CHAPTER – VI
ACTUAL ENFORCEMENT OF SOLID WASTE MANAGEMENT LAWS IN STATE OF PUNJAB

6.1 INTRODUCTION

As per 2011 census of India there are 475 places with 981 overgrowth have been identified as Urban Agglomeration. The number of total towns in India is 7,935 (Statutory Towns, 4,041 + Census Towns 3,894). There are total 6,166 Urban Agglomeration/towns which constitutes the urban frame of the country. In Punjab total 2781 ULB have been reported by SPCBs/PCCs during the year 2013-14, applications for authorizations were received from 287 ULBs and authorization granted to 201 ULBs.

At present the state of Punjab is divided into 10 Municipal Corporations. These 10 Municipal Corporations are further studied by dividing them into four zones. These four zones are: (1) Malwa (2) Doaba (3) Majha (4) Powadh.

Table 6.1
Zones of Corporation in Punjab

<table>
<thead>
<tr>
<th>S.No</th>
<th>Zones</th>
<th>Name of Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Malwa</td>
<td>Municipal Corporation Patiala</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Bathinda</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Ludhiana</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Moga</td>
</tr>
<tr>
<td>2.</td>
<td>Doaba</td>
<td>Municipal Corporation Phagwara</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Jalandhar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Hoshiarpur</td>
</tr>
<tr>
<td>3.</td>
<td>Majha</td>
<td>Municipal Corporation Amritsar</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Municipal Corporation Pathankot</td>
</tr>
<tr>
<td>4.</td>
<td>Powadh</td>
<td>Municipal Corporation Mohali</td>
</tr>
</tbody>
</table>
Figure 6.1: Map of Punjab
After the detailed study of the corporations it is analyzed that most of the towns/ cities are not having proper action plan for implementation of the MSW Rules. Waste collection is observed as only 70% of the total waste generation and the remaining 30% is lost in the urban environment by burning of waste and remaining consumed by the animals. House-to-house collection and segregation is not fully covered in any city. There is a large gap in between waste collection and processing in fact waste processing facility is set up only in the Bathinda Corporation for 25 years. Most of the municipalities have no sanitary landfill facility and follow dumping for disposal of Municipal Solid Waste. Regarding the insanitary conditions of the waste pickers, they are not being provided with any sanitary equipments by the corporation, only in paper work they are provided with masks, gloves and long boots.

6.2 ACTUAL ENFORCEMENT MUNICIPAL SOLID WASTE MANAGEMENT RULES BY MUNICIPAL CORPORATIONS IN STATE OF PUNJAB

State of Punjab consists of 163 Local Bodies out of these 163 local bodies Govt. has withdrawn the notification regarding notified area of Nagar Panchayat Mamdot and Nagar Panchayat, Noorpur Bedi. So local bodies in the state are 161 and all the 161 urban local bodies have identified land for temporary or permanent dumping of their waste. As per the Annual Report on Municipal Solid Waste Management for the year 2014-15, 9 applications are received by the State Pollution Control Board for setting up of dumping sites and 6 applications are received for setting up of the Cluster Sites of Municipal Solid Waste in Urban Local Bodies. Authorization is granted in Punjab by the Pollution Control Board to 6 dumping and Cluster sites. Authorization has not been granted to 3 and applications of 3 bodies is under process. For the implementation of Schedule II of the Municipal Solid Waste Rules (Collection, Segregation, Storage, Transportation) 161 towns have taken initiatives and 8 towns has complied 100% of Schedule II and 100 towns have partially complied and 53 towns have not complied the Schedule II of the Municipal Solid Waste Management Rules. 9 towns Adampur, Alawalpur, Jandiala...
Guru, Rayya, Sardulgarh and 1 in Distt Sangrur have taken good initiative as per Schedule II of Municipal Solid Waste Management Rules.

**Table 6.2**

**Urban Local Bodies in the State of Punjab**

<table>
<thead>
<tr>
<th>Type of Body</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Municipal Corporations</td>
<td>10</td>
</tr>
<tr>
<td>Municipal Council</td>
<td>95</td>
</tr>
<tr>
<td>Nagar Panchayat</td>
<td>58</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td>163</td>
</tr>
</tbody>
</table>

Ludhiana, Jalandhar and Shamchurasi has opted for waste processing treatment facilities and Shamchurasi is based on Vermicompost which has been made operational. Shamchurasi facility is used for the composting of the waste generated from three towns namely Alawalpur, Adampur and Shanchurasi. M/s Punjab Grow More Fertilizers, Wariana, the Composting facility is used for the composting of the waste generated from the city of Jalandhar, however same is not working now. Bathinda Municipal Corporation has set up waste processing plant under the PPP as a Joint Venture of Municipal Corporation Bathinda and JITF (Jindal Infrastructure Transformation and Fabrication). Bathinda has population of 2.17 lakhs. JITF has obtained the contract for collection, treatment, processing and disposal of waste for the term of 25 years. The plant is set up in 56 Acre of land. The project work through Concessionaire under Public Private Partnership with Municipal Corporation of Bathinda under Government of Punjab, which includes waste produced from the Bathinda City and 17 Urban Local Bodies Namely Tapa, Bhuccho, Rama Mandi, Kalianwali, Talwandi, Mour Mandi, Kot Fateh, Sangat, Mansa, Sardulgarh, Baneta, Bhikhi, Budladha, Abohar, Malout, Gidderbaha, Goniana. Daily JITF collects 110 metric tons of waste and treats 110 MT of waste, disposes 35 MT daily, recycle 15 MT and 20 MT is converted to compost. The main problem that is faced by the plant is the plastic as it is in large quantity in the collected waste. Such plant has also been proposed to be set up at Jalandhar Municipal Corporation by the same company but due to
protest by the local peoples and corporation employees plant was not made functional. JITF now only collects the waste of Jalandhar City and 27 Urban Local Bodies and dumps it to the Wariana (Kapurthala Road) landfill for disposal of waste without treating and processing. In Moga JITF is also working for lifting of garbage from the secondary collection points. Ludhiana Corporation also proposed to set up a processing plant. Waste to Energy plant is proposed for Bathinda Municipal Corporation but now no waste to energy plant is made operational in the state of Punjab.

Out of 161 urban local bodies, 12 local bodies are complying with all ten points of Common Action Plan (i.e. Provision of green belt, boundary wall/fencing with gate entry and covering of waste with 10 cm of layer of soil), 88 ULB are partially complying and remaining 61 ULB’s are yet not complying.

The municipal solid waste management committee was constituted for the effective implementation of the provisions in Sub Rule (2) of Rule 6 of Municipal Solid Waste (Management and Handling) Rules, 2000 under the chairmanship of the Chairman, Punjab Pollution Control Board, during its meeting on 16.04.2015 it has decided that all the Urban Local Bodies in the State shall provide piezometer to monitor the quality of ground water. The Committee constituted a team of following members who shall conduct the regular monitoring of ground water quality and will submit 3 monthly reports to the waste management Committee:

1. Member from the concerned Regional Office, Punjab Pollution Control Board.
2. Member form the Central Ground Water Board.

6.3 LATEST STATUS OF MANAGING OF SOLID WASTE IN STATE OF PUNJAB

The solid waste management comprises of four segments-municipal waste, industrial waste, bio-medical waste and Electronic waste. Waste collection is usually done on the contract basis. In most of the cities it is done by rag pickers, small time contractors and municipalities. Total waste generation in India is 1,50,000 tons per day.
The drivers for solid waste management market in India are increasing urbanization, initiatives taken at the corporate level, initiatives by government and NGO’s, new laws and better implementation and challenges faced are lack of collection and segregation at source, scarcity of the land and the lack of the awareness. Metros and other cities are the major contributors of the waste.

More than 500 cities in the country require scientific disposal of municipal solid waste with limited availability of land hence enormous market is available to replicate the success of setting up waste to energy plants. The constant efforts are made to improve the coverage of households for the collection of waste in timely and orderly manner.¹

There are 161 number of urban Local Bodies in the State of Punjab. These urban local bodies generates municipal solid waste to the tune of 3900 tons per day. To solve the problem of solid waste, Government of Punjab has formulated a Punjab Model of Municipal Solid Waste Management Plan, 2014 for managing municipal solid waste. This plan is based on the Public Private Partnership mode for a concession period of 25 years. Under his Punjab Model Municipal Solid Waste Management Plan, 2014, a state level Municipal Solid Waste Master Plan has been prepared and entire State Punjab has been divided into eight Municipal Solid Waste Clusters viz. (1) Jalandhar Cluster (2) Ludhiana Cluster (3) Bathinda Cluster (4) Patiala Cluster (5) Ferozpur Cluster (6) Moga Cluster (7) Pathankot Cluster (8) GMADA Cluster.

These eight clusters are identified by the State Government for setting up of Integrated Municipal Solid Waste Management Projects for management of municipal solid waste. Identification of land has been done by all the concerned Municipal Corporations and Councils and Authorization has been applied to the Board. Under the Municipal Solid Waste (Management and Handling) Rules 2000 Board has granted authorization to all the

municipal solid waste management projects for management of Municipal Solid Waste. Environment clearance have also been applied from competent authority after getting authorization by the Municipal Corporations and Municipal Councils.

<table>
<thead>
<tr>
<th>Name of the Corporation</th>
<th>Management of Waste (TPD)</th>
<th>Waste Management Facilities in Corporation</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Collected</td>
<td>Treated</td>
</tr>
<tr>
<td>Patiala</td>
<td>260</td>
<td>-</td>
</tr>
<tr>
<td>Bathinda</td>
<td>110</td>
<td>110</td>
</tr>
<tr>
<td>Ludhiana</td>
<td>1100</td>
<td>-</td>
</tr>
<tr>
<td>Moga</td>
<td>65</td>
<td>-</td>
</tr>
<tr>
<td>Phagwara</td>
<td>50</td>
<td>-</td>
</tr>
<tr>
<td>Jalandhar</td>
<td>370</td>
<td>-</td>
</tr>
<tr>
<td>Hoshiarpur</td>
<td>85</td>
<td>-</td>
</tr>
<tr>
<td>Amritsar</td>
<td>800</td>
<td>-</td>
</tr>
<tr>
<td>Pathankot</td>
<td>67</td>
<td>-</td>
</tr>
<tr>
<td>Mohali</td>
<td>145</td>
<td>-</td>
</tr>
</tbody>
</table>

6.4 THE PUNJAB MODEL MUNICIPAL SOLID WASTE MANAGEMENT PLAN, 2014

The Government of Punjab has formulated a Punjab Model Municipal Solid Waste Management Plan, 2014 for managing municipal solid waste of all the 161 no. of Urban Local Bodies of Punjab and entire state has been divided into eight Municipal Solid Waste clusters. Thereafter, in compliance to the orders of the Honorable Punjab and Haryana High Court in CWP No. 7039 of 2010, a Common Action Plan for viable alternative measures for disposal of garbage till setting up of solid waste management plants, was prepared in 2012 which was agreed by the Department of Local Government, Punjab. The
Directorate of Local Government is implementing body of the Action Plan and PPCB is monitoring the same regularly. The 10 points of the Common Action Plan are as:

1. Waste in each dumping site shall be scrapped and piled up in a corner after compaction of the waste, it shall be covered with a layer of at least 50 centimeters of soil, inert debris or construction material and shrubs/grass will be planted over the piles. To prevent leaching in rainy season, a clay bed of 40 cm., thickness shall also be prepared before dumping the garbage at dumping sites. This has also to be completed before 15 June 2012.

2. Each collection point shall be fully cleared at least twice in a day and it shall be ensured that there is no garbage left over. 100% collection of garbage shall be ensured in all the ULB’s.

3. Dry garbage or leaves shall not be allowed to burn.

4. For shifting of municipal solid waste, fully covered vehicles shall be used to avoid foul smell and to prevent it from scattering.

5. The plantation shall be done during this monsoon season so that green belt having a width of minimum 5 meters along the entire boundary/ fencing of the dumping sites shall be ensured by growing of dense trees and shrubs for the purpose of greenery and healthy environment of that area.

6. Fencing around dumping site shall be constructed and completed within two months so as to avoid stray animals,

7. Every week at dumping sites to kill the insects and flies fogging of melathene shall also be done

8. 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 Solid Waste Management (Management and Handling) Rules, 2000.

9. To prevent any environmental hazard and to retard the foul smell, all the ULB’s shall ensure that the spray of herbal sanitizer daily on regular basis shall be done at the dumping sites
10. In all the corporation towns and class I ULB’s, Piezometer shall be installed at dumping sites within two months to monitor the quality of ground water.\(^2\)

The Punjab Pollution Control Board is also monitoring the compliance of 10 points of Common Action Plan, through its regional offices. The Punjab Pollution Control Board, during the last one year has also issued show cause notices by personal hearing to 60 ULB’s for violation of the provisions of the Municipal Solid Waste (Management and Handling) Rules 2000.

The Punjab Pollution Control Board has issued the following directions u/s 5 of Environment (Protection) Act, 1986 to all the Municipal Authorities\(^3\) as:

1. The municipal Authority shall ensure the implementation of Municipal Solid Waste (Management and Handling) Rules 2000 as:

2. The municipal authority shall ensure furnishing Annual Report in Form II on or before 30\(^{th}\) June every year. The annual report shall also reflect vital information on (i) the quantity of MSW generation, collection, treatment and disposal (ii) the number of treatment and disposal facilities, (iii) the details of treatment and disposal facilities established, operational, under planned, etc.

Also all the Regional Offices of PPCB have been directed\(^4\) to comply with the following directions issued by CPCB and to submit the periodic report to the concerned Zonal Offices so as to carry out the effective solid waste management in the State.

\(^2\) Available at www.ppcb.gov.in/attachments/Municipal%20solid%20waste/MSW%20Annual%20Report%20%20uto%2031.03.2015.pdf. page 17.
\(^3\) Vide letter no. 80-405 dated 2.01.2015.
\(^4\) Vide letter no. 59-72 dated 2.1.2015.
Table 6.4
Awareness Programmes Carried by the Corporation

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Corporation</th>
<th>Waste Reduction</th>
<th>Recycling</th>
<th>Household Waste Disposal</th>
<th>Non Usage of Disposable Things</th>
<th>Non Use &amp; Non Burning of Plastic Things</th>
<th>Health Awareness</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>1</td>
<td>Patiala</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>2</td>
<td>Bathinda</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>3</td>
<td>Ludhiana</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Moga</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Phagwara</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Jalandhar</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Hoshiarpur</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Amritsar</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Pathankot</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
<tr>
<td>10</td>
<td>Mohali</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
<td>Yes</td>
<td>-</td>
</tr>
</tbody>
</table>

1. The SPCB/Committee shall monitor compliance of the standards regarding groundwater, ambient air, leachate quality and the compost quality including compliance to the incineration standards as specified under Schedule II,III, and IV (g) of the said Rules.

2. The SPCB/Committees shall ensure submission of the Annual Report with regard to implementation of the Municipal Solid Waste (Management and Handling) Rules 2000 in the State /UT as per the Rule 8 (1) specified in the Rules of Central Pollution Control Board by 15th of September every year in Form IV. The Annual Report shall also reflect vital information on the quantity of MSW generation, collection, treatment and disposal, (ii) the number of treatment and disposal facilities, (iii) the details of treatment and disposal facilities established, operational, under planned, etc.5

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6.4.1 Waste Management in Ludhiana.

Ludhiana is the Industrial City of Punjab. The population of Ludhiana is 16.13 lakh. Total production of the solid waste by the Ludhiana Municipal Corporation is 1100 MTD. All the 1100 MTD waste is being disposed at the 64 Acre of Jamalpur Dump site. This site is functional for the last 25 years. Environment clearance was taken under the EIA notification dated 14.09.2006 for Integrated municipal solid waste management facilities to be developed at Village Jainpur and Village Jamalpur and was granted by the Ministry of Environment and Forest, New Delhi on 31.01.2013.

A to Z waste management company has taken initiative to manage the waste of the Ludhiana. But the whole project got entangled due to Court case filed by Municipal Corporation of Ludhiana on waste management company for the termination of the Project. The case is pending. Biomedical waste of the region is being collected by Samb Ramsky Waste Management Company. The project has been appraised by the CPHEEO. Under this project the following towns are part of the Ludhiana Municipal Solid Waste Project, Municipal Corporation Ludhiana, Doraha, Jagraon, Khamanon, Khanna, Machiwara, Malaudh, Dakha, Payal, Raikot, Sahnewal, Samrala, Phillaur. The project capacity was 1125 TPD including collection and disposal which is to be enhanced 2238 by the year 2035. It also includes door to door collection, primary and secondary collection, Transportation of 1325 TPD which includes collection and disposal of waste. Compost Facility, Sanitary Landfill Facility. The project cost was 97.85 crores but the plant remains non functional despite all the machinery and equipments were installed.

6.4.2 Waste Management in Bathinda

Bathinda Municipal Corporation has a population of about 2,85 lakh. Environment clearance under EIA has granted by SEIAA, Punjab for setting up of the an integrated municipal solid waste management facility at Mansa Road Bathinda in an area of 20 acre to handle 350 TPD of Municipal Solid Waste and Engineered Sanitary Landfill Facility in an area of 36.8 acre of land

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at village Mandi Khurd, District Bathinda. A waste management plant has been set up by Jindal Infrastructure Transformation and Fabrication under Public Private Partnership for 25 years from 23.11.2011 to 22.11.2036 under the Municipal Corporation Bathinda. The total cost of the project is 66.46 Crore. Collection and transportation of Municipal Solid Waste has been made functional since January 2012. Till date JITF collects around 110 MTD of waste and treats 110 MTD and Disposes 35 MTD and Recycle 15 MTD and produces compost to the tune of 20 MTD. JITF collects solid waste of Municipal Coripration Bathinda and 17 Urban Local Bodies namely Tapa, Bhuccho, Rama Mandi, Kalianwali, Talwandi, Mour Mandi, Kot Fateh, Sangat, Mansa, Sardulgarh, Baneta, Bhikhi, Budladha, Abohar, Malout, Gidderbaha, Goniana. The solid waste management plant has been running successfully and in the coming year sanitary landfill and waste to energy plant is being set up by the JITF at the Bathinda.

6.4.3 Waste Managemet in Jalandhar

Jalandhar Municipal Corporation has the population of 9 Lakhs, produces 370 MTD of waste. For the setting up the integrated municipal solid waste management facility at village Jamsher spread over 20 acre to handle 750 tons of waste, Environmental clearance under notification dated 14.09.2006 has been granted by SEIAA, Punjab. Under this project another ‘Engineered Sanitary Landfill Facility’ in area of 22 acres in the revenue estate of village Pipanwali, was to be set up at District Hoshiarpur. M/s JITF was to set up the waste processing plant at Jalandhar. Disposal of the waste collected from the Jalandahr was landfilled at the 14 acre of land situated at village Wariana. Wariana landfill dump has exhausted as Municipal Corporation has dumping the waste at this site for last 40 years and the Municipal Corporation has started dumping the waste in villages causing health hazards to around 2 lakh people living nearby.

The waste produced by the Corporation is being collected by JITF Urban Waste Management (Jalandhar) Ltd, the Municipal Solid Waste Company for Jalandhar cluster. The company began to dump around 480

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9 Vide letter no. 36378 dated 30.08.2012.
Metric Tonnes Daily garbage at secluded areas in the city's periphery and in the two ponds at Qadian and Jugral Village situated nearby. Though the Municipal Corporation Jalandhar has proposed to construct a solid waste management plant at around 25 acres at Jamsher Khas village, people of nearby villages have opposed the plan. The people feel that further setting up of waste management plant to process bio-waste of around 27 municipalities will worsen further for the villages.¹⁰

The Municipal Corporation of Jalandhar has also missed the deadline of June 15, 2015 set up by the National Green Tribunal (NGT) last year to implement the solid waste management in Jalandhar cluster comprising 27 municipalities, including five municipal corporations. With no processing plant and no place to dump further garbage, JITF has left with no option but to stop its operation in the city.

6.4.4 Waste Management in Amritsar.

Amritsar Municipal Corporation has a population nearly about 14 lakh. Amritsar daily produces 800 MTD of Municipal Solid Waste. Amritsar Municipal Corporation is divided into 12 divisions which comprises of 6 civil lines division, 4 east zone division and 3 west divisions. Environment Clearance under EIA notification dated 14.08.2006 has been granted by SEIAA.¹¹ There are two dumping grounds for disposal of solid waste. One is situated at Bhagtawala which comprises of 25 Acre of land acquired by the corporation; this site is functional for the last 30 years and is filled within 5 years approximately. Other dumping ground is situated at the Chehrta which comprised of 20 acre of land and is functional for the last 20 years and it will be full in 1 year. There are 8 Urban Local Bodies attached to the Amritsar cluster. The project which is proposed for the waste management at the Amritsar is of 650 TPD capacities and the total project cost is 116 crores to convert the Bhagtawala dumpsite to be into integrated municipal solid waste management facility. Facilities to be provided under the Integrated management includes, engineered sanitary landfill Facility which will convert

¹⁰  The Tribune, dated 24.08.2015.
¹¹  Vide letter no0. 31793 dated 15.07.2014.
130 TPD of waste and compost plant will make compost of 350 TPD, refuse derive fuel will be made from 250 TPD and Recycling Unit will recycle 50 TPD waste. The entire project will handle 650 TPD of waste in 10 hectare of land at Bhagtaawala Municipal Dump Site. But until now no development activity has been started at the proposed plant site.

6.4.5 Waste Management in Ferozepur

For the establishment of integrated municipal solid waste management facility at the Ferozepur Municipal Council. Environment Clearance has been granted by SEIAA, Punjab.\textsuperscript{12} Total 18 No. of Urban Local bodies are attached to the Ferozepur cluster for the collection of municipal solid waste. The integrated Municipal Solid Waste Management facility will cover provision of establishment of engineered sanitary landfill facility, refuse derived fuel plant and compost plant in 20 acre of the revenue estate of village Bir Chahal, District Faridkot to handle 350 TPD of Municipal Solid Waste. The project will cost 66.46 crore. The project was awarded to M/s JITF urban Infrastructure Limited, New Delhi (Jindal Group) and M/s Ladurner Impianti, Italy in December 2011. Collection and transportation of Municipal Solid Waste is operational since Jan, 2012.

As Per the intimation received from Punjab Municipal Infrastructure Development Company the possession is handed over to the M/s JITF except for the land encroached upon. But until now Company has yet not started any development work at the site.

6.4.6 Waste Management in Patiala

Patiala Municipal Corporation has population of about 4.5 lakh. The Corporation collects 260 tones per day of the solid waste. For the setting up of the integrated municipal solid waste management Facility, Environment Clearance has been granted by SEIAA, Punjab.\textsuperscript{13} Patiala cluster will cover 25 Urban Local Bodies. The integrated waste management facility is to be set up at the village Dudhar, District Patiala which will handle 500 TPD of waste. The project will cover Engineered Sanitary Landfill Facility, RDF plant and

\textsuperscript{12} Vide letter No. 44 dated 07.01.2015
\textsuperscript{13} Vide Letter No. 4320 dated 27.07.2015.
Compost Plant. The site at village Samgauli would be utilized for the Sanitary Landfill of municipal solid waste. The project costs 95 Crore. Till the month of May 2015 the site has not been demarcated yet and no fencing work or other work has been started yet. No development work has yet been started at the site. Thus company has yet not started any development work at the site.

6.4.7 Waste Management in Pathankot

Total population of the Municipal Corporation of Pathankot is 2.5 Lakh. 65-67 TPD of waste is produced by the Corporation. The Corporation is divided into 50 wards and these 50 wards is divided into 10 beats, each beat covers 4-5 wards. Pathankot waste is disposed at 20 acre disposal site situated at Dehriwal (Mukimpur) situated at the Gharota road. 5 years have passed till the disposal of waste at this site and total life remaining is 10 years of this disposal site. For the purpose of Integrated Municipal Solid Waste Management under notification 14.09.2006 no site has been identified for the project so far.

6.4.8 Waste Management in Mohali

Mohali Corporation has population of about 1.75 lakhs. 145 TPD of waste is produced by the Mohali Corporation daily. Of the 145 TPD of waste 120 TPD of waste is disposed and the remaining 25 TPD of waste is recycled at the disposal site. For the establishment of integrated municipal solid waste management facility the Environment Clearance under EIA notification dated 14.09.2015 has been obtained from the Ministry of Environment and Forest. Total 18 Urban Local Bodies will be attached to the Mohali Cluster. Project will cost 80 crores.

The integrated waste management plant would be set up at the village Samgauli. The project would acquire 50 acre of land for the Municipal Solid Waste Management. Sanitary landfill will be situated at the village Samgauli. But till the month of May 2015 no steps were taken for the setting of the project Installation.

Vide Letter No. 09.03.2012.
Table 6.5
Survey About Landfill Site and Amount of Waste Deposited in Corporation

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Corporation</th>
<th>Landfill Site</th>
<th>Area of Landfill</th>
<th>Waste Deposited (TPD)</th>
<th>Disposal Starts (Year)</th>
<th>Estimated Life Remaining (Years)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Patiala</td>
<td>Sanour road</td>
<td>7 Acre</td>
<td>260</td>
<td>1980</td>
<td>2 Year</td>
</tr>
<tr>
<td>2</td>
<td>Bathinda</td>
<td>JITF Plant</td>
<td>30 Acre</td>
<td>110</td>
<td>2011</td>
<td>10 Year</td>
</tr>
<tr>
<td>3</td>
<td>Ludhiana</td>
<td>Jamal Pur</td>
<td>64 Acre</td>
<td>1100</td>
<td>1991</td>
<td>9 year</td>
</tr>
<tr>
<td>4</td>
<td>Moga</td>
<td>Dalleke</td>
<td>9 Acre</td>
<td>65</td>
<td>2005</td>
<td>2 Year</td>
</tr>
<tr>
<td>5</td>
<td>Phagwara</td>
<td>Bhogpur</td>
<td>4 Acre</td>
<td>50</td>
<td>2004</td>
<td>3 Year</td>
</tr>
<tr>
<td>6</td>
<td>Jalandhar</td>
<td>Wariana</td>
<td>14 Acre</td>
<td>370</td>
<td>1975</td>
<td>2 Year</td>
</tr>
<tr>
<td>7</td>
<td>Hoshiarpur</td>
<td>Piplanwala</td>
<td>27 Acre</td>
<td>85</td>
<td>2000</td>
<td>25 Year</td>
</tr>
<tr>
<td>8</td>
<td>Amritsar</td>
<td>Bhagtawala</td>
<td>25 Acre</td>
<td>800</td>
<td>1985</td>
<td>5 Year</td>
</tr>
<tr>
<td>9</td>
<td>Pathankot</td>
<td>Dheriwal</td>
<td>20 Acre</td>
<td>67</td>
<td>2011</td>
<td>10 Year</td>
</tr>
<tr>
<td>10</td>
<td>Mohali</td>
<td>Industrial Area Phase 8 B</td>
<td>8 Acre</td>
<td>145</td>
<td>2007</td>
<td>4 Year</td>
</tr>
</tbody>
</table>

6.5 PRESENT CONDITION OF SETTING UP OF INTEGRATED MUNICIPAL SOLID WASTE CLUSTERS

As per the information provided to the State Pollution Control Board/Committees to the Central Pollution Control Board through Annual Review Report 2014-15, Dept of Local Government has demarcated 7 solid waste disposal sites for setting up of Integrated Municipal Solid Waste Clusters at Amritsar, Ferozpur, Bathinda, Patiala, Jalandhar, Bathinda, Mohali (GMADA). The site of integrated waste management plant for Pathankot cluster has not yet been finalized. The practical work for waste management is seem to be finalized in the Bathinda cluster. At Bathinda the JITF has started running its plant of waste management. This plant is run through concessionaire under
Public Private Partnership with Municipal Corporation of Bathinda under the Govt. of Punjab which includes collection of waste from the 17 ULB including Bathinda city. The company collects 110 MTD of waste and treats 110 MTD of waste by disposing 35 MTD, Recycling 15 MTD and Composting 20 MTD of municipal solid waste. 25 vehicles are running for the collection of solid waste by JITF Pvt. Ltd, Bathinda. At Ludhiana, the machinery for segregation of waste is used occasionally as the waste plant to be set up by A to Z waste management company has been debarred from collecting the solid waste by the court. The matter is pending in the High Court and new tenders for setting up of waste management company are yet to be floated. There is no work of waste management in site at the cluster sites of Patiala, Ferozpur, Jalandhar, Amritsar and GMADA. Thus all the cluster sites lacks the timeline framed for the progress of the work. The existing treatment plants installed by Municipal Corporation at village Wariana have not been operated since long time and entire waste is dumped unscientifically at secluded areas in the city’s periphery and in the two ponds at Qadian and Jugral Village situated nearby. The vermiculture based plant set up by 3 Municipal Corporations at village Shamchurasi has been found to be in operation. Hence the entire project of setting up of Integrated municipal solid waste management facilities to be developed in the state of Punjab remains in papers of Punjab and Central Pollution Control Boards.
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>4.</td>
<td>Municipal Council Moga</td>
<td>1.34 Lakh</td>
<td>38 TPD</td>
<td>Municipal Corporation Moga</td>
<td>1.59 Lakh</td>
<td>70 TPD</td>
<td>32 TPD</td>
</tr>
<tr>
<td>5.</td>
<td>Municipal Council Phagwara</td>
<td>1.10 Lakh</td>
<td>17 TPD</td>
<td>Municipal Corporation, Phagwara</td>
<td>1.27 Lakh</td>
<td>50 TPD</td>
<td>33 TPD</td>
</tr>
<tr>
<td>7.</td>
<td>Municipal Council Hoshiarpur</td>
<td>1.48 Lakh</td>
<td>25 TPD</td>
<td>Municipal Corporation, Hoshiarpur</td>
<td>1.75 Lakh</td>
<td>85 TPD</td>
<td>60 TPD</td>
</tr>
<tr>
<td>9.</td>
<td>Municipal Council Pathankot</td>
<td>1.60 Lakh</td>
<td>40 TPD</td>
<td>Municipal Corporation, Pathankot</td>
<td>2.5 Lakh</td>
<td>75 TPD</td>
<td>35 TPD</td>
</tr>
<tr>
<td>10.</td>
<td>Municipal Council Mohali</td>
<td>1.25 Lakh</td>
<td>60 TPD</td>
<td>Municipal Corporation, Mohali</td>
<td>1.75 Lakh</td>
<td>145 TPD</td>
<td>85 TPD</td>
</tr>
</tbody>
</table>
As the management of Municipal Solid Waste\textsuperscript{15} are concerned collection is being done daily basis from all the secondary points. 2 ULB are properly segregating their waste into bio-degradable and non-degradable waste and 28 ULBs are segregating the waste partially. There is no sanitary landfill made and the entire waste is stored at the open landfill sites. 131 Urban Local Bodies are transporting their waste using covered vehicles and 30 ULBs are not using covered vehicles to transport their waste.

6.6 **EMPIRICAL STUDY ABOUT THE BIO MEDICAL WASTES FROM HOSPITALS**

The establishment of an effective waste management system may seem to be a difficult task, but if the management of biomedical waste is done with proper care and caution it may not seem to be a daunting task. The entire process can be achieved by means of a series of easy steps. One thing which must be put in the mind of the hospital staff is that proper waste management of hospital waste disposal decreases the accidents related to the waste disposal or decreases the cost in the treatment of waste, revenues earned by selling the recyclables etc. It is also essential that entire hospital staff must be informed and updated about the larger benefits of the waste management; this can be achieved through regular discussions through conferences where the results of the surveys related to the hospital waste management may be discussed.

In the study it is found that as per the BMW Amended Rules, 2011, the hospitals that have 30 beds or more have constituted their own waste management cell/ unit, where they have recruited individuals fully trained in the methods of handling the hospital waste. In most of the private hospitals handling hospital waste is made easy by appointing specialists like, Infection Control Officer/ Quality and Safety officer to address the grievances of the patients and the hospital staff issues related to hospital biomedical waste disposal in healthcare.

\textsuperscript{15} Under Annexure II of Rules 6 (1) and (3), 7 (1) of the Municipal Solid Waste (Management and Handling) Rules 2000
Table 6.7
Survey in Percent (%) of Hospital Staff Regarding Legislation, Management and Disposal of Bio-Medical Waste According to Colour Coding

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Awareness of legislation of Bio-med waste</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>70</td>
<td>80</td>
<td>90</td>
<td>0</td>
<td>90</td>
<td>70</td>
</tr>
<tr>
<td>Awareness of disposal of waste in coloured bins</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>90</td>
<td>100</td>
<td>90</td>
</tr>
<tr>
<td>Awareness of Taking of Bio-med waste by CBWTF</td>
<td>100</td>
<td>100</td>
<td>90</td>
<td>100</td>
<td>90</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Awareness of bio-med not stored beyond 48 hrs</td>
<td>80</td>
<td>90</td>
<td>80</td>
<td>90</td>
<td>90</td>
<td>70</td>
<td>50</td>
<td>70</td>
<td>50</td>
</tr>
<tr>
<td>Whether destroy used syringe/needle</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Satisfaction of cleanliness in hospital</td>
<td>90</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>60</td>
<td>100</td>
<td>30</td>
<td>90</td>
</tr>
<tr>
<td>Disposal of Solid waste, sharps in coloured bins</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Disposal of chemicals, discarded medicines</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Disposal of Anatomical, bio-tech waste</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>100</td>
</tr>
<tr>
<td>Recognition of bio-med symbol</td>
<td>100</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>80</td>
<td>100</td>
<td>90</td>
<td>100</td>
<td>90</td>
</tr>
</tbody>
</table>
6.6.1 Segregation of hospital waste in Colour Coded Bins

Biomedical waste is the waste generated during diagnosis, treatment or immunization of human beings or animals or in research activities. The Government of India enacted the Biomedical Waste (Management and Handling) Rules in 1998 under section 6,8,25 of the Environment (Protection) Act. 1986. These Rule provide detail provisions of categories of biomedical waste along with its treatment and management alternatives.

Bio Medical Waste (Management and Handling) Rules, 1998 provide ten categories of the material produced from the hospital. To dispose of the waste so produced from the wards the waste is to be disposed according to the colour codes of the containers for proper disposal. If the waste in the hospital is not put according to the colour code mixing of the separate categories of the waste may occur. This may lead to the contamination of the entire waste stem and will cause infection in the hospital wards as well as to the ecology if proper disposal not takes place. So the process of segregation curbs the spreading of infection and prevents the occupational hazards to be caused to the hospital waste handlers.

Comprehensive solutions to medical waste management lie solely in implementing systems of waste segregation, treatment and disinfection through the co-operation of hospital staff, and the doctors, staff nurses, nurses, and lab attendants. Aras of intervention include training, segregation, disinfection, and raising awareness, all co-ordinated within awareness programmes on bio-medical disposal. Non infectious waste in hospital comprises wrapping paper, office paper packaging material including plastic sheets, news paper etc. Almost 90% of the entire hospital waste generated is non infectious as it does not contain infection spreading microbes as it does not come into contact with any body fluids.

6.6.2 Collection of Hospital Waste

Bio medical waste management of hospitals does not stop with the segregation of the hospital waste in the wards- segregation of hospital waste is the first stage of the hospital waste management. The collection of the waste involves housekeeping staff, sweepers who must be fully aware against
the inadvertent mixing, mishandling and spillage of the lab waste. Since in the hospitals, morning work of hospital attendants generally begin with dressings and operating in the operating theaters. Since yellow bags are meant for the collection of biotechnology waste, anatomical waste, animal waste and soiled bandages and related activities. Therefore yellow bags meant for such waste are filled in the morning shift. The waste so collected from the wards is collected by the CBWTF by the noon which is stored in closed containers. Closed containers not only offer spillage of the waste so produced from the ward to the disposal place but also be much safer in cases of the accidents related with the spilling of the bio medical waste.

For the handling of waste which is infectious the bins with lids lined with polythene bags are to be used. The bins and bags should have a colour code. Bins should also be labeled with the bio hazard symbol and if required, for the types of waste they have to be used for. Infectious waste from the wards, Intensive Care Units, Operation theaters should have a common bin allotted to them for final disposal point to the common facility. Transportation of such waste can only be in authorized carriers, under the hazardous Waste Transportation Rules, to such common facilities which are now being proposed.

6.6.3 Incineration of Hospital Waste

Human anatomical and animal waste, microbiology and biotechnology laboratory waste, blood contaminated waste, discarded medicines and cytotoxic waste etc are sent for incineration / deep burial as provided under the biomedical waste and its disposal Rules, 1998.

Incineration has been recognized as an environmental threat of great magnitude, the world over. Incineration is the destruction of bio-medical waste in a furnace by controlled burning at high temperatures. Incineration removes water from hazardous sludge, reduces its mass and/or volume, and converts it to a non burnable ash that can be safely disposed of on land.
6.7 SURVEY ABOUT THE MANAGEMENT OF BIO-MEDICAL WASTE

About the awareness of the legislation about Biomedical waste segregation and disposal total 88% of the civil hospital government employees answered affirmatively that they know about the legislation of biomedical disposal while 12% of employees answered in negativity about the legislation, while 89% of the private employees agree about the knowledge of legislation of bio-medical and 13% answered in negative.

6.8 DISPOSAL OF BIO-MEDICAL WASTE IN COLOUR BINS

Colour coding of bins is made necessary for disposal of bio-medical waste by the Pollution Control Boards under the Bio-Medical Waste (Management and Handling) Rules 2009. It means the waste produced from the different wards be disposed off by segregating them into various sources of their production. Red, yellow, blue, black containers are used for storing and disposal of the waste. About the knowledge about colour coding of the waste it is found that 98% of the civil hospital employees know about the colour coding of the bins for disposal of the hospital waste. While 2% do not know about the colour coding bins for the disposal of the bio-medical waste. These 2% are mainly sweepers. 99% of the private hospital employees know about the colour coding of the waste disposal of hospital waste, while 1% donot know about the colour coding of the bins.

All the employees of the civil hospital know it very well that waste sharps, and solid waste from hospitals is disposed in blue white Translucent containers while all the employees know it very well that discarded medicines and chemical waste is black coloured containers and human anatomical waste, animal waste, Biomedical waste and soiled waste is disposed in yellow coloured bins. While 100% gives correct answer about the disposal of the waste sharps and solid waste from the hospitals be discarded into Blue white translucent containers. 99% of private hospital employees answered that discarded medicines and chemical waste is discarded in the black coloured containers. 99% answered correctly that Human Anatomical waste, Biomedical waste and soiled waste can be discarded in the yellow coloured bins.
6.9 REGULATION OF BIO-MEDICAL WASTE BY POLLUTION CONTROL BOARDS

State Pollution Control Boards made the Regulations and Rules for disposal of the bio-medical waste. 68 % of the Civil Hospital employees know about the regulation of bio medical waste by the State Pollution Control Boards, while 7% said that some private authorities or companies are responsible for making the rules of collection of the bio medical waste. 25 % of person do not know as to who is responsible for the regulation of the bio-medical waste disposal. 70% of private hospital employees know about the regulations of bio medical waste in the State, while 4% said that it was handled by private authorities and 26% do not know as to who is responsible for the making rules for the bio medical waste in the State.  

While the waste which is produced from the health care facilities is mainly taken by the Common Biomedical Waste Transport Facility, (CBWTF) employees for the final disposal. Hospital authorities are not responsible for the disposal of the bio medical waste. CBWTF employees collect the waste from the hospital premises on the per bed charges from the hospital authorities. CBWTF have the basic facilities like incineration, microwaving, autoclaving the waste so collected from the hospital premises. Incineration of waste in the hospitals of Punjab has been banned by the State Pollution Control Boards. CBWTF employees are only authorized to incinerate the hospital waste so collected under the controlled conditions. From the survey it comes to the knowledge that 98% of the civil hospital staff know that they have tie up with the CBWTF for the disposal of the waste. 2% answered the question so put to them in negativity. 99% of the employees of the Private hospitals know about the collection of waste by the CBWTF. 1% of the employee told that the waste so produced by the hospital is handled in the hospital premises.

6.10 CLEANLINESS OF THE HOSPITAL PREMISES

Cleanliness is the main objective of the handling of the Bio Medical waste. Less patients visit the Govt. hospitals because they find the hospital premises not properly cleaned. While it is found that private hospitals are
cashing on the patients due to cleanliness drive in their wards and in hospital premises. When questioned about the satisfaction of cleanliness in the Civil Hospitals, only 61% shows they are satisfied about the cleanliness in the hospital premises. 39% of the hospital staff said that they are not satisfied with the cleanliness in the hospital premises. They also hold cleanliness the main reason behind the non visiting the hospital by the patients, although health care facilities are good enough than the private hospitals in the regions as the qualified doctors are practicing in the government hospitals. 98% of the employees of the Private hospitals are satisfied about the cleanliness in the hospitals. During survey they told that sanitation wing is established in each private hospital. The manpower for the sanitation is to be provided by the private contractor who hires the employees for cleaning purposes. Although employees of most civil hospitals are permanent employees and are getting good salaries from the Government yet they are not willing to keep the hospital clean. They alleged that hospital employees responsible for sanitation does not provide them with the basic things like phenyl, dettol or brooms. On the other hand employees of the private hospitals told that sanitation wing is responsible for upkeep of the hospital cleanliness. They are provided with all the required equipments for upkeeping the hospital clean. They are mainly provided with the masks, gloves and gum boots. All the private hospitals have mechanized machines for dusting, booming and phenyl for disinfecting the floors and toilets in the wards. The sweepers cleaned the toilets of the hospitals in morning, afternoon and in the evening with disinfectants while this facility is found absent in the government hospitals.

6.11 KNOWLEDGE ABOUT THE INFECTIOUS WASTE DISPOSED IN THE HOSPITAL PREMISES

Infectious waste and non infectious waste are produced from the hospital premises. Non infectious waste mainly consists of papers, napkins from kitchen, kitchen waste etc., while infectious waste consists of anatomical waste, waste syringes, bandages soaked with blood, waste produced from the gynae ward. When the employees were asked about the percentage of the infectious waste from the total waste produced from the hospital premises,
70% of the government employees told that 80-90% waste produced from the hospital premises is infectious while 25% affirmed that 60-70% waste produced is infectious, while 4% answered that 30-40% of waste produced is infectious while 1% answered that 10-20% of infectious waste produced from the civil hospitals is infectious. While in private hospitals 74% of employees surveyed answered that 80-90% of the waste produced is infectious waste. 23% answered that 60-70% of the waste produced is infectious. 2% of the employees answered that 30-40% of waste produced is infectious while 1% told that 10-20% of the waste produced is infectious.

6.12 KNOWLEDGE ABOUT THE DESTRUCTION OF THE INJECTION SYRINGES AFTER USAGE BY THE HOSPITAL EMPLOYEES

Needle pricking is the way where the individual got infected with a blood borne pathogen after a needle stick injury form the discarded needle to the handler of the bio-to medical waste handler. Directly related to improper disposal is the virus particles infection to the person through used, infected syringes. At least 0.1 ml of blood is thought to be required to cause infection in case of HIV, where as for HBV- which is much sturdier than HIV, and the circulating titer is also high- it is estimated that 0.00004ml of blood may be enough to cause an infection as a result of the needle stick injury. HBV virus is more readily transmitted, 8700 healthcare workers each year contact Hep-B on the job. More than 200 die. HCV is also a growing threat to nurses. Infection with HCV appears to carry a great potential for chronic liver diseases. Antibody tests have been developed to detect the virus but the number of healthcare workers that are infected remains unknown. No vaccine is currently available.16

Needle destroyer/ Hub Cutters: the needle is inserted into closed box and makes contact with an electrical device that destroys it and/or cuts the plastic hub with the needle. To minimize the effect of the needle pricking and causing the diseases and to curb the effect of reusing of the needle it becomes necessary to destroy the needle. In the survey it is found that all the

civil hospitals and private hospitals destroy the used needles after the injection. Disinfection of the hospital waste is done by shredding of the waste in order to avoid illegal reuse. The shredding of the hospital syringes is made necessary before the disposal. The disinfected waste so produced must be sent to the approved recyclers.

6.13 SEGREGATION OF THE BIO MEDICAL WASTE

Segregation is the key of any waste management scheme. Through segregation, different categories of wastes are sorted and placed in different containers or bags. Segregation is generally carried out at the point of generation to keep the other non infectious waste from becoming infectious. If somehow infectious waste comes into contact with the non infectious waste then the entire waste which is non infectious shall be considered to be infectious although before coming into contact with infectious waste it is non infectious. From the survey it is found that all the employees of the civil and private hospital knows it very well to segregate the waste produced from the hospital premises.

6.14 STORAGE OF HOSPITAL WASTE

Storage of the hospital waste is the time between the generation of waste and its treatment. Storage of the hospital waste could be of different kinds like storage of waste within the hospital wards/ operation theaters, storage of the hospital waste outside wards but within the hospital boundary. If the waste is taken for treatment by the CBWTF site, then storage and moving of the waste in a carriage vehicle specially designed for the purpose of moving the waste, which must be fully covered and non spillage proof ; and finally storage at the CBWTF facility where the waste is finally disposed after the treatment. According to the Indian rules, waste should not be kept untreated for more than 48 hours. One must remember that this is the maximum time limit. Keeping the Indian Climate in mind which is commonly hot and humid it is necessary that the waste so produced must be moved from the hospital premises to the treatment plant without any delay of time after its production from the wards and operation theaters.
It is advisable to the hospital authorities that in temperate climate it should not be stored beyond 72 hours in winter, 48 hours in summer. In warm climate, 48 hours during the cool season, 24 hours during the hot and humid weather in the hospital premises. The storage of the waste so produced must be done in labeled, color coded bins at a place which must be accessible to vehicles of bio medical waste collection. Special instruction be given to the waste handlers at the storage depot if there is accidental spillage of the waste. Storage place must be made accessible only to the authorized person. It should be made in such a way that it be washable. Handling of the Bio-medical waste is proving to be a challenging task for the government and health sector. Liquid biomedical waste is proving to be particularly difficult to handle. Liquid bio medical waste is far more mobile and moves to the subsurface water bodies or underground aquifers, thus polluting the surface water with toxic chemical. Liquid bio-medical waste if untreated contains a wide variety of material that poses health hazards.

To know the exact time from the hospital staff about the storing of hospital waste beyond certain period of time, it is found that the 77% of the civil hospital employees and 82% of the private answered correctly that untreated bio medical waste cannot be stored beyond 48 hours. 2% of the civil hospital employees answered that it can be stored beyond 36 hours and 17 % answer storing for 24 hours while 7% of the private hospital employees answered that it can be stored up to 36 hours while 11% answered that it can be stored for 24 hours.

6.15 SYMBOL OF THE BIO MEDICAL WASTE

Symbol is the method to make known to the illiterate people to recognize that the thing contains bio-medical waste. Bio-medical waste symbol is pasted on the dustbins and containers having the hazardous waste from the hospitals. 85% of the civil hospital employees recognize the symbol of the bio medical waste correctly while 15 of the hospital employees recognize the symbol of danger as the bio-medical waste symbol. 94 % employees of the private hospital recognize the symbol of bio medical waste
correctly while 6% of the employees confused the danger symbol with the biomedical waste symbol.

6.16 SURVEY ABOUT THE HOUSEHOLDERS TO STUDY ABOUT THE SOLID WASTE PROBLEMS

Survey is done among the householders to study their knowledge about generation, collection and disposal of household wastes among them. This study is divided among the people living in the posh area locality and people residing in the slum areas. 20 questions relating to environment and health hazards caused by the waste on the slum and posh area residents were asked. Questions relating to the people’s participation and perception regarding solid wastes were also asked from them.

Table 6.8
Survey About Waste from Middle/Posh Area Householders

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Question About Solid Waste</th>
<th>Yes</th>
<th>No</th>
<th>Can’t Say</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Do you think garbage is a problem</td>
<td>82</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>2</td>
<td>Do illegal discarding of E-Waste and Batteries causes diseases to human beings</td>
<td>64</td>
<td>26</td>
<td>10</td>
</tr>
<tr>
<td>3</td>
<td>Do you segregate the solid waste in your home to degradable and non degradable waste</td>
<td>52</td>
<td>48</td>
<td>-</td>
</tr>
<tr>
<td>4</td>
<td>Are you aware about health related risks caused by improper disposal of solid waste.</td>
<td>91</td>
<td>9</td>
<td>-</td>
</tr>
<tr>
<td>5</td>
<td>Does respiratory diseases are caused by improper burning of garbage at public places</td>
<td>100</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>6</td>
<td>Do you know the concept of 3R (Recycle, Reduce, Reuse) of waste management</td>
<td>89</td>
<td>11</td>
<td>-</td>
</tr>
<tr>
<td>7</td>
<td>Do you think there is a legislation for the disposal of municipal solid waste</td>
<td>97</td>
<td>3</td>
<td>-</td>
</tr>
<tr>
<td>8</td>
<td>Do you think if we separate kitchen waste from solid waste in our homes, compost can be made</td>
<td>95</td>
<td>5</td>
<td>-</td>
</tr>
<tr>
<td>9</td>
<td>Do you energy can be produced from the solid waste by waste to energy plants</td>
<td>83</td>
<td>17</td>
<td>-</td>
</tr>
</tbody>
</table>
The study is done by selection 10 householders from posh area and 10 householders from the slum area. In each corporations total 20 respondents were studied. When the posh householders were asked that what comes to their mind when the term “solid waste” is used, 35% of the posh area residents told that garbage comes to their mind and 16% of the slum dwellers answered about the garbage, while 29% of them answered that they think about dumps when the term garbage is put to them.

When asked how they dispose off their daily solid waste produced from the houses, 75% of the posh area residents told that waste collectors collects the waste from their houses, while 61% of the slum dwellers answered that they throw in open the waste produced from their households.
About the generation of waste daily by the posh areas householders, 59% of the householders answered that they dispose about 300 gm of waste daily while 41% of the householders said they produce 500 gm of waste per day. While answering the same question about the disposal of waste daily, 90% of the slum dwellers answered that they produce 300 gm of waste daily and 10% of the slum dwellers answered that they produce 500 gm of waste daily. When asked about the method of disposal of waste by the householders, 68% posh area residents answered that they keep the garbage produced from their house in the closed containers, 6% of them put the waste in the open containers and 24% of them answered that they put the waste produced in the plastic bags. While answering the question about the storing of the waste by the slum dwellers, 11% of them answered that they store the waste produced in their household in closed containers, 44% of the slum dwellers store the waste in the open containers while 45% of them store the garbage in the plastic bags and throw it away in the open.

When asked that do they know that illegal discarding of E-wastes and Batteries causes diseases in the human beings, 64% of the posh area said that they know diseases are caused 26% of them answered in negative and 10% of them show their inability to answer the question. While the 25 of slum dwellers answered that they are aware and 75% of them answered that they do not know that diseases are caused by the illegal disposal of E-waste and Batteries. When asked that do they segregate the waste into degradable and non degradable, 52% of the posh area residents said that they segregate the waste, while 5% of the slum dwellers told that they segregate the waste. 48% of the posh area residents answered in negative that they do not segregate the waste and 95% of the waste dwellers answered that they do not segregate the waste. When asked about the awareness that health related diseases are caused by the improper disposal of the waste, 91% of the posh area residents answered about the awareness while 38% of the slum dwellers answered about the awareness about the diseases and 9% of posh area residents answered in negative and 62% of the slum dwellers answered in the negative about the ability of waste to cause diseases in human beings. 100% of the posh area residents are aware that respiratory diseases are caused by
burning the garbage at the public places while 40% of the slum dwellers answered that respiratory diseases are caused by the burning of the waste and 60% of slum dwellers answered that they are not aware that diseases are caused by burning of the water at the public places.

When questions were asked about the general awareness of the waste management. A question was put to posh area localities householders that whether they know the 3R principle of the waste management. 89% of them answered that they know about the waste management principle of 3 Rs., while 24 % of the slum area residents answered with great difficulty the concept of the waste management. While 11% of the posh area residents express their inability to answer the question about the waste management. 76% of slum dwellers said that they do not know about the concept of the Waste management.

When asked about the legislation about the disposal of the municipal solid waste in the county 97% of the posh area residents answered that they are fully aware about the legislation, while 10% of the slum dwellers answered that they know about the legislation about disposal of solid waste. 90% of them told that they are not aware that there is legislation about the disposal of the municipal solid waste produced in the country.

Question was put to them about the awareness that whether they know compost be made if we separate the kitchen waste from our houses, 95% of the posh area residents were aware that compost be made if we separate the kitchen waste produced in our houses from the general waste, while 13% of slum dwellers were aware that compost can be made from the kitchen waste. And 87% of the slum dwellers were unaware that compost can be made from the kitchen waste.

About the knowledge that energy can be produced from the solid waste, 83% of the respondents questioned from the posh area answered that they know that energy can be produced from the solid waste by waste to energy plants. 98% of the slum, dwellers expresses their inability that they know that energy can be produced from the solid waste which they generate daily from their houses. Only 2% of the slum dwellers know that energy can be produced from the solid waste.
According to Annual Review Report (2013-2014)\textsuperscript{17} by Central Pollution Control Board regarding implementation of Municipal Solid Waste Rules it is clear that still the Rules are not being implemented properly in many of the States of India. The Report shows that there is no proper implementation of the law regarding recycling, composting and segregation of the waste. Waste to energy plants in many of the states have also not been set up. Now the Urban Local Bodies are acquiring the land for setting up the waste treatment plants. There is no scientific landfill sites in many of the states for the disposal of municipal solid waste. Taking the notice of leaching by the landfill sites, which is causing pollution of the underground water, Central Pollution Control Board has ordered all the State Pollution Control Boards and Pollution Control Committees to continue water quality monitoring in the close vicinity of the existing municipal solid waste dump sites. No proper efforts are being made to handle e-waste, batteries waste, radioactive waste etc. which is too dangerous for the human and animals.

Following is the present position of the Northern States and the Union Territories.

(1) PUNJAB: In the state of Punjab waste processing and disposal facilities are being monitored by the Punjab Pollution Control Board. A state wise master plan has been prepared for the management of municipal solid waste in the state as per the directions for disposal or waste under municipal solid waste management and handling Rules. Out of 143 urban local bodies, 113 urban local bodies are complying and 25 urban local bodies are not complying with the waste management Rules. 117 urban local bodies have still not identified the landfill site for the disposal of the waste produced. Jalandhar is partially processing the waste produced in the state. Collection of the waste is done by all the municipalities but only three urban local bodies are segregating the waste properly and 110 urban local bodies are segregating their waste partially. Storage of the municipal solid waste.

\textsuperscript{17} Annual Review Report on Implementation of Municipal Solid Waste(Management and Handling) Rules for the Year 2013-2014, Published by the Central Pollution Control Board in 2015.
is being done in the open landfills with no facility of the collection of gas and no facility to collect the leachate when it rains. As per the Schedule IV of the Municipal Solid Waste (Management and Handling) Rules, 2000, Wariana village is using facility of composting total garbage produced from the city Jalandhar. M/s UPL Environment Engineering Limited is running the compost plant to process the waste to compost of three towns-Alawalpur, Adampur and Shamchurasi.¹⁹

(2) HARYANA: There are 74 local bodies in the State of Haryana in which there are 17 class one cities. As per the implementation of waste management Rules are concerned only 7 urban local bodies are implying with the rules, Transportation of waste Rules are being followed by these seven urban local bodies. The state of municipal solid waste collection is that all municipalities collect their waste without segregating them. Three waste processing plants are running in the state and thirteen sanitary landfills are used for the disposal of waste produced in the state. Two waste processing plants are waiting the proposal from the pollution control board to get cleared. As far as water monitoring facility near the landfill sites is concerned it is not carried out yet in the state. Total fifty nine dump sites are identified by the state for the disposal of waste in scientific manner. For setting up the municipal waste processing plants Haryana state board has conducted the monitoring for the said purpose at the twelve locations.²⁰

(3) HIMACHAL PRADESH: For the Municipal Solid Waste Management, 56 urban local bodies are established in the state of Himachal Pradesh. For disposing of waste in the landfill sites 50 urban local bodies have identified the sites for the purpose of disposal of waste. Twelve local bodies are processing the waste through pit composting, vessel composting and stac technology. As per recommendation of the Central Pollution Control Board of water monitoring, no water monitoring is being done as there is no ground water source near the landfill sites. Nine urban local bodies have established the waste

¹⁸ Waste processing standards for composting, treated leachate and incineration.
¹⁹ Supra note 17 at 21
²⁰ Id at 32
processing facilities and two urban local bodies are sharing the same processing facilities. As per the collection, storage, transportation and segregation is concerned all the 56 urban local bodies are partially complied with solid waste management. Ragpickers do the source segregation of the recyclable materials. Waste from the Solan is taken to Shimla for the processing where it is processed for compost and refuse derived fuel. No sanitary landfill exists in the state.²¹

(4) DELHI: In the State of Delhi 8390 TPD of municipal waste is produced by five municipal authorities. Entire Delhi region is divided into five zones for the handling of the waste so produced. Corporation divides Delhi into the following zones for the collection of the municipal solid waste (1) South Delhi Municipal Corporation collects 2500 MTD of waste. Compost plant is situated at the Bhalswa which has the composting capacity of 500 TPD, has been issued notice for not complying with the directions under the water pollution Act. Waste to energy plants has been cleared to be set up at Okhla, which will produce 16 MW of electricity by processing 1950 TPD of waste and another waste to energy plant has been sanctioned to be set up at Ghazipur which will produce 12 MW of energy by processing 1300 TPD of waste. One plant at the Timarpur is operational Bawana Waste to energy plant is also in the proposed stage and it will produce 24 Mega Watt of energy by processing 3000 TPD of waste daily. (2) North Delhi Municipal Corporation collects 3000 MTD of waste. (3) East Delhi Municipal Corporation collects 2500 MTD of waste daily. 10-15% of the waste so produced is being taken by the rag pickers. Agencies takes up the waste by house to house collection and they transport the waste so collected to the processing/disposal facilities. (4) New Delhi Municipal Council collects 3000 MTD of waste daily and it composts the 25 to 30 MTD, the landfill is situated at the Bhalswa and now the landfill is full up to the capacity and has exhausted to take the solid waste anymore for the disposal. (5) Delhi cantonment collects 90 MTD of waste daily. There is no processing facility at the Delhi Cantonment

²¹ Id at 32
Bard and the entire waste so produced is taken to the Okhla and the Gazipur landfill sites for the disposal of the waste. There are 4 sanitary landfills in the State which manages the waste collected from house to house. Two composting plants makes the compost from the waste collected from the houses, vegetable markets and other sites where biodegradable waste is disposed. Three waste to energy plants are there in Delhi out of which one is operational and two are under installation. Under PPP project Door-to-door collection is being carried out in the nineteen localities from the residential colonies. Trucks, tippers and compactors are being used for the collection of the waste from the residential area to the final disposal at the landfill sites. The three landfill sites in Delhi are Bhalswa where waste is being dumped from the year 1994, Ghazipur running from 1984 and Okhla which is being running from the year 1996. Delhi Pollution Control Committee has refused to grant authorization and has declared them as the illegal landfill sites as they are not designed as per the Schedule 3 of the Municipal Waste Management and Handling Rules. As the land is not available for the disposal of the waste all the five Municipal Corporation of Delhi are using these 3 landfill sites for illegally dumping the municipal solid waste.  

(5) CHANDIGARH: City Chandigarh produces about 350 TPD of waste. Out of the total waste so produced in the City 340 TPD of waste is being collected by the Chandigarh Municipal Corporation. Garbage processing plant is set up at village Dadu Majra. It is working from the April 2009. Garbage from the vegetable markets, hotels, gardens and houses are being dumped at the waste processing plant. The entire plant is now being mechanized by laying of the pipelines for the collection of the leachate and gas vents has been provided in the closure landfills and the sanitary landfills. For the waste management, Municipal Corporation of Chandigarh is responsible for the waste so collected from the Union Territory. Waste processing plant to process the Refuse Derive Fuel has been set up by the Jai Parkash Associate

22 *Id* at 31.
Ltd. As the land for setting up the new landfill is not available in the city, Corporation is facing hard times in selecting the land for setting up new landfill site for the disposal of the waste produced from the Chandigarh. At the landfill site gas venting system is provided and leachate collection facilities are being provided at the landfill site. One JCB is running for digging and spreading of soil on the waste daily at the landfill site. For measuring the amount of waste produced daily Chandigarh Pollution Control Committee has directed the Municipal Corporation of Chandigarh to install the weighbridge. Monitoring of the waste processing facilities has not been reported by the Central Pollution Control Committee.\footnote{Id at 30.}

6. 17 CONCLUSION:

From the study carried about the waste disposal by the researcher, it can be concluded that quantity of waste produced is increasing by the each passing day. The landfill sites are now full in every city. The corporations are getting harder to acquire the land for the new landfill site for the disposal of the waste. The only thing that can manage the disposal of waste problem is the adoption of the proper waste management techniques of the garbage disposal.

In the State of Punjab only one waste processing plant is set up at the Bathinda Municipal Corporation. This waste processing plant is being run under the PPP by the Jindal Infrastructures and transformation services. In Bathinda district 110 MTD of the waste is being produced out of which the waste processing plant treats all the 110 MTD of the waste out of which it disposes 35 MTD, 20 MTD of waste is converted to the compost and 15 MTD of waste is recycled every day. In this way the waste so produced is converted into the useful products, where as in other corporations waste is being disposed at the landfill sites without treating it. In order to cope up with the leachate problem being produced at the landfill site during the rainy season. It is advised that sanitary landfills must be made so that ground water...
may not get polluted by the seepage of leachate from the landfill site. Waste to energy plants may also be set up so that energy can be produced from the solid waste. For the awareness about municipal solid waste being produced, awareness programmes like waste reduction, reusing of the waste, recycling of waste must be run by the corporations. Plastic is the most popular thing responsible for the pollution as it causes carcinogen fumes when burned and if it is thrown away as such it is carried away by the wind to the far off places and is not disposed easily. Plastic products must be banned if we are actually aware of the environmental degradation.

From the study it comes to light that waste pickers plays an important role in keeping the cities clean. Waste pickers are not provided with any of safety equipments like masks, gum boots and gloves. In the absence of such equipments waste pickers got infected with diseases like, gastrointestinal diseases, skin diseases and chest diseases. In other words it is the duty of the Corporations to provide them with these safety equipments for the collection of the waste.

Sometimes biomedical waste, electronic waste, hazardous waste and industrial waste etc. is also disposed by the concerned authorities at the public places. It causes harm to the waste pickers and public as sometimes they got pricked up by the needles so thrown by the hospitals. So existing Rules of the biomedical waste must be made more stringent so that hazardous waste may not be disposed along with municipal solid waste. Most of the householders do not segregate the waste into degradable and non degradable. The awareness must be generated among the general public that if the kitchen waste is disposed separately compost be made from it. Awareness must also be generated about the 3R golden rule of waste management i.e. Reduce, Reuse and Recycle. Plastics and disposable items must be banned in the cities as they are responsible for the pollution at a large scale. The waste pollution can only be stopped by stepping up to the solid waste management techniques. So in the end we can say that waste is gold if it is properly managed as energy, compost, and fuel pallets can be made from the solid waste that we dump at landfill site without processing.