Chapter 2: Performance Audit

HEALTH & FAMILY WELFARE AND ENVIRONMENT DEPARTMENTS

2.1 Bio-Medical Waste Management in West Bengal

Executive Summary

According to the World Health Organisation[22], health care services in pursuing their aims of reducing health problems and eliminating potential risks to people's health, inevitably create waste that may itself be hazardous to health. The waste produced in the course of healthcare activities carries a higher potential for infection and injury than any other type of waste. Inadequate and inappropriate handling of health-care waste may have serious public health consequences and a significant impact on the environment. Sound management of health-care waste is thus a crucial component of environmental health protection.

With the objective of providing a regulatory frame work for management of bio-medical waste (BMW) generated in the country the Ministry of Environment and Forests, Government of India (GoI) framed (July 1998) the Bio-Medical Waste (Management and Handling) Rules, 1998 under the Environment (Protection) Act, 1986. Thereafter, GoI reviewed these rules and with the objective of implementing these rules more effectively, to improve the collection, segregation, processing, treatment and disposal of these bio-medical wastes in an environmentally sound management thereby, reducing the bio-medical waste generation and its impact on the environment, framed a more comprehensive set of Rules in supersession of the existing rules called 'Bio-Medical Waste Management Rules, 2016' (BMWM Rules) in March 2016. These Rules prescribe the procedures for handling, treatment and disposal of Bio-Medical Waste (BMW) generated by hospitals, nursing homes, blood banks, veterinary institutions, *etc.*

In the State of West Bengal, the West Bengal Pollution Control Board (WBPCB), under the control of the Environment Department, Government of West Bengal (GoWB), is the Authority prescribed to enforce provisions of the BMW Rules. The Health and Family Welfare (H&FW) Department, GoWB is responsible for enforcing the Rules in all Health Care Facilities (HCFs). The responsibility in respect of BMW generated from veterinary HCFs lies with the Animal Resources Development (ARD) Department.

The Audit on Bio-Medical Waste Management covered a period of five years from April 2013 to March 2018 through examination of records of the Environment Department, WBPCB and H&FW Department. Besides, audit coverage was extended to Departments of Correctional Administration (CA), Home & Hill Affairs (H&HA) and Animal Resources Development. In addition, Common Bio-Medical Waste Treatment Facilities (CBMWTFs) were also covered in audit. Significant audit findings are detailed below:

[22] *Safe management of wastes from health-care activities, second edition, WHO*

- WBPCB's inventory of BMW generating units was incomplete. 48 *per cent* of the BMW generating units remained outside the purview of WBPCB monitoring.
- BMW generation was not assessed in the State. Quantification of BMW is the first step in managing BMW**.** HCFs were to report the bio-medical waste generated in terms of category and colour coding as specified in Schedule I of the BMWM Rules 2016, to WBPCB for compilation to arrive at the total quantum of BMW generated in the State. In seven test-checked WBPCB Circle Offices (COs)/ Regional Offices (ROs), 97 *per cent* of the identified HCFs, did not submit Annual Reports during the period 2015-18.
- BMW remained un-treated. In the Annual Report of 2016, WBPCB understated the quantity of BMW generation (26,859 kg per day) to match the figure of BMW shown as treated (26,859 kg per day) by the CBMWTFs so that no BMW was shown as remaining un-treated in the State. WBPCB was intentionally understating and manipulating the BMW generation figure to make it appear that all generated BMW was being treated before disposal.
- No operational research activity was undertaken or supported by the State to assess the risk posed by BMW to the health and environment. Further, there was lack of public awareness of the harm caused by BMW and limited knowledge of pollution prevention which made the risk assessment more essential.
- CBMWTFs failed to comply with Central Pollution Control Board (CPCB)'s norms of distance and beds to be covered, to ensure waste disposal within 48 hours of generation. 3,037 Metric Tonne (MT) of BMW reported to have been collected by four out of six CBMWTFs was beyond the capacity of the installed incinerators, even presuming the incinerators operated in full capacity round the clock during the period from 2013 to 2016.
- Gap between the requirement and availability of BMW treatment facilities was not analysed and as such there was no Action Plan for development of new CBMWTFs.
- WBPCB reported unrealistic figures of treatment of BMW in its Annual Reports, which was even beyond the installed capacity of the CBMWTFs.
- Though WBPCB attributed poor compliance to the BMW Rules to lack of awareness amongst various stakeholders it failed to establish co-ordination with H&FW Department for organising any centralised training during the period under review. In last five years, WBPCB had conducted only eight Workshops in nine months between December 2016 and August 2017.
- Training to generators and handlers of BMW was deficient. 81 *per cent* of the total staff handling BMW in the test-checked 39 Government HCFs remained untrained.

- There was lack of awareness among other Government Departments (*e.g.*, Animal Resources Development, Correctional Administration, Home & Hill Affairs, *etc.*) contributing to BMW.
- The issue of improper segregation of BMW was pointed out in the Audit Report of the Comptroller and Auditor General of India on Government of West Bengal for the year ended 31 March 2008. Even after 10 years, serious irregularities were observed by Audit in segregation of BMW in 52 (74.29 *per cent*) of the 70 test-checked HCFs.
- Highly infectious blood samples were found scattered. BMW was disposed with Municipal wastes. Absence of red plastic bags for segregation of recyclable (plastic) BMW was noticed across the test-checked HCFs. Yellow plastic bags were used to collect the plastic BMW, leading to incineration of the plastic BMWs emitting highly toxic chemical called dioxin.
- The status of health check-up, immunisation and provisioning of personal protective equipment for health care workers and others handling BMW in the test-checked HCFs was poor.
- There was deviation of storage norms at CBMWTFs. None of the CBMWTFs were found to be using closed trolleys. Moreover, none of the CBMWTFs, except West Bengal Waste Management Limited (WBWML), Haldia, had installed any automatic feeding device for feeding of BMW into incinerators to avoid manual feeding.
- There was irregular collection and transportation of BM waste by the CBMWTFs. Non-lifting of BMW by CBMWTFs was never reported by HCFs to WBPCB. Hired vehicles, not fully covered vehicles, which were used were not dedicated for BMW carriage.
- Veterinary and other waste remained un-treated in the State. There was irregular burning and disposal in unauthorised burial pits.
- There was no separate collection system and no effluent treatment system in place for liquid chemical waste in 94.29 *per cent* test-checked HCFs.
- Treatment before disposal was poor in CBMWTFs. Continuous emission monitoring of flue gas not carried out. The emissions were beyond safety standards. Autoclaves meant for disinfecting plastic, glasses and sharp waste were not in operation in four out of six CBMWTFs. Plastic and sharp wastes were also burnt in incinerator.
- Prioritisation of prevention and minimisation of BMW generation over treatment and disposal of BMW, remained un-addressed in the State.
- Control and Monitoring mechanisms were not in place. Clinical Establishment licences were issued to 390 HCFs without valid BMW authorisation.
- Under test-checked WBPCB Regional Offices and Circle Offices jurisdiction, 74.88 *per cent* of 4,164 HCFs were operating without valid authorisation.

- Supervision and monitoring by the BMW Committees in HCFs was found to be inadequate.
- The BMW data with regard to West Bengal hosted on the web-site of CPCB, however, contained various anomalies impacting its reliability and highlighted monitoring failure on the part of CPCB.
- In spite of widespread violations of the Rules and Standards by the HCFs and the CBMWTFs across the State, no punitive action against the defaulters under Section 5 and Section 15 of Environment Protection Act, 1986 was found to have been taken by WBPCB to enforce compliance.
- In the absence of orders clearly delineating the duties and responsibilities of the various functionaries involved in implementation at various levels of the organisational hierarchy either under the WBPCB or under various Departments, no responsibility was fixed at any level of the organisational hierarchy despite gross and widespread irregularities in violations of BMW Rules, 2016.

2.1.1 Introduction

Waste management is an important factor in safeguarding human health and environment protection. Improper waste management may cause adverse health problems by spreading infections and diseases and may cause severe environmental problems by polluting the air and the soil, surface water and groundwater.

Some examples are:

- Soil can be contaminated with toxic components;
- Leachate[23] from waste can pollute surface water and ground water;
- Uncontrolled burning of waste produces toxic and carcinogenic gases; and
- Leaks of radioactive substances can contaminate the air and soil.

Waste is categorised as hazardous and non-hazardous (also called solid waste). Bio-Medical waste is a form of hazardous waste because it contains properties which render them hazardous. As per the Bio-Medical Waste Management Rules, 2016 (BMWM Rules) the term "Bio-Medical Waste" (BMW) means any waste, which is generated during the diagnosis, treatment or immunisation of human beings or animals or research activities pertaining thereto or in the production or testing of biologicals[24] or in health camps, including the categories mentioned in Schedule I[25] appended to the BMWM Rules, 2016.

[23] *Water that dissolves contaminants as it trickles through waste disposed of in a landfill. Leaching may result in hazardous substances entering surface water, ground water or soil.*

[24] *Preparation made from organisms or micro-organisms or product of metabolism and biochemical reactions intended for use in health care of human beings or animals.*

[25] *(a) Human Anatomical Waste, (b) Animal Anatomical Waste, (c) Soiled Waste, (d) Expired or discarded medicines, (e) Chemical Waste, (f) Chemical Liquid Waste, (g) Discarded linen, mattresses, beddings contaminated with blood or body fluid, (h) Microbiology, Biotechnology and other clinical laboratory waste, (i) Contaminated Waste (Recyclable), (j)Waste sharps including Metals, (k) Glassware and (l) Metallic Body Implants.*

This type of waste typically consists of medicines, sharp objects, bandages, body fluids and body parts, and usually contains bacteria and other organisms that can spread harmful diseases if not properly handled.

BMW constituted about 0.19 *per cent* (2016) of the solid waste (non-hazardous) generated in West Bengal. This 0.19 *per cent* of the infectious and hazardous waste has the potential of infecting the remaining 99.81 *per cent* (14,000 tonnes per day in 2016), if mixed with general waste. Hence, management of Bio-Medical waste at source becomes crucial.

In order to protect the environment and human health from the adverse effects of the BMW and provide a regulatory frame work for management of bio-medical waste generated in the country the Ministry of Environment and Forests, Government of India (GoI) framed (July 1998) the Bio-Medical Waste (Management and Handling) Rules, 1998 {BMW (M&H) Rules} under the Environment (Protection) Act, 1986. In supersession of these rules GoI framed a more comprehensive set of Rules called 'Bio-Medical Waste Management Rules, 2016' (BMWM Rules) in March 2016.These Rules apply to all persons [26] who generate, collect, receive, store, transport, treat, dispose or handle BMW in any form.

The Health and Family Welfare (H&FW) Department, GoWB was to ensure implementation of the BMWM Rules in all Health Care Facilities (HCFs) under its control as well as to advise WBPCB/ its committee on implementation of these Rules. H&FW Department was responsible to grant licences to the Government and private HCFs with a condition to obtain authorisation[27] from WBPCB for BMW management and to monitor, refuse or cancel licence for violation of conditions of authorisation or provisions under the Rules. Further, the Department was to undertake or support operational research and assess the risks to environment and health due to BMW, co-ordinate with WBPCB for organising training programmes to staff of HCFs and constitute State Level and District Level Advisory Committees to oversee the BMW management and implement the recommendations of the Committees, *etc*. Animal Resources Development Department had the same responsibility in regard to BMW generated by veterinary HCFs.

West Bengal Pollution Control Board (WBPCB), under the control of Environment Department, Government of West Bengal (GoWB), is the prescribed authority to enforce the provisions of the BMW (M&H) Rules, 1998 (up to March 2016) and then the BMWM Rules, 2016 in the State. Apart from ensuring compliance of the provisions of the Rules, WBPCB was responsible to inventorise BMW Occupiers[28] and data on BMW generation, treatment and disposal, compile data and submit the same in annual report to Central Pollution Control Board, grant/ renew, refuse/ cancel authorisation, ensure adequacy of treatment capacity of BMW, undertake research/ operational research on BMW

[26] *Including hospitals, nursing homes, clinics, dispensaries, veterinary institutions, animal houses, pathological laboratories, blood banks, Ayush hospitals, clinical establishments, research or educational institutions, health camps, medical or surgical camps, vaccination camps, blood donation camps, first aid rooms of schools, forensic laboratories and research labs.*

[27] *Kind of licence granted by WBPCB considering capability for proper management of BMW of a BMW handler/generator.*

[28] *Occupier means the person having administrative control over the institution and the premises generating BMW which includes all human and animal HCFs*

management, impart training to staff of HCFs and CBMWTFs, monitor the compliance of conditions of authorisations and to take legal actions against HCFs/ CBMWTFs for violation of Rules.

Further details regarding responsibilities identified in BMWM Rules, 2016, have been elaborated in ***Appendix 2.1.***

2.1.2 Audit Objectives

The audit objectives were to examine whether:

- Quantum of waste being generated in the State had been assessed and risks to environment and health posed by BMW identified;
- Treatment and disposal facilities were adequate in the State;
- Stake holders were sensitised and awareness created among Occupiers, Operators and handlers of BMW;
- Effective compliance to Rules by the Occupiers and Operators[29] of the Common Bio-Medical Waste Treatment Facilities[30] (CBMWTFs) was taking place in the State;
- Monitoring was effective in checking compliances; and
- Man-power was adequate and accountability determined.

2.1.3 Audit Criteria

Following were the audit criteria:

(i) Relevant provisions under Environment (Protection) Act, 1986;

(ii) Provisions under Bio-Medical Waste (Management and Handling) Rules, 1998 and Bio-Medical Waste Management Rules, 2016;

(iii) Guidelines issued by the Central Pollution Control Board (CPCB) for BMW management;

(iv) Guidelines/ orders/ instructions issued by WBPCB; and

(v) Orders/ circulars/ instructions issued by H& FW Department relating to management of BMW.

2.1.4 Audit Scope and Methodology

Audit covered a period of five years from April 2013 to March 2018. Records of H&FW Department, Environment Department, WBPCB along with its Waste Management Cell (WMC) and Seven COs/ ROs were scrutinised in audit. Besides, coverage was extended to Animal Resource Development (ARD) Department, Correctional Administration (CA) Department and Home & Hill Affairs (H&HA) Department as these Departments also operated HCFs and contributed to generation of BMW.

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[29] A person who owns or controls a common bio-medical waste treatment facility (CBMWTF) for the collection, reception, storage, transport, treatment, disposal or any other form of handling of bio-medical waste.

[30] CBMWT Facility means a facility common to all its member HCFs wherein treatment, disposal of BMW or processes incidental to such treatment and disposal are carried out.

All the six CBMWTFs functioning in the State were selected. Based on the jurisdiction of each CBMWTF, districts were stratified in six groups. Five districts[31] were selected representing the strata based on simple random sampling method. Government HCFs in the five selected districts were selected based on bed strength. Joint inspection was also done in 31 private HCFs randomly selected in five test-checked districts.

The details of sample selection are given in **Table 2.1** and ***Appendix 2.2***.

Table 2.1: Details of Audit Sampling

Sl. No.	WBPCB approved CBMWTFs	No. of districts catered by CBMWTF	Selected district	Concerned WBPCB office	Number of Units covered at District level							
					H&FW Department					ARD Deptt.	CA Deptt.	Home and HA Department
						Health Care Facilities (HCFs)						
					CMOsH	MCHs	Decentralised HCFs	BPHC/ RHs	Private HCFs			
1	**Greenzen Bio Private Ltd., Siliguri, Jalpaiguri**	06	Darjeeling	**Siliguri RO**	01	01	02	03	02	03	00	00
2	**West Bengal Waste Management Ltd., Purba Medinipur**	02	Paschim Medinipur	**Haldia RO**	02	01	03	07	05	00	02	01
3	**Medicare Environmental Management Private Ltd., Raniganj, Burdwan**	05	Bankura	**Durgapur RO**	02	01	03	05	10	04	01	01
4	**Medicare Environmental Management Private Ltd., Kalyani, Nadia**	04	Hooghly	**Barrackpore RO, Kankinara CO and Hooghly RO**	01	00	04	05	08	03	01	01
5	**Medicare Environmental Management Private Ltd., Belgachia, Howrah**	02	Kolkata	**WMC, WBPCB HQ**	00	01	00	00	02	00	00	00
				Camac Street CO	00	00	01	00	00			
6	**Greentech Environ Management Private Ltd., Mograhat, South 24 Pargana**	02	Kolkata	**WMC, WBPCB HQ**	00	01	00	00	00	00	00	00
				Camac Street CO	00	00	01	00	04			
		TOTAL			**06**	**05**	**14**	**20**	**31**	**10**	**04**	**03**

RO: Regional Office, CO: Circle Office, WMC: Waste Management Cell, CMOsH: Chief Medical Officers of Health, MCH: Medical College & Hospital, RH: Rural Hospital, BPHC: Block Primary Health Centre.

An Entry Conference was held (February 2018) with the Health and Family Welfare (H&FW) Department, wherein audit objectives, audit criteria, sampling and methodology were explained. Audit findings and recommendations were discussed with the H&FW Department and WBPCB in an Exit Conference held in March 2019. Replies and views of the Departments have been suitably incorporated in the Report.

[31] *Kolkata being common district for two CBMWTFs, five districts were selected from six strata*

2.1.5 Previous Audit Coverage

A performance audit on 'Management of Bio-Medical and Plastic Waste' was included in the Audit Report of the Comptroller and Auditor General (CAG) of India on the Government of West Bengal (Civil) for the year ended 31 March 2008. The observations arising out of the present audit have been juxtaposed with the responses made by the WBPCB against the earlier report. The current study, however, does not cover Plastic waste.

Audit Findings

2.1.6 Quantification of Bio-Medical Waste and Assessment of Risk

2.1.6.1 WBPCB's inventory of BMW generating units was incomplete

According to BMWM Rules, 2016, the responsibility of inventorisation of Occupiers and data on bio-medical waste generation, treatment and disposal vests with State Pollution Control Boards (SPCBs).

48.32 per cent of BMW generating units in the State remained outside the purview of WBPCB monitoring

WBPCB did not establish a system or device a mechanism whereby it could establish linkages between Departments like H&FW, ARD, Correctional Administration, H&HA, *etc*. and integrate data for developing a dependable inventory of BMW generating units. It was observed that 48.32 *per cent* of the existing HCFs remained outside the inventory of the WBPCB as shown below:

Table 2.2: Comparison between inventory of WBPCB and list of the controlling Departments

Particulars	No. as per Departmental statistics[32]			No. as per WBPCB		
	Bedded	Non-bedded	Total	Bedded	Non-bedded	Total (percentage)
No. of HCFs	2,879	7,835	**10,714**	2,477	3,060	**5,537 (51.68)**
Bed Strength	1,47,401	0	**1,47,401**	1,06,193	0	**1,06,193 (72.04)**

Source: Departmental statistics of H&FW Department and WBPCB database/ records

Thus, the inventory maintained by WBPCB in respect of BMW generating units in the State was incomplete. In reply (February 2019), the Department of Environment stated that WBPCB has started collating the list of HCFs with Health Department.

2.1.6.2 BMW generation not assessed in the State

Quantification of BMW is the first step in managing BMW. As per the mechanism to be followed, the HCFs were to report the bio-medical waste generated in terms of category and colour coding as specified in Schedule I of the BMWM Rules, to WBPCB for compilation to arrive at the total quantum of BMW generated in the State.

Annual Reports not obtained from HCFs

The mechanism failed to generate realistic data as 48.32 *per cent* of HCFs remained unidentified in the inventory of WBPCB. It was also observed by Audit that 97 *per cent* of the identified HCFs, in seven test-checked WBPCB COs / ROs, did not submit Annual Reports during the period from 2015 to 2018.

[32] *Departmental statistics includes H&FW, ARD, H&HA and CA Departments and hospitals under Employees' State Insurance (Medical Benefit) Scheme*

A similar observation was made in the Audit Report of the CAG of India, Government of West Bengal for the year ended 31 March 2008. In spite of its assurances to the Legislature in 2010, WBPCB could not quantify actual BMW generation in the State and continued to depend on hypothetically arrived at figures for reporting to the Central Pollution Control Board (CPCB).

WBPCB, in reply, assured (December 2018) that it would issue reminders and notices to the defaulting HCFs to ensure compliance by them. Reply was silent on why no action had been taken so far, even after more than 10 years of its assertion, to develop the mechanism to quantify the BMW generation reliably.

No weighing machine to weigh the quantity of BMW generated was maintained by HCFs.

It was observed by Audit that no internal bio-medical waste control system was set up in hospitals. The hospitals were not in a position to determine the amount of BMW produced or control the flow of the waste. Assessment of quantity of BMW at source of generation was deficient. It was found that 39 HCFs (55.71 *per cent*) of the 70 test-checked HCFs, did not maintain the BMW Register for recording category and colour coding-wise quantity of BMW generated and collected by the CBMWTF. Moreover, in violation of the CPCB guidelines, none of the HCFs had any weighing machine to weigh the quantity of BMW generated. Only approximate weight of collected BMW as indicated by the CBMWTFs in their collection slips was recorded as BMW generation figure by the HCFs.

Thus, even at the point of generation, the basic records did not capture the actual quantum of BMW generated. The reply (November 2019) of the Directorate of Health Services under the Health and Family Welfare Department also confirms (November 2019) assessment of BMW generation based on CBMWTFs data.

2.1.6.3 BMW remained un-treated

According to the BMWM Rules 2016, Bio-medical waste was required to be treated and disposed of in accordance with Schedule I of the rules, and in compliance with the standards provided in Schedule II, of the rules by the HCFs and CBMWTFs.

The BMW management scenario, when analysed from 2013, was found as below:

Table 2.3: Generation and treatment of BMW

BMW remained un-treated

Year	BMW generated (kg/ day)	BMW treated and disposed (kg/ day)	BMW remaining un-treated (kg/ day) (percentage)	Un-treated BMW per year (kg)
2013	40,407	22,970	17,437 (43.15)	63,64,505
2014	42,237	22,737	19,500 (46.17)	71,17,500
2015	32,823	23,555	9,268 (28.23)	33,82,820
2016	26,859	26,859	0	0

Source: Records of the WBPCB

It was evident from above that 28.23 *per cent* to 46.17 *per cent* of BMW generated in the State remained untreated. This appeared to be an improvement over the earlier figures of 45 *per cent* to 94 *per cent* of BMW remaining untreated, reported in the Audit Report of the CAG of India on the Government of West Bengal for the year ended 31 March 2008. This was, however, only apparent and not real in view of the fact that the figures of BMW generation were being understated as detailed in the following paragraph:

2.1.6.4 Understatement of BMW generation to match the figure of BMW shown as treated

WBPCB understated the quantity of BMW generation to match the figure of BMW shown as treated.

The steep fall in the quantity of waste generation from 2015, as noted in **Table 2.3** above, raised doubts as to the reliability of the data reported in the Annual Reports by WBPCB. Scrutiny showed that in the Annual Report of 2016, WBPCB understated the quantity of BMW generation (26,859 kg per day) to match the figure of BMW shown as treated (26,859 kg per day) by the CBMWTFs so that no BMW was shown as remaining un-treated in the State. It was observed that WBPCB took such decision of depicting the figure of BMW treated as equal to the figure of BMW generation 'to avoid a negative portrayal of the State' which was a matter of serious concern and called for immediate attention of the Government for fixing of responsibility.

An audit analysis of the extent of understatement using average BMW generation figure of 0.231 kg[33] per bed per day showed that BMW generation was understated at least by 49.52 *per cent* considering bed strength of the State as per H&FW Department data ***(Appendix 2.3)***. Thus, the efficacy of the efforts for BMW management was compromised by lack of reliable data. What appeared to be even more worrisome was that the WBPCB was intentionally understating and manipulating the BMW generation figure to make it appear that all generated BMW was being treated before disposal.

The Department of Environment/ WBPCB accepted the audit observations during an Exit Conference held in March 2019.

2.1.6.5 Absence of research on risk to environment and health posed by BMW

As per BMWM Rules, 2016, the H&FW Department was to undertake or support operational research and assessment with reference to risks to environment and health from BMW and previously unknown disposables and wastes from new types of equipment. This was necessary for identifying various aspects of risks involved with BMW, so that steps may be taken to contain generation of BMW and to manage the BMW generated. Further, lack of public awareness of the harm caused by BMW and limited knowledge of pollution prevention makes the risk assessment more essential.

No operational research activity was, however, ever undertaken or supported in the State to assess the risk posed by BMW to the health and environment.

Conclusions: *Even after two decades of implementation of the Rules, WBPCB did not establish a system or devise a mechanism whereby it could establish linkages between Departments and integrate data for developing a dependable inventory of BMW generating units. 48.32 per cent of the existing HCFs remained outside the inventory of the WBPCB.*

WBPCB could not quantify actual BMW generation in the State and continued to depend on hypothetically arrived at figures for reporting to the Central Pollution Control Board (CPCB).

Assessment of quantity of BMW at source of generation was deficient.

[33] *As per the Training Module (2003) on 'Health Care Waste Management' of H&FW Department*

In the Annual Report of 2016, WBPCB understated the quantity of BMW generation (26,859 kg per day) to match the figure of BMW shown as treated (26,859 kg per day) by the CBMWTFs, so that no BMW was shown as remaining un-treated in the State.

Recommendations:

- ***WBPCB needs to establish linkages with the Departments like H&FW, ARD, Correctional Administration, H&HA for developing a comprehensive, reliable and dynamic inventory of Occupiers and data on bio-medical waste generation, treatment & disposal; and***
- ***WBPCB along with H&FW Department and ARD Department needs to enforce the requirement of all HCFs to maintain and update on day to day basis the bio-medical waste management register and display the annual report on its website regarding the bio-medical waste generated in terms of category and colour coding as specified.***

2.1.7 Adequacy of waste treatment facilities

Six Common Bio-Medical Waste Treatment Facilities (CBMWTFs) were set up in West Bengal between 2003 and 2015 and all HCFs in the State were required to hand over the BMW generated by each HCF to the CBMWTF catering for the area ensuring treatment and disposal by the CBMWTF.

Though the quantity of BMW shown (by WBPCB and CBMWTFs) as generated/ treated in 2016 was only about 50 *per cent* of actual BMW generation in the State, coverage and capacity of the CBMWTFs when assessed in audit even with these understated figures, revealed the following:

2.1.7.1 CBMWTFs covered area beyond prescribed limit

As per the guidelines of CPCB, a CBMWTF was supposed to cater to maximum 10,000 beds of HCFs situated at a radial distance of maximum 150 km to ensure that the generated BMW could be collected, treated and disposed within 48 hours.

The CBMWTFs, however, did not comply with the norms of CPCB in terms of distance covered and beds covered as shown in **Table 2.4**:

CBMWTFs failed to comply with CPCB's norms of distance and beds to be covered to ensure waste disposal within 48 hours of generation.

Table 2.4: Comparison between normative coverage load and actual load on CBMWTF

Suggested coverage of distance	Actually covered by CBMWTFs		
	CBMWTFs	Maximum* distance covered	Range of Beds covered From 2013 to 2016
a) 75 km extendable maximum up to 150 km b) Maximum up to 10,000 beds	WBWML** Haldia	155 km	6,978 - 8,200
	Medicare Raniganj	210 km	17,820 - 20,155
	Medicare Kalyani	250 km	22,940 - 27,755
	Medicare Belgachia	110 km	28,368 - 33,820
	Greenzen Siliguri	280 km	11,927 - 14,495
	Greentech Mograhat	250 km	1,869 - 13,526

*Source: Joint Inspection Reports and records of CBMWTFs; *Distance-wise analysis of member HCFs attached to each CBMWTF was not available; ** West Bengal Waste Management Ltd.*

In reply, WBPCB/ Department of Environment (December 2018/ February 2019) stated that since the coverage norm came with 2016 Rules, it was not imposed on CBMWTFs which commenced operation between 2003 and 2015. Audit was of the opinion, however, that WBPCB was always responsible to ensure disposal of waste within 48 hours of generation making the coverage area of CBMWTFs as an essential factor.

2.1.7.2 Over-burdening of the CBMWTFs beyond their capacity

Incinerable waste[34] quantity shown as received and treated by the CBMWTFs in their annual reports *vis-à-vis* incinerator capacities of the CBMWTFs was analysed in audit. It was observed that at least 3,037 MT of BMW reported to have been collected by four out of six CBMWTFs was beyond the capacity of the installed incinerators, even presuming the incinerators operated in full capacity round the clock during 2013 to 2016 as detailed in ***Appendix 2.4***.

Detailed scrutiny of records disclosed that the Medicare, Belgachia and Medicare, Kalyani also transferred their excess waste to WBWML, Haldia due to receipt of waste beyond the capacity of the installed incinerators. During 2016, Medicare, Belgachia transferred 975 MT of BMW. Medicare, Kalyani had transferred 492 MT of BMW during September to December 2016.

Evidently, the capacity of BMW collection and disposal was quite inadequate. There was significant shortfall in BMW treatment capacity in the State and quantity of BMW shown as treated by WBPCB/ CBMWTFs over the years was unrealistic and beyond capacity.

2.1.7.3 Gap analysis not conducted to prepare Action Plan

Gap between the requirement and availability of BMW treatment facilities not analysed – no Action Plan for development of new CBMWTF

As per CPCB guidelines, WBPCB was required to conduct gap analysis in terms of BMW generation and the existing treatment capacity under the coverage area of each CBMWTF. Based on the gap analysis, an Action Plan was to be drawn for development of new CBMWTF over a period of 10 years.

Despite the fact BMW remained un-treated, and CBMWTFs were running beyond capacity, WBPCB had not conducted any gap analysis exercise till September 2018. Also, there was no Action Plan for development of any new CBMWTF. Instead, the 16 HCFs in the State which had their own treatment facility (Autoclaves and Shredders) were asked to stop operating the equipment by H&FW Department in 2014.

Coverage of CBMWTF was beyond the prescribed limit.

WBPCB/ Department of Environment stated (December 2018/ February 2019) that they had recently conducted a gap analysis exercise which showed requirement of seven more CBMWTFs apart from two CBMWTFs which were already under process of development. The Commissioner, Medical Administration, H&FW Department apprised during Exit Conference (March 2019) that to ameliorate the situation, the process of floating tenders to create more CBMWTFs was under finalisation.

Conclusion: *BMW Treatment Facilities were grossly inadequate in the State and consequently overburdened.*

Instead of analysing the gap between the requirement and availability of treatment facility and preparing Action Plan for setting up new CBMWTFs,

[34] *All BMWs except recyclable plastic, glass and sharp BMWs to be burnt in incinerator*

WBPCB reported unrealistic figures of treatment of BMW in its Annual Reports, which was even beyond the installed capacity of the CBMWTFs.

As a result, BMW to a large extent remained untreated, posing a threat to environment and health.

Recommendation:

Gap between the requirement and availability of treatment facilities needs to be analysed based on realistic figures of BMW generation and an Action Plan prepared for setting up of more treatment facilities on immediate basis. This should include assessing levels of further investment in infrastructure for collective processing of BMW as well as collective disposal capacity. Such an Action Plan should be bench-marked to realistic time-frames.

Awareness camps/ trainings not conducted for the stakeholders.

2.1.8 Sensitisation and Creating Awareness

2.1.8.1 Absence of Training by WBPCB

BMWM Rules, 2016 specifically entrusted WBPCB with the responsibility of conducting training in co-ordination with the H&FW Department for staff of health care facilities (HCFs), municipal workers, common bio-medical waste treatment facilities (CBMWTFs) and State Pollution Control Boards (SPCBs) for ensuring compliance with the various provisions of handling, segregation, collection, storage, transportation, treatment and disposal of BMW as specified in the Rules.

WBPCB attributed (October 2016) the poor compliance to the Rules to lack of awareness amongst various stakeholders. No effort on the part of the WBPCB was, however, noted to establish co-ordination with H&FW Department for organising any centralised training during the period under review. In last five years WBPCB, had conducted only eight Workshops[35] in nine months between December 2016 and August 2017.

While accepting the audit observation, the WBPCB/ Department of Environment stated (December 2018/ February 2019) that workshops were being conducted only after notification of BMWM Rules, 2016.

2.1.8.2 Deficiencies in training to handlers of BMW

Every BMW generator was also to provide training to all its health care workers and others, involved in handling of bio-medical waste at the time of induction and thereafter, at least once every year and the details of training programmes conducted, number of personnel trained and number of personnel not undergone any training was to be provided in the Annual Report.

Only 59 trainings (30.26 *per cent*) were, however, organised against 195 trainings required to be conducted by the test-checked 39 Government HCFs during 2013 to 2018. Consequently, 80.98 *per cent* (4,849) of the total staff (5,988) remained untrained about BMW management ***(Appendix 2.5)***.

Conclusion: *Up to November 2016 no awareness camps/ trainings for the stakeholders was organised by WBPCB in coordination with H&FW Department.*

[35] *Durgapur, Kolkata, Chinsurah, Asansol, Siliguri, Malda, Medinipur and Haldia*

In last five years, between December 2016 and August 2017, only eight workshops were organised. Training to generators and handlers of BMW was deficient. 80.98 per cent of the total staff handling BMW in the test-checked 39 Government HCFs remained untrained.

Recommendation:

Creating awareness across all the stakeholders needs to be given utmost priority for ensuring compliance of BMWM Rules.

The quality of implementation at the initial phase of a waste management process, was poor and effective, compliance to the rules remained un-accomplished. The basic management requirements like quantity assessment and reporting of BMW generation, ensuring adequate treatment of the generated BMW for disposal, creating awareness among stakeholders, *etc.*, which were pre-requisites to ensure proper and effective management of BMW in the State, was not in place. This resulted in gross violation of norms both at the test-checked Occupiers' and at CBMWTFs', which are detailed in subsequent paragraphs.

2.1.9 Compliance to BMWM Rules, 2016

2.1.9.1 Handling of BMW by HCFs and CBMWTFs

"Handling" in relation to bio-medical waste includes the generation, sorting, segregation, collection, use, storage, packaging, loading, transportation, unloading, processing, treatment, destruction, conversion, or offering for sale, transfer, disposal of such waste. So both the Occupiers (HCFs) and Operators (CBMWTFs) are required to take all necessary steps to ensure that bio-medical waste is handled without any adverse effect to human health and the environment and in accordance with these rules. If the waste handling is inadequate there is the risk of being exposed to the inherent and/ or potential danger of each type of waste. Hazardous waste needs to be handled in compliance with strict quality requirement. The waste generator should be obliged to manage the waste.

(A) Irregular segregation of BMW

The position of generation of BMW compared with general waste in West Bengal in 2016 was only 0.19 *per cent*. Since this meagre quantity of waste has the potential to infect the entire waste of the State if mixed with and/ or disposed with general waste, segregation of BMW is essential. The BMWM Rules, 2016 has specified colour coding and type of containers for segregation of BMW at the point of generation for ensuring appropriate treatment as detailed in **Table 2.5**:

Table 2.5: Bio-Medical wastes categories and their segregation, collection, treatment, processing and disposal options

Category/ Type of Bag/ Container to be used	Type of waste	Treatment & disposal Options
Yellow Yellow coloured non-chlorinated Plastic bag	i) Human Anatomical waste Human tissues, organs, body parts and fetus below the viability period (as per the Medical Termination of	

Category/ Type of Bag/ Container to be used	Type of waste	Treatment & disposal Options
	Pregnancy Act 1971, amended from time to time).	
	ii) Animal Anatomical waste Experimental animal carcasses, body parts, organs, tissues, including the waste generated from animals used in experiments or testing in veterinary hospitals or colleges or animal houses.	Incineration or plasma pyrolysis[36] or deep burial[37].
	iii) Soiled waste Items contaminated with blood, body fluids like dressings, plaster casts, cotton swabs and bags containing residual or discarded blood and blood components.	Incineration or Plasma Pyrolysis or deep burial. In absence of above facilities, autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilisation and shredding. Treated waste to be sent for energy recovery.
	iv) Expired/ discarded medicines Pharmaceutical waste like antibiotics, cytotoxic drugs including all items contaminated with cytotoxic drugs along with glass or plastic ampoules, vials, *etc.*	Expired 'cytotoxic drugs and items contaminated with cytotoxic drugs' to be returned back to the manufacturer or supplier for incineration at temperature >1200 ^{0}C or to common bio-medical waste treatment facility or hazardous waste treatment, storage and disposal facility for incineration at >1200^{0}C or Encapsulation or Plasma Pyrolysis at >1200^{0}C. All other discarded medicines shall be either sent back to manufacturer or disposed by incineration.
	v) Chemical waste Chemicals used in production of biological and used or discarded disinfectants.	Incineration or Plasma Pyrolysis or Encapsulation in hazardous waste treatment, storage and disposal facility.
	vi) Discarded linen, mattresses, beddings contaminated with blood or body fluid.	Non-chlorinated chemical disinfection followed by incineration or Plasma Pyrolysis or for energy recovery. In absence of above facilities, shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent for energy recovery or incineration or Plasma Pyrolysis.
Autoclave safe plastic bags or containers	vii) Microbiology, Bio-technology and other clinical laboratory waste Blood bags, Laboratory cultures, stocks or specimens of microorganisms, live or attenuated vaccines, human and animal cell cultures used in research, industrial laboratories, production of biological, residual toxins, dishes and devices used for cultures.	Pre-treatment to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines and thereafter for incineration.

[36] *Plasma pyrolysis makes use of an ionized gas in the plasma state to convert electrical energy to temperatures of several thousand degrees using plasma arc torches or electrodes. The high temperatures are used to pyrolyse waste in an atmosphere with little or no air.*

[37] *Disposal by deep burial is permitted only in rural or remote areas where there is no access to CBMWTF. This will be carried out with prior approval from the prescribed authority and as per the Standards specified in Schedule III of BMWM Rules, 2016. The deep burial facility shall be located as per the provisions and guidelines issued by CPCB from time to time.*

Category/ Type of Bag/ Container to be used	Type of waste	Treatment & disposal Options
Separate collection system leading to effluent treatment system	viii) Chemical liquid waste Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids**,** liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities, *etc.*	After resource recovery, the chemical liquid waste to be pre-treated before mixing with other wastewater- combined discharge to conform to the discharge norms given in Schedule- III of BMWM Rules.
Red Red coloured non-chlorinated plastic bags or containers	Contaminated waste (Recyclable) Wastes generated from disposable items such as tubing, bottles, intravenous tubes and sets, catheters, urine bags, syringes (without needles and *fixed needle syringes*) and vacutainers with their needles cut and gloves.	Autoclaving or micro-waving/ hydroclaving followed by shredding or mutilation or combination of sterilization and shredding. Treated waste to be sent to registered or authorized recyclers or for energy recovery or plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste should not be sent to landfill sites.
White (Translucent) Puncture proof, Leak proof, tamper proof containers	Waste sharps including Metals Needles, syringes with fixed needles, needles from needle tip cutter or burner, scalpels, blades, or any other contaminated sharp object that may cause puncture and cuts. This includes both used, discarded and contaminated metal sharps.	Autoclaving or Dry Heat Sterilization followed by shredding or mutilation or encapsulation in metal container or cement concrete; combination of shredding cum autoclaving; and sent for final disposal to iron foundries (having consent to operate from the State Pollution Control Boards or Pollution Control Committees) or sanitary landfill or designated concrete waste sharp pit.
Blue Cardboard boxes with blue coloured marking	i) Glassware Broken or discarded and contaminated glass including medicine vials and ampoules except those contaminated with cytotoxic wastes.	Disinfection (by soaking the washed glass waste after cleaning with detergent and Sodium Hypochlorite treatment) or through autoclaving or microwaving or hydroclaving and then sent for recycling.
	ii) Metallic Body implants	

Source: Segregation Schedule I as per BMWM Rules, 2016

The issue of improper segregation of BMW was pointed out in the Audit Report of the CAG on GoWB for the year ended 31 March 2008. WBPCB, in its reply (January 2010), accepted the observation and intimated that efforts were made to improve the scenario.

Even after 10 years, serious irregularities were observed by Audit in segregation of BMW in 52 (74.29 *per cent*) of the 70 test-checked HCFs. Some instances of irregularities as noticed during physical inspection of the HCFs are detailed below with pictures.

Appalling disposal of highly infectious blood samples

- ***Highly infectious blood samples found scattered:*** Highly infectious blood samples are to be segregated in Autoclave safe plastic bags or containers to be pre-treated to sterilize with non-chlorinated chemicals on-site as per National AIDS Control Organisation or World Health Organisation guidelines and then given to the common bio-medical waste treatment and disposal facility.

  On the contrary they were found strewn around and scattered on the premises in North Bengal Medical College Hospital. It was irregularly

segregated in red plastic (meant for autoclavable waste) in Imambara Hospital, Hooghly. As per the prescribed method the blood samples, were to be handed over to CBMWTFs for incineration, after pre-treatment. Hence, it needed to be segregated in Yellow bag meant for incineration by CBMWTFs. Segregation in Red bags would cause Autoclaving again of the same blood samples by CBMWTFs instead of incineration.

Pic 2.1: Blood samples in black bag scattered in front of Pathology Department in North Bengal MCH (April 2018)

Pic 2.2: Blood samples kept in red bag instead of yellow bag at Imambara Hospital, Hooghly (June 2018)

BMW disposed with Municipal wastes

- ***BMW segregated as municipal solid waste:*** The BMWM Rules 2016 specifically states that Occupiers are not to give treated bio-medical waste with municipal solid waste and no untreated bio-medical waste shall be mixed

with other wastes. BMWs were found to have been gathered in black bags meant for municipal wastes or in buckets/ cardboard boxes with no colour coding.

Pic 2.3: Colour coded plastics not used in Central Nursing Home, Paschim Medinipur (private hospital) (February 2018)

Pic 2.4: Plastic BMW kept in black bag in Spandan Advanced Medicare, Paschim Medinipur (private hospital) (February 2018)

Pic. 2.5: Plastic BMW in black bag in Medinipur MCH, Paschim Medinipur (January 2018)

Pic. 2.6: Infected cotton in black bag in Bishnupur District Hospital, Bankura (June 2018)

This resulted in disposal of BMW along with municipal wastes potentially contaminating the entire quantity of municipal solid waste with adverse effect to human health and the environment.

- ***Wrong segregation caused plastic BMW being irregularly burnt:*** Recyclable plastic BMW to be segregated in red (autoclave safe) were segregated, as a common practice, in yellow (incinerated) plastics.

Pic. 2.7: Tubing in yellow instead of red in Bankura Sammilani MCH, Bankura (April 2018)

Pic. 2.8: Plastic BMW not in red bag in Kanak Nursing Home, Hooghly (private hospital) (July 2018)

Autoclavable plastic BMW irregularly burnt

Absence of red plastic bags for segregation of recyclable (plastic) BMW was noticed across the test-checked HCFs. In 24 of the 70 test-checked HCFs there was no procurement of red bags during the period covered in audit. It was

observed that yellow plastic bags were used to collect the plastic BMW, leading to incineration of the plastic BMW.

A highly toxic chemical called 'dioxin' is emitted in harmful quantities due to burning of plastics which is carcinogenic and hormone disruptor for human health.

- ***Unauthorised selling of un-treated saline bottles:***

Pic. 2.9: Pilfered saline bottles stacked within premises of Kaushalya Nursing Home, Jhargram (private hospital) (February 2018)

Plastic saline bottles were found segregated from BMW. **Picture 2.9** shows that bottles were segregated and packed for transportation for unauthorised sale and not for handing over to the CBMWTF. Saline bottles were prone to carry infection after coming in contact with patients. Un-treated recycling carried risk of contamination.

BMW stored with Municipal wastes indicating slack BMW management

Hence, improper segregation not only resulted in inappropriate treatment of BMW but also caused emission of additional pollutants to environment by incineration of inappropriate waste.

(B) Poor status of storage of BMW materials at HCFs

Every Occupier was supposed to make a provision, as per BMW Rules, within the premises for a safe, ventilated and secured location for storage of segregated BMW for direct transportation from such place to the CBMWTF for appropriate treatment and disposal. Such storage was to be roofed, divided in compartments, having ramp, sloped tile flooring with provision for water supply, signboard and BMW logo.

36 of the 70 test-checked HCFs did not have separate storage places for BMW at all. Storage rooms as used in 24 HCFs were not as per specifications and were

in dilapidated condition. In spite of having vacant storage facility, four HCFs[38] did not use the same for reasons not on record. In HCFs not having/ using storage facility, BMW was found lying in the open at corner of wards, corridors and not in safe and secured condition. The same has been captured in the following pictures. In 12 HCFs, BMW was found lying mixed with municipal waste (MW) in open or in municipal vat.

Pic 2.10: BMW lying in open and in Municipal Vat in Medinipur MCH, Paschim Medinipur (January 2018)

Pic. 2.11: BMW lying open in Barjora BPHC, Bankura mixed with Municipal Waste, Bankura (May 2018)

- Huge amount of BMW was found scattered within the compound of Barjora BPHC (*Pic 2.11*) indicating inaction on the part of the Occupier in utter disregard of the Rules 4 and 8 of BMWM Rules, 2016.

[38] *Serampore Walsh Sub-Divisional Hospital (SDH), Khanakul RH, Singur RH and Pandua RH*

- In Shree Sarbamangala Clinic, Bishnupur, Bankura (private hospital), BMW meant for autoclaving and incineration were stored along with medicines in the same room.
- One person was found residing inside the BMW storage area in R.G. Kar MCH at Kolkata (*Pic 2.12*).
- There was no approach road for vehicles to the place where BMW was stored in SSKM Hospital in Kolkata (*Pic 2.13*). The area was muddy and permeable causing seepage of infectious blood and body fluids into the ground causing possible contamination of ground water.

Pic. 2.12: Person residing inside BMW storage area at R.G. Kar MCH (July 2018)

Pic 2.13: BMW stored on permeable muddy ground at SSKM, Kolkata (July 2018)

Thus the very objective of the Rules envisaging, safe, ventilated and secured location for storage before transportation for disposal, which was to ensure no

secondary handling[39], pilferage of recyclables, inadvertent scattering or spillage by animals was defeated.

Accepting the audit observations, WBPCB/ Department of Environment stated (December 2018/ February 2019) that to address the problem of poor segregation and storage of BMW, the Board was trying to sensitise the HCFs.

The Directorate of Health Services attributed (November 2019) the irregularity of segregation on lack of knowledge of staff and stated that the WBPCB would be requested to prepare an Action Plan for training of staff. As regards BMW storage facility, Directorate of Health Service stated that construction of storage facilities at 71 HCFs was to be taken up soon.

(C) Occupational safety of health care workers handling BMW compromised

The status of health check-up, immunisation and provisioning of personal protective equipment for health care workers and others handling BMW in the test-checked HCFs was poor as shown below:

Table 2.6: Occupational safety status of health care workers handling BMW

Provisions as per Rule	Audit Findings
Health Check-up: Every BMW generator was required to conduct health check-up of all its health care workers and others involved in handling of BMW at the time of induction and at least once in every year.	34 of 39 test-checked HCFs had never done health check-up of 5,646 staff who handled BMW ***(Appendix 2.5)***.
Immunisation: Immunise all its health care workers and others, involved in handling of bio-medical waste for protection against diseases including Hepatitis B and Tetanus	31 of the 39 test-checked HCFs had never taken up immunisation programme for 5,115 staff handling BMW ***(Appendix 2.5)***.
Protective gears: Every BMW generator was to ensure occupational safety of staff handling BMW by providing appropriate and adequate personal protective equipment.	Store records of the 39 test-checked Government HCFs showed that 27 HCFs did not have any stock of Personal Protective Equipment (PPE) like heavy duty gloves, masks, gumboot, *etc*., for the staff handling potentially infectious wastes. No procurement was also made of such PPEs during the period covered in audit ***(Appendix 2.5)***.

Source: Records of HCFs

As such, the health care workers and others involved in handling of bio-medical waste were being exposed to infectious environment without immunisation, health check-up and protective gear.

In its reply the Directorate of Health Services (November 2019) stated that it has started the immunisation initiatives and already covered 80 of the 94 HCFs initially identified for immunisation. In respect of providing Protective Equipment, it stated that such responsibility vested on the agencies engaged for housekeeping and scavenging services and that the same would be strictly enforced on these Agencies.

[39] *Any unwanted handling of BMW apart from required as per the rule.*

(D) Deviation of storage norms at CBMWTFs

As per the revised guidelines issued by Central Pollution Control Board (CPCB) for CBMWTFs based on BMWM Rules 2016, every CBMWTF was also required to have a covered main storage room with partitions for different colour coded containers/ plastics of BMW collected from the HCFs. The front portion of the room was to be used for unloading wastes from the vehicles and back or side portion for shifting of wastes to respective treatment rooms.

It was observed that three[40] out of six CBMWTFs did not have any such storage room. Though there was main storage room in other three CBMWTFs, these were neither as per specifications nor being used by the operators.

Pic. 2.14: Blood and body fluid leaching to ground from wastes in front of incinerator room in Greentech, Mograhat (August 2018)

Pic. 2.15: Wastes stored in equipment room at Greentech, Mograhat (August 2018)

[40] *Medicare, Kalyani; Medicare, Belgachia and Greenzen, Siliguri*

BMW heaped directly in front of incinerators without colour segregation – blood and body fluid leaching from waste

Further, all BMW was found heaped directly in the incinerator and/ or autoclave room without any segregation based on colour resulting in dumping of treated and un-treated wastes alongside. Wastes were also found stored even outside the incinerator room (Medicare, Belgachia) and scattered all around in the premises (Greenzen, Siliguri). Blood and body fluids were found leaching from the heaps of wastes and percolating to ground in Medicare, Belgachia and Greentech, Mograhat.

(E) In-house transportation and feeding of BMW in violation of norms

As per CPCB guidelines, the stored BMW is required to be brought to the treatment equipment using closed trolleys. Further, for feeding of BMW in the primary chamber of the incinerator, automatic feeding device was to be used and no manual handling of waste was recommended.

Pic. 2.16: Manual dragging and feeding at Medicare, Kalyani (June 2018)

Pic. 2.17: Manual dragging and feeding at Greenzen Siliguri (April 2018)

None of the CBMWTFs were found to be using closed trolleys; instead BMW was brought to the incinerator/ autoclave by dragging in open drums. Moreover, none of the CBMWTFs, except WBWML Haldia, had installed any automatic feeding device for feeding of BMW into incinerators to avoid manual feeding.

The process of manual feeding not only involved risk of leakage of hot flue gas[41] and any backfire but also exposed the incinerator operator to the harmful furnace atmosphere.

Conclusion: *Segregation and storage of BMW before disposal, at HCFs and CBMWTFs which constitutes the first step towards efficient management of the BMW was grossly inadequate and irregular. Disposal of highly infectious blood samples was appalling, BMW was disposed with Municipal wastes, BMW was heaped directly in front of incinerators without colour segregation with blood and body fluid leaching from waste.*

Instead of managing the risk involved, the spectrum of risk increased manifold with huge quantum of non-hazardous solid waste getting contaminated by mixing infectious BMW with it.

More alarming was exposing the health care workers and handlers of BMW to infection by not providing any protective gears to them and absence of health check-ups and immunisation.

Recommendations:

- ***The simplest waste-segregation system is to separate all hazardous waste from the larger quantity of non-hazardous general waste and every generator/ handler of BMW is duty bound to ensure it;***
- ***WBPCB and the controlling Departments need to take up urgent upgradation of physical infrastructure along with raising awareness by providing training to all stakeholders ensuring effective compliance of provisions; and***
- ***Health check-up, immunisation and provisioning of personal protective equipment for health care workers and others handling BMW needs to be prioritised.***

2.1.9.2 Collection and Transportation of BMW by CBMWTFs

(A) Irregular collection of waste

To ensure untreated human anatomical waste, animal anatomical waste, soiled waste and, bio-technology waste is not stored beyond a period of 48 hours as stipulated, BMW was to be cleared on at least daily basis from hospital wards to separate storage before the CBMWTF collects the waste for the day. The CBMWTF was also to ensure collection on daily basis to comply with the norms of treatment within 48 hours. Rules provide that CBMWT facility shall ensure collection of bio-medical waste on holidays also.

[41] *Fuel and BMW combustion exhaust coming out of flue or stack of incinerator*

Vehicles of CBMWTFs returned without collecting BMW from the HCFs on several occasions

(i) *BMW retained beyond 48 hours in patient care area by HCFs*

It was, however, observed from the records that on a number of occasions vehicles of the CBMWTFs returned without collecting any BMW from the separate storage as no waste was cleared by the HCFs from patient wards to the storage ***(Appendix 2.6)***.

(ii) *Only 9 per cent to 51 per cent of HCFs were covered by CBMWTFs for collection of BMW*

Collection of wastes on preceding two days from the date of joint inspection of the CBMWTFs exhibited the following status.

Table 2.7: Waste Collection by CBMWTFs

Name of the CBMWTF	No. of HCFs shown as member	No. of HCFs from whom waste was collected on preceding date of inspection (percentage)	No. of HCFs from whom waste was collected two days before date of inspection (percentage)
WBWML Haldia	445	206 (46.29)	226 (50.79)
Medicare Raniganj	974	167 (17.15)	271 (27.82)
Medicare Kalyani	1,565	408 (26.07)	439 (28.05)
Medicare Belgachia	1,669	305 (18.27)	150 (8.99)
Greenzen Siliguri	932	Not furnished	Not furnished
Greentech Mograhat	402	Not furnished	Not furnished

Source: Waste collection reports of CBMWTFs

The percentage of HCFs from whom the BM waste was collected did not exceed 50.79 *per cent* on the two test-checked days. In the case of Medicare Belgachia CBMWTF the collection was as low as 8.99 *per cent* on the second day and 18.27 *per cent* on the first day. Information regarding waste collection was not furnished by two facilities, but it was noted from the frequency of the route chart of vehicles of Greentech, Mograhat that only 23.88 *per cent* of the member HCFs (96 out of total 402) were covered daily. The range of frequency even showed collection once in 29 days.

Non-lifting of BMW by CBMWTFs never reported by HCFs to WBPCB

Further, in respect of 25 test-checked Government HCFs, though the CBMWTFs did not collect waste on daily basis, payments[42] for the entire month including the days when it was not lifted was made resulting in avoidable expenditure of ₹ 36.21 lakh ***(Appendix 2.7)***. Non-lifting of BMW by CBMWTFs was also not reported by the HCFs to the prescribed authority, namely WBPCB, as required.

Retaining untreated waste beyond the stipulated forty-eight hours meant adversely affecting human health and the environment by both the Occupiers and Operators.

Admitting the fact, the Directorate of Health Services stated (November 2019) that this issue would be addressed through discussion during training sessions, to rule out the scope of such lapses recurring in future.

[42] *At rate ranging from ₹4.87 to ₹5.06 per bed per day during the test-checked period.*

(B) Irregular transportation by CBMWTF

Pic 2.18: Label for transporting Bio-Medical Waste or Containers

According to CPCB guidelines, collection and transportation of BMW was to be carried out in a manner so as to prevent any possible hazard to human health and environment. BMW was to be transported in fully covered vehicles having labels of BMW hazard as prescribed in the Rules.

All vehicles used for carrying BMW were to be owned by the CBMWTF and intended only for collection and BMW transportation. Such vehicle numbers were also to be registered with WBPCB. The CBMWTF operator was to install online real time tracking and monitoring provision (GPS) in those vehicles and provide access to the State PCB for cross checking at any time.

Neither details (registration number, *etc.*) of any vehicle were registered with WBPCB, nor online access to monitor movement of vehicles through GPS was provided to WBPCB.

When tracked by Audit using GPS during joint inspections of the CBMWTFs, the status of vehicles found in five CBMWTFs was as below:

Table 2.8: Utilisation of vehicles for transportation of BMW by CBMWTF

CBMWTFs	Number of vehicles shown in Annual Report 2016	Vehicles tracked on GPS	Vehicles found working on the date
Medicare Raniganj	19	14	14
Medicare Kalyani	22	Nil	Nil[43]
Medicare Belgachia	23	20	18
Greenzen Siliguri	19	15	11
Greentech Mograhat	12	12	5
Total	**95**	**61**	**48**

Source: Records and Annual Reports of CBMWTFs

Out of the 95 vehicles reported to have been used by the five CBMWTFs indicated above for transportation of BMW, 47 vehicles were found not in operation on the dates of inspection.

Hired vehicles, not fully covered vehicles, used were not dedicated for BMW carriage

Moreover, the excess waste collected by Medicare, Belgachia and Medicare, Kalyani was transported to WBWML, Haldia on 508 occasions during September 2016 to May 2018, in vehicles that were neither owned by the CBMWTFs nor were they covered vehicles as verified from the vehicle registration numbers on the website of Transport Department.

The uncovered hired vehicles not only exposed infectious wastes to environment but also caused infection to spread as the vehicles were used for purposes other than BMW transfer also.

[43] *CBMWTF Medicare Kalyani did not provide access to GPS screen nor showed the GPS tracked live locations of the BMW carrying vehicles on screen of computers to Audit. The vehicle route chart of the CBMWTF, however, showed presence of 17 routes and as per waste collection report of the facility on the test-checked days 12 to 16 vehicles plied.*

Accepting the audit observations mentioned, WBPCB/ Department of Environment stated (December 2018/ February 2019) that it had issued Show Cause Notice and lodged a court case (January 2018) against the defaulting CBMWTF (Greenzen, Siliguri) operating in North Bengal. Reply did not mention of action taken against the other defaulting CBMWTFs.

Conclusion: *The objective of framing criteria of daily collection and safe transportation of BMW was frustrated while BMW was lying un-treated beyond 48 hours and transported in hired and uncovered vehicles exposing the environment to risk of contamination.*

Recommendation:

WBPCB should ensure strict adherence by the CBMWTFs to the provisions of the Rules and CPCB guidelines by fully implementing the GPS tracking and monitoring of BMW carrying vehicles.

2.1.9.3 Treatment and disposal of veterinary waste and other waste by other HCFs and CBMWTFs

(A) Veterinary and other waste remained un-treated in the State

The BMWM Rules, 2016 specifically stipulate that the rules are applicable to all HCFs generating BMW, which includes veterinary units. The ARD Department is required to grant licences to the veterinary units with the condition to obtain authorisation from WBPCB for bio-medical waste management.

The ARD Department, which operates 3,372 Government veterinary units[44], did not introduce a system of granting licences to veterinary units under its control so that it could impose the condition to obtain authorisation from WBPCB for BMW management. In the absence of a system only one of the 3,372 units had obtained authorisation and complied with the norms. The remaining BMW generating units had remained totally non-compliant to BMWM Rules.

Similarly, of 29 Jail and Police Hospitals only one[45] had obtained authorisation from WBPCB. With regard to the others, BMW generated were either irregularly disposed in pits and/ or disposed with municipal waste.

In reply, WBPCB/ Department of Environment stated (December 2018/ February 2019) that ARD Department had recently approached WBPCB and would apply for authorisation for units under its control. The reply, however, did not make a reference regarding other defaulting Departments.

(B) Irregular burning and disposal in unauthorised burial pits

As per the BMWM Rules 2016, no occupier shall establish on-site treatment and disposal facility, if a service of common bio-medical waste treatment facility is available at a distance of 75 km. In cases where service of the common bio-medical waste treatment facility is not available, the Occupiers shall set-up requisite bio-medical waste treatment equipment like incinerator, autoclave or microwave, shredder prior to commencement of its operation, as per the authorisation given by the prescribed authority.

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[44] *Including Veterinary Hospitals, polyclinics, State and Block Animal Health Centres and Animal Development Centres.*

[45] *Kolkata Police Hospital discharged occupiers' responsibilities by complying with norms unlike others.*

Contrary to the above, it was observed that:

BMW irregularly burnt and/or dumped within premises of HCFs

- the M.R. Bangur TB Sanatorium, a 317 bedded hospital at Digri, Paschim Medinipur neither had its own facility nor had an agreement with the nearest CBMWTF at Haldia (115 km) for treatment of BMW. The Hospital burnt the BMW within the premises in gross violation of the Rules.
- of the 65 Primary Healthcare Centres (PHCs) under control of the 20 test-checked Block Primary Healthcare Centres (BPHCs)/ Rural Hospitals (RHs) in the selected districts, 61 PHCs neither had their own facility nor had agreements with any CBMWTF for treatment of BMW generated by them. As per the Block Medical Officers of Health (BMOsH), the BMW generated in these PHCs was disposed in pits.

No burial pit details on record of WBPCB

Though the PHCs were to maintain a record of such deep burial pits and obtain authorisation of WBPCB for such pits, none of the PHCs, however, had any record or authorisation of WBPCB for deep burial pits.

The issue was pointed out in Audit Report of the CAG of India on Government of West Bengal for the year ended 31 March 2008. In an assurance given to the Legislature against observations made by Audit, WBPCB had then stated (March 2010) that Government HCFs had started discontinuing use of pits by joining CBMWTFs. Even after 10 years, however, the PHCs, had neither joined any CBMWTF nor had authorised pits.

Admitting the audit observation, WBPCB/ Department of Environment assured (December 2018/ February 2019) that action would be taken against the unit for ensuring compliance. Director of Health Services in their reply (November 2019) mentioned that to plug the gaps, tenders have been floated, for creation of more CBMWTFs.

(C) Highly infectious wastes not pre-treated

Every HCF was supposed to pre-treat the laboratory waste, micro-biological waste, blood samples and blood bags through disinfection or sterilisation on-site as per the Guidelines of World Health Organisation or National AIDS Control Organisation and then given to the common bio-medical waste treatment and disposal facility for incineration.

Out of 70 test-checked HCFs, 43 HCFs (61.43 *per cent*) did not pre-treat laboratory wastes. Blood bags and blood samples were autoclaved in only nine test-checked HCFs.

Directorate of Health Services while admitting the fact (November 2019) assured to take corrective measures.

(D) Un-treated liquid chemical wastes mixed with general effluents

HCFs were to ensure segregation of liquid chemical waste[46] at source and ensure pre-treatment or neutralisation prior to mixing with other effluents generated from HCFs. The BMWM Rules, 2016, envisage a separate collection system

[46] *Liquid waste generated due to use of chemicals in production of biological and used or discarded disinfectants, Silver X-ray film developing liquid, discarded Formalin, infected secretions, aspirated body fluids, liquid from laboratories and floor washings, cleaning, house-keeping and disinfecting activities, etc.*

leading to effluent treatment system. An Effluent Treatment Plant (ETP) had to be provided in every HCF to treat the wastewater generated from the hospital. Sludge from Effluent Treatment Plant is required to be given to common bio-medical waste treatment facility for incineration or to hazardous waste treatment, storage and disposal facility for disposal.

No separate collection system and no effluent treatment system in place for liquid chemical waste in 94.29 per cent test-checked HCFs

Of the 70 test-checked HCFs, 66 (94.29 *per cent*) neither had any system of segregation and collection of liquid chemical waste nor did they ensure any treatment of such wastes before mixing with general waste water. There was no ETP in any of the 66 HCFs. This had the potential of infecting the surface and ground water and spreading contagion to human beings through fish and other aquatic plants/ animals. In the Exit Conference, the Commissioner, Health Administration, H&FW Department, intimated that the process of installation of the ETPs was in progress.

This issue had been pointed out in Audit Report of the CAG for the year ended 31 March 2008. Neither WBPCB nor the H&FW Department has enforced the HCFs to act on this in the last 10 years for ensuring safe convergence of liquid waste in water bodies. WBPCB/ Department of Environment stated (December 2018/ February 2019), that in the course of a hearing of a case regarding non-compliance of BMW Rules by HCFs, the National Green Tribunal directed (January 2018) five[47] Government HCFs to install ETPs. There was no noticeable improvement in this regard, over the position communicated in the Exit Conference, as from the reply of the Directorate of Health Services (November 2019) it was seen that DPRs were under finalisation for installation of ETPs in these five Government HCFs. In respect of other HCFs, the reply indicated that a makeshift arrangement was being put in place, details of which were not elaborated in the reply.

Further at CBMWTFs, all liquid waste generated from collected BMW, washing of floor and vehicle washing bay were also to be collected centrally and treated through ETP before discharge or before re-use in incinerator.

Records of WBPCB showed that 14 (66.67 *per cent*) out of 21 test results of the effluents coming out of the CBMWTFs after treatment failed to meet the parameters. Sample of liquid taken at the instance of Audit during joint inspection from Medicare, Kalyani and tested in WBPCB's laboratory, also failed to comply with the standards, as detailed in the **Table 2.9**:

Table 2.9: Test result of ETP water sample collected on Joint Inspection

CBMWTF	Parameters	Prescribed limits	Results
Medicare Kalyani	TSS *(Total Suspended Solids)*	100 mg/ lt	1,430 mg/ lt
	COD *(Chemical Oxygen Demand)*	250 mg/ lt	2,280 mg/ lt
	BOD *(Biological Oxygen Demand)*	30 mg/ lt	661 mg/ lt

Source: Test Reports from WBPCB Lab

No liquid was discharged by the CBMWTFs outside the treatment plant and reused in venturi scrubber (Air Pollution Control Device) of the incinerator for cleaning and removal of air pollutants by dust separation from flue gas. Use of untreated water saturated with suspended particles failed to absorb particulate matter of the flue gas enhancing air pollution.

[47] *Kolkata Medical College & Hospital, RG Kar MCH, NRS MCH, SSKM and Lady Dufferin Victoria Hospital.*

(E) Poor status of treatment in CBMWTFs

Schedule II of BMW Management Rules 2016[48], prescribe the operating standards of incinerator, autoclave and effluent treatment plants for treating incinerable, autoclavable and liquid BMW and fixed the parameters to judge desired outcomes.

Incinerable wastes: For burning, the incinerator was supposed to operate with combustion efficiency[49] of at least 99 *per cent* with 800^0C temperature at the primary chamber and 1050^0C +/- 50^0C at the secondary chamber. Minimum stack height was to be 30 meters (mt.) above the ground and attached with the necessary monitoring facilities. Emission standards (Oxides of Carbon, Oxygen, particulate matter, Oxides of Nitrogen, HCL, *etc*.) were also fixed to ensure compliance to the operating standards and were required to be compliant with standards for Dioxins and Furans.

- ***WBPCB allowed Continuous Emission Monitoring System to remain un-connected:*** The CBMWTFs were supposed to install a Continuous Emission Monitoring System (CEMS) with connectivity to WBPCB and CPCB for real-time monitoring of flue gas parameters like CO_2, CO, O_2 and temperature of primary and secondary chamber.

  None of the CBMWTFs (except WBWML, Haldia) had established connectivity of CEMS with WBPCB and CPCB, which defeated the very purpose of establishing a monitoring system. No attempt by WBPCB to enforce this rule to establish connectivity for ensuring real time monitoring was found on record.

- ***Continuous emission beyond safety standard:*** The CBMWTFs were also to take samples quarterly and carry out tests in WBPCB approved laboratories for compliance in respect of other parameters[50].

  Continuous emission monitoring not carried out

  Records of WBPCB showed that during the period covered under audit, 11 (39.29 *per cent)* out of 28 tests of incinerator flue gas did not comply with the prescribed safety standards for particulate matter[51].

  Sample of flue gas, taken at the instance of audit on date of joint inspection from the stack of Medicare, Kalyani and Medicare, Belgachia (June 2018 and August 2018 respectively) also failed to comply with the standards; as detailed in the table below.

Table 2.10: Test results on samples of flue gases collected during Joint Inspection

CBMWTFs	Limits of Particulate Matter in Flue gas (mg/ Nm^3)	Found during Joint Inspection (mg/ Nm^3)
Medicare Kalyani	50	650.00
Medicare Belgachia	50	253.37

Source: Test Reports from WBPCB Lab; Nm^3: Normal Cubic Metre

[48] *read with Schedule V of BMW (Management and Handling) Rules, 1998 and Schedule II of BMW (Management and Handling) Rules, 1998*

[49] *How well the fuel being burnt is utilised in the combustion process = {(%CO_2)/(%CO_2+%CO)} X 100*

[50] *Particulate matter, NO & NO_2, HCL, Dioxins and Furans, Hg and its compounds*

[51] *Readings ranged from 156.55 to 658.33 mg/ Nm^3 against permissible limit of 150 mg/ Nm^3 before 2016 and from 52.20 to 250.03 mg/ Nm^3 against revised limits of 50 mg/ Nm^3 after 2016*

The temperatures in primary and secondary chambers in Medicare, Kalyani were also found to be 791^0C and 761^0C, which were below the standard[52].

Such sub-optimal performance of the test-checked CBMWTFs in treating incinerable wastes coupled with high percentage of failed quality tests of emissions (43 *per cent*) was alarming, as this indicated release of pollutants in atmosphere at higher than the permissible level.

Autoclavable wastes: All recyclable BMWs like plastics, glasses and sharps were to be disinfected by autoclaving or micro-waving/ hydroclaving at prescribed temperature and pressure followed by shredding or mutilation or combination of sterilisation and shredding before they are sold to an authorised recycler/ iron foundries by a CBMWTF. Waste sharps, if not recycled, were to be encapsulated in metal or concrete container and sent to landfill or designated waste sharp pit. Plastics were to be sent for energy recovery of plastics to diesel or fuel oil or for road making, whichever is possible. Plastic waste was not to be sent to landfill sites.

Autoclaves meant for disinfecting plastic, glasses and sharp waste was not in operation in four out of six CBMWTFs

Joint inspection along with WBPCB representative revealed that the autoclaves in four[53] out of six CBMWTFs were not in operation. In WBWML, Haldia, the autoclave was never used as all BMW was incinerated.

Pic. 2.19: Recyclable red packets put into incinerator by Medicare Kalyani (June 2018)

[52] *The temperature of the primary chamber is required to be minimum of 800^0C and the secondary chamber minimum of 1050^0C + or – 50^0C.*

[53] *WBWML, Haldia; Medicare, Kalyani; Medicare, Belgachia and Greenzen, Siliguri*

Pic. 2.20: Recyclable red and blue packets put into incinerator by WBWML Haldia (December 2017)

Pic. 2.21: Secondary segregation of plastic saline bottles in Greenzen Siliguri (April 2018)

Pic. 2.22: Un-shredded plastic saline bottles in Medicare Belgachia (August 2018)

Possibility of reselling of untreated plastics was not ruled out

It was observed that plastic saline bottles were segregated and stored separately. Re-selling of plastic wastes was on record in every facility except WBWML, Haldia. Scrutiny of records showed that 1,15,756 kg of plastics were sold (March to June 2018) by Medicare, Belgachia when its autoclave was not in operation during the period. Similar instances of selling of plastics were also noticed in Medicare, Kalyani and Greenzen, Siliguri during the period autoclaves were not functioning. Hence, the possibility of reselling of untreated plastics (especially saline bottles) could not be ruled out.

Plastic and sharp wastes also burnt in incinerator

Irregular burning (incineration) of plastic recyclable BMWs was noticed in WBWML, Haldia and Medicare, Kalyani. None of the facilities (except Greentech, Mograhat) could furnish any record regarding storage, treatment and/ or disposal of waste sharps. Burning of waste sharps and plastics leads to release of 'dioxins' causing adverse effects to human health.

Improper maintenance of records of treatment equipment: Every operator of a CBMWTF was required to maintain a log book for each of its treatment equipment recording therein weight of batch, categories of waste treated, time, date and duration of treatment cycle and total hours of operation.

None of the CBMWTFs maintained log books for incinerators or for autoclaves as per prescribed format. As such, actual period of operation of the equipment, with quantity of wastes treated, could not be ascertained. Moreover, none of the facilities installed magnetic flow meter to ETP whereby quantity of water extracted and treated by the facilities for reuse or discharge could be ascertained.

2.1.9.4 Other issues of non-compliance

Apart from above-mentioned serious shortcomings, issues like non-treatment, dumping and irregular transfer of wastes, non-operation/ unauthorised operation of incinerator and autoclave, *etc*. were also observed.

The WBPCB, it was noted, did not issue authorisation to the CBMWTFs (Medicare, Kalyani; Medicare, Raniganj and Medicare, Belgachia) for 33 to 40 months of the test-checked 60 months (April 2013 to March 2018) due to serious non-compliance of the Rules. The facilities, however, continued to collect and dispose wastes from the member HCFs during the period.

Despite non-renewal of authorisation due to serious non-compliance of provisions, WBPCB was compelled to allow the CBMWTFs to collect and dispose the BMW as closure of the CBMWTFs would have affected healthcare services due to non-availability of alternative arrangements. As a result, the BMW was collected, transported, treated and disposed in a grossly inappropriate manner.

Conclusion: *Veterinary and other waste remained un-treated in the State. There was irregular burning and disposal in unauthorised burial pits. Highly infectious wastes not pre-treated and un-treated liquid chemical wastes were mixed with general effluents.*

Treatment of disposable in CBMWTFs was poor.

Continuous emission monitoring was not carried out.

11 (39.29 per cent) out of 28 tests of incinerator flue gas did not comply with the prescribed safety standards for particulate matter.

Autoclaves meant for disinfecting plastic, glasses and sharp waste was not in operation in four out of six CBMWTFs.

Plastic and sharp wastes were also burnt in incinerator which leads to release of 'dioxins' causing adverse effects to human health.

Recommendation:

WBPCB should ensure strict compliance on the part of the common treatment facilities by ensuring immediate connectivity of on-line monitoring systems of flue gas emissions, movement of BMW carrying vehicles, etc., WBPCB may consider enforcement of various provisions of Environment (Protection) Act, imposing fines so that non-compliance of the rules becomes economically unviable for both the Occupiers and Operators.

2.1.10 Control and Monitoring Mechanism

2.1.10.1 Non-prioritisation of prevention and minimisation of waste strategies

Though the major deficiencies of BMW (H&M) Rules, 1998 were addressed by framing the revised BMW Management Rules, 2016, the BMWM Rules, 2016 mainly stipulated guidelines for treatment and disposal of BMW. Prevention and minimisation of BMW generation over treatment and disposal of BMW as priorities remained unaddressed in the State in the absence of specific legislation and/ or due to non-formulation of any policy on prevention and minimisation.

Further, the Rules provide for constitution of a State Level Expert Committee for overall review and promotion of clean or new technologies for BMW management. Formation of such a Committee though discussed in January 2018 in West Bengal, has not been operationalised till date (April 2019).

As a result, management of BMW in the State lacked co-ordination and holistic focus. There was no co-ordination mechanism for sharing of BMW information between WBPCB and H&FW Department.

Also there was no formal mechanism in place for discussion with Urban Development and Municipal Affairs Department regarding implementation of BMWM Rules.

Directorate of Health Services in its reply (November 2019) stated that the process of issue of Government Notification regarding formation of Expert Committee is underway.

Recommendation:

The Government may adopt the 'Polluter Pays' Principle[54] and influence the amount of waste generated though economic incentives, whereby the efficient use of resources and the limited generation of waste are rewarded. To motivate the desired behaviour among waste generators, economic incentives ought to be used, such as tax-exemptions, lower licence fee for fully compliant operations, etc.

2.1.10.2 Monitoring mechanism not followed by H&FW Department

The H&FW Department was supposed to issue licences to the private HCFs with a condition to obtain authorisation from the WBPCB for BMW Management.

Clinical Establishment licences issued to 390 HCFs without valid BMW authorisation

Review of the Clinical Establishment (CE) Registry of H&FW Department showed that CE licences of 390 HCFs were issued/ renewed in four test-checked districts[55], without valid authorisation. Further, no instance of cancellation of CE licence on grounds of not having valid authorisation was noticed.

Director of Health Services in its reply (November 2019) stated that the matter is under review and CMOsH would be duly apprised to prevent recurrence of such lapses in future.

2.1.10.3 Majority of HCFs running without valid authorisation

Every Occupier and Operator handling bio-medical waste was to apply to the WBPCB for grant of 'authorisation' for BMW management. The WBPCB was supposed to issue provisional Bio-Medical Waste 'authorisation' (BMA) upon verification of the capacity of the HCF or Operator in terms of infrastructure required for appropriate handling. For all bedded-HCFs, the authorisation was also to be renewed from time to time following the same procedure.

Under test-checked WBPCB Regional Offices and Circle Offices jurisdiction, 74.88 per cent of 4,164 HCFs were operating without valid authorisation.

WBPCB, in its Annual Report for 2016, showed that only 49 out of 5,537 HCFs did not have valid authorisation. The position was, however, factually incorrect as audit scrutiny of records of test-checked WBPCB Regional Offices and Circle Offices showed that as many as 3,118 (74.88 *per cent*) out of 4,164 HCFs, which were operating did not have valid authorisation as detailed in ***Appendix 2.8***. As the authorisation mechanism was devised as a preventive

[54] *all producers of waste are legally and financially responsible for the safe and environmentally sound disposal of the waste they produce. This principle also attempts to assign liability to the party that causes damage*

[55] *Paschim Medinipur, Darjeeling, Bankura and Hooghly*

measure against unscientific handling of BMW, dilution of such preventive mechanism by permitting the HCFs to operate even without valid authorisations would potentially expose the human health and environment to adverse and hazardous effects.

Absence of authorisation (96 *per cent* of test-checked HCFs), was also reported upon in the Audit Report of the CAG of India on Government of West Bengal for the year ended 31 March 2008. WBPCB, in its reply, had assured improvement of the situation by forming a monitoring committee for Government HCFs and by requesting H&FW Department not to issue licence without WBPCB's authorisation to private HCFs. The mechanism, however, does not appear to be working and the position remains albeit with a slight reduction in the percentage (74.88 *per cent* as against 96 *per cent* earlier) after a lapse of 10 years. Instead of acting on the gravity of the situation, WBPCB in its report to CPCB depicted an inflated figure suppressing the gravity of the scenario.

Further, it was observed in audit that authorisations were issued to the HCFs without conducting any verification of the capacity of the 'Occupier' in scientific handling of BMW. In five test-checked circles/ regional offices, inspections were conducted only in five out of 1,305 cases[56] of grant/ renewal of authorisation during last five years. Acute shortage of inspecting staff in the WBPCB was found to be one of the reason for this failing (*Paragraph 2.1.11.1*).

In reply, WBPCB/ Department of Environment stated (December 2018/ February 2019) that they were trying to improve the situation by working closely with H&FW Department and by issuing notices to the erring HCFs. Director of Health Services in its reply (November 2019) stated that it had already convened a meeting and decided that Dy. CMOH-I, working under the aegis of CMOH, of each district was to ensure data updation in the website of the WBPCB regarding authorisation of all Government HCFs functioning in the respective District. No further details regarding the progress made in this regard, was provided. The aspect of authorisation of private HCFs was, however, not touched upon in the reply.

2.1.10.4 Non-formation of Monitoring Committees

As per Bio-Medical Waste (Management and Handling) Rules, 1998, every State Government was to constitute a State Level Advisory Committee (SLAC) to oversee the implementation of the rules and to advice any improvements. As per BMWM Rules, 2016 the committee was to be formed under the chairmanship of the respective health secretary. The Advisory Committee shall include representatives from the Departments of Health, Environment, Urban Development, Animal Husbandry and Veterinary Sciences of that State Government, State Pollution Control Board, Urban Local Bodies, Municipal Corporation, representatives from Indian Medical Association, common bio-medical waste treatment facility and non-governmental organization.

[56] *During May 2013 to July 2017: Kankinara CO- Nil verification out of 59 BMAs; April 2013 to March 2018: Durgapur RO- two verifications out of 375 BMAs; Hooghly RO- two verifications out of 262 BMAs; April 2013 to May 2018: Barrackpore RO- one verification out of 320 BMAs and January 2014 to February 2018: Siliguri RO- nil out of 289 BMAs.*

Monitoring of the implementation of Rules by the Committee at State level and district level was inadequate

BMWM Rules, 2016 also stipulated formation of the District Level Monitoring Committee (DLMC) under chairmanship of District Magistrate to monitor implementation of the provisions of the Rules by the HCFs and the Common BMW Treatment Facilities in the district. The DLMC was required to report at least once in six months to the SLAC which in turn was required to conduct review meeting for taking further necessary action.

It was observed in audit that an Advisory Committee, constituted by Environment Department in March 1999 and reconstituted in June 2002, met only once in July 2002 and thereafter remained defunct. The H&FW Department constituted the SLAC, in December 2017, which held two meetings in January 2018 and September 2018. A representative from the Urban Development and Municipal Affairs (UD&MA) Department was also included in the SLAC. It was, however, noted that neither was the role of UD&MA Department defined with reference to BMW Management Rules nor was the issue raised of mixing of BMW with Municipal solid waste that was found in large scale across the State. DLMCs were formed in 18 out of 23 districts (between December 2017 and January 2018) and first meeting was held in nine districts, so far.

Besides the above, WBPCB, on the recommendation of the Standing Committee on Environment, Forests and Tourism, West Bengal Legislative Assembly, formed a Monitoring Committee in 2007 to oversee proper implementation of the Rules in Government Hospitals. The Committee was to meet quarterly. Against normative requirement of 20 meetings during 2013 to 2018, the Committee met only thrice (once in 2013 and twice in 2015) during 2013 and 2018. WBPCB/ Department of Health & Family Welfare, however, did not act upon the directions of the Committee for better management of BMW.

While accepting the audit observations, WBPCB/ Department of Environment intimated (December 2018/ February 2019) about formation of SLAC and its meetings. Reply of Director of Health Services (November 2019) claimed formation of DLMCs and convening of meeting in all the districts. District-wise dates of formation of such Committees/ dates of meetings convened, Minutes of all such meetings convened, *etc.* were, however, not provided.

Supervision and monitoring by the BMW Committees in HCFs found inadequate.

2.1.10.5 Slippage in monitoring and reporting systems at HCF level

As per BMWM Rules 2016, every BMW generator was supposed to establish a monitoring committee, which was to meet in every six months. The record of the minutes of the meetings of this committee along with the annual report was required to be uploaded to WBPCB. The healthcare establishments having less than 30 beds were required to designate a qualified person to review and monitor the activities relating to bio-medical waste management within that establishment and submit the annual report.

Out of the 39 test-checked Government HCFs, however, 16 HCFs did not form any committee to monitor and oversee the management of BMW. Though committees existed, 12 HCFs could not furnish any records regarding convening of meetings and minutes thereof. The remaining 11 HCFs though convened a few[57] meetings no deliverable milestones were achieved. Moreover, minutes of

[57] *one to three against minimum requirement of four meetings from April 2016 to March 2018.*

none of the 70 test-checked (including 31 private units) HCFs were uploaded with the Annual Reports of WBPCB. This indicated absence of an effective and adequate internal control mechanism to manage BMW.

WBPCB/ Department of Environment stated (December 2018/ February 2019) that on its part it was following up with the HCFs for ensuring compliance. Reply of Directorate of Health Services only mentioned (November 2019) formation of District Level Monitoring Committees (DLMCs), but remained silent about formation of Committees at HCF level.

2.1.10.6 Lack of monitoring by Central Pollution Control Board

The Central Pollution Control Board (CPCB) acted as the nodal authority to oversee implementation of the BMWM Rules across the country. WBPCB was required to compile, review and analyse the information received in the Annual Reports by 30 June every year from all the Occupiers and Operators in the State and send this information to the Central Pollution Control Board on or before the 31st July of every year. The Annual Reports were also to be available online on the websites of Occupiers, State Pollution Control Boards and Central Pollution Control Board. The CPCB was to compile, review and analyse the information received and send this information, along with its comments or suggestions or observations to the Ministry of Environment, Forest and Climate Change on or before 31st August every year.The BMW data with regard to West Bengal hosted on the web-site of CPCB, however, contained various anomalies impacting on its reliability and highlighted monitoring failure on the part of CPCB.

- The BMW management data submitted by WBPCB and published in the website of CPCB for the period 2010 to 2016 is in **Table 2.11**:

Table 2.11: Generation and Treatment of BMW

Particular/ Year	2010	2011	2012	2013	2014	2015	2016
BMW generated (kg/ day)	29,599	27,236 *(-7.98)*	31,397 *(15.28)*	40,407 *(28.70)*	42,237 *(4.53)*	32,823 *(-22.29)*	26,859 *(-18.17)*
BMW treated (kg/ day)	16,928	16,209 *(-4.25)*	19,535 *(20.52)*	22,970 *(17.58)*	22,737 *(-1.01)*	23,556 *(3.60)*	26,859 *(14.02)*
Un-treated BMW (kg/ day)	12,671	11,027 *(-12.97)*	11,862 *(7.57)*	17,437 *(47.00)*	19,500 *(11.83)*	9,267 *(-52.48)*	0 *(-100)*
Number of beds	92,315	94,649 *(2.53)*	96,035 *(1.46)*	99,075 *(3.16)*	1,03,174 *(4.14)*	1,03,378 *(0.20)*	1,06,193 *(2.72)*

Source: WBPCB and CPCB records; Figures in parentheses indicate percentage change over previous year

It may be seen from the above table that though there is a steady increase in bed-strength over the years, the reported quantity of waste generation (in kg per day) is actually showing a decline from 2015 onwards when it was (-)22.29 *per cent* and in 2016 it decreased further by 18.17 *per cent*.

- What is even more startling is that in the database of CPCB, the data of West Bengal (as well as in case of some other States) showed that the BMW treated was equal to or more than the quantity generated. In the website of CPCB, under status of BMW management in 2016, while

eight[58] states showed the quantity of BMW treated was less than the quantity generated, four[59] states had actually shown the treated BMW to be more than the quantity generated.

- The waste shown as generated in 2016 when compared with the bed-strength of the State was far below the average generation.
- The status with reference to issue of Authorisation for BMW management to HCFs reported by WBPCB and hosted by CPCB in its website was a gross overstatement, when compared with the basic documents test-checked in Audit, which revealed that as many as 3,118 (74.88 *per cent*) out of 4,164 HCFs, were operating without valid authorisation (*already discussed in Paragraph 2.1.10.3*).

Credible and reliable numbers are critical, in fact they constitute the core, for quantifying pollution, assessing its impact and verifying compliance with all applicable Rules and Standards. It is evident that the data with regard to BMW management being made available leaves much to be desired. Further, monitoring by CPCB to ensure the accuracy of the information provided was found grossly lacking.

Conclusion: *Clinical Establishment licences were issued to 390 HCFs without valid BMW authorisation. Under test-checked WBPCB Regional Offices and Circle Offices jurisdiction, 74.88 per cent of 4,164 HCFs were operating without valid authorisation. Supervision and monitoring by the BMW Committees in HCFs was found to be inadequate.*

The BMW data with regard to West Bengal hosted on the website of CPCB, however, contained various anomalies impacting on its reliability and highlighted monitoring failure on the part of CPCB.

Recommendation:

Strict enforcement and strong control mechanisms need to be in place with better inter-departmental co-ordination.

2.1.11 Manpower and Accountability

2.1.11.1 Lack of human resource

WBPCB had staff shortage in excess of the normal average of 25 *per cent*. The vacancy in the cadre of Junior Environment Engineer (JEE) was as high as 92.86 *per cent* and in that of Assistant Environment Engineer (AEE) it was 45.28 *per cent* as depicted in **Table 2.12**:

Table 2.12: Vacancy position in WBPCB

Name of post	Sanctioned Strength	Present Strength (as on 01.09.17)	Vacant Post (*per cent*)
Assistant Environment Engineer (AEE)	53	29	24 (45.28)
Junior Environment Engineer (JEE)	14	1	13 (92.86)

Source: Records of the WBPCB

The above cadres which were mainly responsible for carrying out inspections of HCFs were grossly insufficient for the requirement of WBPCB. This had

[58] *Assam, Goa, Jharkhand, Jammu & Kashmir, Odisha, Rajasthan, Sikkim and Uttar Pradesh*
[59] *Chhattisgarh, Haryana, Puducherry and Tripura*

impacted the efficiency and effectiveness of the inspection of HCFs, which were found to be grossly non-compliant of the Rules and Standards.

2.1.11.2 Lack of legal action by WBPCB against defaulters

As per Rule 18 of BMWM Rules, the Occupiers or Operators of common bio-medical waste treatment facilities are liable for all the damages caused to the environment or public due to improper handling of BMW. WBPCB was supposed to take legal action against the defaulters under Section 5 and Section 15 of Environment Protection Act, 1986 as below:

- Issue directions under Section 5 for closure, prohibition or regulation of any operation or process, supply of electricity or water, and any other service and
- Arrange punishment through court of law under Section 15 as imprisonment up to five years or fine up to ₹ one lakh or both.

In spite of widespread violations of the Rules and Standards by the HCFs and the CBMWTFs across the State, no punitive actions, as mentioned above, were found to have been taken by WBPCB to enforce compliance. The numbers of hearings held and directions issued by WBPCB during 2013-14 to 2017-18 with respect to the HCFs and CBMWTFs were meagre as shown in **Table 2.13**:

Table 2.13: Status of Hearings and Directions by WBPCB

Year	No. of hearings and issue of directions to HCFs	No. of hearings and issue of directions related to CBMWTFs
2013-14	10	04
2014-15	14	01
2015-16	08	02
2016-17	04	02
2017-18	04	01
TOTAL	**40**	**10**

Source: Records of the WBPCB

Closure notices to HCFs were issued for operating without consent and/ or authorisation of WBCPB, irregular segregation, *etc*. only in four case of which three were subsequently revoked. In respect of CBMWTFs, issue of 'authorisation' was delayed and 'Pollution Costs'[60] were imposed on the facilities for non-compliance. WBPCB has recently, however, lodged cases against three[61] of the CBMWTFs in the courts of law for continuous violation of norms under the Act.

2.1.11.3 Responsibility and accountability of various agencies/ functionaries

Successful enforcement of any rules like Bio-Medical Wastes Management Rules depends on the clarity of the accountability regime of the functionaries involved in implementation. The BMW Management Rules, 2016 elaborated on duties and responsibilities of various organisations like GoI Ministry, Central and State PCBs, various State Government Departments, *etc*. The State Government/ WBPCB, however, did not issue any order further delineating the

[60] *₹ 21.50 lakh was collected as pollution costs from four CBMWTFs on seven occasions between March 2010 and May 2018*

[61] *Greenzen Bio Pvt. Ltd. Siliguri, M/s Medicare Environmental Management (P) Ltd., Kalyani and Greentech Environmental Pvt. Ltd., Mograhat*

duties and responsibilities at various levels of the organisational hierarchy either under the WBPCB or under various Departments. Despite gross and widespread irregularities and violations of BMW Rules 2016, no responsibility was fixed at any level of the organisational hierarchy in the absence of orders clearly delineating the duties and responsibilities of the various functionaries.

Recommendation:

WBCPB and H&FW Department may necessarily delineate the duties and responsibilities at various levels of the organisational hierarchy so that accountability can be fixed and rules enforced.

The matter was referred to the Government in October 2018; replies of Environment Department (February 2019), WBPCB (December 2018) and Director of Health Services (November 2019) have been received and incorporated in the Report. Reply of the Department of Health and Family Welfare is still awaited (November 2019).