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VOLUME ONE:
RECOMMENDATIONS

PROPOSED
RECYCLING AND WASTE REDUCTION STRATEGY
FOR THE CITY OF SEATTLE
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EXECUTIVE SUMMARY

Background

The City of Seattle has a serious long term solid waste disposal problem: the City is rapidly running out of space to dispose of our City's solid waste. Our two landfills will be filled by the fall of 1981. King County's regional landfill at Cedar Hills currently has a life span of 50 years. With the addition of Seattle's refuse, the estimated life of Cedar Hills is reduced to about 20 years.

In August, 1978, the Seattle City Council, recognizing these problems, adopted Resolution 25872, which calls for a four-part program to address the City's solid waste disposal problem: Recycling, Composting, Energy Recovery, and Land Disposal. This document recommends a Strategy aimed at fulfilling the recycling and waste reduction requirements of Resolution 25872.

The City's overall strategy is twofold: to reduce the amount of waste requiring disposal through composting, recycling and other waste reduction methods; and to recover energy from the remaining waste, with land disposal of residuals.

Current recycling levels are already high in Seattle because of excellent markets and because many citizens and businesses actively recycle. About 14 percent of what would have otherwise been residential and commercial waste was recycled in 1978 through the efforts of individuals, volunteer groups, and private enterprise. This is higher than the national average. However, there is potential to recycle even more. Currently only 2 percent of tin cans, 16 percent of glass containers, 35 percent of newsprint, and 35 percent of aluminum are being recycled.

Recycling Goals

It is recommended that the City establish a goal to increase its recycling by 50 percent by 1985, increasing the portion of waste recycled from 14 percent to 22 percent.

Recycling Strategy

There is an important role for the City of Seattle in waste reduction through recycling and other means. By its policies, by its example, and by the services it provides (technical assistance and advocacy), the City can help its citizens and business to reduce waste. Governmental regulation and City collection services should not be initiated at this time but held in reserve in the event that market forces alone are not effective in moving the City toward its goals. Instead, leadership, promotion, education and coordination should have first priority.

Given the City's overall strategy, the following specific programs are recommended:

- A. Waste Reduction Education: to educate school children on waste reduction; to explain to community and business groups how and why to reduce waste; to promote neighborhood recycling; and to recognize achievements in waste reduction.

- B. Recycling System Demonstration: to develop more efficient systems to handle glass and steel containers for buy-back and drop-off recycling systems, thereby lowering handling costs so that buy-back recyclers can begin paying cash for these items and drop-off recyclers can increase profit margins, allowing them to provide more locations.
- C. Program Development and Assistance: to develop home collection programs of recyclables by assisting volunteer organizations; to modify City paper procurement specifications to increase recycling; and to provide technical assistance to recyclers.
- D. Recycling and Waste Reduction Planning: to evaluate the feasibility of an apartment building collection program for consideration during the next refuse collection contract development period; and to develop an annual recycling report.

To implement these programs, a Solid Waste Fund appropriation of \$104,885 is requested for 1982. One additional position at the Planning and Development Specialist level will be required to perform this work. In addition, there will be a need to hire consultants and other outside contractors for the promotional, planning and educational aspects of the program.

I. INTRODUCTION

A. Background

The City of Seattle's two landfills, Midway and Kent Highlands, will be filled by the fall of 1981. King County's regional landfill at Cedar Hills currently has a life span of 50 years. With the addition of Seattle's refuse, the estimated life of Cedar Hills is reduced to about 20 years.

In August, 1978, the Seattle City Council, recognizing these problems and opportunities available to solve them, adopted Resolution 25872, which calls for a four-part program to address the City's solid waste disposal problem:

1. Recycling: to develop a strategy to maximize recycling
2. Composting: to develop a strategy for composting yard waste
3. Energy Recovery: to implement an energy recovery system
4. Land Disposal: to use the King County landfills after the City's landfills are full.

This Recycling Strategy is aimed at fulfilling the requirements of Resolution 25872, which states that:

"The recycling strategy should (a) identify achievable long-range goals for recycling, (b) identify programs to achieve these goals, (c) consider the feasibility of the Citizens Solid Waste Advisory Committee's recommendations 1-A and 1-C, and any other practicable ideas, (d) provide a list of proposed recycling programs in order of the Mayor's priority, specify the net cost for each program, such as the number and types of jobs created by each program, and (e) recommend a total level of funding for recycling. The goals should be reviewed from time to time and revised as necessary, based on experience, and based on the potential impact of packaging legislation."

This Strategy is being developed in accordance with the following criteria specified in Resolution 25872:

- Recycling through source separation is preferable to mechanical processing of mixed waste, when there are firm markets for the separated material as a commodity.
- If the City decides to implement a recycling program(s), the City should attempt to obtain a floor price for recycled materials to be marketed.
- If the City decides to implement a recycling program(s), revenues must be secured by firm market commitments to the extent that such revenues are relied upon to assure the financial feasibility of the program(s).

- If the City decides to implement a recycling program(s), the City should make every attempt to either maximize the positive effects on existing recycling organizations or minimize the negative effects.

B. The Solid Waste Disposal Problem

Despite significant increases in recycling, the quantity of municipal solid waste* requiring disposal has increased in the past several years. In 1978, Seattle homes and businesses recycled about 27,000 tons more than in 1976 (Table 1), an increase of about 43 percent. During the same period, however, the total amount of waste generated increased by about 42,000 tons, so that the net amount requiring disposal increased by about 20,000 tons.

* Municipal solid waste is synonymous with residential and commercial solid waste. It includes wastes generated by residences (except sewage) and by commercial activities, such as office buildings, retail stores, restaurants, hotels, distribution activities, schools, etc. It excludes industrial process waste, sewage sludge, and most demolition and construction waste.

TABLE 1
Total Residential and Commercial Solid Waste
Generated, Recycled, and Disposed of in Seattle in 1976 and 1978

(Thousands tons)				
	<u>1976</u>	<u>1978</u>	<u>Increase</u>	<u>% Increase</u>
Total Generated	613	660	47	8
Less: Recycled	<u>63</u> ¹	<u>90</u> ²	<u>27</u>	43
Net Disposed of	<u>550</u> ³	<u>570</u> ⁴	<u>20</u>	4
1. Source: Office of Management and Budget, as adjusted				
2. Source: Table 2: 90,000 tons is an approximation for the range 88,000 - 91,000 tons				
3. Source: Solid Waste Utility				
4. City of Seattle Transfer Stations (Source: Solid Waste Utility).				
		North		191,283 tons
		South		169,656
Ideal Paper Co. Transfer Station (Source: Ideal Paper Co.)				
(approx. 250,000 delivered, less 40,000 tons recycled)				
				<u>210,000</u> **
				<u>570,939</u> tons

** This tonnage includes some waste generated outside of the City of Seattle, which is hauled by private collectors to Marine Disposal/Ideal Paper Co.

There are indications that waste generation will continue to increase. Three factors contribute to this:

1. Population is projected to increase by 0.5 percent per year through 1990.¹
2. Per capita waste generation has increased an average of 1.7 percent between 1968 and 1978. Although there is no way to predict whether this trend will continue, it is interesting to note that per capita waste generation may actually be increasing faster on a volume or item-count basis than it has been on a weight basis because lighter materials (plastic, paper, aluminum) are being substituted for heavier ones (glass, steel, wood).
3. Economic activity, especially from tourism and downtown development, is being encouraged and is increasing. Commercial employment, which is an indicator of commercial activity and, therefore, of commercial waste₁ generation, is projected to increase by 1.66 percent per year.

Because of population growth and increased commercial activity, Seattle's waste requiring disposal is projected to increase by 8 to 18 percent by 1990, despite projected increases in recycling.*

This additional waste generation will shorten the life of King County's regional landfill at Cedar Hills and will hasten the time when the County must find another landfill. With the addition of Seattle's waste, beginning in the fall of 1981, Cedar Hills will be filled within 20 years.

On the positive side, the potential is high in Seattle for more recycling because of excellent markets for recyclable materials and because many citizens and groups actively recycle. As a result, about 90,000 tons (or about 14 percent) of what would have been residential and commercial solid waste were recycled in 1978 (Table 2). This is more than double the national average.

As Table 2 shows, roughly one-third of readily recyclable materials were recycled in 1978. There are several reasons why even more material was not recycled:

- Individuals are not aware of what can be recycled and how to prepare the material.
- Without home collection, recycling often is not convenient because materials must be transported to a recycling outlet.
- Tin cans and glass containers take some preparation to recycle and recycling outlets do not pay for them.

This strategy will provide programs which will attempt to mitigate these problems.

* The lower figure assumes per capita waste generation will remain constant at 1978 levels, while the higher figure assumes it will continue to increase.

TABLE 2

Residential and Commercial Solid Waste Generated, Recycling and Disposed of in Seattle in 1978

Readily Recyclable Materials	Generated		Recycled		Disposed of	
	Tons	% of Item Generated	Tons	% of Item Generated	Tons	% of Item Generated
Paper						
News	42,000	31-38	13,000-16,000	31-38	26,000-29,000	62-69
Corrugated & Boxboard	86,000-90,000	44-47	40,000	44-47	46,000-50,000	53-56
High Grade (white ledger and manila tab cards)	30,000-33,000	42-47	14,000	42-47	16,000-19,000	53-58
Glass (bottles & cullet)	60,000	16	bottles 2,600 cullet 7,400	16	50,000	84
Aluminum (cans & foil)	3,500	35	1,240	35	2,260	65
Steel						
Tin cans	11,000-15,000	1	140	1	10,860-14,860	99
White goods	11,000	91	10,000	91	1,000	9
TOTAL readily recyclable*	244,000-255,000	32-36	88,000-91,000	32-36	153,000-167,000	64-68
Other Materials*	403,000-417,000 ^a		N. D.		403,000-417,000 ^a	
TOTAL Residential & Commercial*	658,000-661,000 ^a		88,000-91,000 ^a		570,000 ^b	

Source: Recycling and Resource Recovery Program, City of Seattle; for methodology, see Appendix D.

* Totals are rounded to reflect that estimates are approximate.

N.D.: Not determined.

a: Excludes underdetermined amounts of recycling or composting of "other" waste included above and excludes recycling of autos and industrial scrap.

b: Source: Table 1.

C. Recycling Goals

Resolution 25872 specifies that "the recycling strategy should (a) identify achievable long-range goals for recycling, (and) (b) identify programs to achieve these goals"

Seattle recycled 14 percent of its waste in 1978, and markets are available to take more.* At present only 1 percent of tin cans, 16 percent of glass containers, 35 percent of newsprint, and 35 percent of aluminum are being recycled.

This Strategy recommends that the City adopt a 5 year goal for recycling 22 percent of its residential and commercial waste. Individual goals are shown on Table 3 in comparison with 1978 recycling levels. Annual reports should be made on progress and individual goals revised upward as the goals are achieved.

D. Waste Reduction and Energy Recovery

Some materials, such as paper products, can be recycled or burned for energy. The feasibility of energy recovery is currently being studied. It is important for the City to decide, in the near future before energy recovery facilities are built, how this potential competition will be resolved. It is recommended that Seattle's overall strategy should be to determine the size of energy recovery facilities in anticipation of reductions in waste generation resulting from future increases in composting, recycling, and other waste reduction techniques. This would result in smaller energy recovery facilities than would be required if waste reductions were not anticipated. Since waste reduction and recycling cannot be increased dramatically overnight, there will probably have to be a greater reliance on landfills (until our waste reduction and recycling goals are reached) than if energy recovery were the only approach. The size of the energy recovery facilities cannot be specified at this time; it can be determined only after more information is available.

* Since 1978, there have been increases in recycling rates of some materials. For example, Fibers International estimates that newsprint recycling reached 45-50 percent in 1980.

TABLE 3
Five Year Goals for Recycling
(All figures are percentages)

<u>Readily Recyclable Products</u>	<u>% of Waste Generated</u> ¹	<u>1978 Level of Recycling</u> ²	<u>Five Year Goal</u>
Newsprint	6.5	35	70
Corrugated and paper board	14.0	45	65
High grade paper	5.0	45	65
Glass	9.0	16	30
Steel cans	2.0	1	20
Appliances	2.0	91	95
Aluminum	0.5	35	70
Sub-Total	39.0	36	56
<u>Other</u>	61	-	- 3
	—	—	—
Total	<u>100.0</u>	<u>14</u>	<u>22</u>

¹ Includes residential and commercial wastes.

² From Table 2. In cases where ranges are given on Table 2, a mid-point is used on this table for simplification.

³ In addition, some of the 61 percent of "Other" (not "readily recyclable") materials in the waste stream can be eliminated by waste reduction techniques. Unfortunately it is difficult to set a waste reduction goal because it is impossible at this time to estimate how much waste can be reduced.

II. STRATEGY STATEMENT

A. Background

The City's First priority should be to reduce waste.

Waste reduction refers to any action that reduces the quantity of waste generated. Recycling and composting are only two of many waste reduction techniques; others include:

1. Reuse of products (e.g., avoiding throwaways, giving away usable discards)
2. Reducing amount of material per product (e.g., smaller cars, less packaging)
3. Redesigning products to be more durable and easier to repair
4. Revising buying habits to use fewer products and less material.

Waste reduction, more effectively than any other waste management method, can:

- reduce the need for land disposal
- reduce the cost of collection and disposal
- conserve energy and materials
- reduce environmental impacts that result from the entire cycle of resource use, from extraction of raw materials to disposal of wastes.

There are five approaches to reducing waste:

- Consumers can voluntarily buy, use, and discard materials more selectively, thereby sending signals to producers to design and market products with concern for waste generation.
- More consumers can recycle more materials if it is convenient to do so and if they are educated as to why and how to recycle.
- Industry can voluntarily design and market waste-reducing products (i.e., products that are reusable, recyclable, more durable, easier to maintain, or less material-intensive).
- Government can provide home collection of multi-materials (newspaper, glass and metal containers).
- Government can regulate product design or marketing practices in favor of waste-reducing products.

A voluntary approach to reducing waste is preferred to regulation or government-provided home collection because:

- A voluntary approach is more likely to succeed because it follows the rules of the marketplace, i.e., that consumer preference should dictate the selection of goods offered.
- There is a need to develop awareness and acceptance of conservation values and techniques.
- Regulatory programs (except in specific cases) are not feasible because experience has shown that it is extremely difficult, if not impossible, to design programs that are simultaneously fair, administerable, and effective, especially at the local level.
- Home collection provided by the City is too expensive due to high labor rates in collection and processing. * Also, the City does not wish to compete with non-profit groups and recycling organizations presently providing this service.

A strategy to reduce waste must take into account how and why waste is generated. Waste is generated as a result of the decisions that consumers (individuals and businesses) make every time they buy, use, and discard materials. These decisions are influenced a great deal by the way products are designed and marketed. To a certain extent, consumers can reduce waste just by buying selectively. Sometimes, however, the marketplace does not offer a suitable alternative, and the consumer has no choice without making a sacrifice. The following Strategy recommends several City responses to this problem.

B. Recommended Strategy

One of the most important roles the City can provide is leadership. This is especially true in an endeavor, like waste reduction, whose success depends more on the actions of individual citizens and businesses than on the central government itself. Leadership is demonstrated by the City's policies, by the example it sets by its own actions, and by the services it provides.

The City should promote waste reduction through education and persuasion to achieve voluntary changes in consumer and industry waste generation habits. Specifically, the City should continue its variable solid waste rate structure, establish a waste reduction education program, and work with industry to develop programs and incentives to reduce waste.

* The net cost would be between \$2.1 million and \$3.4 million per year. The range in costs is the result of two pay scales. The lower cost is figured with labor rates based on non-Teamster union labor in local recycling industries. The higher cost is based on City of Seattle Board of Public Works "prevailing wages," which may have to be paid with a City-contracted service. Based on these costs, single family rates would need to be raised an additional \$1.40 to \$2.30 per month. For a complete analysis, see Appendix A.

Recycling is one means to waste reduction. Recycling of residential materials (newsprint, bottles and cans) should occur through a combination of regularly-scheduled, multi-material home collection plus buy back recycling centers. Because City-run multi-material collection is so costly, volunteer labor should be organized to provide home collection on a regularly scheduled basis; and equipment should be developed to reduce the cost of collecting and handling recyclable materials. Drop-off recycling centers should be encouraged in the short term until home collection programs develop.

Recycling of commercial materials (high-grade office paper, corrugated) should continue through existing channels. The City should act as a catalyst to increase the supply of and demand for recycled high-grade paper. There is little that the City can or should do to increase recycling of corrugated.

C. Programs to Carry Out the Strategy

To assist in the development of home collection programs, the City should help develop volunteer labor sources by providing technical assistance to charitable organizations that conduct paper drives and to neighborhood groups. The City should also conduct a research, development, and demonstration (RD&D) project to develop systems to handle the low value materials (glass and steel containers) more efficiently. If successful, this will enable recycling companies to pay for glass and steel containers, thus providing a financial incentive to home collection organizations. The City should also provide technical assistance to recycling companies.

Regarding high-grade office paper, the City should review its paper procurement specifications to require more recycled fiber and, by persuading other paper buyers to the same, to influence the paper industry to invest in plants that use more waste paper as a raw material. The City should work to increase supplies of recyclable paper by reviewing its paper specifications to eliminate contaminants and other barriers to recycling.

The City should also establish a planning and evaluation capability to review and, if appropriate, modify its programs and to consider new recycling and waste reduction ideas.

Direct services (such as home collection of newsprint) and regulation (such as beverage container legislation) should be considered only if voluntary programs do not produce the desired results.

The programs described above are presented in the following chapter.

III PROPOSED RECYCLING AND WASTE REDUCTION PROGRAMS

A five-part program is proposed to implement the recommended strategy:

- A. Waste Reduction Education
- B. Recycling System Demonstrations
- C. Program Development and Assistance
- D. Recycling and Waste Reduction Planning
- E. Possible Future Actions

A. WASTE REDUCTION EDUCATION

The City can reduce its waste, but only if individual citizens in their homes and workplaces become aware of what they are wasting and then learn why and how they can reduce waste. Four projects are proposed for the waste reduction education program:

PROJECT A-1: SCHOOL PROGRAM

Objective: To change the waste habits of tomorrow's adults by educating children about why and how to reduce waste and recycle.

Description: As in the City's adopted Composting Strategy, the City will work with the Seattle School District to use available waste reduction and recycling curricula. The Energy, Food, and You Program of the Washington State Office of Health Education and the California State Solid Waste Management Board have developed curricula to teach the why's and how's of waste reduction and recycling. These will be supplemented with field trips and special projects. Whether and how these curricula are used are determined by local school administrators and teachers. The recycling curricula compete with many other subjects for a limited amount of teaching time. The City will work with and encourage Seattle School District administrators and teachers to use the curricula.

PROJECT A-2: COMMUNITY EDUCATION

Objective: To encourage Seattle Citizens to reduce their waste generation by explaining why and how to do it.

Description: City staff will prepare a slide presentation and hand-out materials, such as fact sheets on how consumers or retailers can reduce waste. Then City staff will use the slide show in presentations to community groups (community councils, chambers of commerce, trade associations, fraternal organizations, service organizations, youth groups, environmental groups, energy groups, employee associations, etc.) and will get on the agenda of all local conferences on solid waste management and energy conservation. Also, City staff will assist local journalists, writers and producers in order to stimulate features on waste reduction to appear on radio and TV and in print media.

Based on staff's discussions with individuals and businesspersons, it is evident that this kind of program would be well received. Most people want to reduce waste but do not want to go to the trouble of changing their waste patterns unless they think their effort will make a difference. They agree that if a lot of people try to reduce waste, then their effort will make a difference, and they would be willing to make the effort. City leadership, through a visible information program is necessary to convince the public that the entire community is committed to reducing waste.

PROJECT A-3: ACHIEVEMENT RECOGNITION

Objective: To use the City's access to media to publicize the waste reduction achievements of local industry, neighborhood groups, and others for the purpose of reinforcing preferred behavior, illustrating practical waste reduction measures, and encouraging others to do the same.

Description: Monthly, the Mayor will present an award or citation to a community group, business, or government agency that has done something to reduce waste or increase recycling. The publicity from this award will be a vehicle for spreading information about good waste reduction and recycling ideas for the purpose of encouraging others to make similar progress. It will be useful in reinforcing good waste reduction and recycling practices. And the description of the achievement will show citizens how to reduce waste.

Examples of recent events that deserve recognition are:

- Restaurant 1904 began a program to recycle its glass and cans
- Northwestern Glass doubled the price it pays for cullet and made its plant more convenient for recyclers
- The View Ridge Community, in cooperation with the City P-Patch Program, started a neighborhood composting project
- Metrocenter/YMCA, in cooperation with some West Seattle community groups, started a full-line retail recycling center in West Seattle
- Olympia Brewing Company and Rainier Brewing Company increased the price they pay for their recycled refillable bottles
- Safeway Stores, in cooperation with Rainbow Recycling, opened another full-line drop-off center in the parking lot of one of their stores.

PROJECT A-4: MEDIA REINFORCEMENT

Objectives: To encourage waste reduction, to tell the public about the community education program and about recognized achievements, and to promote the support of volunteer sponsored multi-material home collection.

Description: The City will prepare radio and television spots and then buy radio time and distribute the TV spots to local stations for use as public service announcements.

B. RECYCLING SYSTEM DEMONSTRATION

A the present time, buy-back recycling centers and drop-off locations do not encourage recycling of glass containers and steel cans due to low market value and high handling costs. The following Projects are intended to develop systems to reduce handling costs thereby providing recycling operators with an incentive to promote recycling of these items.

PROJECT B-1: BUY BACK HANDLING SYSTEM (handling of glass containers and steel cans in a buy-back recycling center; the system will be designed for compatibility with future home collection systems).

PROJECT B-2: DROP OFF HANDLING SYSTEM (handling of glass containers and steel cans in a drop-off recycling system).

Objective: To develop systems to increase recycling of glass and steel cans and to test these systems through a demonstration project.

Description: Preliminary engineering will be done by the City with the assistance of recycling operators from Seattle and other cities, representatives of industry associations and local markets, and others. The City will prepare and issue two requests for proposals (one from each project). Local recycling companies will propose how they would install and operate the specified systems, demonstrate their capability to carry out the project, and show that the proposed system will reduce handling costs.

The contractor will operate and maintain the equipment, acquire the supply of recyclable materials, and market the products. The City will monitor the operations to evaluate the performance of the system.

The City will prepare interim and final reports on the results of operations and will draw conclusions about what new developments are suggested.

Because of the uncertainties inherent in any demonstration project, it is to be expected that the systems as originally installed may require significant modification to correct problems and make improvements.

The projects will be conducted in three phases:

- Phase I: Preliminary Engineering and Contract Negotiation
- Phase II: Design, Installation, Operation and Reporting
- Phase III: Plant Modification, Operation and Reporting

The budget requested in this strategy includes funds for Phase I (see Appendix C for scope of work) but not for Phase II and III. Funding for Phases II and III will be requested (if feasible) at the conclusion of Phase I. A rough estimate of the City's cost for Phases II and III is presented in Appendix C.

C. PROGRAM DEVELOPMENT AND ASSISTANCE

As stated in Chapter II, the City's first priority should be to encourage volunteer groups to provide collection services, and to work with existing recycling businesses to improve their operations. The following projects call for the City to work within the existing system to stimulate additional recycling. If these projects are successful, there will be no need for the City to resort to regulatory programs to reach our recycling goals.

PROJECT C-1: COORDINATE VOLUNTEER RECYCLERS

Objective: To organize and coordinate existing or potential sources of volunteer labor to provide collection of recyclables on a regular basis in entire neighborhoods or districts of the City.

Description: At the present time, most volunteer recycling groups collect only once or twice each year. As a result, collections are not regular or frequent enough to encourage residents to develop regular recycling habits. Volunteer groups operate independently. As a result, the service areas of different groups are usually not contiguous, and some nearby residents do not receive collection service. The City, working with local recyclers, will try to coordinate volunteer groups so that together they provide service on a regular basis to entire sections of the City.

City staff will identify volunteer recycling organizations (churches, Boy Scouts, charities, etc.) and the scope of their activities (i.e., service areas, frequency of collection). City staff will also identify how the City can help groups combine or coordinate their efforts to be more effective and efficient. Then the City will work with interested groups to develop action plans and to help those groups carry out their plans. Most groups currently recycle newsprint only. Attempts will be made to expand the scope of these services to include bottles and cans, i.e., multi-material collection. This may lead to involvement of recycling companies, which would provide equipment and marketing services.

If feasible, this project will be modeled after a program run by Ecocycle, Inc., of Boulder, Colorado, which provides regular monthly multi-material home collection. Ecocycle provides the collection truck and driver, the processing equipment and labor, and marketing and promotional services. Collection labor (swampers) is provided by volunteer groups, which earn money on the sale of materials collected. A different group participates each month. Several recycling companies in Seattle have expressed interest in this type of program.

PROJECT C-2: GOVERNMENT AND NON-GOVERNMENT OFFICE PAPER RECYCLING

Objective: To increase the use of paper containing post-consumer recycled fiber and to remove barriers to paper recycling such as brightness requirements.

Description: Both the he States of California and Maryland have changed their specifications to increase their consumption of post-consumer fiber. California has a 5 percent preference (i.e., will pay 5 percent more) for specified minimum percentages of post consumer fiber. Maryland requires the State to increase its purchase of recycled paper (paper containing 80 percent post-consumer waste) to 5 percent of total paper purchase by 1978, 25 percent by 1981, and 40 percent by 1985. Since 1977, Maryland has saved \$17,000 "without a loss of quality; the recycled bond has been quite suitable for typing, xeroxing, and print shop use, while the recycled (corrugated) boxes and (paper) towels have been equal to or better than their virgin competitors."⁴

The City will review its purchasing specifications related to paper products and will identify those that could be changed. Then the City will identify the impacts of making such changes, including availability, cost, delivery schedule and performance. If changes are recommended, the Mayor will make those that are within his authority and will recommend others to the City Council for its approval. The City will then encourage industry and other governmental units to make similar changes based on Seattle's experiences.

PROJECT C-3: TECHNICAL ASSISTANCE TO RECYCLERS

Objective: To provide information and assistance to recyclers to improve and expand their collection, buy-back, and drop-off operations.

Description: The recycling companies in Seattle generally do not have adequate resources to work actively in market expansion. As a result, some opportunities to provide more and better service to Seattle citizens are lost or delayed. City staff would, in effect, perform some of the functions normally provided by a trade association staff. The City would not get involved in inappropriate activities, such as lobbying on behalf of recyclers. Until the recycling industry becomes more prosperous, the City will respond to requests for assistance from individual recycling companies or the Washington State Recycling Association. All work products would be made available to the public. Likely types of assistance would include:

1. Market development assistance. For example, a recycler may get information that someone is interested in buying a new product, such as used tires. To develop this market, City staff would (a) find out the market's specifications, price, and delivery schedule, (b) estimate the cost of supplying the product, and (c) determine whether it would be feasible for recyclers to open up this new product line.

2. Information on new equipment
3. Information on recycling operations in other cities
4. Assistance in developing the supply of recyclable materials.

It is likely that City work in other projects, especially waste reduction education and home collection equipment development, could satisfy recyclers' requests for assistance.

D. RECYCLING AND WASTE REDUCTION PLANNING

A planning function will be established to review in greater depth subjects which could not be reviewed fully in the scope of this effort and to measure the amount of recycling in Seattle.

These include the following:

PROJECT D-1: ANNUAL RECYCLING REPORT

Objective: To measure the quantity of Seattle's readily recyclable materials that are recycled each year.

Description: Annual estimates of the quantities of waste generation and materials recycled by product are essential to the management of the City's solid waste program, regardless of how many of the recommendations in this Strategy are adopted.

Working with industry representatives, the City will develop a set of forms and procedures for industry to use in reporting quantities of each material collected and shipped. To accommodate companies concerned about proprietary information, the City will either develop a mechanism to protect confidentiality or will use an estimate as a substitute. The City will then request companies to begin keeping appropriate records and will provide follow-up assistance as needed. At the end of each year, the City will gather the industry reports and prepare an annual report of recycling tonnages.

PROJECT D-2: APARTMENT COLLECTION PLANNING

Objective: To study the feasibility of developing programs for collection of recyclables from apartment buildings for use during the next collection contract development period.

Description: The City will investigate alternative mechanisms for collecting recyclables from apartment buildings, either by City contractors or by other organizations. Apartments have an advantage over single family homes in that a large quantity of recyclables can be collected in one location. A problem, which must be overcome however, is lack of storage space with access for recycling trucks.

A small demonstration project, involving two or three collection routes, may be initiated in 1981 to try various collection techniques.

PROJECT D-3: NEW PROJECT AGENDA

Objective: To identify, assess, and prioritize new waste reduction and recycling ideas to enable management to decide whether and how many resources should be applied to new projects.

Description: Staff will identify ideas for new projects from a variety of sources: (1) feedback from participants in on-going projects; (2) evaluation of on-going projects; (3) unsolicited suggestions from City officials and citizens; (4) through a dialogue with individual companies and industry groups, such as Industry for Quality Environment (IQE); and (5) through peer exchange, information about developments in other cities.

To enable management to assign staff effectively, potential projects must be prioritized. To do this requires a certain amount of investigation into what is involved to complete a project. The output of this project will be a new project agenda report, prepared annually immediately preceding the start of the budget cycle. Special reports will be prepared as needed.

Possible new projects could include working with industry to develop voluntary programs to:

- a. Improve product recyclability, such as easy-off tin can labels, reducing use of hard-to-recycle products (such as bi-metal cans), plastics identification, and reducing contaminants in recyclable paper.
- b. Promote waste reducing products, such as reusables (local beer bottles, cloth or net bags, etc.) and durables.
- c. Develop new markets, such as wine bottle reuse.

Other new projects could include expanding the recycling program in City office buildings to recycle aluminum and more paper.

E. POSSIBLE FUTURE ACTIONS

As stated in Chapter II of this report, the City's approach to reducing waste should be based on promotion, education, coordination and development of new systems to handle recyclables. The City will consider regulatory programs only if voluntary ones have not produced desired results.

If other efforts fail to achieve desired recycling rates, the following two programs will be considered for implementation:

PROJECT E-1: CITY-SPONSORED NEWSPRINT COLLECTION

Objective: To increase the amount of newspaper recycled in the City by having newsprint collected by regular garbage collection trucks fitted with special racks.

Description: As stated in Chapter II, the City's strategy is to encourage volunteer groups to provide collection services. The programs outlined in Program Development and Assistance in Chapter III should lead to the development of collection services by these groups. Through these programs the City should reach our newsprint recycling goal of 70 percent. However, if newsprint recycling does not reach 65 percent within three years, City-sponsored newsprint collection by regular garbage trucks will be considered.

While multi-material home collection is too expensive to be done with paid labor, home collection of newsprint can be economical. Newsprint can be collected by regular garbage trucks fitted with special racks, thereby obviating the additional cost of a separate truck and crew. The cost of collection is increased by adding newsprint collection because of the equipment costs and the additional time to load and unload the paper. However, if markets are good, revenues can exceed costs. A cost analysis is presented in Appendix B.

PROJECT E-2: BEVERAGE CONTAINER LEGISLATION

Objective: To increase the recycling rates of beverage containers by working with King County for the enactment of beverage container legislation (BCL) county-wide.

Description: BCL has been rejected twice by Washington State voters within the last 10 years. The most recent effort, Initiative 61 which was submitted to the voters in 1979, was defeated state-wide by 58 to 42 percent and in King County by 53 to 48 percent. However, Seattle voters supported Initiative 61 by 54 to 46 percent.

The City will consider working for the enactment of a county-wide BCL if recycling rates for aluminum cans and glass beverage containers do not reach 40 percent within 2 years of the enactment of this strategy. County-wide BCL would be necessary because of boundary problems associated with a Seattle only deposit system.

IV EVALUATION

After these programs are implemented, measuring their impacts will be difficult. The City has a very reliable estimate of the total waste disposed of; and can develop a mechanism to obtain a reasonably reliable estimate of materials recycled. But there are many variables at work (market prices, product designs, economic activity, etc.) which make it difficult to pinpoint whether a measurable change in the waste stream is the result of a City program.

PROJECT F-1: PROGRAM EVALUATION

Objective: To measure program effectiveness.

Description: To the extent possible, the quantitative measures described below will be used in planning, reporting and evaluating these projects. The annual recycling report, which will include an estimation of the percentage of material being recycled, will be used as a benchmark to gauge progress toward recycling goals. An attempt will be made, through surveying, to evaluate the effectiveness of the individual programs. The following objectives have been set for each project:

Project A-1: School Program

Provide waste reduction and recycling curricula to each public school within the City of Seattle. Encourage use of the curricula. Arrange to visit and give presentation to 4 classes per month for 6 months.

Project A-2: Community Education

Prepare slide presentation and hand-out materials for use in community education. Use the slide show in presentations to at least 4 community groups per month.

Project A-3: Achievement Recognition

Monthly, identify a community group, business, or government agency that have made a major effort to reduce waste or has increased recycling. A citation will be presented by the Mayor to this group.

Project A-4: Media Reinforcement

To encourage waste reduction, to inform about the community education program, and to promote the support of volunteer sponsored multi-material home collection, at least 4 television public service announcements will be prepared, and at least 3 radio advertisements will be prepared and radio time purchased.

Project B-1: Buy Back Handling System

Complete Phase I of the project, which is as follows: conduct preliminary engineering to design system to reduce processing handling costs of glass containers and steel cans in a buy-back recycling system, and issue and evaluate request for proposals, and negotiate a contract with successful proposer. Phase II will be conducted if Phase I is successful.

Project B-2: Drop Off Handling System

Complete Phase I of the project, which is as follows: conduct preliminary engineering to design system to reduce processing handling cost of glass containers and steel cans in a drop-off recycling system, issue and evaluate request for proposals, and negotiate a contract with successful proposer. Phase II will be conducted if Phase I is successful.

Project C-1: Coordinate Volunteer Recyclers

At least 24 volunteer groups will be contacted regarding provision of regular recycling collection service. The goal is to interest at least 12 in providing this service.

Project C-2: Government Office Paper Recycling

Identify purchasing specifications which could be changed to result in an increase in the consumption of post-consumer fiber. Make recommendations to the Mayor on proposed changes. Contact other governmental units based in the Seattle area and encourage similar changes.

Project C-3: Technical Assistance To Recyclers

Gather information on recycling operations in other cities, and information on new equipment. Inform recyclers that the preceding information is available and that the City has the capability of providing market development assistance.

Project D-1: Annual Recycling Report

Working with industry representatives, the City will develop a set of forms and procedures for industry to use in reporting quantities of material collected and shipped. The City will then request companies to begin keeping appropriate records. At the end of each year, the City will gather the industry reports and prepare an annual report of recycling tonnages.

Project D-2: Apartment Collection Planning

The City will investigate developments for collection of recyclables from apartment buildings. A demonstration program will be proposed if the concept appears to be feasible. This program will be developed over the next two years so that the results can be considered during the next refuse collection contract development period. If an apartment collection program is instituted, a yearly report will be prepared detailing the number and size of apartments affected, and the tonnages collected.

Project D-3: New Project Agenda

The City will prepare a new project agenda report immediately preceding the start of the budget cycle. Special reports will be prepared as needed.

V STAFFING AND BUDGET REQUIREMENTS

To implement these programs, a Solid Waste Fund appropriation of \$104,885 (in 1981 dollars) will be requested for 1982 (Table 4). One additional position (a Planning and Development Specialist II) will be required to perform this work. This is in addition to \$126,128 (in 1981 dollars) to be requested in 1982 for existing staff.

An explanation of how staff time would be allocated to each project is presented in Tables 5 through 8.

The additional appropriation will cost single-family ratepayers approximately \$.10 more per month. This assumes that the \$104,885 cost is shared by all residential ratepayers; multi-family rates would also be affected.

TABLE 4
Proposed Resources for the Recycling and Waste Reduction Program*
for 1982

	FTE**	Existing Resources to be applied	Additional Resources Requested	Total Resources
A. Waste Reduction Education				
One Program Coordinator III	.60	\$ 17,002	-	\$ 17,002
One Public Information Representative I	.30	4,619	-	4,619
	.90	\$ 21,621	-	\$ 21,621
Administrative Expense at 72 percent		15,567	-	15,567
Other: Slide Show				
Fact Sheet (graphics, layout, printing)			\$ 27,000	27,000
School program materials			\$ 27,000	\$ 64,188
Media (consultant and production)				
		\$ 37,188		
B. Recycling System Demonstration				
One Program Coordinator III	.30	\$ 8,501	-	\$ 8,501
Administrative Expenses at 72 percent		6,121	-	6,121
Other: Engineering and cost estimating				\$ 29,000
Technical Advisory Committee				2,500
Monitoring and data collection				7,600
		\$ 14,622		\$ 39,100
			\$ 39,100	\$ 53,722
C. Program Development and Assistance				
One Planning and Development Specialist II	1.00	-	\$ 21,968	\$ 21,968
Administrative Expenses at 72 percent			15,817	15,817
			\$ 37,785	\$ 37,785
D. Recycling and Waste Reduction Planning				
One Resource Recovery Program Manager	.10	\$ 3,002	-	\$ 3,002
One Program Coordinator III	.60	17,002	-	17,002
	.70	\$ 20,004	-	\$ 20,004
Administrative expenses at 72 percent		14,403	-	14,403
Other: Travel				1,000
		\$ 34,407		\$ 35,407
E. Evaluation				
One Program Coordinator III	.10	\$ 1,265	-	\$ 1,265
Administrative Expenses at 72 percent		911	-	911
		\$ 2,176	-	\$ 2,176
Sub Total		\$ 88,393	\$104,885	\$193,278
Management (Resource Recovery Manager)	.50	\$ 15,008	-	\$ 15,008
Administrative Support	.45	6,931	-	6,931
	.95	\$ 21,939	-	\$ 21,939
Administrative expenses at 72 percent		15,796	-	15,796
		\$ 37,735	-	\$ 37,735
		\$126,128	\$104,885	\$231,013
TOTAL	3.95			

* Salaries computed for 12 months at 84 percent (direct labor portion) of either (a) Salary step B, for new positions, or (b) maximum salary step for existing positions, in the City of Seattle Salary Schedule and Compensation Plan, September, 1979, plus 12 percent to include the salary settlement for 1981.

** FTE = Full-time equivalent. For details, see Tables 5 through 8.

TABLE 5
Waste Reduction Education
Detailed Staffing Plan by Project
First Year

	Level of Effort ¹	Duration (mos.)	Fte ²
Project A-1: School Program			
a. To develop program	1/8	4	0.04
b. To present program	1/4	8	0.17
Project A-2: Community Education			
a. To develop program	1/8	4	0.04
b. To present program	1/4	8	0.17
Project A-3: Achievement Recognition	1/20	12	0.05
Project A-4: Media Reinforcement	1/4	12	0.25 ³
Administrative (paid absence, attend meetings, etc.)	1/5	12	<u>0.20</u>
	Total		<u>0.92</u>

1. Fraction of a person's time.
2. Full-time equivalent.
3. To be done in part by a consultant.

TABLE 6
Recycling System Demonstration
Detailed Staffing Plan by Project
First Year

	Level of Effort	Duration (mos.)	FTE
Project B-1: Buy Back Handling System	1/8	12	0.13
Project B-2: Drop Off Handling System	1/8	12	<u>0.12</u>
	TOTAL		<u>0.25</u>

1. Fraction of a person's time.
2. Full-time equivalent.

TABLE 7.
Program Development and Assistance
Detailed Staffing Plan by Project
First Year

	Level of Effort ¹	Duration (mos.)	FTE ²
Project C-1: Coordinate Volunteer Recyclers			
a. To develop action plan	1/3	2	0.06
b. To carry out the plan	1/2	10	0.42
Project C-2: Government Office Paper Recycling	1/4	6	0.12
Project C-3: Technical Assistance to Recyclers	1/5	12	0.20
Administrative (paid absences, attending meetings, program planning and budgeting, etc.)	1/5	12	0.20
	Total		<u>1.00</u>

1. Fraction of person's time
2. Full-time equivalent.

TABLE 8.
Recycling and Waste Reduction Planning
Detailed Staffing Plan by Project
First Year

	Level of Effort ¹	Duration (mos.)	FTE ²
Project D-1: Annual Recycling Report			
To design forms and procedures	1/4	6	0.12
To gather data and prepare the report	1/8	6	0.06
Project D-2: Apartment Collection Planning	1/4	12	0.25
Project D-3: New Project Agenda	1/10	12	0.10
Administrative (paid absences, attend meetings, etc.)	1/6	12	0.17
	Total		<u>0.70</u>

1. Fraction of a person's time.
2. Full-time equivalent.

VI. OPTIONS NOT RECOMMENDED AT THIS TIME

Many measures to reduce waste were considered in preparing this strategy but for various reasons were not recommended at this time. Many of these options will be reconsidered from time to time. The more practical options that were considered are listed below with the principal reason(s) for not recommending them at this time. In some cases, a detailed explanation is presented elsewhere, as indicated.

Resolution 25872 specified that the strategy consider the feasibility of recommendations I.A. and I.C. of the Citizens Solid Waste Advisory Committee. We believe that the recommended strategy and programs incorporate the intent and some of the specific proposals suggested by the Citizens Committee. The few specific proposals that were not recommended are indicated by an asterisk (*).

<u>Option Not Recommended</u>	<u>Principal Reason</u>
I. <u>City-Operated Recycling Services</u>	
*A. City-operated multi-material/Home Collection	
1. Seven materials	Equipment not developed for combined collection; separate collection too expensive (See Appendix A). Other approaches recommended; see Chapters II and III.
2. Three Materials with beverage container legislation	Equipment not developed for combined collection; separate collection too expensive.
B. Dual trash cans (placing a can for recyclables next to each trash can in City parks).	Not necessary because of current scavenging.
*C. Expansion of transfer station program	Very little space available; use of adjacent land is costly and could compete with private sector.
D. Stockpiling of newspapers (to offset market cycles)	City could get stuck with non-saleable material; could be very costly.
E. Commercial collection demonstration	Not legal to finance with rates from residential rate payers. General fund revenues not available.

II. Regulatory Proposals

*A. Beverage container legislation	Impact on recycling companies could be adverse and jeopardize multi-material recycling; (recommended for study; see Chapter III)
*B. Bi-metal can prohibition	Problem not judged serious enough to justify regulatory solution; voluntary approach recommended; see Chapter III (See also Appendix E)
C. Mandatory separation	
1. Mandatory set-out	Would be unfair to volunteer organizations and recyclers for cash; not practical without home collection. (See Appendix A)
2. Mandatory recycling	Extremely difficult to enforce; will reassess at later date.
*D. Freight rates	City does not have jurisdiction (City could lobby Federal government).
E. Progressive solid waste waste rate structure (charge more for each additional can, i.e., rate differential would increase at each higher level of service)	Would appear punitive; measure would not be effective enough to justify punitive solution; difficult to administer in flexible mode.
*F. Franchised recycling areas	Does not seem to be in demand or needed.
*G. Packaging legislation	Would be either ineffective or too costly to administer or both and would probably be inequitable.
*H. Anti-Scavenging ordinance	Does not seem to be in demand or needed; will reassess at later date.
I. Modify office building code to remove barriers to paper recycling	Need does not appear to be sufficient to justify additional regulation.

III. Financial Assistance

- | | |
|---|---|
| A. Equipment subsidies
1. Low interest loans
2. Equipment leasing | Equipment performance needs to be demonstrated before program can be justified. |
| B. Market price subsidies
(assuming exclusion of current recycling to avoid windfalls) | Does not address the cause of the problem, i.e., inefficient collection, handling, and transportation systems; would be difficult to discontinue when no longer needed. |
| *C. Tax incentives | City does not have jurisdiction over taxes except City B & O, which would have insignificant effect. |
| D. Abandoned gas station leasing (to provide sites for recycling centers) | Finding and securing sites is impaired by zoning, not by cost; a zoning code change has been recommended by the Mayor. |

IV. Other

- | | |
|--|--|
| A. Building design education for architects | Would be more expensive than modifying the building code; results cannot be controlled as well; may not reach out-of-town architects. |
| B. Technical assistance to neighborhood groups | Assistance will be provided to volunteer recycling organizations (eg. church groups); further assistance constrained by budget limitations |
| C. Develop home collection equipment through R & D | Projects B-1 and B-2 will help home collection; further work is too expensive given budget limitations |
| D. Technical assistance to office building managers and tenants to recycle paper | Budget limitations |

E5.9

VOL. 2

C. 1

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Volume Two
Background
Information

Proposed Recycling and Waste Reduction Strategy

RECYCLING AND WASTE REDUCTION STRATEGY



City of Seattle
November 1980

VOLUME TWO:
BACKGROUND INFORMATION

PROPOSED
RECYCLING AND WASTE REDUCTION STRATEGY
FOR THE CITY OF SEATTLE

January 7, 1981

Prepared by

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VIII. CURRENT RECYCLING MARKETS AND RECOVERY OPERATIONS

A. Materials Flow

Approximately 88,000 to 91,000 tons of readily recyclable materials, (Chapter 1) were diverted from Seattle's residential and commercial waste in 1978 (Table 2). This means that about one-third of all readily recyclable material, and about one-eighth of all residential and commercial waste generated, were recycled in 1978 (see footnote A on Table 2).

The path of this material from generators to end-users is complex and varied. There are four groups of actors in the recovery and recycling flow: generators or sources (such as consumers or businesses), recovery operations (retail outlets or collection organizations), brokers, and end-users. In the flow of material, each individual or organization has some choices, depending upon market conditions and other factors. Citizens recycle their materials through a variety of channels, the most common being donations to church, clubs or schools, and recycling centers (Table 9). For example, an individual may take aluminum cans to any of several recycling centers, to certain beer distributors, or to the aluminum manufacturers. Some recycling centers sell certain materials to other centers, which sell the material to an end-user. Paperstock dealers (brokers) buy newspapers, for example, from recycling centers, individuals, and charitable or nonprofit organizations such as churches and schools.

TABLE 9

How Citizens Recycle Their Materials *

How or Where?	Material		
	News (%*)	Aluminum (%)	Bottles/Glass (%)
Donate to church or school	25	10	5
Local non-profit collection point	22	10	15
Picked up by neighbor or community group	22	10	8
Recycling center for cash	18	24	16
Return for deposit	NA	NA	21
Beer distributor for cash	NA	NA	4
Burn in fireplace	11	NA	NA
City transfer station	5	4	7
Other	4	7	3
Don't recycle the material	12	39	33

* Source: Recycling Behavior and Motivation in the General Seattle Population and "SORT" Area Residents, Statistical Services, Inc., Sept., 1979.

Random sample survey of Seattle citizens. Table 9 excludes those served by the SORT Program.

* Percentage of all respondents; percentages add to more than 100 because some respondents recycle in more than one way or place.

NA = Not Applicable

The greatest amount of recycling occurs in the commercial sector, where 44 to 47 percent of all corrugated and boxboard and 42 to 47 percent of all high-grade paper (including white ledger computer print-out and manila tab cards) were recycled (Table 2).

Most of the corrugated and boxboard is either picked from mixed waste loads delivered by private haulers to the Ideal Paper Company's transfer station at Pier 35 (site of the discontinued barge operation) or baled at the source, such as at grocery stores. Manila tab cards have been recycled for many years and probably constitute the majority of the high-grade category. Recycling of post-consumer white ledger is a more recent development, stimulated through office recycling programs in Federal, City, and County office buildings by Conbela (a non-profit Seattle paper broker), Weyerhaeuser Corp., Ideal Paper Stock Co., and Fibers International, Inc.. Many private office buildings now have paper recovery programs.

In the residential sector, white goods (used appliances) are recycled at the highest rate (91 percent) primarily because it is as easy to recycle white goods as it is to dispose of them. The City provides containers at its transfer stations for recycling of goods.

Newspapers are next in percentage, at 31 to 38 percent of all newspaper used, and the most-recycled material in the residential waste stream in terms of tons, primarily because of three reasons:

1. Newspapers are usually kept separate from other waste materials, making segregation for recycling easier.
2. Churches, clubs, schools, and other organizations have traditionally collected and sold newspapers for recycling in order to raise money.
3. When paper prices are high, paperstock dealers aggressively enlist organizations to conduct newspaper fund-raising drives.

Aluminum cans and foil are recycled at a rate of about 35 percent (see Table 2), due primarily to the efforts of aluminum manufacturers such as Reynolds Metals Company, Kaiser Aluminum Company, and Alcoa. It should be pointed out that aluminum can recovery during 1978 was about 55 percent, while recovery of foil was negligible.

B. End-Users

The markets (end-users) for post-consumer material are largely responsible for the development of recovery operations as they exist in Seattle today and as they will develop in the future. The end-user, or secondary materials, markets described in this section are summarized in Table 11. The locations of the markets in the Seattle area are illustrated on Figure 1.

TABLE 10

A Description of End Uses, Specifications, and Capacity for Readily Marketable Commodities in the Seattle Area

<u>Material</u>	<u>End Use</u>	<u>Specifications</u>	<u>Capacity</u>
Paper: Newsprint	Export (paperboard)		fluctuates widely depending on market conditions in forest products industry
	De-inking newsprint	clean, dry, no glossy paper	
	Insulation		
Corrugated	Paperboard products	clean, no wax	
High-grade	Tissue		
	Printing & writing paper	No plastic envelope window panes, no self-stick glues	
Glass: Cullet	New glass containers	3% contamination color sorted	24,000 tons/year
	Beer bottles	Wash & re-use	clean, whole, properly packed all bottles originating from Northwest breweries
Metal: Aluminum	Can stock	rinsed, no food or labels (tin cans must be baled)	all
	Steel (tin) cans	Tin, steel scrap	all
	White goods	Steel scrap	loose & flat for MRI all

Secondary Materials Markets in the Seattle Area
(legend on next page)

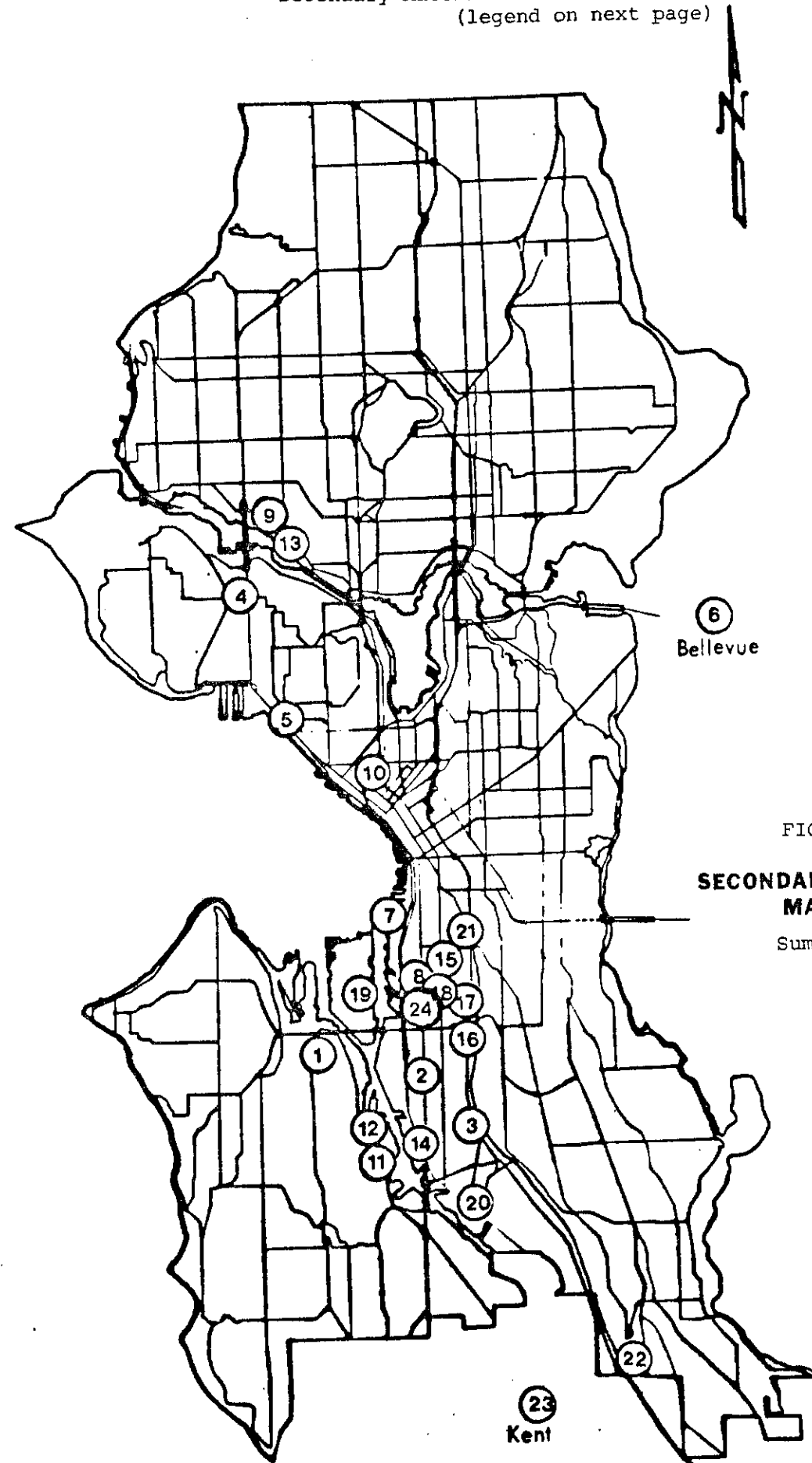


FIGURE 1
**SECONDARY MATERIALS
MARKETS**
Summer 1980

Source: City of Seattle Recycling and Resource Recovery Program

rev. 7/80

9/19/79 BP:bp

Figure 1, continued

SECONDARY MATERIAL MARKET OUTLETS

(Summer 1980)

Map #				Product ¹
1.	Bethlehem Steel	4045 Delridge Way S.W.	938-6800	F
2.	Bloch Steel Industries*	4580 Colorado South	763-0200	F/A
3.	Chemical Processors, Inc.	5501 Airport Way South	767-0350	O
4.	CIMS Corp.*	3257 17th West	284-3382	N
5.	Conbela *	945 Elliott Way	284-1010	P ²
6.	Fibres International *	1533 120th N.E. (Bellevue)	455-9811	P
7.	Ideal Paper Co. *	9 South Massachusetts	623-4841	P
8.	Independent Paper Stock Co. *	66 South Hanford	623-3228	P
9.	J. Washington Co. *	1139 N.W. 46th	782-8954	P
10.	Liquid Waste Disposal Co.	Seattle Tower	284-2950	O
11.	Maralco Aluminum *	6760 W. Marginal Way S.W.	763-0333	A
12.	MRI Corp.	6000 W. Marginal Way S.W.	767-4337	T
13.	Northwest Steel Rolling Mills	4315 9th N.W.	783-4000	F
14.	Northwestern Glass Co. *	5801 E. Marginal Way South	767-7314	G
15.	Pacific Iron & Metal Co. *	2230 - 4th South	628-6222	A
16.	Premium Distributors *	230 Andover Park E.	248-0891	BB
17.	Rainier Brewing Co. *	3100 Airport Way South	622-2600	BB
18.	Reynolds Aluminum Recycling Co.*	923 South Bayview	622-0062	A
19.	Seattle Iron & Metal *	2955 11th S.W.	682-0400	F/A
20.	Sternoff Metals Corp. *	7210 E. Marginal Way S.	762-8100	F/A
21.	Thermoguard Insulation Co.	1922 Airport Way South	624-3871	N
22.	Western Fiber Resources, Inc.	9880 40th South	723-4050	P
23.	Weyerhaeuser	7048 S. 190th (Kent)	682-1035	P
24.	Reynolds Metals	2819 First Avenue	623-2503	A

* Also accept quantities from the general Public

- | | | |
|---------------------|----------------------------|------------------|
| 1. F: Ferrous Metal | P: Several grades of paper | G: Glass |
| A: Aluminum | O: Oil | BB: Beer Bottles |
| N: Newspaper | T: Tin Cans | |

2. Conbela is also open to the public as a full-line recycling center.

SOURCE: Compiled by the City of Seattle Recycling & Resource Recovery Program.

7/80

1. Paper. In Seattle during 1978, 82 percent of all recycled material was paper (Table 2). The recycled paper market fluctuates widely depending on many factors affecting the forest products industry. (Figure 2 shows the fluctuations of newsprint prices, especially 1973 - 1976, to illustrate this.)

a. Newsprint. The demand for newsprint is determined by its three primary end-users: the overseas market, de-inking, and insulators.

(1) The Export Market. Much of Seattle's news is sold to markets overseas, such as mills in Japan and Korea, where it is used in the manufacture of fiberboard and newsprint. The export market is a major factor in the price for local newsprint users. Factors such as labor disputes of truckers and port employees affect the supply route to the Far East.

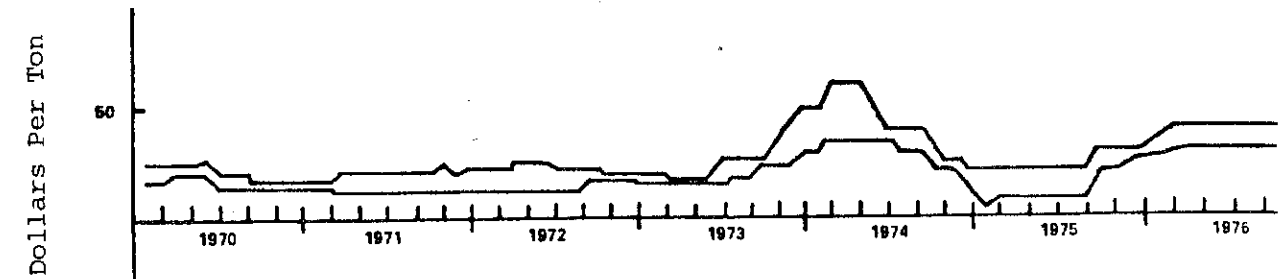
(2) De-inking. Newsprint can be "de-inked" and repulped into new newsprint. Publishers Paper Corporation near Portland operates two mills which will use up to 165 tons per day of old news after modification of one of those mills. Publishers will stabilize the Market for the Northwest. (The Seattle Post Intelligencer is printed on de-inked news.) Domestic mills require a steady supply of raw materials, but the use of waste paper varies with fluctuations in the availability of wood fiber (which varies with housing starts and other factors), and by labor strikes in mills and transportation.

(3) Insulators. Cellulose insulation is manufactured from shredded newsprint. In recent years the insulation business has experienced tremendous growth because of rising energy costs. Insulation is likely to continue to provide a market for old news in the future. Enactment of a tax subsidy in Canada and Seattle's proposed Home Energy Requirement may substantially increase the demand for news. News recovered at the City of Seattle's two transfer stations is sold to a local insulation firm. Insulators require more news in the winter as the demand for insulation increases. In off-months, they may sell their excess supply to other end-users.

Two other factors are important in news recycling. One is the inventory of paper kept by large end-users. This tends to mitigate the effects of short-term demand variations and insulates these users from extreme market fluctuations. It also means that they may stockpile large amounts of paper; and then, when news prices are very high, they can cut off their purchases which lowers the price. The other factor is that the use of waste paper as a feedstock is increasing, although the recovery rate is decreasing because of increases in total mill output.

FIGURE 2

Fluctuation in the Market Price of No. 1 News, 1970-1976*



* Based on weekly price quotes appearing in Official Board Markets for four important wastepaper grades since 1970. The price range represented reflects the spread of the high weekly quoted prices among four representative market areas: New York, Chicago, Los Angeles, and the South (sic). (Prepared by SCS Engineers and EPA staff.)

Newsprint is the material most commonly recycled by Seattle residents.⁶ The primary means of recovery for old newsprint is by recycling centers, brokers, and voluntary drives. Recovery is sporadic because of varying market conditions. When prices are high, some brokers more aggressively solicit volunteer organizations to conduct drives, and drives occur more frequently. Volunteer organizations themselves monitor the market to decide when to use recycling to raise funds.

The development of a large fixed supply of wastepaper, recovered regardless of market prices could result in a lowering of the demand and price.⁸ This does not mean that recovery should not be encouraged; but it does mean that recovery should be responsive to changing market conditions and the demand for old newsprint should be increased.

- b. Corrugated. Old corrugated is used in the manufacture of a variety of paperboard products, such as boxboard (e.g., cereal boxes), linerboard and medium (the components of corrugated) and tube, can, and drum stock. The demand for old corrugated is expected to remain stable and will be related to the increased production of those products manufactured from this material. The primary recovery mechanism for corrugated in Seattle is by either hand picking from mixed commercial waste or by baling at the point of use, the latter done by larger retail stores. As a result, nearly all corrugated that is generated in large quantities is recycled.

Recycling opportunities for small generators of corrugated have been inconvenient or too expensive; however, Seattle Recycling, Inc. recently installed a baler and now takes corrugated, and Ideal Paper Co. and Seattle Disposal Co. have recently begun to offer pick-up service for small quantities of corrugated.

- c. High-Grade Paper. The market for waste paper is a function of the price and availability of wood chips. As the supply of wood chips increases, because of an increase in housing starts, then the demand for waste paper decreases.

Old white ledger paper is used primarily in the manufacture of tissue and printing/writing papers. The use of high-grades in the production of tissue is expected to increase by about ten percent over the next two years.⁹ The use of high-grades in the production of printing and writing paper is expected to remain constant at present levels. Demand for old high-grade paper can be expected to increase only slightly. Demand will depend on the use of these materials by local paper mills.

The Grays Harbor Paper Company in Hoquiam, Washington (a division of Hammermill Paper) is considering the addition of a waste paper recycling capacity of about 18,000 tons per year. Crown Zellerbach in Vancouver, Washington, Scott Paper Company in Everett, and Simpson Paper Company in Ripon, California, presently use waste paper in their production.

- d. Mixed-Waste Paper. This paper is used in the manufacture of roofing material. Ideal Paper Company has begun offering special rates for separate collection of mixed waste paper to commercial accounts. This is a recent addition to the market in Seattle, and little is known about future capacity.

2. Glass

- a. Cullet (crushed glass). Northwestern Glass Company, a glass container manufacturer located in Seattle, is the only market for container glass, other than refillable soft-drink or local beer bottles. Northwestern specifies that cullet must be separated by color and free of contaminants. Cullet has for many years been a stable but low-priced commodity.

Recently, Northwestern has experimented with using increased amounts of cullet, and company officials think that they may be able to double their use of cullet from 12,000 to 24,000 tons per year. To increase its supply of cullet, on June 1, 1980, Northwestern increased its price from \$20 to \$35 per ton for single loads of 3,000 pounds or more and to \$25 per ton for single loads less than 3,000 pounds. In addition, to encourage large suppliers to deliver more cullet, Northwestern has established an incentive program in which recyclers that delivered at least 250 tons in the year ended June 30, 1980, will be paid \$45 per ton for each ton in excess of its prior year's tonnage. (For program details, see Appendix F.)

Even with these improvements, the market cannot accommodate 100 percent recovery of the approximately 60,000 tons per year available in Seattle's waste stream. Increased recovery of glass from outside the City will limit the potential for recovery of glass in Seattle. If out-of-town recovery doubles during 1980, and commercial tonnage remains constant, a market will exist for about 16,000 tons of Seattle's glass. The market is expected to remain constant at about this level.

It is important to note that Northwestern Glass has traffic congestion problems at its plant, primarily because about 76 percent of the deliveries supply only about 24 percent of the cullet. (This is based on a comparison of the percentage of total loads with the percent of the total tons delivered presented in Appendix G.) Northwestern's new price and incentive program is designed to promote the delivery of fewer and larger loads.

- b. Beer Bottles. The local breweries, Rainier, Carling (recently acquired by Rainier), Olympia, General (Lucky Lager), and Blitz-Weinhard in Portland, buy back the bottles in which their beer was sold. These bottles are washed and refilled.

When the buy-back program began in the early 1970's, recovery rates were modest. The breweries worked with a few private recycling firms to establish retail prices (for the public)

and wholesale prices (for recovery operations dealing in larger quantities). As the number of recycling centers in the State increased, so did recovery levels. For example, Olympia Brewery now claims to recover about 75 percent of all the glass containers it distributes in the State. Rainier claims a 55 percent recovery rate of its 11 oz. non-refillable and 90 percent of the standard stubby tavern bottle it distributes. What started as a public relations program is now part of the supply system for the breweries. The cost of used bottles, even after deducting breakage and handling costs, is less than the cost of new bottles. The breweries will purchase all of the containers meeting specifications that are returned to them.

3. Plastic. Small amounts of commercially generated plastic have been recycled in the Seattle area. Until recently, there has been no recycling of post-consumer plastic. In August, 1980, Seattle Recycling Inc. began paying for large plastic soft drink bottles, which are baled and sold to Plastics Research and Development Corporation, a San Francisco broker, which is selling the material to recyclers overseas. Seattle-area soft drink bottlers helped establish this market.
4. Steel Cans. MRI Corporation in Seattle, a subsidiary of American Can Corporation, provides the only market for steel cans in the western portion of the Pacific Northwest Region. This detinning plant is part of a nationwide network originally intended to provide a market for scrap from can manufacturing plants. A relatively clean product is shipped from can makers to MRI, where the material is treated chemically to separate the tin from the steel. The steel is sold to a local steel manufacturer as high-grade scrap. The tin is made into ingot and sold. A remaining sludge-like residue which contains metal in low concentration is exported.

The post-consumer steel can market has been marginal for private recyclers. The material (old food cans) is bulky, light-weight and costly to store and ship. Contamination by food waste and paper labels is a problem.

Steel cans must be reasonably clean and have the labels removed because paper labels absorb tin removed from the cleaning solution. Food residues degrade the solution. Also, MRI prefers that cans be flattened and have both ends removed. Cans which are not flat take up more space in the process equipment. Cans that have one end collect and waste the solution, which would otherwise be reused.

The price received for the material, until recently, has been too low to stimulate much interest in post-consumer recovery. The current manager of the local MRI plant has increased the price they pay for material meeting certain specifications. The price varies with the market value of steel. This market could consume all of the post-consumer steel can scrap in Seattle's waste stream.

Between 1976 to 1979, prices more than doubled, while tonnage nearly quadrupled. (See Appendix H.) These volumes are insignificant, however, when compared to the amount of unrecovered material (Table 2).

5. Bi-Metal Cans. Bi-metal cans are tin-plated steel cans with an aluminum "pop" top. They generally are used to contain carbonated or malt beverages; they are also used to package certain goods, such as peanuts. Bi-metal beverage cans are difficult to recycle in Seattle because (a) the aluminum is a contaminant in recycling the aluminum, and (b) the market value is not high enough to cover the cost of preparing and shipping these cans to markets in other areas. These cans represent only about 3 percent of Washington's can market. Bi-metal food cans, where the entire top is aluminum, can be recycled as steel cans. (See Appendix E.)
6. Aluminum Cans and Foil. The demand for aluminum can scrap is growing rapidly, primarily because of rising energy costs, and expanding overseas market, and the entrance of local scrap dealers into the recovery of cans. Until now, recovery has been primarily by the large aluminum companies and recycling centers.

Aluminum can recovery, at about 55 percent in 1978 (see Table 2), demonstrates the results of an overwhelming demand for material. Public awareness is extensive, and the industry actively promotes aluminum recycling with paid advertising in all media. As the price continues to rise, recovery rates will increase.

The demand for can scrap can be attributed in part to the fact that it is directly substitutable in production facilities (after proper preparation) for the raw material, alumina. Using recycled aluminum saves 95 percent of the energy required to convert bauxite to alumina and then to aluminum. An increase in the cost of energy or bauxite results in an increased demand for can scrap.

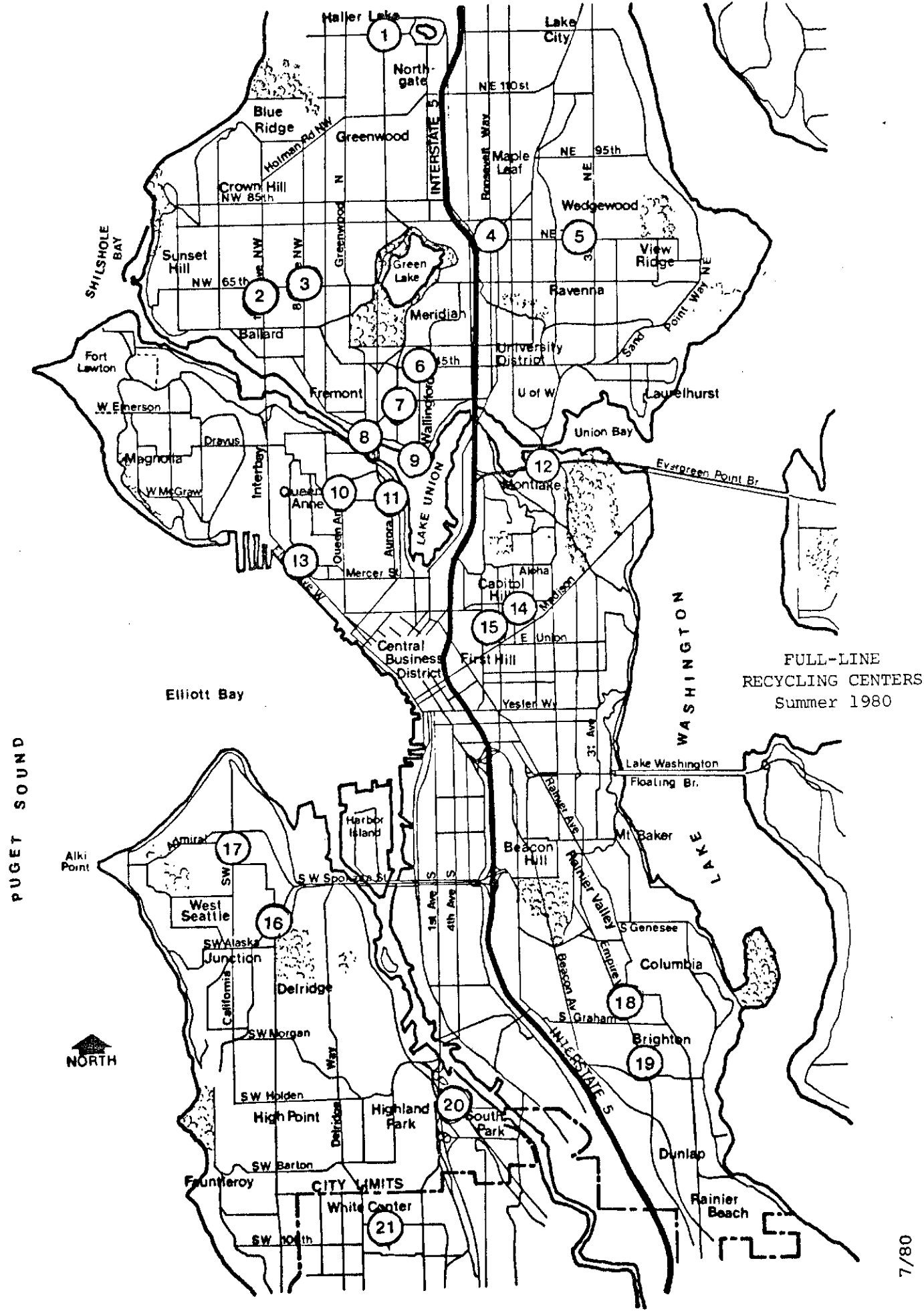
Cans, containers, and packaging products account for 20 percent of aluminum used nationwide. Cans make up about 60 percent of aluminum packaging products. The other 40 percent of aluminum products remain in the waste stream. Foil makes up an estimated 15 percent of the aluminum in the waste stream.

C. Recovery Operations

1. Recycling Centers. There are a variety of recycling centers in Seattle. Their locations are illustrated on Figure 3 (full-line recyclers) and Figure 4 (specialty recyclers). A detailed summary of Seattle recycling centers is presented in Appendix J.

Recycling centers can be categorized according to the number of materials they accept. Full-line recycling centers accept at least the three materials disposed of regularly: newspapers, metal (aluminum cans and foil, and tin-plated steel cans), and glass (refillable or "money" bottles and other glass containers). Specialty recycling centers take only one or two materials, such as corrugated or bottles or cans or newspapers. The distinction between full-line and specialty centers is important because full-line centers can serve a household's regular recycling needs (not counting composting or recycling of things recycled infrequently, such as clothing and appliances) with less inconvenience and less energy used in transportation than if a person had to go to separate locations to recycle.

FIGURE 3
Full-Line Recycling Centers in Seattle
(see legend on next page)



FULL-LINE RECYCLING CENTERS IN SEATTLE
(Summer, 1980)

Site #	Name of Center	Location	Type of Center*	Phone Number
1.	Six Pak City	1113 North 128th	Pay	363-8433
2.	Ballard Recycling	6217 15th Avenue West	Pay	784-6302
3.	Seattle Recycling Mobile Center	6400 Eighth N.W.	Pay	723-2050
4.	Seattle Recycling Mobile Center	7400 Lake City Way N.E.	Pay	723-2050
5.	Peter's Recycling	7513 33rd Avenue N.E.	No Pay	525-5460
6.	Fremont Recycling Station Drop-off	1801 N. 46th (Food Giant)	No Pay	632-4160
7.	Rainbow Drop-off	North 40th & Stone Way North	No Pay	284-4454
8.	Fremont Recycling Station #1	3505 Evanston Avenue North	No Pay	632-4160
9.	North Transfer Station	1315 North 34th Street	No Pay	625-2325
10.	Rainbow Drop-off	2100 Queen Anne Avenue North	No Pay	284-4454
11.	Rainbow Recycling Center	2533 Westlake Avenue North	Pay & No Pay	284-4454
12.	Rainbow Drop-off	2605 22nd East (Super Foods)	No Pay	284-4454
13.	Conbela	945 Elliott Avenue West	Pay	284-1010
14.	Rainbow Drop-off	15th & East John (Safeway)	No Pay	284-4454
15.	Rainbow Drop-off	Harvard & East Pine (SCCC)	No Pay	587-3800
16.	West Seattle Recycling Center	2964 S.W. Avalon Way	Pay	935-4255
17.	West Seattle Recycling Drop-off	3003 California Ave. S.W.	No Pay	935-4255
18.	Seattle Recycling, Inc.	5718 Empire Way South	Pay	723-2050
19.	Union Gospel Mission	6930 Empire Way South	No Pay	723-5700
20.	South Transfer Station	2nd Avenue S. & S. Kenyon St.	No Pay	625-2325
21.	Northwest Reclamation Co.	10426 16th S.W.	Pay	244-2233

Figure 3, continued

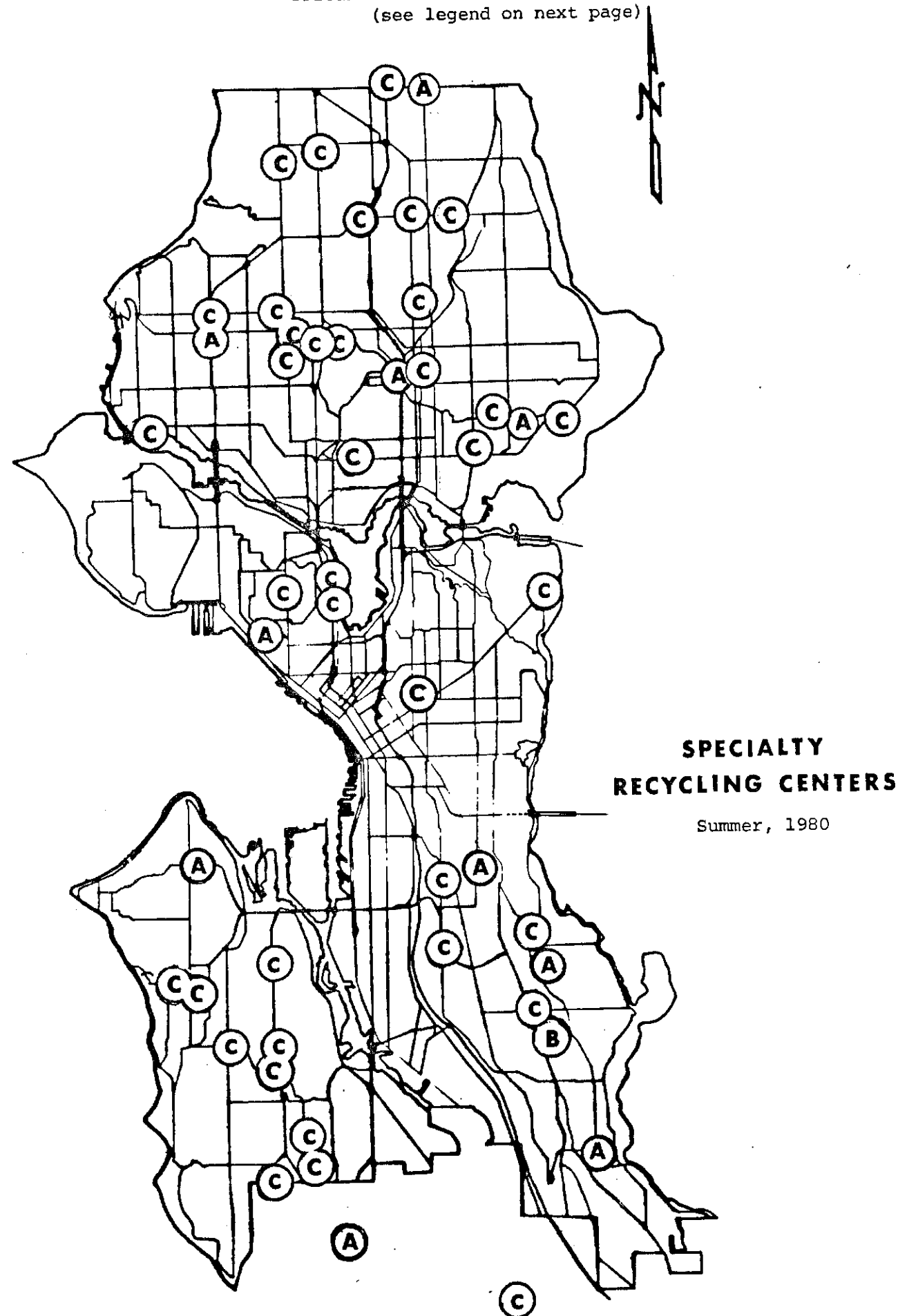
* Pay: Center pays for recyclables

No Pay: Center does not pay for recyclables

Source: Compiled by the City of Seattle Recycling & Resource Recovery Program with the help of data obtained from the Department of Ecology Recycling Hotline.

Figure 4

SPECIALTY RECYCLING CENTERS IN SEATTLE
(see legend on next page)



Source: City of Seattle Recycling & Resource Recovery Program

Figure 4, continued

SPECIALTY RECYCLING CENTERS IN SEATTLE
(Summer, 1980)

Site Code	Name of Center	Telephone #	Material Recycled	Type of Center
A	Reynolds Aluminum Co.	622-0062	Aluminum Cans	Pay
B	South-End Recycle	725-0645	Newspaper Refillable Bottles Aluminum Cans	Pay
C	Variety Club	382-0480	Newspaper	No Pay

HOME PICK-UP SERVICES SERVING THE SEATTLE AREA

(area served not shown on map)

Community Recycling Service

Fremont Recycling Station #1	623-4160
Peter's Recycling	525-5460
South-End Recycling	725-0645
Union Gospel Mission	723-5700

Source: Compiled by the City of Seattle Recycling & Resource Recovery Program based on data obtained from the Department of Ecology Recycling Hotline.

Recycling centers operate in one of three modes:

- Retail (or buy back)
 - Drop-off (attended)
 - Drop-off (unattended)
- a. Retail Recycling Centers. Retail recycling centers purchase materials directly from individuals. Examples of retail recycling centers in Seattle are Northwest Reclamation, Inc., West Seattle Recycling, Seattle Recycling, Inc., Ballard Recycling, and Six-Pak City. The products that can be recycled for cash at recycling centers, scrap dealers, or end users are indicated in Appendix J.

In addition, Seattle Recycling, Inc., operates a mobile buy-back program by moving a truck (with scale and cash register) to designated locations (such as a supermarket parking lot) on a regular schedule (such as every Saturday).

- b. Drop-off (attended). An attended drop-off recycling center is similar to retail centers except that they do not pay for materials delivered. An example is the Fremont Recycling Station #1. This organization (and some others) will share revenues with charities or other organizations named by the supplier of the recyclable material.

Another type of attended recycling center (mobile drop-off) operates by moving a truck or roll-off container to a shopping center or grocery store parking lot at specified times. For example, a Goodwill box, with an attendant, may be open at a specified site every Thursday from two until four o'clock. The public may bring materials only at that time.

- c. Drop-off (unattended). An unattended drop-off center uses roll-off containers or 55-gallon drums and is not staffed. A customer may use it at any time. These are generally located in shopping centers or grocery store parking lots. Examples are the centers located at Safeway Stores on Capitol Hill and Queen Anne (operated by Rainbow Recycling, with initial promotion by the Washington Energy Extension Service), the center at the Wallingford Food Giant (sponsored by the Lions Club and operated by the Fremont Recycling Station #1), and the containers for newsprint at Seven-Eleven Stores (sponsored by the Muscular Dystrophy Association and operated by Fibres International).
- d. Combinations. One center may operate a retail or drop-off business as well as several attended or unattended sites in grocery store parking lots. This allows one operation to service a greater service area with limited additional cost. It also enables an organization to reduce costs through economies of scale.

In this Strategy, a criterion in evaluating recycling centers and other recovery methods is convenience. One indicator of the convenience of a recycling center is how many persons live near (say one mile) a recycling center.

In Seattle, roughly 94,200 people (19 percent of the population) are within 1/2 mile and 217,800 people (44 percent) live within one mile of a full-line recycling center. In addition, these centers may be considered convenient if they are located on the way to one's workplace or other destination. Thus, convenience is not solely a function of proximity to home.

2. Collection Systems. Collection of recyclable materials at the point of generation can be performed in a variety of ways, depending on the sponsor, the frequency of collection, the service area, the vehicle used, and the material(s) collected.

Five types of collection are, or have recently been, operating in Seattle:

- a. Fremont Recycling Station #1 operates monthly collection of newsprint, bottles, and cans in the Fremont community and in ten of the neighborhoods formerly served by the City's SORT project (see below).
- b. The City of Seattle, through its contractor, Seattle Recycling, Inc., under the SORT Project, operated monthly collection of newsprint, bottles, and cans on twenty routes dispersed throughout the City from June, 1978 to December, 1979.
- c. Many churches, clubs, or schools sponsor occasional drives to collect newspapers in their communities. Volunteer drives are typically held twice a year, although some organizations sponsor monthly drives.
- d. Mixed Waste Systems. The Ideal Paper Co., which operates the Massachusetts Street Transfer Station at Pier 35 (from which, until April, 1979, a barge hauled commercial waste to the Tulalip Indian Reservation landfill), hand picks corrugated from the mixed waste dumped by privately owned garbage trucks that collect from various commercial sources.
- e. Commercial Separate Collection. Ideal Paper Company now offers separate collection of mixed waste paper to their commercial solid waste collection accounts. Buildings which generate a lot of paper waste can save money on disposal costs by placing paper waste in one container and mixed waste in another.

D. Energy Savings in Recycling

Recycling saves energy, based on comparison of energy consumption using virgin materials and secondary materials. Excluding the energy consumed in recovering the secondary material, the following shows approximate savings in energy consumed if secondary materials are used instead of virgin materials:

	<u>Percent*</u>
Plastic (polyethylene)	97
Aluminum	96
Copper	88 - 95
Steel: 100% scrap	47
40% Scrap	10
Newsprint	23
Glass containers	4 - 22

* Energy savings, as a percent of energy consumed if virgin materials are used.

SOURCE: Reuse-Recycle, monthly newsletter, Volume 8, No. 11, November, 1978.

The amount of energy saved varies with the percentage of secondary material used and with the amount of energy consumed in recovering the secondary material, as illustrated in Appendix K.

Recycling saves energy only when an energy efficient recovery method is used. Home collection is the most energy efficient recovery method. Recycling centers are energy efficient only if (a) the center is conveniently located or (b) citizens recycle many materials at one time (thus dividing the energy used among several recyclable products).

Reusing products saves more energy than recycling if the product is used enough times. For example, if 12-ounce beer bottles are refilled eight times, refilling bottles uses 30 percent less energy than making new bottles.*

E. Existing Waste Collection and Disposal Systems

Seattle's residences are serviced by two waste collection firms, one operating north of the Lake Washington Ship Canal and one operating south of the Canal, under contract to the City's Solid Waste Utility, which is financed primarily by revenues produced by garbage rates. The amount of the payment to the contractor is based on population. The contracts expire December 31, 1983.

Waste collected on the routes is delivered to one of two City-operated transfer stations, where it is weighed and loaded into long-haul trucks for transport to landfill. Additional material (both residential and commercial waste) is delivered to the transfer station by individuals in cars and pick-up trucks.

The City operates two landfills, both of which will be filled by September, 1981. At that time, the City will haul its waste to King County's Cedar Hills landfill.

Single-family homes have virtually unlimited service. Backyard collection service is provided, and homeowners are allowed up to four cans and two ordinance units (plastic bags) per can per week. Material is collected once a week. Fifteen to twenty percent of these residences place their cans at the curb on collection day; a significant percentage of residences put their cans out for collection at either the curb or near the alley.

In the past and until the end of 1980, all single-family homeowners paid the same rate (\$6.85 per month in 1980) for collection and disposal, regardless of the level of service used. In June, 1980, the City Council passed the Mayor's proposal for a variable can rate, with the charge based on the number of cans used per week. The variable can rate was passed to make rates more equitable and to encourage conservation. The monthly single-family rates for 1981 are: 0 can: \$1.00; 1 can: \$6.40; each additional can: \$1.50 added to the 1-can rate. Multi-family residential buildings have always been on a variable rate basis, although most occupants do not pay on a variable basis because the building owners cost of solid waste collection and disposal is usually included in the rent or condominium fee.

Commercial waste is collected by private haulers under contracts with individual customers. The City is not involved in commercial collection.

Commercial waste is presently beyond the control of the City. However, in 1978, the City passed Ordinance No. 107208, which authorizes the City's Director of Engineering to specify where waste generated within the City of Seattle may be disposed. Whether this ordinance is enforceable depends on the outcome of a court case involving waste haulers and the City of Akron, Ohio. The District Court decided in favor of Akron; the haulers are appealing the decision.

* 9.6 million Btu/ton to collect, handle, and wash used containers compared to 13.49 million Btu/ton to make new containers, according to Bruce M. Hannon, "Bottles, Cans, Energy," in Environment; March, 1972, p. 20.

IX. LIMITING FACTORS: WHY THERE ISN'T MORE RECYCLING

A. The End User

The use of recyclable materials in the manufacturing process is limited by economic conditions, reliability of supply, end-product specifications, procurement policy, product labeling requirements, product recyclability, and lack of information.

1. Economic Conditions. The primary determinant in the decision to utilize a particular commodity as raw material is economics, i.e., what is the cost of using a secondary versus virgin material? How will a return on investment in recycling compare to a similar investment in the use of virgin materials? The use of virgin materials determines the baseline value against which secondary materials compete.

The principal factors that affect the economics of recycling are the price of the material, the quality of the material, the cost of transportation to the processing site, and the technical capability of the industry to utilize the material. Regarding product quality, post-consumer material is often contaminated with other wastes. Removing these contaminants requires extensive processing. For example, MRI Corporation, the detinner (which is actually a materials processor, not an end-user), is capable of processing post-consumer food cans, but contaminants such as food waste, paper labels, and the aluminum ends of bi-metal cans inhibit the detinning process by causing a loss of tin and the chemical detinning agent. As a result, the costs of handling post-consumer material are higher than for handling industrial scrap. This problem can be reduced by the proper preparation of the material by the waste generator (i.e., individual citizens) or by upgrading the material (e.g., by a recovery company) prior to shipment to MRI.

Regarding transportation costs, virgin materials are generally concentrated in non-urban areas. Many industries have traditionally located their operations near the source of their principal raw material. However, most post-consumer material is produced where people live and work, dispersed throughout population centers. In order to use this material in significant quantities, it must be recovered and transported to the processing site. Freight rates have, in most cases, been more expensive for secondary materials.

Regarding technical capability, most plants are designed to handle only virgin raw materials. A plant designed to handle only virgin materials may have to install new processing facilities, such as receiving and storage facilities, a process to remove contaminants, and a handling system to feed the manufacturing process, to handle large quantities of post-consumer materials. If a secondary material can be substituted directly for virgin, as is the case for aluminum cans, then demand for that waste material will be affected more readily by changes in the availability of virgin material.¹⁰

Other examples of technical difficulties that limit recycling in Seattle at this time are:

- a. Glass recycling is limited because Northwestern Glass Company has relatively little space for handling and storage of post-consumer cullet.
- b. Steel can recycling is limited because of the technical requirements of the detinning process and because Bethlehem Steel has indicated it will recycle post-consumer tin cans only if they are free of contaminants (labels, food, etc.), densified, and baled. However, the price they are willing to pay does not justify the cost of baling.

2. Reliability of Supply. Most post-consumer materials have not been considered by the private sector to be a reliable supply of raw material. (Some materials, such as ferrous and non-ferrous metals, have been recovered for years by scrap dealers.) Supply reliability is necessary to justify investment in required equipment.

Historically, companies have integrated vertically to assure reliability of supply. The paper industry, for example has acquired timber lands to assure a raw material for its mills. Consequently, plant locations and manufacturing processes have been based upon this forest-to-mill supply route. Moreover, a recent study on the paper industry's utilization of secondary materials confirms this, indicating that under existing economic conditions, new facility construction is more profitable based on the continued usage of virgin materials.¹¹

The supply/demand relationship for recycling secondary materials is a chicken-egg situation. Experience here and elsewhere indicates that where there is sufficient demand, the supply develops to meet it. Occasionally, however, industries such as Garden State Paper Co. (which de-inks newsprint) and MRI Corporation have built facilities and then worked to acquire the supply. This is the exception, rather than the rule, however, especially with regard to post-consumer material.

Another supply issue that is a concern to potential end-users is control of quantity. In a mining operation, for example, the amount of mined material can be controlled. With post-consumer material, the end-user must have some idea how much material will be recovered at an established price. They must know the responsiveness of the various supply mechanisms (such as recycling centers) to the price they establish or to an increase in price.

3. End-Product Specifications. The specifications of a finished product may preclude the use of secondary materials in its manufacture. Two criteria influence the specifications: performance and aesthetics.

In the case of aesthetics, the exclusion of secondary materials is sometimes not justified. For example, there are no performance barriers¹² to the use of some secondary fiber in printing and writing papers. However, brightness specifications prevent manufacturers

from using any but the highest grades of waste paper, even though they could be reduced with no reduction in the paper's performance and with little or no noticeable difference in appearance.

Another example is color specification in glass containers. A soft drink company, for example, may specify the size, shape, emblems, and color (usually green or clear) of a container it purchases from a glass manufacturer. Strict color specifications for new glass containers preclude the use of mixed colored cullet. As a result, recycled glass must be sorted by color, which inhibits recycling because it is expensive in relation to the value of the material. In California, however, many wineries use a green color container which is made from mixed-colored cullet. This indicates that manufacturers' specifications do not have to be as strict as they are.

4. Procurement Policy. Some governmental and corporate procurement authorities require the use of virgin materials in their purchase specifications even though this policy may not have anything to do with the performance of the product. Others have end-product specifications so strict that secondary materials, while not forbidden, cannot be used. The Federal government has recognized that product specifications can and should be reviewed and, if necessary, modified (a) to delete prohibitions against secondary materials and (b) to require or encourage the use of secondary materials where possible. Purchasing agencies have the ability to influence the demand for recycled materials by modifying their specifications for particular products to require (or at least not prohibit) use of secondary materials.
5. Labeling Requirements. In some cases, labeling requirements may affect the consumer demand for a product. Re-refined motor oil is an example of a product which performs as well as new oil, but which has traditionally been avoided by consumers because highlighting the use of recycled materials on the label implies that the product is inferior.
6. Product Recyclability. Some products, such as the bi-metal cans, are difficult to recycle, primarily because they are made of two or more materials that cannot be separated easily. Each material is a contaminant in a process to recover the other.

There are other examples, many paper products that would otherwise be recyclable are coated with, or laminated to, potential contaminants such as plastic, cardboard, carbon, foil, wax, clay, or adhesives. Envelopes may be made with a plastic window and non-water soluble glues. Paper converters, which make paper products from rolls of freshly manufactured paper, can reduce or eliminate these problems by using water soluble glue and not using plastic panes in the window of envelopes.

Many small retail goods are now packaged in display containers, made of a combination of boxboard and plastic encourage sales and reduce shoplifting. The combination of these materials precludes recycling of either one.

In many cases, consumers can avoid non-recyclable products by buying substitutes that are readily available. In other cases, substitutes are not available; and the only possible alternative to disposal is to change the product.

7. Information. In addition to the factors already mentioned, recovery is sometimes limited because end-users do not have reliable information. A company that wants to develop a supply of material from waste may not know how to go about doing it. Even companies involved in recovery to some degree may not understand how to develop effective post-consumer recovery programs. Northwestern Glass Company has expressed a desire to expand their cullet recovery program but needed assistance from the Glass Packaging Institute to learn how to do so in the most effective way.

B. Material Specific Constraints

1. Paper.

- a. Newsprint. Although the market capacity is increasing and will be stabilized to some extent by the increased capacity of Publishers Paper Company in Oregon, the demand for old news fluctuates widely. Because of the seasonal demand for insulation, the ability of over-seas mills to stockpile large inventories of waste paper, and the close relationship between domestic timber and paper companies, the demand for news will continue to fluctuate.

It is important that the supply mechanisms for news be responsible to market conditions. Recovery of quantities in excess of demand can result in a lower price for newsprint. Two ways to avoid this could be (1) for suppliers to establish long-term contracts with specific end-users or (2) for someone to develop a storage capacity to stockpile old newsprint during times of lessened demand.

These responses to market fluctuations have limitations. Market contracts have been re-negotiated or canceled during periods of extreme market fluctuations. Stockpiling requires maintaining storage facilities and working capital while inventory accumulates; both can be expensive. Also, although this practice is common in agriculture, where commodities are stockpiled to adjust for seasonal supply/demand imbalances, newsprint is physically more difficult to handle (i.e., to lift, move, and pile) than grain. There is also the potential problem that the total demand may never be large enough to use the supply, in which case some newsprint may have to be disposed of in other ways.

- b. Corrugated. Increased recovery is limited by a lack of convenient recycling locations for small commercial and residential generators, although this problem may be resolved if Ideal Paper Company's new pick-up system is successful.

- c. High-Grade Paper. The demand for old high-grade paper is limited because paper manufacturers prefer virgin to secondary materials for the reasons stated on page 51.

The recovery of high-grades has increased substantially since the inception of Federal office waste paper recycling programs in the region in 1976. This example has stimulated many private buildings to begin similar programs. In many buildings, however, storage space is not adequate to accumulate enough material to warrant commercial separate collection. The lack of awareness about paper recycling on the part of managers and tenants also limits recovery.

- d. Mixed Waste Paper. The market for mixed waste paper developed relatively recently. Although future demand is uncertain, the quantity of mixed waste paper recovered by commercial separate collection is likely to meet the demand.

2. Glass. The market for glass containers, other than local beer bottles, is dependent upon one end-user, Northwestern Glass Company. Its capacity to increase the utilization of cullet is limited to 24,000 tons per year in the short term and about 60,000 tons per year in the long term.

In order to increase recovery, the glass plant must:

- improve traffic flow in their receiving yard. This may require receiving or processing cullet at another site, especially for deliveries from small suppliers.
- increase prices to attract the desired amount of cullet.
- control contamination levels.

Even with these changes, the capacity of this market is far less than the amount of material generated in Seattle and the rest of Washington State.

There are two principal post-consumer sources of cullet: (1) "route recyclers" or "scavengers," who collect glass on informal routes throughout the city, and (2) organized recovery operations. There are data that indicate that some low income areas of the city with no organized recycling programs show higher recovery rates than some areas with recycling centers.

An increase in the price paid for cullet may make this informal supply source more productive. On June 1, 1980, Northwestern Glass Company increased its prices to increase its supply of cullet. The new price program includes a higher price to large suppliers, such as recovery companies, to avoid adding to their traffic congestion problem. There is some question as to whether recycling centers will be able to increase their recovery of cullet, even with an increase in price. Unless the new price allows operations both to pay for the material and to increase their margins, the response from scavengers (route recyclers) may be higher than that from recovery companies.

Due to the higher overhead cost of recovery operations, cullet recovery will increase substantially only if efficient handling systems are installed at each site.

3. Plastic. There is no significant demand for most post-consumer plastic in the Seattle area. The fabricators of some types of plastic products can use ground chips of post-consumer material. However, the relatively low cost of virgin plastics has not encouraged much interest by the plastics industry.

Several problems must be overcome in recovering plastics. Although four major types dominate the market, there are over 300 types of plastics in the marketplace. Some are recyclable and some are not. Because each plastic is a unique polymer (a long chain of like molecules) the different types cannot be mixed and then recycled. Also, it is impossible to differentiate among the various types without chemical analysis. This makes recovery difficult.

Several years ago, a proposal was suggested in a letter to the editor of Plastics World magazine that each type of plastic be given a number and then this number be stamped into each product of that type of plastic. This would be done by engraving the number right onto the product mold. The number would be used to identify the type of plastic in order to enhance recovery. This could solve the problem of identification for at least the major types of plastic now in use.

In addition to the low demand and identification problems, transportation costs per ton are high because the material is light weight and bulky.

4. Steel Cans. While a demand for post-consumer steel cans exists, the price paid for the material has not been sufficient to significantly increase recovery. The problem is one of low value compared to the cost of recovery for consumers and recovery operations. The factors contributing to the high cost of recovery are:

- strict specifications limiting food residue and paper label contaminants, and requiring flattening cans to meet those specifications
- the light weight and bulkiness of the material.

Although MRI has increased its prices, recovery operations have not responded with increased supplies. Increased recovery will require a capital investment to develop a handling system to make processing by consumers and recovery operations easier and more efficient.

As mentioned earlier, the results of the public opinion survey indicate that many consumers do not distinguish steel cans from aluminum cans. Many do not think of steel cans as being recyclable.

5. Bi-Metal Cans. Bi-metal beverage cans are difficult to recycle in Seattle because each of the principal materials (aluminum and steel) is a contaminant in the recovery of the other, and, although there are markets for recycling bi-metal cans in other areas, the value of the product in Seattle is too low to justify the cost of processing (baling) and transportation to those markets.

6. Aluminum. The demand for aluminum exceeds supply. This has resulted in a dramatic increase in the price paid to consumers. The supply of scrap cans is increasing accordingly.

The recovery of foil, however, is limited because the material is usually contaminated with food waste and its recovery is not promoted by the industry.

C. Recovery Operations

Recovery operations in Seattle developed in response to two things; (1) a demand by domestic industry and the overseas markets for particular commodities, and (2) the public's willingness to source separate recyclable materials.

As industry's use of secondary materials has increased, a more efficient means of obtaining material has evolved. Recovery businesses collect (or obtain) material from large numbers of individual users, thereby concentrating them in quantities large enough to be handled profitably.

Because of recovery operations, end-users do not have to deal with large numbers of customers in order to obtain a significant supply of material. And full-line recycling centers provide consumers with one outlet for all of their recyclables.

Economics is the primary factor which limits the effectiveness of recovery operations. Zoning is also considered a limiting factor, though a minor one.

1. Economics. Most of the materials referred to in this report have a market price that is low relative to the cost of obtaining, preparing, sorting, and transporting the material. The low market value of the products, combined with the high cost of handling, results in a low profit, if any, and low recovery rates.

Low profits have two consequences. First, recovery operations cannot afford salaries and wages that are sufficient to attract and keep professional managers and technicians. Second, low profits restrict financing for investment in labor saving equipment in order to achieve economies of scale. Most new recovery operations have very little equipment. As a result, they must spend a large amount of labor per ton of product (i.e., per unit of revenue).

As they increase the amount of materials handled, recovery operations can invest in equipment to (a) handle more material (i.e., revenue per unit of labor) and (b) eliminate some labor intensive steps.

For example, an integrated system of containers, lifting equipment, processing equipment, and vehicles would permit movement of materials directly from a collection vehicle to a processing line and then to a vehicle for transport to market, all with only one or two operators. Without such equipment, material must be handled in smaller batches (humans are not as strong as machines), requiring more labor. Also, the least expensive equipment (55-gallon drums, wood pallets, and fork lifts) frequently requires many handling steps.

This is typical for an emerging industry that has not demonstrated a sufficient profit record. If such operations were to show substantial profits, financing would become more readily available. Recovery operations in other cities, particularly Eco-Cycle in Boulder, Colorado, and Ecology Action in Modesto, California, have demonstrated the evolution from the less efficient, labor-intensive mode of operation to the more efficient mechanized and semi-automated mode.

Each recovery method is particularly suited to recovering different materials under different conditions.¹³ Retail recycling and other purchase programs are most effective at recovering high value materials.

Commercial separate collection and mixed waste 'hand' recovery are most effective for large volume, moderate value materials where savings on disposal costs contribute to the economics of recovery. Multi-material volunteer programs and household collection recover high volumes of low value material; most of these programs operate at an economic loss.

Of the materials discussed in this report, only paper products and aluminum are generally profitable. The local brewery buy-back program is marginal for recovery companies. Recovery of local beer bottles is declining. This is due both to their declining share of total beer sales and to the price paid for the containers, which has not kept pace with inflation.

Handling cullet represents a burden for recovery operations. Steel cans may now (since the price increase) be handled at a profit, but volumes are so low that they do not contribute much. These facts are important in determining the feasibility of developing a full-line recovery system in Seattle. If recycling centers are to become convenient one-stop locations for consumers, the economics of handling these material types must improve.

At this time, increasing the supply of recyclables is less of a concern than the low value of the materials or the high cost of handling and transporting them. Increased recovery of low value materials may result in an even greater economic loss for recycling centers until more economic handling systems are developed.

2. Zoning Requirements. In Seattle, zoning requirements are beginning to cause difficulty in the siting of recycling centers. The zoning code classifies recycling centers as light industry and requires that they be located in a CG (general commercial) zone. Recycling centers, however, must be located convenient to residential areas. There does not appear to be property zoned CG in or near enough to residential areas (such as Magnolia and Sand Point) to permit the development of recycling centers where they would be convenient to residences. The City of Seattle's Department of Community Development has written a report on this problem and is proposing to modify existing ordinances to allow recycling centers in neighborhood business districts. The Planning Commission has agreed, provided that recycling centers be allowed as a Council Conditional Use rather than as a use outright.

D. Citizen Behavior

The ability of any recycling program to divert significant quantities of material from the waste stream is dependent upon the participation of individual consumers. Increasing public participation in recycling, which is a function of consumer behavior, is a complicated challenge that does not lend itself to simple solutions.

To find out why people do or do not recycle, the City's Recycling & Resource Recovery Program hired Statistical Services Incorporated of Seattle, Washington to conduct a survey of Seattle citizens to identify and quantify the factors which motivate and restrain consumer participation in recycling. The results of this survey, entitled Recycling Behavior and Motivation in the General Seattle Population and "SORT" Area Residents, September, 1979, are summarized below:

1. Public Awareness and Participation. The survey showed that 62 percent of all Seattle citizens had recycled household glass, aluminum, or newspaper at least once during the previous three months.¹⁴ Further data suggests, however, that some consumers recycle regularly while others recycle only rarely. However, the fact that almost two-thirds of Seattle's population has recycled at least once recently indicates two significant things:
 - a. Programs to increase recycling would encourage people to do something that they are already willing to do.
 - b. Given that the majority of people are not opposed (or even indifferent) to recycling, there must be other reasons why more people do not recycle regularly.

The survey of public behavior and opinion was designed to find out why people do not recycle more.

Among those who recycle, recycling behavior varies in terms of the materials they recycle and how often they recycle. Table 11 shows the percentage of all recyclers who say that they recycle newsprint, aluminum, and glass.

TABLE 11

	Percent Participation by Material (of people who do recycle)		
	Recycle More Than 50% of Material	Recycle Less Than Half of Material	Recycle None of The Material
News	81%	5%	14%
Aluminum	59%	5%	36%
Glass	58%	10%	32%

For any given material, over twenty percent of Seattle households recycle all of that material. Nine percent of the population recycle all types of their recyclable material. Thirty-eight percent do not recycle at all.

Many more people recycle newsprint than any other material discarded regularly, which is also reflected in the estimates on Table 2. This may be due to the long history of newsprint recycling and the volunteer drives by schools, churches, and community groups. Also, used newspapers are usually stored separately from other waste materials and therefore easier to keep separate for recycling.

Awareness of recycling appears to be material-specific. That is, a person may know that aluminum is recyclable and yet have no idea that steel or glass are also. The data on steel can recycling was not incorporated into the final results of the survey due to an obvious misunderstanding by the people polled of what a steel can is.

How often people recycle varies considerably (Table 12).

TABLE 12

Frequency of Recycling
(of people who do recycle)

	2-3 Times/Month	Once/Month	Every 3 Months
News	24%	30%	29%
Aluminum	14%	22%	24%
Glass	17%	24%	25%

2. Motivation. People were given a list of reasons to recycle and asked to rate them in order of importance, Table 13 represents the results.

TABLE 13

Reasons for Recycling
(listed in order of importance)

	Percent*
Conserve natural resources	91
Reduce litter	87
Save energy	86
Help a charity or club	70
To reduce the use of landfills	69
Reduce the cost to ratepayers	48
Because neighbors and friends recycle	36
To receive payment for materials	26

* Percent of recyclers; respondents were allowed to cite as many reasons as applicable.

The validity of the responses is somewhat questionable because people could have been answering as they think they should have rather than providing their actual opinions. This, however, indicates a familiarity with the issue. Recycling for cash appears to be low on the scale of importance. This may also be misleading. In the SORT Survey of people who live in SORT areas but recycle using a means other than SORT (the 'Recycle Elsewhere' group), the following responses were indicated:

<u>Reasons to Recycle</u>	<u>Recycle Elsewhere Group</u>
Help a charity or club	84.0%
Receive payment for materials	37.6%

This indicates that among active recyclers payment for materials is important. Helping a charity or club by recycling actually produces revenue for that group and has the added benefit of making a contribution to a 'good' cause.

Non-recyclers were asked to respond to a variety of reasons why they do not recycle. Table 14 represents the responses.

TABLE 14

<u>Reasons for Not Recycling</u> (Listed in order of importance)	
Not enough materials	63%
Insufficient storage space	61%
No one to pick up the materials	60%
To much trouble to travel to a recycling center	57%
Too busy/not enough time	51%
Too much trouble to separate the materials	31%

The first answer, "Not Enough Materials" may indicate that people think that there is some minimum amount of material that is required to make recycling worthwhile. (However, recycling centers and collection programs encourage recycling no matter how little material is involved. Also, small amounts add up over time. Field information from the start-up of the SORT Project and Fremont Recycling's first collection program in 1975 indicates that many persons are not familiar with the amount of a particular material which they use and discard. Until they begin source separating, they may never see how fast each material accumulates.)

"Insufficient Storage Space" is a very real problem, especially for apartment dwellers. In other cases, it may be that the storage of recyclables has a low priority for the use of space.

The remaining questions indicate that the time to prepare and store the material in the home does not appear to be a major obstacle. However, the time and effort involved in transporting the material to a center is a problem. This is further verified in the following table of SORT participants who began recycling only after home collection was provided:

Question: Did you recycle before SORT?

1. Yes:	50%
2. No:	48%
3. Don't know	2%

These data show that almost half of the SORT participants did not recycle before SORT and that SORT, by providing regular collection service and reducing the time and effort (cost to the consumer) required to recycle, significantly increased the number of recyclers. This indicates that providing convenient collection of materials causes a significant number of people to recycle who would not otherwise do so. In SORT, when the collection service ends, a number of people will simply stop recycling.

The public opinion survey was not able to find any demographic characteristics that distinguish people who recycle from those who do not. The final report on the SORT Project, however, has suggested that there are clear correlations between income level and participation in SORT. According to the SORT report, the higher the average income on a particular SORT route, the greater the participation rate was. The survey indicated that people in low income areas recycle for cash more than do people in upper income areas.

The combined SORT and Statistical Service, Inc. Survey data indicate that certain demographic groups are more likely to utilize collection services, whereas retail recycling appeals more, but not exclusively, to lower income groups. (No demographic information presently exists on who uses drop-off sites.) This would indicate that a successful recovery program (i.e., one that is effective in maximizing recycling) would have to use different recovery mechanisms in different neighborhoods or even within one neighborhood. Recovery would be maximized by providing mechanisms that satisfied all the different reasons that people have for recycling or not recycling.

3. Information. Non-recyclers in the general population were asked if they felt that there was adequate information available on recycling. Forty-nine percent felt that this was a problem and forty-nine percent did not.

From answers to questions asked of persons living in the SORT Program area, it was possible to determine how people learn about recycling programs. The two most effective methods, as Table 15 shows, are newsletters and newspaper articles.

TABLE 15

How People Learned About SORT

Communication Methods Considered Effective	SORT POPULATION		
	Participants %	Recycled Elsewhere %	Non- Participants %
Bi-monthly newsletter	82	57	57
Newspaper articles	45	46	28
Direct telephone contact	41	33	19
Radio	36	33	18
Doorbell contact	32	16	25
Metro bus signs	26	20	15
Yard signs	23	12	10
Block watch reports	20	12	10
Community group meetings	13	9	6

These results can be generalized to apply to other City or private programs that are being instituted elsewhere in Seattle. It must be kept in mind, however, that the SORT Program involved twenty separate test areas spread throughout the City. This severely constrained the SORT Program's ability to inform potential participants because mass media could not be used.

The survey and discussions with citizens have identified certain information needs, which should be addressed if recycling is to be increased:

- Many people do not know that food cans and glass are readily recyclable.
- Information should be aimed at the most common reasons that cause people not to recycle.
- Many office building managers and tenants are not aware of the opportunities for paper recycling in their buildings.
- Many neighborhood businesses do not know what they can do to conserve resources, recycle waste, and save money.
- Many people do not know that private business and public procurement practices can be changed to reduce waste and increase recycling.
- Many people do not know how to reduce the amount of waste produced in the home.
- Many people do not know how and where to recycle.

In order for any conservation program to have an impact, a continual information effort is necessary. This campaign must address specific information needs with the most effective methods available, including extensive use of mass media.

4. Policy Issues. In general, the public said they would support City efforts to encourage recycling; however, 46 percent said they did not want to do so if it meant an increase in rates while 41 percent said they would accept an increase in rates for programs to encourage recycling. (The validity of these responses is questionable, however, because no specific amount of increase was mentioned; people are likely to reject an unspecified increase even if they would accept a specified one.) Recyclers and non-recyclers alike were asked the following questions (answers are expressed as a percentage of a representative sample of Seattle's general population):

Do you think a City program of providing pick-up for recyclable materials would encourage people to recycle?

1. Yes: 86.7%
2. No: 8.9%
3. Don't know: 4.4%

Do you think a City program of charging garbage rates in proportion to the amount of waste set out for collection would encourage people to recycle?

1. Yes: 53.3%
2. No: 35.6%
3. Don't know: 11.1%

Do you think a City program of increasing the number of local recycling centers would encourage people to recycle?

1. Yes: 77.0%
2. No: 12.8%
3. Don't know: 10.3%

Do you think the City should sponsor such programs if it means an increase in garbage rates:

1. Yes: 40.9%
2. No: 46.4%
3. Don't know: 12.7%

Do you think the City should prohibit the use of non-recyclable materials such as bi-metal cans or plastic soft drink bottles?

1. Yes: 51.2%
 2. No: 35.7%
 3. Don't know: 13.1%
- (Recyclers only)

Do you think the City should purchase products made of recycled materials even though they may cost a little more:

- | | | |
|----------------|-------|------------------|
| 1. Yes: | 65.2% | |
| 2. No: | 20.2% | (Recyclers only) |
| 3. Don't know: | 14.4% | |

It is apparent from the opinion survey and from the comments of individuals that many, though a minority of, Seattle citizens consider recycling to be an important and integral part of their daily lives. For them, recycling is the accepted standard of behavior; it is as unthinkable to put recyclables in the trash can as it is to litter their garbage in their neighbor's yard. The majority of Seattle citizens, on the other hand, are not opposed to recycling, but neither do they consider wasting recyclables as an unacceptable act.

The U.S. Environmental Protection Agency (EPA) has concluded, based on its analyses of home collection recycling systems throughout the country, that one of the principal factors that distinguish successful recycling programs from unsuccessful ones is that, in the successful ones, the majority of citizens consider recycling as "the way we do things here." According to EPA, this attitude was held by only a minority of residents until the City decided that recycling was to be the only acceptable way of discarding certain materials. What changed people's attitude was a concerted effort by elected officials and other community leaders, so that now a majority of citizens view recycling as "just the way we do things here."

X. WASTE REDUCTION

A. Definition

Waste reduction refers to any action that prevents waste or that reduces the quantity of waste generated. Waste reduction can be achieved by several means:

- The development and use of products requiring less material per unit of product (for example, smaller automobiles, thinner-walled containers)
- The development and use of products with longer lifetimes, to reduce discards and replacement needs (for example, longer-lived appliances, more durable tires)
- The substitution of reusable products for single-use "disposal" products, and an increase in the number of times that items are reused (for example, reusable plates and cutlery, refillable beverage containers)
- A reduction in the number of units of the product consumed per household per year (for example, fewer automobiles per family).

B. Examples of Waste Reduction

Examples of state or local government waste reduction programs are:

1. Beverage container legislation has been adopted in Oregon, Michigan, Maine, Iowa, Delaware, Vermont, and Connecticut. Several local governments have passed mandatory deposit or refund ordinances; some are contingent on enactment of similar ordinances by surrounding jurisdictions.
2. The State of Minnesota passed a comprehensive waste reduction law, under which they implemented regulations to control new or revised packaging.

Examples of private sector waste reduction programs are:

1. Several newspapers, including the Los Angeles Times, Washington Post, New York Times, and others changed their format in such a way that the old 99-page format is reduced to 84 pages without a reduction in content. The result: a yearly saving in newsprint of about 5 percent.
2. Washington State breweries established buy-back programs as described on page 40.
3. Anheuser-Busch, Inc., brewers of "Budweiser" and other beers, joined with a Michigan brewery in a shape-sharing program. The two breweries agreed that they would use the same bottle shape. The bottles are filled with Budweiser, shipped into Michigan where they are sold and consumed; the empty bottles are returned to the Michigan brewer, where they are washed and refilled.

4. The paper industry redesigned the half-pint milk carton so that less material is required to hold the product.

The U. S. Environmental Protection Agency (EPA) has been the leading advocate for waste reduction at the Federal level. Their efforts included advocacy of national beverage container deposit legislation, a product charge to alter the price difference between virgin and secondary materials, and guidelines for container deposits on Federal facilities. The guidelines were promulgated, but implementation has not been successful. Neither of the other two proposals has been adopted. EPA recently shifted its resources to controlling improper disposal and is doing nothing to promote waste reduction.

Although the State of Washington has a recycling information program, the State is doing virtually nothing to reduce waste at the present time. In its Draft Washington State Solid Waste Management Plan (July, 1980), the Department of Ecology has prepared some very worthwhile waste reduction initiatives.

C. Barriers to Waste Reduction

Waste reduction is the stated goal and first priority in the waste management policies of the Federal Government, many state and local governments, environmental organizations, and other groups. Despite this, few governments have been able to implement waste reduction programs. There are several reasons for this:

- What limited resources there are have been directed to solving problems that represent an immediate threat to public health and safety, such as improper disposal of chemical wastes.
- Governments tend to avoid programs where it is difficult or impossible to predict and measure the results. Government has so little control over waste generation that it is difficult to achieve measurable results.
- The economy is so complex (materials are used for so many different reasons, and materials use decisions are made at so many different levels) that broad government programs are difficult to design and administer, while programs that are targeted at a few products are labeled as discriminatory and are difficult to justify.
- Industry encourages consumption patterns that result in increased—not reduced—waste generation.

Private industry has shown an interest in reducing its own internal waste, and it has done a few things to reduce the waste that consumers discard. In general, industry has encouraged the development of products, services, and marketing and merchandising practices that result in greater consumer waste. Industry does not accept responsibility for this waste on the grounds that industry merely responds to consumer preferences for new products and services (including, for example, convenience packaging). However, industry spends millions in advertising to shape consumer preferences; and consumers do not seem to have much choice about certain

corporate policies, such as planned obsolescence (do automobile models have to change every year?) or merchandising (products that used to be sold without packaging are now sold in individual packages to reduce shoplifting, reduce labor requirements, and increase product appeal). Private industry is not intentionally trying to increase consumer waste, but industry is motivated by profit to increase sales and reduce costs (such as shoplifting losses and store labor). Industry's profit is not affected by certain externalities, such as disposal costs and depletion of resources. These externalities are costs that must be borne by the consumer.

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Volume Three
Appendices

Proposed
Recycling
and Waste Reduction
Strategy

RECYCLING AND WASTE REDUCTION STRATEGY



City of Seattle
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VOLUME THREE:

APPENDICES

PROPOSED

RECYCLING AND WASTE REDUCTION STRATEGY

FOR THE CITY OF SEATTLE

January 7, 1981

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APPENDIX A

Multi-Material Home Collection Analysis

Because home collection can be done in many ways, the following design parameters were considered and used in this analysis.

- a. Sponsor: City or Private. If the private sector were providing home collection service, there would be no question but that the City would not need to. But home collection is not profitable enough for the private sector to be involved by itself. Only one organization, the Fremont Recycling Station #1 (FRS), provides regular home collection service in Seattle. FRS operates this service primarily because it has a uniquely dedicated management and staff and because it has the assistance of government subsidies.

If the City were to sponsor home collection, it could operate the system through a contractor or through City employees and equipment. For purposes of this discussion, it is assumed that contractors would be used, primarily because of the precedent of the garbage collection contracts and because contracts give the City more flexibility. However, sponsorship is not a major factor in this analysis, and a final decision could be made later.

- b. Who would pay? There are two choices:
- All residents (assuming the service is provided to all residents)
 - Users (assuming many will not use the service even if it is provided)

Charging all residents spreads the total cost and lowers the cost per person. It also encourages recycling by requiring people to pay (if you're paying for it, you might as well use it), especially those who just need a little prodding. However, charging all residents penalizes those who recycle by other means and would not use the service. It would also be objectionable to those who place higher priority on their freedom to choose than on the need to recycle.

Charging only the users penalizes recyclers, who are already doing "the right thing," while in effect rewarding wasters for doing "the wrong thing."

It is recommended that, if the City offers a home collection service, it should do so only if all residents pay. Despite the problems, charging all residents lowers the cost per person and would encourage greater participation than a users-only system. Charging people who do "the right thing" while not charging wasters (in an only-users-pay system) is a worse policy than charging those who recycle by other means (in an everybody-pays system).

c. Materials collected. Seven readily recyclable materials are generated in homes on a regular basis and are candidates for home collection:

1. Newspaper
2. Steel cans
3. Glass: clear, green, brown, and local beer bottles
4. Aluminum cans

(Corrugated, high-grade paper, and used appliances are also readily recyclable, but residences do not generate enough to justify home collection.) Home collection could be designed to recover any one material or any combination. This discussion considers collection of the seven materials listed above.

Newsprint-only collection is discussed in Appendix B.

Other options were eliminated for the following reasons:

1. Aluminum only: the market value is so high that cans will be recycled for cash
2. Steel cans or glass or both (with or without aluminum: the market value is so low that the cost is prohibitive.

d. Customers Served. A collection program could serve single-family residences, apartment buildings, commercial customers (hotels, restaurants, etc.), or any combination. This analysis is based on collection service provided to single-family residences only. Apartment buildings were eliminated because most of them do not have sufficient storage space with access for recycling companies. (Despite this obstacle, it is recommended that the City develop ideas for collecting recyclables from apartments because they offer a high concentration of recyclable materials. See Project D-3.) Commercial customers were eliminated because there has been no experience in collecting newsprint, bottles, and cans from commercial accounts on a regular route. (This type of program appears promising and should be done by an organization willing to undertake some risk; the City cannot undertake this risk because it is illegal to have residential ratepayers, which comprise most of the City's rate base, subsidize commercial customers.)

e. Preparation Requirements. Source separation programs around the country have different rules and procedures for preparation of the material by the resident. For purposes of this discussion, we recommend the three-way separation (news, glass, and cans) used by FRS and SORT project, performed by Seattle Recycling, Inc. Preparation requirements are:

- News: bundles wrapped in string or put in grocery bags
- Glass: containers only, unbroken (to facilitate color sorting and recovery of refillables)

- Steel cans: rinsed with labels and at least one end removed; flattening is preferred
- Aluminum cans: rinsed.

There are three reasons for selecting this method:

- Convenience: it involves the least work and is easy to remember. Convenience results in higher participation.
- Market specifications dictate color separation and other preparation.
- Experience: the data from the SORT project are directly applicable to this analysis if the same procedures are followed.

f. Frequency of Collection. More frequent collections (such as weekly) generally result in higher participation and recovery rates because pick-up days are easier to remember and less storage is required. However, less frequent collections (such as monthly) are more cost-effective because more material is collected in less time and distance traveled. To keep costs down, this discussion is based on monthly collection.

g. Equipment Requirements. At the present time, multi-material collection requires the use of a separate truck. A prototype truck called SDC (for Separated Discards Collection), to collect both garbage and recyclables and keep them separate has been developed by Recycling and Conservation, Inc. of Kittery, Maine in cooperation with DREW-IT Corp. of Hampton, New Hampshire. The truck was tested on a regular garbage collection route in Exeter, New Hampshire. According to a report by the developer, Richard Tichenor, "future testing, study, and development are needed, but the tentative conclusion drawn from the Exeter study is that recyclables collection with SDC will involve only modest increases in collection time, making it a significant step toward energy-cost-effective collection of recyclables."¹⁷ Conclusions and recommendations relating to SDC are discussed after the section on the cost of multi-material home collection.

Multi-material collection also requires a processing system to sort glass (separating by color and removing refillable local beer bottles), to crush the sorted glass, to separate steel cans from aluminum, and to flatten the cans.

h. Mandatory vs. Voluntary Participation. This is discussed in Appendix B. For purposes of this analysis, a participation rate of 30 percent is used because, given the current costs of collection and processing, higher participation rates would only result in higher costs. A 30 percent participation rate is achievable in a voluntary program.

Net Costs of Multi-Material Home Collection. Just like news-only home collection, the cost of multi-material home collection would vary with market prices and participation rates. Unlike news only, multi-material collection can be operated only at an additional cost to the solid waste rate payers. Because of this, costs were estimated on only one set of assumptions regarding participation rates and market prices. These costs were based on operating procedures, materials quantities, and productivity data from the SORT project, using the following assumptions:

- The City would be divided into five service areas
- Service includes single-family residences and duplexes (125,000 units)
- Participation rate: 30 percent
- Each collection vehicle would be capable of collection from 250 participating units per day
- Each month has twenty collection days
- Service is provided once per month
- Program cost is charged to 125,000 units
- Thirty percent, or 37,500 of the 125,000 units would participate
- Quantity of material recovered through home collection is assumed to be the same as in the SORT program (additional material was recycled outside of SORT).
- Results from the SORT program were used to determine the capacity of the collection and processing systems.

The SORT data were adjusted to reflect more probable market prices, labor costs, management costs, and promotion costs.

It is estimated that multi-material home collection service provided by the City would cost \$1.40 to \$2.30 per household per month (Table A-1). The range of costs is the result of two pay scales for drivers, swamper, and processors. The "lower" labor rates are comparable to non-Teamster union labor in local recycling industries. The "prevailing" labor rates are taken from the "Prevailing Wage Rates" schedule dated March 20, 1980 provided by the City of Seattle's Board of Public Works. Since the City of Seattle is required by law to require its public works contractors to pay the "Prevailing Wage Rate," these rates are more likely in a City-sponsored program.

This analysis is based on a participation rate of 30 percent; higher rates would increase the cost because the cost of recovering every ton of material exceeds the revenue from selling it. At 30 percent participation in a voluntary program, an estimated 9,000 tons of material would be recycled. This is about 2 percent of the total waste stream, 5 percent of all readily recyclable materials, and 9 percent of residential readily-recyclables.

A \$2.30 per month rate increase* cannot be justified on the basis of such a small amount of waste diversion. Although many citizens believe that the cost of wasting is so high that it is worth \$2.30 per month just to start reducing that waste, we doubt that the majority of Seattle ratepayers hold this views.

The cost of multi-material home collection would be more attractive if it resulted in reductions in the cost of regular garbage collection. However, to cut costs of garbage collection, recycling must reduce the garbage by enough to allow reducing the number of trucks required. Although this can be accomplished by reducing the amount of waste per stop (i.e., per household), the cost of collection is more a function of the number of stops for a given area. Without reducing the number of stops, any reduction in collection costs that could result from recycling would not be large enough or predictable enough to consider in evaluating the cost of home collection.

The cost of multi-material home collection would be substantially lower if collection of recyclables and garbage could be combined on the same truck. With the introduction of the SDC prototype, combined home collection is much closer to being a real opportunity. The prototype has demonstrated that news, bottles, cans and garbage can be collected together and that the truck appears to be of sufficient size and proportions to service the same route as a regular compaction garbage truck (based on recycling participation of 30 to 40 percent in the Exeter test). As the developers have stated, further development and on-route testing is necessary before a city like Seattle could determine with confidence the projected cost of using that truck (or a similar one) on a City-wide basis. Project A-3 is proposed to accomplish this.

*The actual rate increase could be slightly lower (less than \$0.05 per month) depending on how much money could be saved by not having to transfer and dispose of recycled material.

TABLE A-1

Projected Cost of Multi-Material Home Collection		
	At "Lower" Labor rates	At "Prevailing" Labor rates
Annual collection and processing costs (Table A-2)	\$ 1,712,500	\$ 2,562,600
Corporate overhead and profit (15 percent)	258,000	386,000
	\$ 1,970,500	\$ 2,948,600
Inflation during one-year planning and procurement period (16 percent)	317,000	473,000
less: estimated revenues (Table A-3)	(561,870)	(560,870)
Net operating costs	\$ 1,725,630	\$ 2,859,730
City's administrative and promotion costs (Table A-4)	130,000	130,000
	\$ 1,855,630	\$ 2,989,730
Start-up costs (Table A-5)	74,900	74,900
Total operating costs	\$ 1,930,530	\$ 3,064,630
Utility taxes at 9 percent of operating costs	173,700	365,800
Total program cost	\$ 2,103,230	\$ 3,430,430
Total cost per unit (125,000 units):		
Per year	\$ 16.83	\$ 27.44
Per month	\$ 1.40	\$ 2.30

TABLE A-2

Annual Costs for City-Wide Home Collection Program

	At "Lower" Labor rates	At "Prevailing" Labor rates
<u>Personnel: (including fringe benefits)</u>		
5 program managers (½ time)	\$ 60,000	\$ 60,000
5 secretary/bookkeepers (½ time)	32,500	32,500
5 foreman	100,000	100,000
14 drivers (\$10/hour incl. fringes; \$13.51 plus 40% fringes)	291,200	550,800
16 swamper (\$9/hour incl. fringes; \$13.41 plus 40% fringes)	299,500	624,800
16 processors (\$9/hour incl fringes; \$11.57 plus 40% fringes)	299,500	539,000
Equipment maintenance labor	50,000	75,000
Sub Total:	\$ 1,132,000	\$ 1,982,100
<u>Equipment:</u>		
Capital Amortization (5 years)		
14 1½-ton trucks with trailers	95,200	
210 collection bins	25,200	
14 truck/trailer litter nets	1,400	
150,000 collection bags/year	75,000	
5 metal processing systems (magnetic separator \$2,000, conveyor \$1,500, crusher \$2,000)	8,500	
5 glass processing systems (sorting table \$1,000, conveyor, \$1,500, crusher \$2,000)	4,500	
5 scales	2,500	
5 forklifts (partial use)	5,000	
Miscellaneous (10 roll-off containers, 40 tilt bins, travel costs for missed collections)	14,000	
Sub Total	\$ 231,300	231,300
<u>Operation and Maintenance:</u>		
Collection		
- fuel	\$ 32,000	
- insurance	30,000	
- parts and supplies	12,000	
Processing Equipment		
- parts and supplies	4,000	
Warehousing Equipment		
- fuel	4,000	
- repair	2,500	
- transport to market	20,000	
Sub Total	\$ 104,000	104,000

TABLE A-2 (continued)

<u>Other Direct Costs</u>		
Taxes, licenses	20,000	
Rent	30,000	
Phone	6,000	
Disposal	8,000	
Office	10,000	
Utilities	15,000	
Site improvements	25,000	
Contingency	130,000	
	<u> </u>	<u> </u>
Sub Total	\$ 244,000	244,000
	<u> </u>	<u> </u>
Total annual collection and processing costs:	\$ 1,712,500	\$ 2,562,600
	<u> </u>	<u> </u>

TABLE A-3

Revenue Estimate

• 480 lbs/unit/year* X 37,500 units =	<u>9,000</u> tons
• 2% aluminum = 180 tons X \$900/ton =	\$ 162,000
• 9% steel = 810 tons X \$86/ton =	69,660
• 41% glass = 3,690 tons X \$45/ton =	166,050
• 48% news - 4,320 tons X \$33/ton =	<u>142,560</u>
Sub Total	\$ 540,270
Beer bottles (est 27,000 cases X \$.80/case)	<u>21,600</u>
	\$ 561,870

* Based on 40 pounds per household per month, which was the average amount recycled in the SORT program. The percentage breakdown by product is also taken from the SORT program.

TABLE A-4

City Administrative and Promotion Costs

1 Public Information Person	\$ 35,000
Information costs	30,000
1 Program Coordinator	35,000
1 Secretary	20,000
Other Costs	<u>10,000</u>
	<u> </u>
	\$ 130,000
	<u> </u>

TABLE A-5

Start-up Costs
(to allow for reduced revenues in first year)

Revenues not available in first year (2/3 of \$561,870)	<u>\$374,600.00</u>
Cost per unit (125,000 units)	<u>\$ 3.00</u>
Cost per year (\$374,600 amortized over 5 years)	<u>\$ 74,900.00</u>
Cost per unit per year	<u>\$ 0.60</u>
Cost per unit per month	<u>\$ 0.05</u>

APPENDIX B

Newsprint Home Collection Analysis

Introduction. Collection of newsprint could be accomplished by putting racks on the regular collection trucks. These racks would be unloaded and dumped into a roll-off container at the transfer station or other location using a forklift. The roll-off container could then be hauled to the customer. If participation rates were high, the racks could fill up with newspaper before the main container fills up with garbage; this would necessitate putting roll-off or other containers in places where the garbage trucks could unload newspaper in mid-route.

The private sector (except for Fremont Recycling) has not undertaken news collection because of market price fluctuations; they do not want to "turn people on" (get them started in recycling), only to have to "turn them off" when the price drops so much that the product cannot be sold.

The City would have to establish a policy about what to do if news is being collected but cannot be sold. There are three options:

- o Discontinue separate collection until market demand recovers
- o Continue collection and stockpile until demand recovers
- o Continue collection and deliver unsaleable news to the landfill or energy recovery facility(ies) until demand recovers.

Discontinuing separate collection could be confusing, frustrating, and discouraging to citizens; and participation would suffer. Some limited protection from the market fluctuations can be obtained by signing contracts (probably for one year). In return for a guaranteed market and possibly even a floor price, some revenue would have to be foregone when prices are high.

Mandatory vs. Voluntary Participation. It is interesting to note that only 47 percent of SORT participants used SORT to recycle newspaper. The rest donated their news to a church or school, recycled for cash, or recycled it in some other way. (By comparison, 70 percent used SORT to recycle cans, and 87 percent used SORT to recycle glass.)¹⁸ This illustrates a factor that a home collection program would have to deal with: when prices are high, brokers and retail recyclers will raise their prices, and the public will respond to this. As a result, the City would get less material when the prices are high and more when prices are low (and even more when there is no market).

The City could influence participation by requiring citizens to recycle in one of two ways:

- o The City could require all citizens to use the City's collection service. We refer to this as Mandatory set-out; or

- The City could require all citizens to recycle, but each citizen could choose where to recycle. We refer to this as mandatory recycling.

Mandatory set-out would ensure participation rates in excess of 50 percent¹⁹ even in times of good markets; but it would deny a fund-raising opportunity to the organizations and individuals who now rely on it. Retail recyclers would also be hurt by this. Mandatory recycling would achieve an overall level of recycling approximately equal to mandatory set-out, but the level of participation in the collection service would be lower by the number of people who recycle elsewhere (e.g., donate to a church or recycle for cash).

Any mandatory program would require an enforcement mechanism. Mandatory set-out would be easier to enforce because (a) the public would understand clearly what is expected and (b) compliance could be determined by observing the recyclables when they are set out at the curb on collection day. However, it would be difficult to enforce in cases where citizens (a) do not generate any recyclables (e.g., they do not subscribe to a newspaper) or (b) do not use the service every week.

Mandatory recycling would be more difficult to enforce (a) because the public may be confused by the requirement and not totally understand what is expected of them, and (b) because non-compliance could be determined only if recyclables were found in the garbage containers. This could be done only if the garbage collectors took the time to inspect the trash as they put it in their barrels or in the trucks. This would increase the cost of collection by an undetermined, but probably large, amount.

In a totally voluntary recycling program, participation would probably fall between 20 and 50 percent.²⁰

In all cases, drop-off recycling would be reduced or may even be discontinued. This is true even if a news-only collection program is started, because news revenues are used to offset the costs of recycling glass and steel. This would be an unacceptable development. Project C-2 has been recommended to improve the economics of handling glass and steel so that drop-off centers could prosper even if newsprint is lost to home collection.

In summary, mandatory set-out would be politically unacceptable; and mandatory recycling, while politically desirable, is practically impossible to enforce. In general, it is not a good idea to pass a law that cannot be enforced. Therefore, newsprint collection should be on a voluntary basis.

Net Costs of Home Collection: News Only. The range of new cost or income from a news only collection program is presented on Table B-1, which is derived from assumptions and calculations on Table B-2 through B-4.

Depending on market price and participation rates (i.e., the percent of households participating), a news-only collection program could be a big winner or loser. The key is predicting market prices and participation rates. The market prices in Table B-1 are annual averages. In 1980, for example, prices have ranged between \$20 and \$80 per ton. If this were a typical year, average annual prices could be expected in the range of \$30 to \$40 per ton. However, no one can predict market behavior.

Participation rates on the collection program can be expected in the range of 15 to 30 percent. This is in addition to a projected 25 to 45 percent of Seattle homes that recycle elsewhere. With home collection, newsprint recycling participation is likely to be 40 to 70 percent of Seattle homes.

Participation in the SORT program averaged 11 percent (total participation averaged 23 percent, although only 47 percent of SORT participants used SORT to recycle news).*

This rate is lower than would be expected in a City-wide program because the SORT project had two handicaps that a City-wide program would not have:

- SORT could not be publicized with City-wide media because it was operated in only 20 non-contiguous test routes.
- SORT was a temporary (16-month) test program. Many people apparently did not bother to start recycling (or using SORT) because they knew it would end.

* It is likely that the reported SORT participation rate is understated because:

- Homes were counted as participating only when materials were set out for collection once a month. A home that recycled all its materials but set the material out once every two months was counted as half a home instead of one home in the average participation rate
- In cases where two neighboring homes set their recyclables out together in the same batch, the two homes were counted as one
- The survey conducted by Statistical Services, Inc., July, 1979, indicated that a significant number of people recycled through channels other than SORT.

TABLE B-1

Projected Net Income (Cost) per year of Home Collection
of Newsprint only*
(\$000)

Participation rate	Market Value per ton			
	\$20	\$30	\$40	\$50
15%	(\$81)	(\$60)	(\$38)	(\$17)
20%	(67)	(38)	(10)	19
25%	(53)	(17)	19	54
30%	(38)	4	48	90
40%	(10)	48	104	162

Note: Assumes weekly collection of newsprint using racks on garbage collection trucks.

* Net income and cost figures are calculated by subtracting annual expenditures (Table B-3) from annual revenues (Table B-2)

TABLE B-2

Annual Revenues from Sale of Recovered News
(\$000)

Participation Rate and Tons per Year Single Family and Duplex	Market Value per ton ¹			
	\$20	\$30	\$40	\$50
15%, 2,138 TPY	\$ 43	\$ 64	\$ 86	\$107
20%, 2,850 TPY	57	86	114	143
25%, 3563 TPY	71	107	143	178
30%, 4,275	86	128	172	214
40%, 5,700	114	172	228	286

1. Net of transportation costs (i.e., transportation costs paid by buyer).

2. Calculated on Table B-4.

TABLE B-3

Projected Annual Cost of Home Collection of Newspaper

Capital Costs

Truck modification:

Adding two racks per truck at
\$1,400 per truck for 80 trucks \$ 112,000

Two fork lifts 15,000

Contingency 20,000

Total 147,000

Estimated useful economic life 5 Years

Annual amortization (rounded) \$ 30,000

Operating Costs

Collection labor:

\$.10 per person for population of 500,000
(based on difference between 2 cans/
2 ordinance unit service and 4 can
4 ordinance unit service in April, 1976
garbage collection bids) 50,000

Transfer station labor (two laborers) 20,000

Contingency, about 20 percent 14,000

Sub Total \$ 114,000

Utility Taxes 9% 10,000

Total projected annual capital and operating costs \$ 124,000

TABLE B-4

Estimated Recovery (in tons per year) of Newspaper
for Different Rates of Participation
from Single Family Homes and Duplexes

Pounds of Newspaper generated per household per month ¹	19
	X <u>12</u>
Pounds of newspaper generated per household per year	228
Times: Number of households	<u>125,000</u>
Total pounds of residential news generated per year	<u>\$28,500,000</u>
Total tons of residential news per year	<u>14,250</u>

Estimated recovery (tons per
year) by participation rate:

15%	2,138 ²
20%	2,850
25%	3,563
30%	4,275
40%	5,700

1. Please note that the tonnage figures are based on data from the SORT program, in which each household generated 40 pounds of recyclables per month; newspaper was 48 percent of this, or 19 pounds per month. It is important to remember that this was a voluntary program; and, as stated earlier, only 47 percent of SORT participants used SORT to recycle newspaper. If residents had been required to use the SORT program, the amount of newspaper recycled through the program by each household would have been greater.

2. i.e., 14,250 times 15 percent equals 2,138 tons per year.

APPENDIX C

Recycling System Demonstration: Supporting Information

The Scope of Work will include research, concept development and evaluation, concept selection, preparation of a request for proposal, development of proposal evaluation criteria, proposal solicitation, selection and award of contracts for the design, construction and operation of glass and steel can buy-back and drop-off demonstration systems.

The research and study phase will be limited to the recycling of glass and steel cans. The basic function of this study will be to determine the amount of material to design the system for, the price to be paid and to identify problems and risks. The market study will look at various markets for the recycled glass and steel cans. Market requirements for product quality, quantity, and material form will be determined to establish the design of the recycling process and technology. Much of the data for the research and market study phase will come from data documented in the SORT program and other studies documented in the Recycling and Waste Reduction Strategy Report.

The technology study will include a review of technological systems and equipment for glass and steel can recycling. The five following areas of technology will be studied:

1. Collection of recyclables. (Excludes home route collection, but does include collection from drop-off and collection within the recycling center.)
2. Separation of materials. (Includes sorting for different materials and colors.)
3. Processing of materials. (Includes chemical and/or physical actions on a single material.)
4. Storage of products.
5. Distribution of products to various markets.

Items of technology methods which will be studied for both present proposed operation and for future expanded operation.

The economic study will include the two basic areas of economic feasibility and financial split of the proposed demonstration project. The financing split would determine what items or percent would be paid by the City of Seattle and what items or percent by the proposer.

After the study phases, the concept development would begin. This development would take the results of the studies and arrive at several alternate concepts for collecting, separating, processing the recyclable material and transporting the product to the market.

Concurrently with the study and the concept development phases, the evaluation criteria would be evolving. This criteria would be used for evaluation of concept alternatives, the selected alternative concept, and finally the bidders' proposals. The criteria would include the areas of technology, financial feasibility, adaptability to future home collection system, proposer management, environment, long term benefits to the recycling industry, and the potential for increasing the recycling of glass and steel cans.

In summary of the studies, concept alternatives, concept selection, and recommendations will be reported. After the report is reviewed, revised, and approved, a request for proposal will be prepared. This request for proposal will solicit proposals from bidders interested in the demonstrations. When bids are received, tabulated, and evaluated, the most attractive proposals will be selected. Negotiations with the contractors will produce contracts that can be awarded for the design, construction, and operation of the demonstration centers for a buy-back system and a drop-off system.

Program Costs

a. Cost elements: administration

1. Project Management		
	One Program Coordinator III (30% time)	\$ 3,795
	Benefits and office expenses at 72%	<u>2,732</u>
		<u>\$ 6,527</u>
2. Preliminary engineering		<u>\$ 26,000</u>
3. Monitoring and data collection Three months' work		<u>\$ 6,800</u>
4. Technical advisory committee expenses		
	Travel for 3 recyclers for 3 visits to Seattle @ \$250	<u>\$ 2,500</u>

Annual Administrative Costs by Year

	<u>1</u>	<u>2</u>	<u>3</u>
Project Management	\$ 6,527	\$ 6,527	\$ 6,527
Preliminary engineering	26,000	—	5,000
Monitoring & data collection *	6,800	6,800	6,800
Technical advisory committee	<u>2,500</u>	<u>—</u>	<u>2,500</u>
	<u>\$41,827</u>	<u>\$ 13,327</u>	<u>\$ 20,827</u>

b. Cost elements: contracts

The data below indicate the approximate costs and types of expenditures contemplated in this project. These data are presented for information purposes only; an appropriation will be requested on the basis of the engineering to be done in Phase I.

Buy-Back Glass and Steel Handling System Costs

Glass handling system

Conveyance	\$ 1,000	
Scale	3,500	
Hoppers (3)	1,500	
Hydraulics	1,000	
Taxes	<u>500</u>	\$ 7,500

Steel Can handling system

Per vendor price sheet, including taxes	10,200
Electrical service	1,100
Installation	3,200
Other (business interruption, insurance, taxes)	<u>10,000</u>
	<u>\$ 32,000</u>

* At three intervals: before the new equipment is installed, after the new is installed, and again after the plant modifications, if any, are completed.

Drop-Off Glass and Steel Handling System Costs

• 5 sites, 10 containers each @ 150/ container		\$ 7,500
• Glass processing	\$ 9,500	
• Steel processing	9,500	
• Hydraulic loading/unloading on truck	<u>5,000</u>	24,000
• Other (business interruption, taxes, insurance)		<u>10,000</u>
		<u>\$ 41,500</u>

APPENDIX D

Methodology for Table 2

In 1978, a total of 570,000 tons of commercial and residential solid waste was disposed of in Seattle (Column 3, Table 2). Of this amount, 360,000 tons were transported to the City landfills and 210,000 tons were delivered to the Tulalip landfill by Marine Disposal. (See breakdown in the footnotes on Table 1).

Numerous manufacturers and recycling brokers in the private sector were contacted in an attempt to determine the tonnage of recyclable material that was handled in Seattle in 1978. Precautions were taken to ensure no duplication occurred in calculating the total amount of recycled material. Quantities that were reported by manufacturers were corroborated, to the extent possible, by recycling centers who delivered their material to them. Because the firms contacted were assured that their figures would remain confidential, a breakdown of the aggregate tonnage of recycled material (listed in column 2) cannot be provided.

The total amount or "Generated" material (total gross discards) was determined by adding the total "Recycled" tonnage plus the tonnage of total waste "Disposed of" in Seattle. This total was estimated to range from 652,000 to 657,000 tons for 1978. The individual figures in the first column of Table 2, titled "Generated" were calculated by using EPA estimates of national gross discards for each material as a portion of the total gross discards. Percentages of the total gross discards were determined for each material listed. Other methods were also used to corroborate the EPA-based estimates for newspaper, glass, aluminum and tin cans. Regional differences in composition were estimated in determining high grade and corrugated/ boxboard paper because of the lack of other methods available to support the EPA estimates. Listed below by material is an itemized explanation of how each of the figures in column 1 were calculated.

NEWS

Based on national averages, EPA estimated newspaper comprises 6.5 percent of the total municipal (post-consumer) waste generated. Using this percentage for the Seattle area would yield an annual newspaper generation of 42,500 tons.

This figure was corroborated by contacting the two major newspapers in Seattle and estimating the tonnage of newsprint used in Seattle. This was accomplished by using total tonnage used, in-city circulation, and newsstand estimates to determine in-city tonnage of newsprint consumed. The paper industry estimated that 12.2 percent of the total newsprint consumption would be classified as local papers (i.e., weekly, ethnic, clubs, religious and advertisements printed on newsprint). Accounting for a small percentage of imported papers, the total newspaper generation amounted to 42,000 tons yearly.

CORRUGATED AND BOXBOARD

The national EPA estimate for corrugated and boxboard paper is 13.2 percent of the total gross discards. Using this percentage for the Seattle area would yield an estimated annual corrugated and boxboard generation of 86,000 tons. To adjust for regional differences in composition, a range of 86,000 to 90,000 tons was used for Seattle.

HIGH-GRADE PAPER

The national EPA estimate for high-grade paper is 4.6 percent of the total gross discards. Using this percentage for the Seattle area would yield an estimated annual high grade generation of 30,000 tons. A local estimated range of 30,000 to 35,000 tons was used for Seattle.

GLASS (bottles and cullet)

The national EPA estimate for glass containers is 9.2 percent of the total gross discards. This would yield an estimated annual glass container generation of 60,000 tons for Seattle. Another method was available to corroborate the EPA estimate for glass containers generated. The Glass Packaging Institute estimated 10 to 11 percent of the municipal waste stream would be categorized as glass. Of this amount, approximately 90 percent are estimated to be containers. When adding this figure to the amount of recycled glass containers, a gross discards estimate can be calculated. This estimate would yield an upper limit of 65,000 tons of glass containers generated in Seattle.

ALUMINUM (cans and foil)

The national EPA estimate for aluminum cans and foil is .54 percent of the total gross discards. This would yield an estimated 3,500 tons of aluminum cans and foil annually generated in Seattle. Two major aluminum manufacturers, Reynolds and Kaiser Aluminum Co. roughly estimated the total statewide distribution of aluminum cans at 15,200 tons. Multiplying this figure by a population ratio of 14 percent for Seattle, yields an annual generation of 2,100 tons of aluminum cans. The remainder of the 3,500 tons of the EPA estimate would then be classified as foil.

"TIN" CANS

The national EPA estimate for tin cans is 2.3 percent of the total gross discards. This would yield an estimated annual tin cans generation of 15,000 tons for Seattle. The American Can Corporation estimated 75 percent of the ferrous metal disposed of in the residential waste stream to be tin cans. Adding this quantity to the amount of recycled tin cans would yield approximately 11,000 tons of residential tin cans in the municipal waste stream. Because a large portion of the tin cans in the municipal waste stream originate in the residential area, the 11,000 tons figure would determine the lower part of the range.

WHITE GOODS (major appliances)

The national EPA estimate for white goods is 1.4 percent of the total gross discards. This would yield an estimated annual white goods generation of 11,000 tons for Seattle.

APPENDIX E

Discussion of the Bi-Metal Can Problem

The bi-metal beverage can is difficult to recycle in Seattle and is a problem for recycling operations.* Many consumers have difficulty distinguishing bi-metal cans, especially the two-piece type, from all-aluminum or tin-plated steel cans. As a result, they take bi-metal cans to recycling centers. Recyclers have adjusted to this by adding manual or mechanical sorting operations, which result in disposing of most bi-metal cans.

Because the bi-metal can is so difficult to recycle, is so confusing to the consumer, and, at best, is an inconvenience for the recycler, the City Council's Citizens Solid Waste Advisory Committee, in its April 28, 1978, letter to the City Council, recommended that "the sale of beverages in bi-metallic cans should be prohibited." In August, 1978, the Washington State Recycling Association (WSRA) requested Mayor Royer to sign a petition to the manufacturers and fillers of bi-metal beverage containers to take their products off the market.**

In November, 1978, Mayor Royer wrote to the steel industry to express his intention to defer signing the petition as long as reasonable progress is made in pursuing alternatives to taking the bi-metal beverage can off the market, including:

- o Developing an easy-open, all-steel can
- o Developing a market for recycling bi-metal cans
- o Developing a processing system to meet the specifications of Bethlehem Steel's Seattle plant for recycling bi-metal cans.

The Mayor asked the industry to keep him informed about the status and progress made in R & D and marketing efforts.

Since then, there have been several communications between industry and the City. The industry has made no progress in developing an all-steel, easy-open can. The only market for bi-metal cans is in Utah, and the market price is too low to justify the costs of collection, processing, and transportation. The market value is also too low to pay for the processing needed to meet Bethlehem Steel's requirements.

Unlike the case for many non-recyclable products, it is apparently very easy for bi-metal can users to switch to all-aluminum cans. At least one brewery, Anheuser-Busch, Inc., uses both cans for its Natural Light product. The General Brewing Company, which makes Lucky Lager, used bi-metal cans before the Initiative 61 campaign began, then switched to aluminum cans during the campaign, and then switched back to bi-metal cans after the election.

* The bi-metal food can (used for peanuts, for example) in which the entire aluminum top is removed, is recyclable and is not the subject of this discussion.

** WSRA subsequently abandoned the petition effort when they had to shift their resources to fight Initiative 61.

In terms of the City's long-term interests, the strategy is to increase recycling of tin-plated steel cans. To do this, every effort must be made to deliver the highest quality material to the recycling market. This is impossible if the bi-metal can will always be there to contaminate the product.

The options available to the City to deal with bi-metal cans include:

1. Prohibition of bi-metal beverage containers in Seattle.
2. Consumer information to discourage the purchase of beverages in bi-metal cans.
3. Consumer information to educate the public to recognize and dispose of bi-metal cans.
4. Voluntary industry program to persuade corporate buyers of bi-metal cans (distributors, bottlers, grocers, brewers, etc.) not to buy bi-metal cans.
5. Do nothing.

A prohibition on bi-metal cans would be relatively simple to understand and enforce. Retailers in Seattle would be required to specify recyclable containers when purchasing beer and soft drink containers, and it would be illegal for retailers to sell beverages in bi-metal cans. Bi-metal cans would be easy to detect. The penalty would be that the retailer would be required to return the product to the distributor. If the retailer had specified recyclable containers, the distributor would have to pay the shipping costs. A fine would be imposed for repeated violations.

If prohibition were imposed, the adverse impact on the industry would be negligible, especially in Washington State. The bi-metal cans sold in Washington State are made by a California plant of Crown Cork and Seal Company, Inc. Only a few local bottlers (Alpac, which bottles Pepsi and 7-Up, General Brewing Co., and Blitz-Weinhardt) use bi-metal cans. No jobs would be lost in Washington State, and it is doubtful that any jobs would be threatened anywhere else. There would be no impact on retailers (other than adding to their purchasing requirements) or consumers because they would still be able to sell and buy the same products in convenience packages. Furthermore, eliminating the bi-metal can would simplify the recycling of cans, which would increase consumer participation and reduce the costs of handling recyclables.

The industry would object to a prohibition, or even to an information program, for three reasons:

- o they fear it would set a precedent that would hurt them elsewhere even if it did not hurt them significantly in Seattle (Bethlehem Steel Corp. and the United Steelworkers have expressed this point)
- o they do not like government interference
- o they are working on alternatives.

In response to those arguments, a prohibition could be justified in Seattle because of the lack of recycling markets. This would not set a precedent in cities that can recycle bi-metal cans. Otherwise, they may be correct that a precedent would be set; however, this is not necessarily bad for the community as a whole. Government interference is one way to view a prohibition; another view is that it is a collective expression of consumer preference to achieve what individual consumers cannot achieve by themselves. The recycling survey indicated that 51 percent majority of citizens who recycle would support a prohibition against non-recyclable materials such as bi-metal cans.²¹ Regarding the last point, the industry has not demonstrated that there are any alternatives in sight.

On the other hand, government regulation is a serious measure to be used only to solve a serious problem. And, while bi-metal cans are a problem, prohibiting them should be done only if there is a clear mandate to do so.

The bi-metal can problem is not judged to be so serious as to justify a regulatory solution. For this reason, a voluntary approach is recommended. The use of the regulatory approach may be reconsidered if voluntary measures fail.



Northwestern Glass

An Indian Head Company

5801 East Marginal Way South
Seattle, Washington 98134
Telephone (206) 762-0660

May 27, 1980

Dear Recycler:

We have completed the evaluation of our cullet program which began last October. The extended period of time spent on the project has allowed us to develop a thorough understanding of the region's recycling activity. Input from the local recycling industry and government at our meeting April 9, and through verbal and written correspondence over the past few months, has proved to be valuable in helping us shape our new cullet policy.

Attached for your information is a description of NW's new cullet purchasing policy, which will become effective June 1, 1980. This description includes information on our revised cullet price structure, specification requirements and delivery, weighing and payment procedures. A second phase of the program will include the implementation of an incentive program for major cullet suppliers on July 1, 1980. The details of this incentive are covered under paragraph I "B" of the cullet program. We are proceeding to compile data from 1979 cullet receipts, which will serve as the "base" for qualifying recyclers for the period July 1, 1980 through June 30, 1981.

The objective of our new cullet program is to--at a minimum--double the flow of high quality cullet to our plant while at the same time minimizing our bookkeeping and yard labor costs, which support the program. In this regard, it is our intent to promote the delivery of fewer and larger loads of cullet to the maximum extent possible. This should also help control your costs due to increased transportation economies of scale and reduced traffic at our plant.

We hope that our new cullet policy can further assist you in meeting your business objectives. We look forward to continuing our relationship with your organization in the future.

Very truly yours,


H. Ray Logney
President

Att.

NORTHWESTERN GLASS

CULLET PROGRAM

I PRICE STRUCTURE

- A. Effective June 1, 1980, the base price for recycled container glass will be \$35 per ton for single loads of 3,000 lbs. or more.

The base price for recycled container glass will be \$25 per ton for single loads under 3,000 lbs.

Freight allowances* will be paid, as follows:

1. 0 - 25 miles	\$0
2. 25 - 50 miles	\$3/ton
3. 50 - 150 miles	\$5/ton
4. 150 miles or more	\$8/ton

B. INCENTIVE PROGRAM

Qualify: Recycler that delivered a minimum of 250 tons to Northwestern during the past year (6/30/79 - 7/01/80).

Payment of Incentive:

- Increase in tons over individual recycler's supply to Northwestern in prior year.
- Payment of \$10 per ton for each ton in excess of prior year's tonnage.
- Payments will be in one lump sum 45 days following the close of the current year (e.g., payment for period 7/01/80 - 6/30/81 will be made on August 15, 1981 after an audit has been completed by NW).

A cost/benefit analysis will be made of this program at the end of each year to determine its effectiveness in generating additional recycled glass for Northwestern.

Prices are subject to change at any time solely at the discretion of NW.

* To qualify for a freight allowance, it is mandatory that NW has on file the correct mailing address of your recycling operation. Northwestern reserves the right to verify distances from points of operation to our plant.

II QUALITY SPECIFICATIONS & REQUIREMENTS

Northwestern accepts only clean, color-sorted cullet (container glass).

- Each load will be inspected for color and assurance that it is free of contaminants (metal, trash, refractory materials, etc.).
- Evidence of moisture will be assessed and, if judged excessive, the load will be rejected or the tonnage will be reduced.
- A record will be made of all loads that contain moisture, indicating the percentage assessed.
- Organic materials (wood, plastics, etc.) shall not exceed an estimated 1 lb. per 1000 lbs. of cullet.
- Loads of cullet containing ferrous materials (iron) will be rejected (no pieces).
- If three pieces of refractory materials (stone, brick, pottery) are observed in any load, it shall be rejected; if two pieces are found, the load will be held for examination before dumping.

III DELIVERY SCHEDULES

- Loads in excess of 3,000 lbs. will be accepted for delivery as follows:
Daily (except Sundays): 7 - 11 a.m.; 1 - 4 p.m.
- Loads of less than 3,000 lbs will be accepted for delivery as follows:
Tuesdays: 7 - 11 a.m.; 1 - 4 p.m.
Saturdays: 8 - 4 p.m.
- Advance notice will be given, when feasible, when cullet will not be accepted, i.e., during a plant shutdown for repairs, work stoppage, etc.
- The responsibility of unloading cullet rests solely with the recycler; NW does not provide manpower or equipment for unloading.

IV WEIGHING PROCEDURES

- Northwestern's scale can only accommodate vehicles whose front and rear wheels are no more than 20 ft. apart, and those carrying loads of no more than 30,000 lbs. The vehicle is first weighed with the load of cullet, to arrive at a gross weight; then, the cullet is unloaded and the truck is weighed empty, to arrive at the net weight.
- Vehicles that cannot be accommodated at NW must go to a certified scale for the same weighing procedure set forth above; the weigh slips must have the City seal affixed or they will not be accepted.

V PAYMENT PROCEDURES

Checks will be issued once a week for all cullet purchases. Checks are mailed to address on weigh slips or on file with Northwestern Glass. (To prevent errors or delay in receiving checks, print name and address plainly.)

VI IMPLEMENTATION SCHEDULES

- A. The base price increase will become effective June 1, 1980.
- B. The incentive program will be based on deliveries beginning July 1, 1980 and extend through June 30, 1981.

APPENDIX G

NORTHWESTERN GLASS CULLET SUPPLY PROFILE

Category (Tons per Load)	June 1979		TONS		Average Tons/Load
	LOADS		Number	Percent	
	Number	Percent	Number	Percent	
<u>Seattle Sources</u>					
Public (up to 1/4 ton)	50	12	10	1	0.20
Route recyclers, small recycling programs, civic groups (1/4 to 3 tons)	196	45	157	16	0.80
Large recyclers (3 tons & over)	25	6	184	19	7.36
Seattle Engineering	2	--	22	2	10.97
Commercial	<u>40</u>	<u>9</u>	<u>288</u>	<u>23</u>	5.7
Subtotal	<u>313</u>	<u>72</u>	<u>601</u>	<u>62</u>	
<u>Outside Seattle Sources</u>					
Public (up to 1/4 ton)	17	4	3	neg.	0.15
Route recyclers, civic group, small recycling programs (1/4 to 3 tons)	63	15	70	7	1.12
Large recyclers (3 tons & over)	35	8	241	24	6.89
Commercial	<u>5</u>	<u>1</u>	<u>68</u>	<u>7</u>	13.7
Subtotal	<u>120</u>	<u>28</u>	<u>382</u>	<u>38</u>	
TOTAL	<u>433</u>	<u>100</u>	<u>983</u>	<u>100</u>	

Source: Northwestern Glass.

APPENDIX H

MRI Corporation Steel Can Supply Profile
Sources of Steel Cans Recycled in Seattle, 1976 - 1980

January 23, 1980

Price Paid:*	1976	1977	1978	1979	1980*
Small load:	--	37.50	40.00	51.08	82.00
Large load:	30.00	38.90	59.30	76.33	--
Tons Delivered Washington					
Seattle Solid Waste Utility	--	84	35	42	Highly contaminated loads received the lesser price. Price varied.
Commercial accts. (fish canning plants)	49	114	184	145	
Churches	--	--	3	14	
Schools (UW)	16	22	29	26	
Recyclers, individuals**	41	82	106(23)	192(45)	Amount in parenthesis from Seattle Recycling, Inc. includes SORT Tonnage.
TOTAL	107	302	357	419	
Oregon	26	106	364	368	
Idaho	--	--	--	10	
British Columbia	--	26	90	57	
TOTAL	133	434	811	854	

* Price paid is per long ton of material (2,250 lbs). In 1977, the price was modified so that groups delivering loads of over 10,000 lbs. were paid the greater amount. The lesser amount was paid for smaller loads.

** Individuals were unidentified and may have been recyclers.

Source: MRI Corporation

APPENDIX J

RECYCLING CENTERS AND PICK-UP SERVICES IN SEATTLE
Summer, 1980

FULL-LINE SERVICES	Number of Locations by Material													Type of Service			Pick-up Service				
	CLIENTELE	Newspaper	Corrugated	High Grade	Mixed Grade	Magazines	Glass for Cullet	Refill. Beer Bottles	Aluminum Scrap	Aluminum Cans	"Tin" Cans	Ferrous Metal	Non-Ferrous Metal	Oil	Auto Batteries	Retail	Drop-off Attended	Drop-off Unattended	Pick-up (public) ^a	Pick-up (commercial)	
Ballard Recycling	P	1*								1*						1					
Conbela	B	1*	1	1*	1	1	1		1	1	1					1					
Fremont Recycling Station #1	P	2				1	2		2	2							1	1			1
North Transfer Station	P	1				1	1		1	1	1						1	1			
Northwest Reclamation ^b	P	1*							1*	1*	1					1					
Peter's Recycling	P	1					1		1	1							1	1			1
Rainbow Recycling ^c	P	1*/6				6	6	1*/6	1*/6	1*/6	1*/6			1	1*	1**		6			
Seattle Recycling, Inc. ^d	B	3*	1*	3*		3	3	3*	3*	3*			3*	1	3*	3					
Six-Pak City	B	1*	1				1	1*	1*	1*			1	1*	1	1					
South Transfer Station	P	1					1		1	1	1						1				1
Union Gospel Mission	P	1	1				1	1	1	1	1										
West Seattle Recycling Center	P	1*/1	2	1*/1	2	2	2	1*/1	1*/1	1*/1	2	1*/1	1*/1	2	1*/1	1	1	1			
Total Full-Line		22	6	6	3	13	19	20	11	22	19	3	7	5	8	9	2	11			3
Total Pay (included in above figure)		9	1	5				8	7	8	5	4	4		6						

* indicates the center pays for recyclables.

** included in six "drop-off--unattended" but does pay for some recyclables two days per week.

6/30/80

RECYCLING CENTERS AND PICK-UP SERVICES IN SEATTLE
Summer, 1980

APPENDIX J (continued)

SPECIALTY SERVICES	Number of Locations by Material													Pick-up Service							
	CLIENTELE	Newspaper	Currgated	High Grade	Mixed Grade	Magazines	Glass for Cullet	Refill, Beer Bottles	Aluminum Scrap	Aluminum Cans	"Tin" Cans	Ferrous Metal	Non-Ferrous Metal	Oil	Auto Batteries	Retail	Drop-off Attended	Drop-off Unattended	Pick-up (public) ^a	Pick-up (commercial)	
Bloch Steel Industries	B							1*	1*	1*	1*	1*	1*		1*	1					
Bethlehem Steel	W									1		1				1					
Chemical Processors	W													1*		1					
CIMS Corporation	B	1*														1					1
Ideal Paper Stock	W	1*	1	1*	1*	1*		1*	1*	1*	1*				1						1
Independent Paper Stock	B	1*	1*	1*	1*	1*									1						1
J. Washington Company ^e	W	1*		1*	1*										1						1
Liquid Waste Disposal	W													1*		1					1
Maralco	B							1*	1*							1					
MRI. Corporation	W									1*						1					
Northwest Steel Rolling Mills	W										1*					1					
Northwestern Glass Company	B						1*									1					
Pacific Iron & Metal	B							1*	1*	1*	1*	1*	1*		1*	1					1 1
Premium Distributors	B								1*	1*						1					

* indicates the center pays for recyclables

APPENDIX J (continued)

SPECIALTY SERVICES, continued	Number of Locations by Material													Pick-up Service							
	CLIENTELE	Newspaper	Currgated	High Grade	Mixed Grade	Magazines	Glass for Cullet	Refill, Beer Bottles	Aluminum Scrap	Aluminum Cans	"Tin" Cans	Ferrous Metal	Non-Ferrous Metal	Oil	Auto Batteries	Retail	Drop-off Attended	Drop-off Unattended	Pick-up (public) ^a	Pick-up (commercial)	
Rainier Brewing Company	B							1*	1*							1					
Reynolds	B								11*							11					
Seattle Iron & Metal	B								1*	1*	1*	1*	1*	1*	1*	1					
Southend Recycle	P	1	1					1			1					1					1
Sternoff Metals	B								2*	2*		2*				2					
Thermoguard Insulation	B	1*														1					1
United Drain Oil	W													1*		1					
University of Washington Center	P	1	1	1												1					
Variety Clubs ^f	P	50															50				
Western Fiber Resources	W	1*	1*	1*	1*											1					1
Weyerhaeuser ^g				1*												1					1
Total Specialty		58	4	6	5	2	1	3	7	20	3	6	5	4	3	34	1	50	2		9
Total Pay (included in above figure)		6	2	5	4	2	1	2	7	20	2	4	5	4	3						
GRAND TOTAL (full-line + specialty)		80	10	12	8	15	20	23	18	42	22	9	12	9	11	43	3	61	5		9
GRAND TOTAL PAY		15	3	10	4	2	1	10	14	28	7	4	9	4	9						

* indicates the center pays for recyclables

APPENDIX J (continued)

HOME PICK-UP SERVICES IN SEATTLE
Summer 1980

HOME PICK-UP SERVICES	Materials Accepted													Pick-up Service						
	CLIENTELE	Newspaper	Corrugated	High Grade	Mixed Grade	Magazines	Glass for Cullet	Refill. Beer Bottles	Aluminum Scrap	Aluminum Cans	"Tin" Cans	Ferrous Metal	Non-Ferrous Metal	Oil	Auto Batteries	Retail	Drop-off Attended	Drop-off Unattended	Pick-up (public)	Pick-up (commercial)
Community Recycling Service		X						X	X	X	X								X	
Fremont Recycling Station #1		X					X	X	X	X							X	X	X	
Peter's Recycling		X					X	X	X									X	X	
St. Catherine's Church		X						X	X										X	
Southend Recycling		X										X							X	
Union Gospel Mission		X						X	X										X	
Total Home Pick-Up Services		6	1				3	5	5	2	1				1	2	2	6		

NOTES TO APPENDIX J

- a. This column was included here to illustrate the full range of an organization's activities. Any center with a home pick-up service will also be included under the sub-title "Home Pick-Up Service."
- b. Northwest Reclamation serves much of south Seattle although it is actually located in White Center.
- c. Rainbow Recycling operates six unattended drops, one of which is also a retail center which buys recyclable materials two days per week.
- d. Seattle Recycling, Inc. has three retail centers of which two are mobile units located in north Seattle and are open for business only once a month.
- e. J. Washington serves Seattle although it is located in Lynnwood.
- f. Variety Club drop-off bins are located on Safeway lots throughout the city.
- g. Weyerhaeuser picks up high grade paper in the Seattle area but has a main office location in Kent.

W: Wholesale (accepts large quantities only).

P: Open to public

B: Both wholesale and open to the public.

APPENDIX K

Energy Savings in Recycling

Table K-1

Energy Used in Manufacturing Glass Using Cullet

Energy Used (Million Btu per ton of Glass Product)

	No Cullet	20% Cullet	50% Cullet	100% Cullet
Mining & Transportation	2.07	1.66	1.04	--
Manufacturing				
• Furnace	5.88	5.70	5.44	5.00
• Other	<u>5.54</u>	<u>5.54</u>	<u>5.54</u>	<u>5.54</u>
TOTAL	<u>13.49</u>	<u>12.90</u>	<u>12.02</u>	<u>10.54</u>
Percent Energy Saved*	--	<u>4</u>	<u>11</u>	<u>22</u>

* Compared to manufacturing glass using no cullet; excludes energy used in recycling collection, processing and transportation.

SOURCE: Energy Analysis of Secondary Material Used in Product Manufacture, State of California Solid Waste Management Board, 11/79, p. 33-34.

TABLE K-2

Comparison of Energy Consumed in Recovery Alternatives

Activity	Energy Consumption* (10 ⁸ btu per ton)
• Drop-off by citizen at recovery operation assuming a 5-mile round trip, 16 miles per gallon, and delivery of 35 lbs/month of recyclables.	2.23
• Drop-off by citizen at recovery operation assuming a 2-mile round trip, and an expenditure of 0.03 X - 10 ⁸ btu/ton for collection by a recycling vehicle (truck).	0.92
• Separate Curbside Collection by a vehicle other than the refuse collection vehicle (collection only).	0.23
• Integrated Curbside Household Collection of recyclables by the refuse collection vehicle.	0.00**

* In addition to the energy required to collect and dispose of non-recyclable solid waste.

** Although consumption of energy by the refuse collection vehicle would be increased slightly due to increased time required to collect and load/unload recyclables, this would be offset by some savings in transport to the disposal site. It is therefore assumed to be the same as solid waste collection.

SOURCE: Energy Analysis of Secondary Material Use in Product Manufacture, State of California Solid Waste Management Board, November, 1979, p. 18.

TABLE K-3

Net Energy Used in Recycling Post-Consumer Glass Cullet
by Recovery Method

	Energy Used by Recovery Method (Million Btus per ton of Glass Product)		
	Recycling Center ¹	Neighborhood Center ²	Home Collection
Recovery	2.230	.920	.230
Processing and Transportation ³	.106	.106	.106
Manufacturing at 50% Cullet use (see Table 7)	<u>12.020</u> <u>14.356</u>	<u>12.020</u> <u>13.046</u>	<u>12.020</u> <u>12.356</u>
Manufacturing Using no Cullet	<u>13.490</u>	<u>13.490</u>	<u>13.490</u>
Energy Savings (cost)	<u>(.866)</u>	<u>.044</u>	<u>1.134</u>
Percent Energy Savings (cost)	<u>(6.4 %)</u>	<u>3.2 %</u>	<u>8.2 %</u>

1. Assumes drop off by citizens traveling 5 miles round trip.
2. Assumes drop off by citizens traveling 2 miles round trip.
3. Color sorting, crushing, and containerizing, and transport to glass manufacturing plant 10 miles round trip.

FOOTNOTES
(For all three volumes)

1. Source: Puget Sound Council of Governments
2. Fourth Report to Congress: Resource Recovery and Waste Reduction, U. S. Environmental Protection Agency, 1977, P. 17.
3. Ibid., p. 21. (Hereafter; EPA Report to Congress)
4. Keller, Richard, How to Establish a Recycled Paper Purchasing Program: A Manual for State and Local Governments, Maryland Department of Natural Resources, January, 1980, p. 2.
5. EPA Report to Congress, p. 33
6. Statistical Services Incorporated, Recycling Behavior and Motivation in the General Seattle Population and "SORT" Area Residents for the City of Seattle Recycling and Resource Recovery Program, September, 1979, Volume I, page 3. (Hereafter: SSI Survey).
7. Discussion with Gifford Stack, Fibres International, Inc., January 4, 1980.
8. Page Talbot, Conservation and Economic Efficiency, Resources for the Future, 1979.
9. Resource Planning Associates and Franklin Associates, Proposed Industrial Recovered Material Utilization Targets, U.S. Department of Energy, May, 1979, pp. IV 9-11. (Hereafter: RPA and Franklin.)
10. ICF, Inc., Estimates of the Elasticities of Secondary Materials Substitution and Supply, January, 1979, Executive Summary, p. 41.
11. RPA and Franklin.
12. Ibid., p. 7.
13. ICF, p. 40.
14. SSI Survey, p. 3.
15. SSI Survey, Volume II, P. 25.
16. SCS Engineers, Seattle Solid Waste Pilot Program: Source Separation and Variable Rate, Final Report, January, 1980, p. 3. (This is the SORT Project.)

FOOTNOTES, continued

17. Tichenor, Richard, "Designing a Vehicle to Collect Source Separated Recyclables," *Compost Science/Land Utilization*, January-February, 1980, p. 41.
18. SSI Survey, p. 15.
19. Cohen, David, M., A National Survey of Separate Collection Programs (SW-778), U.S. Environmental Protection Agency, 1979, p. 73.
20. Idem.
21. SSI Survey, Volume III, Table 86.