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The Limits of Nuclear Non-Proliferation: Legal Oversight, Safeguards, and Compliance under the 1968 NPT

Ramlan[1], Suhermi[2], Sasmiar[3], Mardhatillah[4]
[1,2,3]Fakultas Hukum, Universitas Jambi, Indonesia
[4]Fakultas Hukum, Universitas Bengkulu, Indonesia
**Corresponding author* : ramlan@unja.ac.id

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Abstract
Background: *The 1968 Non-Proliferation Treaty (NPT) is the cornerstone of the global nuclear non-proliferation regime, aiming to regulate the peaceful use of nuclear energy, prevent the spread of nuclear weapons, and promote gradual nuclear disarmament. Its principles seek to reduce nuclear threats and create a safer international security environment while preventing future remilitarization.* ***Purpose:*** *This study aims to assess the effectiveness of the NPT in enforcing compliance and preventing proliferation, as well as to identify the main challenges that hinder its successful implementation.* ***Methodology:*** *The research employs a normative legal approach by reviewing NPT provisions, IAEA official reports and instruments, and case studies involving states suspected of developing clandestine nuclear programs.* ***Findings:*** *The International Atomic Energy Agency (IAEA) serves as the primary verification body for NPT compliance through its safeguards system. However, enforcement remains challenging, particularly when states conceal nuclear activities. Limited inspection access exemplified by Iran's decision not to ratify the Additional Protocol, makes it difficult for inspectors to verify undeclared nuclear materials and activities. Furthermore, several structural weaknesses reduce the NPT's overall effectiveness, including reliance on the political will of the international community, imbalances between nuclear-weapon states (NWS) and non-nuclear-weapon states (NNWS), insufficient penalties for violations, and the Escape Clause that allows withdrawal from the treaty.* ***Originality/Value:*** *This research provides a critical evaluation of the NPT safeguard and verification mechanisms, highlighting practical implementation obstacles and their implications for the future of the global non-proliferation regime.*

Keywords: Nuclear Non-Proliferation; International Atomic Energy Agency (IAEA); Nuclear Safeguards and Verification

Abstrak
Latar Belakang: Non-Proliferation Treaty (NPT) 1968 merupakan perjanjian internasional utama yang bertujuan mengatur penggunaan tenaga nuklir untuk tujuan damai, mencegah penyebaran senjata nuklir, serta mewujudkan perlucutan senjata secara bertahap. Prinsip dasar NPT diarahkan untuk menciptakan dunia yang lebih aman dengan mengurangi ancaman nuklir serta mencegah tindakan remiliterisasi pada masa mendatang. **Tujuan:** Penelitian ini bertujuan

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mengevaluasi efektivitas NPT dalam menjalankan fungsi pengawasan dan pencegahan proliferasi, serta mengidentifikasi faktor-faktor yang menyebabkan lemahnya penegakan kepatuhan terhadap perjanjian ini. **Metodologi:** Penelitian menggunakan pendekatan normatif melalui telaah ketentuan hukum internasional, laporan dan instrumen resmi IAEA, serta analisis studi kasus negara-negara yang dicurigai mengembangkan program nuklir secara rahasia. **Temuan:** Badan Tenaga Atom Internasional (IAEA) dibentuk sebagai mekanisme safeguards dan verifikasi kepatuhan terhadap NPT. Namun, pelaksanaannya menghadapi tantangan signifikan, terutama pada negara yang tidak transparan dalam kegiatan nuklirnya. Keterbatasan akses inspeksi, seperti kasus Iran yang belum meratifikasi Additional Protocol, mengakibatkan inspektur sulit mendeteksi materi nuklir tersembunyi (undeclared nuclear material). Selain itu, NPT memiliki kelemahan struktural seperti ketergantungan pada kemauan politik komunitas internasional, kesenjangan hak dan kewajiban antara negara pemilik senjata nuklir (NWS) dan negara non-pemilik (NNWS), lemahnya sanksi bagi pelanggar, dan adanya Escape Clause yang memungkinkan negara mundur dari perjanjian. **Orisinalitas/Keunikan:** Penelitian ini memberikan analisis komprehensif mengenai tantangan implementasi sistem pengawasan NPT dan kontribusinya dalam memperlambat proliferasi nuklir, meskipun tidak sepenuhnya mampu mencegahnya.

Kata Kunci: Nonproliferasi Nuklir; Badan Tenaga Atom Internasional (IAEA); Pengawasan dan Verifikasi Nuklir

A. Pendahuluan

This article examines the issue of supervision over the use and development of nuclear weapons under the international legal framework established by the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) of 1968. Nuclear weapons have recently re-emerged as a highly debated subject, particularly in light of the escalating tensions and conflicts involving Israel and Iran. One of the most compelling aspects of nuclear weapons governance lies in the fact that numerous States across different regions of the world have become parties to the NPT. However, questions remain regarding the nature, scope, and effectiveness of the supervision mechanisms established under the Treaty.

Any use of nuclear weapons would be incompatible with the existing rules of international law applicable during armed conflict, particularly the fundamental principles and norms of international humanitarian law. Such use would also contravene the principles of humanity and the dictates of public conscience. As a cornerstone instrument of international law, the NPT, through the role of the International Atomic Energy Agency (IAEA), is expected to exercise effective supervision over the development of nuclear weapons by both Nuclear-Weapon States (NWS)[1] and Non-Nuclear-Weapon States (NNWS) that seek to develop nuclear weapons. This supervisory function applies to both categories of States.[2] Such oversight is essential, given that nuclear weapons may be classified as weapons of mass destruction that pose an existential threat to humanity. The first use of nuclear weapons by the United States against Japan in 1945 during the

[1] The five States that possessed nuclear weapons prior to the adoption of the NPT were the United States, the Soviet Union (now the Russian Federation), the United Kingdom, France, and China.

[2] ,Alifia Qonita "Treaty on The Non-proliferation of NuclearWeapons, *Law Making Treaty* Volume 8 Number 2 January (2011, hlm.402.

Second World War remains a dark chapter in human history that must never be repeated. Accordingly, robust supervision is indispensable.

The NPT of 1968 is a multilateral international treaty aimed at preventing the proliferation of nuclear weapons, signed on 1 July 1968. At the time of its adoption, the Treaty recognized five Nuclear-Weapon States, while the remaining parties were classified as Non-Nuclear-Weapon States. Over time, however, the number of States possessing nuclear weapons has increased, including Pakistan, India, Israel, and Iran, while North Korea[3] has continued to develop nuclear capabilities as its primary strategic weapon.

The NPT faces significant challenges, particularly from States that are not parties to the Treaty and from non-State actors.[4] Although Nuclear-Weapon States, notably the United States and Russia, have undertaken arms reduction initiatives such as the Strategic Arms Reduction Treaty (START), these efforts have not yielded the expected results. As noted by Muhammad Budiana:

> *"Meanwhile, other initiatives, such as the START (Strategic Arms Reduction Treaty) agreement between the United States and Russia, also seek to reduce the number of nuclear weapons in the world. However, many studies reveal that these disarmament efforts are still far from expectations, especially due to differences in political interests among major countries. According to Kristensen, disarmament has stagnated, and increasing geopolitical tensions at present have encouraged certain countries to re-strengthen their nuclear arsenals."*[5]

Despite the efforts of the United States and Russia to reduce nuclear armaments and to discourage other States from developing nuclear weapons, these initiatives have ultimately proven ineffective. In practice, both States have reportedly provided assistance to their respective allies in the development of nuclear weapons. The United States has allegedly supported Israel, while Russia has covertly assisted Iran in advancing its nuclear weapons program.

The International Atomic Energy Agency, established in 1957 as an autonomous international organization, is mandated to promote the peaceful use of nuclear technology, ensure nuclear safety and security, and prevent the use of nuclear energy for military purposes. The IAEA fulfills these functions through the establishment of safety standards, the supervision and verification of national nuclear programs, and the facilitation of nuclear technology transfers for peaceful applications, including in the fields of health and agriculture.[6] Another core responsibility of the Agency is the supervision and verification of nuclear non-proliferation through safeguards.[7]

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[3] Since its withdrawal from the 1968 Treaty on the Non-Proliferation of Nuclear Weapons (NPT), North Korea has continued to develop nuclear weapons, citing the need to protect itself from perceived threats posed by nuclear-armed States. Yordan Gunawan, Rima Ayu Andriana, "The Proliferation of Nuclear Weapons in North Korea: Intenational Law Perspective:, *Jurnal Cindikia Hukum, vol 5 No 1 (2019)* hlm. 32

[4] Muhammad Budiana, : Nuclear Non-Proliferation and the Future of Global Security," *Journal of Student Collaboration vol 2 number 2, May-Augus (2024)* Researchhttps://myjournal.or.id/index.php/JSCRE-ISSN: 3032-6753Vol. 1, No. 2, May-August(2024), pp.51-65, hlm.52.

[5] Muhammad Budiana, Nuclear Non-Proliferation and…hlm 53

[6] Teknologi Nuklir : Peran IAEA. https://www.iaea. org

[7] The tasks of safeguards and non-proliferation verification include: (a) Ensuring that nuclear material and nuclear technology are not diverted to military purposes or the development of nuclear weapons; and (b)

Nevertheless, despite continuous monitoring by the IAEA, many States remain determined to pursue nuclear weapons development, often justified on grounds of national security. This has contributed to a prevailing perception that national security is best ensured through the possession of nuclear weapons.

The failure of the NPT to effectively prevent NNWS from developing nuclear weapons is also attributable to the involvement of NWS in supporting nuclear weapons development within certain NNWS. The role of the United States and Russia in transferring nuclear weapons technology to their allies has enabled some NNWS to acquire nuclear weapons covertly.[8] Such interference by NWS within the operational sphere of the IAEA has further accelerated nuclear weapons development.

Unsurprisingly, NNWS that benefit from technology transfers have followed suit in developing nuclear weapons. This factor has weakened the effectiveness of supervision, even though nuclear weapons oversight is intended to restrict activities related to the acquisition, development, and use of military capabilities.[9] Another definition describes "arms control" as efforts aimed at limiting the development, production, stockpiling, dissemination, and use of weapons, particularly weapons of mass destruction.[10] In this context, supervision over the development and use of nuclear weapons becomes increasingly critical. The IAEA,[11] as an autonomous institution responsible for implementing the NPT, is therefore expected to carry out its supervisory mandate effectively.

The IAEA is responsible for conducting inspections of nuclear facilities under safeguards agreements. The safeguards system constitutes a technical verification instrument designed to ensure compliance with legal obligations concerning the peaceful use of nuclear energy.[12] The primary objective of the safeguards system is political in nature, namely to provide reassurance to the international community regarding nuclear activities by preventing the diversion or misuse of nuclear materials or facilities through early detection measures. Accordingly, safeguards serve to assure the international community that a State will consistently comply with its rights and obligations in developing nuclear energy for peaceful purposes. The IAEA must ensure that supervision prevents the emergence of a nuclear arms race justified by claims of national security or regional balance, whether by NWS or NNWS.[13]

The protection of humanity and the preservation of the environment for future generations constitute paramount considerations in preventing a nuclear arms race.

Conducting regular inspections and audits of nuclear facilities in Member States in order to verify compliance with international agreements, particularly the Treaty on the Non-Proliferation of Nuclear Weapons (NPT).

[8] An Overview, "Nuclear weapon Under International Law, October (2014).

[9] Tri Cahyo Utomo, "Pengawasan senjata Internasional dan Pengurangan Kekerasan, *E-Journal UNDIP* https ://undip, ac. Id.

[10] Tri Cahyo Utamo, Pengawasan senjata Internasional dan Pengurangan Kekerasan, , hlm. 23.

[11] The International Atomic Energy Agency (IAEA) was established following President Dwight D. Eisenhower's 1953 "Atoms for Peace" speech, with the objective of promoting and overseeing the use of nuclear energy for peaceful purposes.

[12] Timothy Juniver Sambuaga, Caecilia J.J. Waha, Stepan O. Voges, "Peranan Organisasi International Atomic ; Energi Agency, *Jurnal aakultas Hukum Universitas Sam Ratulangi Lex Privatum vo. 13. No. 3 Maret (2024),* hlm. 24.

[13] Sukesh K. Aghara and Marco Marzo, "Nuclear Material Accounting and Control," in *The Oxford Handbook of Nuclear Security*, 1st ed., ed. Christopher Hobbs et al. (Oxford University Press, 2023), https://doi.org/10.1093/oxfordhb/9780192847935.013.27.

Consequently, supervisory functions and cooperation between NWS and NNWS must be continuously strengthened.[14]

Pursuant to Articles II and III of the IAEA Statute and Article III (1)–(3) of the NPT, the IAEA possesses administrative authority over States that violate these provisions, although it lacks direct jurisdictional power. United Nations Security Council Resolutions 1696, 1737, 1747, and 1929 mandate the suspension of nuclear development activities and carry jurisdictional authority; however, they are predominantly technical in nature and do not provide comprehensive sanctions or enforcement mechanisms comparable to those envisaged under the NPT.

The IAEA is a specialized autonomous body operating under United Nations oversight, established to promote and expand the peaceful use of nuclear energy and to supervise States that are parties to, or otherwise bound by, the Treaty on the Non-Proliferation of Nuclear Weapons of 1968.[15] Despite the establishment of the IAEA as the implementing body of the NPT, particularly in the field of supervision, the number of Nuclear-Weapon States has continued to increase since its inception, including Pakistan, India, Israel, North Korea, and Iran. Initially, only five States were recognized as Nuclear-Weapon States. Notably, three States, Pakistan, India, and Israel have developed nuclear weapons without being parties to the NPT.[16] This raises critical questions regarding how the IAEA can effectively supervise States that possess nuclear weapons but are not legally bound by the NPT. Another pressing issue concerns the mechanisms through which the IAEA can exercise oversight over the growing number of States that continue to pursue nuclear armament.

B. Discussion

1. Historical Development of Arms Control

History examines the progression of societies over time in their entirety, whereas legal history focuses on a specific aspect of that progression, namely the law that applies universally and, by extension, to its constituent parts. The ultimate objective of legal history is therefore to identify the legal principles and norms that evolve within society. This analytical framework is equally applicable to the history of arms control in general and nuclear weapons control in particular.[17]

At the outset, it is necessary to clarify the meaning of "arms control" itself. Evans and Newnham, for instance, define arms control as efforts aimed at limiting activities related to the acquisition, development, and use of military capabilities.[18] Similarly, Dougherty and Pfaltzgraff characterize arms control as a form of policy intended to restrict or regulate the qualitative design, quantitative production, methods of development,

[14] Hasan Saygin and Özüm Sezin Uzun, "Nuclear Nonproliferation Regime: Are New Institutions Needed?," *International Journal of Political Science and Urban Studies* 7, no. 1 (2019): 115–31, https://doi.org/10.14782/ipsus.539196.

[15] *International Atomic Energy Agency,* INFCIRC/140 - *Treaty on the Non-Proliferation of Nuclear*

[16] Timothy Juniver Sambuaga, Caecilia J.J. Waha, Stepan O. Voges, "Peranan Organisasi International Atomic, hlm. 25

[17] John Gillisen dan Frits Gorle, *Sejarah Hukum Suatu Pengantar,* (Bandung, Refika Aditama), 2007, hlm.11

[18] Evans, Graham and Jeffrey Newnham, Dictionary of International Relations. London, Penguin Books, 1998, hlm. 33

protection, supervision, transfer, planning, threat, and use of military force and weaponry.[19]

Historically, arms control can be traced back to Ancient Greece, where violations of established rules governing the conduct of warfare entailed the imposition of fines on offending parties. From the era of Ancient Greece through the rise of the Roman Catholic Church, arms control was exercised by transnational authorities, with the Church playing a significant role in supervising the weapons employed in warfare.[20] As time progressed, the development of increasingly sophisticated weaponry posed profound and alarming threats to human civilization. Nevertheless, the legal norms governing such weapons remained largely customary in nature, commonly referred to as international customary law.

Legal rules governing arms control based on custom or unwritten law were inherently vulnerable to violation due to the absence of legal certainty. This vulnerability was further exacerbated by rapid technological advancements in weaponry, which outpaced the development of binding legal norms. Driven by this uncertainty, the international community began to recognize the necessity of codifying arms control rules in written legal instruments.[21]

One of the earliest and most significant examples of such codification was the Strasbourg Agreement of 1675, widely regarded as the first international treaty to restrict the use of chemical weapons. The Strasbourg Agreement prohibited the use of poisoned projectiles and was concluded between France and the Holy Roman Empire. This treaty marked a critical milestone in the evolution of written international legal norms governing weapons.[22]

The first comprehensive international legal conference addressing the regulation of warfare was convened in 1899 through the First Hague Peace Conference. Leaders and representatives from no fewer than twenty-six States participated and subsequently adopted the Hague Conventions. These Conventions regulated the procedures for declaring and conducting war and addressed the use of modern weapons.[23] Moreover, they endorsed the establishment of the Permanent Court of Arbitration. The Second Hague Peace Conference, held in 1907, sought to amend and supplement the provisions of the 1899 Hague Conventions. Although plans existed for a Third Hague Peace Conference, the outbreak of the First World War ultimately prevented its realization.[24]

With the advent of the Second World War, military technology advanced significantly, culminating in the use of nuclear weapons by the Allied forces, particularly the United States, in the atomic bombings of Hiroshima and Nagasaki. These attacks resulted in unprecedented humanitarian devastation. In response to this experience and to prevent

[19] Dougherty, James E and Robert L Pfaltzgraff, Jr, Contending Theories of International Relations: A Comprehensive Survey. New York, Harper Collins, 1990, hlm. 413.
[20] Cahyo Utomo, :Pengawasan senjata.Internasional dan Pengurangan Kekerasan, , hlm. 26.
[21] Evhen Tsybulenko and Aleksi Kajander, "Customary International Humanitarian Law and Article 36 of Additional Protocol I to the Geneva Conventions: A Stopgap Regulator of Autonomous Weapons Systems?," *TalTech Journal of European Studies* 12, no. 2 (2022): 87–112, https://doi.org/10.2478/bjes-2022-0013.
[22] Cahyo Utomo, Pengawasan Senjata Internasional dan Pengurangan Kekerasan, hlm. 27.
[23] Carmen Chas, "Against the Laws of Humanity: Expanding Bullets and the 1899 First Hague Peace Conference," *International Review of the Red Cross*, January 13, 2026, 1–21, https://doi.org/10.1017/S1816383125100982.
[24] Cahyo Utomo, Pengawasan Senjata Internasional dan Pengurangan Kenykerasan, halm. 28-29.

the recurrence of nuclear weapons use, the International Atomic Energy Agency (IAEA) was established in 1957.[25]

Subsequently, under the auspices of the United Nations, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) was adopted in 1968 as a substantive legal framework designed to establish supervisory norms governing the peaceful use of nuclear energy and to prevent the utilization of nuclear technology for military purposes. The NPT thus represents a pivotal development in the history of international arms control law, particularly in relation to nuclear weapons.[26]

2. The 1968 Nuclear Non-Proliferation Treaty and Other Relevant International Agreements

Pursuant to Article 38(1) of the Statute of the International Court of Justice, the sources of international law consist of: (a) international conventions, whether general or particular, establishing rules expressly recognized by the contesting States; (b) international customary law, as evidence of a general practice accepted as law; (c) general principles of law recognized by civilized nations; and (d) judicial decisions and the teachings of the most highly qualified publicists, as subsidiary means for the determination of rules of law.[27]

As early as 1675, the Strasbourg Agreement was concluded and is regarded as a significant milestone, as it constituted the first international treaty to restrict the use of chemical weapons. The Strasbourg Agreement prohibited the use of poisoned projectiles and was signed between France and the Holy Roman Empire.[28]

In its most modern development, the international community adopted the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1968. The NPT represents the culmination of historical experience and technological advancement in weaponry that posed an existential threat to humanity, prompting States to reach a collective agreement aimed at preventing such danger. The Treaty constitutes an international legal instrument designed to prevent the development, spread, and collusive use of nuclear weapons.[29] Its primary objective is to ensure that nuclear weapons and related technologies do not proliferate beyond the five States that possessed such weapons at the time of its adoption, namely the United States, the Soviet Union, the United Kingdom, France, and China. The implementation and supervision of the NPT are carried out through a safeguards system under the responsibility of the International Atomic Energy Agency (IAEA).

The NPT refers to an internationally agreed treaty among States governing nuclear weapons. For this reason, it frequently becomes a central reference in discussions surrounding armed conflicts or security crises involving nuclear weapons. Notably, the NPT has achieved near-universal recognition and has been signed by a vast majority of

[25] Katherine E. McKinney et al., "Why the Atomic Bombing of Hiroshima Would Be Illegal Today," *Bulletin of the Atomic Scientists* 76, no. 4 (2020): 157–65, https://doi.org/10.1080/00963402.2020.1778344.
[26] Thomas D. MacDonald, "Our Remaining Options for Preventing a Nuclear Iran," *MIT Science Policy Review* 1 (August 2020), https://doi.org/10.38105/spr.exc4f1jm51.
[27] Jawahir Thontowi, Pranoto Iskandara, *Hukum Internasional Kontemporer,* Cetakan Pertama, Bandung : Refika Aditama, 2006, hlm. 53.
[28] Cahyono, Pengawasan senjata Internasional dan Pengurangan Kekerasan, hlm. Hlm. 76
[29] Anindya Milagsita :, Apa Itu Perjanjian NPT? Ini Isi dan Daftar Negara Anggotanya, :"*Detik Jateng,* 23 Juni (2025), jam : 12.46. ,

States worldwide, reflecting widespread concern over the dangers posed by nuclear armament.[30]

In practice, however, States parties to the NPT have not always adhered to the spirit of nuclear non-proliferation. In certain instances, States have exploited weaknesses in the Treaty's supervisory mechanisms and diverted nuclear materials for non-peaceful purposes. In response, the NPT, through its implementing body, the IAEA, has established regulatory measures intended to strengthen oversight and detect non-compliant States.

Substantively, the NPT rests upon three fundamental pillars: (1) non-proliferation, which prohibits non-nuclear-weapon States from acquiring nuclear weapons; (2) disarmament, which obliges nuclear-weapon States to pursue negotiations aimed at reducing and ultimately eliminating their nuclear arsenals; and (3) the right to the peaceful use of nuclear energy, which guarantees all States parties the right to develop and utilize nuclear technology for peaceful purposes under appropriate safeguards.

a. First Pillar: Non-Proliferation

Under the NPT, only five States are recognized as Nuclear-Weapon States (NWS), namely:

1. France (recognized in 1992);
2. The People's Republic of China (1992);
3. The Soviet Union (1968), whose rights and obligations were subsequently assumed by the Russian Federation;
4. The United Kingdom (1968); and
5. The United States of America (1968).[31]

b. Second Pillar: Disarmament

The Preamble of the NPT affirms the commitment of Nuclear-Weapon States to pursue measures aimed at reducing and ultimately freezing their nuclear stockpiles. Article VI further obliges States parties to undertake negotiations in good faith on effective measures relating to nuclear disarmament and to a treaty on general and complete disarmament under strict and effective international control.[32] Nuclear-Weapon States also undertake not to encourage or induce any Non-Nuclear-Weapon State to acquire nuclear weapons.[33] Doctrines such as pre-emptive strikes and other forms of nuclear threats may be construed as indirect inducements directed at non-Nuclear-Weapon States. The Treaty further provides that any State party may withdraw from the NPT if it determines that extraordinary events related to the subject matter of the Treaty have jeopardized its supreme interests.[34]

c. Third Pillar: The Right to the Peaceful Use of Nuclear Technology

[30] Jana Baldus et al., "The Global Nuclear Order and the Crisis of the Nuclear Non-Proliferation Regime: Taking Stock and Moving Forward," *Zeitschrift Für Friedens- Und Konfliktforschung* 10, no. 2 (2021): 195–218, https://doi.org/10.1007/s42597-021-00066-0.
[31] United Nations, *Treaty on the Non-Proliferation of Nuclear Weapons Treaty* 1968
[32] United Nations, Pasal VI *Non-Proliferation of Nuclear Weapons Treaty.*1968
[33] United Nations, Pasal 1 *Non-Proliferation of Nuclear Weapons Treaty.*1968
[34] United Nations, Pasal X *Non-Proliferation of Nuclear Weapons Treaty.*1968

Given that very few Nuclear-Weapon States and nuclear energy users are willing to completely relinquish possession of nuclear fuel, the third pillar of the NPT grants other States the opportunity to utilize nuclear technology under strict conditions that preclude the development of nuclear weapons. For certain States, this provision, particularly the allowance for uranium mining for fuel purposes represents a significant advantage. The Treaty guarantees every State party the right to develop nuclear energy for peaceful purposes, including electricity generation, and permits the development and international trade of uranium under safeguards.

Nevertheless, the peaceful development of uranium may also be perceived as the initial stage of nuclear weapons development, particularly if a State withdraws from the NPT. To date, no State has been conclusively proven to have successfully developed nuclear weapons clandestinely while remaining fully subject to the NPT safeguards regime.[35]

States that have acceded to the NPT as Non-Nuclear-Weapon States and have maintained that status demonstrate a strong record of compliance in refraining from nuclear weapons development. In certain regions, the existence of nuclear-weapon-free neighboring States reduces pressure on States to pursue nuclear armament, even where nuclear programs exist in nearby countries.

Under the NPT, Non-Nuclear-Weapon States are prohibited from possessing nuclear material or receiving transfers of technology and equipment that could be used to manufacture or utilize nuclear weapons, except for peaceful purposes such as electricity generation, healthcare, and agriculture.[36] Although Nuclear-Weapon States officially deny transferring nuclear weapons technology to Non-Nuclear-Weapon States, it is evident that some NNWS have independently studied and developed nuclear technology for weapons purposes. It may also be inferred that, whether intentionally or inadvertently, certain Nuclear-Weapon States have facilitated technology transfers or provided assistance in the form of equipment that could contribute to nuclear weapons development.

Conversely, Non-Nuclear-Weapon States are prohibited from accepting transfers of nuclear technology or equipment from any party unless such transfers are subject to supervision by the IAEA under the safeguards system.[37] This issue is particularly complex, as several States formerly categorized as NNWS[38] such as India, Pakistan, Israel, and Iran are now widely regarded as Nuclear-Weapon States. Preventing further transitions from NNWS to NWS underscores the crucial role of the IAEA in rigorously implementing the NPT, with the full cooperation and support of Nuclear-Weapon States.[39]

[35] Rebecca Davis Gibbons and Stephen Herzog, "Durable Institution under Fire? The NPT Confronts Emerging Multipolarity," *Contemporary Security Policy* 43, no. 1 (2022): 50–79, https://doi.org/10.1080/13523260.2021.1998294.

[36] United Nations, Pasal 1 *Non-Proliferation of Nuclear Weapons Treaty.*1968

[37] United Nations, Pasal 2 *Non-Proliferation of Nuclear Weapons Treaty* 1968.

[38] The States recognized as Nuclear-Weapon States (NWS) under the Treaty on the Non-Proliferation of Nuclear Weapons are the United States, the Soviet Union (now the Russian Federation), France, the United Kingdom, and China.

[39] Fatih Yaşar and Yunus Emre Karaca, "International Peace and Security: The Non-Proliferation Treaty on Nuclear Weapons," *Uluslararası İlişkiler ve Politika Dergisi* 6, no. 1 (2026): 41–56, https://doi.org/10.62334/ulipod.1822759.

Non-Nuclear-Weapon States accept the safeguards system established under the NPT and are required to conclude safeguards agreements with the IAEA.[40] States parties further agree not to possess nuclear materials, uranium resources, or equipment capable of processing nuclear substances, including related facilities, for the purpose of developing nuclear weapons.[41]

Any State Party that, after 7 July 2017, has owned, possessed, or controlled nuclear weapons or other nuclear explosive devices and has eliminated its nuclear weapons programme, including the irreversible dismantlement or conversion of all nuclear-weapon-related facilities, prior to the entry into force of this Treaty for that State Party, shall cooperate with the competent international authority designated pursuant to this Treaty.[42] This cooperation shall serve the purpose of verifying the irreversible elimination of its nuclear weapons programme. The competent international authority shall report to the States Parties accordingly.

Such a State Party shall conclude a comprehensive safeguards agreement with the International Atomic Energy Agency (IAEA) to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or nuclear activities within the territory of that State Party as a whole. Negotiations on such an agreement shall commence within 180 days of the entry into force of this Treaty for that State Party, and the agreement shall enter into force no later than 18 months thereafter. The State Party shall thereafter, at a minimum, maintain its safeguards obligations, without prejudice to any additional relevant instruments that it may adopt in the future.[43]

Notwithstanding Article 1(a), each State Party that owns, possesses, or controls nuclear weapons or other nuclear explosive devices shall immediately remove such weapons from operational status and destroy them as soon as possible, but no later than a deadline to be determined by the first meeting of the States Parties. Such destruction shall be carried out in accordance with a legally binding, time-bound plan for the verified and irreversible elimination of the State Party's nuclear weapons programme, including the irreversible dismantlement or conversion of all nuclear-weapon-related facilities. No later than 60 days after the entry into force of this Treaty for that State Party, the plan shall be submitted to the States Parties or to the competent international authority designated by the States Parties. The plan shall then be negotiated with the competent international authority, which shall submit it to the meeting of the States Parties or to the next review conference, whichever occurs first, for approval in accordance with the applicable rules of procedure.[44]

A State Party to which the obligations set out in the preceding paragraph apply shall conclude an appropriate safeguards agreement with the IAEA to provide credible assurance of the non-diversion of declared nuclear material from peaceful nuclear activities and of the absence of undeclared nuclear material or activities within its

[40] United Nations, Pasal 3 ayat (1) *Non-Proliferation of Nuclear Weapons Treaty.*1968
[41] Article 3 paragraph (2) of the 1968 Treaty on the Non-Proliferation of Nuclear Weapons provides that "Each State Party to the Treaty undertakes not to provide: (a) source or special fissionable material, or (b) equipment or material especially designed or prepared for the processing, use or production of special fissionable material, to any non-nuclear-weapon State for peaceful purposes, unless the source or special fissionable material shall be subject to the safeguards required by this Article.
[42] The authority referred to is the IAEA, as designated under Article 6.
[43] Paket Informasi Indoneisa, "Traktat Pelarangan Senjata Nuklir, " Maret (2021) hlm. 15
[44] Paket Informasi Indoneisa, "Traktat Pelarangan Senjata Nuklir, " Maret (2021)., *Ibid.*

territory as a whole.[45] Negotiations on such an agreement shall commence no later than the date on which implementation of the plan referred to above is completed. The agreement shall enter into force no later than 18 months after the commencement of negotiations. The State Party shall thereafter, at a minimum, maintain these safeguards obligations, without prejudice to any additional relevant instruments it may adopt in the future. Following the entry into force of the safeguards agreement referred to in this paragraph, the State Party shall submit a final declaration to the Secretary-General of the United Nations confirming that it has fulfilled its obligations under this Article.[46]

Notwithstanding Article 1(b) and (g), each State Party that has, on its territory or at any place under its jurisdiction or control, any nuclear weapons or other nuclear explosive devices owned, possessed, or controlled by another State shall ensure the prompt removal of such weapons as soon as possible, but no later than a deadline to be determined by the first meeting of the States Parties. Upon completion of such removal, the State Party shall submit a declaration to the Secretary-General of the United Nations confirming that it has fulfilled its obligations under this Article.[47]

Each State Party to which this Article applies shall submit a report to every meeting of the States Parties and every review conference on the progress made in implementing its obligations under this Article, until such obligations have been fully satisfied. The States Parties shall designate one or more competent international authorities to negotiate and verify the irreversible elimination of nuclear weapons programmes, including the irreversible dismantlement or conversion of all nuclear-weapon-related facilities, in accordance with paragraphs 1, 2, and 3 of this Article. If such designation has not been made prior to the entry into force of this Treaty for a State Party to which paragraphs 1 or 2 apply, the Secretary-General of the United Nations shall convene an extraordinary meeting of the States Parties to take any decisions that may be required.[48]

In exercising supervision over State activities related to nuclear weapons, (a) each State Party shall adopt the necessary measures to implement its obligations under this Treaty; and (b) each State Party shall take all appropriate legal, administrative, and other measures, including the imposition of penal sanctions, to prevent and suppress any activities prohibited to a State Party under this Treaty that are carried out by persons or within territory under its jurisdiction or control. These policies constitute measures of national implementation aimed at supervising the use of nuclear weapons and are grounded in the principle of good faith, as reflected in Article V of the NPT.[49]

An equally important aspect within the framework of the NPT is the recognition of State sovereignty, under which States Parties may withdraw from the NPT in the event of extraordinary circumstances. Such withdrawal must be effected by giving three months' notice and by reporting the relevant circumstances to the United Nations Security Council.[50]

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[45] Brian Hooton, "International Treaties and Obligations," in *Understanding Nuclear Reactors*, 1st ed., by Brian Hooton (Oxford University PressOxford, 2024), https://doi.org/10.1093/oso/9780198902652.003.0010.
[46] Paket Informasi Indoneisa, "Traktat Pelarangan Senjata Nuklir, " Maret (2021).,hlm. 16
[47] Paket Informasi Indoneisa, "Traktat Pelarangan Senjata Nuklir, " Maret (2021).,*ibid.*
[48] Paket Informasi Indoneisa, "Traktat Pelarangan Senjata Nuklir, " Maret (2021).,*ibid.*
[49] United Nations, Pasal 5 *Non-Proliferation of Nuclear Weapons Treaty.*1968,
[50] Dieter Fleck, "Irreversibility in Nuclear Arms Control and Disarmament Law?," *Journal of Conflict and Security Law* 28, no. 3 (2023): 423–66, https://doi.org/10.1093/jcsl/krad013.

The adoption and entry into force of the Treaty on the Non-Proliferation of Nuclear Weapons of 1968 represent a significant advancement in human civilization's efforts to prevent the recurrence of the tragedies of Hiroshima and Nagasaki in 1945. The NPT embodies the collective awareness of the international community in striving toward a future free from the fear of weapons of mass destruction, notwithstanding the various challenges encountered in its implementation.[51]

3. The Role and Functions of the International Atomic Energy Agency (IAEA) in the Use and Supervision of Nuclear Activities

In supervising Nuclear-Weapon States (NWS) and Non-Nuclear-Weapon States (NNWS) with respect to the use, storage of nuclear materials, development-related equipment, as well as the dissemination and transfer of nuclear technology, the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) constitutes the substantive legal framework that must be complied with by States parties, as it regulates their rights and obligations. To ensure the effective implementation of the substantive provisions of the NPT, the International Atomic Energy Agency (IAEA) serves as the institutional mechanism responsible for supervision, with the mandate to ensure that States adhere to the material legal norms enshrined in the Treaty.[52]

As cited by Chrisnanto Amijaya, the IAEA is a specialized and autonomous organization operating under the auspices of the United Nations and exercising a rule-supervisory function. This function encompasses measures taken to ensure compliance with applicable rules by international actors and requires a series of operational steps, beginning with the identification of facts arising from violations, followed by verification of those facts as a basis for the imposition of sanctions.[53]

The International Atomic Energy Agency was established following the "Atoms for Peace" speech delivered by United States President Dwight D. Eisenhower in 1953, with the objective of promoting and supervising the use of nuclear energy for peaceful purposes.[54] As a specialized and autonomous body under United Nations oversight, the IAEA aims to develop and expand the utilization of nuclear energy while ensuring that such use remains exclusively peaceful.[55]

The IAEA is vested with the authority to implement the provisions of the NPT, including supervisory functions. Its oversight encompasses the transfer of nuclear weapons, nuclear materials, nuclear explosive equipment, and activities related to the manufacture of nuclear weapons.[56] Established formally in 1956, the IAEA bears a substantial mandate: to promote and develop the peaceful use of nuclear energy and, simultaneously, to prevent nuclear energy from being employed as a weapon under any justification. To

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[51] John D. Maurer, "Review: The Nuclear Club: How America and the World Policed the Atom from Hiroshima to Vietnam," *California History* 101, no. 2 (2024): 85–88, https://doi.org/10.1525/ch.2024.101.2.85.

[52] Far Eastern Federal University et al., "Nuclear Weapons Program of The Dprk and Iran in The Context of Global Non-Proliferation Regime," *AZIMUTH OF SCIENTIFIC RESEARCH: ECONOMICS AND ADMINISTRATION* 10, no. 34 (2021), https://doi.org/10.26140/anie-2021-1001-0007.

[53] Chrisnanta Amijaya, :Peranan International Atomic Energy Agency melalui International Fact Finding Expert Mission of the Fukushima Dalam Penanganan Kerusakan Reaktor Nuklir di Jepang Pasca Tsunami 11 Maret 2011, *Global Political Studies Journal* 146 Vol. 2 No. 2 Oktober (2018), hlm. 146.

[54] Amijaya, :Peranan International hlm. 146.

[55] Sambuaga, Caecilia J.J. Waha, Stepan O. Voges, "Peranan Organisasi, hlm.1 dari 15.

[56] United Nations, Pasal 3 ayat (1) *Non-Proliferation of Nuclear Weapons Treaty.*1968,

fulfill this supervisory role, the IAEA operates pursuant to its Statute, which serves as its constitutional and legal foundation.

Under its Statute, one of the primary functions of the IAEA is to promote and expand the contribution of atomic energy to peace, health, and the welfare of humankind, while supervising nuclear activities to prevent their diversion for military purposes.[57] In carrying out its supervisory mandate, the IAEA acts in accordance with both its Statute and the provisions of the NPT, which expressly confer upon the Agency the authority to conduct nuclear oversight.

a. Supervision through the Safeguards System

The safeguards system constitutes the principal mechanism through which the IAEA exercises its supervisory mandate. The primary objectives of the safeguards system are as follows:[58]

(1) to prevent the proliferation of nuclear weapons, which represents the core objective of the NPT;

(2) to verify the peaceful use of nuclear materials and technologies, ensuring that they are not diverted to military applications; and

(3) to provide international assurances that States are complying with their commitments under the NPT.

Through the safeguards system, the IAEA establishes an international verification framework designed to ensure that States parties to the NPT do not divert nuclear materials or technology from peaceful purposes to military uses. This objective is pursued through independent inspections, monitoring activities, and early detection mechanisms aimed at identifying potential diversion of nuclear materials.[59]

The presence of the IAEA is intended to address contemporary challenges, threats, and future risks associated with nuclear activities, particularly the risk that nuclear technology may be weaponized under the pretext of national security. It is therefore expected that the IAEA can play a significant role in reducing States' ambitions to develop nuclear weapons.

b. Supervisory Mechanisms

The IAEA conducts supervision through treaty-based mechanisms, notably comprehensive safeguards agreements. Non-Nuclear-Weapon States that are parties to the NPT are required to conclude comprehensive safeguards agreements with the IAEA,

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[57] United Nations, IAEA Statute Article: *"The Agency shall seek to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world. It shall ensure, so far as it is able, that assistance provided by it or at its request or under its supervision or control is not used in such a way as to further any military purpose.*

[58] Safeguards constitute a set of technical measures applied by the IAEA to nuclear material and nuclear activities. Through these measures, the Agency seeks to independently verify that nuclear facilities are not misused and that nuclear material is not diverted from peaceful purposes. States accept the application of such measures through the conclusion of safeguards agreements.

[59] A. Dyakov, "Small Modular Nuclear Reactors: Development Prospects," *World Economy and International Relations* 67, no. 6 (2023): 47–60, https://doi.org/10.20542/0131-2227-2023-67-6-47-60.

based on the model contained in document INFCIRC/153. These agreements serve as evidence of a State's commitment to nuclear non-proliferation.[60]

To strengthen supervision and identify non-compliant States, the IAEA has developed regulatory frameworks obligating NPT member States to enter into safeguards agreements. These agreements regulate key aspects of nuclear activities, including the handling of nuclear materials, processing procedures, utilization, and the management and disposal of radioactive waste.[61]

In implementing its supervisory mandate, the IAEA employs the safeguards system to regulate and monitor research and development activities, nuclear processing and recycling facilities, and related nuclear installations. If safeguards and verification measures are implemented effectively, the NPT framework can substantially limit the proliferation of nuclear weapons among its member States. However, as observed by Yanuar Indrasari, the effectiveness of IAEA safeguards depends on several factors, including the Agency's capacity to assess the nature and location of nuclear facilities and related activities, the physical access of IAEA inspectors to nuclear sites for independent verification, and the willingness of the international community, particularly through the United Nations Security Council to impose sanctions on States that fail to comply with safeguards obligations.[62]

The Iranian nuclear program provides a salient example of the application of IAEA safeguards. In this case, safeguards have demonstrated partial effectiveness through the adoption of IAEA resolutions addressing safeguards implementation in Iran, the reporting of Iran to the United Nations Security Council, and the continued pursuit of diplomatic and persuasive measures aimed at securing Iran's cooperation in verifying its nuclear program.

Nevertheless, the IAEA has encountered significant challenges in carrying out its supervisory mandate, particularly the difficulty faced by inspectors in determining the existence of undeclared nuclear materials and activities within NNWS.[63] In the case of Iran, these difficulties were exacerbated by the State's failure to ratify the Additional Protocol, thereby limiting inspection access to declared nuclear materials and activities only. Ultimately, the success of the NPT depends heavily on the effectiveness of its supervisory system namely safeguards and verification and the institution responsible for its implementation, the IAEA.

The NPT itself cannot guarantee the complete prevention of nuclear weapons proliferation due to inherent weaknesses, including its reliance on international organizations and collective political will, disparities in rights and obligations between NWS and NNWS, the lack of robust sanctions, and the existence of withdrawal clauses that allow States to evade non-proliferation responsibilities. Nonetheless, the NPT has

[60] K. L. Ramakumar, "State-Level Concept Under Comprehensive Safeguards Agreement and Article II of the Nuclear Non-Proliferation Treaty*," *Strategic Analysis* 47, no. 4 (2023): 389–403, https://doi.org/10.1080/09700161.2023.2288988.

[61] Yanuar Indrasari, Peran Non Proliferation Treaty (NPT) dalam Mencegah Penyebaran Senjata Nuklir di Iran, *Skripsi Ilmu Hubungan Internasional,* 2008, hlm, hlm. 12.

[62] Yanuar Indrasara, Peran Non Proliferation Treaty (NPT) Dalalm Mencegah Penyebaan Senjata Nuklir di Ian, hlm. 13.

[63] Sambuaga, dan Voges, "Peranan Organisasi International Atomic ; Energi Agency, hlm. 26

succeeded in slowing and complicating efforts by States seeking to acquire nuclear weapons.[64]

Accordingly, the successful fulfillment of the IAEA's supervisory mandate requires full cooperation from NNWS and the rejection of undue interference by NWS. Concerns have arisen regarding discriminatory practices in supervision, particularly allegations that certain NWS such as the United States, have supported Israel while exerting disproportionate pressure on Iran. This is especially problematic given that Israel is not a party to the NPT, yet has engaged in military actions against Iran, an NPT signatory State. Such dynamics suggest the presence of discriminatory practices in nuclear supervision resulting from the intervention of Nuclear-Weapon States.

C. Conclusion

Sponsored by the United Nations, the international community, through the United Nations, adopted the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) in 1968. The Treaty embodies fundamental principles and legal norms intended to guide the international community in refraining from the use of nuclear energy as a means of warfare. Under the NPT, nuclear technology is to be utilized exclusively for peaceful purposes and for the welfare of humankind. In this sense, the NPT functions both as a normative framework and as a supervisory regime governing States that engage in nuclear activities.

From a normative perspective, the NPT suffers from several structural weaknesses. These include disparities in rights and obligations between Nuclear-Weapon States (NWS) and Non-Nuclear-Weapon States (NNWS), the absence of a robust and coercive sanctions mechanism, and the existence of withdrawal clauses that allow States to renounce their treaty commitments. Moreover, the effectiveness of the NPT is heavily dependent on the existence of an effective international verification system, and the Treaty has proven incapable of preventing nuclear proliferation by non-party States, such as Pakistan, India, and North Korea, as well as, more recently, in relation to concerns surrounding Iran. In addition, the Treaty's design did not adequately anticipate future technological developments and evolving global trends, rendering certain provisions increasingly inadequate in addressing contemporary challenges.

In order to implement the principles and norms embodied in the NPT, a specialized and autonomous institution, the International Atomic Energy Agency (IAEA) was established. The IAEA exercises its supervisory mandate through the safeguards system as provided for under the NPT. In practice, however, the Agency faces significant challenges, including the inability of IAEA inspectors to conclusively determine the existence of undeclared nuclear materials and activities within NNWS. In the case of Iran, these difficulties have been further exacerbated by the State's failure to ratify the Additional Protocol, which has resulted in inspection access being limited to declared nuclear materials and activities only.

Ultimately, the effectiveness of the NPT is highly contingent upon the efficiency of its supervisory mechanisms, namely safeguards and verification and the capacity of the institution responsible for their implementation, the IAEA. The NPT itself cannot guarantee the complete prevention of nuclear weapons proliferation due to inherent

[64] Sambuaga, dan Voges, "Peranan Organisasi International Atomic ; Energi Agency, hlm. 27.

limitations, including its reliance on international organizations and collective international initiatives, the unequal distribution of rights and obligations between NWS and NNWS, the lack of stringent enforcement measures, and the presence of an "escape clause" permitting States to withdraw from their non-proliferation obligations. Nevertheless, the NPT has contributed to slowing and complicating efforts by States seeking to acquire nuclear weapons.

As an autonomous institution tasked with supervising the implementation of the NPT, and whose membership predominantly consists of sovereign NNWS, the IAEA's inspection and verification authority remains, in practice, significantly constrained by the level of cooperation and transparency of the States concerned. The Agency is generally limited to verifying nuclear materials and activities that have been officially declared by NNWS. Consequently, effective supervision under the NPT framework requires strong international cooperation between the IAEA and NNWS suspected of developing nuclear capabilities, whether purportedly for peaceful purposes or, more controversially, for weaponization under the justification of national security.

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