

REPORT
ON
STATUS OF MUNICIPAL SOLID WASTE
MANAGEMENT IN GWALIOR CITY



2010-11



Central Pollution Control Board
Central Zonal Office
Bhopal



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**Central Pollution Control Board
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Status of Municipal Solid Waste Management in Gwalior City

Executive Summary:

The increase in generation of solid waste is only the result of the rapidly growing human population and the adopted modern life style; the substantial increase in the solid waste generation resulting into the contamination of air, water and land resources. Municipal solid wastes, commonly known as trash or garbage, are the solid wastes generated from different municipalities. Some of these wastes have been proved to be extremely toxic and infectious. The uncontrolled and un-scientific dumping of such wastes has brought about a rising number of incidents of hazards to human health. Contamination of surface and ground water arose more serious human health risk.

Realizing the need for proper and scientific management of solid waste and based on the recommendations of the various committees and of the Supreme Court Committee the Ministry of Environment & Forests notified the Municipal Solid Waste (Management & Handling) Rules, 2000 under the Environment (Protection) Act of 1986. The objective of these Rules was to make every municipal authority responsible for the implementation of various provisions of the Rules within its territorial area and also to develop an effective infrastructure for collection, storage, segregation, transportation, processing and disposal of Municipal Solid Wastes (MSW). The indiscriminate dumping of municipal solid wastes in water bodies and low lying areas is a common practice followed by most of the municipalities with no consideration of its effect on the environment. Moreover, the lack of the basic information regarding generation, collection, transportation and disposal of solid waste was noted.

The non-serious efforts for the proper segregation of waste at source as well as at the disposal site is one of the biggest problem for this most visible, unpleasant odour, potential diseases carrier waste. The poor practise of non-segregated waste, containing some toxic material, chemicals and animal bodies/wastes etc. going into the municipal waste stream end up in the landfills, which serve as dump yards and dump sites. The waste is being disposed in an unscientific manner, which causes serious environmental problems.

As Central Pollution Control Board was identified as the nodal agency to monitor the MSW (Management & Handling) Rules, 2000 implementation directly in the Union territories and in the case of the States through State Pollution Control Boards. In exercise of the same Zonal Office, Bhopal conducted the compliance verification of MSW Rules implementation in the City Gwalior of State Madhya Pradesh.

A Centrally sponsored scheme started in year 2002-03 to enable the concerned towns to take action for proper Solid Waste Management and drainage which will avoid air crashes in the Air-field towns. The Detailed Project Report (DPR) for Gwalior was submitted by National Buildings Construction Corporation (NBCC) & Housing Urban Development Corporation (HUDCO) and approved by the Central Public Health and Environmental Engineering Organisation (CPHEEO), a department under the Ministry of Urban Development (MoUD) and the fund was sanctioned for implementation.

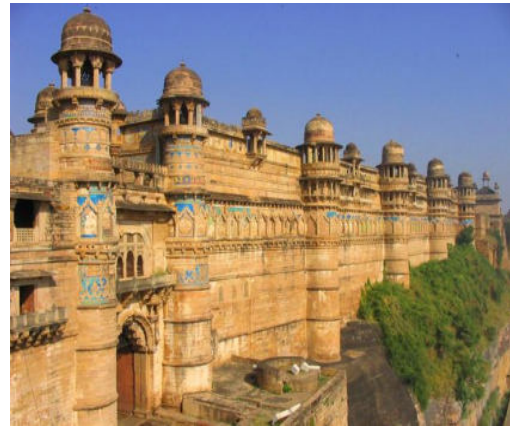
As the Gwalior city is an Air-field town, Zonal office, Bhopal proposed a project under Annual Action Plan 2010-11 to 'Study the performance of MSW Gwalior' to get the status of practices followed to implement the MSW Rules, 2000.

Due to the effective community-to-community garbage collection facility of total generated waste and a processing unit at village Kedarpur for RDF & Compost Gwalior city is complying largely on the MSW (M&H) Rules, 2000.

However it is suggested to involve few more vehicles to transport the ~80 MT waste (left un-collected) to the processing site to get worth out of the waste.

1.0 Introduction:

Gwalior is located at (**Latitude: 26° 13' 25 N, Longitude: 78° 10' 45 E**). It has an average elevation of 197 metres (646 feet). It is an historic Indian city located on the periphery of Madhya Pradesh. It occupies a strategic location in the Gird region of India, and the city and its fortress have served as the centre of several of historic northern



Indian kingdoms. That the location of the city still is considered militarily important is signalled by the presence of a major air force base at Maharajpura. As of 2001, India census, Gwalior had a population of 8, 26,919 & population density of 2409/km². Its greater metropolitan area is the 46th most populous area in the country.

Gwalior has a sub-tropical climate with hot summers from late March to early July, the humid monsoon season from late June to early October and a cool dry winter from early November to late February. Under *Koppen's climate classification* the city has a humid sub-tropical climate. The highest recorded temperature was 53°C and the lowest was -1°C. Summers start in late March and along with other cities like Nagpur and Delhi are among the hottest in India and the world. They peak in May and June with average daily temperatures being around 33-35°C (93-95°F) and end in late June with the onset of the monsoon. Gwalior gets 970 mm (39 inch) of rain every year, most of which is concentrated in the monsoon months from late June to early October. August is the wettest month with about 310 mm (12 in) of rain. Winter in Gwalior starts in late October and is generally very mild with daily temperatures averaging in the 14-16°C (58-62°F) range and mostly dry and sunny conditions. January is the coldest month with average lows in the 5-7°C range (40-45°F) and occasional cold snaps that plummet temperatures to close to freezing.

1.1 Importance of proper MSW management:

The out-dated, inefficient, institutional weakness, shortage of working manpower, inadequate financial resources, improper choice of technologies, inadequate coverage of areas & poor short & long term waste management planning are few of the reasons why the MSW management system in India is lacking to desired level. The City Gwalior is probably the one of the city who is more aware about the un-organised solid waste pollution. To raise the standards of health, sanitation and urban environment keeping pace with the rapid urbanization and growing population city Gwalior's Municipality took an initiative along with the central government scheme and developed one waste processing site through M/s AKC Developers Limited at Kedarpur village. The proper waste collection practice of Gwalior municipality is one of the primary needs to avoid any solid waste nuisance.

The adverse effects on environment due to un-scientific management of waste disposal are well known. These are as follow:

- ♣ Ground and Surface water pollution
- ♣ Air pollution due to bad odour of the waste
- ♣ Green-house-gases i.e. Carbon di oxide
- ♣ Harmful effects of rats, stray animals, flies, mosquitoes, germs and other insects
- ♣ Increase in acidity of soil near the garbage heaps
- ♣ Probability of diseases and epidemics
- ♣ Health related problems for rag pickers

In the view of above, studies were taken up to assess the contamination status in and around the dumpsites of the city. The ambient air quality (SPM, SO₂, NO₂ and NH₃) and ground water (physico-chemical & heavy metal parameters) monitoring was carried out and samples were analysed at CPCB, Zonal Office, Bhopal laboratory.

1.2 Present Scenario - Gwalior city:

Most of the population of Gwalior city was found aware about the adverse effects of un-scientific management of solid waste generated through domestic, industrial activities. The dumping of waste at proper or available municipal bins was found practices by majority however at few places waste was also found on streets, open spaces, drains. Segregation of recyclable waste is practiced at the processing site. It was found that a proper system of door-to-door collection of waste has been developed by the Gwalior Municipal Corporation.

There has been a significant increase in the generation of municipal solid waste in Gwalior over the last few decades. The daily estimated generation of municipal solid waste in Gwalior city from 1, 47,189 houses of all 60 wards of city is approximately **285 tons/day**. To collect this waste municipal co-operation has taken few steps as 325 dust bins, 23 trolleys of 70m³ capacity each, bins of 1200m³ capacity and 15 dumper placers are being used regularly. This facility is able to collect about 200 tons of solid waste per day. Collection of waste done mechanically not manually. To transport collected waste to identified site dumper placers, tractors, refuse collector, dumper, animal carts & hand driven carts are being used.

Gwalior, being a heritage and tourist city, there are many hotels and restaurants in the city. Arrangements of primary collection of waste from hotels and restaurants are also done along with the adequate storage facilities for the waste of vegetable, fruits and fish markets. The market waste is collected in from proper movable/non-movable bins.

Gwalior has a biomedical treatment facility to incinerate the medical waste received from hospitals, nursing homes etc. however a small quantity of medical waste received through municipal solid waste.

1.2.1 Collection of Municipal Solid Waste

The storage of MSW at the source was found satisfactory throughout the Gwalior city. The different bins are being used for the decomposable and non-decomposable waste (proper segregation of waste is performed). Storage bins classified as movable bins and fixed bins. The movable bins are flexible in transportation but lacking in durability, while the fixed bins are more durable but their positions cannot be changed once they have been constructed. A sweeper who sweeps the roads manually is allotted a specific area. The sweepers put the road wastes into a wheelbarrow and then transfer the waste to dustbins or collection points.



The proper storage & collection of waste generated is being practiced seriously and out of the generated 285 MT/Day waste, 200 MT/Day waste collected by the deputed vehicles of municipality and transported to processing site for compost & Refused-Derived Fuel (RDF). Total 14 locations were identified by the municipality authority for waste collection i.e. Railway Station, City Center, Girls college - Murar, DD nagar, Bijali-ghar, Lakshmi-bai colony, Maheshwary hospital etc. The sweepers deputed area-wise for the roads, streets & drains cleaning are doing their work efficiently with full responsibility to make the city clean. It was also observed that sweepers were cleaning road in evening also. Peoples of Gwalior were also found aware and practicing to drop their waste into the available bins. However the city is congested at some places, waste was found in streets but informed by the local persons that municipality persons come and collect the waste. Because of the different-different waste collection bins, waste automatically segregated without any manual extra efforts. The waste was also not found outside the bins at many places. Stray animals' probability near to bins also reduced because of the waste dropped inside the bins not the outside.



1.2.2 Transportation of Municipal Solid Waste

Total waste generation from 1, 47,189 houses of all 60 wards of city is approximately 285 tons/day. To collect this waste municipal co-operation has taken few steps as 325 dust bins, 23 trolleys of 70m³ capacity each, bins of 1200m³ capacity and 15 dumper placers are used regularly. This facility is able to collect about 200 tons of solid waste per day. Collection of waste is done mechanically not manually. To transport collected waste to identified site is done by using dumper placers, tractors, refuse collector, dumper, animal carts & hand driven carts. The Vehicles are covered with plastic sheets to avoid littering of waste during transportation. The site identified by municipality is at Shivpuri link- road, gram Kedarpur, Gwalior spread in the area of 25 hectares. The site was developed by M/s AKC developer's limited. During the study period, it was observed that vehicles transporting waste covered with the tarpaulin/plastic sheets.

1.2.3 Municipal Solid Waste Process plant

Municipal Solid Waste treatment & processing plant identified by municipality is at Shivpuri link- road, gram Kedarpur, Gwalior spread in the area of 25 hectares. Operating by **M/s AKC Developers Ltd.** The processing plant is the result of Central Government scheme of establishment of Municipal Solid Waste processing plant in the Air-based town. The Detailed Project Report (DPR) for Gwalior was submitted by National Buildings Construction Corporation (NBCC) under Solid Waste management scheme for mitigation of bird hit menace to Indian Air Force (IAF) air crafts, Gwalior and approved by the Central Public Health and Environmental Engineering Organisation (CPHEEO), a department under the Ministry of Urban Development (MoUD) and the fund was sanctioned for implementation. Pucca road and adequate light facility provided inside the plant premises. Laboratory facility was also set-up here to assess the moisture content, Calorific



value of the waste. However pollution monitoring conducted by MPPCB at regular time intervals.

The integrated management of solid waste facility commissioned here on **01 November 2009**. The plant is 12 km away from Gwalior city and 21 km away from the airport. Plant is authorized to process & dump the collected waste. Permission was granted for mechanical & vermi-composting as well as Refused Derived Fuel (RDF). On the day of first dry- monitoring (27thSeptember 2010) production of vermi-composting was not in process. As informed by the plant officials & officials of MPPCB, Gwalior, the segregation unit of plant got fire on **24th May 2010** (Unknown cause). The renewing of plant's segregation unit was completed soon and re-commissioned on 01st November, 2010. Second visit was made on 25th January, 2011 by the CPCB, Zonal Office Bhopal team.



In processing plant, firstly the received waste weighed on Weigh Bridge of **25 ton capacity**. Records of received waste maintained regularly. Received waste contains 30% inert, 20-25% Refuse-derived fuel (RDF), 15% compost & 35% inorganic. Plastics, rubbers, stones, wood, iron are few component of waste. After weighing the waste sent to segregation unit, auto-feeding is provided for the same. The waste passed through a ~60mm primary cage, where waste (RDF, Sand and Compost) separates according to their sizes. The waste more than ~60mm size separate as sand particles an average 10-12% of total waste comes as sand particle. Lesser than the ~60mm size separates as composting material, compost material heaped for the windrows composting process. Rest 35% of the total is plastics, papers, organic matters & wood separates as fuel e.g. refused –derived fuel (RDF).

For composting heaps of 250 MT is being inoculated with bio-culture, water spraying done at regular intervals i.e. 6 times for the total composting process of 42 days. After the 42 days of process the waste for compost dried and sent to vibrator of

40 mm sieves. Finally the compost waste passed through the 5mm sieve to get the final product. ~1 mm of the compost size along with the 22-27% of moisture is packed as final compost product. Flow Chart of compost preparation given at **Annexure I**. Total compost production is 40 Tons per day. Final product packed and sold to Haryana, Delhi, Uttar Pradesh & Madhya Pradesh states at ₹ 225 per bag of 50 Kgs.



Refused derived fuel (RDF) contains 4-5% of 7,000-8,000 Calorific values plastics, 90% paper, organic matters and woods etc. Samples of RDF send to in house laboratory to calculate calorific value. The flow chart of RDF preparation is given at **Annexure – II**. The each packet of RDF has approximately 7-8 Kgs weight. One ton of RDF sold to nearby Flex manufacturing industry at the rate of ₹4000/-. Total RDF is 30-40 tons of the total waste received per day. The reject of RDF is being mixed with compost heaps.

There is also vermi-composting facility with 31 numbers of total huts. The vermi-composting process was not in process soon will be started to convert the waste in bio-compost.

1.2.4 Disposal of Municipal waste

Earlier to this processing-cum-disposal site, Gwalior was having its solid waste dumping site at जैविक खाद्य संयंत्र, गोडगुडी का नाका, मुक्तिधाम. Soon after the



commissioning of new site, the waste started to transport here for processing as well as landfill. This site at village Kedarpur developed by M/s AKC Developers have disposal as well as leachate collection tank of HDPE liner to avoid ground water contamination.

As the waste received from the city is normally dry, so leachate generation quantity is

very less.

During the dry visit made during 27th September, 2010 the leachate pond was filled up by the rain water but during the second visit made during 25th January, 2011 leachate pond was dry as there was no rain from last 2-3 months also the waste was of less moisture.

The waste also being disposed near to the side walls of the plant. The dead animals if received with waste, disposed it in soil. The plastics as light material and reject of process were spread in the backyard of the RDF plant that can be improved manually by collecting plastics at one place. The disposed waste was burning at some places.



2.0 Present study:

The present Municipal Solid Waste Management system at Gwalior city is effectively comply with the Norms of the MSW (Management & Handling) 2000 Rules. Gwalior Municipal Corporation (GMC) has adopted traditional as well as current scientific approaches of collection and disposal of MSW. Due to that processing plant is receiving properly segregated waste.

As this MSW site of Gwalior commissioned through a Central Government Scheme for managing generated waste to avoid any Aircraft menace. The Zonal Office, CPCB, Bhopal proposed to study the present status so that the present status of the city's waste can be assessed.

2.1 Objective of studies:

Studies were taken up to assess the contamination status in and around the Municipal Solid Waste dump sites at Gwalior. The ambient air quality (SPM, SO₂, NO₂ and NH₃) and ground water (for physico-chemical and heavy metals parameters) were monitored during 2010-11.

2.1.1 Material & Methods

Ambient air monitoring was carried out at two locations for eight hourly basis. The sampling duration was decided as 8 hours at an average flow rate of 1.1 m³/min for suspended particulate matter and 1 LPM for gaseous pollutants.

The Respirable (RSPM) was collected on a G/F filter paper, whereas the Suspended Particulate Matter (SPM) was collected in a dust collector. Samples for determination of SO₂ and NO₂ were collected by bubbling air samples in an appropriate absorbing media in impingers at a flow rate of 1 LPM.

Improved West and Gaeke method for SO₂ - The ambient air is absorbed in a solution of sodium tetrachloromercurate and analysed by colorimetric technique.

Modified Jacob and Hochheiser method for NO₂- ambient air is absorbed in a solution of sodium hydroxide and sodium arsenite and analysed by colorimetric technique.

Monitoring of ammonia was also done at selected locations. Ammonia was measured by Indophenol method by absorbing the air sample in 0.1N H₂SO₄. Ground water samples were collected for various parameters like pH, chloride, sulphate, total solids were analysed at Zonal office, Bhopal laboratory as per CPCB methods.

2.1.2 Sampling locations

In order to assess the contamination status with respect to the emission sources of particulate matter and gases around the processing plant two sampling stations were established as AAQM-1 to AAQM-2. Total fourteen samples of all air pollutant (SO₂, NO₂, NH₃ & SPM) were collected from two different locations using Respirable Dust Samplers (RDS) & Handy-samplers.

Location details of the monitoring stations are given below:

1. **AAQM-1** : Near Administration building
2. **AAQM-2** : Near First Fuel plant

The surrounding area of plant is being used as dumping area of the rejected waste. The processing plant has landfill as per the guidelines along with a leachate collection tank. However the waste that is being disposed outside the plant area may in future can reduce the water quality through percolation. For the same, two ground water and one leachate sample was drawn to assess current pollution status of the water available for bathing as well as drinking purpose. Details of the ground water monitoring stations are given below:

1. Ground water near Administration building
2. Ground water near First fuel plant
3. Samples from Leachate collection pond

3.0 Results and discussion:

3.1 Ambient air quality

The data of average concentrations of four air pollutants - Suspended Particulate Matter, Sulphur dioxide, Nitrogen dioxide and Ammonia during the study period is provided in **Tables I**.

The estimated SPM concentration in the ambient air of the two sampling sites varied between **254 to 311 $\mu\text{g}/\text{m}^3$** . The primary sources of dust are windblown soil /MSW materials (compost plant near to administration building and RDF plant near to first fuel) and processing plants activity.

SO₂ values were varying **05 to 06 $\mu\text{g}/\text{m}^3$** that is near to Below the Detectable Limits (BDL) at all the locations and the NO₂ concentrations were in the range of **12 to 23 $\mu\text{g}/\text{m}^3$** . These concentrations were well within the acceptable limits. Ammonia (as NH₃) concentration in the ambient air varied between **59 and 78 $\mu\text{g}/\text{m}^3$** .

3.2 Ground Water Quality

The results of the physico-chemical & heavy metals parameters of ground water in and around the processing plant are presented in **Table - II**. Three ground water samples were collected 25th January, 2011. The TDS of the water samples in the study area varied from **454 to 804 mg/L**, indicating that water quality is good as per prescribed limits. Although there is no specific limit for conductivity, but it indicates the soluble ion concentration of the water. The electrical conductivity of water samples varied from **498 to 1,270 $\mu\text{S}/\text{cm}$** . Maximum values of TDS and conductivity was observed in leachate sample due to concentration of the water of waste.

The pH of ground water of the area varied from **7.69 to 8.12**. In the present area, the chloride content of the water samples varied from **42 to 122 mg/L** and the concentration of sulphates in ground water was detected upto **22 mg/L** in the study area. All the concentrations are well within the prescribed limits of **IS 10500:1991**.

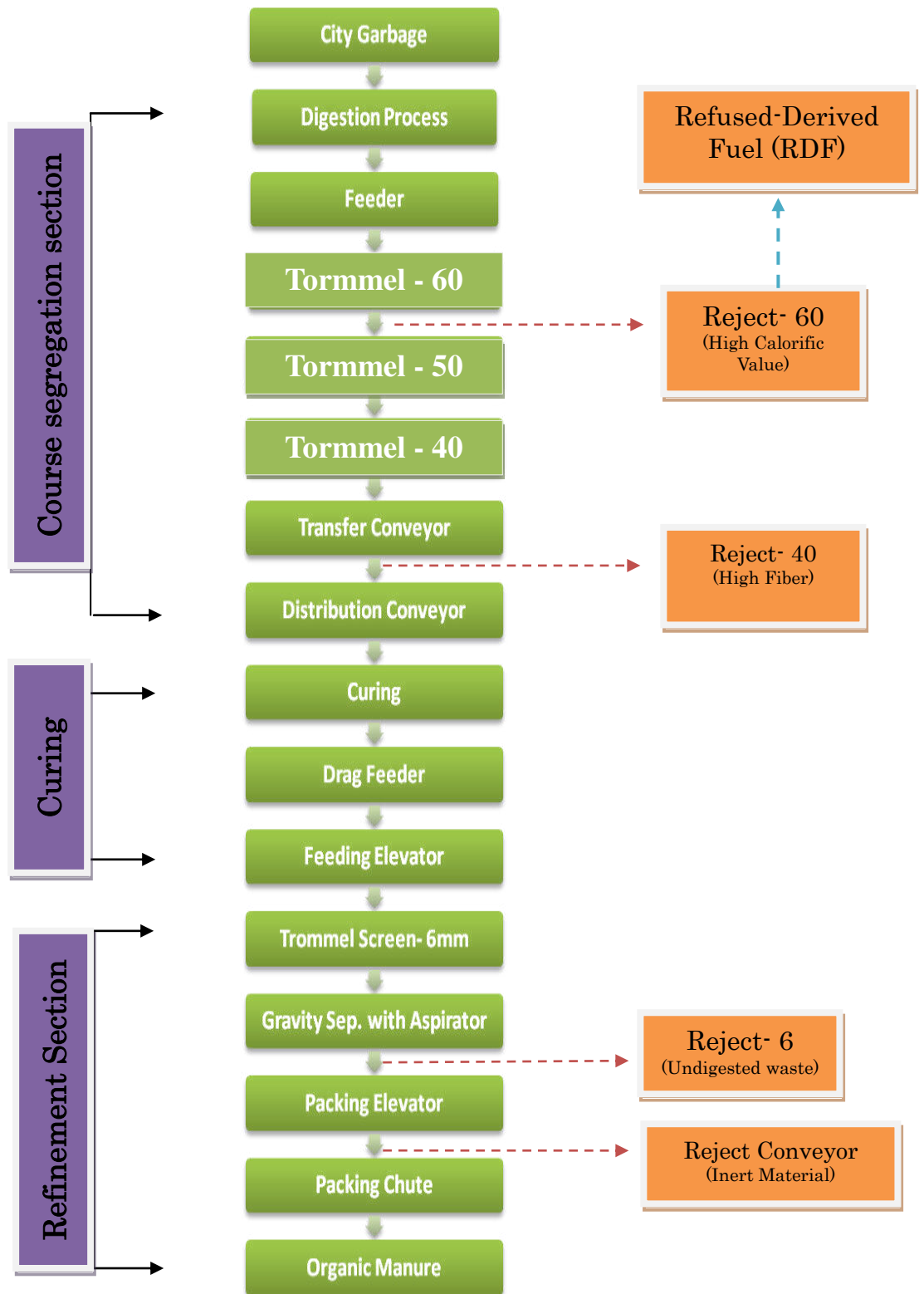
4.0 General Observations

- (a) It was observed that very effective community-to-community garbage collection facility is in practices all over the Gwalior city.
- (b) The cemented/ironed & plastic bins at many places of Gwalior area were in good conditions., overflowing of the bins was seen only 1-2 places else waste was found dropped into the bins. Awareness among public of the city makes it clean by throwing the waste inside the bins not here and there of the bins. Stray animals were away from the bins as the waste was not in their approach.
- (c) It was observed at few places that waste i.e. plastics, dry leaves was being burnt by causing black smoke.
- (d) Most of the drains beside the road were found clean and waste water was flowing freely.
- (e) Collection of waste done mechanically not manually. To transport collected waste to identified site dumper placers, tractors, refuse collector, dumper, animal carts & hand driven carts are being used.
- (f) The management of the waste at processing plant is as such that there is very light odour of waste and birds and animals were like nil in that place.
- (g) The waste is being carried out through the plastic covered vehicles avoiding any nuisance of waste.
- (h) It was observed that records and documents related to the dumping of waste at each dumpsite were maintained properly.
- (i) It is estimated that 280 MTD of solid waste is generated in the city through street sweeping and from the communal waste storage sites. Out of that only 200 MTD is collected and accepted by processing plant and rest is collected on another day.
- (j) It was observed that proper fencing, approach road, light is being provided however the monitoring facility for pollution measures is not available at the plant however regular monitoring is being carried out by MPPCB.

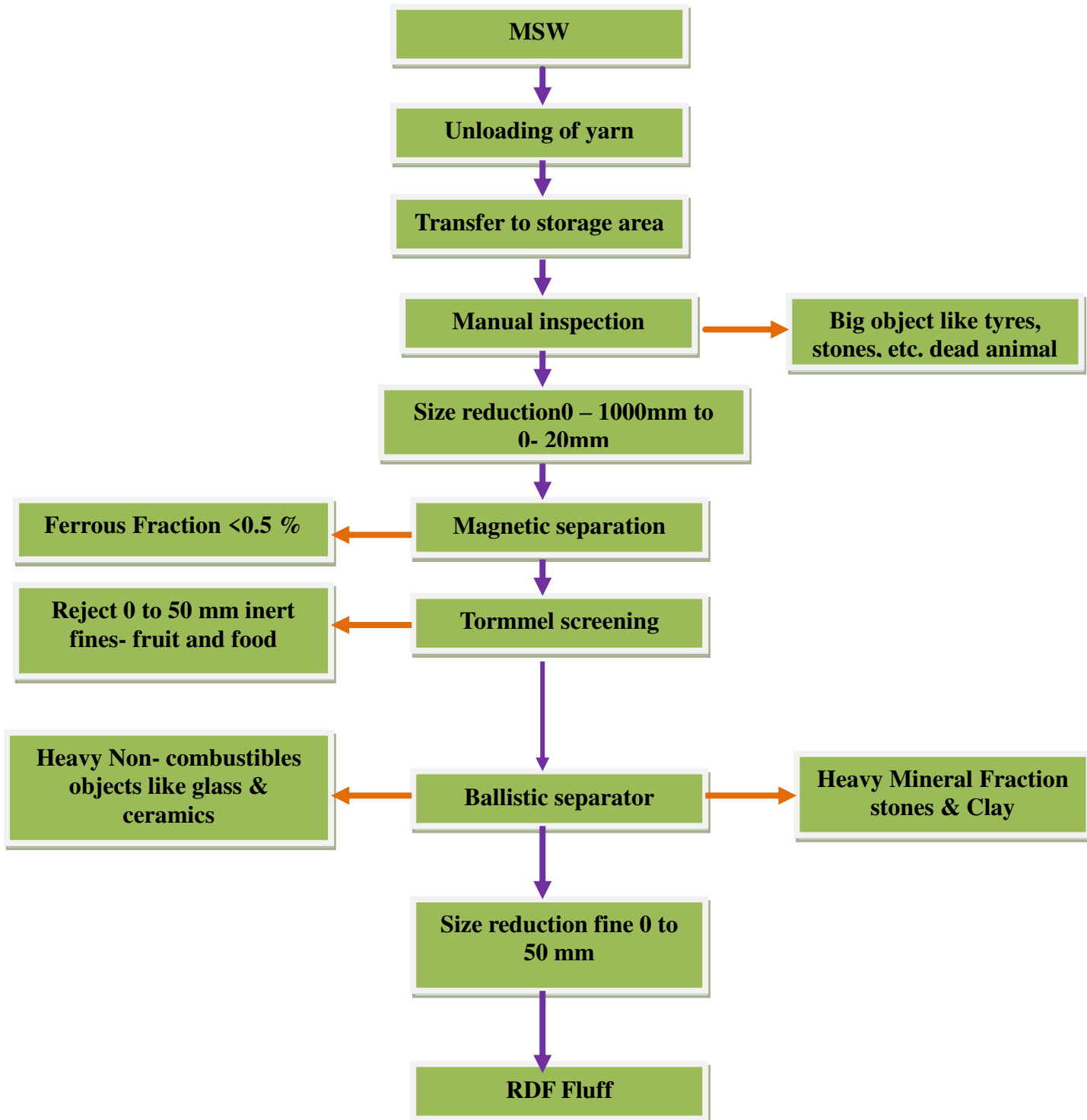
5.0 Recommendations:

- (a) To involve more vehicles per day to collect the rest of the waste 80 MTD to have more amount of waste to convert in compost or RDF.
- (b) To improve the plantation inside the plant premises.
- (c) To stop and prevent open burning of tree leaves and other waste by sweepers on the roadside and direct them to take all the waste to the communal waste storage bins/sites only.
- (d) To assess the pollution load, monitoring facility should to be developed at processing plant area.
- (e) To spread mass awareness through messages like “Clean Gwalior, Green Gwalior” or ‘Keep your waste unmixed’ etc. and cartoons related to MSW management can be painted on the GMC vehicles, Public buses or private buses for public awareness.
- (f) To spread awareness through cable TV and local channels as these are very powerful media to create awareness for public about solid waste management in the city. NGOs with good mass communication skills can develop good education programmes for the public on the new solid waste management strategies either through direct support or through use of GMC facilities.
- (g) To encourage Social Clubs to sponsor many events to keep the topic of Solid Waste Management in city alive and design programmes every week or month. Ward committees should use their good offices for public involvement to make their wards litter free and clean. Healthy competitions among the wards may be organized by the GMC. Corporation may also announce rewards to the employees contributing to the cleanliness of city.

Flow chart of Compost preparation



Flow chart of processing of RDF from MSW



**MSW status at Gwalior city with cross-references to Municipal Solid Waste
(Management and Handling) Rules, 2000**

Schedule-I

S. No.	Compliance Criteria	Status
1.	Setting up of waste processing and disposal facilities- latest by Dec.2003	Waste processing & disposal site was commissioned in year 2009.
2.	Monitoring the performance of waste processing and disposal facilities- Once in six months	Complied
3.	Improvement of existing landfill site as per provisions of these Rules- latest by Dec.2001	Complied
4.	Identification of landfill site for future use and making site(s) ready for operation- latest by Dec.2002	Complied

Schedule-II

S. No.	Parameters	Compliance criteria	Status
1.	Collection of Municipal Solid Waste	(i) Organizing house-to-house collection of municipal solid waste through any of the methods like community bin collection, house-to-house collection.	Complied
		(ii) Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas.	Complied
		(iii) Wastes from slaughterhouses, meat and fish markets, fruits and vegetable markets, which are biodegradable in nature shall be managed to make use of such waste.	Complied <i>(Don't receive dead animals, if received than digged under the soil outside the plant premises)</i>
		(iv) Bio-medical wastes and industrial waste shall not be mixed with municipal solid waste and such wastes shall follow the rules separately specified for the purpose.	Complied <i>(BMW facility is provided in City Gwalior)</i>
		(v) Waste (garbage, dry leaves) shall not be burnt	Partial Complied
		(vi) 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.	Complied
2.	Segregation of Municipal Solid Waste	In order to encourage the citizens, municipal authority shall organize awareness programmes for segregation of waste and shall promote recycling or reuse of segregated materials.	Partially Complied
3.	Storage of Municipal Solid Waste	Municipal authorities shall establish and maintain storage facilities in such a manner as they do not create unhygienic and in sanitary conditions around it. Following criteria shall be taken into account while establishing and maintaining storage facilities namely.	Complied

4. Transportation of Municipal Solid Waste	Vehicles used for transportation of waste shall be covered. Waste should not be visible to public, or exposed to open environment preventing their scattering.	Complied
5. Processing of Municipal Solid Waste	Municipal authorities shall adopt suitable technology or combination of such technology to make use of wastes so as to minimize burden on landfill i.e. biodegradable waste shall be processed by composting, vermin-composting, anaerobic digestion etc.	Complied <i>(Waste processing plant to compost & bio-composting along with the RDF plant)</i>
6. Disposal of Municipal Solid Waste	Land filling shall be restricted to non-biodegradable, inert waste and other waste that are not suitable either for recycling or for biological processing.	Complied

Schedule-III

S. No	Specification for Landfill Sites	MSW dump site Gwalior
1.	Site Selection	Site at village Kedarpur developed by M/s AKC Developers is 12 Kms & 21 Kms away from the railway station & airport respectively. The site was developed as per the CPCB guidelines.
2.	Facilities at the Site	Approach & other internal roads and fence /boundary wall at dumpsite exist inside the sites. Weigh bridge working in good condition and record related dumping of MSW was maintained properly at both the sites. Facilities provided at site: (i) Protection to prevent entry of unauthorized persons and stray animals is managed properly through heavy fencing. (ii) Inspection facility to monitor wastes brought in for landfill, equipment and machinery and pollution monitoring equipment were provided in a on-site laboratory
3.	Specification for land filling	Leachate tank with HDPE liner provided but due to dry & less waste leachate tank was empty.
4	Pollution Prevention	Water Quality Parameters: piezometric holes were not provided; hence ground water from nearby area was collected. Air Quality Data: The values of SPM, SO ₂ , NO ₂ and NH ₃ well within the limits at the time of monitoring. Vegetative covers shall be improved around the plant area.

Table I: Ambient Air Monitoring at MSW Site Kedarpur village, Gwalior

S. No	Time	Near Admn. office				Near First fuel			
		SO ₂	NO ₂	NH ₃	SPM	SO ₂	NO ₂	NH ₃	SPM
Sampling Date: 25.01.2011									
01	10am -- 2pm	05	12	59	254	07	11	76	311
02	2pm --- 6pm	06	23	78		05	30	63	

#All values are in $\mu\text{g}/\text{m}^3$

Table II: Ground Water and Leachate Analysis Report

Sample collection: 25th January, 2011

S.No.	Locations	pH	Conductivity (μS)	TS	TDS	Cl ⁻	SO ₄ ⁻²
1.	Ground water Near Admin office	8.12	498	460	454	42	04
2.	Ground water Near First fuel	8.01	614	508	503	56	03
3.	Leachate collection	7.69	1270	828	804	122	22

#All values are in mg/l, except pH and conductivity in μS

NOTE: The value of heavy metals (Cr, Mn, Cu, Ni, Fe, Pb & Cd) was found Below the Detectable Limits (BDL) in two ground water & one leachate samples.