



Status of MSW Collection, Treatment & Disposal in and around Jaipur City

2007 – 08



Central Pollution Control Board
Zonal Office – Bhopal

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Status of Municipal Solid Waste Management in Jaipur City

Executive Summary

The Municipal Solid Waste (M & H) Rules were notified under E (P) Act in the year 2000 and a time frame for implementing these rules was also specified. The final time was given up to December 2003 to comply with the Rules by all the local bodies in India.

No efforts were made to proper segregation of waste at source as well as at the disposal site. The 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 deposited in an unscientific manner, which causes serious environmental problems. The waste management in Jaipur is no exception and similar findings were made during the study.

The following major observations were made during the study:

- Current municipal solid waste management systems at Jaipur Municipal Corporation (JMC) is partially using the traditional approach of collection and disposal of MSW. Adequate infrastructure was not developed for collection, storage, segregation, transportation, processing and disposal of MSW.
- Very small quantity (130-140 TPD) of MSW was being processed for manufacturing the RDF.
- The existing dumpsites at Sewapura and Langariawas, which continue to be in use for more than 10 years are not be improved to meet the specifications given in Schedule-III of MSW (M&H) Rule, 2000.
- The dumpsites are surrounded by residential colonies, educational institutions, water bodies and many sensitive installations. Service roads and buffer zone were not developed around the site.
- Other facilities like record keeping, shelter, drinking water, bathrooms, first aid, etc. were not even given any thought at the dumpsite.
- Preventive actions to control pollution at the sites such as leachate collection, pucca roads, plantations were also not initiated.
- Both the sites were not fenced allowing the waste pickers, children, animals of all kinds including camel inside the dump yards.
- AAQ data was within the prescribed limits, but high TDS and chloride contents in the ground water indicate contamination of the area due to dumping of MSW.

It was observed that there was a huge gap in implementation of the Rules at the ground level. There is a critical need to address this gap by bringing together all the concerned stakeholders on a common platform and explore the suitable solutions to arrest the problems.

1.0 Introduction

With the rapid growth of population and modern life style, there has been a substantial increase in the generation of solid waste resulting into the contamination of air, water and land resources. Human activities create waste, and it is the way these wastes are handled, stored, collected and disposed of that pose risks to the environment and to public health. 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 unscientific dumping of such wastes have brought about a rising number of incidents of hazards to human health. More serious risk to human health is envisaged due to contamination of surface and ground water.

Realizing the need for proper and scientific management of solid waste, the Municipal Solid Waste (Management & Handling) Rules, 2000 were notified by the Ministry of Environment and Forests, Govt. of India. 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.

1.1 The study area

The population of Jaipur region was 2.7 Million as per 2001 census. The area of Jaipur Municipal Corporation has grown from 200 sq.km in 1981 to 218 sq. km in 1991 to 288 sq.km in 2001. The increase in area in 1991 was a result of addition of Sanganer and Amber tehsils and in 2001 due to the addition of Bagru, Bassi and Chomu tehsils in the municipal area.

Jaipur, founded by Maharaja Sawai Jai Singh II in 1727 A.D, is one of the few planned cities of its time based on the principles of ancient town planning doctrine of Shilpa Shastra. The city conformed to the traditional walled city concept with the encircling wall and 9 entry gates. Jaipur walled city evolved as a gridiron plan with the main road running almost east-west along the ridge in the center and the palace complex at the core. The buildings were built following a strict Architectural guideline. By 1734, the main markets of the town including Johari Bazaar, Sireh Deorhi Bazaar, Kishanpole Bazaar and Gangauri Bazaar had been built.

1.2 Climate and geography of area

Jaipur is located on 26° 55' north latitude and 75° 49' east longitude. Its municipal boundary extends from 26°46' to 27° 01' north latitude and 75° 37' to 76°57' east longitude. The Nahargarh hills in the north and Jhalana in the east, which is a part of Aravalli hills - ranges, surround the city.

The Jaipur is located in the semi-Arid zone of India. The climate of the city is characterized by high temperature, low rainfall and mild winter. The mean temperature of Jaipur is 36 °C varying from 18 °C in winter (January) to 40 °C in summer (June). The normal rainfall of Jaipur is 600 mm.

2.0 Importance of proper MSW management

In India, solid waste management falls short of the desired level as the systems adopted are out-dated and inefficient, institutional weakness, shortage of human and financial resources, improper choice of technology, inadequate coverage and lack of short and long term planning are responsible for the poor state of affairs. The City of Jaipur is also facing these deficiencies in varying degrees and there is a need to make substantial improvement in the MSW practices prevailing in the city to raise the standards of health, sanitation and urban environment keeping pace with the rapid urbanization and growing population.

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.
- ◆ 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, NH₃ and O₃) and ground water (physico-chemical parameters and heavy metals) were monitored during 2007-2008.

2.1 Present Scenario - Jaipur city

Most of the population does not store the waste at source and instead dispose the waste into the municipal bins, streets, open spaces, drains, etc as and when waste is generated. Segregation of recyclable waste is not practiced. Most of the recyclable material is disposed of along with domestic and trade waste. Therefore, recyclable waste is generally found mixed with garbage on the streets, into the

municipal bins and at the dumpsites from where part of this waste is picked up by the rag pickers. There is no system of door-to-door collection of waste except in few housing societies. Street sweeping is thus the only method of primary collection of waste.

There has been a significant increase in the generation of municipal solid waste in Jaipur over the last few decades. This is largely a result of rapid growth of the city. The daily estimated generation of municipal solid waste in Jaipur city is about 1000 to 1100 MTD, which is collected through street sweepings and from communal waste storage sites. The quantity of waste generally transported each day is 900 MTD, which is about 85% of the waste generated in the city. Remaining solid waste is transported through special weekly / fortnightly drives

Jaipur being an heritage and tourist city, there are many hotels and restaurants in the city. Arrangements of primary collection of waste from hotels and restaurants are not yet made. These establishments, therefore, dispose of their waste on the nearby open space or into the municipal bins.

Adequate storage facilities were not provided in the main vegetable, fruits and fish markets. The market waste is thrown in open space leading to unhygienic conditions and unbearable odour.

There are more than 500 Hospitals and Nursing homes in the city with more than 8000 beds. A private operator is transporting the waste to common biomedical waste treatment facility, where proper disposal of waste is being done as per the guidelines. Some pathology labs, small nursing homes, dental clinics, clinics and dispensaries were disposing their waste along with municipal solid waste.



2.2 Collection of MSW

The main system of primary collection of waste is street sweeping. There are 208 Jamadars and 6330 street sweepers in the city for street cleaning. They are deployed for sweeping complete road length. Some roads are cleaned each day and some are cleaned periodically, twice a week or once in a week. Door-to-door collection of waste is another method of segregation, but it is not a common practice in the city. The rag pickers play very important part in the segregation of waste at the storage bins.

Only limited staff is available on holidays to clean market areas and transport the waste.

2.3 Transportation of MSW

Transportation of waste is done through a variety of vehicles such as three-wheelers, tractors and trucks. Modern hydraulic vehicles were being used in areas. The transport vehicles are loaded manually and these are used for two-three shifts in a day. Inadequate number of transport vehicles is a major problem. The transportation system also does not synchronize with the system of primary collection and bulk waste storage facilities. Multiple manual handling of waste becomes necessary. During the study period, it was observed that most of the transporting vehicles were covered with tarpaulin/plastic sheets.



2.4 MSW Process plant

M/s Grasim industries/ Jaipur have established an industry to process municipal solid waste received from Jaipur Municipal Corporation on day-to-day basis. The processing plant designed to handle about 400-500TPD of MSW and generation of 130-140TPD Refuse Derived Fuel (RDF) in the form of fluff. The basic principal included in



processing MSW is separation of different categories of waste, having different densities. The composition of waste was expected to contain moisture 25%, inert material 20% and the balance RDF of 30%. Final product, RDF contains mostly cotton fibre, plastic pouches, and other light density materials. The RDF produced at Jaipur plant transported to M/s Vikram Cement, Neemuch, M.P. where it is used as a fuel in the kiln to substitute the coal requirement to a maximum extent 10-15% in the kiln. The flow chart of the fluff preparation by MSW is given in Annexure – I.

2.5 Disposal of Municipal waste

The city has a total 859-bigha area for municipal land fill sites. The three main sites for land filling are Mathuradaspura, Sewapura and Langariawas areas having an area of 176, 200 and 483 bighas, respectively. The waste generated in the city was being deposited at these landfill sites. No scientific method of waste disposal was adopted at Mathuradaspura pura and Sewapura site. All the waste is disposed at the landfill site by just dumping it. Mathuradaspura trenching ground was proposed to be abandoned because of its proximity to the future development areas. It has proposed that on all the four corners of the city, trenching grounds will be developed beyond the proposed urban development area. The location of these trenching grounds was to be decided at the time of implementation in consultation with district administration and concerned local authorities. Details of the existing dumping sites are given below :

- (1) Mathuradaspura: This site is located in the East direction of city. Total area for the site was 176 bighas. This is the oldest site and about 17 KM from the main city. Approximately 300 to 400 MT garbage was being dumped every day at this site. This site was located just 3 to 4 Km from the habitation area and a primary school was also located in the middle of the dumping site.
- (2) Langriyawas: This site is also located in the East direction of the city, 3 to 4 Km from the Mathuradaspura. At this site M/s Grasim Industries have installed a plant for processing the municipal solid waste to produce RDF, which is further used as an alternative fuel in the cement industries.
- (3) Sewapura: This site is located 20 Km from the main city in North direction on Jaipur- Delhi road. The site was developed to reduce the transportation cost of the waste. Its total area was 200 bighas. Industrial non-hazardous waste was also dumped here as V K Industrial area located near to this dumping site.

3.0 Present study

The present municipal solid waste management system at Jaipur city is not effective to comply with the norms. Jaipur Municipal Corporation (JMC) adheres to the traditional approaches of collection and disposal of MSW. Due to non-segregation of waste, biomedical waste, toxic materials (chemicals), even animal bodies/wastes were also seen entering the municipal waste stream ending up at the landfills, which serve as dumping yards. The Zonal Office, CPCB, Bhopal proposed to study the present status so that the system could be improved.

3.1 Objective of studies

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Studies were taken up to assess the contamination status in and around the MSW dump sites at Jaipur. The ambient air quality (for NO₂, SO₂, RSPM, SPM, O₃, and Ammonia) and ground water (for physico-chemical parameters, heavy metals, and Pesticides) were monitored during 2007-08. The teams from the Zonal Office camped at Jaipur for conducting the baseline and impact surveys.

3.2 Material & Methods

Ambient air monitoring was carried out two times during the study period for two days at three sampling locations. 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 particulate matter was collected on a glass fibre filter paper, whereas the suspended particulate matter 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 and ozone was also done at selected locations. Ammonia was measured by Indophenol method by absorbing the air sample in 0.1N H₂SO₄. For determination of ozone, air sample was passed through 1% solution of potassium iodide buffered at 6.8 pH and concentration was measured by photometric method.

Ground water samples were collected for various parameters like pH, chloride, nitrate, fluoride, sulphate, phosphate and heavy metals and were analysed as per CPCB methods.

3.3 Sampling locations

In order to assess the contamination status with respect to the emission sources of particulate matter and gases around the dumpsites, three sampling stations were established as AAQM-1 to AAQM-3. Total twelve samples of each air pollutant were collected at three different locations using respirable dust samplers.

Location details of the monitoring stations are given below:

- (1) AAQM-1. Near shop at Mathuradaspura MSW dumping site.
- (2) AAQM-2. Near Primary school at Mathuradaspura MSW dumping site.
- (3) AAQM-3. Near weighbridge at Mathuradaspura MSW dumping site.

As mentioned earlier, Mathuradaspura and Sewapura were being used as trenching grounds. Therefore, the possibilities of toxic pollutants reaching to the ground water were high. Two locations were selected for samples' collection for various representative parameters to assess present pollution status. Due to unavailability of bore wells and piezometers in the nearby areas of both the dumping sites, only two



ground water samples were collected to assess the ground water quality. Details of the ground water monitoring stations are given below:

- (1) Primary school, Mathuradaspura pura
- (2) Sewapura dumping site

4.0 Results and discussion

4.1 Ambient air quality

The data of average concentrations of five air pollutants, - suspended particulate matter, sulphur dioxide, nitrogen dioxide, ammonia and ozone for the study period is provided in Tables I-II & Figure 1.

The estimated SPM concentration in the ambient air of the three sampling sites varied between 78 to 269 $\mu\text{g}/\text{m}^3$, within the standards for rural and residential areas. The primary sources of dust are wind blown soil /MSW materials and burnt MSW at dumpsite.

SO_2 values were below the detectable limits at all the locations and the NO_2 concentrations were in the range of 09 to 20 $\mu\text{g}/\text{m}^3$. These concentrations were well within the acceptable limits. Ozone values varied between 20 and 94 $\mu\text{g}/\text{m}^3$ and ammonia (as NH_3) in the ambient air varied between 42 and 160 $\mu\text{g}/\text{m}^3$.

The biological and chemical processes that occur in open dumps produce strong odour, which contaminate the adjacent environment. Fires periodically break out in open dumps, generating smoke and high particulate matter in the region.

4.2 Ground Water Quality

The results of the physico-chemical and biological parameters of ground water in and around the waste dumpsites are presented in Table - III. Two ground water samples were collected during the study period. The TDS of the water samples in

the study area varied from 476 to 2,354 mg/L, indicating the ionic contamination of ground water due to garbage dumping. 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 511 to 3,250 $\mu\text{S}/\text{cm}$. Maximum values of TDS and conductivity was observed at Mathuradaspura, where un- scientific dumping was continued for a long time.

The pH of ground water of the area varied from 7.38 to 8.54. The total hardness of the water was in a range of 202 to 510 mg/L, indicating that the water was moderately hard as per United States Ground Water Surveys (USGS) norms. In the present area, the chloride content of the water samples varied from 35 to 1,041 mg/L, exceeding the limits. The concentration of sulphates in ground water was detected upto 171 mg/L in the study area.

At Mathuradaspura, it was expected that the heavy metals in garbage might have leached to the ground water. The heavy metals such as nickel (Ni), iron (Fe), copper (Cu), cadmium (Cd), lead (Pb), zinc (Zn), and cobalt (Co) were analysed in the ground water samples. Except Fe and Zn, other metals were absent in the ground water of the area. Iron was found up to 14.2 mg/L, while zinc was in the range of 0.16 to 0.44 mg/L.

The ground water samples were also tested for pesticides – DDT, chloreden, HCB, aldrin, endrin, dieldrin and heptachlor. None of the pesticides was found in the water samples.

5.0 General Observations

- (a) It was observed that there was lack of community garbage collection facility in slums; slum dwellers commonly dump their garbage nearby the living areas.
- (b) The refuse bins in old Jaipur area were very dirty and overflowing. People, often threw the garbage out side the bins. The nuisance of huge garbage on roads and sorting by the rag pickers or moving stray animals on the streets, present very ugly scene.
- (c) It was observed at many places in morning, thick black smoke spread over large areas on the roads due to burning of leaves, plastics and other wastes.
- (d) Most of the drains beside the road and even main sewer lines near Mother Dairy, Bais Godam, Durgapura and Pratapnagar were found choked due to the indiscriminate dumping of garbage.
- (e) The use of commercial trucks with or without hydraulic tipping arrangement for waste transportation was very common in Jaipur city. It has a carrying capacity of 3.5 to 8.0 MT waste at a time. Garbage from the roadside bins is lifted manually and hydraulically into the trucks. Besides this, tractor, dumper placer, mobile compactor etc. were also used to transport MSW to the dumping site.

- (f) JMC had one mechanized sweeping machine to pick garbage from inaccessible places. Presently, JMC uses this machine on highways, mainly in traffic congested areas.
- (g) It was observed that at Sewapura dumping site some quantity of the non-hazardous was also dumped along with common municipal waste, because of nearby V K Industrial area.
- (h) Presently, Jaipur has three dumping sites, where unscientific dumping is continued from a long time. Due to this, there was a possibility of percolation of heavy metals from garbage into the groundwater. Even though not many heavy metals were detected in the limited study conducted by CPCB, it is possible that the ground water is polluted with heavy metals at other impact locations.
- (i) It was observed that records and documents related to the dumping of waste at each dumpsite were properly maintained.
- (j) It is estimated that 1000 to 1100 MTD of solid waste is generated in the city through street sweeping and from the communal waste storage sites. The quantity of the waste transported each day is nearly around 800 to 900 MTD, which is 80-85% of the total garbage generated.
- (k) M/s Grasim Industries Ltd. have setup a RDF plant of 350 TPD capacity adjoining the landfill side of Langraiawas. The plant runs at 40 to 50% of installed capacity due to unavailability of desired quantity and quality of garbage for RDF processing.
- (l) It was observed that proper fencing, approach road, monitoring facility for pollution measures, light, pesticide spray to control flies etc. were not available at the dumping sites.
- (m) In spite of good BMW management in the Health Care Facilities of Jaipur, significant quantity of BMW was also found at Mathuradaspura.
- (n) Significant quantity of garbage was observed near the multi-storied buildings and big apartments due to the absence of the collection bins and closed campus system.

6.0 Recommendations

- (a) The provision of sufficient community garbage storage facilities in the slum area is a pre-requisite to better management of MSW.
- (b) JMC should take measures to 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.
- (c) In many parts of the city, open surface drains beside the road found with waste. These drains need to be cleaned on a regular basis to permit free flow of wastewater. Action should be taken to ensure that sweepers and citizens resist from disposing the waste into drains.
- (d) Approach roads leading to the sites should be improved and maintained appropriately. All weather internal roads must be made to facilitate easy movement of vehicles and tipping of waste at sites during monsoon also. Proper fencing, light, monitoring facility etc. should be provided at all the dumping sites.

- (e) Ground water was found polluted at Mathuradaspura due to continued dumping of MSW on ground but ground water quality at Sewapura was found comparatively good. Ground water monitoring and leachate study are necessary at Sewapura site as heavy metals/organics from MSW may percolate and pollute groundwater.
- (f) Industrial waste is required to be stored, transported and disposed by industries as per the guideline of SPCB. However, The JMC may act as catalyst by helping industries located in VKI area to procure land and in the transport and dispose off non-hazardous industrial waste on cost recovery basis.
- (g) Brief message such as "Clean Jaipur Green Jaipur" or Keep your waste unmixed etc. and cartoons related to MSW management can be painted on the JMC vehicles, Public buses or private buses for public awareness.
- (h) Cable TV and local channels 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 JMC facilities.
- (i) Sanitary Landfill sites as per guidelines of MoEF, should be constructed as soon as possible.
- (j) Social clubs can be encouraged to sponsor many events to keep the topic of SWM 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 JMC. Corporation may also announce rewards to the employees contributing to the cleanliness of city.

Following Internet sites may be referred to for more information:

- <http://www.rspcb.nic.in>
- <http://envfor.nic.in>
- <http://www.cpcb.nic.in>
- <http://www.environment.about.com>
- <http://www.edugreen.teri.res.in>
- <http://www.mcgm.gov.in>
- <http://www.epa.org>

ANNEXURE**MSW status at Jaipur 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	Partially Complied RDF plant with the capacity of 350 MTD was set-up at Langriawas.
2.	Monitoring the performance of waste processing and disposal facilities- Once in six months	Not Complied
3.	Improvement of existing landfill site as per provisions of these Rules- latest by Dec.2001	Not Complied
4.	Identification of landfill site for future use and making site(s) ready for operation- latest by Dec.2002	Partially 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.	Some selected areas covered by Societies/NGOs
		(ii) Devising collection of waste from slums and squatter areas or localities including hotels, restaurants, office complexes and commercial areas.	Not 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.	Not Complied
		(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.	Partially Complied
		(v) Waste (garbage, dry leaves) shall not be burnt	Not 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.	Not 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 except some vegetable and fruit markets.
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, vermicomposting, anaerobic digestion etc.	RDF plant was installed at Langriyawas dump site. Compost plant may be set up.
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.	Not Complied

Schedule-III

S. No	Specification for Landfill Sites	Mathuradaspura and Sewapura MSW dump site Jaipur.
1.	Site Selection	Old dumpsites are being used. Not developed as per MSW rule. Recently JMC acquired land for development of new landfill site at Sewapura near Harmada at Jaipur.
2.	Facilities at the Site	<p>Approach and other internal roads exist at both the sites. Weigh bridge working in good condition and record related dumping of MSW was maintained properly at both the sites.</p> <p>The following facilities as per MSW Rules, 2000 are not available at the site:</p> <ul style="list-style-type: none"> (i) Fence /boundary wall at dumpsite. (ii) Protection to prevent entry of unauthorized persons and stray animals. (iii) Inspection facility to monitor wastes brought in for landfill, office facility for record keeping, shelter for keeping equipment and machinery and pollution monitoring equipment. (iv) Drinking water & bathing facilities at the MSW sites and proper light facilities.
3.	Specification for land filling	Non Compliance at both the sites i.e. Mathuradaspura and Sewapura.
4	Pollution Prevention	<p>The following provisions were not provided:</p> <ul style="list-style-type: none"> (i) Storm water drains (ii) Lining system at the base and walls of waste disposal area. (iii) Leachate collection & treatment. (iv) Preventing run-off from landfill area. (v) Water Quality Parameters: piezometric holes were not provided; hence ground water from nearby area was collected. The parameters such as TDS, Chlorides exceeded the limits notified under MSW Rules-2000. (vi) Air Quality Data: The values of SPM, SO₂, NO₂ and NH₃ well within the limits at the time of monitoring during October 2007 and January 2008. (vii) Vegetative covers shall be provided at both the dumpsites.

Table I: Ambient Air Monitoring At MSW Site At Jaipur

S. No	Time	Near shop				Near primary school				Near weigh bridge			
		SO ₂	NO ₂	NH ₃	SPM	SO ₂	NO ₂	NH ₃	SPM	SO ₂	NO ₂	NH ₃	SPM
Sampling Date: 26.09.2007													
01	10am -- 2pm	BDL	09	56	269	BDL	11	76	111	BDL	12	132	105
02	2pm --- 6pm	BDL	14	49		BDL	15	90		BDL	19	160	
Sampling Date: 27.09.2007													
03	10am -- 2pm	BDL	09	63	222	BDL	BDL	69	95	BDL	13	62	131
04	2pm --- 6pm	BDL	12	49		BDL	14	97		BDL	20	83	
Sampling Date: 12.01.2008													
05	10am -- 2pm	BDL	11	49	201	BDL	14	63	148	BDL	11	56	78
06	2pm -- 6pm	BDL	14	48		BDL	20	56		BDL	15	42	
Sampling Date: 13.01.2008													
07	10am -- 2pm	BDL	14	56	211	BDL	12	56	110	BDL	14	63	132
08	2pm -- 6pm	BDL	19	56		BDL	17	63		BDL	13	49	

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

Table II: Ozone monitoring at MSW site at Jaipur

S. No.	Time	Near shop				Near school			
		A	B	C	D	A	B	C	D
01	09: 00 am	38	25	20	26	26	32	24	29
02	10: 00 am	28	26	43	37	31	32	32	38
03	11: 00 am	44	39	38	48	37	42	45	47
04	12: 00noon	54	60	60	65	48	67	55	60
05	01: 00 pm	60	54	76	108	65	94	82	86
06	02: 00 pm	48	80	83	79	54	83	71	78
07	03: 00 pm	45	50	55	75	57	53	67	61
08	04: 00 pm	34	37	38	57	39	38	53	54
09	05: 00 pm	39	23	48	51	42	42	48	49
10	06: 00 pm	23	20	44	32	32	26	28	43

A - Monitored on 26.09.2007,
 B - Monitored on 27.09.2007,
 C - Monitored on 12.01.2008,
 D - Monitored on 13.01.2008

All values are in $\mu\text{g}/\text{m}^3$, USEPA Hourly Standard—235 $\mu\text{g}/\text{m}^3$

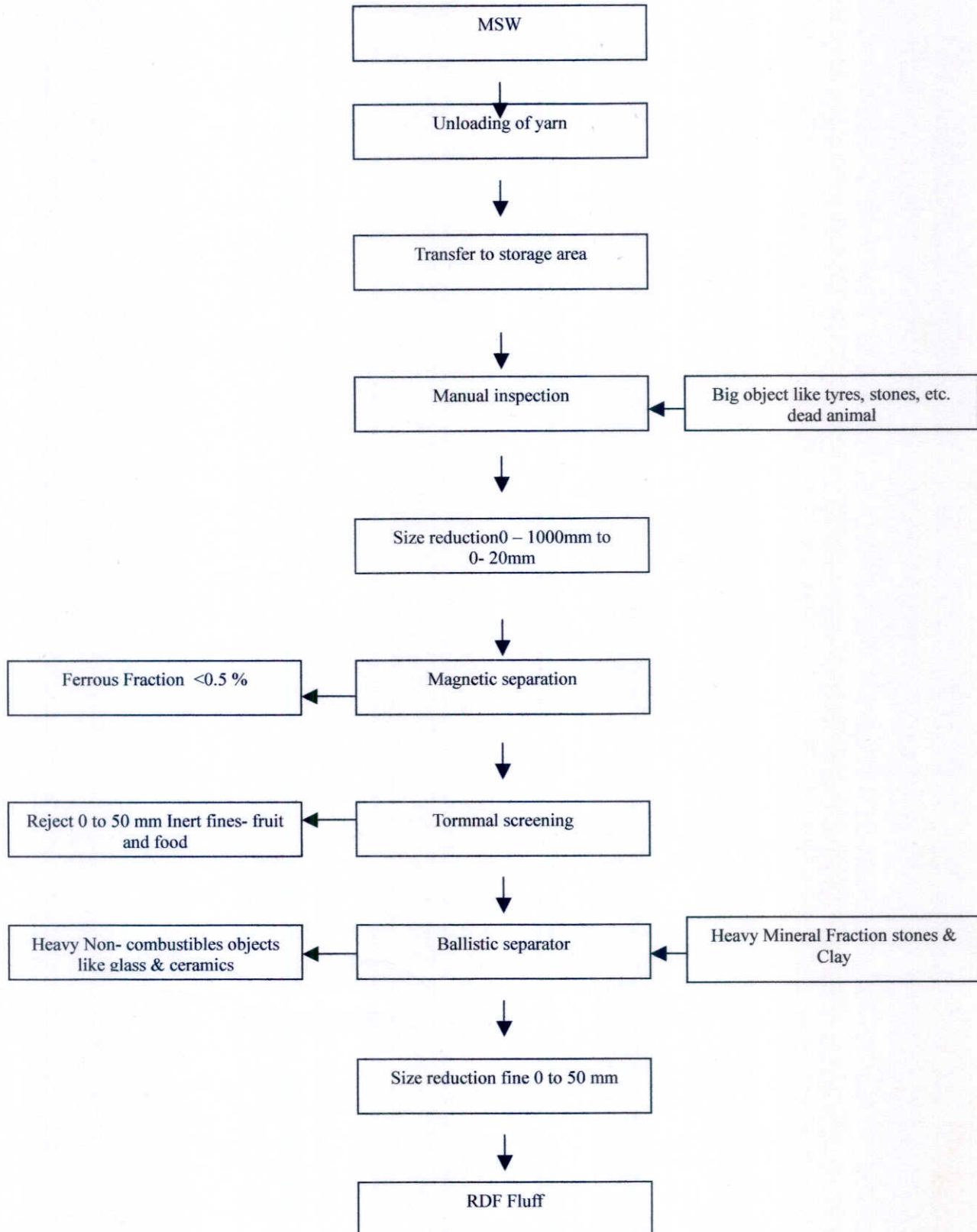
Table III: Waste Water Analysis Report

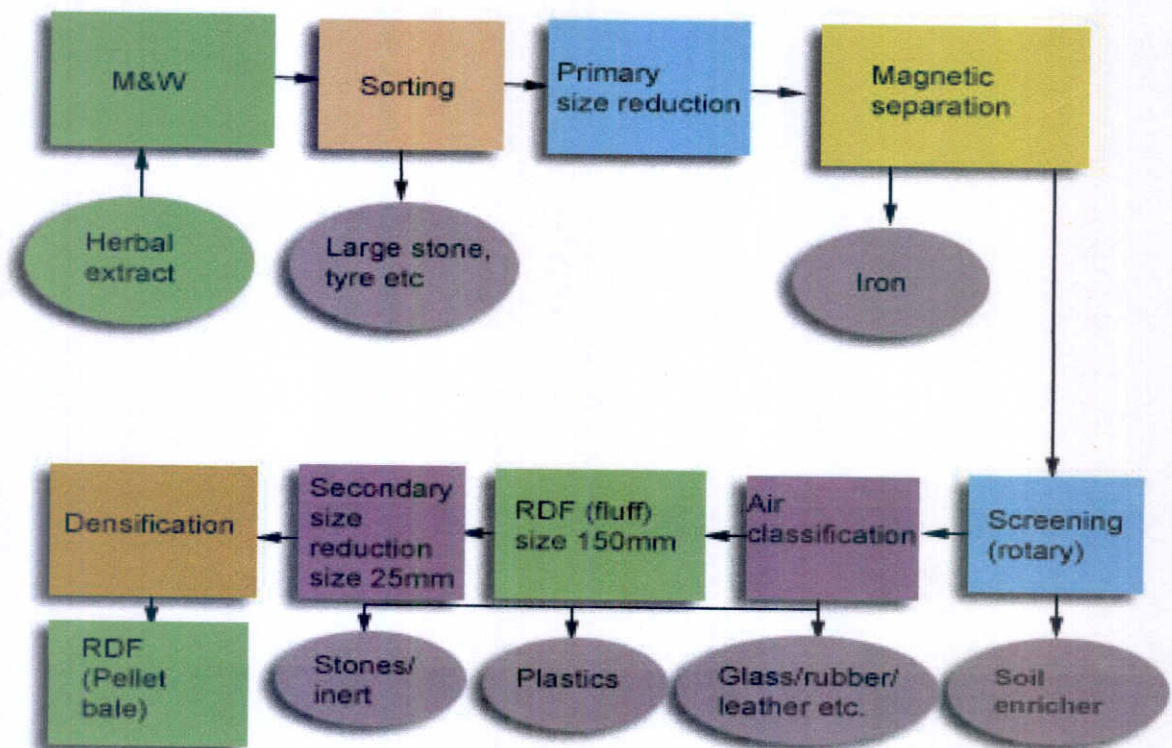
S. No	Location	Sampling Date	pH	Cond	TS	TDS	TH	Cl	NO ₃	SO ₄	PO ₄	F
1	Primary school, Mathuradas pura site	02.07.07	7.38	3250	2444	2321	468	1024	0.21	115	BDL	0.41
		01.10.07	8.54	3150	2480	2354	488	1041	0.43	171	BDL	0.20
		13.01.08	8.13	3089	2412	2279	510	980	0.35	103	BDL	0.32
2	Sewapura MSW site	02.07.07	7.63	670	481	476	236	35	0.41	BDL	BDL	0.21
		01.10.07	8.43	680	496	489	236	38	0.23	BDL	BDL	0.17
		13.01.08	7.73	511	505	498	202	48	0.29	BDL	BDL	0.29

The samples collected at Primary school was turbid red coloured, All values are in mg/l conductivity in μ S.

ANNEXUSRE- I

Processing of Fluff from MSW





Process flow diagram of the installed system at the plant outside system at the plant outside Jaipur city

Ozone Conc. at MSW Dumpsite, Jaipur

