CHAPTER – III

FINDINGS

3.1 Total Waste Generation :

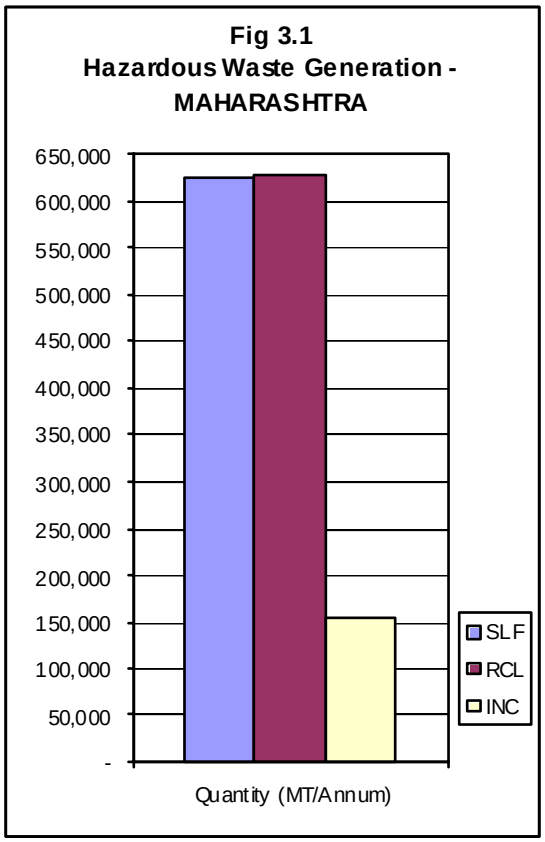
As per the inventory, total hazardous waste generation for Maharashtra State is 14,07,480.20 MT/Annum of which about 44.5% is landfillable, 44.5% is recyclable and balance 10.9% is incinerable. **Table 3.1** and **Fig. 3.1** presents the findings :

Table 3.1

Summary of HW Generation

Sr. No.	Type of Waste	Quantity (MTPA)
1.	Land fillable Waste	6,25,950.3
2.	Recyclable Waste	6,27,531.5
3.	Incinerable Waste	1,53,998.4
	Total	**14,07,480.2**

Fig 3.1
Hazardous Waste Generation - MAHARASHTRA



3.2 Break-up of Hazardous Waste Generation :

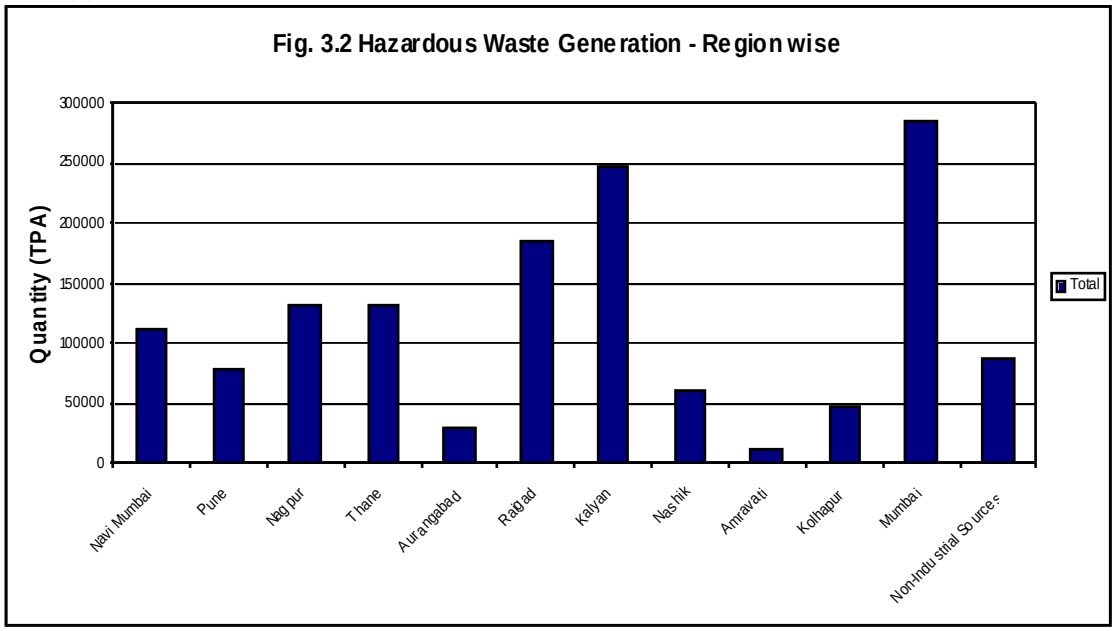
3.2.1 Region Wise Break-up:

The break-up of Hazardous Waste generation for various Regions of Maharashtra Pollution Control Board including generation from non-industrial sources is presented in **Table 3.2** and **Fig. 3.2** below. These indicate that Mumbai Region has the highest generation of waste 2,84,592.5 TPA (20.2%) followed by Kalyan Region with 2,46,474.8 MTPA (17.5%). The lowest generation was observed in Amravati Region 12,920.8 MTPA (0.92%). The generation from other non-industrial sources was observed to be 87,342.8 MTPA (6.2%).

Table 3.2

HW Generation – Region wise

Sr.No.	Region	Total (MT/ Annum)
1	Navi Mumbai	1,11,996.2
2	Pune	77,926.1
3	Nagpur	1,31,726.6
4	Thane	1,31,833.3
5	Aurangabad	28,636.4
6	Raigad	1,84,555.1
7	Kalyan	2,46,474.8
8	Nashik	61,185.1
9	Amravati	12,920.8
10	Kolhapur	48,290.4
11	Mumbai	2,84,592.5
12	Non-Industrial Sources	87,342.9
	TOTAL	**14,07,480.2**



3.2.2 Break-up based on Disposal Method :

The Region wise breakup of Hazardous Waste generation based on disposal method is presented in **Table 3.3/Fig. 3.3(A-C)** & findings are presented below :

Table 3.3

Region wise Break-up of HW based on Disposal Method

Sr.No.	Region	Quantity of HW (MT/Annum)			Total
		SLF	RCL	INC	
1	Navi Mumbai	47,047.2	13,958.0	50,991.0	1,11,996.2
2	Pune	43,944.9	19,178.6	14,802.6	77,926.1
3	Nagpur	74,693.8	45,674.4	11,358.4	1,31,726.6
4	Thane	92,873.3	31,698.5	7,261.5	1,31,833.3
5	Aurangabad	7,753.0	17,513.0	3,370.4	28,636.4
6	Raigad	1,03,450.1	59,027.0	22,078.0	1,84,555.1
7	Kalyan	58,363.0	1,81,092.0	7,019.8	2,46,474.8
8	Nashik	23,899.1	29,179.0	8,107.0	61,185.1
9	Amravati	9,782.8	2,684.0	454.0	12,920.8
10	Kolhapur	19,326.4	16,150.0	12,814.0	48,290.4
11	Mumbai	1,15,857.9	1,54,711.3	14,023.4	2,84,592.5
12	Non-Industrial Sources	28,958.8	56,665.7	1,718.4	87,342.9
	TOTAL	**6,25,950.3**	**6,27,531.5**	**1,53,998.4**	**14,07,480.2**

SLF : Secured Landfill, RCL : Recyclable, INC : Incinerable

Fig. 3.3 (A) Region Wise Break-up - Waste to Secured Landfill

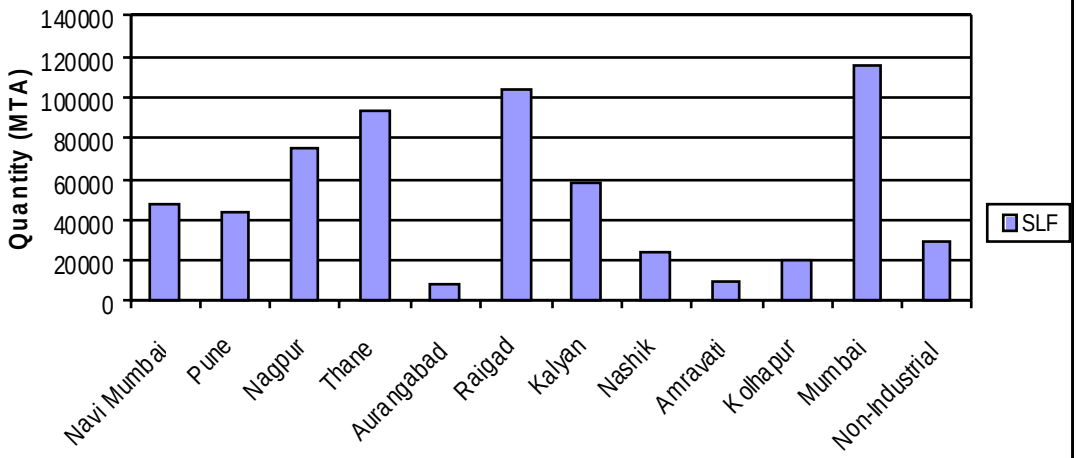


Fig. 3.3 (B) Region Wise Break-up - Recyclable Waste

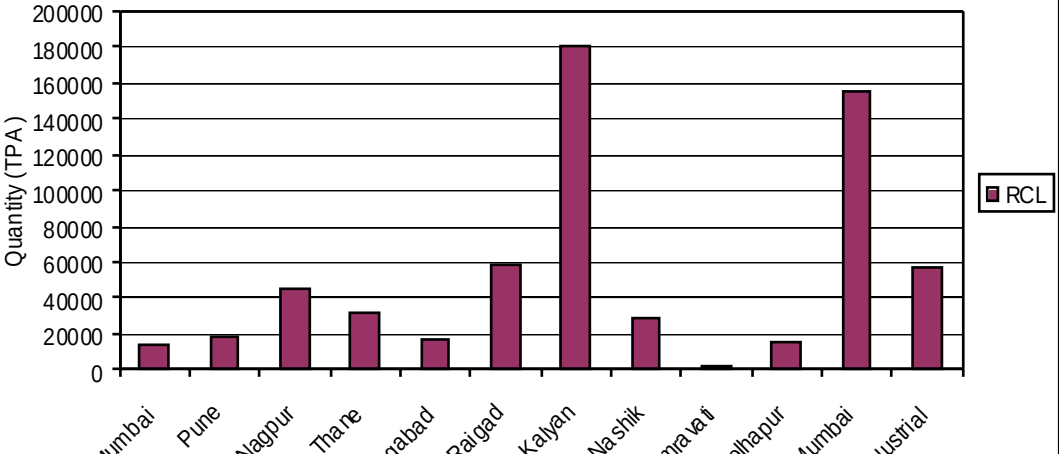
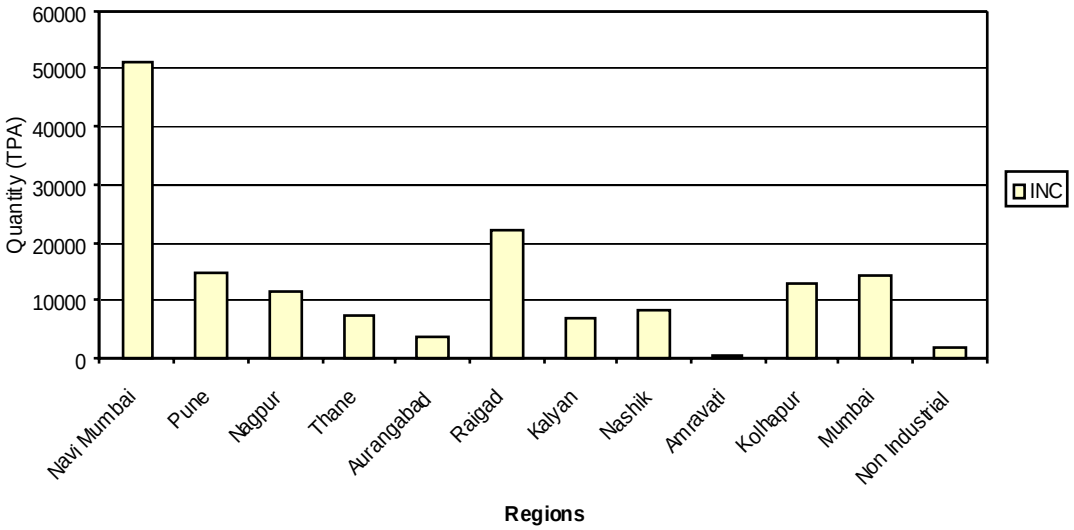


Fig. 3.3 (C) Region Wise Break-up - Incinerable Waste



3.2.2.1 Landfillable Waste :

The largest generation of landfillable waste was seen in Mumbai 1,15,857.9 MTPA (18.5%), followed by Raigad 1,03,450.1 MTPA (16.5%).The lowest generation was observed in Aurangabad 7,753 MTPA (1.2%). Amongst non-industrial sources, landfillable waste generation is primarily from CETP's and is at 28,958.80 MTPA (4.6%). Landfillable waste generation from the five Regions of Raigad, Navi Mumbai, Thane, Kalyan and Mumbai taken together is 4,17,591.8 MTPA (66.7%) which indicates that Taloja & TTC were the right choice for locating the secured landfill facility as it is in centrally located for all these Regions.

3.2.3 Incinerable Waste :

It is observed that the highest incinerable waste generation was in Navi Mumbai 50,991 MTPA (33.1%) followed by Raigad 22,078 MTPA (14.3%). The lowest incinerable waste generation was observed in Amravati 454 MTPA (0.29%). The incinerable waste generation from the five regions of Raigad, Navi Mumbai, Thane, Kalyan and Mumbai taken together is 1,01,373.2 MTPA (65.8%) which justifies location of Common Hazardous Waste Incineration facility at Taloja.

3.2.4 Recyclable Waste :

The highest recyclable waste generation was in Kalyan 1,81,092 MTPA (28.8%) followed by Mumbai 1,54,711.3 MTPA (24.6%). The recyclable waste generation from other non-industrial sources was 56,665.7 MTPA (9.1%), primarily due to used / waste oil generation in automobile service stations, docks, ports, power distribution etc.

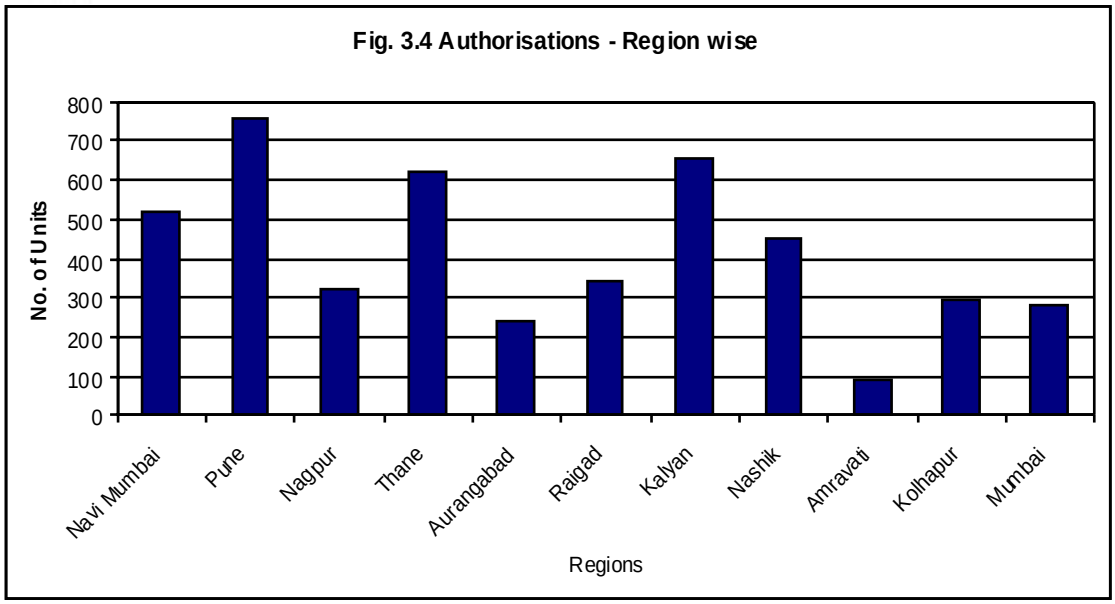
3.3 Classification of Industries Generating Hazardous Waste :

A total of 4,571 authorisations were granted to Hazardous Waste generating units in Maharashtra State. The Region wise break-up of these is presented in **Table 3.4**.

Table 3.4

Authorizations – Region wise

Sr. No.	DISTRICTS	Total no. of units
1	Navi Mumbai	517
2	Pune	756
3	Nagpur	325
4	Thane	621
5	Aurangabad	238
6	Raigad	341
7	Kalyan	654
8	Nashik	451
9	Amravati	91
10	Kolhapur	294
11	Mumbai	283
	Total	**4571**



3.3.1 Region Wise Break-up :

From the Table it is seen that the highest number of authorisations granted to HW generating units were in Pune Region – 756 (16.5%) followed closely by Kalyan 654 (14.3%). Although Raigad has large Hazardous Waste generation, number of authorisations granted to Hazardous Waste generating units in Raigad were only 341 (7.5%). The lowest number of authorizations granted was seen to be in Amravati 91 (1.99%).

3.3.2 Based on type of product manufactured :

The break-up of authorisations granted to Hazardous Waste generating units according to Type of Product manufactured is presented in **Table 3.5** below.

This indicates that chemical manufacturing industry (comprising of Bulk Drug / Dyes / Petrochemicals / Pesticides / Other Chemicals / Resins and Adhesives / Paints / Paints and Solvent Distillation) has maximum number of authorisations granted to hazardous waste generating units viz. 2040 (44.6%). To achieve further clarity, these have been separately classified in the **Table 3.5**.

Many of industry types have been combined together under the "Other Industry" category as indicated in **Table 3.5**. These together also account for a large number of hazardous waste generating units (Total 904).

Table 3.5

Industry Type & Region wise Authorizations

Sr. No.	Industry Type	Region wise Number of Authorisations Granted											
		N MUM	PUNE	NGP	THN	AUG	RAI	KAL	NAS	AMRA	KOLH	MUM	Total
1)	Bulk Drugs & Pharma Formulations	69	61	12	172	38	49	59	30	4	13	18	525
2)	Dyes & Dye Intermediates	25	11	4	60	10	25	45	5	0	22	4	211
3)	Petrochemicals/Oil Refining/Processing	37	17	11	21	15	19	9	21	22	14	15	201
4)	Pesticides & Formulation	10	8	0	4	4	12	4	10	10	10	4	76
5)	Other Chemicals	116	77	29	104	21	69	129	52	4	39	11	651
6)	Metal reprocessing, Finishing, Metallic Salt	97	133	25	44	33	31	20	41	4	10	77	515
7)	Resins & Adhesives	29	21	12	46	4	24	23	8	0	4	5	176
8)	Engineering, Metallurgical	6	138	26	53	16	11	62	94	1	45	31	483
9)	Solvent Distillation	25	18	1	4	0	3	17	16	0	4	0	88
10)	Paper and Mill Board	0	8	29	0	3	7	4	9	0	8	0	68
11)	Power Plants	2	0	3	0	0	3	0	2	0	0	1	11
12)	Textile	43	11	12	47	0	14	212	8	2	36	46	431
13)	Mining	0	0	25	0	0	0	0	0	0	3	0	28
14)	Paints, Inks and Varnishes	14	20	12	28	3	7	10	4	0	5	9	112
15)	Other	44	233	124	38	91	67	60	151	44	81	62	995
	Total no. of units	**517**	**756**	**325**	**621**	**238**	**341**	**654**	**451**	**91**	**294**	**283**	**4571**

Industries covered under others : Sugar manufacturing, Distilleries, Rubber / Asbestos products, Automobile servicing, Rectified spirit, Glass, Fertilizer etc

NMUM : Navi Mumbai NGP : Nagpur THN : Thane AUG : Aurangabad RAI : Raigad
KAL : Kalyan NAS : Nashik AMRA : Amravati KOLH : Kolhapur MUM : Mumbai

3.3.3 Based on Category of Industry / Scale of Operation :

The break-up of authorisations granted to Hazardous Waste generating units based on category of industry viz Red/Orange/Green and scale of operation LSI/MSI/SSI are presented in **Table 3.6**. These indicate that maximum number of authorisations granted to HW generating units are in Red/SSI category 2583 (56.5%) followed by Red/LSI 828 (18.1%).

Table 3.6

Industry Scale & Region wise Authorizations

Sr. No.	Industry Category	Region wise Number of Authorisations Granted											
		N MUM	PUNE	NGP	THN	AUG	RAI	KAL	NAS	AMRA	KOLH	MUM	Total
1)	**RED/SSI**	375	312	147	426	72	144	580	218	47	131	131	**2583**
2)	**RED/MSI**	26	75	46	35	41	68	15	71	9	69	28	**483**
3)	**RED/LSI**	75	179	64	38	70	87	22	131	13	72	77	**828**
4)	**ORG/SSI**	28	62	48	88	32	23	23	17	15	14	41	**391**
5)	**ORG/MSI**	9	26	0	4	10	8	1	2	3	4	2	**69**
6)	**ORG/LSI**	2	13	0	6	5	6	2	6	2	2	2	**46**
7)	**GRN/SSI**	2	77	20	24	5	4	11	5	2	1	1	**152**
8)	**GRN/MSI**	0	7	0	0	2	1	0	0	0	0	1	**11**
9)	**GRN/LSI**	0	5	0	0	1	0	0	1	0	1	0	**8**
	TOTAL	**517**	**756**	**325**	**621**	**238**	**341**	**654**	**451**	**91**	**294**	**283**	**4571**

NMUM : Navi Mumbai NGP : Nagpur THN : Thane AUG : Aurangabad RAI : Raigad
KAL : Kalyan NAS : Nashik AMRA : Amravati KOLH : Kolhapur MUM : Mumbai

3.4 Hazardous Waste Generation – Based on Industry Type and Category of Industry :

3.4.1 Based on Industry Type :

The Hazardous Waste generation quantity has been broken-up for 15 different types of industries identified earlier to find out which industry sector is generating maximum quantity of waste. **Table 3.7** presents statistics for wastes generated by various industry types for different waste disposal options. This indicates that amongst landfillable waste, the industries involved in chemical manufacturing activities viz bulk drugs / dyes and dye intermediates / petrochemical / resins / paints / solvent distillation / other chemicals has highest generation at 3,31,256.6 MTPA (52.9%), followed closely by industries classified under Other Industrial category sector at 90,661 MTPA (14.5%). The metal reprocessing, metal finishing sector metal salt manufacturing is also one of the highest generators of landfillable waste at 58,905.6 MTPA (9.4%).

In case of Incinerable wastes also the chemical manufacturing sector (comprising bulk drugs / dyes and dye intermediates / petrochemical / resins / paints / solvent distillation / other chemicals) is the highest generator at 1,02,169.8 MTPA (66.4%) followed by "other industrial sector" contributor 42,367.2 MTPA (27.5%). There is no incinerable waste generated in sectors like textile, mining, power plants etc.

Amongst recyclable wastes, the highest generation is again from chemicals manufacturing sector (i.e. comprising of bulk drugs / dyes and dye intermediates / petrochemical / resins / paints / solvent distillation / other chemicals) 2,50,512.6 MTPA (39.9%) followed closely by "Other Industries" at 1,77,177.5 MTPA (28.2%).

Table 3.7

Industry Type Wise HW Generation

Sr. no.	Industry Type	Quantity of HW (MT/Annum)			Total
		SLF	RCL	INC	
1)	Bulk Drugs & Pharma Formulations	24,156.6	40,084.6	18,319.4	82,560.6
2)	Dyes & Dye Intermediates	1,21,010.2	7,174.3	2,225.5	1,30,410.0
3)	Petrochemicals/Oil Refining/Processing	50,113.4	22,053.6	23,276.2	95,443.2
4)	Pesticides & Formulation	84,850.0	1,39,166.5	10,292.0	2,34,308.5
5)	Other Chemicals	47,067.4	30,404.7	25,663.9	1,03,136.0
6)	Metal reprocessing, Finishing, Metallic Salt	58,905.6	54,956.6	11.0	1,13,873.2
7)	Resins & Adhesives	2,408.5	1,940.6	1,552.8	5,901.8
8)	Engineering, Metallurgical	31,122.5	46,248.6	6,570.1	83,941.2
9)	Solvent Distillation	1,154.7	7,146.5	20,840.0	29,141.2
10)	Paper and Mill Board	25,343.6	9,263.4	242.4	34,849.4
11)	Power Plants	6,544.0	2,288.1	-	8,832.1
12)	Textile	53,158.1	28,092.8	0.5	81,251.4
13)	Mining	-	2,327.8	-	2,327.8
14)	Paints, Inks and Varnishes	495.8	2,541.8	919.3	3,956.9
15)	Others	90,661.0	1,77,177.5	42,367.2	3,10,205.7
16)	Non Industrial Sources	28,958.8	56,665.7	1,718.4	87,342.9
	Total	**6,25,950.3**	**6,27,532.5**	**1,53,998.4**	**14,07,481.2**

3.4.2 Based on Scale of Industry :

Table 3.8 presents Hazardous Waste generation statistics based on category of industry (Red / Orange / Green) and Scale of operation (LSI / MSI /SSI). As can be seen, the Red Category Industries in the Large Scale Sector generate maximum quantity of hazardous waste followed by Red Category Small Scale Sector Industries.

Table 3.8

Industry scale wise HW Generation

	Category	Quantity of HW (MT/Annum)			
Sr. No.	of Industry	SLF	RCL	INC	Total (MTPA)
1	RED/SSI	1,89,891.8	1,75,706.6	44,565.9	4,10,164.4
2	RED/MSI	91,697.3	1,30,702.2	8,224.3	2,30,623.8
3	RED/LSI	303,827.7	2,58,064.7	95,467.8	6,57,360.3
4	ORG/SSI	4,497.2	1,617.6	1,494.9	7,609.7
5	ORG/MSI	462.6	2,065.9	168.1	2,696.7
6	ORG/LSI	6,420.1	2,092.7	2,208.9	10,721.7
7	GRN/SSI	138.2	320.5	136.9	595.6
8	GRN/MSI	21.9	19.1	9.8	50.8
9	GRN/LSI	34.8	275.7	3.6	314.1
	Non Industrial	28,958.8	56,665.7	1,718.4	87,342.9
	TOTAL	**6,25,950.3**	**6,27,530.5**	**1,53,998.4**	**14,07,480.2**

3.5 Units with Own Disposal Arrangement :

Some units have provided own disposal arrangement for toxic hazardous wastes generated. In particular, units manufacturing pesticides bulk drugs and some other chemicals have provided incinerators to incinerate toxic / hazardous wastes generated in their processes. In some cases incinerators have been supplied as part of technology package or in some cases supplied by manufacturers. Many engineering units have also put up own incinerator to incinerate paint residue. After the passage of Hazardous Waste Management and Handling Rules, 1989 and before creation of secure landfill facility at Taloja, some units generating large quantities of solid hazardous Wastes had been granted Authorisation for landfill inside their plants. Such land fill facilities

in by most factories were primarily concrete pits made with no arrangements for leachate collection, treatment and disposal, and can be best termed as 'temporary storage facilities'. Indeed HPC, in its report to Honorable Supreme Court has labeled them as 'Temporary Storages'.

Also, large number of units were observed to be engaged in the activity of recycling / reprocessing of solid / hazardous waste.

Statistics pertaining to units having own incinerator / own landfill / temporary storage facility and / or engaged in various recycling / reprocessing of solid / hazardous waste are presented in **Table 3.9**.

Table 3.9

Regionwise Break-up of Units having own Landfill / Incineration Facility or Engaged in Waste Recycle

Sr. No.	Regions	Units having temporary Storage / Landfill within own premises	Units having own Incinerator	Units engaged in Recycling / Reprocessing of Hazardous Waste
1	Navi Mumbai	0	6	23
2	Pune	10	16	12
3	Nagpur	7	4	7
4	Thane	4	8	48
5	Aurangabad	3	4	3
6	Raigad	4	5	9
7	Kalyan	0	7	26
8	Nashik	10	7	22
9	Amravati	0	2	3
10	Kolhapur	0	6	19
11	Mumbai	1	2	6
	Total	**39**	**67**	**178**

3.5.1 Units having own Landfill Arrangement / Temporary Storage Facilities :

As seen from **Table 3.9** the number of units having own landfill arrangement / temporary storage facilities inside their factories was 39. Maximum number of such units were located in Pune and Nashik (10 each), Nagpur (7), Raigad and Thane (4 each) and Aurangabad (3). An important observation is that only 1 unit (Godrej) has provided landfill facility in Mumbai, presumably the balance wastewas disposed off in Municipal Solid Waste sites. List of units having own temporary storage facilities are marked separately in the Inventory prepared..

3.5.2 Units having own Incineration Facility :

From **Table 3.9** it can be seen that about 67 units have provided incineration facility in the State. Maximum number of such units is in Pune (16) with the balance spread over all parts of the State. Even Amravati region has two incinerators provided by Pesticide Formulation units. A closer look reveals that maximum number of incinerators is operating in engineering and pesticide sector. Units having own incineration facility are marked separately in the Inventory prepared.

3.5.3 Units Engaged in Recycling / Reprocessing Activity :

The inventory reveals that 173 units are engaged in recycling / reprocessing of Hazardous Waste. Maximum number of such units are seen in Thane (43) followed by Kalyan (26) and Navi Mumbai (23).

The recyclers / reprocessors are further classified into Non-ferrous metal re processors / oil reprocessors and other reprocessors. The statistics for the same is presented in **Table 3.10** and indicates that maximum number of units are engaged in non-ferrous metal reprocessing / recovery / recycling activities (113 units out of 173) whereas oil reprocessors are only 19 in number.

Of these, 22 non-ferrous metal reprocessors (including 12 lead reprocessors) and 9 oil re processors are approved by MoEF / CPCB as having Environmentally Sound Technology (EST). It is understood that one more non-ferrous metal reprocessing unit and 9 oil recyclers have approached CPCB /

MPCB to obtain such Registration.

Other reprocessors include units reprocessing chemicals, polyester / paints / acrylic etc. Solvent distillation to recover / recycle solvents is seen to be a major activity presumably because of the large pharmaceutical industry in the state. About 39 units are engaged in solvent distillation. With maximum units in Navi Mumbai (14), followed by Kalyan (9). Region wise statistics of units engaged in various recycling / reprocessing activities, type of materials recycled and their status (MoEF approved or not) is presented in **Table 3.10**. The recycling / reprocessing units have been separately marked in the Region wise listing of units in the Inventory.

Table 3.10

Classification of Units Engaged in Reprocessing / Recycling Activities

Sr. No.	Regions	Type of Reprocessing Activity				MoEF Approved Reprocessor of	
		Non- ferrous Metals	Used/ Waste Oil	Other (*)	Solvent Distillation	Non- ferrous metals	Used/Waste Oil
1	Navi Mumbai	9	0	0	14	1	0
2	Pune	9	1	2	0	3	1
3	Nagpur	5	0	2	0	3	1
4	Thane	43	4	0	1	11	3
5	Aurangabad	1	2	0	0	0	0
6	Raigad	3	0	2	4	0	1
7	Kalyan	13	4	0	9	3	3
8	Nashik	13	1	0	8	1	0
9	Amravati	2	1	0	0	0	0
10	Kolhapur	10	5	1	3	0	0
11	Mumbai	5	1	0	0	0	0
	Total	**113**	**19**	**7**	**39**	**22**	**9**

(*) Other reprocessors include those engaged in Acrylic, Paint, Polyester recycling