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Implementation of the principle of strict liability in environmental law: A case study of Cesium-137 Radiation Exposure in the Modern Cikande Industrial Area

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ABSTRACT

This study aims to examine the government's efforts to enforce environmental law as a form of legal protection for communities and workers affected by exposure to Radioactive Cesium-137 in the Modern Cikande Industrial Area. This study employs a qualitative descriptive method with a normative juridical and case study approach. The findings indicate that the company responsible for exposure to Radioactive Cesium-137 can be held legally accountable based on the principle of strict liability. The conclusion of this study indicates that the government needs to enhance the supervision of industrial activities that are vulnerable to pollution from hazardous and toxic waste materials. Furthermore, the government must enforce strict legal measures regarding environmental violations in accordance with the principle of strict liability and applicable laws and regulations.

Keywords: Strict Liability, Cesium-137, Modern Cikande Industrial Area

1. INTRODUCTION

According to the law, a good and healthy environment is the right of every citizen, particularly mandated in Article 28H Paragraph (1) of the 1945 Constitution of the Republic of Indonesia. This provision is further clarified in Law Number 32 of 2009 on Environmental Protection and Management. Unfortunately, the mandate in the regulation has been eroded by rampant human-caused pollution. Environmental pollution has become an increasingly important issue that must be addressed promptly.

It is important to remember that discussions related to the environment are not solely about nature. According to Law Number 32 of 2009, the environment is a unity of space with all objects, forces, conditions, and living creatures, including humans and their behavior, that affect nature, the continuity of life, and the well-being of humans and other living beings. This means that the environment encompasses not only physical elements but also social, economic, and cultural ones.

Pollution and environmental degradation are serious issues in Indonesia. Therefore, there is a need for law enforcement efforts that play an important role. Law enforcement can serve as a regulation to address environmental problems, guided by Law Number 32 of 2009 concerning the Management and Protection of the Environment (Taufan, 2021). Humans, whether in their position as members of society, business actors, law enforcement officials, or policymakers, must possess environmental legal awareness, albeit gradually, from merely knowing to complying with and respecting various existing environmental legal provisions (Fadli, 2016).

Furthermore, empirical data indicate that Indonesia faces serious challenges in managing hazardous and toxic waste (B3). According to a report from the Ministry of Environment and Forestry (KLHK), the amount of hazardous and toxic material waste (B3) generated continues to increase each year, in line with the growth of the industrial and manufacturing sectors. This raises concerns about the negative impacts on public health and the environment if they are not properly managed. Therefore, strict regulations and effective implementation are crucial to ensure that hazardous and toxic material waste (B3) is managed safely and responsibly (KLHK, 2021).

Hazardous and toxic material waste are substances, energy, and/or other components that, owing to their properties, concentration, and/or quantity, can directly or indirectly pollute and/or damage the environment and/or pose a threat to the environment, health, and survival of humans and other living beings. In relation to the case of environmental pollution caused by hazardous and toxic material waste in the form of radioactive contamination of Cesium-137 in the Modern Cikande Industrial Area, the authors are interested in examining it with the research title "Implementation of the Principle of Strict Liability in Environmental Law: A Case Study of Cesium-137 Radiation Exposure in the Modern Cikande Industrial Area.

2. METHOD

This study employs a qualitative descriptive method with a normative juridical and case study approach. The normative legal approach is used to analyze legislation related to the environment, particularly concerning pollution from hazardous and toxic waste materials. The authors' team also employs a legal principle in the form of strict liability. A case study approach is utilized to examine a case in depth. In this study, the authors investigated the case of Cesium-137 radioactive exposure in the Modern Cikande Industrial Area.

3. RESULT AND DISCUSSION

3.1 The Case of Cesium-137 Radioactive Contamination in the Cikande Modern Industrial Area

Recently, the Modern Cikande Industrial Area in Serang Regency has become a hot topic in public discussions. This event stemmed from the export activities of frozen shrimp produced by one of the companies located in the Modern Cikande Industrial Area, namely PT Bahari Makmur Sejati (BMS Food).

It began with a finding from the Food and Drug Administration (FDA), the United States agency responsible for overseeing food and drugs, which rejected the export of frozen shrimp from Indonesia. The FDA also urged the public not to consume, sell, or serve imported frozen shrimp from Indonesia, particularly those imported from PT Bahari Makmur Sejati (BMS Food). The FDA stated that PT Bahari Makmur Sejati (BMS Food) had violated the Federal Food, Drug, and Cosmetic Act (FD&C Act), which is a law in the United States (FDA AS, 2025)

From this incident, the main concern was the source of radioactive Cesium-137 found in the frozen shrimp products of PT Bahari Makmur Sejati (BMS Food). This situation has prompted the government to act swiftly to address the issue. In this regard, the Ministry of Environment (KLH), Serang Regency Government, Indonesian Army (TNI-AD), National Police (POLRI), National Research and Innovation Agency (BRIN), and Nuclear Energy Regulatory Agency (BAPETEN) conducted investigations to identify the source of the Cesium-137 radiation contamination. From these investigations, there is a strong suspicion that radioactive exposure to Cesium-137 in the Modern Cikande Industrial Area originates from a metal smelting factory, namely PT Peter Metal Technology (PT PMT). The radioactive substance originated from scrap material present at PT PMT. This finding led the government to take decisive action by sealing off PT Peter Metal Technology. Sealing was carried out by the Ministry of Environment or the Environmental Control Agency (KLH/BPLH). In this incident, the government established a cross-sectoral Task Force (Satgas) and designated a special zone. See Figure 1

Figure 1. Location of PT Peter Metal Technology in the Modern Cikande Industrial Area
(Pradipta, 2025)

Hanif Faisol Nurofiq, as the Minister of Environment and Head of the Environmental Control Agency, has set a target for the decontamination process in the Modern Cikande Industrial Area to be completed by December 2025. Decontamination is the process of cleaning or neutralizing an object, surface, area, or region that has been exposed to hazardous contaminants, including radioactive hazardous substance Cesium-137. To facilitate the decontamination process, the government is undertaking relocation efforts for residents in the Red Zone, specifically in Kampung Barengkok, Sukatani Village, Cikande District, and Serang Regency. Residents in the red zone are being moved to safer locations, one of which is near the Sukatani Village Office. This step has been taken by the government as a rapid response to protect residents from exposure to radioactive Cesium-137. Phase I of the relocation has been completed, followed by the implementation of Phase II of the relocation, which began on October 26, 2025.

The case of radioactive Cesium-137 in the Modern Cikande Industrial Area serves as both a criticism and a serious reprimand for the government. In this regard, the government can be said to be "negligent" or "careless." If the U.S. The FDA did not conduct a serious investigation into frozen shrimp products from Indonesia suspected of containing radioactive Cesium-137. It is possible that the

Indonesian government remains unaware of the significant danger threatening the safety of its citizens and the global community at large. This threat arises not only from the frozen shrimp products but also from the safety of residents living around the Modern Cikande Industrial Area, particularly those still within the red zone and the workers who operate daily in factories or companies located in areas exposed to Cesium-137.

In addition to relocating residents in the red zone, the government is also conducting health checks on workers in the Modern Cikande Industrial Area and residents living in the red zone. From these examinations, nine workers in the Modern Cikande Industrial Area tested positive for radioactive Cesium-137. These nine workers received intensive care at Fatmawati Central General Hospital in Jakarta and were administered *Prussian Blue pills*, which are medications designed to help eliminate or cleanse radioactive substances from the body (Kumparan News, 2025). The examinations and intensive care of these workers represent the responsibility of both the company and the government to protect the occupational health and safety (OHS) of workers. The incident in the Cikande Industrial Area harmed many parties. It affects not only workers and local residents but also consumers both domestically and internationally. For instance, consumers of frozen shrimp products exported to the United States. Fortunately, the U.S. government took immediate and decisive action. Otherwise, the frozen shrimp products from Indonesia would have become a significant "*boomerang*"

3.2 Legal Protection for Communities Affected by Cesium-137 in the Cikande Modern Industrial Area

The subject of criminal law in environmental crimes is outlined in Article 1, number 32 of Law Number 32 of 2009 concerning the Protection and Management of the Environment, which states that "Every person is an individual or a business entity, whether legal or non-legal." The term "business entity" can be interpreted as a corporation or company, which means that a corporation or company can be part of the subject of environmental crimes and can be held criminally liable, as formulated in Law Number 32 of 2009 concerning the Protection and Management of the Environment (Muchtar, 2015).

Civil law also regulates environmental disputes. The resolution of disputes in civil law has several aspects, one of which is liability. In Indonesia, there are two forms of civil liability: general (ordinary) liability and special liability (Siahaan, 2004). The legal basis for ordinary (general) liability is found in Article 1365 of the Civil Code, which states that any unlawful act that causes harm to another person obliges the person who, due to their fault, has caused the harm to compensate for the loss (Muchtar, 2015). Article 1 number 25 of Law Number 32 of 2009 concerning Environmental Protection and Management states that an environmental dispute is a disagreement between two or more parties arising from activities that have the potential to and/or have impacted the environment. Thus, the subjects of the dispute are the perpetrators and victims of environmental impacts, while the object of the dispute is the activities that have the potential to and/or have impacted the environment.

Civil liability of a specific nature applies the principle of Strict Liability. The principle of strict liability, known as absolute liability, is a legal concept that determines that individuals or companies can be held accountable for the damages they cause without having to prove the existence of fault, whether intentional or negligent. In this case, the injured party only needs to demonstrate the damages incurred without needing to prove the fault of the perpetrator. This concept differs from common law systems, which generally require proof of the presence of fault in the actions of the perpetrator. The Strict Liability system is a legal framework that greatly benefits victims in claiming the perpetrator's liability. This system is appropriate because, in an era of advanced and sophisticated technology, many people become victims of the impacts of modernization, including environmental pollution (Muchtar, 2015).

Administrative environmental law is oriented towards resolving issues of environmental pollution (focusing on acts of pollution). The resolution of environmental pollution cases from the perspective of administrative environmental law is carried out by the government apparatus or, more concretely, by officials authorized to issue permits. The means used are supervision and administrative sanctions. Supervision serves as a preventive measure against environmental pollution, while administrative sanctions

are a repressive means to address pollution that has already occurred. The purpose of supervision is to prevent environmental pollution and degradation. With a good supervision mechanism, environmental pollution can be avoided. This approach is certainly preferable to taking remedial actions after environmental pollution has occurred, in accordance with the principle of "better to prevent than to cure" (Efendi, 2011).

Environmental permit requirements serve as instruments for preventing environmental pollution. Thus, the authority of the relevant agency or official that issues environmental permits does not end with the issuance of the permit; their authority continues to oversee compliance with the permit's implementation to prevent environmental pollution. Following the aspect of supervision, the next aspect is administrative sanctions. The application of administrative sanctions is a follow-up to supervision. If, based on the supervision of the permitting agency or official, a violation of the permit conditions is found, the permitting agency or official may impose administrative sanctions to terminate the violation (Efendi, 2011).

The principle of strict liability is implied in Law Number 32 of 2009 concerning Environmental Protection and Management (the Environmental Protection Law). Article 88 of the Environmental Protection Law states that any person whose activities involve hazardous and toxic materials or pose a serious threat to the environment is liable for any resulting damages, without the need to prove fault. Furthermore, the principle of strict liability is also regulated in the "UU Cipta Kerja". However, there is a significant change compared with the Environmental Protection Law. In the "UU Cipta Kerja", the phrase "absolutely liable for any resulting damages without the need to prove fault" has been removed and replaced with "absolutely liable for any resulting damages from their business and/or activities." This implies that proof of (such as intent or negligence) is still required.

In Indonesia, the provisions regarding radiation safety systems and the security of radioactive materials are regulated by Government Regulation Number 45 of 2023 concerning Ionizing Radiation Safety and Security of Radioactive Materials. The legal framework underlying this regulation is Law Number 10 of 1997 on Nuclear Energy. This regulation also played a role in establishing the Nuclear Energy Regulatory Agency (BAPETEN), which is responsible for overseeing all activities related to nuclear utilization. In Government Regulation Number 45 of 2023 concerning Ionizing Radiation Safety and Security of Radioactive Materials, radioactive materials are defined as substances that contain at least one radionuclide whose activity or concentration is equal to or exceeds the exemption level.

Considering the dangers posed by radioactive substances, Government Regulation Number 45 of 2023 also regulates radiation safety. Radiation safety is a condition in which humans and the environment are protected from the harmful effects of ionizing radiation through radiation protection measures. Radioactive waste is regulated under the Law of the Republic of Indonesia Number 10 of 1997, concerning Nuclear Energy. Article 1, paragraph 8 states that radioactive waste is radioactive substances and materials, as well as equipment that has been contaminated with radioactive substances or has become radioactive due to the operation of nuclear installations and can no longer be used. Under the existing legal system, Indonesia is obligated to provide protection for the community and workers affected by exposure to radioactive Cesium-137 in the Cikande Industrial Area.

This incident can be processed through various legal avenues, including criminal, civil, and administrative laws. Each of these legal pathways has different focuses and consequences according to statutory provisions. It is important to emphasize that these various legal routes can operate simultaneously and complement one another. For example, the Ministry of Environment and the Nuclear Energy Supervisory Agency can take action by imposing administrative sanctions; however, victims have the right to file a civil lawsuit, and authorities can proceed with criminal prosecution against those deemed responsible for the incident. In the case of the Cesium-137 radiation contamination that occurred in Cikande, two companies were considered responsible for the event: PT Peter Metal Technologi (PMT) and PT Modern Industrial Estate, the manager of the Modern Industrial Area in Cikande..

The Ministry of Environment (KLH) filed a lawsuit against the two companies. The lawsuit is still being drafted by the government. PT Peter Metal Technologi is being sued for allegedly being the main source of Cesium-137 contamination, while PT Modern Industrial Estate is being sued for its negligence

in managing the industrial area. Currently, the government is still calculating the amount of compensation that must be paid by both companies. In addition, these two companies are also being asked to take responsibility for handling and cleaning up radiation contamination around the Modern Cikande Industrial Area. The incident in the Modern Cikande Industrial Area is hoped to serve as a reflection for all parties, especially the government, in terms of supervision and enforcement of environmental law in the industrial sector.

4. CONCLUSION

The radioactive contamination of Cesium-137 in the Modern Cikande Industrial Area has drawn severe criticism from the Indonesian government. In this regard, the Indonesian government has been negligent in supervising industrial activities that produce hazardous and toxic waste. From this incident, the principle of strict liability can be used as a basis for the resolution. Environmental pollution cases, such as those occurring in the Modern Cikande Industrial Area, can be addressed through three legal avenues simultaneously: administrative environmental law, civil environmental law, and criminal environmental law. This incident serves as a reminder that good regulations will not operate efficiently if the implementation of the law is still weak, both in terms of supervision and enforcement.

Ethical Approval
Not Applicable

Informed Consent Statement
Not Applicable

Authors' Contributions
AIN contributed to the conception and design of the study, conducted the legal framework analysis, and prepared the initial manuscript. SJ collected and analyzed the case-related data, performed normative juridical interpretation, and contributed to refining the research methodology. AA provided critical revisions to the legal analysis, validated the interpretation of strict liability principles, and supervised the overall research process, including the final manuscript review.

Disclosure Statement
The Authors declare that they have no conflict of interest

Data Availability Statement
The data presented in this study are available upon request from the corresponding author for privacy.

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