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INTERNATIONAL ATOMIC ENERGY AGENCY

BACKGROUND GUIDE 2017

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Dear Delegates,

Welcome to the 2017 National Model United Nations Conference in Washington, DC (NMUN•DC)! We are pleased to introduce you to our committee, the International Atomic Energy Agency (IAEA). This year's staff is: Director Joshua Cummins and Assistant Director Kenny Nguyen. Joshua completed his M.A. in International and Comparative Politics in 2012 and currently works as an International Program Analyst at the Pentagon in Washington D.C. This will be his second year on DC staff, and he is excited to return to NMUN•DC. Kenny graduated with a B.A in Political Science and a B.A in Communication from the University of Colorado at Boulder in 2016. This will be his second year on DC staff, and he is thrilled to be back at NMUN•DC.

The topics under discussion for IAEA are:

1. Nuclear Technology and Water Security
2. Improving the Effectiveness of Safeguards and Verifications Mechanisms

IAEA is an important organization within the international system, and it plays a critical role in promoting the peaceful uses of nuclear technology and ensuring the non-proliferation of nuclear weapons. IAEA serves as a forum for the international community for scientific and technical cooperation in nuclear power and nuclear technology. IAEA provides invaluable work in nuclear safety through its widely implemented safeguards and verification measures and works to facilitate technology transfers between its Member States. Though established outside the UN system, the IAEA reports to both the UN Security Council and the General Assembly.

This Background Guide serves as an introduction to the topics for this committee. However, it is not intended to replace individual research. We encourage you to explore your Member State's policies in depth and use the Annotated Bibliography and Bibliography to further your knowledge on these topics. In preparation for the Conference, each delegation will submit a Position Paper by 11:59 p.m. (Eastern) on 13 October 2017 in accordance with the guidelines in the *NMUN Position Paper Guide*.

Two resources, to download from the NMUN website, that serve as essential instruments in preparing for the Conference and as a reference during committee sessions are the:

1. *NMUN Delegate Preparation Guide* - explains each step in the delegate process, from pre-Conference research to the committee debate and resolution drafting processes. Please take note of the information on plagiarism, and the prohibition on pre-written working papers and resolutions. Delegates should not start discussion on the topics with other members of their committee until the first committee session.
2. *NMUN Rules of Procedure* - include the long and short form of the rules, as well as an explanatory narrative and example script of the flow of procedure.

In addition, please review the mandatory NMUN Conduct Expectations on the NMUN website. They include the Conference dress code and other expectations of all attendees. We want to emphasize that any instances of sexual harassment or discrimination based on race, gender, sexual orientation, national origin, religion, age, or disability will not be tolerated.

If you have any questions concerning your preparation for the committee or the Conference itself, please contact the Deputy Secretary-General, Jess Mace, at dsg.dc@nmun.org.

We wish you all the best in your preparations and look forward to seeing you at the Conference!

Joshua Cummins, *Director*
Kenny Nguyen, *Assistant Director*

Committee Overview

"We… seek more than the mere reduction or elimination of atomic materials for military purposes. It is not enough to take this weapon out of the hands of the soldiers. It must be put into the hands of those who will know how to strip its military casing and adapt it to the arts of peace."[1]

Introduction

United States President Dwight Eisenhower first formally proposed the International Atomic Energy Agency (IAEA) in his "Atoms for Peace" speech to the United Nations (UN) General Assembly in 1953.[2] The Conference on the Statute of the IAEA approved the final *Statute of the International Atomic Energy Agency* on 23 October 1956, and it came into force, officially creating the Agency, on 29 July 1957.[3] The growing consensus regarding nuclear disarmament continued with the adoption of the *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT) by the General Assembly in 1968 and the NPT's entry into force on 5 March 1970.[4] The IAEA is the primary organization charged with verifying treaty compliance and carrying out the NPT's aims of non-proliferation, disarmament, and promoting the peaceful use of nuclear technology.[5] Today, the Agency's responsibilities are both normative and functional.[6] The General Conference and the Board of Governors provide a forum for debate on nuclear issues, while the Secretariat carries out inspections, develops safety standards, and assists Member States in utilizing nuclear technology.[7] This year marks the 60th anniversary of the first session of the Agency's General Conference.[8] During this year's session, the agency hopes to highlight the significant contributions it has made to the safety and security of the international community and further promote its on-going work.[9]

Governance, Structure and Membership

The IAEA consists of the Board of Governors, the General Conference, and the Secretariat.[10] The Board of Governors meets five times per year to make recommendations regarding the IAEA's budget, program of work, safeguards agreements and safety standards, and applications for membership.[11] The General Conference meets annually to consider and approve topics brought to it by the Board of Governors, the Director General, and Member States.[12] The General Conference consists of all IAEA Member States, with each state having one vote.[13] The Board of Governors consists of 35 Member States.[14] Ten of the seats are allocated by the outgoing Board to the members most advanced in atomic energy; additionally, the state most advanced in atomic energy from eight geographic areas is appointed if the area is not represented among the initial appointees.[15] The General Conference elects 22 states to the Board, maintaining equitable geographic distribution.[16] The Chair of the Board of Governors for 2016-2017 is the Governor of South Africa, Ambassador Tebogo Seokolo.[17]

The Secretariat is headed by the Director General and includes four offices and six departments which carry out the day-to-day work of the Agency.[18] The Secretariat, including the Director General, acts under the direction and

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[1] UN General Assembly, *Official Record (A/PV.470)*, 1953, p. 452.
[2] Fischer, *History of the International Atomic Energy Agency: The First Forty Years*, 1997, p. 1.
[3] IAEA, *About the Statute of the IAEA*, 2017.
[4] IAEA, *Treaty on the Non-Proliferation of Nuclear Weapons*, 2014.
[5] IAEA, *The IAEA Mission Statement*, 2017; UN General Assembly, *Treaty on the Non-Proliferation of Nuclear Weapons (A/RES/2373 (XXII))*, 1968.
[6] IAEA, *General Conference*, 2017; IAEA, *Board of Governors*, 2017; IAEA, *Secretariat*, 2017.
[7] Ibid.
[8] IAEA, *Sixtieth Anniversary of the IAEA*, 2017.
[9] Ibid.
[10] IAEA, *General Conference*, 2016; IAEA, *Board of Governors*, 2017; IAEA, *Secretariat*, 2017.
[11] IAEA, *Board of Governors*, 2017.
[12] IAEA, *General Conference*, 2017.
[13] Ibid.
[14] IAEA, *Board of Governors*, 2017.
[15] UN Conference on the Statute of the IAEA, *The Statute of the IAEA*, 1956, Art. VI.
[16] Ibid.
[17] IAEA, Board of Governors, 2017.
[18] IAEA, *Organizational Chart*, 2013; IAEA, *Secretariat*, 2017.

guidance of the Board of Governors.[19] The Director General's Office for Coordination, the Office of Internal Oversight Services, the Office of Legal Affairs, and the Office of Public Information and Communication provide administrative functions and support to the remainder of the Secretariat.[20] The Departments of Management, Nuclear Energy, Nuclear Safety and Security, Nuclear Sciences and Applications, Safeguards, and Technical Cooperation carry out the IAEA's work in promoting disarmament, non-proliferation, and peaceful use of nuclear technology.[21]

The IAEA is an independent, autonomous, self-governing body.[22] The Agency's relationship with the UN is established in the *Agreement Governing the Relationship Between the United Nations and the International Atomic Energy Agency*, which defines the formal working and reporting processes of the two organizations.[23] Any formal relationships between the IAEA and other international bodies are established by similar agreements, as called for in Article XVI of the IAEA *Statute*.[24] Its budget is initially drafted by the Director General and submitted to the Board of Governors for approval.[25] Once approved by the Board, the budget is considered by the General Conference, which can either approve the budget or return it to the Board with recommendations for revision.[26] The IAEA is funded by contributions from its Member States, assessed by a scale determined by the General Conference based on gross domestic product, as well as charges to states receiving materials, services, equipment, or facilities from the Agency and voluntary contributions to the general fund.[27] The IAEA budget for 2017 is €366.3 million.[28]

The IAEA currently has 168 Member States, with three of those states in the process of depositing the necessary legal instruments for membership.[29] The only former Member State is the Democratic People's Republic of Korea, which joined the Agency in 1974 and withdrew in 1994.[30] The process of joining the IAEA is defined in Article IV of the Agency's statute.[31] The original Member States of the IAEA were those that signed the statute within 90 days of it opening for signature.[32] Additional states wishing to join the Agency must submit an application to the Secretariat for review by the Board of Governors at its next meeting.[33] If the Board determines the applicant "is willing and able to carry out the obligations of membership," membership is recommended to the General Conference, which confers final approval at its next meeting.[34] Once approved, the applicant deposits an Instrument of Acceptance of the Agency's statute to the United States Department of State, upon which the state is a member of the IAEA.[35] Although the IAEA is closely tied to the NPT, the Agency's list of Member States is not identical to the list of the States parties to the treaty.[36] Notably, India, Israel, and Pakistan were among the Agency's initial members in 1957 but have never signed or ratified the NPT.[37] The participation of these states in the IAEA is indicative of the Agency's ability to influence nuclear policy beyond the scope of the NPT.[38] In addition to these three states, 20 additional States parties to the NPT have never joined the IAEA.[39]

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[19] IAEA Board of Governors, *Provisional Rules of Procedure of the Board of Governors (GOV/INF/500/Rev. 1)*, 1989.
[20] IAEA, *Offices Reporting to the Director General*, 2017.
[21] IAEA, *Organizational Chart*, 2013.
[22] IAEA, *The IAEA Mission Statement*, 2017.
[23] IAEA, *The Texts of the Agency's Agreements with the United Nations (INFCIRC/11)*, 1959.
[24] UN Conference on the Statute of the IAEA, *The Statute of the IAEA*, 1956, Art. XVI.
[25] Ibid.
[26] Ibid.
[27] Ibid.
[28] IAEA, *The Agency's Budget Update for 2017*, 2017.
[29] IAEA, *Member States*, 2017.
[30] Ibid.
[31] UN Conference on the Statute of the IAEA, *The Statute of the IAEA*, 1956, Art. IV.
[32] Ibid.
[33] IAEA, *Becoming a Member*, 2017.
[34] Ibid.
[35] Ibid.
[36] IAEA, *Member States,* 2017; UNODA, *Treaty on the Non-Proliferation of Nuclear Weapons: Status of the Treaty*, 2016.
[37] Ibid.
[38] Miller & Scheinman, *India, Israel, and Pakistan: Engaging the Non-NPT States in the Nonproliferation Regime*, 2003.
[39] IAEA, *Member States,* 2017; UNODA, *Treaty on the Non-Proliferation of Nuclear Weapons: Status of the Treaty*, 2016.

Mandate, Functions and Powers

The IAEA's mandate is established by its statute, which states that it "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."[40] The mandate is further defined by the NPT, which establishes international law regarding the non-proliferation of nuclear weapons, the disarmament of existing weapons systems, and the promotion of peaceful nuclear technology.[41] Although an autonomous body that is separate from the UN, the *Statute* requires that the IAEA report to certain UN bodies, including annual reports to the General Assembly, reports to the Security Council as needed, and reports to other organs regarding matters within the competence of those bodies.[42]

The IAEA's most visible and long-standing function is the role it plays in evaluating compliance with the NPT.[43] Article III of the NPT stipulates that States parties not in possession of nuclear weapons establish a safeguards agreement with the IAEA.[44] In addition to establishing common safety standards for fissile material, the safeguards agreements allow the Agency to verify that states are in compliance with the NPT through activities like field inspections, analysis of satellite images and environmental samples, and reviewing nuclear material accountancy entries.[45] The Agency can also refer matters to the UN Security Council, as it did with the Iranian nuclear program in 2006 and an undeclared reactor in Syria in 2011.[46] In addition to the NPT there are more than 15 treaties and conventions directly under the auspices of the IAEA, which establish responsibilities for and confer powers to the Agency.[47]

The Agency provides a number of key functions to the international community related to nuclear technology.[48] The IAEA is responsible for establishing and updating the nuclear safeguards system, which aims to prevent proliferation of weapons technology by putting early detection mechanisms in place that will help identify any misuse of nuclear technology or fissile materials.[49] Safeguards agreements were applied in 181 Member States in 2015.[50] The IAEA provides technical assistance to its Member States wishing to utilize nuclear technology, including energy, radiation medicine, and agriculture.[51] In 2015, 138 states and territories received technical assistance from the IAEA, with the largest areas of work being health and nutrition, safety and security, and food and agriculture.[52] Additionally, the Agency publishes research on topics like radiation biology, pest control, quality assurance, and radioactive waste management; providing a centralized forum for this research allows all states to benefit regardless of domestic research funding.[53]

Recent Sessions and Current Priorities

Much of the Secretariat's recent work has focused on improving nuclear safety and security and on producing the Agency's annual reports, including the *IAEA Annual Report*, the *Nuclear Technology Review*, the *Nuclear Safety Review*, and the *Safeguards Statement*.[54] The Secretariat is also supporting Member States in the implementation of the Sustainable Development Goals (SDGs) by building states technical capacity to utilize nuclear and isotopic technology to achieve the targets and track data, most notably regarding the targets to end hunger, ensure access to

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[40] UN Conference on the Statute of the IAEA, *The Statute of the IAEA*, 1956, Art. II.
[41] UN General Assembly, *Treaty on the Non-Proliferation of Nuclear Weapons (A/RES/2373 (XXII))*, 1968.
[42] UN Conference on the Statute of the IAEA, *The Statute of the IAEA*, 1956, Art. III.
[43] IAEA, *Treaty of the Non-Proliferation of Nuclear Weapons and the IAEA - A Chronology*, 2014; UN General Assembly, *Treaty on the Non-Proliferation of Nuclear Weapons (A/RES/2373 (XXII))*, 1968.
[44] UN General Assembly, *Treaty on the Non-Proliferation of Nuclear Weapons (A/RES/2373 (XXII))*, 1968, Art. III.
[45] IAEA, *Key Facts and Figures*, 2017.
[46] *UN Nuclear Watchdog Refers Syria to Security Council*, BBC News, 2011.
[47] IAEA, *Treaties Under IAEA Auspices*, 2016.
[48] IAEA, *The IAEA Mission Statement*, 2017.
[49] IAEA, *Basics of IAEA Safeguards*, 2017.
[50] IAEA Board of Governors, *Safeguards Statement for 2014 (GOV/2015/30)*, 2015.
[51] IAEA, *IAEA Annual Report 2015*, 2015, p. v.
[52] Ibid.
[53] IAEA, *Scientific and Technical Publications Subject Areas*, 2010.
[54] IAEA, *Reports*, 2017.

water and sanitation, and promote sustainable industrialization.[55] Externally, the IAEA played a role in the 2015 NPT Review Conference, a gathering of the States parties to the NPT held every five years to discuss treaty implementation and future policy.[56] In addition to providing technical expertise to the Review Conference, the IAEA hosted "How the Atom Benefits Life," a high-level event on the peaceful use of nuclear technology, as well as side events on nuclear security, nuclear safety, and safeguards.[57]

The 60th session of the IAEA General Conference was held from 26-30 September 2016, with more than 2,500 delegates from 155 IAEA Member States, non-governmental organizations, other international organizations, and the media in attendance.[58] At the meeting, IAEA membership for Saint Lucia, Saint Vincent and the Grenadines, and the Gambia were approved; eleven Member States were newly elected to the Board of Governors for the period of 2016-2018; and the IAEA annual budget for 2017 was accepted.[59] The Conference adopted resolution GC(60)/20 on the topic of the "implementation of the NPT safeguards agreement between the Agency and the Democratic People's Republic of Korea," resolution GC(60)/12 regarding "strengthening the Agency's activities related to nuclear science, technology and applications," as well as resolution GC(60)/15 on "the application of IAEA safeguards in the Middle East."[60] During the Conference, over 30 side events were organized, including a two-day Scientific Forum, which sought to draw attention to the role of nuclear technology in the achievement of the SDGs.[61] In particular, the role of nuclear and isotopic techniques in the fields of health, food security, energy and the environment were explored through five thematic sessions.[62]

The Agency's objectives are identified in the *Medium Term Strategy for 2018-2023*, which was developed by an open-ended working group established by the Board of Governors and with contributions by the Secretariat.[63] The document identifies six priorities for the IAEA: "facilitating access to nuclear power and other nuclear technologies; strengthening promotion and development of nuclear science, technology, and applications; improving nuclear safety and security; providing effective technical cooperation; strengthening the effective and efficient Agency safeguards; and providing effective, efficient and innovative management and sound program and budget planning."[64] Additionally, the IAEA will continue its cooperation with other international organizations, notably with the UN General Assembly and Security Council and in Preparatory Committee meetings for the 2020 NPT Review Conference.[65]

Conclusion

The IAEA provides the foundation for maintaining nuclear safety and security through its technical cooperation and safeguards programs.[66] Additionally, its research promotes the peaceful use of nuclear technology in a number of areas, including medicine and diagnostic imaging, water isotope analysis to map hydrological systems, and isotope tracers to measure the nutritional value of food.[67] As the international community continues to pursue nuclear disarmament and the expanded use of peaceful nuclear technology, including energy, the IAEA will play a vital role in facilitating dialogue, coordinating research efforts, and providing technical cooperation to Member States.[68]

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[55] IAEA, *Atoms for Peace and Development: How the IAEA Supports the Sustainable Development Goals*.
[56] IAEA, *IAEA and NPT*, 2017; UN 2015 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, *Background*.
[57] IAEA, *IAEA and NPT*, 2017.
[58] IAEA Office of Public Information and Communication, *Important Resolutions Adopted: 60th IAEA General Conference Concludes*, 2016.
[59] Ibid.
[60] Ibid.
[61] Ibid.
[62] IAEA Office of Public Information and Communication, *Making Nuclear More Effective in Support of Sustainable Development: Conclusions of the 2016 Scientific Forum*, 2016.
[63] IAEA, *Medium Term Strategy 2018-2023*.
[64] Ibid.
[65] IAEA, *Relationship with the United Nations*, 2016; IAEA, *NPT "PrepCom" Sessions*, 2014.
[66] IAEA, *Basics of IAEA Safeguards*, 2017.
[67] IAEA, *Division of Human Health*, 2016; IAEA, *Water Resources Programme: Our Role*, 2010; Joint FAO/IAEA Division of Nuclear Techniques in Food and Agriculture, *Livestock Frequently Asked Questions*, 2017.
[68] IAEA, *The IAEA Mission Statement*, 2017.

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Fischer's experience as a negotiator during the writing of the IAEA statute, Director and Assistant Director General for IAEA External Relations, and Special Advisor to the IAEA Director General contributed to producing the definitive resource on the Agency's early years. Delegates can use this book to understand the conditions under which the Agency was founded, the negotiation of the statute, and the Agency's work and priorities. Understanding the Agency's historical context and work will be critical to successful negotiations at the conference.

International Atomic Energy Agency. (n.d.). *Medium Term Strategy 2018-2023*. Retrieved 22 May 2017 from: https://www.iaea.org/sites/default/files/16/11/mts2018_2013.pdf

The Medium Term Strategy report provides an overview of the current environment in which the IAEA is operating, and a detailed list of the organization' strategic objectives for 2018-2023. In addition, clear mechanisms are described to enable the implementation of these objectives. Delegates should familiarize themselves with this strategy as it will be used as a guiding principle for policy development during the next five years.

International Atomic Energy Agency, Office of Public Information and Communication. (2016, September 30). *Important Resolutions Adopted: 60th IAEA General Conference Concludes*. Retrieved 22 May 2017 from: https://www.iaea.org/newscenter/news/60th-annual-session-of-iaea-general-conference-concludes

This article highlights key resolutions which were adopted during the 60th session of the General Conference. In addition, it provides a description of important events that occurred during the General Session, including over 30 side events. This article provides delegates with a short, yet concise, overview of the important events surrounding the 60th session, and should be used as a starting point for further research regarding this organization and its recent achievements.

United Nations, Conference on the Statute of the International Atomic Energy Agency. (1956). *The Statute of the International Atomic Energy Agency*. Retrieved 22 May 2017 from: https://www.iaea.org/node/9642

As the Agency's founding document, the statute establishes the IAEA's objectives, membership, governance, and program of work. Delegates should be thoroughly familiar with the provisions of the statute and how they are applied in the Agency's work. Particular attention should be given to Article III, which authorizes the key functions of the Agency, and Article XVI, which establishes the process by which the IAEA enters into agreements with other organizations, such as the UN.

United Nations, General Assembly, Twenty-second session. (1968). *Treaty on the Non-Proliferation of Nuclear Weapons (A/RES/2373 (XXII))*. Retrieved 22 May 2017 from: www.undocs.org/A/RES/2373 (XXII)

Article III of the NPT requires States parties to establish safeguards agreements with the IAEA, and the Agency's work is guided by the NPT's three pillars of disarmament, non-proliferation, and the peaceful uses of nuclear technology. In particular, the NPT's provisions to prevent the proliferation of nuclear weapons underpin the IAEA's work to establish and promote safeguards, and the call for the peaceful use of nuclear technology is the impetus for much of the Agency's research. Delegates should have a thorough understanding of the NPT and its implementation.

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I. Nuclear Technology and Water Security

"Nuclear science and technology can help gather the data needed to build effective water management policies and regulatory frameworks, which ultimately impacts people's lives."[69]

Introduction

The promotion of peaceful uses of nuclear technology has been part of the mandate of the International Atomic Energy Agency (IAEA) since its inception in 1957.[70] Nuclear technology has advanced significantly in the past decade with more efficient reactors, sustainable power plants, and increased regulation within the international community.[71] The IAEA has also become more active in the realm of water security, as IAEA research and technology has been utilized to improve access to clean and sustainable sources of water.[72] From the perspective of the IAEA, water security refers to the availability, quality, management, and protection of water.[73] The IAEA has recognized that water security is critical to human development and economic sustainability, particularly in light of global population growth."[74] IAEA's work on water security is varied, but it is best known for using isotope hydrology to discover and develop water resources.[75] Water security has long been an issue addressed by the IAEA and the greater international community, although more recently attention has been re-focused on the issue due to its inclusion in the *2030 Agenda for Sustainable Development*.[76]

International and Regional Framework

The United Nations (UN) and international community have advocated for the peaceful use of nuclear technology and the importance of on-going research for decades.[77] The *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT), ratified in 1970, provides clear objectives for peaceful use of nuclear technology and equal access to this technology for Member States.[78] In 1977, the United Nations Water Conference adopted the *Mar Del Plata Acton Plan* with the goal of universalizing access to water and improving its administration by national, regional, and international organizations.[79] The *Mar Del Plata Action Plan* made several recommendations, including establishing an international body to research water resources, coordinate research and development, and expand existing networks of hydrological and meteorological research stations.[80] Within the *Mar Del Plata Action Plan*, the UN enacted the *International Drinking Water Supply and Sanitation Decade of 1981-1990* and tasked the Committee on Natural Resources to review progress made by governments in the implementation of the *Mar Del Plata Action Plan*.[81]

In 2002, the United Nations Department of Economic and Social Affairs (UNDESA) hosted the World Summit on Sustainable Development and adopted the *Johannesburg Plan of Implementation* (JPOI), a framework with sustainability at its core, that stresses the importance of access to water and effective water resource management.[82] After the JPOI, the General Assembly and UNDESA advocated for international efforts to promote water sanitation and access to clean water with the International Decade for Action: 'Water for Life' from 2005-2015.[83] Along with that declaration, the General Assembly recognized that energy consumption and nuclear power are interconnected

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[69] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[70] IAEA, *Nuclear Technology Review*, 2016.
[71] Ibid.
[72] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[73] Ibid.
[74] IAEA, *Water Resources Programme*, 2016.
[75] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[76] UN General Assembly, *Transforming our world: the 2030 Agenda for Sustainable Development (A/RES/70/1)*, 2015.
[77] Fischer, *History of the International Atomic Energy Agency: The First Forty Years*, 1997, p. 10.
[78] IAEA, *Treaty of the Non-Proliferation of Nuclear Weapons and the IAEA – A Chronology*, 2014.
[79] United Nations Water Conference, *Mar Del Plata Acton Plan*, 1977.
[80] Ibid.
[81] UN General Assembly, 1979). *Follow-up to and implementation of the Mar Del Plata Action Plan of the United Nations Water Conference (A/RES/34/191)*, 1979.
[82] UN DESA, *Plan of Implementation of the World Summit on Sustainable Development*, 2002.
[83] UN DESA, *We're finally at the end of the UN Decade for Water 2005-2015 – It is time to say good-bye*, 2015.

with water.[84] In 2010, the General Assembly passed resolution 64/292 on the *Human right to water and sanitation*, which declared safe and clean drinking water a human right and called for Member States and intergovernmental organizations to provide financial resources, capacity building, and technology transfer as forms of international assistance.[85] In 2015, the General Assembly adopted the *2030 Agenda for Sustainable Development*, which included within it the Sustainable Development Goals (SDGs).[86] SDG 6 focuses on clean water and sanitation and has targets based on improving sanitation in public institutions, promoting affordable and socially and culturally acceptable technologies and practices, integrating sanitation into water resources management strategies, developing innovative financing and partnership mechanisms, and strengthening existing information networks.[87] In November 2016, the General Assembly approved the upcoming *International Decade for Action on Water for Sustainable Development* for *2018-2028*, which focuses on the integrated management of water resources.[88]

Role of the International System

After the adoption of the JPOI, UN-Water was established as an inter-agency mechanism to coordinate all issues concerning freshwater.[89] UN-Water works with other UN bodies and Member States to maximize system-wide coordinated action on water.[90] Any UN body or program that deals with water-related issues can be a member of UN-Water, which makes their membership very broad; it includes: the IAEA; the Food and Agriculture Organization of the UN; the United Nations Development Programme; the United Nations Environment Programme; and the United Nations Educational, Scientific, and Cultural Organization (UNESCO), among others.[91] As an example of an agency implementing action on water, UNESCO helps to build up the capacity of Member States, including with modern training and technology innovations, to improve national water systems and promote water access.[92] UNSECO also operates water-related centers in 26 different geographic areas, each of which provides support, training, and expertise based on the unique needs of the region.[93]

Like UNESCO, the IAEA has a long history of supporting technology that promotes development and water security.[94] In 1960, the IAEA launched the Global Network of Isotopes in Precipitation (GNIP) in order to conduct research and observation of hydrogen and oxygen isotopes in precipitation.[95] With assistance from the World Meteorological Organization (WMO), the IAEA collects spatial data from GNIP on the isotope content of precipitation across the global and compiles it to track water and determine environmental variations.[96] The network and its related technology allows the IAEA to track the entire life cycle of water, which can be helpful in water resources management and the identification of contaminants.[97] Using similar technology and partnerships, the Global Network of Isotopes in Rivers (GNIR) was formed in 2002 to provide environmental observations of river waters and analyze water samples from around the globe.[98] Both of these initiatives, and many other UN bodies that use nuclear technology in their work on water, are supported by the IAEA Environment Laboratories (IAEA-MEL), which was established in Monaco in 1961 to support the IAEA's Department of Research and Isotopes.[99] IAEA-MEL collaborates with Member States and multiple UN bodies to conduct research and share technological advancements.[100] The primary objective of the laboratory is to coordinate technical aspects of international ocean

[84] UN ECOSOC, *Water for Life: Water and Energy*, 2015.
[85] UN General Assembly, *The human right to water and sanitation (A/RES/64/292)*, 2010.
[86] UN DPI, *Sustainable Development Knowledge Platform: Water and sanitation*, 2016.
[87] Ibid.
[88] UN DPI, *International Decade for Action, 'Water for Sustainable Development'*, *2018-2028*, 2016.
[89] UN Water, *What We Do*, 2017.
[90] Ibid.
[91] UN-Water, *Members*, 2017.
[92] UNSECO, *Water Security*, 2017.
[93] UNESCO, *Water-related Centres under the auspices of UNESCO*.
[94] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[95] IAEA, *Global Networks of Isotopes in Precipitation and Rivers (GNIP, GNIR)*, 2017.
[96] Ibid.
[97] Ibid.
[98] Ibid.
[99] IAEA, *Environment Laboratories Monaco*, 2010.
[100] Ibid.

protection, provide training, and assist with analytical quality control services for radioactive and non-radioactive marine pollutants to protect marine environments.[101]

At the 59th session of the IAEA General Conference in 2015, Member States adopted GC (59)/RES/9 on "Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety," which requested that Member States and international organizations cooperate in creating international and regional frameworks for standards in drinking water and other commodities.[102] Since then, the IAEA has committed itself to improving access to sustainable water resources and providing research to the international community in that regard.[103] IAEA research on isotopes allows scientists and researchers to gather information on water replenishment rates, flow, and vulnerability to pollution, as well as to determine water's age, origin, quality, and quantity.[104] The scientific progress made by IAEA scientists has led to the creation of new technologies, further improving the accessibility of water and sustainability of water resources for local populations around the world.[105]

Nuclear Technology: Hydrology, Water Security, and Nuclear Energy

By 2017, roughly 80 Member States had received support through nearly 1,200 projects under the IAEA's technical cooperation program.[106] IAEA assistance has includes over 400 meetings on various topics in nuclear science and technology each year, in addition to the IAEA's Coordinated Research Programs, which consist of groups of scientists in various Member States that cooperatively investigate problems in a wide range of fields.[107] IAEA assistance follows three principles, namely experts, equipment, and training, which allows for 30,000 IAEA experts to be assigned to assist in nuclear-related development in Member States.[108] Additionally, the IAEA engages with Member States on science-based isotope hydrology methodologies and the establishment of technical training sites.[109] This assistance was extended to Japan in the aftermath of the 2011 Fukishima nuclear disaster, where scientists and engineers from the IAEA and Japan cooperated in several technical seminars to ensure that groundwater around Fukishima had not been contaminated by nuclear fallout and radiation.[110]

Access to reliable, sustainable, and safe drinking water is a key aspect of the IAEA's mission and mandate, as is utilization of nuclear isotopic techniques.[111] By the end of 2015, there were 30 Member States with 441 active nuclear reactors and 30 reactors under construction.[112] While there has been significant progress in developing and improving efficient fusion reactors with nuclear reactors, there have been concerns regarding aging nuclear technology.[113] Older reactors can threaten local environments and local drinking water with hazardous radiation.[114] Approximately half of the world's 246 reactors are at some level of risk of failure due to their age.[115] Only eight states are constructing new research reactors or developing programs to improve research and development of nuclear science and technology.[116] The IAEA presently supports Member States with efficient water management in nuclear power plants.[117] The IAEA work is featured in the Water Management Program (WAMP) for the construction or replacement of nuclear power plants.[118] WAMP focuses on waste treatment systems, water for

[101] Ibid.
[102] IAEA, *Measures to strengthen international cooperation in nuclear, radiation, transport and waste safety*, 2015.
[103] Jawerth & Gaspar, *How the IAEA Will Contribute to the Sustainable Development Goals*, 2015.
[104] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[105] Ibid.
[106] IAEA, *IAEA technical cooperation: Strengthening technology transfer*, 2015.
[107] Ibid.
[108] Ibid.
[109] IAEA, *Water Resources Programme*, 2016.
[110] Ibid.
[111] Ibid.
[112] IAEA, *Nuclear Technology Review*, 2016.
[113] Ibid.
[114] Ibid.
[115] Ibid.
[116] Ibid.
[117] IAEA, *Efficient Water Management in Nuclear Power Plants*, 2017.
[118] Ibid.

condenser cooling, and safe water management strategies that allow Member States to access valuable data and research for improving water sustainability within nuclear reactors.[119]

Water Security Case Study: Water Security in Africa

Nuclear scientists from Member States and the IAEA are able to analyze radioactivity of the isotopes.[120] Through this research, scientists can determine the age of water and whether stable isotopes can remain constant throughout the period when they are present in water.[121] Scientists are then able use the different isotope contents in surface water and groundwater to determine various factors and processes, including sources and history of water, past and present rainfall conditions, recharge of aquifers, mixing and interactions of water bodies, evaporation processes, geothermal resources and pollution processes.[122] The IAEA uses this research to observe water molecules and the water cycle of evaporation, precipitation, infiltration, runoff, evapotranspiration, and return to the ocean or to the atmosphere.[123] In the Sahel region of Africa, the IAEA has used this methodology to assist in improving water sustainability in local communities.[124] The IAEA, with scientists from 13 African Union Member States, developed the ability to assess ground water over 5 million square kilometers.[125] This technical cooperation program under the IAEA has provided training and equipment to local scientists to study five regions across Africa, which are the Iullemeden aquifer system, the Liptako-Gourma-Upper Volta system, and the Senegalo-Mauritanian, Chad and Taoudeni basins.[126] The joint research has provided detailed information on contamination levels of water and flow patterns that connect aquifers and basins throughout the region and will likely be used to increase access to water in many parts of the Sahel.[127]

Conclusion

Nuclear technology and water security have become priorities for the IAEA and the international community.[128] The IAEA has positioned itself to support Member States with nuclear technologies to sustain water security and development.[129] The UN, IAEA, and Member States all now recognize that nuclear research and technology may be useful in addressing the growing scarcity of water.[130] In the 21st century, the international community and UN have pushed for a greater need for cooperation in improving water security.[131] As demand for water rises and conflict spreads, Member States and international organizations will continue to look to the IAEA for technical assistance and research to address sustainability needs regarding water security.[132]

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Barretto, P. (2015). *IAEA technical cooperation: Strengthening technology transfer*. International Atomic Energy Agency. Retrieved 20 May 2017 from: https://www.iaea.org/technicalcooperation/Pub/Learn-more-TC/Article2.html

This article provides definitions and highlights efforts of the IAEA in technology transfer and nuclear research. This document outlines IAEA efforts to establish facilities within Member States to strengthen water security and sustainability. Understanding the objectives and what may classify as technical cooperation will be beneficial and greatly contribute to delegates knowledge of what the IAEA does and how it conducts its missions. The article also provides information on

[119] Ibid.
[120] IAEA, *Scientists Explore Groundwater in the Sahel with Nuclear Technology*, 2017.
[121] Ibid.
[122] Ibid.
[123] IAEA, *World Water Day: Using Nuclear Techniques to Protect Water*, 2016.
[124] IAEA, *Scientists Explore Groundwater in the Sahel with Nuclear Technology*, 2017.
[125] Ibid.
[126] Ibid.
[127] Ibid.
[128] Ibid.
[129] Ibid.
[130] IAEA, *Water Resources Programme*, 2016.
[131] Ibid.
[132] Ibid.

IAEA programs and actions that will allow delegates to research the importance of technical training and cooperation in Member States that the IAEA is assisting.

International Atomic Energy Agency. (2016). *Water Resources Programme* [Website]. Retrieved 20 May 2017 from: http://www-naweb.iaea.org/napc/ih/index.html

This website describes many IAEA initiatives to improve water security globally. It is an excellent resource that not only describes these programs, but also outlines how they have been successful and if they have impacted scientific progress. Recognizing the amount of research and work the IAEA does will greatly assist delegates in understanding what actions the IAEA can potentially take. Delegates can also find valuable information through the IAEA's main website on its water programs over the years.

International Atomic Energy Agency. (2016). *Nuclear Technology Review 2016* [Report]. Retrieved 19 April 2017 from: https://www.iaea.org/About/Policy/GC/GC60/GC60InfDocuments/English/gc60inf-2_en.pdf

This annual IAEA report provides statistics, data, and information on nuclear energy in Member States. This report provides detailed information on the application of all relevant nuclear technologies. The report also highlights numerous key issues within the international community such as water based nuclear reactors and decommissioning and sustainability of these reactors. Other aspects worth noting are updates on new technologies, reactors, and various proposals to address these issues.

International Atomic Energy Agency. (2016). *Measures to Strengthen International Cooperation in Nuclear, Radiation, Transport and Waste Safety* [Report]. Retrieved 19 April 2017 from: https://www.iaea.org/About/Policy/GC/GC60/GC60Documents/English/gc60-4_en.pdf

This report discusses the goals and recommendations that were made at the 60th session of IAEA's Board of Governors General Conference. The report provides detailed analyses regarding the IAEA's Safety Standards program, the safety of spent fuel and radioactive waste management. The report provides information on IAEA assistance and Member State's cooperation on radiation safety and environmental protection relating back to water security and nuclear technology. Delegates may find informative data and references of previous work done by the IAEA in order to protect groundwater and addressing water security.

United Nations, Department of Public Information. (2017, May 2). *Scientists Explore Groundwater in the Sahel with Nuclear* Technology [Press Release]. Retrieved 20 May 2017 from: https://www.iaea.org/newscenter/news/scientists-explore-groundwater-in-the-sahel-with-nuclear-technology

This press release provides significant information on how the IAEA's scientists and research provided valuable assistance to Member States to find new water resources. Delegates will be able to use this as a foundation in order to better understand the work of the IAEA and how it cooperates with and assists Member States using nuclear research and technology. Delegates will also be able to find further information on the work of the IAEA with groundwater and water security.

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Jawerth, N. & M. Gaspar. (2015, September 25). *How the IAEA Will Contribute to the Sustainable Development Goals*. International Atomic Energy Agency. Retrieved 22 April 2017 from https://www.iaea.org/newscenter/news/how-iaea-will-contribute-sustainable-development-goals

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II. Improving the Effectiveness of Safeguards and Verification Mechanisms

Introduction

Preventing the proliferation of nuclear weapons and illicit nuclear technology is one of the highest priorities of the international community.[133] The International Atomic Energy Agency (IAEA) plays a critical role in preventing the production and proliferation of nuclear weapons with its safeguards and verification mechanisms.[134] IAEA safeguards consist of a set of technical measures which allow the IAEA to independently verify a Member State's legal obligations to not pursue or develop nuclear weapon material and technologies or other nuclear explosive devices.[135] IAEA safeguards are ingrained in legally binding agreements, which provide the framework for the IAEA to execute effective verification.[136] The IAEA safeguard system functions as an early warning system that triggers responses from the international community if an issue arises.[137] Safeguards and verification mechanisms are aimed at deterring the misuse of nuclear material and/or technology and to ensure that nuclear science and technology is used exclusively for peaceful purposes, including cancer diagnosis, food production, combating climate change, and providing safe and clean sources of energy for the developing world.[138] Through safeguard agreements, the IAEA is able to provide assurances to the international community that Member States are honoring their obligations and only developing nuclear technology and material for peaceful purposes.[139] In 2015, 182 states had IAEA safeguards in place.[140] To date, 2,118 in-field inspections have been conducted by IAEA safeguard inspectors on 200,110 significant quantities of nuclear material at 1,286 nuclear facilities and locations outside facilities (LOFs).[141] The foundational treaty that established the safeguards system under the IAEA was the 1968 *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT).[142] The NPT entrusted the IAEA as the nuclear inspectorate.[143] The core goals of the NPT are to advance peaceful uses of nuclear energy, prevent proliferation of nuclear weapons and weapons technology, and further global nuclear disarmament.[144]

International and Regional Framework

By the mid-1960s five states had developed and tested nuclear weapons technology and it became apparent that a treaty needed to be established to deter future proliferation.[145] In response, the United Nations (UN) General Assembly called for the Disarmament Committee to draft a treaty that would prevent the spread of nuclear weapons.[146] The result was the NPT, a treaty that strikes a balance of rights and obligations with states agreeing to the principles of non-proliferation, to take steps toward disarmament, and to reap the benefits of utilizing peaceful nuclear technology.[147] Under Article III of the NPT, states that have not procured nuclear weapons, or non-nuclear-weapon-states (NNWS), are mandated to sign a safeguards agreement with the IAEA, which allows the IAEA to verify that each NNWS is not manufacturing or developing nuclear weapon material or technology.[148]

These principles of non-proliferation and safeguards have been replicated at the regional level by regional treaties and nuclear-weapon-free-zones (NWFS).[149] This process began at the regional level in 1967 with the *Treaty for the*

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[133] IAEA, *Meetings Safeguards Challenges*, 2013.
[134] IAEA, *IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols*, 2017.
[135] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[136] Ibid.
[137] IAEA, *IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols*, 2017.
[138] IAEA, *Peaceful Applications of Nuclear Technology: Current Situation and Future Perspectives*, 2016; IAEA, *How IAEA Safeguards Contribute to International Peace and Security*, 2015.
[139] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[140] Henriques, *A day in the life of a safeguards inspector*, 2016.
[141] IAEA, *Safeguards in Practice*, 2015.
[142] *Treaty on the Non-Proliferation of Nuclear Weapons*, 1968.
[143] Ibid.
[144] Ibid.
[145] IAEA, *Treaty of the Non-Proliferation of Nuclear Weapons and the IAEA - A Chronology*.
[146] Ibid.
[147] IAEA, *IAEA Safeguards: Staying Ahead of the Game*, 2007.
[148] Ibid.
[149] Ibid.

Prohibition of Nuclear Weapons in Latin America and the Caribbean, otherwise known as the *Treaty of Tlatelolco*, which was the first international treaty that required all of its parties to engage in safeguards agreements with the IAEA.[150] Similarly, the 1985 *Treaty of Rarotonga* (South Pacific), the 1995 *Treaty of Bangkok* (Southeast Asia), the 1996 *Treaty of Pelindaba* (Africa), and the 2006 *Treaty of Semipalatinsk* (Central Asia) each established a NWFZ in their respective region and required each of the Member State party to conclude a safeguard agreement with the IAEA.[151] NWFZ take non-proliferation further by prohibiting all State parties from receiving, storing, installing, deploying, or possessing in any form nuclear weapons or nuclear explosive devices.[152] The NPT also refers to the right of any group of Member States to negotiate and conclude regional treaties with required parties to take part in safeguard agreements and ensures the total absence of nuclear weapons in these respective territories.[153] Some Member States also enter into a regional system of accounting for control of nuclear material (RSAC), which gives Member States the forum to report their nuclear material inventory.[154] Cooperation with state and regional authorities (SRA) allows the IAEA to ensure that safeguards are implemented effectively.[155] In addition, SRAs may facilitate with other actions such as export/import controls, radiation protection, and nuclear safety and security.[156]

The IAEA uses three types of safeguards agreements to verify proper use of nuclear material and administer agreements: comprehensive safeguards agreements (CSAs), item-specific safeguard agreements, and voluntary offer agreements (VOAs).[157] CSAs require that a Member State accept IAEA safeguards on all of the nuclear material in its territory or under its jurisdiction.[158] Any Member State that is party to a NWFZ or a signatory of the NPT is required to conclude a CSA with the IAEA.[159] Under CSAs, the IAEA also has the obligation to verify that all nuclear material subject to safeguards is not improperly used to construct nuclear weapons or nuclear explosive devices.[160] Item-specific safeguards agreements only address nuclear material, facilities, and other items specified in the agreement, thus excluding all other materials not mentioned in the agreement.[161] Member States party to an item-specific safeguards agreement accede to not using nuclear material, facilities, or other items subject to the agreement for construction of a nuclear weapon or for any military purposes.[162] Voluntary offer agreements (VOAs) are agreements between the five NPT nuclear-weapon States (NWS) and the IAEA, in which facilities and material are offered for the application of safeguards on a voluntary basis.[163]

The IAEA also uses two types of protocols to strengthen safeguard agreements: small quantities protocols (SQPs) and additional protocols (APs).[164] SQPs were introduced in the early 1970s and are used to minimize the hardship on NNWS with CSAs that have very minimal nuclear activities.[165] APs equip the IAEA with significant additional verification mechanisms that allow for increased physical access to facilities and material, broader access to information, and strengthened administrative arrangements.[166] Any state with a safeguard agreement with the IAEA can conclude an AP; however, APs require that the party to the agreement must accept all additional provisions.[167] Some of these additional provisions under APs include allowing IAEA access to all aspects of a Member State's nuclear fuel cycle, including nuclear waste and uranium mines; providing the IAEA with fuel cycle research and development activities; and granting the IAEA permission to collect environmental samples beyond declared

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[150] Ibid.
[151] Ibid.
[152] IAEA, *Nuclear-Weapon-Free-Zones*.
[153] Ibid.
[154] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[155] Ibid.
[156] Ibid.
[157] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[158] Ibid.
[159] Ibid.
[160] Ibid.
[161] Ibid.
[162] Ibid.
[163] Ibid.
[164] Ibid.
[165] Ibid.
[166] Ibid.
[167] Ibid.

locations.[168] Once a state has both a CSA and an AP in place, the IAEA is able to ascertain with a high degree of certainty that the state's nuclear activities remain peaceful and in line with legal obligations.[169] Currently, 126 states have an AP in place and another 20 states have signed but not yet ratified an AP.[170] The IAEA's *2017 Safeguards Implementation Report* found that globally 69 Member States could be certified as using all of their nuclear material only for peaceful purposes and that in an additional 104 all declared nuclear material was being used for peaceful purposes.[171] The IAEA can only verify the peaceful use of all nuclear material (both declared and undeclared) if a Member State has concluded both a CSA and AP.[172] As of 2016, 12 State parties to the NPT had yet to conclude a CSA with the IAEA and therefore the IAEA was not able to draw any conclusions on their use of nuclear material.[173]

Role of the International System

The safeguards regime aims to detect the diversion of nuclear material, which includes enriched uranium, uranium-223, and plutonium, all of which can be used for the construction of a nuclear weapon.[174] Natural uranium and depleted uranium, which are commonly used in agriculture and industry, are also subject to IAEA safeguards.[175] Radioactive substances which do not contain nuclear materials are not subject to IAEA safeguards nor do they need to be reported under a safeguard agreement.[176] The *Statute of the IAEA* (1989) states that the agency shall establish a staff of inspectors who have the responsibility of independently verifying Member States' compliance with nuclear safeguards and protective measures.[177] IAEA safeguards are implemented through a variety of headquarters activities including processing, reviewing, and validating information and in-field inspection activities including installation of cameras, verification seals, and the collection of samples from nuclear material.[178]

The IAEA also cooperates with regional organizations, such as the European Union (EU), to strengthen safeguards standards.[179] During a meeting in 2017, the IAEA and EU exchanged views on enhancing nuclear security, safeguards techniques, and nuclear science applications.[180] The EU also played a key role in the negotiation and implementation of the 2016 *Joint Comprehensive Plan of Action* (JCPOA) between the IAEA and Iran.[181] Under the JCPOA, Iran agreed to limit its stockpiles of enriched uranium and reduce the number of gas centrifuges while abiding by all IAEA safeguards and verification mechanisms.[182] The EU has agreed to cooperate with Iran in the areas of nuclear safety and will be providing technical support to the IAEA, including training and equipment.[183]

Organizations outside of the IAEA, such as the UN General Assembly, also play a key role in the implementation of nuclear safeguards.[184] The General Assembly considers matters that pertain to international peace and security including nuclear safeguards, disarmament, and non-proliferation.[185] Through international collaboration, the General Assembly makes recommendations on nuclear security to Member States and to the Security Council.[186] The General Assembly also collaborates with subsidiary bodies such as the Disarmament and International Security Committee and the United Nations Disarmament Commission, which both work to submit concrete

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[168] Ibid.
[169] IAEA, *IAEA Annual Report 2015*, 2015.
[170] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[171] IAEA, *Nuclear Safeguards Conclusions Presented in 2016 Safeguards Implementation Report*, 2017.
[172] Ibid.
[173] Ibid.
[174] IAEA, *IAEA Safeguards: Staying Ahead of the Game*, 2007.
[175] Ibid.
[176] Ibid.
[177] IAEA, *Statute of the IAEA*.
[178] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[179] IAEA, *IAEA and EU Strengthen Cooperation in Nuclear Activities*, 2017.
[180] Ibid.
[181] Ibid.
[182] Ibid.
[183] Ibid.
[184] NTI, *United Nations General Assembly*, 2017.
[185] Ibid.
[186] Ibid.

recommendations on nuclear disarmament issues.[187] Furthermore, the IAEA Statute includes a relationship agreement with the General Assembly which requires the IAEA to submit an annual report to for consideration by the General Assembly.[188]

Challenges in Safeguards and Verification

IAEA safeguards have evolved since the signing of the NPT as a result of changes in technologies, practical experience, and the need for strengthening efficiency and effectiveness.[189] In particular, the IAEA's experience with clandestine nuclear programs in both Iraq and the Democratic People's Republic of Korea (DPRK) in the 1990s highlighted some of the shortcomings in the safeguard and verification system.[190] Despite its CSA with the IAEA, Iraq developed a secretive nuclear weapons program until it was discovered in 1991.[191] Also in the early 1990s, the IAEA identified inconsistencies in the DPRK's nuclear activities and requested increased access to nuclear facilities.[192] However, the DPRK refused to grant the IAEA further access in 1993 and formally withdrew its membership from the IAEA in 1994.[193] After further attempts at a resolution between the IAEA and DPRK failed, the DPRK announced its official withdrawal of the NPT in 2003.[194] The DPRK subsequently called for the complete withdrawal of IAEA inspectors in 2009.[195] These experiences dramatically transformed the international expectations of IAEA safeguards.[196] Safeguards had worked adequately for declared nuclear material, but the safeguard regime was not equipped to detect undeclared nuclear material or activities.[197]

Another challenge posed to the safeguard regime is that the amount of nuclear material and the number of nuclear facilities subject to IAEA safeguard inspection is steadily growing.[198] The use of nuclear power continues to rapidly expand which puts additional stress on the IAEA safeguards regime.[199] The IAEA estimates that over the past five years, the number of nuclear facilities under safeguards has risen by 12% and the quantity of nuclear material under safeguards inspection has grown by 14%.[200] This is also resulting in similar increases in the number of CSAs and APs between States and the IAEA, and the IAEA expects this trend to continue to increase.[201] In addition, many older nuclear facilities are being modernized and becoming more technologically sophisticated and international nuclear research and development and trade in nuclear materials are at record highs.[202] This is all leading to increased demands on the IAEA that the agency cannot currently keep pace with, in part because the IAEA's budget is not expected to grow in order to meet these increased demands.[203] The IAEA relies on financial contributions from its Member States and thus depends on its Member States to address budgetary issues.[204] To avoid compromising the current safeguards regime by relaxing its safeguards policies, the IAEA must adapt and become more efficient while ensuring that its Member States are aware of changing budgetary requirements.[205]

Methods for Improving Safeguards and Verification

Over the past decade, IAEA safeguards and verification measures have been strengthened in many core areas including confidence building applications and measures to increase detection of clandestine nuclear weapons

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[187] Ibid.
[188] Ibid.
[189] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[190] Ibid.
[191] IAEA, *IAEA Safeguards: Staying Ahead of the Game*, 2007.
[192] Ibid.
[193] IAEA, *IAEA and DPRK: Chronology of Events*, 2017.
[194] Ibid.
[195] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[196] IAEA, *IAEA Safeguards: Staying Ahead of the Game*, 2007.
[197] Ibid.
[198] IAEA, *Safeguards in Practice*, 2015.
[199] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[200] Ibid, p. 18.
[201] Ibid.
[202] Ibid.
[203] Ibid.
[204] Ibid.
[205] Ibid.

programs.[206] As a result of some of the challenges mentioned above, the IAEA Board of Governors determined that the IAEA has the right and obligation to verify a Member State's declared, as well as undeclared, nuclear material and activities.[207] These additional verification mechanisms required further legal authority that the existing CSAs could not provide.[208] This led to the development of a new legal instrument, the Model AP, which was approved in May 1997.[209] As mentioned above, the AP has served to fill in the gaps in information reported under safeguard agreements by increasing the scope and depth of acquired information and enhancing access to facilities and materials.[210] This enables IAEA inspectors to gain a complete picture of a Member State's nuclear plans, programs, and materials.[211] In the past five years, the number of states with APs has increased by 25%.[212] The Conference on Disarmament (CD) is also currently discussing a proposed Fissile Material Cut-Off Treaty (FMCT), which if concluded, would prohibit Member States from acquiring or producing fissile material needed for nuclear weapons or nuclear explosive devices.[213] Since the NPT already requires that NNWS not produce or acquire fissile material, a FMCT would primarily limit nuclear weapon activities of the five NWS (China, France, Russian Federation, the United States, and the United Kingdom) and the four States outside of the NPT (India, Israel, DPRK, and Pakistan) if they were to sign the treaty.[214] Extending verification measures to India, Israel, DPRK, and Pakistan would be a significant success for the international community as it would bring nearly every UN Member State into the international safeguards regime.[215]

Verification capabilities have also been strengthened recently through the modernization of the IAEA safeguards analytical laboratories.[216] However, safeguards and verification mechanisms will likely continue to evolve as more challenges arise.[217] The IAEA has identified that there remains a need for further improvements and optimization for the organization to be able to respond to new verification demands from Member States.[218] Specifically, improvements could be made by streamlining internal processes, making use of modern technologies, and encouraging Member States to improve their cooperation and adherence to the implementation of safeguard agreements.[219] The IAEA has also recognized that it needs to better leverage the use of emerging technologies such as safeguards analytics laboratories, enhanced surveillance systems, in addition to other modern information technology (IT).[220] Enhancing the use of analytical services could improve the IAEA's independent verification capabilities because it provides the IAEA with improved sample capacity for nuclear material and environmental analysis.[221]

Conclusion

The world of nuclear energy and technology continues to progress rapidly, which is creating challenges for the implementation of IAEA safeguards and verification mechanisms.[222] The non-disclosure of nuclear material and facilities continues to threaten international peace and security, making the strengthening of the safeguards regime a top priority.[223] The implementation of IAEA safeguards and verification mechanisms depend on financial contributions from Member States and there remains a need for Member States to cooperate with the IAEA while also looking for new and innovative ways of improving the efficiency and effectiveness of safeguards and

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[206] IAEA, *IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols*, 2017.
[207] IAEA, *IAEA Safeguards: Staying Ahead of the Game*, 2007.
[208] Ibid.
[209] Ibid.
[210] Ibid.
[211] Ibid.
[212] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[213] NTI, *Proposed Fissile Material (Cut-Off) Treaty (FMCT)*, 2017.
[214] Ibid.
[215] NTI, *Proposed Fissile Material (Cut-Off) Treaty (FMCT)*, 2017.
[216] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[217] IAEA, *Safeguards in Practice*, 2015.
[218] Ibid.
[219] Ibid.
[220] Jawerth, *Enhancing Effective Nuclear Verification: Upgrading IAEA Safeguards Capabilities*, 2015.
[221] Ibid.
[222] IAEA, *IAEA Safeguards Serving Nuclear Non-Proliferation*, 2015.
[223] Ibid.

verification mechanisms. With the support from its Member States, the IAEA will continue to verify and safeguard nuclear material and technology, thereby deterring the proliferation of nuclear weapons.[224]

Annotated Bibliography

Henriques, S. (2016). A day in the life of a safeguards inspector. *IAEA Bulletin*, 57 (2). Retrieved 20 May 2017 from: https://www.iaea.org/sites/default/files/5720811_spread_0.pdf

This document from the IAEA details a day in the life of an IAEA safeguards inspector. This bulletin details the often grueling procedures which an IAEA inspector must undergo on a daily basis to perform his or her job. Safeguards inspectors are integral to the non-proliferation regime as they ensure that Member States are not diverting nuclear material from peaceful to military purposes. In 2015, IAEA safeguards inspectors performed 2,118 inspections and spent a total of 13,248 calendar days on the road performing inspections.

International Atomic Energy Agency. (2007). *IAEA Safeguards: Staying Ahead of the Game* [Report]. Retrieved 19 May 2017 from: https://www.iaea.org/sites/default/files/safeguards0707.pdf

This IAEA report gives a substantive overview and historical background on IAEA safeguards and verification mechanisms. Although from 2007, this report remains valuable as it details the evolution of IAEA safeguards and their place within the non-proliferation regime. This report also details the founding of the Nuclear Non-Proliferation Treaty (NPT) and explains how it remains a balance of rights and obligations with regard to nuclear disarmament and non-proliferation. This report also details the in-field verification measures undertaken as part of a Comprehensive Safeguard Agreement (CSA) and measures that were utilized to strengthen the safeguard system between 1991 and 2005.

International Atomic Energy Agency. (2015). *IAEA Annual Report 2015*. Retrieved 19 May 2017 from: https://www.iaea.org/sites/default/files/gc60-9.pdf

This IAEA annual report gives an overview of IAEA activities for 2015 and is the most recent annual report that has been published. The report details nuclear technology activities, nuclear safety and security activities, nuclear verification activities, and technical cooperation with States. The section on nuclear verification is especially significant for delegates to consider as it provides a discussion of the implementation of safeguards in 2015. This report also discusses measures for enhancing safeguards including implementation measures, cooperation with states and regional authorities, and safeguards equipment and tools.

International Atomic Energy Agency. (2015). *IAEA Safeguards Serving Nuclear Non-Proliferation* [Report]. Retrieved 19 May 2017 from: https://www.iaea.org/sites/default/files/safeguards_web_june_2015_1.pdf

This IAEA report gives a thorough introduction to the IAEA safeguards framework. This report details how IAEA safeguards are an essential pillar of the nuclear non-proliferation regime, ensuring that the IAEA is able to provide assurances that Member States are honoring their international obligations to only seek nuclear material for peaceful purposes. This is an important document for delegates to consider as they are completing their research because it provides an overview of the way in which IAEA safeguards have been strengthened in recent years. Additional protocols have been put in place in nearly 125 Member States, which has significantly enhanced IAEA verification capabilities. This report also details the challenges that IAEA safeguards continue to face with States outside of the safeguards regime that are seeking nuclear material for nefarious purposes.

International Atomic Energy Agency. (2015). *Safeguards in Practice* [Website]. Retrieved 2 May 2017 from: https://www.iaea.org/safeguards/basics-of-iaea-safeguards/safeguards-facts-and-figures

The IAEA website provides a very useful summary of key facts and figures relating to IAEA safeguards and verification mechanisms for 2015. This source is significant for delegates to review because it provides relevant statistics relating to the number of safeguards agreements and additional protocols currently being applied. This source also provides figures relating to the

[224] IAEA, *Safeguards in Practice*, 2015.

significant quantities of nuclear material, the number of in-field inspections, and the amount of nuclear material reported on for 2015. This source further details current trends in nuclear technology and safeguards application including an overview of the increases in the amount of nuclear technology and material coming under IAEA safeguards.

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