

**APPENDIX-1.0**

**COMPLIANCE FOR ADDITIONAL TERMS OF REFERENCE**

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1	Examine a 10 km. Radius map (on survey of india toposheet) showing co-ordinates of project site, national highway, state highway, district road/approach road, river, canal, natural drainage; protected areas, under wild life (protection) act, archaeological site, natural lake, flood area, human settlements (with population), industries, high tension electric line, prominent wind direction (summer and winter), effluent drain, if any and ponds etc. Should be presented and impacts assessed on the same.	All the desired details has been given in separate Annexure -1
2	Examine and submit the management plan to comply the provisions in schedule II of MSW rules, 2000.	Provision to comply schedule-II of MSWrules 2000 has already been made in DPR and same has been mentioned in chapter 2 of this report (Project Description).
3	Examine and submit the compliance with specifications of land fill site as per schedule III of MSW rules, 2000.	Specification has been incorporated in Chapter 7 (Environmental Managment Plan Heading 7.3 Management of Municipal Solid Wastes. Page no 4.
4	All the data required as per schedule III of MSW rules, 2000 regarding water quality and ambient air quality shall be generated.	All the data required as per schedule III of MSW rules- 2000 and standards prescribed by CPCB. Please refer Chapter 5, heading 5.6 Ground Water Quality page no 18
5	Examine and submit the data to comply the para no 30(plantation at landfill site), para 31(closure of landfill site and post-care), para 33(special provisions for hilly areas) of schedule iii of MSW rules, 2000.	Plantation has been planed accordance with MSW rule-2000 in similar way please refer chapter 7 (Environmental Management Plan heading 7.5.8 Recommendation for Measures for Pollution Control, page no-18.
6	Copy of the latest annual report submitted by municipal authority in form ii as per rule 4(4) of MSW rules 2000 shall be covered in the EIA report.	In Aizawl , only in November 2010 Aizawl municipal council has been constituted and its function is still very limited so desired report is not available.
7	Examine and submit details of the generation of wastes at the residential level.	Please refer chapter 1, Heading 1.9 Total Solid Waste Generation, page no.- 6 to 8
8	The segregation of the waste should be carried out at the house hold level by the public. A system of collection of waste should be developed with the awareness programme and capacity building.	Effort is being made to segerate waste at house hold level, a Community Awareness Program ( cap) and Capacity Building Programm is being implemented which is the part of this Investment Programm

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9	Submit the details about the land use of the site with a copy of a site plan with the location of other activities all around the site.	Within 4 km radius of proposed site there is no habitation. The terrain is hilly and there are few scattered pockets of Jhum Farming. Copy of site plan has been attached as Drawing GEL/SIPMIU/AZL/SMW-24B /27/02A/02B.
10	Examine the details of water bodies and drains located all around the site and also examine the impacts on the nearby water bodies.	There is no water body in /around proposed site except 2 small seasonal drain as the site is in hilly terrain such smal seasonal drain is a comman feature. Any impact on water body has not been anticipated. A small description of near bye drain has been given in Chapter 5 heading 5.9 ( forest Resource)
11	Explore the possibility of using inert material and plastics for use in road construction.	Plastic and other recycalable material will be segregated and reused. Use of inert material in road construction is not significant due to accessibility, transportation, and quantity and quality. In Aizawl most of the road is being constructed through cutting the hill so significant quantity of filling is not required.
12	Examine and submit details of depth of ground water and the impact of leachate on the ground water.	Bore hole has been done in lowest slope of project site to acess the ground water lebel the result show the depth of ground water is below 2.6 meter. (Bore hole drilled at Toe of hill side 60m downward from the Road level)
13	Examine and submit details of storm water collection from the composted area.	Surface water drainage system has been discussed in Chapter 2, heading 2.73 Surface water Dranage system page no. 65. Please refer Drawing of Compost area Drawing No. GEL/SIPMIU/AZL/SWM-25
14	Examine and submit details of monitoring of water quality around the landfill site. Water analysis shall also include for nitrate and phosphate.	Water quality analysis report has been given in Chapter 5, Heading 5.9 page no.18.
15	Examine and submit details of the odour control measures.	Details have been discussed in Chapter 6 Anticipated Environmental Impact and its Mitigation measure, heading 6.15, page no. 18 and Chapter 7, Environmental Management plan, heading 7.5.1 Air quality , page no 7-9.
16	Submit the criteria for assessing waste generation.	Details have been given in chapter 2, Project Description, heading 2.21 Projection of Waste Generation, Page no. 16-17.

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17	Submit a copy of the layout plan of project site showing solid waste storage, green belt (width & length, 33% of the project area), all roads, prominent wind direction, processing plant & buildings etc. Should be provided.	Lay out plan of land fill showing these details has been given in last section of EIA report.
18	Submit a copy of the topography of the area indicating whether the site requires any filling, if so, the details of filling, quantity of fill material required, its source and transportation, etc.	The land fill site for Aizawl Solid Waste is located in Tural and 20Km away from Aizawl city. Land fill site is connected with WBM to NH-54. The total length of WBM road is 1Km. Topography of the site is steep. Filling is required for daily cover and final cover above the waste through excavation at site. Filling material is available at landfill site hence material is not required to be transported from other source. <b>Quantity of material required for filling has been worked out below:</b> 1. 60cm compacted layer (32x12x0.6 = 230.4cum) for each cell  2. 45cm Vegetative cover layer (32x12x0.45 = 172.8um) for each cell
19	Submit the details of sanitary land fill site impermeability and whether it would be lined, if so details thereof.	Please refer chapter 2, Project Description heading 2.64 Land fill design page n0. 54-64.
20	Examine and submit the details of impact on environmental sensitive areas.	There is no Environmental Sensitive area or area of similar nature within the radius of 10 km of Project site
21	Examine and submit details of ambient air quality monitoring including methane and CO <sub>2</sub> and compare with the notification of 16th november, 2009.	At different 6 location Air quality monitoring has been done as per notification dated 16th november 2009. Details has been discussed in chapter 5 Description of Existing Environment Heading 5.4 , Page no 13-16
23	Examine and submit details of wind rose diagram.	Wind speed and direction has been near the land fill site monitored and WindRose digram has been prepared , detail has been discussed in Chapter 5 Description of Existing Environment heading 5.3 wind speed and directions, page no 5-10.
24	Submit details of the design of landfill site and disposal of debris.	Please refer chapter 2, Project Description heading 2.64 Land fill design page n0. 54-64.
25	Examine and submit details of additional traffic generation due to the transportation of garbage upto the site and also examine the impacts on the existing traffic.	The proposed project site is adjusent to existing dumping site, where Aizawl Municipal Waste is being transported and dumped so any significiant additional traffic generation is

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	Necessary proposal should be made for improvement of traffic intersections and also strengthening and widening of the roads.	not anticipated. More ever, presently not much traffice on NH-54 which is being used for transportation of Municipal waste.
26	Submit details of protection from surface drainage. Submit the details of storm water drainage. Examine and submit the details of impact of the project on traffic.	Surface water drainage system has been discussed in Chapter 2, heading 2.73 Surface water Drainage system page no. 65.  The proposed project site is adjusent to existing dumping site, where Aizawl Municipal Waste is being transported and dumped so any signficiant additional traffic generation is not anticipated. More ever, presently not much traffice on NH-54 which is being used for transportation of Municipal waste.
27	Examine and submit details of risk assessment and disaster management.	Ris assessment and disaster management has been described in detail in chapter 9 Additional Study-RISK ASSESSMENT AND DISASTER MANAGEMENT PLAN.
28	Submit the details of the future perspective plan for other areas.	The Proposed project site is more than 20 Km from Aizawl city. No such plan has been made till date.
29	MSW rules should be followed in true spirits.	MSW rules 2000 will be followed strictly
30	Submit environmental management plan and environmental monitoring plan with costs and parameters.	Details has been given in Chapter 8, Environmental Monitoring Plan page no .7-9.

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**APPENDIX Appendix 2.04.1: National Ambient Air Quality Standards**

The finding as Notified on 16<sup>th</sup> November 2009 by the Central Pollution Control Board (CPCB) in exercise of its powers conferred under Section 6 and Section 25 of the Environment Protect Act, 1986.

Pollutant	Time-Weighted Average	Concentration in Ambient Air		
		Industrial, Residential and other rural area	Ecologically Sensitive Area (Notified by Central Government)	Methods of Measurements
SO <sub>2</sub> ug/m <sup>3</sup>	Annual*	50	20	-Improved West and Gaeke -Ultraviolet fluorescence
	24 hours**	80	80	
NO <sub>x</sub> ug/m <sup>3</sup>	Annual*	40	30	-Modified Jacob & Hochheiser (NaArsenite) -Chemiluminescenc
	24 hours**	80	80	
PM <sub>10</sub> ug/m <sup>3</sup>	Annual*	60	60	-Gravimetric -TOEM -Beta attenuatio
	24 hours**	100	100	
PM <sub>2.5</sub> ug/m <sup>3</sup>	Annual*	40	40	-UV photometric -Chemiluminescence -Chemical method
	24 hours**	60	60	
Lead ug/m <sup>3</sup>	Annual*	0.50	0.50	-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper -ED-XRF using Teflon filte
	24 hours**	1.0	1.0	
CO ug/m <sup>3</sup>	8 Hours**	2000	2000	Non Dispersive Infrared Spectroscop
	1 Hour**	4000	4000	
O <sub>3</sub> ug/m <sup>3</sup>	8 Hours**	100	100	-Chemiluminescence -Indophenol blue method
	1 Hour**	180	180	
NH <sub>3</sub> ug/m <sup>3</sup>	Annual*	100	100	-Gas chromatography based continuous analyzer -Adsorption and Desorption followed by GC analysis
	24 hours**	400	400	
Benzene (C <sub>6</sub> H <sub>6</sub> ) ug/m <sup>3</sup>	Annual*	01	01	-Solvent extraction followed by HPLC/GC analysis
Arsenic(As) ng/m <sup>3</sup>	Annual*	06	06	-AAS/ICP method after sampling on EPM 2000 or equivalent filter pape

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<u>ng/m<sup>3</sup></u>	<u>Annual*</u>	<u>20</u>	<u>20</u>	<u>-AAS/ICP method after sampling on EPM 2000 or equivalent filter paper</u>
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Source: Gazette of India, Part II-Section -3-Subsection (i)

- \* Annual Arithmetic Mean of minimum 104 measurements in a year taken twice a week 24-hourly at uniform interval.
- \*\* 24-hourly / 8-hourly values or 0-1 hourly monitored values shall be complied with 98% of the time in the year. However, 2% of the time, it may exceed but not on two consecutive days.

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**APPENDIX -3.0 Appendix 4.2: Ambient Noise Level Limits (in Leq dB(A)),India**

Area/Class	Day Time (6:00 AM to 9:00 PM)	Night Time (9:00 PM to 6:00 am)
	Standard	Standard
Industrial	75	70
Commercial	65	55
Residential	55	45
Silence	50	40

Source: Environment Protection Rules, 1986, Schedule III

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**APPENDIX 4.0 Appendix 4.3: Drinking Water Standards and Probable Effects on Human Health (BIS: IS: 10500, 1991)**

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S. No.	Parameters	Prescribed limits		Probable effects
		Desirable	Permissible	
1	COLOUR (HAZEN UNIT)	5	25	Aesthetically undesirable.
2	ODOUR	Essentially free		Aesthetically undesirable.
3	TASTE	Agreeable		Aesthetically undesirable.
4	TURBIDITY (NTU)	5	10	Indicates pollution/ contamination.
5	pH	6.5	8.5	Affects taste, corrodes supply system.
6	HARDNESS, as CaCO <sub>3</sub> , mg/l	300	600	Causes scaling, excessive soap consumption, calcification of arteries.
7	IRON, as Fe , mg/l	0.30	1.00	Causes staining of laundry and porcelain. In traces it is essential for nutrition.
8	CHLORIDE, as Cl , mg/l	250	1000	May be injurious to heart or kidney patients. Taste, indigestion, corrosion and palatability are affected.
9	RESIDUAL CHLORINE, only when Water is chlorinated	0.20	-	Excessive chlorination causes asthma, colitis and eczema
10	TOTAL DISSOLVED SOLIDS, mg/l	500	2000	May cause gastro-intestinal irritation, corrosion and laxative effect to new users.
11	CALCIUM, as Ca, mg/l	75	200	Excessive Cause incrustation, deficiency causes rickets, essential for nervous, muscular, cardiac functions and in coagulation of blood.
12	MAGNESIUM, as Mg, mg/l	30	100	Its salts are cathartics and diuretic. Excessive may cause laxative effect; deficiency causes structural and functional changes. It is activator of many enzyme systems.
13	COPPER, as Cu, mg/l	0.05	1.50	Beneficial in human metabolism, deficiency results in nutritional anaemia in infants. Large amounts may result in liver damage, causes central nervous system irritation and depression. Enhances corrosion of Al in water supply systems.
14	SULPHATE, as SO <sub>4</sub> , mg/l	200	400	Causes gastro-intestinal irritation. Along with Mg or Na can have a cathartic effect. Concentration more than 750 mg/l may have laxative effect.
15	NITRATE, as N, mg/l	45	100	Causes infant methaenoglobinaemia, at very high concentration causes gastric cancer and effects central nervous and cardiovascular system.
16	FLUORIDE, as F, mg/l	1.00	1.50	Reduces dental carries, very high concentration may cause crippling

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S. No.	Parameters	Prescribed limits		Probable effects
		Desirable	Permissible	
				skeletal fluorosis.
17	CADMIUM, as Cd, mg/l	0.01	No relaxation	Acute toxicity may be associated with renal, arterial hypertension, itai-itai (bone disease). Cd salts cause cramps, nausea, vomiting and diarrhoea.
18	LEAD, as Pb, mg/l	0.05	No relaxation	Burning in mouth, severe inflammation of gastro-intestinal tract with vomiting and diarrhoea. Chronic toxicity produces nausea, severe abdominal pain, paralysis, mental confusion, visual disturbances, and anaemia etc.
19	ZINC, as Zn , mg/l	5	15	Essential and beneficial in human metabolism. Imparts astringent taste to water.
20	CHROMIUM, as Cr, mg/l	0.05	No relaxation	Cr6+ produces lung tumours, coetaneous and nasal mucous membrane ulcers and dermatitis.
21	ARSENIC, as As, mg/l	0.05	No relaxation	Causes skin damage, circulatory problems, increased risk of skin cancer.
22	ANTIMONY, as Sb, mg/l	0.006	No relaxation	Raises blood cholesterol, lowers blood sugar.
23	ALUMINIUM, as Al, mg/l	0.030	0.200	Leads to neurological disorders.
24	BARIUM, as Ba, mg/l	2	No relaxation	Increases blood pressure.
25	BERYLLIUM, as Be, mg/l	nil	0.0002	Is carcinogenic
26	CYANIDE, as CN, mg/l	0.05	No relaxation	Causes nerve damage, thyroid problem.
27	MERCURY, as Hg, mg/l	0.001	No relaxation	Neurological and renal disturbances. Excess causes gonadotoxic and mutagenic effects and disturbs the cholesterol metabolism.
28	MANGANESE, as Mn, mg/l	0.10	0.30	Essential as a cofactor in enzyme systems and metabolism processes. Excessive causes change in appetite and reduction in metabolism of iron to form haemoglobin. Imparts undesirable taste and stains plumbing fixtures and laundry.
29	SELENIUM, as Se, mg/l	0.01	No relaxation	Leads to hair, finger loss, and numbness in fingers or toes, circulatory problems.
30	BORON, as B, mg/l	1.00	5.00	Affects central nervous system, salts may cause nausea, cramps, convulsions, coma, etc.
31	ALKALINITY, as CaCO <sub>3</sub> , mg/l	200	600	Imparts unpleasant taste, deleterious to humans in presence of high pH, hardness and TDS.
32	PESTICIDES, ug/l	nil	0.001	Imparts toxicity, accumulates in different organs of body, and affects immune and nervous systems. Carcinogenic.
33	PHOSPHATE, as PO <sub>4</sub> , mg/l	No guideline		High concentration causes vomiting and diarrhoea stimulates

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S. No.	Parameters	Prescribed limits		Probable effects
		Desirable	Permissible	
				secondary hyperthyroidism and bone loss.
34	SODIUM, as Na, mg/l	No guideline		Harmful to persons suffering from cardiac, renal and circulatory diseases.
35	POTASSIUM, as K, mg/l	No guideline		Essential nutrition element but excessive amounts are cathartic.
36	NICKEL, as Ni , mg/l	No guideline		Non-toxic element but may be carcinogenic in animals, can react with DNA resulting in DNA damage in animals.
37	PATHOGENS a)TOTAL COLIFORM No/dl b)FAECAL COLIFORM No/dl	1	10	Causes water borne diseases like coliform jaundice; Typhoid, Cholera etc. produces infections involving skin mucous membrane of eyes, ears and throat.
38	RADIOACTIVITY: -BETA PARTICLES -ALPHA PARTICLES -RADIUM	0-4 millirem/year 0-15 picocuries/year 0-05 picocuries/year		Increases risk of cancer.

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**APPENDIX 5.1: GUIDELINES FOR BORROW AREAS MANAGEMENT**

**1. SELECTION OF BORROW AREAS**

~~Location of borrow areas shall be finalized as per IRC: 10-1961 guidelines. The finalization of locations in case of borrows areas identified in private land shall depend upon the formal agreement between landowners and contractor. If, agreement is not reached between the contractor and landowners for the identified borrow areas sites, arrangement for locating the source of supply of material for embankment and sub grade as well as compliance to environment requirements in respect of excavation and borrow areas as stipulated from time to time by the Ministry of Environment and Forests, Government of India, and local bodies, as applicable shall be the sole responsibility of the contractor.~~

~~The contractor in addition to the established practices, rules and regulation will also consider following criteria before finalizing the locations.~~

- ~~(1) The borrow area should not be located in agriculture field unless unavoidable i.e. barren land is not available.~~
- ~~(2) The borrow pits preferably should not be located along the roads.~~
- ~~(3) The loss of productive and agriculture soil should be minimum.~~
- ~~(4) The loss of vegetation is almost nil or minimum.~~
- ~~(5) The Contractor will ensure that suitable earth is available.~~

**2. CONTRACTOR'S RESPONSIBILITY**

~~The Contractor shall obtain representative samples from each of the identified borrow areas and have these tested at the site laboratory following a testing programme approved by the Engineer. It shall be ensured that the sub-grade material when compacted to the density requirements shall yield the design CBR value of the sub-grade. Contractor shall begin operations keeping in mind following;~~

- ~~(1) Haulage of material to embankments or other areas of fill shall proceed only when sufficient spreading and compaction plants is operating at the place of deposition.~~
- ~~(2) No excavated acceptable material other than surplus to requirements of the Contract shall be removed from the site. Contractor should be permitted to remove acceptable material from the site to suit his operational procedure.~~
- ~~(3) Where the excavation reveals a combination of acceptable and un-acceptable materials, the Contractor shall, unless otherwise agreed by the Engineer, carry out the excavation in such a manner that the acceptable materials are excavated separately for use in the permanent works without contamination by the un-acceptable materials. The acceptable material shall be stockpiled separately.~~
- ~~(4) The Contractor shall ensure that he does not adversely affect the stability of excavation or fills by the methods of stockpiling materials, use of plants or siting of temporary buildings or structures.~~

**3. BORROWING FROM DIFFERENT LAND FORMS**

**A. Borrow Areas located in Agricultural Lands**

- ~~(i) The preservation of topsoil will be carried out in stockpile.~~
- ~~(ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).~~
- ~~(iii) Borrowing of earth will be carried out up to a depth of 1.5m from the existing ground level.~~
- ~~(iv) Borrowing of earth will not be done continuously throughout the stretch.~~
- ~~(v) Ridges of not less than 8m widths will be left at intervals not exceeding 300m.~~
- ~~(vi) Small drains will be cut through the ridges, if necessary, to facilitate drainage.~~
- ~~(vii) The slope of the edges will be maintained not steeper than 1:4 (vertical: Horizontal).~~
- ~~(viii) The depth of borrow pits will not be more than 30 cm after stripping the 15 cm topsoil aside.~~

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**B. Borrow Areas located in Elevated Lands**

- (i) The preservation of topsoil will be carried out in stockpile.
- (ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- (iii) At location where private owners desire their fields to be levelled, the borrowing shall be done to a depth of not more than 1.5m or up to the level of surrounding fields

**C. Borrow Areas near River side**

- (i) The preservation of topsoil will be carried out in stockpile.
- (ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- (iii) Borrow area near to any surface water body will be at least at a distance of 15m from the toe of the bank or high flood level, whichever is maximum.

**D. Borrow Areas near Settlements**

- (i) The preservation of topsoil will be carried out in stockpile.
- (ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- (iii) Borrow pit location will be located at least 0.75 km from villages and settlements. If unavoidable, the pit will not be dug for more than 30 cm and drains will be cut to facilitate drainage.
- (iv) Borrow pits located in such location will be re-developed immediately after borrowing is completed. If spoils are dumped, that will be covered with a layers of stockpiled topsoil in accordance with compliance requirements with respect MOEF/PPCB guidelines.

**E. Borrow Pits along the Road**

Borrow pits along the road shall be discouraged and if deemed necessary and permitted by the Engineer, following precautions are recommended

- (i) The preservation of topsoil will be carried out in stockpile.
- (ii) A 15 cm topsoil will be stripped off from the borrow pit and this will be stored in stockpiles in a designated area for height not exceeding 2m and side slopes not steeper than 1:2 (Vertical: Horizontal).
- (iii) Ridges of not less than 8m widths should be left at intervals not exceeding 300m.
- (iv) Small drains shall be cut through the ridges of facilitate drainage.
- (v) The depth of the pits shall be so regulated that there bottom does not cut an imaginary line having a slope of 1 vertical to 4 horizontal projected from the edge of the final section of bank, the maximum depth of any case being limited to 1.5m.
- (vi) Also, no pit shall be dug within the offset width from the toe of the embankment required as per the consideration of stability with a minimum width of 10m.

**4. REHABILITATION OF BORROW AREAS**

The objective of the rehabilitation programme is to return the borrow pit sites to a safe and secure area, which the general public should be able to safely enter and enjoy. Securing borrow pits in a stable condition is fundamental requirement of the rehabilitation process. This could be achieved by filling the borrow pit floor to approximately the access road level.

Re-development plan shall be prepared by the Contractor before the start of work inline with the owners will require and to the satisfaction of owner. The Borrow Areas shall be rehabilitated as per following;

- Borrow pits shall be backfilled with rejected construction wastes and will be given a vegetative cover. If this is not possible, then excavation sloped will be smoothed and depression will be filled in such a way that it looks more or less like the original round surface.

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~~• Borrow areas might be used for aquaculture in case landowner wants such development. In that case, such borrow area will be photographed after their post use restoration and Environment Expert of Supervision Consultant will certify the post use redevelopment.~~

~~The Contractor will keep record of photographs of various stages i.e., before using materials from the location (pre-project), for the period borrowing activities (construction Phase) and after rehabilitation (post development), to ascertain the pre and post borrowing status of the area.~~

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## APPENDIX: 5.0

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### GUIDELINES FOR WORKERS SAFETY IN COMMON OPERATION AND DURING CONSTRUCTIONS

#### Tree Felling

- Use hard hats during tree felling
- Ensure tools such as the axes are in good condition
- Determine proper foot and body position when using the axe. Do not cut above head
- Wear appropriate foot protection
- Carry a first aid kit to the site
- Determine possible hazards in the area, e.g. electrical or telephone or other utility lines
- Prior to felling, determine the safest direction for the fall
- Determine the proper hinge size before directing the tree fall.

#### Noise Hazards and its control

1. Note that indications of noise levels are:
  - You have to shout to be heard;
  - Your hearing is dulled just after work;
  - You get head noises or ringing in the ears after work;
  - You have difficulty hearing people while others are talking
2. Use sound level meters to measure. If the sound level exceeds 85 dB(A), then preventive measures should be taken
3. Make personnel aware of noisy areas by using suitable warning signs and insisting that ear protectors should necessarily be worn.
4. Reduce noise at source by improved maintenance, replacing noisy machines, screening with noise absorbing material, making changes to the process/equipment, controlling machine speeds, ensuring that two noise-generating machines are not running at the same time, using cutting oils and hydraulic breakers.

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5. Appoint a competent person to carryout a detailed noise assessment of the site, designate ear protection zone, and give instructions on the necessary precautionary measures to be observed by site personnel, including the use of suitable type of ear protections.
6. Wear and maintain ear muffs and ear plugs as required
7. In construction or repair work, noise should be kept to a low-level bearing in mind the disturbance to local residents.

### **Road Works**

1. The use of signage is most important to caution the road users of possible unsafe conditions due to the road works.
2. Use the appropriate signage devices as required by the site conditions/situation. The devices include regulatory signs, delineators, barricades, cones, pavement markings, lanterns and traffic control lights.
3. In using signs, make sure that they are (i) simple, easy-to-understand and convey only one message, (ii) luminescent and with reflective properties, and )iii) broad, prominent and of appropriate size.
4. In using barricades, make sure that you keep traffic away from work areas and you guide the drivers to keep along a safe, alternative path.
5. Ensure that proper personal protective equipment (PPE) is provided to all the workers.
6. Cover existing road signs and install new ones at appropriate locations taking into account the distances that would be required and reaction times.
7. Plan layout and traffic management so that hazard is not created.
8. Deploy flagmen, who control traffic at the work areas. The flag should be 600mm x 600mm fastened to a 1m length staff.
9. Flagmen should wear reflective safety vests along with hard hats
10. If required, use wireless devices for flagmen to co-ordinate from either ends of the road, where works are being carried out.

### **Electrical hazards in construction areas**

1. Treat all wires as live wires
2. Never touch dangling wires, but report them to your manager
3. Unless you are a qualified electrician, do not attempt electrical repairs
4. Never use electrical equipment if you hands are wet or you are standing in water
5. If electrical equipment is sparking or smoking, turn the power off and report the condition to your supervisor
6. Never use electrical wires that have physical damage
7. Never allow equipment or traffic to run over electrical wires.

### **Use and Storage of Gas/LPG**

1. Store filled gas/LPG cylinder in the open area, i.e. outside of the building

2. Transport, store, use and secure cylinders in upright position
3. Ensure proper ventilation at the ground level in locations where gas/LPG is in use
4. Avoid physical damage to the cylinders
5. Never weld or cut on or near the cylinders
6. Store empty cylinders secured and upright
7. Make sure that the cylinder is closed immediately after use
8. Investigate immediately if there is the smell of LPG or gas
9. Never use destenched gas/LPG on site.
10. Make sure that there is no other unrelated fire in the vicinity of the cylinder

### **Operation of Excavators**

1. Ensure that excavators are operated by authorized persons who have been adequately trained.
2. Prevent unauthorized movement or use of the excavators
3. Check regularly and maintain the machine thoroughly
4. Ensure that all relevant information, including those related to instruction, training, supervision and safe system of work are provided to the operators.
5. Ensure that the operation and maintenance manuals, manufacturer's specifications, inspection and maintenance log books are provided for the use of the mechanics, service engineers or other safety personnel during periodic maintenance, inspection and examination.
6. During tipping or running alongside the trenches, excavators must be provided with stop blocks.
7. Excavators must be rested on firm ground during operation
8. Avoid operating the machine too close to an overhang, deep ditch or hope and be alter to potential carving edges, falling rocks and slides, rough terrain and obstacles.
9. Locate and identify underground services by checking with all utility companies before excavations.
10. Ensure that all excavations are supervised by experienced and competent persons.
11. When reversing or in caste the operator's view is restricted, adequate supervision and signaling should be provided.
12. Ensure that the type and capacity of the excavator are properly chosen for the intended purposes and site conditions. Never use a machine for any purposes other than it is designed for.
13. Check and report for excessive wear and any breakage of the bucket, blade, edge, tooth and other working tools of the excavator.
14. Check that all linkages/hinges are properly lubricated and ensure that the linkage pins are secured. Never use improper linkage pins.
15. Never dismount or mount a moving machine
16. Work only with adequate ventilation and lighting

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17. Ensure that the protective front screen of the driving cabin is fixed in position during excavations to avoid eye injury to the operator.
18. Ensure switch-off of the unattended vehicle.

### **Operation of trucks and dumpers**

1. Ensure that only trained, authorized and licensed drivers operate the vehicles
2. Enlist the help of another worker before reversing the vehicle
3. Switch-off the engine of an unattended vehicle
4. Lower the tipping bodies when the machine is unattended, but if it is necessary to leave them in the raised position they should be blocked to prevent their fall.
5. Wear safety boots or shoes to avoid injuries during loading and unloading.
6. Carryout periodic servicing to the manufacturer's requirements. All records of maintenance and repairs should be in writing or kept on site.
7. Keep the vehicle tidy and the cabin free from tools and material, which might obstruct the controls.
8. Keep to speed limits.
9. No passenger should be carried on a dumper except the driver
10. Never drive the vehicle across a slope
11. Provide stop blocks when the vehicle is tipping into or running alongside excavations
12. Do not overload the vehicle.
13. Carry only well secured loads
14. Park only on level ground, in neutral with the parking brake applied
15. Never mount of dismount from a moving vehicle

### **Gas Welding**

1. Use the following personal protective equipment during welding
  - Face or hand shield fitted with filters
  - Goggles, particularly when chipping slag
  - Gloves long enough to protect wrists and forearms against heats, sparks, molten metal and radiation
  - High-top boots to prevent sparks from entering footwear.
2. Screen of the work area with sturdy opaque or translucent materials because glare can cause eye injury.
3. Key for opening the acetylene cylinder valve must be one the valve stem while the cylinder is in use so that the cylinder valve may be immediately shut-off in an emergency.
4. Ventilate the workplace using air blowers and exhaust fans to remove poisonous fumes and gases that are given off during welding



5. Take precautions against flying sparks and hot slag where welding is being done near flammable materials and check the area before leaving.
6. Do not weld material degreased with solvents until completely dry.
7. Do not use gas cylinders for supporting work or as rollers
8. Do not use oil grease on oxygen cylinder fittings
9. Do not use cylinders with damaged valves.
10. Do not use too much force if valves are stuck.
11. Replace valve caps after use
12. Search for leaks in equipment by using a solution of soapy water.
13. Shut the cylinder valve if acetylene from a cylinder catches fire at the valve or regulator due to leakage at a connection.
14. Treat all gas cylinders as "full" unless you are sure otherwise.
15. Never attempt to transfer acetylene from one cylinder to another or attempt to refill an acetylene cylinder.
16. Place portable fire extinguishers near the welding area
17. Secure all cylinders against accidental displacement.
18. Always lift gas cylinders. Do not slide them along the ground or drop them from trucks.
19. Keep gas cylinders in vertical position both in storage and when in use
20. Keep the work place dry, secure, free from combustible materials and obstruction.
21. Store the acetylene and oxygen cylinders separately, and in a proper store.
22. Keep the gas cylinders from source of heat, flammable materials, corrosive chemicals and fumes.

### **Manual Handling and Lifting**

1. Use mechanical equipment in place of manual handling as far as possible.
2. Assess the manpower required to handle or lift the load safely and arrange the manpower accordingly.
3. In handling hazardous materials, the workers shall be informed of the hazards and safety precautions.
4. All relevant persons shall be trained in the proper methods of lifting and carrying.
5. Where team work is required, select the persons whose ages and physical builds are compatible for teaming up. Coordinate the actions of the team members by giving necessary instructions.
6. Always lighten or suitably shape the load for manual handling as far as possible. Keep a look out for splinters, sharp edges, loose banding and nails.
7. Clear path or obstruction and tripping hazards.
8. Stack and secure goods safely on trucks, otherwise they fall off and injure passers-by.

9. Use personal protective equipment such as gloves, safety shoes, etc.
10. Adopt the following procedure when you lift a load:
11. Stand close to the object. Have a firm footing with feet spread on either side of the road.
12. Bend the knees and keep your back as straight as you can
13. Grasp object firmly. Be sure grip will not slip
14. Breathe in and throw the shoulder back wards.
15. Straighten the legs, continuing to keep the back as straight as you can.
16. Hold object firmly close to the body
17. Always lift smoothly. Avoid jerky motions. Turn with feet instead of twisting the back.

#### **461. Handling chemicals and hazardous substances**

1. Always substitute hazardous chemicals with harmless or less hazardous ones wherever possible.
2. Enclose the process using chemicals or provide other engineering controls such as local exhaust ventilation, a fume cupboard or a safety cabinet.
3. Exercise great care in the storage and use of chemicals because they may be explosive, poisonous, corrosive or combustible.
4. Separate different chemicals physically
5. Store chemicals classified as dangerous goods in a properly constructed and approved goods store. Keep proper records of all chemicals and hazardous substances delivered, stored and used on site.
6. Consider unknown substances and liquids as dangerous until proven otherwise.
7. All containers should be clearly labeled to indicate contents. Never use a wrongly labeled container for chemicals.
8. Prohibit smoking in the vicinity of dangerous chemicals
9. Ensure that you are wearing the correct personal protective equipment before you handle chemicals
10. Maintain the Material Safety Data Sheet of all chemicals for reference on safety precautions to be taken and the use of suitable PPE.
11. When opening containers, hold a rag over the cap or lid, as some volatile liquids tend to spurt up when released.
12. Wash before you eat and do not eat at the work place.
13. If the skin is splashed with a chemical, rinse it immediately with plenty of clean water. Eye should be flushed thoroughly with water followed by immediate medical attention.
14. Eye fountain, emergency shower and breathing apparatus should be available in the vicinity of the workplace.
15. Safety instructions for handling emergency situations should be displayed prominently at both the storage and use locations.

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#### **462. First Aid**

1. Provide first aid boxes at every site
2. Ensure that training on the use of the first aid box is provided to a handful of staff working in the site.
3. Display the list of persons who are trained on providing first aid.
4. Ensure that every first aid box is marked plainly "First Aid" in English and local language.
5. The responsible person or first aider should replenish the contents of the first aid box as necessary.

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### **Personal protective Equipment**

#### **General**

1. Consider the provision of personal protective equipment only after all measures for removing or controlling safety hazards have been provided reasonably impractical.
2. Ensure that sufficient personal protective equipment are provided and that they are readily available for every person who may need to use them.
3. The management should ensure that all persons make full and proper use of the personal protective equipment provided.
4. Provide instruction and training in the proper use and care of any specific protective equipment where necessary
5. Do not willfully misuse, interfere with or ill-treat any protective clothing and equipment provided.
6. Ensure that the personal protective equipment are in good condition. Report immediately any damage to the management for replacement. Always keep the personal protective equipment as clean as possible.

#### **Eye protection**

- ~~7.1.~~ Issue eye protection equipment where there is a foreseeable risk of eye injury
- ~~8.2.~~ Ensure an adequate supply of goggles/shields is available.
- ~~9.3.~~ Keep the goggles clean and make sure they are good fit.
- ~~10.4.~~ Do not watch welding operations unless your eyes are protected from the damaging effect of flash.

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#### **Head Protection**

- ~~11.1.~~ No person shall enter a construction site unless he is wearing a suitable safety helmet
- ~~12.2.~~ Wear a safety helmet:
  - When there is the risk of being hit by falling objects
  - While on or near a construction site
  - During adverse weather conditions
  - When in any area designated as a "hard hat" area.

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- 13.3. Provide identification labels to all helmets in some way to prevent random exchange among wearers, with one helmet exclusive to each person.
- 14.4. Inspect helmets for cracks or sign of impact or rough treatment before each usage. Destroy, remove and replace all worn, defective or damaged helmets.

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### Hearing Protection

- 15.1. Provide ear plugs or ear muffs as required. Use re-usable ear plugs when the reduction required (15-25 dBA) is not excessive. Use ear muffs where a large attenuation of upto 40 dBA is demanded.
- 16.2. Do not use dry cotton wool for hearing protection because it cannot provide any.
- 17.3. Provide disposable ear plugs for infrequent visitors and ensure that they are never re-used.
- 18.4. Provide re-usable ear plugs for those who need to work continuously for a long period in a high noise area.
- 19.5. Use ear muffs with replaceable ear cushions because they deteriorate with age or may be damaged in use.
- 20.6. Avoid wearing spectacles with ear muffs.
- 21.7. Use soap and water or the recommended solvent for cleaning ear muffs.
- 22.8. Provide ear muffs for those who may need to get in and out of a high noise area frequently.

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### Respiratory Protective Equipment

- 23.1. Wear suitable respirable for protection when there is a potential for small particles entering the lungs, e.g. emptying of cement bags.
- 24.2. Ensure that the exhalators can provide adequate protection.
- 25.3. Provide training to all persons using the respirators for their correct fitting, use, limitations and symptoms of exposure.
- 26.4. Clean and inspect all respirators before and after use.
- 27.5. Store respirators properly when not in use.

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### Safety Footwear

- 28.1. Wear suitable footwear for work
- 29.2. Use safety footwear on site or in other dangerous areas
- 30.3. Wear suitable safety shoes or ankle boots when working anywhere where there is high risk of foot injuries from slippery or uneven ground, sharp objects, falling objects, etc.
- 31.4. All safety footwear, including safety shoes, ankle boots and rubber boots, should be fitted with steel toecaps.
- 32.5. Avoid wearing flip flops, high heeled shoes, slippers, light sport shoes in situations where there is a risk of foot injury.
- 33.6. Keep shoe lace knots tight.

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## Hand Protection

- | ~~34.1.~~ Wear suitable gloves for selected activities such as welding & cutting and manual handling of materials & equipment.
- | ~~35.2.~~ Do not wear gloves where there is a risk of them becoming entangled in moving parts of machinery
- | ~~36.3.~~ wash hands properly with disinfectant soap and clean water before drinking, eating or smoking. Wash hands immediately after each operation on site when the situation warrants.

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## Fire Prevention, Fighting and Equipment

### ***Before fire breaks cut***

1. Store flammable material in proper areas having adequate fire protection systems.
2. Display sufficient warning signs.
3. Train selected personnel to use these fire extinguishers
4. Inspect fire extinguishers regularly and replace as necessary
5. Fire escape route should be kept clear at all times and clearly indicated.
6. Know the escape route and assembly point.
7. Display escape route maps prominently on each floor
8. Carryout fire drill regularly. Designate fire officers
9. Install fire alarm wherever required and test regularly.
10. Provide sufficient exit signs at prominent locations for directing people to the escape staircases and routes.

### **When fire breaks out.**

11. Alert all persons
12. Put off the fire with appropriate fire extinguishers only when you are sure that you are safe to do so.
13. Escape if you are in danger through the fire escape route to assembly point
14. Fire officers to carryout head count at the assembly point.

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**APPENDIX: 6.0**

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**463. GUIDELINES FOR THE STORAGE, HANDLING, USE AND EMERGENCY RESPONSE FOR HAZARDOUS CHEMICALS**

**1.1. A1. REFUELING/MAINTENANCE PROCEDURE**

- Truck or suitable containers will bring in all fuel and fluids. There will be no storage of fuel, oil or fluids within 100m (or 50m) of the permanent water line.
- Prior to re-fueling or maintenance, drip pans and containment pans will be placed under the equipment. Absorbent blankets may also be required to be placed under the equipment and hoses where there is a possibility of spillage to occur.
- All used oils or fluids will be properly contained and transported to appropriately licensed (authorized) disposal facilities;
- Following re-fueling and maintenance, the absorbent blankets (if any) and spill pans will be picked up and the fuel truck or container moved outside of the 100m (or 50m) wide area.

**1.2. Emergency Spill Procedure**

Should a spill occur, either through spillage or equipment failure, the applicable emergency spill procedure outlined in sections A-2 to A-4 must be followed.

**A2. SPILL PROCEDURE (INSIDE THE STREAM)**

In the case of a spill, overflow or release fluid into the stream waterway (whether water is flowing during the spill or not), do what is practical and safely possible to control the situation, then get help.

- **Stop the flow**
  - Stop the release into the stream waterway
  - Shutdown equipment
  - Close valves and pumps
  - Plug hoses
- **Remove Ignition Sources**
  - Shut off vehicles and other engines
  - Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition source (if a fire starts, the extinguisher must be easily accessible).
- **Contract the environmental Officer and initiate Emergency Response**

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- Notify the site supervisor and the Contractor's Environmental Officer as soon as possible
- The Environmental Officer will review the situation and decide if Emergency Services like Fire Brigade are required
- Appropriate parties to be notified of the spill are
  - ❖ The contractor's Project Manager
  - ❖ The Engineer through his designated Environmental Officer
  - ❖ The Client
  - ❖ Regulatory Agencies like Pollution Control Board, Municipal Authorities, as applicable.
  - ❖ Site Safety Officer
- **Cleanup and Disposal**
  - Emergency Services will be engaged for the containment, cleanup and disposal of contamination release into the environment
- **Reporting**
  - The contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board (s).
- **Procedure Review**
  - The Engineer will review the report, determine if changes are required to procedures and recommend implementation of all required changes....

**A3. SPILL PROCEDURE (ON LAND)**

In the case of a spill, overflow or release fluid onto land, do what is practical and safety possible to control the situation, then get help.

- **Stop the flow**
  - Stop the release into the water body
  - Shut down equipment
  - Close valves and pumps
  - Plug hoses
- **Remove Ignition Sources**
  - Shut off vehicles and other engines
  - Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition sources (if a fire starts the extinguisher must be easily accessible).
- **Contain the Spill**
  - Dike around the spill to contain the material
  - Spread absorbent or place a spill blanket on the spill
  - Enlist the help of personnel on site
  - Notify your supervisor as soon as possible
- **Notification**

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- Appropriate parties to be notified of the spill are:
  - ❖ The Contractor's Project Manager
  - ❖ The Engineer through his designated Environmental Officer
  - ❖ The Client
- Regulatory Agencies like Pollution Control Board, Municipal Authorities, as applicable
- Site Safety Coordinator
- **Cleanup and Disposal**
  - The Engineer's Environmental Officer will ensure that a proper cleanup and disposal method is determined.
- **Reporting**
  - The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board (s).
- **Procedure Review**
  - The Engineer will review the report, determine if changes are required to procedures are recommend implementation of all required changes.

**A4. Spill Procedure (within ponds)**

In the case of a spill, overflow or release fluid due to equipment or hose failure, do what is practical and safely possible to control the situation, then get help

- **Stop the flow**
  - Stop the release
  - Shut down equipment
  - Close valves and pumps
  - Plug hoses
- **Remove Ignition Sources**
  - Shut off vehicles and other engines
  - Do not allow tiger torches, vehicles, smoking or other sources of ignition near the area. Keep a fire extinguisher on hand but keep it a safe distance away from the potential ignition sources (if a fire starts the extinguisher must be easily accessible).
- **Contain the Spill**
  - Stop any pumps that may be moving the water from the area where the spill occurred
  - Enlist the help of personnel on site
  - Notify your supervisor as soon as possible
- **Notification**
  - Appropriate parties to be notified or the spill are:
    - ❖ The Contractor's Project Manager
    - ❖ The Engineer through his designated Environmental Officer
    - ❖ The Client

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- ❖ Regulatory Agencies like Pollution Control Board, Municipal Authorities, as applicable
- Site Safety Coordinator
- **Cleanup and Disposal**
  - The Engineer's Environmental Officer will ensure that a proper cleanup and disposal method is determined. Absorbent pads will soak up the spilled material. The pads will be contained and removed from site for disposal at a licensed (authorized) facility.
- **Reporting**
  - The Contractor's Environmental Officer will document the event and submit reports to the Engineer, the Client and appropriate regulatory agencies like the Pollution Control Board (s)
- **Procedure Review**
  - The Engineer will review the report; determine if changes are required to procedures and recommend implementation of all required changes.

**APPENDIX:- 7.0 SWMH Rule 2000**

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**Ministry of Environment and Forests**

**Notification**

**New Delhi, the 25<sup>th</sup> September, 2000**

S.O. 908(E).- Whereas the draft of the Municipal Solid Wastes (Management and Handling) Rules, 1999 were published under the notification of the Government of India in the Ministry of Environment and Forests number S.O. 783(E), dated, the 27<sup>th</sup> September, 1999 in the Gazette of India, Part II, Section 3, Sub-section (ii) of the same date inviting objections and suggestions from the persons likely to be affected thereby, before the expiry of the period of sixty days from the date on which the copies of the Gazette containing the said notification are made available to the public;

And whereas copies of the said Gazette were made available to the public on the 5<sup>th</sup> October, 1999;

And whereas the objections and suggestions received from the public in respect of the said draft rules have been duly considered by the Central Government;

Now, therefore, in exercise of the powers conferred by section 3, 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules to regulate the management and handling of the municipal solid wastes, namely :-

**1. Short title and commencement.--**

1. These rules may be called the Municipal Solid Wastes (Management and Handling) Rules, 2000.
2. Save as otherwise provided in these rules, they shall come into force on the date of their publication in the Official Gazette.

**2. Application .--** These rules shall apply to every municipal authority responsible for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes .

**3. Definitions.--** In these rules, unless the context otherwise requires .--

- i. "anaerobic digestion" means a controlled process involving microbial decomposition of organic matter in the absence of oxygen;

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- ii. "authorization" means the consent given by the Board or Committee to the operator of a facility" ;
- iii. "biodegradable substance" means a substance that can be degraded by micro-organisms;
- iv. "biomethanation" means a process which entails enzymatic decomposition of the organic matter by microbial action to produce methane rich biogas;
- v. "collection" means lifting and removal of solid wastes from collection points or any other location;
- vi. "composting" means a controlled process involving microbial decomposition of organic matter;
- vii. "demolition and construction waste" means wastes from building materials debris and rubble resulting from construction, re-modelling, repair and demolition operation;
- viii. "disposal" means final disposal of municipal solid wastes in terms of the specified measures to prevent contamination of ground-water, surface water and ambient air quality;
- ix. "Form" means a Form appended to these rules;
- x. "generator of wastes" means persons or establishments generating municipal solid wastes;
- xi. "landfilling" means disposal of residual solid wastes on land in a facility designed with protective measures against pollution of ground water, surface water and air fugitive dust, wind-blown litter, bad odour, fire hazard, bird menace, pests or rodents, greenhouse gas emissions, slope instability and erosion;
- xii. "leachate" means liquid that seeps through solid wastes or other medium and has extracts of dissolved or suspended material from it;
- xiii. "lysimeter" is a device used to measure rate of movement of water through or from a soil layer or is used to collect percolated water for quality analysis;
- xiv. "municipal authority" means Municipal Corporation, Municipality, Nagar Palika, Nagar Nigam, Nagar Panchayat, Municipal Council including notified area committee (NAC) or any other local body constituted under the relevant statutes and, where the management and handling of municipal solid waste is entrusted to such agency;
- xv. "municipal solid waste" includes commercial and residential wastes generated in a municipal or notified areas in either solid or semi-solid form excluding industrial hazardous wastes but including treated bio-medical wastes;
- xvi. "operator of a facility" means a person who owns or operates a facility for collection, segregation, storage, transportation, processing and disposal of municipal solid wastes and also includes any other agency appointed as such by the municipal authority for the management and handling of municipal solid wastes in the respective areas;
- xvii. "pelletisation" means a process whereby pellets are prepared which are small cubes or cylindrical pieces made out of solid wastes and includes fuel pellets which are also referred as refuse derived fuel;
- xviii. "processing" means the process by which solid wastes are transformed into new or recycled products;
- xix. "recycling" means the process of transforming segregated solid wastes into raw materials for producing new products, which may or may not be similar to the original products;
- xx. "Schedule" means a Schedule appended to these rules;

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- xxi. "segregation" means to separate the municipal solid wastes into the groups of organic, inorganic, recyclables and hazardous wastes;
- xxii. "State Board or the Committee" means the State Pollution Control Board of a State, or as the case may be, the Pollution Control Committee of a Union territory;
- xxiii. "storage" means the temporary containment of municipal solid wastes in a manner so as to prevent littering, attraction to vectors, stray animals and excessive foul odour;
- xxiv. "transportation " means conveyance of municipal solid wastes from place to place hygienically through specially designed transport system so as to prevent foul odour, littering, unsightly conditions and accessibility to vectors;
- xxv. "vadose water" water which occurs between the ground, surface and the water table that is the unsaturated zone;
- xxvi. "vermicomposting" is a process of using earthworms for conversion of bio-degradable wastes into compost.

#### 4. Responsibility of municipal authority .-

1. Every municipal authority shall, within the territorial area of the municipality, be responsible for the implementation of the provisions of these rules, and for any infrastructure development for collection, storage, segregation, transportation, processing and disposal of municipal solid wastes.
2. The municipal authority or an operator of a facility shall make an application in **Form-I**, for grant of authorization for setting up waste processing and disposal facility including landfills from the State Board or the Committee in order to comply with the implementation programme laid down in **Schedule I**.
3. The municipal authority shall comply with these rules as per the implementation schedule laid down in **Schedule I**.

#### (4) The municipal authority shall furnish its annual report in **Form-II**,-

- a. to the Secretary-in-charge of the Department of Urban Development of the concerned State or as the case may be of the Union territory, in case of a metropolitan city; or
- b. to the District Magistrate or the Deputy Commissioner concerned in case of all other towns and cities,

with a copy to the State Board or the Committee on or before the 30<sup>th</sup> day of June every year.

#### 5. Responsibility of the State Government and the Union territory Administrations .-

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(1) The Secretary-in-charge of the Department of Urban Development of the concerned State or the Union territory, as the case may be, shall have the overall responsibility for the enforcement of the provisions of these rules in the metropolitan cities.

(2) The District Magistrate or the Deputy Commissioner of the concerned district shall have the overall responsibility for the enforcement of the provisions of these rules within the territorial limits of their jurisdiction.

**6. Responsibility of the Central Pollution Control Board and the State Board or the Committees .—**

1. The State Board or the Committee shall monitor the compliance of the standards regarding ground water, ambient air, leachate quality and the compost quality including incineration standards as specified under Schedules II, III and IV.
2. The State Board or the Committee, after the receipt of application from the municipal authority or the operator of a facility in Form I, for grant of authorization for setting up waste processing and disposal facility including landfills, shall examine the proposal taking into consideration the views of other agencies like the State Urban Development Department, the Town and Country Planning Department, Air Port or Air Base Authority, the Ground Water Board or any such other agency prior to issuing the authorization.
3. The State Board or the Committee shall issue the authorization in Form-III to the municipal authority or an operator of a facility within forty-five days stipulating compliance criteria and standards as specified in Schedules II, III and IV including such other conditions, as may be necessary.
4. The authorization shall be valid for a given period and after the validity is over, a fresh authorization shall be required.

(5) The Central Pollution Control Board shall co-ordinate with the State Boards and the Committees with particular reference to implementation and review of standards and guidelines and compilation of monitoring data.

**7. Management of municipal solid wastes .--**

1. Any municipal solid waste generated in a city or a town, shall be managed and handled in accordance with the compliance criteria and the procedure laid down in Schedule-II.

(2) The waste processing and disposal facilities to be set up by the municipal authority on their own or through an operator of a facility shall meet the specifications and standards as specified in Schedules III and IV.

**8. Annual Reports .—**

1. The State Boards and the Committees shall prepare and submit to the Central Pollution Control Board an annual report with regard to the implementation of these rules by the 15<sup>th</sup> of September every year in Form-IV.
2. The Central Pollution Control Board shall prepare the consolidated annual review report on management of municipal solid wastes and forward it to the Central Government alongwith its recommendations before the 15<sup>th</sup> of December every year.

**9. Accident Reporting .--** When an accident occurs at any municipal solid wastes collection, segregation, storage, processing, treatment and disposal facility or landfill site or during the transportation of such wastes, the municipal authority shall forthwith report the accident in Form-V to the Secretary in-charge of the Urban Development Department in metropolitan cities, and to District Collector or Deputy Commissioner in all other cases.

**Schedule I**

**[see rules4(2) and (3)]**

**Implementation Schedule**

<b><u>Serial No.</u></b>	<b><u>Compliance Criteria</u></b>	<b><u>Schedule</u></b>
<b><u>1.</u></b>	<b><u>Setting up of waste processing and disposal facilities</u></b>	<b><u>By 31.12.2003 or earlier</u></b>
<b><u>2.</u></b>	<b><u>Monitoring the performance of waste processing and disposal facilities</u></b>	<b><u>Once in six months</u></b>
<b><u>3.</u></b>	<b><u>Improvement of existing landfill sites as per provisions of these rules</u></b>	<b><u>By 31.12.2001 or earlier</u></b>
<b><u>4.</u></b>	<b><u>Identification of landfill sites for future use and making site (s) ready for operation</u></b>	<b><u>By 31.12.2002 or earlier</u></b>

**Schedule -II**

**[see rules 6(1) and (3), 7(1)]**

**Management of Municipal Solid Wastes**

<b><u>S.no</u></b>	<b><u>Parameters</u></b>	<b><u>Compliance criteria</u></b>
<b><u>1.</u></b>	<b><u>Collection of municipal solid wastes</u></b>	<p><b><u>1. Littering of municipal solid waste shall be prohibited in cities, towns and in urban areas notified by the State Governments. To prohibit littering and facilitate compliance, the following steps shall be taken by the municipal authority, namely :-</u></b></p> <p><b><u>i. Organising house-to-house collection of municipal solid wastes through any of the methods, like community bin collection (central bin), house-to-house collection, collection on regular pre-informed timings and scheduling</u></b></p>

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		<p>by using bell ringing of musical vehicle (without exceeding permissible noise levels);</p> <p>ii. <u>Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas;</u></p> <p>iii. <u>Wastes from slaughter houses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature, shall be managed to make use of such wastes;</u></p> <p>iv. <u>Bio-medical wastes and industrial wastes shall not be mixed with municipal solid wastes and such wastes shall follow the rules separately specified for the purpose;</u></p> <p>v. <u>Collected waste from residential and other areas shall be transferred to community bin by hand-driven containerised carts or other small vehicles;</u></p> <p>vi. <u>Horticultural and construction or demolition wastes or debris shall be separately collected and disposed off following proper norms. Similarly, wastes generated at dairies shall be regulated in accordance with the State laws;</u></p> <p>vii. <u>Waste (garbage, dry leaves) shall not be burnt;</u></p> <p>viii. <u>Stray animals shall not be allowed to move around waste storage facilities or at any other place in the city or town and shall be managed in accordance with the State laws.</u></p> <p><u>2. The municipal authority shall notify waste collection schedule and the likely method to be adopted for public benefit in a city or town.</u></p> <p><u>3. It shall be the responsibility of generator of wastes to avoid littering and ensure delivery of wastes in accordance with the collection and segregation system to be notified by the municipal authority as per para 1(2) of this Schedule.</u></p>
<u>2.</u>	<u>Segregation of municipal solid wastes</u>	<p><u>In order to encourage the citizens, municipal authority shall organise awareness programmes for segregation of wastes and shall promote recycling or reuse of segregated materials.</u></p> <p><u>The municipal authority shall undertake phased programme to ensure community participation in waste segregation. For this purpose, regular meetings at quarterly intervals shall be arranged by the municipal authorities with representatives of local resident welfare associations and non-governmental organizations.</u></p>
<u>3.</u>	<u>Storage of municipal solid wastes</u>	<p><u>Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and insanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities, namely :-</u></p> <p>i. <u>Storage facilities shall be created and established by taking into account quantities of waste generation in a given area</u></p>

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		<p>and the population densities. A storage facility shall be so placed that it is accessible to users;</p> <p>ii. <u>Storage facilities to be set up by municipal authorities or any other agency shall be so designed that wastes stored are not exposed to open atmosphere and shall be aesthetically acceptable and user-friendly;</u></p> <p>iii. <u>Storage facilities or 'bins' shall have 'easy to operate' design for handling, transfer and transportation of waste. Bins for storage of bio-degradable wastes shall be painted green, those for storage of recyclable wastes shall be printed white and those for storage of other wastes shall be printed black;</u></p> <p>iv. <u>Manual handling of waste shall be prohibited. If unavoidable due to constraints, manual handling shall be carried out under proper precaution with due care for safety of workers.</u></p>
4.	<b><u>Transportation of municipal solid wastes</u></b>	<p>Vehicles used for transportation of wastes shall be covered. Waste should not be visible to public, nor exposed to open environment preventing their scattering. The following criteria shall be met, namely:-</p> <p>i. <u>The storage facilities set up by municipal authorities shall be daily attended for clearing of wastes. The bins or containers wherever placed shall be cleaned before they start overflowing;</u></p> <p>ii. <u>Transportation vehicles shall be so designed that multiple handling of wastes, prior to final disposal, is avoided.</u></p>
5.	<b><u>Processing of municipal solid wastes</u></b>	<p><u>Municipal authorities shall adopt suitable technology or combination of such technologies to make use of wastes so as to minimize burden on landfill. Following criteria shall be adopted, namely:-</u></p> <p>(i) <u>The biodegradable wastes shall be processed by composting, vermicomposting, anaerobic digestion or any other appropriate biological processing for stabilization of wastes. It shall be ensured that compost or any other end product shall comply with standards as specified in Schedule-IV;</u></p> <p>ii. <u>Mixed waste containing recoverable resources shall follow the route of recycling. Incineration with or without energy recovery including pelletisation can also be used for processing wastes in specific cases. Municipal authority or the operator of a facility wishing to use other state-of-the-</u></p>

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		<u>art technologies shall approach the Central Pollution Control Board to get the standards laid down before applying for grant of authorisation.</u>
<b>6.</b>	<b><u>Disposal of municipal solid wastes</u></b>	<u>Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing. Land filling shall also be carried out for residues of waste processing facilities as well as pre-processing rejects from waste processing facilities. Land filling of mixed waste shall be avoided unless the same is found unsuitable for waste processing. Under unavoidable circumstances or till installation of alternate facilities, land-filling shall be done following proper norms. Landfill sites shall meet the specifications as given in Schedule -III.</u>

**Schedule III**

**[see rules 6(1) and (3), 7(2)]**

**Specifications for Landfill Sites**

**Site Selection**

1. In areas falling under the jurisdiction of 'Development Authorities' it shall be the responsibility of such Development Authorities to identify the landfill sites and hand over the sites to the concerned municipal authority for development, operation and maintenance. Elsewhere, this responsibility shall lie with the concerned municipal authority.
2. Selection of landfill sites shall be based on examination of environmental issues. The Department of Urban Development of the State or the Union territory shall co-ordinate with the concerned organisations for obtaining the necessary approvals and clearances.
3. The landfill site shall be planned and designed with proper documentation of a phased construction plan as well as a closure plan.
4. The landfill sites shall be selected to make use of nearby wastes processing facility. Otherwise, wastes processing facility shall be planned as an integral part of the landfill site.
5. The existing landfill sites which continue to be used for more than five years, shall be improved in accordance of the specifications given in this Schedule.
6. Biomedical wastes shall be disposed off in accordance with the Bio-medical Wastes (Management and Handling) Rules, 1998 and hazardous wastes shall be managed in accordance with the Hazardous Wastes (Management and Handling ) Rules, 1989, as amended from time to time.
7. The landfill site shall be large enough to last for 20-25 years.
8. The landfill site shall be away from habitation clusters, forest areas, water bodies monuments, National Parks, Wetlands and places of important cultural, historical or religious interest.

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9. A buffer zone of no-development shall be maintained around landfill site and shall be incorporated in the Town Planning Department's land-use plans.
10. Landfill site shall be away from airport including airbase. Necessary approval of airport or airbase authorities prior to the setting up of the landfill site shall be obtained in cases where the site is to be located within 20 km of an airport or airbase..

#### **Facilities at the Site**

11. Landfill site shall be fenced or hedged and provided with proper gate to monitor incoming vehicles or other modes of transportation.
12. The landfill site shall be well protected to prevent entry of unauthorised persons and stray animals.
13. Approach and other internal roads for free movement of vehicles and other machinery shall exist at the landfill site.
14. The landfill site shall have wastes inspection facility to monitor wastes brought in for landfill, office facility for record keeping and shelter for keeping equipment and machinery including pollution monitoring equipments.
15. Provisions like weigh bridge to measure quantity of waste brought at landfill site, fire protection equipments and other facilities as may be required shall be provided.
16. Utilities such as drinking water (preferably bathing facilities for workers) and lighting arrangements for easy landfill operations when carried out in night hours shall be provided.
17. Safety provisions including health inspections of workers at landfill site shall be periodically made.

#### **Specifications for land filling**

18. Wastes subjected to land filling shall be compacted in thin layers using landfill compactors to achieve high density of the wastes. In high rainfall areas where heavy compactors cannot be used alternative measures shall be adopted.
19. Wastes shall be covered immediately or at the end of each working day with minimum 10 cm of soil, inert debris or construction material till such time waste processing facilities for composting or recycling or energy recovery are set up as per Schedule I.
20. Prior to the commencement of monsoon season, an intermediate cover of 40-65 cm thickness of soil shall be placed on the landfill with proper compaction and grading to prevent infiltration during monsoon. Proper drainage berms shall be constructed to divert run-off away from the active cell of the landfill.
21. After completion of landfill, a final cover shall be designed to minimize infiltration and erosion. The final cover shall meet the following specifications, namely :-
  - a. The final cover shall have a barrier soil layer comprising of 60 cms of clay or amended soil with permeability coefficient less than  $1 \times 10^{-7}$  cm/sec.
  - b. On top of the barrier soil layer there shall be a drainage layer of 15 cm.
  - c. On top of the drainage layer there shall be a vegetative layer of 45 cm to support natural plant growth and to minimize erosion.

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**Pollution prevention**

22. In order to prevent pollution problems from landfill operations, the following provisions shall be made, namely :-

- a. Diversion of storm water drains to minimize leachate generation and prevent pollution of surface water and also for avoiding flooding and creation of marshy conditions;
- b. Construction of a non-permeable lining system at the base and walls of waste disposal area. For landfill receiving residues of waste processing facilities or mixed waste or waste having contamination of hazardous materials (such as aerosols, bleaches, polishes, batteries, waste oils, paint products and pesticides) minimum liner specifications shall be a composite barrier having 1.5 mm high density polyethylene (HDPE) geomembrane, or equivalent, overlying 90 cm of soil (clay or amended soil) having permeability coefficient not greater than  $1 \times 10^{-7}$  cm/sec. The highest level of water table shall be at least two meter below the base of clay or amended soil barrier layer;
- c. Provisions for management of leachates collection and treatment shall be made. The treated leachates shall meet the standards specified in Schedule- IV;
- d. Prevention of run-off from landfill area entering any stream, river, lake or pond.

**Water Quality Monitoring**

- 23. Before establishing any landfill site, baseline data of ground water quality in the area shall be collected and kept in record for future reference. The ground water quality within 50 metres of the periphery of landfill site shall be periodically monitored to ensure that the ground water is not contaminated beyond acceptable limit as decided by the Ground Water Board or the State Board or the Committee. Such monitoring shall be carried out to cover different seasons in a year that is, summer, monsoon and post-monsoon period.
- 24. Usage of groundwater in and around landfill sites for any purpose (including drinking and irrigation) is to be considered after ensuring its quality. The following specifications for drinking water quality shall apply for monitoring purpose, namely :-

<u>S.No.</u>	<u>Parameters</u>	<u>IS 10500: 1991</u> <u>Desirable limit ( mg/l</u> <u>except for pH)</u>
<u>1.</u>	<u>Arsenic</u>	<u>0.05</u>
<u>2.</u>	<u>Cadmium</u>	<u>0.01</u>
<u>3</u>	<u>Chromium</u>	<u>0.05</u>
<u>4.</u>	<u>Copper</u>	<u>0.05</u>
<u>5.</u>	<u>Cyanide</u>	<u>0.05</u>
<u>6.</u>	<u>Lead</u>	<u>0.05</u>

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7.	<u>Mercury</u>	<u>0.001</u>
8.	<u>Nickel</u>	<u>-</u>
9.	<u>Nitrate as NO<sub>3</sub></u>	<u>45.0</u>
10	<u>PH</u>	<u>6.5-8.5</u>
11.	<u>Iron</u>	<u>0.3</u>
12.	<u>Total hardness (as CaCO<sub>3</sub>)</u>	<u>300.0</u>
13.	<u>Chlorides</u>	<u>250</u>
14.	<u>Dissolved solids</u>	<u>500</u>
15.	<u>Phenolic compounds (as C<sub>6</sub>H<sub>5</sub>OH)</u>	<u>0.001</u>
16.	<u>Zinc</u>	<u>5.0</u>
17.	<u>Sulphate (as SO<sub>4</sub>)</u>	<u>200</u>

**25. Ambient Air Quality Monitoring**

26. Installation of landfill gas control system including gas collection system shall be made at landfill site to minimize odour generation, prevent off-site migration of gases and to protect vegetation planted on the rehabilitated landfill surface.
27. The concentration of methane gas generated at landfill site shall not exceed 25 per cent of the lower explosive limit (LEL).
28. The landfill gas from the collection facility at a landfill site shall be utilized for either direct thermal applications or power generation, as per viability. Otherwise, landfill gas shall be burnt (flared) and shall not be allowed to directly escape to the atmosphere or for illegal tapping. Passive venting shall be allowed if its utilization or flaring is not possible.
29. Ambient air quality at the landfill site and at the vicinity shall be monitored to meet the following specified standards, namely :-

<u>S.No.</u>	<u>Parameters</u>	<u>Acceptable levels</u>
<u>(i)</u>	<u>Sulphur dioxide</u>	<u>120 μγ/μ<sup>3</sup> ( 24 ηουρσ)</u>
<u>(ii)</u>	<u>Suspended Particulate Matter</u>	<u>500 μγ/μ<sup>3</sup> (24 ηουρσ)</u>
<u>(iii)</u>	<u>Methane</u>	<u>Not to exceed 25 per cent of the lower explosive limit (equivalent to 650 mg/m<sup>3</sup> )</u>
<u>(iv)</u>	<u>Ammonia daily average</u>	<u>-</u>
<u>-</u>	<u>(Sample duration 24 hrs)</u>	<u>0.4 mg/m<sup>3</sup> (400 μγ/μ<sup>3</sup>)</u>

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-	-	-
(v)	<u>Carbon monoxide</u>	<u>1 hour average : 2 mg/m<sup>3</sup></u> <u>8 hour average : 1 mg/m<sup>3</sup></u>

29. The ambient air quality monitoring shall be carried out by the concerned authority as per the following schedule, namely:-

- (a) Six times in a year for cities having population of more than fifty lakhs;
- (b) Four times in a year for cities having population between ten and fifty lakhs;
- (c) Two times in a year for town or cities having population between one and ten lakhs.

**Plantation at Landfill Site**

30. A vegetative cover shall be provided over the completed site in accordance with the and following specifications, namely :-

- (a) Selection of locally adopted non-edible perennial plants that are resistant to drought and extreme temperatures shall be allowed to grow;
- (b) The plants grown be such that their roots do not penetrate more than 30 cms. This condition shall apply till the landfill is stabilised;
- (c) Selected plants shall have ability to thrive on low-nutrient soil with minimum nutrient addition;
- (d) Plantation to be made in sufficient density to minimize soil erosion.

**Closure of Landfill Site and Post-care**

31. The post-closure care of landfill site shall be conducted for at least fifteen years and long term monitoring or care plan shall consist of the following, namely :-

- (a) Maintaining the integrity and effectiveness of final cover, making repairs and preventing run-on and run-off from eroding or otherwise damaging the final cover;
- (b) Monitoring leachate collection system in accordance with the requirement;
- (c) Monitoring of ground water in accordance with requirements and maintaining ground water quality;
- (d) Maintaining and operating the landfill gas collection system to meet the standards.

32. Use of closed landfill sites after fifteen years of post-closure monitoring can be considered for human settlement or otherwise only after ensuring that gaseous and leachate analysis comply with the specified standards.

### **Special provisions for hilly areas**

33. Cities and towns located on hills shall have location-specific methods evolved for final disposal of solid wastes by the municipal authority with the approval of the concerned State Board or the Committee. The municipal authority shall set up processing facilities for utilization of biodegradable organic wastes. The inert and non-biodegradable waste shall be used for building roads or filling-up of appropriate areas on hills. Because of constraints in finding adequate land in hilly areas, wastes not suitable for road-laying or filling up shall be disposed of in specially designed landfills.

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### **Schedule IV**

**[see rules 6(1) and (3), 7(2)]**

### **Standards for Composting, Treated Leachates and Incineration**

1. The waste processing or disposal facilities shall include composting, incineration, pelletisation, energy recovery or any other facility based on state-of-the-art technology duly approved by the Central Pollution Control Board
2. In case of engagement of private agency by the municipal authority, a specific agreement between the municipal authority and the private agency shall be made particularly, for supply of solid waste and other relevant terms and conditions.
3. In order to prevent pollution problems from compost plant and other processing facilities, the following shall be complied with, namely :-
  - i. The incoming wastes at site shall be maintained prior to further processing. To the extent possible, the waste storage area should be covered. If, such storage is done in an open area, it shall be provided with impermeable base with facility for collection of leachate and surface water run-off into lined drains leading to a leachate treatment and disposal facility;
  - ii. Necessary precautions shall be taken to minimise nuisance of odour, flies, rodents, bird menace and fire hazard;
  - iii. In case of breakdown or maintenance of plant, waste intake shall be stopped and arrangements be worked out for diversion of wastes to the landfill site;
  - iv. Pre-process and post-process rejects shall be removed from the processing facility on regular basis and shall not be allowed to pile at the site. Recyclables shall be routed through appropriate vendors. The non-recyclables shall be sent for well designed landfill site(s).
  - v. In case of compost plant, the windrow area shall be provided with impermeable base. Such a base shall be made of concrete or compacted clay, 50 cm thick, having permeability coefficient less than  $10^{-7}$  cm/sec. The base shall be provided with 1 to 2 per cent slope and circled by lined drains for collection of leachate or surface run-off;
  - vi. Ambient air quality monitoring shall be regularly carried out particularly for checking odour nuisance at down-wind direction on the boundary of processing plant.

- In order to ensure safe application of compost, the following specifications for compost quality shall be met, namely:-

<u>Parameters</u>	<u>Concentration not to exceed *</u> <u>(mg/kg dry basis , except pH value and C/N ratio)</u>
<u>Arsenic</u>	<u>10.00</u>
<u>Cadmium</u>	<u>5.00</u>
<u>Chromium</u>	<u>50.00</u>
<u>Copper</u>	<u>300.00</u>
<u>Lead</u>	<u>100.00</u>
<u>Mercury</u>	<u>0.15</u>
<u>Nickel</u>	<u>50.00</u>
<u>Zinc</u>	<u>1000.00</u>
<u>C/N ratio</u>	<u>20-40</u>
<u>PH</u>	<u>5.5-8.5</u>

\* Compost (final product) exceeding the above stated concentration limits shall not be used for food crops. However, it may be utilized for purposes other than growing food crops.

4. The disposal of treated leachates shall follow the following standards, namely:-

<u>S.No</u>	<u>Parameter</u>	<u>Standards</u> <u>( Mode of Disposal )</u>		
		<u>Inland surface water</u>	<u>Public sewers</u>	<u>Land disposal</u>
<u>1.</u>	<u>Suspended solids, mg/l, max</u>	<u>100</u>	<u>600</u>	<u>200</u>
<u>2.</u>	<u>Dissolved solids (inorganic) mg/l, max.</u>	<u>2100</u>	<u>2100</u>	<u>2100</u>
<u>3</u>	<u>PH value</u>	<u>5.5 to 9.0</u>	<u>5.5 to 9.0</u>	<u>5.5 to 9.0</u>
<u>4</u>	<u>Ammonical nitrogen (as N), mg/l, max.</u>	<u>50</u>	<u>50</u>	<u>=</u>

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<u>5</u>	<u>Total Kjeldahl nitrogen (as N), mg/l, max.</u>	<u>100</u>	<u>=</u>	<u>=</u>
<u>6</u>	<u>Biochemical oxygen demand ( 3 days at 27<sup>0</sup> C) max.(mg/l)</u>	<u>30</u>	<u>350</u>	<u>100</u>
<u>7</u>	<u>Chemical oxygen demand, mg/l, max.</u>	<u>250</u>	<u>=</u>	<u>=</u>
<u>8</u>	<u>Arsenic (as As), mg/l, max</u>	<u>0.2</u>	<u>0.2</u>	<u>0.2</u>
<u>9</u>	<u>Mercury (as Hg), mg/l, max</u>	<u>0.01</u>	<u>0.01</u>	<u>=</u>
<u>10</u>	<u>Lead (as Pb), mg/l, max</u>	<u>0.1</u>	<u>1.0</u>	<u>=</u>
<u>11</u>	<u>Cadmium (as Cd), mg/l, max</u>	<u>2.0</u>	<u>1.0</u>	<u>=</u>
<u>12</u>	<u>Total Chromium (as Cr), mg/l, max.</u>	<u>2.0</u>	<u>2.0</u>	<u>=</u>
<u>13</u>	<u>Copper (as Cu), mg/l, max.</u>	<u>3.0</u>	<u>3.0</u>	<u>=</u>
<u>14</u>	<u>Zinc (as Zn), mg/l, max.</u>	<u>5.0</u>	<u>15</u>	<u>=</u>
<u>15</u>	<u>Nickel (as Ni), mg/l, max</u>	<u>3.0</u>	<u>3.0</u>	<u>=</u>
<u>16</u>	<u>Cyanide (as CN), mg/l, max.</u>	<u>0.2</u>	<u>2.0</u>	<u>0.2</u>
<u>17</u>	<u>Chloride (as Cl), mg/l, max.</u>	<u>1000</u>	<u>1000</u>	<u>600</u>
<u>18</u>	<u>Fluoride (as F), mg/l, max</u>	<u>2.0</u>	<u>1.5</u>	<u>=</u>
<u>19</u>	<u>Phenolic compounds (as C<sub>6</sub>H<sub>5</sub>OH) mg/l, max.</u>	<u>1.0</u>	<u>5.0</u>	<u>=</u>

Note : While discharging treated leachates into inland surface waters, quantity of leachates being discharged and the quantity of dilution water available in the receiving water body shall be given due consideration.

The incinerators shall meet the following operating and emission standards, namely:-

**A. Operating Standards**

(1) The combustion efficiency (CE) shall be at least 99.00%.

(2) The combustion efficiency is computed as follows :

$$C.E. = \frac{\%CO_2}{\%CO_2 + \%CO} \times 100$$

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**1. Emission Standards**

Parameters	Concentration mg/Nm <sup>3</sup> at (12% CO <sub>2</sub> correction)	
(1) Particulate matter	150	150
(2) Nitrogen Oxides	450	
(3) HCl	50	
(4) Minimum stack height shall be 30 metres above ground.		
(5) Volatile organic compounds in ash shall not be more than 0.01%.		

**Note :**

1. Suitably designed pollution control devices shall be installed or retrofitted with the incinerator to achieve the above emission limits, if necessary.
2. astes to be incinerated shall not be chemically treated with any chlorinated disinfectants
3. Chlorinated plastics shall not be incinerated.
4. Toxic metals in incineration ash shall be limited within the regulatory quantities as specified in the Hazardous Wastes (Management and Handling) Rules, 1989 as amended from time to time.
5. Only low sulphur fuel like l.d.o., l.s.h.s or Diesel shall be used as fuel in the incinerator.

**Form –I**

**[see rules 4(2) & 6(2)]**

**Application for obtaining authorization**

To,  
 The \_\_\_\_\_ Member \_\_\_\_\_ Secretary  
 \_\_\_\_\_  
 \_\_\_\_\_

1.	<u>Name of the municipal authority/Name of the agency appointed by the municipal authority</u>	:	-
2.	<u>Correspondence address</u>  <u>Telephone No.</u>  <u>Fax No.</u>	:	-
3.	<u>Nodal Officer &amp; designation(Officer authorised by the municipal authority or agency responsible for operation of processing or disposal facility)</u>	:	-
4.	<u>Authorization applied for (Please tick mark)</u>	:	<u>(a) Setting up &amp; operation of</u>

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			<u>waste rocessing facility</u>
			<u>(b)Setting up &amp; operation of disposal facility</u>
<u>5.</u>	<u>Detailed proposal of waste processing/disposal facility (to be attached ) to include</u>	:	-
<u>5.1</u>	<b><u>Processing of Waste</u></b>  <u>i. Location of site</u> <u>ii. Name of waste processing technology</u> <u>iii. Details of processing technology</u> <u>iv. Quannitty of waste to be processed per day</u> <u>v. Site clearance (from local authority)</u> <u>vi. Details of agreement between municipal authority and operating agency</u> <u>vii. Utilization programme for waste processed (Product utilization)</u> <u>viii. Methodology for disposal of waste processing rejects (quantity and quality)</u> <u>ix. Measures to be taken for prevention and control of environmental pollution</u> <u>x. Investment on Project and expected returns</u> <u>xi. Measures to be taken for safety of workers working in the plant</u>	:	-
<u>5.2</u>	<b><u>Disposal of Waste</u></b>  <u>i. Number of sites indentified</u> <u>ii. Layout maps of site</u> <u>iii. Quantity of waste to be disposed per day</u> <u>iv. Nature and composition of waste</u> <u>v. Details of methodology or criteria followed for site selection</u> <u>vi. Details of existing site under operation</u> <u>vii. Methodology and operational details of landfilling</u> <u>viii. Measures taken to check environmental pollution</u>	:	-
<u>Date</u>		<u>Signature of Nodal Officer</u>	

Form - II

[See rule 4(4)]

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Format of Annual Report to be submitted by the Municipal Authority

- i. Name of City/Town:.....
- ii. Population .....
- iii. Name of municipal body:..... and  
Address .....

Telephone No. : .....

Fax : .....

- iv. Name of Incharge dealing with municipal solid wastes .....  
..... with  
designation .....

**1. Quantity and composition of solid wastes**

(i) Total quantity of wastes generated per day

.....

(ii) Total quantity of wastes collected per day

.....

(iii) Total quantity of wastes processed for :

- a. Composting: .....
- b. Vermiculture: .....
- c. Pellets: .....
- d. Others, if any, please specify  
.....

(iv) Total quantity of waste disposed by landfilling:  
.....

a. no. of landfill sites used :  
.....

b. Area used: .....

c. Whether Weigh bridge facilities available : Yes/No

a. Whether area is fenced : Yes/No

a. Lighting facility on site : Yes/No

(f) Whether equipment like Bulldozer, Compacters etc.available. (Please specify) :-----

a. Total Manpower available on site: -----

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a. Whether covering is done on daily basis : Yes/No

i. Whether covering material is used and whether it is adequately available :  
-----

a. Provisions for gas venting provided : Available (Yes/No) /Not available

a. Provision for leachate collection : Provisions made/ Provisions not made

**2. Storage facilities**

(i) Area covered for collection of wastes : -----

(ii) no. of houses covered : -----

(iii) Whether house-to-house collection is practised (if yes, whether done by Municipality or through Private Agency or Non-Governmental Organisation) : -----

(iv) Bins : -----

Specifications Existing Proposed

(Shape & Size) Numbers for future

a. RCC Bins (Capacity) : -

b. Trolleys (Capacity) : -

(c) Containers (Capacity) : -

d. Dumper Placers : -

e. Others, please specify : -

(v) Whether all bins/collection spots are attended for daily lifting of garbage : Yes/No

(vi) Whether lifting of garbage from dustbins is manual or mechanical i.e. for example by using of front-end loaders (Please tick mark) : Manual/Loader/Others, please specify

**3. Transportation**

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	<u>Existing number</u>	<u>Actually Required/Proposed</u>
<u>(i) Truck :</u>		
<u>(ii) Truck-Tipper :</u>		
<u>(iii) Tractor-Trailer :</u>		
<u>(iv) Refuse-collector :</u>		
<u>(v) Dumper-placers :</u>		
<u>(vi) Animal Cart :</u>		
<u>(vii) Tricycle :</u>		
<u>(viii) Others (please specify) :</u>		

**4. Whether any proposal has been made to improve solid wastes management practices**

**4. Are any efforts made to call for private firms etc. to attempt for processing of waste utilising technologies like :**

	<u>Waste Utilisation Technology</u>	<u>Proposals</u>	<u>Steps taken (Quantity to be processed)</u>
<u>i. Composting :</u>			
<u>ii. Vermiculture :</u>			
<u>iii. Pelletisation :</u>			
<u>iv. Others if any, Please specify :</u>			

**6. What provisions are available and how these are implemented to check unhygienic operations of :**

- i. Dairy related activities :
- ii. Slaughter houses and unauthorised slaughtering :
- iii. Malba (cnstruction debris) lifting :

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iv. Encroachment in Parks, Footpaths etc. :

**7. How many slums are identified and whether these are provided with sanitation facilities :**

-

**8. Are municipal magistrates appointed for Taking penal action : Yes/No**

[ If yes, how many cases registered & settled during last three years (give year-wise details)]

**9. Hospital waste management**

i. How many Hospitals/Clinics under the control of the Corporation:

ii. What methods are followed for disposal of bio-medical wastes ?:

iii. Do you have any proposal for setting up of common treatment facility for disposal of bio-medical wastes :

iv. How many private Nursing Homes, Clinics etc. are operating in the city/town

and what steps have been taken to check disposal of their wastes :

Signature of Municipal Commissioner

Dated :

---

**Form -III**

**[See-rule 6(2)]**

**Format for Issue of Authorisation**

File No.: \_\_\_\_\_

Date: \_\_\_\_\_

To,

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Ref: Your application number \_\_\_\_\_ dt. \_\_\_\_\_

The \_\_\_\_\_ State Pollution Control Board/Pollution Control Committee after examining the proposal hereby authorises \_\_\_\_\_ having their administrative

office at \_\_\_\_\_ to set up and operate waste processing/waste disposal facility at \_\_\_\_\_ on the terms and conditions (including the standards to comply) attached to this authorization letter.

1. The validity of this authorization is till \_\_\_\_\_. After the validity, renewal of authorization is to be sought.
2. The \_\_\_\_\_ State Pollution Control Board/Pollution Control Committees may, at any time, revoke any of the conditions applicable under the authorization and shall communicate the same in writing.
3. Any violation of the provision of the Municipal Solid Wastes (Management and Handling) Rules, 2000 will attract the penal provision of the Environment (Protection) Act, 1986 (29 of 1986).

(Member Secretary)

State \_\_\_\_\_ Pollution \_\_\_\_\_ Control \_\_\_\_\_ Board/  
Pollution Control Committee

Date \_\_\_\_\_ :

Place :

**Form - IV**

**[see rule 8(1)]**

**Format of Annual Review Report to be submitted by the State Pollution Control Board/Committees to the Central Pollution Control Board**

To,  
The \_\_\_\_\_ Chairman,  
Central \_\_\_\_\_ Pollution \_\_\_\_\_ Control \_\_\_\_\_ Board,  
(Ministry of Environment and Forests )  
Government of \_\_\_\_\_ India,  
'Parivesh Bhawan', East Arjun Nagar,  
**DELHI- 110 0032.**

1.	<u>Name of the State/Union territory</u>	:	-
2.	<u>Name &amp; address of the State Pollution Control</u>	:	-
3.	<u>Board/Pollution Control Committee Number of municipal authorities responsible for management of municipal solid wastes in the State/Union territory under these rules</u>	:	-
4.	<u>A Summary Statement on progress made by municipal authorities in respect of implementation</u>	:	<u>Please attach as Annexure-I</u>

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	<u>of Schedule I [rule 4(3)]</u>		
5.	<u>A Summary Statement on progress made by municipal authorities in respect of implementation of Schedule II [rules 6(1) and (3), 7(1)]</u>	:	<u>Please attach as Annexure-II</u>
6.	<u>A Summary Statement on progress made by municipal authorities in respect of implementation of Schedule III [rules 6(1) and (3), 7(2)]</u>	:	<u>Please attach as Annexure-III</u>
7.	<u>A summary statement on progress made by municipal authorities in respect of implementation of Schedule IV [rules 6(1) and (3), 7(2)]</u>	:	<u>Please attach as Annexure-IV</u>
Date: _____		Chairman or the Member Secretary	
Place : _____		State Pollution Control Board/ Pollution Control Committee	

Form - V

[see rule 9] \_\_\_\_\_

Accident reporting

1.	<u>Date and time of accident</u>	:	-
2.	<u>Sequence of events leading to accident</u>	:	-
3.	<u>The waste involved in accident</u>	:	-
4.	<u>Assessment of the effects of the accidents on human health and the environment</u>	:	-
5.	<u>Emergency measures taken</u>	:	-
6.	<u>Steps taken to alleviate the effects of accidents</u>	:	-
7.	<u>Steps taken to prevent the recurrence of such an accident</u>	:	-

Date : .....	Signature : .....
Place : .....	Designation : .....

V.Rajagopalan, Jt.Secy.  
[F.No.17-2/95-HSMD]

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