Learning objectives

By the end of this chapter, the students will be able to:

1. discuss the importance of onsite handling of solid waste
2. explain onsite solid waste handling methods
3. list types of containers that can be used to store solid waste
4. describe the objectives of on-site solid waste processing
Functional elements of solid waste Mgmt

Waste Generation

Waste handling, separation, storage and processing at the source

Collection

Transfer and Transport

Separation and processing and transformation of solid waste

Disposal
Functional elements of solid waste management

- Waste Generation
- Waste handling, separation, storage and processing at the source
- Collection
- Transfer and Transport
- Separation and processing and transformation of solid waste
- Disposal
SOLID WASTE HANDLING, STORAGE AND PROCESSING AT THE SOURCE

• The handling, storage and processing of solid wastes at the source before they are collected is the second of the six functional elements in the solid waste management system.

**On-site handling**

On-site handling methods and principles involve public attitude, individual belief and ultimately affects the public health. It is an activity associated with the handling of solid waste until they are placed in the containers used for their storage before collection.

• Importance of on-site handling of solid waste:
  - reduce volume of waste generated
  - alter physical form
  - recover usable materials

• **On-site handling Methods**
  - sorting
  - shredding
  - grinding
  - composting
On-site Storage

- The first phase to manage solid waste is at home level. It requires facilities for temporary storage of refuse on the premises. Individual householder or business man has responsibility for onsite storage of solid waste.
- For individual homes, industries, and other commercial centers proper onsite storage of solid waste is the beginning of disposal.
- Simple dumps are sources of nuisance, flies, smells and other hazards.
- There are four factors that should be considered in the on-site storage of solid waste.
  1. type of container to be used,
  2. the location where the containers to be kept,
  3. public health,
  4. collection method and time.
On-site storage cont...

1. Type of storage container to be used and location

- The type and capacity of storage container used will depend on a number of things:
  - The characteristics and type of wastes to be stored
  - The collection system
  - The collection frequency
  - The space available for the placement of the containers
On-site storage cont...

1. Type of storage container to be used and location
   
   • The collection system, *e.g.*, manual collection at the curbside

   – Containers shouldn’t be too heavy for one man to carry when full- they should be light when full
   – Galvanized or plastic containers can be used
On-site storage cont...

1. Type of storage container to be used and location

- Should be properly designed, waterproof
- Tightly fitting covers
  - disadvantage of galvanized iron is that they can be damaged resulting in the lids failing to properly seal, over time
- Adequate numbers as need permits
- Usually, people will add on temporary containers *e.g.*, cardboard boxes, plastic bags, *etc*
- Usually, they are carried along with the waste
On-site storage cont...

1. Type of storage container to be used and location

- Problem with additional containers - due to liquids formed, they tend to disintegrate during storage and lifting in collection
- Plastic containers tend to stretch/scratch and break during lifting posing harm to the collection personnel if there are sharp objects among the wastes

- Cool place on a platform 30cm above ground
- Collection recommended daily
• **1. Storage container**
• Garbage and refuse generated in kitchens and other work areas should be collected and stored in properly designed and constructed water-proof garbage cans (waste bins).
• The cans or receptacles can be constructed from galvanized iron sheet or plastic materials.
• They should have tightly fitting covers.
• They must be of such size that, when full, can be lifted easily by one man.
• They should be located in a cool place over platforms, at least 30 centimeters above ground level.
• After putting in garbage, they should be kept covered.
• The bins must be emptied at least daily and maintained in clean conditions.
• A typical example of garbage can, constructed from galvanized iron sheet, dimensions: diameter 45 cm and height 75 cm,
• Suitable containers shall be water tight, rust resistant, tight fitting covers, fire resistant, enough size, light in weight, side handle and washable.
On-site storage cont...

• 2. Effects of storage on waste components

• Important considerations on this include:
  – Biological decomposition
  – Absorption of fluids
  – The contamination of waste components
On-site storage cont...

• 2. Effects of storage on waste components

• Biological decomposition
  – Issues of putrefaction - microbiological decomposition of food and other wastes, which occurs almost immediately
  – These kinds of waste also invite flies and other breeding insects which can carry diseases
  – Odours= due to gases produced under poor aeration
On-site storage cont...

• 2. Effects of storage on waste components

• Absorption of fluids
  • Solid wastes have got initial moisture contents
  • Re-equilibration takes place whereby there is distribution of moisture from one waste component to another
  • Depending on length of stay of the waste, all the wastes will have shared the moisture
  • Corrosion, odour, decomposition problem etc
On-site storage cont...

• 2. Effects of storage on waste components
• The contamination of waste components
  – The most serious problem, probably
  – Contamination of some potentially useful components by wastes like oils, paints, household cleaners, etc
  – This reduces the value of recyclable waste components
  – However, this may serve to lessen the concentration of these contaminations as the waste is spread and compacted in landfilling
2. Container size (capacity)

- Consideration should be given for the size of the loaded container that must be hauled the collection vehicle or to the disposal site.
- Therefore, container size for:-
  - ash up to 80 to 128 litter
  - mixed refuse should not exceed 120 to 128 litter
  - rubbish up to 200 liter
  - office waste is 10-20 liter
  - kitchen waste is 40 liter
  - garbage is 48 to 80 liter
• Plastic liners for cans and wrapping for garbage reduce the need for cleaning of cans and bulk containers, keep down odors, rat and fly breeding.
• Galvanized metal is preferable for garbage storage because it is resistant to corrosion.
• Plastic cans are light in weight but are easily gnawed by rats.
• Bulk containers are recommended where large volumes of refuse are generated, such as at hotels, restaurants, apartment houses, shopping centers.
On-site processing

- On-site processing is intended to improve disposal options, recover valuable resources, and prepare materials for recovery as new products or energy.

- Obviously an engineer would want to evaluate various processing options for the system’s impact on the local and global environment, reliability, safety to workers and the local community, ease of operation, efficiency, economics, and, aesthetics (noise, odors, litter, increased traffic).
On-site processing

• Some of the objectives of solid waste processing include:

• **1) Component separation** (hand sorting, screening, magnetic separation, air classification for lighter materials such as paper and plastic). Remember though, as stated earlier, it is much more efficient to separate wastes at the source.

• **2) Volume reduction** (baling, shredding, incineration). Incineration may reduce volume by more than 90%.
Sorting / separation
• 3) Size reduction (Shredding, grinding)

• 4) Resource recovery (composting, energy recovery, material recovery)
• **Review questions**
  1. What is the importance of onsite handling of solid waste?
  2. Mention onsite solid waste handling methods?
  3. List types of containers that can be used to store solid waste
  4. Explain the objectives of on-site solid waste processing