



Noxious Liquid Substances Management Plan in Preventing Marine Pollution on MT. Prima Lautan II

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Abstract. The objective of this study is to reduce marine pollution caused by the improper use and disposal of hazardous liquid chemical waste that does not comply with the procedures and regulations mandated by MARPOL 1973/1978. The research employs a qualitative approach with descriptive analysis. Data were obtained through direct interviews with officers and engineers, as well as through direct observations during the researcher's practice onboard the vessel. The hypothesis was confirmed, suggesting that the handling of noxious liquid substances on MT. Prima Lautan II has not been carried out appropriately. Field evidence indicates that the processes involving compliance with requirements, disposal regulations, and record-keeping were not conducted in accordance with MARPOL regulations. This is attributed to the crew's lack of adherence to the existing regulations and the government's insufficient enforcement of these rules. Therefore, the implementation of a management plan is necessary onboard MT. Prima Lautan II to prevent marine pollution.

Keywords: MARPOL, Pollution Prevention, Marine Pollution, Waste Disposal

1 Introduction

One of the pollutants that significantly impacts the aquatic environment is oil spills or liquid chemicals mixed with water during the washing of tanker cargo tanks and the fuel tanks of other vessels. The impact on the aquatic environment depends on the quantity of the spilled chemicals, the location of the incident, the timing, and the emissions of the liquid chemicals. Spills from transportation activities can lead to widespread pollution due to ocean currents or waves.

MT. Prima Lautan II is a fully refrigerated liquefied gas carrier, where the cargo can be re-liquefied if it transitions back into gas. The cargo consists of hazardous liquid substances such as propane and butane, which are dangerous chemicals used as raw materials for liquefied gas. In addition, the author recorded that the reported waste management involved hazardous liquid chemical waste, specifically propane and butane, as residual cargo. This was found to be inconsistent with the operational procedures and regulations of MT. Prima Lautan II during the author's twelve-month practical training onboard.

The objective of this research is to examine the implementation of bulk hazardous liquid waste handling processes in accordance with Annex II of the MARPOL 73/78

Convention to prevent pollution from ships. To facilitate the discussion of the research process and the key issues related to this topic, the author has formulated the following research question: Has the use of hazardous liquid substances produced by MT. Prima Lautan II complied with the provisions of MARPOL Annex II for preventing marine pollution?

2 Research Method

This research was conducted on MT. Prima Lautan II during the author's Sea Training (Prala) for 12 months, from February 14, 2022, to February 17, 2023. The thesis employs a qualitative research method. Qualitative research can be interpreted as descriptive research that typically uses inductive analysis. The inductive approach involves analyzing specific examples before drawing conclusions. In qualitative research, the process and meaning are the most important aspects. Theory is used as a tool to achieve research objectives based on field data. It also helps to provide a general overview of the research environment and aids in discussing the research findings. The relevant research observed by the author focuses on how the hazardous liquid management plan is implemented to prevent marine pollution on MT. Prima Lautan II.

The data processing and analysis methods used in this research involve qualitative descriptive data analysis techniques. The author analyzes the material based on field notes from observations and interviews that support the research. After all the data obtained from observations and interviews are collected, the next step is data processing, which includes summarizing the results and focusing on the most important aspects. This method allows for a comprehensive understanding of the subject by highlighting key findings and providing a clear analysis of the collected information.

The subsequent step is communication, which involves providing information that is well-organized and easily understood, making it accessible for review, reading, and comprehension. The author provides an overview or explanation of the facts observed in the field and then compares them with existing theories to seek solutions for the implementation of the hazardous liquid management plan to prevent marine pollution on MT. Prima Lautan II.

3 Research Finding

During the research conducted on navigation, the author observed the handling processes of hazardous liquid substances aboard MT. Prima Lautan II. The findings revealed that hazardous liquid substances were being discharged into the sea without adhering to proper procedures and regulations. This was primarily due to the absence of necessary facilities for proper disposal and treatment in line with the established standards, both when the ship is at sea and when docked in port. Furthermore, some crew members lacked a proper understanding of hazardous chemical waste management as outlined in Annex II of the MARPOL 1973/1978 Convention. This lack of implementation contributed to marine pollution, highlighting a significant gap in both infrastructure and crew training regarding environmental protection.

As a result, the quality of seawater deteriorates to a level that can cause changes in the quality and function of the marine environment, negatively impacting the marine ecosystem. The author observed cases onboard where cargo waste, particularly from spray containers, was discharged directly into the sea without any special treatment or compliance with the MARPOL Annex standards. This waste should have been reprocessed or recycled at specialized onshore storage facilities. However, due to the lack of onshore facilities for storing residual cargo waste, the remaining cargo could not be processed, and as a result, it was improperly disposed of at sea, in violation of MARPOL Annex II.

This issue arises from the absence or unavailability of onshore storage facilities or treatment options for hazardous chemical cargo waste at cargo ports, leading to non-compliance with the international regulations set out in Annex II of the MARPOL 1973/1978 Convention. Effective hazardous chemical waste management, including storage, treatment, and disposal, heavily depends on the availability of onshore facilities, as the entire process can only function properly with adequate infrastructure and governance both on the ship and onshore. This ensures that hazardous chemical waste issues are properly managed, thereby reducing marine pollution caused by residual hazardous chemical cargo.

In Indonesia, the prevention of pollution caused by ships is regulated by Government Regulation of the Republic of Indonesia No. 19 of 1999, which addresses the prevention of marine pollution and damage. Article 110 of Government Regulation No. 51 of 2002 emphasizes the responsibility of ship owners, operators, masters, managers, crew members, and other seafarers to prevent environmental pollution. The primary focus has shifted to preventing marine pollution, particularly concerning marine environmental issues. To support this, research institutions are increasingly conducting intensive studies on the subject. Numerous studies, seminars, and symposium workshops, both domestically and internationally, have been held to address and raise awareness about marine pollution, underlining the importance of understanding and protecting the marine environment.

Therefore, marine environmental issues themselves pose a threat to humans, marine elements, and human life, potentially endangering and degrading environmental sustainability. This makes it essential to raise awareness about addressing marine pollution. Consequently, organizations such as the IMO were established to regulate issues related to marine pollution at the international level.

The IMO (International Maritime Organization) was created and established to regulate and develop legislation concerning marine pollution caused by ships, and all countries are required to comply with it. The components of marine pollution from ships include oily liquid waste, hazardous chemicals, processed food waste, solid waste, organic waste, and inorganic waste.

Table 1. Processing Conditions

No.	Regulation	Implementation
1.	<i>Noxious Liquid Substances</i> are mixed with water with the intention of reducing the concentration of hazardous materials.	No

Table 2. Storage Conditions

No.	Regulation	Implementation
1.	<i>Noxious Liquid Substances</i> are stored in designated areas to prevent dispersion and mitigate hazards on board the vessel.	Yes
2.	<i>Noxious Liquid Substances</i> receive containment or facilitation at the port or loading and discharging docks.	No

Table 3. Disposal Conditions

No.	Regulation	Implementation
1.	<i>Noxious Liquid Substances</i> are discharged at least 12 nautical miles from the nearest land at a minimum depth of 25 meters.	No
2.	<i>Noxious Liquid Substances</i> are disposed of while the vessel is moving at a speed exceeding 7 knots.	No
3.	<i>Noxious Liquid Substances</i> are discharged below the waterline of the vessel, taking into account the location of the seawater intake.	No

Table 4. Recording Conditions

No.	Regulation	Implementation
1.	Recording the vessel's location at the beginning and end of the discharge of <i>Noxious Liquid Substances</i> .	No
2.	Recording the types of <i>Noxious Liquid Substances</i> discharged into the sea.	No
3.	Recording the quantity of <i>Noxious Liquid Substances</i> discharged into the sea.	No

In operations conducted on vessels, particularly in waste management, there are instances when procedures do not proceed as established. This issue often arises because the crew does not fully understand these procedures, and the regulations within shipping companies are quite stringent. Therefore, effective management is crucial to address the issues that could lead to marine pollution from ship-generated waste.

During transit, the use of waste that does not meet the required standards has a negative impact on the marine environment, damaging ocean areas and marine ecosystems. This is particularly concerning since marine ecosystems are vital to Earth, covering approximately one-third of the planet's surface and supporting all forms of life. Consequently, preventing pollution from hazardous liquid chemical waste is of utmost importance.

The following procedures are in place for processing hazardous liquid chemical waste to ensure its disposal complies with regulations:

Processing. When handling waste, it is essential to recognize that the area is hazardous, as propane and butane at certain concentrations can cause respiratory distress and death if inhaled, as well as frostbite if they come into contact with the skin. Therefore, cargo residues must be mixed with water beforehand to mitigate their harmful effects, specifically to lower the temperature and reduce the vapor content of the cargo.

Containment. The containment of cargo residue waste on the MT Prima Lautan II has been effectively implemented. Below the manifold, there is a spill box that can accommodate residual cargo during both the loading and discharging processes. However, as for the containment of waste from the Inert Gas Generator (IGG), such facilities are currently not available on board. It is possible that in the future, gas tankers may install waste containment systems for IGG to prevent direct discharge into the sea.

Disposal. The disposal of waste on board vessels must be conducted in accordance with Annex II of the MARPOL 1973/1978 agreement. Sedimentation at port facilities should also be a priority, as the disposal of hazardous liquid chemical waste requires significant attention and must comply with MARPOL 73/78 practices. The Practical Guide II 2015 outlines the requirements for the disposal of hazardous liquids.

Recording. Conducting exploration and exploitation at sea, Garbage Record Book Part I and a Garbage Record Book Part II are obliged specifically for tankers. These are crucial shipping documents in which the date and details of each waste processing operation, disposal location, and the quantity of waste discharged by the responsible officer must be recorded. At all times during inspections, the manager must sign each page of the book to confirm their responsibility.

4 Conclusion

Discussion and based on the results of the hazardous liquid management plan to prevent contamination of the MT Prima Lautan, the researcher can draw the following conclusions:

The management and disposal processes for hazardous liquid waste on the MT Prima Lautan II have not been properly implemented, resulting in the failure to fully realize the “Noxious Liquid Substances Management Plan” as outlined in Annex II of MARPOL 73/78. The ship’s procedures for processing, handling, and containing waste are inadequate, with waste disposal not complying with the established regulations and conditions. Additionally, there has been no proper recording of waste disposal on board. These issues were significant observations during the author's research, which took place over the course of more than a year during practical work.

It is suggested that the chief officer and chief engineer, as the environmental officers, hold regular safety meetings at the end of each month so that the crew can gain a clear understanding of the procedures for handling hazardous liquid chemical waste, such as disposal distances and waste management processes in accordance with applicable regulations. Furthermore, regulations and inspections need to be strengthened by the government to enhance awareness and discipline in the handling of ship waste, ensuring that the Noxious Liquid Substances Management Plan can be effectively implemented on the MT Prima Lautan II.

Additionally, the company should facilitate the easier and better production of tools and systems that meet the criteria for the application, processing, storage, disposal, and registration of hazardous chemical waste in bulk or liquid form.

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