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Transfer of Nuclear Technology Under International Law: Case Study of Iraq, Iran and Israel

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Summary: The author provides an excellent summary of the international law framework guiding the safe transfer of nuclear technology for peaceful purposes between nation states. The author discusses the many benefits and uses of nuclear technology and the importance of sharing such technology throughout the world. The author focuses her legal analysis on the substantive components of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and the standards outlined by the International Atomic Energy Agency (IAEA). The book ends with an examination of case studies involving the use of transferred nuclear technology in Iraq, Iran, and Israel.

INTRODUCTION

Nuclear technology has many uses beyond traditional defense-related applications. When President Eisenhower initiated the "Atoms for Peace" project in 1953, he did so with the hope that nuclear technology could be easily and safely transferred for worldwide use, while "prohibiting the spread of knowledge regarding the military uses of the atom."[2] The transfer of innovative nuclear technologies throughout the world is important because nuclear techniques can be applied in a variety of settings to revolutionize the manner in which mankind lives.[3]

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[2] NAMIRA NEGM, TRANSFER OF NUCLEAR TECHNOLOGY UNDER INTERNATIONAL LAW: CASE STUDY OF IRAQ, IRAN AND ISRAEL 1 (Martinus Nijhoff Publishers 2010).

[3] *Id.* at 2.

While nuclear technology can have many positive impacts on human life, it is not accessible worldwide. Typically, only developed states have the resources to advance and implement nuclear technologies.[4] It is through the use of various treaties and bilateral cooperation with developed states that developing nations gain the opportunity to access and utilize the wide array of nuclear technological advances.[5]

THE USE OF NUCLEAR TECHNOLOGY FOR PEACEFUL PURPOSES

Nuclear technology has many economically beneficial applications. First and foremost, nuclear energy can be used as a generating source of electrical power. It also has prime application in the fields of industry, agriculture, water management, medicine, pest control, crime detection, and animal breeding.[6]

In terms of animal reproduction, the viability of livestock populations is wholly dependent on optimizing animal health and improving animal reproductive performance.[7] Nuclear technology can be utilized to advance livestock productivity by analyzing parameters of livestock health, nutrition, and reproductive cycles. Nuclear and related bio-technologies can be used to study nutrient levels within the animal, the onset of puberty and sexual maturity, and the diagnosis of potentially fatal illnesses. With this information, scientists can improve livestock breeding conditions, thereby producing sustainable increases in livestock birthrates.[8] With

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[4] NEGM, *supra* note 2 at 2.

[5] *Id.*

[6] *Id.*

[7] *Id.* at 16.

increased livestock production comes increased income generation, as livestock and livestock byproducts can be openly traded in the market for economic gains.

Pest control is a major problem worldwide, as pests can have a devastating toll on crop production and cause the spread of disease.[9] It has been suggested that pests "reduce world food production by 25% to 30%."[10] Nuclear technology can be used as an environmentally-friendly method of pest population management. Insects can be gathered into large storage areas and sterilized using ionizing radiation. Once released into nature, "the wild females are sterilized following mating with a released sterile male."[11] Nuclear technology methods are very efficient at stopping the growth of pest populations and the destruction such populations create.[12]

In the medical and human health context, nuclear technology has transformed patient treatment and the way the human body is studied.[13] Through the use of radioactive isotopes, vitamin levels can be accurately measured, and bone imaging can be conducted to search for fractures and unusual bone growth. Osteoporosis, cardiovascular disease, and a variety of genetic disorders can all be monitored through isotropic tracer detection.[14] Furthermore, nuclear medicine has become its own field of medical specialty, where doctors rely on internally

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[8] NEGM, *supra* note 2 at 16.

[9] NEGM, *supra* note 2, at 16.

[10] *Id.* at 17.

[11] *Id.* at 16.

[12] *Id.* at 17.

[13] NEGM, *supra* note 2, at 19.

[14] *Id.*

administered open source radiation for diagnostic testing in the fields of oncology, endocrinology, neurology, cardiology, and nephrology.[15]

Many industries have used nuclear technologies to streamline production and to improve the performance, efficiency, and safety of many of their products.[16] Radiation processing is used in the manufacturing of plastics and rubbers, and has produced new materials such as hydro-dressings for the treatment of wounds.[17] Radiation is also being used to sterilize tissues, pharmaceuticals, and medical devices.[18] Radioactive isotopes are also used throughout the industry as a means of calibrating machinery, checking equipment function, and optimizing production output.

Finally, nuclear energy can be utilized to create electric power. Unlike the burning of fossil fuels, the use of nuclear energy to produce electricity does not release greenhouse gases into the atmosphere. Nuclear reactors, through a process of chain reactions during which individual atoms split, create a controlled rate of released heat. This heat is used to turn water into steam which pushes on turbine generators. This pressure forces coils of wire to interact with a magnetic field generating electric current. This current is then shipped or dispensed through power lines to customers.[19] While the majority of the world still relies on fossil fuels and hydroelectric power, advances have been made to expand the future use of nuclear power to supplement the global electricity supply.

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[15] NEGM, *supra* note 2, at 20.

[16] *Id.* at 21.

[17] *Id.* at 21-22.

[18] *Id.* at 22.

[19] NEGM, *supra* note 2, at 23.

TRANSFER OF NUCLEAR TECHNOLOGY FOR PEACEFUL PURPOSES

As nuclear technology has many successful applications, countries around the world are striving to acquire nuclear capabilities. In 1953, President Eisenhower initiated the "Atoms for Peace" project designed to separate civilian and military use of nuclear technology. Following the project's introduction, the United Nations-sponsored Geneva Conference on the Peaceful Use of Atomic Energy established the IAEA in 1955 and created the legal framework for successfully transferring nuclear technology for peaceful purposes among nations. After it was determined that the safeguards in the IAEA were insufficient to prevent nuclear proliferation, the international community created the NPT in 1968, which was effected in 1970, and extended indefinitely in 1995.[20]

NPT GUIDELINES

Under the NPT, Nuclear Weapon States (NWS – US, Russia, UK, France, and China) are allowed to maintain their nuclear weapon capabilities. However, the goal of the treaty for these signatories was to legally prevent other countries from exploring nuclear weapon technology.[21] The NPT required bargaining and compromise. To ensure that Non-Nuclear Weapon States (NNWS) were not developing nuclear weapons, the NWS had to promise to transfer nuclear technology for peaceful purposes, provided that the receiving NNWS were kept under international supervision. The NWS also agreed to earnestly reduce their nuclear weapon arsenals over time until they were fully eliminated. The NPT works as a two-fold system: (1) it

[20] NEGM, *supra* note 2, at 41-42.

[21] *Id.* at 43.

encourages the transfer and development of nuclear technology for peaceful purposes; and (2) imposes a nuclear disarmament obligation on both NNWS and NWS.[22]

Article IV of the NPT gives signing members the authority to engage in the research, production, and development of nuclear technology for peaceful purposes.[23] It also allows for open exchange of ideas, equipment, materials, and information.[24] While Article IV encourages exchange of scientific and technological knowledge among signing members, there has been concern over the exchange of knowledge regarding "techniques relevant to enriching uranium and building power reactors."[25]

Article VI of the NPT contains the provision stipulating that parties to the treaty must undertake measures toward nuclear disarmament.[26] Since the signing of the NPT, only the US and Russia have taken progressive steps towards nuclear disarmament, though their pace has been extremely slow.[27] France, UK, and China have not undertaken any means to limit their development of nuclear weapons in compliance with Article VI.[28] The indefinite extension of the NPT in 1995 has given NWS indefinite time to start their decrease in nuclear arsenals,

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[22] NEGM, *supra* note 2, at 43.

[23] *Id.* at 45.

[24] *Id.*

[25] *Id.* at 48.

[26] NEGM, *supra* note 2, at 52.

[27] *Id.* at 53.

[28] *Id.*

thereby rendering Article VI unenforceable and eliminating a definite time frame under which NWS must eliminate nuclear weapon capabilities.[29]

The NPT has many inadequacies including the treaty's discrimination between NWS and NNWS and the failure of NWS to begin meeting their obligations under the Article VI disarmament provisions. The current rules lack the force needed to ensure the elimination of all nuclear weapons worldwide. Moreover, as global terrorist organizations gain more power and support, the threat of nuclear proliferation and the use of such weaponry remains a viable threat.[30]

IAEA RULES

The IAEA was established as an autonomous organization in 1957 with the goal of promoting "peaceful uses of nuclear energy for the benefit of humanity."[31] The IAEA ensures that nuclear projects conducted by member states remain peaceful in nature. After the signing of the NPT in 1970, the IAEA is responsible for ensuring the NPT NNWS signatories comply with the nonproliferation requirements of the treaty.[32] Under Article II of the IAEA statute, the organization is tasked with two objectives: (1) to accelerate the spread and use of atomic technology for "peace, health, and prosperity throughout the world;" and (2) to ensure that such technology is not used for "any military purpose."[33]

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[29] NEGM, *supra* note 2, at 55.

[30] *Id.* at 59.

[31] *Id.* at 61.

[32] *Id.*

[33] NEGM, *supra* note 2, at 61.

Additionally, the IAEA provides scientific and technical assistance to member states during nuclear projects and administers established safeguards to guarantee that projects using nuclear technology are not being manufactured for defense and military purposes.[34] Article III of the NPT obliges NNWS to accept IAEA safeguards regarding the use of nuclear technology.[35] These safeguards give the IAEA authority to conduct investigations and inspections of NNWS nuclear projects to ensure that such projects are not enriching uranium for military purposes.

The IAEA utilizes two safeguard systems while inspecting nuclear projects. Before the NPT began in 1970, the IAEA would conduct investigations on an independent case-by-case basis upon the request of either the supplying or receiving state. This process is still used for non-NPT members.[36] The second safeguard system is found in Article III of the NPT, which requires NNWS to accept all IAEA safeguards. NNWS must report all nuclear activities to the IAEA and the Agency has the right of access to conduct investigative inspections to ensure all nuclear activities remain peaceful.[37] The IAEA has the authority to conduct three types of inspections: (1) routine inspections, (2) ad hoc inspections, and (3) special inspections.[38] Before the IAEA can undertake special inspections, the Director General of the IAEA must determine that there is reasonable evidence for suspecting illegal nuclear proliferation. Any state under the NPT not participating in illegal nuclear activities would likely grant inspectors access to dispel

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[34] NEGM, *supra* note 2, at 61.

[35] *Id.*

[36] *Id.* at 5, 63.

[37] *Id.* at 68.

[38] NEGM, *supra* note 2, at 68.

suspicion. However, any state violating NPT obligations would deny IAEA inspector's access to their facilities. Such behavior would qualify as reasonable suspicion that the state is trying to conceal treaty violations and uranium enrichment.[39]

The IAEA has legal authority to search for nuclear weapon programs, yet the safeguards still require modification to ensure the goals of the IAEA are achieved. This is evidenced by the failure of the IAEA to identify the presence of the covert Iraqi nuclear program in the 1990s.[40] While the IAEA has taken steps to ensure quality of its inspections, the Agency is still required to rely on the cooperation of NNWS, as the rules do not place obligations on supplying states. These rules limit the Agency's capability of assessing illegal nuclear activities.[41]

CASE I: IRAQ

Although a member to the NPT and IAEA, Iraq had initiated an active covert nuclear program designed to enrich uranium in violation of its international non-proliferation obligations. Iraq began developing its own nuclear technology in the 1950s with the creation of small mega-watt reactors.[42] During the 1970s, Iraq began dispatching Iraqi scientists to train in nuclear technologies around the world. At that time, Iraq also began to invest extensive financial resources into its nuclear program. The immediate goal of the program was to secure nuclear technology with long term objectives of creating nuclear weapons. With the secret operations underway, Iraq was hosting IAEA inspectors in its declared facilities in cooperation with its NPT

[39] NEGM, *supra* note 2, at 71.

[40] *Id.* at 78.

[41] *Id.*

[42] *Id.* at 148.

obligations.[43] In 1974, Iraq dispatched an Iraqi "scientist attaché" to its Vienna Embassy with the sole objective of working with the IAEA. Iraq used the information it obtained from the diplomat as a means to cover up its illegal nuclear activities.

In the late 1970s, Iraq began to contract with various countries and businesses to purchase materials necessary for the enrichment of uranium.[44] To avoid export regulations, Iraq would divide equipment orders into sub-components and employ the use of intermediaries to hide purchases. It was not until 1991 that the IAEA discovered "the scope and intensity of the Iraqi nuclear weapons program."[45] It was determined that Iraq's nuclear program was dependent on external supplies provided by many international suppliers including Germany, UK, Switzerland, US, Austria, Yugoslavia, Japan, Italy, Brazil, and Niger.[46] Iraq's actions violated Articles II and III of the NPT.

During the 1970s, Iraq's nuclear developments were in line with the NPT protocols, as its actions were in pursuit of peaceful nuclear technology. However, in subsequent years, the concentration and goals of the nuclear projects were shifted to the development of nuclear weapons, and Iraq's clandestine approach to this goal constituted direct violation of the NPT and the safeguards established under the IAEA.[47]

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[43] NEGM, *supra* note 2, at 148.

[44] *Id.* at 149.

[45] *Id.* at 151.

[46] *See id.* at 152-59.

[47] *See* NEGM, *supra* note 2, at 160-62.

Iraq was the first country to violate the NPT. Since 1991, the United Nations Security Council (UNSC) has adopted several resolutions to disarm Iraq's nuclear capabilities.[48] In creating its weapons program, Iraq deceived both the IAEA and the international firms that provided its much needed supplies. The episode in Iraq displayed the IAEA's inadequacy in successfully inspecting countries for nuclear weapons programs, and the failure of the IAEA to use a cohesive process and modern technology to assist in its inspection duties.[49]

CASE II: IRAN

While IAEA findings indicate the Iranian nuclear program is directed towards peaceful purposes, several States believe Iran is covertly investigating military uses for nuclear energy.[50] Iran became a member of the NPT when it ratified the treaty in 1970.[51] In the early 1970s, Iran announced a long-term endeavor to develop nuclear power plants for electric power. Thus far, Iran has fulfilled almost all of its obligations under the NPT.[52] However, the IAEA has discovered that in recent years, Iran neglected to report all information regarding its nuclear program to the IAEA for review.[53]

Before 2002, Iran had been in compliance with all treaty obligations, but in 2002 Iran failed to report to the IAEA the import of fissionable material and neglected to follow IAEA

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[48] NEGM, *supra* note 2, at 183.

[49] *See id.* at 185-86.

[50] *Id.* at 8.

[51] *Id.* at 193.

[52] NEGM, *supra* note 2, at 193.

[53] *Id.* at 194.

prescribed safeguards.[54] It was later determined that Iran also concealed information regarding the capabilities of some of its nuclear facilities.[55] To mend this breach, IAEA inspection teams conducted extensive inspections to ensure Iran was compliant with its NPT obligations.[56] Even with the concern from western nations over Iran's nuclear activities, Iran has accepted IAEA safeguards and has declared that all nuclear activities are being conducted for peaceful purposes.

CASE III: ISRAEL

The case study on Israel is unique because Israel is not a member to the NPT and only a limited number of its nuclear facilities fall under IAEA safeguards.[57] Since the birth of the Israeli state in 1948, the country has been actively engaged in nuclear research for both military and peaceful purposes.[58] President Eisenhower's "Atoms for Peace" project in 1955 provided Israel with nuclear training and helped fund and construct a 5 mega-watt nuclear reactor for Israel.[59] However, it was Israel's relationship with France that led to its acquisition of nuclear bombs. Israeli scientists trained at the French Sarclay Institute in the art of nuclear reactions. The scientists participated in the production of a small reactor powered by uranium and heavy water. Once back in Israel, the scientists built a similar reactor powered by indigenous uranium

[54] NEGM, *supra* note 2, at 195.

[55] *Id.* at 197.

[56] *Id.* at 194.

[57] *Id.* at 227.

[58] NEGM, *supra* note 2, at 227.

[59] *Id.*

and locally available heavy water.[60] In the late 1950s, the French supplied Israel with a plutonium reactor in Dimona. American spy planes noted subterranean digging in Dimona and concluded that Israel was creating a nuclear weapon.[61] By June 1967, Israel had completed its weapons design and was capable of manufacturing warhead missiles.[62] Israel has stated that they will only use their nuclear weaponry in response to actual attacks on Israel, and will not use them as a pre-emptive tool against suspected aggression.[63]

Israel has refused to join the NPT because "in the absence of reliable arrangements for preventing armed conflict, nuclear deterrence is essential for the survival of the nation."[64] Even though Israel is not a member of the NPT, it is a member of the United Nations Charter and has legal obligations to adhere to resolutions by both the UNSC and the United Nations General Assembly.[65] UNSC Resolution 487 of 1981 requested Israel "adhere to the NPT and to place its nuclear facilities under full scope safeguards."[66] Furthermore, the Israeli nuclear program has been a subject of annual General Assembly regulations, some specifically urging the country to place its nuclear facilities under IAEA safeguards.[67] Thus, Israel is in direct conflict with its responsibilities under the United Nations Charter.[68]

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[60] NEGM, *supra* note 2, at 229.

[61] *Id.*

[62] *Id.* at 230.

[63] *Id.* at 232.

[64] NEGM, *supra* note 2, at 241.

[65] *Id.* at 257.

[66] *Id.* at 243.

[67] *Id.* at 247.

CONCLUSION

The use of nuclear technology has been one of the most contentious debates throughout history. Many proponents laud nuclear power as a sustainable form of energy that can reduce carbon emissions and increase global energy security. Opponents argue that the use of nuclear power creates many threats to human health and the environment, including the health risks associated with uranium exposure, environmental damage from uranium mining, the problem of disposing radioactive nuclear waste, and the potential for nuclear weapons proliferation. Throughout this book, Ms. Negm thoughtfully explains the controversies that surround the global nuclear regulatory schemes and their applications in countries that have been notorious for their use and transfer of nuclear technology.

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[68] NEGM, *supra* note 2, at 257.