Country: The Federative Republic of Brazil

Committee: International Atomic Energy Agency (IAEA)

Agenda Item: Technology Infrastructure for Prevention Detection and Responses Regarding Nuclear Security

The Federative Republic of Brazil presents its compliments and has the honour to submit its position paper to the IAEA committee on the issue of Technology Infrastructure for Prevention Detection and Responses Regarding Nuclear Security. The Federative Republic of Brazil recognizes that the misuse of nuclear technology poses severe risks, and as a nation committed to the peaceful use of nuclear energy, emphasizes the necessity of international cooperation, advanced technological systems and strong legal frameworks for maintaining nuclear security.

1. Background and National Perspective

Brazil, officially the Federative Republic of Brazil, is the largest and easternmost country in South and Latin America. It is the fifth-largest country in the world by area and one of the most populated countries. Its capital is Brasília, and its most populous city is São Paulo.

Brazil's nuclear program began in the 1930s with initial research into nuclear fission. In the 1940s, the country entered agreements with the United States for uranium mining and nuclear technology transfers, eventually leading to the construction of the Angra I nuclear plant in 1971. Brazil also pursued partnerships with Germany in the 1970s to acquire advanced nuclear technology, including uranium enrichment methods, which were seen as a response to

the global energy crisis and regional competition with Argentina. By the late 1970s, during military rule, Brazil started a secret program (PATN) to develop uranium enrichment technology. Different branches of the military worked on various methods, with the Navy's ultracentrifuge program being the most successful, helping to advance its goal of building nuclear-powered submarines. However, these hidden activities faced criticism both internationally and within Brazil.

Although it once engaged in nuclear competition with Argentina, Brazil renounced its interest in nuclear weapons and curtailed ballistic missile development after the ouster of its military government in the 1990s. In 1990, President Collor de Mello publicly ended the military's nuclear weapons program. Brazil then focused on peaceful nuclear development, signing agreements with Argentina and the IAEA to show compliance with international rules. It has never developed chemical or biological weapons.

2. Current Advancements and the Future of Nuclear Energy

Nuclear energy has become an essential source for source for Brazil in its effort to achieve clean energy. Today, nuclear energy accounts for about 3% of Brazil's electricity. It has a robust nuclear program focused on energy production and research, and investigates nuclear energy to meet the country's energy needs. Its two operational nuclear power plants, Angra 1 and Angra 2, supply a significant portion of the country's electricity. A third plant, Angra 3, is under construction to meet growing energy demands. Nuclear power plants, Angra 1 and 2 are located in the municipality of Angra dos Reis, in Rio de Janeiro. Angra 1 (657 megawatt) went into operation in 1982, Angra 2 (1,350 megawatt) was taken over in 2000, and lastly, Angra 3's (1,350 megawatt) construction continues. In addition to their capacity, Angra 1 and Angra 2 have consistently delivered reliable energy, with high availability factors.

Brazil's first nuclear submarine, Alvaro Alberto, is part of the strategic partnership signed between France and Brazil on 23 December 2008, creating the Submarine Development Programme.

Brazil also operates uranium mining and enrichment facilities, making it one of the few countries with a complete nuclear fuel cycle. The Santa Quitéria project seeks to diversify Brazil's uranium production by mining a new deposit in the northeast region of the country, with an expected annual production of 2.400 tons of uranium concentrate starting in 2027. This capacity positions Brazil as a leader in peaceful nuclear energy but also underscores the importance of strict security measures to prevent misuse of nuclear materials.

Additionally, the Brazilian Multipurpose Reactor (RMB) Project is an action of the Federal Government, through the Ministry of Science Technology and Innovation (MCTI) and has its execution under the responsibility of the Brazilian National Nuclear Energy Commission (CNEN). The project’s aim is to build a multipurpose reactor with applications in science, technology, and the production of radiopharmaceuticals. By providing a source of radioisotopes, the RMB can contribute to the advancement of the country's medicine, industry, and research fields. The future of the RMB development could significantly contribute to cancer treatment, where radiopharmaceuticals have shown significant benefits. It represents a meaningful opportunity for Brazil to bring innovative, accessible, and most importantly, safe nuclear technologies to its people. Environmental licensing and nuclear licensing processes started for the project.

Brazil’s extensive nuclear program, managed by entities like the National Nuclear Energy Commission (CNEN) and Eletronuclear, highlights the country’s dedication to peaceful nuclear development. As a signatory of the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) and a member of the International Atomic Energy Agency (IAEA), Brazil advocates for the global adoption of preventive measures and technological innovation.

Furthermore, Brazil has actively contributed to regional nuclear security through the Brazil-Argentina Agency for Accounting and Control of Nuclear Materials (ABACC), a model of bilateral trust and cooperation.

Brazil continues to work closely with the International Atomic Energy Agency (IAEA) and Brazilian Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) to ensure compliance with international safeguards. The country remains a strong advocate for equitable access to nuclear technology for peaceful purposes, particularly for developing nations.

3. Possible Challenges and Vulnerabilities Regarding Nuclear Security

Limited Technological Capacity

Despite advancements, Brazil faces limitations in certain areas of nuclear security technology, particularly in advanced detection systems and rapid response capabilities. To illustrate, first of all, the deployment of radiation detection systems may not be uniform across the country, potentially leaving some areas with insufficient monitoring capabilities. Secondly, challenges may exist in effectively analyzing and interpreting data from existing detection systems, hindering timely identification and response to potential threats.

Goiânia Accident

The Goiânia accident was a radioactive contamination accident that occurred on September 13, 1987, in Goiânia, Goiás, Brazil, after an unsecured radiotherapy source was stolen from an abandoned hospital site in the city. It was subsequently handled by many people, resulting in four deaths. About 112,000 people were examined for radioactive contamination and 249 of them were found to have been contaminated. The psychological impact of the Goiânia accident, while not directly related to nuclear power plants, highlights the importance of public awareness and education regarding nuclear safety. In the consequent cleanup

operation, topsoil had to be removed from several sites, and several houses were demolished. All the objects from within those houses, including personal possessions, were seized and incinerated. *Time* magazine has identified the accident as one of the world's "worst nuclear disasters" and the International Atomic Energy Agency (IAEA) called it "one of the world's worst radiological incidents".

Evolving Threats

The emergence of new technologies, like artificial intelligence, 3D printing technology, biotechnology and cyber technology might have detrimental applications. These technologies could be exploited by malicious actors to disrupt critical infrastructure, compromise nuclear facilities, or even facilitate the development of nuclear weapons. Additionally, potential non-state actors, like the threat of terrorist groups and cybercriminals, necessitates a proactive approach to address evolving nuclear security challenges. Terrorist groups may potentially acquire or utilize nuclear materials through illicit trafficking networks or by exploiting vulnerabilities in nuclear facilities; and cybercriminals could target nuclear facilities with cyberattacks, potentially disrupt operations, compromise sensitive data, or even disable safety systems.

4. Proposed Solutions

A comprehensive strategy is needed to enhance global nuclear security. From Brazil’s standpoint, the UN (United Nations) could take the following potential actions:

Technology Upgradation

1. To enhance nuclear security, Brazil advocates for significant technology upgrades. This includes investing in and deploying the most advanced radiation detection systems at critical sites like nuclear power plants, research facilities, and transportation routes.
2. Recognizing the growing cyber threat, Brazil emphasizes the need for robust cybersecurity measures, including international cooperation to share best practices

and establish global standards to protect critical nuclear systems. Furthermore, real-time monitoring systems utilizing technologies like GPS tracking and remote sensing should be implemented for nuclear materials.

3. Finally, Brazil insists on the importance of benefiting from data analytics and artificial intelligence technologies for improving nuclear safety hazard assessments, and claims that advance technology usage holds power to enhance early warning and prevention systems.

Capacity Building and Improvement

1. To enhance nuclear security, Brazil argues that it is crucial to strengthen the capacity of regulatory bodies through comprehensive training programs. Brazil stands up for tailored training programs that are appropriate for specific roles and responsibilities of individuals within the nuclear security domain. These specific roles should include trainings for regulatory personnel, law enforcement officers, first responders, nuclear facility personnel, and transportation personnel. Brazil underlines the importance of practical exercises, simulations, and field training to develop practical skills and decision-making abilities in possible real-world scenarios.
2. Brazil states that another aspect of tailored training programs is regularly evaluating the effectiveness of them through assessments, feedback mechanisms, and after-action reviews. Additionally, Brazil highlights the human factor of nuclear safety operations; thus, sides with fostering a strong security culture within the nuclear sector and addressing the psychological and emotional challenges faced by the facility personnels involved in nuclear security operations.
3. Brazil suggests that fostering research and development in cutting-edge nuclear security technologies, such as advanced materials for radiation shielding and innovative decontamination techniques, is crucial for maintaining a proactive defense against evolving nuclear threats.
4. Moreover, Brazil believes in the importance of enhancing public awareness and education on nuclear safety issues, and advocates for integrating basic concepts of nuclear security into school curricula at various levels, from primary to higher

education. It calls for nations to develop specialized courses and programs on nuclear security for professionals in relevant fields.

5. Finally, and critically, Brazil is of the opinion that a special focus must be placed on preventing insider threats through rigorous personnel vetting, continuous training, and vigilant monitoring of nuclear facility staff.

International Cooperation:

1. Brazil advocates for international cooperation to enhance global nuclear security. This includes actively seeking international collaboration to access and transfer advanced nuclear security technologies, fostering information sharing through active participation in international forums and platforms to learn from best practices and share experiences, and strengthening existing international agreements and frameworks for nuclear security cooperation.
2. Inspired by the success of the Brazilian Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), Brazil proposes the establishment of similar regional frameworks to effectively monitor nuclear security risks.
3. Furthermore, international collaboration on research and development, particularly in emerging areas like artificial intelligence for threat detection, is crucial. Brazil is committed to contributing its knowledge and experience to build global capacity and strengthen the international nuclear security architecture.

Public Opinion:

1. Brazil believes in government transparency, and the power of ensuring open and transparent communication from government agencies regarding nuclear security policies, activities, and incidents. It invites all nations to provide timely and accurate information to the public in a clear and understandable manner in order to build trust and confidence.

2. Lastly, Brazil supports creating platforms and using social media for interaction between government officials, nuclear security experts, and the broader public. These platforms could include public forums, conferences and seminars, physical meetings, and online platforms that facilitate open discussions and exchange of information.

Brazil recommends actively addressing public concerns and questions regarding nuclear security issues is paramount to building trust and ensuring that the public's voice is heard.

By taking these steps, the global community can build a safer, more secure future. Brazil stands ready to lead by example and work with all member states to achieve this vital goal, and remains steadfast in its commitment to a world free of nuclear threats. Brazil strongly supports the role of the IAEA in fostering international cooperation.

References

Blumenberg, A., & Clemons, J. (2023, July). *The goiânia incident, the semiotics of danger, and the next 10,000 years*. Clinical toxicology (Philadelphia, Pa.). https://pubmed.ncbi.nlm.nih.gov/37535035/

Brazil's Angra 1 approved for 20-Year life extension. World Nuclear News. (2024, November 22). https://www.world-nuclear-news.org/articles/brazils-angra-1-authorised-for-20-year-extension

Galvani to work on Brazil's largest Uranium Reserve. World Nuclear News. (2008, June 24). https://www.world-nuclear-news.org/Articles/Galvani-to-work-on-Brazil-s-largest-uranium-reserv

Instituto de Pesquisas Energéticas e Nucleares. (2016). Brazilian Multipurpose Reactor Progress Report.

James Martin Center for Nonproliferation Studies at the Middlebury Institute of International Studies. (2024, June 7). *Brazil*. The Nuclear Threat Initiative. https://www.nti.org/countries/brazil/

Kassenova, T. (2014). *Brazil's nuclear kaleidoscope: An evolving identity*. Carnegie Endowment for International Peace.

Morrison, D. (2022, June 17). *Brazil's nuclear ambitions, past and present*. The Nuclear Threat Initiative. https://www.nti.org/analysis/articles/brazils-nuclear-ambitions/

Moura, B. F. (2024, July 1). *Brazil aims to expand use of nuclear energy*. Agência Brasil. https://agenciabrasil.ebc.com.br/en/economia/noticia/2024-07/brazil-aims-expand-use-nuclear-energy

Zanella, N. (2024, March). Nuclear Energy in Brazil: Brazil: Advances and Prospects. The Latin American Section of the American Nuclear Society (LAS/ANS).