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Evaluation of Storage, Packaging and Transportation in The Management of Hazardous and Toxic Waste (B3) at PT X Batam City in 2024

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Abstract
This study aims to evaluate the non-conformity of hazardous waste packaging aspects and infrastructure facilities with the Minister of Environment and Forestry Regulation Number 6 of 2021 concerning Procedures and Requirements for Hazardous and Toxic Waste Management. This research uses a qualitative descriptive method with data collected through interviews, observation, and documentation. Data analysis was carried out using triangulation techniques and this research involved 8 informants who were responsible for the management of B3 waste. The results showed that the management of B3 waste at PT X has not fully met the applicable regulations. Several problems were found, such as rusty packaging conditions, leaking waste packaging, and unstable packaging lids, which led to the scattering of B3 waste. In addition, there are inappropriate infrastructure facilities, such as the presence of a rest area in the B3 waste storage building, which should not be permitted. The conclusion of this study is that Human Resources (HR) involved in hazardous waste management need to increase awareness regarding the handling of hazardous waste in accordance with PERMEN-LHK regulation No. 6 of 2021. Improving the quality of human resources is very important because it determines the success of performance in achieving the company's vision and mission.

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Introduction

The industrial world is growing rapidly, both globally and in Indonesia. This significant development is accompanied by advances in knowledge, technology, and increasing demand for products in the market, both locally and internationally. This rapid market growth in the world of industrialization has the potential to generate hazardous and toxic waste (B3) from industrial production. Therefore, the management of B3 waste must be carried out in accordance with applicable laws and regulations (Hidayah, 2023); (Fajriyah & Wardhani, 2020); (Berliana, Murti, & Utomo, 2023)

In 2021, Indonesia generated 68.5 million tons of hazardous waste, and this number increased to 81.87 million tons in 2022. The waste comes from the mining, energy, oil and gas, manufacturing, agro-industry, and medical waste sectors (DITJEN PSLB3 KLHK, 2022); (Nursabrina, Joko, & Septiani, 2021); (HUTASOIT, 2024)

In Batam City, waste generation was recorded at 466,004 tons in 2022 and increased to 521,645 tons in 2023 (PT X Kota Batam, 2023). Every year, at least 100 companies in Batam dispose of toxic and hazardous waste without treatment, with the total volume of waste generated estimated at 2,000 tons per year. According to data from Bapedal Kota Batam, there are 776 industrial companies in Batam, 375 of which have the potential to generate hazardous and toxic waste (B3) (Lisdiyono & Rumbadi, 2018)

PT X is a service company that manages B3 waste, including transportation, collection, utilization, and treatment of B3 waste in Batam City. This B3 waste is generated by various companies from various sectors, such as government agencies, distributors, waste processors, energy industry, hospitals, textile industry, shipbuilding industry, electronics, automotive, plastics, food and beverages, and pulp and paper industry (PT X Kota Batam, 2023).

Hazardous waste management in industry is very important because if it is not managed properly and in accordance with laws and regulations, it can cause damage to the surrounding environment. If allowed to continue, this will have a negative impact on the survival of living things (PP No.22, 2021); (Kaunang, 2023); (Safitri, 2022);

This research was raised from the results of an internship activity report at PT X in 2023. Based on the results of observations in September 2023, researchers found that the management of hazardous and toxic waste in the transportation, packaging and collection processes at PT X showed discrepancies with the Minister of Environment and Forestry Regulation Number 6 of 2021 concerning Procedures and Requirements for Hazardous and Toxic Waste Management. For example, in the transportation process, waste was found scattered because the packaging used was not suitable for the characteristics of the waste, and in the collection process, it was seen that the packaging was damaged. This will have a significant impact on the hazardous and toxic waste management process.

Based on the above background, the author is interested in conducting research with the title "Evaluation of Storage, Packaging, and Transportation in Hazardous and Toxic Waste Management (B3) at PT X Batam City in 2024".

Method

This research uses a qualitative descriptive method with a system approach based on inputs, processes and outputs. Data were collected through interviews, observations, and documentation, and analyzed using triangulation techniques to ensure data validity. This research was conducted at PT X, a company engaged in hazardous waste management services and located in Batam City, Riau Islands. The research took place from July 2024 to August 2024. The research population consisted of 8 informants who

were divided into two groups. The main informants came from PT X Batam City and included HRD Staff (1 person), Plant Manager (1 person), HSE Staff (1 person), Sorting section (1 person), and Receiving section (1 person). Supporting informants came from the Customer or Service User of PT X Kota Batam, which included Environmental Officer (1 person), Environmental Specialist (1 person) and HSE Staff (1 person).

Result and Discussion

1. Result

Input

Human Resources: Based on the results of in-depth interviews conducted by researchers to informants, field officers in this company are expected to have a minimum education of senior high school, while safety staff and office staff have a minimum education of D3 or S1. Although there are no specific criteria for waste management operators, they have received training from experienced leaders. Leaders in the field of hazardous waste management have fulfilled the requirements of the Certificate of Competence in Waste Management (B3). Medical check-ups for field staff are conducted every six months, while those for office staff are conducted annually. A review of medical documents shows that one of the field staff has a record of hearing loss due to noise exposure.

Infrastructure Facilities: Based on the results of interviews and observations conducted by researchers, information was obtained that the B3 waste storage building has been designed in accordance with the Minister of Environment and Forestry Regulation No. 6 of 2021 Article 60 paragraph (2), which guarantees safety and health of humans and the environment. Facilities such as First Aid for Accidents (P3K), Fire Extinguishers (APAR), and Emergency Showers are available and adequate. Waste packaging such as drums, jumbo bags, and tanks are available and checked regularly. Machine maintenance is carried out regularly with monthly and weekly checks, while forklifts are checked monthly and buildings annually. Personal Protective Equipment (PPE) such as masks, gloves, safety shoes, and wearpacks are mandatory.

Standard Operating Procedure: Based on the results of interviews and observations conducted by researchers, information was obtained that all departments are required to follow existing SOPs with clear written guidelines. However, there are obstacles related to government policies that do not pay attention to special needs outside Java Island. For example, the 90-day shelf life of hazardous waste is not in accordance with the conditions in Batam City, which faces the FTZ system and customs. Socialization to waste-producing industries to treat waste according to regulations is also a challenge because there are still people who dispose of waste carelessly. In emergency conditions, first aid is carried out using a spill kit, and an emergency triangle light sign is installed to anticipate other vehicles. Waste loading procedures use forklifts with officers wearing complete PPE according to the SOP.

Process

Storage Aspects: Based on the results of interviews and observations conducted by researchers, information was obtained that the company has a waste storage permit valid until 2025. The maximum storage period for hazardous waste is 90 days, while medical waste must be stored 1x24 hours to 2x24 hours. Storage facilities, including buildings, packaging, plastic wrapping, and forklifts, have met good standards. Storage

is done according to the characteristics of the waste, with a minimum distance of 60 cm between blocks and storage boundaries not exceeding two levels.

Packaging Aspects: Based on the results of interviews and observations conducted by researchers, information was obtained that hazardous waste packaging must be equipped with clear symbols and labels to identify the type and characteristics of waste. Packaging is done with drums or jumbo bags for solid waste, jerry cans for liquid waste, and IBC tanks for large volumes of liquid waste. Although packaging is done according to procedures, there are problems such as damaged, rusted, leaking packaging, and packaging caps that are not strong. Labels should be durable, clearly legible, contrasting, and non-overlapping. Inspection of packaging condition is supposed to be done daily, but observation shows that inspection is not done routinely, with some packaging in poor condition and waste scattered outside.

Transportation Aspects: Based on the results of in-depth interviews conducted by researchers to informants, information was obtained that PT X has a waste transportation permit from KLHK which is valid until 2029. Transportation is carried out with technical completeness such as loading and unloading procedures, emergency response equipment, emergency handling procedures, and the use of GPS. Truck vehicles are equipped with the company name, telephone number, and B3 waste symbol. PT X cooperates with a number of companies, as evidenced by contract documents and field observations. Each truck is equipped with a vehicle inspection checklist sheet containing inspection items. Transportation supervision is carried out by facility staff.

Customer/User: Based on the results of in-depth interviews conducted by researchers to informants, information was obtained that the criteria for choosing third-party partners include environmental permits, hazardous waste management, SLO, and transportation recommendation permits. During the cooperation, communication with partners went well, supported by regular visits and satisfactory cooperation results. No significant obstacles were found, and PT X succeeded in meeting customer needs and managing waste well. The partner's performance evaluation showed positive results with a commitment to improvement and the environment.

Output

Based on the results of the research analysis, Human Resources (HR), Standard Operating Procedures (SOPs), and the process of storing and transporting hazardous waste at PT X are in accordance with applicable regulations. However, infrastructure and packaging facilities have not fully met the requirements set out in PERMEN-LHK No. 6 of 2021. Some of the problems in waste packaging found include unclear waste identity, rusty, leaking packaging, and packaging caps that are not strong. Identity labels must meet the requirements of durability, legibility, color contrast, and non-overlapping. Observations also showed that workers' rest areas are located inside the hazardous waste storage building, whereas they should be separate to reduce the risk of hazard exposure and improve worker comfort and safety.

2. Discussion

Input

Human Resources: According to the researcher's assumptions, human resources (HR) show that the workforce at PT X has met the requirements of PERMEN-LHK No. 6 of 2021 concerning Hazardous Waste Management, as evidenced by the ownership of a Competency Certificate and the implementation of regular Medical Check-Ups. However, researchers recommend paying more attention to workers' health, especially regarding hearing loss due to noise exposure. It is recommended to control the noise source so that it does not exceed the threshold value of 85 dBA for exposure for 8 hours per day to prevent potential Occupational Diseases (PAK).

Infrastructure Facilities: According to the researcher's assumption, the facilities and infrastructure of PT X in Batam City show that the company has fulfilled the requirements of PERMEN-LHK No. 6 of 2021 concerning Hazardous Waste Management. In general, the available facilities are adequate. However, there are shortcomings in terms of room arrangement and facilities. The researcher suggests improvements, especially in the rest area for field employees, which should be separated from the hazardous waste storage building to reduce the risk of hazards and improve worker comfort and safety.

Operational Standards: According to the researcher's assumption, the Standard Operating Procedure (SOP) shows that PT X Batam City has established a clear SOP for each technical implementation of hazardous waste management, which facilitates the evaluation of the work process. The company has optimally fulfilled the written regulatory policy, in accordance with the regulation of PERMEN-LHK No 6 of 2021. These written guidelines serve as guidelines to ensure good performance in hazardous waste management.

Process

Storage Aspects: According to the researcher's assumption, the storage of B3 waste shows that PT X Batam City has fulfilled the requirements of PERMEN-LHK No. 6 of 2021 concerning the Procedures and Requirements for Hazardous Waste Management in the aspect of storage. However, the company needs to continue to comply with applicable legislation to ensure health and safety in the storage of hazardous waste is maintained properly.

Packaging Aspects: According to the researcher's assumption, packaging shows that a training and education program is needed for hazardous waste management officers to improve their understanding of proper packaging procedures according to regulations. Hazardous waste packaging is essential to prevent leakage into the environment and reduce potential hazards to humans and the environment. Packaging must be in good condition, free from damage, rust, and leakage. Packaging that is damaged or cannot be reused must be treated as hazardous waste. In addition, the packaging material must not react with the stored hazardous waste. Proper packaging will prevent environmental pollution and reduce the risk of harm to humans.

Transportation Aspects: According to the researcher's assumption, transportation shows that B3 waste transportation activities at PT X Batam have met the requirements of PERMEN-LHK No. 6 of 2021 concerning Procedures and Requirements for B3 Waste Management. Triangulation through interviews, observations and document reviews show compliance with applicable regulations. The company should continue to operate

in accordance with the recommendations of the hazardous waste transportation license to ensure safety and security during the transportation process.

Output

According to the researcher's assumption, the hazardous waste management at PT X Kota Batam found that the workers' rest area related to hazardous waste management is inside the hazardous waste storage building. To reduce the risk of exposure, it is recommended that the rest area be placed outside the hazardous waste management building so that workers can avoid contamination. A good facility arrangement will improve worker comfort and safety. The aspect of hazardous waste packaging also shows that the packaging process is still not in accordance with applicable regulations. Some of the problems found include unclear waste identity labels, rusty packaging, leaking, and packaging caps that are not strong, all of which can endanger workers and the surrounding environment. Waste identity labels must be durable, clearly visible, contrasting in color, not overlapping with other symbols, and affixed to packaging, transport vehicles, and storage warehouses. Hazardous waste packaging must follow PERMEN-LHK No. 6 of 2021 concerning Procedures and Requirements for Hazardous Waste Management. Several other aspects of hazardous waste management, such as Standard Operating Procedures (SOPs) and storage and transportation processes, have met the requirements in accordance with the regulation. The management of B3 waste must always be guided by the applicable legislation to ensure the continuity of the process efficiently.

Conclusions

There are no specific criteria for education, but waste management officers have undergone training by experienced leaders and are certified in B3 waste management from BNSP. In addition, periodic employee *Medical Check-Ups* are conducted with a certificate of work eligibility. Hazardous waste storage is designed according to applicable regulations, ensuring the safety and health of people and the environment. Infrastructure facilities include emergency response equipment, Personal Protective Equipment (PPE) and adequate waste container packaging. There is also structured routine maintenance for transportation facilities, such as trucks and forklifts. The Company has established Standard Operating Procedures (SOP) for each technical implementation of hazardous waste management operations, in accordance with PERMEN-LHK No. 6 of 2021 concerning Procedures and Requirements for Hazardous Waste Management.

PT X Batam City has a B3 waste storage license valid for five years, issued in 2020 and valid until 2025. The procedure for placing the distance between packages and the time limit for storing B3 waste has fulfilled the provisions of PERMEN-LHK No. 6 of 2021. Hazardous waste packaging aims to prevent the release of waste into the environment and reduce potential hazards. Each package has been equipped with symbols and labels according to the type of waste, but there are still some problems such as rusty packaging, leaks, and packaging caps that are not strong, which can cause scattered waste. The company's hazardous waste transportation activities are in accordance with the permit and general and special specification requirements. Inspection of hazardous waste transportation trucks is carried out according to the available check format. PT X Batam City has not fully complied with the provisions stipulated in the Regulation of the Minister of Environment and Forestry Number 6 of 2021 concerning Procedures and Requirements for Hazardous and Toxic Waste Management (B3).

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