CHITTENDEN SOLID WASTE DISTRICT
RESIDENTIAL ORGANICS COLLECTION PROJECT

FINAL REPORT

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Nancy Plunkett
Chittenden Solid Waste District
1021 Redmond Rd.
Williston, VT 05461
802-872-8100 x222
nplunkett@cswd.net

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I. PROJECT SUMMARY

From October 1999 to May 2001, the Chittenden Solid Waste District (CSWD) conducted a study on the economics and effectiveness of the curbside collection of residential organics. CSWD wanted to determine: 1) how much material could be diverted using this waste diversion strategy, 2) if CSWD residents were willing to separate food scraps and non-recyclable paper from their trash, 3) if collection container liners made a difference in participation, 4) if the quality and marketability of the resulting compost were satisfactory, and 5) if there were collection or processing obstacles to implementing a permanent program.

The pilot project was conducted in three Chittenden County neighborhoods. Of the 558 households invited to participate in the project, 265 agreed to do so. These households received 65-gallon aerated carts and 2.5-gallon kitchen bins. Half of the participating households also received compostable liners for their kitchen bins. Participants were asked to place food scraps, non-recyclable paper (including waxed cardboard and wet-strength and laminated boxboard), and yard debris in the carts for pickup for 3½ months beginning in January 2000. When collection was extended for an additional 4½ months, 203 households agreed to continue.

Organic materials were collected using a semi-automated collection vehicle biweekly for five months and weekly for three months during the summer. The materials were delivered to the Intervale Compost Program for processing, analysis, and marketing.

A total of 47.7 tons were collected from households. During the winter, when only food scraps and non-recyclable paper were being generated by participants, an average of 7.6 pounds per household per week were collected. When yard waste was being generated, an average of 16.6 pounds per household per week were collected.

Results of the post-pilot survey suggest a strong public support base for curbside organics collection in Chittenden County. Liners did not appear to make a difference in participation. There were no major collection or processing issues. The compost produced from the collected materials was of good quality and was marketed with the compost facility's standard compost.

If full participation in the more densely-populated municipalities is obtained in an organics collection program, CSWD estimates that an additional 9,300 tons of organic matter or 19.8% of the total District residential waste stream could be collected for composting annually. This figure excludes yard waste, which would be collected in a permanent program, but is already being diverted from landfill disposal. If a more realistic 50% participation is obtained in those same communities, approximately 4,600 tons or 9.9% of the District residential waste stream could be collected for composting annually.

Since yard waste collection is not currently offered to households, adding curbside collection of organics to the existing collection system would be expensive; a restructuring of the whole collection system would be required to keep collection costs down. If single-stream recycling and biweekly collection of recyclables and trash were implemented, the reduction in collection costs that would be realized would potentially cover the costs of adding organics collection routes (excluding the cost for carts). The impact of the high initial capital costs could be reduced by implementing the program over 2-3 years.

II. PROJECT DESCRIPTION

Background

The Chittenden Solid Waste District was created in 1987 to provide for the efficient, economical, and environmentally sound management of solid waste generated by over 7,500 businesses and 144,000 residents within its seventeen member towns and cities. Mandatory recycling and a ban on landfilling yard waste were enacted in 1993. Trash and recyclables are collected curbside by the private sector (with one municipal exception) or brought to drop-off centers. Yard waste collection is not a standard service offered. A commercial food scrap composting program (a partnership between the Intervale Foundation and CSWD) was established in 1993. Eight public drop-off sites for commercial and residential yard waste are located within the District. According to the data collected in CSWD's 2000 Household Solid Waste Survey, approximately 39% of the District's 60,000 households participate in backyard composting of yard waste and 26% compost food scraps. Backyard composting and drop-off locations for yard waste are widely promoted.

Problem

Over 125,000 tons of trash [75% municipal solid waste (MSW) and 25% construction and demolition debris] generated in CSWD will be landfilled in 2001. Significant quantities of food scraps and non-recyclable paper products from both the commercial and residential sectors are being included in this trash. Food waste is also being discharged with wastewater through garbage disposals. While commercial food scrap collection and composting continues to grow, no formal public or private options exist for households to divert food scraps except through backyard composting, which is not appropriate for all households. In addition, backyard composters of food waste usually do not compost meat, fish, bones, oily foods, dairy products or paper products, which can be managed at a centralized composting facility. Many composters also suspend food waste separation during the winter months.

Strategy

CSWD decided to evaluate the economics and effectiveness of a residential organics collection and composting program. It was estimated that an organics collection program could divert 15-25% of the current residential waste stream from disposal.

Curbside collection of residential food scraps and non-recyclable paper is not a commonly used waste diversion strategy, but its use and evaluation is growing. A CSWD review prior to the pilot project of U.S. and Canadian pilot and permanent organics collection programs revealed that most programs experienced: 1) minimal contamination (< 1%), 2) over 80% participation, and 3) a set-out rate of over 50%. In those programs that attempted to measure public support for organics separation, a range of 67-96% responded favorably.

Objectives of the Pilot Project

The goal of the project was to generate data that would help CSWD determine the feasibility and value of a District-wide residential organics collection program operated in partnership with the private sector. The pilot project was designed to answer the following questions:

1. How much material can be diverted through curbside collection of residential organics?
2. Are CSWD residents willing to separate food scraps and non-recyclable paper from their trash?
3. Do collection container liners make a difference in participation?
4. What is the quality and marketability of the resulting compost?
5. Are there collection or processing obstacles to implementing a permanent program?

Methodology

Summary

- 265 households in 3 neighborhoods
- 2 1/2 gal kitchen bins provided to participants
- 65-gallon aerated carts provided to participants
- Kitchen bin liners provided to half of households
- Accepted food scraps, non-recyclable paper, and yard trimmings
- Biweekly collection for 3 1/2 months (Phase 1)
- Extended for 4 1/2 additional months, weekly collection for June, July and August (Phase 2)

Participants

The pilot project was conducted in three Chittenden County neighborhoods. Invitations to participate in the project with postage-paid return postcards were mailed the week of October 4, 1999, to 558 households in Burlington, Colchester and Williston. Copies of these materials may be found in Appendix A. Staff contacted the households that had not responded after two weeks by phone or in person (with an informational handout) to encourage their participation.

The goal was to obtain 100 participants in each of the neighborhoods, however, only 265 or 47% of the households that were invited to participate in the project agreed to do so and did so. Eleven others originally agreed to take part in the project but withdrew before participating. Reasons for non-participation were obtained from only 30 residents and are summarized as follows (some provided multiple reasons):

Reasons for Non-Participation	
Compost at home	6
Going away/moving	6
Generate small volume	5
Space for cart	4
Concerns with biweekly pickup	3
Time/hassle	3
Cleanliness/pests/odors	3
Physical reasons	2
Other	2

The following table shows the breakdown of the number of participants by neighborhood.

Municipality	**Neighborhood**	**# of Households**
Burlington	Sister Streets Area	99
Colchester	Sunderland Woods Justin Morgan Drive Area Country Meadows	71
Williston	South Ridge Turtle Pond	95

A “thank you for volunteering” letter and a pre-pilot survey were mailed to volunteers. The pre-pilot survey asked for information about current disposal habits for organic waste, recyclables, and trash. Copies of these materials may be found in Appendix A. Reminders were mailed or phone calls were made to those households that had not returned the pre-pilot survey.

Promotion of Project

CSWD distributed three press releases to the media about the project (November and December 1999 and April 2000). Articles appeared in the *Burlington Free Press* (October and December 1999 and January 2001), the *Colchester Chronicle* (November 1999), the *Williston Whistle* (November and December 1999), and the *Vermont Times* (March 2001). Articles also appeared in the Allen Brook and Williston Central Schools' newsletter to parents and CSWD's Fall 1999 *Solid Waste and Recycling Update*. CSWD's General Manager Tom Moreau was interviewed about the project on WVMT radio, and the WVNY (ABC) television station ran a story in October 1999. *BioCycle*, a national solid waste industry journal, also carried articles about the study in its January 2000 and March 2001 issues. Nancy Plunkett, CSWD's Waste Reduction Manager, presented on the project at the August 2000 *BioCycle* conference in Burlington. Copies of the press releases and articles may be found in Appendix B.

Collection Equipment & Instructional Materials

Sixty-five gallon aerated and imprinted Rehrig-Pacific carts, 2.5-gallon Rehrig-Pacific kitchen bins, and 2.5 gallon Biocorp compostable liners were selected, ordered, and received. A copy of the request for proposals for the carts may be found in Appendix C. A decal for the kitchen collector, an instructional brochure, and a curbside educational/corrective piece to hang on the cart handle were designed and printed. Copies of these materials and the cart imprint may be found in Appendix A. The containers and instructional brochure were delivered to participating households during the first week of January 2000. Half of the households in each neighborhood received 40 liners to use in their kitchen collectors during Phase 1 of the project. Liner households who participated in Phase 2 received 60 additional liners in April 2000. Additional liners were distributed upon request.

Participants had access to information and assistance by phone and in person. Hotline calls by participants were logged. In July 2000, participants received a postcard with tips on reducing odor and flies. A copy of the postcard may be found in Appendix A.

Organics Collection

During Phase 1, the participants were asked to separate certain compostable materials from their trash for biweekly collection over a 3½-month period. It was estimated that 25 tons of materials would be collected. These materials are:

FOOD SCRAPS
all residential food scraps

YARD DEBRIS
grass clippings
leaves
house and garden plant waste

OTHER
coffee filters
tea bags
pet and human hair
dryer lint

PAPER PRODUCTS
paper towels
paper napkins
tissues
wax paper
wet-strength boxboard
waxed/plastic-coated cardboard and boxboard
paper plates and cups
sugar, potato, and flour bags
soiled recyclable paper (e.g., wet newspaper, oily pizza boxes)

A request for proposals was issued for container preparation and delivery and hauling services for the project. CSWD contracted with All Cycle Waste, Inc. for these services. Copies of the request for proposals and contracts may be found in Appendix C. A CSWD staff member assisted All Cycle in the preparation and delivery of the carts and accompanied the driver on col-

lection days for data collection purposes. The CSWD staff person also filled out and left educational/corrective information for participants who included non-project items in their carts.

The first pickup of materials occurred on January 19, 2000 and continued biweekly through April 12, 2000 for a total of 7 collections for Phase 1. Weight by route by collection date was recorded. Information by household was collected. This information included whether or not the cart was set out; how full it was (i.e., ≤ ¼, ≤ ½, ≤ ¾, full); the types of materials included (kitchen waste, yard waste, non-recyclable paper); an estimate and description of visible contamination; and existence of unpleasant odor. Other relevant qualitative information was noted.

Aerated carts set out for organics collection in Burlington.

At the conclusion of Phase 1, it was decided to extend the pilot for an additional 4½ months to examine collection during the warmer months of the year when odor, insects, or animals might be an issue and when yard waste is being generated. Two hundred and three of the 265 households agreed to continue in the pilot through the summer. Thirty of the 62 participants who chose not to continue provided reasons for their decision; 21 or 70% of them said it was due to some negative aspect of the program. Eleven of them provided multiple reasons. The following is a summary of all of the reasons given:

Reasons for Not Continuing	
Odor	13
Will be travelling	8
Generate small volume	3
Compost at home	3
Moving	2
Cart size	2
Problem with bags	2
Family not cooperative	2
Other negative aspect	8

A thank-you note, information about the pickup date for containers, and a post-pilot survey, which asked for information about various aspects of the program and waste management habits during the pilot project, were sent to participants who chose not to continue in the Project. Copies of these materials may be found in Appendix A.

Phase 2 consisted of 16 collections over 20 weeks. Collection occurred weekly during the months of June, July, and August. At the end of August, participants received the thank-you note, information about the pickup date for containers, and the post-pilot survey.

Composting

The materials were delivered to the Intervale Compost Program (ICP) in Burlington and composted using the windrow method. The ICP Facility Management Plan may be found in Appendix D. Materials received from this pilot project were managed in a windrow separate from other windrows at ICP to enable an accurate evaluation of the composting process and quality of the finished compost. Estimates of contamination and other qualitative information were recorded.

Residential organics windrow at ICP (April 2000).

Random samples of the cured compost were taken for extensive lab analysis. In the spring of 2001, the compost was marketed to landscapers and residents.

Summary of Data Collected

- Responses to the pre-pilot survey of household waste generation, waste management habits, and demographic information
- Participation
- Cart volume
- Contamination
- Odors/pests
- Participant inquiries
- Responses to the post-pilot survey of household waste generation and waste management habits during study, opinions on various aspects of residential organics collection, and demographic information
- Collection operations and costs
- Processing operations and costs
- Compost lab analyses
- Compost marketing analysis

III. PROJECT RESULTS

Participation Data Phase 1

7 COLLECTIONS/14 WEEKS/265 HOUSEHOLDS
FOOD SCRAPS & NON-RECYCLABLE PAPER ONLY

- Total tons collected = 14.06
- 82.6% set out carts 3-7 times
- 7 households never set out their carts
- Number of *Oops* hangers (corrective pieces) placed on carts = 75
- Average set-out = 4.78 times (68.3%)
- Average set-out for those with liners = 4.70 times; without liners = 4.87

- Average fullness of cart when set out = .40 (per household/week = .14)
- Average fullness of cart when set out for those with liners = .38; without liners = .42
- Average weight/household/week = 7.6 pounds (.20 tons/year)
- Average weight/person/day using 2.4 persons per household = .45 pounds

CSWD staff member collects data on the Burlington route.

Participation Data Phase 2

16 COLLECTIONS/20 WEEKS/203 HOUSEHOLDS
FOOD SCRAPS, NON-RECYCLABLE PAPER, & YARD WASTE

- Total tons collected = 33.64
- 87.2% set out carts 7-16 times
- 3 households never set out their carts
- Number of *Oops* hangers (corrective pieces) placed on carts = 80
- Average set-out = 11.08 times (69.3%)
- Average set-out for those with liners = 11.06 times; without liners = 11.10
- Average fullness of cart when set out = .45 (per household/week = .25)
- Average fullness of cart when set out for those with liners = .43; without liners = .47
- Average weight/household/week = 16.6 pounds (6 months with yard waste and 6 months without yard waste = 11.9 pounds/household/week or.31 tons/year)*
- Average weight/person/day using 2.4 persons per household = .99 pounds (6 months with yard waste and 6 months without yard waste = .71 pounds/person/day)

*Only food waste and non-recyclable paper were collected during Phase 1 of the project because of the time of year. Phase 2 collections included yard waste. In a permanent program, we might expect to collect only food scraps and non-recyclable paper during six months of the year and see yard waste during the other six months.

Three households dropped out of the program during Phase 2. One moved and two indicated they no longer wanted to participate. The above calculations were made using 203 households, which is the number of participants at the beginning of Phase 2.

Comparison to Recycling

CSWD estimates that recycling diverts .2-.5 tons/household/year or .46-1.145 pounds/person/day in Chittenden County (based on 2.4 persons per household).

Participant Inquiries

- 105 phone calls were logged from participants between October 1999 and October 2000.
- Most frequently asked questions related to liners (mostly requests for more) and acceptable materials.

Collection Data

- All Cycle described collection as feasible and easy.
- Carts emptied easily in three seasons.
- Cart size appeared adequate (more than adequate for most households).
- The presence of insects in some carts was first noted on May 10. The following table shows by month the percent of carts set out in which insects were noted.

Month	Percent of Carts with Insects	
	Maggots or Maggots & Fruit Flies	**House Flies or Fruit Flies**
May	1.9%	0.9%
June	4.6%	6.0%
July	1.7%	16.6%
August	4.3%	25.5%
TOTAL	**3.3%**	**14.3%**

Semi-automated collection vehicle used by All Cycle Waste during the pilot project.

Due to the potential weight of an individual cart, semi-automated or fully-automated collection vehicles would be required for an organics collection program. A semi-automated collection vehicle was used in the pilot project and would be preferable in urban neighborhoods where cars are commonly parked along the streets. Fully-automated collection vehicles would be more efficient in suburban neighborhoods and would reduce the cost per stop.

Processing Data

ICP's report on the project may be found in Appendix E.

- ICP estimated there was 1-2% contamination by weight.
- The primary contaminants found were plastic food packaging & recyclable paper. Other contaminants observed include Chinese food take-out containers (with metal handles) and twist ties.
- Non-recyclable paper accounted for more than half the volume of material collected, but less than 15% of the weight.
- The plastic lamination on milk and juice cartons appeared to remain in one piece after the paper had decomposed. This material, plastic caps, and other contaminants were easily screened out before marketing the product. No visible plastic remained in the screened compost.
- To trap wind blown paper, ICP staff recommends using a wind screen.
- There were no other pile management issues.

Product Data

- The metals and composition analyses conducted by Woods End Research Laboratory of samples of the end compost product yielded very positive results. A copy of the analyses may be found in Appendix E.

- Plastic particles, while not visible, may exist in the end product. It is not currently known if plastic particles have negative impacts on soil and soil microbes. Therefore, while the results of the lab tests were very positive, ICP expressed the opinion that compost that includes laminated boxboard is of lower quality than their standard compost. ICP did not attempt to market the compost alone. The compost was mixed and marketed with ICP's standard compost to landscapers and property owners at $17.00-19.00 per cubic yard wholesale and $25.00-28.00 per cubic yard retail depending on quantity purchased.

Laminated cartons after composting.

The finished residential organics windrow at ICP.

Pre-Pilot Survey Responses

Completed pre-pilot surveys were received from 242 or 91% of the households that participated in the Residential Organics Collection Project. Ninety-three percent of the respondents indicated that they owned their home and 7% said they rented. The following table shows the frequencies and percents for the number of persons residing in the participating households for those who completed the pre-pilot survey.

# in Household	Frequency	Percent
1	20	8.3%
2	66	27.3%
3	44	18.2%
4	80	33.1%
5	25	10.3%
6	6	2.5%
No answer	1	0.4%
TOTAL	242	100.0%

The responses to the pre-pilot survey show, with few exceptions, households are in the habit of managing their yard waste separately from trash (e.g., by composting, mulching with the lawnmower, bringing to a drop-off center, or throwing in the woods or a community pile). Only six of the 242 pre-pilot survey respondents indicated that they put their yard waste in the trash. Thirty-one percent of the respondents indicated that they composted at least some of their food scraps at home.

The results of selected crosstabulations which included questions from both the pre- and post pilot surveys may be found in the next section on post-pilot survey responses. Summaries of responses regarding generation of trash and recyclables before the pilot are also included below in a comparison to post-pilot responses.

Post-Pilot Survey Responses

Seventy-four percent of the households returned post-pilot surveys to CSWD. The following table shows the breakdown of the number of project participants by whether or not they returned the post-pilot survey, received liners for their Kitchen Collectors, and participated in both Phase 1 (January through mid-April) and Phase 2 (mid-April through August).

	Liners	Non-Liners	Totals
Participated in Phase 1 Only			
Returned Post-Survey			
Yes	13	17	30
No	16	16	32
Total	29	33	62
Participated in Phases 1 & 2			
Returned Post-Survey			
Yes	83	83	166
No	19	18	37
Total	102	101	203
Total Participants	131	134	265
Total Post-Surveys Returned	96	100	196

Forty-eight percent of the participants in Phase 1 Only and 82% of those who participated in both Phases 1 and 2 completed the survey. About equal numbers of households with and those without liners completed the survey.

Overall, the responses of the participants to the project were very positive. It should be noted, however, that the participants in this study were a self-selected group. As indicated earlier, only 47% of the 558 households that were invited to participate in the project agreed to do so. Therefore, we should be very careful when making projections regarding the potential participation levels of CSWD households in a permanent program.

The results of the post-pilot survey are summarized below. Frequencies and percents for each of the quantifiable questions, written responses to the final question on the survey which asked for the participants' general comments about the program, and graphs for selected questions may be found in Appendix F.

A number of the questions asked the respondents to rate the accurateness of particular statements using a scale of 1 to 6 in which 1 equals strongly disagree and 6 equals strongly agree. In the summary below, agreement or support is defined as the majority of participants rating a statement as 4 or higher. Disagreement or lack of support is defined as the majority of participants rating a statement as 3 or lower. Using an odd-numbered scale for similar surveys in the future is recommended in order to provide a neutral zone for respondents.

Participation

- Over 96% of the survey respondents indicated that they participated for the entire project period (either 3 months for Phase 1 Only participants or 8 months for Phase 1 and 2 participants). This does not mean that they put their carts out on each collection day.

Curbside Collection Cart

- Participants in general found the cart durable, convenient to use, easy to roll to the curb, and fairly easy to clean.

- 92% of the respondents agreed the cart didn't attract animals.

- 62% agreed that it produced odors (see graph for Question #2f in Appendix F). Seventeen households (9%) specifically noted in the comment section for this part of the survey that they had a serious odor or insect problem with the cart.

- 40% of the responding participants had difficulty finding a convenient location to store the cart (see graph for Question #2i in Appendix F).

- 52% would prefer a smaller cart (see graph for Question #2j in Appendix F).

- Only 10% would prefer a larger cart.

- Almost half of the respondents would be willing to pay $50 for a cart with a ten-year warranty if the program became permanent.

Collection Frequency

- Two-thirds of the households who completed the survey were happy with every-other-week collection. Almost three-quarters said they prefer weekly collection during warmer weather, however.

Kitchen Bin

- 88% of the survey respondents used the bin provided for the pilot project to store organics before transferring them to the compost cart. Others used their own rigid container or bag.

- 40% of the respondents stored their bin under the sink. The second most popular location was the floor. Other storage locations included the garage, porch, deck, basement, and countertop.

- Generally, respondents found the bin convenient to use, durable, and easy to clean. They liked the color, size, and shape of the bin and agreed that the decal made it easy to determine what was compostable. Most did not find it attractive enough to place on the countertop.

- Half of the respondents agreed that collecting food waste in the bin attracted flies and over half indicated that it created unwanted odors (see graphs for Questions #7j and 7k in Appendix F).

Liners

- 96% of households provided with liner bags who completed the survey used them. In general, respondents found the liners made it easy to transfer organics from the Kitchen Collector to the Compost Cart and reduced the mess in both containers.

- 45% agreed that the liners broke apart before transferring them to the cart. Many of the participants with liners commented that they had trouble separating the bags along the perforation and that the bags leaked.

- Almost two-thirds of the households with liner bags who completed the survey indicated that they would not be willing to participate in a permanent program without liners (see graphs for Question #10e in Appendix F). The data show, however, that those who did not receive liners have very similar levels of support for an organics collection program for all of Chittenden County and similar levels of agreement that separating organics is worth the effort as those who received liners (see graphs for Questions #19g and 19h by liner vs. non-liner in Appendix F).

- Survey respondents were fairly evenly split on whether they would be willing to pay ten cents per liner.

- The average number of liners used per week by those responding to the survey was three. Seventy percent of respondents with liners knotted the top of the bags before placing them in the cart.

Materials Separated

- Food scraps had the highest rate of separation, followed by non-recyclable paper, then yard waste, and finally other items, such as pet or human hair and dryer lint. Almost half of the 48% of survey respondents who indicated they backyard compost continued to compost during the project as recommended in the instructional brochure. This may explain why yard waste was not included in the compost cart at a higher rate.

Instructional Brochure

- 97% of survey respondents said they read the instructional brochure which came with the containers and 77% kept it for future reference.

- 96% indicated that the format of the brochure made it easy to use.

Overall Program

- Survey respondents agreed that information they received about the program before they agreed to participate was clearly presented.

- Respondents agreed that:

    1) once their households became accustomed to separating organics, it was easy (see graph for Question #19b in Appendix F),
    2) they were sure most of the time about what could go in the cart,
    3) they noticed a significant decrease in the amount of landfill-bound trash they generated once they started participating in the project, and
    4) their households became more aware of the items they throw away.

- Respondents agreed:

    1) with the statement "Composting is good for the environment",
    2) that they would support an organics collection program for all of Chittenden County (see graph for Question #19g in Appendix F),
    3) and that separating organics is worth the effort (see graph for Question #19h in Appendix F).

    Support is less strong for mandatory separation of organics (see graph for Question #19i in Appendix F). There were no relationships found between the number of persons in a household, income, or municipality of residence and whether respondents would support an organics program.

- 63% of respondents with garbage disposals continued to use them during the project, but mostly for liquids and wet and small food scraps.

- 53% of respondents who backyard compost stopped composting during the project. A number of these participants indicated they stopped because the collection project was easier.

- 146 of the survey respondents provided waste generation information on both the pre- and post-pilot surveys. According to these data, these households reduced the amount of landfill-bound trash they generated by an average of 12 gallons per week during the project. In the pre-pilot survey, these households reported they generated an average of 45 gallons of trash per week. In the post-pilot survey, they reported an average of 33 gallons per week.

- It had been hypothesized that separating organics would greatly increase participants' awareness of what else was being thrown away and that recycling rates would increase. However, there was a negligible difference between the number of recycling bins filled per week before and during the pilot as reported by the 159 households who provided data in both the pre- and post-surveys (.07 bins per week increase). It was clear from the responses of many households that when we asked in the post-pilot survey, as opposed to the

pre-pilot survey, how many recycling bins they filled per week, they assumed we now meant the organics collection cart. Therefore, it is not possible to determine from the data whether there was a significant change in the amount of materials recycled by participants due to the project.

- 69% of the survey respondents indicated that the entire household was involved in and aware of the organics separation in their households. Primarily one person was involved in 28% of the households.

- 33% of respondents utilized the CSWD Hotline when they had a question and 2% utilized the CSWD website. Almost half of the respondents had no questions.

- 46% (91) of the survey respondents chose to answer the final question on the post-pilot survey that asked for their general comments about the program. Seventy-eight percent of the written comments were positive, 12% were negative, and the remaining were neutral observations, questions, or suggestions.

Household Solid Waste Survey Responses on Separation of Organics

The Residential Organics Collection Project took place between the last two of CSWD's biennial household surveys. In those surveys, residents were asked if they would be willing to separate organics for pick up and/or drop off if there was no additional charge. There has been an increase in support for organics programs since the earlier survey. The following table shows the results of the two questions by whether they currently use a drop-off center or have curbside service for their regular trash and recycling.

Trash & Recycling Customers	**Willing to Separate Organics**			
	FOR PICK UP		FOR DROP OFF	
SURVEY YEAR	1998	2000	1998	2000
CURBSIDE	34.8%	54.2%	20.3%	27.9%
DROP-OFF	39.5%	39.2%	34.2%	52.7%
TOTAL	35.5%	51.4%	23.8%	32.4%

Relationships were observed between residents' willingness to separate organics for pickup and their: 1) municipality, 2) type of trash and recycling service, 3) age, and 4) home ownership. The crosstabulations may be found in Appendix F.

- Residents of Burlington, Colchester, Essex, Shelburne, and Williston were more likely to express willingness to separate organics for pickup than residents from other municipalities. The Residential Organics Collection Project, which received a lot of positive coverage in the *Burlington Free Press* and the town and city newspapers, took place in three of these communities. This may account for the overall increase in support for organics collection and implies that further education on this topic may lead to the level of participation that would be needed to sustain a permanent program.

- Curbside customers, younger respondents, and renters were more likely to express a willingness to separate organics for pickup. No relationship was observed between willingness and level of education or income.

IV. ECONOMICS OF RESIDENTIAL ORGANICS COLLECTION

If CSWD implements a residential organics collection program, additional costs will be incurred in three areas: 1) separation, 2) collection, and 3) composting. For the purpose of projecting costs for a permanent program, a conservative estimate of 23,200 participating households diverting 4,600 tons of food waste and non-recyclable paper annually is used. It is further estimated that 2,600 tons of yard debris would be collected in the program (material that is already being diverted in CSWD from landfills). These numbers were derived in the following manner:

CSWD population (U.S. Census 2000)	143,579
# of households (using 2.4 people per household)	59,825
Population of participating municipalities[1]	111,470
# of households of participating municipalities (using 2.4 people per household)	46,446
# of households in program using estimated 50% participation rate	23,223
Estimated tons of food waste & paper diverted per year @ .20 tons per household	4,645
Estimated tons of food waste, paper, & yard debris collected per year @ .31 tons per household	7,199
% of MSW & C&D diverted using FY 2000 disposal data (124,486 tons)[2]	3.7%
% of MSW diverted using FY 2000 disposal data (94,198 tons)[2]	4.9%
% of residential waste stream (~50% of MSW) diverted using FY 2000 disposal data[2]	9.9%

[1]Burlington, Colchester, Essex, Shelburne, South Burlington, Williston, and Winooski were chosen for population density and/or 2000 Household Solid Waste Survey responses regarding current use of curbside service and willingness to separate organics.

[2]The percentages were calculated using the estimated tonnage of food scraps and non-recyclable paper that would be diverted through a residential organics collection program. They do not include the yard debris that would be collected as well.

Separation

In order to maximize participation by residents, an easy and convenient system for separating organics must be provided. Estimated costs for providing containers to 23,200 households and educating participants are as follows:

Kitchen Bins

At $4 per bin, if bins were provided to all participating households, the cost would be $92,800, not including distribution.

Liners

The average number of liners used per week by those households who received them was three. At $0.10 per liner, the total cost to a household per year would be about $16.00. The price does not include staff time for acquisition and maintenance of inventory, storage space, or delivery to residents. The collection data and the results of the post-pilot survey suggest that it isn't necessary to provide liners. Very similar levels of participation in the study and support for a permanent program were observed between households with liners and households without liners. To encourage participation by certain households, however, it might be prudent to make them available at local retail stores. Forty-eight percent of the liner households who responded to the post-pilot survey said they would be willing to buy bags at 10¢ each.

Carts

To reduce odors and yuck, aerated organics carts are recommended, particularly for biweekly collection. If 65-gallon aerated carts are provided, the total cost, using an estimate of $45 per cart, is $1,044,000, not including distribution.

Over half of the pilot participants indicated a preference for a smaller cart. If half of the carts distributed are 32-35 gallons, the total cost of carts, using an estimate of $35 per 32-gallon cart, is $928,000. This reduces the total cart cost by $116,000.

Instructional Brochure
The estimated cost of printing an instructional brochure that would be distributed with the containers is $3,000.

Distribution
CSWD paid $4.70 per cart for cart preparation and delivery for both the Residential Organics Collection Project and the Single-Stream Recycling Pilot Project. Using a price of $4.00 per cart for a larger distribution, preparation and delivery for 23,200 carts and kitchen bins would come to $92,800.

Promotion
The cost of promoting the implementation of residential organics collection is estimated at $10,500, not including staff time for design, coordination, press releases, or press conferences. This cost includes two hauler bill inserts and print ads in the papers of the towns and cities included in the program.

Summary of Separation Costs

Expense	Cost
23,200 kitchen bins	$92,800
11,600 65-gallon aerated carts	$522,000
11,600 32-gallon aerated carts	$406,000
Instructional brochure	$3,000
Distribution	$92,800
Promotion	$10,500
TOTAL	$1,127,100

Collection
Pilot participants supported biweekly collection during most of the year and weekly collection during the warmer months. Based on estimates from All Cycle Waste, the pilot project hauler, a separate organics collection route that occurs biweekly for 8 months and weekly for 4 months would add $9.00-10.00 per month to a household's solid waste bill (for current customers under a subscription service). The cost per household would be greatly reduced with contracted residential organics collection which would provide increased route density (perhaps 700-800 stops per day per route vs. an average of 400 stops). If organics collection under subscription service is combined with biweekly single-stream recycling collection and weekly trash collection, a household's current bill would increase approximately $7.50 per month. Organics collection with biweekly trash and biweekly single-stream recycling collection would cost about the same as the current weekly trash and two-stream recycling collection. The additional cost by collection scenario is summarized in the table below.

Residential Curbside Service Organics collection w/:	**Additional cost per month to household**
Weekly trash & weekly 2-stream recycling	$9.00-$10.00
Weekly trash & biweekly 1-stream recycling	$7.50
Biweekly trash and biweekly 1-stream recycling	$0.00

If residents (and haulers) accept an overhauled solid waste collection system, it appears they will not incur higher charges, assuming we do not raise CSWD's solid waste management fee to cover the costs of containers. The program could be phased in over 2-3 years to spread out the capital costs. If most curbside customers insist on weekly trash collection, as one hauler has suggested they will, the question remains whether they will be willing to pay more to have an organics collection program, too.

Composting

The Intervale Compost Program could accommodate the estimated volume from a permanent program by renting additional land and purchasing more bulking materials. To cover costs, ICP expects the tipping fee would be between $25.00 and $40.00 per ton.

V. PILOT PROJECT COSTS

The following table shows a summary of the Residential Organics Collection Project expenses and revenues:

Expenses	
Request for proposal legal ads	$128.04
315 2.5-gal kitchen collectors	$1,445.85
12,000 kitchen collector liners	$1,517.20
315 65-gal curbside carts	$14,962.50
Postage	$714.27
Copying of brochure	$88.20
Printing of kitchen collector decals	$265.50
Printing of correction hanger	$65.65
Container preparation	$200.00
Container delivery	$1,200.00
Organics collection	$15,900.00
Compost processing & marketing fee	$1,908.00
Compost analysis	$608.00
Curbside cart collection & washing	$654.00
Miscellaneous	$8.20
TOTAL	$39,665.41
Revenues	
VT ANR Implementation Grant	$6,988.27
VT ANR Compost Center Grant	$5,500.00
TOTAL	$12,488.27
CSWD Net Cost	$27,177.14

NOTE: Expenses exclude CSWD staff time and overhead.

VI. CONCLUSIONS

Potential Diversion

A residential organics collection program in CSWD has the potential to divert a significant portion of the waste stream from disposal. CSWD estimates that 4,600 tons of additional organic matter (food scraps and non-recyclable paper) or 9.9% of the residential waste stream could be

diverted annually if 50% of households in the more densely-populated areas of Chittenden County participated. In addition, a more convenient yard debris disposal option for residents would be available through an organics collection program.

Public Support & Program Preferences

The responses to the pilot collection program by the households in the three neighborhoods in the study suggest a strong public support base for curbside organics collection in Chittenden County. Their responses also tell us that a permanent program should include the following elements:

1) choice of more than one cart size;
2) liner bags with better perforations and slower breakdown rates (if liners are provided or made available through local retail outlets);
3) similar instructional materials, i.e., introductory letter, brochure, and decal (given the very low level of contamination noted in the organic material received at the Intervale Compost Program and the high percentage of participants who read and kept the brochure);
4) more information on how to reduce odors and insects in the kitchen collector as well as the compost cart; and
5) weekly collection of organics during the warmer months of the year.

If CSWD decides to move forward with the implementation of a permanent residential organics collection program, the results of the post-pilot survey should be helpful in the promotion of the program to CSWD households.

Collection & Processing

There appear to be no major collection issues from the hauler's perspective or processing issues at the ICP.

Obstacles & Future Plans

Currently, a number of obstacles to implementing a permanent program exist. These include:

1) adding curbside collection of organics to the existing collection system would be expensive; a restructuring of the whole system would be required to keep collection costs down,
2) a curbside organics collection program would incur high initial capital costs, and
3) selling the program to some of the haulers on a voluntary basis may be a challenge.

Since yard waste collection is not currently offered to households, adding another collection route without altering the current collection system for trash and recyclables would increase the cost to households for solid waste collection services. CSWD is currently examining single-stream recycling. If single-stream recycling and biweekly collection of recyclables and trash were implemented, the reduction in collection costs that would be realized would potentially cover the costs of adding organics

WSI of Vermont employee emptying a single-stream recycling cart during Fall 2000 pilot project.

collection routes (excluding the cost for carts). The impact of the high initial capital costs could be reduced by implementing the program over 2-3 years.

Only one hauler currently collects commercial food waste on a regular basis. Other haulers have not expressed an interest in providing this service to their customers. Franchising is an option that may be considered for residential organics collection. CSWD plans to continue to work toward implementing residential organics collection as well as reducing curbside collection costs for the various waste streams.

Collection day on Williston route.

In addition, CSWD plans to evaluate organics collection at its residential and small business drop-off centers for trash and recycling. CSWD estimates that 1,000 to 3,000 tons of food waste and non-recyclable paper could be diverted through this type of program.