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DEPARTMENT OF
PUBLIC WORKS

SOLID WASTE DIVISION

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March 20, 1990

Budget and Finance Committee
Sacramento, CA

Honorable Members in Session:

SUBJECT: Cost Estimates for Residential Curbside Collection of Recyclables

SUMMARY

This report provides information about the status of cost estimates for proposed residential curbside recycling programs in response to a request from the Budget and Finance Committee.

BACKGROUND

On November 14, 1989, staff from several departments presented to the joint committees of Transportation and Community Development a series of reports on recycling matters. One of these reports was titled "City of Sacramento Program Alternatives and Proposed Implementation Plan for Residential Curbside Recycling" in response to Council direction in Resolution No. 89-685 adopted on August 29, 1989. This report was subsequently presented to the public at two recycling educational workshops on December 7, 1989, and February 1, 1990. In addition, the report was made available to the Solid Waste Advisory Committee and its recycling subcommittee. Comments were received by staff during this time. Also, staff continued research on the subject by contacting many program operators and visiting different recycling programs. Then, staff presented an updated report to the joint committees on March 13, 1990. The joint committees approved the staff report and forwarded to the City Council a recommendation supporting staff recommendations.

The Budget and Finance Committee has since requested that staff report on the following two issues:

1. Why staff no longer submits the preliminary cost estimates for curbside programs contained in the November 14, 1989 report (a comment made during the verbal presentation to the joint committees on March 13, 1990).

2. Why staff does not accept the specific cost estimates of curbside recycling programs prepared for the County of Sacramento by their consultant, R. W. Beck and Associates.

The following sections respond to these two questions.

1. Staff Preliminary Cost Estimates

The preliminary cost estimates in the November 14, 1989 staff report were prepared cooperatively by staff in the Departments of Finance, General Services, and Public Works based on a number of assumptions. In the Financial Data section of the March 13, 1989 staff report to the joint committees, the following statement was made:

> Preliminary estimates for cost comparisons were presented in the November, 1989 staff report titled "Program Alternatives and Proposed Implementation Plan for Residential Curbside Recycling". In that report, very conservative assumptions we used and program elements recommended by other cities were incorporated. This resulted in projected costs that are high compared with costs reported by other jurisdictions. Also, many programs do not report the total program costs, but only direct operational costs after start-up. After further policy direction is given to staff, more detailed work will be required to present specific budget estimates during the upcoming budget hearings.

This was first identified as a problem when the recycling subcommittee to the Solid Waste Advisory Committee began to compare these cost estimates with cost figures reported by the County of Sacramento resulting from its analysis of private sector bids for curbside programs using 3 bins. The costs reported by the County were substantially less than those reported by the City. A closer evaluation of the cost estimate methodologies revealed differing assumptions used in the estimates. Staff from the City's Finance Department prepared an informal work sheet reconciling the two cost estimates. When comparable assumptions and methods were used, the two cost estimates were very close. This information was presented to the City's recycling subcommittee at one of its regular meetings.

In addition, the November 14, 1989 staff report cost estimates were prepared in response to the specific direction of Council Resolution No. 89-685 which referred to a pilot program serving only 25% of City residents. Since then, staff is recommending that the City implement a city-wide curbside program. When the customer base changed from 24,000 to almost 100,000 residents, the original economic analysis was no longer relevent because of the different economies of scale. The larger program will tend to make an automated collection system with greater processing look more economical. Whereas, a smaller customer base will tend to give an advantage to the manual collection systems, making them appear more economical.

It is interesting to note that the three bids received by the County for curbside collection all involved the "blue box method" and not 3 stackable bins. This indicates a strong preference in the private sector for the "blue box" system for manual collection. The County's request for bids contained the option of serving either 40,000 residents, 105,000 residents, or 145,000 residents at the County's option. City staff's research indicates that 50,000 residents is the absolute smallest number that can economically justify an automated collection system with advanced processing center.

In summary, the original staff estimates included major policy assumptions and represented serving only 25,000 residents. Therefore, the results are not appropriate to use for evaluating a city-wide system.

2. Sacramento County's R.W. Beck Reports

City staff has cooperated with the County in preparation of its Sacramento County Recycling Study in response to AB1462 which required that County Solid Waste Management Plans include a goal of recycling 20% of the waste stream. The County hired R. W. Beck and Associates to prepare a report identifying alternative strategies for meeting this goal county-wide (towards the end of this study, AB939 was passed mandating 50% recycling by the year 2000). The Final Report was dated October, 1989, and presented to the Sacramento County Board of Supervisors on December 5, 1989. The report contained information on a wide variety of waste management and recycling issues of which residential curbside collection was only one minor component. The report discussed in general terms the alternative methods of curbside collection, but it did not make a specific recommendation. Attached is a copy of pages 5-4 through 5-11 of the October, 1989 Final Report where this is discussed. It is important to note that when this report was written, the Phoenix six-month pilot program report and program statistics on Seattle's program demographics and customer opinion surveys were not yet available. This recently available data was used by City staff in preparation of staff reports.

R. W. Beck has submitted two letter reports to the County dated February 16 and March 1, 1990. Both letter reports are labelled for internal use only and were not available for City staff review until very recently. The first letter report presents cost comparisons of curbside collection by 3 stackable bins and 90 gallon cans in a program to serve 145,000 residents. The second letter report compared the costs of the 3 stackable bin method with the "blue box" method.

City staff has reservations about the cost estimates prepared by R. W. Beck in these two letter reports. Since they were so recently made available to us to review, we have not been able to examine them thoroughly, or to question County staff or R. W. Beck about our interpretation of the cost tables. Therefore, any initial observations about these reports must be confirmed in discussions with the County. However, we note the following areas of concern in the February 16, 1990 letter report:

- It appears that the cost estimates compared weekly collection of 3 stackable bins with weekly collection of 90 gallon containers instead of monthly collection proposed by City staff. Thus, the operating costs of collection for the automated system should be about 1/4 of that reported.

- The estimate shows the manual collection system productivity at 432 pick-ups per day and the automated system productivity at only 400 per day. Our automated garbage collection vehicles collect an average of over 600 cans per day and has greater load capacity than manual recycling vehicles. With automated recycling service at once per month, one automated truck could service about 24,000 residences compared to 4,000 for weekly 3 bin service.

- The same replacement rate of 3% is used for both container types. Our experience with 90 gallon garbage containers is less than a 1% replacement rate; 1/2% would be very conservative. On the other hand, the stackable bins are made of a less durable plastic material and have a high theft rate because of their usefulness for other purposes. Research in trade journals indicates 5% is a good estimate for replacement of 3 stackable bins.

- Revenue from materials collected is based on the same materials and quantities in both systems. There was a penalty given to the automated system based on assumed contamination rates and corresponding less revenue. However, no provision was made to account for the anticipated greater quantities and types of materials that may be collected in the large containers in the future as noted in the Beck Final Report on page 5-5 which states that the automated system could double or triple the materials collected depending on market conditions.

- The cost of processing the recyclables collected was not addressed at all in the Beck estimates. It is generally agreed that automated collection of commingled recyclables will require more expensive processing than the 3 bin system, although the cost differential is narrowing. Any cost comparison of systems should take this into consideration.

- The Beck estimate shows the manual collection vehicle costing $90,738 and the automated side loader costing $120,000. A recent quote for the manual collection truck was $97,000 and the City's cost of automated side loaders is about $110,000.

As noted above, there was a March 1, 1990 letter report comparing costs of the 3 bin system with the "blue box" system. At the time of writing this report, staff has not had the opportunity to give even a casual review of this letter report.

FINANCIAL DATA

See background section.

RECOMMENDATION

Accept this report for information and forward to City Council.

Respectfully submitted,

David A. Pelser
Solid Waste Division Manager

Approved for information:

For: Jack R. Crist
Deputy City Manager

Approved:

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March 20, 1990
All Districts

Attachments:
Excerpt from R. W. Beck October 1989
Final Report, 8 pp.

C. CATEGORIES OF SEPARATION

One of the determinations that must be made in developing a recycling program, especially a curbside collection program, is deciding how households will separate materials from the waste stream. The two extremes are for participants to mix all recyclable materials, or to collect each item separately. Any combination of partially commingled materials can also be chosen, based on markets, processing, and preferred collection practices.

One of the main advantages of offering commingled collection would be to simplify decisions for program participants. Allowing all of the designated recyclable materials to be placed into a single container potentially saves the resident time and space, and reduces the instructions and restrictions involved in separating recyclable materials. Some members of the recycling industry believe that this simplification of the recycling process increases overall participation.

In a survey of recycling programs recently performed by Biocycle magazine, the average amount of material collected per household for five programs offering weekly collection of separated materials was 22.6 pounds per stop. The average amount collected from six commingled programs offering weekly collection was 19.5 pounds per stop. This indicates that the amount collected per household from a commingled program would not necessarily be more than the amount collected from a separated materials program.

Further evidence indicates that allowing materials to be commingled may not even result in higher percentage of public participation. The City of Seattle currently operates two curbside collection programs which provide a limited comparison of commingled and separated materials programs. The North Seattle program provides weekly collection of three separated materials as follows: mixed bottles and cans; newspaper; and mixed paper. Participation rates for this program have grown over the last six months of operation to more than 70 percent. The South Seattle program provides monthly collection of commingled bottles, cans, newspaper, and mixed paper. Participation rates for this program have grown to more than 50 percent. In addition, the recovery rate in North Seattle is 74 pounds per participating household per month, and in South Seattle is 60 pounds per participating household per month.

These results indicate that, contrary to conventional wisdom, a significantly greater participation is being obtained by the separated materials program. However, other factors may be affecting participation in these two programs. While both programs operate in the City of Seattle, there are significant differences between them. The North Seattle program provides weekly collection while the South Seattle program provides monthly collection. Weekly collection is generally felt to be more

convenient for the household recycler and may be partly responsible for the higher participation rate in the North Seattle program.
Other factors which may be affecting the participation rates in the South Seattle program include the fact that recycling programs were in place in the area prior to the curbside program. Social and economic differences between South Seattle and North Seattle may have an effect which has not been calculated. It may be that the act of sorting materials into component types for separate collection gives the residents the feeling that they are more directly participating in the recycling program. As compared with having mixed garbage and mixed recyclables, this sorting allows the resident to play a more direct role in helping improve the environment, and so may increase participation.

But even so, residents should not be asked to sort materials into more than four categories. Two categories are good ideas at the low end:

* Paper: newspaper only, or all paper;

* Containers: cans and bottles or cans, bottles, pet bottles, other plastics, etc. Either of these sorts can be split for 3-way sorting.

Another advantage of the commingled approach is that it could more easily add or drop materials from the collection list without requiring changes in containers or collection vehicles. In general, this would allow a commingled program more flexibility to follow market changes and expand the program to accommodate future markets. In some commingled programs, however, the materials are separated at the curb by the collection crew. In this case, the vehicle might have to be modified to accommodate a change in collected materials.

On the other hand, collection of commingled materials requires separation of the materials, either by the driver as he or she loads the truck, or back at the processing facility by a crew of workers, mechanical sorters, or a combination. In the former case, more trucks are needed to service the same number of households as the trucks spend more time in front of each house. In the case of sorting the commingled materials at the processing facility, additional space and equipment are needed. These alternatives add to the expense of providing this type of service, but may increase the variety and, hence, volume of materials collected at curbside.

In the future, the integration of commingled curbside programs and sophisticated Material Recovery Facilities (MRFs) will permit a much broader array of materials to be collected at curbside - for example, all paper, all metals and all plastics. This could double or even triple the proportion of materials in residential waste targeted for recycling at curbside. However, the actual result would depend upon the strength

of markets, local landfill disposal costs, and technical capacity to decontaminate materials.

In summary, commingled collection might in theory encourage greater participation due to the ease to the resident of recycling commingled materials, and might enable a much broader variety and volume of materials to be collected if sorting facilities are available, but evidence to date is not available to support this conclusion.

Due to the anticipated high participation levels in a curbside program for either type of collection and the existing markets for both types of materials, the decision between commingled and separated collection of recyclables may be one of markets and economics. In the following economic considerations of recycling alternatives, both commingled and separated materials options are discussed.

D. HOUSEHOLD CONTAINERS

1. Rationale

A number of curbside programs in North America are achieving dramatic results by providing containers to households to encourage and sustain participation. A survey conducted in 1985 in Kitchener, Ontario, Canada, reported, "Provision of the recycling container was **very important** in the decision of 72.2 percent of the sample to recycle; only 4.8 percent stated the container was not at all important. Convenience of collection was considered [very important] by 62.9 percent of the sample." A 1986 City of Boulder, Colo., survey reported, "Approximately one-third of recyclers say they would increase the amount they recycle if they were provided with free in-house storage containers for recyclables. Three-fourths of the non-recyclers claim they would be more likely to recycle if a free in-home container were provided."

Two of the most dramatic demonstrations of the effectiveness of household containers are the recycling programs in San Jose, California, and Champaign, Illinois. In an attempt to determine the effectiveness of the household recycling container, household containers were provided to some neighborhoods and not to others. In San Jose, the household participation rate in areas with containers was approximately 60 percent, while in areas without containers it was approximately 30 percent. The City of Champaign reported an average 83 percent participation with containers and 17 percent in the one area without containers.

The success of programs using household containers can be attributed largely to the convenience and identity the containers provide to the recycling program. Household

containers offer a simple in-house system for storage of recyclables, and ease of transport to the curb or drop-off site for collections. Containers can be brightly colored to enhance their visibility, both inside and outside of the household. Preparation instructions and collection information can be printed on or affixed to the containers.

In addition, providing containers offers an opportunity to build community recycling participation quickly. The containers advertise the recycling program when placed on the curbside and reinforce friendly neighborhood peer group pressure by helping identify which households are recycling and which are not. Another benefit to providing containers, as realized at the San Jose program, is that the presence of the containers can reduce the problem of scavenging, possibly by implying ownership and an intention to recycle through the City sponsored program rather than to throw away materials in the containers. This can be of significant importance to a curbside collection program as scavenging of set-out materials can rob a program of necessary revenues, reduce collection efficiency, and discourage participation.

For these reasons, household containers of some type are recommended as an important part of a curbside collection program for the City and County of Sacramento. Little data has been collected regarding the effectiveness of household containers with drop-off programs. Recycling experts generally agree that the household container may increase participation in drop-off programs by as much as one-third. For these reasons, the County should consider providing household recycling containers for drop-off or curbside programs. A more detailed discussion of container types, reviewed for capacity, cost, ease of use, and compatibility with commingled or separated materials programs, is presented below.

2. Recyclables Containers

As previously discussed, most communities have increased participation and collection efficiencies by supplying plastic recycling containers to homeowners. These containers are used for storing recyclables during the week and are carried or wheeled to the curb for pick-up on collection day or transported to drop-off sites.

When placed out at the curb, the containers serve as a friendly reminder to neighbors that this is recycling collection day. The containers create a sense of community responsibility and a certain amount of positive peer pressure to participate in recycling.

Various types of containers are available. Some are designed specifically for curbside collection while others may have been originally designed for other

purposes. Most containers are made from plastic because of its durability, light weight, low cost, and range of color. It is recommended that plastic containers have ultraviolet light stabilizers to prevent fading. Most manufacturers offer the option of imprinting a logo, advertisement, or theft warning statement on the container. In addition, the type of material to be placed in the bin or container may be imprinted. Some containers are made from recycled plastic, or are themselves recyclable. Most manufacturers can add a limited amount of recycled plastic material in the production of the containers.
There are six basic categories of recyclables containers: woven bags; single rectangular bins or round pails; stackable multi-bin systems; wheeled containers; compartmentalized wheeled containers; and multiple containers with a cart handling system.

Woven Bags.

Woven polyethylene plastic or burlap bags have been used successfully by several recycling programs. These containers have the advantage of being the least expensive choice available. Additionally, a few communities have found them desirable because once they have been emptied, they are less visible to people driving down the street. The disadvantage of these containers is that they do not have a rigid shape and are harder to fill.

Single Rectangular Bins and Round Pails.

Several manufacturers make plastic rectangular bins and round containers. Of the containers designed specifically for collecting recyclables, one of the most common is a plastic rectangular bin, sometimes referred to as a "blue box." These bins generally come in sizes of approximately 1.5 to 2 cubic feet. Some rectangular bins are available in sizes up to approximately 3 cubic feet. These larger containers are designed to hold up to three paper grocery style bags containing separated recyclable materials. The 1.5 to 2 cubic feet plastic rectangular containers are acceptable for use in programs where one container is used to store commingled recyclables collected weekly or to store separated materials. The cost of the 1.5 to 2 cubic foot bins is generally $5 to $6, while the 3 cubic foot container costs approximately $7.

Round containers are available in a variety of sizes. Typical sizes of containers manufactured for collection of recyclables range from six to 20 gallons, which hold between 1.2 and 2.7 cubic feet. For these containers costs range from approximately $8 to $25. Many round containers have lids and handles. Some programs have used round containers not specifically designed for recyclables collection. The curbside program in Marin County, California, boosted its participation well above what it had

been without any container by supplying six-gallon white buckets donated by a local business. In return, the local business was allowed to advertise on the container. The president of the Marin Recycling and Resource Recovery Association, which operates the program, said that he would have preferred the colorful, well-designed containers that encourage residents to source separate recyclables, but the association could not afford them. Six-gallon, (.8 cubic feet) paint and pickle buckets are available for $1.50 to programs which need to purchase them. Marin County is currently planning to switch to this type of container.

Mecklenburg County, North Carolina, tested container designs (rectangular bins and cylindrical pails) in the first phase of its recycling program to determine which container participants and collection vehicle operators preferred, whether a 1.5-cubic-foot volume was sufficient, and which container characteristics were most effective. Participants were asked to save newspaper, PET plastic bottles, aluminum and bi-metal cans, and glass containers in a single recycling container provided to them, and to place the container of commingled materials at the curb once per week. City collection crews then separated the materials at the curb.

The testing program indicated that the 1.5-cubic-foot capacity was adequate. In addition, interviews with collection vehicle drivers indicated that:

* The drivers preferred a rectangular box was preferable to the round pail.

* The smaller opening of the pail makes identifying and sorting non-recyclables difficult.

* The containers were equally durable, but color fading of the containers was a problem.

* When given a choice most participants requested a box rather than a pail.

Stackable Multi-Bin Systems.

Stackable multi-bin systems can be used in drop-off or curbside systems. Both webbed and solid bins are available. The webbed bins use 20% less plastic, are 20% lighter and are more durable than the solid sided bins. However, they are reportedly harder to clean and do not contain small materials, such as broken glass, and liquids remaining in beverage containers, as well as solid bins. The full volume of the bin is not available for storage of recyclables because an opening in the front of the bin is generally cut to allow access when bins are in a stacked position. Bins

typically have a usable capacity of approximately 1.5 cubic feet and are durable. A stackable system of three bins costs approximately $15 to $18, or approximately $5 to $6 per bin.

San Jose's curbside program uses stackable containers. One bin is used for newspapers, one for mixed bottles, and one for cans and PET plastic bottles. The containers are a main promotional focus of the program. As noted earlier, San Jose conducted a pilot program in which 9,000 homes were provided with containers and 11,000 homes were asked to use their own containers. Participation rates were twice as high in the areas where containers were provided.

Recycle America is using the same stackable three-bin system in their North Seattle curbside program. One bin is used for newspapers, one for mixed bottles and cans, and one for mixed wastepaper.

Wheeled Containers.

Wheeled plastic containers, in a variety of sizes up to 105 gallons, can be used in a curbside collection program. Several manufacturers produce this type of container in round or rectangular shapes. Some are specifically manufactured for recyclable materials, while others are designed for refuse collection but could be used for recycling. The larger containers are generally used only for curbside collection of commingled materials. The size depends on the amount and type of materials recycled and the frequency of collection. One manufacturer sells separate small containers in conjunction with wheeled carts. The small containers are used to temporarily store materials in the home, and when full are emptied into large wheeled carts. The 105-gallon containers cost between $40 and $60, the smaller containers proportionately less.

An example of a program using wheeled containers is Rabanco's curbside program in South Seattle. Rabanco is using 90-gallon wheeled plastic containers in which recyclables are commingled and collected once each month.

Compartmentalized Wheeled Containers.

Two manufacturers are currently making wheeled recycling containers with removable interior bins and trays. The containers have one to four wire or plastic inner bins for separate storage of recyclables and a lid for the outer container. This type of container would only be used if program participants were asked to separate their materials. The bins, tray and outer container are manufactured in a variety of colors. This type of container costs between $40 and $110 depending on the size of exterior container and number of inserts used. Exterior container volumes can be

purchased in a variety of sizes including 45, 64, and 105 gallons. These containers have wheels to make it easier to get them to the curb. Depending on the size of the exterior container, the inner bins may range in size from eight to 19 gallons each. The 45-gallon exterior container would generally be used if program participants are asked to set out separated materials on a weekly basis. The systems with the larger exterior containers could be used for programs with less frequent collection of either commingled or separated materials.

The City of Olympia, Washington, is currently using a 45-gallon container with two 13-gallon interior bins and a 19-inch by 17-inch by 9-1/2-inch tray. A representative of the container's manufacturer reported that homeowners were given a choice between these containers and the standard 14-gallon rectangular bins. The homeowners seemed to like the compartmentalized container because of its neatness. Some homeowners reportedly remove the bins and trays from the exterior container and put them under their kitchen sink or in other convenient places in their homes. At collection time homeowners then replace the bins and trays in the exterior container and wheel the container to the curb. A City representative involved in collecting recyclables indicated, however, that collecting materials from the bins and trays in the exterior container tends to be labor intensive.

Multiple Containers with a Cart Handling System.

This system uses multiple containers which are placed on a cart with wheels. According to a representative of a company which recently began marketing this system, no curbside program in the United States is yet using it. This system features an aluminum cart with four, six, or eight covered eight-gallon containers. The cost of these systems ranges from $148 to $197, depending on the number of containers and the size of cart purchased. This system takes up two to three times the amount of floor space of any of the other systems.

E. CONVENIENCE

Convenience is a major factor in getting people to participate in a recycling program. Recycling, for most people, will require a change in behavior: not only will the recyclable materials need to be separated from the discards, but they will need to be either taken to a drop-off site or out to the curb for collection. The more convenient it is to handle and transport the recyclables, the higher the public participation rate. The following discusses convenience in terms of location of drop-off sites and the curbside collection schedule.