Bulk Storage and Mechanized Collection of Combined Refuse

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SYSTEMS for bulk storage and mechanized collection of combined refuse, developed in recent years, provide for in-place, mechanized transfer of refuse from bulk-storage containers to large-capacity collection trucks equipped with compactor mechanisms. These systems eliminate the need to transport bulk-storage containers to the disposal site. A number of refuse equipment firms now manufacture the necessary equipment.

The capacities of bulk-storage containers range from one-half cubic yard to 8 cubic yards or more. The heavy-gauge metal containers are watertight and are capable of excluding small animals and most insects. They may be finished in colors that blend into or complement the surroundings, and are not unsightly or malodorous when properly maintained.

Self-loading, compactor-type trucks empty the containers at the storage point in less than a minute each (see illustration). The process consists of: (*a*) engaging the container with the truck's lift mechanism, (*b*) lifting and inverting the container over the opening in the truck's receiving unit, and (*c*) righting the empty container and returning it to its regular spot. The truck then compacts the collected refuse and proceeds to the next container.

This kind of storage and collection system, particularly useful in business districts and other areas where large volumes of refuse are produced, does not require special refuse storage rooms or bins, quantities of small containers, separation of refuse, or a large number of collection personnel.

The large volume of refuse produced by special short-term community events, such as fairs and rodeos, can be quickly and economically removed with mechanized equipment. For such events extra containers, kept on hand to fill replacement needs, can be used. Containers are placed at strategic sites during the event and later returned to storage. Frequent pickup of waste prevents rapid accumulation of organic matter, which invites heavy breeding of flies. Bulk storage and mechanized collection systems also enable provision of refuse service to roadside parks, recreation areas, and rural population concentrations.

Although the systems have many advantages, some operational difficulties are still being encountered. A major difficulty with bulk-storage containers is keeping the loading doors closed. If side or top doors are left open, flies will invade the containers. Considerable strength is required to open and close top-loading doors, and users are prone to leave them open. Conversely, much less effort is needed to open side-loading doors, and these are more likely to be kept closed. Spring-loaded, door-closing devices were supplied by a manufacturer for one city, but these did not solve the problem.

Incidentally, indigents have been known to seek shelter in bulk-storage containers, and crewmen should check each container before it is emptied.

Manufacturers of collection vehicles have not developed equipment to effectively clean the

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containers at the storage place. Several manufacturers have spraying systems powered by compressed air. These systems have limited liquid capacities, which are adequate for applying insecticides and deodorants but inadequate for cleaning the containers. Refuse collection agencies have partially solved the cleaning difficulty by periodically replacing soiled containers with containers that are cleaned, repaired, and painted at a central facility. In Savannah, Ga., containers are sprayed and deodorized each time they are emptied, and they are also serviced in the city shops once every 3 months.

Hopper extensions on the trucks may help to keep paper from scattering during the container-emptying process. Fires in containers are rare. Frequently, containers are over-filled with empty cardboard boxes. This can be overcome by requiring users to crush the boxes or to use larger or additional containers.

Small capacity (less than 2 cubic yards) containers are inadequate for most storage points. Sturdy containers, 6 to 8 cubic yards, can be serviced rapidly and economically with modern collection equipment. With present equipment, collection of containers from locations along narrow alleys presents some difficulties. With front-loading trucks, the best solution may be to provide a means of wheeling containers into the alley ahead of the truck.

Systems in Current Use

Refuse systems are being used in many cities, particularly those where refuse collection is provided by private firms. Collection charges are usually based on capacity of containers and frequency of collection. U.S. military bases here and abroad are adopting these systems.

Orlando, Fla., has recently installed a city-owned containerized system, which serves all business places (*1*). The trucks are also used for collection of refuse from residential areas. In Madison County, Ala., a similar system provides twice-weekly collection service to rural population concentrations.

Valdosta, Ga. Valdosta (population 30,652 in 1960) was one of the first U.S. cities to install a system for bulk storage and mechanized collection of refuse throughout its business area. Installation of the system was prompted by a community project to clean and beautify commercial areas, provide improved storage and collection of combined refuse, and to reduce collection costs. The system was started in 1959 with 131 bulk-storage containers, and 147 additional containers were purchased in 1960. The cost of these 278 containers was approximately $80,500. Two 20-cubic-yard collection vehicles, with compaction and front-mounted lift mechanisms, were purchased at a cost of $22,000 for both.

Businesses pay a service charge ranging from $3 to $25 per month, depending on the volume of refuse collected. In 3 years, the reduction in collection costs paid for the new system. The system requires only one driver and a helper for each truck, and it replaces 2½ collection trucks and 10 men formerly used in the commercial area. Similar savings were achieved in service to schools and other establishments producing large amounts of refuse.

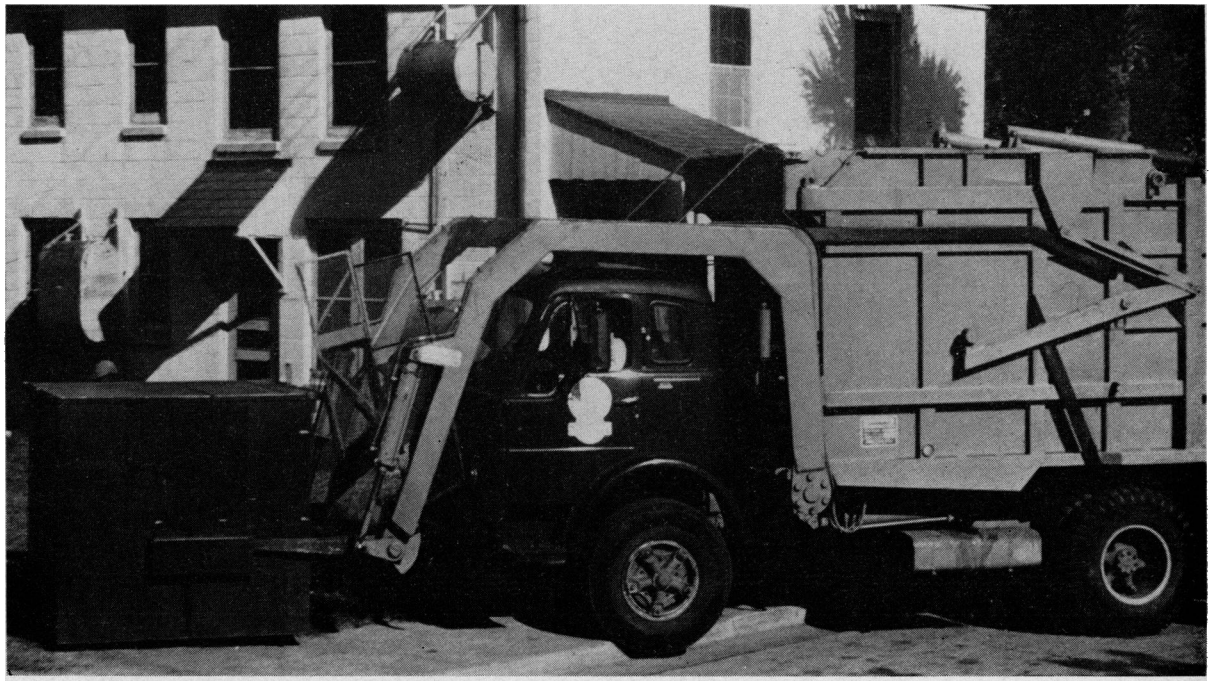
After collections are made in the downtown area, between 3 a.m. and 8 a.m., containers at schools, suburban shopping areas, and other outlying locations are emptied before noon.

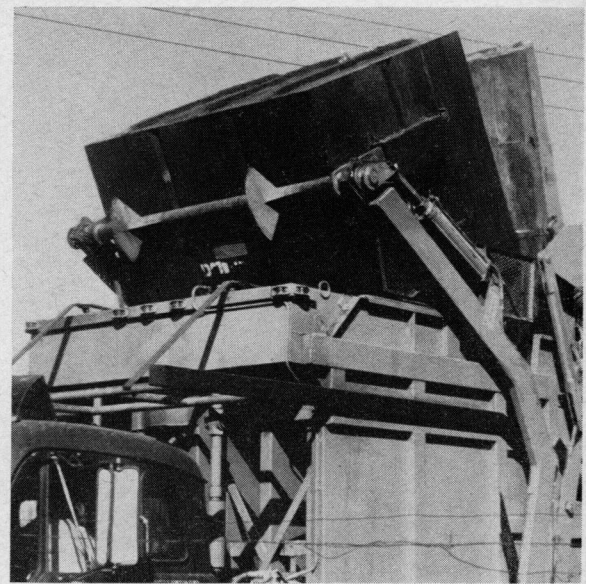
The lifting device on the collection truck engages a single **V**-shaped channel welded to the front of the container, permitting the truck to approach the container at an angle in narrow alleys or other confined areas. It has been possible to establish convenient locations for most containers, even in narrow alleys, without unduly interfering with traffic.

During a representative week 1,050 collections were made from 278 containers, an average of 3.8 collections per container; 3,147 cubic yards of refuse were collected; and, the average refuse volume per container was 3 cubic yards per collection, 11.3 cubic yards per week.

Savannah, Ga. In spring 1961 Savannah (population 162,000) installed a system similar to Valdosta's, with 367 bulk-storage containers, costing approximately $139,400, and two 24-cubic-yard packer trucks (equipped with front-mounted hoist devices), costing $18,000 each.

The city was reimbursed by schools, public housing authorities, and a few businesses for containers made available for their use. The containers were placed in downtown business alleys, public housing areas, schools, and suburban shopping areas. The equipment's empty-





Bulk refuse storage container and collection vehicle, Savannah, Ga. Lifting device engages container (top) and empties it into closed vehicle equipped with compaction mechanism (right).

ing process is the same as Valdosta's equipment, except that the truck-mounted lifting mechanism engages two rectangular channels, one on each side of the container.

Bulky commercial refuse, comprising about one-fifth of Savannah's total refuse volume, is handled at about one-eighth of the total collection cost. Each collection vehicle requires only two men, and each container is emptied two to six times a week. One employee checks each container before emptying, wheels it to a place accessible to the truck (if necessary), helps the driver engage the lifting mechanism, and, if needed, sprays the empty container with insecticide or deodorant, or both.

In downtown business areas the new system replaces bins, unsatisfactory from a public health standpoint, from which refuse had to be removed by hand. No major difficulty has been encountered in operating the system in business-area alleys. Costs of refuse collection in commercial and residential areas in Savannah for 1961 are shown in the table.

Locations for 300 additional containers have been selected, and two additional trucks were recently purchased. During an average summer week in 1962 two trucks, operating three shifts each 24 hours, made 1,850 collections from the 367 containers and handled 198 tons of refuse, an average collection frequency of five times per week. Collection efficiency was higher at night: 125 containers were serviced per night shift in contrast to 70 per day shift.

Conclusions

Systems for bulk storage and mechanized collection of refuse have proved effective and economical for use in commercial, industrial, and public housing areas. They also have application for elimination of accumulations of bulk refuse at parks, roadside rest stops, and other recreational sites. With continued improvement and modification, these systems may have even wider application including service for residential areas. We therefore recommend that manufacturers consider the following improvements:

1. Provision of side-loading doors of heavy-gauge metal on all bulk-storage containers.
2. Development of self-closing devices for container doors.
3. Modification of door design to make containers insect and rodent proof.
4. Development of a practical mechanical method of cleaning bulk containers at the storage point.
5. Lowering of the noise level caused by the emptying process.
6. Provision of a means to service bulk containers placed in confined areas.

Costs of refuse collection in commercial and residential areas, Savannah, Ga., 1961

Area	Cost per ton of refuse			
	Refuse collected (tons)[1]	Operations	Depreciation[2]	Total
Commercial (bulk containers and mechanized collection)	7, 764	$6. 43	$2. 47	$8. 90
Residential (standard containers, hand collection packer trucks)	39, 507	11. 55	1. 37	12. 92

[1] All refuse is weighed at the sanitary landfill.
[2] Based on 10-year life of containers and 5-year life of packer trucks.
[3] Collection equipment only.

REFERENCE

(*1*) Carr, R. S.: $600,000 saved annually. American City 77: 85, May 1962.

Vaccination for All U.S. Children

The Public Health Service has issued State and local health departments the first grants under the Vaccination Assistance Act of 1962. The funds will assist the departments in community immunization campaigns against poliomyelitis, diphtheria, tetanus, and whooping cough. The goal of the act is the immunization of the entire population, with special emphasis on the 14 million children under 5 years of age in the United States who are not fully protected against these four diseases.

Vaccination assistance funds may be used to purchase vaccine for children under 5 years of age and to support certain other activities connected with immunization campaigns. State and local health departments participating in the project are emphasizing community education programs and house-to-house contacts in areas where concentrations of unimmunized children are known to exist. Some States are using the voluntary assistance of home demonstration agents, county agents, school teachers, and others to achieve the widest possible public response.

Upon completion of the initial phases of immunizing the huge pockets of susceptibles, a program for adequate and continuing early immunization of preschool children must be developed, according to Dr. James L. Goddard, chief of the Public Health Service's Communicable Disease Center, Atlanta, Ga., headquarters for administration of the act.