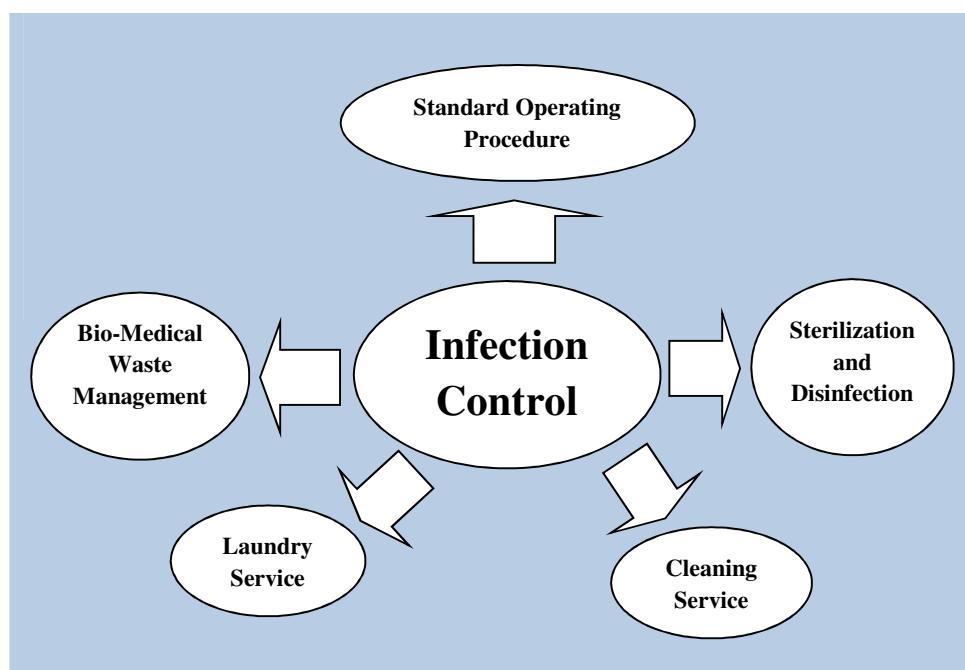


6 Infection Control

Infection control practices are important in maintaining a safe environment for both patients and staff in the hospitals by reducing the risk of potential spread of hospital associated infections. This chapter discusses audit findings in respect of various aspects of infection control, as shown in **Chart 6.1**.

Chart 6.1: Infection Control Mechanism.



6.1 Standard Operating Procedures

To prevent hospital acquired infections in patients, visitors and staff, NHM Assessor's Guidebooks for DHs recommends framing up of an infection control programme and procedures to be put in place for prevention and measurement of hospital associated infections. It requires cleaning and disinfection of patient's care areas by maintaining a checklist for hygiene and infection control in each hospital. Further, to promote cleanliness, hygiene and infection control practices in public health care facilities, a Hospital Infection Control Committee (HICC) needs to be formed in each hospital as envisaged under "*Kayakalp*", a programme launched (May 2015) by GoI.

Audit observed that the Department directed (September 2015) all Civil Surgeons to constitute District Infection Control Committee (DICC) similar to HICC for framing policies for infection control and monitoring its

implementation. DICC was constituted (September 2015) in all the six test-checked DHs. Further, the State Quality Assurance Committee (SQAC) prepared standard operating procedures (SOPs) for infection control related to various services⁶⁷ and sent (June 2016) it to all Civil Surgeons (CSs) cum Chief Medical Officers (CMOs) with the direction to modify the SOPs as per the needs of the districts with changes, if any, to be reported to SQAC. However, out of the six test-checked DHs, only two DHs (Ranchi and East Singhbhum) prepared SOPs for cleaning, laundry, bio-medical waste, sterilisation and disinfection in February 2016 and August 2018 respectively. The remaining four DHs neither prepared their own SOPs nor adopt SOPs prepared by SQAC as of March 2020 for reasons not available on record. In the absence of SOPs, cleanliness and infection control activities were being carried out in an ad-hoc manner in the four DHs.

The Department accepted the facts in respect of DH, Hazaribag. No replies were furnished in respect of DHs, Deoghar, Palamu and Ramgarh.

Further, DICC was to meet at least once a month to review the infection control activities carried out in the hospital. However, against the required 41 meetings, only three meetings each in two DHs (Deoghar and Ramgarh) and seven meetings in DH, East Singhbhum were held between September 2015 and January 2019 in which issues⁶⁸ relating to infection control were discussed. DICCs of three DHs (Hazaribag, Palamu and Ranchi) did not meet even once during 2014-19.

Thus, in the absence of SOPs or monitoring of infection control activities by DICCs, audit could not derive an assurance that prescribed processes of hygiene and infection control were followed in the test-checked DHs during 2014-19.

The Department accepted (January 2021) the facts in respect of DH, Palamu. No replies were furnished in respect of the remaining DHs.

6.2 Pest and rodent control

As per NHM Assessor's Guidebook, controlling spread of infection through rodents and pests in the hospital is an important component of infection control practices.

Audit observed that pest and rodent control work was not carried out by three (Deoghar, Hazaribag and Palamu) out of the six test-checked DHs during 2014-19. Two DHs (East Singhbhum and Ranchi) started pest and rodent control work in 2016 whereas DH, Ramgarh started it from 2018.

⁶⁷ Accident & Emergency, Blood Bank, IPD, Laboratory, Labour room, Maternity, OT, OPD, Pharmacy & Stores, Radiology, SNCU, General Administration and Mortuary.

⁶⁸ Providing personal protection equipment kit to cleaning staff, following up of provisions of Bio Medical Waste (BMW), fumigation OT/ ICU/ labour room on regular basis and ensure culture test etc.

Thus, the standardisation of pest and rodent control for minimising hospital acquired infections was not ensured by three test-checked DHs during 2014-19.

The Department accepted (January 2021) the fact in respect of DH, Palamu and stated that pest and rodent control work had now been started. No replies were furnished in respect of the remaining two DHs.

6.3 Disinfection and sterilisation

As per Hospital Infection Control Guidelines of the Indian Council of Medical Research (ICMR), disinfection and sterilisation helps in preventing the build-up of bacteria/ viruses etc., on medical tools, linen and consumables and reduce the chances of spread of infection in patients and staff of hospitals. Further, NHM Assessor's Guidebook recommends boiling, autoclaving, high level disinfection (HLD) and chemical sterilisation for disinfection in DHs. Guidelines of "*Kayakalp Initiative*" also prescribes that critical instruments⁶⁹ and equipment (surgical, eye and dental equipment etc.) should undergo sterilisation before and after use. Semi-critical instruments⁷⁰ and equipment (anesthesia equipment etc.) should undergo HLD before use and intermediate level disinfection (ILD) after use.

Methods of disinfection and sterilisation carried out in the test-checked DHs as on March 2019 is shown in **Table 6.1**.

Table 6.1: Availability of disinfection and sterilisation procedures

Name of DH	Boiling	Chemical sterilisation	Autoclaving	High level disinfection (HLD)
Deoghar	Yes	Yes	Yes	Yes
East Singhbhum	Yes	Yes	Yes	No
Hazaribag	Yes	Yes	Yes	Yes
Palamu	Yes	Yes	Yes	No
Ramgarh	Yes	Yes	Yes	No
Ranchi	Yes	Yes	Yes	Yes

It can be seen from **Table 6.1** that HLD system, a process of complete elimination of all micro-organisms in or on a device with the exception of small numbers of bacterial spores, was not available in three DHs though mandatorily required for disinfection of specific instruments and equipment.

6.3.1 Maintenance of autoclave machine

As per IPHS norms, there should be an Annual Maintenance Contract

⁶⁹ Equipment/ devices that enter sterile tissues including the vascular system.

⁷⁰ Equipment/ devices that comes in contact with non-intact skin or mucous membrane but do not penetrate them.

(AMC) for all equipment which need special care and preventive maintenance to avoid breakdown and reduce downtime.

The Department executed an agreement (June 2017) with M/s Medicity for AMC of equipment at all levels of health facilities in the State. Prior to that period, maintenance of equipment was being done at the hospital level.

It was observed that records relating to AMCs done prior to June 2017 were not maintained by all the six test-checked DHs and hence audit could not derive an assurance regarding regular maintenance of autoclave machines prior to June 2017. After June 2017, the outsourced agency was carrying out regular maintenance of autoclave machines in the test-checked DHs.

The Department accepted (January 2021) the facts in respect of DH, Palamu. No replies were furnished in respect of the other DHs.

6.3.2 Validation of autoclaving process

NHM Assessor's Guidebook requires that biological and chemical indicators should be used in all hospitals for regular validation of sterilisation of instruments and equipment after autoclaving to prevent hospital associated infections. The same system has also been included in the "*Kayakalp Initiative*" guidelines prescribed by Ministry of Health and Family Welfare, GoI.

Audit observed that the prescribed indicators were not used in five out of six test-checked DHs except Ranchi. DH, Ranchi used only biological indicators from 2018-19. Reasons for not using the prescribed indicators in the test-checked DHs were not available on record. Thus, effective prevention of hospital associated infections was not ensured.

The Department accepted (January 2021) the facts in respect of DH, Palamu. No replies were furnished in respect of the other four DHs (Deoghar, East Singhbhum, Hazaribag and Ramgarh).

6.3.3 Records of sterilisation using autoclave

Audit observed that DH, Ranchi was maintaining records of sterilisation using autoclave for the period 2016-19. However, records of sterilisation using autoclave were not available in the remaining five test-checked DHs for 2014-19.

The Department accepted (January 2021) the facts in respect of DHs, Hazaribag and Palamu. No replies were furnished in respect of the other three DHs (Deoghar, East Singhbhum and Ramgarh).

6.4 Cleaning services

6.4.1 Standard operating procedure for housekeeping

As per IPHS, to provide a clean environment to patients, visitors and staff,

hospitals were required to develop and implement an SOP for housekeeping activities.

Audit observed that SOP, framed in August 2018, for housekeeping was available only in one (East Singhbhum) out of the six test-checked DHs. The SOP lays down that the DH should follow daily cleaning, periodic cleaning, trash and garbage removal, proper hospital waste disposal, discharge cleaning, exterminating bugs and pests, preventing spread of infection, safety and security of the hospital, creating healing environment, gardening and interior decoration etc. However, despite availability of SOP, 33 *per cent* of patients of DH, East Singhbhum were not satisfied with the cleanliness of the hospital premises as seen from the patient satisfaction survey conducted by *Mera Aspataal* during 2018-19.

Audit further observed that the cleaning staff were outsourced by the six test-checked DHs and agreements were executed with the Agencies between May 2014 and February 2019. However, procedures of cleaning were not detailed in the agreements except agreement executed by DH, East Singhbhum and was being done in ad-hoc manner in the other five test-checked DHs. As a result, Audit could not derive an assurance regarding quality of cleanliness maintained by these DHs.

The Department accepted (January 2021) the facts in respect of DH, Palamu and stated that the SOP was now available. No replies were furnished in respect of the other three DHs (Deoghar, Hazaribag and Ramgarh).

6.4.2 Hygiene practices

NHM Assessor's Guidebook prescribes that the hospital must have a system to take air and surface samples for microbiological survey to check for infections.

Audit noticed that four⁷¹ out of the six test-checked DHs did not prepare the report of microbiological survey even in critical care areas like OT, Pediatric ward etc., during 2014-19. Two DHs (Ramgarh and Ranchi) also did this only in 2018-19. It was further seen that though DICCs decided to conduct surface swab tests⁷² in two DHs (East Singhbhum and Deoghar) in March and November 2018 respectively, swab tests were not done by these DHs. Thus, Audit could not derive an assurance regarding effective implementation of hygiene practices in the test-checked DHs.

The Department accepted (January 2021) the facts in respect of DHs, Hazaribag and Palamu. No replies were furnished in respect of DHs, Deoghar and East Singhbhum.

⁷¹ Deoghar, East Singhbhum, Hazaribag and Palamu.

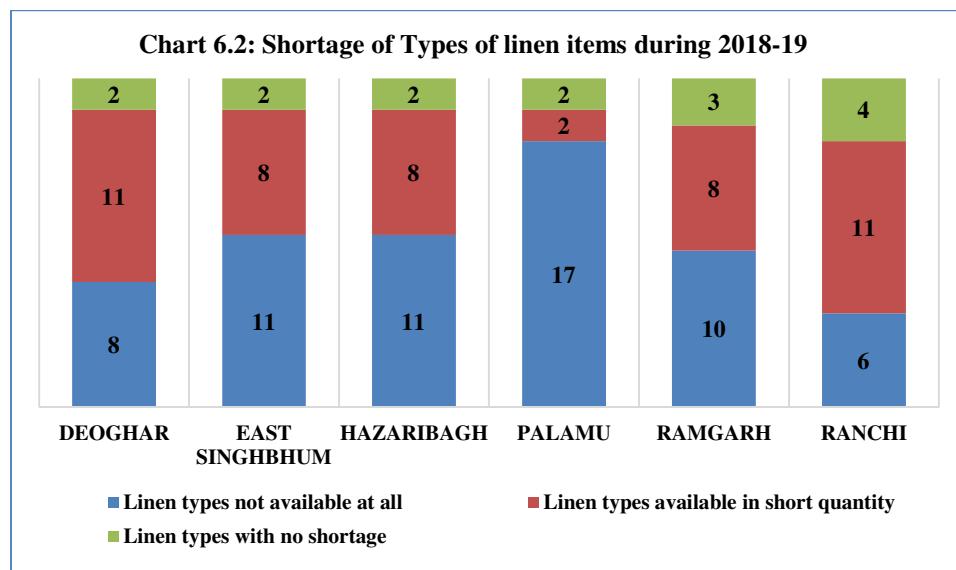
⁷² The OT Swab culture test is done to check for and identify aerobic bacteria on different equipment and surfaces in an operation theatre.

6.5 Laundry services

6.5.1 Availability of linen

IPHS norms prescribes 21 types of linen for patient care services in accordance with the bed capacity of a DH. Further, as per Operational Guidelines for Quality Assurance in Public Health Facilities 2013, the DHs should establish standard procedures for handling, collection, transportation and washing of linen.

Audit observed shortage of different types of linen such as bedspreads, hospital worker OT coats, pediatric mattresses, table cloths etc., in the six test-checked DHs during 2018-19 as shown in **Chart 6.2**.



It can be seen from **Chart 6.2** that only two to four types of linen comprising mainly of bed sheets and blankets were sufficiently available in the test-checked DHs. There was shortage of two to 11 types of linen that included table cloths, OT coats, overcoats etc., whereas six to 17 types of linen comprising of bedspreads, draw sheets, overshoes pair etc., were not available at all. DHs-wise details of items not available is shown in **Table 6.2** with details of shortage in **Appendix 6.1**.

Table 6.2: Linen not available at all in test-checked DHs

Name of DH	Linen items
Deoghar	Bedsheets, Draw sheets, Patient's house coats (for female), Over shoes pairs, Perineal sheets for OT, Leggings, Mortuary sheets and Mats (Nylon).
East Singhbhum	Bedsheets, Patna towels, Table cloths, Overcoats, OT coats, Patient's Pyjamas/Shirts (for male), Over shoes pairs, Abdominal sheets for OT, Perineal sheets for OT, Mortuary sheets and Mats (Nylon)
Hazaribag	Bedsheets, Draw sheets, Overcoats, Patient's house coats (for female), Over shoes pairs, Pediatric Mattresses, Abdominal sheets for OT, Perineal sheets for OT, Leggings (in pairs), Mortuary sheets and Mats (Nylon).
Palamu	Bedsheets, Patna towels, Table cloths, Draw sheets, Overcoats, OT coats, Patient's house coats (for female), Patient's Pyjamas/ Shirts (for male),

Name of DH	Linen items
	Over shoes pairs, Mattresses (foam) Adult, Pediatric Mattresses, Abdominal sheets for OT, Perineal sheets for OT, Leggings, Mortuary sheet, Mats (Nylon) and Mackintosh sheets.
Ramgarh	Bedspreads, Table cloths, Patient's Pyjamas/ Shirts (for male), Over shoes pairs, Mattresses (foam) Adult, Pediatric Mattresses, Perineal sheets for OT, Leggings, Mortuary sheets and Mats (Nylon).
Ranchi	Bedspreads, Table cloths, OT coats, Over shoes pairs, Leggings and Mortuary sheets.

(Source: Details furnished by DHs)

The Department accepted (January 2021) the facts in respect of DHs, Deoghar and Palamu. No replies were furnished in respect of the remaining four DHs.

6.5.2 Other deficiencies in linen

Audit observed that:

- Bed sheets were available in excess of requirement by 14 to 412 *per cent* in four⁷³ DHs and short of requirement by 13 to 43 *per cent* in two DHs⁷⁴. Blankets were also in excess of requirement by 46 to 446 *per cent* in all the six test-checked DHs (*Appendix 6.2*). Procurement in excess of requirement resulted in stacking of these items in almirahs and on the floor of the store in DH, Ramgarh as can be seen from the photographs below.



Photographs (03 March 2020) showing blankets stacked in almirahs and store room floor at DH Ramgarh

- Physical verification of linen was not carried out by any of the test-checked DHs during 2014-19. Records relating to pilferage/ loss of linen were also not maintained by the test-checked DHs.
- Two DHs (Deoghar and East Singhbhum) prepared and adopted policy for condemnation of linen in August 2016 and August 2018 respectively but no action for condemnation of linen was initiated as of March 2020. The remaining four test-checked DHs neither prepared any policy for condemnation nor condemned linen during 2014-19.

⁷³ Deoghar, Hazaribag, Palamu and Ranchi.

⁷⁴ East Singhbhum and Ramgarh

The Department accepted (January 2021) the facts in respect of DH, Palamu and stated that policy was being made for condemnation of linen. However, no response had been received regarding physical verification of linen or its pilferage.

➤ In DH Deoghar, bed sheets were available in excess of requirement by 412 *per cent* as per IPHS norms whereas in DH Ramgarh it was short by 43 *per cent* of the actual requirement. Patients in the maternity ward of these DHs were found on beds without bed sheets during joint physical verification.

6.5.3 Deficiencies in laundry services

As per IPHS norms, hospitals were required to provide clean and hygienic linen to patients for preventing infection among patients and hospital staff. The Operational Guidelines for Quality Assurance in Public Health Facilities, 2013 prescribes that the facility should have adequate sets of linen, established procedures for changing of linen in patient care areas and standard operating procedures for handling, collection, transportation and washing of linen.

Audit scrutiny of records related to linen services in the six test-checked DHs revealed the following deficiencies:

- Standard Operating Procedure (SOP) for handling, collection, transportation and washing of linen was not prepared by five out of the six test-checked DHs during 2014-19. DH, East Singhbhum had prepared the SOP only in August 2018. In the absence of SOP, quality assurance for handling of linen could not be ascertained in audit.
- Washing of linen was not done through mechanised laundry in the premises of test-checked DHs during 2014-19 as desired under guidelines of “*Kayakalp*”. Instead, washermen, who collected soiled linen from wards and returned it directly to the wards, were engaged⁷⁵ by the six test-checked DH as centralised linen stores was not available. Audit could not ascertain whether the patients were provided hygienic and clean bed linen in these hospitals as no mechanism existed for inspection of washing of linen.
- As per guidelines of “*Kayakalp*”, soiled linen should be segregated into dirty and infected linen which were required to be transported in covered trolleys to the laundry. Infected linen should be soaked in 0.5 *per cent* bleaching solution for 30 minutes and should be handed over for washing only after thorough rinsing and removal of bleach with plain water.

⁷⁵ Two DHs Deoghar and Hazaribag, engaged outsourced personnel to whom washing powder/detergent was supplied by DHs. In remaining four DHs, agreements were executed with outsourced personnel with all material.

Audit noticed absence of segregation of dirty and infected linen and as such lack of pre-treatment of infected linen. Absence of covered trolleys to carry dirty linen from wards was also noticed. Further, there were no almirahs or covered racks in wards in the test-checked DHs to keep the washed linen safely.

- Monitoring of cleanliness of linen was not done after receiving washed linen and thus the cleanliness and disinfection of linen were not ensured.

The Department did not furnish replies to the audit observations.

6.6 Bio-medical waste management

Bio-medical waste (BMW) is generated during procedures related to diagnosis, treatment and immunisation in the hospitals and its management is an integral part of infection control within the hospital premises. The GoI framed Bio Medical Waste (Management and Handling) Rules, 1998 under the Environment (Protection) Act, 1986, which were superseded by Bio Medical Waste (BMW) Management Rules, 2016. BMW Rules inter alia lays down the procedures for collection, handling, transportation, disposal and monitoring of bio-medical waste with clear roles for waste generators and Common Bio-Medical Waste Treatment Facility (CBMWTF).

6.6.1 Authorisation for bio-medical waste

The BMW Rules requires hospitals generating bio-medical waste to obtain authorisation from the State Pollution Control Board (SPCB) for the generation, collection, reception, storage, transportation, treatment, processing, disposal or any other form of handling of bio-medical waste. The category-wise quantity of bio-medical waste generated and disposal report were to be forwarded to SPCB in a prescribed format annually.

Scrutiny of records revealed that the six test-checked DHs did not obtain requisite authorisation from SPCB during 2014-19. Four DHs (Deoghar, East Singhbhum, Ramgarh and Ranchi) obtained authorisation from SPCB between July 2019 and February 2020. The remaining two DHs (Hazaribag and Palamu) had applied (July and August 2019) for authorisation to SPCB but authorisation was awaited as of March 2020.

Thus, the test-checked DHs were handling bio-medical waste without proper authorisation and proper monitoring of bio-medical waste disposal was not ensured.

The Department accepted the facts in respect of DH Palamu. No replies were furnished in respect of DH, Hazaribag.

6.6.2 Segregation of bio-medical waste

The BMW Rules require hospitals to segregate different categories of bio-medical waste in bins of different colours at the point of generation and

collection by the CBMWTF in respective colour coded bags. In respect of liquid chemical waste generated in health care facilities, BMW Rules mandates segregation of such waste at source and its pre-treatment or neutralisation through Effluent Treatment Plant (ETP) prior to mixing it with liquid waste generated by health care facilities as required under Guidelines for Management of Healthcare Waste under BMW Rules, 2016.

Audit observed that solid bio-medical waste was segregated as required in all the six test-checked DHs. However, liquid chemical waste was neither segregated nor treated separately in the test-checked DHs before discharging them into drains. ETP was also not found established for pre-treatment of liquid chemical waste in five test-checked DHs except in DH, Ranchi (from 2018-19). As a result, liquid waste⁷⁶ was being directly discharged into the drainage system in violation of the BMW Rules which is hazardous to public health at large.

The Department accepted (January 2021) the facts in respect of DHs, Hazaribag and Palamu. No replies were furnished in respect of DHs Deoghar, East Singhbhum and Ramgarh.

6.6.3 Collection and disposal of bio-medical waste

As per BMW Rules, CBMWTF is responsible for collection and proper disposal of BMW from DHs. Scrutiny of records revealed the following:

- Audit observed that outsourced operators were engaged for segregation, collection and disposal of BMW in five test-checked DHs except DH, Deoghar. It was further observed that bio-medical waste of two DHs (Ranchi since August 2019 and Palamu since January 2019) were being disposed off at CBMWTF sites situated at Lohardaga⁷⁷, of two DHs (Ramgarh since March 2016 and Hazaribag since January 2018) at Ramgarh⁷⁸ and one DH (East Singhbhum since June 2015) at Jamshedpur⁷⁹. In DH, Deoghar, BM waste was being disposed off in sharp pits and deep burial pits as CBMWTF site was not situated within a radius of 75 km⁸⁰.
- Against the requirement of daily collection as per BMW Rules, it was further observed that bio-medical waste was collected on a daily basis only in DH, Palamu while it was being collected on alternate days in two DHs (Hazaribag and Ramgarh) and two days in a week in one DH (East Singhbhum). Records related to the collection of bio-medical waste was not available at DH, Ranchi though the service was outsourced. Non-collection

⁷⁶ Liquid waste generated from laboratory, washing, cleaning, house-keeping and disinfection activities.

⁷⁷ M/s Medicare Environmental Management Private Limited, Lohardaga

⁷⁸ M/s. Bio-Genetic Lab Private Limited, Waste Disposal Plant, Ramgarh

⁷⁹ Tata Main Hospital, Jamshedpur

⁸⁰ As per guidelines of CBMWTF, bio-medical waste should be disposed at CBMWTF situated within 75 km of source of generation.

of bio-medical waste on a daily basis was a health hazard to the patients and staff of the concerned DHs.

The Department did not furnish replies to the audit observations.

To sum up, the test-checked DHs lacked an environment of infection control. The non-availability of SOPs/checklists for hygiene and infection control in DHs was indicative of indifference towards the need for instilling infection control practices. Cleaning and laundry services in the DHs were not of a satisfactory level. The collection of bio-medical waste on a daily basis in DHs was not ensured. Liquid chemical waste generated by the DHs was being directly discharged into the drainage system without being treated.

