

Windrow Procedure

This process and methodology to be adopted for aerobic composting. Leachate treatment and sanitary land fill.

Aerobic composting process :

We are adopting aerobic composting process in this facility for bioconversion of organic waste into organic manure (compost) because of following reason.

- a) Aerobic composting is faster than anaerobic composting Total Cycle time is less than 8 weeks.
- b) Exothermic reaction of aerobic composting destroys harmful pathogens and nullify the weed seeds.
- c) Production of foul-smelling gases like methane, hydrogen sulfide etc is minimized.
- d) Nutrients are fairly preserved.

Methodology :

MSW is received on the windrow platform and formed into windrows after treating with a specially developed biological inoculum, This inoculum contains active. Microbes (bacteria, fungi, actinomycetes) effective in fast decomposition of organic matter.

Water is also sprayed depending upon the moisture level of the incoming waste.

Each days arrival is kept in separate windrow Progress of composting depends on flowing factors.

C/N ration of the waste.

If C/N ration is more than 60 composting process gets detarded. In such case nitrogenous material like cow dung is added to bring down C/N ration below 60.

Presence of active microbes.

Trough biological inoculation population of aerobic microbes is adequately maintained.

Aeration.

The windows are formed in such a way that proper aeration is assured. The surface of the platform where fresh Waste is formed into windrow is trough shaped with central drain. Leachate generation is maximum in the first week of decomposition. If leachate is not extracted regularly anaerobic conditions will be present in the central and bottom portions of the wind rough. The trough shape will facilitate the leachate generated to flow down into the central drain where the leachate flows directly to the

leachate collection tank. Thus aerobic condition is ensured. Further the windrows are regularly turned every week to ensure proper aeration.

Moisture :

Moisture level has to be 35 to 40% depending on the actual condition of the waste, water is sprayed onto the windrow regularly to maintain adequate moisture level.

Leachate collection and treatment

Leachate will be generated at two places, on the windrow platform where composting activity is done and in the landfill cell where inserts are landfilled. Leachate generation in landfill cell will be very minimum as the inserts are practically free of decaying organic matter. But during rains rain water may percolate in the active area of operation. Care will be taken to minimize this by covering the area with tarpaulins during rains. During non monsoon months leachate generated will be fully recycled for spraying on the windrows to maintain moisture level. Leachate during monsoon months will be treated and stored for reuse during non monsoon months for composting operation as well as watering the trees of the green belt and garden.

Landfill operation.

Landfill cell will be developed as per the norms prescribed in MSW Rules 2000. Cross sectional drawing of the landfill cell is attached (annexure B) The cross section of the proposed covering during capping of the landfill cell is also shown in the drawing. The landfill cell will have a 90 cm thick compacted clay liner above which 105 mm thick HDPE liner be laid. The filter media will consist of sand and aggregates. Leachate collection pipes are kept in this filter media. Above the filter media geotextile liner will be spread to filter down the leachate of suspended particles of larger sizes which may clog the perforations of collection pipes. The inerts coming from the screening operations will be spread and compacted daily. At every 1 mtr height intermediate soil cover will also be provided. The landfill will be constructed and operated strictly as per the norms prescribed in MSW rules 2000.

2. Segregation of waste :

MSW generation and delivered at site will be heterogeneous in shape size density and composition. Hence it is impossible to segregate them through any mechanical devices. Hand picking is the only option available to segregate which is not effective as the waste will be wet with offensive odour and full of harmful pathogens due to which hand picking becomes difficult and unhygienic. The corporation should implement source segregation as a policy so that the waste coming to site is properly

segregated into compostable fractions and inerts. The technology we adopt can manage mixed waste also. Presegregation is not a prerequisite. Although the cost of operation may be higher composting activity does not get affected by the presence of inorganic iners in the waste.

3. windrows platform design.

The windrow is designed with a capacity to handle 120 tons per day as against the contracted capacity of 100 TPD. When the daily arrivals start crossing 12 TPD we will extend the window longitudinally to increase the capacity. Window size calculations are given below. The attached sheet (annexure C) clearly shows how the windrows of 1st, 2nd, 3rd and 4th weeks will be accommodated.

Daily intake	120 tons
Bulk density	0.6
Volume of daily arrivals	200 cum
Bottom width of the 1 st window	5 mtr
Top width	3 mt
Height when heaped	4 mtr
Cross sectional area	16 sq.mtr
Length of windrow	12.5 mtr
Length of two windrows	25 mtr
Length of 4 windrows on one side	50 mtr
Space at both ends of the platform	3 mtrs each
Space at he central portion	4 mtr
Total length of the platform	60 mtr
Width of 1 st and 2 nd windrows	4 mtr
Width of 1 st and 2 nd windrows	5 mtr each
Width of 3 rd windrow	4 mtr
Width of last windrow	2mtr (last windrow will be clubbed together from both sides)
Spacing at both ends	3 mtr each
Spacing between 1 st and 2 nd , 2 nd and 3 rd windrows	1 mtr each
Spacing between 3 rd and 4 th windrow	3 mtr
Total width of the platform	50 mtr.

The turning will be done with excavator. Turning operation will start in reverse direction 3rd week heap will be shifted from pocked C to pocked D. that is why 3 mtr space is provided between C and D pockets so that the excavator can stand and do the

turning operation. Excavator will pick up material by the back hoe of capacity. 2 cum. It will start picking up from top layer and put at the bottom of the next pocket. Thus top layer will go to the bottom layer in the turning operation. Since bucket capacity is 0.2 cum the turning will be done in small quantities ensuring dislodging of interlocking and compaction during storage for one week. Adequate quantity of air will be trapped in the windrow for aerobic microbes to be active. During turning operation water will also be sprayed if needed to maintain the moisture level. Turning operation will be done in the sequence C to D, B to C and A to B. the incoming vehicles will not travel inside the platform. Their movement will be restricted to the periphery of the platform. Fresh arrivals will be unloaded in A pockets only. Windrow turning cycle will be maintained in such a way that always one pocket is vacancy everyday to accept fresh arrivals.

We are allowing the waste to undergo 30 days composting activity on the windrow platform. Thereafter it is taken up for screening in the preparatory section. In this section it will pass through 35 mm and 16 mm rotary screens. Material less than 16mm will be stored in the curing shed for further myration. During this storage also composting activity continues. After 30 days of maturation it will further screened through 4mm screen. Specific gravity separator also will be there in the screening line to separate sand and broken bangle pieces. Final product will be less than 4 mm insize free from sand weed seeds glass pieces etc conforming to FCO specifications.

4. designated area for initial storage.

A pockets on the windrow platform will be the designated area for storing treatment an compositing of fresh waste received daily.

5. Compositing is not proposed to be carried out in a closed shed. Open area accelerate composting activity due to free air plow. In closed sheds humid gases get accumulated on the roof portion creating environmental pollution. Covered shed also restrict free air flow which is essential for fast for fast and effective aerobic composting. During rains the windrows will be fully covered with tarpaulins so that the windrows do not get wet with excess rain water.

Since the process is exothermic the heaps will be hot enough not to permit birds to rest on them.