenge, of consumer education concerning packaging and waste reduction. Solid waste issues involve complex technological, economic, social, and political judgments. In addition to this, consumer education involves much more than working to enhance consumer roles and choices in the private sector (e.g., the supermarket). It must also include consumer education about the public purchases made by citizens (e.g., waste management policies and systems) and about consumer potential to influence these waste-related policies, regulations, and practices in both the public and private sector. The route to waste reduction in the future likely requires a combination of voluntary initiatives by manufacturers and retailers, governmental intervention, and better-informed consumers.

Section 1

INTRODUCTION

Everyday purchasing decisions made by consumers have important implications for reducing solid waste. With today's dizzying array of consumer products, functionally similar products are often packaged quite differently or are more or less durable, so that one choice generates substantially more waste than another. While in some cases, identification of the environmental choice seems quite obvious, in others, it is less clear how to balance tradeoffs between waste reduction and recycling in determining what is the best environmental choice (Hinrichs and Harrison 1995-96; Miller 1994). Consumer purchase decisions, therefore, play an important role in waste reduction, both through direct changes in consumption and through influencing manufacturers, retailers, and their distribution networks.

During the 1980s and early 1990s, educators and solid waste professionals throughout the United States began developing and implementing environmental shopping campaigns (Kashmanian 1989). These initiatives coincided with mounting public concern about the solid waste crisis, as symbolized by the garbage barge at sea off Long Island and the closing of countless local dumps across the nation. Educators have stressed the importance of understanding the motivations and concerns of consumers in order to change individual purchasing behavior in ways that will decrease solid waste problems (Clarke 1989; Cude 1993). Accordingly, environmental shopping interventions, including brochures, mailings, videos, and supermarket tours, have formed the basis of various environmental shopping campaigns and educational programs.* However, while grocery industry sponsored reports note recent declines in grocery packaging generation as a percent of municipal solid waste (MSW) generation and increases in grocery industry recycling and composting (Franklin Associates 1993), it is not evident to what extent such changes might be attributed to environmental shopping programs.

In general, environmental shopping campaigns and programs are predicated on the broad assumptions of the K-A-P paradigm: that increasing knowledge (K) about a subject through education will enhance favorable attitudes (A) and in turn lead to the desired changes in

* Such programs have taken place nationwide and include, for example, the Grinnell (Iowa) 2000 Grocery Store Source Reduction Project, Tompkins County (New York) Trash Lite Shopper Awareness Campaign, Environmental Shopping: A Consumer Environmental Education Teaching Packet through Cooperative Extension Service at the University of Illinois at Urbana-Champaign, "The Future of the Earth is in Your Shopping Cart" through the Northern Counties (New Jersey) Recycling and Solid Waste Planning Association, "Become an Environmental Shopper" through the Pennsylvania Resources Council, and the Shop S.M.A.R.T. program developed by the Minnesota Office of Waste Management.

practice (P). Such work stems from behavioral and cognitive approaches to the analysis of human activity in the fields of environmental psychology and social psychology and receives practical application in marketing, health education, environmental education, and countless other areas.

Much of the first work on what might broadly be termed environmental behavior focused on the correlates of energy conservation activities, such as turning down thermostats. More recently, researchers have examined what individual and attitudinal attributes seem to be associated with recycling behaviors. To a far less degree, research has examined the structural or policy context of different levels of recycling behavior (Derksen and Gartrell 1993). However, investigation of waste reduction behaviors, as distinct from recycling behavior, has so far been less common.

Some research has suggested that higher levels of education and greater knowledge about the issue are significantly associated with positive environmental behaviors (Arbuthnot 1977; Granzin and Olsen 1991; van Liere and Dunlap 1980). Other research has found little significant association between sociodemographic variables and specific behaviors, like recycling (Vining and Ebreo 1990). However, research on environmentally appropriate behaviors in a natural recreation setting found that having less prior knowledge about the issue was associated with greater behavioral change in the desired direction (Manfredo and Bright 1991). People with considerable prior knowledge and opinions about the issue were less likely to move from the undesired to the desired behavior, perhaps because they had more investment in and conviction about the validity of their own views.

A considerable body of research has examined the effect of various interventions on environmental behaviors. Such work tends to focus on 1) information techniques; 2) extrinsic vs intrinsic motivations; and 3) social interactions and social support. Research on information techniques suggests that general messages alone (e.g., "be an environmental shopper!") have limited effectiveness (Cook and Berrenberg 1981; Geller 1992); instead messages should refer to specific actions to be promoted or discouraged (e.g., "return your grocery bags for a two cent rebate") (Geller 1992). In addition, messages promoting environmental behaviors are more effective when delivered at the place and time where such behavior tends to occur (Cook and Berrenberg 1981), a guideline suggesting the temporal and situational specificity of the "educational moment."

Research on motivations has drawn broad distinctions between the outcomes of extrinsic vs intrinsic motivations. Extrinsic motivations include both negative motivators, such as penalties for failure to recycle, and positive motivators, such as material incentives (e.g., tokens, rebates). Various research has found that extrinsic motivations may be effective in the immediate term, but often do not produce lasting behavioral changes since effects often diminish once the motivator is withdrawn (De Young 1985-86, 1993; Geller 1992). Therefore, considerable attention has turned to the importance of more intrinsic motivations and personal satisfactions. Researchers taking a cognitive approach, for example, have found that altruism and a spirit of helpfulness are important elements in the adoption of recycling behaviors (Granzin and Olsen 1991; Hopper and Nielsen 1991). DeYoung (1985-86) has found that personal satisfaction derived from being frugal and contributing to conservation often constitutes the most important reward of environmental behaviors. Following more behavioral models, other researchers have determined that personal commitment, in the form of non-binding written or verbalized pledges, is more effective than material incentives in promoting durable adoption of newspaper recycling behaviors (Geller 1992; Katzev and Pardini 1987-88; Wang and Katzev 1990). Related to the importance of intrinsic motivations is evidence that people having a strong internal "locus of control" may be more likely to believe that their consumer actions can help solve solid waste problems (Schwepker and Cornwell 1991).

Finally, there is evidence that social interaction and social support are important aspects of educating people towards more environmental behaviors. Geller (1992) notes that education in small group settings of 10-15 people, where interaction is possible, produces changes towards the desired behaviors more effectively than more general mass communication efforts. Hopper and Nielson (1991) found that block leader programs were highly influential in determining levels of neighborhood recycling participation, not just because of the information exchanged, but because of the social expectations and interactions involved in this exchange between neighbors.

Unfortunately, many studies that have attempted to evaluate the effect of waste reduction education have only surveyed consumers about their awareness, knowledge, and self-reported accounts of environmental activities or behaviors (Clarke 1994, 1995; DeYoung et al. 1993; Jones 1993; Schultz and Brill 1993). For assessing the impact of environmental education on behavior, there are obvious limitations in relying on consumers' self-reports, which range from the inaccuracy of human memory to social desirability effects in survey respondents' responses.

Studies that have attempted to measure more directly actual solid waste impacts of waste reduction education are few. A residential source reduction education program in Greensboro, North Carolina, for example, conducted waste stream audits of one neighborhood receiving waste reduction education and one control neighborhood before and after the educational intervention (City of Greensboro 1992). The average household in the treatment neighborhood reduced its generation of waste by 10 percent, while the average household in the control neighborhood only reduced its generation of waste by 5 percent. However, reduction in the amount of packaging waste generated was not apparent in the treatment neighborhood. In another study, conducted in Blaine, Minnesota, direct mail messages and in-home workshops on waste reduction were targeted to one hauling zone of the city. Over a 1-year period, total waste generated (the sum of both MSW and recyclables collected) in the target zone declined by about 4 percent, while it increased by 1 percent in hauling zones not receiving the educational treatments (Springer and Roark 1994).

Taken together, these studies suggest some potential for promoting waste reduction behavior through education, although it is not clear that the different components of the residential waste stream (i.e., yard waste, packaging, newspaper, food waste) are equally reducible via public education. Furthermore, while these studies assess the effectiveness of general residential waste reduction education, there is little evidence of research evaluating the effectiveness of waste reduction education in the supermarket setting. In short, there has been little systematic evaluation of how specific educational approaches incorporating waste reduction messages affect actual purchases by consumers of grocery products and packaging.

In an effort to determine if applied environmental educational strategies would have an influence on purchasing behavior, the Ulster County Resource Recovery Agency, Cornell University, Cornell Cooperative Extension of Ulster County, and Wakefern Food Corporation joined forces to conduct the Waste Reduction Through Consumer Education research project. The objectives of the project were to develop, demonstrate, and evaluate consumer education strategies for waste reduction.

Five different consumer education strategies on waste reduction were developed for evaluation. These included countywide education, shopper education by supermarket operators, direct mailing, educational shoppers' tours of supermarkets, and financial incentives (i.e., coupons). Each strategy was designed to address environmental and energy conservation issues, as well as other consumer concerns such as cost and safety, recognizing that consumers evaluate environmental considerations in conjunction with other concerns (Cude 1993). In experimental

research testing the effect of environmental and economic rationales on self-reported waste reduction behavior, De Young et al. (1993) found that economic and environmental motivational information each independently increased waste reduction behaviors, but their effect was strongest when combined.

There are various source reduction practices, including lightweighting, redesigning or even eliminating packaging, that can reduce the environmental impacts of grocery product packaging (Franklin Associates 1989). To guide shoppers to these purchasing practices, messages in this study were organized around four broad waste reduction principles that project cooperators deemed central:

- Large containers generate less packaging per use or serving than smaller containers.
- A lower ratio of packaging waste weight to usable product weight generally indicates a more waste-reducing product form.
- Concentrated versions of a given product generate less packaging per use or serving than dilute versions.
- The more durable the consumer product, the longer it lasts and thus, the less waste is generated (durable goods vs disposable goods).

A notable innovation in this project was the use of supermarket scan data to evaluate the effectiveness of the waste reduction educational strategies. Available for all grocery items marked with UPCs (Universal Product Codes), scan data are now collected by most large grocery chains. An electronic scanner at the checkout reads the UPC on each purchase and sends the information to the store's central computer for instant inventory records. To date, scan data have been used for purposes related to marketing and management. Syndicated research services use scan data to inform manufacturers about market shares and sales trends and to provide retailers with information on their share of local markets, sales trends, product movement, and response to promotions (O'Connor 1991). Many in the grocery industry maintain that scan data systems now make possible much more finely tuned shelf space management and product category management in the retail setting. However, while the uses of scan data by grocery retailers and manufacturers are developing rapidly, there are few known examples of these data being used for public interest or non-commercial research purposes.

In this project, scan data were used to monitor actual purchases and their packaging waste implications in selected product categories over time. Results of each of the five different education treatments were then analysed to:

- Measure the impact on consumer supermarket purchasing decisions
- Determine the energy, environmental, and economic impacts of the observed changes in behavior
- Prepare model educational strategies based upon research results
- Develop and disseminate recommendations concerning waste prevention educational programs through New York State to waste management professionals, educators, government decision-makers, and the grocery industry.

Section 2
STUDY SITE CONTEXT

NEW YORK STATE WASTE MANAGEMENT ACT OF 1988

The New York State Waste Management Act of 1988 calls for a 50 percent reduction in the amount of solid waste requiring disposal by 1997. Legislators hope to reach this goal by eliminating 8-10 percent through source reduction, and recycling 40-42 percent of the state's solid waste. Planning units for solid waste management were designated by the Department of Environmental Conservation for counties and/or blocks of counties, and a September 1, 1992 deadline for enacting local recycling laws or ordinances was established (New York State Department of Environmental Conservation 1995).

ULSTER COUNTY

Ulster County is situated in the Mid-Hudson Valley Region of Eastern New York. The Catskill Mountains dominate its western portion. The county covers 1,127 square miles. In 1990, the population was 165,304, with 60,807 households. There are 20 towns, 3 villages, and one city (Ulster County Data Book 1994). The City of Kingston, the county seat, is located 90 miles north of New York City and 50 miles south of Albany. The population of Kingston is 24,000, with 43,000 in the greater suburban area. At the time of the study, IBM was the largest employer. New Paltz is about 15 miles south of Kingston, with a population of 11,388. New Paltz is the home to the State University of New York (SUNY) College at New Paltz.

Ulster County can be formally classified as a rural-urban county (Eberts 1994), although it is above average in area among rural-urban counties, and its population is well above average in size. However, Ulster can be still be characterized as a predominantly rural county, since 70 percent of its population lives in places of less than 2,500 people .

ULSTER COUNTY RESOURCE RECOVERY AGENCY (UCCRA)

The Ulster County Resource Recovery Agency (UCRRA) is the designated planning unit for solid waste management in the county. Prior to May 31, 1993, there were 15 municipally owned and operated landfills in the county. At the time of the study, all but three had been closed and these are now operated by the UCRRA. Under flow control, all waste from the county went to these three landfills. Waste is hauled to the landfills from town transfer stations, and the municipalities are

charged for disposal. The tipping fee, \$53/ton in 1993, rose to \$57/ton in 1994. Towns pass the cost of the tipping fee on to residents by charging for waste dropped at the transfer station (anywhere from \$1-2 per bag). In the Town and City of Kingston, residents have curbside pickup financed by general taxes. County residents outside of the Town and City of Kingston can use municipal transfer stations or they can contract with a private hauler for curbside pickup of both trash and recyclables. There is no charge for recycling at municipal transfer stations/recycling centers, although some municipalities may require an annual user's fee of anywhere from \$5 to \$20. Rather than a fee based on the amount of waste, private haulers generally charge a monthly fee based on the cost of collection, transport and disposal—a system that does not necessarily encourage people to recycle or reduce. It is estimated that approximately 50 percent of the County population uses transfer station/recycling centers and 50 percent have curbside pick-up.

Demonstrating a strong commitment to improved environmental and economic management of the county's wastes, the UCRRA has developed a solid waste management plan calling for diversion of 72.5 percent of the county's total solid waste by the year 2014, through source reduction, recycling, organic waste composting (including sludge management), and household hazardous waste management. With waste prevention as the first priority in the management plan, the county's long-range goal is to reduce the amount of waste sent to the landfill by 11 percent through waste reduction and reuse.

Residential recycling became mandatory in Ulster County in April 1992. At the time of the study, mandatory recyclable materials included: newspaper, corrugated cardboard, plastic bottles and jugs, glass bottles and jars, and metal cans including metal lids. In addition, most municipal recycling centers offered opportunities to recycle other materials such as waste mail and magazines, paper bags, scrap metal, tires and polystyrene. In the county overall, that portion of the waste stream that is actually recycled or composted has increased from 9.3 percent in 1991 to 36.8 percent in 1993. The UCRRA's long-range goal is to try to divert an additional 35 percent of the waste stream by aggressive promotion of these practices (Ulster County Solid Waste Management Plan 1991). Compared to some other New York State counties, Ulster County has set a very ambitious long-range goal for waste diversion.

SHOPRITE SUPERMARKETS

Two ShopRite supermarkets in Ulster County were selected to participate in the project, one in Kingston and the other in New Paltz. Owned by Big V Supermarkets, and part of the Wakefern Food Corporation, ShopRite has been in the vanguard of trying to create environmental awareness in

the supermarket setting. Both ShopRite stores recycle baled corrugated cardboard, waxed cardboard, and wooden produce crates. By the conclusion of the study, both stores were also offering plastic bag recycling to customers and a two-cent rebate for each bag brought back to the store for reuse. In addition, ShopRite stores were desirable study sites because they collect supermarket scan data that can track purchases of specific products through their PricePlus Club shopper card programs. Shoppers voluntarily apply for and obtain a shopper card entitling them to certain privileges (e.g., discounts on selected products) if they use the card when they shop.

The PricePlus Club program allowed the project to work with scan data from selected groups of shoppers and to provide different educational treatments to different experimental and control groups at both stores. The PricePlus application forms provided demographic information such as family size, income and address, while maintaining the confidentiality of the individual shopper. The advantage of following PricePlus shoppers' behavior is that shoppers did not need to be recruited for the study, thus avoiding the studied individual effect where subjects are on good behavior because they know they are being observed.

Big V Supermarkets, which owns the two ShopRite stores (along with 30 others), is the largest shareholder in the Wakefern Food Corporation, which is a cooperative. Big V provided the following information. On average, each ShopRite store has issued 20,000 PricePlus Cards to shoppers and 85 percent of all customers have a PricePlus Card. Big V's monitoring of shopping trends suggests that customers in the Northeast are abandoning their previous loyalty to national brands, probably due to extremely high prices of cereal, cookies, soda, etc., and are increasingly purchasing the ShopRite private label brand instead. Big V has also seen an increase in the number of customers purchasing in-store prepared or ready-to-eat items in the meat and deli departments. This growth in the purchase of convenience foods may be due to the time constraints experienced by many dual-income households. With less time to prepare meals from scratch, many shoppers seek pre-cooked and/or microwavable foods. This is a trend that might decrease the amount of food waste, but ultimately increase generation of food packaging waste.

The New Paltz store is located on Route 299, Main Street and is 32,000 sq. ft. in area. Because SUNY New Paltz is located nearby, students provide an important customer base. However, the New Paltz store manager does not note significant differences in purchasing patterns between students and other customers. Approximately 90 percent of the New Paltz customers have PricePlus cards and the manager estimates that customers travel from a 15- mile radius to shop.

The Kingston store is located on Route 9W in the Town of Ulster, in the suburban area around Kingston. The store is 57,000 sq. ft. in area and has about 23,000 customers a week, mostly in the low-to-medium-income brackets, who travel up to 20 to 25 miles to shop. Though there is a steady clientele, many of the customers shop there in order to pick up sale items, a practice managers dub "cherry picking" or "cross shopping. Such a practices are encouraged by the proximity of the Kingston store to other grocery stores. (There were three other supermarkets within 1 mile of the Kingston store during the study period.)

Tables 2-1 and 2-2 present the distribution of age and income for the two stores and for all Big V supermarkets. This information is based on an outside research agency's survey of all ShopRite stores. According to the survey, New Paltz has a below average age customer group, perhaps reflecting the college population, and both stores have customers with average incomes below the chainwide norm. Appendix A contains a more detailed comparison of PricePlus cardholders at the two stores.

Table 2-1. Age Distribution of Shoppers for Kingston and New Paltz ShopRites; All 30 Big V Stores.					
	Age				
	18-25	26-35	36-45	46-55	>55
New Paltz					
1993/94	4%	32%	30%	22%	13%
1992/93	1%	29%	31%	26%	13%
Kingston					
1993/94	4%	26%	31%	25%	14%
1992/93	2%	29%	32%	22%	14%
Big V ShopRites					
1993/94	4%	27%	30%	25%	15%
1992/93	5%	27%	31%	23%	14%

Source: Big V Supermarkets, 1995.

Table 2-2. Income Distribution of Shoppers for Kingston and New Paltz ShopRites; All 30 Big V Stores.						
	Income					
	<\$20K	\$20-29999	\$30-39999	\$40-49999	\$50-59999	>\$60K
New Paltz						
1993/94	8%	12%	26%	23%	19%	12%
1992/93	6%	11%	24%	23%	23%	12%
Kingston						
1993/94	7%	14%	25%	20%	18%	17%
1992/93	6%	11%	25%	22%	19%	17%
Big V ShopRites						
1993/94	9%	13%	20%	20%	19%	16%
1992/93	8%	11%	20%	21%	19%	17%

Source: Big V Supermarkets, 1995.

Section 3

SELECTION OF PRODUCTS

PRODUCT IDENTIFICATION

At the outset of the project, cooperators identified 14 grocery product categories that offered both milestone (waste-reducing) and anti-milestone (waste-generating) options and reflected one or more of the waste reduction principles to be stressed in the project's educational treatments. In addition, milestone products to be selected for the purposes of this project were to:

- Result in reduction of the weight or volume of waste generated by the consumer
- Not result in any net total increases in waste generation, energy use, or economic penalty to the producers, supermarkets, UCRRA, or the waste management system
- Bring net total benefits considering the waste generation, energy and economic impacts to the producers, consumers, supermarket, UCRRA, and the waste management system.

Product categories selected were: dishwashing liquid, frozen vegetables, raisins, coffee, pancakes, hot cereal, rice, toothpaste, soup, baby wipes, fabric softener, cranberry juice, light bulbs, and razors. A total of 484 products within the product categories were used to conduct this study. In general, all brands within a broad category were tracked in order to capture the full range of purchasing behavior change at the stores. (Initially, several products that were considered overpackaged and excessively waste producing, but that had no milestone options, were also tracked in this study. However, during the course of the study, these products were either discontinued or taken off the market shelves for one reason or another.) (See Appendix B for a complete list of products tracked in this study.)

PRODUCT EVALUATION

Empirical assessment of the 14 grocery product categories was essential for determining the types of products to be promoted by the waste reduction educational strategies. A system of product evaluation relying on a laboratory assessment of packaging component weight and volume was devised, following a methodology developed for the Minnesota S.M.A.R.T. Shopping Project (Minnesota Office of Waste Management 1992). Both weight and volume of solid waste are important to assess. The weight of garbage often determines landfill and

incinerator charges and measures the amount of material used, while volume has a bearing on landfill and collection vehicle capacity (Murphy 1993). For each of the 14 grocery product categories, all product choices within one brand available at the Kingston store in August 1993 were purchased. The product line at the New Paltz store was generally a subset of the larger Kingston store. These product choices were each weighed full and unopened, using an electronic scale. Contents were emptied and usable product, total packaging, and packaging by constituent material were also weighed. Weight measurements were rounded to the nearest 0.1 gram. Appendix C presents the weight of total waste, of the recyclable components and of the non-recyclable components of waste for the 14 product categories, as assessed in the laboratory.

Volume of waste was also measured, using the water displacement method. Packaging waste was compacted manually or by foot stomping, by average-sized women of average strength, in an effort to approximate what consumers in the household actually do with their trash. Volume for glass packaging was first measured with containers completely intact and then with containers fully crushed using a hammer. Following the Minnesota protocol, packaging was then placed in a plastic bag to let air escape from the bag as it was submerged, but not allow water to fill all the empty spaces. This procedure was intended to approximate the volume actually taken up by discarded packaging in a landfill situation (Minnesota Office of Waste Management 1992). Then larger packaging was submerged in water in a 5-gallon pail, while smaller packaging was submerged in a 250-ml cylinder. Measurements were rounded to the nearest 10 ml. The volume measurement was not always precise because of variable compaction and reexpansion of some packaging materials. The difference in packaging materials and shapes also made it difficult to maintain consistency in eliminating air from the outer plastic bag. To compensate for such sources of variability in the volume measurements, these measurements were taken three times for each package and then averaged.

In a modification of the Minnesota S.M.A.R.T. Shopping protocol, the product evaluation system for this study also attempts to take recyclability into account. As some packaging materials in the study are recyclable in Ulster County, those recycling opportunities were acknowledged in calculating the amount of waste destined for disposal. Because accurate data on the diversion rates for different recyclable materials in the study locality are not available, diversion factors derived from recent research conducted for the American Plastics Council were used (DSM Environmental Services 1993a, 1993b; Waste Matters Consulting 1993). Data on the participation rates of residents in recycling programs and the capture rate of recyclables (i.e., the percent of potentially recyclable materials that these participants recycle) in six communities were used to arrive at a projected recovery rate for each of the locally recyclable

packaging materials in the study locality. Because New York is a bottle bill state, the calculations were based on research from states with bottle deposit legislation (Massachusetts, Vermont, Oregon). Table 3-1 presents the recovery and non-recovery rates for selected recyclable materials, based on this research for the American Plastics Council.

<p style="text-align: center;">Table 3-1. Adjustment for Local Recyclability in Product Evaluations.</p>		
<u>Recyclable Material</u>	<u>Recovery Rate</u>	<u>Non-Recovery Rate</u>
Container glass	69%	31%
Steel cans	66%	34%
Pigmented high-density polyethylene (HDPE)	30%	70%
Natural non-beverage HDPE	38%	62%
Custom polyethylene (PET)	22%	78%

Source: DSM Environmental Services 1993a, 1993b; Waste Matters Consulting 1993.

To arrive at an adjusted weight of waste, the percentage of locally recyclable waste projected for diversion through recycling was subtracted from the total weight of waste, so only that proportion not diverted for recovery was counted as waste under the study method. In effect, this approach assumes that the portion recycled is environmentally benign, generating no waste or impacts, which tends to make recycling look more favorable than it actually is. Furthermore, this method does not give credit for recycled content of packaging materials. An adjusted volume of waste was calculated using the same approach. The equation, based on weight or volume of constituent materials for each product and its package, is as follows:

$$(\text{recyclable package components} \times \text{non-recovery rate}) + \text{non-recyclable package components} = \text{total waste}$$

The total waste figures were then standardized by either the amount of usable product or by the number of servings in a given product choice to arrive at the amount of waste per ounce or per use for each product choice. Uses or servings were based on the manufacturer's claims posted on the label; in the case of product categories, such as pancakes, where a range (e.g., 8-10 pancakes) was cited, the mid-point (e.g., 9 pancakes) was used. Thus, within this system of evaluation, a lower weight or volume of waste per use indicates less environmental impact.

In addition to these waste and volume measures, the waste reduction and recycling educator from Ulster County was asked to evaluate the product choices within the product categories from the standpoint of packaging waste reduction and ongoing efforts in public education about waste reduction and recycling. Because materials that may be recyclable in one community are not always recyclable in another community, the educator's assessments of environmental packaging are geographically specific to Ulster County, but follow New York State's general criteria for handling solid waste--reuse and reduce, recycle and compost, and finally, landfill or incinerate.

Following are examples of how products corresponding to each of the four waste reducing principles were evaluated:

Large Containers versus Smaller Containers

Dishwashing Liquid. Within brands, product choices in hand dishwashing liquid generally come in different sizes, but in packaging with identical constituent materials. In the case of Dawn™, the container, which is locally recyclable, is made of high density polyethylene (HDPE), while the polypropylene (PP) cap is not recyclable in the locality.

The weight based assessment method yields a progressively lower packaging-to-product ratio as container size increases. Volume based measures of packaging waste depart from this precise sequence, with the 32-oz. container yielding the same volume of waste as the 96-oz. container. This outcome may reflect the greater difficulty compacting the heavier plastic used in the 96-oz. container, as well as the inherent variability of volume measurements under the system used.

The educator ranks the dishwashing liquid choices in an order that parallels the weight measures. This ranking reflects the generally accepted advice to "buy the largest size" on the basis of an expected reduction in packaging to product ratio with larger sizes. Table 3-2 shows the comparison.

Table 3-2. Environmental Ranking of Dishwashing Liquid.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
22-oz. Dawn	Container: HDPE*	3 (1.5g/oz.)	2 (10 ml/oz.)	3 (Least preferred)
32-oz. Dawn	Container: HDPE*	2 (1.3g/oz.)	1 (8 ml/oz.)	2 (2nd most preferred)
96-oz. Dawn	Container: HDPE*	1 (0.8g/oz.)	1 (8 ml/oz.)	1 (Most preferred)

Numbers are ranking from best (1) to worst (3) environmental choice.

* = based on non-recovery rate of 62% for natural, non-beverage HDPE.

Ratio of Packaging Waste Weight to Usable Product Weight

Pancakes. The product category of pancakes encompasses different product forms, packaging materials and package sizes. In the Aunt Jemima™ brand, three sizes of boxed pancake mix were analyzed. Also analyzed was a pancake product, the Bisquick™ brand "shake n' pour," because in the view of many environmentalists and waste reduction educators, it epitomizes wasteful packaging. The product is marketed for one time use, so that with the addition of water, the pancake mix can be shaken in the package and poured directly on the griddle. Although the boxed pancake mix package is made of recycled paperboard, no credit is given for this under the study's product evaluation method. Only the "shake n' pour" option, with its HDPE container, uses locally recyclable materials.

By weight and volume measures, the 5-lb box of pancake mix appears the clear environmental choice. Although from a volume standpoint the 2-lb box generates less waste per pancake than the 1-lb box, there was no difference in weight of waste per pancake between these size choices. Under the study's weight and volume-based evaluation methods, the status of the "shake and pour" option is highly dependent on the local recycling recovery rate for HDPE. For example, with improved diversion of HDPE (i.e., a recovery rate of 60 percent or more), the "shake n'

"pour" option could generate less weight of waste per pancake than the 2-lb or 1-lb boxes. With a recovery rate of 70 percent, the "shake n' pour" could even become equivalent to the 5-lb box in weight-based assessments.

The waste reduction educator provides a ranking of the product choices, echoing the weight and volume based evaluations, but explicitly prioritizing the boxes from largest to smallest, following the size principle. In addition, the recycled content packaging of the boxes support recycling markets and thereby help "close the loop." Furthermore, these single layered, dry boxes have the potential to be recycled or composted, which supports possible recycling program development in the future. The plastic "shake n' pour" choice is ranked last by the educator, who found the extra, empty space (allowing water to be added) in this package unacceptable, although the local recyclability of the package material, HDPE, was viewed positively.

Table 3-3. Environmental Ranking of Pancakes.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
"Shake-n-Pour" Bisquik (9 pancakes)	Container : HDPE*	3 (3.7 g/ pancake)	4 (31 ml/ pancake)	4 (4th most preferred)
Aunt Jemima 1-lb box (13 pancakes)	--	2 (2.7 g/ pancake)	3 (14 ml/ pancake)	3 (3rd most preferred)
Aunt Jemima 2-lb box (25 pancakes)	--	2 (2.7 g/ pancake)	2 (12 ml/ pancake)	2 (2nd most preferred)
Aunt Jemima 5-lb box (62 pancakes)	--	1 (2.0 g/ pancake)	1 (9 ml/ pancake)	1 (Most preferred)

Numbers are ranking from best (1) to worst (4) environmental choice

* = based on non-recovery rate of 70% for pigmented HDPE.

Chicken Noodle Soup. The vast soup category increasingly includes ready-to-eat options that offer consumers convenience, as well as more complex packaging. Table 3-4 presents a comparison of three forms of chicken noodle soup within the Campbell's brand. The

microwaveable single serving cup represents a highly complex package, made from an array of unrecycled and locally unrecyclable materials. It includes a mixed plastic cup, a virgin aluminum seal, a polystyrene (PS) label and a low-density polyethylene (LDPE) lid. The longstanding canned option is semi-concentrated; its steel can is locally recyclable, although its paper label is not. The dry packet contents can be seen as a form of concentrating, but the packaging material, a mixed plastic, is neither recycled nor locally recyclable.

Based on the weight-based evaluation, the dry packet appears the clear environmental choice. The dry packet produced far less weight of packaging waste per serving than the canned, although the canned option produced less volume of packaging waste per serving than the dry. Such an outcome for volume measures, however, may reflect differences in the ease of compacting and maintaining a compacted shape for the two product choices. The canned option, as a concentrate in a locally recyclable steel can, is most preferred by the waste reduction educator. The dry packet, although neither recyclable nor made of recycled content, is second most preferred, because it too is a concentrated product. The microwaveable cup, as a complex package and single-use serving, is least preferred. As with other product categories, the waste reduction educator gives significant weight to local recyclability and the number of uses or servings supported by a given amount of packaging.

Table 3-4. Environmental Ranking of Chicken Noodle Soup.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
Microwaveable cup (0.97 - 8-oz. serving)	--	3 (31.6 g/ serving)	3 (270 ml/ serving)	3 (Least preferred)
Canned concentrate (2.60 - 8-oz. servings)	Steel can*	2 (7.0 g/ serving)	1 (32 ml/ serving)	1 (Most preferred)
Dry packet (2.00 - 8-oz. servings)	--	1 (2.5g/ serving)	2 (50 ml/ serving)	2 (2nd most preferred)

Numbers are ranking from best (1) to worst (3) environmental choice.

* = Based on non-recovery rate of 34% for steel can.

Concentrate versus Dilute

Fabric Softener. This category includes both dilute and concentrated options, although many manufacturers are now phasing out their dilute products. In addition, fabric softener comes in different sized containers and in containers made of different materials. Within the Snuggle™ brand, there were two packaging options in the concentrate (a plastic container, where the jug was made of locally recyclable pigmented HDPE and the cap of locally non-recyclable PP, and a plastic film-coated paperboard carton that was not locally recyclable). Each of these were available in two sizes. There was also a dilute product choice in one size, whose HDPE container and PP cap involved the same packaging materials as the first concentrate option.

The dilute product choice yields the most packaging waste per use, despite local recyclability. In the weight and volume-based measures, the 36-oz. concentrate plastic container and the 40-oz. concentrate gabletop carton closely rival one another for ranking as the environmental choice, followed closely by the 20-oz. concentrate gabletop carton, with the 22-oz. concentrate plastic container a bit farther behind. Focusing on the more reliable weight-based measures alone, the differences in the adjusted weight of waste among the concentrates are small. By extension then, the relative rankings of the recyclable concentrate plastic containers and the non-recyclable concentrate gabletop cartons depend on the recovery rates of the locally recyclable material, pigmented HDPE.

Since the 30 percent recovery rate used in the calculations for Table 3-5 is an estimate, the impact on the relative rankings under the weight-based analysis was examined when different diversion rates were applied. At a 50 percent recovery rate for HDPE, there is little change in the rankings. The 36-oz. plastic container remains first, the 40-oz. gabletop carton remains second, while the 22-oz. plastic container and the 20-oz. gabletop carton converge to share the third rank. However, with an increase in diversion to 75 percent, the 36-oz. plastic container still remains first, but is followed by the 22-oz. plastic container, and then by the 40-oz. gabletop carton and the 20-oz. gabletop carton in that order.

The local educator's assessment does not favor the paperboard concentrate options relative to even the dilute HDPE option, because at present, plastic film-covered paperboard cartons are not locally recyclable or compostable. This assessment is based on the assumption that with HDPE recycling programs locally in place, no plastic fabric softener containers need end up in the waste stream.

Table 3-5. Environmental Ranking of Fabric Softener.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
64-oz. Snuggle dilute plastic (23 uses)	Container: HDPE *	5 (4.9 g/use)	5 (45 ml/use)	3 (3rd most preferred)
22-oz. ultra Snuggle concentrate plastic (22 uses)	Container: HDPE *	4 (3.0 g/use)	4 (21 ml/use)	2 (2nd most preferred)
20-oz. ultra Snuggle concentrate gable top (20 uses)	--	3 (2.3 g/use)	3 (17 ml/use)	5 (Least preferred)
40-oz. ultra Snuggle concentrate gable top (40 uses)	--	2 (2.0 g/use)	1 (15 ml/use)	4 (4th most preferred)
36-oz. ultra Snuggle concentrate plastic (36 uses)	Container: HDPE *	1 (1.9 g/use)	2 (16 ml/use)	1 (Most preferred)

Numbers are ranking from best (1) to worst (5) environmental choice.

* = based on non-recovery rate of 70% for pigmented HDPE.

Cranberry Juice. Cranberry juice is another product category that reflects choices between concentrated and dilute forms and between different packaging materials and sizes. Table 3-6 displays the results of comparisons between the product choices. At the grocery stores under study, in the Ocean Spray™ brand, there were two sizes of dilute juice in glass containers with metal lids, a three-pack of dilute single-serving aseptic juice boxes, a large polyethylene (PET) container of dilute juice with a non-locally recyclable HDPE lid, and a concentrated aseptic box refill. Of the various packaging materials in these product choices, only three were locally recyclable: glass, metal lids, and PET.

The concentrated aseptic refill produces considerably less weight and volume of packaging waste per serving and appears the environmental choice. Next, in the weight-based evaluation, is the 64-oz. PET container, followed by the aseptic single-serving juice boxes, the 48-oz. glass container and the 32-oz. glass container. The volume-based system yields a

different sequence, however. Volume-based measures for the two glass containers are presented both for "fully intact" and "fully crushed." Actual volume taken up by glass containers in landfills is probably somewhere between the two. Here the two glass containers result in the same volume of waste per serving (a probable outcome of imprecisions in the volume measurement system, detailed earlier in this section). Even intact, the glass containers yield a volume of waste, adjusted for local recyclability, that is less than either the aseptic single serving juice boxes or the PET container. If volume is measured with the glass containers fully crushed (a condition that very likely underestimates volume of waste under current solid waste management practices), the two glass containers could possibly yield a lower volume of waste than the concentrated aseptic refill box.

The local educator's assessment again incorporates closer attention to local recycling opportunities and programs in evaluating packaging waste impacts of the product choices. Locally recyclable and a large sized container, the PET dilute container is seen as most preferred. The 48-oz. dilute glass and the 32-oz. dilute glass containers follow in descending order, as they too are recyclable, but their packaging-to-product ratios are assumed to be less favorable. The educator ranks the aseptic refill concentrate as the fourth product choice, but stresses that it is a difficult determination. Although concentrating receives high marks, being locally unrecyclable is, in the educator's view, a strong mark against this packaging form. Finally, the aseptic dilute juice boxes are ranked as least preferred, for being overly packaged, locally unrecyclable single-serving products.

Table 3-6. Environmental Ranking of Cranberry Juice.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
32-oz. Ocean Spray dilute glass (5.3 6-oz. servings)	Glass container* metal lid*	5 (26.0 g/ svg)	2 (Intact = 69 ml/svg) or (Crushed = 11 ml/svg)	3 (3rd most preferred)
48-oz. Ocean Spray dilute glass (8 6-oz. servings)	Glass container* metal lid*	4 (24.7 g/ svg)	2 (Intact = 69 ml/svg) or (Crushed = 11 ml/svg)	2 (2nd most preferred)
3 - 8.45-oz. Ocean Spray dilute aseptic juice boxes (4.2 6-oz. servings)	--	3 (9.8 g/ svg)	3 (95 ml/svg)	5 (Least preferred)
64-oz. Ocean Spray dilute PET bottle (10.6 6-oz. servings)	PET container* HDPE lid	2 (6.9 g/ svg)	4 (102 ml/svg)	1 (Most preferred)
8.45-oz. Ocean Spray concentrate aseptic refill (7 6-oz. servings)	--	1 (1.9 g/ svg)	1 (15 ml/svg)	4 (4th most preferred)

Numbers are ranking from best (1) to worst (5) environmental choice.

* = Based on non-recovery rates of 31% for glass, 34% for metal lids, and 78% for custom PET.

Durable versus Disposable Goods

Razors. The principle of purchasing more durable as opposed to disposable products to reduce waste is perhaps epitomized by the product category of razors. Whereas cartridge blades for use with a permanent razor handle were once the dominant product choice facing consumers, plastic disposable razors have gained significant market share during the last 15 years. Although some consumers might move to an electric razor as a result of waste reduction education, this particular change in purchase behavior could not be tracked, given the product line at the ShopRite stores under study.

In the Schick Slim Twin™ line, three purchase options, which were available at the study stores and appeared representative of the extensive razor product category, were analyzed: a cello bag of 12 disposable razors; a cello bag of 5 disposable razors; and a cello bag of 6 refillable cartridges. Also analyzed was an Attra™ blister pack containing 10 cartridges, since blister packing represents another prominent form of packaging in the razors category. None of the constituent materials of the packaging or razors for any of the product choices was recyclable in Ulster County. The local educator distinguished broadly between razor cartridges (more preferred) and disposable razors (least preferred).

Table 3-7 presents the evaluation of the razors category. By both weight and volume measures, the cartridge razor options generate less waste per shave. Based on communication with the manufacturers, both disposable razors and razor cartridges were assumed to be good for 8.5 shaves. Although both disposable options tested resulted in less than one gram of waste per shave, the two cartridge options produced approximately half as much weight of waste per shave. A similar pattern is evident for volume of waste per shave.

Table 3-7. Environmental Ranking of Razors.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
12 Disposables (102 shaves)	--	3 (.7g/shave)	2 (4 ml/shave)	2 (Least preferred)
5 Disposables (42.5 shaves)	--	3 (.7g/shave)	2 (4 ml/shave)	2 (Least preferred)
10 Attra cartridges* (85 shaves)	--	2 (.4g/shave)	-	1 (Most preferred)
6 Cartridges* (51 shaves)	--	1 (.3g/shave)	1 (2 ml/shave)	1 (Most preferred)

*For use with "permanent" non-disposable razor handles.

Appendix D contains the environmental rankings of products within those product categories included in the study, but not presented in this section.

Section 4

SHOPPER SELECTION

Although tens of thousands of PricePlus cards have been issued by the Kingston and New Paltz stores together, an initial review of purchasing behavior for a random selection of cardholders revealed insufficient product movement for the anti-milestone products (those products within product categories that are comparatively more waste-generating). As a result, a purposive sample was drawn, selecting on the basis of anti-milestone purchasing behavior. One hundred seventy-seven (177) Universal Product Codes (UPCs) for anti-milestone products (e.g., smallest hand dishwashing liquid, smallest mini-packs of raisins, microwaveable oatmeal singles, dilute fabric softener, disposable razors, pump toothpaste) were identified. (See Appendix B for a complete listing of UPCs used in the study.) During a 5-week baseline period, 24,777 PricePlus cardholders shopped at least once at either the Kingston or New Paltz stores. Of these, 1,457 purchased three or more of these 177 anti-milestone products during the baseline period and were selected to constitute the purposive sample (see Table 4-1).

Table 4-1.	
Purchase of Anti-milestone UPCs in Baseline Period.	
<u>Number of "Bad" Purchases</u>	<u>Number of Cardholders</u>
Five or more	404
Four or more	713
Three or more	1457

The rationale for conducting a purposive sample was to ensure that the study focused on shoppers doing the wrong thing from a waste reduction standpoint, thus allowing considerable room to educate shoppers towards more waste-reducing purchase choices and to evaluate the effectiveness of the educational strategies in promoting that change.

Using a simple random sample selection procedure, the 1,457 cardholders were randomly assigned to one of four groups, comprised of 364, 364, 364, and 365 cardholders respectively. Three of these groups received more targeted, but variable educational treatments: one group received a direct mailing with an educational message; another received invitations to

shoppers' tours; and the third received coupons for more waste-reducing product choices. The fourth group served as a control. (See Section 5 for a detailed description of the variable treatments). Through address cleaning services arranged by Wakefern Food Corporation, the numbers (Ns) of the three variable groups were reduced; however, cardholders with "unclean" addresses were added to the control group on the assumption that such households could well be active shoppers whose purchasing behavior was documented by the scanner, even though their mailing addresses were misrecorded and unusable.

Despite address cleaning, some mailings were returned (Group 1 = 18; Group 2 = 13; Group 3 = 10); these households were also added to the control group. Finally, through a computer mix-up, 50 households received more than one treatment; these households were reconstituted as a new "interactive" treatment group, since it would be impossible to separate out the effects of the different treatments they had received. In a further complication, five cardholders received invitations to and attended the shoppers' tours who were not part of the original purposive sample. Given the comparatively low response to the shoppers' tour invitation, all tour participants were retained in the treatment group, regardless of whether or not they had been part of the original purposive sample. Table 4-2 presents the evolution of shopper sample size for the project.

Table 4-2. Sample Groups.			
	Random (N)	After Address Cleaning (N)	After Returns and Treatments (N)
Educational mailing	364	278	215
Shoppers' tours	364	268	228
Coupons	364	251	217
Control	365	660	752
Interactive (received mailings for more than one variable treatment)	---	---	50
Total	1457	1457	1462

In addition to the purposive sample of 1,457 cardholders (1,462 with five additional tour takers) selected on the basis of three or more anti-milestone purchases during the baseline period, more than 1,100 cardholders were randomly selected and tracked for the duration of the project. This group permits comparison of a truly random group of shoppers to those selected on the basis of purchasing behavior targeted by the project for change. The random control group, like the purposive control group, received none of the three variable educational treatments. Section 6 presents extended comparisons between the random control and the purposive control groups.

Section 5

EDUCATIONAL TREATMENTS

Waste reduction messages, organized around the four waste reduction principles previously mentioned, were designed and developed for use in all the educational treatments. They stressed:

- The rationale for waste reduction, including environmental and economic concerns and intrinsic satisfaction
- The collective harm and social benefits in various purchasing behaviors
- The potential impact of individual behavior
- Concrete, "how-to" examples, including their convenience and ease.

Permission was obtained from the Minnesota Office of Waste Management (MOWM) to use the slogan and other educational materials from their "Shop S.M.A.R.T.: Save Money and Reduce Trash" enviroshopping program. Broadly speaking, the present project tested educational treatments that spanned the continuum from broadbrush, background strategies to more targeted, focused, and small group learning approaches. The educational treatments are discussed below in order of execution.

TREATMENT ONE: COUNTY-WIDE EDUCATION

Steady exposure to mass media messages about waste reduction is seen as a crucial first step in improving public knowledge, which will then help to change attitudes and, in time, behavior. This is an educational strategy predicated not on one-to-one information exchange, but rather on creating a public climate of heightened concern, new information and practical advice about waste reduction. In this project, county-wide education occurred in two stages: first, "gentle rain," and then a "media downpour":

Gentle Rain

The "gentle rain" portion of the county-wide education was implemented primarily by the UCRRA and secondarily by Cornell Cooperative Extension of Ulster County (CCE-Ulster County). Gentle rain both pre-dated and post-dated the actual duration of the project. Its purpose was to disseminate waste reduction messages and information in ways accessible to the

entire Ulster County population. It was ongoing throughout the duration of the project. Gentle rain has included presentations to the public, including talks and/or displays; a County Fair exhibition tent with displays; print ads; radio public service announcements; print press releases; radio talk shows; distribution of brochures; and handling telephone queries (via the UCRRA helpline).

Media Downpour

The "media downpour" phase, in contrast, provided a concentrated focus and intensity of waste reduction messages to heighten awareness and a sense of importance around the issue and was distinctly linked to this project. Table 5-1 at the end of this section presents the resources required to implement the various components of the county-wide education. The media downpour portion of the county-wide education was implemented primarily by the UCRRA and CCE-Ulster County, and secondarily by Wakefern Food Corporation. Media downpour took place October to December 1993. It included the following elements:

- **Written Radio Public Service Announcements (PSAs)** were sent out every 2 weeks starting October 6. Intermediate PSAs were developed and recorded by the UCRRA and CCE-Ulster County and sent directly to area radio stations. Students from a SUNY New Paltz communication class wrote PSAs for the project as part of a class assignment and these PSAs were mailed November 15. PSAs were used in store broadcasts and also in paid radio ads, so they received extended use. (For samples, see Appendix E.)
- **Press Releases** were also an element of the media downpour. Staff sent out four press releases to local print media outlets on October 6. These were intended for use as filler space. (For samples, see Appendix E.)
- **A Waste Reduction Contest** took place between October 23 and November 20. It was developed to involve the public more actively in thinking up waste reduction tips and offered the incentive of a prize to encourage participation. The contest was promoted on the UCRRA's recycling radio talk show and through press releases to local media (see Appendix E). Most winners learned of the contest through print media; this may have allowed them to clip and save information on where to send their contest entries. The contest allowed waste reduction staff to get direct feedback from the public, and thereby tailor educational messages more closely to public needs and interests.
- **Print advertising** was administered during the media downpour period. The ads featured general waste reduction tips and specific information on comparative savings in packaging waste and price for pairs of product choices within selected product categories. The ads appeared in two dailies and two weeklies every 2 weeks (with a Thanksgiving hiatus) between October 24 and December 5. There were a total of 22 ads. These ads were considered effective by waste reduction staff and presented no particular problems to administer. (See Appendix E for samples.)

- **Feature Articles** focusing on the waste reduction tips identified for the project appeared on October 27, in Kingston's Daily Freeman, and on November 28, in Middletown's Times Herald Record (see Appendix E). Full-length articles were an effective way to reach the public, with considerably more detailed information and a higher level of explanation, and they generated considerable interest (as measured informally by calls to the UCRRA helpline).
- **Paid Radio Ads** were also purchased between December 14 and 21. The project sought to broadcast ads, coordinated to specific times and days during the media downpour and contributing to the overall themes of the media campaign. Paid radio ads were undertaken to compensate for the lack of control as to time or frequency of airing of PSAs. Using PSAs already produced by SUNY New Paltz for the project, Wakefern arranged for and implemented the paid radio ads.

TREATMENT TWO: IN-STORE SHOPPER EDUCATION

In-store shopper education was seen as a way to build on the generality of the county-wide education within the grocery store setting, where consumers are facing immediate purchasing decisions that have waste reduction implications. Thus, it was more focused and targeted than the county-wide education. In-store shopper education created an environment of consumer waste focused messages and information experienced by all shoppers at the New Paltz and Kingston ShopRite stores.

The actual treatment ran from January 7 to March 5, 1994. Certain elements continued beyond the official treatment period, including a brochure rack. The treatment was implemented jointly by the UCRRA, CCE-Ulster County, and Wakefern/ShopRite. Table 5-2 at the end of this section outlines the resources required to implement the various components of the in-store education. The design of the in-store shopper education presumed basic familiarity with enviroshopping concepts and tips on the part of store associates. Overall, the in-store shopper education included the following activities and elements:

- **A Short Video** (about 5 minutes) was produced. The video served a dual purpose: it was shown to store associates to achieve employee training objectives (i.e. to provide basic knowledge about consumer waste reduction, so employees would be capable of answering consumer questions), but it was also used as a tool to promote awareness in more general waste reduction education settings. The video project was coordinated by the UCRRA and by CCE-Ulster County, whose staff wrote the script. All project cooperators proofread the script. Actual production was contracted to the Marist College Media Center in the fall of 1993. Production of the S.M.A.R.T. video included researching costs and possible producers, writing the draft script, coordinating revisions, purchasing products to be shot in video, planning studio vs store shooting, taping studio and location footage, recording voice-over, and editing. (See video jacket in Appendix F.)

- **Training Store Associates** was a critical activity if store employees were to understand and contribute to the project. The fundamental goal of training was to teach associates the basic waste reduction principles so they could confidently answer any enviroshopping questions posed by shoppers. This training involved planning meetings with the store managers, distribution of the video, and follow-up at the stores. Employee training at the two stores took place during December 1993.
- **S.M.A.R.T. Shopping Literature Production** included developing a specific project brochure and a bookmark, based on material from the MOWM S.M.A.R.T. shopping project. Printed material detailing the waste reduction tips and providing concrete examples was developed to reinforce messages extant in the county-wide education and elsewhere in the stores. The brochure in particular was an opportunity to underscore the environmental and economic implications of enviroshopping. These elements were implemented by the UCRRA, Wakefern and CCE-Ulster County, with production taking place in December 1993. (See samples in Appendix F.) Tasks in producing the S.M.A.R.T. brochure included research on cost and waste comparisons of selected milestone and anti-milestone products (done by Cornell and the UCRRA), and actual design and printing of the brochure (coordinated by the UCRRA and implemented by Wakefern). The bookmark was a more straightforward venture, involving replication of MOWM materials, coordinated by CCE-Ulster County.
- **Brochure Racks** in the stores provided shoppers with a centralized location for free information on waste reduction, both materials specific to this project and those of a more general, supporting nature. The brochure rack went up at the Kingston store January 25, 1994 and a month later in New Paltz. This element was implemented by Wakefern, CCE-Ulster County and the UCRRA and involved design, delivery, installation and follow-up.
- **Plastic Bag Recycling** constituted another element of the in-store education that received reinforcement via the two-cent credit ShopRite gives at the checkout for bag reuse. Although plastic bag recycling is not technically waste reduction, providing an opportunity for such recycling demonstrated to shoppers that the store shares their concerns about the environment and recycling. In this sense, plastic bag recycling reinforced the overall waste reduction initiative at the two stores. Bag recycling already existed at the New Paltz store, but had to be initiated at the Kingston store. Project staff contributed to ongoing coordination of this program and its implementation at the Kingston store.
- **A Staffed Educational Display** formed the centerpiece of the in-store education during the two month period. It was implemented by CCE-Ulster County, the UCRRA, volunteers, and Wakefern. The educational display tables were staffed by trained volunteers at peak shopping times (typically Thursdays, Fridays, and Saturdays) during the treatment period. During the treatment period, project staff and volunteers made 950 shopper contacts at the Kingston store and 405 shopper contacts at the New Paltz store. Tasks involved in overall implementation of the educational display included purchasing materials (table, cloth, display board, poster material, and examples of products), assembling the display, staffing the display, coordinating with the ShopRite managers, recruiting volunteers (by telephone and by mail), preparing for the volunteer training, running the training sessions, scheduling staff, conducting follow-up at the stores, and writing thank-you notes to the volunteers.
- **Promotional Buttons** for the project to be worn by store associates were designed and produced. Two and one-half inches in diameter, with green lettering on a

white background, the buttons read "Shop S.M.A.R.T. Save Money and Reduce Trash" and included the image of a reusable (presumably cloth) grocery bag. Buttons were intended to consolidate and reinforce the waste reduction themes of the project by providing a visual stimulus that might compel shoppers to ask associates, "What does your button mean? What can I do about waste reduction? Can I really save money if I buy the waste-reducing choice?" Design, production, and implementation (i.e., distribution to stores and clearing with store managers) were shared by Wakefern, the UCRRA, and CCE-Ulster County. Buttons were available at the Kingston store between February 5 and March 6, 1994 and at the New Paltz store between February 4 and March 6, 1994 for associates to wear. (See copy of sample button in Appendix F.)

- **Playing Pre-recorded Broadcast Messages** in the stores was another element of the in-store education intended to reinforce broad exposure to the project's waste reduction tips by using another communication channel. Messages prepared by SUNY-New Paltz for use as radio PSAs were modified for in-store broadcast. Cooperators responsible for this element included Wakefern, the UCRRA, and CCE-Ulster County. Although initially played manually, the waste reduction tip messages were eventually played automatically. Overall they were played in the stores between February 6 and March 6, 1994. (For sample, see Appendix F.)
- **The S.M.A.R.T. Shopping Video** played continuously, providing another communication channel reinforcing waste reduction messages for the in-store education. While not every shopper will take time to watch even a 5-minute video, those that do are likely to be more engaged, and perhaps more receptive to the video's information than those listening to background audio messages. The UCRRA, CCE-Ulster County, and ShopRite staff coordinated and implemented the playing of the S.M.A.R.T. Shopping video in the stores between February 6 and March 6, 1994.

VARIABLE TREATMENTS THREE-A, THREE-B, AND THREE-C

The variable treatments took place as near to concurrently as could be achieved during April and May 1994, and were administered to the sample groups described in Table 4-2. These variable treatments were designed to determine the effect of more targeted and detailed waste reduction information and incentives on purchasing behavior. Specific elements of the three variable treatments and the resources they require are outlined in Table 5-3.

Educational Mailing

The purpose of the educational mailing was to evaluate the impact of a brief informational letter about waste reduction (i.e., direct mail) on shoppers' purchasing behavior. The letter (see Appendix G) was drafted by Cornell project cooperators, and critiqued by all other project cooperators. It was sent out on ShopRite letterhead and the mailing included a Shop S.M.A.R.T. brochure and a Shop

S.M.A.R.T. bookmark. While the letter was dated March 30, it did not go out until the first week of April.

Shoppers' Tours

Shoppers' tours comprised another of the variable treatments, one premised on the significance of personal contact and small group experience in effective educational communication. Primary responsibility for the shoppers' tours fell to CCE-Ulster County, and involved developing tour formats, issuing mailed tour invitations (which did not allude to the waste reduction orientation of the tour in order to avoid pre-selecting shoppers with established environmental interests), handling sign-ups, coordinating with store personnel, and leading the tours. To enhance participation, a \$10 ShopRite gift certificate was offered to those completing a tour. Tour invitations and response cards can be seen in Appendix G, as can a copy of the script for the shopper tour. Eight tours were conducted, including four at the Kingston store (April 19 and 20 at 10:30 A.M. and 7:30 P.M.) and at the New Paltz store (April 26 and 27 at 10:30 A.M. and 7:30 P.M.). Days for tours were chosen on recommendation of the store managers, who preferred traditionally less busy days of the week. Times for tours were selected by project staff to accommodate people with varied personal schedules. A total of 26 shoppers participated in these tours.

Coupons

The purpose of the financial incentive or coupon treatment was to determine how distinct economic factors (i.e., price considerations) might influence packaging waste purchasing behavior. This treatment was jointly implemented by Cornell, the UCRRA, and Wakefern. The initial plan was to issue coupons at the point of purchase (i.e., cash register generated by the Catalina system), but due to technical infeasibility, coupons had to be mailed to the treatment group.

Project cooperators decided to issue the coupons for relatively unambiguous milestone products and, in several cases, to allow the coupons to be used for any brand within the category. A sheet with 10 coupons was produced for the following products: any 20- to 40-oz. frozen mixed vegetable, 16-oz. or larger bag frozen peas or corn, 18-oz. Quaker hot oat cereal, 42-oz. Quaker hot oat cereal, any brand 32- to 42-oz. dishwashing liquid, any brand 64-oz. dishwashing liquid, the concentrate box Ocean Spray cranberry juice, any brand 15-oz. or larger raisins, refillable razors, and Sylvania double life light bulbs. (See coupons in Appendix G.)

The total value per sheet of coupons was \$5.25. Each coupon had printed on it a waste reduction tip. In addition, every coupon on any given sheet was coded with the cardholder ID of the person to whom the sheet had been mailed. This was to permit linkage of redemption with particular cardholder records. The coupons were printed April 14, mailed April 19, and set to expire May 15, 1994.

According to the A.C. Nielsen company, direct mail coupons typically redeem at 5.8 percent, although newspaper and magazine coupons range between 1.8 and 3.6 percent. The redemption rate of coupons for this project was 1.07 percent, while the total value of redeemed coupons returned to Cornell was \$13.40. This appears low for direct mail, but it is possible more coupons were used by cardholders in the treatment group than were ultimately recovered by Wakefern and returned to Cornell for linkage to the purchase data. Despite uncertainty about the redemption rate for the coupons, this group did receive a waste reduction educational message along with the actual coupons. Therefore, the entire coupon group is included in the statistical analyses presented in Section 6.

Tables 5-1, 5-2, and 5-3 outline in general terms the resources required to implement the various components of the educational treatments discussed in this section. For a more precise breakdown of actual time and expenses for the project conducted in Ulster County, New York, that might be used by communities interested in replicating the waste reduction education, see Appendix H.

Table 5-1.
Resources Required for Treatment One:
County-wide Education.

Treatment Elements	Waste Reduction Staff Time	Volunteer Time	Non-staff Expense*
GENTLE RAIN			
1. General Management			
• Developing brochure	1-7 days		
• Producing brochure	~ 1 day		
• Handling telephone queries	~ 1 day		
• Coordinating with municipal recycling coordinators	1-7 days		
2. Presentations to Public			
• Design & construction of displays	1-7 days		yes
• Coordination	< 1 day		
• Staffing	variable	variable	
3. County Fair			
• Planning/preparation	~ 1 day		
• Implementation	1-7 days	variable	yes
4. Print Ads			
• Design	1-7 days		yes
• Implementation	~ 1 day		yes
5. Radio PSAs			
• Developing/writing	1-7 days	1-7 days	
• Recording	< 1 day	~ 1 day	
• Distributing	< 1 day	< 1 day	yes
• Follow-up	< 1 day		
6. Radio Talk Show			
• Arranging	< 1 day		
• Broadcasting	< 1 day		

*Includes materials, supplies, postage, consulting services, and the like.

Table 5-1 (Continued).

Treatment Elements	Waste Reduction Staff Time	Volunteer Time	Non-staff Expenses
MEDIA DOWNPOUR			
1. Waste Reduction Contest			
• Writing press releases	< 1 day		yes
• Coordinating contest	~ 1 day		
• Radio promotion	< 1 day		
• Soliciting prizes for contest	< 1 day		maybe
• Judging	< 1 day		
• Follow-up	< 1 day		
2. Print Advertising			
• Designing	1-7 days		yes
• Implementation	< 1 day		yes
• Follow-up	< 1 day		
3. Radio PSAs			
• Developing	1-7 day	1-7 day	
• Recording	< 1 day	~ 1 day	
• Distributing	< 1 day	< 1 day	yes
• Follow-up	< 1 day		
4. Feature Article(s)			
• Planning/preparation	< 1 day		
• Interview	~ 1 day		
• In-print follow-up	< 1 day		
5. Press Releases			
• Developing	1-7 days		
• Mailing	< 1 day		yes
• Follow-up	< 1 day		

Table 5-2.
Resources Required for Treatment Two:
In-store Shopper Education.

Treatment Elements	Waste Reduction Staff Time	Grocery Store Staff Time	Volun- teer Time	Non-staff Expenses*
IN-STORE SHOPPER EDUCATION				
1. General Coordination of S.M.A.R.T.				
Video Production				
• Researching costs & producers	< 1 day			
• Writing draft script	1-7 days			
• Revisions	~ 1 day			
• Purchasing products	< 1 day			yes
• Coordination	~ 1 day			
• Studio taping	~ 1 day	< 1 day		yes
• Location taping	~ 1 day	< 1 day		yes
• Voice-over	~ 1 day			
• Editing	1-7 days			yes
2. S.M.A.R.T. Video Broadcast				
• Installing televisions	~ 1 day			
• Monitoring broadcast	~ 1 day			
3. Store Employee Training				
• Meeting with managers	~ 1 day	~ 1 day		
• Distribution of video	< 1 day	< 1 day		
• Follow-up	< 1 day	< 1 day		
4. S.M.A.R.T. Brochure				
• Researching cost savings for products in brochure	1-7 days			
• Designing brochure	1-7 days			
• Printing brochure		~ 1 day		yes
5. Brochure Rack in Stores				
• Designing rack	< 1 day			
• Delivering rack to stores	< 1 day	< 1 day		
• Installation	< 1 day	< 1 day		yes
6. Buttons				
• Designing	< 1 day	~ 1 day		yes
• Production		~ 1 day		yes
• Distribution	< 1 day	< 1 day		

*Includes materials, supplies, postage, consulting services, and the like.

Table 5-2 (Continued).

Treatment Elements	Waste Reduction Staff Time	Grocery Store Staff Time	Volun- teer Time	Non-staff Expenses*
7. Pre-recorded Broadcasts				
• Editing and re-recording		~ 1 day		
• Coordination and follow-up	< 1 day			
8. Plastic Bag Recycling				
• Coordination	< 1 day	< 1 day		
9. Staffed Store Display				
• Purchasing materials (table, cloth, display board, poster material, example products)	~ 1 day			yes
• Display assembly	1-7 days			
• Coordination w/store manager	~ 1 day			
• Volunteer recruiting by telephone and mailings	~ 1 day			
• Volunteer training preparation	1-7 days		~ 1 day	
• Volunteer training sessions	~ 1 day			
• Scheduling of staffing	< 1 day			
• In-store display staffing	1-7 days		1-7 days	
• Follow-up	< 1 day			
• Thank you notes	< 1 day			yes

Table 5-3.
Resources Required for Three Variable Treatments.

Treatment Elements	Waste Reduction Staff Time	Grocery Store Staff Time	Non-staff Expenses*
Treatment Three-A:			
EDUCATIONAL MAILING			
1. Mailing List Preparation		1-7 days	yes
2. Cover Letter Preparation	< 1 day		
3. Mailing	< 1 day		yes
Treatment Three-B:			
SHOPPERS' TOURS			
1. Coordination with Store Staff	< 1 day	< 1 day	
2. Tour Preparation (for two stores)			
• Writing outline	~ 1 day		
• Walk-through of tour	~ 1 day		
• Final script	1-7 days		
3. Tour Invitations			
• Mailing list preparation	< 1 day	1-7 days	yes
• Letter preparation	< 1 day		
• Response card preparation	< 1 day		
• Mailing	< 1 day		yes
4. Tour Sign-Up	< 1 day		
5. Confirming Tour Attendance			
• Preparing confirmation notices	< 1 day		
• Mailing	< 1 day		yes
6. Leading 8 Tours (45 min/tour), Preparation, Debriefing	1-7 days		
Treatment Three-C:			
COUPONS			
1. Preparation of Coupons			
• Decision on products to coupon	1-7 days	< 1 day	
• Research on size, cost, brand	1-7 days	~ 1 day	
• Designing coupons	~ 1 day	< 1 day	
• Printing coupons		~ 1 day	yes
2. Distribution of Coupons			
• Mailing list preparation		1-7 days	yes
• Mailing coupons		1-7 days	yes
3. Notification of Store Manager		< 1 day	
4. Redemption			
• Collecting redeemed coupons		variable	
• Analyzing redeemed coupons		~ 1 day	
• Determining cost of redeemed coupons		~ 1 day	yes
*Includes materials, supplies, postage, consulting services, and the like.			

Section 6

DATA ANALYSIS FOR ALL PRODUCTS

DATA SOURCES AND PROCEDURES

Four data sets were collected from September 28, 1993 through June 30, 1994:

- **Scan Data for Daily Sales** (collected by UPC and shopper identification number) for the 484 products were collected by the New Paltz and Kingston stores and sent to Catalina Marketing for processing. Cornell faculty used Catalina's data retrieval system to download the data via modem, unzip the compressed data files, then upload the data on to the mainframe computing facilities at Cornell. Daily data were aggregated into weekly data, and then into treatment period data for analysis. Data were also separated by product category, resulting in 14 separate data sets.
- **Demographic Data** from the PricePlus card members included gender, age, household size, children's ages, and categorical income (seven categories: under \$20,000; \$20,000-\$29,999; \$30,000-\$39,999; \$40,000-\$49,999; \$50,000-\$59,999; \$60,000-\$69,999; and more than \$70,000). These data are linked to the purchase data via the shopper identification number. (See Appendix F for ShopRite PricePlus card members' demographic information.)
- **Weekly Price Data** on the 484 UPCs being tracked were collected from the price books used by store managers. Weekly price books were made available to the project team in the week following their use in the stores. The UPC and its corresponding price were entered into a data set and linked to the purchase data via UPC.
- **Store Data on Marketing and Product Promotions** were collected weekly by the sales associates through the use of a team-developed check list. The check list covered: whether or not the item was on sale; if there was a buy-one-get-one-free or similar promotion; if there was a coupon or rebate; if there was a product-with-purchase (e.g., a free toothbrush with toothpaste purchase); if there was a change in the position of the product on the shelf from the previous week; if there was an endcap display; if there was any other special display; if the product was out of stock on the shelf; and if the product was discontinued. In addition, the weekly sales flyer from the stores was used to determine if there was any special sale or advertisement (e.g., cents-off with or without coupon, sale price advertised). These data were linked to price data via the UPC code.

First, the data were grouped by treatment period:

Baseline	September 28 - October 30	Control Period Before Treatments
Period 1	October 31 - December 11	Gentle Rain/Media Downpour
Period 2	December 12 - January 5	Holiday Lag Period
Period 3	January 6 - March 5	In-store Shopper Education
Period 4	March 6 - April 9	Lag Period
Period 5	April 10 - May 14	Variable Education Treatments
Period 6	May 15 - June 30	Lag Period

Attrition (i.e., people dropping out of the sample) is always an issue in working with longitudinal data. A data search eliminated persons who had dropped out of the sample over the 9-month period. Only shoppers who appeared in the first and last periods were retained in the sample; as long as a shopper made at least one purchase in period 6, she/he was retained. About 100 shoppers were lost due to attrition.

Next, data were sorted by the 14 product categories (i.e., dishwashing liquid, coffee, rice, light bulbs, fabric softener, etc.). It is at this product category level that all the following analyses were performed.

The best way to describe the data analysis is to walk through an example. First, within each product category and time period, it is possible that a shopper made multiple purchases of multiple products within the product category. For example, a shopper may have purchased several bottles of dishwashing liquid during the baseline period, and these may have been different sizes. Thus, the first step in data manipulation was to aggregate the total number of purchases and the size of each purchase:

Week #	Shopper #	Quantity (Q)	Size	Total Q for Period	Total oz. for Period
1	1	2	22 oz.	4 =	98 =
2	1	1	32 oz.	(2+1+1)	(2*22)+(1*32)
4	1	1	22 oz.		+ (1*22)

At this stage, the data from the weight of waste adjusted for recyclability in Ulster County were incorporated into the data. (See Appendix I for discussion of rationale for focus on weight of waste with adjustment for recyclability.) The total weight of waste associated with the purchases was then calculated:

Size	Weight of Waste	Quantity	Subtotal Weight of Waste	Total Weight of Waste	Average Weight of Waste/oz. Purchased
22 oz.	1.5 g/oz.	3	99 = (22*1.5*3)	140.6 g = (99+41.6)	1.43 g = (140.6/98)
32 oz.	1.3 g/oz.	1	41.6 = (32*1.3*1)		

In this case, Shopper 1 purchased four bottles of dishwashing liquid during the baseline period, three 22-oz. bottles and one 32-oz. bottle, or a total of 98 oz. of dishwashing liquid. The total amount of waste calculated to enter the waste stream from these four purchases is 140.6 grams. The average weight of waste per ounce of dishwashing liquid purchased is 1.43 grams. The goal of the study was to educate this shopper to purchase larger sizes of dishwashing liquid, thus lowering the average weight of waste per ounce of dishwashing liquid purchased (i.e., by the end of the project, the average weight of waste per ounce purchased would be some number less than 1.43).

It is this average weight of waste per ounce or unit purchased (from now on referred to as AWW/U) that was measured to compare groups and to ascertain behavior changes in individuals and groups.

A variety of comparisons of AWW/U were made. First, the overall AWW/U for the purposive waste reduction control sample (WRS-control) was compared to the random sample (a random sample of shoppers drawn and tracked by the graduate research assistant for this project). Both these groups received identical treatments so that this comparison examines any differences that might be caused by the WRS-control selection of shoppers who purchased the 177 anti-milestone products in the baseline period.

In addition, a variation of the Chow test (Chow 1960) was performed to determine if the pattern of changes in the AWW/U was the same between the WRS-control and random samples. Specifically, this test checks the slopes of two regression lines and determines whether the slopes are the same or different. In this case, if the interacted variable of the period and sample is significant, the difference in the slopes of the lines of the two samples is confirmed and a difference in behaviors is confirmed. In essence, this procedure answers the question: did the WRS-control and random samples exhibit the same behavior changes, even

though they may be at different levels of waste? If a difference in behaviors is confirmed, it is noted on the tables in the text of this section.

Next, the WRS-control group was compared to the treatment groups by time period. This comparison examines the impact of the differential treatments taking place in time period X. T-tests between the means were performed to determine significant differences between the groups.

Finally, individual changes were examined to determine the percentage of shoppers that improved (reduced waste), stayed the same, or worsened (increased waste) for each product category. The AWW/U for the first and last observed purchases of shoppers was compared (note that this requires that shoppers purchase in at least two periods in order to calculate this change in behavior). Shoppers were then placed in one of three categories: improved, stayed the same, grew worse. A Chi-Square analysis tested for differences between these groups. Using simple t-test statistical comparisons, the demographic characteristics of the shoppers in the three categories were also examined.

Following are the results for the 14 product categories studied within the four waste reduction principles drawn on in the educational treatments.

DATA ANALYSIS RESULTS BY WASTE REDUCTION PRINCIPLE

Waste Reduction Principle of Size

Product categories within the size principle (large containers generate less packaging per use or serving than smaller containers) include dishwashing liquid, frozen vegetables, and raisins. Several products fit within both the size and packaging form principles and will be discussed under the packaging form section; these include coffee, pancakes, hot cereal, rice, and toothpaste.

Dishwashing Liquid. Differences in the WRS-control and random samples were confirmed in the baseline period and in period 1 (Table 6-1, Figure 1). Also, differences in behavior over time between the WRS-control and random samples were confirmed by the Chow test variation.

Some differences in the treatment groups emerged (Table 6-2, Figure 2): the mail group was different from the control group in the baseline period and the tour group was different from the control group in period 2. However, it is important to note that these groups were not

differentially treated during these periods; therefore, the differences are assumed to be random.

Treatments (mailing, couponing, tours, or combinations of these) did not seem effective in encouraging shoppers to purchase larger sizes of dishwashing liquid and thereby reduce the AWW/U for this product.

Table 6-1. Comparison AWW/U (g/oz.) of WRS-Control and Random Samples by Period for Dishwashing Liquid.		
Period	WRS-Control (N=548)	Random (N=685)
Baseline	1.04	0.98*
1	1.04	1.02*
2	1.03	1.02
3	1.01	0.99
4	1.04	1.02
5	1.05	1.05
6	1.05	1.05

*t-test between means significant at .95 or better
Confirmed by Chow variation test

Figure 6-1. Average weight of waste (g/oz.) per shopper by WRS-control and random samples for dishwashing liquid.

Period	Control (N=548)	Tour (N=19)	Mail (N=134)	Coupon (N=143)	Interactive (N=30)
Baseline	1.04	1.02	1.07*	1.03	1.06
1	1.04	0.99	1.06	1.03	1.07
2	1.03	1.10*	1.05	1.02	1.05
3	1.01	0.92	1.03	0.98	1.04
4	1.04	1.07	1.03	1.03	1.06
5	1.05	1.03	1.07	1.04	1.02
6	1.05	1.02	1.07	1.05	1.06

*t-test between means of control and treatment groups significant at .95 or better

Figure 6-2. Average weight of waste (g/oz.) per shopper by group for dishwashing liquid.

Table 6-3. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Dishwashing Liquid				
Behavior Change	Random	Control	Treatment	Number
Improved	8.49	12.54	13.04	82
Worse	24.35	16.83	16.15	143
Same	67.16	70.63	70.81	510
Number	271	303	161	
3-Way Chi-square is not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-3. Change in purchase behavior before and after differential treatments for dishwashing liquid.

There were no significant differences between the random, control, and treatment groups (Table 6-3, Figure 3). Within the treatment group, shoppers who improved tended to be older. Comparing the treatment and control groups, households who improved in the treatment group tended to have older children than those who improved in the control group. Male cardholders in the control group were more likely to worsen than their counterparts in the treatment group. Among those who stayed the same, persons in the treatment group had higher incomes than those in the control group.

Frozen Vegetables. Differences in the WRS-control and random samples were confirmed in five of the seven periods (Table 6-4, Figure 6-4), and these differences in behavior were confirmed over time by the Chow variation test. However, there were no significant differences between the control and the treatment groups (Table 6-5, Figure 6-5).

Treatments (mailing, couponing, tours, or combinations of these) did not seem effective in encouraging shoppers to purchase larger sizes of frozen vegetables.

Table 6-4.
Comparison AWW/U (g/oz.) of WRS-Control Group and Random Samples by Period for Frozen Vegetables.

Period	WRS-Control (N=517)	Random (N=652)
Baseline	1.18	0.81*
1	0.99	0.77*
2	1.13	0.85*
3	1.01	0.82*
4	0.93	0.73*
5	0.99	0.87
6	1.04	0.90

*t-test between means significant at .95 or better

Figure 6-4. Average weight of waste (g/oz.) per shopper by group for frozen vegetables.

Table 6-5. Comparison AWW/U (g/oz.) of WRS-Control and Treatment Groups by Period for Frozen Vegetables.					
Period	Control (N=517)	Tour (N=15)	Mail (N=132)	Coupon (N=145)	Interactive (N=28)
Baseline	1.18	1.31	1.14	1.09	1.36
1	0.99	1.01	0.89	0.81	1.25
2	1.13	0.92	0.93	1.09	1.03
3	1.01	0.57	0.95	0.92	0.78
4	0.93	0.75	0.91	0.98	1.14
5	0.99	1.34	0.66	1.17	1.01
6	1.04	1.17	1.01	1.01	0.66
t-test between the means of the control and treatment groups not significant

Figure 6-5. Average weight of waste (g/oz.) per shopper by group for frozen vegetables.

Table 6-6. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Frozen Vegetables.				
Behavior Change	Random	Control	Treatment	Number
Improved	26.85	25.19	33.11	174
Worse	24.54	28.57	22.30	162
Same	48.61	46.24	44.59	294
Number	216	266	148	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-6. Change in purchase behavior before and after differential treatments for frozen vegetables.

There were no significant differences between the random, control, and treatment groups (Table 6-6, Figure 6-6). Comparing the treatment and control groups, cardholders who improved in the treatment group were more likely to be male than those who improved in the control group. Cardholders within the control group with older children were more likely to worsen than their counterparts in the treatment group. There were no differences among those who stayed the same.

Raisins. Differences in the WRS-control and random samples were confirmed in the baseline and in all periods except for period 4 (Table 6-7, Figure 6-7). There were no differences in behavior over time between the WRS-control and random samples, and no differences emerged among the treatment groups across time periods (Table 6-8, Figure 6-8). Treatments (mailing, couponing, tours, and combinations of these) did not seem effective in encouraging shoppers to purchase larger sizes of raisins.

Table 6-7. Comparison AWW/U (g/oz.) of WRS-Control Group and Random Samples by Period for Raisins.		
Period	WRS-Control (N=327)	Random (N=350)
Baseline	2.89	2.50*
1	2.48	2.22*
2	2.43	2.16*
3	2.60	2.17*
4	2.41	2.27
5	2.59	2.13*
6	2.57	2.28*

*t-test between means significant at .95 or better

Figure 6-7. Average weight of waste (g/oz.) per shopper by group for raisins.

Period	Control (N=327)	Tour (N=13)	Mail (N=92)	Coupon (N=92)	Interactive (N=21)
Baseline	2.89	3.45	2.98	2.97	2.99
1	2.48	2.61	2.42	2.51	2.40
2	2.43	2.72	2.53	2.48	2.76
3	2.60	2.55	2.40	2.66	2.37
4	2.41	1.87	2.29	2.60	2.72
5	2.59	2.13	2.46	2.57	3.16
6	2.57	2.38	2.46	2.61	3.16

t-test between means of control and treatment groups not significant

Figure 6-8. Average weight of waste (g/oz.) per shopper by group for raisins.

Table 6-9. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Raisins.				
Behavior Change	Random	Control	Treatment	Number
Improve	35.37	28.26	30.30	75
Worse	15.85	23.91	10.61	42
Same	48.78	47.83	59.09	123
Number	82	92	66	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-9. Change in purchase behavior before and after differential treatments for raisins.

Comparing the treatment and control groups, among households who remained the same, cardholders in the treatment group were more likely to be female.

Waste Reduction Principle of Package Form

Product categories that embody the package form principle (i.e., that a lower ratio of packaging waste weight to usable product weight indicates a more waste reducing form) include coffee, pancakes, hot cereal, rice, toothpaste, soups, and baby wipes.

Coffee. Differences in the WRS-control and random samples were confirmed in period 3 (Table 6-10, Figure 6-10). However, differences in behavior over time between the WRS-control and random samples were not significant, and there were no significant differences between the control and the treatment groups (Table 6-11, Figure 6-11).

Table 6-10. Comparison AWW/U (g/oz.) of WRS-Control and Random Samples by Period for Coffee.		
Period	WRS-Control (N=422)	Random (N=534)
Baseline	2.82	2.93
1	2.95	2.99
2	3.10	3.03
3	2.99	3.11*
4	3.04	3.08
5	2.98	3.01
6	2.98	3.01

*t-test between means significant at .95 or better

Figure 6-10. Average weight of waste (g/oz.) per shopper by group for coffee.

Period	Control (N=422)	Tour (N=10)	Mail (N=117)	Coupon (N=103)	Interactive (N=31)
Baseline	2.82	2.24	2.78	2.93	3.29
1	2.95	3.29	2.91	2.83	3.39
2	3.10	3.31	2.91	3.15	3.15
3	2.99	3.26	2.96	3.13	3.03
4	3.04	3.27	2.83	2.91	3.22
5	2.98	3.33	2.88	3.16	2.93
6	2.98	3.39	2.70	3.06	2.85
t-test between means of control and treatment groups not significant

Figure 6-11. Average weight of waste (g/oz.) per shopper by group for coffee.

Table 6-12. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Coffee.				
Behavior	Random	Control	Treatment	Number
Improve	17.74	19.44	28.10	109
Worse	20.43	30.09	24.79	133
Same	61.83	50.46	47.11	281
Number	186	216	121	

3-Way Chi-square significant at .95 or better
2-Way Chi-square (between control and treatment groups) not significant

Figure 6-12. Change in purchase behavior before and after differential treatments for coffee.

There were no significant differences between the random, control, and treatment groups (Table 6-12, Figure 6-12). Within the treatment group, shoppers who improved tended to have higher incomes. Comparing the treatment and control groups, among households whose behavior improved, households in the treatment group were more likely to have larger households, have higher incomes and were more likely to have female cardholders.

Pancakes. There was very low product movement in this particular category, making it very difficult to find significant differences in the groups. There were no differences in behavior

change between the WRS-control and random samples (Table 6-13, Figure 6-13), nor were there any differences in the treatment groups (Table 6-14, Figure 6-14).

Table 6-13. Comparison AWW/U (g/pancake) of WRS-Control Group and Random Samples by Period for Pancakes.		
Period	WRS-Control (N=300)	Random (N=321)
Baseline	2.71	2.66
1	2.69	2.62
2	2.78	2.78
3	2.68	2.69
4	2.70	2.63
5	2.66	2.68
6	2.73	2.66
t-test between means not significant

Figure 6-13. Average weight of waste (g/pancake) per shopper by group for pancakes.

Table 6-14.					
Comparison AWW/U (g/pancake) of WRS-Control and Treatment Groups by Period for Pancakes.					
Period	Control (N=300)	Tour (N=8)	Mail (N=86)	Coupon (N=70)	Interactive (N=22)
Baseline	2.71	2.70	2.69	2.65	2.69
1	2.69	—*	2.69	2.84	2.69
2	2.78	2.46	2.76	2.90	2.69
3	2.68	2.46	2.68	2.72	2.69
4	2.70	2.70	2.69	2.84	2.69
5	2.66	—*	2.69	2.55	2.70
6	2.73	2.02	2.69	2.71	2.69
t-test between means of control and treatment groups not significant					
* No purchases

Figure 6-14. Average weight of waste (g/pancake) per shopper by group for pancakes.

Table 6-15. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Pancakes.				
Behavior	Random	Control	Treatment	Number
Improve	16.67	10.94	4.26	19
Worse	15.00	14.06	17.02	26
Same	68.33	75.00	78.72	126
Number	60	64	47	

3-Way Chi-square not significant
2-Way Chi-square (between control and treatment groups) not significant

Figure 6-15. Change in purchase behavior before and after differential treatments for pancakes.

There were no significant differences between the WRS-control, random, and treatment groups (Table 6-15, Figure 6-15). Numbers were too low to make meaningful comparisons within and among the groups.

Hot Cereal. There were significant differences between the WRS-control and random samples in all periods (Table 6-16, Figure 6-16); however these differences in behavior change were not confirmed over time by the Chow test variation. There were also no differences between the control and treatment groups over time (Table 6-17, Figure 6-17).

Table 6-16.
Comparison AWW/U (g/oz.) of WRS-Control Group and Random Samples by
Period for Hot Cereal.

Period	WRS-Control (N=464)	Random (N=505)
Baseline	10.39	7.38*
1	9.97	7.47*
2	10.18	8.11*
3	10.07	7.89*
4	9.92	7.94*
5	11.13	7.91*
6	9.34	7.25*

* t-test between means significant at .95 or better

Figure 6-16. Average weight of waste (g/oz.) per shopper by group for hot cereal.

Table 6-17.					
Comparison AWW/U (g/oz.) of WRS-Control and Treatment Groups by Period for Hot Cereal.					
Period	Control (N=464)	Tour (N=18)	Mail (N=100)	Coupon (N=116)	Interactive (N=26)
Baseline	10.39	6.53	10.99	10.42	9.60
1	9.97	10.49	9.61	9.72	9.19
2	10.18	8.40	9.83	9.63	9.58
3	10.07	8.44	10.52	9.02	11.33
4	9.92	9.51	10.52	10.34	9.56
5	11.13	9.15	10.67	11.74	7.76
6	9.34	8.20	9.23	9.42	10.54
t-test between means of control and treatment groups not significant

Figure 6-17. Average weight of waste (g/oz.) per shopper by group for hot cereal.

Table 6-18.				
Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Hot Cereal.				
Behavior Change	Random	Control	Treatment	Number
Improve	14.12	26.05	15.79	52
Worse	24.71	25.21	35.09	71
Same	61.18	48.74	49.12	138
Number	85	119	57	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-18. Change in purchase behavior before and after differential treatments for hot cereal.

There were no significant differences between the random, control, and treatment groups (Table 6-18, Figure 6-18). Comparing the treatment and control groups, among households who stayed the same, cardholders in the treatment group were more likely to have higher incomes than their counterparts in the control group.

Rice. Differences in the WRS-control and random samples were confirmed in the baseline period and in periods 4 and 6 (Table 6-19, Figure 6-19). However, these differences in behavior

change were not confirmed over time. Some differences in the treatment groups emerged (Table 6-20, Figure 6-20); the interactive group was different from the control group in periods 1 and 5; however, these differences are assumed to be random because there was no differential treatment until period 5.

Table 6-19. Comparison AWW/U (g/svg.) of WRS-Control Group and Random Samples by Period for Rice.		
Period	WRS-Control (N=321)	Random (N=397)
Baseline	2.00	1.44*
1	1.94	1.75
2	1.57	1.33
3	1.59	1.43
4	2.10	1.51*
5	1.76	1.25
6	1.87	1.24*

*t-test between means significant at .95 or better

Figure 6-19. Average weight of waste (g/svg.) per shopper by group for rice.

Table 6-20.					
Comparison AWW/U (g/svg.) of WRS-Control and Treatment Groups by Period for Rice.					
Period	Control (N=321)	Tour (N=10)	Mail (N=80)	Coupon (N=89)	Interactive (N=22)
Baseline	2.00	0.18	2.45	2.26	1.60
1	1.94	1.45	2.06	1.62	0.78*
2	1.57	0.54*	2.24*	2.12*	1.98
3	1.59	0.71	1.91	1.89	1.06
4	2.10	0.18	2.26	1.90	1.50
5	1.76	0.98	2.31	1.79	0.42*
6	1.87	1.32	2.20	2.02	1.47

*t-test between means of control and treatment groups significant at .95 or better

Figure 6-20. Average weight of waste (g/svg.) per shopper by group for rice.

Table 6-21.				
Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Rice.				
Behavior Change	Random	Control	Treatment	Number
Improve	25.96	12.24	12.50	47
Worse	14.42	16.33	12.50	39
Same	59.62	71.43	75.00	180
Number	104	98	64	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-21. Change in behavior before and after differential treatments for rice.

There were no significant differences between the random, control, and treatment groups. Within the treatment group, those who improved tended to have higher incomes. Comparing the treatment and control groups, among households whose behavior improved, households in the treatment group also had higher incomes than those in the control group.

Toothpaste. Differences in the WRS-control and random samples were confirmed in three of the seven periods (Table 6-22, Figure 6-22). However, there were no significant differences in behavior over time between the two groups.

Some differences in the treatment groups emerged (Table 6-23, Figure 6-23): the tour group was almost always significantly different from the control group except for period 5, the major differential treatment period. The coupon group and the interactive group were different from the control group in the early periods of the study, but not when differential treatments were applied. It is also important to note the low product movement in this category; in some periods for some treatment groups, there were only 2 or 3 observations.

Treatments (mailing, couponing, tours, or combinations of these) did not seem effective in encouraging shoppers to purchase larger sizes of toothpaste.

<p>Table 6-22. Comparison AWW/U (g/oz.) of WRS-Control Group and Random Samples by Period for Toothpaste.</p>		
Period	WRS-Control (N=407)	Random (N=470)
Baseline	4.57	4.37
1	4.43	4.61
2	4.59	4.13*
3	4.61	4.12*
4	3.88	4.00
5	3.83	4.13*
6	3.92	4.02
*t-test between means significant at .95 or better

Figure 6-22. Average weight of waste (g/oz.) per shopper by group for toothpaste.

Period	Control (N=407)	Tour (N=12)	Mail (N=111)	Coupon (N=114)	Interactive (N=29)
Baseline	4.57	4.10*	5.04	4.62	3.86*
1	4.43	4.10*	4.60	4.00	3.65*
2	4.59	3.94*	4.49	4.08	3.77*
3	4.61	4.10*	4.45	4.06*	4.04
4	3.88	4.12*	3.92	4.12	4.01
5	3.83	4.10	3.78	3.75	3.22
6	3.92	4.10*	3.97	3.78	3.57

*t-test between means of control and treatment groups significant at .95 or better

Figure 6-23. Average weight of waste (g/oz.) per shopper by group for toothpaste.

Behavior Change	Random	Control	Treatment	Number
Improve	22.66	28.95	29.35	100
Worse	17.19	16.45	14.13	60
Same	60.16	54.61	56.52	212
Number	128	152	92	

3-Way Chi-square not significant
2-Way Chi-square (between control and treatment groups) not significant

Figure 6-24. Change in purchase behavior before and after differential treatments for toothpaste.

There were no significant differences between the random, control, and treatment groups (Table 6-24, Figure 6-24). Comparing the treatment and control groups, households whose behavior worsened in the control group were more likely to have older children than those in the treatment group. Among households who stayed the same, households in the treatment group were larger and had higher incomes than those in the control group.

Soup. There were no significant differences between the WRS-control and the random samples (Table 6-25, Figure 6-25), nor were there any differences in behavior change confirmed over time. Some differences in the treatment groups emerged (Table 6-26, Figure 6-26); the coupon group was different from the control group in periods 1, 3, 4 and 6. However, it is important to note that these groups were not differentially treated until period 5; therefore, the differences prior to this period are assumed to be random.

Table 6-25.		
Comparison AWW/U (g/oz.) of WRS-Control Group and Random Samples by Period for Soup.		
Period	WRS-Control (N=271)	Random (N=301)
Baseline	7.82	7.02
1	8.21	7.60
2	7.46	7.29
3	8.22	7.17
4	9.32	8.20
5	9.05	7.95
6	8.69	8.10
t-test between means not significant

Figure 6-25. Average weight of waste (g/oz.) per shopper by group for soup.

Table 6-26.					
Comparison AWW/U (g/oz.) of WRS-Control and Treatment Groups by Period for Soup.					
Period	Control (N=271)	Tour (N=7)	Mail (N=65)	Coupon (N=76)	Interactive (N=17)
Baseline	7.82	—**	7.50	6.97	6.46
1	8.21	7.81	7.52	6.63*	8.42
2	7.49	5.51	7.29	7.17	9.46
3	8.22	—**	7.44	5.96*	8.13
4	9.32	4.64	8.08	7.01*	8.32
5	9.05	—**	10.16	6.99	12.40
6	8.69	—**	9.25	6.72	—**
*t-test between means of control and treatment groups significant at .95 or better **Numbers too low to make meaningful comparisons within and among the groups

Figure 6-26. Average weight of waste (g/oz.) per shopper by group for soup.

<p align="center">Table 6-27. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Soup.</p>				
Behavior	Random	Control	Treatment	Number
Improve	22.45	12.50	4.00	19
Worse	26.53	23.21	36.00	35
Same	51.02	64.29	60.00	76
Number	49	56	25	
<p>3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant</p>

Figure 6-27. Change in purchase behavior before and after differential treatments for soup.

The numbers were too small to make meaningful comparisons. There were no significant differences between the random, control, and treatment groups.

Baby Wipes. Differences in the WRS-control and random samples were confirmed in the baseline period and in periods 1, 2, and 6 (Table 6-28, Figure 6-28). However, these differences were not confirmed over time by the Chow variation test. Treatments (mailing, couponing, tours, or combinations of these) did not seem effective in encouraging shoppers to purchase larger sizes of baby wipes and thereby reduce the AWW/U for this product.

Table 6-28.
Comparison AWW/U (g/wipe) of WRS-Control Group and Random Samples by Period
for Baby Wipes.

Period	WRS-Control (N=162)	Random (N=126)
Baseline	1.17	0.98*
1	1.21	1.11*
2	1.14	0.99
3	1.15	1.12
4	1.09	0.95
5	1.11	1.13
6	1.06	0.82*

* t-test between means significant at .95 or better

Figure 6-28. Average weight of waste (g/wipe) per shopper by group for baby wipes.

Period	Control (N=162)	Tour (N=3)	Mail (N=42)	Coupon (N=42)	Interactive (N=11)
Baseline	1.17	1.20	1.13	1.10	1.17
1	1.21	1.20	1.09	1.20	1.18
2	1.14	1.20	1.05	1.02	1.20
3	1.15	1.20	1.04	1.10	1.18
4	1.09	1.20	0.93	1.07	1.19
5	1.11	—	0.98	1.06	1.20
6	1.06	0.53	0.90	1.05	1.20

t-test between means of control and treatment groups not significant

Figure 6-29. Average of weight of waste (g/wipe) per wipe per shopper by group for baby wipes.

Table 6-30.				
Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Baby Wipes.				
Behavior Change	Random	Control	Treatment	Number
Improve	38.46	25.71	30.43	42
Worse	11.54	11.43	8.70	15
Same	50.00	62.86	60.87	85
Number	26	70	46	
3-Way Chi-square not significant				
2-Way Chi-square (between control and treatment groups) not significant

Figure 6-30. Change in purchase behavior before and after differential treatments for baby wipes.

There were no significant differences between the random, control, and treatment groups (Table 6-30, Figure 6-30). Comparing the treatment and control groups, among households whose behavior stayed the same, households in the treatment group were more likely to have higher incomes than those in the control group.

Waste Reduction Principle of Concentrating

Product categories within the concentrate principle (concentrated versions of a given product generate less packaging per use or serving than dilute versions) include fabric softener and cranberry juice.

Fabric Softener. The unit of analysis in this case is average weight of waste per use (i.e., load of wash). Differences in the WRS-control and random samples were confirmed in period 6 (Table 6-31, Figure 6-31). However, differences in behavior change over time between the WRS-control and random samples were not significant.

It is important to note that the product movement in this category is small; in the case of the tour group, in six of the periods, only one purchase was made, making it impossible to compute a t-statistic on this group. There were no significant differences between the control and treatment groups (Table 6-32, Figure 6-32).

Table 6-31. Comparison AWW/U (g/use) of WRS-Control and Random Samples by Period for Fabric Softener.		
Period	WRS-Control (N=233)	Random (N=210)
Baseline	4.45	4.77
1	4.60	4.47
2	4.69	4.80
3	4.57	4.57
4	4.92	4.84
5	4.75	5.36
6	5.06	4.19*
*t-test between means significant at .95 or better

Figure 6-31. Average weight of waste (g/use) per shopper by group for fabric softener.

Period	Control (N=233)	Tour (N=5)	Mail (N=53)	Coupon (N=62)	Interactive (N=15)
Baseline	4.45	2.46	4.03	4.65	4.52
1	4.60	2.38	3.93	4.36	5.12
2	4.69	2.46	3.72	4.75	4.85
3	4.57	2.64	4.66	4.27	4.09
4	4.92	2.46	4.01	4.37	3.54
5	4.75	2.00	4.81	4.70	5.13
6	5.06	4.90	4.61	3.88	4.83
t-test between means of control and treatment groups not significant

Figure 6-32. Average weight of waste (g/use) per shopper by group for fabric softener.

Behavior Change	Random	Control	Treatment	Number
Improve	22.95	15.00	26.32	36
Worse	26.23	28.75	34.21	52
Same	50.82	56.25	39.47	91
Number	61	80	38	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-33. Change in purchase behavior before and after differential treatments for fabric softener.

There were no significant differences between the random, control, and treatment groups (Table 6-33, Figure 6-33). In part, this analysis reflects the relatively low product movement of fabric softeners; in fact, only 118 households in the study made two purchases of fabric softener over the period of the study. Comparing the treatment and control groups, among households whose behavior stayed the same, households in the treatment group were smaller than those in the control group.

Cranberry Juice. There were no significant differences between the WRS-control and the random samples (Table 6-34, Figure 6-34), nor were there any differences in behavior change confirmed over time. The tour group was different from the control group in the baseline period and periods 2, 5, and 6. The mail group was different from the control group in period 3, and the interactive group was different from the control group, also in period 3 (Table 6-35, Figure 6-35). Since these groups were not differentially treated until period 5, the differences in other periods are assumed to be random. Also, it is important to note that with the exception of the interactive group, the differences are in the opposite direction to what we had hoped to accomplish. It may be that consumers were receiving mixed messages about buying concentrates and buying larger sizes. It may also be that some felt the recyclability of the larger bottles of juice in glass and plastic was preferable to the concentrate in an aseptic box.

Table 6-34. Comparison AWW/U (g/svg.) of WRS-Control Group and Random Samples by Period for Cranberry Juice.		
Period	WRS-Control (N=347)	Random (N=400)
Baseline	16.91	15.53
1	20.91	20.56
2	15.44	16.68
3	12.04	12.38
4	15.63	15.88
5	20.91	19.16
6	12.69	11.80
t-test between means not significant

Figure 6-34. Average weight of waste (g/svg.) per shopper by group for cranberry juice.

Period	Control (N=347)	Tour (N=11)	Mail (N=81)	Coupon (N=82)	Interactive (N=20)
Baseline	16.91	25.30*	15.39	18.26	18.52
1	20.91	21.63	20.48	17.98	19.52
2	15.44	26.90*	15.94	14.97	10.58
3	12.04	25.30	14.93*	12.45	8.63*
4	15.63	21.62	16.20	14.49	13.34
5	20.91	25.30*	22.54	18.79	22.67
6	12.69	25.30*	13.20	11.48	8.94

*t-test between means of control and treatment groups significant at .95 or better

Figure 6-35. Average weight of waste (g/svg.) per shopper by group for cranberry juice.

Table 6-36. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Cranberry Juice.				
Behavior Change	Random	Control	Treatment	Number
Improve	32.86	39.38	34.57	137
Worse	22.14	27.50	30.86	100
Same	45.00	33.13	34.57	144
Number	140	160	81	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-36. Change in purchase behavior before and after differential treatments for cranberry juice.

There were no significant differences between the random, control, and treatment groups (Table 6-36, Figure 6-36). Within the treatment group, families who improved tended to be in smaller households, to have lower incomes, and to be older. Comparing the treatment and control groups, cardholders who improved in the treatment group were more likely to be female than those who improved in the control group. Among those who stayed the same, persons in the treatment group were younger than those in the control group.

Waste Reduction Principle of Durability

Product categories within the durability principle (the more durable the consumer product, the longer it lasts, and thus less waste is generated; durable goods vs disposable goods) include light bulbs and razors.

Light Bulbs. The unit of analysis in this case is 100 hours of use. Differences in the WRS-control and random samples were confirmed in the baseline period (Table 6-37, Figure 6-37). However, differences in behavior over time were not significant.

It is important to note that the product movement in this category is small; in the case of the tour group, in two of the periods, no purchases were made, making it impossible to compute a t-statistic on this group. Treatments (mailing, couponing, tours, or combinations of these) did not seem effective in encouraging shoppers to purchase more durable light bulbs.

Table 6-37. Comparison AWW/U (100 hrs.) of WRS-Control and Random Samples by Period for Light Bulbs.		
Period	WRS-Control (N=327)	Random (N=307)
Baseline	1.17	1.06*
1	1.03	1.07
2	1.17	1.18
3	1.06	1.10
4	0.99	0.96
5	0.96	1.09
6	1.06	1.02
*t-test between means significant at .95 or better

Figure 6-37. Average weight of waste per 100 hours per shopper by group for light bulbs.

Table 6-38.					
Comparison AWW/U (100 hrs.) of WRS-Control and Treatment Groups by Period for Light Bulbs.					
Period	Control (N=327)	Tour (N=12)	Mail (N=76)	Coupon (N=89)	Interactive (N=19)
Baseline	1.17	1.18	1.03	1.12	1.25
1	1.03	1.06	1.11	1.12	1.12
2	1.17	1.00	1.15	1.22	0.95
3	1.06	1.25	1.04	1.16	0.68
4	0.99	1.25	1.11	1.03	0.95
5	0.96	---*	1.06	1.00	1.25
6	1.06	---*	1.03	1.08	.87
t-test between means of control and treatment groups not significant					
*No purchases

Figure 6-38. Average weight of waste per 100 hours per shopper by group for light bulbs.

Behavior Change	Random	Control	Treatment	Number
Improve	15.63	30.77	25.00	24
Worse	15.63	10.26	17.86	14
Same	68.75	58.97	57.14	61
Number	32	39	28	
3-Way Chi-square not significant				
2-Way Chi-square (between control and treatment groups) not significant

Figure 6-39. Change in purchase behavior before and after differential treatments for light bulbs.

There were no significant differences between the random, control, and treatment groups (Table 6-39, Figure 3-39). Comparing the treatment and control groups, among those who stayed the same, households in the treatment group were older than those in the control group.

Razors. There were no significant differences between the WRS-control and the random samples (Table 6-40, Figure 6-40), nor were there any differences in behavior change over time. Some differences emerged in the treatment groups (Table 6-41, Figure 6-41); the tour group was different from the control group in periods 2 and 3; and the interactive group was different from the control group in the baseline period and periods 1, 3, and 4. However, it is important to note that these groups were not differentially treated until period 5; therefore, the differences are assumed to be random.

Table 6-40. Comparison AWW/U (g/shv.) of WRS-Control Group and Random Samples by Period for Razors.		
Period	WRS-Control	Random
Baseline	.61	.59
1	.60	.55
2	.63	.60
3	.61	.61
4	.58	.56
5	.60	.54
6	.58	.55
t-test between means not significant

Figure 6-40. Average weight of waste (g/shv.) per shopper by group for razors.

Period	Control (N=264)	Tour (N=11)	Mail (N=71)	Coupon (N=63)	Interactive (N=14)
Baseline	.61	.50	.61	.61	.68*
1	.60	.70	.57	.57	.70*
2	.63	.70*	.62	.61	.70
3	.61	.70*	.59	.62	.70*
4	.58	.56	.56	.65	.70*
5	.40	.66	.63*	.60	.50
6	.58	.50	.61	.58	.60

*t-test between means of control and treatment groups significant at .95 or better

Figure 6-41. Average weight of waste (g/shv.) per shopper by group for razors.

Table 6-42. Percentage of Shoppers with Changed Waste Reduction Behavior During Study by Shopper Group for Razors.				
Behavior Change	Random	Control	Treatment	Number
Improve	18.37	10.61	12.20	21
Worse	8.16	9.09	12.20	15
Same	73.47	80.30	75.61	120
Number	49	66	41	
3-Way Chi-square not significant 2-Way Chi-square (between control and treatment groups) not significant

Figure 6-42. Change in purchase behavior before and after differential treatments for razors.

There were no significant differences between the WRS-control, random, and treatment groups (Table 6-42, Figure 6-42). Nor were there significant differences found within the treatment group among those who improved, worsened, or stayed the same. Comparing the treatment and control groups, households who improved in the treatment group tended to have younger children and lower incomes than those who improved in the control group. Among households whose behavior grew worse, those in the control group tended to have larger families than those in the treatment group. Among those who stayed the same, households in the treatment group had larger families and were more likely to be female cardholders than those in the control group.

Section 7

COSTS AND BENEFITS OF WASTE REDUCTION EDUCATION

BASIC APPROACHES FOR EVALUATING PROGRAM COSTS

Although the waste reduction education conducted for this project did not result in significant, systematic reduction in the weight of waste for the product categories studied, project cooperators maintain that similar waste reduction activities could ultimately reduce waste management costs and, perhaps more importantly, result in other long-term environmental benefits. In this section, discussion of how communities might evaluate the costs and benefits of such waste reduction education programs is presented.

Basic approaches to evaluating waste reduction education programs have attempted to assign project expenses per household in the targeted community (City of Greensboro 1992) or per ton of waste diverted (Frierson 1994). The first approach to evaluating waste reduction education costs involves assigning program costs per targeted household. In assessing a residential waste reduction education project, the City of Greensboro (1992) in North Carolina divided its actual annual (non-research related) program costs of \$11,032 by the number of households in the target population (918 households in two contiguous neighborhoods), arriving at per household project costs of \$12.02. In this study, targeted households reduced their actual volume of waste by five percent, but no effort was made to calculate the dollar value per household of that waste reduction and compare it to the measured costs per household of the program.

The second approach, in contrast, involves a form of cost analysis that compares the dollar costs associated with program efforts to the amount of waste projected to have been diverted. The cost of diversion through waste reduction education can then be compared to the conventional cost of waste disposal, providing municipalities one assessment of the dollar value of their educational intervention. An environmental shopping campaign in California provides an example.

In evaluating waste reduction educational measures implemented in two grocery stores in Alameda, California, Frierson (1994) determined all project expenses related strictly to conducting the waste reduction education (\$15,837). Municipality data indicated that the average Alameda household annually disposed of 0.68 tons of garbage. A survey administered in conjunction with the project determined that one-third of Alameda residents shopped at either or both of the target supermarkets. Two assumptions were then applied: first, that 6

percent of shoppers at the two stores responded to the waste reduction education and, second, that those responsive shoppers then proceeded to reduce household waste by 5 percent. The following equations were calculated:

$$\begin{aligned} & (0.06 * 0.33 * \text{total Alameda households}) * (0.05 * 0.68 \text{ tons}) = \\ & 614 \text{ households} * 0.034 \text{ tons} = \\ & 21 \text{ tons waste diverted in project} \end{aligned}$$

$$\begin{aligned} & \text{Total project costs} / 21 \text{ tons} = \\ & \$15,837 / 21 \text{ tons} = \\ & \$754 \text{ per ton waste diverted} \end{aligned}$$

Under these calculations, for the Alameda intervention, the cost of diverting waste from conventional disposal via waste reduction education appears very high.

EVALUATING COSTS OF THE PRESENT PROJECT

Although actual pronounced waste reduction effects were not measured in the Waste Reduction through Consumer Education Project, it is instructive to consider the costs and possible benefits that would be associated with such reductions. Such an exercise offers a way of considering the possible economic trade-offs in conducting consumer waste reduction education campaigns.

Following the second approach, as demonstrated by the Alameda project, a comparison of waste diversion costs to conventional disposal costs can be made. Although less dramatically than in the Alameda study, this projection also indicates that efforts to reduce consumer waste would cost more than direct conventional management of these wastes via disposal. The following factors were applied in the analysis.

The focus of this consumer waste reduction project was Ulster County. In 1990, according to U.S. Census data, Ulster County had a population of 156,774 persons in 60,807 households. Residential solid waste generation figures (garbage and recyclables, but minus yard waste) for Ulster County (average of 1993 and 1994) indicate 1.9 tons per household per year. Total waste reduction education costs can be analyzed in two ways: first, excluding specifically research related-costs (e.g., scan data acquisition, computer management and analysis), they can include development and implementation of the educational treatments (e.g., video, PSAs, news releases, feature articles, etc.) and so reflect the costs of this project, as conducted in Ulster County by the UCRRA and CCE-Ulster County (\$50,358.60); or second, they can omit both research costs and costs related to development of the educational materials, since these are

available now from Cornell University, and include only costs related to implementation (\$37,649). This second approach to estimating the consumer waste reduction costs provides a closer approximation of the costs that a municipality replicating the project might assume. (See Appendix H for further information on this breakdown of implementation costs for the project).

ShopRite's weekly customer count (based on unique cardholder numbers) revealed 31,449 at the Kingston store who had an Ulster County zipcode and 17,509 at the New Paltz store who had an Ulster County zipcode. To adjust for the possibility that some cardholders may have shopped at and therefore been counted at both stores and the likelihood that some unknown proportion of active cardholders live in Ulster County households with other cardholders, the total of 48,958 was reduced by ten percent to 44,062. If 44,062 represents the number of distinct Ulster County households shopping at either or both of the two studied stores, 72 percent of the county's 60,807 households shop at these stores and so were exposed to countywide education and in-store education. If we then apply the Alameda project's assumptions that 6 percent of these shoppers would respond to these messages, and that they, in turn, would reduce their waste by 5 percent, the following calculations can be made.

$$\begin{aligned} & (0.06 * 0.72 * 60,807 \text{ Ulster households}) * (0.05 * 1.9 \text{ tons waste/HH}) = \\ & \quad 2,627 \text{ households} * 0.095 \text{ tons waste reduced/HH} = \\ & \quad 250 \text{ tons waste projected diverted by project} \end{aligned}$$

$$\begin{aligned} & 1) \text{ costs per ton diverted (includes development and implementation)} \\ & \quad \$50,359 / 250 \\ & \quad \$201 / \text{ton diverted by project} \end{aligned}$$

$$\begin{aligned} & 2) \text{ costs per ton diverted (includes only implementation)} \\ & \quad \$37,649 / 250 \\ & \quad \$151 / \text{ton diverted by project} \end{aligned}$$

It is critical to keep in mind that these figures are only projections, based on assumptions about some level of measurable waste reduction through educational efforts, which was not actually achieved in this project. Nonetheless, compared to Ulster County's tipping fees at the landfill, as reported in Section 2 (\$53/ton in 1993 and \$57/ton in 1994), these projections regarding the cost of waste diversion through consumer education are still higher than the cost of conventional disposal.

A cost analysis following the first approach, arraying program costs over targeted households, is more difficult to make. It is unreasonable to suppose that all 44,062 households shopping at

either of the two stores would notice either media messages or in-store information on waste reduction. If, following the formula used in the Alameda study, we assume that 72 percent of county households shop at the stores and only 6 percent of those note or respond positively to the education, then 2,627 households were affected. Project development and implementation costs work out to \$19.17 per household, while implementation costs alone work out to \$14.33 per household.

DISCUSSION OF COSTS

Analyses such as those performed above offer one very rudimentary way of assessing direct waste-related impacts of waste reduction education. However, they should be treated with caution in drawing conclusions about the impacts of waste reduction education. While municipalities are most likely to be concerned with reducing their direct costs of municipal waste management, such analyses focus on this aspect so overwhelmingly that they ignore potential environmental benefits obtained by avoiding the impacts of manufacturing in the first place (Ackerman 1993). Reductions in air and water emissions at this level may not directly benefit a municipality sponsoring waste reduction education, but they do confer environmental benefits on society at large. Although assignment of costs via some sort of life cycle assessment procedure is difficult to agree on (Hinrichs and Harrison 1995-96), recognition that environmental impacts extend backward and forward from waste disposal remains critical.

A further limitation of cost analyses, as presented above, is that they afford no way to account for delayed or indirect positive environmental impacts. Do consumers only gradually develop and enact a set of values leading to more waste reducing shopping behaviors? Do the examples of those that do reduce their purchased waste influence other friends and relatives to similarly change their own practices? Do very small changes in purchasing behavior generate receptivity to other positive environmental practices, such as yard waste composting, water conservation, or energy conservation, that are not captured in solid waste focused analyses? In short, the impact of waste reduction education beyond the immediate targeted behaviors may be very important in encouraging broader environmental stewardship.

Finally, it is important to note that conventional disposal costs (e.g., at landfills) are unlikely to decrease dramatically over the long term, so that the investment in waste reduction, to the extent that these behaviors can be sustained, should continue to bear fruit. Evaluating waste reduction programs solely in terms of how direct costs compare to immediate benefits (i.e., present diversion of waste from landfills) may foster a short-term view of how to approach

solid waste and other environmental problems. Section 8 extends this discussion of the costs and benefits of waste reduction education with more general discussion of the project results and recommendations regarding consumer waste education, private sector initiatives and public policies.

Section 8

DISCUSSION AND RECOMMENDATIONS

DISCUSSION OF RESULTS

As explained in Section 6, the various statistical tests applied to the purchase data for the product categories sought to assess patterns of change in the average weight of waste per unit (AWW/U) of product purchased. Program objectives were:

- 1) To assess differences between the waste reduction sample control group and the random sample by study period
- 2) To assess differences between the waste reduction sample control group, the three treatment groups, and the "interactive" treatment group by study period
- 3) To examine differences between the waste reduction control sample and the random sample over time
- 4) To examine patterns of change in waste reduction behavior for the random sample, the waste reduction sample control group, and the aggregated waste reduction treatment groups.

The expectation underlying the research project had been that successive waves of waste reduction education might lead broadly to reductions in the amount of waste associated with shoppers' purchases within the 14 product categories tracked over the 9-month period. At the same time, however, it was expected that such declines in the weight of waste per unit purchased might vary based on exposure to the different variable treatments (i.e., direct mail, shopper's tour, or coupons) or different socio-demographic characteristics of the household. The precise nature of that variation was not hypothesized.

Analysis of the purchase data for the 9-month period of observation, in fact, revealed very few meaningful statistical differences between study groups or changes in behavior over time.

Comparisons Between Study Groups

In many of the comparisons between the waste reduction control group and the random sample, the random sample had a statistically significant lower average weight of waste per unit purchased. Such an outcome makes sense given the purposive sampling procedure by which the waste reduction sample was drawn: as described in Section 4, purchase of designated "bad"

product choices provided the criterion for admission to the sample. A sample selected on the basis of more wasteful purchase choices, therefore, would be expected to have a higher average weight of waste within product categories.

All groups received the same treatments up until period 5, thus we would expect any changes in behavior to be similar between groups. Any differences between groups could not be attributed to the treatments since all groups were treated alike until that time.

Analyses examining differences between the waste reduction sample groups across the time periods revealed few statistically significant differences, suggesting that the fluctuation in values for AWW/U is simply a product of normal variation in the study population. Leaving aside statistical tests of significance, it is perhaps most noteworthy that the patterns of values in these analyses appear random throughout the 9-month period of observation.

Implementation of the variable treatments in period 5 offers grounds for a prediction that AWW/U would decline for the three treatment groups perhaps by period 5, although more likely by period 6. However, no such clear pattern was actually observed in any of the product categories.

Changes in Behavior Over Time

Analyses comparing the slopes of the lines for the waste reduction control sample and the random sample ask whether, over time, the behavior (i.e., AWW/U purchased) of the random sample (which received no variable treatments in period 5) and the waste reduction control sample (which also did not receive variable treatments in period 5) differs. The test itself does not identify where the lines differ, but whether there was a *different direction or degree of change* in the two groups. With the exception of the product categories of dishwashing liquid and frozen vegetables, no product categories revealed a significant interaction term in this analysis. The data thus broadly support the conclusion that the purposive waste reduction control sample and the random sample responded similarly.

A final set of analyses looks at the proportion of shoppers purchasing within a product category who improved (reduced waste), stayed the same, or worsened (increased waste). The expectation had been that a larger proportion of shoppers in the combined waste reduction sample treatment groups (all of those receiving some additional education in period 5) would have improved than in the waste reduction sample control group or in the random sample, due to the treatment groups having received both more exposure and more direct (as opposed to mass

media or in-store communication) information. In fact, although the patterns often array in the expected or desired patterns, the differences between proportions that improved, stayed the same, or worsened were overwhelmingly not statistically significant. While a three-way comparison between the random, waste reduction control, and waste reduction treatment groups was significant in the coffee product category, a two-way comparison between the waste reduction control and waste reduction treatment groups was not. This outcome suggests caution in interpreting the greater proportion of improved in the waste reduction treatment group.

Overall, then, there is no evidence that patterns of improvement, staying the same, or worsening are related to being in the random sample as opposed to in the waste reduction control group as opposed to in the combined waste reduction treatment groups. Given the broad evidence of virtually no systematic change by shoppers towards more waste-reducing purchases in the course of the study, regardless of the educational treatments, it is worthwhile to consider first, how aspects of the design and implementation of the study may have contributed to these outcomes and second, how prior work on knowledge, attitudes, and conservation behavior may be consistent with the results of this study.

Design and Implementation of the Study

Field-based project cooperators expressed reservations during the study about the intensity and duration of the educational treatments and have suggested that the educational treatments (particularly the county-wide education and the in-store education) may have been too little, not long enough. Drawing on their extensive work with different populations, they maintained that education about solid waste issues needs to be hard-hitting, frequent, consistent, and continuous over a long period of time if one seeks noticeable behavioral change. While educational treatments for the study were carefully designed and conscientiously executed, by this argument, there may not have been a sufficient number of message reinforcements to push shoppers to make real changes.

Providing broad scale information, with the aim of increasing knowledge and creating more favorable attitudes, is different from conducting in-depth, one-to-one or small group education, which can more reasonably be expected to lead to behavioral change (Geller 1992). It is also important to note that in the present climate of public fiscal constraint, the resources available to waste educators are unlikely to permit educational treatments either longer or more intensive than those implemented in this study. Therefore, despite their limitations, the educational

treatments in this study may represent the way it is likely to be even if they do not represent the way we would like it to be.

Another challenge in this study rested with the coordination and implementation of two of the variable treatments. The shoppers' tour drew few participants (only 26 shoppers), despite invitations to more than 200 shoppers and a \$10 incentive. At the programmatic level, this outcome is consistent with the experience of other environmental shopping programs.

Increasingly, waste educators question the yield on shoppers' tours, which are labor intensive for educators, but draw few participants. Furthermore, they tend to draw citizens who have the discretionary time and motivation to participate in community education opportunities and, therefore, shoppers' tours can often be seen as preaching to the converted. Such citizens may or may not be those whose waste-related shopping behaviors offer the most room for improvements with respect to waste reduction. From a research standpoint, the small number of actual shoppers' tour participants makes it quite difficult to assess changes in their behaviors and impedes useful comparisons with the other much larger groups under study. As the invitation to shoppers' tours included no mention of waste reduction, receipt of the invitation alone cannot be construed as a waste reduction education treatment.

The coupon treatment also presented problems for the study. There were difficulties in coordinating this complicated treatment with the two supermarkets under study and with the parent company, and researchers were unsure by the end of the study whether more shoppers had actually used the coupons issued than were indicated by the number of redeemed coupons submitted to the company's offices by the stores. However, while the exact number of coupon users was unclear, the coupon group, as a whole, did receive a waste reduction educational message along with the coupons, and it is this group that was used for statistical analyses.

A further research design issue related to the study concerns the substantial challenge of deciding how to measure waste reduction. In this study, cooperators opted for a continuous measure based on the weight of waste, standardized to the amount of usable product in that package option. This decision only emerged after involved deliberations and attempted assessments of product categories. It reflects detailed field-based knowledge regarding the complexity of contemporary grocery product categories, which rarely present a binary choice between a clear environmental choice and a clear bad choice. It acknowledges that a given shopper might buy waste-reducing and waste-generating product options within a product category on the same shopping trip and allows those purchases to be added together and jointly assessed. The weight of waste per unit of product measure offered a way to distill an enormous

amount of complex purchase data. However, study researchers only settled on this measure after they had the opportunity to examine the data and fully observe its scope and complexity.

One important implication of the timing in this decision is that the data analysis came to rest overwhelmingly on weight of waste as an indicator of purchase behavior well after the educational treatment messages were designed and executed. As a result, although they focused on four widely recognized general waste reduction principles, the waste reduction messages may not have directly or clearly prompted shoppers to move toward purchase choices that systematically reduced weight of waste. For example, while the juice concentrate refill tetra-pak produces the least amount of waste, both in weight and volume, consumers in the study tended to buy the larger sizes of dilute juice. It may be that they were receiving mixed messages about buying concentrates and buying larger sizes, or that some felt the recyclability of the larger bottles of juice in glass or plastic was preferable to the concentrate in the throw-away box.

Insights from Previous Research

Previous research has stressed the importance of message content and tone in promoting environmentally desired behavior. Following the S.M.A.R.T. Shopping Campaign of the Minnesota Office of Waste Management, messages developed and used in this project combined both environmental and economic appeals (De Young et al. 1993). In addition, the messages emphasized specific actions consumers might take through use of the four waste reduction principles (i.e., use concentrates; select least waste packaging; use reusable, durable goods; buy the larger size). Finally, the project's environmental shopping brochure included reference to collective harm and collective solutions, as suggested by Granzin and Olsen (1991), as evident in the following text: "By reducing the amount of waste we generate, we can all help reduce the impact we have on the environment."

Despite appropriate educational messages and carefully designed educational treatments, no systematically meaningful changes in purchasing behavior, as measured by average weight of waste per unit occurred as a result of the project. Much of the previous work on conservation or environmental behavior has focused on adoption of recycling behaviors and many of these interventions have produced measurable change. It is important to recall that recycling represents a new set of practices now supplementing old waste management behaviors (i.e., putting everything out for the trash). In addition, although recycling is not found at the top of the waste reduction hierarchy, it may retain pride of place in the public mind, simply because

recycling was among the first and perhaps easiest actions citizens were told they could do for the environment; if this is so, it may be an easier environmental behavior to promote than reuse or reduction (Simmons and Widmar 1989-90).

Other studies suggest that consumer waste reduction can be more difficult to promote. As discussed in Section 1, the generally positive impacts of a residential source reduction education program in Greensboro, North Carolina, when disaggregated by material type, did not include strong evidence that packaging waste from consumer purchases had specifically been reduced (City of Greensboro 1992). However, since the Greensboro project did not focus expressly on environmental shopping and did offer specific information about composting and grass-cycling, this can be construed as further evidence that messages must specify targeted behaviors, if measurable outcomes are desired.

However, another study focused more directly on consumer waste reduction also suggests the difficulty of producing behavioral change. At two grocery stores, the City of Alameda, California, tested the effectiveness of in-store waste reduction signage (i.e., posters and shelf tags), as measured by store sales of 50 specific products (about half to be promoted and about half to be discouraged). Comparing product sales before and after the 6-week test period revealed a statistically significant increase in the sales of positively targeted items at one of the stores; however, this positive impact disappeared when items whose average price decreased between the baseline period and end of the test period were eliminated from the analysis (Frierson 1994).

Such outcomes underscore the challenging reality that consumer purchase decisions take place in a complex environment. First, waste reduction messages in-store and elsewhere compete with a blizzard of information, appeals, and advertisements. Under such conditions, many consumers have difficulty even recalling elements of recently conducted in-store environmental shopping campaigns (Frierson 1994; Schultz and Brill 1993). Second, efforts to redirect consumers to more waste-reducing purchases occur in a shopping environment where consumers also process information about price, special promotions, convenience, and brand preference, entering a host of factors into an extremely complicated, if often unconscious calculus. In this respect, consumers may have countervailing concerns that outweigh, in some instances, doing the environmentally right thing at the supermarket check-out. In the Alameda study, for example, there was suggestive evidence that decreasing product price may have had more effect than waste reduction signage in accounting for increased sales of the targeted products. These points

underscore the importance of linking the goals and insights of environmental education and consumer education (Cude 1993).

Other research also suggests the limitations of undifferentiated educational efforts, on their own. Grunig (1989), for example, links insights from theories of media audiences with those from theories of segmentation, developed in public relations and marketing. For most educational campaigns or programs, there are different publics--groups of people with similar levels of problem recognition, constraint recognition and involvement for the same issues and problems (Grunig 1989: 214). The more that is known about these groups--their psychographics, demographics, etc.--the more customized the information campaign can be, and the higher its probability of eliciting the desired attitudinal or behavioral change. This notion of publics corresponds nicely with the Roper Organization's typology of consumers (True-Blue Greens, Greenback Greens, Sprouts, Grouzers, and Basic Browns) (Cude 1993). Therefore, to the extent resources are available, environmental consumer educational efforts should structure their messages, appeals, and recommendations to the specific attitudes and world views of consumers, recognizing that consumers are rarely an undifferentiated group.

RECOMMENDATIONS

The environment remains very important to most Americans. However, what the public sees as an environmental issue today may not be so tomorrow. During the 1980s, garbage disposal and ground water pollution gained notoriety: a garbage barge floating around New York Harbor with nowhere to go received daily media coverage; toxics leaking into sources of drinking water from overburdened, often poorly maintained landfills alerted the public to the increasing amount of waste being generated and the finiteness of resources for handling that waste. People began to take a look at what could be done to stop this ballooning garbage disaster. As a result, in New York State, the New York State Waste Management Act of 1988 was passed. The goal: to reduce solid waste by 50 percent by 1997. Source reduction by 8-10 percent was highlighted as the prime way to address the problem, followed by recycling, 40-42 percent; waste-to-energy incineration, and finally, disposal in landfills. Excess packaging by manufacturers, therefore, became one environmental issue of the early 1990s. It is in this context that the Waste Reduction through Consumer Education study was conducted. Recommendations discussed below center on the role of consumer education, manufacturer and retailer initiatives, and government intervention.

Expand Educational Messages

By the mid-1990s, public concern about solid waste and packaging seems to have shifted to broader issues of environmental conservation: public health, maintenance and preservation of national parks, overfishing of the oceans, adequate safe supplies of drinking water, and destruction of the ozone layer are several of the more pressing issues now considered key by citizens and environmentalists. This observation regarding shifting public concern is consistent with the work of environmental sociologists, who have delineated an issue-attention cycle in reviewing trends in public opinion about environmental issues (Downs 1972; Dunlap 1992).

One recommendation of this project is to link consumer education about waste reduction and environmental packaging to the bigger picture to increase the likelihood of holding consumer interest. Ulster County has experienced fairly intensive campaigns in recent years concerning the importance of waste reduction, reuse, and recycling. Varying the content and approach of the messages and linking them to broader environmental concerns may renew and enhance public attention.

Beyond Ulster County, such an approach may also have merit, given that waste issues have become less salient to most of the public, even though solid waste problems for citizens and communities still elude resolution. Therefore, messages can stress that less packaging uses less energy, both in manufacturing and transportation, creates less pollution, and reduces the amount of trash ultimately delivered to the landfill. The educational messages in this project did address the positive link between less waste and less cost, but the brevity of the messages delivered made it virtually impossible to address the larger environmental context and implications of grocery packaging.

Encourage Initiatives by Manufacturers and Retailers

While some manufacturers have voluntarily complied with public demands for less packaging (most noticeably laundry soap companies working to develop concentrates [Siwolop 1993]), other companies offer little or no opportunity to purchase products without excessive packaging. Another recommendation of this project is to encourage continued work with manufacturers to develop more responsible, environmentally sound packaging for their products. Those companies who have moved towards reduced packaging have saved countless dollars in production and transportation costs. Other manufacturers should look for similar opportunities to enhance the greening of the American marketplace, for environmental as well as public

relations and business reasons (Bechtel 1993). Retailers should be reminded of the economic benefits they can realize from less packaging by the manufacturers--smaller packages take up less space on the shelf and more product can be stocked/displayed. It is in fact difficult to understand why the opportunities for cost savings in reducing packaging have not spurred more action on the part of manufacturers. There is a complex feedback loop between manufacturers and customers. Cereal boxes have remained unnecessarily large (there is a lot of air/waste space in most cereal boxes) for example, because manufacturers fear that a small box would seem to contain less cereal and thus appeal less to economy-conscious shoppers. In addition, a smaller box would take up less eye-catching shelf space. Other waste reduction product changes require behavior changes for consumers. Concentrates require a change in practice, and manufacturers are concerned about consumer acceptance. In some supermarkets, in fact, dilute versions of detergent have recently reappeared on supermarket shelves, although it is unclear whether this is directly related to consumer confusion about the correct use of concentrated versions.

Because advertising by manufacturers plays an important role in defining what consumers desire and choose, manufacturers and retailers could play an important role in educating consumers to the value of environmental packaging. Manufacturers should advertise waste-reducing products on the containers and in the media, and retailers should be trained to educate consumers at point-of-purchase.

In addition, several other factors in the supermarket make it more difficult for shoppers to purchase the less-waste options. For example, unit pricing information provided on shelf labels is misleading in relation to concentrates. The information is given as price per unit of product and since the amount of product required for an equivalent use may be many times less for a concentrate, the price per unit may be much higher than the price per unit for the dilute version, when in fact the price per use may be favorable for concentrates. Another consideration is that in some product categories the largest size may not be the least unit price, despite the fact that less packaging is required. This appears to be due to pricing considerations on the part of the retailer, with the most popular size priced low to entice shoppers. Follow up with manufacturers, retailers, and the regulators who implement unit pricing regulations might help to resolve such inconsistencies.

Consumers should be convinced that their purchasing decisions can ultimately affect future policy. Even those shoppers who intentionally look for environmentally sound products may be discouraged from buying them because many of the products cost more, or more sales are offered on those products that have a higher ratio of packaging to product. Disgruntled consumers

should be encouraged whenever possible to send letters to supermarkets and/or manufacturers, to call the 800 numbers, or to sign petitions if necessary. When discrepancies in pricing are found, consumers should find out why the more environmentally sound products are costing more. Is there a legitimate reason? Is it because of the early infrastructure--the startup costs for new facilities to produce the new product--or is it because manufacturers are taking advantage of consumers who do want to buy the environmental choice and are willing to pay more to do so?

Work Towards More Effective Government Interventions

Legislation mandating manufacturers to decrease packaging might also be effective, although attempts to pass an environmentally sound packaging act have failed for the past several years in New York State. Indeed efforts in New York State to legislate packaging waste reduction reveal often divergent appraisals of the packaging problem and appropriate solutions. (New York State Joint Legislative Commission on Solid Waste Management 1993). However, previous legislation requiring returnable containers and mandating recycling in New York State has made a difference. In 1993, New York State generated an estimated total of 25.4 million tons of solid waste. Approximately 0.3 million tons of that was recovered through the Returnable Container Act; and another 7.2 million tons was recovered through recycling. The remaining solid waste, about 18.2 million tons, required disposal. The recycling rate for 1993 was approximately 28 percent, up from the 1992 rate of 23 percent (NYS Department of Environmental Conservation 1995).

Various analysts have pointed to recent European legislation that has attempted to shift the responsibility for management and disposal of packaging materials from consumers to manufacturers, wholesalers, and retailers (see, for example, Hershkowitz [1993] and Underwood and Fishbein [1993]). Given the present political climate in this country and differing views on the roles and responsibilities of government vs business, such sweeping changes in waste management policy appear unlikely in the United States. However, they do underscore the potential impact of public policy in structuring the economic context of waste management decisions.

Continue Educational Efforts

Findings of this project suggest that broadbrush consumer education about waste reduction is not effective in changing behaviors at the supermarket. This is consistent with the relative rankings that consumers give to the factors they consider in making choices. Price, convenience,

and even brand name tend to rank higher than environmental issues in consumer decisions. However, the cooperators in this study believe there is a continuing need for environmental consumer education at all levels. While short-term point of purchase education did not seem effective in itself, it may, combined with media reinforcement, have helped to create a general awareness of the issues surrounding excess packaging and consumer responsibility. As noted in Section 2, Ulster County's recovery from the total waste stream through recycling and composting increased from 9.3 percent in 1991 to 36.8 percent in 1993. While on the one hand, this improvement in county rates would seem to suggest a continued focus on promotion of recycling and composting to capitalize on a trend, improvement in recycling and composting can also be seen as an indication that the stage has been set for concerted efforts in waste reduction education. Therefore, recommendations for Ulster County are not only to continue general educational efforts, but also to build on this informational foundation by addressing those consumers seeking additional information, to provide waste reduction information at points where people are actually paying to get rid of waste, such as at transfer stations or landfills, and to increase one-on-one education. Because broadbrush educational measures yielded no systematic reductions in weight of waste in this study, other communities may want to consider carefully the tradeoffs in mounting formal store-based environmental shopping campaigns. However, ongoing waste and environmental education should certainly incorporate messages about consumer waste reduction, packaging, and environmental shopping.

Recent studies have suggested that more intensive education can be effective in changing behaviors at the supermarket (Hogarth, Harrison, and Cascio 1995). Developed to increase participation of low-income families in waste prevention and recycling, "Get the Goods Not the Garbage" (GTGNTG) is an outreach program, incorporating waste reduction education into an existing curriculum used for a national nutrition education program run through Cooperative Extension. This intensive program involves families in home visits or small group sessions with a paraprofessional educator over the course of six months. The hands-on sessions are tailored to the information needs of the participating family. This approach was developed out of recognition that effecting behavioral change requires intensive and long-term education. A pilot test of the GTGNTG program run in rural Steuben County and in New York City showed significant self-reported behavior change (as measured through a pre- and post-survey of the participants). After the education, 18 percent more families said they recycled, 17 percent more said they bought products with less packaging, 32 percent more said they bought products with recycled content, and 14 percent more said they bought packages that can be recycled. These changes in self-reported behavior are encouraging, although they were not matched to actual purchase data.

This Waste Reduction through Consumer Education research and outreach project underscores the significance and the challenge of consumer education concerning packaging and waste reduction. Solid waste issues involve complex technological, economic, social, and political judgments. In addition to this, consumer education involves much more than working to enhance consumer roles and choices in the private sector (e.g., the supermarket). It must also include consumer education about the public purchases made by citizens (e.g., waste management policies and systems) and about consumer potential to influence these waste-related policies, regulations, and practices in both the public and private sector (Uhl 1970). The answer to waste reduction in the future may well be a combination of voluntary initiatives by manufacturers and retailers, governmental intervention, and better-informed consumers, who themselves make more environmentally sound grocery purchases, but also press both government and business to establish and maintain sound policies and programs facilitating greater waste reduction.

Section 9
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Comparison of Kingston and New Paltz Price Plus Card Members in Sample

	All Shoppers	Kingston	New Paltz
Age	45.7	45.8	46.1
Household size	3.04	3.15	2.85***
Age of Children			
First Child	5.8	6.1	5.5
Second Child	4.2	4.5	4.0
Number of Children	0.97	1.21	1.03***
Income Category ¹	2.38	2.40	2.36
Gender of Shopper (1=female) ²	.79	.78	.81*
Number	2514	1201	735

* Difference between Kingston & New Paltz significant at .10.

***Difference between Kingston & New Paltz significant at .01.

Differences in the Kingston and New Paltz shoppers in terms of household size, number of children, and gender may reflect the fact that New Paltz is a college town with a lower proportion of traditional families.

¹Income categories:

1 = under \$20,000	2 = \$20 - \$29,999
3 = \$30 - \$39,999	4 = \$40 - 49,999
5 = \$50 - \$59,999	6 = \$60 - \$69,999
7 = \$70,000 and over	

A mean of 2.38 indicates that the average shopper was between the 2nd and 3rd income categories.

²In the case of gender, the mean is the proportion of shoppers coded 1 (female); 79% of all shoppers were female.

Waste Reduction Through Consumer Education

Cooperators: Cornell University, Wakefern Food Corporation,
Ulster County Resource Recovery Agency, and
Cornell Cooperative Extension of Ulster Co.

**Funded by the New York State Energy Research and Development
Agency
19 August 1993**

UPC FOR PRODUCTS TO BE TRACKED *

1. Liquid hand dishwashing detergent

Brand	Variety	Size	Unit Price	UPC
Palmolive	original	42 fl oz	2.20/qt	03500045800
"	lemon lime	42 fl oz	2.20/qt	03500045900
"	original	32 fl oz	2.49/qt	03500046200
"	lemon lime	32 fl oz	2.49/qt	03500046700
"	sensitive skin	32 fl oz	2.49/qt	03500047332
"	original	22 fl oz	1.88/qt	03500046100
"	lemon	22 fl oz	0.99/qt (sale)	03500046600
"	sensitive	22 fl oz	2.31/qt	03500047322
Dawn	original	22 fl oz	2.45/qt	03700000822
"	original	32 fl oz	2.29/qt	03700000823
"	original	96 fl oz	1.53/qt	03700094015
"	lemon	22 fl oz	2.45/qt	03700097553
"	Mt. spring	22 fl oz	2.45/qt	03700097530
Crystal White	regular scent	40 fl oz	1.43/qt	03500043400
"	lemon	40 fl oz	1.43/qt	03500043300
Ivory	clear	22 fl oz	2.75/qt	03700000862
"	clear	32 fl oz	2.49/qt	03700000863
Dove	regular	22 fl oz	1.88/qt	01111140129
Ajax	fresh lemon	22 fl oz	2.31/qt	03500044400
"	fresh lemon	32 fl oz	1.89/qt	03500044500
"	fresh lemon	42 fl oz	1.82/qt	03500044600
"	fresh lemon	64 fl oz	1.82/qt	03500045900
Joy	lemon	22 fl oz	2.90/qt	03700000882
Shop-Rite	So-Soft regular	22 fl oz	1.88/qt	04119002386
"	(green)			
"	regular	32 fl oz	.99/qt	04119002387
"	regular (blue)	32 fl oz	.99/qt	04119002416
"	lemon	22 fl oz	1.88/qt	04119002384
"	lemon	32 fl oz	.99/qt	04119002385
"	white	22 fl oz	.99/qt	04119001336
Sun Light	lemon	22 fl oz	2.60/qt	01111143012
Dermassage	protein protection	22 fl oz	2.09/qt	03500049100
Value-pak	lemon	32 fl oz	.69/qt	04119002423
"	pink	32 fl oz	.69/qt	04119002424

* During course of Project, UPCs were added or deleted due to Product Changes.

2. Hot cereals

Brand	Variety	Size	Unit price	UPC
Shop-Rite	instant oats maple	10*1.50oz	1.91/lb	04119002266
"	" bananas	10*1.25oz	2.29	04119002455
"	" variety	10*1.25oz	2.29	04119002270
"	" creamy fruit	10*1.25oz	2.29	04119002879
"	" strawberry	10*1.25oz	2.29	04119002457
"	" peaches	10*1.25oz	2.29	04119002273
"	" apple cinnamon	10*1.25oz	2.29	04119002272
"	" cinnamon spice	10*1.5oz	1.76	04119002267
"	old fashion bulk	2 lb 10oz	.758	04119002106
"	quick oats bulk	2 lb 10oz	.758	04119000921
"	quick oats bulk	18 z	.80	04119000922
Quaker Oat	in a cup raisin&spice	4*5.5oz	2.32	03000001590
"	" apple cinnamon	4*5.5oz	2.32	03000001380
"	instant cinnamon & spice	10*1.62oz	3.15	03000001350
"	" raisin & spice	10*1.5oz	3.40	03000001320
"	" cinnamon toast	10*1.25oz	4.08	03000001340
"	" apple & raisin	10*1.3oz	3.93	03000001120
"	" honey nut	10*1.25oz	4.08	03000001370
"	plus fibre oatmeal instant raisin	8*1.6oz	3.99	03000002380
"	instant oat regular	12*1.00oz	3.93	03000001210
"	" apple	10*1.25oz	4.08	03000001380
"	" maple	10*1.25oz	3.40	03000001190
"	" peach	10*1.25oz	4.08	03000001800
"	" fruit cream	10*1.25oz	4.08	03000001880
"	" straw cream	10*1.25oz	4.08	03000001820
"	old fashion regular	42 oz	1.14	03000001040
"	quick oat	42 oz	1.14	03000001200
"	old fashion	18 oz	1.77	03000001020
"	quick oat	18 oz	1.77	03000001180

3. Frozen vegetables

Brand	Variety	Size	Unit price	UPC
Shop-Rite	corn yellow (box)	10 oz	1.58/lb	04119040023
"	corn yellow (bag)	24 oz	.92/lb	04119040022
Bird Eye	corn yellow sweet (box)	10 oz	1.58/lb	04300000183
"	corn yellow sweet (bag)	16 oz	1.69/lb	04300000439
Green Giant	corn yellow (bag)	16 oz	2.29/lb	02000014586
Hanover	corn yellow (bag)	16 oz	1.49/lb	02880029261
"	corn white (bag)	16 oz	2.19/lb	02880029281
Shop-Rite	peas sweet (box)	10 oz	1.42/lb	04119040031
"	peas sweet (bag)	24 oz	.92/lb	04119040105
"	peas petite (box)	16 oz	1.49/lb	04119040380
"	peas sweet (bag)	40 oz	1.08/lb	04119040264
Bird Eye	peas sweet (bag)	16 oz	1.69/lb	04300000437
Green Giant	peas sweet (bag)	16 oz	1.89/lb	02000012062
Hanover	peas petite (bag)	16 oz	2.19/lb	02880029031
Shop-Rite	corn white (bag)	16 oz	1.69/lb	04119040367
Shop-Rite	cut green beans (box)	9 oz	1.58/lb	04119040007
"	cut green beans (bag)	20 oz	1.27/lb	04119040006
"	cut green beans (bag)	40 oz	1.20/lb	04119040278
"	Lima beans (box)	9 oz	2.38/lb	04119040012
"	Lima beans (bag)	20 oz	2.13/lb	04119040011
"	chopped broccoli (box)	10 oz	1.42/lb	04119040018
"	chopped broccoli (bag)	20 oz	1.35/lb	04119040272
"	cauliflower (box)	10 oz	1.42/lb	04119040020
"	cauliflower (bag)	20 oz	1.43/lb	04119040014
"	crinkle cut carrots (box)	10 oz	1.42/lb	04119040028
"	crinkle cut carrots (bag)	20 oz	1.19/lb	04119040029
"	mixed vegetables (box)	10 oz	1.58/lb	04119040025
"	mixed vegetables (bag)	24 oz	1.20/lb	04119040135
"	leaf spinach (box)	10 oz	1.10/lb	04119040033
"	leaf spinach (bag)	20 oz	1.27/lb	04119040360

4. Fabric softener

Brand	Variety	Size	Unit Price	UPC
Snuggle Ultra	Morning Fresh (Concentrates)	22 fl oz	3.62/qt	01111156123
"	"	36 fl oz	4.61/qt	01111156136
"	Cuddle-Up Fresh (Concentrates)	22 fl oz	3.62/qt	01111156023
"	" (")	36 fl oz	4.61/qt	01111156037
"	" (")	48 fl oz	2.65/qt	01111156048
Snuggle	Cuddle-up Fresh (Dilute)	64 fl oz	1.65/qt	01111156309
Snuggle Ultra	Morning Fresh (Refill)	20 fl oz	4.62/qt	01111156119
"	Cuddle-Up (Refill)	20 fl oz	4.62/qt	01111156019
Downy Ultra	April Fresh (Concentrates)	20 fl oz	4.78/qt	03700035746
"	April Fresh (Concentrates)	40 fl oz	4.31/qt	03700035751
"	Sunrise (Concentrates)	20 fl oz	4.78/qt	03700035746
"	Sunrise (Concentrates)	40 fl oz	4.31/qt	03700035756
"	April Fresh (Refill)	60 fl oz	3.78/qt	03700035890
"	April Fresh (Refill)	20 fl oz	4.94/qt	03700035770
"	Sunrise (Refill)	20 fl oz	4.94/qt	03700035775
Final Touch	Regular (Dilute)	64 fl oz	.99/qt	01111158239
"	Regular (Refill)	21.5 fl oz	2.96/qt	01111158215
Sta Puf	Regular (Refill)	21.5 fl oz	2.96/qt	02420013428
"	Concentrates	64 fl oz	1.20/qt	02420013431
Lauendan Sachet	Regular (Dilute)	42 fl oz	2.35/qt	02660060842
Shop-Rite	Fluffy (Concentrates)	128 fl oz	1.65/qt	04119001563
"	Pink (Dilute)	64 fl oz	.495/qt	04119000311
"	Pink (Dilute)	128 fl oz	.398/qt	04119001124
"	Lemon (Dilute)	128 fl oz	.398/qt	04119001125

5. Razors

Brand	Variety	Size	Unit Price	UPC
Gillette	Good news	5 each	045/each	04740011036
"	" Plus	5 each	0458/each	04740012040
"	" Pivot plus	5 each	.458/each	04740012046
"	" Pivot	5	.458/each	04740000036
"	" Pivot plus	10	.329/each	04740000067
"	" Micro Trac	5	.458/each	04740000042
"	" Pivot	10+2(prom.)	.274/each	04740011088
"	" Pivot	10	.329/each	04740000043
"	" Pivot plus	10+2(prom.)	.274/each	04740012027
"	"			
"	" Plus	10+2(prom.)	.274/each	04740012023
"	" Plus	10	.329/each	04740000058
"				
"	Daisy Slim	5	.458/each	04740012632
"	"	10	.329/each	04740012633
"	"	10+2(prom.)	.274/each	04740012623
"	Daisy Plus	5	.458/each	04740012652
"	Daisy Plus	10+2(prom.)	.274/each	04740012753
"	Daisy Plus	10	.329/each	04740000065
"	Sensor (Cartridge)	5	.534/each	04740011500
"	Atra (Cartridge)	15	.466/each	04740011746
"	Atra Plus (Cartridge)	15	.466/each	04740011757
"	Atra Plus (Cartridge)	10	.549/each	04740011625
"	Atra Plus (Cartridge)	5	.638/each	04740011605
"	Trac II (Cartridge)	10	.549/each	04740012249
"	Trac II (Cartridge)	5	.638/each	04740011240
"	Sensor women Cartridge)	5	.534/each	04740011525
Bic	Lady Shaver	5	.198/each	07033035587
"	Shaver Normal	5	.198/each	07033070220
"	Shaver Sensitive	5	.198/each	07033081046
"	Metal	5	.398/each	07033090391
"	Twin Select Normal	5	.358/each	07033091524
"	Twin Select Sensitive	5	.358/each	07033091525
"	Pastel Shavers	5	.398/each	07033090553
"	Twin Pastel	5	.358/each	07033091526
Schick	Disposable	5	.298/each	01254700271
"	Slim Twin	10	.289/each	01254700703
"	Slim Twin	5	.398/each	01254700700
"	Twin (Cartridge)	10	.579/each	01254700505
"	Twin (Cartridge)	5	.678/each	01254700500
"	Tracer (Cartridge)	10	.619/each	01254700410
"	Tracer (Cartridge)	5	.658/each	01254700405
Personal Touch	Disposable	5	.278/each	01254700382
"	Slim Disposable	5	.398/each	01254700850
Shop-Rite	Lady's Plus	10	.179/each	04119021447
"	Twin Blade	10	.179/each	04119021250
"	Twin Plus	10	.179/each	04119021318
"	Twin Plus	6	.215/each	04119021005
"	Twin Blade (Cartridge)	10	.579/each	04119020672

"	Twin Blade (Cartridge)	5	.678/each	04119020588
"	Fits Atra	10	.619/each	04119021283
"	Automatic II	5	.658/each	04119020770
Wakinson	Ultra Caresse	5	.298/each	07480980200
Gillette	Sensor (Refillable)	1	3.29/each	04740012103
"	Sensor for women(Ref.)	1	3.29/each	04740012403
"	Atra Plus (Refillable)	1	4.49/each	04740012005
Flicker	Refillable w 5 blade	1	.698/each	02450029103
Schick	Slim Twin (Refillable)	1	3.39/each	01254700510
"	Tracer (Refillable)	1	2.29/each	01254700400
Personal Touch	Refillable	1	2.99/each	01254700260

6. Light bulbs

Brand	Variety	Size	Unit Price	UPC
Shop-Rite	Soft White	40 w	.423/each	04119025488
"	"	60 w	.423/each	04119025487
"	"	75 w	.423/each	04119025486
"	"	100 w	.423/each	04119025485
"	Soft White (Long Life)	60 w	.748 "	04119025021
"	"	75 w	.748 "	04119025022
"	"	100 w	.748 "	04119025023
"	Standard	40 w	.623 "	04119025484
"	"	60 w	.623 "	04119025483
"	"	75 w	.623 "	04119025482
"	"	100 w	.623 "	04119025481
Sylvania	Soft White	40 w	.723 "	04613510996
"	"	60 w	.723 "	04613511205
"	"	75 w	.723 "	04613510970
"	"	100 w	.723 "	04613512770
"	Standard	40 w	.698 "	04613511060
"	"	60 w	.698 "	04613511180
"	"	75 w	.698 "	04613512525
"	"	100 w	.698 "	04613512750
"	Double Life	60 w	.823 "	04613511204
"	Double Life	75 w	.823 "	04613511331
"	Double Life	100 w	.823 "	04613511332

7. Coffee

Brand	Variety	Size	Unit Price	UPC
Folgers	Coffee Single Regular	38 bags	11.41/100 CT	02550081123
"	" Regular	19 bags	14.16/100 CT	02550081121
"	" Decaf.	19 bags	17.32/100 CT	02550081122
Martinson	Coffee Bag	20 bag	10.40/100 CT	01115608014
Maxwell House	Filter Pack	10 pack	7.25/100 CT	04300070192
"	" (Decaf.)	10 pack	8.99/100 CT	04300070194
Folgers	Regular (Can)	13 oz	3.43/lb	02550080258
"	French Roast (Can)	12 oz	3.72/lb	02550082100
"	Regular (Brick)	13 oz	3.43/lb	02550080262
"	Regular (Can)	39 oz	1.64/lb	02550080273
"	Custom Blend (Can)	34.5 oz	1.72/lb	02550080022
"	Decaffeinated (Can)	13 oz	4.91/lb	02550080031
Maxwell House	Regular (Can)	13 oz	3.07/lb	04300070130
"	French Roast (Can)	12 oz	3.32/lb	04300070150
"	Decaffeinated (Can)	13 oz	4.91/lb	04300074010
"	Slow Roasted 1892 (Can)	16 oz	3.09/lb	04300074260
"	Regular (Can)	39 oz	2.46/lb	04300070630
"	Decaffeinated (Can)	39 oz	2.87/lb	04300074110
"	Colombian (Can)	13 oz	4.91/lb	04300071602
Savarin	Regular (Can)	13 oz	3.19/lb	01115601420
"	Decaffeinated (Can)	13 oz	4.54/lb	01115600052
Martinson	Extra-Fine (Can)	16 oz	3.49/lb	01115600009
"	Mr. Automatic (Can)	16 oz	3.49/lb	01115608019
Shop-Rite	All Purpose (Brick)	13 oz	1.83/lb	04119002243
"	Automatic Drip (Brick)	13 oz	1.83/lb	04119002244
"	Decaffeinated (Can)	13 oz	2.45/lb	04119001968
Sanka	Decaffeinated (Can)	13 oz	3.18/lb	04300073120
Chockfull O's nuts	Regular (Brick)	10.5 oz	2.27/lb	07103800532
"	" (Can)	10.5 oz	3.05/lb	07103800200
"	Ultra Blend (Can)	10.5 oz	2.42/lb	07103800432
"	Decaffeinated (Can)	13 oz	4.30/lb	07103800040
"	French Roast Decaf.	13 oz	4.65/lb	07103800205
"	Decaffeinated (Can)	39 oz	2.87/lb	07103800006
"	Ultra Blend (Can)	39 oz	1.85/lb	07103800440
"	French Roast (Can)	12 oz	3.05/lb	07103800200

8. Toothpaste

Brand	Variety	Size	Unit Price	UPC
Arm & Hammer (Dental Care)	Tartar Control Gel Fresh Mint	6.3oz	7.59/lb	03320018270
"	Tartar Control Gel Baking Soda	7oz	6.83/lb	03320018670
"	" Fresh Mint	4.5oz	8.5/lb	03320018250
"	" "	2.7oz	10.61/lb	03320018230
"	" Baking Soda)	5oz	7.65/lb	03320018650
"	" "	3oz	9.55/lb	03320018630
"	Baking Soda	7oz	6.83/lb	03320018370
"	"	5oz	7.65/lb	03320018350
"	"	3oz	9.55/lb	03320018330
"	Baking Soda Gel	6.3oz	7.59/lb	03320018470
"	"	4.5oz	8.50/lb	03320018450
"	"	2.7oz	10.61/lb	03320018430
Aqua Fresh	Tartar Control	7.6oz	4.74/lb	05310033400
"	"	6.0oz	5.23/lb	05310033300
"	Extra Fresh	8.2oz	4.39/lb	05310032550
"	Triple Protection	8.2oz	4.39/lb	05310032500
"	"	6.4oz	4.90/lb	05310032210
"	"	2.7oz	8.24/lb	05310032000
"	Triple Protection (Pump)	6.4oz	5.95/lb	05310000318
"	Tartar Control (Pump)	4.6oz	6.82/lb	05310000311
"	Extra Fresh (Pump)	4.6oz	6.82/lb	05310000360
"	Tartar Control (Pump)	4.3oz	7.29/lb	05310000420
"	Kid (Pump)	4.4oz	7.13/lb	05310000310
Crest	Tart. Control Smooth Mint gel	6.4oz	4.20/lb	03700072823
"	Tart. Control Fresh Mint Gel	6.4oz	4.20/lb	03700000309
"	Tart. Control Original Flavor	6.4oz	4.20/lb	03700000391
"	Cool Mint	6.4oz	4.20/lb	03700000312
"	Mint Flavor	6.4oz	4.20/lb	03700000345
"	Regular Flavor	6.4oz	4.20/lb	03700000321
"	Baking Soda Mint	6.4oz	4.20/lb	03700072917
"	Neat Sqz. BK. soda Mint Gel	6.0oz	6.64/lb	03700072926
"	" Regular	6.0oz	6.64/lb	03700000325
"	" Mint Flavor	6.0oz	6.64/lb	03700000326
"	" Cool Mint	6.0oz	6.64/lb	03700000327
"	" Original Flavor	6.0oz	6.64/lb	03700000328
"	" Fresh Mint Gel	6.0oz	6.64/lb	03700000337
"	" Smooth Mint Gel	6.0oz	6.64/lb	03700072825
"	Regular (Free Toothbrush)	8.2oz	4.20/lb	03700072908
"	BK. Soda Mint (Free Toothbrush)	8.2oz	4.20/lb	03700072916
"	Tart. Control Fresh Mint Gel	8.2oz	4.20/lb	03700000306
"	" Original flavor	8.2oz	4.20/lb	03700000392
"	Smooth Mint Gel (Pump)	4.6oz	5.84/lb	03700072826
"	Tart. gel (Pump)	6.4oz	5.60/lb	03700000287
"	Tart. Gel (Pump)	4.6oz	5.84/lb	03700000288
Shop-Rite	Baking Soda	5oz	3.17/lb	04119021454
"	Fresh Mint	6.4oz	2.48/lb	04119021244
"	Regular with Fluoride	6.4oz	2.48/lb	04119021240
"	Fresh with Fluoride	6.4oz	2.48/lb	04119020839

"	Fluoride Mint	6.4oz	2.48/lb	04119020885
Close-Up	Anti-Plaque Gel	6.4oz	4.48/lb	01111373701
"	New Red Gel	6.4oz	4.48/lb	01111374102
"	New Bk. Soda	6.4oz	4.48/lb	01111367051
"	Regular	6.4oz	4.48/lb	01111367051
Colgate	Regular	3oz	7.95/lb	03500050500
"	Regular (Free Toothbrush)	9oz	3/lb	03500051377
"	Regular (15% more)	8.05oz	3.34/lb	03500050985
"	Tart. Gel	8.1oz	4.43/lb	03500059777
"	Tart. Regular	8.1oz	4.43/lb	03500057200
"	Winter Fresh (15% more)	7.36oz	3.45/lb	03500058785
"	Winter Fresh	6.4oz	4.20/lb	03500058700
"	Regular	7oz	3.84/lb	03500050900
"	Regular	9oz	3.98/lb	03500051300
"	Regular Gel	8.2oz	4.37/lb	03500058800
"	Tart. Gel	8.1oz	4.43/lb	03500059700
"	Tart. Regular	8.1oz	4.43/lb	03500057200
"	Winter Fresh (Stand Up)	6oz	5.17/lb	03500072700
"	Regular (Stand up)	6oz	5.17/lb	03500072600
"	Tart. Gel (Stand Up)	6oz	5.17/lb	03500072900
"	New Tart. (Stand Up)	6oz	5.17/lb	03500072800
"	Regular (Free Toothbrush)	4.7oz	9.8/lb	03500055604
"	Tart. Control (Free Toothbrush)	4.7oz	9.8/lb	03500055504
Close Up	Crystal (Stand Up)	5oz	4.296/lb	01111364510
"	Original Red Gel (Stand Up)	5oz	4.296/lb	01111388250
"	Regular (Stand Up)	6oz	4.48/lb	03700072935
"	Original (Stand Up)	6oz	4.48/lb	03700072938
"	Fresh Mint (Stand Up)	6oz	4.48/lb	03700072939
"	Smooth Mint (Stand Up)	6oz	4.48/lb	03700072940
Aim	Anti-Tart.	6.4oz	5.45/lb	01111325381
"	Extra-Strength	6.4oz	5.12/lb	01111323101
"	BK. Soda	6.4oz	5.45/lb	01111329780
"	Regular	6.4oz	5.12/lb	01111320202

10. Rice

Brand	Variety	Size	Unit Price	UPC
Success	Boil in Bag	6*3.6oz	1.52/lb	01740010177
	Boil in Bag	4*3.6oz	1.93/lb	01740010077
	Boil in Bag Brown	4*3.6oz	1.93/lb	01740010078
Uncle Ben's	Boil in Bag Regular	4*3.6oz	1.70/lb	05480004026
	Boil in Bag Small	4*7oz	3.41/lb	05480004028
	Boil in Bag Large	4*21oz	1.90/lb	05480004027
Minute	Boil in Bag (Long Grain)	4*3.6oz	1.69/lb	04300022100
Uncle Ben's	Coverted Original	16oz	1.49/lb	05480001002
	"	32oz	1.30/lb	05480001008
	"	48oz	1.16/lb	05480001009
	"	10lb	.459/lb	05480001024
	"	5lb	.838/lb	05480001007
Shop-Rite	Enriched Long Grain	80oz	.538/lb	04119001784
	Fancy Long Grain	80oz	.398/lb	04119000893
	Enriched	160oz	.429/lb	04119002078
	Fancy	160oz	.199/lb	04119000891
Carolina	Enriched	5lb	.558/lb	01740010960
	Enriched	10lb	.399/lb	01740011063
Farm Flower	Enriched	5lb	.398/lb	04119000890
	"	20lb	.25/lb	04119001787
Minute	Enriched White	14.2oz	1.7/lb/lb	04300022080

11. Pancakes

Brand	Variety	Size	Unit Price	UPC
Bisquick	Shake'n Pour	7oz	3.41/lb	01600047090
	Baking & Pancake Mix	60oz	79.7/lb	01600042080
	"	40oz	99.6/lb	01600042040
Ant Jemina	Buttermilk Complete	32oz	.945/lb	03000005300
	Pancake & Waffle Mix	5lb	.598/lb	03000005810
	"	32oz	.845/lb	03000005040
	"	1lb	.99/lb	03000005020
	Complete(Just Add Water)	32oz	.945/lb	03000005070
Shop-Rite	Complete Pancake & Waffle	32oz	.595/lb	04119000065
	Pancake & Waffle Mix	32oz	.595/lb	04119001614
Hanns Mann's	Old Fashioned	32oz	.845/lb	07391201122
	Buttermilk	32oz	.845/lb	07391203122
	Buck Wheat	32oz	1.10/lb	07391202122
Washington	Pancake Mix	5lb	.30/lb	01020021400

12. Cranberry Juice

Brand	Variety	Size	Unit Price	UPC
Ocean Spray	Liquid Concentrate	Makes 42oz	1.59/qt	03120000505
"	Juice Dilute	32oz	1.99/qt	03120020000
"	"	48oz	1.73/qt	03120020005
"	"	64oz	1.25/qt	03120020007
"	"	1gal	1.32/qt	03120020010
Shop-Rite	Juice Dilute	32oz	.99/qt	04119000374
"	"	48oz	.66/qt	04119000375
"	"	64oz	.89/qt	04119001724
"	"	1gal	.99/qt	04119001287
Apple & Eve	Juice Dilute	64oz	1.33/qt	07630172214
"	"	48oz	1.41/qt	07630172653

13. Microwaveable soup

Brand	Variety	Size	Unit Price	UPC
Lipton	Chicken Noodle (Box)	2*4.3oz	4.53/lb	04100000332
Shop-Rite	"	2*4.3oz	3.08/lb	04119002684
Lipton	"	4*1.08oz	10.58/lb	04100001480
Campbell	Double Noodle (in Chicken Broth)	11oz	1.15/lb	05100002021
"	Homestyle Chicken Noodle	10 3/4oz	1.77/lb	05100002457
"	Chicken Noodle	10 1/4oz	1.36/lb	051000001621
"	C. Noodle (Family Size)	26oz	.855/lb	05100001254
Shop-Rite	Condensed Chicken Noodle	10 1/2oz	.808/lb	04119000764
Chunky Soup	Chicken Noodle	19oz	1.51/lb	05100003885
Campbell	Homestyle Cookin'	19oz	1.51/lb	05100001659
Progresso	Chicken Noodle	105oz	1.75/lb	04119601140
"	"	19oz	1.59/lb	04119601088
Campbell	Microwaveable C. Noodle	7 3/4oz	2.25/lb	05100005310
"	Microwaveable C. Noodle with Rice	7 3/4oz	2.25/lb	05100003340
Hormel	Noodle & Chicken	7 1/2oz	2.11/lb	03760005130

14. Raisins

Brand	Variety	Size	Unit Price	UPC
Sun Maid	Canister	24oz	1.99	04114302870
"	Box	15oz	1.91	04114302460
"	Box	9oz	1.14	04114302450
"	6 Pack	6*1.5oz	2.47	04114302010
"	14 pack	14*.5oz	3.41	04114302570
Champion	Canister	15oz	1.27	07004400699
Dole	Canister	18oz	1.08	07570006260
"	Box	12oz	1.72	07570003280
"	6 pack	6*1.5oz	2.47	07570003214
"	Bulk	24oz	1.86	07570003100
Shop-Rite	Box	15oz	1.48	04119000263
"	6 pack	6*1.5oz	1.76	04119002110
"	Canister	24oz	1.46	04119002362

15. Squeeze juice bottles

Brand	Variety	Size	Unit Price	UPC
Betty Croker	Orange	6*6.75 fl oz	2.28/qt	01600046860
"	Puncher	6*6.75 fl oz	2.28/qt	01600049190
"	Grape	6*6.75 fl oz	2.28/qt	01600046840
"	Berry Wild	6*6.75 fl oz	2.28/qt	01600046820
Kool Aid	Koolburst	6*6.75 fl oz	2.13/qt	04300095372
"	Orange	6*6.75 fl oz	2.13/qt	04300095371
"	Bluedini	6*6.75 fl oz	2.13/qt	04300095373
Mondo	Fruit	6*8 fl oz	1/qt (Sale)	07239234164
"	Primo Punch	6*8 fl oz	1/qt (Sale)	07239234163
"	Global Grape	6*8 fl oz	1/qt (Sale)	07239234161

16. Lunchables

Brand	Variety	Size	Unit Price	UPC
Oscar Mayer	Turkey & Cheddar	4.5oz	5.33/lb	04470002455
"	Ham & Swiss	4.5oz	5.33/lb	04470002454
"	Smoked Turkey & Monterey Jack	4.5oz	5.33/lb	04470002459
"	Bologna & American	4.5oz	5.33/lb	04470002456

17. Tuna lunch Kit

Brand	Variety	Size	Unit Price	UPC
Star Kist	Charlie's Lunch Kit	5oz	4.13/lb	08000000091

18. Microwavable Chili & Spaghetti(with Meat Ball)

Brand	Variety	Size	Unit Price	UPC
Hormel	Chili with Bean (Microwavable)	7 3/8 oz	2.58/lb	03760028183
"	Chili with Bean (Can)	15 oz	1.38/lb	03760022318
"	Chili without Bean (Can)	15 oz	1.91/lb	03760024193
"	Hot Chili with Bean (Can)	15 oz	1.38/lb	03760023352
Shop-Rite	Chili with Bean (Can)	15 oz	1.06/lb	04119001251
"	Hot Chili with Bean (Can)	15 oz	1.06/lb	04119000626
Chef Boyardee	Spaghetti & Meat Ball (Microwavable)	7 1/2 oz	1.60/lb	06414404717
Libby's	Spaghetti & Meat Ball (Microwavable)	7 3/4 oz	2.04/lb	03900000650
Chef Boyardee	Spaghetti & Meat Ball (Small Can)	7 oz	1.81/lb	06414486170
Franco - American (Spaghetio)	" (Can)	14 3/4 oz	1.40/lb	05100002526
Chef Boyardee	" (")	15 oz	1.06/lb	06414404322
Franco - American (Plain)	" (")	14 3/4 oz	79.2 /lb	05100002542

APPENDIX C

Product Weight of Waste: Total, Recyclable, and Non-Recyclable Components			
Products	Total Waste	Components Recyclable in Ulster County (g/oz or use)	Components Not Recyclable in Ulster County (g/oz or use)
Dishwashing Liquid (Dawn)			
22 oz bottle	2.3 g/oz	2.1	0.2
32 oz bottle	2.1 g/oz	1.9	0.2
96 oz bottle	1.3 g/oz	1.2	0.1
Frozen Vegetables			
9 oz Green Giant box of corn	2.7 g/oz		2.7
10 oz Bird's Eye box of peas	2.5 g/oz		2.5
10 oz ShopRite box of corn	2.1 g/oz		2.1
16 oz Bird's Eye bag of peas	0.3 g/oz		0.3
24 oz ShopRite bag of peas	0.2 g/oz		0.2
40 oz ShopRite bag of peas	0.2 g/oz		0.2
Raisins (Sunmaid)			
Bag of 14 one-half oz boxes	4.4 g/oz		4.4
Pack of 6 one and one-half oz boxes	3.2 g/oz		3.2
15 oz box	1.9 g/oz		1.9
24 oz canister	1.3 g/oz		1.3
Coffee			
Folgers "singles" in box (38 svg)	3.5 g/svg		3.5
13 oz Folgers can (85 svg)	1.5 g/svg	1.4	0.1
Ten Maxwell House filter packs (50 svg)	1.3 g/svg		1.3
39 oz Folgers can (255 svg)	1.3 g/svg	1.2	0.1
13 oz Folgers brick pack (85 svg)	0.2 g/svg		0.2
Pancakes			
Bisquick "Shake and Pour" (9 cakes)	5.0 g/cake	4.3	0.7
1 lb box Aunt Jemima (13 cakes)	2.7 g/cake		2.7
2 lb box Aunt Jemima (25 cakes)	2.7 g/cake		2.7
5 lb box Aunt Jemima (62 cakes)	2.0 g/cake		2.0
Hot Cereal (Quaker Oats)			
Microwaveable cups (4 svg)	24.3 g/svg		24.3
Instant single packets in box (10 svg)	6.0 g/svg		6.0
18 oz canister (14.4 svg)	4.4 g/svg		4.4
42 oz canister (33.6 svg)	3.3 g/svg		3.3
Rice (Uncle Ben's)			
Boil in bag 7 oz (4 svg)	7.9 g/svg		7.9
Boil in bag 14 oz (9 svg)	5.6 g/svg		5.6
Boil in bag 21 oz (13 svg)	5.4 g/svg		5.4
3 lb box (30 svg)	2.2 g/svg		2.2
1 lb box (10 svg)	2.2 g/svg		2.2
2 lb box (20 svg)	1.9 g/svg		1.9
5 lb bag (50 svg)	0.3 g/svg		0.3
10 lb bag (100 svg)	0.2 g/svg		0.2

Products	Total Waste	Recyclable Components g/oz or use	Non-Recyclable Components g/oz or use
Toothpaste (Crest)			
Pump 4.6 oz	12.3 g/oz		12.3
Pump 6.4 oz*	12.1 g/oz		12.1
"Neat Squeeze" 6 oz	5.1 g/oz		5.1
Box/Tube 4.6 oz	4.6 g/oz		4.6
Box/Tube 6.4 oz	4.1 g/oz		4.1
Box/Tube 8.2 oz	3.8 g/oz		3.8
"Stand Up" 6 oz	2.2 g/oz		2.2
Soup (Campbell's)			
19 oz can (2.38 svg)	34.4 g/svg	33.2	1.2
Microwaveable Single (0.97 svg)	31.6 g/svg		31.6
10 1/4 oz can (2.6 svg)	19.1 g/svg	18.4	0.7
26 oz can concentrate (6.5 svg)	17.7 g/svg	17.1	0.6
Dry foil/plastic packet (2 svg)	2.5 g/svg		2.5
Baby Wipes (Babyfresh)			
42 pack	1.7 g/wipe		1.7
84 pack	1.2 g/wipe		1.2
126 pack	1.0 g/wipe		1.0
84 refill	0.1 g/wipe		0.1
Fabric Softener**			
128 oz "semiconcentrate" ShopRite (21.3 uses)	10.1 g/use	8.9	1.2
64 oz dilute Snuggle (23 uses)	6.5 g/use	5.4	1.1
22 oz concentrate Snuggle (22 uses)	4.1 g/use	3.5	0.6
36 oz concentrate Snuggle (36 uses)	2.6 g/use	2.2	0.4
20 oz carton concentrate Snuggle (20 uses)	2.3 g/use		2.3
40 oz carton concentrate Snuggle (40 uses)	2.0 g/use		2.0
Cranberry Juice (Ocean Spray)			
32 oz glass (5.3 svg)	83.7 g/svg	82.3	1.4
48 oz glass (8 svg)	79.8 g/svg	78.9	0.9
3 pack aseptic boxes (4.2 svg)	9.8 g/svg		9.8
64 oz PET (10.6 svg)	8.7 g/svg	8.2	0.5
Concentrate aseptic box (7 svg)	1.9 g/svg		1.9
Light Bulbs (Sylvania)			
4 standard 75 watt (3000 hrs)	5 g/100 hrs		5.0
4 "double life" 75 watt (6000 hrs)	2 g/100 hrs		2.0
Razors			
12 disposables in bag (102 shaves)	0.7 g/shv		0.7
5 disposables in bag (42.5 shaves)	0.7 g/shv		0.7
10 cartridges in blister pack (85 shaves)	0.4 g/shv		0.4
6 cartridges in bag (51 shaves)	0.3 g/shv		0.3
<p>* All toothpaste options, except 6.4 oz pump, were weighed after being cleansed of remaining product residue and wiped dry. 6.4 oz pump was weighed, after toothpaste was squeezed out manually, but without opening, cleaning and drying of package.</p> <p>** Fabric softener "uses" (i.e., washloads) were determined by measuring softener, according to package instructions, into cap provided with each option.</p>			

APPENDIX D

<p>Table D-1. Environmental Ranking of Frozen Vegetables.</p>				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
9-oz. Box, Green Giant corn	—	5 2.7 g/oz.	3 25 ml/oz.	4
10-oz. Box, Bird's Eye peas	—	4 2.5 g/oz.	4 26 ml/oz.	4
10-oz. Box, ShopRite corn	—	3 2.1 g/oz.	2 16 ml/oz.	4
16-oz. Bag, Bird's Eye peas	—	2 0.3 g/oz.	1 3 ml/oz.	3
24-oz. Bag, ShopRite peas	—	1 0.2 g/oz.	1 3 ml/oz.	2
40-oz. Bag, ShopRite peas	—	1 0.2 g/oz.	1 3 ml/oz.	1

Numbers are ranking from best (1) to worst (5) environmental choice.

Table D-2.				
Environmental Ranking of Raisins.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
Bag of 14 boxes, 1/2-oz. each	--	4 4.4 g/oz.	4 37 ml/oz.	4
Pack of six boxes, 1.5-oz. each	--	3 3.2 g/oz.	3 27 ml/oz.	3
15-oz. box	--	2 1.9 g/oz.	1 13 ml/oz.	2
24-oz. canister	--	1 1.3 g/oz.	2 17 ml/oz.	1

Numbers are ranking from best (1) to worst (4) environmental choice.

Table D-3.				
Environmental Ranking of Coffee.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
38 "singles" in box (38 svgs.)	--	4 3.5 g/svg.	4 46 ml/svg.	5
10 filter packs (50 svgs.)	--	3 1.3 g/svg.	3 15 ml/svg.	4
13-oz. can (85 svgs.)	Steel Can*	2 0.5 g/svg.	2 3 ml/svg.	3
39-oz. can (255 svgs.)	Steel Can*	2 0.5 g/svg.	2 3 ml/svg.	2
13 oz. brick pack (85 svgs.)		1 0.2 g/svg.	1 1 ml/svg.	1

Numbers are ranking from best (1) to worst (5) environmental choice.

* = Based on non-recovery rate of 34% for steel can.

Table D-4.
Environmental Ranking of Hot Cereal.

Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
Microwave cups, 4 svgs. (1 svg = 5.5 oz. wet weight)	--	4 24.3 g/svg.	4 124 ml/svg.	4
Instant singles, 10 svgs. (1 svg = 1.25 oz. dry weight)	--	3 6.0 g/svg.	2 29 ml/svg.	3
18-oz. canister, 14.4 svgs. (1 svg = 1.25 oz. dry weight)	--	2 4.4 g/svg.	3 40 ml/svg.	2
42-oz. canister, 33.6 svgs. (1 svg = 1.25 oz. dry weight)	--	1 3.3 g/svg.	1 24 ml/svg.	1

Numbers are ranking from best (1) to worst (4) environmental choice.

Table D-5.
Environmental Ranking of Rice.

Product Choices (Serving = 45 g. dry rice)	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
7-oz. Boil-in-bag (4 svgs.)	--	7 7.9 g/svg.	8 62 ml/svg.	8
14-oz. Boil-in-bag (9 svgs.)	--	6 5.6 g/svg.	7 34 ml/svg.	7
21-oz. Boil-in-bag (13 svgs.)	--	5 5.4 g/svg.	6 31 ml/svg.	6
3 lb box (30 svgs.)	--	4 2.2 g/svg.	4 9 ml/svg.	3
1 lb box (10 svgs.)	--	4 2.2 g/svg.	5 10 ml.svg.	5
2 lb box (20 svgs.)	--	3 1.9 g/svg.	3 8 ml/svg.	4
5 lb bag (50 svgs.)	--	2 0.3 g/svg.	2 3 ml/svg.	2
10 lb bag (100 svgs.)	--	1 0.2 g/svg.	1 2 ml/svg.	1

Numbers are ranking from best (1) to worst (8) environmental choice.

Table D-6.
Environmental Ranking of Toothpaste.

Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
4.6 oz. pump	--	7 12.3 g/oz.	6 54 ml/oz.	7
6.4 oz. pump*	--	6 12.1 g/oz.	3 45ml/oz.	6
6 oz. "Neat Squeeze"	--	5 5.1 g/oz.	2 37 ml.oz.	5
4.6 oz. box/tube	--	4 4.6 g/oz.	7 58 ml/oz.	4
6.4 oz. box/tube	--	3 4.1 g/oz.	4 46 ml.oz.	3
8.2 oz. box/tube	--	2 3.8 g/oz.	5 50 ml/oz.	2
6 oz. "Stand Up" tube	--	1 2.2 g/oz.	1 17 ml/oz.	1

Numbers are ranking from best (1) to worst (7) environmental choice.

*Weight of all toothpaste options, except 6.4 oz. pump, was calculated after packaging was cleaned of remaining product residue and wiped dry.

Table D-7.				
Environmental Ranking of Baby Wipes.				
Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
Hard pack, 42 wipes	--	4 1.7 g/wipe	2 11 ml/wipe	4
Hard pack, 84 wipes	--	3 1.2 g/wipe	3 13 ml/wipe	3
Hard pack, 126 wipes	--	2 1.0 g/wipe	3 13 ml/wipe	2
Soft refill, 84 wipes	--	1 0.1 g/wipe	1 2 ml/wipe	1

Numbers are ranking from best (1) to worst (4) environmental choice.

Table D-8.
Environmental Ranking of Lightbulbs.

Product Choices	Packaging Materials Recyclable in Ulster County	Amount of Waste Adjusted for Recyclability		Educator's Assessment
		wt.	vol.	
4 standard bulbs, 75 watts each (3000 hours total)	--	2 5.0 g/100 hrs.	*	2
4 "double life" bulbs, 75 watts each (6000 hours total)	--	1 2.0 g/100 hrs.	*	1

Numbers are ranking from best (1) to worst (2) environmental choice.
* Volume measures not made for lightbulbs.

APPENDIX E

SMART SHOPPING

PUBLIC SERVICE ANNOUNCEMENTS PRODUCED BY SUNY NEW PALTZ
STUDENTS, SPRING 1994, WILL REBEDEE, INSTRUCTOR

(30 Seconds)

PSA #1: Hey Phil

MUSIC: Perky yet calm in background

SOUND EFFECTS: Buzzing of city street up then under

DAVE: Hey Phil, heading home?

PHIL: Actually, I have to stop off and do some SMART Shopping first.

DAVE: SMART Shopping?

PHIL: It's a new program which helps people Save Money and Reduce Trash. SMART, you get it? Did you know if you buy the big bottle of dishwashing liquid instead of the regular size you save 30% in money and it makes half the trash?

DAVE: I never realized shopping differently could help the environment so much. I think I should do some SMART shopping.

PHIL: Now you've got it. Be SMART. Save Money and Reduce Trash.

ANNC: This message has been brought to you by (your agency).

MUSIC: Up then out

PSA #2: Did you Know?

ANNC: Did you know that the United States generates almost two hundred million tons of garbage a year? A large percentage of this comes from unnecessary packaging and other wasteful products. Fortunately, we can help crack this problem by doing things like buying products with little or no packaging and reusable products rather than disposables. Remember, sometimes it's the little things that end up making a big difference. So please be SMART and shop SMART, Save Money and Reduce Trash.

This message has been brought to you by (your agency).

PSA #3: Hey!

ANNC: Hey, would you like to help the environment? Join thousands of other people in reducing the amount of waste we generate. Shop SMART, Save Money and Reduce Trash by purchasing products with less packaging waste and get more product and less packaging. Save money as well as waste by buying the economy size products when possible. This will reduce the amount of packaging you have to throw away. Help prevent garbage by shopping SMART. Be a part of the solution in our community. Shop SMART, Save Money and Reduce Trash.

This message has been brought to you by (your agency).

PSA #4: Lunch

MUSIC: Background, Up Then Under

MALE ANNC: It pays to make your lunch a SMART Lunch. Use a cloth lunch bag or reusable box. Keep your drink in a plastic bottle. Buy reusable containers for sandwiches and chips and use a washable cloth napkin. All these lunchbox items can be used over and over. That saves money and that helps reduce waste. Save Money and Reduce Trash. Be SMART, shop SMART. This message was brought to you by (your agency).

MUSIC: Up And Out

PSA #5: Recycling

MALE ANNC: Recycle, Recycle, Recycle. That's all you hear nowadays. Recycling is important, but reducing waste is the first step. I say be SMART, Save Money and Reduce Trash. You can prevent waste by buying only what you need. By using durable and reusable products instead of disposables and also by giving usable products away to friends or charities instead of throwing them away. Remember, first try to Reduce, Reuse, Repair, and then Recycle.

This message has been brought to you by (your agency).

PSA #6: Lunch

(Starts off with the sounds of children playing and continues throughout the segment.)

ANNC: Can you believe it, it's school time again and this year everybody wants their children to be SMART of course. By SMART I'm talking about Saving Money and Reducing Trash...SMART! Parents, one way you can teach this to your children is by packing a SMART lunch in reusable containers, lunch box or cloth bag and a cloth napkin that's washable. You save money and trash. You can't get much SMARTer than that.

This message has been brought to you by (your agency).

PSA #7: Landfills

(Starts off with soft guitar music and continues throughout the segment.)

ANNC: Do you know that Americans produce almost 200 million tons of garbage each year. Unnecessary waste not only overloads landfills it also costs you

money. You can prevent this by shopping SMART. Save Money and Reduce Trash by avoiding disposable goods, utilizing reusable containers, and thinking about the waste you produce.

This message has been brought to you by (your agency).

PSA #8: Environment

(Starts off with the sound of the wind then soft music throughout the segment.)

ANNC: Our environment is in need of intensive care. You'll care when you shop SMART, you're saving money and providing a safer and healthier environment. How can you help? You can help by reducing packing, reusing containers and repairing torn or broken items. Please don't ignore the chance for a richer and healthier life. Shop SMART, Save Money and Reduce Trash.

This message has been brought to you by (your agency).

PSA #9: Save The Earth

(Starts off with soft guitar music and continues throughout the segment.)

ANNC: Did you know that you can save the earth and a little money just by packing a SMART lunch. SMART stands for Saving Money and Reducing Trash. And it's easy to do by using a lunch box or cloth bag, plastic bottle for juice, a sandwich keeper, container for chips and a washable cloth napkin. You're preventing waste and putting a little extra cash in your pocket at the same time. Now that's SMART.

This message has been brought to you by (your agency).

PRESS RELEASE — BUYING TRASH

Buying trash? It sounds like a crazy idea and consumers don't do it on purpose. But, the fact is that one dollar out of every eleven you spend on groceries is really spent on just the packaging. With your next grocery bill of \$100.00, you could be throwing \$9.00 in the garbage as discarded packaging. True, some packaging is necessary to keep food fresh and help reduce breakage, but some product's packaging produces unnecessary waste.

Next time you're shopping, take a look at the packaging of the product you're considering buying. Are you purchasing an over-packaged product? Could you be saving money and reducing garbage by selecting another packaging choice? Think about buying the larger size of a product and doing without individual serving size packaging. Reducing packaging waste is one way to manage our garbage and save money.

(Your agency) and (cooperators) of (your town or county) believe that by practicing waste reduction techniques, like shopping carefully, we can reduce garbage in (your town or county). Shop SMART. Save Money and Reduce Trash.

###

Contact:

PRESS RELEASE — ENVIRONMENTAL SHOPPERS

As our lives seem to get busier, many of us turn to the convenience of single service food containers and disposable products. However, there is a price to pay for these conveniences: and it's paid by our environment and out of our pocket books. What can you do? Plenty. When you're shopping, select products with a minimum of packaging. Remember, you don't have to sacrifice convenience. You can create your own microwaveable meals by buying in bulk, cooking in large quantities and simply freezing leftovers in reusable containers.

When consumers voice their opinions and change their shopping habits, companies that produce these over packaged goods will change, too. Write or call manufacturers to complain about wasteful packaging and products.

(your town or county) and (cooperators) ask you to be an environmentally aware shopper. Feel good about the part you're playing to preserve the environment. And there's an added bonus - you'll save money too! Shop SMART - Save money and reduce trash.

###

Contact:

PRESS RELEASE — SHOPPING SMART

Are you tired of struggling with layers of packaging to get to the product you've bought? Have you thought about where those layers of packaging go when they are not reused or recycled? In (your town or county), packaging waste is collected and buried in a landfill. The cost of disposing of our waste is increasing.

What can you do? One of the best ways to reduce waste is to not make it in the first place. You can help reduce solid waste by purchasing products that produce less waste. You'll be helping the environment by reducing the harmful effects associated with the manufacture and transport of packaging in the first place and you will be saving money, too. (your town or county) and (cooperators) suggest that when you go grocery shopping you:

- Purchase a concentrated version of a product rather than its diluted version. Why carry home all that water when you can add it at home.
- Buy in bulk when it's practical.
- Select durable goods, not disposable - they'll save you money in the long run!

Take a few minutes to examine your packaging choice.

How about the bag that you receive at the check out? Reduce this packaging by bringing your own cloth bag or reuse a paper or plastic one from home. Shop SMART. Save money and reduce trash.

###

Contact:

PRESS RELEASE — LET'S NOT THROW IT ALL AWAY

Would you like to improve the quality of the environment for your family? Would you like to make a positive change in (your town or county)? (your town or county) and (cooperators) have a suggestion: reduce your trash.

It's no secret that we're running out of places to put our trash. You can play a vital role in helping to solve our trash problem: practice waste reduction. It's not that difficult to reduce the amount of trash you throw away.

Make a habit of choosing the products that will generate the least packaging waste. Here are a few tips: buy in bulk and avoid wasteful packaging and avoid individual serving sizes. Buying long lasting, durable products reduces the waste of disposable or single use goods. Consumers should practice waste reduction. Not only will they save money by not paying for packaging, but they will also help the environment by throwing out less trash. Shop SMART - Save Money And Reduce Trash.

###

Contact:

RRA has contest on waste-cutting

KINGSTON — Do you have any unique ideas or tips for reducing waste? If so, you might want to enter a contest being held by the Ulster County Resource Recovery Agency.

Emilie Hauser, a waste-reduction expert with the RRA, said the tips may include ways of reusing products so they don't end up in the trash or methods of reducing the toxicity of household waste. Either residential or commercial waste reduction tips can be submitted.

Hauser said waste prevention is beneficial to the environment because it reduces pollution from the manufacture and transport of goods and decreases the amount of waste going to landfills. Waste prevention also saves money by avoiding garbage fees.

Special prizes will be awarded for winners in two categories: Dinner for two at the Postage Inn in Tillson

Ulster County

will be given to the contestant with the suggestion that saves or prevents the most waste; a brunch for two at the DePuy Canal House in High Falls will be awarded to the contestant with the most creative, original or unique waste-reduction tip.

Runners-up in both categories will receive an RRA recycling T-shirt.

Waste-reduction tips will be shared on the weekly WGHQ-AM recycling hotline show at 10 a.m. every Saturday. Contest winners will be announced on the show on Nov. 20.

Judges for the contest will be Hauser and Andrea Park of Cornell Cooperative Extension of Ulster County.

Entrants should send their waste-reduction suggestions, with their name, address and phone number, printed legibly or typed on a postcard, to: UCRRA, 52 Mair St., P.O. Box 4298, Kingston, N.Y. 12401. Entries must be received by Nov. 18.

Hauser said waste reduction or prevention means decreasing either the amount of toxicity of waste. Simple waste reduction tips include:

- Avoid overpackaged products.
- Purchase concentrates.
- Buy the largest size of a product you can use.
- Use long-lasting, durable products.
- Use non-toxic alternatives for household cleaning.

The contest is being sponsored by the RRA, Cornell Cooperative Extension of Ulster County and radio station WGHQ.

Do you pack a **S M A R T** lunch?

Use reusable containers:

Cloth bag or
lunch box

Containers for sandwiches and snacks

Bottle or thermos

Cloth napkin

Be **S M A R T** : Save Money And Reduce Trash

For more information call

S.M.A.R.T. logo courtesy of Minnesota Office of Waste Management

For A Brighter Future...

Develop a lasting relationship with durable, reusable products.

long-life
light bulb

cloth napkin
or towel

refillable
razor

reusable
mug

Be **S M A R T** = Save Money And Reduce Trash

For more information call

S.M.A.R.T. logo courtesy of Minnesota Office of Waste Management

Be **S M A R T** = Save Money And Reduce Trash

o Buy in Bulk

o Use Reusables

1.5 lb. bag

14 mini-snack boxes in a bag

Bulk bag

Reusable container

Bag is 47% less expensive and makes
97% less waste than mini-snack boxes

Make your own mini-snacks

For more information call

S.M.A.R.T. logo and facts courtesy of Minnesota Office of Waste Management

Be **S M A R T** = Save Money And Reduce Trash

- o Buy in Bulk
- o Use Concentrates
- o Use Reusables
- o Buy things that last
- o Buy products with *least* packaging

For more information call

S.M.A.R.T. logo courtesy of Minnesota Office of Waste Management

Waste reducers target

By BLAISE SCHWEITZER
Freeman staff

WASTE is wanted not. Children may love to guzzle from six-packs of shrink-wrapped Kool-Aid and boxed juices, dip individually packed Dunkaroos with frosty abandon and scarf Oscar Mayer Lunchables, but landfills choke with the non-recyclable packaging that comes with the products.

Andrea Park, Cornell Cooperative Extension waste reduction technician, practically gags at the stuff. "That's landfill bound," she said, looking at a line of flavored sugar water heavily packaged in non-recyclable materials. "You create a lot of trash and you only get a little bit of product."

As part of a project to reduce waste at its source, sponsored by Cornell University and the Ulster County Resource Recovery Agency, Park educates buyers on the excesses that fill grocery store shelves.

CAREFUL to sniff at the packaging, not the products therein, Park said she doesn't play favorites with manufacturers when slamming or praising products. Sometimes the same manufacturer offers both high-pollution and low-pollution options, and buyers can vote with their dollars.

As part of the project, tours of Shop Rite in the town of Ulster will be offered to targeted consumers to see how much education will change their buying habits.

The hope is that not only will shoppers become smarter and buy fewer wasteful products, but that businesses will respond to public concerns and provide more ecologically friendly options, Park said.

Under fire by environmentalists, some producers have already modified packaging. In the case of the pared-down Lunchable with 30 percent less packaging than its previous incarnation, Oscar Mayer's attempt still falls short, she said.

IN ADDITION to the sheer quantity of the wrappings, none of the material is recyclable locally, she said.

Packaging isn't inherently evil, Park said, it is hog-wild packaging that is improper.

Some products are especially onerous.

Park scoffs at Charlie's Lunch Kit, an individual serving of tuna with separately wrapped crackers, mayonnaise and relish, for its packaging within packaging within packaging. It isn't so difficult to

make up a batch of tuna salad and keep it and a few crackers fresh until lunch time, she said.

Standing in Shop-Rite's fruit and vegetable aisle, Park said ideal packaging is the sort nature provides. An orange rind can be surprisingly protective.

THE NEXT best option is the smallest amount of packaging necessary to preserve items and allow consumers to spot tampering.

Park has some sympathy for confused shoppers. "There really is a dizzying array of products to choose from," she said.

She has a few guidelines to help consumers find a better product to garbage ratio:

- Buy durable reusable goods.

- Buy the largest size of the product that you can use.

- Buy products in concentrate form.

- Buy the product in the least amount of packaging there is.

Park has a sense of humor about it. She laughed as she recalled her son trying to coax her to buy boxed drinks, suggesting that if frozen they would keep his lunch cold.

INSTEAD she has plied him with convenient, reusable, brightly-colored packaging of her own.

"He's happy he's got his neon orange reusable lunch bag and his food goes in with lime green reusable containers inside," she said.

Emilie Hauser, waste reduction and recycling program assistant for the Ulster County Resource Recovery Agency, said Park's work is part of a coordinated effort using advertisements, public service announcements and pamphlets to reduce waste. "The push is going to be until mid-November," she said.

This is first time the UCRRRA has pushed so hard on this aspect of slowing landfill closure. "We haven't tried to focus on waste reduction," she said. Aside from an occasional pamphlet, education on how to recycle has taken precedence.

As part of the effort, the UCRRRA, Cornell Cooperative Extension of Ulster County and WGHQ radio are sponsoring a waste reduction contest.

THE AIM is to come up with new ways to reduce or prevent waste.

Park and Hauser will judge the competition.

Anyone interested in the contest should contact Hauser at 339-7283. Those interested in getting a speaker to talk about waste reduction and recycling can contact Cornell Cooperative Extension at 338-3494.

"We're available for public education on waste prevention," Park said.

food packaging

Freeman photos by Bill Madden

Andrea Park has little sympathy for people who can't take the time to fix tuna salad before leaving for work. Starkist's Charlie's Lunch Box, with separate mayonnaise and relish packets, plastic-wrapped crackers, shrink-wrapped plastic carton and outer cardboard casing, is one of her least favorite items.

Top right, apple juice in the bottle costs just 89.5 cents per quart, while the contents in Kool-Aid Bursts add up to \$2.13 per quart. Middle, instead of buying the hyper-packaged Luncheables and pricey Dunkaroos for lunch, a wise consumer can invest in reusable plastic containers and custom-make their lunches. For those who must include frosting for dipping cookies, compartmentalized lunch boxes will do. Bottom right, buying loose produce cuts down on waste packaging.

Cutting packaging cuts costs, too

Waste reducers find that buying highly packaged items in small quantities costs more.

- Toothpaste in the 4.6 ounce pump costs 26 percent more than the traditional 6.4 ounce tube and produces 69 percent more waste.

- A microwave single-serving soup container costs 65 percent more than a packet of instant soup and produces 98 percent more waste.

- Boil-in-bag rice costs 47 percent more and produces 98 percent more waste than a 5-pound bag of rice.

- A six-pack of snack pudding costs 64 percent more than a 5.9 ounce box of instant pudding and produces 89 percent more waste.

- A 12-pack box of instant oatmeal costs 72 percent more than a 72 ounce bag of oats and produces 84 percent more waste.

- Six-packs of non-carbonated soft drinks in plastic bottles cost 93 percent more than drinks made from powdered drink packets and produce 99 percent more waste.

Cornell
Waste
Management
Institute

Shop
S.M.A.R.T.

Cornell Cooperative
Extension of
Ulster County

Cornell Department
of Consumer
Economics & Housing

Ulster County
Resource Recovery
Agency

Wakefern Food
Corporation

NYS Energy Research
& Development
Authority

Enviroshopping Resources

*Shop S.M.A.R.T.
Educational Tool Kit*

*Get the Goods,
Not the Garbage*

*Shop S.M.A.R.T.
Video*

Printed on recycled paper using vegetable-based inks.

SMART basics

REDUCE

- o Look for least-waste packaging.
- o Buy in bulk, when practical.
- o Avoid disposable, single use items.
- o Buy concentrates.
- o Buy long lasting products that can be repaired.
- o At checkout, don't take a bag if you can do without.
- o Buy only what you need.
- o Buy non-hazardous products.
- o Buy refills.

REUSE

- o Use cloth bags for shopping.
- o Reuse items such as bags, jars, and plastic tubs.
- o Pack your lunch in reusable food containers.
- o Use rechargeable batteries.
- o Repair and maintain items instead of replacing them.
- o Buy returnable and refillable bottles.
- o Use refillable, pump-spray bottles.

RECYCLE

- o Buy readily recyclable products and then participate in local recycling programs: glass bottles and jars, metal cans, and newspaper are collected in most communities.
- o Close the loop: Buy products made from recycled materials.

SMART ideas

USE REUSABLES & REFILLABLES

Storing bulk or large amounts of food in airtight reusable containers allows easy access and extends shelf-life. Refrigeration and freezing can extend shelf-life even further.

Small reusable containers can be used to pack food in single servings for lunches and snacks.

Refill pump spray bottles.

For further information on Waste Reduction contact your Solid Waste or Recycling Agency or Cooperative Extension.

Brochure prepared by:

Ulster County Resource
Recovery Agency
1266 Ulster Ave.
Kingston, NY 12401
(914) 336-3336

Cornell Cooperative
Extension of Ulster County
74 John Street
Kingston, NY 12401
(914) 338-3494

SMART logo and campaign created by the
Minnesota Office of Waste Management
(612) 649-5750.

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The examples in this brochure should not be seen as either endorsing or condemning any specific product or businesses. The opinions expressed in this brochure do not necessarily reflect those of NY State Energy Research and Development Authority, Wakefern Food Corp., other project participants, or NY State.

S. M. A. R. T.

Save Money And Reduce Trash

Shopping

- o Use concentrates.
- o Select least-waste packaging.
- o Use reusable, durable goods.
- o Buy the larger size.

Printed on Recycled Paper

Save Money And Reduce Trash

In the United States, we generate about 1,500 pounds of solid waste per person each year. About 35 percent of our household waste comes from the packaging of products we buy. While packaging is sometimes necessary for health and shelf-life reasons, packaging can be excessive. By taking a few seconds to consider the alternatives before you buy, you can save money and reduce trash with SMART shopping.

SAVING MONEY:

SMART shopping can save you money. Buying products with the least waste means you are getting more product and less packaging for your money. Research conducted by Cornell University found several examples of cost savings of more than 50% for products packaged with the least amount of waste (see SMART Examples). Buying a product with less waste usually means that you save money.

F-3

REDUCING TRASH:

SMART shopping is also a form of source reduction and is the most effective way to reduce the amount of trash entering our solid waste stream. Source reduction prevents waste before it is created. Buying less wasteful packaging is one way you can do this. By reducing the amount of waste we generate, we can all help reduce the impact we have on the environment. The following SMART examples could reduce your waste from 39% to 99% on specific purchases. Buy SMART. Save resources, prevent waste and save money.

Less waste

More waste

RICE

5 lb. bag

Bag is 72% less expensive and makes 97% less waste than boil-in-bag.

7 oz. boil-in-bag

DISHWASHING LIQUID

96 oz. bottle

22 oz. bottle

96 oz. is 38% less expensive and 50% less waste than 22 oz.

FROZEN PEAS

40 oz. bag

Bag is 24% less expensive and 89% less waste than box.

10 oz. box

CHICKEN NOODLE SOUP

10.25 oz. can

Can is 70% less expensive and makes 39% less waste per 8 oz. serving than microwaveable container.

7.75 oz. microwaveable

FABRIC SOFTENER

36 oz. concentrate

Concentrate is 12% less expensive and 61% less waste per washload than regular strength.

64 oz. regular

RAISINS

24 oz. canister

14 x .5 oz. mini-snack

Canister is 42% less expensive and 69% less wasteful than mini-snacks.

RAZORS

Refill cartridges

Disposables

Cartridges are 41% more expensive but make 54% less waste than disposables per use.

NON-CARBONATED SOFT DRINKS

0.13 oz. powder packet

Packet is 93% less expensive and makes 99% less waste than 6-pack plastic bottles.

6-pack plastic bottles

Information from Minnesota Office of Waste Management. Figures do not include the cost of necessary additional ingredients. Figures based on volume of waste.

Research conducted by the Waste Management Institute, Center for the Environment, Cornell University. All figures based on equivalent amount of product. Unless otherwise indicated, packaging waste based on weight. Prices determined from 1993 shelf labels.

Pack a

S M A R T

lunch

using reusable containers

Cloth lunch bag or box

Plastic bottle for juice

Sandwich keeper

Container for chips

Cloth napkin (washable)

FOR MORE INFORMATION
 Cornell Cooperative Extension, Ulster County
 914/338-3494
 Ulster County Resource Recovery Agency
 914/339-7283
 SMART Shopping campaign created by
 Minnesota Office of Waste Management

S M A R T

**SAVING MONEY AND
 REDUCING TRASH**

s h o p p i n g

- 1** Bring your own shopping bag.
- 2** Look for least-waste packaging.
- 3** Buy in bulk when practical.
- 4** Use reusable containers.
- 5** Avoid disposable and individually wrapped items.
- 6** Buy products packaged with recycled material.
- 7** Buy locally recyclable packaging.
- 8** Buy repairable products.
- 9** Buy returnables and refillables.
- 10** Use concentrates and pump sprays.

IN-STORE BROADCAST MESSAGES

1. Hey shoppers! Did you know that packaging alone accounts for one third of all trash? Did you also know that each person in the U.S. generates about one ton of garbage a year? That's why I'm urging you to be SMART, buy the concentrated form of your favorite products, or buy the largest package you can use, it's cost effective and reduces the amount of packaging so you can Save Money and Reduce Trash. This message is brought to you by (your agency). Remember to be SMART: Save Money and Reduce Trash.
2. Hey! This is Mr. G. at the supermarket, reminding you to shop SMART. When you pick up your favorite products, make sure that you buy them either in concentrated form or in the largest package you can use. This saves packaging and helps protect our environment. It also saves you money. Remember: be SMART, buy SMART: Save Money and Reduce Trash. This message is brought to you by (your agency). Remember to be SMART: Save Money and Reduce Trash.
3. Be SMART, Save Money and Reduce Trash. When shopping for juices or cleaning products, buy them in the concentrate forms. These versions require far less packaging than the dilute versions of the same products, and that's less that you have to throw away, and that is a far smaller burden on our planet Earth.
4. By the year 2000, the United States will have an additional 26.4 million tons of garbage to manage annually. Recycling alone will not solve the problem. We need to reduce waste at the source. To help, we can use reusable and more durable products instead of disposables. Bring your own reusable cloth bags into the store when shopping. Be SMART, Save Money and Reduce Trash.
5. Imagine your children living in harmony with nature. What could be more beautiful? Today's consumer is concerned with preserving the environment. What better way to create harmony with nature than to reduce waste? You can make a difference by purchasing products that make less trash and help preserve the world your children will inherit. Be SMART, Save Money and Reduce Trash. This message is brought to you by (your agency). Remember to be SMART: Save Money and Reduce Trash.

These In-Store Broadcast Messages may be used interchangeable with the PSAs.

March 30, 1994

Dear Shoprite Customer,

Are you interested in good value and concerned for the environment? If so, then we are happy to share some tips to help you Shop S.M.A.R.T.--Save Money And Reduce Trash.

Shoprite, Cornell Cooperative Extension of Ulster County (CCE-UC) and the Ulster County Resource Recovery Agency (UCRRA) are working together to help supermarket shoppers learn how to reduce waste by purchasing less packaging and products that last. The enclosed brochure points out that less wasteful items usually cost less too, so you can save money as you help protect the environment.

Packing a S.M.A.R.T. lunch can reduce waste, save money and help teach your children to save resources. The complimentary bookmark shows some easy ways to reduce lunch wastes. The reverse side gives 10 waste reducing shopping tips.

If you have questions or would like further information, please call CCE-UC at 338-3494, UCRRA at 336-0600 or talk to staff at your Shoprite store.

Sincerely,

SHOPRITE

*Reuse your shopping bags or bring
reusable cloth bags and we'll give you
2¢ credit for each bag saved!*

**Cornell
Cooperative
Extension**

Ulster County

Extension Education Center
74 John Street
Kingston, NY 12401-3824
914-338-3494

March 30, 1994

Dear Valued ShopRite Customer,

You're invited to join a consumer education shopping tour at the ShopRite Supermarket in either Kingston or New Paltz in April. The 45 minute tour will take you through an array of products and offer guidelines for making educated purchases.

As the selection of products available to consumers grows daily, it is often helpful to take a closer look at our shopping habits in order to discover whether we are making wise shopping decisions for ourselves and our families. Tours are being conducted by Cornell Cooperative Extension of Ulster County as part of their on-going commitment to public education.

At the end of the consumer education tour you will receive a \$10.00 gift certificate from ShopRite to apply to your next purchases.

To respond to this invitation, simply return the stamped, addressed postcard enclosed indicating your choice of tour time and location. Responses must be received by Monday, April 11th. Please add your telephone number. You'll receive a confirmation of your tour time.

On the day of the tour please meet at the store's Courtesy Counter and bring your Price Plus Shopping Card to verify your invitation as this tour is offered to you or an immediate family member only.

I hope that you will be able to join one of our shopping tours.

Yours sincerely,

Andrea Park
Senior Technician

Enclosure

Helping You Put Knowledge to Work

Cornell Cooperative Extension in Ulster County provides equal program and employment opportunities.

Please reply by April 11, 1994

Telephone Number _____

I'd like to join a shoppers' tour at The Kingston ShopRite on:

- _____ Tuesday, April 19 at 10:30 a.m.
- _____ Tuesday, April 19 at 7:30 p.m.
- _____ Wednesday, April 20 at 10:30 a.m.
- _____ Wednesday, April 20 at 7:30 p.m.

I'd like to join a shoppers' tour at The New Paltz ShopRite on:

- _____ Tuesday, April 26 at 10:30 a.m.
- _____ Tuesday, April 26 at 7:30 p.m.
- _____ Wednesday, April 27 at 10:30 a.m.
- _____ Wednesday, April 27 at 7:30 p.m.

Your tour time will be confirmed.

Dear ShopRite Customer:

Thank you for joining a ShopRite tour. I look forward to meeting you on:

Wednesday, April 20 at 10:30 a.m.
at ShopRite Kingston

Please remember to bring your Price Plus card and meet at the Customer Service Counter.

Andrea Park

Note: This script can be rearranged to accommodate the layout of products in the supermarkets you are touring. Including the shelf location of a product or product group, i.e. top left, is very helpful for the tour leader.

SHOPPERS' TOUR OUTLINE

Meeting location: Customer Service Counter

Welcome and introductions
Confirm names of tour participants

Begin the tour by taking your group to the _____ aisle.

Produce — Many people are not only concerned about the money they spend on groceries but are also concerned about the amount of household trash they generate. You are all familiar with Reduce, Reuse and Recycle. This first R = Reduce which is a theme for our tour. Waste prevention shopping tips will help you do just that. By following the shopping tips, not only will you save money but you will be conserving natural resources and helping to decrease the rising costs of managing our county's garbage.

1. *Use concentrates* — you're not buying water and the container is small.
2. *Select least-waste packaging* — avoid products that have layers of packaging.
3. *Use reusable, durable goods* — avoid disposable products.
4. *Buy the largest size that you can use* — different sizes are appropriate for different households.

Introduce the four shopping tips...

This tour will show you how to save money and reduce trash. It's called S.M.A.R.T. shopping = Save Money And Reduce Trash.

Packaging is important. For example, it keeps food fresh and reduces tampering. However, some packaging is excessive. This tour will show you some packaging options and make some practical suggestions for reducing your household garbage. The produce department has many examples of natural packaging. No extra packaging is needed for many items; we don't always need to take a bag. Point out examples from the produce department that come with their own "package": pineapples, melons, bananas, etc.

Deli Counter — Minimal packaging can be used to wrap food such as cheese and meats. You can order the amount you need which should cut down on food waste as well.

Giant Aisle — Many examples of buying the largest size that you can use — show examples of pasta (*right*), laundry detergent (*left*).

Aisle 3 — Juice and Juice Squeezers (*left*) — Also available in many types of containers. Non-carbonated drinks can be mixed from small packets. It is much less expensive to mix it yourself and put it in a reusable container than to purchase the over packaged “Squeezers” — show the number of layers of packaging. Fruit juice is available in a diluted or concentrated form. (Point out the variety of Ocean Spray options [*left middle*]). The Tetra pack with concentrated juice is the environmental choice when you consider all the options — it’s concentrated, so you’re not buying water, the package size and shape allows for easier transportation (reduced fuel and emissions).

Coffee — (*right top*) — Available in a variety of containers. Think about buying the largest size that you can use when purchasing.

Aisle 4 — Baby Wipes — If you use baby wipes select a brand that makes refills. The container can be used over and over again and that reduces your household trash. *Cut through to Aisle 6.*

Aisle 6 — Razors (*right end*) — There are many choices available for men and women in both disposable and refillable version. Next time you are shopping select the durable, reusable product. In the long run it will save you money and reduce trash.

Go up **Aisle 8 — Cereals (*top left*)** — Hot cereals are available in different packaging forms. You can choose from single serving sizes in individual packets inside a large box or a larger container of cereal in a canister which has only one layer of packaging. (Point out the containers). Not only will you be saving money by purchasing the larger size and adding your own flavorings at home, but you will be reducing trash.

Aisle 9 — Soups (*left*) — (Another good opportunity to point out that all packaging is not equal when it comes to trash). The tin of soup produces 39% less waste and costs 70% less per 8 oz. serving of soup in a manufacturers’ microwavable container. Buying the can of soup is really S.M.A.R.T. shopping.

Prepared foods (*left*) — Here’s a good selection of ready to eat foods. Many are packaged in cans, others in microwavable containers. You’ll save money by purchasing it in the can and reheating it in a reusable container. (Show examples of the packaging.) Select the can to not only save money, but also to reduce trash. Remember the can can be recycled and other packaging choices cannot.

Aisle 12 — **Baking needs, dried fruit/raisins** (*left middle*) — Snack sizes are more expensive and produce more trash. Purchase the larger size canister and use a reusable snack container to get a better price and less trash. You'll also reduce food waste by making the serving size just the right size!

Prepared fruit (*left*) — (Point out applesauce in an individual container and compare the price with one of the larger sizes in a glass jar). Applesauce is another product that could be put in a reusable container to save money and reduce trash.

Reusable containers (*right end*) — point out the variety of containers available.

Aisle 13 — **Rice** (*left middle*) — Compare the price of the boil-in-the-bag product to the rice that is available in the larger box or a larger bag. There is a lot more packaging waste with the pre-measured, boil-in-the-bag size. The 5 lb. bag of rice is 72% less expensive per serving and makes 97% less trash than the boil-in-the-bag option. Once again buy the largest size that you can use.

Aisle 14 — **Laundry detergent** (*right*) — Many manufacturers are producing a concentrate form of detergent (Double Power). The product is a good value and there is less trash because the container is smaller.

Fabric softener (*right middle*) — Also available in a concentrated form and now the manufacturer is making larger sizes of the concentrate, i.e. the 60 oz. Ultra Downy.

Dish detergents (*right end*) — Your favorite brand is probably available in a variety of sizes, and the larger one is usually the best price. If it is easier to have the smaller one near your sink, just remember to top it up with the detergent that you bought in the larger size. Compare Dawn size 96 oz. at \$_____ vs. Dawn size 22 oz. for \$_____.

Aisle 15 — **Light bulbs** (*left middle*) — Light bulbs are usually available in a longlife or more durable version. (Point out the wording on the SR and Sylvania brands that indicates the more long lasting version.) The longlife/durable bulbs do cost a little more but, they last twice as long and in the long run that will save money and you'll produce 1/2 the trash in light bulb packaging.

Aisle 17 — **Frozen vegetables** — If you purchase frozen vegetables consider buying the largest size that you or your family can use. The smaller boxes create more trash per serving and the unit price bag of peas is 24% less expensive and produces 89% less waste than the 10 oz. box.

Frozen dinners (*across aisle, walk back down dinners/entrees*) — Also in the frozen food aisles watch out for over-packaged meals. Try putting together your own convenience meal using usable trays and containers.

Frozen concentrated juice — (Remind shoppers that concentrated juices are also found in this case and that they can save money by adding the water at home.)

Dairy (*far wall*) — Watch out for over-packaged goods like single serving portions (*top*). The larger sized products, such as yogurt, will save you money and you can prepare your own individual servings using reusable containers.

End tour. Bring to area in front of ice cream (patio goods on display).

Checkout — Be prepared for that final source of packaging and bring your own bags. Mention plastic bag recycling bin and bag rebate available. Canvas bags are very durable.

Summary:

Review tips. Any questions?

Remind shoppers that reducing household waste helps to conserve natural resources, decreases pollution and saves money. Shopping S.M.A.R.T. is one way we can help the environment.

Thank you. Hand out gifts, brochures and bookmarks.

To Our Valued Customer:

We hope you can use the enclosed coupons. Thank you for your patronage.

ShopRite Supermarkets

ShopRite Coupon

1.00 OFF

TOWARD THE PURCHASE OF ANY
HANDLE WITH 2 TO 3 CART. REFILLS

**Refillable
Razors**

With This Coupon. Limit one per family. Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: CHOOSE REUSABLE PRODUCTS.

ShopRite Coupon

.30 OFF

TOWARD THE PURCHASE OF ANY
20 TO 40-OZ. PKG.

**Frozen
Mixed
Vegetables**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY LEAST WASTE PACKAGING

ShopRite Coupon

.30 OFF

TOWARD THE PURCHASE OF ANY
FLAVOR 8.45-OZ. CONCENTRATE

**Ocean Spray
Cranberry
Juice**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE WASTE: BUY CONCENTRATES

ShopRite Coupon

1.00 OFF

TOWARD THE PURCHASE OF ANY 60 TO
100 WATT 4-CT. ShopRite LONGLIFE OR

**Sylvania
Double Life
Light Bulbs**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY LONG LASTING PRODUCTS

ShopRite Coupon

.25 OFF

TOWARD THE PURCHASE OF ANY
18-OZ. QUICK OR OLDFASHIONED
ShopRite OR

**Quaker
Hot Oat
Cereal**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY THE LARGER SIZE

ShopRite Coupon

.50 OFF

TOWARD THE PURCHASE OF ANY
42-OZ. BULK QUICK OR
OLDFASHIONED ShopRite OR

**Quaker
Hot Oat
Cereal**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY THE LARGER SIZE

ShopRite Coupon

.25 OFF

TOWARD THE PURCHASE OF 32 TO
42-OZ. CONT.

**Any Brand
Dishwashing
Liquid**

With This Coupon. Limit one per family.
Good at any ShopRite.
Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY THE LARGER SIZE

ShopRite Coupon

1.00 OFF

TOWARD THE PURCHASE OF
64-OZ. CONT.

**Any Brand
Dishwashing
Liquid**

With This Coupon. Limit one per family.
Good at any ShopRite.

Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY THE LARGER SIZE

ShopRite Coupon

.40 OFF

TOWARD THE PURCHASE OF ANY
15-OZ. SIZE OR LARGER

**Any
Brand
Raisins**

With This Coupon. Limit one per family.
Good at any ShopRite.

Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY LEAST WASTE PACKAGING

ShopRite Coupon

.25 OFF

TOWARD THE PURCHASE OF ANY 16-OZ.
BAG OR LARGER, NO SAUCE, ANY BRAND

**Frozen
Peas or
Corn**

With This Coupon. Limit one per family.
Good at any ShopRite.

Effective thru Sun. May 15, 1994.

REDUCE TRASH: BUY LEAST WASTE PACKAGING

APPENDIX H

Table H-1.
Resources Required for Treatment One:
County-wide Education.

Treatment Elements	Waste Reduction Staff Time (hours)	Volunteer Time ¹ (hours)	Material Expenses ²
GENTLE RAIN (Approximately 40 weeks)			
1. General Management			
• Developing brochure	**		\$ 15
• Producing brochure	10		1,000
• Distributing brochure	40		400
• Handling telephone queries	400		
• Coordinating with other agencies and volunteers	100		
2. Presentations to Public (County Fairs, Radio Talk Shows)			
• Design & construction of displays	100		2,000
• Coordination	100		
• Staffing	500	160	
3. Print Ads			
• Design	**		
• Implementation	40		3,200
4. Radio PSAs			
• Developing/writing	**		
• Coordination	20	10	
• Recording	10	10	
• Distributing	20	20	80
• Follow-up	10	10	
Totals	1,350	210	\$6,495
(Staffing @ \$12/hr.)	\$16,200		
(Overhead - 15%)	\$ 2,430		
Grand Totals	\$18,630	210	\$6,495

¹ For county-wide education, the use of volunteers can reduce costs and increase educational effort, especially for staffing displays at events, leading shopper tours, or recording radio PSAs. Donated contest prizes or other in-kind services can also reduce costs.

² Includes materials, supplies, postage, consulting services, and the like. Expenses assume education is performed at two stores.

**Materials Available from Cornell Waste Management Institute.

Table H-1 (Continued).

Treatment Elements	Waste Reduction Staff Time (hours)	Volunteer Time (hours)	Materials Expenses
MEDIA DOWNPOUR			
1. Waste Reduction Contest			
• Writing press releases	4		\$15 (30 @ \$.50)
• Coordinating contest	6		
• Radio promotion	4		
• Soliciting prizes for contest	4		Donations
• Judging	3		
• Follow-up	3		
2. Print Advertising			
• Designing	**		
• Implementation	6		\$2,000 (25 @ \$80.00)
• Follow-up	6		
3. Radio PSAs	**		
• Developing	**		
• Recording	5	5	
• Distributing	4		\$75 (50 @ \$1.50)
• Follow-up	4		
4. Feature Article(s)			
• Planning/preparation	6		
• Interview	6		
• In-print follow-up	2		
5. Press Releases			
• Developing	**		
• Mailing	2		\$30 (30 @ \$1.00)
• Follow-up	2	5	
Totals	67		\$2,210
(Staffing @ \$12/hr.)	\$804		
(Overhead - 15%)	\$121		
Grand Totals	\$925	5	\$2,210

Table H-2.
Resources Required for Treatment Two:
In-store Shopper Education.

Treatment Elements	Waste Reduction Staff Time ¹ (hours)	Materials Expenses ^{2*}
IN-STORE SHOPPER EDUCATION		
1. General Coordination of S.M.A.R.T. Video Production	**	**
2. S.M.A.R.T. Video Broadcast		
• Installing televisions	8	
• Monitoring broadcast	6	
3. Store Employee Training		
• Meeting with managers	6	
• Distribution of video	4	
• Follow-up	4	
4. S.M.A.R.T. Brochure	**	**
• Printing brochure		\$200 (1,000)
5. Brochure Rack in Stores		
• Designing rack	4	
• Delivering rack to stores	2	
• Installation	4	
6. Buttons		
• Designing	**	
• Production	2	\$125 (500 @ \$.25)
• Distribution		
7. Pre-recorded Broadcasts	**	**
• Editing and recording	5	Donations
• Coordination and follow-up	2	

¹ For county-wide education, the use of volunteers can reduce costs and increase educational effort, especially for staffing displays at events, leading shopper tours or recording radio PSAs. Donated contest prizes or other in-kind services can also reduce costs.

² Includes materials, supplies, postage, consulting services, and the like. Expenses assume education is performed at two stores.

* It is assumed that the supermarket will provide in-kind services, staff time for training and access to video players and store broadcasting equipment.

**Materials Available from Cornell Waste Management Institute.

Table H-2 (Continued).		
Treatment Elements	Waste Reduction Staff Time (hours)	Materials Expenses
8. Plastic Bag Recycling		
• Coordination	2	
9. Staffed Store Display		
• Purchasing materials (table, cloth, display board, poster material, example products)	10	\$984 (2 displays)
• Display assembly	16	
• Coordination w/store manager	8	
• Volunteer recruiting by telephone and mailings	8	
• Volunteer training preparation	16	
• Volunteer training sessions	4	
• Scheduling of staffing	6	
• In-store display staffing	72	
• Follow-up	4	
• Thank you notes	2	\$ 10
Totals	192	\$1,519
(Staffing @ \$12/hr.)	\$2,304	
(Overhead - 15%)	\$ 346	
Grand Totals	\$2,650	\$1,519

Table H-3. Resources Required for Three Variable Treatments.		
Treatment Elements	Waste Reduction Staff Time ¹ (hours)	Materials* Expenses ²
Treatment Three-A: EDUCATIONAL MAILING		
1. Mailing List Preparation		
2. Cover Letter Preparation	6	
3. Mailing	6	\$139 (278 @ \$.50)
Treatment Three-B: SHOPPERS' TOURS		
1. Coordination with Store Staff	2	
2. Tour Preparation (for two stores) (writing outline, tour walk-through, final script)	24	
3. Tour Invitations (mailing list preparation, letter preparation, response card preparation, mailing)	8	\$268 (268 @ \$1.00)
4. Tour Sign-Up	2	
5. Confirming Tour Attendance (Preparing confirmation notices, mailing)	6	\$18 (36 @ \$.50)
6. Leading 8 Tours (45 min/tour), Preparation, Debriefing	6	
Treatment Three-C: COUPONS²		
1. Preparation of Coupons		
• Decision on products to coupon	16	
• Research on size, cost, brand	16	
• Designing coupons	8	\$100
• Printing coupons		\$25 (250 @ \$.10)

¹ For county-wide education, the use of volunteers can reduce costs and increase educational effort, especially for staffing displays at events, leading shopper tours, or recording radio PSAs. Donated contest prizes or other in-kind services can also reduce costs.

² Includes materials, supplies, postage, consulting services, and the like. Expenses assume education is performed at two stores.

* It is assumed that the supermarket will provide such in-kind services as plastic bag recycling and durable bag sales, staff time for training and access to video players and store broadcasting equipment.

Table H-3 (Continued).		
Treatment Elements	Waste Reduction Staff Time (hours)	Materials Expenses
COUPONS Cont.		
2. Distribution of Coupons		
• Mailing list preparation		yes
• Mailing coupons		\$125
		(251 @ \$.50)
3. Notification of Store Manager	2	
4. Redemption (collect, analyze redeemed coupons)		\$1,091
		(100%)
		\$1.09.19
		(10%)
Totals	248	\$1,798
(Staffing @ \$12/hr.)	\$2,976	
(Overhead - 15%)	\$ 446	
Grand Totals	\$3,422	\$1,798

APPENDIX I

RATIONALE FOR FOCUS ON WEIGHT OF WASTE WITH ADJUSTMENT FOR RECYCLABILITY

As detailed in Section 3, Selection of Products, both weight and volume measurements were made in 14 grocery product categories. Weight measurements were chosen for incorporation with the scan data about product purchases, in part due to the greater reliability of waste vs volume measures in the laboratory procedures of this study.

The decision to apply a recyclability adjustment factor to the weight of waste measures emerged based on project cooperators' concern that the probable diversion of waste accomplished through local recycling be reflected in attributions about the amount of waste ultimately generated for landfilling or incineration. From a programmatic standpoint alone, such deliberations highlight the difficulty of drawing sharp boundaries around either waste reduction or waste recycling objectives within broader goals for solid waste management. Indeed, managers and educators in many local waste agencies, even if their formal job descriptions align solely with waste reduction or waste recycling, see the two as intertwined and maintain concern about advancing both.

Nonetheless, it is worth considering how assumptions used in this study may have affected conclusions about waste reduction. To do this, we can extend the example on how weight of waste was calculated (Section 6, p. 6-3), by examining weight of waste without the recyclability adjustment and volume of waste with the recyclability adjustment. Examples of waste attributions made for a hypothetical shopper in two product categories are provided. The first (Table I-1), for dishwashing liquid, illustrates a product category characterized by differing sizes, all of which are made of the same locally recyclable material (HDPE). The second (Table I-2), for fabric softener, illustrates a product category characterized by differing sizes and by different packaging materials, only some of which are locally recyclable (HDPE).

Table I-1

Product Category Based Only on Size Differential (Dawn Dishwashing Liquid).

Weight of Waste with Recyclability Adjustment

Size	Weight of waste	Quantity	Subtotal weight of waste	Total weight of waste	Average weight of waste/oz. purchased
22-oz.	1.5 g/oz.	3	99 = $22 \times 1.5 \times 3$	140.6 g = $(99 + 41.6)$	1.43 g = $(140.6 / 98)$
32-oz.	1.3 g/oz.	1	41.6 = $(32 \times 1.3 \times 1)$		

Weight of Waste without Recyclability Adjustment

Size	Weight of waste	Quantity	Subtotal weight of waste	Total weight of waste	Average weight of waste/oz. purchased
22-oz.	2.3 g/oz.	3	$22 \times 2.3 \times 3 = 151.8$	$151.8 + 67.2 = 218$	$218 / 98 = 2.22 \text{ g/oz.}$
32-oz.	2.1 g/oz.	1	$32 \times 2.1 \times 1 = 67.2$		

Volume of Waste with Recyclability Adjustment

Size	Volume of waste	Quantity	Subtotal volume of waste	Total volume of waste	Average volume of waste/oz. purchased
22-oz.	10 ml/oz.	3	$22 \times 10 \times 3 = 660$	$660 + 384 = 1044$	$1044 / 98 = 11 \text{ ml/oz.}$
32-oz.	12 ml/oz.	1	$32 \times 12 \times 1 = 384$		

Table I-2

Product Category Based on Size and Packaging Material (Fabric Softener).

Weight of Waste with Recyclability Adjustment

Size	Weight of waste	Quantity	Subtotal weight of waste	Total weight of waste	Average weight of waste/use purchased
64-oz. dilute (HDPE)	4.9 g/use	1	$23 \times 4.9 \times 1 = 112.7$	$112.7 + 68.4 + 80 = 261.1$	$261.1/99 = 2.63 \text{ g/oz.}$
36-oz. conc. (HDPE)	1.9 g/use	1	$36 \times 1.9 \times 1 = 68.4$		
40-oz. conc (ppbd carton)	2.0 g/use	1	$40 \times 2 \times 1 = 80$		

Weight of Waste without Recyclability Adjustment

Size	Weight of waste	Quantity	Subtotal weight of waste	Total weight of waste	Average weight of waste/use purchased
64 oz. dilute (HDPE)	6.5 g/use	1	$23 \times 6.5 \times 1 = 149.5$	$149.5 + 90 + 80 = 319.5$	$319.5/99 = 3.23 \text{ g/oz}$
36-oz. conc. (HDPE)	2.5 g/use	1	$36 \times 2.5 \times 1 = 90$		
40-oz. conc. (ppbd carton)	2.0 g/use	1	$40 \times 2 \times 1 = 80$		

Volume of Waste with Recyclability Adjustment

Size	Volume of waste	Quantity	Subtotal volume of waste	Total volume of waste	Average volume of waste/use purchased
64 oz dilute (HDPE)	45 ml/use	1	$23 \times 45 \times 1 = 1035 \text{ ml}$	$1035 + 576 + 600 = 2211$	$2211/99 = 22.33 \text{ ml/use}$
36 oz conc. (HDPE)	16 ml/use	1	$36 \times 16 \times 1 = 576 \text{ ml}$		
40 oz conc. (ppbd carton)	15 ml/use	1	$40 \times 15 \times 1 = 600 \text{ ml}$		

These examples demonstrate that the relative waste attributions about product choices within product categories tend to remain stable, when all product choices involve the same mix of packaging materials. However, waste attributions do shift when the recyclability adjustment is removed. In the case of fabric softener, the 40 oz. nonrecyclable paperboard carton generates less waste than the 36 oz. HDPE container when the recyclability adjustment is removed. Retaining the recyclability adjustment, but examining volume, the paperboard carton generates only somewhat more waste than the HDPE container nearest in number of uses. These findings underscore how assessments of waste reduction follow from initial assumptions about how waste is measured and assigned.

Limitations of time and computer space prevented more detailed analysis of this project's purchase data using either volume measures of waste or weight of waste measures without a recyclability adjustment. It is therefore not known whether more pronounced waste reduction effects would have been found with different measures of waste.