PT PLN (PERSERO)

ENERGY TRANSITION AND SUSTAINABILITY DIVISION

Hazardous Waste

MANAGEMENT GUIDELINE

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Document Status

Version : 1.0

Document No	Date of Issuance	Subject of Amendment
14.0	31 – May - 2024	Not Applicable

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Key Abbreviation

AOI	:	Area of Influence
CHSS	:	Community Health, Safety and Security
E&S	:	Environmental and Social
EHS	:	Environmental, Health and Safety
ERP	:	Emergency Response Plan
ESF	:	Environmental and Social Framework
ESMP	:	Environmental and Social Management Plan
ESMS	:	Environmental and Social Management System
ESS	:	Environmental and Social Standard
FABA	:	Fly Ash Bottom Ash
GHG	:	Greenhouse Gas
IA	:	Impact Assessment
IFC	:	International Finance Corporation
MoEF	:	Ministry of Environment and Forestry
PCB	:	Polychlorinated biphenyls
PPE	:	Personal Protective Equipment
PS	:	Performance Standard
RPFLH	:	*Rencana Pemulihan Fungsi Lingkungan Hidup*
SSPLT	:	*Surat Status Penyelesaian Lahan Terkontaminasi*
WBG	:	World Bank Group

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1 Introduction

PLN is committed to avoid or minimize adverse impacts on human health and the environment by avoiding or minimizing the generation of hazardous waste from the project activities. This guideline is developed in order to manage the impact due to hazardous waste in PLN's Projects and facilities, whether for a new project development, expansion of an ongoing project, or there are changes in the operation of PLN's facilities. This guideline is developed to be consistent with the E&S principles described in the ESMS Manual and based on international good practices including the World Bank's Environmental and Social Standard (ESS) 3, WBG's Environmental Health and Safety (EHS) Guidelines, IFC Performance Standard (PS) 3 and also based on PLN's documents related to hazardous waste (see **Section 13**) and other relevant documents as listed in **Section 14** of this management guideline.

This management guideline will be required for projects that generate hazardous waste from their activities. The scope of waste management is as far as the project has access to control it, which is usually the point at which the hazardous waste is collected by an appropriately licensed contractor for further process. Management within the scope of the project will be responsible of PLN (and its contractors and sub-contractors) and PLN accountability will not extend to the activities outside of the project that are conducted by third party that are not associated with the project and beyond PLN's area of control. However, PLN will manage as far as possible to minimize the risks and impacts related to waste handling outside of the project area, such as selecting the best third party available to manage the waste according to the requirements that are applied (example: PLN cannot control or has the expertise to monitor the condition of vehicles used for transportation. However, PLN should include the requirement of possession of valid licenses as applicable and ownership of and commitment to use waste transportation fleet with certain specification in compliance with the applicable regulations throughout contract period as part of legal agreement with the third party).

The objective of managing hazardous waste generated from the project activities are is to minimize its generation and to control the waste distribution in order to create a healthy work environment and to minimize pollution to the surrounding environment. The hazardous waste management plan is also developed to comply with the applicable national and local regulations and policies.

2 Disclaimer

This management guideline should not be taken as a standard, regulation, or manual and is not described to the detail level of a work instruction. If a more relevant or updated standard, regulation, or manual is available and requires for revision of this guideline, then such revision is permitted. If any revision to this guideline is made; references, rationales and amended sections should be clearly defined.

To be able to serve its purpose, this management guideline should be reviewed, implemented, and enforced by PLN staff with relevant authorities and competencies specified in the ESMS Manual Section 3. Any changes to this guideline may potentially trigger the need to revise the associated procedures and other guidelines that connected with this guideline. Any update,

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deviation, or suggestion of this guideline will be followed up in alignment with the provision of Chapter 9 of the ESMS Manual (Management of Change).

3 Management Approach

Management of hazardous waste will be commensurate with the level of potential risks associated with the handling, storage and treatment of hazardous waste that have been identified. The management of hazardous waste is a risk-based approach, which means that the management activities will be proportional to the risk and impact. Hazardous waste management requirements should be analysed as part of the environmental and social assessment. The base activities of a risk-based approach are identifying the risk and impact of hazardous waste generation, handling, storage and treatment; and assessing the significance level of those risk and impact. Based this identification – assessment process, the management effort and activities will be determined and implemented in a manner that is commensurate proportional with the significance level of the risk and impacts.

Hazardous waste, as defined by the WBG EHS Guidelines[1] and relevant national law, is generated from project activities, and should be segregated for appropriate final treatment and management.

In general, hazardous waste management include prevention and minimization of waste generation, and proper practice of waste storage, transportation, and treatment. If generation of hazardous waste cannot be prevented through the implementation of the general waste management practices, e.g., waste prevention, reuse and recycling, treatment and disposal (see Management Guideline for Non-Hazardous Waste), the hazardous waste management should focus on the prevention of harm to health, safety, and the environment, according to the following additional principles:

- Understanding potential risks and impacts associated with the management of any generated hazardous waste during its complete life cycle.
- Ensuring contractors that handling, treating, and disposing of hazardous waste are reputable and legitimate enterprises, licensed by the relevant regulatory agencies and following good international industry practices for the type of hazardous waste being handled.
- Ensuring compliance with applicable national and international regulations, including those relating to transboundary movement[2].

4 Process Overview

In order to achieve the objectives of each step of the E&S safeguard process, the hazardous waste management will implement the following process:

[1] Hazardous waste may include: explosives; compressed gases, including toxic or flammable gases; flammable liquids; flammable solids; oxidizing substances; toxic materials; radioactive material, including radioactive medical waste; medical and biological waste; corrosive substances; chemical fertilizers; soil amendments; chemicals, oils, and other hydrocarbons; paints; pesticides; herbicides; fungicides; asbestos; metal waste; hospital waste; used batteries; fluorescent light bulbs and ballasts; by-products of plastic incineration at low temperatures; heavy metals (Pb, Cr, Cd, and Hg); dioxin-bearing wastes; and PCBs in electrical equipment.

[2] The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal.

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- Identification of potential risks and impacts of hazardous waste generation;
- Assessment of the identified risks and impacts;
- Planning of mitigation measures; and
- Monitoring and review of the implementation of mitigation measures.

All the above process is conducted within the Impact Assessment (IA) process as required by the ESMS manual, which includes the screening process and categorization, scoping, a baseline study analysing and assessing impact, defining mitigation measures and monitoring strategies. In every step of the IA process, the mitigation hierarchy will be taken into consideration.

5 Screening and Categorization

5.1 Screening of potential hazardous waste impact

The screening stage is a key step for an initial identification of impacts of hazardous waste generated from project activities, which conducted at an early stage of a project's lifecycle. The objective of screening in the context of hazardous waste management is to identify potential major hazardous waste impacts of a proposed project/activity. Screening of potential hazardous waste impact serves as the basis for scoping (see **Section 6**) and will contribute in calculating the likely E&S effect of a project when determining project category (see ESMS Manual Chapter 5.3).

Screening is based on professional judgement and the information available at the time. Project screening and categorization process is conducted at the earliest possible stage in every project lifecycle; therefore, it is probable that the data used for identification is not widely available and not very detailed. Whenever possible the data collection and the initial identification of impacts is conducted concurrently with or part of the pre-feasibility and feasibility studies, and in collaboration with preparers of the feasibility assessments.

The identification of impact of hazardous waste will also include of the following information:

- The source of risks and impacts.
  The sources of impact are activities of project that generate hazardous waste. This also includes the storage of hazardous waste. Sludge from a waste treatment plant, water supply treatment plant, or air pollution control facility, and other discarded material, laboratory waste, medical waste, including solid, liquid, semisolid, or contained gaseous material resulting from industrial operations needs to be evaluated on a case-by-case basis to establish whether or not it constitutes a hazardous waste.
- Types and characteristics of hazardous waste;
- The receptors of the impact (e.g., workers, communities, soil, water, etc).

Initial identification of the potential hazardous waste impacts will be based on information of the project type and its nature and the planned activities in general. Information that needs to be obtained are the following but not limited to:

- Type of project (e.g., transmission line, types of power plant, distribution line, etc.)
- Hazardous materials used on site;

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- Availability of hazardous waste transport services and treatment facility surround the project area;
- Technology used in the project (e.g., types of transformers, etc.)
- Project phases (e.g., pre-construction, construction, operation, decommissioning)

All the information above will provide information on types of hazardous waste that will be generated, rough estimation of the amount, and management options. The type of project and technology used will give information on types of hazardous waste that generally generated; different types and technology may also give information on the amount of specific hazardous waste produced. For example, different types and technology of transformers may have different amount of PCB content in oil waste. Any hazardous material used on site will give information on types and amount of hazardous waste produced, because in general the hazardous material will become waste after processing, either in different form or different substance due to reaction in a process. Information on project phases will give estimation of number of personnel employed in each project phase (that will affect amount of waste generated). Information on the availability of hazardous waste transport services and treatment facilities in the project location may give information the scope and risk of waste handling outside the project area, for example the absence of waste transport service causes the Project need to allocate resources (e.g. personnel, fleet, permit, etc) to transport the waste to the treatment facility.

5.2 Preliminary assessment of hazardous waste impact

Once relevant information and potential hazardous waste impacts has been assembled, a preliminary assessment will be conducted to assess the significance of the identified potential impacts. The significance of the potential hazardous waste impacts is measured by assessing the probability and the consequence level, using reference criteria for probability and consequence as provided in Appendix 4 of the ESMS Manual, criteria for Resource Efficiency, Pollution and Emissions of Greenhouse Gases (GHG).

The significance of hazardous waste impacts will contribute to calculating the Likely E&S effect of a project when determining project's category. Potential hazardous waste impacts may be assessed to have several impacts (such as impact of sludge from water treatment plant, Fly Ash Bottom Ash (FABA), etc.) where each of these impacts will have its own impact significance. However, in the context of determining project E&S category, the risk category will follow the highest risk significance.

The results of the screening and categorization process are preliminary in nature and will be expanded and revisited as part of the Impact Assessment, when more information about the nature and the scope of a project becomes available or when project definition and circumstances change (e.g., screening of subprojects identified during project implementation, change of project design or components, etc.). This is in line with an adaptive risk management approach.

6 Scoping of Hazardous Waste Impact

Scoping aims to deepen the understanding of the potential hazardous waste impacts that have been identified during Project Screening and Categorization, to clearly define what is within

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the scope of the assessment (activities, risks/impacts, affected area), and develop a suitable methodology and data for the hazardous waste Impact Assessment that ensues.

At the scoping stage, the identification of impacts from hazardous waste will be further broadened and deepened. Identification of the potential impacts of hazardous waste are derived based on the project's description. However, more information about the project is usually available, detailed and more defined, compared to the information available during the project screening and categorization stage. All impacts that were identified from the project screening and categorization stage will be included in the list of a project's potential impacts.

The scoping will include, but is not limited to:

a. Understanding project activities, project description and project alternatives.

   At this stage of the project, information regarding the project is available in a more comprehensive manner, such as the project's phases, the technology to be applied, the site design, etc., including some alternatives of project components design. Understanding of the project activities and description will be needed to identify potential interaction between the project and resources/receptors in the Area of Influence (see point c).

b. Identify potential hazardous waste impacts

   Identification of potential hazardous waste impacts in the scoping stage is an iteration of identifying potential impacts in the screening stage. However, usually more information about the project is available, detailed and more defined (although some alternatives of design and/or project locations may still exist, but not in a broad range of selection), compared to the information available during the project screening and categorization process. Therefore, the identification of impacts of hazardous waste is further broadened and deepened in this scoping process.

   Identification of hazardous waste impacts is based on the project's description, activities that generate hazardous waste and how they interact with receptors. When identifying the potential impact of hazardous waste generated, the types and estimated amounts of hazardous waste generated need to be taken into account by developing an indicative hazardous waste inventory through the various phases of the project.

   During the identification of potential impacts, permitting or licensing requirements related with hazardous waste shall be also identified. Identification of permits and license requirements will provide information on management action that may need to be conducted when developing mitigation and monitoring plan.

c. Identify area of influence (AOI) for hazardous waste impact

   The project activities will impact spatial (area) and temporal (time) dimension. Based on the potential hazardous waste impacts that have been identified (both in the screening process and deepened in this scoping process), the area of influence for hazardous waste impacts will be determined. The extent of AOI for hazardous waste impact will consider the extent of the direct and indirect impact of hazardous waste impact and location characteristics. The extent of direct impacts may be determined based on reference to similar project or activities, the characteristics of the hazardous waste generated or other justified studies.

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It should be noted that the AOI determined in the scoping process may be revised and adjusted when new information gathered throughout the impact assessment process (e.g., new information on existing baseline condition from the baseline survey result) or circumstances change (e.g., changes in project design).

d. Identify sensitive receptors

Hazardous impact impacts that relate to or may affect sensitive receptors need to be identified in order to determine which hazardous waste impacts that need to be focused and analysed in more depth. Sensitive receptors include community residential receptors, animal, plant, ecological sensitive (e.g., national parks). Children, the sick, infirm and the elderly can be more prone to exposure of hazardous waste that make them particularly sensitive receptors.

e. Identify existing environment conditions and social issues related to hazardous waste

The existing environmental conditions and social issues related to hazardous waste that can be exacerbated by the project will be identified. For example, if there have been public complaints related to a polluted river in the project area which suspected to be polluted by waste which contained hazardous substances. The presence of environmental conditions and/or social issues related to hazardous waste needs to be considered when analysing the impacts, also as a basis for planning appropriate hazardous waste management.

f. Define methodologies for impact analysis

In analysing the potential hazardous waste impacts, there are methods that can be used, including quantitative, semi-quantitative, and qualitative methods. As much as feasible, the hazardous waste impact assessment is carried on quantitatively. In general, the methodology for hazardous waste impact assessment will include primary and secondary data collection.

g. Identify baseline data requirements

Baseline data that needs to be collected will be identified, based on the previous activities in the scoping, i.e., the potential impact identified, the AOI defined, and methodology for impact analysis that has been defined, MSDS information for hazardous materials that can potentially become waste, etc. Input from stakeholder engagement that has been conducted as part of the impact assessment process, especially that related to hazardous waste, will be taken into consideration in determining baseline data that may require to be collected.

7 Baseline Study

A baseline study will include collection of primary and secondary data collection and analysis of data collected. The primary and secondary data that shall be collected is used to understand the characteristics of the hazardous waste that may be generated by the project and the surrounding condition of the project location.

Collection of data and information will include the following, but not limited to:

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- The types and amounts of hazardous waste that may be generated and their characteristics. This information should be recorded and should include a summary table with the following information:
  - Name and description (e.g., composition of a mixture) of the hazardous waste;
  - Classification (e.g., code, class or division) of the hazardous feature of the waste;
  - Internationally accepted regulatory reporting threshold quantity or national equivalent of the hazardous waste;
  - Quantity of hazardous waste generated per month;
  - Characteristic(s) that make(s) the waste hazardous (e.g., flammability, toxicity);
  - Toxicity information and exposure limits;
  - Potential pathways to receptors.
- Available waste processing facilities and waste management partners, including treatment facilities and transport services by the government or private sector.
- The condition surrounding the project area, especially related to potential receptors, such as location of community settlements, access road for waste transportation, climatic data, natural hazard probabilities (e.g., flood, seismic, storms), etc.

Waste characteristics can be derived from available data on the type of waste and the MSDS for any hazardous materials that are likely to become waste. Simulation of the waste to be generated may also be required to determine waste characteristics. For some cases the waste needs to be determined whether the waste characterized as hazardous waste or non-hazardous waste, e.g., sludge from a waste treatment plant. This simulation will be conducted with appropriate methods, valid equipment, reliable, and in accordance with applicable national laws and regulations or the international standard, whichever is more stringent and technically feasible.

8 Analyse and Assess Hazardous Waste Impact

8.1 Prediction of impact and impact mapping

All the available information and data collected during the scoping process and from the result of baseline studies will be analysed to determine what could potentially happen to receptors as a consequence of the project and its associated activities. From the potentially significant interactions identified in scoping process, the impacts to the various receptors are described and evaluated. It is to be noted that impact assessment is not an isolated process, there may be additional information obtained which may indicate that an impact will occur, where this impact has not been identified during the scoping process, including impacts to one receptor that can cause secondary impacts to other receptors and requires an assessment of the interaction of impacts that may intensify their scale and significance. For example, based on the scoping process, a potential impact identified from temporary storage of hazardous waste that may pollute the soil and groundwater; meanwhile from the baseline study, it is known that there is a communal shallow groundwater well nearby to the location where the temporary storage is planned. Therefore, there is potential impact to community health due to contaminated soil and groundwater from the hazardous waste (pathway).

Once all the impacts that have been collated, they will be grouped based on stages of the project when they will potentially occur and the correlation between impacts (including impacts

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other than hazardous waste impacts) will be mapped. This will give a clear picture of what impacts that may influence other impacts and any intersection amongst the identified impacts that will enable identification of possible indirect and cumulative impacts. For example, improper hazardous waste storage may cause contamination of groundwater. Contaminated groundwater may cause impact to community health. If that occurs near an already polluted water source, then cumulative impacts might arise.

8.2 Significance of impact

After the identified potential impacts are defined and mapped, they will be assessed for their significance using the same method as in the preliminary assessment stage using a risk matrix method. The significance of impact will be assessed based on the probability of the impact to occur and it's the extent if it occurs. However, if more reliable data is available, including impact modelling that will give a more quantitative and reliable information, specifically related to the significance of the impact and other impact consequence factors (if available). The consequence of the impact will take into account the following factors:

- Type of impact (direct, indirect, and cumulative)
- Duration of impact (short, medium, or long term)
- Extent or size of the affected area
- Reversibility of impact (reversible or permanent)
- The location and physiology of the site and proximity of surrounding communities
- Sensitivity of receptors (vulnerability)

It is important to note that in determining the potential impact significance, embedded controls (i.e., physical or procedural controls that are included in Project Description) are taken into account. An example of an embedded control is the design of temporary storage for hazardous waste that equipped with bunds to contain the hazardous waste if leakage or spills occurs.

Once the significance of an impact has been defined, the next step is to evaluate what mitigation and enhancement measures are warranted (see **Section 9**). The main objective of developing mitigation measures is to reduce the significance of an impact by reducing the consequence and/or lowering the likelihood. Re-evaluation of impact significance value needs to be conducted once mitigation measures are developed. The significance of the residual impact will be assessed with the same risk matrix, taking into account the application of mitigation measures.

All the impacts that have been assessed will be managed, through mitigation measures (See **Section 9**) that have been defined and will be monitored (see **Section 10**). The management and monitoring strategies will need to be developed to reduce the impact significance, prevent an impact to escalate, and to improve the E&S performance of a project. The management and monitoring strategies will be conducted through developing a Hazardous Waste Management Plan (See **Section 11**).

9 Management Action and Mitigation Measures

The principles of hazardous waste management will follow the general principles of waste management, which includes waste reduction (which may include reuse and recycling), final treatment and also includes storage and transportation of the waste. In general, management

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actions planned will be commensurate with the level of potential risks associated with the handling, storage and treatment of hazardous waste that have been identified.

Hazardous wastes should always be segregated from non-hazardous wastes and various classifications of hazardous waste must be kept separated. Hazardous waste management, including storage, transportation and treatment, should comply with existing requirements for management such as national legislation and applicable international conventions.

Hazardous waste are also frequently generated in small quantities from a variety of activities such as equipment and building maintenance activities. Examples of these types of wastes include spent solvents and oily rags, empty paint cans, chemical containers; used lubricating oil; used batteries (such as nickel-cadmium or lead acid); and lighting equipment, such as lamps or lamp ballasts. Contaminated soils from accidental spills of hazardous fluid as well as the contaminated spill kits should be treated as hazardous waste. In spite of their small quantities, these wastes should also be managed following the guidance provided in this chapter.

9.1 Waste Management Planning

Effective planning and implementation of hazardous waste management strategies should include:

- Identify pollution prevention opportunities, necessary treatment, storage and treatment facilities and services, based on information regarding waste sources throughout the project phases as has been assessed through the impact assessment process.
- Collection of data and information about the process and waste streams, including characterization of waste streams by type, quantities, potential use and their properties.
- Establishment of priorities based on risk analysis that takes into account the potential EHS risks during the waste cycle and the availability of facilities and services to manage the waste in environmentally manner.
- Definition of opportunities for source reduction, as well as reuse and recycling.
- Definition of procedures and operational controls for onsite storage.
- Definition of options, procedures and operational controls for treatment and final treatment.
- Emergency Response Plan (ERP) and post events activities.
  Contaminated spill kit must be provided as part of preventive and control measures of hazardous waste spill or release event. The principles of developing ERP o hazardous waste will be following the principles of hazardous material's ERP (see Hazardous Material Management Guideline). Post event activities must be determined commensurate with the severity of impact.
- Training of operators on release prevention, including drills specific to hazardous waste as part of emergency response training

9.2 Waste Reduction

In the matter of waste reduction, the project should be designed to prevent or minimize the quantities of hazardous waste generated and/or the hazards associated with the waste generated. The following are several strategies that can be implemented, but are not limited to:

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- When hazardous materials are to be used in an operation, substituting raw materials or inputs with less- or non-hazardous or toxic materials, or with those where processing generates lower waste volumes.
- Substituting equipment that generate less or zero hazardous waste.
- Instituting good housekeeping and operating practices, including inventory control to reduce the amount of waste resulting from materials that are out-of-date, off-specification, contaminated, damaged, or excess to plant needs.
- Implementing stringent waste segregation to prevent the commingling of non-hazardous and hazardous waste to be managed.

9.3 Hazardous Waste Storage

Hazardous waste should be stored in a manner that prevent or control accidental releases to air, soil, and water resources in area location where:

- Waste is stored in a manner that prevents the commingling or contact between incompatible wastes and allows for inspection between containers to monitor leaks or spills. Example includes sufficient space between incompatibles or physical separation such as walls or containment curbs.
- Store in closed containers away from direct sunlight, wind and rain.
- Secondary containment systems should be constructed with materials appropriate for the wastes being contained and adequate to prevent loss to the environment.
- The available volume of secondary containment should be at least 110 percent of the total storage container,
- Provide adequate ventilation where volatile wastes are stored.
- Ensure the availability of emergency response items such as eye wash stations, fire extinguishers, PPE etc.
- Located away from exposure to natural events such as flooding, with appropriate fire breaks;
- Design shall comply with national regulations as required by applicable permit.

Hazardous waste storage should also be subject to special management actions, conducted by employees who have received relevant training on the handling and storage of hazardous wastes that they are required to manage, including:

- Provision of readily available information on chemical compatibility to employees, including the need for clearly labelling each container to identify its contents and class of hazard.
- Limiting access to hazardous waste storage areas to employees who have received proper training.
- Clearly identifying (volume measurement, labelling, and signage) and demarcating the area, including documentation of its location on a facility map or site plan.
- Conducting periodic inspections of waste storage areas and documenting the findings.
- Preparing and implementing spill response and emergency plans to address their accidental release.
- Avoiding underground storage tanks and underground piping of hazardous waste.
- Compliance with permit requirements.

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9.4 Hazardous Waste Transportation

On-site and off-site transportation of waste should be conducted to prevent or minimize the possibility of spills, releases, and exposures to employees and the public. All waste containers designated for off-site shipment should be appropriate for the class of material and be secured and labelled with the contents and associated hazards, be properly loaded on the transport vehicles before leaving the site. There shall be appropriate shipping documentation (i.e., manifest) that describes the load and its associated hazards, consistent hazardous material transportation procedures.

Hazardous waste bins and temporary hazardous waste storage are usually within the area of a project, therefor all management activities are under the control of the project's management. The transportation and final treatment of hazardous waste are usually conducted outside of project area and the activities conducted by a duly licensed third party, although there is the possibility that these activities may need to carried out by the Project, in which case appropriate permits to be obtained and notifications to be made.

9.5 Hazardous Waste Treatment Facility

If hazardous wastes are generated after the implementation of feasible waste reduction, those waste materials should be treated, and all measures should be taken to avoid potential impacts to human health and the environment. The primary management requirement is the appointment of a duly licenced provider of transportation and treatment services. Selected management approaches, if required, should be consistent with the characteristics of the waste and national regulations, and may include one or more of the following:

- On-site or off-site biological, chemical, or physical treatment of the waste material to render it to non-hazardous prior to final treatment.
- Treatment at permitted facilities specially designed to receive the type of waste.

PLN will only use licensed hazardous waste treatment facility that are being operated to acceptable standards. Where licensed sites are not being operated to acceptable standards, PLN will minimize the amount of waste sent to such sites and consider alternative treatment options, including the possibility of developing its own recovery or treatment facilities at the project site or elsewhere.

In the absence of qualified and licensed commercial or government-owned waste treatment vendors (taking into consideration proximity and transportation requirements), PLN project activities/facilities that generate hazardous waste should:

- Have the technical capability to manage the waste in a manner that reduces immediate and future impact to the environment.
- Have all required permits, certifications, and approvals, of applicable government authorities.
- Consider the option of Installing on-site waste treatment.

As a final option, PLN may need to construct facilities that will provide for the environmental sound long-term storage of wastes, without disregard the limitation of storage period as set by the national regulations, on-site or at an alternative appropriate location up until external commercial options become available.

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9.6 Requirements in selecting Third Parties

When transportation and treatment of hazardous waste is involving third parties, PLN will only engage reputable contractors with valid licenses and should always obtain chain of custody documentation to the final destination.

Information on past experience, status of licenses, and other documentation from the contracted third parties for hazardous waste management is essential to ascertain their reputation and legitimacy. Information about and/or provided by and pertinent to the third party to include among others:

- Information in public records, for example, corporate registers;
- Current business licenses, registrations, permits, certificates, and approvals;
- Documents relating to their track record pertaining to hazardous waste management systems;
- Safety records; and
- Copies of relevant previous contracts.

9.7 Emergency Response Plan (ERP)

Emergency Response Plan must be developed for project that store and/or treat hazardous waste, where the response action will be developed commensurate with the hazardous risk. Management actions that have been determined for spill prevention, control and countermeasures should be included as a specific component of the ERP.

Description of response activities in the event of a spill, release, or other chemical emergency including:

- Internal and external notification procedures;
- Specific responsibilities of individuals or groups;
- Decision process for assessing severity of the release, and determining appropriate actions (including reporting and post-event activity);
- Facility evacuation routes;
- Post-event activities such as incident investigation, clean-up and disposal (e.g., remediation), employee re-entry, and restoration of spill response equipment.

When an incident occurs, actions to follow is not limited to the initial response and reporting of the incident. However, it is necessary to determine the appropriate post event action, commensurate with the severity of the impact.

For example, in condition where producer suspects/confirms that certain amount of waste is released to the environment, the producer shall conduct investigation that covers identification of volume of released hazardous waste, impacted environmental matrix (e.g., soil, surface water, groundwater, etc.), size and depth of impacted area, presence of impacted human and/or ecological receptor, etc., in accordance to the provisions in the national regulation[3].

Based on the investigation result, the producer holds responsibility to conduct 'Recovery of Environmental Function' if contamination is confirmed. In this case, producer shall prepare an

[3] Technical process for mitigating hazardous waste contamination issue on soil (that may lead to groundwater and surface water impacts) is specified in the MoEF's Regulation No. P.101/MENLHK/SETJEN/KUM.1/11/2018 regarding *Guideline for Remediation of Hazardous Waste Contaminated Land*.

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Environment Function Recovery Plan (*Rencana Pemulihan Fungsi Lingkungan Hidup* or 'RPFLH'). The RPFLH document must at least contain information such as the steps in recovery of environmental function post contamination and the results of identification of contaminant. This RPFLH needs to be approved by the Minister of Environment and Forestry (MoEF) prior to be executed. Such plan may include various options of technical approach subject to the nature of contamination, such as, physical excavation/collection, transportation, and treatment of contaminated soil and/or groundwater; extraction of contaminant substance (e.g., in Soil Vapour Extraction); insitu bioremediation (e.g. with aeration), and many other methods. If the Recovery attempt has achieved an acceptable condition, MoEF will issue a Contaminated Land Recovery Completion Letter (*Surat Status Penyelesaian Lahan Terkontaminasi* or 'SSPLT') by request of the producer. This request must at least include detailed report on the implementation of Recovery of Environmental Function.

For major hazard, the emergency response plan should include response system for the community that have the risk upon the hazard, which should be aligned with Community Health, Safety and Security (CHSS) management plan.

10 Monitoring

Monitoring will serve as a tool to improve the E&S performance. As part of the hazardous waste management, monitoring consists of periodical monitoring as part of management activities (i.e., mitigation measures planned) and review of the overall management.

10.1 Management activity monitoring

Each of the mitigation measures and activities that are planned should be monitored to ensure that management activities are carried out according to plan, ensure that project activities do not violate the provisions that have been regulated and determined, and serve as tools for early notification for abnormal condition. The monitoring plan will be developed based on the mitigation measures that has been set, and will be commensurate with the significance level of impact and risk based on the impact and risk analysis and assessment result.

In developing a monitoring plan for activities planned in the management plan, the following items should be taken into account, but are not limited to:

- Parameters to be monitored.
  Parameters to be monitored are the performance indicators that have been determined when developing management plan. The parameters to be monitored should also include parameters that are stated in the permits, if any.

- Monitoring locations
  Monitoring can be carried out at the source of impact, hazardous waste storage, treatment facilities (if the treatment facilities is owned by the project), and the surrounds of the project area if necessary.

- Frequency of inspection and monitoring.
  The frequency of monitoring will depend various factors, which include the duration of impact, magnitude of impact, the sensitivity or limit of the receptor, etc. Longer periods of impact, larger magnitudes of impact, more sensitive receptors will require more frequent monitoring, likewise. Frequency of several parameters that are required to be

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monitored in the permit, if any, must comply with the provisions in the permit, at minimum.

- Instruments that will be used for monitoring, including calibration requirements.
  The method and instrument to be used will comply with applicable regulation (if any) and will follow the best practice as far as technically feasible.

- The resources
  The monitoring will determine the minimum required qualifications of persons who will conduct the monitoring and inspection. In some cases, public participation in monitoring can be a requirement or a strategy in a management. Public participation in monitoring should be also determined, including the requirements of the public that will participate.

Monitoring activities associated with the management of hazardous waste should include:

- Regular visual inspection of all waste storage collection and storage areas for evidence of accidental releases and to verify that wastes are properly labelled and stored. When significant quantities of hazardous wastes are generated and stored on site, additional monitoring activities need to be conducted, for examples:
  - Inspection of vessels for leaks, drips or other indications of loss.
  - Orderly layout and stacking, consistent with segregation requirements.
  - Identification of cracks, corrosion, or damage to tanks, protective equipment, or floors.
  - Verification of locks, emergency valves, and other safety devices for easy operation (lubricating if required and employing the practice of keeping locks and safety equipment in standby position when the area is not occupied).
  - Checking the operability of emergency systems and safety provisions.
  - Documenting results of testing for integrity, emissions, or monitoring stations (air, soil vapor, or groundwater).
  - Documenting any changes to the storage facility, and any significant changes in the quantity of materials in storage.
- Regular audits of waste segregation and collection practices.
- Tracking of waste generation trends by type and amount of waste generated, preferably by facility departments.
- Identifying the characteristics of waste at the beginning of generation of a new waste stream, and periodically documenting the characteristics and proper management of the hazardous wastes.
- Developing hazardous waste balance which equipped with records of waste generated, transported, and treated disposed. The waste balance will give a whole picture of the waste generated and its control measures. Waste manifests or other records that documented the amount of waste generated and its destination shall be well kept and managed.
- Periodically auditing of third-party that provide treatment services, including re-use and recycling facilities, when significant quantities of hazardous wastes are managed by third parties. Whenever possible, audits should include site visits to the treatment location.

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- Regular monitoring of groundwater quality and other potential impact receptors (e.g., nearest river, etc.) in cases of hazardous waste stored on site or treated on site.
- Monitoring records for hazardous waste collected, stored, or shipped should include:
  - Name and identification number of the material(s) composing the hazardous waste.
  - Physical state (i.e., solid, liquid, gaseous or a combination of one, or more, of these)
  - Quantity (e.g., kilograms or Liters, number of containers).
  - Waste shipment tracking documentation to include, quantity and type, date dispatched, date transported and date received, record of the originator, the receiver and the transporter.
  - Method and date of storing, repacking, treating, or disposing at the facility, cross-referenced to specific manifest document numbers applicable to the hazardous waste
  - Location of each temporary hazardous waste storage within the facility, and the quantity at each location.

10.2 Management plan review

The Hazardous Waste Management Plan (see **Section 11**) is a living document has to be referred to every stage along the project cycle. The targets and approaches established in the plan should be reviewed, modified, or renewed from time to time as deemed necessary to find the best possible result.

The following are items that need to be determined related to management plan review:

- Schedule for regular review. The management plan should be reviewed regularly. If the phase will be more than one year, then the regular review shall be conducted annually.
- The parties that responsible for conducting the review, making an amendment, and the party approving the result of the review.
- Provision for adhoc review in the event of an incident or community grievance.

11 Hazardous Waste Management Plan

The planned mitigation measures and other management activities are arranged in a Hazardous Waste Management Plan. The management plan can be part of the Project's ESMP, or to be a stand-alone document. In general, the components of the hazardous waste management plan are described as below.

11.1.1 Component 1: Objective(s)

The management plan should state the objectives of implementing hazardous waste management activities. The main objective is to minimize the generation of waste and minimize the impact on worker health and communities that may affected by waste generated. Waste management should also in compliance with applicable national and local regulations and policies and permit requirements.

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11.1.2 Component 2: Waste characteristic

The management plan should give a detailed information on the expected hazardous waste that will be generated and to be managed. The information includes the waste source, types, estimated amount and the timing of its generation.

11.1.3 Component 3: Management action

The management plan should describe the management actions to be implemented, including the mitigation measures planned to be embedded in the management action. The management plan should also include the waste balance in the management plan.

The activities planned should also consider other plans that are related (if any), such as Transportation Management Plan, Occupational Health Safety Management Plan, Community Health Safety and Security Management Plan, Non-hazardous Waste Management Plan, Emergency Response Plan, etc.

The management plan should also require that local communities be consulted and informed of hazardous waste that will be transported through their community or might otherwise have an adverse effect on community through fire, explosion, spills, or other incidents. The management plan must provide for timely treatment of complaints received through the formal grievance mechanism or otherwise, including identifying the person or persons responsible for dealing with such issues.

11.1.4 Component 4: Performance Indicator

Every mitigation measure or management activity planned should have a measurable indicator of success as a tool to determine achievement targets and control the implementation of the management activity. Performance indicators determined shall be measurable, wherever possible to be quantitative in nature and can be measured with applicable tools. The management indicator may be based on the amount of waste that can be reduced, zero incident (e.g., spill from temporary waste storage), compliance with the rules and regulation, number or level of grievance related with hazardous waste, etc.

11.1.5 Component 5: Institutional Responsibility

The management plan must identify and describe the responsibilities of all parties (PLN, contractor or other relevant third parties) and competent authorities. The management plan must also identify the roles and responsibilities of individual positions within the organization in its implementation, including the socialization of waste management (such as hazardous waste segregation, waste handling), coordination with relevant third party (vendor for waste management, local government) and person or persons that are responsible to following up and take action upon grievance related hazardous waste that are submitted through formal grievance. It shall also include a training and induction plan.

11.1.6 Component 6: Implementation Schedule

The management plan should detail an implementation schedule of management activities, taking into account the planned timing of construction and other project activities, including any permit or license and any contract with third parties that should be obtained prior waste management activities commencement. This implementation schedule includes details of waste transport and also the schedule/frequency of waste treatment (if any).

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11.1.7 Component 7: Cost Estimates

The management plan should include cost estimates for implementation of each of activity or set of activities including up-front investment costs and long-term recurrent costs.

11.1.8 Component 8: Monitoring, Recordkeeping and Reporting

The management plan must call for inspection and monitoring of waste handling. The monitoring plan should specify:

- Locations of waste bins at sources, temporary waste storage, and treatment facility (if applicable).
- Parameters to be monitored;
- The frequency of inspection and monitoring;
- Regulatory criteria and any specific requirement imposed on the project by government (as applicable);
- Instruments that will be used for monitoring, including calibration requirements;
- The required qualifications of persons who will conduct the recording, monitoring and inspection, and of any members of the public who may participate in monitoring;
- Records that must be kept and the person responsible for keeping the records;
- Reports that will be prepared, to whom the reports are to be submitted for review, and the length of time records will be kept. This will include summary reports at intervals and to which institutional should be submitted.
- The timing and content of waste picked-up be the transporter.

For Project activities or management activities that requires a permit for their implementation, the monitoring requirements in the permit should be included in the monitoring plan.

The monitoring component is elaborated in **Section 10** of this guideline.

11.1.9 Component 9: Management Plan Review

The management plan should determine and state the schedule of management plan review (see **Section 10.2**). Regular review of the management plan and the party responsible for conducting a review, making an amendment and the party approving the results of the review and the changes made (if any) must be stated in the management plan.

12 Procedures

In carrying out hazardous waste management plan activities, procedures may be developed as necessary, e.g., procedure for collecting waste, for transporting waste, for specific hazardous waste handling, spill prevention and handling, etc. In general, there are several key items that need to be included in the procedures to be developed are, but not limited to:

- Procedure Information, which includes procedure title, identification number, number of pages.
- Purpose. The procedure should provide information on the objective of the procedure.
- Scope. The procedure should inform the boundary of the procedure, aspects or parties that are covered under the procedure, and limitation to the procedure.
- Definition. The procedure should define the terms used in the procedure.
- Responsibilities. The procedure should identify and state the parties that will be responsible to follow the procedure, supervise the implementation of the procedure,

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provide training of the procedure, and parties that will regularly review and update the procedure.

- Work instructions. The procedure should list, in a simple and clear manners, the specific steps that will be taken to implement the procedure.
- Reference documents. The procedure should list the relevant documents that support, utilized as the basis or provide additional information for the procedure, including rules and regulation that need to be complied.
- Records. The procedure should provide information of the required documented outcomes of the procedures. Format for required records will be provided under the procedure, as necessary.
- Approving authority. The procedure should provide information on party that is responsible for approving the procedures.
- Issue date. The procedure should provide information on time of procedure issuance.
- Revision date. The procedure should provide information on time of procedure reviewed and revised (Procedures should be continually updated and improved).
- Other Environmental & Social components, if applicable. The procedure should include other environmental and social component, if applicable, related with the activities in the procedure. Example: PPE required for the activities must be clearly stated in the procedure.

Several procedures that are in accordance with the general principles of hazardous waste management in this guideline are already in place within the PLN[4], which can be adopted for Project implementation or referred for development of necessary procedure, depending on the nature and requirements of the Project. However, it is to be noted that some of these available procedures in PLN may need to be amended due to the changes in relevant rules and regulation.

13 Relevant Documents

The following is list of PLN documents that are available for implementation of hazardous waste management and aligned with this management guideline. To be noted that any changes to this management guideline may potentially trigger the need to revise or amend the following documents. PLN may develop further technical procedures (see **Section 12**) as deemed necessary to complement the implementation of this management guideline.

- PLN PT-HSSE-05 on Hazardous Waste Control Procedure
- PLN PT-HSSE-08 on Procedure for Obtaining Hazardous Waste Storage Permit
- PLN PT-K3L-29 on Procedure for Hazardous, PCB, Asbestos Waste Management for Distribution Activities with International Financing
- PLN PT-K3L-30 on Procedure for PCB Cross-contamination Prevention for Distribution Activities with International Financing
- PLN PT-K3L-31 on Used Material and Hazardous Waste Management Procedure for Transmission and Distribution Activities with International Financing
- PLN PT-K3L-32 on Oil Spill Handling Procedure for Transmission and Distribution Activities with International Financing

[4] Please refer to Section 13

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- PLN PT-HSSE-09 on Procedure for Obtaining Fly Ash-Bottom Ash (FABA) Utilization Permit
- PLN PT-HSSE-10 on Procedure for Obtaining Fly Ash-Bottom Ash (FABA) Dumping Permit

14 References

- Act No. 11 Year 2020 on Omnibus Law
- Government Regulation No. 22 Year 2021 on Implementation of Environmental Protection and Management
- Minister of Environment and Forestry Regulation No. 6 Year 2021 on Procedure and Requirements of Hazardous Waste Management
- Minister of Environment Regulation No. 14/2013 regarding Hazardous Waste Symbols And Labels
- World Bank Environmental and Social Framework (ESF), Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management
- World Bank Environmental and Social Framework (ESF) Guidance Note, Environmental and Social Standard (ESS) 3: Resource Efficiency and Pollution Prevention and Management
- WBG Environmental, Health, and Safety (EHS) Guidelines, 2007
- IFC PS 3: Resource Efficiency and Pollution Prevention, 2012
- IFC Guidance Note 3: Resource Efficiency and Pollution Prevention, 2012

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