

ON SITE HANDLING

Public Health and Aesthetics

Although municipal solid wastes account for a very small proportion of the total wastes generated in the United States (5% or less) they are perhaps the most important because they are generated in areas with limited storage space. As a result, they can have significant public health and aesthetic impacts.

Public health concerns are related primarily to the infestation of areas used for the storage of solid wastes with vermin and insects that often serve as potential reservoirs of disease. By far the most effective control measure for both rats and flies is proper sanitation. Typically, this involves the use of containers with tight lids. The periodic washing of the containers as well as of the storage areas, and the periodic removal of biodegradable materials (usually within less than 8 days, in areas with warm climates).

Aesthetic considerations are related to the *production of odors* and the unsightly conditions that can develop when "adequate attention is not given to" the maintenance of sanitary conditions. Most odors can be controlled through the use of containers with tight lids and with the maintenance of a reasonable collection frequency. If odors persist, the contents of the container can be sprayed as a temporary expedient. To maintain aesthetic conditions, the container should be scrubbed and washed periodically.



Fig. 2.1 Different size of containers

ONSITE HANDLING

Onsite handling refers to the activities associated with handling of solid waste until they are placed in the containers used for their storage before collection. Depending on the type of collection service, handling may also be required to move the loaded containers to the collection point and to return the empty containers to the point where they are stored between collections.

Chutes for use in apartment buildings are available in diameters from 12 to 36 in (3- 9.15) cm. The most common size is 24 inch in diameter. All the available chutes can be furnished with suitable intake doors.

In some of the more recent apartment building developments underground *pneumatic transport systems* have been used in conjunction with the individual apartment chutes. The underground pneumatics systems are used to transport the wastes from the chute discharge points in each building to a central location for storage in large containers or onsite processing. Both air pressure and Vacuum transport systems have been used in this application.

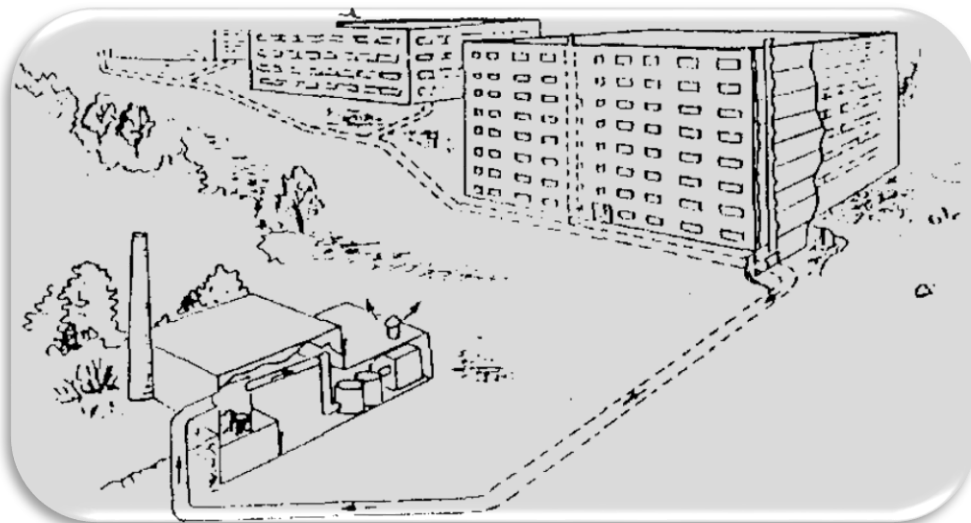


Figure 2.2 Pneumatic transport systems for solid wastes

Where kitchen grinders are used, food wastes and other grind able materials are ground and discharged to the waste-water collection system.

Newspapers may be bundled and put out for pickup by salvage handlers or city crews, or (they may be taken by the tenants, bundled or loose, to the service area for pickup or disposal.

Bulky items usually are taken to the service area by the tenants.



Fig 2.3 America's throwaway society has generated unprecedented amounts of electronic garbage. Each American produces four and a half pounds of garbage a day.

ON SITE STORAGE

Factors that must be considered in the onsite storage of solid wastes include (1) the type of container to be used, (2) the container location, (3) public health and aesthetics, and (4) the collection methods to be used.

CONTAINERS

Types and capacities of containers depend onto (1) the characteristics of solid waste to be collected (2) The collection frequency (3) The available space for the placement of containers.

Note: Because solid waste is collected manually from most residential low –rise detached dwellings, the container should be light enough to be handled easily by one collector when full. See table 1

Table 1: Limitations for containers used for onsite storage for solid waste

| Container type | Limitations |
|------------------------------|---|
| Galvanized | Containers are damaged over time and degraded in appearance and capacity; containers add extra weight that must be lifted during collection operations, tend to be noisy when being emptied and, in time can be damaged so that a proper lid seal cannot be achieved. |
| Plastic | Containers are damaged over time and degraded in appearance, some containers constructed of plastic materials tend to crack under exposure to the ultraviolet rays of the sun and to freezing temperatures, but the more expensive plastic containers apparently do not present these problems. |
| Disposal paper bags | Bag storage is more costly: if bags are set out on streets or curbside, dogs or other animals tear them and spread their contents: paper bags themselves add to the waste load. Paper and cardboard containers tend to disintegrate because of the leakage of liquids. |
| Disposal plastic bags | Bag storage is more costly; bags tear easily, causing litter and unsightly conditions: bags become brittle in very cold weather, causing breakage; plastic lightness and durability causes later disposal problems. In extremely warm areas where disposable plastic bags are used for lawn trimmings, plastic containers frequently stretch or break at the seams when the collector lifts the loaded bag. Such breakage is potentially hazardous and may lead to injuries to the collector because of the presence of glass and sharp or otherwise dangerous items in the wastes. |



Fig. 2.4 Solid waste on land in Baghdad



Fig.2.5 Solid waste on land in one of the American United Nations

ON-SITE PROCESSING OF SOLID WASTE

Grinding, sorting, compaction, shredding, composting, and hydropulperly are all onsite processing methods used to (1) reduce the volume, (2) alter the physical form, or (3) recover usable materials from solid wastes.

Grinding: Home grinders are used primarily for waste from the preparation, cooking, and serving foods, and they cannot be used for large bones or other bulky items. Functionally, grinders render the material that passes through them suitable for transport through the sewer system. However, because the organic material added to sewage has resulted in overloading many treatment facilities, it has been necessary, in some communities, to forbid the installation of grinders in new developments until additional treatment capacity becomes available.

In terms of the collection operation, the use of home grinders does not have significant impact on the volume of solid wastes collected. In some cases where grinders are used, it has been possible to increase the time period between collections pickups because wastes that might readily decay are not stored.



Fig. 2.6 kitchen home grinders

Sorting: The sorting or separation of waste materials into newspapers, aluminum cans, and glass and others by hand at the household is **one of the most positive ways to achieve the recovery and reuse materials**



Fig 2.7 Solid waste sorting

Compaction: Within the past few years, a number of small compactors designed for home use have appeared on the market for compaction of loose paper and cardboard. Although it is possible to reduce the original volume of wastes placed in them by up to 70 percent, they can be used only for a small proportion of the wastes actually generated.

Composting: It is an effective way of reducing the volume and altering the physical composition of solid waste while at the same time producing a useful by-product.

Home incineration: Until recently, home incineration, burning combustible materials in fireplaces and burning rubbish in crude backyard incinerators was a common practice. Backyard incineration is now banned in many countries. The design of small outdoor and indoor incinerators has improved. The simplest outdoor incinerator consists of a metal drum with holes punched near the bottom. The more elaborated units are lined with refractory brick and are equipped with cast-iron grates and small chimneys.



Fig. 2.8 Solid waste home incinerators

Shredding and Pulping: are alternative processing operations that have been used, both in conjunction with the previous methods and by themselves, for reducing the volume of wastes that must be handled. Where shredding is used alone without the addition of water, the volume of wastes has often been observed to increase. Although the system works well and the volume of solid wastes is reduced, it is

expensive. Special equipment may be required to remove and empty the full pulp containers. An alternative is to discharge the pulped material to the local sewer. This is often done in small operations where a pulper is used to destroy outdated confidential documents. Because the discharge of pulped material increases the organic loading on local treatment facilities, the use of pulverizers may be restricted if the treatment capacity is limited.



Fig 2.9 Solid waste shredders



Fig.2.10 Solid waste pulping and pulverization

EXAMPLE 1: Effect of Home Recovery on Energy Content of Collected Solid Wastes

Using the typical percentage distribution data given in Table 9 in the first lecture, estimate the number of British thermal units per pound (Btu/lb) of the remaining solid wastes if 90 percent of the cardboard and 60 percent of the paper were recovered by the homeowner.

Answer: = 3,843 Btu/lb (8,939 KJ/kg) vs. 4,762 Btu/lb (11,076 kJ/kg) in original sample

EXAMPLE 2: Assume that home compaction units are to be installed. Estimate the volume reduction that could be achieved in the solid wastes collected if the compacted density is equal to 20 lb/ft³ and original density is 11.4 lb/ft³.

Volume of reduction $V_r = V_c/V_o$

V_c = Volume after compaction, V_o = Volume before compaction