The Recycle of Hotel X Lembang Domestic Liquid Waste : A Form of Fulfilling Environmental Legal Obligations

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Abstract

In hotel activities, liquid waste is generated from bathrooms, toilets, laundry, and kitchen activities. From the hotel's activities, wastewater is classified as domestic liquid waste. Efforts to treat waste that are comprehensive and sustainable are continuously needed as part of the fulfillment of environmental legal obligations that have been regulated in PP NO.2 the YEAR 2021 concerning environmental management. The purpose of this research is to know how to protect water management, air management, and land management. Moreover, knowing the quality of the results of the domestic liquid waste recycling process at Hotel X Lembang using the Indonesian Government Regulation approach and the LHK Ministerial Regulation. This study used an empirical juridical approach through primary and secondary data and analyzed descriptively and qualitatively. Data collection techniques were carried out through laboratory test results of recycled water samples and literature studies. The wastewater quality test aims to determine the condition of the recycled water using ozone based on the established quality standards, namely by referring to PP RI No. 22/2021 Appendix VI class 4 according to its designation, and PerMen LHK RI No. P.68/2016 Appendix I Regarding Separate Domestic Wastewater Quality Standards. The parameter test results are by the quality standard according to the Regulation of the Minister of Environment and Forestry No. 68 of 2016, where H 6.96; TSS of 10 mg/l; ammonia 3.02 mg/l; oil/fat <0.94 mg/l; BOD5 19.8 mg/l; COD 63.8588 mg/l; total coliforms, 920 MPN/100 ml. Based on the results of research and discussion, it was concluded that the system for recycling domestic liquid waste at Hotel X Lembang using ozone met the appropriate quality standard ministerial Regulation of LHK RI No.P.68/2016 Attachment I and PP RI Number: 22/2021 Attachment VI, class 4 according to its designation. It is a manifestation of the fulfillment of environmental legal obligations.

I. Introduction

The role of the environment is crucial in tackling the damage to the environment that is happening at this time. It is not enough with the rule of law, and environmental law enforcers cannot be separated in protecting and

managing the environment—activities within the hotel as one of the supporting tourism activities that produce liquid waste. Hotel activities produce liquid waste sourced from a bathroom or the toilet used food items such as fish, meat, etc., and washing kitchen utensils. Liquid waste from hotel activities is classified as domestic liquid waste. Like liquid waste from various sources, domestic liquid waste also requires processing before being released into the environment. If not done processing correctly, it can cause pollution to aquatic ecosystems, groundwater, and soil

The occurrence of pollution in the water or air sources due to waste from domestic and industrial activities results in the scarcity of clean water[1]. Many do not realize that the primary source of pollution in receiving water bodies, such as rivers, comes from domestic liquid waste. Based on data from DLH DKI Province, in 2018, DKI Jakarta's water pollution was dominated by domestic waste, which was72.7%, 17.3% office, and commercial waste, and 9.9%. Industrial waste. The monitoring of the water quality of 20 rivers in Jakarta in 2014 showed that 32% of rivers were heavily polluted. In 2015, it became 43%, and in 2016-2017 it became 60-61%.[2] This data shows how not to underestimate the issue of domestic liquid waste and its impacts on the environment, such as on aquatic ecosystems, groundwater, and soil.

1.1 Domestic Liquid Waste Characteristics

Domestic liquid waste is wastewater from human activities in the household, sourced from the kitchen, bathroom, sink, toilet, and laundry. Physically, it is grey, has a distinctive odor, and contains solids ranging from 0.1% (consisting of solids).suspended solids (TSS) of about 30% and dissolved solids (TDS) of about 70%. Chemically, domestic wastewater contains approximately 70% organic compounds, 30% inorganic compounds, and several types of gases. Organic compounds generally present in domestic wastewater are carbohydrates as much as 25%, protein as much as 65%, and fat as much as 10% (this composition can vary according to the type of food and individual diet). Organic compounds consist of heavy metals, nitrogen, phosphorus, pH, sulfur, chloride, alkalinity, toxic compounds, etc. Biologically, it contains various microorganisms such as bacteria, fungi, protozoa, and algae. Pathogenic

[1] T. Tazkiaturrizki, P. Soewondo, and M. Handajani, 'Nitrogen Removal on Recycling Water Process of Wastewater Treatment Plant Effluent Using Subsurface Horizontal Wetland with Continuous Feed', in *IOP Conference Series: Earth and Environmental Science*, 2018, CVI <https://doi.org/10.1088/1755-1315/106/1/012078>; Satyendra Tripathi and Touseef Hussain, 'Water and Wastewater Treatment through Ozone-Based Technologies', in *Development in Wastewater Treatment Research and Processes: Removal of Emerging Contaminants from Wastewater through Bio-Nanotechnology*, 2021 <https://doi.org/10.1016/B978-0-323-85583-9.00015-6>.

[2] Ginanjar Pratama, Itok Dwi Kurniawan, and Aidil Fadli Ilhamdy, 'Pengendalian Pencemaran Limbah Domestik Sebagai Upaya Rehabilitasi Pesisir Di Desa Malangrapat, Kabupaten Bintan', *PRIMA: Journal of Community Empowering and Services*, 4.1 (2020) <https://doi.org/10.20961/prima.v4i1.41228>.

microorganisms in domestic wastewater generally come from humans infected with certain diseases or carriers of certain diseases, such as fecal coliforms[3].

Domestic liquid waste has characteristics: it contains pathogenic microorganisms such as bacteria, parasites, and viruses, organic and non-organic materials, and suspended solids[4]. The characteristics of the content in a domestic liquid waste can cause pollution if it is not treated correctly and safely. Pollution of river water/groundwater is the mixing of living things, substances, energy and/or other materials into the environment of river water or groundwater caused by human activities. As a result, there is a decrease in the quality of river water or groundwater, so that water can no longer function properly.

Pollution of the soil due to the entry of chemicals in concentrations that exceed the building limits harms the soil ecosystem. According toMirawanty Amin [5], the source of soil pollution is pollutants from mining, domestic, agricultural, and other activities. Pollutants are physical, chemical, or biological substances that enter the environment and can harm humans and other living things directly or not[6].

In order to prevent the occurrence of environmental pollution, concrete steps are needed in the management of liquid waste. Recycling domestic liquid waste is a legal responsibility to preserve environmental functions, which is binding. With regard toUU PP LH Number 32/2009, article (20) paragraph 4, related to environmental quality standards by the development of science and technology; Article 56 related to environmental pollution control; and ministerial Regulation of LHK-RI No. : 5/2021, liquid waste needs to be recycled, and its utilization is adjusted to Appendix VI. PPRINumber: 22/2021 concerning implementing Environmental Protection and Management, based on water class. The threshold standard used as a reference for domestic liquid waste is Candy. LHK-RINo. : 68 year2016.

1.2 Recycle Domestic Liquid Waste

In recent decades, the issue of environmental pollution has been widely voiced by environmental activists (society) and the international community. Given the importance of the attention of all parties to the sustainability of the environment, it is necessary to make continuous efforts to overcome

[3] Sindy Rukmana Pratiwi and F Roosslan Edy Santosa, 'Household Waste Management For The Achievement Of SDGs In Bulak Surabaya', *The Spirit Of Society Journal*, 2.2 (2019) <https://doi.org/10.29138/scj.v2i2.901>; I. Wayan Koko Suryawan and others, 'Nh3-n and Cod Reduction in Endek (Balinese Textile) Wastewater by Activated Sludge under Different Do Condition with Ozone Pretreatment', *Walailak Journal of Science and Technology*, 18.6 (2021) <https://doi.org/10.48048/wjst.2021.9127>.
[4] Pratama, Kurniawan, and Ilhamdy.
[5] Mirawanty Amin, 'Polusi Tanah Dan Dampaknya Terhadap Kesehatan Manusia', *Jurnal Sumberdaya Lahan*, 15.1 (2021) <https://doi.org/10.21082/jsdl.v15n1.2021.36-45>.
[6] Amin.

environmental pollution. Continuous efforts must be carried out through a technological approach to protect water resources and the environment. Yaser & Safie[7] stated that several wastewater treatment techniques are often used through physical, chemical, and biological processes or a combination of several processes. According to Irianto, wastewater treatment can be carried out in two stages: processing it to meet quality standards and recycling it using specific treatments[8].

Generally, the liquid waste treatment process goes through 5 steps; (1) pre-processing (physical and mechanical); (2) primary stage processing (physicochemical and chemical); (3) secondary processing (chemical and biological); (4) tertiary stage treatment (physical and chemical); and (5) sludge treatment[9].

Various treatment techniques have been developed and used to treat domestic wastewater. Generally, they can be grouped into physical, chemical, biological, and combined treatment systems. Recycle Hotel "X" Lembang domestic liquid waste uses technology ozone. The choice of ozone technology because it is simpler when compared to conventional chemical treatment processes. The equipment used in the recycling process uses less ozone technology when compared to chemical methods. The use of ozone technology in the process of recycling domestic liquid waste can be sustainable because it does not require additional chemicals. Ozone is reliable in reducing various types of contaminants in domestic wastewater. Some of the advantages of ozone, among others[10]: effectively suppress the growth of pathogenic microorganisms such as viruses and bacteria more effective than chlorine; fast reaction and more easily decomposed in liquid waste; product handling is not complex and can be produced in situ; give effect to the increase in Dissolved Oxygen; can reduce levels of BOD and COD and other contaminants; more cost-effective compared to routine chemical use.

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[7] Abu Zahrim Yaser and Nurliyana Nasuha Safie, 'Sewage Treatment in Campus for Recycling Purpose: A Review', in *Green Engineering for Campus Sustainability*, 2019 <https://doi.org/10.1007/978-981-13-7260-5_15>.

[8] Fajar Arinal Khaq and Agus Slamet, 'Perencanaan Sistem Pengolahan Air Limbah Domestik Di Kecamatan Sidoarjo, Kabupaten Sidoarjo', *Jurnal Teknik ITS*, 6.2 (2017) <https://doi.org/10.12962/j23373539.v6i2.24661>; Ahmed Joko Susilo and Tyas Satrio Nugroho, 'Sistem Pengolahan Limbah Cair Industri Batik Di Yogyakarta (Literature Review)', *Jurnal Lingkungan*, 2020.

[9] Grégorio Crini and Eric Lichtfouse, 'Advantages and Disadvantages of Techniques Used for Wastewater Treatment', *Environmental Chemistry Letters*, 2019 <https://doi.org/10.1007/s10311-018-0785-9>.

[10] Kassim Olasunkanmi Badmus and others, 'Treatment of Persistent Organic Pollutants in Wastewater Using Hydrodynamic Cavitation in Synergy with Advanced Oxidation Process', *Environmental Science and Pollution Research*, 2018 <https://doi.org/10.1007/s11356-017-1171-z>; Precious Nneka Egbuikwem, Jose Carlos Mierzwa, and Devendra Prakash Saroj, 'Evaluation of Aerobic Biological Process with Post-Ozonation for Treatment of Mixed Industrial and Domestic Wastewater for Potential Reuse in Agriculture', *Bioresource Technology*, 318 (2020) <https://doi.org/10.1016/j.biortech.2020.124200>.

Treatment of wastewater using ozone effectively reduces dissolved organic pollutants, requires less energy, is low-cost, and is environmentally friendly[11]. Ozone is a strong oxidant used in wastewater treatment with the Advanced Oxidation Process (AOP) technique[12]. Through the non-photochemical AOP technique, the processing time is less than the traditional process. The product contains lower pollutants and is easier to pass to bioremediation[13].

1.3 Environmental Law Regulations and Recycle Obligations According to Laws and Regulations

Environmental law is related to the environment, which has been regulated in PP NO.2 the YEAR 2021 concerning environmental management. The role of environmental law is significant in fixing various environmental damage currently happening. In general, environmental problems are divided into environmental pollution and Destruction. According to Law No. 32 of 2009 concerning Environmental Protection and Management, the aspects often related or often faced today in environmental law include pollution, population, waste disposal, ocean acidification phenomena, and others, which are very dangerous for living things, especially humans.

Law No. 32 of 2009 has types of instruments in environmental law enforcement, namely administrative law instruments, civil law instruments, and criminal law instruments. In general, actions that are prohibited by the threat of criminal sanctions for those who violate the UUPPLH environmental pollution and destruction environment, namely: - Environmental pollution

Environmental pollution is the entry or input of substances, energy, and other components into the environment by human activities to exceed the environmental quality standards that have been set. (Article 1 point 14 UUPPLH).

Criminal acts and sanctions in criminal law, specifically in the environmental field in Law No. 32 of 2009, include Material offenses for environmental crimes. Article 98 paragraph (1) UUPPLH 2009: Any person intentionally commits an act that results in exceeding the ambient air quality standard, water quality standard, sea quality standard, or criteria that damage the environment shall be punished with imprisonment for a minimum of 3 years and a maximum of 10 years. Imprisonment, a minimum fine of Rp.3,000,000,000.00 (Three billion rupiahs) and a maximum of Rp.10,000,000,000.00 (Ten billion rupiahs).

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[11] Pavlos K. Pandis and others, 'Key Points of Advanced Oxidation Processes (AOPs) for Wastewater, Organic Pollutants and Pharmaceutical Waste Treatment: A Mini Review', *ChemEngineering*, 2022 <https://doi.org/10.3390/chemengineering6010008>.

[12] Eva Domingues and others, 'Advanced Oxidation Processes Perspective Regarding Swine Wastewater Treatment', *Science of the Total Environment*, 2021 <https://doi.org/10.1016/j.scitotenv.2021.145958>.

[13] Tripathi and Hussain; Rina Indah Dianawati, Nur Endah Wahyuningsih, and Muhammad Nur, 'Efektivitas Ozon Dalam Menurunkan Kadar TSS Dan Nilai PH Limbah Cair Rumah Sakit Dr. Adhyatma, MPH Semarang', *Jurnal Kesehatan Masyarakat (e-Journal)*, 5.5 (2017).

According to GrégorioCrini, and Eric Lichtfouse, when water is polluted, and treatment is needed, it is necessary to approach the best treatment/purification technology used for decontamination by applicable legislation[14].

Several laws and regulations state the obligation to treat liquid waste generated from each activity and produce waste. All these laws and regulations are intended to provide binding legal certainty for all parties in managing and carrying out environmental protection efforts. As mentioned in UUPPLH No. : 32 of 2009, every citizen must actively carry out all efforts to preserve the environment. Article 1, paragraph (2) reads: "Environmental protection and management is a systematic and integrated effort carried out to preserve environmental functions and prevent environmental pollution and/or damage, which includes planning, utilization, control, maintenance, supervision, and law enforcement. "Government Regulation of the Republic of Indonesia Number: 22/2021, Article 2 point (b) regulates the Protection and Management of Water Quality and in paragraph (2) Prevention of Water Pollution" Article 128 (2) Prevention of Water Pollution is carried out through the best management method and at point (3) Prevention of Water Pollution as carried out through: a. Provision of facilities and infrastructure; b. Implementation of reduction, reuse, recycling, recovery of benefits, and/or backfilling of Wastewater". "In article 129 paragraph (4), the results of wastewater treatment from water pollution control facilities and infrastructure must meet the Wastewater Quality Standards and the allocation of water pollutant loads. Article 131 article 2 (d). Other wastewater disposals and/or utilization are by Article 129 paragraph (4). with the development of science and technology (3) Determination of Wastewater Quality Standards for activities is carried out based on: a. availability of wastewater treatment technology; and b. economic considerations".Minister of Environment and Forestry Regulation No. 68/2016, Appendix I.

PP No. 22 of 2021 concerning "Environmental Protection and Management, Appendix VI" stated the maximum threshold value for river water and the like for class 4, which can be used as a reference to classify recycled water whether it can be reused or not and for what purpose.

Table 1. Water Class According to PP No. 22/2021

WATER CLASS	EXPLANATION
Class 1	Intended as a raw source of drinking water, and other purposes with the exact quality requirements for such use
Grade 2	Intended for water recreation accommodation, fish cultivation, animal husbandry, crop irrigation, and other needs with the

[14] Crini and Lichtfouse; Philipp Kehrein and others, 'A Critical Review of Resource Recovery from Municipal Wastewater Treatment Plants-Market Supply Potentials, Technologies and Bottlenecks', *Environmental Science: Water Research and Technology*, 2020 <https://doi.org/10.1039/c9ew00905a>.

WATER CLASS	EXPLANATION
	exact quality requirements as the said use.
Grade 3	Intended for fish, livestock, crop irrigation, and other needs with the exact quality requirements as those used.
4th grade	Intended for irrigating plants and/or other uses with the exact quality requirements as those used

2. Research Method

2.1 Stages of Research

Recycle Hotel X Lembang's domestic liquid waste is carried out through several stages. The outlet of the biological treatment process that utilizes the bio tank is accommodated in the tank to undergo a recycling process using ozone. The zone used is produced from an ozone generator with a capacity of 3 grams. The ozonation process is carried out in circulation, using a pump and an ozone mixer. The scheme for treating domestic liquid waste in the recycling process is illustrated in the following figure:

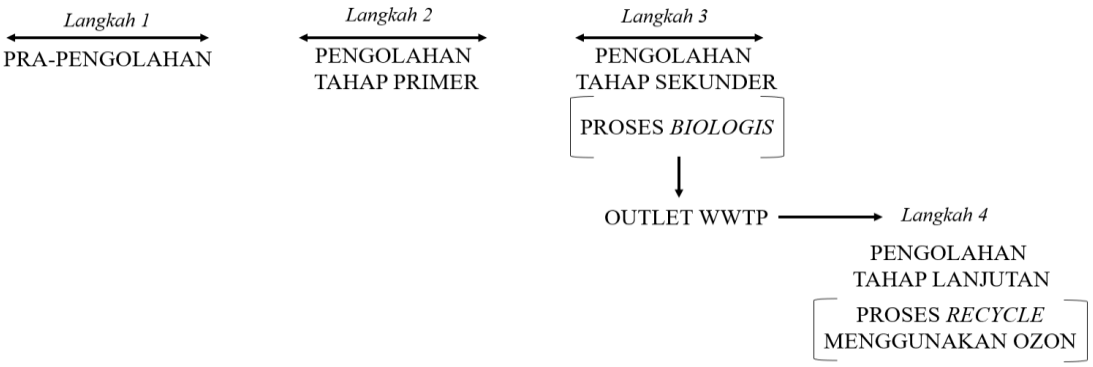


Figure 1 Schematic of Domestic Liquid Waste Treatment Process

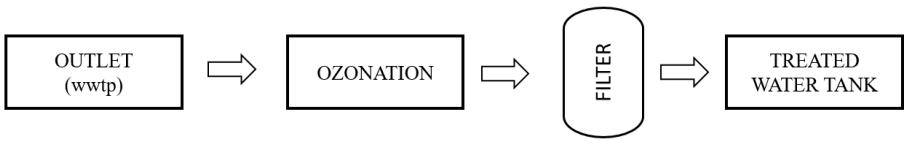


Figure 2 Schematic of Recycle Process Using Ozone

2.2 Parameters and Test Method

This study's experimental parameters consisted of pH, BOD5, COD, TSS, Oil/Fat, Ammonia, and Total Coliform. The pH parameter test method refers to SNI 6989.11-2019, BOD5 refers to the method according to SNI 6989.72:2009; COD refers to the analysis method according to SNI 6989.2-2019; TSS refers to

the analysis method according to SNI 6989.3:2019; Oil and Fat refers to the analysis method according to SNI 6989.10:2011; Ammonia refers to the analytical method according to SNI 06-6989.30-2005; and Total Coliform used the method of analysis according to APHA 9222-B-2017* (*American Public Health Association, Standard Method Edition 23 of 2017)

3. Results and Discussion

This experiment was carried out to determine the success of the domestic liquid waste recycling process at Hotel X Lembang using ozone technology to meet the threshold standards according to existing regulations. Based on the analysis (presented in table 1, graphs 1,2, and 3), it was found that the recycling process using ozone significantly reduced the levels of TSS, Ammonia, Oils & Fats, and Total Coliform. The comparison used as a reference is the quality standard of liquid waste according to the ministerial Regulation of LHK RI No. P.68 of 2016 in Appendix I.

The test results for these parameters are shown in the following table:

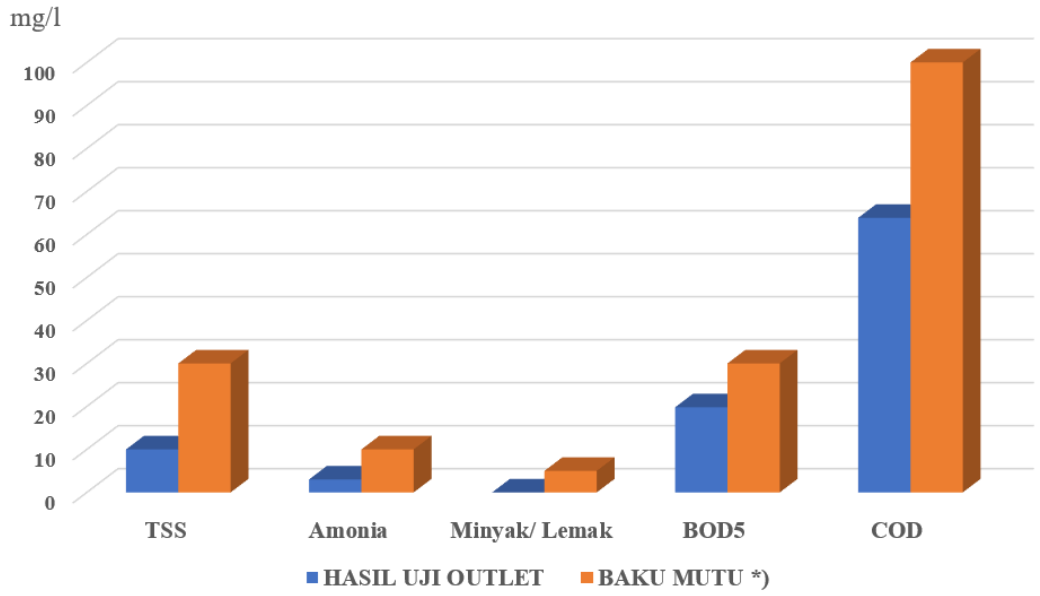
Table2 Wastewater Quality Test Results After Ozone Treatment

No	Parameter	Outlet Test Result	Quality Standards *)	Quality Standards**)	Unit
1	Ph	6.96	6.0-9.0		-
2	Tss	10	30	400	*Mg/L*
3	Ammonia	3.02	10	-	*Mg/L*
4	Oil/ Fat	<0.94	5	5	*Mg/L*
5	Bod5	19.8	30	I2	*Mg/L*
6	Cod	63.8588	100	80	*Mg/L*
7	Total Coliform	920	3000	2000-10000	*Mpn/ 100 Ml*

Source: Primary Data, 2021

*) *Regulation of the Minister of Environment and Forestry of the Republic of Indonesia Number P.68/Menlhk/Setjen/Kum.1/8/2016 Appendix I Regarding Separate Domestic Wastewater Quality Standards*

**) *Quality standard according to Attachment VI. PP No. 22 of 2021 concerning the Implementation of Environmental Protection and Management, for class 4*



Graph 1 Outlet test results refer to the Minister of Environment and Forestry Regulation Number: P.68/2016

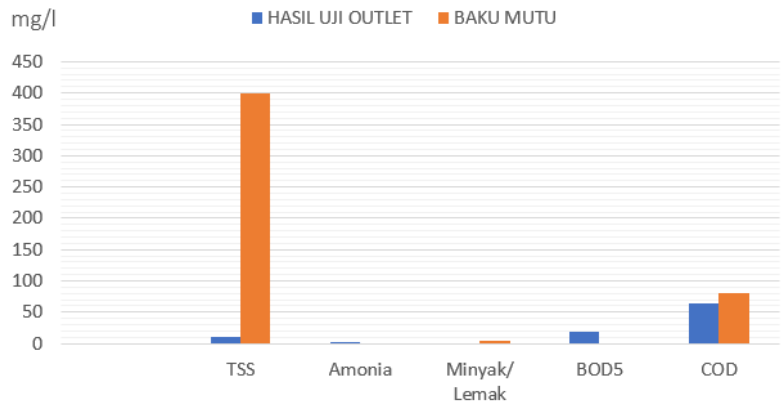
After being treated with ozone, it is known that the TSS value is 10 mg/l, while the quality standard is 30 mg/l. It shows that ozone affects the reduction of suspended solids in liquid waste. Ozone could have effects such as coagulants/flocculants. The ozone process can reduce minimal solids to form larger solids, making them easier to filter[15]. While microscopic particles can be lost to foam, the higher the ozone level in the liquid waste, the larger the floc formed and reduced TSS overall[16].

For the ammonia parameter, the result is 3.02 mg/l, and the quality standard is 10 mg/l. The ammonia value is far below the standard threshold value. According to Suryawan et al. (2021), ozone reduces NH3-N and COD[17]. In the oil/fat parameter measurement, the value <0.94 mg/l was obtained, where the threshold was 5 mg/l. The BOD5 parameter is 19.8 mg/l, while the maximum allowable threshold is 30 mg/l; for the COD parameter, the result is 63.8588 mg/l, and the maximum required threshold is 100 mg/l. It is in line with the results of the study by Dianawati et al. [18]. It is known that ozonation with a

[15] Dianawati, Wahyuningsih, and Nur; Prateek Khare and others, 'Recent Trends in Advanced Oxidation Process for Treatment of Recalcitrant Industrial Effluents', in *Advanced Oxidation Processes for Effluent Treatment Plants*, 2021 <https://doi.org/10.1016/b978-0-12-821011-6.00008-6>; Domingues and others; Chairul Abdi, Riza Miftahul Khair, and Siti Aisyah, 'Pengaruh Ozonisasi Terhadap Penurunan Intensitas Warna Dan Kadar Besi (Fe) Pada Air Gambut', *Jukung (Jurnal Teknik Lingkungan)*, 3.1 (2017) <https://doi.org/10.20527/jukung.v3i1.3196>; Mauro Martinelli and others, 'Water and Air Ozone Treatment as an Alternative Sanitizing Technology [Abstract]', *Journal of Ozone Therapy*, 3.4 (2019) <https://doi.org/10.7203/jo3t.3.4.2019.15426>.
[16] Dianawati, Wahyuningsih, and Nur.
[17] Suryawan and others.
[18] Dianawati, Wahyuningsih, and Nur.

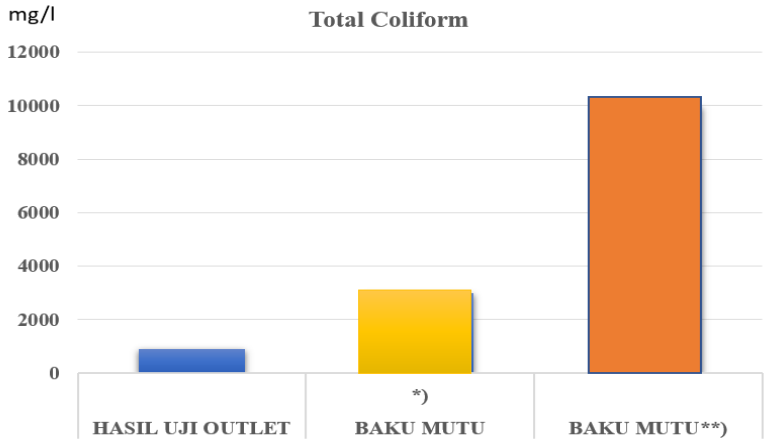
combination of alum and lime can reduce levels of BOD5, COD, and TSS.[15]the pH parameter obtained is 6.96, which still meets the quality standard, 6.0-9.0. The pH value, which tends to approach the minimum value, is thought to be caused by the significant release of H+ ions due to the influence of ozone. Study results by Abdi C. et al., the pH of the ozonated water tends to decrease due to the increasing number of H+ ions formed[19].

Meanwhile, when juxtaposed with the maximum permissible quality standard according to Attachment VI of PP RI No. 22/2021 concerning the quality standard of river water and the like for class 4, the TSS parameter, after being treated with ozone, obtained a value of 10 mg/l, while the maximum allowable threshold is 400 mg/l. For the ammonia parameter, the result is 3.02 mg/l, the maximum allowable threshold is mg/l; the parameter of oil/fat obtained value <0.94 mg/l, while the standard value of quality is 5 mg/l; for the BOD5 parameter, the result is 19.8 mg/l, the maximum allowable threshold is 12 mg/l; for the COD parameter, the result is 63.8588 mg/l, and the maximum allowable threshold is 80 mg/l; and for the total coliform parameter, the results were 920 MPN/100 ml, while the maximum permissible threshold was 2000-10000 MPN/100 ml.



Graphics2 Outlet test results are compared with quality standards according to Attachment VI PP No. 22/2021

[19] Abdi, Khair, and Aisyah.



Graphics3 Comparison of Total Coliform Test Results Against 2 Bakumatu

The results obtained for the total coliform parameter are 920 MPN/100 ml, while the quality standard is 3000 MPN/100 ml. The effect of ozone in suppressing the amount of coliform significantly so that it meets the required quality standards. According to Martinelli et al., the application of Ozone in water is proven effective in reducing the levels of microorganisms studied so that it can meet the requirements for reuse[20].

Ozone technology used in treating waste with contamination of dissolved organic materials can be reduced in an environmentally friendly and efficient manner in the use of energy costs[21]. Advantages of using ozone in wastewater treatment, as disclosed[22] , can eliminate viruses and bacteria much better than chlorine and several other advantages[23].

Through the approach of the Minister of Environment and Forestry RI No. 68/2016 and Government Regulation No. 22 of 2021, all experimental parameters are still below the maximum allowable threshold. Figure 1 shows a graph of the tendency of the experimental parameters to be below the threshold, and Figure 2 shows the condition of the recycled water according to PP RI No. 22 in the year 2021.

From the two quality standards used as a reference, it can be stated that the domestic wastewater recycling process results meet the technical requirements for reuse according to the class 4 designation. As stated in the applicable environmental regulations, water quality management is a concrete step in maintaining water with the aim of (1) in order to obtain water with quality according to its use and (2) in order to ensure that water quality is in its natural

[20] Mauro Martinelli and others; M. Martinelli and others, 'Water and Air Ozone Treatment as an Alternative Sanitizing Technology', *Journal of Preventive Medicine and Hygiene*, 58.1 (2017) <https://doi.org/10.15167/2421-4248/jpmh2017.58.1.757>.
[21] Pandis and others.
[22] Badmus and others.
[23] Badmus and others.

condition. The quality of recycled water still below the threshold can reduce the potential for pollution.

The implementation of laws and regulations regarding PPLH, as stated in Law Number 32 of 2009, is about the use or implementation of science and technology that can be implemented for other processing liquid waste (domestic). Concerning waste disposal, the government has also issued various environmental quality standards and standardization arrangements to reduce the negative impact of waste disposal without treatment. Advanced recycling processing using ozone technology is considered to meet the demands of sustainable, inexpensive, energy-efficient, and effective technology. Following science and technology, as outlined in the applicable laws and regulations, ozone technology can be a distinct advantage in fulfilling obligations in treating liquid waste.

4. Conclusion

Environmental management is crucial, which has been regulated in laws and regulations articles, to maintain and maintain the function of our environment and prevent environmental Destruction and pollution. In its application, participation or participation from the community is very much needed. The recycling process using ozone technology is proven to reduce pollutant levels of domestic liquid waste from the activities of Hotel X Lembang. It is evident from the parameter test results according to the quality standard according to the Minister of Environment and Forestry Regulation No. 68/2016, namely pH, TSS, Ammonia Oil/fat, BOD5, COD, and Total Coliform, with an excellent level of reduction.

Based on the specified quality standards, the liquid waste from the processing meets the environmental quality standards. All parameters are also compared with the threshold value according to appendix VI. PP RI Number: 22/2021, class 4, recycling domestic liquid waste using ozone provides results that can be used for irrigating plants and other uses with quality requirements equivalent to those purposes. The use of ozone in recycling domestic liquid waste has met the maximum requirements according to the two quality standards used as references.

RecycleHotel X Lembang's domestic liquid waste as a form of fulfilling environmental legal obligations can be fulfilled.

Suggestions for further research to find appropriate technology that can be used widely and research on the use of ozone technology in wastewater treatment must be based on the relevant laws. Research on the performance of ozone in reducing pollutant levels in domestic liquid waste still needs to be developed more deeply.

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Amin, Mirawanty, 'Polusi Tanah Dan Dampaknya Terhadap Kesehatan Manusia', *Jurnal Sumberdaya Lahan*, 15.1 (2021) <https://doi.org/10.21082/jsdl.v15n1.2021.36-45>

Badmus, Kassim Olasunkanmi, Jimoh Oladejo Tijani, Emile Massima, and Leslie Petrik, 'Treatment of Persistent Organic Pollutants in Wastewater Using Hydrodynamic Cavitation in Synergy with Advanced Oxidation Process,' *Environmental Science and Pollution Research*, 2018 <https://doi.org/10.1007/s11356-017-1171-z>

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