DINASTI RESEARCH
Ranah Research
Journal of Multidisciplinary Research and Development
E-ISSN: 2655-0865
082170743613 ranahresearch@gmail.com https://jurnal.ranahresearch.com

DOI: https://doi.org/10.38035/rrj.v7i6

Layout Redesign and Area Determination for B3 Waste Temporary Storage at PT XZY in Jababeka Industrial District, West Java

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Abstract: The expansion of production capacity in the automotive industry has resulted in a proportional increase in the generation of hazardous and toxic waste. PT XYZ produces seven types of B3 waste as a byproduct of its production and operational activities. This study aims to assess current waste management practices in light of relevant government regulations, identify the types and quantities of B3 waste produced, and develop a redesigned layout for the B3 Waste Temporary Storage Facility (TPS) in accordance with the Minister of Environment and Forestry Regulation No. 6 of 2021. The research methodology includes field observations, interviews, and a redesign of the TPS that complies with the stated regulation. The findings indicate that the company has not yet fully adhered to the applicable regulatory requirements. For instance, the facility's limited building area and inadequate spill containment infrastructure. Therefore, improvements in B3 waste storage practices are necessary. The recommended dimensions for the TPS are 8.79 meters in length, 5.86 meters in width, and 3 meters in height. The spillage container size is suggested to be 0.4 meters long, 0.3 meters wide, and 0.55 meters high.

Keyword: B3 waste, TPS B3, hazardous and toxic waste, temporary storage, B3 layout.

INTRODUCTION

Driven by rising vehicle demand, the automotive industry in Indonesia has experienced significant growth, positioning the country as a major hub for automotive manufacturing in Southeast Asia, second only to Thailand, which accounts for approximately 50% of the region's automobile production (Ratman & Syarifudin, 2020). The growing demand for vehicles has driven the automotive industry to expand its production capacity significantly. An effective production process must consider not only efficiency and effectiveness but also its environmental implications (Syahidah, 2024). Furthermore, industrial operations should account for environmental impacts, including safety concerns and the waste produced (Fajriyah & Wardhani, 2020). This is particularly important in the automotive sector, as the waste generated often contains hazardous and toxic substances classified as B3 waste.

Hazardous and Toxic waste possessing certain characteristics can pose serious risks to the environment, human health, and the survival of living organisms if released directly into the environment (Faradila & Nisa, 2025). According to Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management, B3 waste is classified based on six characteristics: explosive, flammable, reactive, infectious, corrosive, and toxic. Wastes exhibiting any of these six characteristics fall under Category 1 B3 waste, while Category 2 B3 waste is limited to those with toxic characteristics only. The following section provides a detailed explanation of each of these B3 waste characteristics.

a) Explosive B3 waste refers to waste materials that exhibit a high potential for explosion. Under standard conditions, namely a temperature of 25°C and a pressure of 760 mmHg, this type of waste may explode spontaneously or undergo chemical and/or physical reactions that generate gases at elevated temperatures and pressures, potentially causing significant damage to the surrounding environment.
b) Ignitable B3 waste includes liquid waste containing less than 24% alcohol by volume and/or having a flash point of no more than 60°C (140°F). Such waste can easily ignite upon contact with open flames, sparks, or other ignition sources under standard atmospheric pressure conditions of 760 mmHg.
c) Reactive B3 waste refers to waste materials that are inherently unstable and capable of undergoing significant changes without detonation. When such waste comes into contact with water, it may potentially trigger explosions or release gases, vapors, or fumes that can be immediately recognized without laboratory analysis. This category includes cyanide and sulfide wastes which, under pH conditions between 2.0 and 12.5, can emit toxic gases, vapors, or fumes.
d) Infectious B3 waste refers to solid medical waste that is contaminated with pathogenic microorganisms not commonly found in the environment. These organisms exist in quantities and possess a level of virulence sufficient to cause disease in individuals who are susceptible or have compromised immune systems.
e) Corrosive B3 waste refers to waste materials with high water content that exhibit extreme pH levels—specifically, a pH of ≤ 2 for acidic waste and ≥ 12.5 for basic waste. Such waste has the potential to cause irritation, which is typically indicated by physical symptoms such as redness (erythema) and swelling (edema).
f) Toxic B3 waste (Toxic – T) is characterized by its potential to cause adverse effects on the behavior of living organisms or even result in death upon exposure. The identification of toxic characteristics in B3 waste is determined through several testing methods, including the Toxicity Characteristic Leaching Procedure (TCLP), the LD50 toxicological test, and sub-chronic toxicity testing.

The storage of hazardous (B3) waste must be tailored to the specific characteristics of each waste type to prevent potential physical and chemical hazards that may arise from improper interactions. This approach also anticipates the possible increase in waste volume, gas formation, or pressure buildup within the storage area. Key considerations in B3 waste storage include classifying waste based on its hazardous properties, ensuring the separation of incompatible waste types, using appropriate packaging, providing adequate ventilation, preventing physical and chemical interactions between wastes, conducting regular inspections and monitoring, and planning for future storage capacity needs (Yudistira & Jawwad, 2024). By addressing these aspects, B3 waste can be managed more safely and efficiently, thereby minimizing risks to both the environment and human health (Adelino, Fitri, & Sundari, 2021). The specific compatibility guidelines for various B3 waste characteristics are presented in Figure 1.

LIMBAH B3	CAIRAN MUDAH TERBAKAR	PADATAN MUDAH TERBAKAR	REAKTIF	MUDAH MELEDAK	BERACUN	CAIRAN KOROSIF	INFEKSIUS	BERBAHAYA TERHADAP LINGKUNGAN
CAIRAN MUDAH TERBAKAR	C	C	C	X	X	C	C	T
PADATAN MUDAH TERBAKAR	C	C	C	C	X	T	C	T
REAKTIF	C	C	C	C	X	T	C	T
MUDAH MELEDAK	X	C	C	C	X	T	C	T
BERACUN	X	X	X	X	C	X	C	T
CAIRAN KOROSIF	C	T	T	T	X	C	C	T
INFEKSIUS	C	C	C	C	C	C	C	C
BERBAHAYA TERHADAP LINGKUNGAN	T	T	T	T	T	T	C	C

Keterangan : C = cocok; X = tidak cocok; T = terbatas.

Figure 1. Compatibility Matrix for B3 Waste Characteristics in the Context of B3 Waste Storage
Source: Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 6 of 2021

The initial step in planning the design of a B3 Waste Temporary Storage Facility (TPS) involves collecting comprehensive data on the quantity, types, and characteristics of the B3 waste generated (Dewantara, Setiani, & Rizal, 2014). This information is essential for designing the TPS and determining the necessary supporting facilities, such as appropriate packaging, containment tubs, and pallets for waste placement. To ensure the safe storage of B3 waste, for both the environment and the workers, the TPS B3 must also be equipped with adequate support facilities (Dinayah & Novembrianto, 2023). Key supplementary components include spillage containment and emergency response equipment to handle potential incidents effectively.

According to the Ministry of Environment and Forestry Regulation No. 6 of 2021 concerning the management requirements for hazardous and toxic (B3) waste, the Temporary Storage Facility (TPS) for B3 waste must meet several criteria. These include having a storage area that is proportional to the volume of B3 waste stored, and a building design and structure that protects the waste from rain and direct exposure. The roof must be constructed from non-combustible materials, and the facility should be equipped with adequate ventilation and air circulation systems. Additionally, the flooring must be waterproof and level, with spill containment channels to manage any leaks or runoff from B3 waste. A designated containment area must also be provided for handling B3 waste spills.

According to Article 51, Paragraph (1) of the Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 6 of 2021, all parties involved in the generation, collection, processing, and accumulation of hazardous and toxic (B3) waste are obligated to conduct proper B3 waste storage. Consequently, temporary storage facilities for B3 waste must comply with the stipulated regulatory requirements. These facilities should be structurally designed to include separate compartments, with each section designated for storing B3 waste of a specific and compatible characteristic. In addition, physical barriers or separation zones must be established between compartments to prevent cross-contamination or accidental mixing of B3 waste in the event of a spill as shown in Figure 2.

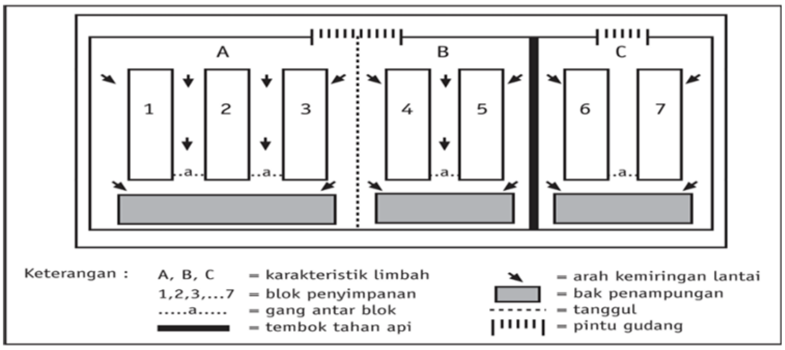

Figure 2. Layout illustration of a B3 Waste Storage Facility designed in the form of a warehouse
Source: Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number 6 of 2021

The automotive companies examined in this study are involved in the manufacturing of components or the assembly of four-wheeled motor vehicles. The company is located at Sertajaya Village, East Cikarang, Bekasi, West Java. The escalation of production activities in automotive companies has led to a significant increase in both the volume and variety of hazardous and toxic waste. This development has placed considerable pressure on the existing temporary storage facilities for B3 waste, which are often inadequate in size and incapable of accommodating the growing quantity of waste. As a result, B3 waste packages are frequently stored in close proximity to one another, violating the spatial separation requirements stipulated in Indonesian regulations ash shown in Figure 3. Furthermore, the arrangement and placement of B3 waste do not adhere to compatibility standards as outlined in the applicable legal framework, thereby posing potential safety and environmental risks.

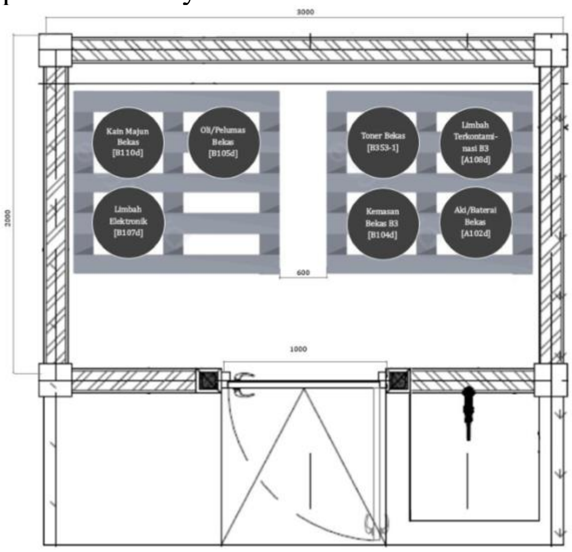

Figure 3. Existing Condition of B3 Layout at PT XYZ Temporary Storage
Source: PT XYZ Environmental Document

METHOD

This study was conducted at PT XZY, an automotive industry facility located within the Jababeka Industrial Area, East Cikarang District, Bekasi Regency, West Java. The data collection process was carried out over a period spanning from May to July 2025.

The data collected for this study comprised both primary and secondary sources. Primary data were obtained through direct observations and interviews with personnel from the Health, Safety, and Environment (HSE) division. These focused on the company's B3 waste management practices, the quantity of B3 waste generated, and field assessments of the current waste handling conditions. Secondary data were gathered from internal company documents, including the Environmental Management Efforts and Environmental Monitoring Efforts (UKL UPL) and the official permit for the Temporary Storage Facility for Hazardous and Toxic Waste. Following data collection, the information was analyzed to assess the existing conditions of the TPS B3 facility, the procedures for B3 waste storage, and the spatial design of the TPS area in accordance with applicable regulations. The design phase involved several stages, including the identification of B3 waste types that could affect packaging and pallet dimensions within the TPS. This process also included the layout design of the B3 waste storage facility and the integration of supporting components, using QCAD software for technical drafting and visualization.

The research framework in this study consist of several key stages which are problem identification, data collection, data analysis, and conclusion formulation. This framework are illustrated in the form of a flowchart to provide a clear and systematic overview of the research process.

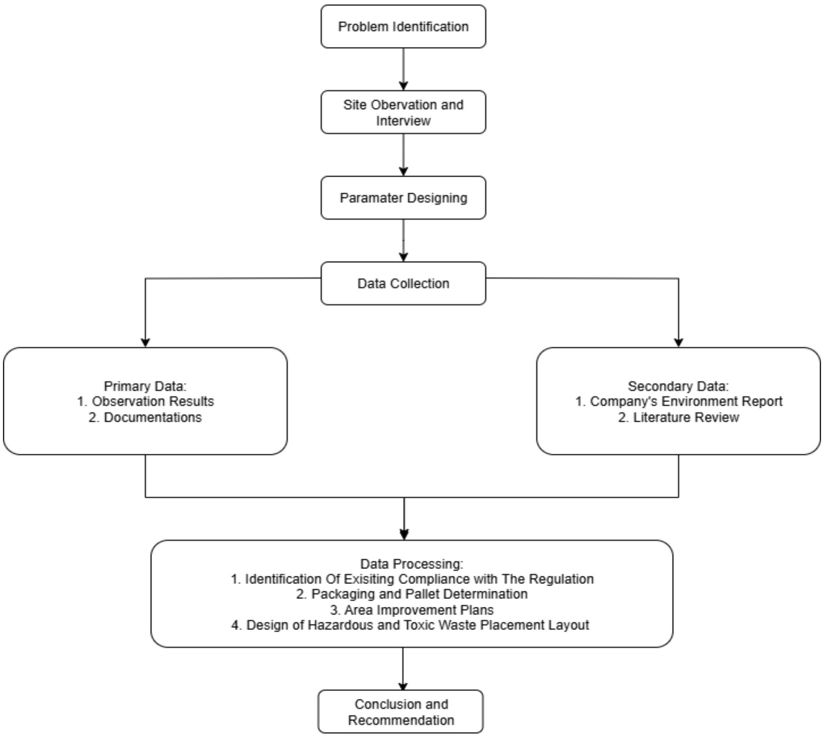

Figure 4. Conceptual Framework

RESULTS AND DISCUSSION

Existing Condition Compliance

PT XYZ operations generate various types of hazardous and toxic waste originating from activities such as machining, stamping, welding, painting, assembly, material handling, maintenance, quality control, and office activities. The company currently has a designated building for the temporary storage of B3 waste; however, it has not yet obtained an official permit for the storage facility. The current TPS B3 facility measures 3 meters by 2 meters with a height of 2 meters, covering a total area of 6 m^2 and is located at the rear section of the facility, adjacent to the caravan parking area. The presence of this B3 TPS serves as proof that PT XYZ has implemented proper storage and handling of the hazardous waste it produces. The waste is temporarily stored before being transported by PT SVT and subsequently treated by PT LN. This practice aligns with Article 51, Paragraph 1 of the Ministry of Environment and Forestry Regulation No. 6 of 2021, which states that every producer, collector, transporter, and processor of B3 waste is required to conduct B3 waste storage.

Figure 5. PT XYZ's Existing Hazardous and Toxic Waste Temporary Storage

Source: Research data

Based on field observations, the storage practices employed by the company do not comply with prevailing regulations governing B3 waste management. Furthermore, PT XYZ does not possess a temporary storage permit for B3 waste, which is a regulatory requirement. The B3 waste management activities conducted by PT XYZ have so far been limited to collection, packaging, storage, transportation, and utilization, all of which are carried out by third-party service providers. However, due to the limited number and inadequate size of temporary storage facilities, these measures are insufficient to address the current waste management challenges. Additionally, the restricted space of the existing storage area results in improper waste placement, with waste containers being positioned too closely together which does not comply with the provisions of Article 71, Paragraph 1 of the Regulation of the Minister of Environment and Forestry No. 6 of 2021, which requires a minimum spacing of 60 cm between storage blocks. Therefore, it is necessary to implement additional improvements, including the expansion of the temporary storage facility (TPS) and the reconfiguration of the waste placement layout, to ensure safer and more compliant B3 waste management.

Figure 6. Hazardous and Toxic Waste Placement
Source: Research data

In addition, the supporting infrastructure, specifically the spillage containment for liquid B3 was, is inadequate. The reservoir tub, with dimensions of 0.2 meters in length, width, and height, has a total volume of only 0.008 m^3 equivalent to 8 liters, which falls short of the regulatory requirement as presented in Figure 7.

Figure 7. Spillage Containment
Source: Research data

According to the Regulation of the Minister of Environment and Forestry No. 6 of 2021 Article 62 Paragraph 3, the minimum spillage containment capacity must be at least 110% of the volume of the largest container used for storing liquid B3 waste, a standard that the current facility does not meet. The existing condition compliance is shown in Table 1.

Table 1. PT XYZ Existing Temporary Storage Condition Check Sheet

No.	Criteria Based on The Regulation of the MOEF No. 6 of 2021	Check Sheet
1	Article 51 Paragraph 1	✓
2	Article 52	✓
3	Article 59 Paragraph 1	✓
4	Article 60 Paragraph 1	✓
5	Article 60 Paragraph 2 Letter b	x
6	Article 61	x
7	Article 62 Paragraph 2	x
8	Article 67	✓
9	Article 68 Paragraph 2	✓
10	Article 71 Paragraph 1	x

Based on Table 1, it is evident that 4 out of 10 TPS B3 criteria do not comply with the standards outlined in the Minister of Environment and Forestry Regulation No. 6 of 2021. These non-compliant aspects include: a storage area that does not match the volume of B3 waste stored, the presence of flammable B3 waste without appropriate safeguards, the absence of a partition wall separating the facility from adjacent buildings, and a containment container that holds less than 110% of the liquid waste packaging volume. On the other hand, 6 criteria have met regulatory requirements, including a TPS B3 building that is resistant to rain and sunlight, waterproof flooring, proper B3 waste packaging, designated loading and unloading areas, adequate lighting, and the use of pallets.

Hazardous and Toxic Waste Characterization

The identification of B3 waste is a crucial step in determining the types and characteristics of hazardous and toxic waste generated (Wiryawan & Pharmawati, 2024). This process enables the formulation of appropriate handling strategies, particularly in designing an effective layout for B3 waste storage. Presented below are the identified types and characteristics of B3 waste produced by PT XYZ.

Table 2. Category, Characteristic, and Generation of Hazardous and Toxic Waste

No	Waste	Code	Category	Characteristic	Generation per month
1	Electronic waste	B107d	2	Environmentally hazardous	17 kg
2	B3-contaminated waste	A108d	1	Toxic	0.8 kg
3	Used toner	B353-1	2	Toxic	0.83 kg
4	Used rags	B110d	2	Environmentally hazardous, flammable solid	3 kg
5	Used packaging	B104d	2	Environmentally hazardous, toxic	0.15 kg
6	Used oil	B105d	2	Environmentally hazardous	2 liters
7	Used battery	A102d	1	Corrosive, toxic	0.2 kg

According to Table 2, PT XYZ generates seven types of B3 (hazardous and toxic) waste, comprising both solid and liquid forms. Among these, electronic waste and used rags are the most frequently produced. The total amount of B3 solid waste generated monthly is 21.98 kg, with the highest contribution coming from electronic waste at 17 kg per month, and the lowest from used B3 packaging at 0.15 kg per month. Meanwhile, the monthly generation of liquid B3 waste amounts to 2 liters, originating from used oil or lubricants. All seven types of waste produced by PT XYZ have distinct characteristics. Electronic waste falls under the environmentally hazardous category. B3-contaminated waste and used rags have both toxic and flammable properties. B3 used packaging is classified as environmentally hazardous and toxic. Used oil is considered environmentally hazardous, while used batteries exhibit both corrosive and toxic characteristics.

Figure 8. Hazardous and Toxic Waste Packaging
Source: Research data

The packaging used consists of 60-liter pails and 200-liter drums. All containers comply with the standards set out in Article 68 of the Minister of Environment and Forestry Regulation No. 6 of 2021, as they are leak-proof, rust-free, and undamaged. Additionally, the packaging is equipped with secure lids to ensure the B3 waste remains safely contained. To prevent direct contact with the TPS B3 floor, the containers are placed on pallets at the base layer.

Area Improvement Plans

The planning and design of a Temporary Storage Facility (TPS) for Hazardous and Toxic (B3) Waste must adhere to the provisions outlined in Ministry of Environment and Forestry Regulation No. 6 of 2021 concerning Procedures for the Management of Hazardous and Toxic Waste. A critical component of this process involves the accurate calculation of the facility's dimensions, including length, width, and height, to ensure the adequacy of the storage area. This includes considerations for waste accumulation capacity, forklift maneuverability, and container placement.

The packaging and pallet requirements are planned for B3 waste generated from a series of production processes. The designated packaging for B3 waste includes 60-liter pails and 200-liter drums. These containers will be placed on a base consisting of 7 pallets, each with dimensions of 1.2 meters in length, 1.2 meters in width, and 0.15 meters in height. Each pallet is capable of accommodating a different number of containers, depending on their size and volume. The packaging selection plan and storage capacity for B3 waste are presented in the Table 3.

Table 3. Number of Packaging and Pallet

No	Packaging Type	Packaging Capacity	Waste	Pallet Capacity
1	Drum	200 liters	Electronic waste	1
2	Drum	200 liters	B3 contaminated waste	1
3	Pail	60 liters	Used toner	1
4	Pail	60 liters	Used rags	1
5	Pail	60 liters	Used packaging	1
6	Pail	60 liters	Used oil	1
7	Pail	60 liters	Used battery	1

According to (Muarif, Pangesti, & Ariesmayana, 2024), the number of packaging units and pallet requirements for each type of waste can be calculated using the following formula:

Number of packaging = Waste generation/Packaging capacity

a. Electronic Waste
   Number of packaging = Waste generation/Packaging capacity
   = 17 kg/200 liter
   = 0.085 rounded to 1
b. B3 Contaminated Waste
   Number of packaging = Waste generation/Packaging capacity
   = 0.8 kg/200 liter
   = 0.004 rounded to 1
c. Used Toner
   Number of packaging = Waste generation/Packaging capacity
   = 0.83 kg/60 liter
   = 0.013 rounded to 1
d. Used Rags
   Number of packaging = Waste generation/Packaging capacity
   = 3 kg/60 liter
   = 0.05 rounded to 1
e. Used Packaging
   Number of packaging = Waste generation/Packaging capacity
   = 0.15 kg/60 liter
   = 0.0025 rounded to 1
f. Used Oil
   Number of packaging = Waste generation/Packaging capacity
   = 2 liter/60 liter
   = 0.033 rounded to 1
g. Used Battery
   Number of packaging = Waste generation/Packaging capacity
   = 0.2 kg/60 liter
   = 0.003 rounded to 1

Since the 200-liter drum has a bottom diameter of 60 cm and 60-liter pail has a diameter of 39 cm, means each packaging use to keep the waste needs only pallet each.

In the addition, (Bachtiar & Cahyonugroho, 2025) stated that the area needed for a hazardous and toxic waste temporary storage can be calculated using the following formula:

Area = Number of pallet x Pallet area

a. Electronic Waste
   Area = Number of pallet x Pallet area
   = 1 x 1.2 m x 1.2 m
   = 2.4 m^2
b. B3 Contaminated Waste
   Area = Number of pallet x Pallet area
   = 1 x 1.2 m x 1.2 m
   = 2.4 m^2
c. Used Toner
   Area = Number of pallet x Pallet area
   = 1 x 1.2 m x 1.2 m
   = 2.4 m^2
d. Used Rags
   Area = Number of pallet x Pallet area
   = 1 x 1.2 m x 1.2 m
   = 2.4 m^2
e. Used Packaging

Area = Number of pallet x Pallet area
= 1 x 1.2 m x 1.2 m
= 2.4 m^2

f. Used Oil
Area = Number of pallet x Pallet area
= 1 x 1.2 m x 1.2 m
= 2.4 m^2

g. Used Battery
Area = Number of pallet x Pallet area
= 1 x 1.2 m x 1.2 m
= 2.4 m^2

Based on the formula, the summary of the total packaging and pallet requirements for B3 waste as well as area improvement plan is presented in Table 4.

Table 4. Number of Pallet, Packaging, and Area

No	Waste	Number of Packaging Needed	Pallet Required	Area (m^2)
1	Electronic waste	1	1	2.4
2	B3 contaminated waste	1	1	2.4
3	Used toner	1	1	2.4
4	Used rags	1	1	2.4
5	Used packaging	1	1	2.4
6	Used oil	1	1	2.4
7	Used battery	1	1	2.4

Based on Article 61 Paragraph 3 of the Minister of Environment and Forestry Regulation Number 6 of 2021, a Temporary Storage Facility for B3 liquid waste must be equipped with drainage channels and spill containment reservoirs designed to capture any B3 waste leakage or spillage. Additionally, the containment structure must have a minimum capacity of 110% of the total volume of the tanks and/or containers stored within it. The capacity of the containment basin can be calculated using the following formula:

Spillage Containment = Hazardous and Toxic Liquid Waste Packaging Capacity x 100%

Based on the results of the containment capacity calculation, the minimum required volume for the container tub in the automotive company is 66 liters, obtained from 60 liters x 110%, in accordance with regulatory requirements. The planned container tub has dimensions of 0.4 meters in length, 0.3 meters in width, and 0.55 meters in depth, resulting in a total volume of 0.066 m^3 which equivalent to 66 liters. In addition, the floor within the TPS (Temporary Storage Facility) area is designed with a 1% slope slanting towards the drainage channel that leads to the containment tub. This design ensures that in the event of a liquid waste spill or leakage, the waste will naturally flow toward the drainage channel, thereby minimizing environmental and safety risks.

Hazardous and Toxic Waste Layout Determination

The planning and design of a Temporary Storage Facility (TPS) for Hazardous and Toxic (B3) Waste must adhere to the provisions outlined in Ministry of Environment and Forestry Regulation No. 6 of 2021 concerning Procedures for the Management of Hazardous and Toxic Waste. A critical component of this process involves the accurate calculation of the facility’s dimensions, including length, width, and height, to ensure the adequacy of the storage area.

The design of the B3 Waste Temporary Storage Facility (TPS) in the machining area is planned with dimensions of 8.79 meters in length, 5.86 meters in width, and 3 meters in height. The storage layout will be divided into two sections: the left side allocated for solid B3 waste, and the right side allocated for liquid B3 waste. The types of B3 waste intended for storage in the new TPS exhibit hazardous characteristics, including being toxic, flammable, corrosive, and harmful to the environment. In accordance with Article 71, Paragraph (1) of the Ministry of Environment and Forestry Regulation No. 6 of 2021, hazardous waste must be stored with a minimum spacing of 60 cm between blocks.

The determination of storage blocks will be based on the specific characteristics of each type of B3 waste. As indicated in Table 2, waste materials with light-emitting properties are not compatible with those exhibiting toxic or corrosive characteristics. Due to volume constraints and compatibility concerns, separate storage containers will be utilized. A physical barrier, 15 cm in thickness, will be constructed to separate B3 wastes with toxic and flammable properties. Two distinct storage blocks are planned, labeled as Block A and Block B. Block A will be designated for B3 waste with corrosive and easily ignitable characteristics, while Block B will be allocated for storing B3 waste with toxic characteristics. The layout of the new layout adjustment is shown in Figure 8.

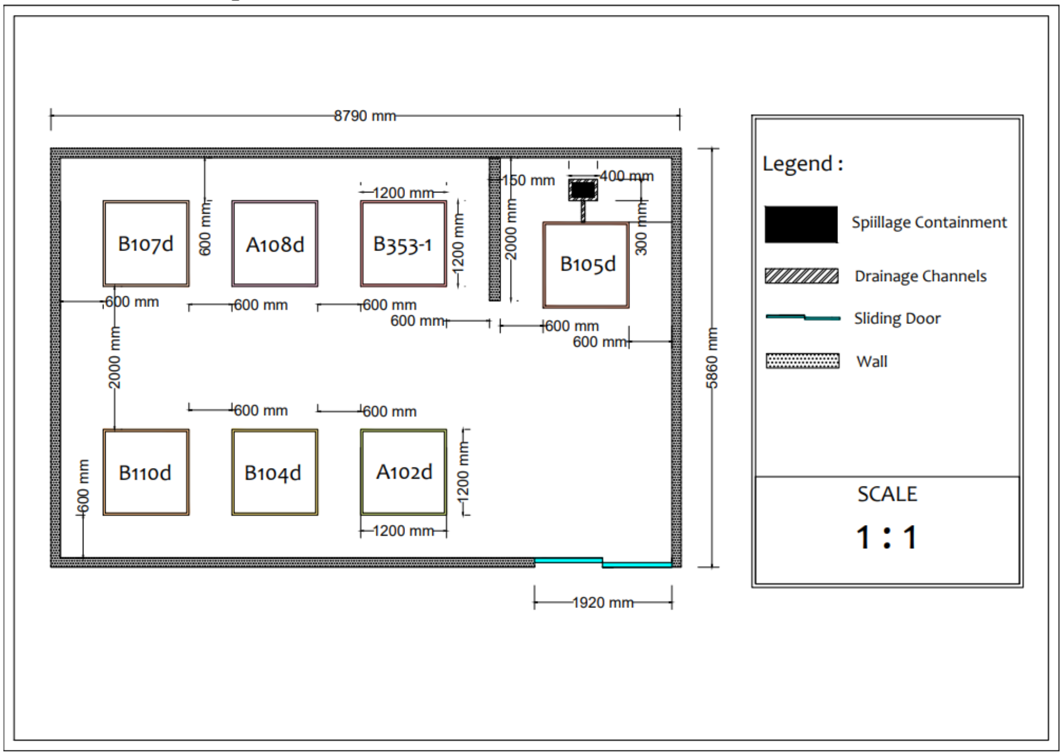

Figure 9. Recommended B3 Layout Placement
Source: Research Data

CONCLUSION

The evaluation of the B3 Waste Temporary Storage Facility (TPS) at PT XYZ revealed several issues, including the limited area of the facility, the unorganized layout of B3 waste that does not consider the classification based on waste characteristics and types, and the spillage containment that does not meet the standard of the Minister of Environment and Forestry Regulation No. 6 of 2021. As a result, this study proposes a redesign plan that includes the reorganization of the storage layout, the addition of supporting facilities, and a revised building design tailored to the volume of waste generated on a monthly basis.

The redesign of the B3 Waste Temporary Storage Facility was carried out in accordance with the provisions outlined in Regulation No. 6 of 2021 issued by the Ministry of Environment and Forestry. The proposed redesign features a building with dimensions of 8.79 meters in length, 5.86 meters in width, and 3 meters in height, covering a total area of 51.509 m². This redesign aims to enhance the overall management of B3 waste by providing sufficient space to prevent overcrowding of waste containers and to ensure adequate room for operational activities within the TPS B3 area.

The results of this study are expected to support PT XYZ in optimizing the storage of B3 waste generated from its production processes by improving the design and management of the B3 Waste Temporary Storage Facility (TPS). Such improvements can serve as a preventive strategy to mitigate environmental impacts arising from errors in the storage process. In turn, this may help the company avoid more significant and costly losses in the future.

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