Dear Honorable Delegates:

It is my pleasure to welcome you to the International Atomic Energy Agency Board of Governors simulation at the 2005 Southern Regional Model United Nations Conference. My name is Jennifer Kon, and I will be the Director of this committee. I am a senior at the University of South Florida and plan to graduate in December 2005 with degrees in International Studies and History. I have been participating in Model United Nations for the past three years and have attended seven conferences as a delegate and served on staff at nine conferences. I am also an intern with the UNA-USA Global Classrooms Tampa Bay program and the previous President of Model United Nations at the University of South Florida. Our Assistant Director is Kate Moore. Kate is a graduate of Clemson University where she majored in Political Science and minored in French.

At the conference in November, we will be simulating the IAEA Board of Governors. The International Atomic Energy Agency is an autonomous agency of the United Nations and the Board of Governors is one of the two main policymaking bodies of this agency. Before this committee are three very important and interesting topics. The topics before the International Atomic Energy Agency Board of Governors are:

I. Battling Nuclear Terrorism
II. Enforcing Adherence to the Nuclear Non-Proliferation Treaty
III. Strengthening the International Capability to Respond to Nuclear Emergencies

A position paper must be submitted by each delegation to Director-General Brian Halma (srmundg@yahoo.com) by October 29 at 11:59 pm. **Please follow the format as specified on the SRMUN website at www.srmun.org. It should be no longer than two pages in length and single-spaced. The position paper should express your country's policies and recommendations for all of the committee's topics.**

Model United Nations is a part of the educational process that will prepare you for what lies ahead of you in life and our goal is to facilitate learning so that you get the best possible experience from this conference. While conducting your research, if you have any questions, please feel free to contact Kate or myself by email. We look forward to seeing you at the conference in November. Good luck!

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History of the International Atomic Energy Agency Board of Governors

The International Atomic Energy Agency was founded on July 29, 1957, to promote and control the peaceful uses of nuclear technology. It is an autonomous agency of the United Nations and receives funding from the United Nations. Its headquarters are located in Vienna, Austria.[1] It is currently made up of 138 member states. Its creation was sparked by a speech made at the United Nations General Assembly in 1953 by United States President Dwight D. Eisenhower in which he proposed an international organization focused on "Atoms for Peace."[2] The IAEA's mission is focused on three pillars: nuclear security and safety; science and technology; and safeguards and verification.[3]

The Board of Governors is one of the two policymaking bodies of the IAEA. The other body is the General Conference of all IAEA member states. The Board of Governors is made up of 35 members who are elected annually by the General Conference. Members of the Board of Governors select one individual to represent them on the Board. A representative from the United Nations or other specialized agencies may attend meetings of the Board as non-voting observers.[4] The Board of Governors generally meets five times a year, and meetings may be held in public or private. The General Conference meets once a year to approve the recommendations made by the Board of the Directors and the Director General. Since the organization's founding there have been no major changes in the structure of the IAEA.

The Board passes resolutions which are then discussed and voted on in the General Conference. It makes recommendations on the agency's budget, programs and any new membership applications. Decisions require a two-thirds majority vote to pass. The Board has the power to establish committees and has the responsibility of preparing the annual report. The Board authorizes safeguards agreements and publishes reports on safety standards.[5] The Director General of the IAEA is appointed by the Board, who is then approved by the General Conference. The current Director General of the IAEA is Mohammed ElBaradei.[6]

On July 1, 1968, the Treaty on the Non-Proliferation of Nuclear Weapons was introduced.[7] The NPT Treaty states that only the five permanent Security Council member nations are permitted to have nuclear weapons: China, France, Russia, the United Kingdom and the United States. The Treaty's goals are to promote the peaceful use of nuclear technology, thwart the spread of nuclear weapons and work towards complete disarmament. According to the NPT Treaty, the system for investigations to ensure compliance with the Treaty is the responsibility of the IAEA.[8] Countries that are found to be in violation of the NPT Treaty may be referred by the IAEA to the UN Security Council to consider possible sanctions on that country. Currently 189 nation-states have signed the treaty. Non-signatories to the Treaty are Israel, India and Pakistan. The Democratic People's Republic of Korea withdrew from the Treaty in January 2003. Every five years a review conference is held and at the 1995 review conference the decision was made to indefinitely extend the treaty. The last review conference was held in 2000 at the United Nations headquarters in New York.

After the Chernobyl disaster in the Ukraine in 1986, the IAEA took on a stronger role in expanding nuclear safety and radiological protection efforts.[9] The agency concentrated on ensuring that legitimate nuclear power programs and nuclear materials were secure. In recent decades, the IAEA has focused on investigation and inspections based on possible violations of the Nuclear Non-Proliferation Treaty. The IAEA dispatches inspectors to nuclear facilities to ensure compliance with the statutes of the NPT. At the end of the Gulf War, the IAEA was directed by the United Nations to oversee the weapons inspections process in Iraq. Recent investigations include North Korea, South

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[1] "The 'Atoms for Peace' Agency." International Atomic Energy Agency. http://www.iaea.org/About/index.html
[2] "History of the IAEA." International Atomic Energy Agency. http://www.iaea.or.at/About/history.html
[3] "International Atomic Energy Agency." International Atomic Energy Agency. http://www.iaea.org
[4] "Provisional Rules of Procedure of the Board of Governors." International Atomic Energy Agency. http://www.iaea.or.at/About/Policy/Board/bgrules1.html
[5] "International Atomic Energy Agency." *International Organizations Atlas.* http://departments.oxy.edu/dwa/201/atlas/iaea/iaea.html
[6] Ibid.
[7] "The Treaty on the Non-Proliferation of Nuclear Weapons (NPT)." International Atomic Energy Agency. http://www.iaea.org/Publications/Documents/Infcircs/Others/infcirc140.pdf
[8] Ibid.
[9] "IAEA conventions on nuclear safety provide for co-operation in wake of nuclear accident." *UN Chronicle.* November 1986.

Korea, Pakistan and Iran. Another current focus on the IAEA is the threat of nuclear terrorism. In 2002, the IAEA approved an Agency Action Plan to deal with the new threats of nuclear terrorism.[10]

I. Battling Nuclear Terrorism

> *"An unconventional threat requires an unconventional response, and the whole world needs to join together and take responsibility for the security of nuclear material."*[11]

Introduction

Terrorism has become an increasing concern of citizens all over the world in the past decade. Once incident that brought the issue of terrorism to the forefront of the entire world was the terrorist attacks that occurred in the United States on September 11, 2001. "The horrifying events of September 11, 2001 demonstrated all too well the urgent need to strengthen worldwide control over nuclear and other radioactive material."[12] Many wondered how long it would be before a terrorist attack was executed using a nuclear weapon or dirty bomb instead of conventional bombs or commercial aircraft. Terrorists could construct a nuclear device using highly enriched uranium (HEU) and detonate it in a major urban area. To these terrorists, a successful nuclear attack on one of their targets would be the ultimate victory.

Some terrorists groups around the world may be actively working to acquire nuclear materials or a nuclear device. While a nuclear attack would require sophisticated planning and resources, some groups may be capable and willing to acquire materials and coordinate an attack. A likely scenario that requires limited nuclear materials and planning is a dirty bomb attack. A dirty bomb, or radiological dispersion device (RDD), is a conventional bomb combined with some form of radiological material. Upon detonation the bomb would contaminate the area with radiation in addition to any destruction incurred from the blast. A retaliatory attack on a terrorist group would be difficult, since unlike states, they often have no stable geographic location or headquarters. It may even be difficult to determine which terrorist group is responsible for the asymmetrical attack. With nuclear technology, a relatively small group can attack a much larger and stronger adversary using unconventional means.

The International Atomic Energy Agency immediately began planning in order to attempt to ensure that such a scenario would not take place. Nuclear terrorism is a concern that crosses national borders and thus international response and cooperation is required.

> The IAEA…like the United Nations…has been responding to new challenges virtually throughout its existence. The Agency now has the opportunity to re-examine the adequacy of safeguards and physical security controls. It must also re-examine closely its own past assumptions about the likely motivations of terrorists and their willingness and capabilities to "do the unthinkable"…[13]

Nuclear terrorism has been recognized as a threat long before September 11. For instance, the Nuclear Control Institute has studied the threat of nuclear terror since it was founded in 1981. The International Task Force on Prevention of Nuclear Terrorism met in 1986 and issued a report detailing information on the nuclear terror threat.[14] With the end of the Cold War and the collapse of the Soviet regime, the former Soviet Union's large stockpiles of nuclear weapons and materials were left vulnerable to theft or sabotage. In 1991 United States Senators Sam Nunn (Ga.-D) and Richard Lugar (Ind.-R) sponsored the Soviet Nuclear Threat Reduction Act to secure and destroy nuclear, chemical and biological weapons and materials in the former USSR. In 1993 it became known as the Cooperative Threat Reaction program and has assisted several former Soviet republics, including Kazakhstan,

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[10] "IAEA Action Plan to Combat Nuclear Terrorisms." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/Nuclear_Terrorism/index.shtml

[11] "Calculating the New Global Nuclear Terrorism Threat." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/PressReleases/2001/nt_pressrelease.shtml

[12] "Promoting Nuclear Security: What the IAEA is doing." International Atomic Energy Agency. http://www.iaea.org/Publications/Factsheets/English/nuclsecurity.pdf

[13] Jayantha Dhanapala (Under-Secretary-General, UN Department for Disarmament Affairs). "Statement to the IAEA International Symposium, 29 October 2001." *Newsbriefs.* January 2002. p. 3. http://www.iaea.org/Publications/Magazines/Bulletin/Bull434/newsbriefs_suppl.pdf

[14] "Nuclear Terrorism: How to Prevent It." Nuclear Control Institute. http://www.nci.org/nci-nt.htm

Ukraine and Belarus, in destroying of all of their nuclear weapons.[15] Even with all the efforts that have been made, tens of thousands of nuclear weapons and radioactive materials may still sit unsecured in the former Soviet Union today. This danger is highlighted by the fact that authorities have made hundreds of arrests of thieves who have stolen nuclear material since the break up of the Soviet Union.[16]

Agency Action Plan

In 2002, the IAEA approved the "Nuclear Security Plan of Activities" to address the threat of nuclear terrorism. This three year Agency Action Plan was approved on March 18-22 and implementation of the plan began immediately.[17] The IAEA has outlined four potential nuclear terrorism threats: the theft of a nuclear weapon from a nuclear-capable state, the creation of a crude nuclear weapon by using stolen nuclear materials, the use of a "dirty bomb" (or Radiological Dispersal Device), or the sabotage or attack of a nuclear facility or vehicle transporting nuclear materials.[18] The explosion of a "dirty bomb" by terrorists is one of the most likely scenarios. "Experts at Los Alamos National Laboratory who studies this threat concluded that 'a RDD…attack somewhere in the world is overdue.'"[19]

In addition to military facilities, there are nuclear power plants, reactors, research facilities and materials that are being transported that need to be secured against threats of theft and sabotage. The possibility of the theft of nuclear weapon is very real. Cases of illicit trafficking of nuclear materials occur every year and the IAEA tracks these incidents in a database. At the end of 2003, 75 states were members of this database.[20] Eight hundred eighty four incidents were recorded in the database from January 1993 to December 2003.[21]

The plan focuses on prevention, detection and response. Accordingly, the plan lists eight areas of emphasis for nuclear security: protection of nuclear facilities and materials; detection of criminal activities; improving state accountancy systems; securing radioactive materials; assessing the vulnerabilities of nuclear facilities; responding to emergencies; enforcing adherence to international instruments; and coordinating security and information management.[22]

Nuclear terrorism is preventable if all nations and the international community make the necessary efforts to prevent this ultimate nightmare from occurring.[23] The technology to help prevent nuclear terrorism exists. Efforts by the international community can reduce the risk of a nuclear terror incident. It is simply a matter of controlling nuclear and radioactive materials. These materials need to be properly controlled and monitored in all states because a weak point in the system can undermine security elsewhere. "Denying terrorists access to nuclear weapons and weapons-grade material is thus a challenge to nations' willpower and determination, not to their technical capabilities."[24]

The IAEA recognized the need to assist member states with securing their nuclear facilities and materials. The International Nuclear Security Advisory Service (INSServ) is one way that the IAEA is assisting member states by supplying experts in nuclear security. Education and training programs are an important component in the IAEA's

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[15] Sam Nunn. "The Race between Cooperation and Catastrophe." Speech given at the IAEA Conference on March 16, 2005. http://www.nti.org/c_press/speech_nunniaea_031605.pdf

[16] Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* New York: Times Books. 2004, p. 9.

[17] "Promoting Nuclear Security: What the IAEA is Doing." International Atomic Energy Agency. http://www.iaea.org/Publications/Factsheets/English/nuclsecurity.pdf

[18] "Promoting Nuclear Security: Possible Terrorist Scenarios." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/NuclearSecurity/scenarios20040601.html

[19] Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* New York: Times Books. 2004, p. 8.

[20] "IAEA Illicit Trafficking Database (ITDB)." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/RadSources/PDF/itdb_31122003.pdf

[21] Ibid.

[22] Gamini Seneviratne. "Nuclear Terrorism Action Plan Enters Implementation Phase." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/RadSources/Nuclear_TerActPlan.html

[23] Graham Allison. *Nuclear Terrorism: The Ultimate Preventable Catastrophe.* New York: Times Books. 2004.

[24] Graham Allison. "How to Stop Nuclear Terror." *Foreign Affairs.* Volume 83, No. 1. pp. 64-74.

prevention strategy. Since the INSServ program began, the IAEA has many of member states in enhancing the security of their nuclear materials. The IAEA has carried out 125 advisory missions and over 100 training events.[25]

Detection is the next line of defense against a possible nuclear terrorist incident. The IAEA is working with states to improve security at border crossings and compiling and sharing information regarding potential malicious activities. Incidents involving the illicit trafficking of nuclear materials or weapons occur several times each year.[26] Since 1995, the IAEA has compiled information from states regarding the illicit trafficking of radioactive and nuclear materials in the Illicit Trafficking Database (ITDB).[27] States can also obtain assistance with locating and securing all radioactive and nuclear materials and acquiring the technology needed to detect these materials. If an incident were to occur, it is essential to have a swift emergency response plan coordinated.

The plan also establishes a Nuclear Security Fund to assist member states with strengthening security over their nuclear materials and facilities. The fund has received over $35 million since its inception from 26 states and international organizations and agencies such as the European Union and the Nuclear Threat Initiative.[28]

The plan also calls for strengthening and amending existing international agreements and conventions concerning nuclear security. In September 2003, the IAEA Board of Governors revised the "Code of Conduct on the Safety and Security of Radioactive Sources." On July 4-8, 2005, an IAEA conference was held in Vienna to discuss amending the 1987 "Convention on the Physical Protection of Nuclear Material." In contrast to the Code of Conduct, the CPPNM is legally binding and requires member states to ensure the security of nuclear materials in their possession.[29]

In addition to the IAEA Action Plan, many states and international organizations are taking the initiative to develop programs to combat the threat of nuclear terror. In June 2002, the G8 announced its support for global nuclear terrorism prevention in the "Global Partnership against the Spread of Weapons and Materials of Mass Destruction."[30] The European Union introduced a "Strategy against Proliferation of Weapons of Mass Destruction" in December 2003.[31] In May 2004, the United States acted to create the "Global Threat Reduction Initiative" to secure radiological and nuclear materials.[32]

Conferences and Treaties

On March 16-18, 2005 the government of the United Kingdom hosted the "International Conference on Nuclear Security: Global Directions for the Future" in London. It was organized by the International Atomic Energy Agency in cooperation with several other international agencies.[33] The conference aimed to discuss the threats posed by nuclear terrorism and what can be done to further international cooperation on the issue and prevent nuclear terrorism incidents.

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[25] Tomihoro Taniguchi. "Nuclear Security: Lessons Learned from the Past and Future Global Directions." International Atomic Energy Agency. March 16, 2005. http://www.iaea.org/NewsCenter/Statements/DDGs/2005/taniguchi16032005.html

[26] Graham Allison. "How to Stop Nuclear Terror." *Foreign Affairs.* Volume 83, No. 1. pp. 64-74.

[27] "IAEA Illicit Trafficking Database (ITDB)." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/RadSources/PDF/itdb_31122003.pdf

[28] Mohamed ElBaradei. "Nuclear Terrorism: Identifying and Combating the Risks." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Statements/2005/ebsp2005n003.html

[29] *The Convention on the Physical Protection of Nuclear Material.* International Atomic Energy Agency. October 26, 1979.

[30] *The G8 Global Partnership Against the Spread of Weapons and Materials of Mass Destruction.* The Group of Eight Leaders. June 27, 2002. http://www.state.gov/e/eb/rls/othr/11514.htm

[31] *EU Strategy Against Proliferation of Weapons of Mass Destruction.* European Union. http://ue.eu.int/uedocs/cmsUpload/st15708.en03.pdf

[32] "IAEA Welcomes US New Global Threat Reduction Initiative." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/News/2004/GTRI_Initiative.html

[33] "'New Reality' Shaping Nuclear Security's Global Directions." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/News/2005/securityconf.html

At the conference, awareness of the necessary to strengthen the CPPNM was noted.[34] The need for international cooperation and the important role of the IAEA was also emphasized.

> The Conference expressed the view that a clear focus and concentrated efforts for the following actions are essential:
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> 1. Accelerate efforts to develop and implement a fully effective global nuclear security framework based on prevention, detection and response.
> 2. The expeditious agreement among State Parties on amending the CPPNM.
> 3. Full implementation of the Code of Conduct and an enhanced CPPNM.
> 4. Enhanced cooperation and coordination at the global, regional and bilateral levels.
> 5. The IAEA assuming -- and being resourced to deliver -- a leading role, specifically for supporting the Member States, and for furthering international cooperation.[35]

Other past IAEA conferences on nuclear security include the International Conference on Security of Material: Measures to Prevent, Intercept and Respond to Illicit Uses of Nuclear Material and Radioactive Sources in May 2001, the International Conference on the Security of Radioactive Sources in March 2003, and the International Conference on National Infrastructures for Radiation Safety in September 2003.

The United Nations General Assembly unanimously adopted Resolution 59/290, *International Convention for the Suppression of Acts of Nuclear Terrorism*, on April 13, 2005.[36] It is the first United Nations resolution focusing on counter-terrorism and will be opened for signatures in September 2005. It strengthens the international legal framework. The convention also encourages international cooperation in investigations and requires the extradition or prosecution of groups or individuals that commit terrorist acts using nuclear or radioactive materials.[37]

Other United Nations resolutions relating to nuclear security include Security Council Resolution 1373, which created the Counter Terrorism Committee, and Security Council Resolution 1540, which concentrates on the prevention nuclear weapons proliferation.

The Nuclear Nonproliferation Treaty was introduced on July 1, 1968. Currently, all states are members of the NPT with the exception of Israel, India, and Pakistan. North Korea has withdrawn from the Treaty. The NPT must be enforced in order to effective combat the nuclear terrorist threat. An increase in the number of nuclear-capable states would further increase the danger of a nuclear weapon being sold to or stolen by a terrorist group.

Also, the NPT only takes into account states and not non-state actors such as terrorist organizations. Globalization has brought new power and dangerous opportunities to non-state actors in the international system. The focus of the treaty was on countries and their governments, not individuals, as this leaves a gap that needs to be addressed.[38]

Conclusion

> Preventing nuclear terrorism will require a comprehensive strategy: one that denies access to weapons and materials at their source, detects them at borders, defends every route by which a weapon could be delivered, and addresses motives as well as means.[39]

The threat of nuclear terrorism is an extremely important issue. Terrorist groups and unauthorized individuals must not be allowed to access nuclear materials and weapons. The international community has focused much attention lately on preventing terrorism, but not enough attention has been focused specifically on preventing nuclear terrorism. A lot has been accomplished in the past few years with the implementation of the agency action plan and

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[34] "Findings of the President of the Conference." International Conference on Nuclear Security: Global Directions for the Future. London. 16-18 March 2005. http://www-pub.iaea.org/MTCD/Meetings/PDFplus/2005/cn136-findings.pdf

[35] Ibid.

[36] A/RES/59/290. *International Convention for the Suppression of Acts of Nuclear Terrorism.* United Nations General Assembly.

[37] Ibid.

[38] "Nuclear Proliferation and Terrorism." *The CQ Researcher.* April 2, 2004. Volume 14, Number 13. pp. 297-320. http://www.thecqresearcher.com

[39] Graham Allison. "How to Stop Nuclear Terror." *Foreign Affairs.* Volume 83, No. 1. pp. 64-74.

other treaties and conventions. However, a great deal of work still needs to be done in preventing, detecting, and responding to possible nuclear terrorism incidents.

II. Enforcing Adherence to the Nuclear Non-Proliferation Treaty

Introduction

The Nuclear Non-Proliferation Treaty (NPT) is considered to be one of the most important and influential multi-lateral documents produced in the twentieth century. It is certainly one of the largest and most successful international endeavors that the world has ever seen. But as the treaty has aged and international relations have evolved and moved in new directions, many fear that the staying power of the Nuclear Non-Proliferation Treaty is waning. The recent developments in Iran, the continuing arms race between Pakistan and India and the announced withdrawal of the Democratic People's Republic of Korea (DRPK)[40] from the treaty are all alarming examples of the obstacles in the battle against nuclear proliferation. The IAEA Board of Governors must consider how to improve the Nuclear Non-Proliferation Treaty or whether the NPT can be improved upon at all. In short, the IAEA must renew its commitment to creating a nuclear weapons-free world.

Nuclear Energy

Nuclear energy has surfaced as one of the many new energy alternatives to fossil fuels. This is due partly to the fact that nuclear energy requires only a small amount of material to produce an enormous amount of power. According to the Nuclear Energy Institute, "one uranium fuel pellet—[about ½ an inch in size]—is the equivalent of 17,000 cubic feet of natural gas, 1,780 pounds of coal, or 149 gallons of oil."[41] Additionally, unlike fossil fuels, nuclear energy is in no danger of being depleted as it can be created using some of the most abundant materials in the atmosphere.[42]

Unlike other types of energy which are based on the modification of an atom's electrons, nuclear energy involves the transformation of the nucleus, or core, of an atom.[43] There are two ways to alter nuclei: by nuclear fusion (the combining of lighter elements to form heavier ones) and nuclear fission (the splitting of nuclei). Nuclear fission is the better-understood form of nuclear reaction and can occur both spontaneously (in nature) or by inducement in laboratories.[44] Fission occurs when emitted neutrons collide with nuclei, thus splitting the nuclei and creating both kinetic energy and heat. If strong enough, that energy can start a chain reaction, propelling more neutrons to collide with and split more nuclei, thus creating more energy until the material is used up.[45] Over the last several decades, scientists have learned how to control fission by changing the materials used and in what amounts, and by influencing the speed and strength of the process. Fission is the nuclear process currently employed by the world's power plants to create energy.[46]

Fusion, which is less understood than fission, is the same energy that creates stars.[47] Fusion is based on the natural positive charge of a nucleus which repels other nuclei. In extremely hot temperatures (millions of degrees), an element's nuclei can gain enough energy to overcome this natural repulsion and combine with other nuclei to form a heavier element. When the nuclei combine to form a new element, they must lose a small portion of their individual masses by turning it into energy.[48] Because fusion is more complex and harder to control, scientists have yet to build fusion reactors for practical energy production in the way that they have built fission reactors. Recent developments in the understanding and control of fusion have made fusion reactors a very real possibility in the near future.[49]

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[40] The Democratic People's Republic of Korea (DPRK) is often commonly referred to as North Korea.
[41] "Reliable, Economical Energy: Economical Energy Source." Nuclear Energy Institute. http://www.nei.org/index.asp?catnum=2&catid=48
[42] Ibid.
[43] "Nuclear Energy." Encyclopædia Britannica Online. http://search.eb.com/ebi/article-9276131
[44] "Nuclear Fission." Encyclopædia Britannica Online. http://search.eb.com/eb/article-9110414
[45] Ibid.
[46] Ibid.
[47] "Nuclear Fusion." Encyclopædia Britannica Online. http://search.eb.com/eb/article?tocId=9110415
[48] Ibid.
[49] Ibid.

Nuclear Reactors have been built all over the world for research and production of nuclear power. Though there are many kinds of nuclear reactors, the most common type is the light-water power reactor (LWR).[50] Reactors function by inducing fission in a controlled, insulated environment and then capturing the resulting energy for practical use. The fission process is maintained at a "critical" rate which means that, on average, only one neutron will incur additional fission at a time. Most reactors are designed so that even with all of the safety parameters removed, fission would only occur at a slightly supercritical rate (where more than one neutron is incurring additional fission).[51]

Nuclear Weapons

Unfortunately, the same efficiency and potency that makes nuclear energy so viable a source of energy has been exploited to make weapons of mass destruction more deadly than any type of conventional warfare. The concept of nuclear weapons relies on using the most volatile materials and creating enough fission or fusion to start an uncontrollable chain reaction that creates a force great enough to wipe out an entire city.[52]

Atomic bombs are created from uncontrolled fission. Uranium-235 and Plutonium-239 are the two materials used most commonly to create atomic bombs because they more readily react to fission; these substances are often referred to as "weapons grade material" as their volatility is not necessary to peaceful nuclear purposes.[53] Additional tools such as electron reflectors (which contain escaping electrons) and "boosted fission" materials (other substances with large amounts of neutrons to produce more fission) are used to strengthen the blast. [54]

The result of the uncontrolled fission in a nuclear bomb produces enormous amounts of heat and thermal energy which create a large fireball at the source of the reaction. This fireball sparks ground fire while sucking in dust and other ground materials, creating the signature mushroom cloud of an atomic bomb.[55] The fission also releases a vast amount of radiation and creates a shockwave powerful enough to destroy buildings within a 2 mile radius. This entire process occurs in only a fraction of a second. Additionally, the debris from the mushroom cloud burns into fine-particles, called fallout, and is spread over the surrounding region by atmospheric winds in the following weeks. The fallout is also highly radioactive, and creates continual damage long after the initial detonation of the bomb.[56]

Hydrogen bombs (also referred to as thermonuclear bombs) are created by uncontrolled fusion.[57] They are detonated when enough heat is produced (usually by detonating an atomic bomb first) for the nuclei to fuse together. Deuterium and Tritium, isotopes of hydrogen, are the primary materials used in the production of hydrogen bombs because they so easily fuse together. The hydrogen bomb is considered to be a far greater threat than the atomic bomb: though it has similar results to an atomic bomb, its strength is 1,000 times greater.[58] In addition to being more devastating, this means that hydrogen bombs are smaller and lighter than atomic bombs, and so can travel with greater speed. When placed inside a ballistic missile, hydrogen bombs can travel nearly halfway around the world in less than half an hour.[59] A variant of the hydrogen bomb is the neutron bomb, which contains less physical force, but a deadlier radiation.[60]

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[50] "Nuclear Energy." Encyclopædia Britannica Online. http://search.eb.com/ebi/article-9276131
[51] Ibid.
[52] Ibid.
[53] "Atomic Bomb." Encyclopædia Britannica Online. http://search.eb.com/eb/article?tocId=9010127
[54] Ibid.
[55] Ibid.
[56] Ibid.
[57] "Thermonuclear bomb." Encyclopædia Britannica Online. http://search.eb.com/eb/article?tocId=9072087
[58] Ibid.
[59] Ibid.
[60] Ibid.

Background to the Nuclear Non-Proliferation Treaty

Pre-NPT Nuclear History

The nuclear arms race began during the Second World War as the American, British, German and Soviet militaries all began research into then-newly discovered nuclear technology in hopes of creating a new, more powerful weapon.[61] It was understood that whoever was the first to wield a nuclear weapon would be able to conclusively end the war in their favor and gain considerable power after armistice.[62] The U.S. was the first country to develop a nuclear weapon in the form of an atom bomb through the Manhattan Project.[63] Both the power of the newly developed nuclear bomb and its destructiveness were quickly realized with the United States' bombing of Hiroshima and Nagasaki in August of 1945. In Hiroshima alone, 78,000 people were killed instantly, and the death toll grew to over 140,000 by December of that same year. Birth defects, cancer and many other diseases discovered years later were also traced back to the effects of radiation.[64]

The newly developed United Nations quickly acted in 1946 to create an international agency to address the concerns of nuclear power. This agency, the United Nations Atomic Energy Commission (UNEAC), was the precursor to the IAEA.[65] Unfortunately, the deadliness of nuclear weaponry was overshadowed by the power that it brought to a country possessing it, and despite the horrors of Nagasaki and Hiroshima and the efforts of the UNEAC, many nations continued to develop their own nuclear bombs. The USSR became the second country to successfully create an atomic bomb in 1949, bringing about both the death of the UNEAC and the birth of the arms race of the Cold War.[66]

By 1953, both the United States and the USSR had successfully created and tested the hydrogen bomb, and in 1954, the USSR commissioned the construction of the first nuclear power plant in Obninsk.[67] Scientists and leaders around the world continued to worry about the direction that the arms race was taking. Finally, U.S. President Dwight D. Eisenhower, speaking to the United Nations General Assembly in 1953, called for "an international Atomic Energy Agency," which "could be made responsible for the impounding, storage, and protection of the contributed fissionable and other materials."[68] His famous "Atoms for Peace" speech furthermore charged the proposed agency "to devise methods where by this fissionable material would be allocated to serve the peaceful pursuits of mankind."[69] The IAEA was officially created three years later in 1956.[70]

The Creation of the NPT

The Agency immediately began work to contain the field of nuclear weapons testing, a crucial problem since the 1957 launch of Sputnik had brought new potential to the arms race both in the scope and range of nuclear weapons capability. With the launch of the space age, countries were closer in range to one another than ever before, and the resulting fears of an attack spurred the arms race even further. The continuing sophistication in conventional warfare further compounded the problem: The invention of the Intercontinental Ballistic Missile (ICBM), a faster and more evasive weapon, was combined with the deadliness of the hydrogen bomb, for a silent and deadly weapon that was virtually unstoppable.[71]

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[61] Mark Kishlansky, et al. *Civilization into the West.* 5th Edition. New York: Addison-Wesley Educational Publishers Inc. 2003, p. 974.
[62] Ibid., pp. 940-941.
[63] Ibid.
[64] Ibid., pp. 940-941.
[65] Lothar Wedekind. "IAEA Turns 40: Key Dates and Historical Developments." *IAEA Bulletin.* September 1997, p. 3. http://www.iaea.org/Publications/Magazines/Bulletin/Bull393/Chronology/chronology.pdf
[66] Ibid.
[67] Ibid., p. 4
[68] Dwight D. Eisenhower. "Atoms for Peace." General Assembly of the United Nations on Peaceful Uses of Atomic Energy. United Nations, New York City. December 1953. http://www.eisenhower.archives.gov/atoms.htm
[69] Ibid.
[70] David Fischer. *History of the IAEA: The First Forty Years.* Vienna: The Agency, 1997.
[71] "Thermonuclear bomb." Encyclopædia Britannica Online. http://search.eb.com/eb/article?tocId=9072087

The IAEA's first success was the multi-lateral declaration of Antarctica as a Nuclear Weapons Free Zone (NWFZ) in 1961.[72] A NWFZ bans the presence and testing of nuclear weapons within a particular region. That same year saw the opening of the first IAEA nuclear laboratory in Seibersdorf, Austria, fulfilling Eisenhower's challenge to create a place for global nuclear research.[73] The UN General Assembly also approved a resolution put forth by Ireland that called for nations to create a treaty to ban the acquisition and transfer of nuclear arms.[74] Unfortunately, at this same time, the United Kingdom (in 1952) and France (in 1960) had also successfully created nuclear weapons, and China was very close to doing so.[75] Political leaders began to fear that the number of nuclear weapons-states would increase to twenty or thirty within the next twenty years.[76]

The arms race heightened in 1963 with the Cuban Missile Crisis, which almost resulted in open nuclear warfare between the U.S. and the U.S.S.R.[77] That same year, the two superpowers signed the Nuclear Test-Ban Treaty, which banned the testing of nuclear weapons in the atmosphere, underwater and in space.[78] With this treaty came the lessening of tensions between the two nations, which led to increased U.S./U.S.S.R. conferences that would help pave the way for the NPT.[79]

The drafting of the Nuclear Non-Proliferation Treaty began at the Geneva Disarmament Conference in 1965.[80] It was finalized and opened for signing in 1968. 43 nations initially signed the NPT, including three countries already possessing nuclear weapons: the United States, the U.S.S.R. and the United Kingdom.[81] The NPT went into effect in 1970. It set the number of nuclear weapons states at five (US, UK, USSR, France and China) and bans any non-nuclear state from creating or otherwise acquiring nuclear weapons.[82] The Treaty does not restrict the use of nuclear materials for peaceful purposes, but requires member states to allow for inspection of their nuclear programs for the verification of their nuclear programs, and places the obligation to perform such inspections and ensure adherence of the Treaty with the IAEA.[83]

Within a year, a model for safeguards agreements was drawn up, and Finland became the first country to sign an official agreement with the IAEA.[84] A positive cycle quickly formed: as other member states to the Treaty signed the safeguards agreements, their openness provided the first tangible evidence that the NPT would indeed curb and prevent proliferation, which in turn encouraged more countries to become members to the Treaty. Another significant step was taken with the signing of the other two recognized nuclear weapons states, France and China, in 1992.[85]

The NPT Today

Today, the total number of member states to the NPT is 189, almost 100% of the recognized nation-states of the world.[86] The almost-universal membership to the NPT is the major source of its power. Only Israel, Pakistan and

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[72] Lothar Wedekind. "IAEA Turns 40: Key Dates and Historical Developments." *IAEA Bulletin.* September 1997. http://www.iaea.org/Publications/Magazines/Bulletin/Bull393/Chronology/chronology.pdf

[73] David Fischer. *History of the IAEA: The First Forty Years.* Vienna: The Agency, 1997.

[74] "Treaty on the Non-Proliferation of Nuclear Weapons." U.S. Department of State Bureau of Non-Proliferation. http://www.state.gov/t/np/trty/16281.htm

[75] David Fischer. *History of the IAEA: The First Forty Years.* Vienna: The Agency, 1997, p. 1.

[76] Ibid.

[77] Lothar Wedekind. "IAEA Turns 40: Key Dates and Historical Developments." *IAEA Bulletin.* September 1997, p. 8 http://www.iaea.org/Publications/Magazines/Bulletin/Bull393/Chronology/chronology.pdf

[78] Mark Kishlansky, et al. *Civilization into the West.* 5th Edition. New York: Addison-Wesley Educational Publishers Inc. 2003, p. 975

[79] Ibid.

[80] "Treaty on the Non-Proliferation of Nuclear Weapons." U.S. Department of State Bureau of Non-Proliferation. http://www.state.gov/t/np/trty/16281.htm

[81] "Status of Multilateral Arms Regulations and Disarmament Agreements." United Nations Department for Disarmament Affairs. http://disarmament.un.org:8080/TreatyStatus.nsf

[82] *Treaty on the Non-Proliferation of Nuclear Weapons.* The United Nations. March 5, 1970.

[83] Ibid.

[84] Lothar Wedekind. "IAEA Turns 40: Key Dates and Historical Developments." *IAEA Bulletin.* September 1997, p. 8. http://www.iaea.org/Publications/Magazines/Bulletin/Bull393/Chronology/chronology.pdf

[85] "Status of Multilateral Arms Regulations and Disarmament Agreements." United Nations Department for Disarmament Affairs. http://disarmament.un.org:8080/TreatyStatus.nsf

[86] Ibid.

India remain non-members. The Treaty was further strengthened by the decision in 1995 of a majority of the IAEA Review Committee (which meets every 5 years) to extend the Treaty indefinitely.[87]

Since the inception of the NPT, the IAEA has worked to create a system of verification to reassure the world that member states are fulfilling their obligations and to notify the Security Council when they are not. In particular, the IAEA works to verify that all nuclear material has been openly declared, securely protected and that all nuclear material information provided by the member state is accurate and complete. In the case of non-nuclear weapons states, the IAEA works to verify that nuclear material is not being diverted to any military purpose.[88]

The IAEA has three general verification measures to carry out its obligation to the Treaty.[89] The most invasive measures are collectively called "nuclear material accountancy (NMA)," and are independently conducted by inspectors to verify the accuracy of state reports.[90] NMA includes physical counting, measuring, weighing and material analysis to determine defects (which could indicate the constant, incremental removal of nuclear material over time to be diverted to unnamed purposes). With the best available technology, the IAEA can verify a state's report with an accuracy of less than one percent.[91] This means that the IAEA could detect the slightest changes to the make-up of a declared nuclear substance (in the example that a state attempt to divert material for undisclosed purposes by removing fractions of a declared nuclear substance in incremental amounts over a long period of time).[92]

To complement the NMA, inspectors also use "containment/surveillance techniques (CSTs)," which primarily include optical surveillance and sealing.[93] CST monitor facilities between NMA visits to ensure that material is being used as reported and that it remains well-secured. Because they are less invasive, CSTs save money, especially when done in the form of remote monitoring, such as cameras. Remote monitoring is only available to those states who meet high standards of reliability and accuracy in their reporting of nuclear activities. The IAEA must also ensure the authenticity of the data source to ensure that there is no tampering and that data remains encrypted for confidentiality of a state's programs.[94]

Environmental Sampling is a more recent verification measure that was adopted by the IAEA in the 1990's.[95] Environmental Sampling to detect radiation assures inspectors that nuclear activity has not taken place in a specific area within a state.[96]

In response to new technology, the IAEA evaluated new ways to verify nuclear activity and established in 1997 a "Model Additional Protocol" that serves as an extension to existing safeguards and verification agreements between member states and the IAEA.[97] The Additional Protocol, if ratified by a country, gives the IAEA more power in verification procedures. This increased power includes an expansion in the scope of inspections, increased rights to access information and increased rights in obtaining environmental samples near nuclear facilities.

The effects of the NPT continue to this day. Verification inspections have effectively assured the world that many countries are upholding their agreement to the NPT. On average, the IAEA inspects over 600 facilities in 140

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[87] Berhanykun Andemicael, et al. "Measure for Measure: The NPT and the Road Ahead." *The IAEA Bulletin*. 1995. http://f40.iaea.org/worldatom/Periodicals/Bulletin/Bull373/bulletinv37n3.htmlhttp://www.iaea.org/Publications/Magazines/Bulletin/Bull452/index.html

[88] 2005/Note 22. *International Atomic Energy Agency activities relevant to United Nations Security Council Resolution 1540 (2004).*

[89] "Safeguard Techniques and Equipment." *International Nuclear Verification Series.* 2003, p. 11.

[90] Ibid.

[91] Ibid.

[92] Ibid.

[93] Ibid., p. 12.

[94] Ibid.

[95] "IAEA & NPT." International Atomic Energy Agency. http://www.iaea.org/Publications/documents/treaties/index.html

[96] "Safeguard Techniques and Equipment." *International Nuclear Verification Series.* 2003, p. 11.

[97] "IAEA Safeguards Overview: Comprehensive Safeguards Agreements and Additional Protocols." International Atomic Energy Agency. http://www.iaea.org/Publications/Factsheets/English/sg_overview.html

countries every year.[98] Equally important are the many offshoots of the treaty which have in turned helped to continue its success. The 1991 accession of South Africa to the NPT led to the Pelindaba Treaty in 1996, making the continent of Africa a Nuclear Weapons Free Zone (NWFZ).[99] Other important regional treaties include the Treaty of Tlatelolco in 1967 and the Treaty of Rarotonga in 1986, which created NWFZ's in Latin America and the Caribbean, and in the South Pacific countries, respectively.[100] Furthermore, each independent country formed upon the breakup of the Soviet Union quickly signed on to the treaty and agreed to return all elements of the nuclear weapon cycle remaining within their borders back to Russia for disposal.[101] These agreements are still being fulfilled today, as the recent removal of highly enriched uranium out of Latvia demonstrates.[102] More recently, supporters of the NPT have pointed to the recent declaration by Libya to begin adhering to its obligations to the treaty—by destroying its nuclear weapons programs and allowing in IAEA inspectors—as continued evidence of the treaty's success.

Other important offshoots of the NPT include the Comprehensive Test Ban Treaty (CTBT) which opened for signing by the General Assembly in 1996. 173 countries have signed the CTBT, even though it has not yet entered into force. [103] Also, the Trilateral Initiative, which consists of the Russian Federation, the United States and the IAEA, was founded in 1996 to develop new verification methods to track all nuclear material ever released by those countries.[104] One of the most recent developments from the NPT is the 2005 announcement of an agreement to establish a NWFZ in central Asia.[105]

Current Situation

Though the benefits of the Nuclear Non-Proliferation Treaty are numerous, the NPT has garnered criticism for many shortcomings that have become evident since its inception. These shortcomings, critics point out, allow for countries to ignore and break with fundamental aspects of the treaty, which ultimately allows for the continual proliferation of nuclear weapons. The recent declaration of withdrawal of the Democratic People's Republic of Korea is a glaring example of why efforts need to be renewed to fight nuclear weaponry.

One of the largest criticisms of the NPT is that it does not ban the enrichment of uranium or the reprocessing of plutonium, the two basic methods of creating nuclear weapons.[106] Possession of these materials significantly increases the "break out potential" (the potential of a nuclear program to develop nuclear weaponry) to a matter of months.[107] The recent disclosure of Iran regarding its nuclear enrichment facilities, which produce uranium-235 and plutonium-239, has underscored this concern.[108] Mohamed Elbaradei, the Director General of the IAEA has publicly stated a need to limit the pervasiveness of these materials, suggesting that the production and use of uranium and plutonium be made available "by having an international consortium for example, producing the fuel and then [taking] back the fuel again under international supervision."[109]

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[98] "IAEA Verification Activities at a Glance." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Focus/Npt/activities_glance.shtml

[99] Lothar Wedekind. "IAEA Turns 40: Key Dates and Historical Developments." *IAEA Bulletin.* September 1997, p. 19. http://www.iaea.org/Publications/Magazines/Bulletin/Bull393/Chronology/chronology.pdf

[100] Ibid., pp. 7-11

[101] "Treaty on the Non-Proliferation of Nuclear Weapons." U.S. Department of State Bureau of Non-Proliferation. http://www.state.gov/t/np/trty/16281.htm

[102] "Nuclear Weapons Grade Material Removed from Latvia," International Atomic Energy Agency News Centre. May 26, 2005. http://www.iaea.org/NewsCenter/News/2005/latvia_uranium.html

[103] "Status of Multilateral Arms Regulations and Disarmament Agreements." United Nations Department for Disarmament Affairs. http://disarmament.un.org:8080/TreatyStatus.nsf

[104] "2005 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons: Background Information." United Nations. http://www.un.org/events/npt2005/background.html

[105] Ibid.

[106] "Experts Target Nuclear Proliferation Risks at IAEA Seminar." February 6, 2004. International Atomic Energy Agency. http://www.iaea.org/newscenter/news/2004/ngo_forum0602.html

[107] David Albright and Corey Hinderstein. "Iran: Furor over Fuel." *The Bulletin of the Atomic Scientists.* May/June 2003. pp. 12-15. http://www.thebulletin.org/article.php?art_ofn=mj03albright

[108] Piet De Klerk. "Under Fire! Is the World's Treaty Against the Spread of Nuclear Weapons Strong Enough?" *IAEA Bulletin.* December 2003, p. 32.

[109] Mohamed ElBaradei. Interview conducted with Christiane Amanpour. CNN. March 17, 2005. http://www.iaea.org/newscenter/transcripts/2005/cnn17032995.html

Iran's admission of nuclear programs that date back to the 1990's highlights another major problem that helped spur the creation of the Treaty in the 1960's—a lack of trust between member states.[110] Critics believe that the Treaty depends too heavily on the word of governments, many of which are believed to be dishonest about the nature of their nuclear programs and facilities.[111] An example of this issue is the contention by several members to the treaty that the Islamic Republic of Iran is in violation of its obligation to the NPT, despite Iran's assurances that its programs are solely peaceful.[112] Conversely, the U.S.-led war in Iraq, which was based on contentions of a secret Iraqi nuclear weapons program, also underscores the growing problem of distrustfulness between states.[113]

Lack of enforcement has also long plagued the efforts of the IAEA to uphold the NPT.[114] Once IAEA inspectors are reasonably sure that a member state is breaking its treaty obligations, the breach is referred to the Security Council.[115] The Security Council has not always acted on these referrals.[116] In particular, the Security Council has been criticized for failing to act decisively on the actions of the DPRK, still considered by the IAEA to be a member to the Treaty and in delinquency of its obligations. This is based on the assertion of the IAEA that the NPT as a binding contract to which a member country cannot withdraw from.[117]

A new and growing problem is the rise in "counter-proliferation" efforts.[118] The recent terrorist attacks on the United States have seen a rise in foreign policies by many countries that seek to protect themselves against the potential attacks from terrorists, insurgents and enemy states. The tense relations between India and Pakistan also highlight this problem. Not unlike the arms race during the Cold War, these two nations continue to pursue nuclear programs out of a fear of attack from one another. [119]

Some other important issues of contention include the increased tension arising from the existence of 2 "classes" of NPT-members: the nuclear weapons-states and the non-nuclear weapons-states.[120] This is linked to the desire to limit the spread and use of weapons-grade materials, as non-nuclear states generally believe that no individual state should have control of these substances whereas states already in possession of them prefer to maintain their current position of sharing materials with other member-states.[121]

One issue that is universally acknowledged is the lack of 100% participation in the Treaty.[122] Supporters of the Treaty attribute its success in large part to the relative feeling of safety that member states feel (compared to the escalating nuclear arms race that was driven by a perceived need to "out-arm" opponents). The refusal of Israel, India and Pakistan to join the NPT and the rejection of the NPT by the DPRK are serious obstacles that stand in the way of creating peace in their respective regions and of a completely non-proliferation regime. It originates from

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[110] Piet De Klerk. "Under Fire! Is the World's Treaty Against the Spread of Nuclear Weapons Strong Enough?" *IAEA Bulletin.* December 2003, p. 32.
[111] Ibid.
[112] Thomas Fuller. "Europeans to Urge Iran to Resume Suspensions of Atom Program." *International Herald Tribune.* August 11, 2005. http://www.nytimes.com/glogin?URI=http://www.nytimes.com/2005/08/11/international/europe/12irancnd.html
[113] Piet De Klerk. "Under Fire! Is the World's Treaty Against the Spread of Nuclear Weapons Strong Enough?" *IAEA Bulletin.* December 2003, p. 32.
[114] Ibid.
[115] 2005/Note 22. *International Atomic Energy Agency activities relevant to United Nations Security Council Resolution 1540 (2004).*
[116] Piet De Klerk. "Under Fire! Is the World's Treaty Against the Spread of Nuclear Weapons Strong Enough?" *IAEA Bulletin.* December 2003, p. 32.
[117] Ibid.
[118] Ibid., p. 33.
[119] Ibid.
[120] Berhanykun Andemicael, et al. "Measure for Measure: The NPT and the Road Ahead." *The IAEA Bulletin*. 1995. http://f40.iaea.org/worldatom/Periodicals/Bulletin/Bull373/bulletinv37n3.htmlhttp://www.iaea.org/Publications/Magazines/Bulletin/Bull452/index.html
[121] Piet De Klerk. "Under Fire! Is the World's Treaty Against the Spread of Nuclear Weapons Strong Enough?" *IAEA Bulletin.* December 2003, p. 32.
[122] Ibid.

the "ripple effect" theory of current proliferation: the DPRK's pursuance of a nuclear program has created an imbalance in the region, which could potential cause other states in Asia to develop nuclear weapons.[123]

Committee Directive

It is clear that additional steps must be taken to continue the success for the Non-Proliferation Treaty. Many suggestions have already been made, including those that would build upon the Treaty, with the Added Protocol as an example, and those that would throw out the Treaty altogether in favor of a new, stronger treaty. Many leaders in the IAEA, including the Director General, support the creation of multi-lateral programs to produce and dispose of weapons-grade material.[124] Other suggestions include the construction of nuclear facilities that do not use weapons-grade materials to produce energy.[125] Others suggest throwing out the NPT in favor of a more extensive treaty with tougher standards, such as banning any country from possession of nuclear weapons and weapons grade material.[126] These critics have not given very much information on what statutes a new treaty would include.

Members of the Board of Governors are encouraged to seek both creative and practical solutions to the growing needs of the NPT and the IAEA to better ensure the continuing non-proliferation regime. Proposed resolutions may be regionally-based or more international in nature. Delegates are asked to examine the background of their individual countries for ideas—what is your country's position on proliferation? What has your country done in the past to deal with a situation regarding nuclear weapons?

III. Strengthening the International Capability to Respond to Nuclear Emergencies

Introduction

One of the first nuclear accidents that caused changes in emergency response focus and planning was the accident at the Three Mile Island nuclear power plant in Middletown, Pennsylvania. A partial meltdown occurred on March 28, 1979 at the plant, only three months after the reactor had begun operating. After the accident, the plant worked to expand training and improve emergency response procedures.[127]

The accident that occurred at the Chernobyl nuclear power plant in the Ukraine on April 26, 1986, forced the IAEA and the international community to take action on the issue of improving emergency response.[128] An explosion occurred at one of the plant's nuclear reactors that caused the worst nuclear emergency to date. The workers at the plant were not properly trained and made many mistakes which exacerbated the magnitude of the accident.[129] In addition to several deaths at the plant resulting from the explosion, the radioactive materials released into the air contaminated the surrounding area and spread across Europe.[130] At first, the Soviet government attempted to conceal what had occurred and the accident did not become known to the public until radioactive particles were detected in Sweden.[131] As nuclear particles spread across Europe, the accident became a problem for not only the Soviet Union but also all of Europe and in fact the entire world. The effects of the accident are still being felt in the area today with thyroid cancer in children[132] and difficulty with agriculture[133] and farming[134] that still plague the area today.

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[81] Ibid., p. 34.
[82] Tariq Rauf. "Perspectives on Multilateral Approaches to the Nuclear Fuel Cycle." International Atomic Energy Agency. April 30, 2004. http://www.iaea.org/NewsCenter/Focus/Npt/npt2004_3004_mnfc_npt.pdf
[125] Ibid.
[126] Ibid.
[127] "Nuclear Safety: Basic Principles. 6. Development of Safety 6.2 The 1980's: Focus on human performance." International Atomic Energy Agency." http://www-ns.iaea.org/tutorials/edf-op-safety/edfmaterial/ch1_nsafe/development2.htm
[128] "Chernobyl +15: Frequently Asked Questions." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/Chernobyl-15/cherno-faq.shtml
[129] "Causes of the Chernobyl Accident." Chernobyl Nuclear Disaster. http://www.chernobyl.co.uk/causes.html
[130] Chernobyl Nuclear Disaster. http://www.chernobyl.co.uk/
[131] "History of the United Nations and Chernobyl." United Nations. http://www.un.org/ha/chernobyl/
[132] "Chernobyl +15: Thyroid Cancer Effects in Children." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/Chernobyl-15/thyroid.shtml
[133] "Chernobyl +15: Countering Agricultural Consequences." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/Chernobyl-15/agriculture.shtml

The accident at Chernobyl demonstrated to the IAEA and the world that existing nuclear emergency response procedures were not adequate. Nuclear accidents are a concern to the entire international community no matter where they occur. The Chernobyl disaster occurred in Ukraine but it affected the rest of entire region and caught the attention of the rest of the world. Each sovereign state has the responsibly to ensure the safety of their nuclear and radiological materials. However, some states may not meet those responsibilities and international cooperation and assistance is essential.

The IAEA has identified six types of nuclear emergencies. The first two types are referred to as emergencies specific to nuclear installations. This includes site area emergencies and general emergencies. A site area emergency would involve a decline in the security on or near the nuclear site, such as possible criminal or terrorist activity. A general emergency would occur if there were risks of radiation being released, such as a successful terrorist attack on a facility or core damage to the reactor. The next three types are referred to as emergencies not specific to nuclear installations. This includes a missing dangerous source, space object re-entry and elevated radiation levels of unknown origin. The sixth type is another radiation emergency or threat.[135]

Conventions

In response to the need for an international framework to define and coordinate nuclear emergency response, the IAEA adopted two conventions, "The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency" and "The Convention on the Early Notification of a Nuclear Accident" in September and November 1986. These conventions are legally binding to the states that have signed them. All five declared nuclear capable states have signed the both of these conventions. The Notification Convention requires member states to notify the IAEA in the event of a nuclear or radiological accident.[136] However, states are not required to notify the IAEA of accidents resulting from nuclear weapons testing or the detonation of a nuclear weapon.[137]

The Assistance Convention creates a structure to improve cooperation among the member states to provide assistance in the case of a nuclear or radiological emergency.[138] In accordance with the Convention, the IAEA produces publications in order to distribute information on planning and training for responding to nuclear emergencies.[139] The Convention was first invoked in response to the accident in Goiania, Brazil, in 1987.[140] The IAEA has also assisted states that are not parties to the Assistance Convention including El Salvador, Belarus, Viet Nam and Venezuela.[141]

The Food and Agriculture Organization of the United Nations (FAO), World Heath Organization (WHO) and the World Meteorological Association (WMO) are also parties to these Conventions. These international intergovernmental organizations have contributed to nuclear response preparation. For instance, the WMO maintains an Office for Emergency Response to Nuclear Accidents (ERNA) which works in association with the IAEA to prepare for environmental emergency response.[142] The FAO and the WHO held a forum on "Preparedness

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[134] "Chernobyl +15: Seeds of Promise for Farmers." International Atomic Energy Agency. http://www.iaea.org/NewsCenter/Features/Chernobyl-15/farm.shtml

[135] "Joint Radiation Emergency Management Plan of the International Organizations." International Atomic Energy Agency. http://www-pub.iaea.org/MTCD/publications/PDF/JPLAN2004.pdf

[136] *The Convention on the Early Notification of a Nuclear Accident.* International Atomic Energy Agency. November 18, 1986. http://www.iaea.org/Publications/Documents/Infcircs/Others/inf335.shtml

[137] Ibid.

[138] *The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency.* International Atomic Energy Agency. September 26, 1986.

[139] "Technical Products." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/technicalproducts.htm

[140] Flakus, Franz-Nikolaus and Larry D. Johnson. "Binding Agreements for Nuclear Safety: The Global Legal Framework." International Atomic Energy Agency. IAEA Bulletin 40/1/1998. http://www.iaea.org/Publications/Magazines/Bulletin/Bull402/flakus.pdf

[141] Ibid.

[142] "Role of the WMO Secretariat in case of Nuclear Accident." World Meteorological Organization. http://www.wmo.ch/web/www/DPS/rolewmo.html

for Nuclear Emergencies affecting Agriculture" in October 1994.[143] Moreover, in 2004 the IAEA and the FAO concluded a series of agreements for corporation and information exchange between the two organizations in the event of a nuclear or radiological emergency.[144]

On account of these two conventions, many new agencies, committees and offices have been established. The Emergency Response Center (ERC) was created in 1986 and began operating in 1989 at the IAEA headquarters in Vienna, Austria. If a nuclear accident were to occur, the ERC would coordinate notifications and requests for assistance and information.[145] The ERC would coordinate notifications and requests through the Emergency Notification and Assistance Conventions (ENAC) website. The IAEA is planning to enhance the website and information exchange system.[146] Training exercises are an important aspect of the ERC's preparation process.

The IAEA produces an Emergency Notification and Assistance Technical Operations Manual (ENATOM), which details emergency response arrangements. The ENATOM was last reviewed in June 2001 and updated in December 2002. [147]

The IAEA's Emergency Response Network (ERNET) is a network of emergency response teams organized to quickly respond to a nuclear or radiological emergency. ERNET functions to provide assistance, if necessary, in accordance with "The Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency" and encourage proper preparation among IAEA member states for responding to accidents.[148] The IAEA is working to make the ERNET fully operational.[149]

The Inter-Agency Committee on Response to Nuclear Accidents (IACRNA) coordinates emergency response preparation between international intergovernmental organizations. The "Joint Radiation Emergency Management Plan of the International Organizations" was developed by several international organizations and the IAEA to describe plans for emergency response preparation and delineation of authority and responsibility of international organizations.[150]

Recent Developments

The IAEA's "Nuclear Security Plan of Activities," which was approved in March 2002 to prevent nuclear terrorism, includes plans to improve the response to possible nuclear emergencies. In addition to threats from a nuclear bomb, the Plan addresses other likely nuclear terrorism scenarios including attacks on nuclear facilities, power plants or the detonation of a dirty bomb. The threat of nuclear terrorism has forced the international community to turn their attention towards responding to a possible nuclear terrorism incident. Existing plans must be expanded and new plans must be developed to deal with this threat to prevent this type of incident from occurring and minimize the damage if it does occur.

In September 2004, the IAEA Board of Governors approved the "International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies" to improve the international nuclear emergency response framework. The five-year Action Plan focuses on international

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[143] "Second FAO/WHO Global Forum of Food Safety Regulation." Food and Agriculture Organization of the United Nations. http://www.fao.org/docrep/meeting/008/ae146e.htm

[144] "Information exchange and technical support in relation to food and agriculture in the case of a nuclear or radiological emergency." International Atomic Energy Agency and the Food and Agriculture Organization of the United Nations. http://www.iaea.org/programmes/nafa/dx/emergency/agreement.pdf

[145] "IAEA Emergency Response System." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/ers.htm

[146] "Strengthening the Emergency Response Center." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/default.htm

[147] "ENATOM." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/enatom.htm

[148] "ERNET." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/ernet.htm

[149] "Strengthening the Emergency Response Center." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/default.htm

[150] "International Liaison." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/inter-liaison.htm

communication, international assistance, and sustainable infrastructure.[151] Much of the plan still needs to be implemented and progress thus far needs to be assessed.

Some IAEA member states are still insufficiently prepared to respond to nuclear and radiological emergencies. These states need assistance in developing common approaches to emergency response. There is still much work to be done on developing uniform standards and coordinating information and training with other nations and international organizations. [152] In addition, the IAEA's Emergency Response Center must be improved in order to better meet the needs of member states.[153] After incidents occur, the evaluation procedures need to be enhanced so that we may learn from the mistakes of the past.[154]

Conclusion

More work must be done to ensure that all states have the resources, information and training to be able to prevent and plan for a nuclear emergency. States that cannot finance nuclear security projects on their own should receive assistance from other states or organizations. Cooperation among states and other international actors (such as NGOs) is essential to creating better nuclear security. It is not good enough that a few states are prepared. Any state that possesses nuclear or radiological materials must be prepared. As the IAEA Director General noted, "Ultimately, our success will only be as strong as our weakest link."[155]

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[151] "International Action Plan for Strengthening the International Preparedness and Response System for Nuclear and Radiological Emergencies." International Atomic Energy Agency. http://www-ns.iaea.org/downloads/rw/action-plans/ers-action-plan.pdf

[152] "Emergency Preparedness and Response." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/default.htm

[153] "Strengthening the Emergency Response Center." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/default.htm

[154] "Retrospectively Evaluating Radiation Accidents." International Atomic Energy Agency. http://www-ns.iaea.org/tech-areas/emergency/default.htm

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