



Solid Waste

Dear Reader:

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We hope this information will be useful to you; reference to it will assist you with many of the questions that will arise in your tenure with municipal government. However, the *Tennessee Code Annotated* and other relevant laws or regulations should always be consulted before any action is taken based upon the contents of this document.

Please feel free to contact us if you have questions or comments regarding this information or any other MTAS website material.

Sincerely,

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Solid Waste

Reference Number: MTAS-253

Solid Waste Management Act of 1991

The Solid Waste Management Act of 1991 outlines a comprehensive process for dealing with Tennessee's municipal solid waste on a regional basis. Cities that collect and dispose of solid waste have a right to appoint representatives to the region's (single or multi-county) board. Through regional plans, regional boards have the authority to approve applications for new or expanded landfills or incinerators in their territory and to restrict waste coming in from outside the region. T.C.A. §§ 68-211-813–814, T.C.A. § 68-211-817.

The act authorizes the region to impose and collect a solid waste disposal fee. Funds from these fees are to be used to establish and maintain solid waste collection and disposal services, including convenience centers and collection centers for whole waste tires, lead-acid batteries, and used oil. Cities and counties must use a uniform solid waste financial accounting system developed by the state comptroller. T.C.A. § 68-211-835, T.C.A. § 68-211-866, T.C.A. § 68-211-874.

Solid waste needs assessments, first required by 1992, must be revised every five years.

All landfills accepting municipal solid waste must pay a surcharge of 90 cents per ton to the state. The surcharge applies only to Class I solid waste disposal facilities and incinerators. T.C.A. § 68-211-835.

The act makes it unlawful to deposit solid waste into the waters of the state and to burn solid waste except in accordance with state regulations. It also is unlawful to construct or alter a solid waste processing or disposal facility or to transport, process, or dispose of solid waste in violation of rules and regulations established by the commissioner of environment and conservation or the board of energy and natural resources created by T.C.A. § 69-3-104. T.C.A. § 68-211-104. The state also exercises general supervision and regulation over all solid waste disposal facilities in the state, including the authority to review and approve federal grants or loans to cities for constructing or modifying such facilities. T.C.A. §§ 68-211-105–109.

Funds in the solid waste management fund may be used for grants to municipalities with a Class I landfill without a liner and for using shredded tires for recreational purposes. T.C.A. §§ 68-211-832, 867.

Closed Trucks

Refuse, garbage, etc., must be hauled in a closed-body truck or covered securely with a tarpaulin. In addition, all trucks hauling litter to an energy recovery facility and having a gross weight of less than 16,000 pounds must carry the litter in an enclosed space unless the truck has a hydraulic lift system. T.C.A. §§ 39-14-507.

Resource Recovery and Used Oil Collection

Reference Number: MTAS-553

Resource Recovery Facilities

T.C.A. §§ 68-211-501–505 empower any city to construct and operate an "energy or resource recovery facility ... within its corporate limits or within the limits of the county wherein it is located," and a 1974 act authorizes state loans for such purposes. A 1976 act intending primarily to permit local governments to participate in a TVA-sponsored plan for using solid waste as fuel empowers cities and counties to join in any such enterprise. The act is sufficiently general to permit participation in any such plan, not necessarily only those sponsored by TVA. The act would apply to any facility with a primary objective of recovering energy and a secondary objective of recovering recyclable materials. T.C.A. §§ 7-58-101–110.

Contracts for using solid waste for resource and fuel recovery or among counties and cities for cooperative solid waste operations may not exceed 40 years. T.C.A. §§ 7-58-103–104.

Used Oil Collection Act of 1993

The Used Oil Collection Act allows the Tennessee Department of Environment and Conservation to make grants or loans to cities to establish and operate used oil collection centers. Grants and subsidies

also may be available to local governments to buy equipment that burns used oil as fuel. In awarding the latter grants, priority will be given to local governments that have created used oil collection centers. The grants are funded by a 2 cents per quart fee on automotive oil, paid by distributors. The act contains extensive regulations governing used oil collection centers. T.C.A. §§ 68-211-1001, *et seq.*

Hazardous Waste

Reference Number: MTAS-372

Hazardous Waste Permit

When the state considers an application to permit a hazardous waste site within a municipality or within one mile of a municipality, the city council must vote within 90 days to accept, reject, or modify the application. The city must send the state a report that addresses a series of questions. The questions ask whether the facility:

- minimizes incompatibility with the surrounding area and its effects on the value of the area;
- minimizes the impact on traffic flow; and
- meets zoning requirements for hazardous solid waste facilities.

Before issuing or denying the permit, the state commissioner of environment and conservation must affirm, reverse, or modify the decision of the local government. T.C.A. § 68-212-108.

Applicants for hazardous waste storage or disposal facilities must hold a public meeting and complete a community impact statement before submitting a permit application. T.C.A. § 68-212-108. T.C.A. § 68-212-105 makes it unlawful to place a new commercial hazardous waste facility closer than 1,500 feet to residential, day-care, church, park, or school property.

Hazardous Waste Plans and Reports

The Tennessee Hazardous Waste Reduction Act of 1990 requires hazardous waste generators to classify themselves as large or small, prepare hazardous waste reduction plans, and file annual reports with the state. T.C.A. §§ 68-212-301–312.

Superfund and Hazardous Waste Sites

The commissioner of environment and conservation is required to notify the register of deeds in each county in which property has been placed on the list of inactive hazardous substance sites. The register must record a notice that the property has been so listed. This notice effectively freezes any loan for development of the site until the environmental problem is addressed and the notice is removed.

Local governments are not liable for cleanup of hazardous waste sites if they acquire ownership through tax delinquency, bankruptcy, abandonment, or similar circumstances. This exemption does not apply if the government contributed to releasing hazardous materials or if liability has been otherwise adjudicated. T.C.A. §§ 68-212-101–302.

Refuse Collection and Disposal

Reference Number: MTAS-822

Counties are authorized to provide refuse collection and disposal on a countywide basis. A county agency may be given this function, or contracts for the service may be made with "any municipality, any utility or other service district, any private organization, or any combination of such entities." Joint action with other counties and municipalities also is authorized.

As with fire protection, districts must be established where refuse collection and disposal service are to be provided. The full costs must be paid from a tax levy within the district or charges levied on service recipients or both. A countywide property tax levy may be used "only if all persons in the county are to be equally served." This is specifically prohibited if any city or special district within the county provides collection and disposal services to its residents. T.C.A. §§ 5-19-101–116.

Under the 1991 Solid Waste Management Act, counties are required to provide residents a collection system that consists, at a minimum, of convenience centers with certified operators and attendants. T.C.A. § 68-211-851.

Residential Refuse Collection Technologies

Reference Number: MTAS-369

Many Tennessee cities collect refuse today in much the same way they did 60 years ago. Yet, advances in technology now offer alternatives to older, conventional collection methods. New methods combined with the older technology can also be very successful. Cities now can choose from several refuse collection systems that are highly cost effective.

Types of Refuse Collection System

Automated and semi-automated refuse collection technologies are based on the curbside collection of standardized, wheelttype, refuse containers. Curbside collection not only promotes more economical refuse collection but also provides the opportunity for automation. Standardized containers, or carts, are necessary as the lifting devices on automated and semi-automated collection vehicles are engineered to handle only specially designed containers.

With automated pick up, residents are provided with the standardized container into which they place their wastes. The specially shaped cart is parked at the curb, and the collection vehicle operator picks up the cart with a hoist and dumps it into the vehicle.

In semi-automated collection, the carts are rolled to the back or side of the truck where specially designed hydraulic lifts known as “flippers” empty waste into the vehicle. Semiautomated pick up reduces worker injuries and can reduce worker fatigue, but it is, except for back door collection, the slowest of the collection methods.

As a general rule of thumb, with curbside collection a one-person crew with an automated side-loading vehicle should be able to service 950 homes per day. A three-person crew with a rear-loading vehicle can provide curbside service to 800 homes per day.

Automated and semi-automated systems are easy to use, are less labor intensive, and reduce on-the-job injuries. They can be adapted to operate efficiently in almost any climate, terrain, or street configuration. Reduction of on-the-job injuries is an important consideration; solid waste collection workers have the highest rates of on-the-job injury of any class of municipal employees, including fire and police.

Automated rear-loader packer trucks generally have two or more operators. Refuse is placed in the rear of the vehicle, then compacted by a ram mechanism. Truck capacities of 20 to 32 cubic yards are common; payloads average 20,000 to 32,000 pounds.

Automated side-loading vehicles allow a single operator to drive and load the waste into the vehicles. Some trucks are configured with multiple hoppers so that recyclable materials can be collected at the same time as the refuse.

Front- and top-loading collection vehicles provide lifting mechanisms for picking up large refuse containers and tipping them into the vehicle. These vehicles can be used in conjunction with a small fleet of satellite vehicles.

Automation Benefits

Reference Number: MTAS-586

One city in Tennessee converted to a system using a front-loading compactor truck and four Cushman dump bed satellite vehicles. Using the compactor truck and the Cushman satellite vehicles, weekly residential collection is completed in three days, using 112 employee hours. In contrast, the former conventional method took five days and 120 employee hours. The compactor truck is used 24 hours versus 40 hours previously; thus freeing additional truck time for commercial collection. This maximizes the efficient use of equipment resources and avoids the possible necessity of purchasing an additional truck and the expense of additional employee hours. There is a collateral benefit of not having a large collection truck using the edge of a light-duty pavement system in residential neighborhoods.

Automation Also Works for Recycling

Recyclables often are collected in trucks specially designed to handle lighter weight, bulky materials. Where recyclables are mixed together, bagged, and set out at the curb, all the recyclables are hauled together in one chamber of the vehicle. Where residents separate their recyclables into different categories such as glass, plastic, and metal, the pick-up vehicle has multiple compartments into which the different materials are directed.

Refuse Collection: Issues to Consider

Reference Number: MTAS-1469

When a private firm is able to undercut a municipality's cost of collection and still earn enough profit to make the contract desirable, it is because the firm has paid attention to the following:

- Proper routing;
- Proper equipment selection;
- Proper staffing;
- Proper training; and
- Economy of scale

These are all items that a municipality can address if the policy decision is made to do so.

Appropriate planning, especially on collection routing, is critical to the municipality's competitiveness. The collection environment should be studied carefully, and suitable vehicles with the correct staffing selected to meet the need. Higher equipment prices and automation, for instance, are not necessarily the answer.

One of the most common problems with competitive residential collection is the over-manning of municipal collection vehicles. Having too many employees lowers individual productivity and increases cost of service.

Preventative maintenance is an area where municipalities must guard against falling short. Solid waste collection equipment is a major capital investment. Successful private sector enterprises recognize this. They also recognize that preventative maintenance programs have proven to more than pay for themselves. Equipment will last longer, allow crews to perform at peak efficiency, and not be subject to costly and annoying down time.

Private firms also recognize the value of accurate record keeping for making sound management decisions. Having complete records aids in route planning, staffing, and equipment selection.

Thorough employee and management training is another key area where cities need to take a note of private firm operations.

Once again, policy decisions come into play, but curbside collection allows the municipality to provide service at the lowest cost to the public. A curbside collection route with bagged garbage can be served by a one-person crew in a dual controlled side loader. Bagged trash in a side loader can cut the collector's steps in half compared to city rollouts or customer containers.

Cost and Productivity Estimates

Reference Number: MTAS-806

Figure 1 provides cost and productivity estimates for seven different refuse collection technologies, each serving 4,000 customers per week. The fully automated side-loading system serving 950 customers per day per vehicle is the most cost effective at an estimated \$61,958 per year or \$1.29 per customer per month. This figure does not include a number of costs common to the various methods, nor does it reflect what a customer's monthly rate should be. It is merely a convenient method for comparing the relative efficiency of these refuse collection technologies.

Data in Figure 1 are based on the following assumptions:

- Labor cost is \$505 per week for salary and benefits per crew member.
- Equipment cost is based on a six-year life cycle, and all costs are prorated to actual equipment use.
- Other costs not addressed, but common to all operations, include supervision, equipment insurance and storage, vehicle operation and maintenance based on vehicle usage, vehicle financing, other debt service, and overhead.
- Productivity rates (or customers served per day) are average figures that most cities should be able to achieve, the key words in that sentence being “average” and “most.” Circumstances vary among cities, and one size does not fit all. These rates assume that each crew works 40 hours per week, spends 30 hours on the route, and collects only refuse placed in containers or plastic bags. Data from a variety of jurisdictions around the country show that with proper management, equipment, and incentives, these or higher productivity rates can be met.

Figure 1

Collection Method	Crew	Vehicles	Equipment Cost	Labor Cost	Total Cost/Yr.	Customer Cost/Mo.
Manual, rear-loader, back door ~350 customers/day/vehicle	3	3	\$48,640	\$179,618	\$228,258	\$4.76
Manual, rear-loader, curb side ~650 customers/day/vehicle	3	2	\$28,085	\$96,742	\$124,827	\$2.60
Semi-auto, rear-loader, curb side ~700 customers/day/vehicle	3	2	\$29,450	\$89,809	\$119,259	\$2.49
Manual, rear-loader, curb side bagged trash (no cans) ~800 customers/day/vehicle	3	1	\$24,716	\$78,780	\$103,496	\$2.16
Semi-auto, side-loader, curb side w/cans ~500 customers/day/vehicle	1	2	\$74,760	\$42,016	\$116,776	\$2.43
Semi-automated, side-loader, curb side bagged trash ~950 customers/day/vehicle	2	1	\$39,200	\$44,117	\$83,317	\$1.74
Automated, side-loader, curb side w/cans ~950 customers/day/vehicle	1	1	\$39,900	\$22,058	\$61,958	\$1.29

Note: This table does not account for equipment redundancy. Backup equipment is essential in refuse collection.

The most critical difference among the systems presented in Figure 1 are labor costs, not equipment costs. It is largely this labor difference — more than \$150,000 per year between the most efficient and least efficient collection methods — that produces the overall system cost differences. The least efficient, of course, reflects rear door collection, which involves a policy decision. The same crews with the same equipment can provide curbside service at about one-half the cost per customer compared to back door collection. Figure 1 does not reflect what a customer’s monthly rate should be, nor does it consider other common overhead factors. Figure 1 also does not reflect equipment redundancy. Equipment redundancy does not always necessitate a purchase. Interlocal agreements and vendor contracts are alternatives to purchasing back-up equipment.

Some cities in Tennessee collect refuse twice per week. Using standard containers and automated or semi-automated systems, cities can save up to 40 percent on fuel costs by converting to collection once

per week. The standard containers are adequate to handle a week's refuse for the average family and are virtually waterproof and spill proof. In addition, over the life of the containers they actually cost less to the homeowner than two garbage cans and a plastic bag per week. Automated and semi-automated technologies represent reliable, cost-effective methods of refuse collection, and they should be given serious consideration by almost every city that provides refuse collection service.

Data from cities as diverse as McMinnville, Tennessee, (pop. ~13,000) and Memphis, Tennessee, (pop. ~650,000) show that automated and semi-automated refuse collection can work well.

Public reaction to converting to curbside automated or semi-automated refuse collection can be critical to system success. Officials must anticipate the genuine concerns of citizens, answer those concerns honestly, and show citizens that the new systems will save taxpayer dollars while maintaining or improving refuse collection service. Also, cities should implement special programs for people such as the elderly and the handicapped whose physical limitations prevent them from wheeling refuse containers to curbside for collection.

In order to achieve significant savings, local communities must ensure that their new automated or semi-automated systems work effectively. Factors such as how to finance the system, how to deal with personnel displaced by automation, efficient route design, and proper maintenance of automated equipment must be taken into consideration well in advance of system implementation. These same criteria are relevant to cities that elect not to automate. Proper planning, training, staffing, maintenance, and methodology are key to the success of all residential refuse collection technologies.

Equipment Quotation: (listed in the order of appearance from Figure 1)	
Projected budget figures to match the units in Figure 1:	
Manual rear loader, back door (HEIL 4000-16 2015 Ford F750)	\$128,000
Manual rear loader, curbside (HEIL 4000-20 2015 Ford F750)	\$137,000
Semi-automated rear-loader, curbside (HEIL PT1000-20 2015 Freightliner)	\$155,000
Manual rear-loader, curbside (HEIL PT1000-20 on 2015 Freightliner M2-106)	\$148,000
Semi-automated side-loader, curbside (Bridgeport Trinity-29 on 2015 Mack)	\$280,000
Manual side-loader, curbside (HEIL Multi-Task-28 on 2015 Mack LEU)	\$280,000
Automated side-loader, curbside (HEIL Python-28 on 2015 Mack LEU)	\$285,000
(Cart prices \$65 to \$70 range.)	

Stopping Solid Waste Vehicles

Reference Number: MTAS-672

Certain restrictions against parking on public streets do not apply to garbage trucks collecting trash. These vehicles must have flashing hazard lights that are activated when stopping or stationary, and they must be clearly viewable from 200 feet in each direction while stopped. Special lighting also is required in accordance with rules promulgated by the state Department of Safety. T.C.A. § 55-8-158, T.C.A. § 55-8-160.

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