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LEGAL CONTROL OF NUCLEAR TECHNOLOGY – INTERNATIONAL SCENARIO

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ABSTRACT

Contrary to popular belief, the potential for nuclear weapons proliferation and nuclear war is frequently seen in opposition to peaceful uses of nuclear energy and all the promise they hold for humanity. It makes sense that there is a mixed impression because the resources, know-how, and skills needed to create nuclear weapons are frequently the same as those required to manufacture nuclear electricity and carry out nuclear research. The international community has therefore always focused on ensuring that nuclear energy is used safely and peacefully. A sophisticated web of domestic and international regulations defines the strategy. Although it has been acknowledged that national authorities bear the major duty for regulating the use of nuclear energy, it has also been acknowledged that other nations may also be impacted. Therefore, the international community must be given residual responsibility, or in some cases co-responsibility, for regulating nuclear energy, just like it is for so many other human endeavours that may have transboundary effects. This is necessary to ensure compliance, standardisation, coordination, and sharing of resources and services, among other things. An overview of the international legal framework governing the safe and peaceful development of nuclear energy is provided in this article.

Keywords: Nuclear energy, Nuclear Safeguards, Nuclear Liability, International Agreements

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I. INTRODUCTION: -

The use of nuclear energy for energy production is one of the most strictly controlled human endeavours, both domestically and globally. To make sure that resources connected to the peaceful production of nuclear power are not diverted for use in illegal weapons programmes, a complex system of international, regional, and national restrictions is in place. Since the dawn of the nuclear era, two main objectives have guided nuclear policy: first, to promote the growth of civilian nuclear power plants into new regions of the globe; and second, to reduce the number of states possessing nuclear weapons. Throughout the past 35 years, the global non-proliferation system has been incredibly successful on one level. While three States acquired nuclear weapons from 1945-54, the rate of "overt" horizontal proliferation[1] has declined in each ensuing decade: two States acquired nuclear weapons from 1955-64, one State joined the nuclear weapons club from 1965-74,[2] and no other State has seen fit to claim military nuclear status[3] or has been conclusively demonstrated to have acquired nuclear weapons since.[4] However, on another level the nonproliferation regime has clearly not eliminated the possibility of new nuclear perils. Iraq, Israel, India, Pakistan, Argentina, Brazil, and South Africa are among the States which have taken at least some steps toward the manufacture of nuclear explosives,[5] and several other States have both the access to materials and technological capability to undertake nuclear weapons programs.[6]

This article looks at how state-to-state legal nuclear energy regulation differs. The cornerstone of the non-proliferation regime continues to be limiting the access of non-nuclear weapons states ("NNWS") to nuclear materials and technology. The strict system of nuclear materials safeguards must be adjusted to accommodate the shifting centre of global nuclear activity as the focus of new civilian nuclear power installations shifts from the traditional market economy States of the West towards the States of the former Eastern Bloc and other newly industrialising States. While the international safeguards system is highly developed, the global accounting

[1] "Horizontal proliferation" refers to the acquisition of nuclear weapons by previously nonnuclear weapons States.
[2] This includes the "peaceful" nuclear explosion undertaken by India
[3] Sanders, Non-Proliferation in the Year 2000, in 9 DISARMAMENT 106 (1986).
[4] Fischer, International Safeguards, in SAFEGUARDING THE ATOM: A CRITICAL APPRAISAL 8 (J. Goldblatt ed. 1985); Nonproliferation Regime: Safeguards, Controls and Sanctions, in THE NUCLEAR CONNECTION: A REASSESSMENT OF NUCLEAR POWER AND NUCLEAR PROLIFERATION 187-89 (A. Weinberg, M. Alonso & J. Barkenbus eds. 1985)
[5] L. SPECTOR, THE UNDECLARED BOMB (1988); LIMITING NUCLEAR PROLIFERATION (J. Snyder & S. Wells eds. 1985).
[6] Fialka, North Korea May be DevelopingAbility to Build Nuclear Weapons, Wall St. J., July 19, 1989, at A16.

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system it has erected is often supplemented by even more stringent national export and bookkeeping regulations in leading nuclear States,[7] and by non-treaty agreements between the world's leading suppliers of nuclear materials and technology.[8] The emerging nuclear power producing States, which have assumed new importance as "second-tier suppliers,"[9] generally lack such supplemental safeguards, and international controls must be ready to take full account of the operating procedures of the new facilities in these States. The changing global context of nuclear power production (and the attendant increase in the nuclear materials trade) highlights the words of Dr. Norbert Pelzer that: "Chernobyl has shown that national regulation is not enough."[10]

II. THE IMPORTANCE OF INTERNATIONAL NUCLEAR SAFEGUARDS: JUS COGENS AND NUCLEAR REGULATION:

It has been stated that there is currently an international convention forbidding States from entering into agreements which would favor the horizontal proliferation of nuclear weapons because the restrictions over nuclear weapons, materials, and information are so well established. There are some basic legal standards in international law that individual States cannot agree to deviate from. This is termed jus cogens.[11] The broad bans on slavery and genocide are two examples. Four characteristics define Jus cogens: moral underpinnings; significance to global peace and order; widespread recognition in the international community; and commitment to serving global interests rather than those of any one State.[12] After looking into the sale of nuclear weapons, Walter Gang] comes to the conclusion that doing so would be against jus cogens because one of the main tenets of international law is the ban on the spread of nuclear weapons. The sale of civilian nuclear technologies, such as the production of electricity, should be banned from international trade, he continues, until stronger measures are put in place to stop the illicit transfer and use of material suited for bombs. International organisation inspectors should

[7] the U.S. Nuclear Nonproliferation Act of 1978, 22 U.S.C.3201-3282 (1988), unilaterally imposed new conditions on existing supply agreements.
[8] infra section III.B.2. for a discussion of the role of the London Supplier's Group. Additionally, multinational bodies have traditionally closely regulated and monitored exports of hightechnology devices with potential nuclear weapons applications.
[9] New Nuclear Suppliers: Second-Tier Issues, in THE NUCLEAR SUPPLIERS AND NONPROLIFERAT1ON 93-128 (R. Jones, C. Merlini, J. Pilat & W. Potter eds. 1985).
[10] Pelzer, Current Problems of Nuclear Liability in the Post Chemobyl Period-A Gennan Standpoint, 39 NUCLEAR L. BULL, June 1987, at 66.
[11] Vienna Convention on the Law of Treaties, opened for signature May 23, 1969, art. 53, U.N. Doc. A/Conf. 39/27, reprinted in 8 I.L.M. 289 (1969).
[12] The Jus Cogens Dimensions of Nuclear Technology, 13 CORNELL INT'b L.. 63 (1980).

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conduct audits of material stocks and records pertaining to the movement and use of peaceful nuclear technology, in addition to inspecting nuclear plants.

III. MANAGEMENT OF NUCLEAR MATERIALS, INFORMATION, AND ARMAMENTS

A. International Conventions on Safeguards, Physical Protection, and Nuclear Materials

Three major concerns arise from the use of nuclear energy:

1) The possible use of nuclear weapons and therefore war;
2) The spread of radioactive contamination in the environment; and
3) The liability for nuclear damage in such an event. These concerns are manifest in a nuclear explosion.

Given the financial means, the expertise, and the nuclear material, anyone with access to common machine equipment and conventional materials may create a nuclear explosive device. Therefore, the only way to stop the proliferation of nuclear weapons is to keep nuclear materials and information under control. Treaties aiming to prevent or regulate nuclear explosions serve to limit the risk of radioactive leaks from these explosions contaminating the environment.[13]

- States that currently possess nuclear weapons may lower the chance of contamination and conflict by putting restrictions on how many of them they keep and how they use them (reducing the vertical proliferation of nuclear weapons).[14] By declining to create them, states without nuclear weapons can lower the likelihood of contamination and conflict and restrict the number of states possessing nuclear weapons overall (reducing horizontal proliferation). The Non Proliferation Treaty ("NP"), ratified by both nuclear and non-nuclear armed states, has limited horizontal proliferation. The Treaty restricts the flow of information, infrastructure, and nuclear materials. The Convention on the Physical Protection of Nuclear Materials, common policy among States, and national legislation of weapons States all have some influence over the possession of nuclear materials—and thus, the potential for nuclear weapons—by non-weapons States that are not parties to the NPT.[15] Nevertheless, as will be seen later, a select few States

[13] The Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outerspace, and Under Water, opened for signature Aug. 5, 1963, entered into force, Oct. 10, 1963, T.I.A.S. 5433,480 U.N.T.S. 43
[14] The limitation of vertical proliferation ("arms control") continues to be the subject of discussion and negotiation between the nuclear weapons States, primarily the U.S. and the U.S.S.R.
[15] Convention on the Physical Protection of Nuclear Materials, opened for signature Mar. 3, 1980, 28 I.L.M. 1419 (1979).

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have produced nuclear weapons. The NPT is a "bargain" between states with and without nuclear weapons that was signed by 136 states as of 1987. It provides that:

- "The nuclear weapons State agrees not to transfer and the non-nuclear weapons State agrees not to accept or seek or receive assistance in the manufacture of nuclear explosives (ie., the limitation of horizontal proliferation);"
- Everybody involved agrees to share technology, materials, and equipment for the peaceful use of nuclear energy, and states that do not possess nuclear weapons will be allowed to profit from any prospective benefits from the peaceful use of nuclear explosives;".
- Every party commits to pursuing sincere talks aimed at ending the nuclear arms race (i.e., restricting vertical proliferation).

B. Management of Nuclear Armaments, Supplies, and Information

1. Treaties on Weapons Control.

The United States, the Soviet Union, and the United Kingdom agreed to the Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outer Space, and Under Water, which forbids and prohibits nuclear explosions in these areas as well as in environments that could result in radioactively contaminated debris outside of a state's borders for an indefinite amount of time.[16] Additionally, each participant committed to abstaining from initiating, supporting, or taking part in a nuclear explosion anywhere inside those areas. Thus, each of the three States is permitted by the Treaty to carry out underground explosions on its own land and to take part in explosions of a similar nature in a third nation. China, India, and France—three non-signatory weaponry states—have now also limited testing to underground locations.8s The Treaty's implementation has directly led to a decrease in radioactive contamination in the atmosphere.

2. Non-Treaty Measures.

Outside of the Treaties, efforts have been made to limit the transfer of nuclear fuel enrichment and reprocessing technology and, consequently, the production of nuclear material. Founded in the 1970s, the London Suppliers Group is a club with fifteen members.[17] Its guidelines include:

[16] The Treaty Banning Nuclear Weapons Tests in the Atmosphere, in Outspace, and Under Water, s

[17] The Nuclear Supplier's Guidelines C'NSG') do not constitute a formal international agreement. A major accomplishment of the NSG was to persuade France, which is not a party to the NPT, to require safeguards on its exports of nuclear materials. See, e.g, NATIONAL ACADEMY OF SCIENCES (U.S.), NUCLEAR ARMS CONTROL: BACKGROUND AND ISSUES 235 (1985)

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- "Trigger list" goods, or unique materials and equipment used in the production of weapons, shall only be transferred in accordance with explicit assurances that they will not be utilised in any way that could cause a nuclear explosion and when they are protected by IAEA safeguards;
- "trigger list" items ought to be well protected physically; caution should be used while exporting technologies and sensitive facilities (those with potential for enrichment and reprocessing) as well as materials that could be used in weapons; assurances concerning the possible future retransfer of "trigger list" items should be required by the original suppliers of these items; and
- It is advisable to use "best endeavors" when advising prior approval for reprocessing.

C. Protection of Nuclear Material from Terrorist Action

A second significant global issue is the potential for nuclear material to be stolen and used by terrorist groups or non-Treaty States. This danger exists in addition to potential NPT gaps that might permit the transfer and use of nuclear materials to produce nuclear weapons. The State has full authority for the physical safeguarding of nuclear material. However, state cooperation is required in international transport. With forty member states and twenty-one ratifications, the Convention on the Physical Protection of Nuclear Materials came into effect on February 8, 1987, in order to achieve this goal[18]. The Convention requires each party to take action to guarantee that nuclear material during international transport is protected to an agreed level while in its jurisdiction; it does not apply to nuclear material utilised for war purposes,[19] requires each party to the Convention to take steps to ensure that nuclear material during international transport is protected to an agreed level while in its territory.[20] Nuclear material is divided into groups based on how well it can be used as weaponry feedstock[21] and appropriate levels of protection are specified. Each party agrees not to export or import nuclear material or to allow transit through its territory unless it is protected.16 In the event of theft or suspicion of theft, the parties undertake to cooperate and provide assistance in the protection and recovery of the material involved."[22]

Additionally, the parties consent to confer and work together on the development of physical

[18] Convention on the Physical Protection of Nuclear Materials,
[19] Convention on the Physical Protection of Nuclear Material, Art. I.
[20] Convention on the Physical Protection of Nuclear Material, Art. II
[21] Convention on the Physical Protection of Nuclear Material, Annex II
[22] Convention on the Physical Protection of Nuclear Material, Art. V.

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security measures. Each party consents to treat the deliberate commission of specific acts as crimes'[23] which include: (1) alteration or disposal of nuclear material which is likely to cause death, serious injury or damage to property;[24] and (2) an attempt or participation in such an act[25] or a threat to cause damage or to refrain from an act.

D. Third Party Nuclear Liability

The possibility of a nuclear accident is the third main issue with nuclear energy. The world community moved swiftly to define the obligations of States where nuclear accidents have occurred as well as those of reactor operators engaged in accidents after the Chernobyl disaster. The Conventions on Third Party Nuclear Liability have addressed the topic of liability. The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency came into force on October 27, 1986, and February 26, 1987, respectively, following the Chernobyl accident.

Sixteen European States signed the Paris Convention in 1960, addressing the issue of nuclear harm risk and promoting the development of peaceful uses of nuclear energy'[26] The signers were "desirous of ensuring adequate and equitable compensation for persons who suffer damage caused by nuclear incidents whilst taking the necessary steps to ensure that the development of the production and uses of nuclear energy for peaceful purposes is not thereby hindered."On April 1, 1968, the Paris Convention came into effect. It established three fundamental principles that are applicable to the operator of a nuclear site and are covered in more depth below:

Liability limitations, financial stability, and absolute and exclusive liability are the first three.

1. **Absolute and Exclusive Liability.**

Based on the Paris Convention, the Vienna and Paris Conventions have the same goals. Therefore, a succinct synopsis of their shared concepts will be provided by the Paris Convention. The participating States accepted the idea that a victim of a nuclear accident should be able to get compensation without having to show responsibility or identify the perpetrator. The parties

[23] Convention on the Physical Protection of Nuclear Material, Art. VII.
[24] Convention on the Physical Protection of Nuclear Material, supra note 59, art. VII (i) (a).
[25] Convention on the Physical Protection of Nuclear Material, supra note 59, art.VII (f)-(g)
[26] Convention on Third Party Liability in the Field of Nuclear Energy (Paris Convention), opened for signature July 29, 1960, modified by an Additional Protocol signed 28 July 1964, in IAEA, INTERNATIONAL CONVENTIONS ON CIVIL LIABILrrY FOR NUCLEAR DAMAGE 22 (1976).

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to the Conventions decided to hold the owner of a nuclear site strictly accountable for any harm a nuclear accident causes to people or property.[27] An event that results in harm is referred to as a nuclear incident. This implies that the operator bears full responsibility for any harm brought about by a nuclear accident that occurs within, on the way to, or from his nuclear site.

2. Limitation of Liability.

The responsibility under the Paris Convention is limited to a maximum of fifteen million European Monetary Agreement units of account ("EMA u/a"), even if it is agreed by the Conventions that the operator is strictly liable for harm caused by a nuclear disaster.[28] The operator must have insurance or other coverage before this money can be removed solely to pay for losses resulting from a nuclear disaster. This has the effect of channelling all insurance through the operator and avoiding separate coverage for the different parties who could have been liable under common law. If the lawsuit is not filed within ten years after the date of the nuclear incident, the entitlement to compensation is forfeited. Two further levels of compensation are established by the Brussels Supplementary Convention: above 15 and up to 70 million EMA u/a are funded by the responsible operator's government, and between 70 and 120 million EMA u/a are divided among the Convention parties. Neither the Vienna Convention nor the Paris Convention are ratified by the Soviet Union. Thus, the effectiveness of the Conventions was not put to the test by the Chernobyl accident. However, the fact that the damage done within the Soviet Union significantly exceeded seventy million EMA u/a raises concerns because human injury might happen or show symptoms long after the ten-year statute of limitations has passed.

3. Social Security.

People who are injured in several states will be compensated by their government through the social security system. The contractual party has the following options under the Conventions:

1) If such a person's rights against the operator will be curtailed or eliminated;
2) The question of whether the social security organisation in question can get reimbursement from the operator for damages awarded to aggrieved parties. A person who had to provide compensation under the law of a non-contracting State is allowed to

[27] Paris Convention, Art. Ill.
[28] Art. VII. The EMA u/a is the European unit of account, also known as the European Currency Unit ("ECU"). On March 25, 1991, 1 ECU = U.S. $1.23.

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file a lawsuit to obtain the right of the person who was so compensated under the Conventions. Those who the operator has a right of action against under the Convention do not obtain this right.

4. Legal Action.

The Conventions only let an operator to pursue a lawsuit for damages if the contract specifically permits such a line of action.[29] Such legal action may also be initiated when the person being sued knowingly causes harm[30] or in the case of transportation of nuclear materials through a State that has a higher threshold for compensation, and where the transportation has been carried out without consent.[31] Tortuous acts are forbidden, with the exception of those that might concern the operator's property on the nuclear installation site and the nuclear installation itself. For such damages, the standard tort rules may apply, allowing the operator to bring legal action against the supplier. The Conventions do not preclude a State from enforcing criminal penalties against individuals who, through deliberate or careless actions or inactions, cause nuclear damage. If the source of ionising radiation is not covered by the Convention, the operator's right of action against other operators in the event of joint liability remains unaffected.

The jurisdiction of the State's court where the nuclear incident took place is centralised under the Conventions. That State may not transfer any claims for nuclear damage to the courts of another State, and it has jurisdiction even in cases where harm is caused in another State.

E. Experience of Nuclear Energy International Agreements

Since the agreement to cease atmospheric testing, the amount of nuclear explosions contaminating the atmosphere has decreased. In the meantime, there are now more States that could possess nuclear weapons than there are nuclear weapons States. More specialised bilateral arrangements and unofficial agreements have resulted from the major multilateral treaties' incomplete coverage.

However, the success of safeguards and the IAEA are prerequisites for both bilateral agreements and the arrangements made under multilateral treaties. Systems for functional safety have been installed and evaluated. For instance, the accuracy of the IAEA survey of the Osirak reactor was

[29] Paris Convention, Art. VI(f)(ii).
[30] Paris Convention, Art. VI(b)
[31] Paris Convention, Art. VI(b)

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demonstrated in its report. Complete safeguards need to be in place and visible in order to guarantee the real limitations of weapons. This isn't the case yet because States with nuclear weapons exempt weapons-related materials from safeguards, and bilateral agreements or treaties only call for safeguards on the precise materials they cover. Only when all materials are under surveillance while being protected will there be true non-proliferation. By establishing plutonium banks, centrally storing high-level waste, and centrally reprocessing nuclear material on a regional scale, there have been proposals for international control of nuclear material.[32]

The non-proliferation regime has been guided by the idea that non-nuclear weapons states should forgo their weapons programmes due to the economic benefits of using atomic energy for peaceful purposes, which dates back to the Atoms for Peace proposal. Without nuclear electricity, many States, like South Korea and Japan, would not be able to maintain their current rate of economic growth. The development of irradiation techniques for seed strain improvement and food irradiation for deterioration prevention has enabled advances in agricultural technology that benefit other parts of the world. 477 This technology will help prevent starvation by extending the shelf life of food. There will likely always be a restriction on the horizontal spread of nuclear weapons if these inducements are powerful enough and the NPT, safeguards, and IAEA work as intended.

The operator of a nuclear installation can be exposed to a limited amount of financial risk in the event of a nuclear accident thanks to the nuclear liability conventions. Up to a predetermined financial threshold, the States parties to the conventions split the risk. However, it is obvious that such limits would be exceeded given the experience of the Chernobyl accident. Despite the language contained in the Convention, Professor Herzog stated in a 1984 speech to the Munich Conference that there is no cap on the amount of compensation for claims under German law. Herzog made the point that the State is not required to provide compensation to victims of natural disasters like floods. It typically does so, though, without reducing the total amount of compensation that is available. It is interesting to note that the U.S. Price Anderson Act, which covers nuclear insurance, requires contractor indemnity of seven billion dollars, indexed every five years for inflation. This is strictly outside the scope of this article.

[32] WALKER & LONNROTH, NUCLEAR POWER STRUGGLES (1983).

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In the event that the value of claims surpasses the various thresholds, the issue of priority of claims would come up. Would the costs of emergency actions taken to lessen the impact of a nuclear accident, for example, be covered? The conventions do not clearly address the issue of liability in relation to decommissioning and the ultimate disposal of waste; further research is necessary. It is still difficult to establish the causal relationship between the intentional or deliberate leakage of radioactive material and the planned or unintentional escape of radioactive material, which results in injuries from occupational radiation exposure (not from explosions).

IV. CONCLUSION

The potential harm that could result from uncontrolled use of nuclear energy has been fully acknowledged in the development of weapons and the production of electricity using this technology. The political process has encouraged this development. As an alternative to coal and oil, nuclear materials and technology have been used to generate electricity. In general, by minimising certain forms of politically unacceptable risk, the intricate web of international, national, and industry-wide regulations has served to promote the expansion of the nuclear energy sector. The framework under the NPT that makes it easier to conduct efficient inspections of nuclear installations as part of IAEA safeguards agreements reduces the possibility of material and technological divergence to the production of weapons. Comparable measures are in place to stop nuclear materials from being diverted to states that are not signatories to the NPT or to terrorist organisations. Although the spread of nuclear weapons manufacturing has not been completely stopped by these treaties, supporters of the contemporary non-proliferation regime can highlight a number of noteworthy successes.