

The Spread of Lindi (Liquid Garbage) of Benowo Garbage Landfill on Fish Pond Water Quality in Surabaya

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Abstract— Benowo Garbage Landfill had an unexpected problem where Lindi (garbage liquid) pipe channel was leaking due to the activity of excavator to complete the project of garbage burning place. lindi (garbage liquid) pipe leaked on January 05, 2017 until March 15, 2017, but was not solved yet because of the rainy season and flood that made repairmen getting slow. The leak could not flow the garbage liquid completely which caused the leak partially sank into the soil and partly overflow to the area around leak point. The purpose of this study was to determine the spread of leak pollution and its impact on the fish pond around the leak point of Lindi (garbage liquid) pipe in Benowo Landfill. This research used descriptive quantitative research to describe the condition of leak of Lindi (garbage liquid) pipe impact Benowo garbage landfill to water contamination around fishpond helped by tests of laboratory and then analyzed. The sample in this research was fishpond water of 0 m-150 m distance from the leak point of Lindi (garbage liquid) pipe. This research variable was water quality of fishpond based on ph content which showed acid level in a solution and Chemical Oxygen Demand (COD) to see the size of the contamination level by organic material. The result was that the polluted water of fishpond from leak point of Lindi (garbage liquid) pipe after the pH and COD analyzed descriptively based on data obtained was a 25 m and 75m to the north, 25 m to the east and from leak of Lindi (garbage liquid) pipe Benowo garbage landfill and caused water contaminated, death of fish at pond, watercolor changed into black, and the smell was not good. In short, the farther water distance with the leak point of the Lindi pipe TPA Benowo the smaller Lindi pollution or Lindi pollution is reduced.

Keywords— *Fishpond Water Quality, Lindi pollution*

I. INTRODUCTION

Garbage is all kinds of solid materials that discarded and considered to waste, it useless or disposable items due to excess. Garbage is expressed in the form of solid waste derived from human activities. Domestic garbage is dominated by organic materials although the composition of garbage varies from city to city even from day to day [1]

Final Disposal (TPA) is a solution to environmental pollution caused by garbage, a lot of the consequences that can be caused by garbage if not treated and not handled. Living beings whether human, animal, or plant are potentially produced waste or garbage that increasingly accumulated over time and can disrupt the balance of the environment as well as being a source of disease.

The final disposal (TPA) that not properly managed will have an impact on the environment. Three important aspects of the environment they are soil, air, and water becomes the target of the negative impact of final disposal (TPA) [2]

TPA Benowo is experiencing unexpected problems that have been discovered pipeline leak Lindi Backhoe activity due to exposure in the process of settlement of the incinerator project. Lindi pipeline leaked on January 5, 2017, until March 15, 2017, which has not been resolved due to the rainy season that caused flooding so that is very slow repaired. The leak can't drain the liquor completely, causing some Lindi to sink in into the ground and some overflows into the area around the point of leakage of Lindi pipes.

TPA Lindi management of Benowo is good and managed using modern tools that have been applied from 2015 until now in 2017. Lindi management is processed through the Holding Tank, it works by take the Lindi then processed into clean water that repeatedly processed, before using this modern tool TPA Benowo used the alum, although after using this modern tool it used the Hydrogen Ion Lindi management, ie as Oxidizer so there is no residue so the sample results in the form of foam and then returned to the storage pond.

Table 1. Garbage composition in surabaya

Garbage Composition	Percentage (%)
Wet garbage	71,96
Plastic	12,94
Paper and cardboard	5,35%
Diapers	4,71%
Cable	0,03%
Wood	0,89%
B3	0.16%
Fabric	1,94%
Glass	0,92%
Rubber	0,58%
Aluminum cans	0,24%
Metal	0,20%
Others	0,08%

Source: Primary Data in the year 2017

Lindi garbage processing in TPA Benowo is used for its own purposes such as watering plants, washing heavy equipment and others because the water is nice and clean.

A serious problem at TPA Benowo is caused by untreated Lindi that hazardous and leach point leakage is located around the pond area. The condition is getting worse because the rainy season so to fix leaking lindi pipe is also takes a long time. The leakage condition of this pipe is getting worse because besides the repair process of leachate pipe this takes a long times not while the lindi that unprocessed is leaked more and more lindi out and overflow everywhere plus rain water so that exacerbate the condition and bad for the surrounding environment Ponds that exist around the leakage point of the Benowo waste TPA pipe.

Lindi water is a liquid of waste containing dissolved and suspended elements [3] water with a high concentration of organic content formed in Landfill due to rainfall entering into Landfill[4].

According to the Regulation of the Minister of Environment of the Republic of Indonesia Number 5 of 2014, water quality is a condition of water quality measured or tested based on certain methods and methods based on prevailing laws and regulations. Water quality standards are a measure of the extent or extent of living things, substances, energies, and pollutant elements that are tolerated in water.

Tabel 2. Klasifikasi Mutu Air Limbah Golongan C

Parameter	Satuan	Kadar
pH	-	6 – 9
TSS	Mg / L	100
Sulfida	-	1
Amonia	-	5
Klor Bebas	-	1
BOD	Mg / L	100
COD	Mg / L	200
Minyak lemak	-	15

Sumber: [5]

This study aims to determine the distribution of lindi pollution in the vicinity of lindi pipe leaks and lindi impacts on ponds around the location of lindi pipe leaks. Based on the context of the research in this study, the main focus of this study was "Distribution of lindi at Benowo Waste Disposal Site (TPA) Against the Water Quality of Surabaya City Pond".

II. METHOD

This type of research uses quantitative descriptive research. The research location is at the point of leakage of the final disposal site (TPA) Benowo lindi pipe. The sample in this research is pond water at a distance of 0 m - 150 m from the lindi leaks pipe of TPA Benowo.

The research variable is the quality of the pond water. Pond water quality around the leakage point of lindi pipe of TPA Benowo is pond water quality based on pH content and Chemical Oxygen Demand (COD). pH indicates the level of acid or base in a solution while COD is the amount of oxygen needed so that the organic waste inside can be oxidized through chemical reactions. The COD value is a measure of the level of pollution by organic matter.

In this research the primary data was obtained from 8 points of pond water samples around the lindi leaked point at TPA Benowo. Data collection in this research uses techniques that are considered appropriate there is the measurement of laboratory tests, observation, and documentation. The analytical technique is descriptive or comparing the quality standard of class C wastewater based on the Regulation of the Minister of Environment of the Republic of Indonesia Number 5 year 2014 with the water quality that obtained from the field based on the analysis of Research and Industrial Development Agency of the Industrial Research and Development Center of Surabaya..

III. RESULT AND DISCUSSION

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A. Pond Water Quality Around Landfill According to pH

Table 3. Laboratory Test Results for Pond Water according to the pH content around the lindi leak point of TPA Benowo

Sample Point	Parameter (pH)	Unit	Minister of Environment Regulation No. 5/2014 (Group C)	
			pH	Unit
A1	8,0		6-9	-

A2	7,8			
A3	7,5			
B1	7,9			
B2	7,7			
C1	7,6			
C2	7,6			
C3	7,2			

Source: Primary Data, 2017

The pH of pond water around Benowo TPA Laboratory test results in Table 3 is based on Minister of Environment Regulation No. 5/2014 (Group C) that pond water is still in the limits, so that water around the leakage point still can be used as a pond.

B. Pond Water Quality Around Landfill According to COD Content

Table 4. Laboratory Test Results for Pond Water by COD Content

Sample Point	Parameter COD	Unit (mg/l)	Minister of Environment Regulation No. 5/2014 (Group C)	
			Parameter	Unit
A1	558,93	mg/l	200	mg/l
A2	273,21	mg/l		
A3	41	mg/l		
B1	306,32	mg/l		
B2	130,36	mg/l		
C1	78	mg/l		
C2	33	mg/l		
C3	14	mg/l		

Sources : primary data 2017

Testing the pond water quality based on samples that tested by Laboratory Testing and calibration of Surabaya Industrial Baristand, the COD values there are 3 contaminated sample points and 5 sample points below the limit.

C. Distribution of Lindi Pollution around TPA

Table 5. Quality Of Water Pond On North Location Level Lindi Pipe TPA Benowo

Parameter	Minister of Environment Regulation No. 5/2014 (Group C)	Laboratory Test Results		
		A1	A2	A3
pH	6 – 9	8,0	7,8	7,6
COD	200 mg/l	558,93 mg/l	273,21 mg/l	41 mg/l

Sources: primary data 2017

Table 5 show that the pond water quality in the north that ranged at 25 m, 75 m, and 150 m from the lindi leaks in TPA Benowo (A1, A2, and A3) based on Minister of Environment Regulation No. 5/2014 (Group

C), some of them is not suitable to be used for aquaculture ponds. If based from the pH it show that the values is below the threshold, but in terms of the COD values is above the threshold.

Table 6. Pond Water Quality in the East Location of lindi Leakage Pipes TPA Benowo.

Parameter	Minister of Environment Regulation No. 5/2014 (Group C)	Laboratory Test Results		
		B1	B2	B3
pH	6 – 9	7,9	7,7	-
COD	200 mg/l	306,32 mg/l	130,36 mg/l	-

Sources: primary data 2017

Table 6 shows that the ponds water quality in the east of the leakage point of the lindi pipe of TPA Benowo to the distance of 75 m, because at a distance of 150 m already used as a parking area of TPA Benowo and idle land that in the future will be build incinerator of TPA Benowo.

The pH and COD parameters, which are suitable are seen from the pH parameters while the COD parameters from 25 m distance are not suitable while the distance of 75 m is suitable but the COD value from a distance of 25 m to a distance of 75 m the pollution value is further away from the point where the lindi pipe leakage at TPA Benowo shows that pollution value is lower at the farther from the leakage point of lindi leaked pipe, its less lindi pollution.

Table 7. Pond Water Quality in the South Location of Lindi leaked Pipe at TPA Benowo.

Parameter	Minister of Environment Regulation No. 5/2014 (Group C)	Laboratory Test Results		
		C1	C2	C3
pH	6 – 9	7,6	7,6	7,2
COD	200 mg/l	78 mg/l	33 mg/l	14 mg/l

Sources: primary data 2017

The table shows that the water quality of the pond in the South ranged 25 m, 75 m, and 150 m (C1, C2, C3) from the leaking point of lindi pipe TPA Benowo based on water quality classification according to Minister of Environment Regulation No. 5 of 2014 class C are all suitable values from the parameters of pH and COD. From the corresponding parameters the value decreases with increasing distance from the leaking lindi pipe of the TPA Benowo.

D. Impact of Lindi Against Ponds around the Lindi pipe leakage point of TPA Benowo

The impact of lindi pipe leakage on the pond in the north with a distance of 25-75 m from the leaking point lindi pipe is quite serious because the pond water is polluted so the life in the pond will die. So the pond can't be used as long as the leak pipe has not been repaired.

Repairing of lindi pipe is still not resolved and then the pond owner asking for losses to the TPA Benowo Management as a compensation over ponds affected by lindi. Ponds from a distance of 150 m to the south have not experienced the impact of lindi leak pipe because according to the owner of the pond, the fish is still alive and the water is still good for fish farming.

The impact of lindi pipe leakage on the pond in the east at a distance of 25 m, is the same that experienced by the pond in the south at a distance of 25 m, a lot of lindi occurred into the pond so that the water turns black then the fish die due to lindi pollution. The pond owner at distance 75 m to the east also asked for compensation from the TPA Benowo Management although the impact is lesser than the distance of 25 m from lindi leak.

The impact of leaked lindi pipe to the south of the leakage point at a distance of 25 m is a small percentage of the fish died. Within a long time span of lindi leakage at TPA Benowo unhandled of course the life of fish in the south pond will be worse. For a distance more than 75 m from the leak point for the south there is no significant impact.

IV. CONCLUSION

The distribution of lindi pollution around the point of lindi leakage of TPA Benowo is the distance of pond water contaminated with lindi from the lindi pipe leak point after being analyzed descriptively based on data obtained at a distance of 25 m, 75 m and 150 m. The results showed pollution spread as far as 25 m and 75 m to the north, a distance of 25 m to the east from the leak point of lindi pipe of TPA Benowo has occurred lindi pollution while at a distance of 150 m to the north, at a distance of 75 m to the east, and distance 25, 75 m, 150 m to the south there is no lindi pollution. The farther distance of the pond with the lindi pipe leak from TPA Benowo, is lesser the lindi pollution or the lindi pollution decreases.

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