Standard Operating Procedure

Material Recovery Facility

Ward / Cluster / Community Level
1. Introduction

The conventional practice of collecting non-biodegradable materials under one single category makes recycling labour intensive. The heterogeneous nature of non-biodegradable materials is the biggest challenge in managing them after it’s intended use. The random appearance of specific grades of material among heaps of non-biodegradable waste makes resource recovery unattractive to scrap-dealers. Thus recycling becomes economically viable only if the material of high purity is diverted to forwarding agents in bulk quantity. Segregation and Aggregation of non-biodegradable waste transform it into a utility or resource. Forwarding agents or buyers are more interested in the consistent delivery of such high-quality material. Consistent delivery of clean, dry, segregated materials with high purity would be the key to a sustainable model of non-biodegradable waste management. A Material Recovery Facility would enable such levels of segregation and aggregation.

Material Recovery Facility (MRFs)

Material Recovery Facilities are sheltered spaces for storing non-biodegradable discards in a segregated, clean & dry manner. The facilities are set up at ward level/cluster level or community level. An office, school, hotel, commercial institution, apartment complex/condor, gated residential communities, supermarkets, and shopping complexes could house an MRF. These shall be the 1st point of interface with the community for resource recovery. Such facilities shall keep non-biodegradable materials segregated as per the requirements of local scrap dealers.

Resource Recovery Centre (RRCs)

Resource Recovery Centres function as an aggregator of segregated material from the Material Recovery Facility (MRF). It is a space where the 1st step of value addition takes place in Resource Recovery. Value addition could be in the form of higher segregation levels, shredding of low-value plastics, bailing, etc. RRC shall aggregate non-biodegradable material from a town or an urban body. Higher levels of segregation and value addition shall attract forwarding agents of the recycling industry. The facility shall also allow the sale of high purity non-biodegradable material.
2. Purpose


3. Definitions

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>a.</td>
<td>Non-biodegradable</td>
</tr>
<tr>
<td>b.</td>
<td>Discard</td>
</tr>
<tr>
<td>c.</td>
<td>Segregation</td>
</tr>
<tr>
<td>d.</td>
<td>Recovered Material</td>
</tr>
<tr>
<td>e.</td>
<td>PET</td>
</tr>
<tr>
<td>f.</td>
<td>HDPE</td>
</tr>
<tr>
<td>g.</td>
<td>PVC</td>
</tr>
<tr>
<td>h.</td>
<td>LDPE</td>
</tr>
<tr>
<td>i.</td>
<td>PP</td>
</tr>
<tr>
<td>j.</td>
<td>PS</td>
</tr>
<tr>
<td>k.</td>
<td>Collection Calendar</td>
</tr>
<tr>
<td>l.</td>
<td>Ton Pallet / Lifting Carts</td>
</tr>
<tr>
<td>m.</td>
<td>Resource Recovery Centre (RRC)</td>
</tr>
<tr>
<td>n.</td>
<td>Office in Charge</td>
</tr>
<tr>
<td>o.</td>
<td>Cluster</td>
</tr>
</tbody>
</table>
4. Infrastructure

a. Structure

- The facility shall be roofed and protected from rain/snow.
- The facility shall have a double roof for proper air circulation as stored plastic often tends to trap heat.
- The facility shall be at a raised platform from the ground, at least by one foot. This is to protect the stored material from rainwater/water logging.
- The facility shall be fenced properly to ensure protection from rodents and other animals
- The facility shall be gated to ensure the protection of material
- The facility shall be manned and essential utilities like a washbasin, toilet, the changing room should be available for the staff.
- There shall be a notice board to display an important message about the material collection, important information from the local government, and to put up campaign posters.
- The facility is preferred to have rainwater harvesting mechanism & solar panels.
- The facility could have a welcoming garden made from recovered material.

b. Functional requirements

- **Point of Transfer:** Space, protected by a roof, for visitors to deposit/unload materials as per categories
- **Point of Receipt:** Space where the staff can check material brought by visitors. The materials shall be checked for dirt, high moisture content, and decaying food content. Accepted material shall be weighed and details of the visitor shall be recorded along with the weight of the material brought. After recording details the material shall be forwarded for further sorting.
  
  Personal details like:
  - Name
  - Address
  - Phone Number
  - Material Brought
  - Weight of Material &
  - The signature shall be recorded for all material receipt

  A copy of the above-mentioned details shall be included in a material receipt slip. Material receipt slip shall be handed over to the visitor.

  - **Sorting, Disassembly & Cleaning Station:** Space for further sorting as per storage categories using smaller trays / smaller buckets. Space shall also be used to disassemble complex components into smaller materials as per storage categories. Space for disassembly activities shall be demarcated and floored
with the HDPE sheet. The demarcated space for cleaning shall have facilities like water outlet, faucet (if required), area for cleaning & proper drainage. The space shall have provisions to dry materials after washing as well.

- **Storage**: Cupboard / industrial racks / Hanging sacks / industrial trays / industrial drums / box containers can be used to storage. Material shall be stored under labelled categories. Examples of Categories for segregated storage are:

<table>
<thead>
<tr>
<th>SI</th>
<th>Category</th>
<th>Sub Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.a</td>
<td>Paper</td>
<td>Newspaper</td>
</tr>
<tr>
<td>1.b</td>
<td>White Paper</td>
<td>Magazines</td>
</tr>
<tr>
<td>1.c</td>
<td>White Paper (Office paper &amp; notebook paper)</td>
<td>Other Paper (Bills, Notices, tissue paper, receipts, tickets, etc)</td>
</tr>
<tr>
<td>2</td>
<td>Cardboard</td>
<td>Boxes &amp; sheets</td>
</tr>
<tr>
<td>3.a</td>
<td>Plastic</td>
<td>PET (Hard &amp; firm plastic used for liquid food packaging)</td>
</tr>
<tr>
<td>3.b</td>
<td>HDPE (Hard &amp; firm plastic used for chemical packaging)</td>
<td>Other hard plastics (PVC &amp; PP)</td>
</tr>
<tr>
<td>3.c</td>
<td>Thin plastics (LDPE, Cling films &amp; film wrapping, Multilayer, carry bags, snack &amp; toffee wrappers, etc)</td>
<td></td>
</tr>
<tr>
<td>3.e</td>
<td>Milk Packets</td>
<td></td>
</tr>
<tr>
<td>3.f</td>
<td>Oil Packets</td>
<td></td>
</tr>
<tr>
<td>3.g</td>
<td>Polystyrene, Extended PS, Thermocol, Styrofoam</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Special</td>
<td>Category as per collection calendar</td>
</tr>
</tbody>
</table>

These categories are mentioned as an example. Finer changes in storage categories could be made as per the trend of material received and as per the demand of local scrap dealers.

- The storage capacity of each category of material shall be fixed by analysing the trend in the material receipt. 90% of the intended storage capacity shall also be calculated and displayed. Dispatch procedures should be initiated once 90% of the intended storage capacity is attained.

- **Point of Sale / Dispatch**: Scrap Dealers and Recycling agents can purchase desired quantities & categories of material as per rates decided by the Local Self Government Unit (LSG) or Local Administrative Authority. The sale of material shall be recorded by the Health Inspector / Officer in Charge.

Material sold shall be weighed and details of the buyer shall be recorded along with the weight of the material bought.

Personal details like:

- Name
- Address
- Phone Number
- Material Bought
- Weight of Material &
- The signature shall be recorded for the sale of any material

Material shall be uploaded for dispatch to the nearest Resource Recovery Centre (RRC) as per the instruction of concerned Health Inspector / Officer in Charge once every month. The following details shall be recorded during the dispatch of the material.

- Destination
- Name of the truck driver
- Phone Number
- Date & Time
- Authorised by:
- Signature of Truck Driver

c. Equipments

The following set of equipments are required for the smooth functioning of the facility:

i. Personal Protective Equipment (PPE) : Rubber Gloves, Gum Boots, Face Mask
ii. Digital Weighing Machine (Least count 0.050kg, Maximum 25kg)
iii. Equipments to clean soiled material: Trays, Sieve & cleaning agents
iv. Ton Pallet / Lifting Carts
v. Register & Logbook (separate for material receipt, dispatch & sale)
vi. Industrial Tray for receipt of material
vii. Smaller trays/buckets for sorting.
viii. Blade, hack saw, screwdriver set for disassembly.
ix. Cupboard / industrial racks / Hanging sacks / industrial trays / industrial drums / box containers for storing and storing material received
x. Water Dispensing Unit
xi. Fire Extinguishing Unit
xii. Health & Sanitation equipments: Floor Cleaning Agent, Mop, Commercial Broom, Dust Pan, Bucket, Mug
xiii. Dust bins for depositing wet waste & domestic composting equipment.
xiv. Printed labels for each segregated storage
5. Procedure

a. **Daily Operation**

i. **Preparedness**

1. Premises of the facility, both inside & outside, shall be cleaned on a daily basis.
2. The welcoming garden shall be watered and maintained.
4. Opening Stock of each labeled storage compartment shall be displayed on it.
5. The transfer point shall be kept clear. Unidentified materials / Vehicles shall not be allowed to park at the Transfer Point.
6. Staff at MRF may provide support for visitors to unload bulky quantities of non-biodegradable material brought by households. Material from commercial institutions need not be assisted for off-loading.

ii. **Receipt**

1. Material shall be brought to point of receipt for checking & logbook/register entry.
2. Material shall be put to the industrial tray for checking the material for dirt / high moister content / decaying food matter. Material with any one of these shall not be accepted.
3. Material worthy of acceptance shall be weighed and recorded. Weight shall be recorded to the nearest 50 gram using a digital weighing machine
4. Staff shall ensure that the material received is as per segregation categories displayed in the MRF. Materials that are not segregated shall be rejected/returned. The staff could request the visitor to segregate it themselves while at the MRF, so that material can be collected.
5. Material receipt slip shall be handed over to the visitor once the material is accepted.
6. Material shall be transferred to labeled storage compartments using the Ton Pallet / Lifting carts.
7. New visitors shall be attended only after handing over the material for sorting, cleaning, and storage.

iii. **Storage**

1. Staff to ensure that only dry items are stored in designated labeled compartments.
2. Material that needs cleaning shall be taken to Cleaning Station and dried.
3. Each labeled compartment shall display the total weight of materials in it. The display board shall be updated daily. The weight of the material shall be recorded at the beginning of every day.
4. Fragile materials shall be kept at a lower height. Materials that are sensitive to moisture shall be kept at a higher place. Materials that could be damaged by rodents shall also be kept at a higher place.

5. Staff to ensure that compartments are not stored beyond their capacity. Once the total weight reaches 90% of the intended storage capacity, dispatch procedures need to be initiated with Health Inspector / Officer in charge.

6. Compartments are to be cleaned once in a month, after the dispatch of material to Resource Recovery Centre or identified MRF.

iv. Dispatch

1. Materials are to be sent to the nearest Resource Recovery Centre or nearest MRF with ample storage capacity once every month.

2. Dispatch procedures shall also be initiated if the total weight of a particular category reached 90% of the intended storage capacity.

3. The dispatch of material shall be approved by the concerned Health Inspector / Officer in Charge

4. During dispatch, outgoing materials shall be weighed and value shall be recorded to the nearest 50 gram. Details of the receiver shall be recorded:
   - Name
   - Address
   - Phone Number
   - Material Dispatched
- Weight of Material
- The signature shall be recorded for the dispatch of any material

5. **Health Inspector / Officer in Charge** shall advise dispatch of material to the nearest MRF with higher storage capacity or nearest RRC in case of high storage space utilisation. Priority shall be given to moving material from those storage compartments that are more than 80% full.

v. **Sale of Materials**

1. Sale of materials shall be under the supervision of Health Inspector / Officer in Charge.

2. Unit Rate for materials shall be decided by the Local Administrative Government Body / Local Self Government unit.

3. Basic information about the purchaser shall be recorded in the ledger. The ledger should have the below-mentioned categories.
   - Purchaser's Name
   - Designation, Organisation & Address
   - Material Bought
   - Unit Rate
   - Weight of Material
   - Amount paid

4. Cash received shall be logged into the cash register. Receipt slip shall be signed by Health Inspector / Officer in Charge

5. The purchase of material from MRF could be promoted by the distribution of cloth bags to the purchaser or through any other promotional offers.

vi. **Reporting**

1. Quantity of materials received (in terms of weight) shall be reported category wise to Health Inspector / Officer in Charge once a week. The date of submission of details shall be decided by Health Inspector / Officer in Charge as per his peer review schedule.

2. Attendance of staff shall also be reported weekly to the Health Inspector / Officer in Charge.

3. Quantity of materials dispatched, in terms of weight, shall be reported category wise to the Health Inspector / Officer in Charge once a week.

4. The total number of visitors and utilisation of the facility shall be reported to Health Inspector / Officer in Charge once in 3 months for review. Feedback on purity and cleanliness of material received shall also be shared with the Health Inspector / Officer in Charge. Campaign strategies shall be formulated based on material received, material dispatched, purity & cleanliness of material received, and the number of visitors by the Local Administrative Authority.
vii. **Display of Information**

1. Working hours shall be displayed outside the facility. The facility shall also display “OPEN” and “CLOSED” signboards during and after working hours respectively.

2. Items that are collected daily shall be displayed at the notice board. Items collected as per the collection schedule shall be highlighted and shall be updated daily.

3. Items collected as per the collection calendar shall be displayed outside the facility in a way that attracts public attention. The display shall be put up two days before the date of collection.

4. Campaign posters on the following topics shall be displayed at the notice board:
   - Green Protocol
   - Segregation
   - Recyclability of material
   - Composting
   - Hazards of Burning Mixed Waste / Incineration

   Campaign posters can be prepared with the support of Local Green Army Units.

5. Notice announcing the availability of complaints and feedback register shall be displayed.

6. The contact number of the Health Inspector / Officer in Charge shall be displayed.

**b. Maintenance Operation**

i. **Monthly Maintenance**

1. Storage compartments shall be cleaned after the dispatch of materials to the nearest Resource Recovery Centre or identified Material Recovery Facility.

2. The structural strength of the compartment shall be checked and the necessary requests shall be forwarded to Health Inspector / Officer in Charge for carrying out repair work.

3. All Equipments shall be cleaned and greased.

4. The floor shall be washed and all drain holes shall be cleared of debris.

5. All compartments shall be checked for impurities and they shall be sorted & stored as per correct classification.

6. The functioning of all utilities like drinking water, toilet facilities, electrical fittings, rainwater harvesting system (if any), and solar panel & inverter (if any) shall be checked for complaints. Necessary requests shall be submitted to Health Inspector / Officer in Charge for required repairs.

7. Floor, Roof & sidewalls shall be checked & necessary repair requests need to be submitted to Health Inspector / Officer in Charge

8. All labels of storage compartments shall be cleaned and necessary repair requests need to be submitted to Health Inspector / Officer in Charge
ii. **Documentation**

1. Receipt & Dispatch details shall be consolidated for monthly reporting. A soft copy of the consolidated figures shall be maintained by Health Inspector / Officer in Charge.

2. Attendance & visitor log details shall be consolidated and submitted for processing monthly wages.

3. Photo documentation of monthly dispatch of materials to RRC and sale of materials to scrap dealers shall also be done.

4. A complaint & feedback register shall be maintained at the MRF material receipt station. Every visitor shall be informed about the complaint & feedback register.

5. Complaints received shall be checked & solved by Health Inspector / Officer in charge.
# 8. Format for Registers (templates)

## a. Material Receipt (entry log & visitor’s slip)

<table>
<thead>
<tr>
<th>SI No</th>
<th>Name &amp; Address (of Depositor)</th>
<th>Phone Number</th>
<th>Material</th>
<th>Weight (in Kilogram)</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## b. Material Dispatch

<table>
<thead>
<tr>
<th>SI No</th>
<th>Name, Designation &amp; Organisation (of Receiver)</th>
<th>Phone Number</th>
<th>Material</th>
<th>Weight (in Kilogram)</th>
<th>Signature</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## c. Material Sale (entry log & visitor’s slip)

<table>
<thead>
<tr>
<th>SI No</th>
<th>Name, Designation &amp; Organisation (of Receiver)</th>
<th>Material</th>
<th>Unit Rate</th>
<th>Weight (in Kilogram)</th>
<th>Amount Paid</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## d. Monthly report

<table>
<thead>
<tr>
<th>SI No</th>
<th>Material</th>
<th>Month</th>
<th>Received (in Kilogram)</th>
<th>Dispatched (in Kilogram)</th>
<th>In stock (in Kilogram)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

## e. Information Display

- **<Local Body Name>**
- **<Location of MRF>**

<table>
<thead>
<tr>
<th>Material Accepted</th>
<th>Operating Time: 0600am to 0900pm</th>
<th>Open On: &lt;Day&gt;</th>
<th>Closed On: &lt;Day&gt;</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 Plastic</td>
<td>Date: &lt;The day’s date&gt;</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2 Shoe / Leather / Bag</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Annexure - 1

Photographs of Equipment

Face Mask  Rubber Gloves  Gum Boots  Electronic Weighing Machine

Tray for Cleaning &  Sieve for drying  Ton pallet for transferring material

Lifting cart for transferring material  Blade  Hack Saw  Screw Driver Set