



Analysis of High-Temperature Coal Handling on MV. ALCYONE I Managed by PT. IDT Trans Agency Palembang Branch

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Abstract. This paper discusses the handling of high-temperature coal cargo on MV. ALCYONE I, managed by PT. IDT Trans Agency Palembang. The research focuses on identifying obstacles during the handling process and the methods applied to mitigate the issue. The findings indicate that the primary challenge is the increase in operational costs caused by high-temperature coal. The study suggests regular monitoring of coal temperatures and the use of both conventional and chemical cooling methods to prevent issues associated with self-heating coal.

Keywords: High-temperature coal, cargo handling, MV. ALCYONE I

1 Introduction

Sea transportation, especially shipping, plays a crucial role in transporting mining products through waterways. According to Article 1, Clause 36, of the Republic of Indonesia Law Number 17 of 2008 on Shipping, a ship is defined as a watercraft of specific shape and type, propelled by wind, engine power, or other energy sources, including both dynamically powered vehicles and stationary structures. Among the vessels used for transporting bulk cargo is the bulk carrier, which is specifically designed to carry large quantities of unpackaged commodities like cement and coal due to its significant cargo capacity.

Coal, as a valuable mineral resource, contributes substantially to Indonesia's trade revenue. According to Coal Country Mine (2007), "Indonesia ranks among the top ten coal-producing countries globally, with numerous entrepreneurs entering the mining sector to meet the rising demand for coal."

Natural resources (SDA), particularly coal, have a key role in energy generation. According to the Ministry of Energy and Mineral Resources (2017), coal-fired power plants produce approximately 27% of the world's total energy and over 39% of the world's electricity due to coal's abundance, ease of extraction, and lower production costs compared to other energy sources. Indonesian coal is exported to countries such as India, Japan, South Korea, and even Europe.

While coal transportation provides many benefits, it also presents significant challenges. These include adverse weather conditions, natural factors in waterways, and specific transportation issues such as elevated coal temperatures during transit. According to the International Maritime Solid Bulk Cargo (IMSBC) Code and vessel owners'

According to the International Maritime Solid Bulk Cargo (IMSBC) Code and vessel owners' standards, coal should not be loaded onto a ship if its temperature exceeds 55°C. Elevated temperatures can create hot spots in the coal, which may spread throughout the cargo and pose serious safety risks.

These standards have been in place since the 1960s, when the International Maritime Organization (IMO) introduced the Code of Safe Practice for Solid Bulk Cargoes (BC Code). The BC Code, first published in 1965, was later replaced by the IMSBC Code, which became mandatory following amendments to SOLAS Chapter VI, as adopted by the Maritime Safety Committee (MSC) in 2008. The IMSBC Code took effect on January 1, 2011, ensuring the safe transport of solid bulk cargo consistently.

During the author's observation of MV. ALCYONE, In January 2023, while loading coal at Tanjung Kampeh Anchorage, four out of five barges had coal temperatures above 55°C, causing delays. This underscores the need for proper handling of high-temperature coal before loading onto vessels.

1.1 Problem Formulation

The core issues identified in this research are as follows:

- a. How is high-temperature coal cargo managed on MV. ALCYONE I?
- b. What are the challenges faced during the handling of such cargo?
- c. What solutions have been implemented to address these challenges?

2 Cargo Handling Process

Handling high-temperature coal cargo requires specific strategies to prevent spontaneous combustion and ensure safety during the voyage. According to international maritime guidelines, such as the International Maritime Solid Bulk Cargoes (IMSBC) Code, coal should not be loaded if the temperature exceeds 55°C, as elevated temperatures increase the risk of self-heating and combustion, endangering the crew, vessel, and cargo. In such cases, coal must be cooled using conventional methods, such as spreading the coal to dissipate heat or chemical treatments to lower temperatures at hotspots. These preventive measures are essential to maintaining safe operating conditions during the voyage and ensuring compliance with international safety regulations. Additionally, regular monitoring of coal temperatures during loading and transit is crucial to prevent further issues, minimize risks, and ensure smooth operations at 55 °C.

2.1 Cooling Methods

Two cooling methods were employed during the handling of high-temperature coal cargo on MV. ALCYONE I:

Conventional Method: The coal is spread out using bulldozers to release the trapped heat. The first step in addressing this issue is to spread and break up the coal

(treatment by bulldozer) at locations where the temperature exceeds 55°C. High-temperature coal must then be separated from coal at normal temperatures. This process involves using bulldozers and loaders to level the coal. As the high-temperature coal is moved and spread out, trapped heat can dissipate, preventing the heat from concentrating in one area and spreading to others. The time required for handling this coal typically ranges between 3 to 5 hours.

Chemical Method: Chemical agents are applied to reduce the coal temperature, particularly in cases of self-heating. e contribution should contain no more than four levels of headings. After the handling process using bulldozers, the next step involves the application of chemical treatments, where the cooling liquid is transported by the cargo owner (shipper) using small boats. The cooling treatment with chemical agents is an efficient and safe method used to reduce the temperature of overheated coal. This procedure is commonly employed in the transportation and handling of high-temperature coal, especially to prevent the potential risk of spontaneous combustion, which can occur when coal becomes too hot. Self-heating is a natural increase in coal temperature that can happen during transportation, such as when coal is shipped via waterways like barges. This occurs due to the coal's exposure to oxygen and high ambient temperatures. Oxidation at normal temperatures releases heat, and if the heat generated is greater than what can be dissipated through conduction and evaporation, the coal's temperature will naturally rise—a process known as coal self-heating. In severe cases, this can even lead to steaming within the coal cargo. If the temperature from self-heating continues to rise beyond the critical threshold, spontaneous combustion can occur. The application of chemical cooling treatments requires special attention to safety, environmental protection, and the effectiveness of the cooling process. Therefore, it is crucial to follow applicable guidelines and regulations and to collaborate with technical experts or chemical specialists to ensure the process is conducted safely and efficiently.

3 Challenges

The primary challenge highlighted in this study was the significant increase in operational costs related to cooling high-temperature coal. These elevated costs arose due to the need for additional labor, specialized equipment, and chemical treatments required to safely manage the overheated coal. Handling high-temperature coal involves a complex process of separating, cooling, and constantly monitoring the cargo, all of which require additional resources. This results in higher expenses for the shipping company, as more personnel and machinery must be deployed to ensure the safe transportation of coal.

Furthermore, the management of coal temperatures often causes delays in the loading and unloading process. These delays, in turn, lead to demurrage charges—penalties imposed when a vessel is detained beyond the agreed-upon timeframe. The extra time needed for cooling operations, such as using bulldozers to spread the coal and applying chemical treatments, means the vessel remains idle for longer periods,

further driving up costs for the shipping company. Consequently, both direct operational expenses and indirect costs due to delays combine to pose a significant financial challenge for the company.

3.1 Safety and Compliance

Adhering to international safety standards is essential when handling high-temperature coal, as it poses significant risks such as spontaneous combustion and environmental hazards. To ensure the safe transport and storage of coal, strict compliance with guidelines such as the International Maritime Solid Bulk Cargoes (IMSBC) Code is mandatory. These standards mandate regular monitoring of coal temperatures throughout the loading, transit, and unloading processes.

Digital thermometers are used to frequently check the temperature of the coal. Any coal that exceeds the critical temperature threshold of 55°C must be treated immediately to prevent potential hazards. If coal is found to be at a dangerously high temperature, safety protocols require that cooling measures be implemented without delay. These measures may include spreading the coal to release trapped heat or applying chemical agents to rapidly reduce its temperature.

In addition to monitoring, crews must follow specific procedures to ensure the safety of both the cargo and the vessel. This includes proper ventilation to avoid the buildup of gases and maintaining separation between high-temperature coal and other cargo. The continuous application of these safety protocols helps prevent incidents such as fires or explosions, ensuring that both the crew and the environment are protected. Compliance with these international standards not only safeguards operations but also minimizes potential legal and financial liabilities for the shipping company.

4 Conclusion

- a. High-temperature coal cargo management on MV. ALCYONE I involves specific handling techniques to mitigate the risks associated with overheating, such as spontaneous combustion. The coal's temperature is regularly monitored, and any coal exceeding 55°C is treated promptly using a combination of mechanical (bulldozer spreading) and chemical cooling methods. These steps are essential for maintaining the safety of the vessel and its crew during transport.
- b. The main challenges in handling high-temperature coal include increased operational costs, as the need for additional labor, equipment, and chemical cooling methods drives up expenses. Furthermore, managing coal temperatures causes delays, which can lead to demurrage charges, increasing the financial burden on the shipping company.
- c. The solutions implemented to address these challenges focus on preventing the temperature from reaching dangerous levels. This includes spreading hot

coal to release trapped heat, using chemical cooling agents, and continuously monitoring temperatures with digital thermometers. These solutions aim to balance safety with operational efficiency, ensuring that risks are mitigated without excessively increasing costs. The importance of regular monitoring is to mitigate risks and reduce additional costs.

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