

Principles of Chemical Management in the Textile and Garments Industry in Bangladesh

Promotion of Sustainability in the Textile and Garment Industry in Asia - FABRIC

Module 8:

Managing chemical waste and residues

Module 8: Managing chemical waste and residues

8.1 General Principles

8.2 Managing chemical containing wastewater and treatment sludge

8.3 Managing solid chemical waste

8.4 Controlling releases of chemicals into the air

Module 8: Managing chemical waste and residues

8.1 General Principles

8.1.1 At the end of a manufacturing process in textile and apparel industry a large amount of wastewater is discharged. If the discharged water is not properly treated, it poses a threat to the environment. Water that has been used for manufacturing processes and no longer meets the quality standard for beneficial use is considered as **industrial wastewater**.

8.1.2 This guideline is applicable to all factories with **direct discharge, indirect discharge and onsite Zero Liquid Discharge (ZLD) treatment plants**.

8.1.3 Treatment **sludge is the residual solid, semisolid, or slurry material produced** as a byproduct of wastewater treatment processes, including septic/ sewage and ZLD systems.

8.1.4 Treatment sludge could potentially contain high levels of chemicals and requires proper handling and disposal. The **sludge disposal must meet all local requirements**. Proper safety protocols need to be followed when handling and transporting sludge.

Module 8: Managing chemical waste and residues

8.1 General Principles

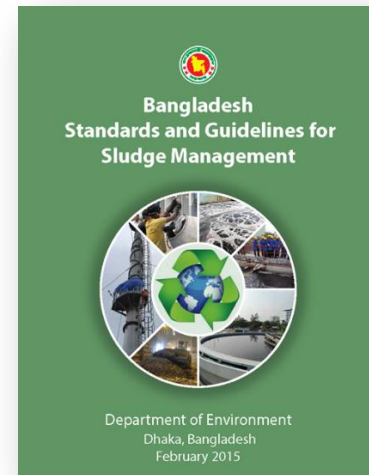
8.1.5 Sludge is categorized accordingly based on the source of generation and hazard properties:

Category A: Municipal sludge from domestic or urban wastewaters only.

Category B: Sludge from industry, including from CETP.

Category C: Sludge from industry belonging to a hazardous waste category including sludge from CETP. Exhibits one or more hazardous characteristics such as high flammability, explosive property, oxidizing property, poisonous, infectious, etc.

The details can be found in Bangladesh Standards and Guideline for Sludge Management 2015.



Module 8: Managing chemical waste and residues

8.2 Managing chemical containing wastewater and treatment sludge

8.2.1 Each factory must, at a minimum:

- a) **Be compliant** with applicable wastewater and sludge discharge permits at all times.
- b) Ensure there are **no unpermitted bypasses for untreated wastewater** around wastewater treatment systems.
- c) **Follow generally accepted process engineering best practices** with respect to wastewater treatment and overall factory water efficiency management.
- d) **Not dilute wastewater discharge** with incoming water or cleaner wastewater as a means to achieve conformance to concentration-based discharge permits.
- e) **Properly classify sludge** produced from a wastewater treatment plant
- f) Ensures treatment sludge is properly treated **and disposed of**.

Module 8: Managing chemical waste and residues

8.2 Managing chemical containing wastewater and treatment sludge

8.2.2 The factory shall ensure the treatment of wastewater thereby maintaining the conventional parameter limits including temperature, pH, biological oxygen demand (BOD), or chemical oxygen demand (COD), Dissolved Oxygen (DO), Total Dissolve Solids (TDS) and others according to ECA 95 and ECR 97.

8.2.3 For managing sludge generated from a wastewater treatment plant, including sampling and testing of sludge, factory shall refer to Bangladesh Standards and Guideline for Sludge Management 2015.

8.2.4 The factory shall ensure to have qualified personnel to monitor, manage and maintain the wastewater treatment plant. A factory shall establish an in-house testing lab or use an external laboratory service to monitor and record at the minimum the daily frequency parameters.

Module 8: Managing chemical waste and residues

8.2 Managing chemical containing wastewater and treatment sludge

8.2.5 In order to ensure proper planning and operation of the wastewater and sludge management processes, **personnel in charge of the wastewater and sludge treatment should have access to the SDS as well as be informed about production** in order to assess possible wastewater load arising from the use of the chemicals and plan the wastewater treatment processes.

8.2.6 To ensure consistency between sampling events **each factory shall develop a written procedures** that clearly identify and document the sampling points, sampling methodologies and reporting frequency to meet the expectations. Documentation shall include:

- a) Written description of sampling procedures
- b) Photographs of the sampling location
- c) Posted signs at the sample locations identifying the points as sample points

Module 8: Managing chemical waste and residues

8.2 Managing chemical containing wastewater and treatment sludge

8.2.7 Factory shall **carry out pretreatment of sludge** and ensure the parameter limits of sludge according to the Bangladesh Standards and Guideline for Sludge Management before disposing.

8.2.8 **Sludge must be disposed of through a qualified/ authorized waste contractor.** Proper waste disposal documentation, including a copy of the license of the authorized waste contractor, shall be kept on record by the factory.

8.2.9 **The factory shall take best available techniques (BATs)** (e.g. substitution of environmentally hazardous chemicals, full or partial recovery of chemicals) into consideration for reducing hazard level and load of the factory's wastewater.

Module 8: Managing chemical waste and residues

8.2 Managing chemical containing wastewater and treatment sludge

8.2.10 The applicability of such BATs should be assessed as **part of the development of a sludge management plan**, aiming to minimize pollutants at the source and apply suitable recycling and recovery technologies where possible.

8.2.11 With regard to monitoring and recording of wastewater and sludge, the **factory in addition shall also take into account of other than the stipulation** as per the national regulatory and standards requirements, such as for example supply chain requirements (e.g. wastewater testing and reporting as per ZDHC). In case recognized certificates for the same are available, the factory may bring these to the attention of the competent national authorities.

Module 8: Managing chemical waste and residues

8.3 Managing solid chemical waste

8.3.1 In order plan and manage chemical waste in a systematic manner, it is recommended that the factory establishes and **maintains a waste inventory which lists all wastes (including chemical wastes) generated in the factory**, thereby recording type, quantity and hazard characteristics of waste as well as location of waste generation and waste disposal method.

8.3.2 **Every factory should classify its solid waste as hazardous or non-hazardous.** Hazardous waste needs to be collected and disposed of in accordance with local regulations.

8.3.3 A **systematic separation of hazardous and non-hazardous waste at source** and during disposal shall be consequently applied in order to avoid cross-contamination of solid waste. Mixing of hazardous and non-hazardous waste will result in the classification of the combined waste as hazardous waste.

Module 8: Managing chemical waste and residues

8.3 Managing solid chemical waste

8.3.4 Hazardous waste is defined as in ECA 95 and/or international conventions, based on risks posed by it to human health and/ or environment. The list of such waste can include, but is not limited to the following:

- a) Used chemical drums and containers
- b) Residual chemical waste from padding mangles, print pastes
- c) Film and printing frame
- d) Expired/ unused chemicals
- e) Compressed gas cylinders (refrigerants, Argon gas, LPG cylinders, etc.)
- f) Contaminated materials (oily rags)
- g) Decommissioned equipment (contaminated parts, electronic waste)
- h) Batteries
- i) Fluorescent light bulb
- j) Ink cartridges
- k) Waste oil and grease (from cooking or boilers)
- l) Electronic waste
- m) Combustion residuals (fly ash and bottom ash/coal slag)

Module 8: Managing chemical waste and residues

8.3 Managing solid chemical waste

8.3.5 Non-hazardous waste is the type of waste that does not pose any risk to human health and environment. The list of such waste can include, but is not limited to the following:

- a) Materials (fabric waste)
- b) Rubber
- c) Metals
- d) Plastic
- e) Paper/Cardboard
- f) Glass
- g) Domestic wastes (food, yard waste)

8.3.6 A factory shall manage its waste according to following steps:

- a) Systematically identify and quantify all types of solid wastes in the manufacturing facility.
- b) Identify, separate and classify hazardous waste.
- c) Create a waste inventory table for offsite treatment and disposal.
- d) Set up a dedicated waste yard to store all waste, segregated as per materials.
- e) Conduct a yearly waste audit and plan actions to reduce waste generation.

Module 8: Managing chemical waste and residues

8.3 Managing solid chemical waste

8.3.7 In case of storing hazardous solid waste, factory shall consider the following steps and practices:

- a) Keep the waste store locked, preventing access by any unauthorized personnel.
- b) Provide adequate ventilation where volatile waste is being stored
- c) Construct secondary containment systems with materials appropriate for the waste being contained and adequate to prevent loss to the environment
- d) Ensure impermeable surface in storage area
- e) Use proper signage indicating chemical hazards and recommended good practices (e.g. recommended PPE)
- f) Label hazardous waste containers to clearly identify content and associated chemical hazards
- g) Keep ready spill clean-up equipment and proper PPE at the waste yard
- h) Avoid burning any hazardous waste within or outside the facility, as the burning process may result in release of toxic by-products such as dioxins, furans and persistent organic pollutants.

Module 8: Managing chemical waste and residues

8.3 Managing solid chemical waste



Quick check for safe waste storage and handling

- Designated onsite storage areas for hazardous wastes of (i) sufficient size and (ii) separated, protected and (iii) in clearly marked location available
- Procedure and instructions for safe handling of empty chemical containers established and communicated to the concerned personnel
- Thorough cleaning before storage or disposal carried out with the wash water being discharged to wastewater treatment device
- Procedures in place to prevent reuse of empty chemical containers for the storage of drink/food items
- Possibility of returning containers to the chemical supplier considered
- Registered/qualified waste service provider for final disposal engaged

Module 8: Managing chemical waste and residues

8.4 Controlling releases of chemicals into the air

8.4.1 In textile manufacturing, various processes lead to the generation of air pollution. Standard Operating Procedure (SOPs) for **air emission management include the following:**

- (a) Identify all sources and types of air pollutants generated and released from a facility operation and processes.
- (b) Create an air emission inventory according to the Environment Conservation Rules, 1997.
- (c) Check all permits, authorisations, laws, regulations and standards required with regards to air emissions.
- (d) Track pollutant emission quantities and compliance with emission standards.
- (e) Monitor the emission through an available online monitoring system or through a third party approved laboratory.

Module 8: Managing chemical waste and residues

8.4 Controlling releases of chemicals into the air

8.4.1 In textile manufacturing, various processes lead to the generation of air pollution. Standard Operating Procedure (SOPs) for air emission management include the following:

- (f) Install appropriate control measures to meet the applicable requirements.
- (g) Carry out regular maintenance of control equipment to ensure their working order.
- (h) Perform third-party checks for all types at regular intervals to ensure compliance and to identify opportunities for improvement.
- (i) Strive for continual improvement on air emission beyond compliance for process modification, new machinery, chemical substitution, etc.

Module 8: Managing chemical waste and residues

8.4 Controlling releases of chemicals into the air

8.4.2 The reduction and control of air emission from the processes and operations are achieved through various emission control devices available. The following table outline few devices and their specific goals.

Type of emission control device	Goal
Cyclone precipitator	to remove particulate matter from exhaust gases
Electrostatic precipitator (ESP)	to reduce particulate emissions from boilers, kilns, engines, etc.
Baghouse	particulate control
Scrubbers	to reduce pollutants such as particulate and Sox emissions.
Activated carbon adsorption	to remove organic compounds (such as VOCs)

Module 8: Managing chemical waste and residues

8.4 Controlling releases of chemicals into the air

8.4.3 Factories are **expected to do the following as minimum requirement:**

- Meet requirements for legal compliance
- Identify facility's sources of emissions and relevant discharge points
- Track air emissions from processes
- Track air emissions from facility operations
- Modernize equipment or install emissions control devices to protect workers and prevent emissions to the environment

**Deutsche Gesellschaft für
Internationale Zusammenarbeit (GIZ) GmbH**

Registered offices
Bonn and Eschborn

Employment Injury Protection Scheme for Workers in
the Textile and Leather Industries (EIPS)

GIZ Bangladesh

PO Box 6091, Gulshan 1

Dhaka 1212, Bangladesh

T +880 2 5506 8744-52, +880 9666 701 000

F +880 2 5506 8753

E giz-Bangladesh@giz.de

I www.giz.de/bangladesh