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Case Study of Decreasing of Quality of Processed Waste at Sewage Treatment Plant to Contain Waste Disposal on Ship Mv. Ck Angie

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Abstract: Prevention of contamination by sewage on ships can be overcome by using an auxiliary sewage treatment plant, a sewage treatment plant is a liquid waste treatment installation which is generally intended for domestic waste in the form of feces and laundry residue containing detergents which are harmful to the environment by utilizing aerobic bacteria as waste decomposers and UV sterilizers as a neutralizer for waste parameters. However, in reality when the author and engineer 3 conducted regular tests on the processed water content of the sewage treatment plant from May 4 2021 to May 25 2021, the results of the waste parameters were not in accordance with the manual book. So, according to the test results above, the authors take 3 causes for the decline in the quality of processed water which is the background for writing this thesis, namely the operation of the aeration blower is ineffective, the UV sterilizer does not function properly and the accumulation of sludge or excessive solid residue in the separation tank section. The research method used is descriptive. The approach method used is a qualitative approach method with data collection techniques carried out by means of observation and documentation based on data analysis techniques carried out using root cause analysis (RCA) techniques carried out on the MV ship. CK ANGIE from 11 December 2020 to 24 January 2022. the operation of the aeration blower is ineffective, If the uv sterilizer does not function properly, the cause of the problem is the dirty blower air filter and dirty blower air inlet pipe and the uv sterilizer section is caused by the life of the uv lamp which has exceeded running hours and the uv jacket is dirty. And for engine cadets to pay attention to the exhaust air pressure from the aeration blower so that when the exhaust air pressure from the aeration blower starts to decrease, they can immediately report it to the engineer in charge. suggestions for maintaining the performance of the UV Sterilizer are to pay more attention to the usage period or running hours of the UV Lamp so that the effectiveness of the UV Lamp continues to function properly. And for the jacket section of the UV sterilizer to be cleaned regularly by implementing a regular planned maintenance system (PMS).

Keyword: Sewage Treatment Plant, Planned Maintenance System, Waste Parameters

INTRODUCTION

One of the means of transportation that is needed in the economic field to support the export-import trade today is the ship (Sea Transportation). However, the use of sea transportation can cause various marine pollution. Therefore, maritime regulations are created that regulate pollution of the marine environment by ships. one of these regulations is contained in Annex IV which contains the prevention of pollution from ships by excrement.

Prevention of contamination by sewage on ships can be overcome by using an auxiliary sewage treatment plant, a sewage treatment plant is a liquid waste treatment installation which is generally intended for domestic waste in the form of feces and laundry residue containing detergents which are harmful to the environment by utilizing aerobic bacteria as waste decomposers and UV sterilizers as a neutralizer for waste parameters.

But in reality at the timewriter and engineer 3 conducted regular tests on the processed water content of the sewage treatment plant while the ship was docked at Muara Satui port and Pagbilao port from 04 May 2021 to 25 May 2021, the results of the effluent parameters were not in accordance with the manual book. Should be a pH value of 6 – 8.5 to be pH 9, COD <125 mg/L to 130 mg/L, TSS <35 mg/L to 40 mg/L, Coliforms 100 cfu/100 mL to 120 cfu/100 mL, BOD5 25 mg/L to 35 mg/L. So, according to the test results above, the authors take 3 causes for the decline in the quality of processed water which is the background for writing this thesis, namely the ineffective operation of the aeration blower, the malfunctioning of the UV Sterilizer and the accumulation of excessive sludge or solid residue in the separation tank section.

RESEARCH METHOD

The research method used is descriptive. The approach method used is a qualitative approach method with data collection techniques carried out by means of observation and documentation based on data analysis techniques carried out using root cause analysis (RCA) techniques carried out on the MV ship. CK ANGIE from 11 December 2020 to 24 January 2022.

RESULTS AND DISCUSSION

Ineffective Aeration Blower Operation

Ineffective operation of an aeration blower can cause aerobic bacteria to not reproduce properly so that the solid residue in the aeration tank cannot be properly decomposed by bacteria and eventually causes the accumulation of solid waste in the aeration tank.

Cause identification: Blower air filter is dirty. The blower air filter is a component in the blower whose function is to filter impurities from the atmospheric air that is sucked into the blower. From the results of the analysis it was found that there was a lot of dirt in the blower air filter which prevented air from entering so that it could reduce the suction pressure and finally reduce the exhaust pressure from the blower. This was discovered after opening the filter casing, a lot of dirt stuck to the filter because the engine room at that time was very dirty due to the amount of dust that entered the engine room. The exhaust pressure decreased to 0.010 MPa on the blower, which should have been 0.02 MPa according to the manual book. Dirty air duct. The air pipe functions as an air distributor from the blower to the tank. The air is needed by aerobic bacteria to survive in the tank. From the results of the analysis it was found that there was dirt in the pipe which was caused because it had not been cleaned for a long time, so that the dirt prevented the air from flowing and lowered the exhaust air pressure on the blower.

Not Functioning UV Sterilizer Properly

If the UV sterilizer does not function properly, it can cause waste to be disposed of into the sea in an unsterile state.

Cause identification: The UV lamp is not working effectively. The UV lamp on the UV sterilizer functions as a source of ultraviolet (UV) light which can kill microorganisms such as bacteria, viruses and fungi in water or other liquids. From the results of the analysis it was found that the light conditions of the UV lamp were dim, so that the bacteria could not be sterilized using ultraviolet light.

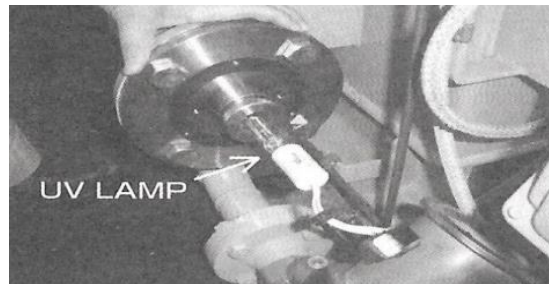


Figure 1. UV Lamp

Dirty UV jacket sterilizer. The jacket on the UV sterilizer functions to maximize the effectiveness of ultraviolet (UV) rays in killing microorganisms in water or liquids. This transparent glass jacket or tube protects the UV lamp from contamination or damage. The jacket on the UV sterilizer is designed to block UV rays and extend the contact time between UV rays and water or liquids to be sterilized. By blocking UV rays, the jacket can ensure that water or liquids passing through the UV sterilizer are exposed to UV rays of sufficient intensity to kill microorganisms. From the results of the analysis it was found that the condition of the UV sterilizer jacket was dirty so that the ultraviolet rays could not function optimally.

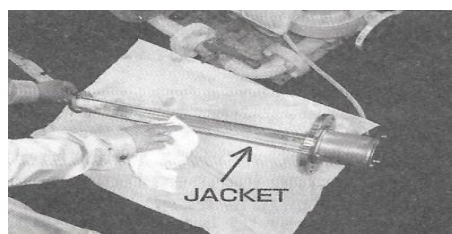


Figure 2. Jacket UV sterilizer

Ineffective aeration blower operation:

The method chosen to solve problems that occur in the blower air filter is to clean the blower air filter regularly with the implementation of a regular planned maintenance system (PMS).

The way to solve the problem of dirty air ducts is to clean the air ducts regularly by implementing a planned maintenance system (PMS) that regularly uses clean water and cleaning chemicals.

UV sterilizer not working properly

The way to deal with a UV lamp that doesn't work effectively is to replace the UV lamp based on running hours (running hours of a UV lamp 8,760 hours or 1 year for continuous use).

The way to deal with dirty UV jackets is to clean the UV jackets regularly by implementing a regular planned maintenance system (PMS).

CONCLUSION

After the author describes several matters relating to the decline in the quality of sewage treatment plant processed waste. From the results of the analysis and discussion, further conclusions can be drawn which can be used as useful input in subsequent assignments.

1. Operation Ineffective aeration blower occurs due to the large amount of dirt in the blower filter and blower air duct pipe which inhibits blower suction which results in a decrease in exhaust air pressure from the aeration blower and in the end aerobic bacteria cannot reproduce due to lack of oxygen-containing air so that waste such as feces cannot decompose properly and results in accumulation of waste in the aeration tank.
2. Cause of non-function The UV sterilizer is good because the UV sterilizer jacket is dirty which can cause the UV lamp to be directly contaminated by dirt and the condition of the UV lamp that is no longer suitable for use because it has exceeded the usage limit (exceeding running hours).

Based on the problems that have been discussed and accompanied by alternative solutions problems that are carried out to overcome these problems, the author tries to provide some suggestions related to the problems discussed in this thesis which aim to provide preventive measures so that incidents like this do not happen again. The suggestions are:

1. To avoid excess buildup in the blower filter section and blower air duct, cleaning must be carried out periodically by carrying out a regular planned maintenance system (PMS). And for engine cadets to pay attention to the exhaust air pressure from the aeration blower so that when the exhaust air pressure from the aeration blower starts to decrease, they can immediately report it to the engineer in charge.
2. Suggestions for maintaining the performance of the UV Sterilizer are to pay more attention to the service life or running hours of the UV Lamp so that the effectiveness of the UV Lamp continues to function properly. And for the jacket section of the UV sterilizer to be cleaned regularly by implementing a regular planned maintenance system (PMS).

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