

STANDARDS DEVELOPMENT BRANCH OMOE



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Burlington Waste Reclamation Pilot Study

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Burlington Waste Reclamation Pilot Study

Final Report

1972

Prepared for the Waste Management Branch of the Ontario Ministry of the Environment and the Town of Burlington, Ont. by Philips Planning and Engineering Limited, Consulting Engineers and Town Planners, Burlington.

PREFACE

In view of the widespread interest in this study, not only in Ontario but ranging as far afield as the Yukon, I believe it is desirable to incorporate into this final report a statement of the objectives which prompted the Waste Management Branch to initiate such a project, our views on its success in attaining them, and the future action we will take as a result.

The misconceptions which developed after publication of preliminary results from the study make this particularly necessary. Most unfortunately, some of the statistical evidence presented was seized upon without any knowledge or consideration of the background, and completely unwarranted conclusions were drawn from it.

It cannot be emphasized too strongly that the principal objective of the Branch was to obtain basic background data, unobtainable from any other source, to permit realistic planning of future home separation projects.

We are interested in the prospects of home separation for two reasons:

- As a possible interim recycling measure until municipal reclamation plants become a practical proposition.
- As a fundamental element in a total reclamation system, where one or more classifications of waste may be separated at source, the balance being dealt with at a central reclamation plant.

While these are not exclusive alternatives, the second is obviously the more significant. For this reason, it requires very careful and very thorough investigation. For example, the selection of a particular design for a municipal reclamation plant would certainly be dependent upon assumptions made concerning the types and quantities of waste which could be economically separated at source on a continuing basis.

This particular study is the first step in a planned program to obtain the necessary *facts*.

As it was only the first step, it was quite deliberately designed as a controlled experiment. The approach was, therefore, kept on a very simple, low-key level to obtain basic background data uninfluenced by extraneous factors.

It follows that the support provided to members of the public participating in the study had to be strictly limited. No serious attempt was made to encourage participation by a public relations campaign; no special assistance was provided to residents in the study area, such as properly designed containers for the separated materials; and the study began with the request to separate wastes into five distinct classifications — a completely unrealistic approach to a recycling operation but, in our view, an essential approach to an initial data-gathering study.

Viewed in this light, the study proved to be highly successful. Without going into technical details (though these were, of course, the object of the exercise), the

results of the study in relation to the original objectives can be summarized as:

- As anticipated, the degree of continued public support for the multiple separation requested (newsprint, mixed metals, colored glass, plain glass) without inducement or by-law requirement was limited.
- A number of problems were uncovered both in relation to collection (for example, difficulties of access to buildings in condominium development) and in the recovery of raw materials (e.g. tri-metallic cans)
- Basic information was obtained on the economics of the process, which will be of considerable value in future studies.
- It is obvious that very significant input from provincial government and/or municipalities will be necessary if multiple separation at source is to be viable.

The questions now requiring answers are:

- Can any single classification of waste be separated at home reliably without major inducement? (For example, newsprint or glass.)
- What inducements are necessary to obtain reliable multiple separation at home on a continuing basis? (For example, the provision of containers or enforcement of a by-law.)
- Would changes in collection systems improve the economics and enable problem areas to be dealt with more effectively?
- Can separated material be utilized by the secondary materials industry on a larger scale without major intervention by government?
- We propose to proceed with further studies to answer some of the questions discussed above. These studies will, of course, be very closely linked with the other programs of the Branch, such as provincial support in carrying out waste management area planning studies.
- The Branch is most appreciative of the assistance provided by the Corporation of the Town of Burlington and the Citizens' Committee for Pollution Control. I, personally, cannot express too strongly my own appreciation for those dedicated individuals in the study area who were prepared to practice what they preached, and actually do something about the preservation of the environment, at considerable inconvenience to themselves.
- I realize how disappointing it must be to expend time and effort for what must appear a negative result. I would like to assure them that this is not so. We believe that reclamation is the only rational solution to the mounting problems of waste management. This study is one of the first steps towards that goal in Ontario — it may well be one of the most significant.


DIRECTOR, WASTE MANAGEMENT BRANCH

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INTRODUCTION

Waste reclamation and recycling is not something new and revolutionary. Man has consciously and subconsciously been reusing waste materials for many centuries. However, in the past few decades, population growth, orientation to large urban centres, and mounting generation of waste per capita has brought about an ever growing pollution problem of collection and disposal.

It is only in the late 1960's and early 1970's that people throughout North America have become interested in the quality of the environment in which they must live, and the fact that in our world some resources are non-renewable. This has accelerated interest in reclamation, recycling, and reuse of waste materials.

One of the largest generators of waste is our households — a waste that is complex, awkward to handle, and difficult to dispose of.

There are many voluntary groups of people and individuals on our continent who are now advocating

recycling and reuse of some components in our solid waste stream. Many urban centres have environment groups who actively participate on a volunteer basis in the collection, storage, and marketing of reclaimed materials.

It is recognized that the ultimate treatment of waste is reclamation and reuse. There is, however, a great deal of technology, education and economics to consider and gradually adjust to before complete recycling is reached, if ever — certainly not in our lifetime.

The Waste Management Branch of the Ministry of the Environment of the Province of Ontario is responsible for enforcing prescribed standards for the total management of waste. With this responsibility that was established in 1966, this Branch of Government is vitally interested in the philosophy of reclamation and reuse. The opportunity to examine a method of extracting reusable materials from the residential solid waste stream was presented in the Municipality of the Town of Burlington.

Burlington, like most municipalities, had its environmental group. This group was quite active in the area of recycling and had demonstrated a mature, responsible attitude to the subject. This citizen group petitioned the Town Council to establish separated collection procedures within the Municipality.

The Council, however, recognized that there could be many problems and additional costs if this proceeded without prior study. Therefore, the Town of Burlington in turn petitioned the Provincial Government to undertake a pilot study and agreed to pay 20% of the cost of such a study.

In recognition of this interest, the Ministry of the Environment in conjunction with the Town of Burlington developed guidelines for a Waste Reclamation Pilot Study in the Town of Burlington, and solicited proposals from consulting engineers. In May of 1971 Philips Planning and Engineering Limited were awarded the contract to assist in this study, and actual field work commenced in July.

Generally the aims of this study are to determine:

1. WASTE GENERATION

Determination of per capita generation of waste from various types of housing developments, and detail of components of these wastes and the proportion that might be reasonably reclaimed.

2. PUBLIC INTEREST

An assessment of public interest and the degree of involvement of separating wastes in the home for separate collection and recycling.

3. COSTS

The actual costs of establishing a system to collect, transfer and deliver the separated materials to the market place. Costs to include estimates of possible savings in terms of reduction in the quantity of wastes to be disposed of.

4. MARKETS

The extent of currently existing markets for reclaimed materials, and the impact on the markets if a system of reclamation became adopted in the area.

SECTION 2

STUDY ORGANIZATION

It is paramount that representation and participation by individuals and agencies continues throughout a given study period if this study is to be viable. To assist the consultant in the full development and implementation of the Burlington Waste Reclamation Pilot Study plan, an Advisory and Co-ordinating Committee was formed from the participating agencies and the local environment group, which consisted of:

Waste Management Branch, Ontario Ministry of the Environment: *Mr. Ken Childs*

Corporation of the Town of Burlington: *Mr. Gord Johnson*

Citizens' Committee for Pollution Control: *Mrs. Pat Reble*

Philips Planning and Engineering Limited (Consultant): *Mr. Jack M. Tomlinson (See also Fig. 1)*

Meetings of the Co-ordinating Committee were held regularly throughout the study period, and were called when decisions were required with respect to the study plan direction, and for study progress reports. This procedure worked out extremely well. As the study proceeded, there were several changes in the study program.

Several key meetings were held prior to the commencement of any field work – the final selection of the study area – the selection of materials to be separated by the householders – communications with the householder.

STUDY PLAN

Upon receiving an invitation to submit a proposal for the undertaking of a pilot study on waste reclamation, several discussions took place with the agencies and people involved concerning the objectives of the study – what the study was to determine – and the project design guidelines. This resulted in the Study Design Program flow network, Figure 2.

The study plan consisted of three major phases:

PROGRAM DEVELOPMENT

- ▣ establishment of a Co-ordinating Committee
- ▣ selection of the study area
- ▣ number and selection of materials that were to be separated
- ▣ informing the householder in the study area
- ▣ collection, transportation and marketing of the reclaimed materials
- ▣ cost records
- ▣ quantity records

IMPLEMENTATION OF THE PROGRAM

- ▣ householder home interviews
- ▣ information dissemination of separation and collection procedures
- ▣ weekly collection of all separated materials
- ▣ regular Co-ordinating Committee meetings
- ▣ market research for reclaimed materials
- ▣ weekly summaries of total refuse generated and quantities of each reclaimed material
- ▣ cost of revenue accounting

ANALYSIS OF INFORMATION OBTAINED

- ▣ quantities by housing type
- ▣ composition of refuse
- ▣ extent of householder participation with respect to each reclaimed item
- ▣ identification of problems with this type of reclamation
- ▣ costs
- ▣ market considerations

The study plan was followed closely throughout the actual study period. The first collection of separated materials took place on August 25, 1971 and continued each week until the last collection day of January 26, 1972.

In Appendix "A" the major activities that took place during the study are summarized giving the date and description of each major event. The "Summary of Activities" commenced on May 27, 1971 with the Ministry of the Environment, Province of Ontario, Waste Management Branch invitation for proposals from consulting engineers.

STUDY AREA

The Town of Burlington is a rapidly growing urban area, situated on the north shore of Lake Ontario, adjacent to the steel city of Hamilton, and west of one of Canada's largest metropolitan centres, the City of Toronto. Most of the 85,000 people in Burlington reside in an east-westerly direction for about nine miles between the north shore of Lake Ontario and the Queen Elizabeth Way, one of the major arterial highways in the province. (See Figure 3 – Regional Location.)

Waste is collected from the residential areas and some of the commercial areas by Munisan Limited. Munisan Limited is retained by the town on a contract basis to pick up residential refuse generally once per week. This refuse is then taken by the collection trucks to a central land-fill site area. During the study period, the municipality was just closing its previous land-fill site and opening up a new one, which has an estimated life of approximately five years.

With a modest budget of some \$25,000, it was necessary to limit the size of the study area. However, the sample area to be selected had to represent the type of development that is normally found in a community and, for this study, had to have approximately the same proportions found in the town as a whole.

One of the first decisions was to limit the size of the area to represent approximately 5% of the population of the Town of Burlington, i.e. 1,000 dwelling units and 4,000 people. For purposes of working out a viable collection system it was also considered necessary to select an area that was within the same collection day – the selected area was in the regular weekly Wednesday pick-up zone.

The types of development in the area would include single family units, townhouses, apartments, a senior citizen area, and a commercial area. In addition, it was hoped that a mixture of home sizes and types could be found that would be representative of each new subdivision design and some older types of development that are normally found in each community.

The area selected was fairly central and adjacent to a major north-south urban arterial street. The general location within the municipality may be seen in Figure 3. Specifically, the area was located immediately east of the Guelph Line, north of Lakeshore Road, and generally south of Woodward Avenue. The area was typical of a growing municipality of to-day. It includes a good mixture of old and new subdivision as well as various sizes and styles of homes, (see Figure 4). The townhouse units included a variety of types – row housing along the street, and off-street courts (Figure 5).

There were several high-rise apartments in the general study area. To keep within the required ratio, two

PUBLIC INVOLVEMENT

apartment units were initially selected. One apartment unit was equipped with an incinerator, with the residue being collected by the municipal contracting agency, while the other unit had an open container collection by a separate private contract.

Separation and collection did not commence immediately with these units, due to complications and arrangements. As it turned out, collection took place from only one apartment unit (Figure 5), the one with the incinerator and the one handled by the municipal contractor.

The commercial area, consisting of some 48 establishments including a large food store, was also excluded from the study. This was a result of several factors. Following personal interviews with the questionnaire form, the individual store owner's interests in the waste that they would separate were quite varied, and indications were that the collection results would not be too indicative of a normal commercial area.

In addition, it was found that this commercial area was not collected by municipal contract due to poor access. The refuse from the plaza was picked up by open container at the back of the shops by more than one private contractor (Figure 6).

To work out collection details for this commercial area would have been too complicated and costly. As mentioned later on in the study, commercial areas must be designed and planned to properly accommodate collection of their refuse either in total or partially separated.

It was also found that there were a large number of senior citizen units in this area and, to achieve a sample representative of the whole municipality, an apartment building for senior citizens was excluded.

The study area selected represented approximately 4-1/2 per cent of the entire Town of Burlington. The following table gives the ratios of the residential areas in the study area to the town as a whole.

<i>Type of Development</i>	<i>No. of Units in Study</i>	<i>No. of Units in Town</i>	<i>% in Study Area</i>	<i>% in Town</i>
Single Family Units	720	18,100	65-1/2	71
Apartment Units	215	4,580	19-1/2	18
Townhouses	143	2,560	13	10
Senior Citizen Units	26	200	2	1

Figure 7 shows the area where separation and collection procedures were proceeded with. The location of the various types of development within the study area are also indicated.

Following the decision to proceed with "in-house" separation with special collection in Burlington, and the actual selection of a study area, it became necessary to make the householder aware of what was going to take place and the manner in which he would be involved.

To start with a press conference was called and a news release issued by the Honourable George Kerr, Minister of the Environment, outlining that the Province and the Town of Burlington were embarking on a Waste Reclamation Pilot Study. Representatives of the local radio stations, newspapers and television stations were invited and the meeting took place in the Council chambers in the Town Hall of Burlington on July 9, 1971.

Two of the resulting newspaper articles from the Spectator, Saturday, July 10, 1971, and the Post on Wednesday, July 14, 1971 are included in this report (Figures 8 and 9).

It was quite important at the beginning of the study to make householders aware of what it was trying to achieve. As mentioned, excellent co-operation from the news media in Burlington and Hamilton assisted greatly in keeping up the interest of the householders throughout the period of the study.

The next step was to actually contact each householder in the study area to inform him of the purpose of the study, and that he would be involved in separate collection for the next six-month period. At this point of time, the final selection of material to be separated had not been decided. It was felt there should be some indication from the people in the area what they would be willing to separate.

A questionnaire form was designed and random sampling took place on July 20, 1971 by members of the Citizens' Committee and representatives of Philips Planning and Engineering Limited. Figure 10 shows the instruction sheet designed for use of the interviewers for first contact with the householder. Figure 11 shows the form used for random sampling.

Random sampling indicated that the questionnaire form was adequate and distribution to each householder on a person to person basis got under way. The form was relatively simple in design and asked only a few basic questions, including the number of people in the household.

Along with the questionnaire form a general information sheet (Figure 11A) was distributed to every household to outline the objectives and organization of the study.

The interviews were conducted by students employed by the Halton Region Conservation Authority, working on Project SWEEP, and by volunteers from the Citizens' Committee for Pollution Control during the period from July 26 to July 29, 1971.

Prior to interviews the local news media provided valuable assistance in announcing that home interviews

would take place. One such article may be seen in Figure 12, a publication on July 21st by the Post.

To obtain maximum coverage of the area within the shortest period of time, the study area was divided into 13 sub areas as shown by Figure 13. SWEEP students canvassed in the day time and volunteers from the Citizens' Committee returned calls in the evening to ensure as large a coverage as possible. For the first home interviews there was excellent co-operation by the householders, and we were able to obtain 84 per cent coverage.

Following the analysis of the questionnaire and the final decision to separate newsprint, clear glass, colored glass and mixed metal cans, information sheets were prepared for distribution to each of the householders. These information sheets, Figures 14 and 15, outline the materials that were to be separated, the preparation of the materials, when they would be collected, and the approximate duration of the study. The information sheets were dropped off at each householder's door (excluding the apartment unit), by volunteers from the Citizens' Committee approximately one week before the first collection day.

The first collection of recyclable wastes took place on August 25, 1971. During this collection procedure difficulties were identified and problems related to the householders' preparation of recyclable materials became apparent. In an attempt to alleviate some of the collection and preparation difficulties, a second instruction sheet, was distributed on August 30, 1971 (see Figure 16).

On September 9, 1971, after three weeks of separation and collection, a public meeting with officials of the study committee was held in the auditorium of one of the public schools in the study area. All residents of the study area were invited.

The purpose of the meeting was to outline the objectives of the study and to answer questions regarding study procedures. Unfortunately the gross attendance at the meeting including study officials was less than twenty.

In the first few weeks no separation or collection took place in the apartment units. Negotiations were taking place with the managers and superintendents of the two apartment buildings in the study area. Eventually an agreement was reached with the manager and superintendent of one of the apartments enabling a recycling program to begin in that building. The first collection was made on November 3, 1971.

Specially marked containers for metal cans, clear glass and colored glass were supplied to the apartment building and placed in the parking lot adjacent to the building. Residents were requested to bring their recyclable materials out to these containers.

After the first few weeks of collection, it became apparent that a large box for recyclable newspaper was required at the apartment building. This was supplied by the Town of Burlington. These containers were emptied and the contents transferred to the collection vehicle along with the weekly collection of recyclable materials.

A second series of home interviews took place during the period November 4-8, 1971, by volunteers from the Citizens' Committee for Pollution Control. A copy of this second questionnaire is included in Figure 17, along with the attached Information Sheet No. 2 (Figure 18).

This questionnaire was intended to determine the attitude of the residents toward the recycling program, and to determine the interval at which they placed their recyclables out for collection.

Results of this survey were analyzed on the basis of single family homes, townhouses and senior citizens' cottages. Apartment units were not surveyed at this time, as these units had completed only one collection week.

As the collections proceeded, a relatively constant trend appeared in the collection of recyclable materials from the single family units. It was therefore decided to alter the number of recycled materials to determine the effect on overall co-operation. Collection of clear and colored glass from the single family homes was ended following the collection on November 24, 1971.

The information sheet dated November 24, 1971 (Figure 19), distributed door-by-door by volunteers of the Citizens' Committee, notified the residents of the revisions to the program.

The collections also revealed that co-operation from the residents of the townhouse units and senior citizens' cottages was low, due in part to collection problems unique to these areas. It was therefore decided to stop separate collection of recyclable materials from the townhouse and senior citizen units. Residents in the townhouse units were notified door-by-door by the Citizens' Committee (See Figure 20).

Collection of metal cans and newspaper from the single family homes, and collection of metal cans, newspaper and clear and colored glass from the apartment building continued weekly until all collections were stopped after January 26, 1972. A copy of the information sheet distributed at this time is included in Figure 21.

Following the last collection, a second public meeting was held on January 27, 1972 to review the results of the study, to answer questions and to assess public opinion regarding the project. Attendance at this meeting was even poorer than at the first meeting.

COLLECTION OF SEPARATED WASTES

As previously mentioned, residential refuse in the Town of Burlington is collected by Munisan Limited, a private contractor who is retained by the municipality on a contract basis to collect and deliver residential refuse to the municipally owned land-fill site.

The study area selected is normally collected once a week each Wednesday by Munisan. During the study organization and planning meetings were arranged with Charles B. Gale, P. Eng., of Munisan Limited, to discuss the study plan and methods that could be adopted to allow the collection of separated materials as well as the keeping of records of volume and weights of all the refuse in the selected study area.

As one of the objectives was to record the total volumes of waste being generated from the householder in the area under study as well as the individual volume of separated materials, it was necessary for Munisan to revise their collection procedure in this area for the duration of the collection period.

Several packer trucks were operating in the area, which would have made it almost impossible to keep track of all the refuse that was not being separated. Munisan therefore were very obliging by rescheduling their collection in this area, to use the same three packer trucks that would be required.

Normal refuse for this size of area was approximately three loads each week. Each week the total weight of refuse in each packer unit was recorded.

The next problem was to find an economical and practical method of collecting the four additional items: newspapers, clear glass, colored glass and metal cans.

Several methods were considered: small trailers behind the packer trucks, separate trucks, a single truck with compartments for each separated item. Prior to making the decision, consideration also had to be given to the transportation of these separated items either to storage depots or direct to the secondary material brokers.

From an estimate of the amount of separated materials that it might be possible to collect from this size of study area, it was difficult to completely assess the volumes that would be expected. Taking all the factors into consideration, it was decided to use a stake truck that could be divided into compartments, with each compartment capable of being dumped separately.

Figure 22 shows the stake truck used and its various compartments. Three men handled collection: the truck driver, one man on the truck to empty containers or place each separated item into its proper compartment, and one loader on the ground handing up the separated material and returning the empty container. Fortunately,

in the Town of Burlington, each householder must place his refuse to be collected at the curb and must take back the empty container to his house.

The first collection day was not without its problems. First it was not really known how much reclaimed material would be collected, therefore the four items were picked up in two groups – the first trip picked up newspaper and metal cans, the second clear and colored glass.

This took too long, as the truck was required to go around the area twice. By the time the separate collection truck got around to the last items, some of the people had already taken the separated materials back in.

However, there was now an indication of the volume of materials that required collection, and compartments were installed in the stake truck to allow for one stop only at each household, once around only.

Additional information was distributed to the householder concerning the time that the various separated refuse had to be placed out on the street. The next collection day set the pattern for the balance of the study. Compartment sizes were adjusted after the first couple of collections and proved to be satisfactory for the balance of the study.

As a result of the questionnaire from the first home interview and our first collection day there were a number of phone calls that were quite varied and some rather amusing. Some of these are shown on Figure 23, Householder Comments.

Collections continued each week along with the normal garbage collections. Recyclable materials collected during the first five collection weeks were stored in space provided by the Town of Burlington (See Figure 24) and delivered to secondary material brokers at a later date.

Following marketing arrangements beginning with the sixth collection on September 29, 1971, recycled materials were delivered directly to secondary material brokers in Hamilton by the collection vehicle. This system of delivering the recyclable materials directly to the markets on the collection vehicle immediately following the collection was continued to the end of the study period.

The collection vehicle was able to pick up all the separated items and make delivery to the secondary material broker within an 8 to 8-1/2 hour working day. The distance between the collection area and the material brokers in Hamilton was approximately 12 miles one way. With the proximity of these markets for reclaimed materials, costs of delivery were fairly reasonable.

The apartment unit was supplied with containers by the Town of Burlington that were labelled and placed adjacent to the visitor parking lot as may be seen on Figure 25. In addition to the steel drum for glass and metal a large wooden box with a cover was also provided – this kept the newspapers dry and prevented littering.

The individual householder supplied a great variety of open containers: wooden boxes, baskets of all sizes, cardboard cartons, plastic containers, metal containers,

QUANTITIES OF COLLECTED SEPARATED MATERIALS

During the 23 week collection period, the quantities of wastes that were collected each week in the study area were accurately recorded. Each reclaimed material was separately weighed as it came off the special collection truck. Not only was this required for study purposes, but also for sale of reclaimed materials, as the secondary material broker paid for recycled materials by the ton.

In addition, the net weight of refuse in each packer truck had to be recorded. This was not normally required, as the contractor was being paid on a per capita basis. Munisan again was very co-operative and made the necessary arrangements.

In addition, separate records were kept of all recyclable and other wastes by housing type — single family residential area, townhouse units and apartment units.

SINGLE FAMILY HOMES

Table "A" is a record of all wastes collected in single family housing units. The first collection on August 25, 1971 was not indicative of what to expect each week. People were accumulating newspapers and, with the trial pick-up procedure mentioned previously, some of the glass was carried back into the homes by the householder and did not get picked up until the following week. November 24 was the last collection day for glass, therefore, commencing December 1st, only newspaper and metal cans were required to be separated.

From Table "A" a graph has been produced (Figure 26) to show the total refuse generated per capita per week, and the total separated materials that were collected per capita per week for single family homes. The average total refuse generated per capita per week during the study period was 13.6 pounds, slightly under 2 pounds per capita per day.

Table "B" indicates the per capita generation each week of individual separated materials for this single family area. Newspapers averaged 1.2 pounds, metal cans 0.2 pounds, and clear and colored glass 0.64 pounds per capita per week.

bags etc. Newspapers were to be tied, although this was not always the case.

If the materials to be recycled were not in separate containers they were not picked up by the special collection vehicle, but were left to be picked up by the following packer truck, as the purpose of the study was in-home separation. Photographs of separated materials awaiting collection are included in Figure 25.

TOWNHOUSE UNITS

Prior to starting collection from the townhouses, a few additional problems had to be sorted out. One of the difficulties was the fact that not all units faced on a public street. One area, as shown on Figure 5, had private access into a central court area. The refuse from the central court townhouse units was brought out to the street by the management of these units.

We, therefore, were not very optimistic about the degree of participation that we would obtain in separation procedures.

Another problem was having to separately weigh each reclaimed material and the total refuse from the townhouse areas. To obtain the weights of the recyclables, the Town of Burlington provided a separate truck. Again we had to approach Munisan to provide a separate run of one of the packer trucks to handle only the refuse from the relatively small number of townhouse units.

With the co-operation of all concerned and arrangements finally being completed, separate collection comprised 4 pick-ups over the 3-week period November 3 to 24, 1971.

Table "C" shows the quantities that were collected. Due to the difficulties and additional costs in collecting from the townhouses, November 24, 1971 was the last collection day for these areas. One of the problems that came to light was the fact that one group of townhouses actually had collection twice a week, not the normal once per week.

Unless townhouse units are designed and planned to accommodate refuse separation and multiple collection, the resulting problem would be difficult to overcome.

APARTMENT UNITS

Final arrangements could only be made with the management of one of the the two apartment buildings to be included in the study, i.e. the one that was included in Munisan's contract.

Even with the building selected, it was a condition by management that the superintendent would not be required to increase his duties because of any separation or collection procedures we would implement. It was up to the apartment dweller to carry his separated materials to the containers provided by the town (See Figure 25).

As the apartment unit incinerated its refuse, it was not possible to obtain total generated refuse figures. On November 3, 1971 the first collection of separated materials commenced. Since it was quite late in the study period and costs had been incurred to provide container separation, collection of all four materials – newspaper, clear glass, colored glass and metal cans – continued in the apartment building until the last collection day of January 26, 1972.

Apartment collection results of the reclaimed materials are shown on Table "D". Table "E" shows per capita collection per week of each recycled material for the apartment building and the townhouse units.

The per capita weight separated and collected from the apartment unit was almost double that of any other type of land use development. A great deal of enthusiasm and co-operation was obtained in the apartment building. As a matter of interest, as of the date of the preparation of the final draft of the report some two months later, the residents in the building have continued their recycling procedure on a voluntary basis.

TOTAL COLLECTIONS

Table "F" is the record of total collections from the

study area including all housing types. On November 24, 1971 a detailed analysis of the refuse on the packer trucks from the study area commenced. The refuse was sorted into the items outlined on Table "G". The refuse was delivered to the land-fill site where it was sorted by hand and the components were weighed. Figure 27 shows photographs of the sorting operation. Of particular note is the "field office", where one of the sorters was having a coffee break.

HOUSEHOLDER PARTICIPATION STATISTICS

The first door-by-door interview with residents in the study area was carried out from July 26 to July 29 to assess their willingness to separate wastes for recycling, and to make a final choice of the number of items to be selected. The results of this poll are included in Table "H", Results of First Questionnaire.

From this survey, 89% of the householders in the residential area and 86% of the merchants in the commercial area indicated support of the program and a willingness to participate actively in home separation for recycling.

In the commercial area, the large food store was already recycling its cardboard. The stores in the commercial area were not too keen on separating items other than newspapers and cardboard.

Due to the known marketability of cardboard, it was not as important to study this separated material in depth. Besides, because of bulk, it would have been difficult to include the collection of cardboard from either the commercial or residential area without increasing the separate collection costs and revising our collection system. Cardboard, then, was not included as one of the materials that would be separated.

With the difficulties of collection as previously mentioned in this report in the commercial area, and the low interest in glass and metal can separation, further study in the commercial areas was not undertaken. As outlined in Figure 14, people in single family homes were notified that 89% of them were willing to separate wastes, and that the collection would start on August 25, 1971.

Three detailed analyses were taken during the next eleven weeks, on September 15, October 20, and November 3, to find out how many residents were actually separating waste. The results of these three analyses are shown in Table "I".

The demonstrated support of 14-1/2 to 40% as shown on Table "I" was far from the interviewed willingness of 81% to 88%, as summarized on Table "H", in the single family areas. With such a substantial difference of what people said they would do and what actually was occurring, another series of home interviews was undertaken, using the questionnaire form previously shown in Figure 17. The second door-by-door interview took place immediately prior to the regular collection on November 10, 1971, the twelfth week of collection.

Table "J" is a summary of the results of the second interview. In the single family homes, it was being stated that each week approximately 60% were separating newspaper, 52% clear glass, 48% colored glass, 52% mixed metals and 37% all four items. At the same time they

were expressing from 75% to 85% willingness to continue separation. Percentages were somewhat less for the townhouses and senior citizen areas.

In an attempt to correlate actual separation by detailed analysis and the latest questionnaire, a detailed analysis took place on November 10, 1971 within a day or two of the home interviews. Actual collection again varied considerably from the questionnaire. It was then decided to carry out several other detailed weekly analyses. These are also shown on Table "I". The expression of support on the questionnaire was still substantially different from practical support.

SECTION 9

QUANTITY PROJECTIONS OF SEPARATED MATERIALS

BASED ON CO-OPERATION AS FOUND IN STUDY

In the Town of Burlington there are some 25,440 dwelling units as follows:

Single Family Units	18,100
Townhouses	2,560
Apartments	4,580
Senior Citizen	200

From the pilot study results of in-home separation, the average weights of separated refuse for recycling per unit are:

Newspaper	3.96 pounds per week
Metal Cans	0.71 pounds per week
Glass	2.21 pounds per week

When these are projected for the whole of the Town of Burlington, we have 50.4 tons of newspaper, 9 tons of metal cans, and 28.1 tons of glass that may be recyclable. The average total refuse, including these recyclables, based on the pilot study figure is 47.8 pounds per unit per week, of 610 tons per week. Therefore, the percentage of refuse that could be recycled is 14-1/2% by weight.

BASED ON PROJECTION IF ALL MATERIALS WERE RECYCLED

If all the newspaper, glass and metal cans were separated from the normal refuse, the weight per dwelling unit would be:

Newspapers	6.19 pounds per week
Metal Cans	1.63 pounds per week
Glass	2.86 pounds per week

which would produce 73.8 tons of newspapers, 20.8 tons of metal cans, and 36.4 tons of glass.

The maximum percentage that could be recycled, i.e. newspaper, clear glass, colored glass and metal cans would be 21.5%. Even if legislation was adopted requiring separation of these items in the home, it is highly unlikely that this maximum would occur. There would always be people who would not separate. Unless people are willing to participate, enforcement of such legislation would be extremely difficult.

VOLUME PROJECTIONS

From the statistics obtained, there is a fairly accurate record of densities of the separated materials.

Newspapers	490 lbs. per cubic yard
Metal Cans	190 lbs. per cubic yard
Glass	1,000 lbs. per cubic yard

There was, however, no accurate recording of the volumes of the balance of the refuse being collected by the packer trucks, although weights had been recorded, as may be seen throughout the report.

These volumes are difficult to determine. For the purpose of projection in this report, the nominal density of refuse in the packer trucks was taken to average 450 pounds per cubic yard.

Based on the above densities, the estimated average total volume of refuse per week in Burlington was 2,700 cubic yards per week. Based on volumes, the percentage of recyclables that would be eliminated from the waste items using the co-operation obtained in the study period would be 13.2%.

SECTION 10

COLLECTION COSTS

As outlined earlier in the report, the most effective and economic system for collecting the separated materials was the provision of an open stake truck, divided into wooden compartments with removable walls. Munisan Limited, the private collector contractor for the Town, provided the truck at the following rates:

Truck	8 hours @ \$3.50	\$ 28.00
Driver	\$30.00 per day plus 20% fringe	36.00
Loader	2 @ \$28.60 per day plus 20% fringe	68.64
TOTAL		\$132.64

This cost which excluded overhead or profit was agreed to by Munisan for the study collection period. If collection in this manner were to be continuous, additional amounts would have to be charged to make it commercially feasible. The cost would then be approximately \$165.00 per day.

On the average it took the special collection truck 8 hours to collect, transport, weight and make delivery to the 3 secondary material brokers in Hamilton. It was approximately 12 miles from the study area to the delivery points.

Both the contractor, Munisan Limited, and the Town of Burlington had additional costs such as:

- ▣ partitioning of the truck
- ▣ supply of truck and men by the Town of Burlington to collect the separated materials in the townhouse area
- ▣ provision by the town of the containers that were placed at the apartment building
- ▣ renting of scales and hiring of men for 2 days to hand-sort refuse
- ▣ collection and transportation of the stockpiled material prior to direct delivery
- ▣ rerouting and rescheduling of collection trucks by Munisan
- ▣ personal time of Charles Gale of Munisan Limited
- ▣ the cost of interviewing, using SWEEP students provided by the Province
- ▣ volunteer help from the Citizens' Committee for Pollution Control during interviews and information drop-offs
- ▣ staff time of the Town of Burlington
- ▣ staff time of representatives of the Ministry of the Environment, Waste Management Branch.

From average figures of separated waste, the revenue obtained per week was:

Newspaper	1.867 ton @ \$ 8.00	\$ 14.94
Metal Cans	.333 ton 10.00	3.33
Glass	1.014 ton 12.00	12.17
		\$ 30.44 per week

SECTION 11

MARKETING

One of the aims of the study was the location of markets for the sale of the materials that would be separated in the study area. Following the decision on August 10, 1971 to separate newspaper, clear glass, colored glass and metal cans, discussions commenced with secondary material brokers.

Since any separated materials would have to be delivered to the recycling plant, it was important to find markets adjacent to the Town of Burlington to keep transportation costs down. Outlets for the relatively small volumes of secondary materials were found in the City of Hamilton at a distance of approximately 12 miles from the study area in Burlington.

From early discussions with the brokers, it was obvious that it would be necessary to initiate separation and collection procedures for the reclaimed items that would ensure an acceptable condition for recycling. The required conditioning was included in Instructions Sheets 1 and 2 (Figures 15 and 16) which were distributed to each householder in the study area.

Instruction Sheet 1 was distributed prior to the first collection. Following the first collection day, after a close look at the separated materials, it was obviously necessary to issue a second instruction sheet to ensure that the materials would be suitable for marketing.

Metal rings had been left on the glass bottles, there was some mixing of clear and colored glass which could not be allowed, paper labels were in evidence on some metal cans, newspapers had not all been tied, some magazines and other shiny paper were mixed with the newsprint, and the odd plastic bottle was included with the glass for collection.

In an attempt to correct these problems, Instruction Sheet No. 2 was distributed in the study area prior to the second collection. The separated materials collected first week were not stockpiled for eventual recycling; they were placed in the land-fill site along with the other refuse.

However, after issuing the second Instruction Sheet, the separated materials that were collected appeared to be acceptable and were stockpiled (See Figure 24) for the first four weeks. By the fourth week arrangements had been finalized to market the separated materials, and the acceptability of the materials was confirmed by material brokers examination of the stockpiled after materials.

In addition to agreeing to accept delivery at their plants commencing the next collection day, they found the stockpiled material in good condition, and also agreed to accept delivery of the stored material.

Newspaper was purchased by Mill Paper Fibres Ltd. in Hamilton at \$8.00 per ton. Figure 28 is a picture of the plant and the paper baler inside. The reclaimed newspaper was distributed from this centre to secondary uses, such as shredded packing material and pressed paper products.

The clear and colored glass was sold to Dominion Glass Company in Hamilton for reprocessing in their glass plant at a purchase price of \$12.00 per ton. Figure 28 shows the entrance to the plant and glass that was delivered by the collection vehicle.

The metal cans were purchased by M & T Products of Canada Ltd. at \$10.00 per ton. Figure 29 shows a bale of metal cans and various loading procedures.

NEWSPAPER

Mill Paper Fibres Ltd. in Hamilton stated that they handle approximately 700 tons of newspaper and cardboard each month. This, however, varied with mill demand. Their limit for newsprint from an area such as Burlington was stated to be 20 tons per week. The maximum weight of newspaper collected in any one week in the study area was 2½ tons.

If recycling of newspaper were to take place in the whole Town of Burlington, and the co-operation of in-home separation remained at the same level, there would be approximately 50 tons of newsprint to be marketed each week. To handle this projected volume, additional markets would be required, as it would be above the amount that Mill Paper Fibres Ltd. could handle.

Further market research with secondary material brokers showed that there was no potential market for the projected 50 tons of newsprint per week in the Hamilton or Toronto area. Discussions took place with Abitibi, who have a paper mill plant in Thorold at St. Catharines, which confirmed that recycling in paper mills is in the form of mill broke and cuttings and trimmings from major newspapers and printing houses. Repulped newsprint at the moment is converted into items such as tar paper roofing felts, for which there is a limited market.

The major problem of newsprint recycling would appear to be the lack of a de-inking re-pulping facility in this area of the country. This type of facility would require a minimum of 350 tons of newsprint per day. At the moment, this would appear to be very much in the future. Not only would it entail a large capital expenditure, costly assembly and costly collection procedures, but would also require a great deal of marketing to find a guaranteed outlet for the recovered processed pulp.

Before expanding separated newspaper collection to a whole city or town the size of Burlington, additional extensive research would have to be undertaken to ensure that markets are available to handle large volumes of recycled materials. These markets are not readily discernible.

GLASS

On an expanded basis for the whole municipality, there would appear to be no specific problem of disposing of bottles, providing the bottles are separated into groups of clear and mixed colors.

In any one week of the study period, the maximum amount of glass collected was around 1½ tons. Projections

based on the whole municipality would amount to 28 tons per week.

At the Dominion Glass plant in Hamilton, Ontario, management stated that they could handle up to 150 tons per week. It also has been stated that the glass companies are recycling approximately 20% and feel that 40% would be a realistic level.

The degree of recycling of glass in the home for collection as set up in this pilot study would be subject to considerable variation if it became mandatory for the glass industry to pay a premium for the returning of bottles instead of the more recent trend to non-returnables.

Quantities requiring collection would become less. From the analysis of the waste components from the study area, 7.7% (Table "G") is glass, of which 55.2% was being separated by the householder. This represents 4.2% of the generated wastes, a relatively small percentage of the whole.

METAL CANS

For this pilot study, it was felt necessary to initiate a separation and collection procedure for metal cans that would produce maximum participation.

The householder therefore was not requested to remove aluminum ends from tin plate cans, nor required to separate aluminum from tin. We were attempting to obtain as great a participation as possible, and if the householders were required to completely separate aluminum from the tin, we would have received considerably less support.

In addition, verifying removal of all aluminum ends before sending cans to the secondary material broker was beyond economic limits and not practical. This meant that we obtained \$10.00 per ton for the cans instead of \$20.00 per ton for tin plate only.

The bi-metal cans that were received by M & T Products were baled and sold to the local steel mills in Hamilton (Stelco and Dofasco). At the time of the study, M & T Products stated that they had a contract with the steel mills which limited them to a total of 40 tons of baled bi-metal cans per month.

From projected figures of separation in the whole of Burlington, the average would be 9 tons per week which would use up their quota. Either the steel mills would have to accept more tonnage of bi-metal cans, or separation of the aluminum from the tin would have to occur. The aluminum could be separated through additional recovery procedures. However, costs could be excessive and prove uneconomical.

Tin plate is processed at their plant with the tin in powder form exported to M & T's parent company, and the de-tinned steel scrap baled in bundles of 500 pounds (See Figure 29) and sold to Dofasco and Stelco.

From discussions with American Can Co. there is considerable research and review going on at present by the can manufacturers concerning bi-metal cans, and prior to the expansion of any separation or collection systems additional information on the status of the industry would be necessary.

CONCLUSIONS

Although some problems were encountered in obtaining data from apartment units and townhouse units, it was felt that the statistics used for projection of total waste quantities and reclaimable materials would be indicative of municipal residential areas. The information obtained for single family dwelling units was quite extensive and very detailed.

Study results indicated that the householder was recycling approximately 14% of his refuse. To collect, store and transport this percentage of recycled material from in-home separation cost more than four times the revenue received.

For Burlington, on a projection that would include the complete municipality, it would mean an additional net increase in collection cost in the order of 40% to 50%. From the statistics that were compiled throughout the study period, it was calculated that there would be a saving of 10% or less in the sanitary land-fill site.

Demonstrated support from the study area was fairly constant throughout the 23 weeks. It was, however, at least 50% less than personal interviews had indicated. It would certainly not be advisable to proceed with any in-home separation procedure based on stated co-operation obtained from personal interviews.

Research results indicated that no markets existed in the area able to absorb the amount of reclaimed newsprint that could be obtained from Burlington if separation were carried out in full scale by the municipality.

Existing market conditions also indicated that absorption of reclaimed bi-metal cans would be a problem. It appeared that there was no specific problem with glass, provided that it could be kept separated into clear and colored.

The collection and transportation system that was worked out for the pilot study area was extremely efficient, and costs were kept to a minimum. To avoid even greater costs on an expanded system, it would be imperative to locate markets no further away than those that were found.

To go beyond the immediate regional area would increase transportation costs. To avoid any additional separation or collection problems or costs, the procedure of collection on the normal refuse day should be adopted for any expanded system.

The results and procedures used in this pilot study indicate several points worth further consideration.

ADDITIONAL DATA REQUIRED FROM MEDIUM AND HIGH DENSITY UNITS

The statistics obtained from one-apartment and townhouse units were quite limited and not completely representative of what generally may occur in dwellings of this type. The apartment unit used in the study was an adult building and contained an incinerator which

made it impossible to identify accurately the total refuse generated.

Several problems arose with respect to the townhouse units. Not all of the townhouses were on the same collection day, and some had a normal pick-up twice a week. One grouping of townhouses was in a small court and its refuse was picked up by the owner and taken out to the street for municipal collection. Under those circumstances, many of the materials that were separated tended to get mixed up with the balance of the refuse.

In the case of both apartment and townhouse complexes, one of the key problems and issues is obtaining ownership management co-operation. It is recommended that further studies be considered for medium and high density residential units to obtain more accurate statistics on refuse generation from each type of unit.

BUILDING DESIGN CONSIDERATIONS

As previously discussed, the commercial area had to be excluded from the study due to the complexity of refuse collection. Refuse in this area was not picked up by the municipality but was disposed of by open container contractors and by the owners themselves.

This occurs when the commercial areas do not provide proper facilities and internal road networks that would enable a packer truck to obtain adequate access and egress. It is a condition in Burlington that, if the municipal collection truck is not provided with adequate access facilities, the store owner must make his own arrangements for refuse disposal.

There is also the additional problem of lack of adequate storage facilities for refuse in commercial areas and multi-family dwelling units. This is quite apparent in most of the smaller plazas that have been recently constructed. The above problems are compounded if it is a requirement of the municipality to separate materials for recycling.

Even though separation procedures may not be incorporated, there is an immediate need to provide proper solid refuse facilities in all types of development. Over the past ten years there has been a marked shift towards higher density living, mainly in high-rise apartments. This trend is expected to continue so that by 1980 50% to 60% of all new housing will be multiple dwelling units. This would compound the problems of separation.

It is recommended that municipalities seriously consider requesting that all multi-family buildings and commercial areas be designed and constructed to provide adequate facilities for the storage and collection of their refuse.

CONTAINERS FOR RECLAIMED MATERIALS

For the pilot study in Burlington, any type of open container was allowed for the storage of reclaimed material by the householder. Many of these, however, contravened the local by-law, e.g. paper bags, cardboard cartons and wooden boxes.

For any long term separation procedure, it is recommended that standardized open containers that meet the requirements of the local by-law be provided by the householder. By using an acceptable standard type of container,

collection problems of separated materials would be minimized.

During the study several questions were raised, such as: why did we not provide each householder with a standard type of container? why did we not start the recycling program with only one reclaimable material? In Appendix "B", questions of this nature are discussed in further detail.

The study results reiterate the opening remarks that there is "a great deal of technology, education and economics to consider and gradually adjust to before complete recycling is reached".

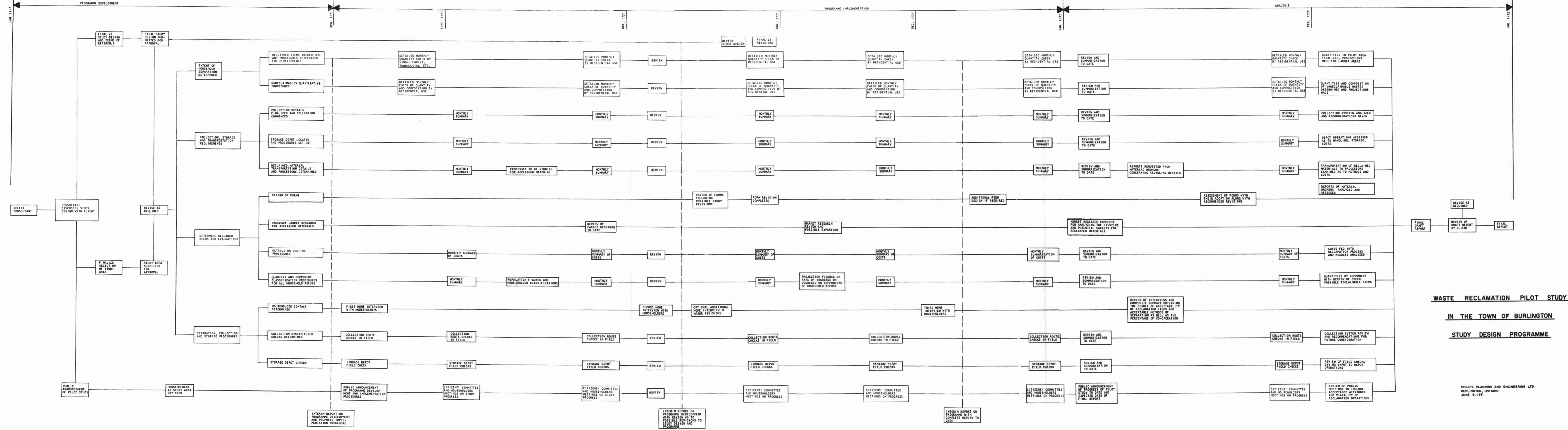
Before considering any in-home separation recycling system, each area must enter into in-depth market research to ensure that the reclaimables can be marketed. Collection and transportation details and costs must be carefully analyzed to ensure that each system is feasible. It also must be recognized that only a certain percentage of each selected reclaimed material can be recovered, even if there is full co-operation from each household unit.

The study has provided data and statistics on a controlled in-home separation program that should prove of considerable value to all concerned. No study of this nature could be initiated or completed without a great deal of co-operation and enthusiasm of all concerned. The time and effort given by the people in the study area and by members of the Citizens' Committee for Pollution Control is worthy of considerable note.

During the time of this study we endeavoured to measure the results of people's actions in numerical quantities — we talk about numbers participating, cubic yards and tonnage picked up and separated etc. What we did not embark upon is a study into the whole area of people's attitudes towards refuse, towards advertising campaigns to buy specific products, in short to the whole culture of waste.

And yet, surely this is what refuse is all about. Until more than a few in our communities are concerned enough to change buying habits, and until more than a few are willing to act upon it, any attempt to make separation, collection or recycling palatable to more than these few would seem to have doubtful results.

PHILIPS PLANNING AND ENGINEERING LIMITED
Jack M. Tomlinson, P. Eng.
STUDY DIRECTOR

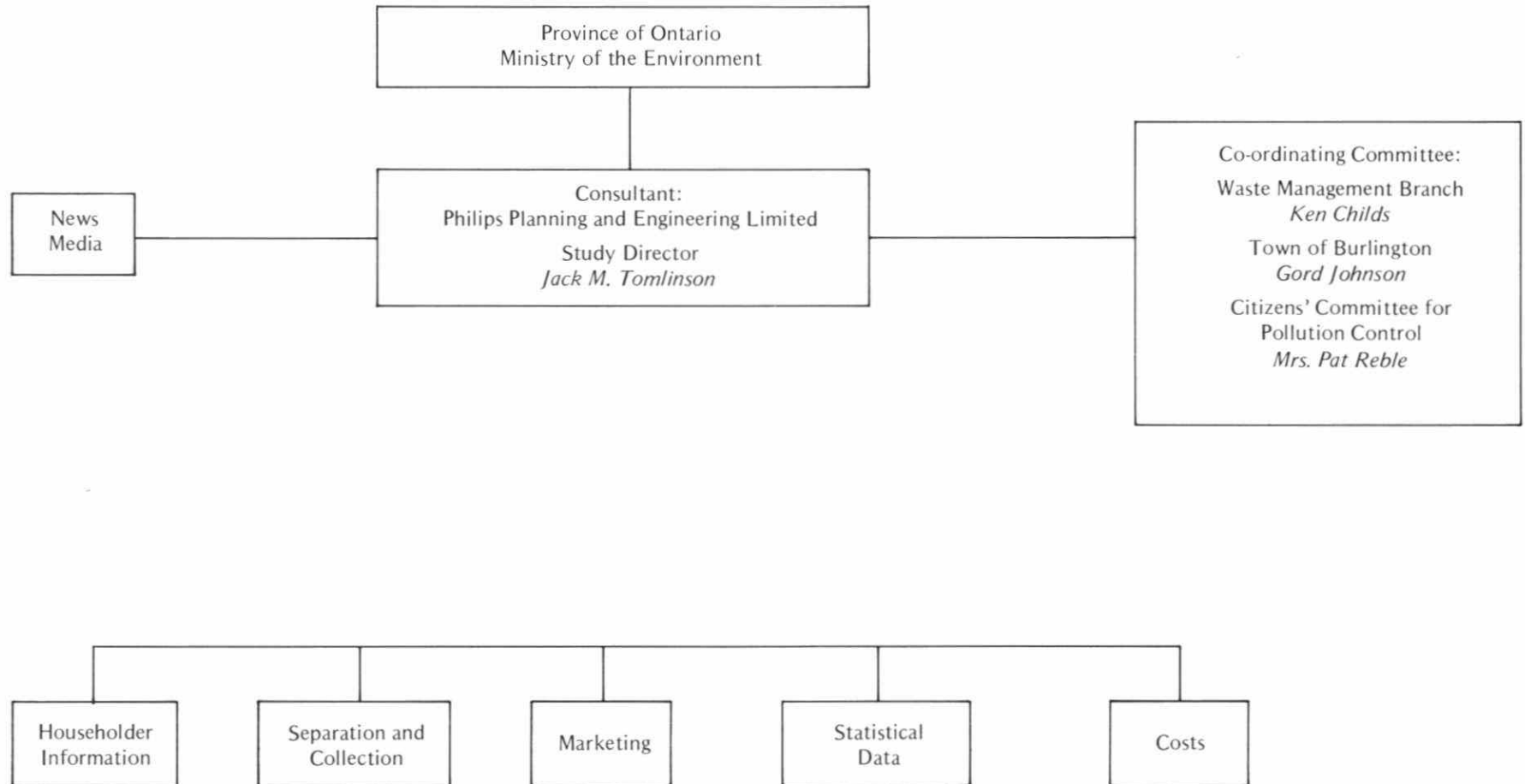


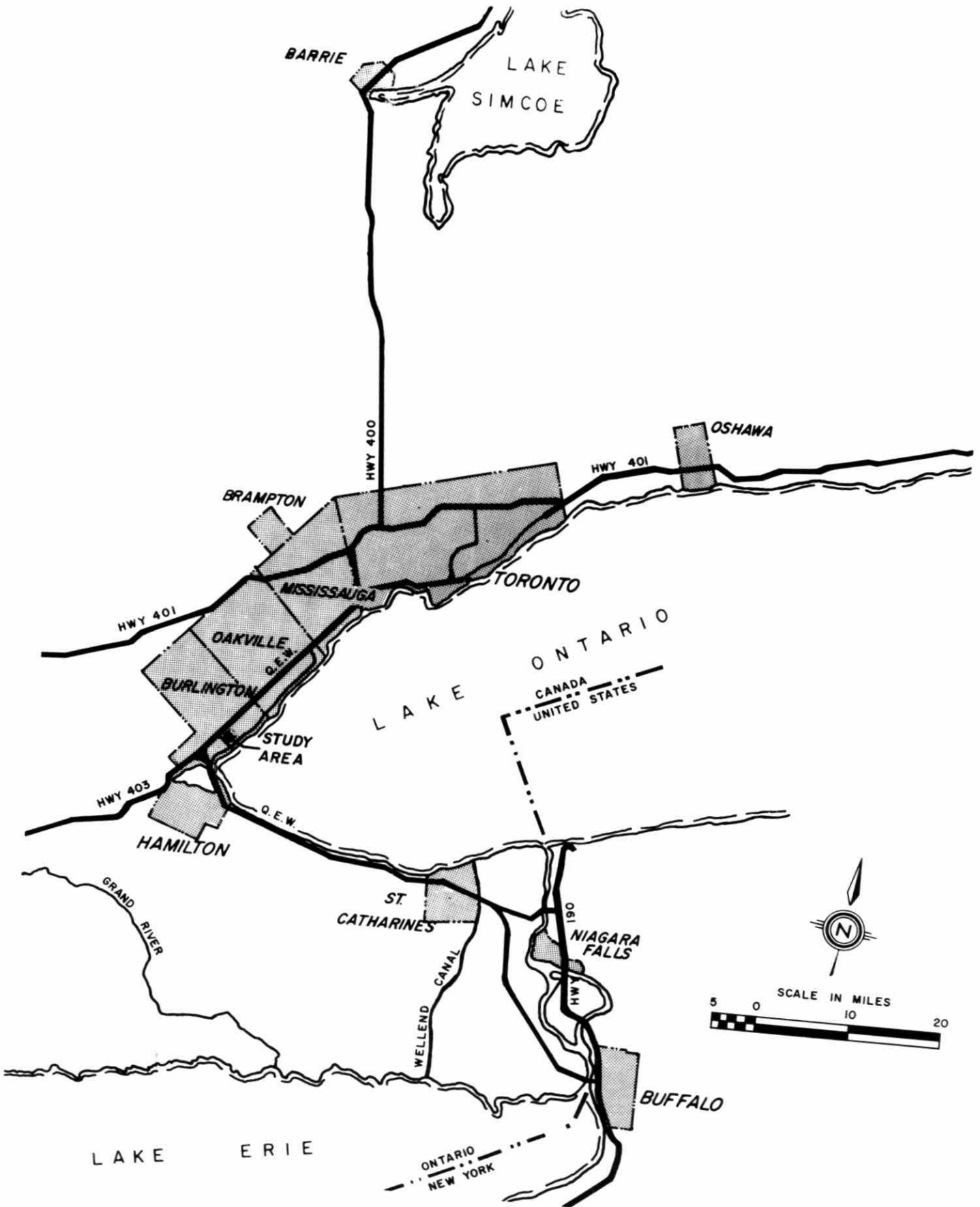
**WASTE RECLAMATION PILOT STUDY
IN THE TOWN OF BURLINGTON
STUDY DESIGN PROGRAMME**

FIGURES

WASTE RECLAMATION PILOT STUDY IN THE TOWN OF BURLINGTON – Figure 1

ORGANIZATION CHART





REGIONAL LOCATION
FIGURE 3



Large Lots



Newer Subdivision



Older Subdivision



Townhouses



Townhouse "Court Type"



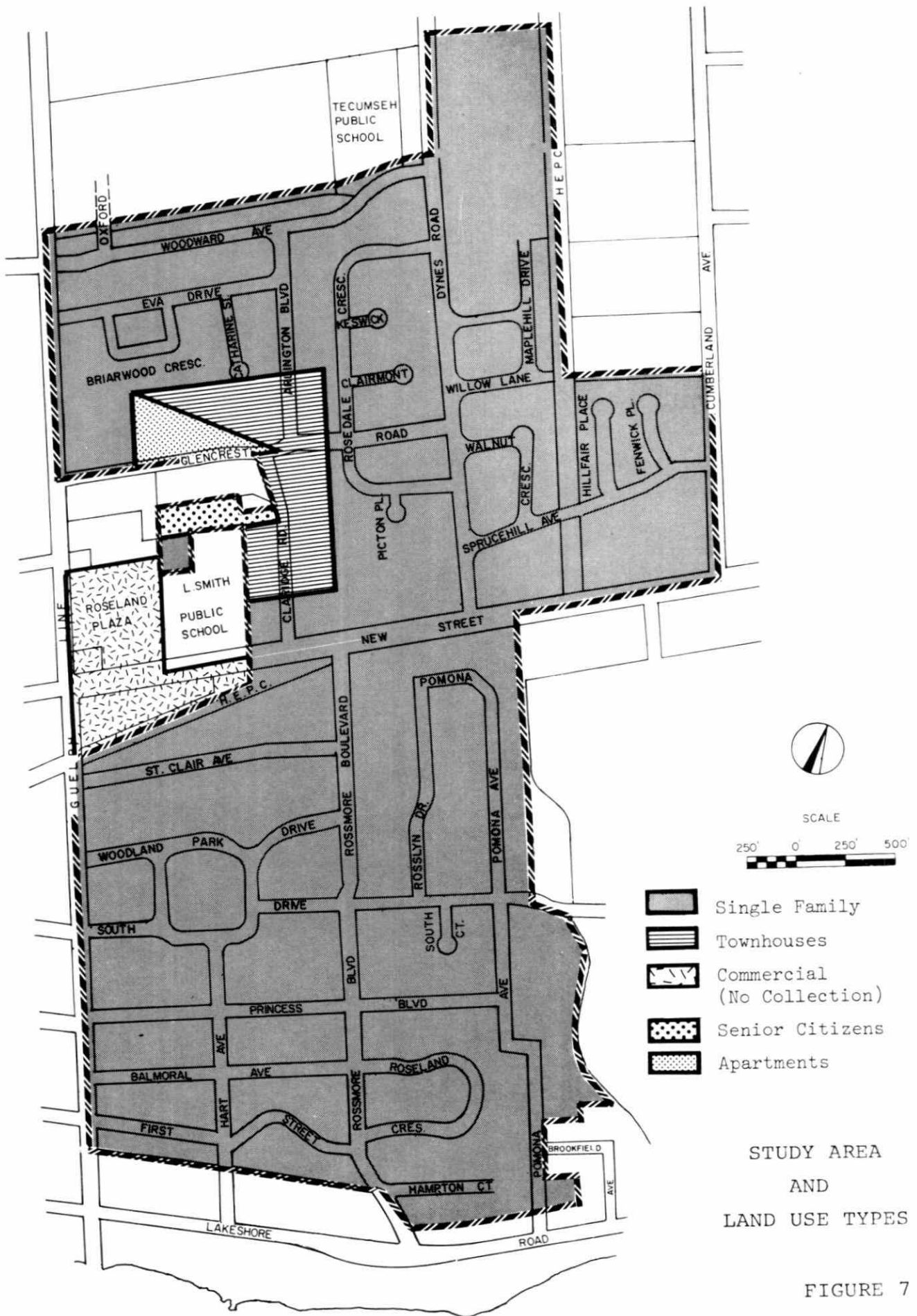
Selected Apartment Unit



Shopping Plaza



Rear of Plaza
Containers



Grant makes garbage study possible

One thousand Burlington families will have \$20,000 spent on a study of their garbage.

The money covers the basic cost of the first study to be carried out in Ontario to determine the feasibility of garbage being separated in the home for eventual recycling.

The project was announced yesterday as a joint undertaking by the province and Burlington by George Kerr, energy and resources minister. The announcement came at a press conference at town hall.

Mr. Kerr said Burlington was selected for the pilot project largely because it had a

strong anti-pollution group — the Citizens Committee for Pollution Control operating a recycling centre.

MR. KERR is also MLA for Halton West, which includes Burlington.

The financing for such a study was originally requested by town council last December, after suggestions from the CCPC. Until recently, though, there was uncertainty as to whether it would be available.

Mr. Kerr said that 80 per cent of the \$20,000 would be contributed by the province and the balance by Burlington.

The program, however, will include volunteer work by CCPC members, staff of the waste management branch of

the Energy and Resources Management and students employed through the provincial Sweep program with the Halton Region Conservation Authority.

KEN CHILDS, regional engineer for the waste management branch said: "The real leg work is being done voluntarily. I think we can achieve an awful lot with the money that's available."

The project begins this month with a survey of families living in an area described as east of the Guelph Line and north of South Drive, although exact boundaries have not been determined. Single family homes, houses and businesses are included.

The types and quantities of waste being generated will be studied, as well as the willingness of people to separate the wastes according to paper, glass and metals, and store them for collection.

From August until February the separated garbage will be collected by the town, stored and transported to recycling centres — if the residents agree to co-operate.

Conducting the study will be Philips Planning and Engineering Ltd., a firm of consulting engineers. The firm's president, Jack M. Tomlinson, will act as study director, according to Mr. Kerr.

BOTH MR. TOMLINSON and Mr. Childs are members of the project's co-ordinating

committee. With them are Gordon Johnson, town works superintendent, and Mrs. John Reble of the CCPC.

Mr. Childs said that in addition to studying household wastes, Mr. Tomlinson's firm will also examine the markets available for the various types of reusable materials.

The survey, he said, would probably determine the method of separation used in the homes. He said that help might be available from the plastics industry in providing colored bags for the different materials, if this method is chosen.

The program also will determine the costs involved in such "in-home" recycling and the effect on current garbage

disposal methods of removing a large portion of the waste.

Mr. Childs said that any profit from the sale of materials would be put back into the study. He said he did not expect researchers to be "in a big marketing position".

MAYOR GEORGE Harrington said the problems of garbage disposal were becoming larger every year. He said that space for land fill areas was scarce and that garbage incinerators were polluters.

"We have to find out what we are going to do with our garbage," the mayor said. "Recycling makes sense."

He said that one major industry discovered Teflon, a popular lining for pots and

pans, while doing research into the recycling of its own residues.

"The research men found an ultimately more valuable and useful purpose for the residue than for the product they were marketing," Mr. Harrington said.

The period from August to February was chosen, Mr. Tomlinson said, because it would expose the program to three seasons and the various changes which would occur with different types of weather.

Officials said they did not expect any problems with the town's garbage collectors, a private firm which contracts for the service, in collecting the separated wastes.

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ROY SINGLETON,
Publisher

ED O'TOOLE
Editor

Pilot study - a CCPC victory

Hon. George Kerr, minister of energy and resources management, spoke in glowing terms of the work that has been done by the Burlington Citizens Committee for Pollution Control.

The occasion came last Friday when Mr. Kerr announced the beginning of a pilot waste reclamation study sponsored by his department and the town.

Burlington was chosen for the study, said the minister, because of the great nucleus of an organization, the CCPC, and also the co-operation of Burlington town council.

The Burlington Citizens Committee on Pollution Control has done a tremendous job in trailblazing in a practical manner. President of the organization, Mrs. Roberta Golightly, and her co-workers have seen the experimental recycling depot they started flourish to the point now where more space is needed. Membership in the group is around 120 and participation in numbers is more than 1,000.

The best thing probably that can be said of the group is that it is working effectively as Mr. Kerr pointed out.

And now the new pilot project will determine the feasibility of householders separating reusable materials from their garbage for special pickups and eventual recycling.

The problems so far outlined are numerous and one of the reasons behind this pilot study is to determine even more problems - and even if the whole idea is really feasible.

But the most hopeful thing to come from the announcement could be the fact that something tangible is being done.

And it looks like the days of scare talk and no action might be coming to an end. Whether or not the citizens of Burlington are willing to go to the extra bother of "preparing" their garbage, remains to be seen.

As does other problems such as number of pickups necessary, garbage storing problems for apartment dwellers, and cost.

But it must be something of a victory for Mrs. Golightly, her committee, Burlington town council and concerned citizens.



BURLINGTON WASTE RECLAMATION PILOT STUDY

INSTRUCTIONS TO INTERVIEWERS

1. INTRODUCTION

How do you do - my name is _____.
I am working for (or with) the Province of Ontario,
Department of Energy and Resources, and the Town of
Burlington. They are doing a study on pollution control
and refuse disposal, and need everyone's co-operation.
I am wondering if I might ask you a very few questions.

(If the person tries to stall - or evade - reassure by
informing that this information is confidential and that
you will take very little time.)

2. QUESTIONNAIRE

Try to ascertain if this is the householder -
keep track of calls and call-backs by address.

3. A sheet has been prepared giving you general
information on the project which I will leave with you.

4. Thank you very much. You will be receiving
further instructions in the mail just before the separate
collection will commence. The instructions will indicate
the materials that will be separated, the collection
dates, etc.

BURLINGTON WASTE RECLAMATION PILOT STUDY

HOUSEHOLDER QUESTIONNAIRE

Street _____

House No. _____ Apartment No. _____

	<u>Yes</u>	<u>No</u>
1. Have you heard about the Burlington Citizens who are separating their household garbage each week and keeping it in separate containers for collection?	_____	_____
This area has been selected to do this for a 6-month period by the Province of Ontario and the Town of Burlington.		
2. Would you separate your garbage and place it in separate containers for collection?	_____	_____
3. Would you separate from the garbage such items as:		
newspapers?	_____	_____
cardboard cartons?	_____	_____
clear glass bottles?	_____	_____
coloured glass bottles?	_____	_____
mixed metals?	_____	_____
4. How many people are there in the household?	_____	_____
5. Would you be willing to answer 2 or 3 more questionnaires of this nature over the next 6-month period?	_____	_____
6. Thank you very much. You will be receiving further instructions in the mail just before the separate collection will commence. The instructions will indicate the materials that will be separated, the collection dates, etc.		

BURLINGTON WASTE RECLAMATION PILOT STUDY

HOUSEHOLDER GENERAL INFORMATION SHEET

July 22, 1971

On July 9, 1971, the Hon. George A. Kerr, Q.C., Minister of the Ontario Department of Energy and Resources Management, announced that his Department along with the Town of Burlington was sponsoring a pilot waste reclamation recycling study involving approximately 1,000 Burlington householders.

The households selected for the study will be in the area east of Guelph Line and west of Cumberland Ave. and General Brock High School, north and south of New Street from Woodward Ave. to South Drive.

The study is being co-ordinated by a four-member Committee with Philips Planning and Engineering Ltd. conducting the study.

Committee members are:

- Mr. Ken Childs - Regional Engineer of Waste Management Branch, Department of Energy and Resources Management
- Mr. Gord Johnson - Maintenance Engineer of the Town of Burlington
- Mrs. John Reble - Representative of Burlington Citizens' Committee for Pollution Control
- Mr. Jack Tomlinson - Study Director and President of Philips Planning and Engineering Limited

Following the first householder interview during the week of July 26, it is expected that a special collection program for separated wastes will commence by mid August and will carry through on a continuous basis to February, 1972.

The aims of the study are to determine the willingness of the householder to separate wastes, the total amount of wastes, the amount and type of waste that can be reclaimed, the problems of separating, storing and marketing the reclaimed materials, and the costs.

This study is being undertaken in an attempt to obtain the basic information which is required by government, public, private groups and individuals concerned with this growing environmental problem.

For specific enquiries during the length of the study, please contact the Study Director Jack M. Tomlinson at Philips Planning and Engineering Limited.

NEED CO-OPERATION

Students start householder interviews for pilot study

Burlington students, working with the Sweep Program, will be knocking on doors during the week of July 26 - initiating the first householder interviews in the Burlington Waste Reclamation Pilot Study.

The study, to cost \$20,000, was announced last week by Hon. George Kerr.

Sweep students and members of the Waste Reclamation Pilot Study will be leaving background study information with the householder and seeking their co-operation in this extremely important initial project of this nature in the overall problem of en-

vironmental conservation.

The personal contacting in the Study Area will commence Monday July 26 through to and including Friday, July 30.

The selected study area is east of Guelph Line west of Cumberland Avenue and General Brock High School, north and south of New Street from Woodward Avenue to South Drive.

Study Director, Jack Tomlinson of Philips Planning and Engineering Ltd. is optimistic that excellent co-operation will be obtained.

"This part of the study is very important," said Mr. Tomlinson. "The number of house-

holders contacted will be around 1,000 but this isn't definite yet as we are still considering the number of apartment units we will handle."

Mr. Tomlinson added that a briefing of the SWEEP students will

take place tomorrow morning before the study begins.

Following the householder interviews, the decision on items to be separated, the details of collection and recycling procedures will be finalized.

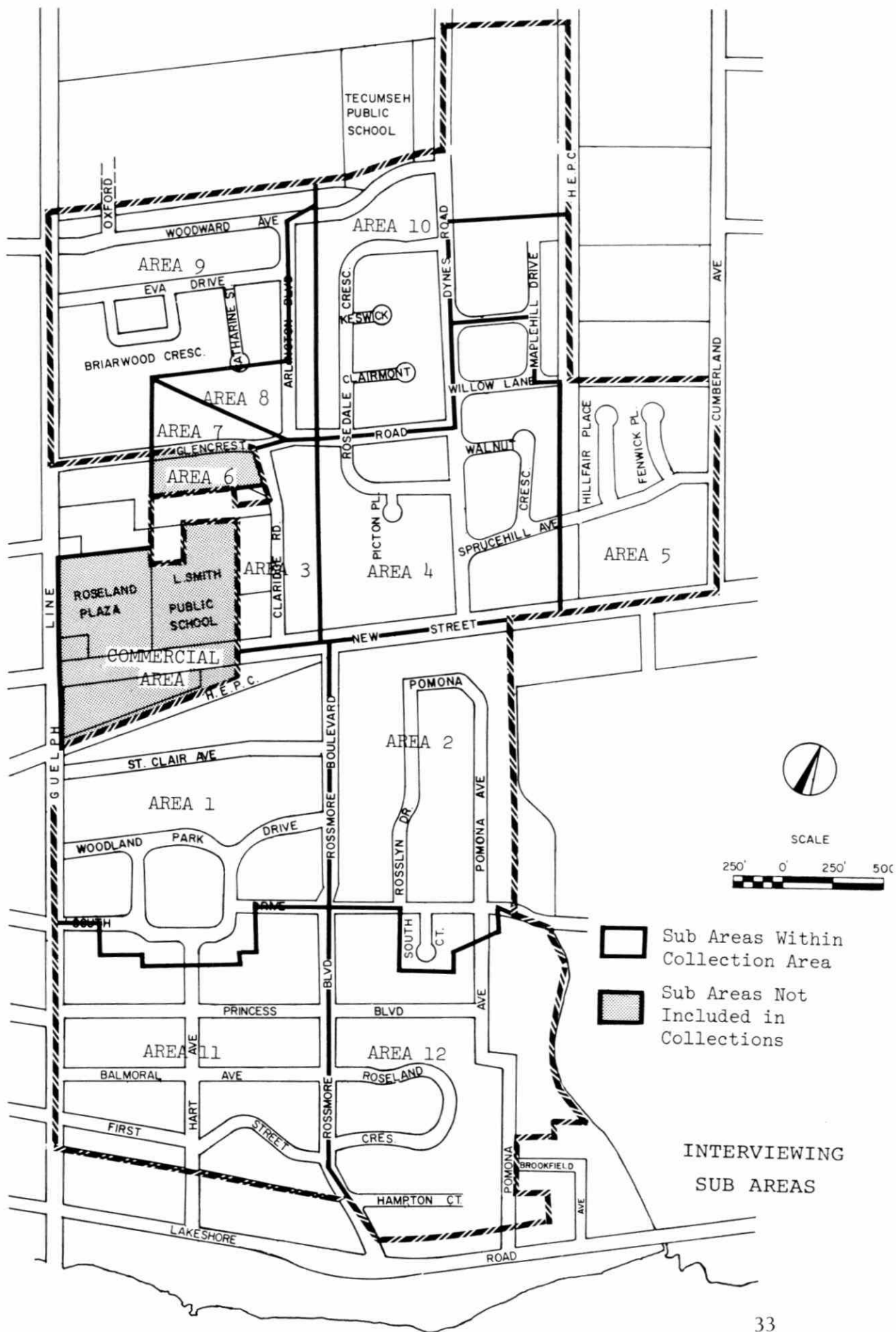


FIGURE 13

Burlington, Ontario
August 16, 1971

BURLINGTON WASTE RECLAMATION PILOT STUDY

Dear Householder:

The results of the recent home interview in your area indicate that 89% of the local residents are willing to separate household wastes for recycling. A program of in-home separation and recycling of household wastes is therefore being instituted. The first collection day will be August 25, 1971.

The attached instruction sheet lists the materials to be separated, the required preparation and the collection details. The preparation requirements may be modified at a later date.

A public meeting of all householders in the study area will be held on Thursday, September 9, 1971 at 8:00 P.M. in the auditorium of Lawrie Smith Public School located at 3055 New Street. At this time the study program will be outlined, specific problems discussed and questions answered.

As this is the first study of its kind undertaken, we look forward to your interest and co-operation.

Burlington Waste Reclamation Study Committee

HOW TO PREPARE YOUR RECYCLABLE WASTES

	<u>ITEMS</u>	<u>PREPARATION</u>	<u>NOT ACCEPTABLE</u>
GLASS:	All jars and bottles	1. Remove lids and metal neck rings. 2. <u>SORT</u> into <u>CLEAR</u> and <u>COLOURED</u> and place in separate containers.	1. Lightbulbs 2. Window panes 3. Earthenware or china 4. Opaque containers such as cold cream jars
TINS:	Tin cans, pop cans, etc.	1. Remove all paper labels. 2. Place in separate container. 3. Although not necessary, it would be helpful if cans are flattened.	1. Aerosol cans 2. Paint cans
NEWSPAPER:	Newspapers and newsprint	1. Flatten. 2. Pile neatly and <u>TIE SECURELY</u> .	1. Shiny paper 2. Magazines

These four categories: clear glass, coloured glass, tins and newspaper are the only recyclable wastes to be collected. The preparation procedure established at this time may be modified as the study progresses.

These recyclable wastes are to be placed in separate OPEN CONTAINERS and put out on the NORMAL GARBAGE DAY. The container will be left behind for reuse.

The first pick-up of recyclable wastes will be made on Wednesday, August 25, 1971, and will continue every week along with normal garbage pick-up until January 26, 1972.

Normal garbage pick-up of non-recyclable wastes will continue as usual.

For information phone 637-2353.

HOW TO PREPARE YOUR RECYCLABLE WASTES

INSTRUCTION SHEET NO. 2

This instruction sheet is to be used in addition to the first instruction sheet distributed on August 16, 1971.

	<u>RIGHT</u>	<u>WRONG</u>
GLASS	<ol style="list-style-type: none">1. Separate clear and coloured glass.2. Use separate containers for clear and coloured.3. Be sure to <u>remove all metal neck rings and lids.</u> This is essential.4. Place bottles which cannot be recycled in the normal garbage.	<ol style="list-style-type: none">1. <u>Do not mix glass and cans</u> in the same container.2. Do not include plastic bottles.
TINS	<ol style="list-style-type: none">1. Be sure to remove all paper labels.2. Keep tins and glass in separate containers.3. Put tins which cannot be recycled (paint cans etc.) in the normal garbage.	<ol style="list-style-type: none">1. <u>Do not include paint or oil cans</u> of any type.2. Do not include aerosol cans.3. Do not include tin-foil containers.4. Do not include cans with plastic tops or ends.
NEWSPAPER	<ol style="list-style-type: none">1. Be sure to tie newspaper in tight bundles.2. Put papers which cannot be recycled in the normal garbage.	<ol style="list-style-type: none">1. Do not include shiny paper, magazines, catalogues etc.2. Do not include corrugated cardboard. Corrugated cardboard should go with the normal household garbage.
CONTAINERS	<ol style="list-style-type: none">1. Use a separate open container for each type of recyclable waste, e.g. boxes, large baskets, pails. Containers which are in good condition will be left behind for reuse.	<ol style="list-style-type: none">1. Do not put recyclable wastes in a tied bag. These are not readily identified or handled.
PICK-UP	<ol style="list-style-type: none">1. Put out your recyclable wastes (clear glass, coloured glass, tins and newspaper) as well as normal household garbage by <u>8:00 A.M.</u>	

NOTE:

1. It is essential that all metal of any type is removed from the glass bottles. The presence of even small amounts of metal in the glass recycling process is hazardous.
2. Keep recyclable glass and tins in separate containers. If these are mixed, they cannot be recycled.
3. Be sure to have all your recyclable wastes and regular household garbage ready for collection by 8:00 A.M. Under the new system, recyclable wastes will be picked up before the regular garbage collection. It is therefore necessary to begin the collection at 8:00 A.M.

BURLINGTON WASTE RECLAMATION PILOT STUDY

HOUSEHOLDER QUESTIONNAIRE NO. 2

Street _____
No. _____

Date _____
Apt. No. _____

- | | <u>Yes</u> | <u>No</u> |
|--|------------|-----------|
| 1. Were you living here in July? | _____ | _____ |
| 2. Were you interviewed by us at that time? | _____ | _____ |
| 3. Have you been regularly separating the following items? | | |

	<u>Yes</u>	<u>No</u>	<u>Every Week</u>	<u>Every 2nd Wk.</u>	<u>Other</u>
Newspaper	_____	_____	_____	_____	_____
Clear glass	_____	_____	_____	_____	_____
Coloured glass	_____	_____	_____	_____	_____
Metal cans	_____	_____	_____	_____	_____

- | | | |
|---|------------|-----------|
| 4. Will you continue to separate your refuse for the remainder of this study period into: | <u>Yes</u> | <u>No</u> |
| Newspaper | _____ | _____ |
| Clear glass | _____ | _____ |
| Coloured glass | _____ | _____ |
| Metal cans | _____ | _____ |

5. How do you feel about this method of separating your garbage?
In favour _____ Indifferent _____ Opposed _____

6. Interviewer's Remarks:

(Indicate here if the homeowner is not separating but would separate if containers were provided.)

BURLINGTON WASTE RECLAMATION PILOT STUDY

HOUSEHOLDER GENERAL INFORMATION SHEET NO. 2

As you are aware, the Ontario Department of the Environment together with the Town of Burlington has sponsored a pilot project to study garbage recycling. The study area includes your home. Details of the study were outlined at the time of the original home survey in July, 1971.

Actual separation and collection of recyclable materials has been under way since August 25, 1971.

The results to date have been encouraging and indicate that approximately 50% of the local residents are actually separating one or more of their wastes for recycling. The current average weekly collection of recyclable materials is approximately 6,000 lbs., representing approximately 15% of the total garbage collected.

The recyclable materials are being delivered to markets in Hamilton following their collection. Proceeds from the sale of these recyclable materials are paid directly to the Province of Ontario to partially offset the additional costs of collection.

As stated previously, the weekly collection will continue until January 26, 1971.

The study is providing valuable basic information concerning public acceptance and the problems of in-home separation and collection of recyclable materials.

We wish to remind you that the preparation procedures for recyclable materials are outlined on instruction sheets 1 and 2 distributed in August.

Please note that four separate containers are to be used, one container for each of the separated materials.

For specific inquiries, please call 637-2353.

BURLINGTON WASTE RECLAMATION PILOT STUDY

November 24, 1971

To: All Single Family Home Residents

A Pilot Waste Recycling Study sponsored by the Department of the Environment and the Town of Burlington has been under way in your area since July of this year. The aims of this study are to determine the willingness of the householder to separate wastes, the total amount of generated wastes, the amount and type of each waste that can be reclaimed, the problems of separating, storing and marketing the reclaimed materials, and the costs. Actual separate collections of recyclable wastes have been made every week since August 25th, 1971.

Collection results from the single family homes have shown a definite trend which has been maintained over the past several collections. To further the aims of the study, the Study Committee wishes to reduce the number of items to be separated in order to determine whether co-operation will increase in the separation of two items instead of four.

For the balance of the study period, which is expected to continue to the end of January, 1972, you no longer will be requested to separate glass each week. The collection on November 24th, 1971 will be the last day that clear and coloured glass will be picked up by the separate collection truck.

Separation and collection of newspaper and metal cans will continue until the end of January, 1972. Preparation procedures for newspaper and metal cans will remain the same.

We have appreciated the co-operation of the residents received to date and look forward to your continuing co-operation in this study.

A second public meeting will be held in January of the new year prior to the completion of the complete study. You will be advised of the time and place at a later date.

For inquiries, please call 637-2353.

Burlington Waste Reclamation Study Committee

BURLINGTON WASTE RECLAMATION PILOT STUDY

November 24, 1971

To: All Townhouse Residents

A Pilot Waste Recycling Study sponsored by the Department of the Environment and the Town of Burlington has been underway in your area since July of this year. The aims of this study are to determine the willingness of the householder to separate wastes, the total amount of generated wastes, the amount and type of each waste that can be reclaimed, the problems of separating, storing and marketing the reclaimed materials, and the costs. Actual separate collections of recyclable wastes have been made every week since August 25th, 1971.

Collection results from the townhouse and maisonette units in the study area have shown a definite trend which has been maintained over the past several collections. For this reason, the Study Committee feels that no further information relative to the aims of the study can be obtained from further collections of recyclable wastes from the townhouse areas.

Therefore, Wednesday, November 24th, 1971, will be the last collection day for separated recyclable wastes from the townhouse and maisonette units.

Following the collection on November 24th, 1971, all refuse will be collected by the regular garbage truck on your normal collection day.

We wish to thank all the townhouse and maisonette residents for their co-operation during the study period.

For those who wish to continue recycling on a voluntary basis, we suggest that you contact the Citizens' Committee for Pollution Control at 634-9311.

A second public meeting will be held in January of the new year prior to the completion of the study. You will be advised of the time and place at a later date.

For inquiries, please call 637-2353.

Burlington Waste Reclamation Study Committee

BURLINGTON WASTE RECLAMATION PILOT STUDY

To: All single family home residents and all apartment
residents in the study area

A Pilot Waste Recycling Study sponsored by the Department of the Environment and the Town of Burlington has been underway in your area since July of this year. The aims of this study are to determine the willingness of the householder to separate wastes, the total amount of generated wastes, the amount and type of each waste that can be reclaimed, the problems of separating, storing and marketing the reclaimed materials, and the costs. Actual separate collections of recyclable wastes have been made every week since August 25th, 1971.

The program of separation and collection for the pilot study has now been completed, therefore, Wednesday, January 26th, 1972 will be the last collection day for separated recyclable wastes.

Following the collection of January 26th, 1972 all refuse will be collected by the regular garbage truck on your normal collection day.

For those who wish to continue recycling on a voluntary basis, we suggest that you contact the Citizens' Committee for Pollution Control at 634-9311. A recycling depot operated by the C.C.P.C. on a voluntary basis is located on the Guelph Line, one block north of Highway 5.

We wish to thank all of you for your co-operation during the study period, and for providing us with a great deal of valuable information.

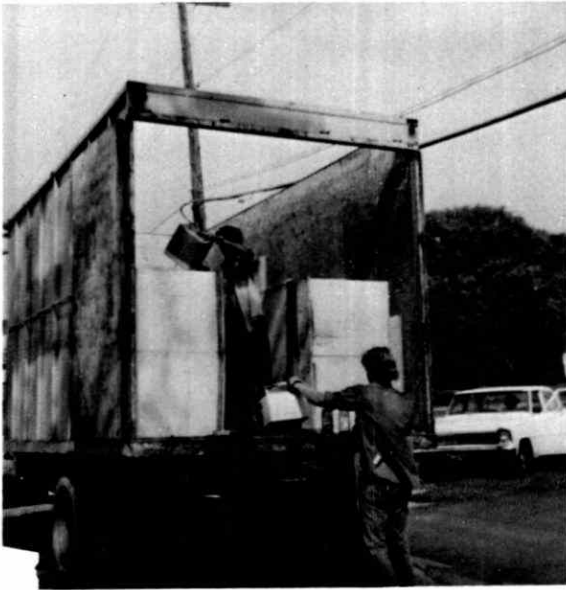
A second public meeting of all residents from the study area with the Study Officials will be held on January 27th, 1972 at 8:00 P.M. in the auditorium of Lawrie Smith Public School at 3055 New Street. At this time any questions you may have relating to the study will be answered and a review of the results of the study will be presented.

We would appreciate receiving any comments you may have regarding the study. These may be given orally at the public meeting or submitted in writing to the following address:

Philips Planning and Engineering Limited
P. O. Box 220
Burlington, Ontario
Attention: Burlington Waste Reclamation Pilot Study

In the meantime, if you have any inquiries, please call 637-2353.

Burlington Waste Reclamation Study Committee



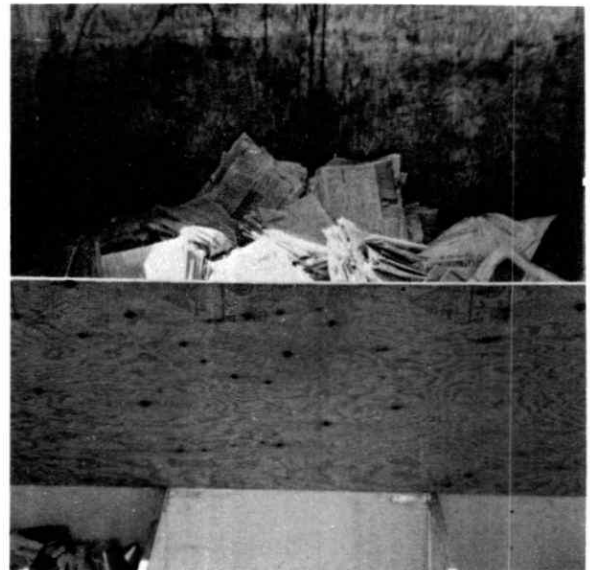
Collection



Prior to Unloading



Glass and Metal Can
Compartments



Newspaper Bin

SUMMARY OF COMMENTS

- . Would like a better explanation of the needs for and benefits of recycling.
- . Why not use a central disposal area like a shopping plaza to continue the project after the study finishes.
- . Supply marked containers which will not be taken away by garbage truck.
- . Containers were taken.
- . Every week is too often for pick-up, why not every two weeks or once a month.
- . Might we start recycling other items soon.
- . Not interested; it is a nuisance.
- . Good idea, keep up the good work.
- . Continue the project longer.
- . Thinks it silly; must come from the government.
- . Change special collection day to same day as regular collection.
- . Change special collection day to some day other than regular collection day.
- . Objects to doing this work when already paying for garbage collection.
- . Too much trouble finding containers.
- . Should be an incentive to encourage co-operation.
- . Don't use enough bottles and cans to warrant recycling.
- . Object to separating cans and bottles and clear and coloured glass.
- . Too much trouble removing labels.
- . Since we pay taxes we shouldn't have to separate garbage, let the welfare cases do it.



Outside Storage of
Metal and Glass



Inside Storage of
Newspaper



Four Weeks of Metal Cans



Photo by Courtesy of The Spectator, Hamilton



Containers Supplied at
Apartments

REFUSE GENERATION PER CAPITA PER WEEK SINGLE FAMILY HOMES

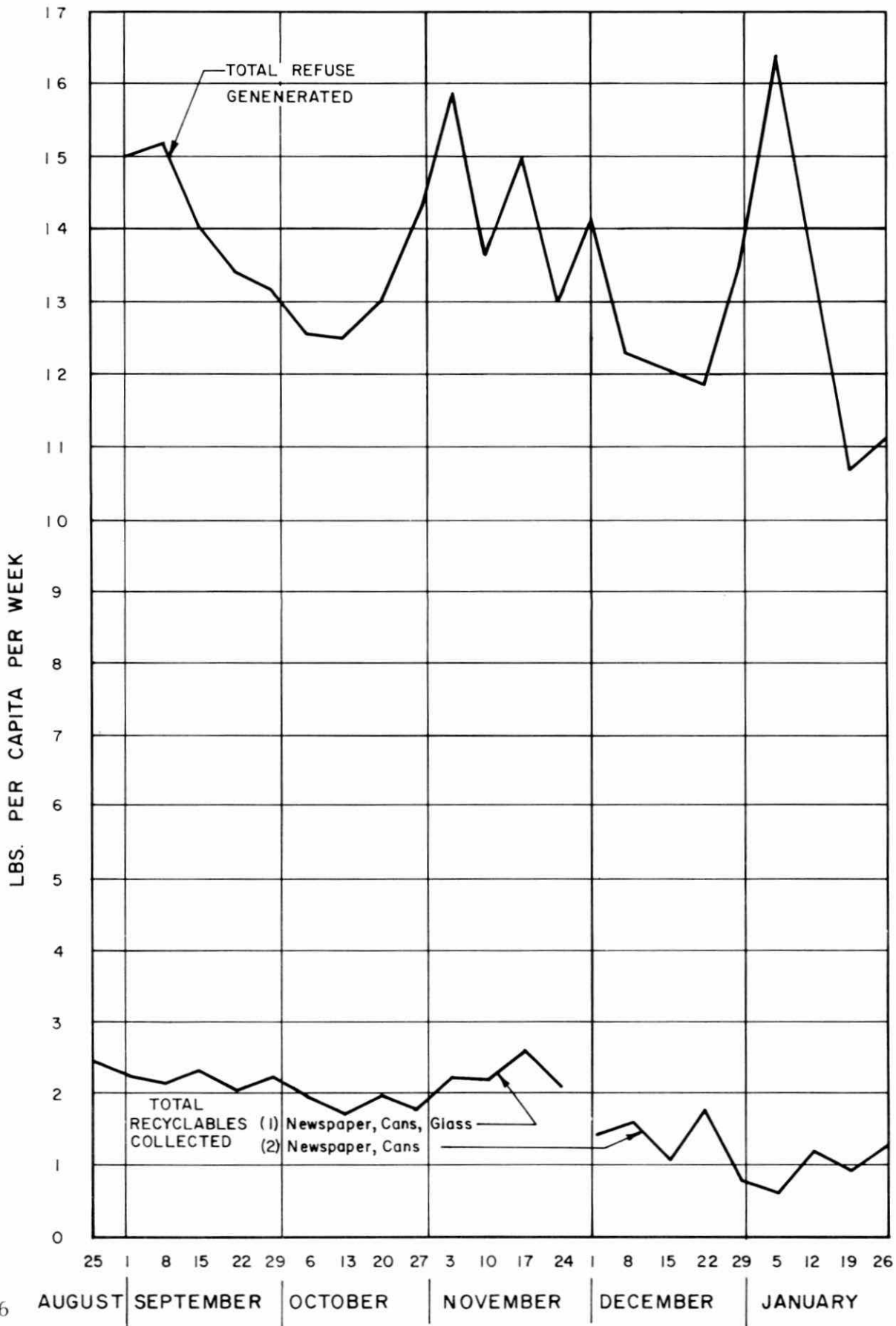


FIGURE 26



Separation in Progress



Separation in Progress



Large Scale for Weighing

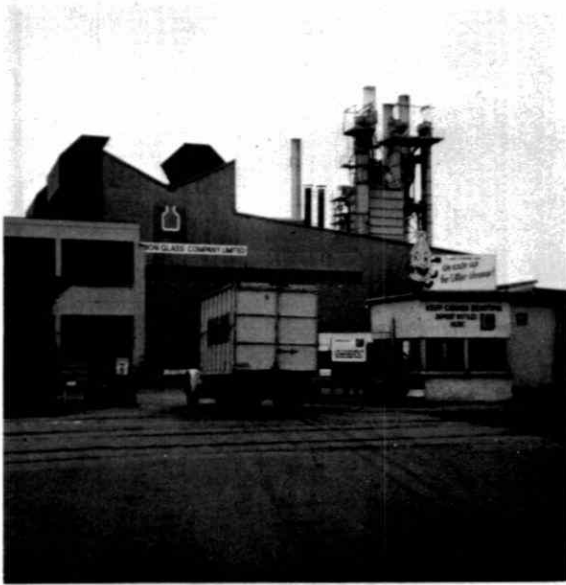


Small Scale
For Weighing



"Field Office"
Coffee Break

FIGURE 27



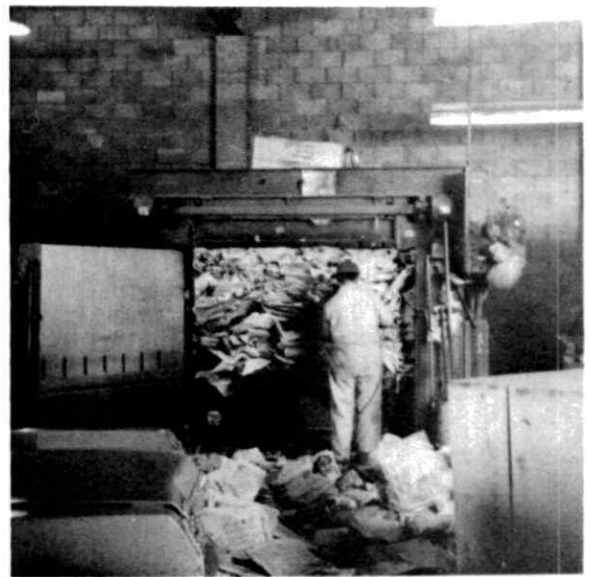
Glass Plant



Waste Paper Plant



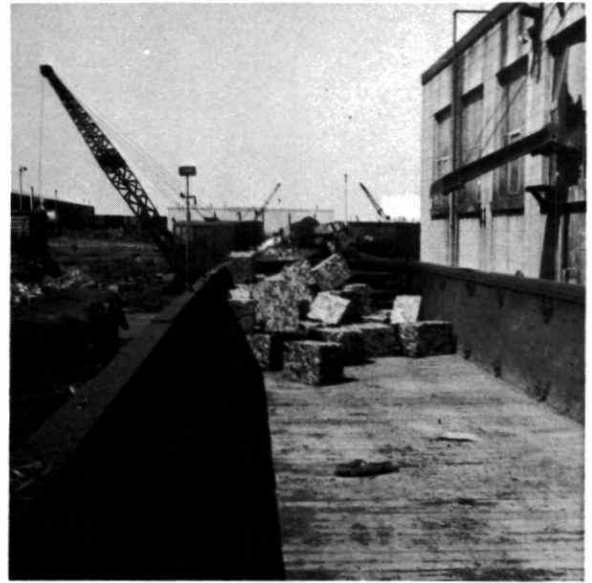
Glass from Collection Truck



Paper Baler



Magnet Pick-up



Metal Bales in Rail Car



Metal Can Bale

TABLES

SINGLE FAMILY HOUSING COLLECTIONS – TABLE A
721 Households – 2,700 People

COLLECTION PERIOD DATE	NEWS-PAPER	GLASS CLEAR	COLOR	METAL CANS	TOTAL RECYCLABLES	MISC. GARBAGE	TOTAL REFUSE	RECYCLED MATERIALS	CO-OPERATION	
	LBS.				LBS.		LBS.	LBS.	%	%
Aug. 25/71	4,633*	1,593*	50	50	442*	6,668				
Sept. 1/71	3,143	2,233	69	31	552	5,928	34,515	40,443	14.6	
Sept. 8/71	3,163	1,953	79	21	552	5,668	35,391	41,059	13.8	
Sept. 15/71	3,463	1,993	73	27	712	6,168	31,927	38,095	16.2	55
Sept. 22/71	3,323	1,653	76	24	652	5,628	30,449	36,077	15.6	
Sept. 29/71	3,683	1,533	70	30	612	5,828	29,907	35,735	16.3	
Oct. 6/71	3,083	1,593	60	40	572	5,248	28,849	34,097	15.4	
Oct. 13/71	2,683	1,253	62	38	572	4,508	29,183	33,691	13.4	
Oct. 20/71	2,983	1,613	54	46	652	5,248	29,929	35,177	14.9	50
Oct. 27/71	2,043*	1,953	65	35	652	4,648	34,247	38,895	12.0	
Nov. 3/71	3,860	1,676	67	33	664	6,200	36,778	42,978	14.4	53
Nov. 10/71	3,617	1,839	56	44	633	6,089	30,820	36,909	16.5	52
Nov. 17/71	4,147	2,232			693	7,072	33,420	40,492	17.5	
Nov. 24/71	3,772	1,230			616	5,618	29,420	35,038	16.0	51
Dec. 1/71	3,305				588	3,893	34,240	38,133	10.2	44
Dec. 8/71	3,759				474	4,233	28,960	33,193	12.7	43
Dec. 15/71	2,350				400	2,750				33
Dec. 22/71	4,156				622	4,778	27,020	31,798	15.0	44
Dec. 29/71	1,630				354	1,984	34,425	36,409	5.4	28
Jan. 5/72	1,402				307	1,709	42,640*	44,349	4.0	29
Jan. 12/72	2,800				580	3,380	33,500	36,880	9.2	36
Jan. 19/72	2,284				346	2,630	26,160	28,790	9.1	31
Jan. 26/72	2,963				538	3,501	26,480	29,981	11.9	37

* Irregularities in Collections

TOWNHOUSE COLLECTIONS – TABLE C

COLLECTION PERIOD	NEWSPAPER	WEIGHT	GLASS CLEAR	COLOR	METAL CANS	TOTAL RECYCLABLES	MISC. REFUSE	TOTAL REFUSE	RECYCLED MATERIALS	REFUSE PER CAPITA PER WEEK
	LBS.	LBS.	%	%	LBS.	LBS.	%	%	%	LBS.
Nov. 3/71	325	96	72	28	32	453				
Nov. 10/71	165	129	75	25	26	320	3,340	3,660	9.5	7.3
Nov. 17/71	200	107	63	37	40	347	4,820	5,167	6.7	10.3
Nov. 24/71	177	95	72	28	15	287	4,070	4,357	6.6	8.7

Based on 143 townhouse units and population of 500.

RECYCLABLE MATERIALS COLLECTED PER CAPITAL AND PER WEEK – TABLE B
SINGLE FAMILY HOUSEHOLDS
(Population 2,700)

<u>COLLECTION DATE</u>	<u>ACTUAL NEWSPAPERS COLLECTED</u>	<u>METAL CANS COLLECTED</u>	<u>ACTUAL GLASS COLLECTED</u>	<u>NEWSPAPERS PER CAPITA PER WEEK</u>	<u>CAN PER CAPITA PER WEEK</u>	<u>GLASS PER CAPITA PER WEEK</u>	<u>PER CENT RECYCLED BY WEIGHT</u>
Aug. 25/71	4,633	442	1,593	1.7	0.16	0.59	N.A.
Sept. 1/71	3,143	552	2,233	1.2	0.20	0.83	14.6
Sept. 8/71	3,163	552	1,953	1.2	0.20	0.72	13.8
Sept. 15/71	3,463	712	1,993	1.3	0.26	0.74	16.2
Sept. 22/71	3,323	652	1,653	1.2	0.24	0.61	15.6
Sept. 29/71	3,683	612	1,533	1.4	0.23	0.57	16.3
Oct. 6/71	3,083	572	1,593	1.1	0.21	0.59	15.4
Oct. 13/71	2,683	572	1,253	1.0	0.21	0.46	13.4
Oct. 20/71	2,983	652	1,613	1.1	0.24	0.60	14.9
Oct. 27/71	2,043	652	1,953	0.8	0.24	0.72	12.0
Nov. 3/71	3,860	664	1,676	1.4	0.25	0.62	14.4
Nov. 10/71	3,617	633	1,839	1.3	0.23	0.68	16.5
Nov. 17/71	4,147	693	2,232	1.5	0.26	0.83	17.5
Nov. 24/71	3,772	616	1,230	1.4	0.23	0.46	16.0
Dec. 1/71	3,305	588		1.2	0.22		10.2
Dec. 8/71	3,759	474		1.4	0.18		12.7
Dec. 15/71	2,350	400		0.9	0.15		N.A.
Dec. 22/71	4,156	622		1.5	0.23		15.0
Dec. 29/71	1,630	354		0.6	0.13		5.4
Jan. 5/72	1,402	307		0.5	0.11		4.0
Jan. 12/72	2,800	580		1.0	0.21		9.2
Jan. 19/72	2,284	346		0.8	0.13		9.1
Jan. 26/72	2,963	538		1.1	0.20		11.9

APARTMENT COLLECTIONS – TABLE D

<u>COLLECTION PERIOD DATE</u>	<u>NEWSPAPER</u>	<u>WEIGHT</u>	<u>GLASS</u>		<u>METAL CANS</u>	<u>TOTAL RECYCLABLES</u>	<u>MISCELLANEOUS GARBAGE AFTER INCINERATION</u>	<u>PER CENT RECYCLABLES</u>
	LBS.	LBS.	CLEAR	COLOR	LBS.	LBS.	LBS.	%
			%	%				
Nov. 3/71	215	268	56	44	44	527	N.A.	N.A.
Nov. 10/71	368	262	65	35	101	731	452	62
Nov. 17/71	553	241	63	37	67	861	400	68
Nov. 24/71	501	255	71	29	89	845	271	76
Dec. 1/71	595	297	65	35	92	984	313	76
Dec. 8/71	691	342	68	32	126	1,159	358	76
Dec. 15/71	679	263	70	30	144	1,086	N.A.	N.A.
Dec. 22/71	544	378	66	34	118	1,040	393	73
Dec. 29/71	370	393	66	34	126	889	412	68
Jan. 5/72	448	469	59	41	153	1,070	N.A.	N.A.
Jan. 12/72	470	372	56½	43½	114	956	587	62
Jan. 19/72	516	274	69	31	134	922	N.A.	N.A.
Jan. 26/72	537	347	78	22	162	1,046	N.A.	N.A.

**ACTUAL RECYCLABLE MATERIALS COLLECTED PER CAPITA PER WEEK – TABLE E
APARTMENT AND TOWNHOUSES**

<u>COLLECTION PERIOD DATE</u>	<u>ACTUAL NEWSPAPER COLLECTED</u>	<u>METAL CANS COLLECTED</u>	<u>ACTUAL GLASS COLLECTED</u>	<u>NEWSPAPER* PER CAPITA PER WEEK</u>	<u>CANS* PER CAPITA PER WEEK</u>	<u>GLASS PER CAPITA PER WEEK</u>	<u>PER CENT RECYCLED BY WEIGHT</u>
Apartment Units (*Based on Population of 240 Persons)							
Nov. 3/71	215	44	268	0.90	0.18	1.12	N.A.
Nov. 10/71	368	101	262	1.53	0.52	1.09	N.A.
Nov. 17/71	553	67	241	2.30	0.28	1.00	N.A.
Nov. 24/71	501	89	255	2.09	0.37	1.06	N.A.
Dec. 1/71	595	92	297	2.48	0.38	1.24	N.A.
Dec. 8/71	691	126	342	2.88	0.53	1.43	N.A.
Dec. 15/71	679	144	263	2.83	0.60	1.10	N.A.
Dec. 22/71	544	118	378	2.27	0.49	1.58	N.A.
Dec. 29/71	370	126	393	1.54	0.53	1.64	N.A.
Jan. 5/72	448	153	469	1.87	0.64	1.95	N.A.
Jan. 12/72	470	114	372	1.96	0.48	1.55	N.A.
Jan. 19/72	516	134	274	2.15	0.56	1.14	N.A.
Jan. 26/72	537	162	347	2.24	0.68	1.45	N.A.
Average				2.08	0.47	1.33	
Townhouse Units (*Based on Population of 500 Persons)							
Nov. 3/71	325	32	96	0.65	0.06	0.19	N.A.
Nov. 10/71	165	26	129	0.33	0.05	0.26	9.5
Nov. 17/71	200	40	107	0.40	0.08	0.21	6.7
Nov. 24/71	177	15	95	0.35	0.03	0.19	6.6
Average				0.43	0.06	0.21	

**ANALYSIS OF REFUSE COLLECTED IN STUDY AREA – TABLE G
ON NOVEMBER 24, 1971**

	<u>TOTAL QUANTITIES</u>	<u>GLASS</u>	<u>METAL CANS</u>	<u>NEWSPAPER</u>	<u>MISC. PAPER</u>	<u>CORRUGATED CARDBOARD</u>	<u>WOOD</u>	<u>MISC. GARBAGE</u>
From Packer Trucks (Lbs.)	30,480	1,280	914	1,737	4,359	792	122	21,276
Separated Recycled Materials (Lbs.)	6,750	1,580	720	4,450				
Total Waste Generated (Lbs.)	37,230	2,860	1,634	6,187	4,359	792	122	21,276
Total Waste Component (%)	100	7.7	4.4	16.6	11.7	2.1		57.5
Per Cent Recycled	18.1	55.2	44.1	71.9				

NOTE: Miscellaneous garbage included food scraps and wastes, leaves, twigs, cloth, plastic bags and containers, metal objects, metal foil and paper scraps that were not readily separable.

REFUSE AND RECYCLABLES COLLECTED FROM STUDY AREA – TABLE F
ALL HOUSING TYPES COMBINED PER WEEK
(Pounds per Capita)

COLLECTION DATE	TOTAL REFUSE COLLECTED	TOTAL REFUSE PER CAPITA PER WEEK	RECYCLABLE NEWSPAPER COLLECTED	RECYCLABLE CANS COLLECTED	RECYCLABLE GLASS COLLECTED	RECYCLABLE NEWSPAPER PER CAPITA PER WEEK	RECYCLABLE CANS PER CAPITA PER WEEK	RECYCLABLE GLASS PER CAPITA PER WEEK
Aug. 25/71	N.A.		4,850	470	1,700	1.50	0.15	0.53
Sept. 1/71	45,290	14.0	3,360	580	2,340	1.04	0.18	0.72
Sept. 8/71	46,020	14.2	3,380	580	2,060	1.05	0.18	0.64
Sept. 15/71	42,610	13.2	3,680	790	2,100	1.14	0.24	0.65
Sept. 22/71	40,400	12.5	3,540	680	1,760	1.10	0.21	0.54
Sept. 29/71	39,985	12.4	3,900	640	1,640	1.21	0.20	0.51
Oct. 6/71	38,210	11.8	3,300	600	1,700	1.02	0.19	0.53
Oct. 13/71	37,847	11.7	2,900	600	2,900	0.90	0.19	0.90
Oct. 20/71	39,430	12.2	3,200	680	1,720	0.99	0.21	0.53
Oct. 27/71	43,710	13.5	2,260	680	2,060	0.70	0.21	0.64
Nov. 3/71	48,220	14.9	4,400	740	2,040	1.27	0.21	0.59
Nov. 10/71	40,570	12.6	4,150	760	2,230	1.20	0.22	0.64
Nov. 17/71	46,060	14.3	4,900	800	2,580	1.41	0.23	0.74
Nov. 24/71	39,390	12.2	4,450	720	1,580	1.28	0.21	0.46
Dec. 1/71	38,130	14.1	3,900	680		1.33	0.23	
Dec. 8/71	33,193	12.3	4,450	600		1.51	0.20	
Dec. 15/71	N.A.		2,350	400		0.87	0.15	
Dec. 22/71	31,800	11.8	4,700	740		1.60	0.25	
Dec. 29/71	36,410	13.5	2,000	480		0.68	0.16	
Jan. 5/72	44,350	16.4	1,850	460		0.63	0.16	
Jan. 12/72	36,880	13.7	2,800	580		0.95	0.20	
Jan. 19/72	28,790	10.7	2,800	480		0.95	0.16	
Jan. 26/72	29,980	11.1	3,500	700		1.19	0.24	
Average		13.0				1.11	0.20	0.62

RESULTS OF FIRST QUESTIONNAIRE – TABLE H

	NUMBER OF UNITS	WILLING TO SEPARATE WASTES FOR RECYCLING	REFUSED TO SEPARATE WASTES FOR RECYCLING	REFUSE TO ANSWER THE QUESTIONNAIRE	WILLING TO SEPARATE INTO VARIOUS CATEGORIES				
					NEWS-PAPER	CARD-BOARD	CLEAR GLASS	COLOR GLASS	MIXED METAL
					%	%	%	%	%
Commercial Area	48	86	14	Nil	49	60	33	18	18
Total Residential Area	1,104	89	8	3	88	84	87	82	84
Single Family Homes	720	90	8	2	88	84	87	81	85
Apartments	215	88	8	4	86	85	85	82	81
Townhouses	143	92	4	4	91	88	90	86	87
Senior Citizens' Cottages	26	67	28	5	67	61	67	61	61

SUMMARY OF DETAILED ANALYSES OF SINGLE FAMILY HOMES – TABLE I

DATE OF ANALYSIS	COLLECTION NUMBER	ACTUAL PERCENTAGE OF HOMES SEPARATING VARIOUS COMPONENTS				
		NEWSPAPER	CLEAR GLASS	COLORED GLASS	METAL CANS	ALL ITEMS
		%	%	%	%	%
Sept. 15/71	4	40	31	18	38	9
Oct. 20/71	9	29	24	14½	29	6
Nov. 3/71	11	39	29	19	38	10
Nov. 10/71	12	38	28	16	37	8
Nov. 24/71	14	36	27	17	35	8
Dec. 1/71	15	35			30	19
Dec. 8/71	16	35			32	21
Dec. 22/71	18	35			30	21
Jan. 5/72	20	19			20	11
Jan. 12/72	21	25			24	14

RESULTS OF SECOND QUESTIONNAIRE – TABLE J

NUMBER OF UNITS	ACTUALLY SEPARATING					REGULARLY SEPARATING ALL FOUR ITEMS	WILLING TO CONTINUE SEPARATING				OPINIONS**	
	NEWS-PAPER	CLEAR GLASS	COLOR-ED GLASS	MIXED METALS	NEWS-PAPER		CLEAR GLASS	COLOR-ED GLASS	MIXED METALS	IN FAVOUR	INDIF-FERENT	OPPOSED
	%	%	%	%	%		%	%	%	%	%	%
Single Family Homes	720											
Every Week	46	38	34	40	29	} 85	78	75	77	78	11	4
Every 2 Weeks	20	18	19	17	11							
Other*	16	17	16	15	10							
Weekly Average	60	52	48	52	37							
Townhouses	143											
Every Week	22	22	19	23	18	} 67	63	63	67	65	10	10
Every 2 Weeks	17	15	15	15	7.5							
Other*	9	6	6	5	7.5							
Weekly Average	33	31	28	32	24							
Senior Citizens' Cottages	24											
Every Week	40	30	30	30	30	} 55	40	40	45	60	15	15
Every 2 Weeks	5	5	5	5	5							
Other*	10	10	10	15	10							
Weekly Average	45	35	35	37	35							

NOTE: * The interval for the other category is every three to four weeks.

** Not all of the residents interviewed expressed an opinion about the method of separation.

APPENDIX A

SUMMARY
OF ACTIVITIES

<i>May 27, 1971</i>	Province of Ontario, Ministry of the Environment, Waste Management Branch invitation for proposals for a pilot study.
<i>June 14, 1971</i>	Proposals submitted by consultants.
<i>June 18, 1971</i>	Proposal of Philips Planning and Engineering Ltd. accepted by Ministry of the Environment. Work commenced on the pilot study.
<i>June 23, 1971</i>	Meeting held between representatives of Waste Management Branch, Town of Burlington, Citizens' Committee for Pollution Control, Philips Planning and Engineering Ltd. Committee members named as follows: <i>Ken Childs</i> – Waste Management Branch <i>Gord Johnson</i> – Town of Burlington <i>Pat Reble</i> – Citizens' Committee <i>Jack M. Tomlinson</i> – Study Director, Philips Planning and Engineering Ltd.
<i>July 9, 1971</i>	Public announcement by Hon. George Kerr, Minister of the Environment, that a waste reclamation pilot study would take place in Burlington.
<i>July 15, 1971</i>	Study Committee meeting. Study area defined with possible future revisions. Procedure for first public interviewing and distribution of general information discussed.
<i>July 20, 1971</i>	Random sampling of home interviews by Philips Planning and Engineering Ltd. and Citizens' Committee for Pollution Control.
<i>July 21, 1971</i>	Announcements by local papers of the beginning of home interviews by SWEEP students and members of the Citizens' Committee.
<i>July 22, 1971</i>	Briefing of interviewers (SWEEP Students) by Philips Planning and Engineering Ltd.
<i>July 26, 1971</i>	Beginning of first home interviews by SWEEP Students and C.C.P.C. volunteers.
<i>July 27, 1971</i>	Study area expanded to provide a more representative sample. Final area consists of 1,104 units: 720 Single Family 215 Apartments 143 Townhouses 26 Senior Citizens' Units Estimated total population 3,700.
<i>July 29, 1971</i>	First home interviews completed and results tabulated.
<i>August 10, 1971</i>	Study Committee meeting. Results of first home interview revealed showing 89% willingness to co-operate. Final study area approved. Separation categories approved as follows: Clear Glass Colored Glass Tin Cans Newspaper. First collection date set for August 25, 1972.

<i>August 16, 1971</i>	Distribution of general information form and first instruction sheet concerning recycling procedures to all household units by C.C.P.C. volunteers.
<i>August 23, 1971</i>	News release to local newspapers concerning revised study area and preparation and collection procedures.
<i>August 25, 1971</i>	First collection of recyclable wastes, results summarized and problems identified.
<i>August 30, 1971</i>	Distribution of second general information form and instruction sheet to all household units by C.C.P.C. volunteers in an effort to correct problems revealed during first collection.
<i>September 1, 1971</i>	Second collection of recyclable wastes, results as outlined on sheet. Number of households participating increased over first collection participation, also collection procedures improved.
<i>September 7, 1971</i>	Study Committee meeting. Results of first and second collections discussed, quantities and co-operation outlined. Interim report requested by September 29, 1971.
<i>September 8, 1971</i>	Third collection of recyclable wastes, results as outlined on sheet. Further increase in participation over past two collections.
<i>September 9, 1971</i>	Public meeting of all householders in the area at Lawrie Smith School to outline the program and answer questions. Exceedingly small turn-out.
<i>September 15, 1971</i>	Fourth collection of recyclable wastes and detailed analysis of collection.
<i>September 22, 1971</i>	Fifth collection of recyclable wastes.
<i>September 29, 1971</i>	Sixth collection of recyclable wastes. First delivery of recyclables directly to brokers in Hamilton on collection vehicle.
<i>September 30, 1971</i>	Study Committee meeting. Interim draft report presented. Collection results and citizen co-operation discussed. Collection costs outlined.
<i>October 6, 1971</i>	Seventh collection of recyclable wastes. Results remaining relatively constant.
<i>October 13, 1971</i>	Eighth collection of recyclable wastes.
<i>October 20, 1971</i>	Ninth collection of recyclable wastes, and detailed analysis of collection.
<i>October 26, 1971</i>	Study Committee meeting. Discussion of results of delivering recyclables directly to material brokers in Hamilton. Discussion of problems in apartment and townhouse areas, and also procedure for second household interviews. One apartment building will begin recycling.
<i>October 27, 1971</i>	Tenth collection of recyclable wastes.
<i>October 28, 1971</i>	Distribution of information sheet to apartment residents re beginning of recycling program.

<i>November 3, 1971</i>	Eleventh collection of recyclable wastes, and detailed analysis of collection. Results still relatively constant. First collection from apartment building.
<i>November 4, 1971</i>	Beginning of second home interviews by C.C.P.C. volunteers.
<i>November 8, 1971</i>	Second home interviews completed and results tabulated. Stated support for the idea slightly lower than during first interviews, but higher than the actual support being obtained.
<i>November 10, 1971</i>	Twelfth collection of recyclable wastes and detailed analysis of collection.
<i>November 12, 1971</i>	Study Committee meeting. Discussion of second home interview results. Decision to proceed with analysis of garbage packer truck contents. Decision to end all collections from townhouses after two more weeks, and to stop collection of recyclable glass from single family homes to determine the effect on overall participation.
<i>November 17, 1971</i>	Thirteenth collection of recyclable wastes. Collections from single family units remaining constant. Collections from apartment building increasing.
<i>November 24, 1971</i>	Fourteenth collection of recyclable wastes and detailed analysis of collection. Last collection from townhouses. Last collection of glass from single family units.
<i>November 24, 1971</i> <i>November 25, 1971</i>	Analysis of garbage packer truck contents at land-fill site.
<i>December 1, 1971</i>	Fifteenth collection of recyclable wastes and detailed analysis of collection. Further increase in collection from apartments but a drop in co-operation from single family units.
<i>December 8, 1971</i>	Sixteenth collection of recyclable wastes and detailed analysis of collection.
<i>December 10, 1971</i>	Study Committee meeting. Discussion of collection costs, collection results, land-fill analysis and conclusions relating to townhouses, apartments, commercial areas and single family homes.
<i>December 15, 1971</i>	Seventeenth collection of recyclable wastes. Further drop in co-operation from single family homes.
<i>December 22, 1971</i>	Eighteenth collection of recyclable wastes and detailed analysis of collection. Trend developing in collection from apartment units.
<i>December 29, 1971</i>	Nineteenth collection of recyclable wastes.
<i>January 5, 1972</i>	Twentieth collection of recyclable wastes and detailed analysis of collection. Good co-operation from apartment but co-operation from single family homes was low.
<i>January 12, 1972</i>	Twenty-first collection of recyclable wastes and detailed analysis of collection.

- January 13, 1972* Study Committee meeting. Decision made to terminate all collections following January 26 collection and to hold a second public meeting on January 27, 1972.
- January 19, 1972* Twenty-second collection of recyclable wastes and detailed analysis of collection. Good co-operation from apartment units but still low co-operation from single family units.
- January 24, 1972* Distribution of information sheet regarding termination of collection of recyclables and public meeting on January 27, 1972.
- January 26, 1972* Final collection of recyclable wastes.
- January 27, 1972* Public meeting of all householders in the study area to outline results and answer questions. Very poor attendance at the meeting.

STUDY QUESTIONS

During the study, a considerable number of questions were asked by the householders. Most of these, however, were of a minor nature and were quite often explained on the several information sheets. Some of the questions that recurred are discussed more fully below.

Why did you not supply containers for the separated materials for each householder?

Questioners quite often commented that more co-operation could be obtained and more material collected if containers could be provided.

The question of containers came up in the early Committee discussions, and the decision was made not to provide containers. First of all, due to the large costs that would be involved, it was not economically feasible. Secondly, as this was a pilot study, procedures might have to be revised, which would alter the number of containers required. As it turned out, the number of items was reduced, and collection was not continuous for the complete study area.

Why did you not pick one material only for recycling?

There were several variations of this question. Some felt that we should start with one item and gradually increase the number of items as the study progressed. Others stated we should do the opposite – start with several and decrease to one etc.

One of the main concerns during the study design phase was obtaining maximum possible participation by the people in the selected study area. To obtain this participation, it was felt necessary to avoid any undue changes in study procedure once the program was started.

To be representative, four materials were selected for recycling. The maximum was four, due to more expensive collection and transportation systems if more than this number were selected.

Why collection each week of the reclaimed materials?

Some people indicated that collection every week was too often, others that they would have preferred collection of their recyclables on a different day.

Again, these variations and others were considered prior to the system adopted. Simplicity again was the key: same collection day so people would not forget to carry out their reclaimed materials; a more efficient collection system for Munisan, with regard to both supervision and cost. Moreover, those materials not properly separated could be picked up with the remainder of the refuse, on usual collection days.

COMMENTS BY THE CITIZEN'S COMMITTEE FOR POLLUTION CONTROL

CONCLUSIONS

1. The percent participation cannot really be judged by the number of families having recyclable materials out for pick-up on any given day. Most families did not accumulate sufficient recyclable materials to put them out each week (at no time in the study were they told to put recyclable materials out every week).

The study seems to show that about 40% of the families in the test area had materials out for one particular pick-up. If most families had put materials out two of every three weeks, the participation rate would actually be 60%. If most families had put out materials every second week, the participation rate would be 80%!

Table K is of considerable importance in bearing out these conclusions. It shows, for example, that 73% of the people said they were separating clear glass, but only half of these were putting it out each week. The analysis of this table predicts that 52% would have glass out for any given pick-up, which is exactly what was found (see Table A, page 43). This and similar results seem to show that about 70% of the people in the test area participated in the study.

2. The study shows (Table G, page 53) that about 70% of available paper, 55% of available glass, and 45% of available metal was being separated. Considering the amount of preparation for the project and the lack of provided containers, the 70% participation and 60% separation strike us as encouraging results.
3. With containers provided and management co-operation, separation of recyclables by apartment dwellers is feasible. At time of writing, the apartment building mentioned in the report is still separating some 700 lbs. of recyclables per week.
4. As indicated 15% saving for land used for land-fill sites represents a part of the cost of the recycling operation. No statistics on this seem to be available.

RECOMMENDATIONS

1. Research into which natural resources are truly being exhausted and, therefore, which materials are in greatest need of being recycled.
2. The study would indicate that at best 25% of home waste can be reclaimed. To reduce unnecessary use of land fill sites, strong efforts should be made to minimize unnecessary throw-away packages (e.g. no-return milk jugs). This may be as much as 20-30% of "miscellaneous garbage".
3. Our conclusion of about 70% public participation and 60% recyclable separation should justify further in-

vestigation to find the maximum results obtainable from citizen separation. We would strongly recommend the following changes in any such project:

- ▣ Increased public education and preparation (minimal for this study and all done in July and August).
- ▣ Provision of labelled containers for separated recyclables.
- ▣ Shared responsibility for information release. Having put many hours of work into the project, the Citizen's Committee were very disappointed to read of the "failure" of this project some months before the completion of this report. It is therefore recommended that in case of future studies more control is exercised over the dissemination of information in the course of the study, and only with the approval of any steering or co-ordinating committee.
- ▣ Cost analysis statement showing cost per taxpayer per year, rather than a percentage increase.

This was one of the first studies of its kind. Since its inception many municipalities have begun limited recycling projects of their own.

We sincerely hope that this study will be used to encourage participation by the public in this important concept, not to discourage it.

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