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Legal Dilemmas and Institutional Innovation in Nuclear Pollution Control under the Framework of International Maritime Law-Based on the Fukushima Nuclear Wastewater Discharge Incident

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Abstract: In the context of increasingly close international exchanges and cooperation, the concept of protecting the marine environment and rights has become increasingly deeply rooted in people's minds. Based on the Fukushima nuclear wastewater discharge incident, the concept of the marine community and even the human community as a whole has gradually become a topic of concern and discussion. This article uses the method of literature research and legal text analysis to deeply explore the legal dilemmas and institutional innovations in nuclear pollution control under the framework of international maritime law. This study, based on the background of the times and legal background, proposes corresponding innovative solutions and breakthrough viewpoints for the nuclear pollution control mechanism, post-event dispute resolution mechanism, and judicial enforcement mechanism. It optimizes and supplements the determination of state responsibility and the regulation of existing normative legal documents and also analyzes and proposes innovations for the dispute resolution mechanisms internationally. Focusing on pre-emptive prevention and post-event measures, it further understands and supplements nuclear pollution control. This is done to solve the marine rights protection issues caused by marine environmental protection in the international community.

Keywords: International Law, International Maritime Law, Nuclear Wastewater, Damages Compensation, International Disputes

1. Introduction

The United Nations Convention on the Law of the Sea (hereinafter referred to as the "Convention") came into effect on November 16, 1994. The Convention focuses on maritime delimitation and rights, marine environmental protection, marine scientific research, maritime dispute resolution, and the high seas system, and has 170 contracting parties. The Convention clearly stipulates that all countries have the obligation to protect and preserve the marine environment. At the same time, marine environmental protection has reached a high consensus internationally with the emergence of the concept of "humanity as a community". However, on March 11, 2011, a major earthquake

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occurred near the Fukushima Prefecture in Japan, which led to a 7-level nuclear leakage incident at the Fukushima nuclear power plant that attracted worldwide attention. The Japanese government, without finding a reasonable and legal storage method and disposal approach, disregarded all domestic and international voices and "decided" to launch the project of discharging nuclear contaminated water into the Pacific Ocean through the near-shore submarine pipeline. Regarding this incident, the current academic community mainly focuses on the research of whether Japan has violated its international law obligations. However, due to the international law of the sea failing to provide precise and complete definitions for terms such as nuclear wastewater and nuclear waste discharge standards, notification systems, etc., it has caused a series of obstacles in the attribution of responsibility of the state, emergency measures after the nuclear pollution incident, and the determination and compensation of damages [1, 2]. Some scholars believe that Japan, as a contracting state, has violated its obligations and can be attributed to the state, constituting an international wrongful act, and should bear state responsibility [1]. Based on this, this study uses the literature research method and legal text analysis method to explore the legal dilemmas and institutional optimization and innovation in maintaining the rights and interests of the damaged country and pursuing compensation liability at the level of nuclear pollution governance based on the international law of the sea.

2. Literature review

Regarding the relevant regulations of the Convention, it has clearly required the obligations and responsibilities that contracting states should fulfill. Some scholars believe that Japan's decision to discharge nuclear wastewater into the ocean is entirely based on considerations of its own economy and disposal costs, and the London Dumping Treaty has clearly regulated the behavior of intentionally dumping waste into the ocean. However, after a meeting within Japan, it chose an emission method that could effectively "avoid" the application of the London Dumping Treaty. Therefore, it is necessary to clarify the content of international law norms for attributing responsibility of the state, improve the principle of obligation fulfillment in international environmental law, and reasonably regulate Japan's nuclear wastewater disposal behavior [3]. Additionally, some scholars believe that in the current status of international dispute resolution mechanisms related to nuclear wastewater discharge, there are problems such as high litigation costs and difficulty in tracing the attribution of damage rights, which can be summarized as the deficiencies in the regulation of nuclear pollution part under international law [4].

At present, most scholars are dedicated to researching institutional optimization issues at the level of nuclear pollution governance in international law of the sea. Starting from analyzing the current problems, seeking "loopholes" in the regulation from the problems, and then "filling the holes". However, some scholars have introduced the concept of "humanity as a community" and further improved it from the legal perspective, exploring the relationship between "national interests" and "common interests of humanity" from the perspective of the state and humanity, and hoping to seek a balance between the two to further enhance the recognition of the international law of the sea in the international community and conduct efficient behavioral regulation and rights protection for all countries [5]. Through the research of theoretical and practical circles in the past decade, specific legal dilemmas and institutional optimization problems have become the mainstream direction of research, analyzing the real problems brought about by existing international events, and discussing the legal problems, political problems, and national interests' problems faced by the international marine framework.

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Furthermore, from the perspective of nuclear pollution governance, further supplementation and explanation are needed for the preventive measures and post-event measures. Based on this, this report's research concludes that the existing studies have discussed that Japan, as a contracting party, needs to bear the national responsibility for discharging nuclear wastewater into the ocean. However, they lack in-depth studies on the rights and interests of the affected countries and compensation after the fact.

3. Legal dilemmas in nuclear pollution control under the international law of the sea and the responsibility of states

3.1. Legal dilemmas in nuclear pollution control under the international law of the sea

Based on the current facts, eight months after the start of the nuclear wastewater discharge, radioactive substances will appear in the eastern waters of Taiwan. Subsequently, they will rapidly spread to the southeastern coastal areas of our country and affect the East China Sea region and the Bohai Sea region. Therefore, as time goes on, the area of nuclear pollution will show a trend of continuous expansion [6].

Domestic and foreign scholars have also published research results at the legal and practical levels regarding the nuclear wastewater discharge incident. Based on this, this study summarizes the legal dilemmas encountered in nuclear pollution control under the international law of the sea, mainly concentrating on three aspects: the difficulty in tracing liability for damages, the high cost of environmental litigation, and the structural defects of the rule system.

3.1.1. Difficulty in tracing liability for damages

By comparing the relevant legal norms of China and Japan regarding nuclear accident compensation liability, it can be found that the contents of Article 2, Article 8, and Article 10 of the reply of China on the issue of nuclear accident compensation liability are consistent with the content of Article 3 of the Atomic Energy Compensation Law of Japan and the contents of Chapter 1 to Chapter 4 of the Implementing Order of the Law on the Regulation of Radioactive Isotopes and Elements of Japan. They all clearly stipulate the principle of no-fault liability, that is, the nuclear facility operator needs to bear unlimited liability for nuclear accidents, regardless of whether there is fault [6, 7]. Such provisions raise the controversy regarding the tracing of liability for damages. The dispute lies in whether the liability should be traced to Tokyo Electric Power Company, which is the executor, or to the Japanese government, which is the decision-making party.

Tokyo Electric Power Company, as the direct operator of the nuclear power plant, mainly works by using its own nuclear wastewater treatment technology (such as the claimed ALPS technology), to treat other nuclides in the nuclear wastewater except tritium to meet the standards and reduce the tritium concentration to below the international standard, and to implement the decision of the Japanese government on the time and location of nuclear wastewater discharge. Based on this, as the operator of the nuclear power plant in Japan, the Japanese power company is only responsible for nuclear wastewater treatment technology, nuclear wastewater discharge operations, and responses to short-term accidents. The Japanese government intervenes in the decision-making as a government entity, agrees with the technical feasibility of Tokyo Electric Power Company's technology and obtains the support of the International Atomic Energy Agency, and regards the discharge decision as a national task. According to the "Draft Provisions on the Responsibility of States for International Illegal Acts", Articles 4 to 11, the entities or individuals authorized to exercise

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government rights or individuals or groups actually under the command or control of the state, the state is responsible for the actions of such entities or individuals. Therefore, Tokyo Electric Power Company, which was originally a privately-owned enterprise, after the nuclear accident in Fukushima in 2011, through the "Nuclear Damage Compensation Support Institution", invested 1 trillion yen and obtained approximately 50.1% of the voting equity, becoming the actual controller of Tokyo Electric Power Company. Although the company still maintains the legal form of a private enterprise, the act of discharging nuclear wastewater from Fukushima and the actual control of the company by Japan have met the relevant contents of the bill, including Article 139 of the Convention regarding liability for damages and the understanding and analysis of the content related to "the victim country", it can be determined that the damage caused to other countries in terms of economy and environment by the discharge of nuclear wastewater from Fukushima requires responsibility and compensation [7, 8].

3.1.2. Structural defects of the rule system

Promoting the revision of the Convention and providing specific explanations for the definition of specific terms is conducive to reducing disputes in the international community regarding relevant content. For example, in the case of discharging nuclear wastewater from Fukushima, the Japanese side claimed that the discharged nuclear wastewater was not nuclear wastewater and had already reduced the relevant atomic elements contained therein to safe international standards through relevant technologies. However, the existing normative legal documents could not verify the accuracy of their data. Therefore, in addition to specific explanations and supplements to the specific provisions of the United Nations Convention on the Law of the Sea (UNCLOS), the construction of a specialized international convention can be more targeted. As the application of nuclear energy becomes increasingly widespread internationally, specific definitions of terms such as nuclear wastewater, nuclear wastewater, discharge standards, safety standards, etc. are made in specialized international conventions. These definitions include provisions for the prevention of nuclear accidents in advance and emergency measures after the event, as well as the supplementation of corresponding penalty mechanisms to address principles and obligations related to the Convention and other relevant current and effective normative documents. This is to prevent incidents such as the international disputes caused by the discharge of non-nuclear wastewater by Japan, where the nuclear elements in the wastewater are below international standards.

3.2. Japan's discharge of nuclear wastewater violates the legal basis of international ocean law and the assumption of state responsibility

The Convention came into effect on November 16, 1994, with 168 contracting parties including the European Community and the European Union. The Convention clearly stipulates the rights and obligations of each country in protecting and preserving the marine environment in Article 194 and Article 195 and emphasizes that contracting states should not transfer activities that may harm the marine environment. It also ensures the protection of the marine environment and related biological resources and other important resources. An international maritime law court has been established internationally, and litigation is carried out to safeguard the maritime rights of each country.

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3.2.1. Violation of principles and obligations of international maritime law

According to Article 145, Article 194, Article 195, and Article 210 of the Convention, Japan, as one of the contracting parties, through the discharge of nuclear wastewater through submarine pipelines and conducting long-term review and monitoring of this behavior, and adopting specific protection measures and countermeasures, has violated the principles and obligations of effectively protecting the marine environment [9].

3.2.2. Legal logic and practical disputes of state responsibility

Firstly, based on the analysis of the actors in the Fukushima nuclear wastewater discharge incident, it can be confirmed that the Japanese government is the main actor, and Tokyo Electric Power Company is the executor with no decision-making power of significant importance. The environmental pollution and economic damage caused by the nuclear wastewater discharge behavior have already violated international obligations, and it can be confirmed that its behavior constitutes an international wrongful act, attributable to the state, namely the Japanese government. Secondly, after constituting an international wrongful act, the Japanese government failed to terminate its behavior and did not guarantee that such behavior would not be repeated. There are disputes regarding compensation, and reasonable and effective satisfaction and economic compensation have not been provided. In combination with the relevant content in Annex 3 of the London Dumping Convention, as long as there is a "possibility" of infringement, the conditions are met. The "risk prevention principle" can be invoked as a reason to request arbitration from the United Nations Ocean Court to take temporary measures, but the danger of nuclear wastewater is difficult to predict, and Japan can argue that the operation of the MOX factory at that time was not organized by the arbitration tribunal to defend the necessary conditions. The "risk prevention principle" has also been practically implemented internationally, such as the Irish v. UK MOX nuclear fuel case. In the practice of the discharge of nuclear wastewater from Fukushima, there are also disputes regarding the political attribute of state responsibility and the legal attribute.

The act of the Japanese government authorizing Tokyo Electric Power Company to discharge nuclear wastewater has aroused strong opposition at home and abroad. In China's response, considering the impact of nuclear wastewater on the marine environment and biological resources, China has issued relevant contents such as "prohibiting the import of Japanese seafood", which is the main manifestation of the responsibility with political attributes in international relations. Its responsibility is more based on the contest of rights between countries and the condemnation of moral stance by the international community and the pressure of public opinion from international society. At the legal attribute level, state responsibility mainly refers to the specific legal consequences that a state has to bear when it violates international law obligations, including treaties and customary treaties. The International Court of Justice can, based on its determination of state responsibility, never rule on issues related to compensation between states.

4. Optimal path for nuclear pollution control under the framework of international maritime law

Based on the existing normative legal documents and the actual legal dilemmas encountered, this paper proposes three paths for innovative optimization of nuclear pollution control under the framework of international maritime law: the reform and improvement of the rule system, the

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innovation and practice of the governance mechanism, and the strengthening of dispute resolution and enforcement mechanisms.

4.1. Reform and improvement of the rule system

The Convention does not provide a clear definition for nuclear wastewater or nuclear waste, only having general provisions on the discharge of pollutants. The London Dumping Convention defines "dumping" and "radioactive waste" clearly, such as dumping includes the disposal of waste from ships, aircraft, or artificial structures into the ocean; "radioactive waste" refers to high-level radioactive waste, but there are specific conditions for the disposal of low-level radioactive waste. According to the technical knowledge provided by the International Atomic Energy Agency's (IAEA) "Safety Standards Series" on the management of radioactive wastewater, but without legal binding force, it can only be regarded as technical recommendations and cannot be regarded as an exact international legal definition. Based on the relevant regulations of the IAEA, if the IAEA considers it to be in line with the standards, it can allow the discharge, but long-term continuous monitoring is required to ensure safety.

Based on this, promoting the revision of UNCLOS and providing specific explanations for the definitions of specific terms is conducive to reducing international disputes regarding related content, such as in the case of the discharge of nuclear wastewater in Fukushima, the Japanese side claimed that the discharged nuclear wastewater was not nuclear waste and had reduced the relevant atomic elements to safe international standards through relevant technologies, but due to the inability to verify the accuracy of the data in the existing normative legal documents, so in addition to specific explanations and supplements to the specific provisions of UNCLOS, establishing a specialized international convention can be more targeted. With the increasing application of nuclear energy internationally, it is necessary to clearly define specific terms such as nuclear wastewater, nuclear waste, discharge standards, safety standards, etc. in the specialized international convention, including the prevention of nuclear accidents in advance and emergency measures after the accident, and supplementing corresponding penalty mechanisms to the principles and obligations included in the relevant current effective normative documents. To prevent international disputes such as the one claimed by the Japanese side that its discharged non-nuclear wastewater has nuclear elements below the international standard.

4.2. Innovation and practice of the governance mechanism

Currently, there is no specialized governance institution for nuclear pollution control in the international community. Each country conducts self-restraint through existing normative legal documents, but it is unable to effectively ensure that illegal incidents do not occur again. Therefore, establishing a new governance institution to improve the governance mechanism can promote international exchanges and cooperation and enable the sharing of information on this platform. The specific operation is as follows.

Firstly, based on the series of management standards for radioactive substances formulated by the IAEA and the relevant content of the "Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management", such as requiring contracting parties to submit national reports and undergo international review , as well as the content of the Chemical, Biological, Radiological, and Nuclear (CBRN) Risk Response Initiative initiated by the European Union, establish a long-term international monitoring mechanism to ensure the safety of the marine environment while enhancing the international ability to deal with radioactive waste and nuclear

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accidents [10]. Under this monitoring mechanism, through international national information sharing and vessels, establish a nuclear pollution early warning network. Through regular reviews and evaluations of the reasonable storage of nuclear energy devices by various countries, the evaluation values should be publicly displayed on the monitoring mechanism platform to enhance the transparency of nuclear safety information and strengthen public society's trust in the country's nuclear pollution control. Secondly, based on the determination of state responsibility, clearly define the liability for damages when determining liability, and effectively ensure that cross-border damage compensation can be resolved. According to the currently valid normative legal documents, in addition to the clearly defined responsible entities mentioned in this article, by establishing a multi-level compensation fund chain such as establishing a nuclear pollution control support institution in one's own country or setting up a specialized compensation foundation by the state to deal with the damages after a nuclear accident, internationally, a specialized nuclear damage claim institution can be established to simplify the adjudication procedures and improve the content of judicial relief. Based on this, efforts should be made to establish a global nuclear pollution liability framework to address the risks of cross-border marine environmental pollution.

Based on the Fukushima nuclear wastewater incident, people can learn that the decision to discharge radioactive water needs to be considered based on various factors and corresponding measures should be taken to prevent long-term and irreversible environmental and health impacts, ensure no unnecessary harm is caused, and at the same time conduct a thorough assessment of the impact of the release of radioactive nuclear elements. Regarding the issue of nuclear pollution control, it is called for global cooperation, recommitting to responsible environmental management, and ensuring that scientific evidence, ecological well-being, and moral responsibility are balanced when making decisions [8].

4.3. Strengthening the dispute resolution and execution mechanism

By establishing a specialized arbitration mechanism instead of the existing International Court. The establishment of a specialized court can clarify the dispute resolution procedures, simplify the burden of proof procedures, and establish a fast-trial institution to ensure that cross-border litigation is not so lengthy, and at the same time solve the problem of excessively high environmental litigation mentioned earlier. This action belongs to a new breakthrough in the judicial approach. In non-judicial means, the most direct access is public opinion pressure and diplomatic pressure. At the ordinary level, such pressure is more based on moral and ethical analysis and has no actual legal binding force.

Facing international issues of nuclear pollution control, senior officials also need to communicate and interact with grassroots people to reach a consistent and reasonable solution. By sharing information on marine environmental research, public trust can be obtained, when facing corresponding governance risks, the right to know of the citizens should be maintained, the complexity and limitations of the marine environment should be recognized, and the importance of public participation in nuclear pollution control should be understood [9].

5. Conclusion

To sum up, from the perspective of Japan's nuclear wastewater discharge in Fukushima and given the current legal predicaments in nuclear pollution control, based on the existing research results, in terms of exploring the issue of national liability, the academic community does not have conflicting viewpoints and has relatively rich theoretical support. Therefore, this study takes the core issue of

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tracing liability for damages as the basis, through research, it is found that when tracing liability for damages, it is necessary to clearly define the national responsibility, and at the same time, both at home and abroad, it is necessary to actively respond to international environmental litigation to seek efficient international dispute resolution solutions. Secondly, at the legal level, it is necessary to further explain the specific terms in international maritime law regarding nuclear pollution, such as radioactive substances, nuclear wastewater, and nuclear waste.

This study focuses on the specific perspective of the discharge of nuclear wastewater from Fukushima. In addition to supplementing the existing normative legal documents, it mainly conducts research on the legal predicaments of tracing liability for damages at home and abroad, analyzes international liability exemptions and the existing international governance mechanisms, resolution mechanisms, and enforcement mechanisms, and proposes to establish a global monitoring and early warning network, improve the cross-border damage compensation mechanism, and propose to break through the existing judicial approaches based on the existing non-judicial means, and based on the current legal background and context of the times, propose supplementary measures such as public opinion pressure and diplomatic pressure.

Nowadays, in order to truly implement the concept of the community with a shared future for mankind, nuclear pollution control has become a topic of heated discussion both domestically and internationally. Therefore, whether at the academic level or in international social practice, the issue of nuclear pollution governance under the background of international maritime law will become a core topic in the future. At the same time, marine environmental protection and marine rights protection will also become popular topics in academic research. Based on this, this research report hopes to provide theoretical support for the realization of the community with a shared future for mankind.

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