INTERNATIONAL ATOMIC ENERGY AGENCY

STUDY GUIDE

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Addressing Illicit Trade and Smuggling of Nuclear Material

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Introduction

Since the end of WWII and the invention of the atomic bomb, nuclear materials have become a point of interest of not only legitimate actors such as states, but also of more unpredictable and dangerous entities including but not limited to terrorist groups. Even though an immense amount of infrastructure would be required to create a nuclear weapon, even a relatively small amount of radioactive material could suffice in the creation of a “Dirty Bomb” and each year, over 100 incidents involving unauthorized handling of radioactive material occur. However, independent sources suggest that the number of incidents actually taking place might be significantly larger than that which is reported to the IAEA.

Despite the IAEA's efforts and international cooperation on the topic, the issue has only seen a rise in severity through recent history, with the increased involvement of non-state actors and technological advances.

Key Terms

Radioactive material
Any substance or a material emitting, or related to the emission of, ionising radiation.

Nuclear material
Plutonium except that with isotopic concentration exceeding 80% 238Pu; uranium enriched in the isotope 235 or 233; uranium containing the mixture of isotopes as occurring in nature other than in the form of ore; any material containing one or more of the above mentioned

Dirty Bomb
Refers to a device which utilizes conventional explosives as a means of spreading radioactive material over an area.

Non-Proliferation Treaty
Officially the Treaty on the Non-Proliferation of Nuclear Weapons is an international multilateral treaty aiming to prevent the spread of WMDs between countries. Having been signed by all nuclear capable countries at the time, it signified a commitment to prevent the spread of nuclear weapons, and even to disarm the already existing nuclear arsenal. It serves as a key document in many questions regarding nuclear technology and international law, undergoing multiple revisions and updates through the years.

Current overview

Since 1993, 4243 incidents of illegal or unauthorized activities involving nuclear and radioactive materials have been reported in the Incident and Trafficking Database(ITBD), with roughly 100 being added every year. Out of these acts, roughly 8% have been confirmed to be related to trafficking or malicious use. However, many more incidents may have occurred according to independent sources.

The threat posed by nuclear weapons remains one of the greatest humanity has ever seen, and while many nations have made commitments of non-proliferation, multiple other nuclear-capable nations have not done so, even withdrawing themselves as parties of the NPT. Many nations and even non-state actors (including terrorist organisations such as Al-Qaeda) have displayed interest in gaining access to a nuclear arsenal throughout recent history.

The threat of retaliation (nuclear deterrence) has prevented nuclear capable nations from utilising this technology even in times of conflict. Non-state actors, however, could prove quite unpredictable in regards to their use of such technology, with deterrence possibly not being sufficient to dissuade from aggression given the difficulties in regards to specific retaliation. The possibility of uncontrolled spread of nuclear material and technology to not just other nations, but to non-state actors as well could pose a threat to world peace and destroy the fragile balance currently present in regards to nuclear weaponry.

Timeline of key events

1945
USA use nuclear weapons for the first time, destroying the cities of Nagasaki and Hiroshima. The event signified the beginning of the nuclear arms race and nuclear proliferation as a concept and a threat.

1946
Soviet Union conducts their first successful nuclear test, breaking the monopoly on nuclear weapons held by the USA.

1957
The International Atomic Energy Agency (IAEA) is established with the mission of promoting and overseeing the peaceful use of nuclear technology.

1968
The first iteration of the NPT is signed by the P5, the only countries which possessed nuclear weapons at the time. Despite their commitment to disarm, all possess nuclear weapons to this day.

1974
India conducts its first successful nuclear weapon test.

1991
The USSR collapses, leaving much of its nuclear arsenal and technology unsecured. Thus, theft, illicit trafficking and smuggling of nuclear material increases in frequency, caused largely by individuals seeking personal profit.

1995
A group of Chechen rebels bury a dirty bomb made of Caesium-137 in Izmailovsky Park in Moscow. This event demonstrates the real possibility and threat posed by illegally acquired radioactive material.

1998
Pakistan successfully creates its own nuclear bomb, largely thanks to A. Q. Khan, who had been involved with illegal transfer of nuclear materials and technologies for multiple decades.

2006
North Korea orders all IAEA inspectors out of the country and announces that they have successfully completed a nuclear test cca. 4 years after withdrawing from the NPT.

Key Questions a Resolution should adress

- *Which measures could be taken to further prevent illicit trafficking of nuclear and radioactive material?*
- *What can be done about the rising possibility of non-state actors gaining access to nuclear weapons?*
- *How could the IAEA gain a more accurate idea of illicit trafficking and smuggling incidents?*
- *How should the issue of states continuing to spread nuclear capabilities be handled?*

Conclusion

Nuclear Proliferation poses a threat to global peace and to each single nation. The increasing possibility of non-state actors gaining access to such an arsenal causes further concern, given the unpredictability of such actors in comparison with states. Illegal trafficking and smuggling of both nuclear and radioactive material, as an almost necessary part of nuclear proliferation, must be taken as a serious issue and addressed with necessary cooperation.

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Harnessing Nuclear Technologies to Combat Global Hunger

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Introduction

World hunger continues to be one of today's most pressing issues, affecting nearly 9% of the world's population. The lack of food and resources has far-reaching consequences, including malnutrition, poverty, and social unrest. Addressing this issue will require new beyond traditional agricultural methods.

In this context, nuclear technologies offer potential solutions to reinforce food security and combat global hunger. These solutions include enhancing plant yields, boosting resistance to weather stresses, and optimizing the utilization of inputs. Nuclear technology has already entered the agricultural world and has been efficiently applied in food production. When adequately and sustainably applied, they can be a significant vehicle in achieving the United Nations Sustainable Development Goal of "Zero Hunger."

Nevertheless, these technologies may present significant challenges, including their availability in developing countries, high costs, and the need for proper supervision and safety protocols.

Key Terms

Nuclear Technology
Technologies using atomic energy and radioactive materials for various purposes, for example, in agriculture, industry, and healthcare.

Food Security
A state where everyone has access to sufficient, safe, and nutritionally adequate food to be able to maintain a healthy life.

Zero Hunger
One of the United Nations’ objectives to eliminate hunger and undernourishment by 2030 and provide critical areas with safe and sustainable access to quality food.

Radiation Technologies
Technologies using ionizing radiation to provide various functions, such as breeding crops through mutations, increasing crop resistance, or sterilizing food to improve its shelf life.

Radiation Sterilization
A process in which ionizing radiation destroys microorganisms in food, thereby increasing its safety and extending its shelf life.

Safety Standards
Strict rules ensuring safe use of nuclear technologies without risk to human health and the environment.

Crop Mutation Breeding
A kind of breeding when radiation to induce genetic changes in plants is used to create varieties that are resistant to pests, diseases, and climate change.

Soil Degradation
During this process, the quality and productivity of soil are increased due to poor management, pollution, or erosion. Nuclear technologies can monitor soil and enhance its fertility.

Climate Resilience
The crops and agricultural systems ability to acclimate to changes in climate, such as extremely high temperatures, drought, or floods, which can be improved and bred with nuclear technologies.

Food Waste
Food thrown out by humans, making up around 40% of all eatables sold.

Current overview

Major Strategies in Implementing Nuclear Technologies in Agriculture

Isotopic Methods
Isotopic techniques are used to follow the pathway of nutrients and water in soil systems, making it possible for scientists and farmers to understand how they can maximize irrigation management and fertility of soil.

By learning how nutrients act together with the soil, such methods make effective management of nutrients a possibility while wasting less and obtaining more. Isotopic tracing also allows the tracking of soil erosion and supports sustainable agriculture.

Radiation-Based Methods
Radiation technologies are widely used in crop mutation breeding to develop more disease-resistant, pest-resistant, and weather-resistant varieties of plants. This makes crops sustainable even in more erratic climates.

Food irradiation is also significant in extending the shelf life of perishable foods. This reduces the wastage of food and enhances food product safety by killing harmful pathogens.

Nuclear Approaches to Govern Livestock Well-being and Productivity
Nuclear methods are also applied in the disease control and diagnosis of livestock to enhance animal raising to be cost-effective and more sustainable.

Benefits of Nuclear Technologies in Fighting Hunger

Enhanced Farm Output
Water and nutrient usage in an efficient manner results in more crop output without depleting natural resources. Enhanced soil fertility ensures sustained agricultural livelihoods.

Enhanced Resistance in Crops
Nuclear radiation-bred crops are resistant enough to weather pests, diseases, and weather extremes caused by global warming. This does away with the use of chemical fertilizers and pesticides, thereby ensuring eco-friendly agriculture.

Enhanced Food Safety and Security
Radiation sterilization ensures increased food safety by killing dangerous bacteria andmicroorganisms.

The longer life of food products reduces food waste along supply chains, enabling more people to access healthy food.

Enabling Development
Nuclear technologies promote sustainable agriculture and environmental conservation through minimized wastage of resources and greater agricultural yields.

Challenges and Limitations

Inadequate Access in Developing Nations
The majority of developing countries lack the infrastructural facilities or the economic muscle to adopt nuclear technologies.

Equipment and operational expertise are usually scarce in wealthier countries, resulting in unequal access.

High Implementation Cost
It requires huge investments to purchase, maintain, and operate nuclear weapons, which may be out of the reach of poor regions.

Safety Concerns
Caution needs to be exercised for safe handling of radioactive materials in a way that prevents potential health and environmental risks.

Stringent checks and regulations are required to guarantee safety standards.

Needs for Qualified Staff
The operation of nuclear technologies requires extremely skilled operators, which might prove to be a challenge in areas where the availability of schools and technical personnel is low.

Public Acceptance and Perception
Public opposition to the use of nuclear technologies is possible based on inaccurate ideas about radiation and safety hazards.

The Role of International Cooperation

Technology Transfer
The transfer of technology, methodologies, and knowledge between developing and developed nations is vital to enable equal access to such technologies.

Capacity Building
Providing training courses for developing capacities at the grassroots level ensures that areas can implement and maintain these technologies effectively.

Establishing Regulatory Frameworks
Strong international policy is needed to ensure the safe, ethical, and sustainable use of nuclear technology in agriculture.

Financial Support for Research and Implementation
Investments from international organizations, governments, and private sectors can help bridge the financial gap in less affluent regions.

Key Success Factors

Fair Access
It is essential for nuclear technologies to reach even the most disadvantaged people in order to end hunger worldwide.

Sustainability
Minimizing environmental impact and guaranteeing long-term resource management are crucial to sustainable development.

Safety and Transparency
Effective safety practices and transparency in dealing with nuclear material are essential to building public confidence and avoiding risk.

Public Awareness and Education
Public education about the benefits and safety aspects with respect to nuclear technologies can make them more acceptable and utilized.

Conclusion

Nuclear technologies can be a game-changer for global hunger. With higher yields, safer food, and more sustainable agriculture, nuclear technologies have the potential to be the backbone of the United Nations' "Zero Hunger" goal. Nevertheless, this journey will require dismantling access, safety, and affordability barriers in the process.

Global cooperation, fair access, and a perception of sustainability are required to ensure that nuclear technologies are responsibly used. Used correctly, these technologies can make the world hunger-free and food-secure for everyone.

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