




Bangladesh Power Development Board

**INTEGRATED MANAGEMENT SYSTEM
(BASED ON ISO 9001:2015, ISO 14001:2015 & ISO 45001:2018
STANDARDS)**

CHEMICAL MANAGEMENT PLAN

	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 2 of 14

1. Purpose

The Purpose of this procedure is to describe the responsibilities of all persons at BPDB associated with the handling of hazardous substances and measures taken to ensure that hazards have been identified and adequately controlled.

2. Scope

This procedure applies to all activities of BPDB pertaining to safe storage and use of hazardous substances during its operation.

3. Terms and Definition

- **Site Inventory for the Hazardous Substances:**

The inventory of hazardous substances on site maintained by Stores, after a survey of all substances in use or generated as a result of operations and categorized for handling under related regulations.

- **Risk and Impact Assessment:**

Process carried out prior to work by the relevant managers under the supervision of MR and LAB CHEMIST for the determination of any possible risk to health associated with the use, or possible contact with the hazardous substances and precautions /control measures required.

- **SDS – Safety Data Sheet** (formerly known as Material Safety Data Sheet – MSDS)

The document containing detailed information about a substance such as manufacturer name, composition, chemical, properties, composition, and chemical properties related to Environment, Health and Safety hazards and related precautions/control measures. The manufacturer of the substance must supply this document and procurement shall handover SDS to HSSE for proper display in work site

Abbreviations

BPDB – Bangladesh Power Development Board

SDS – Safety Data Sheet

HSSE - Health, Safety Security and Environment

CRE - Corporate Responsibility Social


HSE – Health, Safety and Environment

4. Roles and Responsibility

Chemist

- Responsible for update of this procedure as per legal and regulatory and other requirements

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	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 3 of 14

- Ensure that specific information regarding the hazards and risk of handling of chemicals and hazardous substances is provided to all concerned.

Procurement Manager

- Shall ensure the chemical supplier supplies SDS.
- Shall ensure that hazardous substances are labelled as required; stored according to compatibility of hazardous materials and in the appropriate storage facility as per risk assessment (or SDS requirements)

MR

- Ensure the procedure is implemented and communicated to all staff.
- Responsible for maintaining the records relevant to this procedure.
- Shall ensure that SDS is available on areas where specific chemicals are being used.
- Shall ensure that specific PPE requirements for hazardous substances are available all the time

Maintenance Manager

- Shall provide assistance in safe unloading and storage of the stored hazardous substance

HR & Admin Manager

- Shall ensure that training requirements are met and,
- Medical check-up (every 12 months) is conducted for personnel directly involved in hazardous substances handling


5. Procedures

BPDB manages hazardous materials through specific indicators and objectives that cover the following:

- Air quality (fumes initiated, filtration efficiency)
- Water Quality (effects of accomplished tasks or daily testing and analysis operations)
- Land Management spills and leakage

All BPDB departments, whose work including use or management of hazardous materials shall ensure preventative and correction actions are set.

Prepared By		Approved By	
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	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 4 of 14

5.1 Classification of Chemicals

i. Definition and Hazards

The category "Reactive" is a term given to a chemical class that displays a broad range of reactions. This category includes explosives, oxidizers, reducers, and water sensitive, and acid sensitive, air sensitive and unstable chemicals. These substances are capable of producing toxic gases, explosive mixtures, being explosive, reacting with water violently, or they may contain cyanide or sulfide. Reactive chemicals exhibit moderate to extremely rapid reaction rates and include materials capable of rapid release of energy by themselves (self-reaction or polymerization), and/or rates of reaction that may be increased by heat or pressure or by contact with incompatible substances.

Reactives may be broadly classified into two groups: those that may explode and those that do not. Reactivity of individual chemicals in specific chemical classes (e.g., alkali metals) varies considerably. This rate of activity may also vary because of aging or contamination. Reactive may be further subdivided and placed into eight classes based upon their chemical behavior.

1. Class I

Chemicals normally unstable that readily undergo violent change without detonating.

Properties

1. Pyrophoric--spontaneous ignition in contact with air. Examples: metal alkyls, phosphorus, finely divided metal powders such as magnesium, aluminum, and zinc. Prevent contact with air or water - use and store in inert environments.
2. Polymerizable--spontaneous polymerization in contact with air. Examples: divinyl benzene. Keep cool and avoid contact with water.
3. Oxidizers--violent reaction in contact with organic materials or strong reducing agents. Examples: perchloric, chromic and fuming nitric acid. Use minimum amounts for procedure; do not keep excessive amounts of material in the vicinity of process; store properly, away from organic materials, flammable materials and reducers.

2. Class III

Chemicals that form potentially explosive mixtures with water.

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 5 of 14

Properties

Chemicals decompose violently in water with evolution of heat and flammable gases, which may ignite if exposed to ignition source. Evolution of heat with water may be sufficient to cause auto-ignition (and explosion). Examples: alkaline metals, alkaline earth metals, alkaline metal hydrides, alkaline metal nitrides.

Precautions

1. Provide ventilation to disperse flammable gases.
2. Use dry sand to smother materials - use of water as a fire extinguisher may aggravate fire.
3. Avoid contact with and handle away from water sources.

3. Class IV

Chemicals that, when mixed with water, generate toxic gases, vapors or fumes in quantity sufficient to present a danger to human health or the environment.

Properties

Reacts rapidly with water with the production of gases or vapors, which are acutely toxic to human health. Examples: alkaline metal phosphides, phosphorus halides, aluminum phosphide, toluene di-isocyanate.

Precautions

1. Provide adequate ventilation when handling.
2. Keep containers sealed.
3. Do not handle near water.

4. Class V

Cyanide or sulfide bearing chemicals.

Properties

Acid sensitive cyanides and sulfides that produce extremely toxic hydrogen cyanide or hydrogen sulfide gases on contact with acids or materials which form acids in the presence of moisture or liquid water.

Examples: metal cyanide salts, organic cyanide compounds, metal sulfide salts, organic sulfides and mercaptans.

Precautions

1. Do not store in cabinets with acids and oxidizers.
2. Isolate from other reactive chemicals.

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 6 of 14

3. Protect sulfide salts from moisture.
4. Provide adequate ventilation due to severe inhalation hazard of hydrogen cyanide and hydrogen sulfide and acute toxic effects from skin contact with hydrogen cyanide.

5. Class VI

Chemicals capable of detonating or exploding if subjected to a strong initiating source or if heated under confinement.

Properties

Detonation or explosion can occur if heated above ambient temperature; or if exposed to an initiating source such as shock, mechanical shock, spark or flame, or a catalyst that accelerates decomposition. Examples: lead amide, sodium amide, thallos nitride, metal azides, brominated organic compounds, benzene diazonium salts, ammonium picrate, ammonium tetra-chromate, metal periodates, organic perchlorates, isoamyl nitrite, ammonium nitrate & chlorate.

Precautions

1. Protect containers from physical damage, heat and incompatible chemicals.
2. Chemicals in this class exhibit a wide range of other properties, i.e., flammability, acid or water or light sensitivity. Know the properties of the materials being worked with.
3. Check SDS for information on incompatibles when storing.

6. Class VII

Chemicals readily capable of detonation, explosive decomposition, or reaction at standard temperature and pressure.

Properties

Chemicals capable of detonation or explosive decomposition under ambient temperature and pressure without any external initiating source. Examples: ammonium chlorate, organic azides, metal azides, benzoyl peroxide, peroxidized ethers.

Precautions

1. Materials should only be handled by knowledgeable and trained individuals.

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 7 of 14

- Evaluate chemicals periodically to determine whether deterioration has occurred. If so, dispose of properly by contacting Environmental Health & Safety.
- Check the SDS for information on incompatibles for storage and chemical properties of materials handled.
- Follow recommendations on SDS for personal protective equipment.

7. Class VIII

Forbidden explosives, Class A explosives, and Class B explosives as defined in 49 CFR 173.

Properties

Forbidden Explosives are capable of detonation or explosive decomposition under ambient conditions, considered too dangerous for transportation. Examples: Forbidden explosives: diethylene glycol dinitrate, unstabilized nitroglycerine, nitrocellulose. Class A Explosives: TNT, mercury fulminate, diazo-dinitrophenol, lead 2,4-dinitroresorcinate. Class B. Explosives: stabilized nitrocellulose, stabilized nitroglycerin.

Precautions

Materials should only be handled by experienced and properly equipped persons.

ii. Environment and Environmental aspect:


BPDB shall identify the environmental aspects of the hazardous substances and chemicals that are used in operation that may cause environmental impact to its surroundings in which the plant operates, including air, water, land, natural resources, flora, fauna, humans and their interrelationships.

To ensure that hazardous chemicals and substances that are used in the plant operation are not disposed off or discarded to the environment, only minimum quantity requirement of chemicals and substances are stored and proper storage and segregation is in place.

Neutralization system is also available in the plant.

In the event of emergency, refer to 3.01.01.004 (Emergency Preparedness and Response Plan)

Prepared By		Approved By	
Reviewed By			

	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 8 of 14

5.2 Procurement of Hazardous Substances

- The Procurement department shall only make purchase of hazardous chemicals. The Procurement Manager shall ensure that specific information shall be specified on the purchase request such as size of packaging, required shelf life of material and any other requirements like SDS or other additional information like approval from ministry to be included in the delivery.
- All the SDS for Hazardous Chemicals shall be obtained.

5.3 Inspection of Delivered Hazardous Chemicals

- Warehouse personnel shall inspect the deliveries of chemicals. Employees who ordered hazardous chemicals may be asked to assist during inspection.
- Delivered hazardous chemicals must have proper labels and hazard information. Packaging without identifying labels and those that are damaged or unsealed should not be accepted.

5.4 Hazard Communication Tools

BPDB shall ensure clear communication with regards to the hazardous materials. A master inventory list of all hazardous materials used in BPDB will be kept with the HSE department, a copy of the SDS shall also be kept near the source of the Hazardous Chemicals usage/storage.

Labeling, Packaging and Hazard Warning

BPDB shall ensure proper labeling and packaging of hazardous materials is done as per the GHS (Globally Harmonized System) requirements which is as follows:

- Symbols, signal words and hazard statements for each of the hazard categories of the hazard classes within GHS.
- Pictograms shall be used to convey specific information about hazardous substances and shall be prepared according to the dimensions and format specified in the GHS.
- Information to be displayed on labels shall include as a minimum:
 1. Symbols
 2. Signal words
 3. Hazard statements

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 9 of 14

4. Pre-cautionary statements and pictograms as approved by the sector regulatory authority.
- Information on labels may also include as deemed appropriate by the supplier or sector regulatory authority which shall include Product identifiers and supplier identification.
 - In case a substance or mixture presents more than one hazard, the presence of hazard information on the label including the allocation of symbols, signal words and hazard statements shall follow the hierarchy as followed by GHS.
 - SDS shall be prepared for all substances and mixtures meeting the criteria for physical health and environmental hazards as specified by the GHS. The content of SDS shall be as follows.
 - Product identity
 - Hazard identification
 - Composition/Information on ingredients
 - First aid measures
 - Firefighting measures
 - Accidental measures
 - Handling and storage
 - Exposure controls/personal protection
 - Physical and chemical properties
 - Stability and reactivity
 - Toxicological information
 - Ecological information
 - Disposal considerations
 - Transport information
 - Regulatory information
 - Other information
 - An SDS shall be prepared based on the cut-off values/concentrations for each of the following health and environmental classes

Hazard Class	Cut-off value/Concentration limit
Acute Toxicity	Greater than or equal to 1.0 %
Skin corrosion/Irritation	Greater than or equal to 1.0 %
Serious damage to eyes/irritation	Greater than or equal to 1.0 %

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 10 of 14

Hazard Class	Cut-off value/Concentration limit
Respiratory/skin sensitization	Greater than or equal to 1.0 %
Mutagenicity: Category 1	Greater than or equal to 0.1 %
Mutagenicity: Category 2	Greater than or equal to 1.0 %
Carcinogenicity	Greater than or equal to 0.1 %
Reproductive toxicity	Greater than or equal to 0.1 %
Specific target organ systemic toxicity (single exposure)	Greater than or equal to 1.0 %
Specific target organ systemic toxicity (Repeated exposure)	Greater than or equal to 1.0 %
Hazardous to aquatic environment	Greater than or equal to 1.0 %

5.5 Hazardous Materials Handling and Storage

Safe handling and storage procedures will be based on SDS and manufacturers and/or suppliers' information. The inventory of hazardous goods will be readily available for inspection by any employee involved in the handling or storage on hazardous materials.

- **Hazardous Materials Storage**

- ✓ **Flammable or Combustible Materials**

- Flammable goods will be stored away from oxidizers and other reactive materials
- Bulk storage will have a secondary bund wall.
- Electrical wiring will be explosion proof and storage containers will be grounded (earthed) to limit risk from static electrical buildup


- ✓ **Corrosive Materials**

- Corrosives will be stored away from other reactive materials
- Alkalis will be stored away from acid store
- Corrosive materials will be stored in appropriate storage cabinets
- Eyewash stations of continuous water flow will be provided.

- ✓ **Toxic Materials**

- Toxic materials shall be securely stored in access-controlled cabinets
- Storage shall ensure no contamination from the toxic materials to the surrounding environments
- Eyewash stations of continuous water flow will be provided.

Prepared By		Approved By	
Reviewed By			

	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 11 of 14

✓ **General Requirements for Storing Hazardous Materials**

- Storage of hazardous materials shall be in accordance with manufacturer's recommendation to optimize product quality
- Hazardous materials shall be released for use on the basis of First In-First Out to allow them to be used within their shelf life.
- Storage must take into account the limitations of packing and containers to ensure that these are not damaged.
- Control of occupational exposure limits for hazardous materials shall be maintained
- Adequate ventilation of the storage area must be ensured.

✓ **General Handling Procedures**

- Obtain and review Safety Data Sheets (SDS) before ordering and using chemicals. Ensure that the material can be safely procured, stored, used, and disposed of.
- Know the hazards associated with materials you are using.
- Be prepared for emergencies and know what action to take. Assure that necessary supplies and equipment are available for handling small spills.
- Know the location of safety equipment such as emergency shower, eyewash, fire extinguisher, fire alarm, and emergency telephone numbers.
- Purchase minimum amounts of hazardous materials necessary to accomplish work and dispense only amounts necessary for immediate use.
- Use hazardous materials only as directed and for their intended purpose.
- Never smell or taste a hazardous chemical.
- Avoid direct contact with any chemical, use protective equipment to avoid exposure, and review SDS for specific recommendations for each chemical used.
- Smoking, drinking, eating and the application of cosmetics is forbidden in areas where hazardous chemicals are in use.
- Ensure emergency contact information is posted at the lab
- Ensure all containers are labeled.
- Label all secondary containers with chemical name and hazard information.
- Assure ventilation is adequate for the materials you are using. Where possible, handle all materials in a chemical fume hood.
- Electrically ground and bond conductive containers using approved methods before transferring or dispensing a flammable liquid from a large container.
- Store chemicals in compatible categories.

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 12 of 14

- Only permit reactions to run unattended when the reaction is well understood, provisions are in place to contain toxic substances in the event of a utility failure, and emergency contact information is posted on the door.
- Dispose of waste properly according to HSE's "Waste Management Guidelines and Procedures Manual."
- When transporting chemicals outside the lab, use precautions to avoid dropping or spilling chemicals. Use bottle carriers for glass containers and use carts with edges to prevent containers from falling off the cart and breaking.


✓ Exposure to Hazardous Materials

Hazardous substances can enter the body system by a number of separate means, all of which have a significant effect on health. The actual means of entry into the system is likely to depend upon the PPE being worn and the characteristics of the substance/hazardous material. The means by which the substance enters the body in order to exert systemic toxicity is called "Route of Exposure". The Toxic effects of the substance may appear during exposure (acute effect) or maybe delayed until sometime after exposure (chronic)

Route of Exposure:

- **Inhalation:** This is the quickest and most common exposure route for gases / fumes, vapors and particulate matter, and is caused by breathing in the substance. It presents the most immediate danger and may result in:
 - Respiratory damage
 - Absorption into the blood system
 - Transport to other organs
- **Ingestion:** this is the second quickest exposure route and is generally caused by swallowing. This is frequently a result of poor hygiene or eating / smoking after having handled hazardous substances and/or failure of the worker to ensure that they have undergone a full decontamination procedure. Ingestion is the simplest route of exposure to protect against but often the most difficult to stop.
- **Injection:** A rare route of exposure which occurs when skin is punctured by material coated with a toxin. The circulatory system delivers the toxin rapidly to other parts of the body.
- **Absorption:** This is the slowest but a very common exposure route; toxins pass through skin or eyes and cause either surface damage on

Prepared By		Approved By	
Reviewed By			

	INTEGRATED MANAGEMENT SYSTEM	Document No.: BPDB-IMS-PR-069
	CHEMICAL MANAGEMENT PLAN	Revision No.: 00 Effective Date: 01-11-2021
		Page 13 of 14

contact or systematic problems through the transfer of the toxins into the bloodstream.

✓ **Notification of Hazardous Substance Release:**

1. **ALERT** personnel within the immediate area
2. **NOTIFY** the BPDB ERT using the designated CCR.
3. **ISOLATE** the area by having non-essential personnel evacuate to the area upgrade and upwind.

5.6 Employee Training

Training and Development Manager shall identify all training requirements related to the handling and storage of hazardous materials in coordination with the MR and LAB CHEMIST Manager. The LAB CHEMIST shall train employees dealing with chemicals in the safe handling and use of hazardous substance internally.

5.7 Internal Notification and Reporting

Release of hazardous substances (leaks and spills) shall be notified using the Incident Notification form. The relevant manager shall complete the form with all information required. The incident report will be submitted to HSSE Department for record keeping.

The following considerations shall also apply:

- The CRE (Corporate Responsibility Social) shall be notified for accidental release of any materials in any quantity sufficient to cause death, major injury or any damage to the health of the person.

5.8 Records

Records	Responsibility	Retention period
SDS	Lab Chemist	continuous
Training records	HR& Admin	At least 5 years
Medical records	HR& Admin	At least 30 years
Risk assessment	HSSE Manager	Continuous

5.9 Waste Management and Disposal

Follow Waste Management Plan Procedure

6. Reference

1. Environmental conservation Rules 1997
2. HAZARDOUS MATERIALS MANAGEMENT International Finance Corporation.
3. ISO 14001:2015 Standard

Prepared By		Approved By	
Reviewed By			



INTEGRATED MANAGEMENT SYSTEM

Document No.:
BPDB-IMS-PR-069

Revision No.: 00

Effective Date: 01-11-2021

CHEMICAL MANAGEMENT PLAN

Page 14 of 14

4. Chemical List and Consumption

7. Appendix

None

8. Revision History

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Prepared By		Approved By	
Reviewed By			