

Solid Waste--Collection

SHELF

Municipal Technical Adv



CITY OF COOKEVILLE
SOLID WASTE STUDY

June 6, 1991

Solid Waste--Collection

The University of Tennessee

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EXECUTIVE SUMMARY

This report for Cookeville is timely. Governor McWherter is expected to sign a solid waste bill for Tennessee that will create a state-wide solid waste fund; provide direction to local governments on how to manage solid waste over the next 10 years; establish a waste reduction mandate of 25% by December 1995; and require local governments to establish full fund accounting for solid waste costs. By looking at solid waste issues, Cookeville is a step ahead in complying with the requirements of the new solid waste bill.

BACKGROUND

Cookeville city officials John Gentry, City Manager, and Hugh Birdwell, Public Works Director, asked The University of Tennessee's Municipal Technical Advisory Service (MTAS) to help Cookeville with five solid waste issues:

- Investigate and cost a solid waste transfer station
- Investigate converting commercial solid waste collection to front loading
- Look at what Cookeville charges for commercial solid waste collection vs actual cost
- Look at the actual cost of residential solid waste collection
- Recycling

A review of Cookeville's solid waste operations (both commercial and residential) was conducted during the Spring of 1991. This report presents what was learned and what is recommended. Specific actions and timetables are:

**TABLE 1
Cookeville's Solid Waste Planning Guide**

Action	Year and Quarter																
	1991	1992				1993				1994				1995			
	4	1	2	3	4	1	2	3	4	1	2	3	4	1	2	3	4
Select a site for a transfer station and put it into operation as soon as possible.																	
Reconfigure all solid waste collection routes.																	
Purchase front end loaders for commercial operations.																	
Investigate separation of apartment complex waste from single-family residential waste.																	
Explore the use of front end loaders for apartment complex dumpsters.																	
Review commercial operations, central-ize accounting functions, and increase user fees to cover the cost of operation.																	
Amend the existing sanitation ordinance.																	
Develop guidelines for solid waste operations, and review them periodically.																	
Establish productivity standards.																	
Modify the duties of the public works director and the public works superintendent to allow them time to attend to managerial duties. Investigate the creation of a solid waste manager position within the public works department.																	
Visit recycling centers in Tennessee.																	
Develop a recycling plan for the city and county.																	
Reexamine all residential services, explore options for automated or semi-automated systems.																	

Cookeville can see a substantial reduction in cost for both commercial and residential solid waste collection services by implementing the recommendations of this report. A transfer station will save the city at least \$17,000 per year once it is operational. A shift to front end loaders for commercial operations will show a \$60,335 annual savings. In addition to cost savings, Cookeville should experience improved productivity and efficiency.

COOKEVILLE'S SOLID WASTE OPERATIONS

A staff of 18 individuals make up the solid waste division. Five vehicles (20 yard, rear-end loading packers) operate full-time in the collection of residential and commercial solid waste. Another vehicle (16 yard packer) operates as a spare (see Table 2). Three trucks handle residential collection five days per week. Residential collection is curbside, one day a week (Monday through Friday) for each household. Two trucks run commercial collection five and half days a week (Monday through Saturday) on a subscription basis (businesses contract with the city for solid waste pick-up). Cookeville does not charge for residential collection. The fee for commercial collection is \$5.00 per pick-up.

TABLE 2
SOLID WASTE VEHICLE INVENTORY
CITY COOKEVILLE

Number	Year	Size	Model
2	1985	20 cubic yard	Ford F-8000
1	1987	20 cubic yard	Ford F-8000
1	1988	20 cubic yard	Ford F-8000
1	1990	20 cubic yard	Ford F-8000
1	1981	16 cubic yard	Ford F-8000

Source: City of Cookeville

Each truck is staffed by three employees: a driver and two collection persons. Three other individuals work as fill-in workers in the division (to cover illnesses and vacations). These 18 solid waste employees report directly to the public works supervisor, who has additional responsibilities within the public works department. Cookeville picks up waste from 8,199 households (6,651 houses and 1,548 apartments) with a budget of \$260,000 (1990-91 budget). The commercial collection division provides 7,120 stops per year from 296 dumpsters with a 1990-91 budget of \$192,400. Considerable overtime occurs in both residential and commercial operations.

Cookeville disposes of its solid waste at the Putnam County landfill, located approximately 15 miles southwest of the city. Cookeville delivers 7,200 tons of residential waste and 8,832 tons of commercial solid waste to the landfill per year (see Figure 1). Cookeville and Putnam County reached an informal agreement in the 1980's concerning fees for disposal at the landfill. The parties agreed that Cookeville support the operation of the joint city-county school system by dedicating sales tax dollars to the system's operations. Putnam County, in exchange, accepts residential waste at no charge to Cookeville. The fee for disposal of commercial waste is \$420.00 per month. Putnam County estimates that the landfill has 15 years of life remaining.

It appears that citizens and businesses in Cookeville are pleased with residential and commercial solid waste collection services. The public works department receives few complaints (on the average of one every two weeks), and works hard to respond to residents' and customers' needs. The operation of the system seems stable. There is little turnover in employees. In fact two drivers have about 20 years of service with the city. Workmen's compensation claims for 1990-91 (approximately \$7,000 for residential and \$2,200 for commercial) included: hurt hands, mashed fingers, and strained backs.

RESIDENTIAL COLLECTION

A performance indicator used to measure efficiency in solid waste collection is the number of stops handled per individual. Use caution when applying this performance indicator. Many factors are involved in the average number of pick-ups per day per person (i.e., miles traveled, types of waste collected, terrain, and volume). The system average per individual is 182 stops per employee per day (see Table 3). Route 2 exceeds the system average, and Routes 1 and 3 do not meet the system average. A total system analysis would help explain these differences in stops per day.

(figure 1)

Total Solid Waste In Cookeville

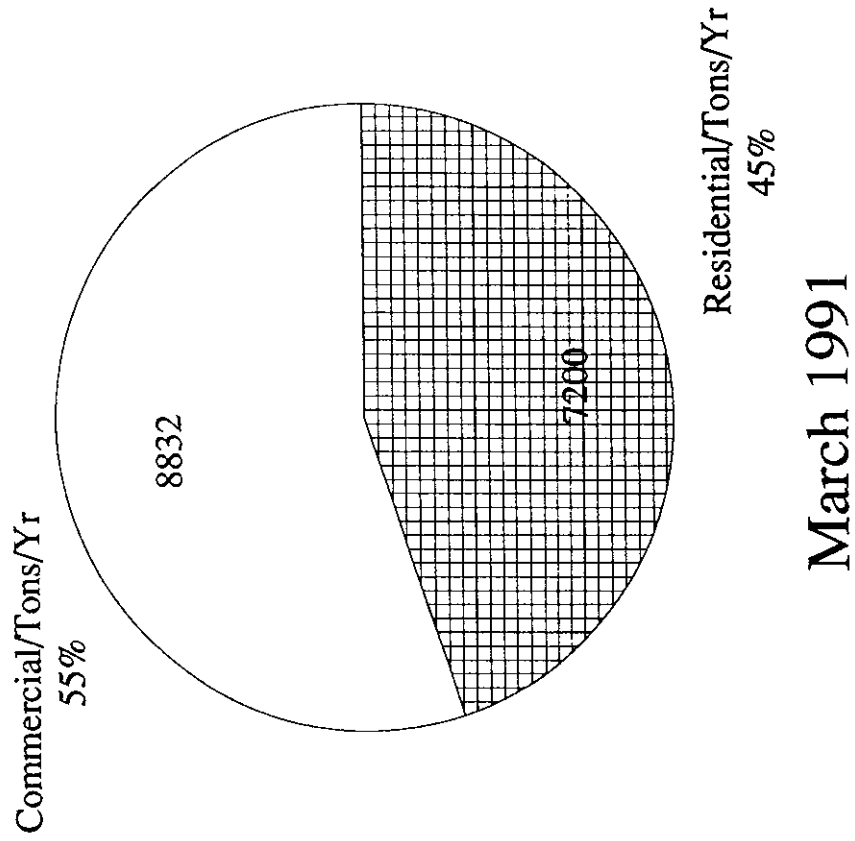


TABLE 3

**CITY OF COOKEVILLE
SANITATION DEPARTMENT
RESIDENTIAL GARBAGE ROUTES
MARCH 1991**

ROUTE #1: TRUCK #14

DAY	NO. OF HOUSES	NO. OF APARTMENTS	TOTAL	AVERAGE PERSON
MONDAY	485	14	499	166
TUESDAY	525	15	540	180
WEDNESDAY	340	157	497	166
THURSDAY	330	31	361	120
FRIDAY	450	61	511	170
TOTAL:	2,130	278	2,408	160

ROUTE #2: TRUCK #13

MONDAY	672	59	731	244
TUESDAY	530	90	620	207
WEDNESDAY	600	19	619	
THURSDAY	612	80	692	231
FRIDAY	366	147	513	171
TOTAL:	2,780	395	3,175	212

ROUTE #3: TRUCK #12

MONDAY	542		542	181
TUESDAY	376	412	788	263
WEDNESDAY	312	194	506	169
THURSDAY	442	97	539	180
FRIDAY	69	172	241	80
TOTAL:	1,741	875	2,616	174

TOTAL ALL ROUTES:	6,651	1,548	8,199	182
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SOURCE: Cookeville Public Works Department

Another performance indicator is the number of stops per day per vehicle. The number of stops per day for Cookeville's residential collection ranges from 241 to 788. The system average is 547 stops per day per vehicle. Again, there is variability in the number of stops due to the way routes are run and the number of trips to the landfill. Based on the experience of other solid waste collection systems in Tennessee, a range of 650 to 900 stops per day could be achieved in Cookeville with improved system efficiencies. These efficiencies include: route reconfiguration, a transfer station, productivity standards, and use of satellite vehicles.

In addition to these three regular routes, the residential collection division (with assistance from the commercial collection division on Monday and Friday at the Jr. High School) picks up solid waste at seven schools in Cookeville (see Appendix A, Table 1). Routes 1 and 2 are long standing routes in Cookeville. Until three years ago Route 3 did not exist. The routes reflect the way things have always been done - modified over time as the city annexed residential areas. A quick review of the routes reveal that more efficiency can be obtained from the existing system by reconfiguring the three routes. The objective of reconfiguring routes is to optimize the use of processing and disposal facilities in terms of daily and long-range capacities and operating cost of the facilities, while minimizing the round trip haul time from collection routes to the processing and disposal sites.

MTAS recommends a manual micro-routing heuristic approach to solving the problem of developing new residential routes. The manual heuristic approach includes applying human intelligence, experience, common sense, and certain rules of thumb to develop an acceptable solution to the problem of routing. By using these heuristic rules and conducting a time and motion study, Cookeville should find a system average of 650 to 900 stops per day per route. MTAS can help perform the route reconfiguration. A preliminary review of Route 2 performed by MTAS on Thursday, March 7, 1991 is summarized in Appendix A, Table 2.

According to Clyde Presley, the residential collection trucks make 18 trips weekly to the Putnam County landfill. Assuming that there are 600 man-hours in a work-week¹ -- and that it takes one and one half hours to travel to and from the landfill -- and that 18 trips a week are made by three employees (each trip), then Cookeville loses 81 hours each week in traveling to the landfill.² These 81 lost hours are 13.5% of the total work-week. Cookeville's residential collection service

¹15 employees at 40 hours per week.

²1.5 hours x 18 trips x 3 people = 81 hours.

actually only operates 86.5% of total possible hours. An additional problem associated with trips to the landfill is overtime. Neither the three employees on each vehicle nor the vehicles they ride in can be used for collection when traveling to and from the landfill.

The trucks used in residential collection were not designed to travel long distances or to withstand the wear-and-tear on tires experienced in current operations (the Putnam County landfill is filled with broken materials). Hugh Birdwell reported that the system spends \$800.00 per week on tire repair only. If Cookeville sites and develops a transfer station, the trips to the landfill and expenses for tire repairs could be reduced. Another way of reducing tire damage that occurs in the landfill is by inserting various products in the tires. MTAS can research this further, at Cookeville's request.

COST OF RESIDENTIAL COLLECTION

Cookeville's 1990-91 budget for residential collection is \$260,000 (Appendix A, Table 3 presents the statement of proposed expenditures for fiscal year 91). Of that amount \$22,000 will be paid in overtime (or 8.5 % of the total budget). The average monthly cost is \$21,667. Assuming that 8,199 households are served per month, the average monthly cost per household for residential solid waste collection is \$2.64.

COMMERCIAL COLLECTION

338 businesses contract with Cookeville for 600 commercial stops per month, or 7,140 stops per year.³ Twelve stops per month are picked up by the residential collection division.

MTAS followed a portion of one commercial route. Appendix A, Table 4 summarizes these findings. Like the residential operation, the commercial solid waste collection division makes daily trips to the Putnam County landfill. Clyde Presley estimates that each week one truck makes nine trips and the other seven trips to the landfill. This means that Cookeville loses 9% of available weekly work hours due to travel to and from the landfill.

³Radio Shack and Hunan Restaurant share a dumpster. In Cookeville's listing of commercial customers both businesses are listed as one pickup per day, five times per week, yielding 10 pickups. Actually it is only five pickups -- it is the same dumpster.

COST OF COMMERCIAL COLLECTION

The 1990-91 budget for Cookeville's commercial solid waste collection system is \$192,400 (Appendix A, Table 5 presents the statement of proposed expenditures for fiscal year 1991). Cookeville charges \$5.00 per stop for commercial collection. It costs Cookeville \$16,033.33 per month to operate commercial collection. Overtime cost for commercial operations, for 1990-91 will be approximately \$23,000 (12% of the total budget). According to Bob McCally at the city, Cookeville bills businesses \$17,013.00 monthly for commercial operations. On paper the system generates revenue beyond expenses. However, the cost of operation does not include administrative or overhead costs. It appears that the commercial collection division operates at a break even level.

Cookeville does not collect the revenue it expects each month for commercial operations. If it did, the total revenue generated would be \$204,156, instead of \$196,000 (the revenue collected for 1990-91). Part of the problem is that the public works department sets up commercial accounts and organizes the collection routes, and the business tax office with the city sends bills. There is no control clearinghouse in operation to make sure that businesses are billed for all trips collected.

If Cookeville implemented front end loading in the commercial collection division, an immediate savings of \$57,505 in salaries would be seen (see Figure 2). The crew of six men would be reduced to two with front end loaders. There are four vacant positions in the public works department where the four utility workers in the sanitation division could be transferred. The additional cost of adding front end loaders to the fleet (purchasing a new vehicle at \$103,000 in 1991-92 budget and a \$30,000 used vehicle that could be paid for from the current (1990-91) budget) would be offset by the savings in personnel. The annualized cost savings to Cookeville would be \$60,335. Cookeville will need to purchase new canisters for commercial collection and can recover the cost for these purchases by leasing them to commercial customers. Over a 10-year period Cookeville can expect at least a \$603,350 cost savings.

TRANSFER STATION

Two options are generally available for hauling waste to the landfill: direct hauling by collection vehicles or hauling to transfer stations by collection vehicles and subsequent hauling to the landfill by larger vehicles. Transfer stations offer an alternative to the considerable man-hours and fuel costs expended in direct hauling.

(figure 2)
**CITY OF COOKEVILLE
 COMMERCIAL REFUSE COLLECTION
 PROPOSAL TO GO TO FRONT END LOADERS**

Description	Estimated	Proposed	One Man	Net Savings
	Expend. FY 1990-91	Budget FY 1991-92	Operation FY 1991-92	Going to 1 Man Crews in 91-92
Salaries	95,435	117,600	69,600 b	48,000
Overtime	26,314	24,000	24,000 c	0
Salaries/Labor Pool	0	0	0	0
Benefits	38,776	36,330	21,930 d	14,400
Vehicle Expense	13,516	12,360	12,360	0
Fuel	9,842	9,270	9,270	0
Landfill Services	2,016 a	2,100	2,100	0
Uniform Expense	2,254	2,030	1,015 e	1,015
Materials and Supplies	122	130	130	0
Liability Insurance	3,010	2,820	2,820	0
Machinery/Equip. Repair	1,088	970	970	0
Miscellaneous	360	440	440	0
Equipment Purchase	24	220	3,300 f	(3,080)
Total	\$192,757	\$208,270	\$147,935	\$60,335
				x 10 years
			Total Savings g	\$603,350

- a Prorated cost of \$420/month among all solid waste vehicles.
- b Reflects a reduction of four employees.
- c Assumes no other change in operations (i.e. a transfer station).
- d Benefits are calculated at same percentage of salaries as "90-91" figure.
- e With a reduction of 4 employees, this will be reduced
- f Reflects cost difference between front end loader (\$103,000) and the cost of the planned purchase of a rear loader (\$70,000) spread over 10 years (\$33,000/10 yrs). Assuming the \$200,000 for new dumpsters will be recovered through user charges.
- g This assumes no salary increases or inflationary increases for the 10 year period.
 (Any salary increases would make savings greater.)

The costs incurred through construction of a transfer facility include: land, structures, equipment and utilities, labor, operation, maintenance, and overhead costs involved at the transfer site and in the bulk hauling to the landfill. These costs are recovered through: reduction of non-productive crew time in riding to and from the landfill; reduced size of collection crew because of increased productive collection time; reduced mileage traveled by collection vehicles; and reduced maintenance requirements for collection vehicles.

The advantages of transfer facilities include a reduction in total system costs and an added measure of convenience to the system. Disadvantages of a transfer station are potential public opposition of the proposed site, and a need to redistribute the workload among the surplus men and equipment.

Cookeville is in a good position to consider siting a transfer station. It is expected that total system costs will decrease with a transfer station and efficiencies will improve. The public works department has four vacant positions, so that any workers no longer needed in solid waste collection could be transferred to other positions within the public works department. Public opposition to a transfer station site in Cookeville will vary. Depending on what site is selected, the city can take steps to minimize any negative impact on the community.

Cookeville owns land at three potential sites for a transfer station:

- Cane Creek park
- Street department garage
- Wastewater treatment plant.

Ideally, the site selected for the transfer station ought to be adequate to build a material recycling facility. The material recycling facility should include shredders, sorting lines, densifiers, can buyers, and balers. The most desirable transfer station site should include land available for a leaf, brush, and grass compost operation. Some communities are beginning to integrate sewage sludge in compost operations. By housing a transfer station, material recovery facility, and compost (possibly incorporating sewage sludge) operation at one site, the city could realize some efficiencies:

- potential for employees to work in a variety of activities (based on demand)

- educating Cookeville residents on the various ways solid waste can be used
- minimizing construction and maintenance cost.

In Appendix A, Table 7 summarizes the advantages and disadvantages of each site. All three sites are viable. The best selection would be the site of the former transfer station at the street department garage. The site is centrally located, was previously developed as a transfer station, is not isolated from other governmental functions, has additional land available for compost operations, and could potentially house a recycling center. The site is less than four miles from the wastewater treatment plant, should the city decide to use sewage sludge in composting. The street department garage site must have controlled access, as it is adjacent to a residential development. The cost of developing and staffing this transfer station site would be minimal. The site is near (less than one half mile) from a major artery in Cookeville, providing easy access to the landfill. The other two sites are also attractive. Development of any of the three would place Cookeville in a win-win situation. All sites are developable, and would solve the problem of 18 weekly trips to the landfill currently made in commercial and residential collection. MTAS encourages Cookeville to select and install a transfer station as soon as possible.

Figure 3 compares the current cost of providing both residential and commercial solid waste collection with the expected cost of operation if a transfer station is implemented in 1991. The biggest cost savings (\$46,000) with using a transfer station will be seen in the elimination of employee overtime. Though Figure 3 does not reflect a reduction in vehicle cost, Cookeville will probably see some additional savings in tire expenses and fuel costs. The annualized cost of constructing and making the transfer station operational is about \$23,210. The operation and maintenance of the transfer station will be about \$6,000 per year. A conservative estimate of the net savings to Cookeville with a transfer station will be \$16,790 in 1991-92. Over the next ten years the city should see more than a \$167,900 savings in operation costs.

(figure 3)

CITY OF COOKEVILLE
SOLID WASTE COLLECTION
GOING TO A TRANSFER STATION

Description	Estimated Expend. FY 1990-91	Proposed Budget FY 1991-92	With Transfer Station In FY 1991-92	Net Savings With Transfer Station in 91-92
Salaries	247,365	262,700	262,700	a 0
Overtime	49,158	46,000	0	b 46,000
Salaries/Labor Pool	0	0	0	0
Benefits	83,790	74,990	74,990	0
Vehicle Expense	30,698	27,420	27,420	c 0
Fuel	23,750	23,040	23,040	c 0
Landfill Services	5,040	5,200	5,200	0
Uniform Expense	4,916	4,350	4,350	0
Materials and Supplies	2,534	2,280	2,280	0
Transfer Station O & M	0	0	6,000	d (6,000)
Liability Insurance	8,026	7,300	7,300	0
Machinery/Equip. Repair	2,942	2,690	2,690	0
Miscellaneous	1,288	1,300	1,300	0
Equipment Purchase	24	440	23,650	e (23,210)
Total	\$459,531	\$457,710	\$440,920	\$16,790
				x 10 years
			Total Savings	\$167,900

- a Assumes no need for staff increase, based on flexibility of existing staff of 18 persons.
- b Assumes no overtime because of efficiencies obtained in reduced numbers of trips to Putnam County landfill
- c Assumes no increase or decrease in total vehicle cost of operation.
- d Assumes a \$500/ month cost for maintenance of transfer station (utilities, water, repair, etc.)
- e Assumes construction cost of transfer station at \$53,000, with the cost spread over the life of the facility over 20 year period, and the purchase of a packer for \$60,000, two trailers for \$80,000, and a tractor for \$70,000, with the cost spread over their expected life, or 10 years. Annual cost will therefore be (\$53,000/20 yrs) + (\$210,000/10 yrs)

RECYCLING

Thirteen recycling collection days, organized by the Cookeville-Putnam County Clean Commission, have been held in Cookeville. During these collection days, residents from the city and county brought their aluminum cans, newspapers, glass, and plastic to the Kroger parking lot. Initially, the collection days were conducted by volunteers. More recently, the city's public works department has provided trucks for collection at the Kroger site, then hauled the recyclables to J and W recycling. Residents of the city and county support recycling, as evidenced by the volume of recyclables collected:

	<u>Collection Days 1 - 12</u>	<u>13th Collection Day</u>	<u>Total</u>
Aluminum cans	251,572	28,080	279,652
Newspapers	100 tons	14.5 tons	114.5 tons
Glass	50,627 lbs	7,680 lbs	58,307 lbs
Plastic	11,740 lbs	2,860 lbs	14,600 lbs

There is a recycling task force in Cookeville-Putnam County. The task force members include: the Director of the Water Center at Tennessee Tech (chairperson), the City Manager of Cookeville, Putnam County Executive, Cookeville's Public Works Director, Wal-Mart, K-Mart, Kroger, Tennessee Tech, the Cookeville-Putnam County Clean Commission, and J and W Recycling. The task force is looking at where to go with recycling in the city and county. In addition to the task force, Cookeville's City Manager appointed Rita Craighead, Administrative Assistant, to begin an office paper recycling program at City Hall. There is some discussion within the Upper Cumberland Development District to begin a recycling marketing cooperative. This recycling cooperative could enhance the region's ability to market recyclable products and dispose of them more economically. The discussion is in its early stages and Cookeville stands to benefit by its continued monitoring and participation.

The big questions facing Cookeville-Putnam County with recycling are:

- Who will be in charge of recycling?
- Who will haul the recyclables?
- Who will identify markets for recyclables?
- Who will pay for recycling?

- Will the city elect to provide curbside recycling?
Or will there be a drop-off center?
- Where would a drop-off center be located?
- Will the city and county contract with a third party recycler (i.e., J and W Recycling, a marketing cooperative)?
- How will the site currently used by J and W be improved?

There are no easy answers to these questions. The recycling experience nation-wide and in Tennessee clearly demonstrates that what works with recycling in one community may or may not work in another. MTAS has information on planning, designing, and implementing recycling programs. Before deciding whether to provide curbside collection in Cookeville, to establish a materials recovery center (recycling drop-off center), to continue with recycling as it is in Cookeville, or to drop the idea of recycling, MTAS recommends the following:

- The Public Works Director and City Manager should visit Johnson City's recycling program. Johnson City has provided curbside recycling for two years (initially to selected neighbors, now city-wide -- including commercial). There are funds available from the International City Manager's Association (ICMA) environmental peer exchange program to fund a portion of the cost incurred with this visit.
- The Public Works Director and City Manager should visit Recycle Signal, Signal Mountain's drop-off center recycling program. Again, Cookeville might be able to receive partial funding for this trip through ICMA.

After visiting both of these sites, MTAS recommends that the city and county (through the Recycling task force) develop a recycling plan. The plan could include selecting a recycling coordinator for the city and county, sharing expenses, using existing resources and expanding on them (i.e., J and W Recycling), implementing curbside recycling, or developing a drop-off recycling center.

RECOMMENDATIONS FOR RESIDENTIAL SOLID WASTE COLLECTION DIVISION

A few simple recommendations include:

- Educate the citizens of Cookeville about why it is important to use standardized size containers or strong plastic bags.
- Educate the Cookeville community in the importance of recycling.
- Enforce the existing sanitation ordinance, especially Section 8-103, accumulation of refuse.
- Amend the sanitation ordinance to clearly outline the city's policy in terms of dumpsters (i.e., when there are four or more dwelling units, the apartment complex must provide a dumpster).
- Continue the separate collection of brush and grass clippings -- possibly using them as compost available for the city's use and public use. This service could be upgraded. One innovation is a tow behind chipper with its own knuckleboom (estimated cost is \$30,000 to \$35,000) for high production on the route.
- Install flashing lights on all vehicles, and mark all vehicles with the city's logo.
- Check policies of special collection for elderly and handicapped.
- Establish a policy on callbacks to minimize return trips to the same location.
- Develop "Guidelines for the operation of Cookeville's solid waste collection system." These guidelines do not need to be a part of the sanitation ordinance, but should reflect the management practices of the city. Periodically, the guidelines should be reviewed by the public works director.
- Periodically inspect condition of dumpsters, making sure that apartment complexes comply with the sanitation ordinance.
- Continue current practice of handling bulky or "white goods" (on-call basis with a schedule that divides the city into different zones -- permitting collection per zone per weekday).

Other recommendations are not as simple:

- Consider using front-end loaders on all multi-family residential dumpsters.
- Perform a comprehensive route analysis in conjunction with a transfer station. If, however, Cookeville does not choose to use a transfer station, a route analysis needs to be performed as soon as possible. The public works superintendent needs to perform the route analysis with assistance from others. This might include other personnel from Cookeville, MTAS staff, staff from other Tennessee cities, or Tennessee Tech staff.
- As trucks wear out, the city needs to consider the possibility of not replacing them with rear loading packers. Instead, Cookeville should look at altering its mode of operation. Currently there are 15 men involved in residential collection. Cookeville might consider two Lodal or similar side-loading 20 to 28-cubic yard high compaction trucks with a walk-in cab (staffed with two men and operating on both sides of the street at the same time). The production rate should be at least as good as (and probably better than) the three men used on each truck. Carts could make it even more efficient, and allow the three 20-cubic yard packers (used in present practices) to be reduced to two trucks with a total of four men. There should be one auxiliary satellite vehicle of about six cubic yards of some type integrated into the system to help the two Lodals. The auxiliary vehicle would take care of all the problem situations: dead end streets, long driveways, elderly customers, etc. The intent is to maximize production with two larger trucks. An instant reduction from nine men to five men could be achieved in residential collection.
- If Cookeville decides to implement curbside recycling, then it might consider purchasing a combination truck with split compartments for mixed material with other compartments for recyclable materials. This allows the same crew, same route, and same day pickup of recyclables and landfill rejects. Several manufacturers offer this innovation.
- Free some of the public works director's and public works superintendent's time so that they can become involved in analyzing the performance

of the residential collection division, receive training in new methods of solid waste collection, and conduct other managerial duties. Cookeville needs to consider creating the position of a waste manager to oversee all residential, commercial, and recycling efforts. Organizationally this could be an assistant public works director or a new position at the supervisor's level.

RECOMMENDATIONS FOR COMMERCIAL SOLID WASTE COLLECTION DIVISION

Recommendations for the commercial collection division are straightforward:

- Cookeville needs to reevaluate the provision of commercial services. Does the city want to remain competitive with the private sector?
- Acquire front end loaders. If Cookeville continues to operate commercial collection as it does today, the city needs to consider purchasing front end loaders. One front end loader is currently for sale from Algood at a cost of about \$30,000 (which could be paid for from the 1990-91 budget). Another front end loader (at a cost of about \$103,000) could be added to the fleet as soon as possible.
- The volume of commercial waste collected by the city could be reduced by using front end dumpsters, maximizing the size of the dumpsters to permit once weekly pickups, and implementing a commercial recycling program. If all of these efficiencies are implemented, Cookeville could probably handle all commercial collection with one front end loader. The other front end loader (like the one available from Algood) could be used as a spare. This used vehicle could be used when the larger front end loader is out-of-service.
- It is possible that a number of small businesses could be collected in residential pickup if collection carts are used in a semi-automated or automated system and a recycling pickup occurs (as discussed in "recommendations for residential collection" in this report).
- Accounting for commercial collection could be set up in a number of ways. Kingsport is investigating the use of bar codes. The bar code is pasted on the dumpster. When the driver picks

up a commercial load, a recording wand is passed over the bar code and the information entered into a computer system. The computer system then generates bills.

- Look at increasing the size of dumpsters, periodically inspecting dumpsters, and review the city's policy on dumpsters. Should the city convert to front end loading, all dumpsters must be replaced. Cookeville might consider purchasing new dumpsters for all commercial and multi-family residential customers then leasing the dumpsters to customers to recover cost. If Cookeville owns the dumpsters, it could better enforce policies on the condition of dumpsters.
- Perform a comprehensive route analysis on commercial operations.
- Site and install a transfer station.
- Attempt to reduce all commercial pickup to one time weekly by re-evaluating the number of dumpsters at each business. By implementing commercial recycling and using a small truck to collect from the food establishments (probably daily), once weekly pickup is possible. MTAS observed that some businesses need fewer pickups, some need larger dumpsters.
- Look at commercial recycling to minimize the waste stream.
- Centralize accounting and management of commercial accounts.

CONCLUSION

Cookeville, by reviewing and adopting the recommendations of this report, should experience improved efficiencies in solid waste collection. With the passage of the 1991 Tennessee Solid Waste Bill, Cookeville will be working with other local governments on solid waste issues. The challenge will be to find ways to continually improve collection, disposal, and materials recovery processes. This study is just the first step.

APPENDIX A

TABLE 1

CITY OF COOKEVILLE
SOLID WASTE COLLECTION FOR
SCHOOL SYSTEM
MARCH 1991

<u>SCHOOL</u>	<u>STOPS/ WEEK</u>	<u>DAYS OF WEEK</u>	<u>ROUTE</u>
Jere Whitson	2/week	Tu & Th	Route 1
Jr. High	3/week	M, W, & F	M & F - Commercial handles W - Route 3
Sr. High	2/week (every other week an extra pick up)	Tu & Th	Route 3
Sycamore	2/week	Tu & F	Route 2
Northeast	2/week	Tu & F	Route 3
Capshaw	3/week	M, W, & F	Route 3
Parkview	2/week	Tu & F	Route 2

SOURCE: Clyde Presley, March 20, 1991

TABLE 2

CITY OF COOKEVILLE
RESIDENTIAL SOLID WASTE COLLECTION
ROUTE 2
THURSDAY, MARCH 7, 1991

FIRST PICK-UP: 7:10 am

TRUCK: 20 yard packer

NUMBER OF PICK-UPS: TOTAL = 230
including: 163 houses
49 2-family units
3 3-family units
3 4-family units
2 5-family units
8 6-family units
2 10-family units

TIME: TOTAL = 4 hours 14 minutes
including: 1 hour 10 minutes to landfill & back
18 minute break

MILEAGE: TOTAL = 43 miles
including: 31.2 miles to landfill & back
2.50 miles during break

(NOTE: MTAS did not follow the afternoon portion of the route)

Comments:

1. Inconsistent size, condition of trash receptacles (ranging from litter, many brown paper bags, variety of sizes and types of trash cans to plastic bags) -- first stop, the bag burst and garbage had to be picked up by hand on the street.
2. Dumpster -- open topped, rusted, empty, overflowing.
3. Accepting mixed waste -- brush, leaves, grass clippings, garbage, toilet, reclining chair, carpet, rocking horse (child's toy).
4. Truck backing up and down streets -- a route study may provide an alternate solution to backing down streets. Therefore saving time and producing a more efficient route.
5. Many recyclable materials in the waste stream -- cardboard, aluminum cans, plastic, children's toys.

TABLE 2 COMMENTS CONTINUED

6. The driver and two workers left the truck and went door-to-door in a housing project to collect waste. Is it possible to use dumpsters here? Or is this as a courtesy to elderly and handicapped residents? Is everyone in the housing project eligible?
7. The truck backed into a driveway at an apartment complex where the pavement was torn up. The bottom of the truck scraped the pavement. The owner needs to repair the drive.
8. The crew operated for 14 minutes (.3 of a mile) upon returning from the landfill, and took a break. They returned along the same path followed in going to the landfill when taking their break. Is there any reason why the crew did not take a break when they returned to town? -- rather than double tracking?
9. All three members of the crew traveled to the landfill. This took one hour and ten minutes. Cookeville lost three hours and thirty minutes of its employees' time in this one day. A transfer station would help improve efficiency.
10. The Putnam County landfill has poor access roads. Roads are rutted, muddy, and filled with objects that can easily damage tires.
11. Route 2 on Thursday picks up a large number of dumpsters at multi-family units. This means that the driver must back into stops, maneuver, and then the crew attaches a pulley to the dumpster. Using a rear end loader in this capacity causes problems -- potential accidents with a lot of backing and maneuvering, strain on the crew, etc. Is it possible to separate multi-family units and apartments from other residential collection, and use a front end loader for the dumpsters?
12. The crew wore City of Cookeville uniforms and safety vests.

TABLE 3

CITY OF COOKEVILLE, TENNESSEE
 STATEMENT OF PROPOSED EXPENDITURES
 FOR THE FISCAL YEAR ENDING JUNE 30, 1991

100 GENERAL FUND

Account Number	Account Description	Actual 1988-89	Amended Budget 1989-90	Estimated Actual 1989-90	Final Budget 1990-91
1143	PUBLIC WORKS DEPARTMENT				
114320	RESIDENTIAL COLLECTION DIV:				
143111	Salaries/Wages	0	210,000	171,142	155,127
143112	Salaries/Overtime	0	27,500	19,576	22,000
143118	Salaries-Longevity Pay	0	0	0	1,560
143122	Salaries-Labor Pool	0	0	0	19,000
143140	Employee Training	0	0	0	150
143141	FICA-City Share	0	17,900	14,475	14,935
143142	Hospital Insurance	0	33,250	20,481	25,000
143143	Retirement	0	4,700	2,330	4,085
143144	Retirement-Admin Cost	0	250	201	200
143146	Workmen's Compensation	0	10,000	6,940	7,000
143147	Unemployment	0	1,500	0	0
143148	Wellness Program	0	0	0	600
143261	Vehicle Expense	0	23,500	3,269	3,300
143262	Fuel	0	11,400	7,402	7,500
143290	Landfill Services	0	3,000	2,160	3,000
143299	Uniform Expense	0	600	1,966	2,000
143310	Materials & Supplies	0	5,700	5,201	5,500
143513	Liability Insurance	0	1,700	1,744	1,800
143941	Small Equipment	0	0	0	0
143942	Machinery/Equipment Repair	0	500	500	500
143999	Miscellaneous	0	750	351	500
Total Residential Collection		0	352,250	257,738	273,757

TABLE 4

CITY OF COOKEVILLE
COMMERCIAL SOLID WASTE COLLECTION
WEDNESDAY, MARCH 13, 1991

(The route began at 4 am. MTAS began following the route at 9:27 am upon its return from the landfill.)

Left garage:	9:27 am	Mileage:	656.4
First pickup:	9:31 am	Mileage:	658.
Last pickup:	10:45 am	Mileage:	669.4
Return garage:	10:54 am	Mileage:	673.6
Total number of stops:	19	Total mileage:	17.2 miles

Comments: (see attached pictures)

1. The crew used the spare 16 yard packer truck. The public works superintendent was out-of-town locating a repair part for one of the trucks. The public works director was filling in for the superintendent.
2. There is some type of dump on Interstate Drive across from Miller machine shop (shingles, tree stumps, and brush). This should be checked on and cleaned up to prevent further dumping here.
3. There is a lot of cardboard, plastic, and glass in the commercial waste stream -- potential for recycling.
4. Several containers were overly full, some not full at all.
5. Driver and crew got out of the truck to remove a ribbon fence at Clayton Mobile Homes and opened privacy gates at several establishments.
6. The crew picked up a broken sign at Days' Inn.
7. The crew completed pick up early this day. They said it was the first time they had finished early in a long time.
8. They had already been to the landfill once, and estimated that the truck was 1/2 full.
9. The driver had to back the truck in and out to reach dumpsters.

TABLE 5

CITY OF COOKEVILLE, TENNESSEE
 STATEMENT OF PROPOSED EXPENDITURES
 FOR THE FISCAL YEAR ENDING JUNE 30, 1991

100 GENERAL FUND

Account Number	Account Description	Actual 1988-89	Amended Budget 1989-90	Estimated Actual 1989-90	Final Budget 1990-91

1143	PUBLIC WORKS DEPARTMENT				
114330	COMMERCIAL COLLECTION DIV:				
143111	Salaries/Wages	0	80,000	100,508	118,952
143112	Salaries/Overtime	0	7,500	22,777	23,000
143118	Salaries-Longevity Pay	0	0	0	2,220
143122	Salaries-Labor Pool	0	0	0	18,999
143123	Salaries-Cleanup Crew	0	0	0	0
143140	Employee Training	0	0	0	150
143141	FICA-City Share	0	6,500	9,360	14,136
143142	Hospital Insurance	0	14,250	13,294	17,000
143143	Retirement	0	1,800	2,028	3,918
143144	Retirement-Admin Cost	0	100	151	150
143146	Workmen's Compensation	0	5,000	2,200	2,300
143147	Unemployment	0	500	0	0
143148	Wellness Program	0	0	0	420
143261	Vehicle Expense	0	15,500	3,461	3,500
143262	Fuel	0	7,600	5,781	6,000
143290	Landfill Services	0	2,100	1,440	1,500
143299	Uniform Expense	0	400	1,370	1,500
143310	Materials & Supplies	0	3,800	5,130	5,000
143513	Liability Insurance	0	1,050	951	1,000
143941	Small Equipment	0	0	0	0
143942	Machinery/Equipment Repair	0	300	0	500
143999	Miscellaneous	0	500	500	500

	Total Commercial Collection	0	146,900	168,951	220,745

TABLE 6

CITY OF COOKEVILLE
COMMERCIAL SOLID WASTE COLLECTION
ACTUAL VS EXPECTED REVENUE FOR 1/90 - 2/91

<u>Month</u>	<u>Actual Revenue Collected</u>	<u>Average Expected Revenue</u>
July 1990	\$ 18,183	\$ 17,013
August	\$ 16,646	\$ 17,013
September	\$ 14,527	\$ 17,013
October	\$ 16,741	\$ 17,013
November	\$ 15,707.50	\$ 17,013
December	\$ 16,439	\$ 17,013
January 1991	\$ 16,440	\$ 17,013
February	<u>\$ 16,447.50</u>	<u>\$ 17,013</u>
TOTAL	\$131,131	\$136,104

TABLE 7

CITY OF COOKEVILLE, TENNESSEE
POSSIBLE TRANSFER STATION SITES

	CANE CREEK PARK (old landfill)	STREET DEPARTMENT GARAGE (former transfer station)	WASTEWATER TREATMENT PLANT
City owns land	yes	yes	yes
Location from center of town (city hall)	2.4 miles	1.4 miles	3.5 miles
Mileage to landfill	15+ miles one-way	15+ miles one-way	less than 15 miles one-way
Site development costs	Land is flat, former landfill. Possesses un- desirable use. Has access roads. Low development cost.	Site previously developed as trans- fer station. Need to remove tank. Low development cost.	Site already possesses undesirable use. High development cost.
Other factors	<ul style="list-style-type: none"> ● Site of former landfill ● Adjacent to animal shelter ● Adjacent to a popular park ● Isolated from other city government functions ● May affect other other planned useage 	<ul style="list-style-type: none"> ● Site of former transfer station ● Adjacent to residential area Would have to have controlled access & buffer ● Houses city government functions ● At this location whatever employee in street department can be double utilized transfer station employee can be used in other functions 	<ul style="list-style-type: none"> ● Easy access to landfill ● Potential for compost operation w/ sewerage sludge ● Houses city government functions ● May affect other planned useage