

Development of nuclear industry: the roles of international civil liability legal regime for nuclear damage

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Abstract: As International Atomic Energy Agency has stated in its Handbook on Nuclear Law, "Even in situations for which the highest standard of safety has been achieved, the occurrence of nuclear accidents cannot be completely excluded." Therefore, the international legal framework for nuclear damage compensation liability has been evolving since the establishment of Nuclear Energy Agency of Organization for Economic Co-operation and Development (OECD NEA) and International Atomic Energy Agency (IAEA). Over the years, various international treaties have been enacted to address the compensation of nuclear damage and to establish liability regimes for nuclear incidents. To date, these treaties have established a series of legal principles of nuclear damage liability, such as the sole liability principle, the strict liability principle, the financial guarantee principle etc., which have been developing since establishment. This paper offers an overview of the historical development of the principles of these international treaties for nuclear damage liability and thus draws upon both primary and secondary sources, including treaties, official documents, academic literature, and reports by international organizations. The paper reveals that with the awareness of protecting public's rights having been significantly strengthened, the range of compensation has been broader, the matters of immunity from liability for operators of nuclear power plants have been reduced, the limitation of the compensation amount has been higher etc. In conclusion, the international legal regime for nuclear damage liability has been showing a shift from protecting the development of the nuclear industry to a joint protection of both public health and rights and the nuclear industry.

1. Introduction

The Paris Convention on Third Party Liability in the Field of Nuclear Energy, the world's inaugural international treaty addressing nuclear damage compensation, has been in effect for over six decades. Throughout its history, the international framework for nuclear damage compensation has undergone significant evolution, both in its scope and substance. The aftermath of the Fukushima nuclear disaster in March 2011 catalyzed an increase in the number of countries ratifying international treaties related to nuclear damage compensation. This, in turn, has amplified the treaties' influence on both member and non-member states alike. Consequently, more nations are creating, enhancing, and refining their domestic legal frameworks for nuclear damage compensation, drawing upon these international agreements. Therefore, analyzing the developmental trends and key elements of these international treaties is crucial for a comprehensive understanding and study of the nuclear damage compensation legal framework.

2. Expanding Compensation Scope for Nuclear Damage

The definition of compensable nuclear damage has progressively broadened over time. Initially, the 1960 Paris Convention confined compensation to personal injuries, fatalities, and property damage. The scope was widened by the 1963 Vienna Convention to potentially include additional types of damage, contingent upon the approval of the law governing the competent court. The 1997 Vienna Convention further extended this scope to cover a variety of economic losses, environmental damages, and costs associated with preventive measures, all subject to the adjudication of the competent court.

Figure 1 delineates the gradual enlargement of the scope of damages eligible for compensation in the wake of a nuclear incident. This spectrum now embraces personal injuries or death, property damages, economic losses, costs for environmental rehabilitation, income losses attributable to environmental degradation, expenses for preventive actions, and other related economic losses. These latter categories (3 to 7) are recognized provided they conform to the legislation interpreted by the

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competent court. The term "reinstatement measures" denotes initiatives sanctioned by the relevant national authority to repair environmental damage, whereas "preventive measures" involve prudent steps taken after a nuclear incident aimed at averting or mitigating further damage, as judged by the competent court in light of specific circumstances.

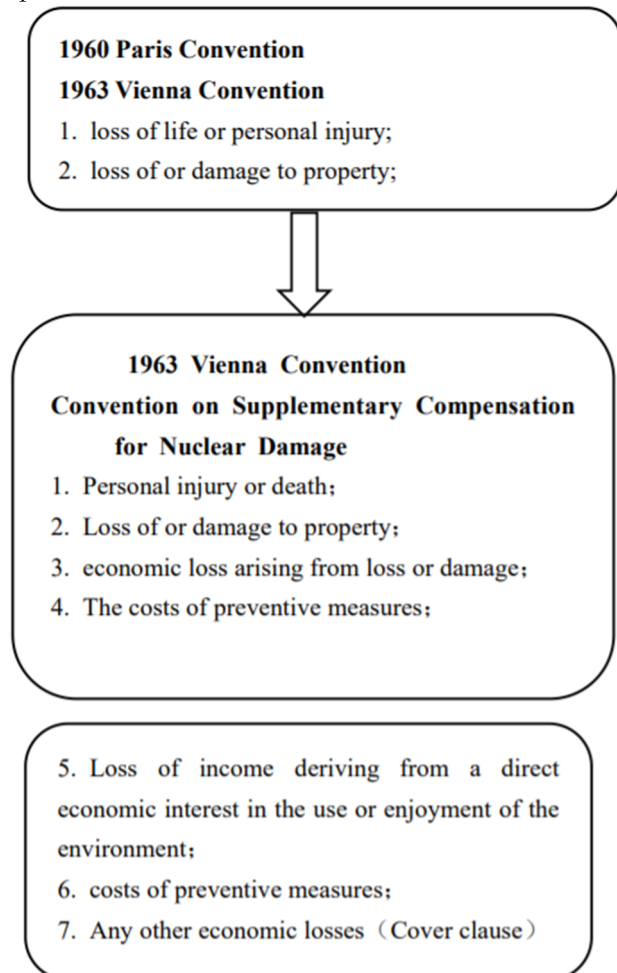


Fig.1 The Scope of Compensation for Nuclear Damage is Increasingly Broad.

3. Fewer Exemptions for Nuclear Facility Operators

International conventions on nuclear damage compensation impose strict liability on operators of nuclear facilities, yet these obligations are not absolute. Specific statutory conditions allow for operators to be exempted from liability for nuclear damage, even in cases where their actions would normally incur such liability. The foundational texts in this domain, the Paris Convention and the 1963 Vienna Convention, clearly delineate the circumstances under which nuclear facility operators may be exempted from compensating for nuclear damage.

The "Paris Convention" Article 9 states that:

The operator shall not be liable for nuclear damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war, or insurrection.

The Paris Convention, in Article 9, specifies that operators are not liable for nuclear damage caused directly by nuclear incidents if those incidents result from acts of armed conflict, hostilities, civil war, or insurrection. Similarly, Article VI of the 1963 Vienna Convention states that operators can be wholly or partially relieved from their compensation obligations if the nuclear damage was caused, in whole or in part, by the gross negligence or intentional misconduct of the damaged party. This article further exempts operators from liability for nuclear damage directly resulting from acts of armed conflict, hostilities, civil war, insurrection, or, unless otherwise specified by the Installation State's law, grave natural disasters of an exceptional character.

To summarize, the earliest international treaties on nuclear damage compensation provide liability exemptions for operators under three conditions:

- 1) Nuclear incidents arising from armed conflict, hostility, civil war, or insurrection;
- 2) Incidents directly caused by severe natural disasters; and
- 3) Incidents where the victim's negligence or intentional acts contribute to the damage, potentially absolving the operator from compensatory obligations, either partially or fully.

The 1997 Convention on Supplementary Compensation for Nuclear Damage reaffirms these exemptions in Article 3, with conditions similar to those in the Paris and Vienna Conventions. However, the 1997 Vienna Convention, and the revised Paris Convention, which was amended in 2004 and came into effect in 2022, reflect a shift. As Figure 2 demonstrates, the revised Paris Convention removes the exemption for nuclear damage caused by severe natural disasters, signaling a move towards fewer exemptions for nuclear facility operators. This change indicates a gradual tightening of the conditions under which operators can claim exemption from liability, effectively reinforcing the principle of strict and exclusive liability for nuclear facility operators in the face of nuclear incidents.

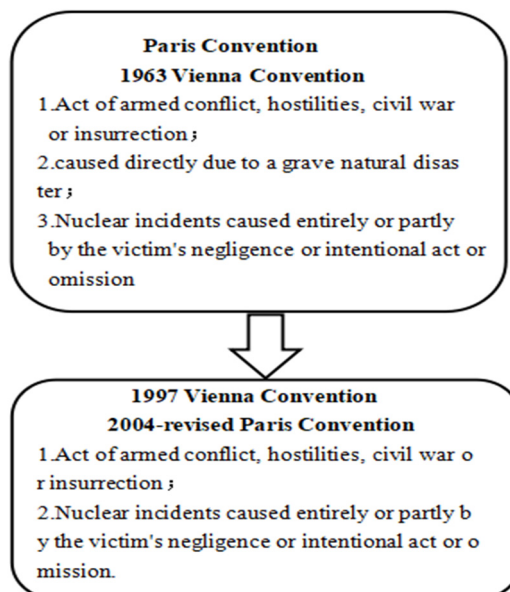


Fig.2 Narrowing Exemptions for Nuclear Facility Operators.

4. Significant Increase in the Compensation Limits for Nuclear Damage

International nuclear damage compensation frameworks set forth in treaties delineate maximum liability limits for nuclear facility operators. These caps aim to protect victims' rights post-incident while preventing the financial collapse of operators and the broader civil nuclear sector. Further, they motivate operators to adopt stricter safety measures, thus mitigating the risk of nuclear incidents.¹

It has become a consensus within the industry that the operation of nuclear facilities must ensure the probability of adverse outcomes is significantly lower than that associated with other accepted industrial activities.² Nuclear power plant reactors are well understood in terms of design safety and operational risks.³ With the relatively steady expansion of the global civil nuclear industry and the improved financial robustness of operators, these compensation limits have been significantly increased.

Specifically, the Paris Convention of 1960, in its Article 7, establishes:

Mandatory liability for nuclear damage from a single incident at no less than 700 million euros by each Contracting Party, ensuring victim protection and industry sustainability.

a) Allowance for reduced liability amounts under specified conditions for certain facilities and nuclear substance transportation, with absolute minimums set at 70 million euros and 80 million euros, respectively, to maintain a safety net.

b) Requirement that compensation for nuclear substance transportation incidents does not reduce operator liability below 80 million euros or a specified higher amount, safeguarding transport-related claims.

c) Application of liability amounts and national provisions uniformly to operators, regardless of the incident's location, promoting consistency across jurisdictions.⁷

d) Permission for Contracting Parties to regulate nuclear substance transit, including potential liability increases for foreign operators, capped at domestic maximums, ensuring equitable treatment.

e) Exemption of specific carriage scenarios from paragraph (e) as per Convention stipulations, clarifying the scope of liability in varied transport contexts.

f) Flexibility for Contracting Parties to adjust liability minimums in engagements with non-Contracting States, contingent on reciprocal arrangements, fostering international cooperation.

g) Clarification that interest and court-awarded costs are additional to the liability cap, emphasizing comprehensive victim compensation.

h) Provision for currency conversion of stipulated sums into national currency, accommodating economic diversity among Contracting Parties.

i) Assurance of direct compensation claim rights for affected individuals, streamlining the legal process for victims.

Article 7's original setting at 15 million European

Currency Agreement units reflects an adaptable framework, allowing for adjustments based on insurance or financial guarantees. Subsequent amendments in 1964, 1982, and 2004 significantly raised these caps to 150 million SDRs, 1.5 billion SDRs, and 700 million euros, respectively, indicating a trend towards heightened operator accountability.

Conversely, the 1963 Vienna Convention's Article 5 prescribes a minimum operator liability limit for nuclear damage, ensuring a baseline financial protection for victims while accommodating state-specific legal frameworks.

The 1997 Vienna Convention, Article 5, further iterates on compensation limits, offering a nuanced approach to liability caps based on state provisions and the evolving needs of nuclear damage compensation, marking a progressive step towards ensuring adequate victim compensation and operator responsibility in the nuclear energy sector.⁴

5. Expansion of the Principle of Exclusive Jurisdiction

In response to the evolving dynamics of maritime law, particularly regarding Exclusive Economic Zones (EEZs), and the concerns of coastal nations over possible nuclear incidents during the maritime transport of nuclear materials, the 1997 Vienna Convention and the 1997 Convention on Supplementary Compensation for Nuclear Damage (CSC) have broadened the principle of exclusive jurisdiction by a single court. This expansion, building on the foundations laid by previous international nuclear damage compensation treaties, extends exclusive jurisdiction to incidents occurring within a contracting state's EEZ, specifically for adjudicating nuclear damage compensation claims.⁵ This adjustment aims to streamline the legal process for such claims, ensuring clarity and consistency without altering existing rights or obligations concerning the transportation of nuclear materials.

Both treaties underscore the paramountcy of exclusive jurisdiction by a designated court in cases of nuclear damage.⁶ They delineate that "should a contracting party have declared its EEZ to the depositary prior to a nuclear incident, exclusive jurisdiction for disputes arising from damages in such zones shall reside solely with the courts of that contracting party." To further solidify legal clarity, an additional clause mandates "contracting parties possessing multiple potential jurisdictions to designate a singular court for all legal matters pertaining to any nuclear incident." This measure seeks to avert the complications of disparate judgments, promoting a cohesive approach to compensation fund allocation and distribution.

Furthermore, these updates extend the singular court's exclusive jurisdiction to encompass not only incidents within a contracting state's territory or territorial waters but also those within its EEZ.⁷ However, this extension is explicitly confined to the scope of these Conventions. It emphasizes that such jurisdictional authority is intended solely for the resolution of nuclear damage claims and "does not extend to exercising jurisdiction in ways that

conflict with established international maritime law, including the principles set forth in the United Nations Convention on the Law of the Sea."

6. Establishment of an International Public Fund Mechanism for Compensating Nuclear Damage

As the scope of nuclear damage compensation and the liability limits for operators of nuclear facilities have expanded, some international treaties on nuclear damage compensation have introduced an international public fund mechanism to supplement and address potential shortfalls in compensation, in accordance with domestic legislation.⁸ Under this mechanism, when a nuclear incident occurs necessitating compensation for nuclear damage, the compensation process involves three levels of funding responsibility:

The first level of compensation funds is primarily the responsibility of the operator, with a liability amount set at 700 million euros.

The second level of compensation funds is provided by the state where the nuclear incident occurred, with a liability amount of 500 million euros. It is worth noting that domestic law has the flexibility to specify that this amount be provided by the operator, effectively increasing their maximum liability (e.g., the operator's maximum liability can be set at $700+500=1.2$ billion euros).

The third level of compensation funds is jointly borne by all contracting states based on certain rules. This level has a liability amount of 300 million euros, and the allocation among contracting states is determined based on specific criteria. The primary principle for determining each country's share is their total installed nuclear power capacity. The larger the total installed capacity of nuclear power in a contracting state, the greater its share of the fund to be contributed.⁹

The rules for distributing the public fund among contracting states are as follows:

50% of the fund is allocated based on the ratio of each contracting state's Gross National Product (GNP) to the total GNP of all contracting states, using figures officially published by the Organisation for Economic Co-operation and Development (OECD) from the year preceding the nuclear incident.

The other 50% of the fund is distributed based on the ratio of the thermal power generated by nuclear reactors within each contracting state's territory to the total thermal power generated by all reactors within the territories of the contracting states.

It's important to note that the scope of application of the international public fund mechanism, as stipulated by the 'Brussels Convention,' is limited, primarily involving Western European countries as its member countries.¹⁰

In summary, the 1997 CSC continues and expands upon the public fund system introduced by the Brussels Convention.¹¹ It establishes a two-tier international public fund mechanism, ensuring compensation for nuclear damage. Contracting States are required to contribute to these funds, with the second tier of funding shared collectively among them, based on criteria related to

nuclear power capacity and economic factors. The CSC aims to address potential shortfalls in compensation for nuclear damage resulting from nuclear incidents.¹²

7. Conclusion and Insights from the Evolution of the International Civil Liability Regime for Nuclear Damage

Nuclear energy, crucial for attaining peak carbon and achieving carbon neutrality, represents a significant low-carbon energy source.¹³ Despite its benefits, the potential for nuclear incidents exists, posing challenges as the industry progresses. The nuclear damage liability system, which encompasses both pre-incident financial guarantees and post-incident compensation, plays a pivotal role in balancing the legal dynamics between responsible parties and victims. Pioneering organizations such as the International Atomic Energy Agency and the OECD Nuclear Energy Agency have developed foundational treaties—such as the 1960 Paris Convention, the Brussels Supplementary Convention, the 1963 Vienna Convention, the 1997 Vienna Convention, and the Convention on Supplementary Compensation for Nuclear Damage. These treaties articulate core principles of liability: exclusive liability, strict liability, limited liability, advance financial guarantees, and national supplementary compensation. More than six decades after the inauguration of the first nuclear damage liability treaty, the Paris Convention, the framework has undergone significant evolution. Reflecting on the progression of this system, we observe: firstly, the scope of compensation for nuclear damage has been expanding. Secondly, the number of exemptions available to nuclear facility operators has been decreasing. And, the limits of nuclear damage liability have significantly increased. Moreover, the principle of exclusive jurisdiction has been extended.

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