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Article

Evaluation of Compliance of Domestic Waste Management to Environmental Quality Standard At the Implementation Unit of PT PLN (Persero) East Java and Bali Transmission

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Abstract

Domestic waste management in accordance with environmental quality standards is an important part of maintaining environmental quality and supporting the sustainability of company operations. This study aims to describe the level of compliance of domestic waste management at the Transmission Unit of PT PLN (Persero) East Java and Bali to applicable environmental quality standards, especially those regulated in Government Regulations and Regulations of the Minister of Environment. This study aims to evaluate the extent to which PLN's domestic waste management practices comply with the established environmental quality standards. This study uses a descriptive method with a qualitative approach, involving field observation and review of RKL-RPL documents of the Implementing Unit of PT. PLN East Java and Bali Transmission Main Unit. Data collection includes direct observation of the domestic waste processing process, and analysis of environmental monitoring reports. Parameters such as Biochemical Oxygen Demand (BOD), Chemical Oxygen Demand (COD), pH, Total Suspended Solids (TSS), Lead (Pb) and oil and fat are analyzed to assess compliance with applicable environmental regulations. The results of the study indicate that most domestic waste management activities have complied with the established standards, although there are still some weaknesses in the aspects of recording, monitoring wastewater quality, and the availability of supporting facilities. These findings provide a basis for recommendations for improving internal supervision and improving the company's environmental management system.

Keywords: Management Domestic Waste, Electricity Transmission, Environmental Permit Documents, Quality Standard Regulations, PLN, Environmental Quality Standard

1. Introduction

The industrial sector is crucial for growth, particularly when it comes to boosting labor absorption and promoting local economic development [1]. The amount of waste produced will increase along with industrial progress and operations [2]. If liquid waste is not properly managed, it can harm both people and the environment. Processing liquid waste to specific quality requirements is a requirement for all waste producers. Processing it involves using water from the processed items in addition to processing waste. Reusing household wastewater as irrigation

raw water is possible [3]. Instead of using clean water for gardening, household wastewater can be utilized [4].

Waste is leftover or waste from an activity that, if improperly treated before being disposed of, could constitute a risk to human health and the environment. Waste can be classified into solid, liquid, gas, and sound categories according to its form. In Indonesia, liquid waste continues to be a source of environmental degradation [5]. Domestic and industrial liquid waste are the two categories into which liquid waste is separated according to its source. Because it is combined with human waste and kitchen garbage, domestic liquid waste is waste that has lost all of its usefulness for other purposes. It accounts for 50–70% of the average amount of clean water used per person, which is between 120 and 140 liters per person. Numerous pollutant indices, including BOD, COD, TSS, pH, ammonia, and fatty oils, are typically present in domestic liquid waste [6].

Managing household garbage is a crucial aspect of environmental preservation initiatives. Domestic garbage produced by home and company operations frequently contains materials that, if improperly managed, can contaminate the environment. Therefore, it is crucial to manage household garbage in compliance with relevant laws and standards in order to avoid detrimental effects on ecosystems and public health [7]. Business entities are required by Permen LHK No. 22, 2021, to regulate the management and protection of water quality, and by Permen LHK No. 32, 2009, to regulate environmental quality limits that all entities, including state companies like PT. PLN, must adhere to. Despite regulations, there are frequent issues with their practical application. These include the lack of suitable waste management facilities and the degree of awareness and comprehension of legislation [8].

As a corporation working in the energy industry, especially in the power transmission sector, PT. PLN (Persero) plays a very important role in home waste management. PT. PLN East Java and Bali Transmission Main Unit (UIT JBTB), one of the operational units of PT. PLN in this area is not only needed to manage trash created from its operations efficiently, but also must ensure that the management of waste generated from its operations is compliant [9]. In its operational activities, the East Java and Bali Transmission Unit of PT PLN (Persero) produces domestic waste from office activities and supporting facilities. The management of this domestic waste must meet the environmental quality standard provisions as stipulated in applicable laws and regulations, such as Government Regulation No. 22 of 2021 concerning the Implementation of Environmental Protection and Management. Failure to meet these standards can have an impact on environmental pollution, legal risks, and the company's image.

Given the importance of this, this study was conducted to provide a real picture of the level of compliance of the unit in managing domestic waste. Through a descriptive approach, this study is expected to be the basis for evaluation and strategic decision-making in efforts to improve environmental management performance in the future. As a result, conducting an analysis of PT compliance is crucial. In terms of household trash management, PLN UIT JBTB adheres to environmental quality standard norms. This study's objective is to assess PT's degree of compliance. PLN UIT JBTB in relation to these rules and the variables affecting the degree of adherence. The analysis's findings could help paint a clearer picture of how PT's household waste management regulations are being implemented. PLN UIT JBTB.

2. Material and Method

Identification of the sources of waste produced, it can be seen that the material used in this study is domestic waste resulting from activities at PT. PLN UIT JBTB. Domestic waste produced consists of several types such as organic waste (food scraps), inorganic waste (plastic, paper, metal), and domestic liquid waste (washing water, toilet water, and so on). The domestic waste analyzed will be identified by its characteristics including type, physical and chemical properties, and the volume of waste produced. After knowing the Source and Characteristics of waste, the last thing that needs to be analyzed is the Impact generated by the waste. The impact includes the influence of waste on the surrounding environment, both in terms of health, ecosystem, and the aesthetics of the company's environment.

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The method used by the researcher is the literature study method as the main approach, by analyzing various relevant reference sources, including internal company documents such as Environmental Management Plan (RKL) and Environmental Monitoring Plan (RPL) reports, as well as archives related to domestic waste management. In addition to secondary data from the literature, the researcher also collected primary data through direct observation in the field, interviews, and information collection from the Implementation Unit of PT. PLN East Java and Bali Transmission Main Unit. This primary data functions as a complement that strengthens the analysis, provides a real picture of the conditions at the location, and becomes the basis for compiling waste management recommendations.

The research began with a review of the RKL and RPL documents to obtain initial information about waste sources, their characteristics, and the management methods that have been implemented. Then, a qualitative analysis was carried out on the data obtained, including identification of types of domestic waste, assessment of their impact on the environment, and evaluation of the effectiveness of the management that has been implemented. In the final stage, the research produced recommendations based on the results of the analysis aimed at providing domestic waste management solutions that are in accordance with the needs and conditions of PT. PLN East Java and Bali Transmission Main Unit. This approach, which combines literature reviews and field data, produces in-depth analysis, supports compliance with environmental regulations, and increases the effectiveness of domestic waste management in the company. From these steps, an explanation of the characteristics and impacts of domestic waste produced will be produced as well as the form of its management to become the basis for company compliance regarding domestic waste management.

3. Results and Discussion

3.1 Sources of Domestic Waste PT PLN UIT JBM

Domestic waste produced by PT PLN Java Bali Madura Transmission Main Unit (UIT JBTB) mostly comes from daily operations and monitoring of operations on the project site, office areas, and facilities at GI/GIS. Usually included in this category are solid trash from domestic waste, including food scraps, plastic packaging, paper, and bottles as well as other non-organic waste that cannot break down, such plastic and metal. Conversely, domestic liquid waste results from waste water from household activities like bathing as well as from waste water from office operations including sinks or other sites used for hand washing or toileting [10].

Domestic liquid waste comes in two varieties: gray and black water. Gray water is liquid waste from human activities not ending in the toilet. Gray water results from light objects contaminating bathrooms containing less weight than toilet waste [11]. Meanwhile, black water is liquid waste that comes from toilets which contain high levels of contaminants [12]. The refuse generated from the cleaning of eating and drinking utensils, such as plates, glasses, spoons, and cooking tools, is commonly known as kitchen garbage (pantry). Pantry wastewater typically contains organic components such as food scraps, oils, and beverage particles, along with soap, beverages, and oil. Food fats, butter, and cooking oil can combine with wastewater to create an oil coating that is difficult for the environment to decompose [13].

3.2 Regulations Regarding Domestic Waste

PP No. 22, 2021 requires every sector producing liquid waste—including household waste and manufacturing—to treat the waste before releasing it into water bodies. The Republic of Indonesia's Minister of Environment and Forestry Regulation P.68/Menlhk-Setjen/2016 on residential wastewater quality standards then provides direction for the quality criteria applied in household wastewater testing. Maintaining water quality and environmental health depends on ensuring that domestic wastewater from running activities is disposed of in line with current laws. The following constitute the quality criteria for domestic liquid waste:

Table 1. Domestic Wastewater Quality Standards

Parameter	Unit	Max
pH	-	6-9

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Parameter	Unit	Max
BOD	mg/L	30
COD	mg/L	100
TSS	mg/L	30
Oils and Fats	mg/L	5
Ammonia	mg/L	10
Total Coliform	Quantity/100 ml	3000
Debit	L/Person/Day	100

Source: Minister of Environment and Forestry Regulation Number P.68/MenLHK-Setjen/2016

The Decree of the Minister of Environment and Forestry of the Republic of Indonesia Number SK.1041/MenLHK/SETJEN/ PLA.4/9/2023 concerning the Environmental Feasibility of Electric Power Transmission Operational Activities in East Java and Bali Provinces by PT. PLN (PERSERO) East Java and Bali Transmission Main Unit (UIT JBTB) guides the compliance analysis for domestic solid waste management. Indicators of environmental management success reflect PPRI recommendations No. 81/2012 concerning household trash and household-like waste.

Table 2. Environmental Management Plan Regarding Domestic Waste

Indicators of Successful	Forms of Environmental Management	Management Period
Waste processing follows PPRI guidelines no. 81/2012 concerning household waste and similar household waste There are no disease vectors that arise due to the accumulation of waste	Develop and implement a 3R program for domestic waste management activities. Provide separate organic and inorganic waste bins throughout the project site in quantities that can accommodate the estimated volume of waste generation. Collecting waste and sorting it at the TPS available at the project site Hand over the waste to the local environmental service/cleaning service and/or third parties who can manage the waste further. Carrying out field observations and regular data collection to ensure the implementation of the 3R program is reflected in the environmental aesthetics in the project site area.	Continuously during the operation phase

3.3 PT PLN UIT JBM Domestic Liquid Waste Quality Test Results

Regular monitoring of effluent from domestic IPAL by PT. PLN UIT JBTB guarantees that domestic liquid waste/effluent expelled into water bodies satisfies environmental quality criteria established in laws. In the second semester of 2024, a third party performs laboratory testing of IPAL effluent water quality under this monitoring.

Third party domestic wastewater quality testing is done by this company. Home waste outlets conduct testing of home wastewater. The test approach applied follows SNI SM APHA 23rd Ed, 2540 D, 2017 criteria (physical and chemical parameters) and SNI 6989:2019 (biological criteria). One uses SNI SM APHA 23rd Ed, 2540 D, 2017 (physical and chemical parameters) and SNI 6989:2019 (biological parameters). Testing residential wastewater is guided by Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number: P.68/Menlhk-Setjen/2016 concerning residential Wastewater Quality

Standards. Quality standard parameters include pH 6-9, BOD 30 mg/L, COD 100 mg/L, TSS 30 mg/L, oil and fat 5 mg/L, ammonia 10 mg/L, and total coliform 3000/100 mL. The results of laboratory testing by a third party are as follows:

Table 3. Domestic Liquid Waste Laboratory Test Results for September

Parameter	Results	Max	Method Specifications
pH	8.68	6-9	SNI 6989.11:2019
BOD (mg/L)	5.90	30	SNI 6989.72:2009
COD (mg/L)	15.5	100	SNI 6989.2:2019
TSS (mg/L)	6.26	30	SM APHA 23rd Ed, 2540 D, 2017
Oils and Fats (mg/L)	0.15	5	SNI 6989.10:2011
Ammonia (mg/L)	0.27	10	SNI 06-6989.30-2005
Total Coliform (mg/L)	2800	3000	SM APHA 24th Ed., 9221 B & C, 2023
Temp(C)	30.1	-	SNI 06-6989.23-2005
pH	8.68	6-9	SNI 6989.11:2019

The test results for each domestic liquid waste test parameter are displayed based on Table 3: pH (test result: 8.68), BOD (5.90), COD (15.5), TSS (6.26), Oil and Fat (0.15), Ammonia (0.27), Total Coliform (2800), and temperature (30.1 degrees Celsius). This explains why the total value of all the residential liquid waste test parameters in September 2024 is less than the designated maximum level.

Table 4. Domestic Liquid Waste Laboratory Test Results for November

Parameter	Results	Max	Method Specifications
pH	7.38	6-9	SNI 6989.11:2019
BOD (mg/L)	4.90	30	SNI 6989.72:2009
COD (mg/L)	11.5	100	SNI 6989.2:2019
TSS (mg/L)	3.73	30	SM APHA 23rd Ed, 2540 D, 2017
Oils and Fats (mg/L)	1.22	5	SNI 6989.10:2011
Ammonia (mg/L)	0.0419	10	SNI 06-6989.30-2005
Total Coliform (mg/L)	1700	3000	SM APHA 24th Ed., 9221 B & C, 2023
Temp(C)	29.3	-	SNI 06-6989.23-2005
pH	7.38	6-9	SNI 6989.11:2019

Based on Table 4, the test results for each domestic liquid waste test parameter are shown, namely pH with a test result of 7.38, BOD with a test result of 4.90, COD with a test result of 11.5, TSS with a value of 3.73, Oil and Fat with a value of 1.22, Ammonia with a value of 0.0419, Total coliform with a value of 1700, and temperature of 29.3 degrees Celsius. Based on table 4, it also explains that every domestic liquid waste test parameter in November 2024 has a value below the maximum level according to the SNI SM APHA 23rd Ed, 2540 D, 2017 (physical and chemical parameters) and SNI 6989:2019 (biological parameters). SNI SM APHA 23rd Ed, 2540 D, 2017 (physical and chemical parameters) and SNI 6989:2019 (biological parameters) are used.

In addition, in accordance with the decision of the Minister of Environment and Forestry of the Republic of Indonesia Number SK.1041/MENLHK/SETJEN/PLA.4/9/2023,

PT. PLN (PERSERO) East Java and Bali Transmission Main Unit (UIT JBTB), monitors the environmental management plan included in the environmental feasibility document for electric power transmission operational activities in East Java and Bali Provinces. The results show that:

Table 5. Environmental Management Plan Monitoring Results Regarding Domestic Waste Generation

Indicators of Successful	Forms of Environmental Management	Suitability
Waste processing follows PPRI guidelines no. 81/2012 concerning household waste and similar household waste There are no disease vectors that arise due to the accumulation of waste	Develop and implement a 3R program for domestic waste management activities	Fulfil
	Provide separate organic and inorganic waste bins throughout the project site in quantities that can accommodate the estimated volume of waste generation	Fulfil
	Collecting waste and sorting it at the TPS available at the project site	Fulfil
	Hand over the waste to the local environmental service/cleaning service and/or third parties who can manage the waste further	Fulfil
	Carrying out field observations and regular data collection to ensure the implementation of the 3R program is reflected in the environmental aesthetics in the project site area	Fulfil

Based on Table 5, it is explained that PT. PLN East Java and Bali Transmission Main Units have carried out environmental management such as preparing and implementing the 3R program, providing separate trash bins, collecting and sorting waste, handing over waste to the sanitation service and have also carried out field observations to ensure the implementation of the 3R program, this is in accordance with PPRI guidelines No. 81/2012 concerning household waste and household-like waste and in accordance with the decision of the Minister of Environment and Forestry of the Republic of Indonesia Number SK.1041/MENLHK/SETJEN/PLA.4/9/2023.

3.4 Analysis of Domestic Waste Compliance with Environmental Permit Documents

The results of the analysis show that domestic waste management at PT. PLN (Persero) East Java and Bali Transmission Main Unit (UIT JBTB) has met the provisions stated in the environmental permit document. This can be seen from various technical and administrative indicators that are the objects of evaluation. Based on the results of laboratory testing by a certified third party, domestic wastewater produced by PT. PLN UIT JBTB meets all pollutant parameters according to the quality standards stipulated in laws and regulations. This indicates that the Wastewater Treatment Plant (IPAL) used is functioning optimally, both in technical aspects (processing process) and operational aspects (maintenance and control). The effectiveness of IPAL is largely determined by the consistency of

maintenance and the integration of standard operating procedures (SOP)[14]. In the context of PLN UIT JBTB, this success demonstrates not only formal compliance, but also the internalization of sustainability principles in daily operations.

Wastewater that has been treated and discharged into water bodies (rivers) with quality parameters that meet quality standards, according to the report, does not cause negative impacts on the environment, either on aquatic ecosystems or public health around the operational area. Domestic wastewater that meets standards tends to have low toxicity levels and does not significantly affect the structure of aquatic biotic communities[15]. In other words, compliance with environmental permits is not only administrative, but has also shown positive ecological impacts.

Meanwhile, based on the conformity of the results of environmental management monitoring regarding domestic waste generation at PT. PLN UIT JBTB, it can be seen that PT. PLN UIT JBTB has fulfilled all forms of environmental management obligations in operating and maintaining operational activities at the project site of the office area and GI/GIS facilities of PT. PLN UIT JBTB. This indicates that PT. PLN UIT JBTB has carried out monitoring, maintenance, and compliance with applicable environmental permit documents.

Based on environmental monitoring documents, PT. PLN UIT JBTB actively conducts periodic monitoring of solid and liquid waste, recording waste generation and handling methods, reporting to environmental agencies routinely. This indicates that PLN UIT JBTB has carried out environmental management obligations as mandated in the environmental permit document. Companies with good environmental reporting systems tend to have higher levels of regulatory compliance and are a reflection of responsible environmental governance[16]. PT. PLN UIT JBTB's compliance with regulations both in the processing of domestic liquid waste to quality standards and the generation of domestic solid waste indicates that PT. PLN (PERSERO) East Java and Bali Main Transmission Unit has good social and environmental responsibility.

4. Conclusion

Based on the research findings on compliance in domestic waste management at PT. PLN (Persero) East Java and Bali Transmission Main Unit, it can be concluded that the implementing unit has shown quite good compliance with the applicable environmental quality standards, both in liquid and solid waste management. This compliance is reflected in the results of waste quality monitoring which shows that parameters such as BOD, COD, pH, TSS, and oil and fat content are still below the maximum limits set by regulations. Waste management is carried out according to procedures, including the stages of sorting, processing through IPAL, and routine monitoring. However, there is still room for improvement, especially in terms of increasing the capacity of processing facilities and strengthening employee awareness of the importance of waste management.

The success of this management is supported by the existence of a structured RKL-RPL document and the company's strong commitment to maintaining compliance with environmental regulations. On the other hand, the challenges faced include limited facilities in several units and the lack of comprehensive socialization and training for all employees. This study also underlines that good domestic waste management practices can provide significant benefits, not only in maintaining environmental quality, but also in strengthening the company's image and minimizing potential legal problems.

As a follow-up step, it is recommended that PT. PLN UIT JBTB consistently conducts periodic evaluations, updates waste processing facilities, and expands education and training programs to all human resources. This is important to ensure sustainable compliance with environmental regulations and support an environmentally friendly development agenda. Overall, this study shows that PT. PLN UIT JBTB has implemented adequate domestic waste management according to the provisions, although ongoing efforts are still needed to improve the quality of environmental management.

References

[1] L. Indrayani, "Batik Industry Liquid Waste

Processing as One of the Pilot Batik Ipals in Yogyakarta," ECOTROPHIC: Journal of Environmental Science, vol. 12, no. 2, p. 173, 2018.

[2] D. P. Yuniarti, R. Komala, and S. Aziz, "The Effect of the Aeration Process on the Aerobic Processing of Palm Oil Mill Liquid Waste at Ptpn VII," vol. 4, pp. 7–16, 2019.

[3] I. G. A. Sastrawijaya, I. Supraba, and J. S. M. Ahmad, "According to the Central Bureau of Statistics for the Special Region of Yogyakarta Province (2020), Centralized Domestic Wastewater Treatment Plants at the Scale of Settlements are changing the aesthetics of the environment," Waters that contain T) Scale, vol. 14, pp. 78–92, 2022.

[4] S. N. S. Rosadi, D. Mutiari, T. Yuliarahma, and A. A. Madania, "Utilization of Used Dish Washing Water as a Substitute for Clean Water for Watering Plants at Edupark Gemolong," in RAPI National Symposium, vol. 1, pp. 263–267, 2021.

[5] R. Listyaningrum, "Analysis of the content of DO, BOD, COD, TS, TDS, TSS and analysis of the physicochemical characteristics of liquid waste from the tofu industry in MSMEs in the West Imogiri region of Yogyakarta," Industrial Technology, Jun. 2022.

[6] R. V. Soyan, E. S. Sofiyah, N. L. Zahra, and Pertamina University Environmental Engineering Study Program, "Design of domestic wastewater treatment installations in the PT X mining industry," Journal of Environmental Engineering, vol. 1, no. 1, pp. 13–23, 2022.

[7] E. Sunarsih, "Household Waste Processing Concept in Efforts to Overcome Environmental Pollution," Journal of Public Health Sciences, vol. 5, Nov., pp. 162–167, 2014.

[8] M. R. A. Haidar, A. N. P. Wasistha, and R. K. Rajib, "Implementation of Environmental Law on Industrial Waste Management in Indonesia," Student Research Scientific Journal, vol. 2, no. 3, pp. 60–64, 2024.

[9] Y. Prasetyaningsih, D. R. Sari, and R. Sayyidati, "New Web-Based Electrical Installation Information System (Case Study: PT. PLN (Persero) ULP Pelaihari)," Journal of EL Science, vol. 5, no. 1, pp. 11–16, 2023. [Online]. Available: https://doi.org/10.30996/elsains.v5i1.8693

[10] Metcalf & Eddy, Wastewater Engineering: Treatment and Resource Recovery, 5th ed. New York: McGraw-Hill Education, 2014.

[11] A. A. Tandjung, R. Prijadi, and H. H. Karongkong, "Trans Sulawesi Rest Area Between Provinces Biomimicry Architecture," Doctoral dissertation, Sam Ratulangi University, 2015.

[12] M. Marhama, "Effectiveness of Floating Septic Tanks in Reducing COD, TSS, Temperature and pH Levels of Black Water Waste on Kodingareng Island, Makassar City," Doctoral dissertation, Hasanuddin University, 2020.

[13] S. Ganefati, "The Effect of Blimbing Wuluh (Averrhoa Blimbi) Juice on Reducing Fat Content and Germ Numbers in the Processing of Kitchen Liquid Waste," Yogyakarta Ministry of Health Polytechnic, 2011.

[14] H. Setiawan and D. Nurhalim, "Effectiveness of domestic wastewater treatment plant management in meeting environmental quality standards: Case study on urban public facilities,"Journal of Environmental Engineering, vol. 27, no. 1, pp. 55–66, 2021.

[15] L. Amalia and B. Suprapto, "Environmental reporting compliance and implementation of environmental permit documents in the energy sector,"Indonesian Journal of Environmental Policy, vol. 13, no. 1, pp. 23–32, 2019.

[16] R. Fadillah, S. Nurhasanah, and D. Prasetyo, "The effect of domestic waste processing on the quality of river ecosystems in urban areas,"Journal of Environmental Science, vol. 18, no. 2, pp. 115–124, 2020.