Nuclear Security Review 2024

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NUCLEAR SECURITY REVIEW 2024

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Foreword

The *Nuclear Security Review 2024* includes the global trends and the Agency's activities in 2023 and thereby demonstrates the progress made regarding the priorities for 2023. It also presents priorities for 2024 and beyond, as identified by the Agency, for strengthening nuclear security globally. The majority of priorities remain unchanged from the previous year due to their long term nature but some have evolved to take into account changing global trends and in response to activities performed.

A draft version of the *Nuclear Security Review 2024* was submitted to the March 2024 session of the Board of Governors in document GOV/2024/4. The final version of the *Nuclear Security Review 2024* was prepared in light of the discussions held during the Board of Governors and also of the comments received from the Member States.

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Nuclear Security Review 2024

Report by the Director General

Executive Overview

1. The *Nuclear Security Review 2024* reflects the Agency's perspective on global trends in nuclear security in 2023. It shows that the international community is committed to further advancing nuclear security around the world. It also presents planned Agency activities for 2024 and priorities, as identified by the Agency and its Member States, including through the *Nuclear Security Plan 2022–2025*, for strengthening nuclear security globally. Agency activities completed in 2023 can be found in Appendix A.

Nuclear Security Priorities

- Supporting Member States, upon request, in developing, maintaining and implementing national nuclear security regimes, including legislative and regulatory frameworks; physical protection of nuclear and other radioactive material, insider threat mitigation and nuclear security culture; security of radioactive sources throughout their life cycle; and preparedness for, detection of and response to nuclear security events;
- Continuing efforts to promote further adherence to, and full implementation of, the Convention on the Physical Protection of Nuclear Material and its Amendment;
- Developing and strengthening nuclear security guidance and assisting with the application of such guidance through activities such as peer review and advisory services;
- Assisting Member States in strengthening capacity through the implementation of nuclear security education and training programmes, available to all States, and utilizing the International Nuclear Security Education Network, Nuclear Security Support Centres and national Collaborating Centres;
- Operating the Nuclear Security Training and Demonstration Centre;
- Continuing to assist States, upon request, in strengthening the protection of sensitive information and computer-based systems, recognizing threats to nuclear security from cyber-attacks at nuclear-related facilities, as well as their associated activities including the use, storage and transport of nuclear and other radioactive material;
- Continuing to keep abreast of scientific, technological and engineering innovations with a view to confronting current and emerging threats to nuclear security, and also considering opportunities to enhance nuclear security from these innovations;
- Continuing to facilitate, in close cooperation with Member States, upon request, coordination to address the management of the interface between nuclear safety and security, as appropriate, and to develop safety and security publications, as well as joint publications, as appropriate, to ensure consistency and foster nuclear security culture among Member States;
- Ensuring that contributions to the Nuclear Security Fund are used efficiently and according to the principles of results based management;
- Hosting the International Conference on Nuclear Security: Shaping the Future in 2024;
- Continuing to strengthen communication with the public and Member States about Agency nuclear security activities and how these activities can assist Member States in improving nuclear security globally; and
- Continuing to monitor, assess and report on the nuclear safety and security situation in Ukraine, and to provide assistance to Ukraine's nuclear facilities and activities involving radioactive sources, including support and assistance missions and delivery of equipment, as requested by Ukraine.

2. The present document, *Nuclear Security Review 2024,* intends to complement the forthcoming *Nuclear Security Report 2024*, which will focus on the activities undertaken by the Agency to implement the relevant General Conference resolutions and will cover the period 1 July 2023 to 30 June 2024. In consultation with Member States, the complementarity and timing of the issuance of the assorted reports, within their defined scopes and with an objective of minimizing duplication, were considered in the development of the present report.

3. Global events in 2023, notably the conflict in Ukraine, highlighted the importance of nuclear safety and security. The Agency and Member States continue to place the safety and security of nuclear and radioactive materials and facilities as high priorities.

4. The responsibility for nuclear security within a State rests entirely with that State. Member States have consistently recognized the central role of the Agency in strengthening the nuclear security framework globally and in coordinating international cooperation in nuclear security activities, while avoiding duplication and overlap of such activities.

5. During 2023, the Agency continued implementing activities, with due regard to the protection of confidential information, under the *Nuclear Security Plan 2022–2025*, approved by the Board of Governors in September 2021 and taken note of by the General Conference at its 65th regular session in September 2021. The Agency undertook a number of steps to enhance its application of a results based approach during the planning, implementation and monitoring, and performance assessment phases of the Agency's nuclear security programme. The Agency remains committed to further mainstreaming and implementing a results based approach in its delivery of the relevant assistance to States.

6. As the only international organization having a central and coordinating role in nuclear security activities with competence in the various technical subjects that promote nuclear security, the Agency contributes to the work of the dedicated Committees of the United Nations, such as the 1540 Committee, and offices of the United Nations, such as the United Nations Office of Counter-Terrorism, United Nations Office on Drugs and Crime, and United Nations Office for Disarmament Affairs, and has established cooperation with a number of international organizations.

7. The Agency continued its systematic approach to external communication on nuclear security. The Agency issued 10 press releases and published 27 articles on nuclear security-related topics on its website. In addition, a podcast entitled "Nuclear Explained — Computer Security in the Nuclear World", an edition of the *IAEA Bulletin* entitled "Computer Security in the Nuclear World" and a video entitled "IAEA Nuclear Security Centre Opens" were developed and made available for public information purposes.

8. Further, to build and maintain the framework needed for States to effectively communicate and exchange information, the Agency held major conferences and organized virtual, hybrid and in-person Technical Meetings on nuclear security topics, and convened Information Exchange Meetings to encourage communication among organizations active in various aspects of nuclear security.

9. The Agency continues to receive a high volume of requests for support in education and training, across all technical areas of nuclear security, to support the ongoing sustainability of nuclear security in countries. To address these requests and to help States establish and sustain national nuclear security regimes more broadly, the Agency places considerable emphasis on its human resource development programme and on activities hosted by Nuclear Security Support Centres and Collaborating Centres. Training activities based on a systematic approach support States in providing managers and personnel with the knowledge, skills and attitudes necessary to discharge their duties and perform their jobs and tasks in various areas of nuclear security.

10. The Agency opened its Nuclear Security Training and Demonstration Centre in October 2023, which will enhance nuclear security capacity building through the use of advanced technology and expertise, and will complement training opportunities offered in Member States and Nuclear Security Support Centres.

11. The Agency continued its efforts to strengthen international norms supporting nuclear security, including through activities that support States in joining relevant legally binding international instruments and implementing obligations thereunder, namely the Convention on the Physical Protection of Nuclear Material and its Amendment.

12. Development or enhancement of regulatory infrastructures for nuclear security; nuclear material control and accounting systems at nuclear facilities for security purposes; and specific guidance on insider threats, nuclear security culture, threat-based and risk informed approaches, the safety–security interface, and contingency planning continue to be important nuclear security elements.

13. The Agency's assistance consists of many elements, including peer review missions, assistance missions and expert missions, following countries' requests for assistance; national and regional workshops; international and regional training courses; technical visits; physical protection upgrades, and loaning and delivery of equipment.

14. Agency missions, including the International Physical Protection Advisory Service (IPPAS), the International Nuclear Security Advisory Service and the Advisory Mission on Regulatory Infrastructure for Radiation Safety and Nuclear Security, provide States with invaluable information that is used in developing action plans within the Integrated Nuclear Security Sustainability Plan framework. These missions continue to be in high demand. A major milestone for the longest-running security-related mission programme was achieved in September 2023 in Zambia, with the completion of the 100th IPPAS mission.

15. Information and computer security remains a topic of high importance for Member States, as the nuclear industry increasingly uses digital technologies to control, monitor and protect the various aspects of operations at nuclear power plants; other fuel cycle and spent fuel storage facilities; non-power reactors; novel advanced reactors, including small and medium sized or modular reactors (SMRs); decommissioned nuclear facilities; and in other applications involving radioactive sources. Vulnerability to theft and/or manipulation of sensitive information or operational technology via cyber-attack is a challenge across all aspects of the digitally connected world. The International Conference on Computer Security in the Nuclear World: Security for Safety highlighted the importance of continuing effort on these topics and provided opportunities for experts and policymakers to exchange information and experiences related to computer security.

16. With increased interest in SMRs, new approaches to security and the development of guidance, tools and human resources to handle challenges related to the secure deployment of SMRs are under consideration. Nuclear security is being considered in the Agency's Nuclear Harmonization and Standardization Initiative, and national nuclear security experts are engaged in all aspects of the initiative, including the development of a technical document related to a multinational pre-licensing regulatory review that could include safety and security aspects of a reactor design.

17. Implementation of activities relevant to nuclear security depends on close interaction with States, with other international organizations and within the Agency. Effective mechanisms are required for coordination, including planning and monitoring, and for narrative and financial reporting to Member States and organizations that provide voluntary contributions to the Nuclear Security Fund (NSF). Interactions with States are facilitated through the establishment of nuclear security support arrangements between the Agency and individual States. Some Member States implement nuclear security support programmes on a bilateral basis. The Agency continues to bring together States'

experiences and to share information, as appropriate, as well as to implement joint activities, in order to improve both the effectiveness of the Agency-wide programme on nuclear security and the efficient use of resources.

18. In 2023, the Agency received contributions to the NSF from donors: Belgium, China, Estonia, the European Union, Finland, France, Germany, Japan, New Zealand, Pakistan, the Republic of Korea, the Russian Federation, Spain, Switzerland, the United Kingdom, the United States of America, as well as non-governmental donors. The total revenue in 2023 was €23 million.[1] The Agency is committed to utilizing contributions to the NSF in an expedient and prudent manner utilizing principles of the results based management. Rigorous planning and robust processes have allowed the Agency to achieve some of its highest rates of NSF expenditure in 2023 and 2022; in 2023, NSF expenditure was higher than NSF revenue for the second year in a row.

19. The Agency remains committed to providing guidance and assistance to Member States in establishing comprehensive national nuclear security practices for protecting nuclear and other radioactive material, and for detecting and responding to nuclear security events. The Agency will continue to analyse new and emerging threats in order to assist Member States in preparing for, preventing and responding to potential nuclear security events.

[1] For purposes of this report, ‘revenue’ refers to funds that have been recognized as revenue and deferred revenue in accordance with the International Public Sector Accounting Standards.

Abbreviations

A/CPPNM	Amendment to the Convention on the Physical Protection of Nuclear Material
AI	artificial intelligence
CPPNM	Convention on the Physical Protection of Nuclear Material
CRP	coordinated research project
DSRS	disused sealed radioactive source
I&C	instrumentation and control
INSEN	International Nuclear Security Education Network
INSServ	International Nuclear Security Advisory Service
INSSP	Integrated Nuclear Security Sustainability Plan
IPPAS	International Physical Protection Advisory Service
ISAMZ	IAEA Support and Assistance Mission to Zaporizhzhya
ITDB	Incident and Trafficking Database
M-INSN	Mobile-Integrated Nuclear Security Network
MORC	nuclear and other radioactive material out of regulatory control
MPE	major public event
MR	microreactor
MSCFP	Marie Skłodowska-Curie Fellowship Programme
NHSI	Nuclear Harmonization and Standardization Initiative
NPP	nuclear power plant
NSF	Nuclear Security Fund
NSGC	Nuclear Security Guidance Committee
NSS	Nuclear Security Series
NSSC	Nuclear Security Support Centre
NSSC Network	International Network for Nuclear Security Training and Support Centres
NSTDC	Nuclear Security Training and Demonstration Centre
NUSEC	Nuclear Security Information Portal
NUSIMS	Nuclear Security Information Management System
RBM	results based management

RCSM	radiological crime scene management
RIDP	Regulatory Infrastructure Development Project
RISS	Advisory Mission on Regulatory Infrastructure for Radiation Safety and Nuclear Security
RPM	radiation portal monitor
SMRs	small and medium sized or modular reactors
TECDOC	IAEA Technical Document
TRACE	Tool for Radiation Alarm and Commodity Evaluation
UNSC	United Nations Security Council
ZNPP	Zaporizhzhya nuclear power plant

Analytical Overview

A. General Nuclear Security Areas

A.1. Promoting Further Adherence to International Legal Instruments

Trends

1. Efforts to strengthen international norms supporting nuclear security continue through activities that support States in joining and in fully implementing obligations under relevant legally binding international instruments. These include the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment (A/CPPNM), the International Convention for the Suppression of Acts of Nuclear Terrorism and United Nations Security Council Resolution 1540.

2. Member States continue to support Agency activities aimed at the universalization of the CPPNM and its Amendment. The CPPNM was adopted on 26 October 1979, and entered into force on 8 February 1987. As of December 2023, there were 164 Parties to the CPPNM, a number that has remained stable since 2021. The A/CPPNM was adopted on 8 July 2005 and entered into force on 8 May 2016. As of December 2023, there were 135 Parties to the A/CPPNM, an increase of 4 compared to the end of 2022. In 2023, the Agency increased the number of national and regional workshops promoting the universalization of the A/CPPNM, with a particular focus — at the request of Member States — on engaging decision makers as well as technical experts.

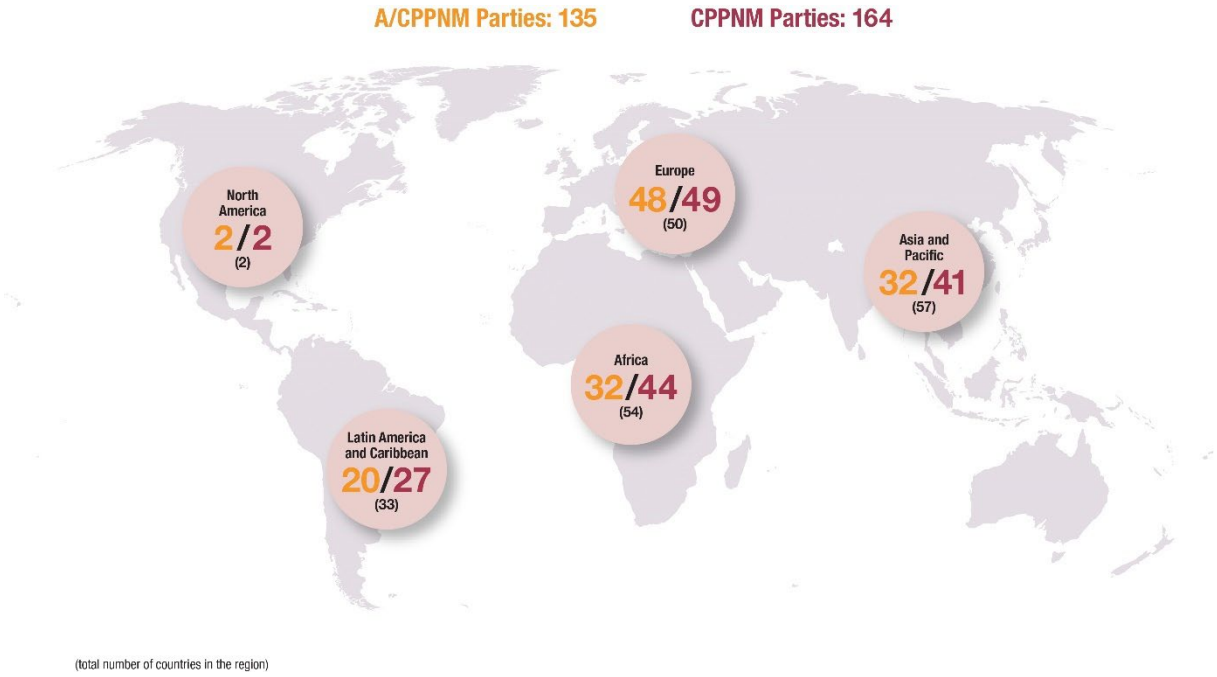


Figure 1: A/CPPNM and CPPNM parties in 2023.

3. Member States continue to request legislative and technical assistance towards universal adherence to, and full implementation of, the CPPNM and its Amendment. States Parties continue to provide information on laws and regulations giving effect to the CPPNM and its Amendment and continue to

designate Points of Contact for the CPPNM and its Amendment pursuant to Articles 14 and 5, respectively. As of December 2023, 78 States had informed the Agency of their laws and regulations in accordance with Article 14, representing an increase of 2 compared to the end of 2022. In the reporting period, 4 more States provided the Agency with details of their CPPNM and/or A/CPPNM Points of Contact, bringing the total number of Points of Contact and Central Authorities designated under Article 5 to 137.

Figure 2: New Parties to the A/CPPNM in 2023.

Related Activities

4. ***The Agency will continue assisting Parties in meeting their obligations under the CPPNM and its Amendment and will continue its efforts to promote universal adherence to the CPPNM and its Amendment. The Agency is planning to undertake the following related activities:***

- Continue promoting and facilitating the exchange of information, on a voluntary basis, on the implementation of nuclear security provisions of international instruments relevant to nuclear security;
- Continue promoting universalization of the CPPNM and its Amendment through workshops and engagement with decision makers and legal and technical experts, as well as through other targeted activities;
- Further encourage States Parties to the CPPNM and to the A/CPPNM to identify the CPPNM and A/CPPNM Points of Contact pursuant to Article 5.1 and to inform the Agency of laws and regulations giving effect to the CPPNM and its Amendment pursuant to Article 14.1;
- Continue supporting Member States, through its legislative assistance programme, in adhering to and implementing the provisions of the CPPNM and its Amendment as part of national nuclear legislation; and
- In consultation with Member States, consider ways of further promoting and facilitating the exchange, on a voluntary basis, of information on the implementation of nuclear security provisions of international instruments relevant to nuclear security.

A.2. Nuclear Security Guidance and Peer Review and Advisory Services

Trends

5. The Agency continues to place considerable emphasis on the development and publication of comprehensive guidance as part of the Nuclear Security Series (NSS), with the involvement of Member States, including through the Nuclear Security Guidance Committee (NSGC), which completed its

fourth term in December 2023, and in accordance with the road map drawn up in consultation with the NSGC. These publications are consistent with, and complement, international nuclear security instruments, and form the basis of the Agency's nuclear security assistance to Member States.

6. Work on the Agency's nuclear security guidance continues to focus on further enhancing the set of NSS publications. Following the recommendations of the NSGC and an open-ended meeting of technical and legal experts on *Objectives and Essential Elements of a State's Nuclear Security Regime* (IAEA Nuclear Security Series No. 20) held in December 2022, the Agency decided to revise the Nuclear Security Fundamentals (IAEA Nuclear Security Series No. 20) and the Nuclear Security Recommendations (IAEA Nuclear Security Series Nos 13, 14 and 15). To further facilitate the revision as recommended, the Secretariat initiated the review of terminology used in the NSS to ensure its consistent use throughout all NSS publications in parallel with development of Document Publication Profiles for the top tier nuclear security guidance documents.

Figure 3: NSS publications in 2023.

7. Member States remain committed to ensuring the physical protection of nuclear and other radioactive material, as evidenced through continued requests from Member States for Agency missions to support this area.

- Member States continue to request International Physical Protection Advisory Service (IPPAS) missions. In 2023, the Agency conducted five IPPAS missions. Since 1996, a total of 102 IPPAS missions have been conducted, upon request, in 60 Member States. In September 2023, the milestone of 100 IPPAS missions was achieved with the completion of an IPPAS mission to Zambia. There is strong interest from Member States in utilizing the information of the Agency's IPPAS Good Practices Database, coordinated through the designated Point of Contacts in States. Member States recognize the database as an important tool for information sharing, collective learning, benchmarking and continuous improvement.

- Member State interest in the International Nuclear Security Advisory Service (INSServ) continues. During the reporting period, the Agency conducted three INSServ missions, the same number conducted in 2022, based on the revised INSServ guidelines published in 2019. A similar number of INSServ missions is anticipated to be conducted in 2024. Requests for INSServ missions are expected to increase, as several States have stated their intention to make requests in 2024. Since 2002, a total of 86 missions have been conducted, upon request, in 70 Member States.
- Since the Agency's initiation of the Advisory Mission on Regulatory Infrastructure for Radiation Safety and Nuclear Security (RISS) in March 2022, interest in the missions has remained strong and is anticipated to continue. Six RISS missions were conducted in 2022 and five RISS missions were conducted in 2023.
- There is strong interest from Member States in requesting follow-up activities to implement mission recommendations and suggestions with potential assistance from the Agency and other international partners. The Agency has made dedicated efforts to ensure linkages between mission follow-up activities and the Integrated Nuclear Security Sustainability Plans (INSSPs) of host countries.

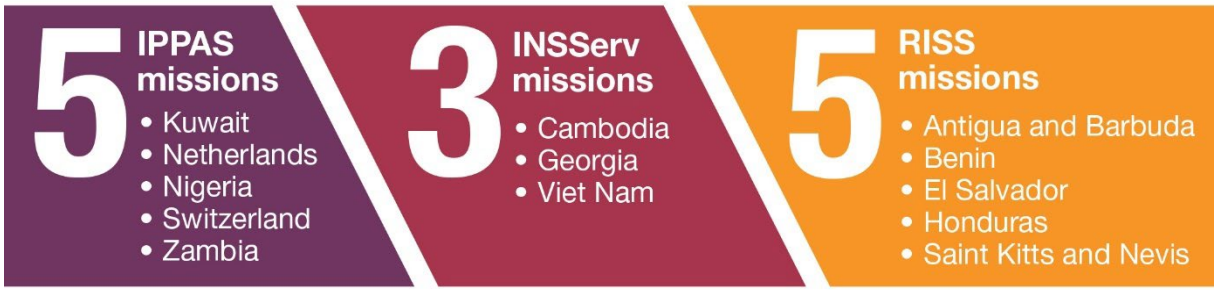


Figure 4: Security related missions in 2023.

Related Activities

8. ***The Agency will continue developing and further strengthening its nuclear security guidance to address a wide range of nuclear security topics. The Agency will assist with the application of its nuclear security guidance by, inter alia, strengthening its peer review and advisory services and related self-assessment tools. The Agency is planning to undertake the following related activities:***

- Continue to review the terminology used in the NSS to ensure an efficient and harmonized revision of the top tier of the NSS — the Nuclear Security Fundamentals and three Recommendations-level publications — taking into account feedback from Member States and recommendations of the NSGC;
- Continue to implement IPPAS, INSServ and RISS missions, upon request; and
- Continue to analyse data and feedback from Member States to increase the effectiveness of IPPAS, INSServ and RISS missions, including the maintenance and updating of good practices and lessons learned, and finalizing and publishing self-assessment guidelines for IPPAS.

A.3. Assessing Nuclear Security Needs and Priorities

Trends

9. The Agency continues to aim to maximize the impact of efforts to establish and maintain nuclear security regimes. To this end, in 2023, the Agency completed a significant update to the INSSP framework to better anchor the assessment of nuclear security needs to the essential elements contained

in the Nuclear Security Fundamentals (Nuclear Security Series No 20) and to the recommendations contained in the three Nuclear Security Recommendations documents (Nuclear Security Series No 13, 14 and 15), and to strengthen the results based management (RBM) approach in the implementation of the INSSP programme. This resulted in a name change, from Integrated Nuclear Security Support Plan to Integrated Nuclear Security Sustainability Plan, to reinforce the approach that the INSSP supports the continuous improvement of a State's nuclear security regime over time, adapting to the needs of the State as its regime strengthens. It emphasizes that the INSSP is first and foremost a plan for the State, owned by the State to build and maintain sustainable nuclear security capabilities.

10. The INSSP template was reorganized to revolve around six functional areas, namely national policy and strategy for nuclear security, legislative and regulatory framework for nuclear security, prevention, detection, response, and assurance and continuous improvement; and to work in full complementarity with a revised nuclear security self-assessment questionnaire, aimed to serve as the entry point to the INSSP mechanism. Both the INSSP template and the self-assessment questionnaire are now better aligned with the top tier of nuclear security guidance, and can be used as a reference for assisting States in systematically and comprehensively assessing their nuclear security needs and priorities. Performance indicators for the six functional areas were developed in line with the principles of RBM and will be embedded in the revised nuclear security self-assessment questionnaire to allow States to define priorities and measure progress in their nuclear security regimes over time.

11. The development and implementation of INSSPs continue to be a high priority. INSSPs assist States, upon request, in applying a systematic and comprehensive approach to enhancing their nuclear security regimes. Targeted assistance is provided to States, upon request, to address needs identified within the INSSP framework and in line with emerging and existing Member State priorities, as per the regular INSSP review cycle.

12. In 2023, the total number of States with approved INSSPs remained at 92 (no change from 2022). As of 31 December 2023, there were 19 INSSPs awaiting Member State acceptance (3 more than in 2022). In 2023, 17 States updated their INSSP (a similar number to 2022). This illustrates States' continued interest in strengthening their national nuclear security regimes.

13. In 2023, physical protection regimes (in particular, the security of radioactive material and transport security of both nuclear and other radioactive material) remained the highest priority area of needs identified by States within the framework of the INSSP.

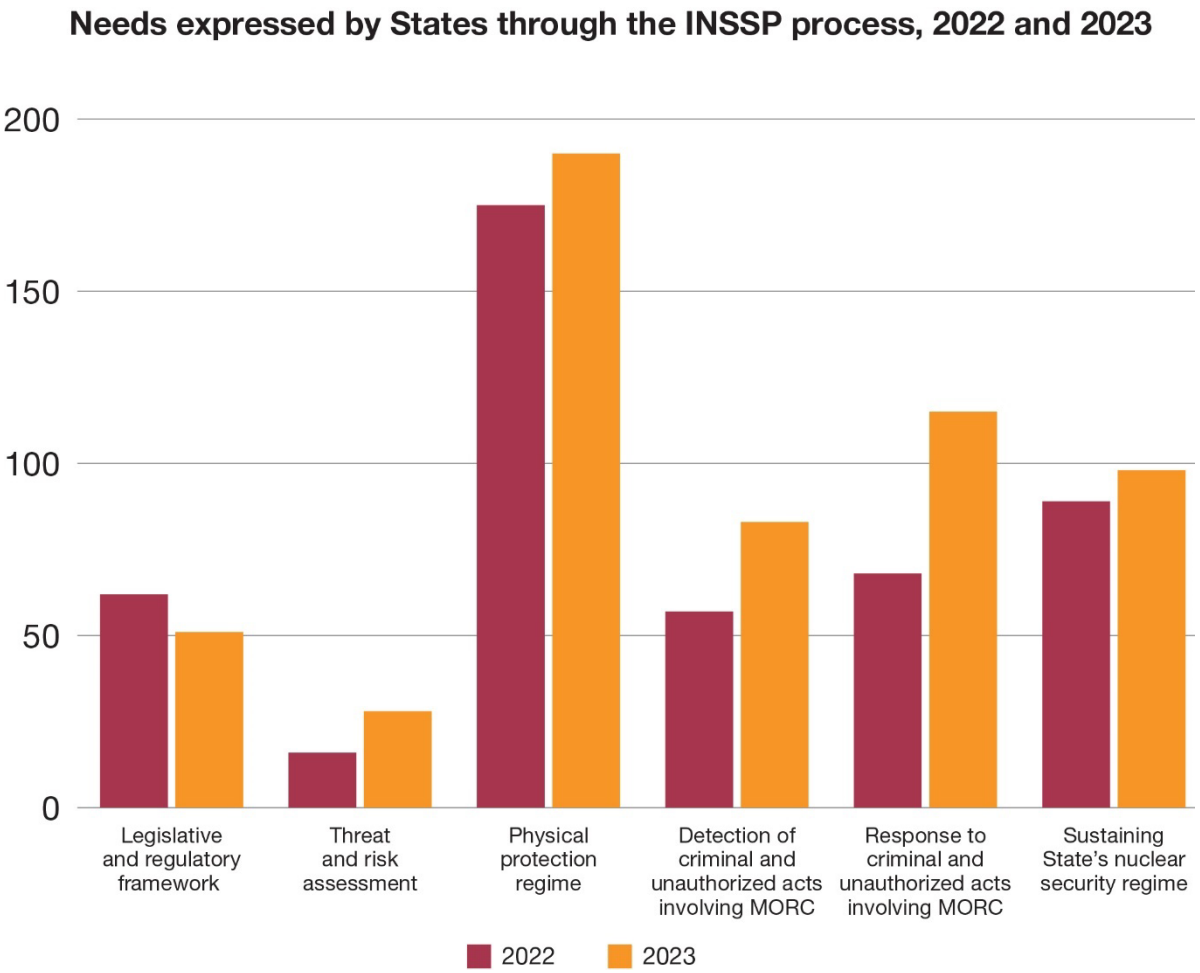


Figure 5: Number of needs expressed by States through the INSSP process per functional area in 2022 and 2023.

14. The number of requests in five of the six functional areas that currently constitute the INSSP increased as compared to 2022. Particularly noticeable was the steep increase in the number of requests within the area of threat and risk assessment (by 75% as compared to 2022) and those within the area of response to nuclear security events (by 69.12% as compared to 2022). Requests pertaining to the area of legislative and regulatory nuclear security framework decreased by 17.74%, demonstrating the impact of the Agency's continuous efforts in this area.

15. In response to these trends, the Agency further enhanced the planning of nuclear security assistance delivery to States by streamlining its approach to consolidating, clustering and sequencing activities into projects; and ensuring efficient use of resources, as well as the application of RBM principles.

Related Activities

16. The Agency will continue assisting States in providing, through INSSPs, a comprehensive framework for systematically identifying and prioritizing States' nuclear security needs, including through performing nuclear security self-assessments on a voluntary basis. The Agency is planning to undertake the following related activities:

- Continue a progressive roll-out of the new INSSP approach, template and self-assessment questionnaires to States, both through regular INSSP missions and a series of regional workshops;
- Finalize and deploy an information technology solution to support the revised self-assessment questionnaires with the goal of providing States with to access a user-friendly tool through the secure web-based Nuclear Security Information Management System (NUSIMS) platform;

- Further promote utilization of NUSIMS self-assessment questionnaires, and the development and implementation of INSSPs in States; and
- Continue clustering and sequencing responses to States' needs into a smaller number of larger projects along thematic and geographic lines, taking into account the graded approach and order of operations for training in establishing and sustaining national nuclear security regimes, and in accordance with RBM principles.

A.4. Capacity Building in Nuclear Security

Trends

17. The Agency's capacity building activities in the area of nuclear security continue to be implemented in close collaboration with States, including through the activities of the International Nuclear Security Education Network (INSEN), national Nuclear Security Support Centres (NSSCs), the International Network for Nuclear Security Training and Support Centres (NSSC Network), and Collaborating Centres:

- Member States continue to request assistance in establishing and enhancing educational programmes on nuclear security based on international guidance and recommendations primarily through the INSEN. INSEN membership increased by 7 institutions from 6 States and 1 observer institution in 2023, bringing the total to 220 institutions from 72 States. Based on a summary survey conducted in 2023, there was an increase in the number of INSEN members offering new degree programmes in nuclear security — from 7.69% in 2022 to 7.94% in 2023. There was also an increase in the number of INSEN members teaching courses on nuclear security in existing programmes, from 47.69% in 2022 to 53.97% in 2023.
- Member States continue to share information and resources to promote coordination and collaboration among States with an NSSC, or those with an interest in developing such a Centre, through the NSSC Network. The NSSC Network has grown since its inception in 2012, beginning with 29 Member States and now having representatives from 71 Member States (an increase of 4 in 2023) and 10 observer organizations.
- Agency Collaborating Centres, through research and development and training, continue to assist the Agency in building capacity regionally and internationally. In 2023, there were 24 Agency training-related events in nuclear security hosted by Collaborating Centres, the same quantity as the 24 completed in 2022.

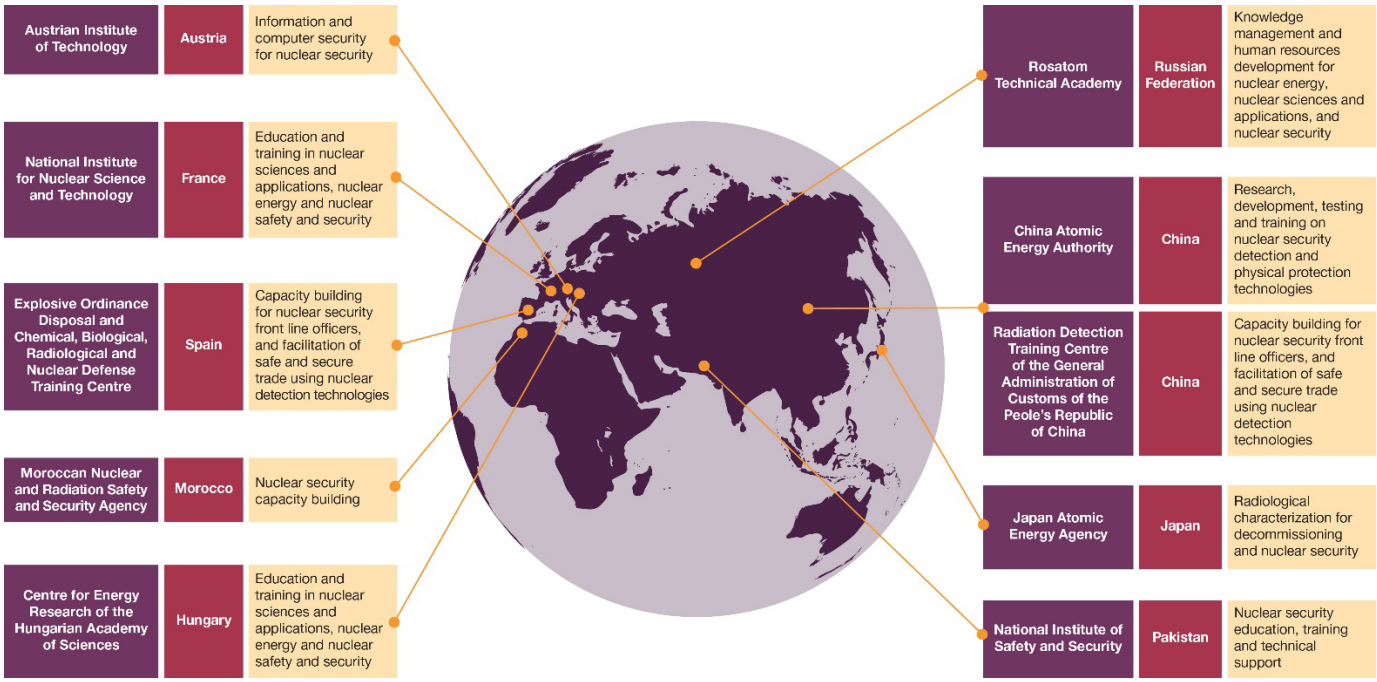


Figure 6: The Agency's Collaborating Centres for Nuclear Security in 2023.

18. Based on its analysis of the needs of Member States and the capabilities of NSSCs in different regions, the Agency established the Nuclear Security Training and Demonstration Centre (NSTDC) at the Agency's laboratories in Seibersdorf. Equipped with state-of-the-art technical infrastructure and equipment, the NSTDC began operation in October 2023. The NSTDC complements and fills gaps in the existing national and international capabilities in nuclear security. By focusing on offerings that do not commonly exist among institutions in States and on new capabilities for the IAEA, the NSTDC further enhances capacity building in nuclear security by providing hands-on training and using advanced technology and expertise. Currently, the NSTDC training programme incorporates 23 training courses and workshops. These courses and workshops address Member States' training needs in the area of physical protection of nuclear and other radioactive material and associated facilities; and in the area of detection and response to criminal or intentional unauthorized acts involving or directed at nuclear or other radioactive material, associated facilities or associated activities.

Figure 7: The Agency's NSTDC will increase capacity building capabilities.

19. Schools on Nuclear Security continue to be well attended and represent prominent Agency capacity building activities. These Schools provide early career professionals from Member States with fundamental knowledge of nuclear security necessary to understand international requirements in this area, as well as the measures to be taken in order to meet any obligations under the international nuclear security legal framework. In 2023, the International School on Nuclear Security was conducted in Trieste, Italy and was attended by 36 participants from 34 countries. In addition, since 2021, the Agency has organized an annual School on Nuclear Security for fellows of the Marie Skłodowska-Curie Fellowship Programme. In 2023, 56 fellows from 46 countries attended the School either in person or virtually.

20. The Leadership Academy for Nuclear Security was piloted in 2022 and continued with two events in 2023, one of them for French speaking countries. The events were widely attended by middle and senior managers from organizations with functions in nuclear security. Presentations and engaging, interactive case studies encourage participants to develop and apply leadership characteristics and behaviours derived from Agency publications, including *Nuclear Security Culture* (IAEA Nuclear Security Series No. 7). Due to a substantial revision of the training material, the evaluation rating of the Leadership Academy increased from 4.2 on a scale of 1 (‘poor’) to 5 (‘excellent’) in 2022 to 4.8 in 2023, with participants noting their appreciation for the knowledge and experience received.

21. Agency efforts to reduce disparities in workforce diversity, including gender equality and geographic diversity, have been well received. Women, as well as individuals from a broad range of countries, regularly participate in the Agency’s nuclear security conferences, consultancy meetings and training courses. The Agency observed a steady share of female participants in overall training activities, with 24.85% female participation in 2023 compared to 26.06% in 2022 and 24.04% in 2021.

22. The Agency continued to support the IAEA Marie Skłodowska-Curie Fellowship Programme (MSCFP), including through the organization of an International School on Nuclear Security exclusively for MSCFP participants in Vienna in July-August 2023. Panel discussions on gender aspects were included in this event. Since its inception, the School has had a profound impact on the participants, who overwhelmingly view nuclear security as a promising career path. Of these participants, 19% are considering pursuing PhD programs, 39% – engaging in further capacity-building activities, 16% – undertaking internships, 12% – joining professional networks, 9% – being involved in research projects, and 6% are exploring other related opportunities, according to the survey.

23. The Agency continued to organize nuclear security training activities, implementing 125 training courses, workshops and schools in 2023, the same level as in 2022. Webinar activities continued to be held for awareness-raising on nuclear security, although at a reduced scale (from 16 in 2022 to 3 in 2023) owing to a greater focus on in-person training events.

24. The number of countries nominating participants for IAEA training activities in nuclear security increased from 137 (1700 participants) in 2021 to 158 (3200 participants) in 2022, and 164 (2900 participants) in 2023. In total, 7 800 participants from 178 countries took part in 373 training activities during the period of 2021-2023. Participants represented different regions of the world, with 41% coming from Africa, 26% from Asia and the Pacific region, 20% from Europe, 11% from Latin America, and 2% from North America. The regional distribution of participants was consistent through the period of 2021-2023. Among the training event types, regional and national training courses addressing the needs of particular States were the most sought.

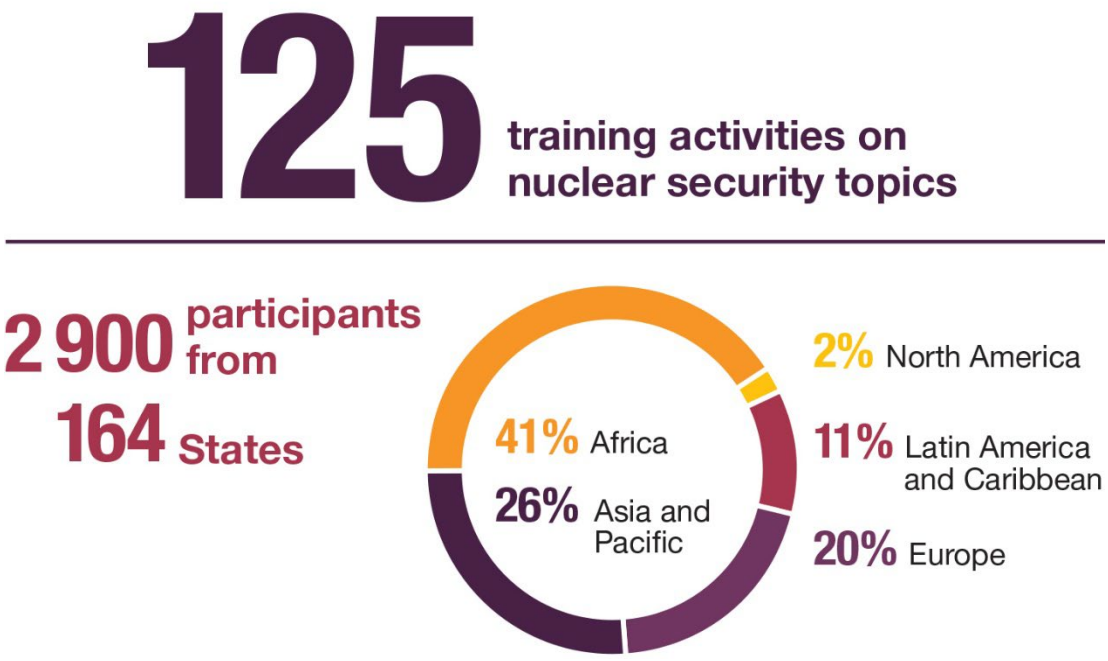


Figure 8: Security training in 2023.

25. Needs identified and prioritized by Member States through INSSP missions continue to reveal a high demand for national human resource development programmes in the area of nuclear security. The number of participants from Africa and Asia and the Pacific regions reflects the needs of States for capacity building expressed through the States' respective INSSPs.

26. The Agency instituted a standardized sequence for training to ensure that the substance and sequence of the capacity building programme provided to States is complete and consistent with NSS guidance and provides for increased sustainability. Training on nuclear security topics is gradually shifting from the development of generalized competencies to job-specific training. New topical areas introduced through offerings at the NSTDC include hands-on training on physical protection and central alarm station operation, training on radiation detection equipment use and maintenance, and training on the use of nuclear security systems and measures for major public events (MPEs). Furthermore, the Agency continues to focus on training the trainers in different aspects of nuclear security, with more than 80 experts being trained in 2023.

27. All e-learning courses on nuclear security are available in Arabic, Chinese, French, English, Russian and Spanish, and the number of users completing courses in languages other than English is

growing. Overall, 30% of the nuclear security e-learning completions are in the five languages other than English. The accumulated number of translated module completions doubled from 2200 at the end of 2021 to 4500 at the end of 2023.

28. The Agency reported a continuously high rate of e-learning usage. In 2023, over 1 500 users from 134 States completed more than 4 000 e-learning modules, a steady volume of usage compared to 5 300 completions by 1 600 users in 2022 and 3 100 completions by 1 200 users in 2021. The most demanded topics for e-learning in 2023 were: introduction to nuclear security culture (505 completions), radiation basics and consequences of exposure to radiation (419 completions), categorization of radioactive sources (242 completions), physical protection (239 completions) and overview of nuclear security threats and risks (229 completions). Traditionally, the highest rate of e-learning completions is in the month of December (21% of all completions in 2023) due to the deadline for the international nuclear security school requesting completion of e-learning as a prerequisite for the school's application. Participants indicated two main purposes for taking e-learning: pre-requisite course (41% of responses) and personal career development (50%).

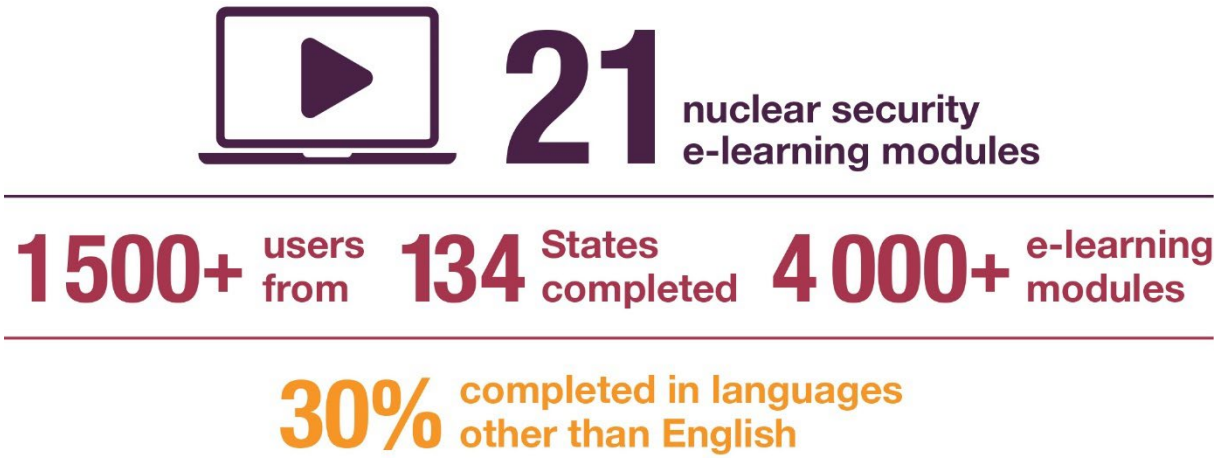


Figure 9: Nuclear security e-learning in 2023.

29. Feedback summaries received on the Agency's training courses, workshops and schools show that participants highly appreciate the content and quality of the training materials; the experience and teaching skills of instructors, lecturers and facilitators; and the overall implementation of training events. Evaluations typically rate the quality of the Agency's nuclear security training events as between 'good' and 'excellent'. The average rating of the Agency's training courses on nuclear security topics, based on 101 training events conducted in 2023, was 4.76 on a scale of 1 ('poor') to 5 ('excellent'). This rating demonstrates a continuously high level of training quality recognised by participants in the past few years – 4.75 in 2022 and 4.70 in 2021.

Related Activities

30. The Agency will continue assisting Member States in strengthening capacity through the implementation of nuclear security education and training programmes, available to all States. The Agency is planning to undertake the following related activities:

- Continue to develop a suite of training courses, based on NSS guidance, the results of gap analyses, and the needs of and requests from Member States, including through INSSPs, to identify areas where new and revised training courses are needed, and make these training courses available for delivery, including through the NSTDC and NSSCs;

- Implement train-the-trainer programmes to increase sustainability of capacity building efforts in nuclear security on the national and regional levels;

- Continue the operation of the NSTDC, ensuring engagement with Members States and with due consideration to the planning of resources for its long-term sustainability;

- Continue to assist States in establishing and implementing nuclear security education programmes through INSEN, as well as through the development of NSSCs, to facilitate regional and international cooperation in human resource development, technical support and scientific support for nuclear security; and

- Introduce appropriate assessment measures and engage in follow up with States in line with RBM principles to measure knowledge improvement resulting from instruction and knowledge application, as well as to measure increases in States' capacities, competencies or capabilities after the delivery of capacity building events.

A.5. Information and Computer Security

Trends

31. Member States continue to recognize the threat of cyber-attacks and their potential impact on nuclear security, as well as the need to take effective security measures against such attacks. Member State demand for assistance in the area of information and computer security, including requests for support for developing computer security regulations and computer security exercises, has increased by 30% since 2022 and is expected to continue rising, with planned schools on drafting computer security regulations, inspector training, and training in and execution of computer security exercises.

32. In 2023, the Agency conducted 43 computer security-related events, including events focused on computer security regulations, exercises, virtual training environments and the integration of computer security training modules across courses at the NSTDC to support capacity building for Member States.

33. The Agency's International Conference on Computer Security in the Nuclear World: Security for Safety (CyberCon23), held in Vienna in June 2023, affirmed the Agency's unique and continuing role in fostering cooperation between countries and enabling the sharing of technical information and best practices in the adoption of rapidly developing technologies. Attendance at the conference from a diverse participant group reflected the high priority that the international nuclear security community places on the topic of computer security.

34. As identified at CyberCon23, there is growing interest from Member States in Agency support to promote computer security culture in all aspects of the industry, with an emphasis on bridging gaps between information technology and operational technology professionals and nuclear engineers in the realm of nuclear cyber security.

35. Artificial intelligence (AI) based approaches to nuclear technologies are emerging in applications, methodologies, and software-based tools to improve reactor design and operation. AI applications are being used to enhance efficient operations and to detect anomalies and track complex problems for safety and security solutions. Expanded use of AI will increase vectors for potential computer and information security vulnerabilities and threats. The Agency continues to engage internally and with external collaborators to provide advice on the appropriate consideration of information and computer security aspects aligned with the NSS in near-term deployments of AI within nuclear facilities.

36. The Agency continued its initiative to explore computer security aspects of small and medium sized or modular reactors (SMRs) and microreactors (MRs). Increased digital automation, unique environmental conditions, remote supervisory control and remote maintenance, and reduced on-site staffing reinforce the need for instrumentation and control (I&C) solutions that incorporate computer

security measures. These measures need to be considered and maintained during the SMR and MR life cycles, from design to operation and decommissioning. SMR and MR innovations come at a time of significant advances in digital technologies that will be critical to the efficient operations of such reactors. However, recognizing the threat of cyber-attacks and the increasing difficulty for qualification of safety I&C systems, it is important that the Agency continue to support SMR and MR computer security activities to address these challenges.

Related Activities

37. The Agency will continue assisting Member States in raising awareness of the threat of cyber-attacks, and their potential impact on nuclear security, by promoting a nuclear security culture and supporting States in taking effective security measures against such attacks and improving their relevant nuclear security capabilities. The Agency is planning to undertake the following related activities:

- Assist States, upon request, in the area of computer security by providing training courses, webinars and exercises, as well as developing new or updating existing related guidance, including schools on drafting computer security regulations and inspector training activities;
- Promote the exchange and sharing of information and experiences in computer security for nuclear security;
- Further develop training tools, including hands-on exercises and demonstrations, to support Agency training and exercises on computer security for nuclear security, and to raise awareness of the threat of cyber-attacks, and their potential impact on nuclear security; and
- Continue research to address computer security for nuclear security topics through coordinated research projects (CRPs), including exploring new technologies such as SMR and MR computer security designs and potential benefits or risks related to the use of AI and machine learning.

A.6. Information Exchange and Sharing

Trends

38. Secure web-based systems provide valuable information exchange services to States. A growing number of registered users are using the Nuclear Security Information Portal (NUSEC), which is a web-based information tool for Member States that supports the exchange of information across the nuclear security community. In 2023, 595 new users were approved for access to NUSEC. In total, NUSEC has more than 7700 registered users from 181 States and 25 international organizations and non-governmental organizations.

39. Through the Incident and Trafficking Database (ITDB), States voluntarily report incidents of nuclear and other radioactive material out of regulatory control. The ITDB continues to represent a valuable key component of information exchange. In the period between the inception of the ITDB in 1993 and 31 December 2023, States had reported — or otherwise confirmed to the ITDB — a total of 4243 incidents. In 2023, 168 incidents were reported to the ITDB, an increase of 22 incidents compared to 2022.

40. The number of incidents reported by participating States to the ITDB in 2023 on illicit trafficking, thefts, losses and other unauthorized activities and events involving nuclear and other radioactive material continues to follow historical averages.

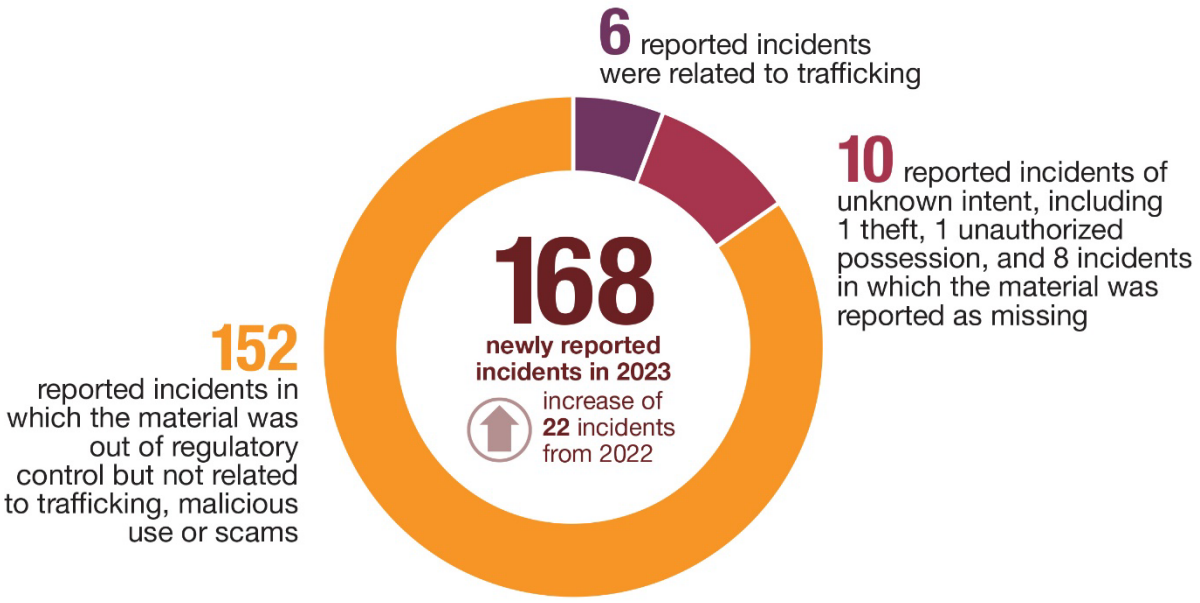


Figure 10: Incidents reported to the ITDB in 2023.

41. Six of the newly reported incidents were related to trafficking. The material involved in five of these trafficking-related incidents was seized by the relevant competent authorities within the reporting State. In the remaining one incident, the factual existence of the material was not established by the reporting State. Hence, it remained unclear whether the incident was an actual attempt at nuclear material trafficking, in which case the unrecovered materials remain unaccounted for, or whether it was a scam. No incidents involved plutonium, highly enriched uranium or Category 1 radioactive sources. No incidents involved attempts to traffic materials across international borders. In recent years, incidents related to trafficking or malicious use have been reported at steady levels, although the frequency has remained low. Financial gain appears to be the principal incentive behind most confirmed trafficking incidents.

42. In 2023, there were ten reported incidents in which the intent to conduct trafficking or malicious use could not be determined. These included one theft, one unauthorized possession and eight incidents in which the material was reported as missing. In seven of the incidents in which the material was reported as missing, the material had not been recovered at the time of reporting. In two of these ten incidents, the materials involved a Category 3 source. Only in one of these two incidents was the material recovered by the reporting State. The other eight incidents involved sources that were lower risk than Category 3.

43. In 2023, there were also 152 reported incidents in which the material was out of regulatory control but not related to trafficking, malicious use or scams. Most of these incidents involved unauthorized disposals, unauthorized shipments, unauthorized or undeclared storage, discovery, loss and unauthorized possession of material. There were also three thefts not related to trafficking, malicious use or scams. A number of incidents involved the detection of manufactured goods contaminated with radioactive material. Although these 152 incidents were not related to trafficking, malicious use or scams, they do indicate potential deficiencies in the systems used to control, secure and properly dispose of radioactive material.

44. Overall, during the reporting period, there were seven thefts, four of which involved Category 4–5 sources used in industrial applications. Two thefts involved Category 2–3 sources. In one theft, the reporting State was unable to confirm the Category of the source at the time of reporting. Historically, the recovery rate for Category 1–3 sources is high, but the rate has been much lower for Category 4–5 sources. In 2023, the material in all seven thefts was recovered by the reporting States.

45. ITDB regional workshops on information sharing and co-operation in the field of nuclear security have yielded encouraging results and strengthened efforts to prevent and combat illicit trafficking in nuclear and other radioactive materials and to improve overall nuclear security. Following outreach initiatives in South-East Africa, for example, reporting has improved significantly this year compared to the previous year, with four incidents reported in 2023 compared to one incident in 2022. As such, the regional figures for 2023 have also moved closer to the 10-year average of around five reported incidents per year, suggesting that the trend is recovering to a historical average. The Agency assesses this positive trend as a sign of the continued commitment of participating States to actively engage in information sharing and co-operation. In addition, the workshops facilitated the designation of six new ITDB points of contact, including two from one new state – Somalia – which has joined the ITDB programme. These positive developments strengthen the reach and effectiveness of the programme and underscore the overall success of the ITDB regional workshops in strengthening national, regional and international coordination to address nuclear security challenges through joint efforts and increased awareness.

Related Activities

46. The Agency will continue supporting international cooperation in nuclear security through assisting Member States in exchanging and sharing nuclear security information on a voluntary basis. The Agency is planning to undertake the following related activities:

- Continue the management and support of activities relevant to nuclear security information exchange and sharing while ensuring confidentiality, including through convening conferences, working group meetings and other exchanges on nuclear security matters;
- Maintain a central coordinating role in nuclear security activities among international and regional organizations and institutions, including through regular Information Exchange Meetings and the coordination of complementary activities between NSSCs;
- Continue the maintenance and further enhancement of a comprehensive and secure information management system to provide stakeholders with accurate relevant information; and continue the facilitation, including through designated points of contact, of the exchange of information through secure electronic access to information contained in the ITDB; and
- Continue outreach to Member States that do not participate in the ITDB to encourage their participation.

A.7. Nuclear Security Research and Emerging Technologies

Trends

47. Member States continue to express increasing concerns in relation to existing and emerging nuclear security threats. The Agency continues to undertake efforts to assist States, and anticipate needs, to address current and evolving challenges to nuclear security, through the conduct of Technical Meetings, CRPs, and other technical projects and webinars. The input from States received in Technical Meetings and CRP proposals continues to provide insight into nuclear security needs. The Agency's activities and support for the development of tools and processes enable nuclear security activities to be effectively implemented and sustained, often using solutions developed in conjunction with Member States.

Figure 11: Security related CRPs in 2023.

48. Based on input and interest from Member States, the Agency continues research into emerging technologies such as uncrewed aerial, ground and maritime systems; counterfeit, fraudulent and suspect items; active interrogation technologies; AI in areas such as assessment of complex gamma spectra, X-ray image analysis, and detection of anomalies in radiation portal monitor response; and enhancement of command, control and decision making capability in conducting nuclear security detection operation.

49. Member States also continue to request additional tools and guidance in the areas of maintenance, repair and calibration, and modernization of radiation detection equipment, as well as in the areas of enhancing the use and sustainability of nuclear security detection systems and measures used to detect nuclear and other radioactive material out of regulatory control at points of entry and exit and other trade locations.

50. Development of the Mobile-Integrated Nuclear Security Network (M-INSN) continued in response to Member State demand for support for command and control over radiation detection equipment during operations. This vendor neutral system, under development by the Agency and to be provided free of charge to Member States, will allow for the networking of individual detectors to command locations in States, enabling the coordination, management and oversight of radiation detectors deployed for security as well as safety purposes. In 2023, M-INSN underwent testing and evaluation in four Member States.

51. Member States continue to enhance their technical capabilities using the Tool for Radiation Alarm and Commodity Evaluation (TRACE) smartphone application. TRACE plays a crucial role in assisting Member States by reducing the time required for training new operators and streamlining the radiation alarm assessment process. Application of TRACE has a measurable impact on alarm assessment operations, improving trade facilitation while fostering nuclear security. For example, from the user survey data of one of the user States, usage of TRACE leads to an approximate 33% improvement in alarm processing efficiency, which over a year translates into a savings of more than 6000 person hours. By December 2023, the TRACE mobile application had a total user base of more than 17 000 users in 175 countries. There was also increased demand for the desktop version of TRACE for radiation alarm assessment in containerized cargo and automation integration processes. In 2023, the desktop version was deployed in ten Member States, an increase of seven since 2022.

52. Member States continue to express a need for tools to conduct assessments of persons who cause radiation alarms. Anticipating the need for an easily deployable tool that quantitatively evaluates the level of radiation emitted by a person reporting a nuclear medicine procedure, the Agency developed the Personnel Alarm Assessment Tool, a smartphone application that easily guides front line officers through an assessment process that provides a consistent and defensible science-based evaluation.

Related Activities

53. The Agency will continue to keep abreast of scientific, technological and engineering innovations, with a view to confronting current and evolving challenges and threats and also considering opportunities to enhance nuclear security from these innovations. The Agency is planning to undertake the following related activities:

- Engage in dialogue with Member States and, as appropriate, the nuclear industry to identify key current and evolving challenges and threats to nuclear security; and
- Continue implementing CRPs, technical projects and Technical Meetings to promote research and development in the area of nuclear security; and assist Member States in utilizing the outcomes of the CRPs, technical projects and Technical Meetings to enhance States' technical capabilities.

B. Nuclear Security of Materials and Associated Facilities

B.1. Nuclear Security Approaches for the Whole Fuel Cycle

B.1.1. Physical Protection of Nuclear and Other Radioactive Material and Associated Facilities and Activities

Trends

54. Member States continue to request the development of practical technical guidance and training on the security of nuclear and other radioactive material and associated facilities, including during transport. In 2023, the Agency supported capacity building in these areas through 46 events, an increase from 27 in 2022.

55. Important nuclear security elements include the development or enhancement of regulatory infrastructures for nuclear security; nuclear material accounting and control systems at nuclear facilities for security purposes; and specific guidance on insider threats, nuclear security culture, threat-based and risk informed approaches, the safety–security interface and contingency planning.

56. The high number of State requests for technical assistance for risk-reduction activities, advisory services and assessment missions on the physical protection of nuclear and other radioactive materials, facilities and activities is anticipated to continue.

57. Member States continue to request assistance in establishing or further enhancing their regulatory frameworks for physical protection of nuclear material and nuclear facilities and capacity building of regulatory staff to perform regulatory functions. These requests were widely addressed through five international and national training events, in comparison to three training events in 2022.

58. Agency assistance is used by Member States to characterize and assess threats; develop, use and maintain design basis threats or representative threat statements; conduct vulnerability analyses; and develop methodologies for performance assessment of physical protection systems. In 2023, the Agency

saw a 75% increase from 2022 in requests through the INSSP within the area of threat and risk assessment. Those requests were addressed by six training events, compared to three in 2022. In addition to national training events, which address country-specific needs in threat assessment, two regional events were conducted.

59. Member States continue to request the Agency's assistance in enhancing understanding of nuclear security culture and its application in practice. In 2023, the Agency conducted five training events on this topic at the national, regional and international levels.

60. Member States continue to request assistance in enhancing their capacities for developing and testing contingency plans for response to malicious acts, such as unauthorized removal of nuclear and other radioactive material or sabotage of such material and associated facilities. All activities implemented in 2023 utilized exercises to focus on practical aspects of contingency response.

Related Activities

61. The Agency will continue assisting Member States, upon request, in enhancing nuclear security of facilities and activities involving nuclear and other radioactive material under regulatory control, including during transport, decommissioning and lifetime extension of facilities. The Agency is planning to undertake the following related activities:

- Continue the development of publications addressing nuclear security for the whole nuclear fuel cycle;
- Provide support to Member States, upon request, in the implementation of nuclear security activities for the whole nuclear fuel cycle, including support for capacity building activities; and
- Assist Member States, upon request, in the development and strengthening of nuclear security culture, including through publishing guidance, providing training and related self-assessment, and developing training materials and tools.

B.1.2. Nuclear Security of Advanced Reactors, Including SMRs

Trends

62. The growing participation of Member States in Agency activities related to SMRs reflects Member States' strong interest in various designs of SMRs and a corresponding increase in requests from countries embarking on such technology for the development of guidance, tools and human resources to handle the challenges related to the secure deployment of SMRs.

63. Development of SMR technology and the unique characteristics of SMRs are leading to increased interest in, and the need for guidance related to, protecting facilities and materials in new ways. Some areas of increased focus include using the latest possible technologies and strategies in developing and deploying physical protection systems to ensure detection, delay and response. Advanced technologies for physical protection systems will likely incorporate new and emerging technologies, such as AI, computer modelling and simulations, infrared cameras and uncrewed aerial vehicles.

64. Members of the Small Modular Reactor Regulators' Forum have acknowledged the need to enhance their international cooperation in dealing effectively with regulatory challenges associated with the formulation of a balanced and risk informed approach to the implementation of nuclear security measures in decision making, planning and design activities over the life cycle of SMRs in order to achieve the secure deployment of SMRs at the global level.

65. Security issues are an important consideration for SMR development and for the Agency's Nuclear Harmonization and Standardization Initiative (NHSI). Security considerations are being included in the

work of both the regulatory and industry tracks on topics including but not limited to sharing of information and physical protection of nuclear infrastructure.

66. The development of new types of nuclear fuels for different types of reactors, including SMRs, high temperature gas cooled reactors and molten salt reactors, will call for considerations with regard to potential new security challenges for facilities, transport and waste storage.

Related Activities

67. The Agency will continue assisting Member States, upon request, to address matters related to nuclear security of advanced reactors, including SMRs. The Agency is planning to undertake the following related activities:

- Continue to highlight nuclear security challenges and considerations in Agency efforts on SMRs, including the NHSI;
- Continue the development of publications addressing nuclear security of SMRs through analysing and synthesizing the existing NSS publications considering how the specific features of SMRs may affect the application of nuclear security recommendations for such reactors; and
- Support Member States, upon request, in developing and reviewing applicable research and guidance for addressing nuclear security of SMRs, including through international conferences and training events.

B.1.3. Enhancing Nuclear Security Using Nuclear Material Accounting and Control

Trends

68. There is increased demand from Member States for the development of practical technical guidance and training on nuclear material security using accounting and control for nuclear security purposes, including the threat posed by insiders. Nuclear material accounting and control and measures to address insider threats share the common goal of preventing or mitigating the unauthorized removal of nuclear material or sabotage. The topic of insider threat was specifically addressed through six dedicated training events in 2023, an increase from the one event held on the topic in 2022.

69. Training courses and consultancy meetings on the topic of nuclear material accounting and control are well attended and enhance Member State understanding and collaboration. Interactive training, including gamification, virtual reality and video-based training tools that utilize the simulated Shapash Nuclear Research Institute, is in high demand.

Related Activities

70. The Agency will continue assisting Member States in enhancing nuclear security of materials using accounting and control, including by addressing the need to counter insider threats. The Agency is planning to undertake the following related activities:

- Continue to assist States in establishing effective and sustainable national nuclear security regimes that enhance accounting and control for nuclear security purposes at facilities to mitigate insider threats; and
- Further develop training tools, including gamification, virtual reality and video-based training tools using the simulated Shapash Nuclear Research Institute.

B.1.4. Nuclear Security in the Transport of Nuclear and Other Radioactive Material

Trends

71. Each year, more than 20 million packages containing radioactive material are transported worldwide. There has been notable achievement in international adherence to the Agency's *Regulations*

for the Safe Transport of Radioactive Material (IAEA Safety Standards Series No. SSR-6 (Rev. 1)), which have helped to keep people and the environment safe from radiological hazards for six decades. However, there is a need to remain vigilant, as transport is a potentially vulnerable phase of domestic and international commerce.

72. In the period 1993–2023, Member States reported to the ITDB 656 thefts of material, 52% of which occurred during transport and, in 56% of these transport-related cases (192 incidents), the stolen radioactive material was reported as unrecovered at the time of reporting.

73. The Agency assists Member States, upon request, in efforts to strengthen transport security arrangements at the national level, including in the development and improvement of relevant national regulatory infrastructures. In 2023, six Member States were supported in finalizing the draft regulations on security of radioactive material in transport. This was an increase from four Member States being supported in this area in 2022.

74. Member States continue to request assistance in upgrading physical protection equipment for transport of nuclear and other radioactive material.

Figure 12: Agency support for transport security in 2023.

Related Activities

75. The Agency will continue assisting Member States in the security of nuclear and other radioactive material during transport. The Agency is planning to undertake the following related activities:

- Assist Member States, upon request, in drafting transport security regulations;
- Support capacity building for Member States, upon request, in the area of security for nuclear and other radioactive material in transport, including through training courses and tabletop exercises; and
- Continue the development of publications within the NSS in the area of the secure transport of nuclear and other radioactive material.

B.2. Security of Radioactive Material[1] and Associated Facilities

B.2.1. Assistance Provided to States to Enhance the Security of Radioactive Material in Use and Storage and of Associated Facilities

Trends

76. There is an increased demand by States for assistance in the area of radioactive material security, with an emphasis on regulatory infrastructure development and risk reduction activities, such as trainings, physical protection enhancements, including activities complementing the technical assistance provided under the Agency's technical cooperation programme, and the life cycle management of high

[1] For the purpose of this section, "radioactive material" refers to "other radioactive material", as defined in *Objective and Essential Elements of a State's Nuclear Security Regime* (IAEA Nuclear Security Series No. 20).

activity radioactive sources. In 2023, the Agency conducted 21 training events related to security of radioactive material to support capacity building for Member States.

77. The number of Member States benefiting from the Agency's assistance in enhancing radiation safety and nuclear security through the Regulatory Infrastructure Development Project (RIDP) continues to grow; 72 States from Africa, Latin America and the Caribbean participated in 2023, which is 4 more participating States than in 2022.

78. Ensuring safe and secure management options for disused sealed radioactive sources (DSRSs) remains an important priority for Member States, as an increasing number of radioactive sources are reaching the end of their useful life. In 2023, comprehensive assistance to States, under nuclear security projects, to ensure the safe and secure management of high activity DSRSs, including their repatriation and removal to authorized recipients, as well as their disposal, continued. In 2023, the Agency supported the removal of 18 high activity DSRSs from 2 States, continued work on the removal of 15 DSRSs from 6 States and the conditioning of 4 radioisotope thermoelectric generators and initiated the removal of over 30 DSRSs from 7 States. This contributes to an overall effort to reduce radiological risk globally by securing materials that could be potentially used for malicious purposes. Since 2019, 37 countries have benefited from these types of assistance.

79. Member States continue to express interest in sharing experiences related to the security of radioactive material, including on approaches to provide cradle-to-grave security. This topic of life cycle security is expected to increase in attention as global demand for radioactive sources, particularly for medical and industrial applications, grows.

Related Activities

80. The Agency will continue assisting States, upon request, in the security of radioactive material and associated facilities, including in the life cycle management of radioactive material, through the provision of comprehensive guidance and technical assistance. The Agency is planning to undertake the following related activities:

- Continue to support States in enhancing their national regulatory infrastructure for radiation safety and the security of radioactive material;
- Continue to support States in enhancing their secure and safe management of sealed radioactive sources; and
- Continue to support States in strengthening their physical protection measures at facilities with high activity radioactive sources in use or in storage.

B.2.2. Support for the Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources

Trends

81. Efforts to strengthen international norms supporting nuclear security continue through activities that support States in implementing the provisions of legally non-binding instruments such as the Code of Conduct on the Safety and Security of Radioactive Sources and its supplementary Guidance on the Import and Export of Radioactive Sources and Guidance on the Management of Disused Radioactive Sources.

82. Commitment to implement the Code of Conduct on the Safety and Security of Radioactive Sources is expanding. In 2023, 4 Member States made a political commitment to implement the Code, bringing the total number to 149. This is comparable to the level of political commitments made in 2022.

83. In 2023, 5 Member States notified the Director General of their intention to act in a harmonized manner with the supplementary Guidance on the Import and Export of Radioactive Sources, increasing the total number of Member States that have done so to 134. During the reporting period, 4 additional Member States nominated points of contact for facilitating the import and export of radioactive sources, increasing the total number of Member States that have done so to 153.

84. In 2023, 12 Member States made a political commitment to implementing the supplementary Guidance on the Management of Disused Radioactive Sources, bringing the total number of Member States that have done so to 64.

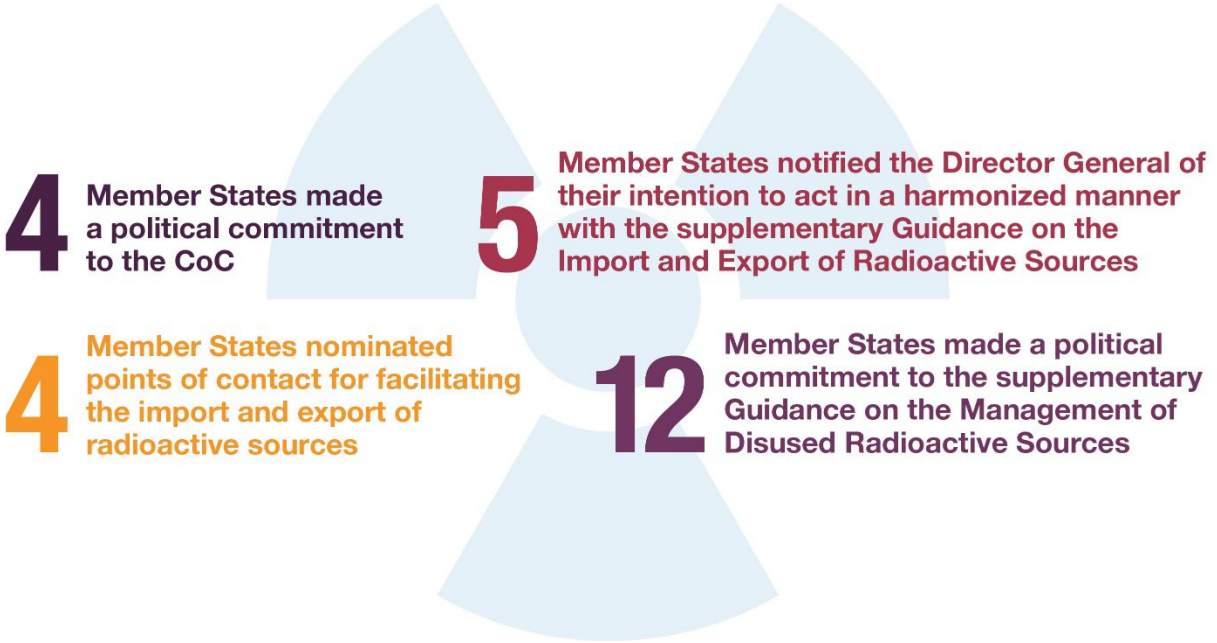


Figure 13: Member State support for implementing the CoC grew in 2023.

85. At the Open-Ended Meeting of Technical and Legal Experts for Sharing Information on States' Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources, held in Vienna in May–June 2023, Member States identified areas for future focus, based on current needs, in order to support continued progress towards implementing the Code and Guidance. These include a common interest in pursuing additional training and experience-sharing events, expanding Code guidance to include more information about the management of disused sources and addressing positive uses of and threats from new and emerging technology for the management of radioactive sources.

Related Activities

86. The Agency will continue assisting Member States in the implementation of the Code of Conduct on the Safety and Security of Radioactive Sources. The Agency is planning to undertake the following related activities:

- Continue to assist States in meeting the provisions of international instruments relevant to the security of radioactive material, such as the Code of Conduct on the Safety and Security of Radioactive Sources; and
- Continue outreach activities to communicate the benefits of implementing Code of Conduct and related Agency activities.

C. Nuclear Security of Materials Out of Regulatory Control

C.1. Nuclear Security Measures for Material Out of Regulatory Control

Trends

87. Member States continue to request guidance, training and assistance to establish and further enhance the infrastructure needed to implement nuclear security measures in response to criminal or intentional unauthorized acts involving nuclear and other radioactive material out of regulatory control (MORC). Using a phased approach, States, supported by the Agency, identify their specific needs related to developing plans and procedures for response to criminal or intentional unauthorized acts involving MORC, which are addressed through the provision of associated training, exercising of those plans and procedures, and the procurement of necessary equipment.

88. In 2023, four Member States benefited from the Agency's assistance in this area, which is comparable with the level of support provided in previous years. Procurement of radiation detection equipment was initiated for Cambodia and Indonesia under the Project on Nuclear Security Response Capability Development for South East Asia Region, as well as for Egypt under its Nuclear Security Response Capability Development Project. In addition, following Agency support to the 2022 FIFA U-20 Women's World Cup, in 2023 Costa Rica received a donation of hand-held radiation detection equipment.

Related Activities

89. The Agency will continue assisting Member States in establishing and sustaining effective infrastructure and arrangements to protect people, property, the environment and society in response to criminal or intentional unauthorized acts involving MORC. The Agency is planning to undertake the following related activities:

- Continue to develop publications within the NSS on nuclear security infrastructure, addressing nuclear security measures in response to criminal or intentional unauthorized acts involving MORC; and
- Continue to support Member States in establishing and sustaining effective nuclear security infrastructure.

C.2. Nuclear Security Detection Architecture

90. Member States continue to request guidance, training and assistance to establish and sustain their capabilities for detecting and responding to criminal or intentional unauthorized acts involving MORC.

91. In 2023, 5 States drafted their road maps for the design and implementation of their national nuclear security detection architectures, bringing the total number of Member States utilizing the road map approach for nuclear security detection architecture to 41.

92. The International Network of Front Line Officers and Organizations for Nuclear Security Detection remains a valuable source of information sharing. Regional meetings of the network are well attended, allowing for broad sharing of good practices, lessons learned in nuclear security detection and discussions of new and ongoing activities of members.

93. Member States continue to request loaned or donated hand-held radiation detection equipment in support of their detection systems, including nuclear security assistance for preparation and support for MPEs and training in radiation detection equipment operation, frontline maintenance and calibration. In 2023, 4 Member States received equipment through a loan process, while 2 others received donations

of equipment; 348 items of equipment in total were loaned from over 1590 items of nuclear security detection and monitoring equipment maintained by the Agency.

Related Activities

94. The Agency will continue assisting Member States in strengthening and maintaining effective national nuclear security detection architectures, and in enhancing and improving capabilities in detecting, locating and interdicting MORC. The Agency is planning to undertake the following related activities:

- Continue to support activities implemented to assist States in detecting nuclear and other radioactive material, including support for identifying a strategy based on risk and threat assessment and, subsequently, for the establishment of detection operations at strategic locations, including border crossings; and
- Promote the integration of nuclear security systems and measures in major urban areas.

C.3. Major Public Events

95. Requests to support States' MPEs continue to be received, with States increasingly recognizing the benefits of engaging the Agency to support their nuclear security activities for MPEs. Launched in 2004, the programme has supported a total of 73 MPEs in 45 Member States to date. In 2023, the Agency supported the planning or implementation of six MPEs. This level of support aligns with the five years prior to the COVID-19 pandemic (2015-2019 inclusive), in which the Agency supported an average of six MPEs per year. The types of MPEs supported in 2023 varied and included Uganda's Martyrs' Day, a large national religious event attended by around three million pilgrims; sporting events, including the 2023 Pan American Games in Chile, the 50th World Pétanque Championship in Benin, the 2023 Africa Cup of Nations in Côte d'Ivoire and the 2023 African Games in Ghana; and a major international conference — the 28th session of the Conference of the Parties to the United Nations Framework Convention on Climate Change (COP28) in the United Arab Emirates. This was the second consecutive year in which the Agency was asked to support this high-profile, global United Nations conference.

Figure 14: Agency support for MPEs in 2023.

96. There is continuing demand from Member States for support in strengthening the implementation of nuclear security measures before and during MPEs. In 2023, the Agency trained 168 personnel from a range of national nuclear security agencies and loaned 409 items of radiation detection equipment. Of this loaned equipment, 61 items were associated with M-INSN, which was deployed by Côte d'Ivoire for the 2023 Africa Cup of Nations.

97. Continued and growing demand for Agency support and Member State use of Agency guidance for implementing nuclear security measures during MPEs have led to a revision of the Implementing Guide *Nuclear Security Systems and Measures for Major Public Events* (IAEA Nuclear Security Series No. 18). The revision will incorporate many of the lessons and good practices identified by States implementing nuclear security measures at their MPEs, as well as consider developments in methodologies and technology since the guidance was originally published in 2012.

98. Member States have high levels of interest in sharing experiences and learning about how to integrate nuclear security into MPEs. In cooperation with the host Member States, the Agency is developing a number of MPE reports, detailing the support provided, the nuclear security measures implemented and the lessons learned during MPEs, through which information and the experiences of host Member States can be shared for the benefit of all States wishing to host MPEs in the future.

Related Activities

99. The Agency will continue assisting Member States in preparation and conduct of MPEs through utilizing nuclear security measures for MPEs. The Agency is planning to undertake the following related activities:

- Continue to support Member States, upon request, in the implementation of nuclear security systems and measures before and during MPEs through training, workshops, exercises, loans of equipment and expert support, among others;
- Continue the review and update of IAEA Nuclear Security Series No. 18 and the publication of Agency reports to share Member States' experiences of hosting of MPEs;

- Build capacity for MPE experts at the NSTDC through the delivery of train the trainers programmes on nuclear security measures and emergency response arrangements for major public events and on major public events for equipment specialists; and
- Hold a high-level Technical Meeting in celebration of 20 years of Agency support to Member States in the implementation of nuclear security systems and measures for MPEs.

C.4. Radiological Crime Scene Management and Nuclear Forensics Science

Trends

100. Building capacity in the fields of radiological crime scene management (RCSM) and nuclear forensics science remains important to Member States based on needs expressed to the Agency. In 2023, the Agency provided training through eight events for RCSM and nuclear forensics, a 14% increase from 2022. These training events included two train-the-trainer events with 53 participants who are now equipped with the knowledge to train relevant staff in their own countries, amplifying the Agency's capacity building efforts through increased impact.

101. Assistance requests for supporting the development and sustainability of national nuclear forensics capabilities as part of a nuclear security infrastructure are regularly received.

102. Links are being built between RCSM, nuclear forensics, conventional forensics and investigation through information exchange channels between judicial authorities and other investigative bodies. Similarly, a need exists to build stronger links between the scientific, law enforcement and prosecutorial communities at the national and regional levels.

103. Member State interest continues in scientific research and development of in-field analytical techniques that can be applied at radiological crime scenes as well as in nuclear forensic laboratories, new methods for origin assessment of nuclear or other radioactive material encountered out of regulatory control, determination of nuclear forensic signatures relevant for investigations of sealed radioactive sources encountered out of regulatory control, and national nuclear forensic libraries.

Related Activities

104. The Agency will continue assisting Member States in building capacities for managing radiological crime scenes, collecting evidence for use in subsequent legal proceedings, and undertaking nuclear forensics examinations to support investigations and help determine the origin and history of the material. The Agency is planning to undertake the following related activities:

- Provide national, regional and international training courses and workshops on basic and advanced levels in the fields of RCSM and nuclear forensics, including train the trainers courses and a workshop specially developed for delivery at the NSTDC; and
- Provide expert missions to Member States, upon request, and develop new technical documents to enhance the resources available to States for developing and sustaining nuclear forensics capabilities.

D. Nuclear Security Interfaces

Trends

105. Member States continue to encourage the Secretariat to facilitate a coordination process to address safety and security interfaces, while recognizing that the activities that address nuclear safety and nuclear security are different.

106. As is evident from the requests for consolidating or removing, and enhancing the physical protection of DSRSs that the Agency receives from Member States, an increasing number of radioactive sources are becoming disused and are no longer considered an asset. Ensuring continuous safe and secure management options for DSRSs remains an important priority for Member States.

107. Some Member States expressed an interest in addressing safety–security–safeguards, in particular for SMRs, at an early stage of the design process, without prejudice to Member States' legal commitments, the Agency's Statute and the relevant General Conference resolutions. Some Member States also expressed interest in sharing experiences in the development of technical publications and the organization of education and training activities.

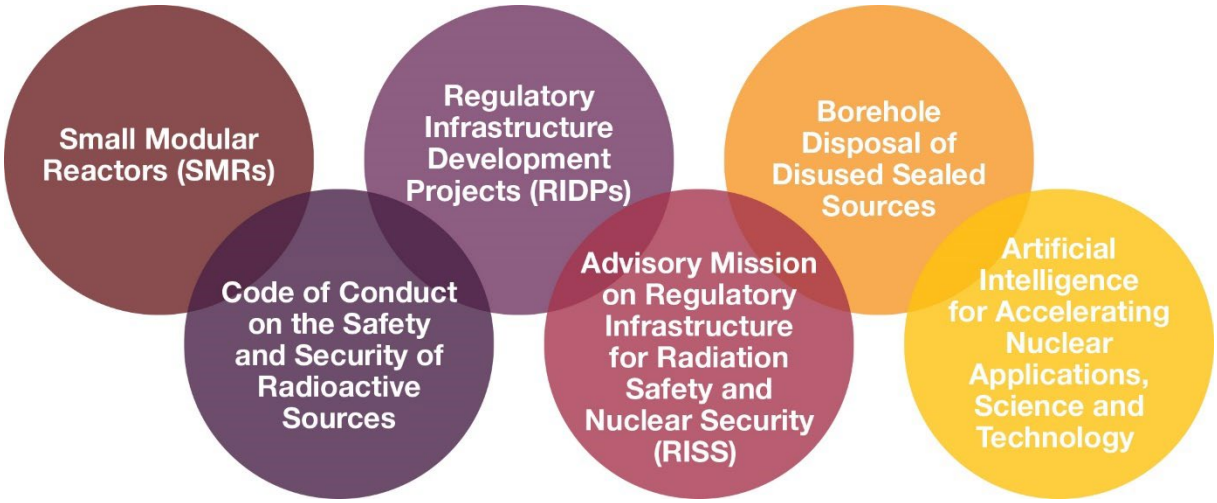


Figure 15: Areas of high effort in the security and safety interface.

Related Activities

108. The Agency will ensure that safety standards and nuclear security guidance take into account the implications for both nuclear safety and nuclear security whenever appropriate, recognizing that the activities that address nuclear safety and nuclear security are different. The Agency is planning to undertake the following related activities:

- Continue supporting Member States in establishing and strengthening their regulatory infrastructures under the RIDP; and
- Conduct an interregional workshop on safety–security–safeguards by design in SMRs.

E. Nuclear Security Fund

Trends

109. In 2023, the Agency received contributions and pledges to the Nuclear Security Fund (NSF) from the following donors: Belgium, China, Estonia, the European Union, Finland, France, Germany, Japan, New Zealand, Pakistan, the Republic of Korea, the Russian Federation, Spain, Switzerland, the United Kingdom, the United States of America, as well as non-governmental donors. The total revenue[2] in 2023

[2] See footnote 1.

was €23 million (or €29 million excluding reclassification of deferred revenue)[3]. In 2019, 2020, 2021 and 2022, the reported revenue was €38 million, €45 million, €34 million and €29 million respectively. At the end of 2023, the balance of reserve NSF funds was €68 million (in comparison with €60 million at the end of 2022). These funds are being used to implement the nuclear security programme in 2024.

110. In implementing activities in 2023, the Agency utilized funds from contributions received in 2023, as well as from previous contributions, including those received in 2022 from Canada, China, Estonia, Finland, France, Germany, Japan, the Netherlands, New Zealand, the Republic of Korea, the Russian Federation, Spain, Switzerland, the United Kingdom and the United States of America. The Agency also used funds received in earlier years, including those contributed by the European Union.

111. Overall, 48 Member States, the European Union, and governmental and non-governmental organizations have contributed to the NSF since its establishment. Specifically, 24 of those donors have contributed to the NSF in the past 5 years (2019–2023), with 6 donors contributing once, 14 donors contributing 2 to 4 times, and 5 donors contributing 5 or more times. Contributions from donors contributing 5 or more times accounted for 67% of the total amount received in the past 5 years. Moreover, contributions from the top four donors accounted for 84% of the total amount received in the past five years.

112. The Agency maintains efficiency in the technical and financial implementation (expenditure) of NSF revenue. In 2023, the Agency's rate of annual expenditure set against revenue of NSF funds was 139%, and against revenue excluding reclassification of deferred revenue was 110%. In comparison, the annual rate of NSF expenditure set against revenue was 121% in 2022, 63% in 2019 and 84% in 2018. During the COVID-19 pandemic when the Agency could only implement a reduced number of in-person events, the annual rate of NSF expenditure set against revenue was 43% in 2021 and 36% in 2020. In 2023, NSF expenditure (€32 million) was also higher than NSF revenue (€23 million). Rigorous planning and robust processes have allowed the Agency to achieve some of its highest rates of NSF expenditure in 2023 and 2022.

[3] The difference between the amount of revenue and deferred revenue in 2023 is the result of inclusion in the revenue of 2023 of a reclassification of €6 million which was recorded and reported already as part of deferred revenue in previous years.

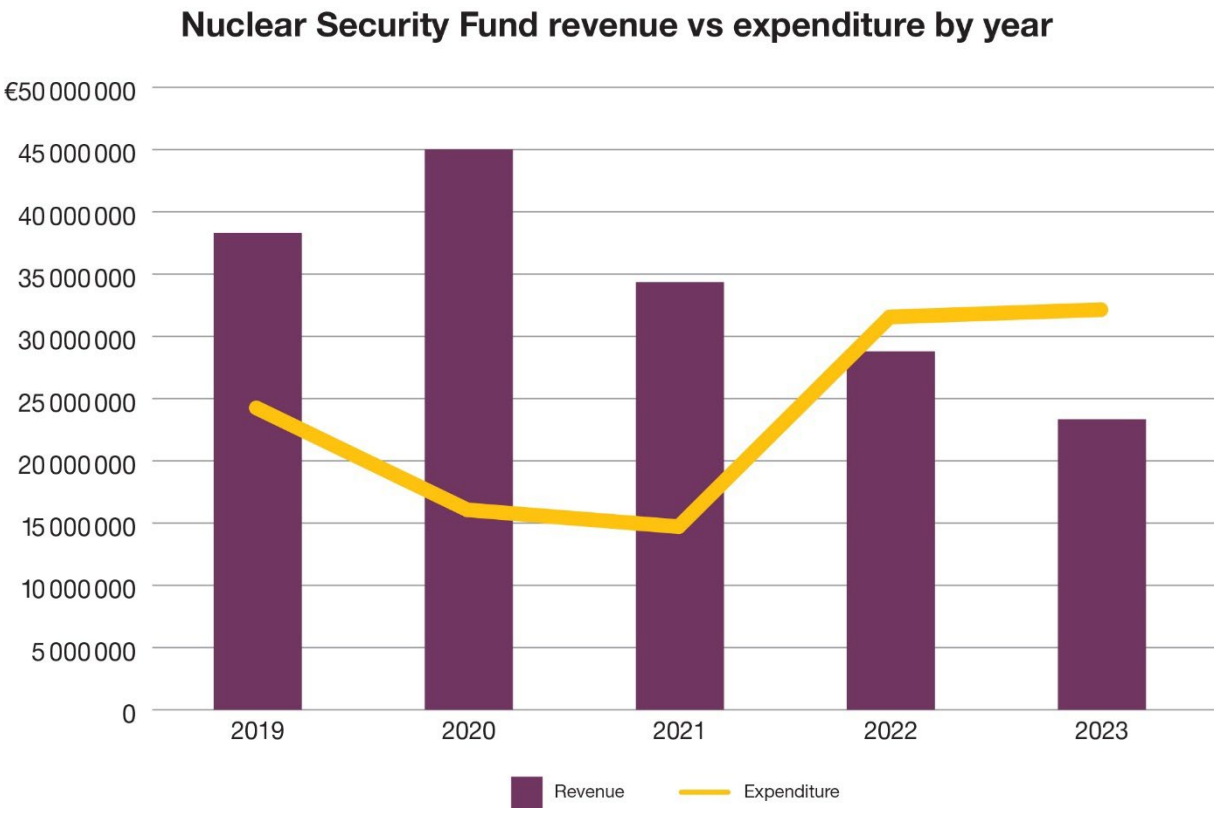


Figure 16: Revenue versus expenditure, 2019-2023.

113. In 2023, NSF expenditure increased by more than 60% compared to 2022 in the technical area of computer security, by 50% in physical protection and international cooperation, by more than 30% in response and education and training, and by more than 20% in nuclear material security. The increase in the number of activities (and corresponding expenditures) in those areas in 2023 reflects the Agency's greater attention to the areas identified as priorities by States within the framework of the INSSP (as referred to in section A.3 of this report). The high NSF expenditure compared to revenue, along with the information about the increased activities and impact presented in this report, demonstrate a high level of efficiency in implementing the Agency's nuclear security programme.

114. In 2023, the Agency saw a significant increase in revenue received by the NSF that can be used in line with the structure of Programme 3.5 within the Agency's Programme and Budget, rather than being earmarked for specific activities — €2 million in 2023, compared to €140 000 in 2022. Such contributions, which have fewer restrictions on their use, allow the Agency to more efficiently plan, implement and fund the nuclear security programme, addressing Member States' needs effectively and in line with the principles of RBM. The Agency continues to engage with donors with the goal of better aligning contributions to programmatic areas requiring funding.

115. Effective alignment of donor contributions with the Agency's Programme and Budget has improved resource mobilization by reducing funding gaps in the nuclear security programme. However, these contributions currently still make up only a small proportion of the total NSF revenue — 8% and 0.5% of annual revenue in 2023 and 2022, respectively. The Agency still requires a significant amount of funding in order to implement the activities that have been identified as Member State priorities during the past several years. The following graph presents a snapshot of currently unfunded activities, all of which have been presented to donors and are awaiting funding. These activities cannot be funded by existing contributions due to donor conditions on the use of the funds.

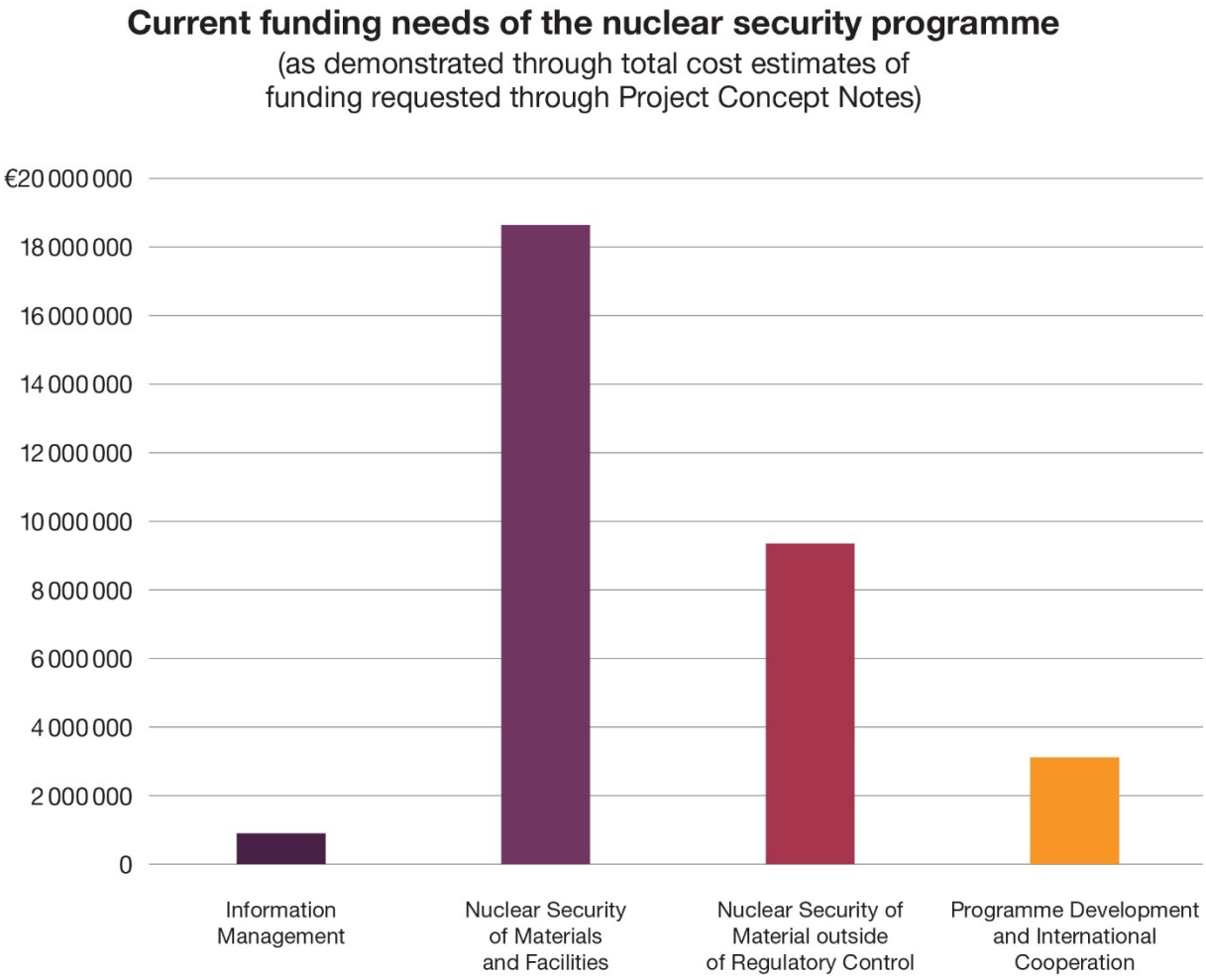


Figure 17: This graph presents a snapshot of the Agency's funding needs for specific projects in nuclear security as of January 2024. Not all requests for funding are expressed in Project Concept Notes.

116. The Agency further strengthened its data analytics capacity for NSF management in 2023. These efforts included the development of a number of dashboards used internally to support effective fund management, as well as external dashboards for donors to the NSF. The donor dashboards reinforce the Agency's engagement with donors to the NSF by providing insights into the use of their extrabudgetary contributions, which are intended to assist donors in their decision-making and planning. The rollout and further enhancement of the donor dashboards will continue in 2024.

117. The Agency continues to actively engage with potential new donors to the NSF, with the goal of broadening the donor base to ensure the sustainability of the nuclear security programme. In addition to traditional financial contributions, the Agency's nuclear security programme is supported through in-kind contributions such as expertise, equipment or venues for activities. In 2023, two new donors provided in-kind contributions and one donor that had not contributed since 2017 provided a financial contribution. In addition, the Agency has been increasingly diversifying the funding sources of nuclear security activities through co-funding from more than one donor. In 2023, 31% of events were co-funded, compared to 27% in 2022.

Related Activities

118. The Agency will continue ensuring that contributions to the NSF are used prudently. The Agency is planning to undertake the following related activities:

- Continue to use the NSF in compliance with Agency policies and procedures, while concurrently providing transparency to donors, in order to ensure efficient performance and utilization of extrabudgetary contributions;
- Continue to coordinate and engage with Member States, through the existing mechanisms of bilateral consultations, bilateral coordination meetings and multilateral coordination meetings, in order to ensure that contributions to and expenditures from the NSF are aligned with Member State requirements and expectations;
- Continue to engage with Member States to streamline existing funding processes in order to ensure greater predictability and unearmarked funding for longer-term results;
- Continue to prioritize funding of projects and programmes based on expressed needs; and
- Continue to engage with Member States to demonstrate results and share information.

F. Technical Support and Assistance to Ukraine

Trends

119. The Agency continued to closely monitor the situation at Ukraine's nuclear facilities as well as activities involving radioactive sources, focusing on the implications for nuclear safety and security. The Agency has continued sharing information with Member States, international organizations and the public on the nuclear safety and security situation in Ukraine. Further information on related Agency activities is provided in Section F of Appendix A.

120. The Agency further intensified and deepened its technical work in Ukraine by, inter alia, establishing a continued presence of Agency staff at a further four nuclear sites in Ukraine in January 2023 (Khmelnytskyy NPP, South Ukraine NPP, Rivne NPP and the Chornobyl NPP site); announcing and implementing a medical assistance programme for NPP operating staff; and announcing a programme of assistance for the Kherson Oblast to address the impact of the destruction of the Kakhovka dam with remote consultations taken to discuss the needs and the potential implementation of the IAEA Support and Assistance Mission to the Kherson Oblast (ISAMKO).

121. The armed conflict has continued to threaten nuclear safety and security in Ukraine. In 2023, the Khmelnytskyy, South Ukraine and Rivne NPPs continued to operate safely and securely despite the challenging circumstances imposed by the armed conflict. The situation at the Zaporizhzhya NPP (ZNPP) continues to be particularly difficult and challenging, with six out of the seven indispensable pillars for ensuring nuclear safety and security during an armed conflict being compromised fully or partially.

122. After intensive consultations and discussions with all parties, in his address at the United Nations Security Council (UNSC) in New York on 30 May 2023, the Director General set out five concrete principles to help ensure nuclear safety and security at the ZNPP in order to prevent a nuclear accident and to ensure the integrity of the ZNPP. The Agency monitors the observance of these concrete principles through the IAEA Support and Assistance Mission to the ZNPP (ISAMZ).

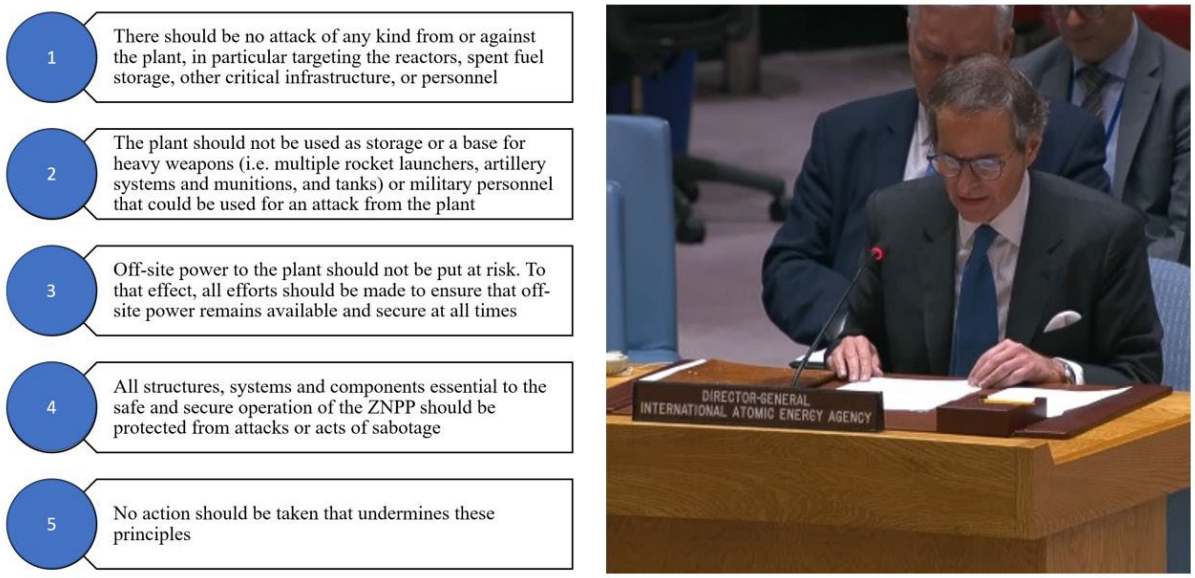


Figure 18: The five concrete principles for protecting the nuclear safety and security at the ZNPP established by the Director General Rafael Mariano Grossi at the UNSC meeting on 30 May 2023.

123. The Agency continued to deliver nuclear safety and security related equipment to Ukraine and to cooperate closely with Member States and international organizations in the interests of efficiency.

Related Activities

124. The Agency will continue closely monitoring the nuclear safety and security situation in Ukraine. The Agency will also continue providing technical support and assistance to Ukraine in the area of nuclear safety and security and maintain the continuous presence of its experts at all Ukrainian NPPs. The Agency is planning to undertake the following related activities:

- Continue the delivery of technical support and assistance to Ukraine as needed, including, but not limited to, the conduct of expert missions and deployment of a continued presence at all nuclear sites; the delivery of nuclear safety- and security-related equipment; the delivery of medical assistance for NPP operating personnel; and the delivery of assistance for the Kherson Oblast;
- Continue sharing information on the nuclear safety and security situation in Ukraine and on the Agency's activities with Member States, international organizations and the public;
- Continue close cooperation with Member States and international organizations to ensure efficiency in the provision of technical support and assistance; and
- Complete the analysis of challenges in the application of the Agency's safety standards and nuclear security guidance in an armed conflict and prepare a draft of the technical document using the knowledge and experience collected in Ukraine since February 2022.

Appendix A

Agency Activities in 2023

A. General Nuclear Security Areas

A.1. Promoting Further Adherence to International Legal Instruments

Figure A-1: The Agency organized a Technical Meeting to promote the universalization of the A/CPPNM in November 2023. (Photo: IAEA)

1. In order to facilitate and improve mechanisms for information exchange and experience sharing among States Parties to the Convention on the Physical Protection of Nuclear Material (CPPNM) and its Amendment (A/CPPNM), the Agency convened the annual Technical Meeting of the Representatives of Parties to the CPPNM and the CPPNM Amendment (Points of Contact Meeting) in October–November 2023 in Vienna.

2. To continue promoting universalization of the CPPNM and its Amendment, during the reporting period, the Agency conducted two regional workshops, for Africa in March and for the Caribbean in May. The Agency also conducted two national workshops, for Sierra Leone in April and for Liberia in August; and five outreach missions, to Ghana, Fiji, Mongolia, Thailand and Togo.

3. During the week of the 67th regular session of the General Conference, the Agency organized, jointly with the United Nations Office on Drugs and Crime, a side event on synergies between the CPPNM as amended and the International Convention for the Suppression of Acts of Nuclear Terrorism. The Agency also conducted for the first time a Technical Meeting to Promote the Universalization of the Amendment to the Convention on the Physical Protection of Nuclear Material immediately after the annual CPPNM Points of Contact Meeting in October–November 2023 in Vienna.

4. During the reporting period, the Agency conducted 19 awareness raising meetings, 2 regional workshops and 12 national workshops, covering all technical cooperation regions, to increase the understanding of the elements of comprehensive national nuclear legislation and the importance of adhering to the relevant international legal instruments, including the CPPNM and its Amendment.

5. During its outreach activities on the A/CPPNM and the CPPNM Points of Contact Meeting, the Agency continued to encourage States Parties to the CPPNM and to the A/CPPNM to identify the CPPNM Points of Contact pursuant to Article 5.1 and to inform the Agency of their laws and regulations giving effect to the CPPNM and its Amendment pursuant to Article 14.1.

A.2. Nuclear Security Guidance and Peer Review and Advisory Services

Figure A-2: A milestone for the Agency's IPPAS programme was achieved when the Agency conducted its 100th IPPAS mission in Zambia from 28 August to 8 September 2023. (Photo: Radiation Protection Authority, Zambia)

6. One new Technical Guidance publication was issued in 2023, *Detection at State Borders of Nuclear and Other Radioactive Material out of Regulatory Control* (IAEA Nuclear Security Series No. 44-T), bringing the total number of publications in the Nuclear Security Series (NSS) to 44.

7. At the end of the reporting period, 17 NSS publications were in various stages of development, including 4 revisions.

8. The Agency continues to translate NSS publications into other languages. In 2023, fourteen Implementing Guides were made available in Chinese, eight in Russian and one in Spanish. Three Technical Guidance documents were made available in French, one in Russian and one in Spanish.

9. Along with all Safety Standards Series publications, all NSS publications are available online via the Nuclear Safety and Security Online User Interface platform. The platform allows users to search a uniform knowledge base and contains information on the relationships between publications, allowing users to navigate from one publication to other relevant guidance and recommendations from other publications.

10. The Agency again held the Webinar on the IAEA's Nuclear Security Series: Past, Present and Future in April 2023 to further raise awareness of the NSS. The webinar was conducted in English, with simultaneous interpretation into Arabic, Chinese, French, Russian and Spanish.

11. The Nuclear Security Guidance Committee met in Vienna in June and December 2023, including a joint session with the Nuclear Safety Standards Committee and the Emergency Preparedness and Response Standards Committee.

12. The Agency conducted International Physical Protection Advisory Service (IPPAS) missions to Kuwait in May - June 2023, Nigeria in July 2023, Zambia in August - September 2023, the Netherlands in October 2023 and Switzerland in October - November 2023. Additionally, the Agency held eight IPPAS preparatory meetings for upcoming missions and three IPPAS national workshops in Lusaka in March 2023, Abuja in May 2023, and Rabat in October 2023.

13. To broaden the pool of potential team members for IPPAS missions, the Agency held an International Workshop on the IPPAS for Potential IPPAS Team Members in Vienna in May 2023. The purpose of the workshop was to provide essential information to subject matter experts in nuclear security on preparing for and conducting IPPAS missions to enable productive and effective participation in IPPAS missions.

14. The Agency conducted an International Nuclear Security Advisory Service (INSServ) mission to Viet Nam — the first of its kind to the country — in March 2023. Following the official handover of the final INSServ report in Hanoi in June 2023, a consultancy meeting was held in Vienna in September 2023 to follow up on the INSServ mission. At the meeting, participants discussed the implementation of the INSServ mission recommendations and suggestions with regard to potential assistance from the Agency and other international partners, including through Viet Nam's Integrated Nuclear Security Sustainability Plan (INSSP). Further discussion occurred during the INSSP review mission in Hanoi in November 2023.

15. The Agency conducted INSServ missions to Georgia in April–May 2023 and to Cambodia in December 2023. Additionally, in June 2023, the Agency held a preparatory meeting for the INSServ mission to Costa Rica to be held in March 2024.

Figure A-3: In March 2023, the Agency conducted an INSServ mission to Viet Nam to assess its national nuclear security regime for nuclear or other radioactive material out of regulatory control. (Photo: IAEA)

A.3. Assessing Nuclear Security Needs and Priorities

16. In October 2023, the Agency hosted a Technical Meeting of the Points of Contact for Integrated Nuclear Security Sustainability Plans at which the new INSSP conceptual approach, which is closely aligned with the top tier nuclear security guidance documents, was officially launched. The revised INSSP template and Nuclear Security Information Management System self-assessment questionnaires were also presented. The meeting served as a platform for States to share experience and lessons learned from the development and implementation of INSSPs and the usefulness of the mechanism in coordinating international assistance in meeting States' nuclear security needs.

17. Revised self-assessment questionnaires are fully aligned with the revised INSSP template and, moving forward, will be systematically used as the entry point for States in the INSSP mechanism. The development of the supporting online information technology solution is in progress.

18. Three regional workshops were conducted to coordinate the implementation of INSSPs, for the members of the Arab Network of Nuclear Regulators in January–February 2023 in Hammamet, Tunisia; for the members of the Economic Community of Western African States in August in Lomé; and for Central Asian States in November in Samarkand, Uzbekistan.

A.4. Capacity Building in Nuclear Security

Figure A-4: The fourth iteration of the International School on Nuclear Security for fellows of the Marie Sklodowska-Curie Fellowship Programme was held in Vienna from 31 July to 10 August 2023. (Photo: IAEA)

19. The Agency conducted three train the trainers courses on different nuclear security topics in 2023. By enabling those who complete the courses to train others, these types of courses have the potential to increase the number of individuals trained in different nuclear security topics manyfold. Train the trainers courses were held in Vienna in September 2023, on the security of radioactive material and associated facilities; in Obninsk, Russian Federation in October–November 2023, on the physical protection of nuclear material and nuclear facilities; and at the Agency's Nuclear Security Training and Demonstration Centre (NSTDC) in December 2023, on radiological crime scene management for subject matter experts.

20. The NSTDC was inaugurated and started operation in October 2023. In total, 14 events were conducted at the NSTDC in 2023. A catalogue of 23 training events, to be available at the NSTDC, was finalized and published for the launch of the Centre.

21. The Agency continued to assist States in establishing and implementing nuclear security education programmes through the International Nuclear Security Education Network (INSEN). The Agency also hosted the 2023 INSEN Leadership Meeting in February 2023 and the INSEN Annual Meeting in July 2023, both in Vienna. Since 2016, the INSEN has regularly organized panel sessions on women in nuclear security at its annual meetings. Additionally, women represent 50% of the chairs of the INSEN and its working groups.

22. The Agency held International Schools on Nuclear Security including a School hosted jointly with the Abdus Salam International Centre for Theoretical Physics in March in Trieste, Italy; and a School for fellows of the Marie Skłodowska-Curie Fellowship Programme in July–August in Vienna. Gender parity sessions were included at these Schools.

23. The Women in Nuclear Security Initiative organized a side event at the IAEA International Conference on Computer Security in the Nuclear Field: Security for Safety (CyberCon23) in Vienna in June 2023. This event highlighted programmes, initiatives and good practices from the IAEA and Members States that support gender equality in nuclear security.

24. In 2023, the Agency continued to provide support and resources to Member States in establishing and operating Nuclear Security Support Centres (NSSCs) with core functions in the area of human resource development, technical support and scientific support, including through the NSSC Network. The Annual Meeting of the NSSC Network was conducted in February 2023 in Pattaya, Thailand, with 72 participants from 42 Member States and two observer organizations. A Consultancy Meeting of the Bureau of the NSSC Network was held in December 2023. A Technical Meeting of the Working Groups of the NSSC Network was held in December 2023 to assess progress in overall NSSC Network priorities and individual working group objectives, 86 participants from 42 Member States attended the meeting. Two newsletters of the NSSC Network were issued in May and November 2023.

25. In January 2023, the Agency conducted a Training Course for Instructors on Establishing and Operating a National NSSC. This event included 22 participants from 13 Member States who are now prepared to support the conduct of regional and international workshops.

26. In May 2023, the Agency held a Regional Workshop on Establishing and Operating a National NSSC in Quezon City, Philippines to support States in implementing a systematic and sustainable approach to the establishment and operation of an NSSC. Twenty participants from 11 Member States enhanced their knowledge and shared experiences on the subject of this workshop.

27. In addition, bilateral support was provided to Cuba, Nigeria and Sudan regarding establishment and operations of NSSCs.

28. In November 2023, the Agency held the International Workshop on Human Resource Development in Nuclear Security Programme Planning, and the Technical Meeting on the Management of Training on Nuclear Security by Training Organizations at the NSTDC.

Figure A-5: The Agency's NSTDC was inaugurated on 3 October 2023. (Photo: IAEA)

A.5. Information and Computer Security

29. The Agency developed a virtual training environment to enhance the execution and broaden the reach of computer security training. This environment supports easy deployment of computer security training courses and distribution of the training environment to Member States with training centres to expand their capacity building activities.

30. The Agency continued responding to Member State requests in 2023 by delivering two Training Courses on Computer Security Fundamentals for Nuclear Security, two Training Courses on Computer Security Incident Response for Nuclear Facilities, one Training Course on Computer Security for Industrial Control Systems at Nuclear Facilities, one Training Course Conducting Computer Security Exercises for Nuclear Security, and one Training Course on Conducting Computer Security Inspections for Nuclear Facilities.

31. To raise awareness of and capabilities for protecting against cyberthreats across the entire nuclear security regime, computer security training modules were developed and integrated into courses for the NSTDC.

32. The Agency is actively pursuing the inclusion of computer security information in its publications. To this end, for example, work is ongoing to align the upcoming revision of the Implementing Guide *Security of Nuclear Information* (IAEA Nuclear Security Series No. 23-G) with new computer security publications in the NSS. Work is also ongoing to integrate computer security regulation elements into a new non-serial publication that will support Member States in developing computer security regulations and integrating them into national regulatory frameworks.

33. In June 2023, the Agency held the International Conference on Computer Security in the Nuclear World: Security for Safety. The conference included a main computer security demonstration and seven State-level demonstrations highlighting various aspects of mitigation and risk management for cyber-attacks and reflecting the eight themes of the conference through active international cooperation. Hands-on interactions with real equipment were offered in the ‘Cyber Villages’ of the conference.

34. In December 2023, a new coordinated research project (CRP) entitled “Enhancing Computer Security of Small Modular Reactors and Microreactors” was approved to assess and advance computer security for SMRs, considering safety, security, operational modes, emergency preparedness, human factors, novel technologies (disruptive, innovative, and emerging) and methodologies applied to I&C, physical protection systems, communications, network infrastructure, accountancy and control, and other associated systems.

35. The Agency continues to explore artificial intelligence (AI) applications in order to address challenges and to help ensure secure uses of AI in nuclear technologies. Several AI-related meetings, at which nuclear security linkages were discussed, were held during the reporting period. These meetings included a Technical Meeting on Artificial Intelligence and its Existing and Near-term Deployment in Operating Nuclear Power Plants and consultancies, and a meeting of the Technical Working Group on Small and Medium Sized or Modular Reactors at which the computer security challenges of small and medium sized or modular reactors (SMRs), including the application of machine learning and artificial intelligence, were presented and discussed.

Figure A-6: In June 2023, the Agency hosted the International Conference on Computer Security in the Nuclear World: Security for Safety. (Photo: IAEA)

A.6. Information Exchange and Sharing

36. In November 2023, the Agency held a virtual International Training Course for New and Prospective Points of Contact of the Incident and Trafficking Database, where participants learned about the role and responsibilities of Incident and Trafficking Database (ITDB) points of contact and the information sharing tools used in the ITDB programme. In addition, States not participating in the ITDB were encouraged to attend the training to learn about the ITDB programme and join it as participating members.

37. The Agency supported the United Nations Interregional Crime and Justice Research Institute at the "CONTACT — Southeast Asia" peer-to-peer workshop, held in Luang Prabang, Lao People's Democratic Republic, in May 2023. The workshop provided participants with an overview of the major security threats in Southeast Asia, notably terrorism and organized crime, while also providing opportunities to discuss partner countries' assessments and perceptions of the identified threats and their impact on (and/or linkages with) risks stemming from nuclear or radioactive material trafficking; to share best practices and challenges related to various forms of crimes, including nuclear or radioactive material trafficking; and to identify future activities to improve regional cooperation using the ITDB programme.

38. In June 2023, the Agency held a Regional Workshop on Nuclear Security Information Exchange and Cooperation for South-East African Countries in Arusha, United Republic of Tanzania. In August 2023, the Agency held an Interregional Workshop on Nuclear Security Information Exchange and Cooperation for Central Asian Countries in Dushanbe. The purpose of the workshops was to strengthen national, regional and international capacity among national experts, and to support national

response to the prevention and combat of illicit trafficking and other unauthorized activities in nuclear and other radioactive material through enhanced information coordination.

39. In 2023, the Agency continued to maintain the secure ITDB restricted area on the Nuclear Security Information Portal by providing ITBD points of contact and other authorized users with the ITDB incident notification forms (Web Incident Notification Forms (WebINFs)), regular analysis reports and other relevant ad hoc information (e.g. MPE reports) in a timely and accurate manner.

40. In 2023, the Agency processed 168 WebINFs in a timely manner (more than 95% of the reports were processed within 24 hours), two reports in support of MPEs and numerous ad hoc requests for ITDB data and analysis.

41. The Agency conducted outreach to Member States not participating in the ITDB to encourage their participation through invitations to the aforementioned regional workshops.

A.7. Nuclear Security Research and Emerging Technologies

42. During the reporting period, the Agency continued to keep abreast of scientific, technological and engineering innovations in relation to nuclear security. Examples of related work include the hosting of the Technical Meeting on Network and Communication Systems for Radiation Detection Equipment Used for Nuclear Security in Vienna in April 2023; the Technical Meeting on Performance Testing and Specification of Spectroscopic and Energy Discrimination Algorithms Used for Nuclear Security in Cairo in May 2023; the Technical Meeting on Emerging Threats and Technologies in Nuclear Security, Including the Detection of Nuclear and Other Radioactive Material Out of Regulatory Control in Bangkok in July 2023; and the Third Technical Meeting on Radiation Detection Instruments for Nuclear Security: Trends, Challenges, and Opportunities in Vienna in August. These meetings provided participants with opportunities to discuss and share information about new innovations.

43. The Agency continued to enhance the features and functionality of the Mobile-Integrated Nuclear Security Network (M-INSN). Efforts are ongoing to support the publishing of the M-INSN source code in an open-source repository, and to update the software with new features and capabilities. Additionally, M-INSN underwent a computer security audit to identify potential risks and develop a computer security plan for M-INSN’s continued security.

44. In 2023, the Agency’s Minimum Detectable Quantity and Alarm Threshold Evaluation Tool was deployed in seven Member States, and its use was requested by three radiation detection equipment vendors. The tool enables Member States to use a risk informed approach for establishing alarm threshold values and estimating the operational impact of those values on traffic through a radiation portal monitor (RPM).

45. A technical course description and technical theory portions of a curriculum were developed for a basic course on active interrogation for nuclear security to be held at the Agency’s NSTDC.

46. The Agency remains committed to providing RPM kits to Member States upon request. The first RPM kits were delivered to the Agency in 2023. Efforts to test the systems and develop training materials are under way. Once acceptance testing is completed, the kits will be available for Member State use for training purposes.

B. Nuclear Security of Materials and Associated Facilities

B.1. Nuclear Security Approaches for the Whole Fuel Cycle

B.1.1. Physical Protection of Nuclear and Other Radioactive Material and Associated Facilities and Activities

47. During 2023, the Agency continued the development of publications addressing nuclear security for the whole nuclear fuel cycle, including the draft publications provisionally entitled *Establishment and Implementation of a Trustworthiness Programme in Nuclear Security* and *Identification and Categorization of Sabotage Targets, and Identification of Vital Areas at Nuclear Facilities*.

48. In 2023, the Agency held an International Training Course on Preventive and Protective Measures against Insider Threats to Nuclear Material in St. Petersburg, Russian Federation, in May. The Agency also held an International Training Course on Insider Threat Using the Shapash 3D Model at the NSTDC in October. National training courses on this topic were held in Bucharest in February; Abu Dhabi in May; Obninsk, Russian Federation (for Bangladesh) in September; and Accra in November.

49. In May 2023, the Agency conducted a National Workshop on Regulations for Physical Protection of Nuclear Material and Nuclear Facilities in Niamey.

50. The Agency held the following international training courses: the International Training Course on Nuclear Security in Practice: Field Training for University Students in June 2023 in Obninsk, Russian Federation; the International Training Course on Establishing Nuclear Security Regulatory Regimes for Emerging Nuclear Power Programmes in August–September 2023 in Vienna; the International Training Course on Insider Threat Using the Shapash 3D Model in October 2023 at the NSTDC in Seibersdorf, Austria; the International Training Course on Physical Protection Inspections at Nuclear Facilities in October 2023 in Obninsk, Russian Federation; the International Training Course on the Practical Operation of Physical Protection Systems at Nuclear Facilities in November 2023 in Obninsk, Russian Federation; and the International Training Course on Central Alarm Station Design and Operation for Facilities Using Nuclear or Other Radioactive Material in December 2023 at the NSTDC in Seibersdorf, Austria. These international training courses supported Member States in the implementation of nuclear security activities.

51. In addition, the Bangladesh National Training Course on Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities was held in September 2023 in Obninsk, Russian Federation; and, in November 2023, the National Training Course on the Protection against Sabotage of Nuclear and Radioactive Material and Nuclear and Associated Facilities was held in Rawalpindi, Pakistan.

52. In October 2023, the Agency conducted a Regional Workshop on the Physical Protection of Nuclear Material and Nuclear Facilities in Delft, Netherlands.

53. The Agency provided support to Egypt to improve its regulatory framework through reviewing draft regulatory documents, including a regulatory development plan.

B.1.2. Nuclear Security of Advanced Reactors, Including SMRs

54. During the reporting period, the Agency continued its efforts towards the development of publications addressing the nuclear security of SMRs. During a Technical Meeting held in Vienna in March 2023, participants discussed different approaches to establishing, strengthening, sustaining and enhancing nuclear security measures for SMRs, including concepts of security by design. A Technical

Meeting held in Vienna in July 2023 further informed the Agency of the needs, views and priorities of Member States concerning the nuclear security of SMRs.

55. Outcomes from these and other meetings support the development of publications related to SMRs, including a draft IAEA Technical Document (TECDOC) on the nuclear security of SMRs.

56. Nuclear security matters are addressed within cross-Departmental working groups related to SMRs, including on the Nuclear Harmonization and Standardization Initiative and the SMR Platform Implementation Team.

57. The Agency is also engaged in developing guidance to ensure facility and material security related to nuclear fusion-based reactors. Contributions concerning nuclear security are included in two 2023 publications: a collaborative project with the International Project on Innovative Nuclear Reactors and Fuel Cycles – *Legal and Institutional Issues of Prospective Deployment of Fusion Facilities* and *IAEA World Fusion Outlook 2023 — Fusion Energy: Present and Future*.

B.1.3. Enhancing Nuclear Security Using Nuclear Material Accounting and Control

58. The Agency conducted an expert mission on the use of nuclear material accounting and control for nuclear security purposes at facilities to Tokyo in July 2023. An International Training Course on Nuclear Material Accounting and Control for Nuclear Security Purposes at Facilities was held in October in Obninsk, Russian Federation.

59. In December 2023, at the NSTDC, the Agency held a Technical Meeting on Good Practices and Challenges in Establishing, Implementing and Maintaining a Nuclear Material Accounting and Control Programme for Nuclear Security Purposes at Nuclear Facilities. The objective of the event was for Member States to gain an understanding of how existing national infrastructures can be enhanced to support a State's nuclear security programme, specifically focusing on nuclear material accounting and control practices for nuclear security.

60. The Agency utilizes the virtual reality capabilities of the simulated Shapash Nuclear Research Institute to enhance training opportunities through interactivity. In July–August 2023 in Vienna, those attending the International School on Nuclear Security for the Students of the Marie Skłodowska-Curie Fellowship Programme benefited from a demonstration of the virtual reality simulation. In September 2023, fellows visiting the Secretariat in Vienna as part of the United Nations Disarmament Fellowship Programme also received a demonstration.

B.1.4. Nuclear Security in the Transport of Nuclear and Other Radioactive Material

Figure A-7: A Regional Workshop on Conducting Transport Security Inspections for Asian Countries was held in Singapore from 11 to 14 September 2023. (Photo: IAEA)

61. The Agency held four Regional Workshops on Conducting Transport Security Inspections — in Cyprus in February 2023, in Singapore in September 2023, in Ghana in October 2023 and in Burkina Faso in December 2023.

62. The Agency organized expert missions to consolidate the transport security regulations of six Member States — to Sierra Leone in May 2023, to Seychelles in May 2023, to Togo in May 2023, to Botswana in June 2023, to Nigeria in November 2023 and to Zimbabwe in November 2023.

63. The Agency conducted two transport security tabletop exercises to assist Member States in developing the knowledge and tools to plan, implement and maintain an effective transport security programme for radioactive materials. The exercises were held in the Niger in June 2023 and in Cameroon in July 2023.

64. The Agency drafted a Technical Guidance publication provisionally entitled *Security of Nuclear and Other Radioactive Material in Transport* (NST053).

B.2. Security of Radioactive Material[1A] and Associated Facilities

B.2.1. Assistance Provided to States to Enhance the Security of Radioactive Material in Use and Storage and of Associated Facilities

Figure A-8: The IAEA held a Regional Training Course on the Security of Radioactive Material in Use and Storage in Senegal from 16 to 20 October 2023. (Photo: ARSN, Senegal)

65. In 2023, 13 countries received assistance in the review of draft laws for the security of radioactive material in use and storage and of associated facilities and activities (Colombia, Côte d'Ivoire, Dominica, The Gambia, Mongolia, Nicaragua, the Philippines, Qatar, Saudi Arabia, Saint Vincent and the Grenadines, Sri Lanka, Trinidad and Tobago, and the Bolivarian Republic of Venezuela).

66. The Agency assisted in the review or drafting of regulations on the security of radioactive material in use and storage for Uzbekistan and, through training on drafting regulations for radiation safety and nuclear security of radioactive material in June 2023, for States in the Caribbean.

67. The Agency, upon request, provided assistance to Gabon and Rwanda through the review and update of draft national policies and strategies for radiation safety and security of radioactive material.

68. In January–February 2023, the Agency held a Regional Workshop on Strategic Directions for Establishing Integrated Management Systems for Regulatory Bodies in Vienna for Caribbean States. The workshop, part of the Regulatory Infrastructure Development Project (RIDP), provided background information based on the requirements and recommendations on the subject using IAEA publications to facilitate the discussion about the benefits and the challenges of establishing an integrated management system from a senior management perspective.

[1A] For the purpose of this section, "radioactive material" refers to "other radioactive material", as defined in *Objective and Essential Elements of a State's Nuclear Security Regime* (IAEA Nuclear Security Series No. 20).

69. The Agency held two National Training Courses on Regulatory Control of Radiotherapy Practices for the Plurinational State of Bolivia, one virtually in May 2023 and another in La Paz in June 2023. The courses enhanced participants' awareness of international best practices in the regulation of radiation safety and security of radioactive material from selected radiotherapy practices, with reference to the Agency safety standards and nuclear security guidance and enabled the exchange of practical experiences in the application of these practices.

70. The Agency held multiple regional training courses on radiation safety and nuclear security to enhance the participants' understanding of key Agency guidance on the security of radioactive material and associated facilities in use and storage. These included:

- Two Regional IAEA Schools on Nuclear and Radiological Leadership for Safety and Nuclear Security, one in May 2023 for English-speaking African States and one in August 2023 for French-speaking African States;
- Two Regional Courses on the Authorization and Inspection of Radiation Safety and Nuclear Security, one for medical practices in Zambia in June 2023 for English-speaking African States and one for industrial practices in Morocco in September 2023;
- Three Regional Training Courses on Security of Radioactive Material in Use and Storage, in Bogotá in October 2023 for Latin American States, in Dakar in October 2023 for French-speaking African States, and in Nairobi in November 2023 for English-speaking African States; and
- One Regional Training Course for New Regulators in Radiation Safety and Security of Radioactive Material, for Latin American States, held over the course of six weeks in October–November 2023 in Buenos Aires and conducted in Spanish.

71. The Agency conducted five Advisory Missions on Regulatory Infrastructure for Radiation Safety and Nuclear Security, to Benin in January 2023, to Saint Kitts and Nevis in April 2023, to Honduras in June 2023, to El Salvador in August 2023, and to Antigua and Barbuda in October 2023.

72. Two International Training Courses on the Security of Radioactive Material in Use and Storage were held in the Russian Federation in July 2023 and in September 2023. Additionally, one International Training Course on the Security Management of Radioactive Material was held at the NSTDC in October 2023.

73. Projects to strengthen physical protection measures at facilities with high activity radioactive sources are ongoing in seven countries.

74. The Agency conducted expert missions, upon request, to El Salvador in January 2023, to Côte d'Ivoire in August 2023, to the Plurinational State of Bolivia in September 2023, to Madagascar in November 2023, and to Cuba in December 2023 in order to support the completion of national inventories of radioactive sources and to provide expert guidance on the establishment of centralized storage facilities.

75. The Agency conducted seven virtual coordination meetings with eight countries regarding the project entitled "Enhancing the Safe, Secure and Sustainable Management of Disused Sealed Radioactive Sources — Phase II" (DSRS Phase II Project).

76. The Agency conducted an expert mission to support the management of DSRSs in Caracas in March 2023. The purpose of the mission was to develop a preliminary action plan aimed at enhancing the safe, secure and sustainable management of DSRSs in the country and at thoroughly assessing the national situation, existing infrastructure and national inventory, as well as the national policy and strategy for the management of DSRSs.

77. New training material was developed aimed at supporting States in the development of national policies and strategies for the management of DSRSs. This training material was used in a pilot international workshop, held in Abuja in December 2023, for recipient countries of the DSRS Phase II Project.

78. In a large removal operation supported by the IAEA in 2023, a record number of 31 DSRSs, which were mainly cobalt sources previously used for cancer treatment in hospitals, were removed from temporary storage at a specialized facility managed by the Chilean Nuclear Energy Commission (CCHEN) and transferred to a recycling facility abroad.

79. The Agency continued its support to Ghana and Malaysia in the implementation of borehole disposal for DSRSs. The Agency supported the Nuclear Regulatory Authority of Ghana in the review of the safety case for borehole disposal of DSRSs to form a decision on authorization. Assistance to Malaysia consisted of supporting the construction of a borehole facility, training of the local teams to undertake the disposal operation and the procurement of various equipment to be used for this purpose.

Figure A-9: A record number of DSRSs were removed from Chile and transferred to a recycling facility abroad in 2023 during a removal operation supported by the IAEA. (Photo: Chilean Nuclear Energy Commission, CCHEN)

B.2.2. Support for the Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources

80. The Agency held its first International Meeting of the Points of Contact for the Purpose of Facilitating the Import and Export of Radioactive Sources in Accordance with the Guidance on the Import and Export of Radioactive Sources in Vienna in January 2023.

81. In May–June 2023, the Agency held the 20th Open-Ended Meeting of Technical and Legal Experts for Sharing Information on States' Implementation of the Code of Conduct on the Safety and Security of Radioactive Sources in Vienna.

82. In November 2023, the Agency held the Asia and South Pacific Regional Meeting for Sharing Experience and Lessons Learned in Implementing the Code of Conduct on the Safety and Security of Radioactive Sources and its supplementary Guidance in Jakarta.

83. The Agency continues outreach efforts (through various Agency activities such as side events at meetings and conferences, event sessions and Technical Meetings) to communicate the benefits of implementing the Code of Conduct to States that have not made a political commitment to do so.

C. Nuclear Security of Materials Out of Regulatory Control

C.1. Nuclear Security Measures for Material Out of Regulatory Control

84. In February 2023, the Agency met with Indonesian officials in Jakarta to finalize the country's action plan for nuclear security response capability development and to discuss future implementation.

85. The Agency held a Regional Workshop on Developing a National Framework for Managing the Response to Criminal or Intentional Unauthorized Acts involving Material Out of Regulatory Control in Tokai, Japan in August–September 2023.

86. In October–November 2023, the Agency held an International Workshop on Developing a National Framework for Managing the Response to Criminal or Intentional Unauthorized Acts Involving Material Out of Regulatory Control in Beijing.

87. The Agency supported the procurement of equipment for nuclear security response capability development for three Member States.

C.2. Nuclear Security Detection Architecture

88. In July 2023, the Agency held a Technical Meeting in Beijing to promote the integration of nuclear security systems and measures in major urban areas and at major transportation hubs.

89. In April 2023, the Agency, in cooperation with the RACVIAC Centre for Security Cooperation conducted a Regional Workshop on Nuclear Security Detection Architecture Design, Strategy and Planning in Zagreb. The Agency also conducted two Regional Workshops on Threat Assessment and a Risk Informed Approach for Nuclear and other Radioactive Material out of Regulatory Control, in September 2023 in Bangkok and in October 2023 in Tashkent; two Regional Workshops to Develop a Road Map for Building a Nuclear Security Detection Architecture for Nuclear and Other Radioactive Material out of Regulatory Control in Djibouti and in Tegucigalpa, both in November 2023; a Regional Workshop on Planning, Implementing and Evaluating Detection Operations in November 2023 in Lagos, Nigeria; and a Regional Workshop on the Expert Support for the Assessment of Alarms and Alerts for Nuclear and Other Radioactive Material out of Regulatory Control in December 2023 in Qinhuangdao, China.

90. The Agency held three regional meetings of the International Network of Front Line Officers and Organizations for Nuclear Security Detection to share best practices and lessons learned in nuclear security detection operations and to encourage networking and regional cooperation. The meetings were held for the Asia region in June 2023 in Beirut, for the Latin America region in July 2023 in Bogotá and for the Africa region in November 2023 in Kampala.

91. In July–August 2023, in Vienna, the Agency held a Technical Meeting on Developing and Sustaining a Nuclear Security Detection Architecture to facilitate the exchange of best practices, challenges, and views and to discuss ways to meet such needs, including through the use of resources available in the region and assistance from the IAEA and other international partners.

C.3. Major Public Events

Figure A-10: The Agency assisted Benin in implementing nuclear security measures at the 2023 World Petanque Championship. (Photo: IAEA)

92. In January, the Agency supported a National Workshop on Major Event Security in Santiago.

93. The Agency conducted two missions and associated technical visits on the implementation of nuclear security measures for major public events — one in March 2023 to Cameroon and the other in September 2023 to Benin.

94. In May 2023, the Agency conducted a virtual coordination meeting with Ghana on the implementation of nuclear security measures in the framework of the 2023 African Games.

95. In June 2023, the Agency conducted a mission to Uganda to review Uganda's nuclear security measures for major public events.

96. The Agency held three National Workshops on Developing and Implementing Nuclear Security Systems and Measures for Major Public Events, in May 2023 in the United Arab Emirates, in July 2023 in Côte d'Ivoire and in August 2023 in Benin.

97. The Agency held two National Workshops on Arrangements for Notification, Reporting and Assistance in Nuclear or Radiological Incidents and Emergencies, in June 2023 in Benin and in August 2023 in Côte d'Ivoire.

98. Two National Training Courses on Equipment Performance Verification were held in Vienna, for Benin in July 2023 and for Ghana in November–December 2023.

99. A National Training Course on Equipment Operation, Testing and Maintenance in Preparation for Major Public Events was held in Vienna in November 2023 for Côte d'Ivoire.

100. In December 2023, the Agency held a National Workshop on Responding to Criminal or Intentional Unauthorized Acts Involving Nuclear and other Radioactive Material at Main Venues and other Strategic Locations of Major Public Events in Côte d'Ivoire.

C.4. Radiological Crime Scene Management and Nuclear Forensics Science

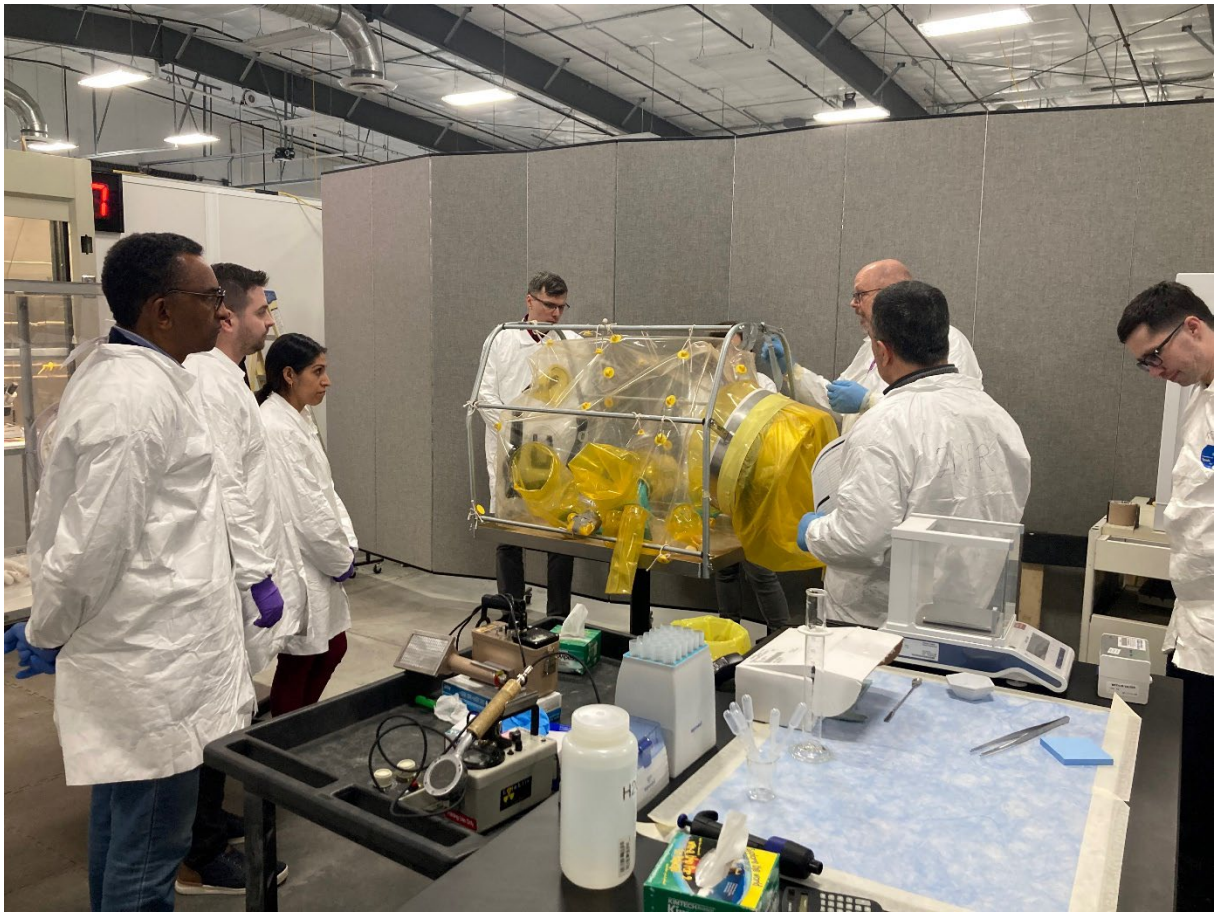


Figure A-11: The Agency hosted an international training course on nuclear forensics methodologies to enhance national response plans in the United States of America from 27 February to 10 March 2023. (Photo: IAEA)

101. In 2023, the Agency published a TECDOC entitled *Establishing a Nuclear Forensic Capability: Application of Analytical Techniques* (IAEA-TECDOC-2019).

102. The Agency held an International Training Course on Nuclear Forensics Methodologies in February–March 2023 in Richland, United States of America.

103. The Agency held two National Workshops on Radiological Crime Scene Management, in June 2023 in Kuala Lumpur and in August 2023 in Muscat, to train participants in the management of a radiological crime scene, including command arrangements, safety aspects, mitigation of risks and hazards, and the operating procedures that are unique to a radiological crime scene.

104. In July 2023 in Bangkok, the Agency held a National Train the Trainer Course on Radiological Crime Scene Management. In December, the Agency held a Train the Trainer Course on Radiological Crime Scene Management for Subject Matter Experts at the NSTDC.

105. One International Training Course on Introduction to Nuclear Forensics was held in September 2023 in Bangkok and one Regional Training Course on Introduction to Nuclear Forensics was held in November 2023 in Port Louis, both aiming to familiarize participants with the role of nuclear forensics in the context of a national response plan to respond to nuclear security events involving nuclear and other radioactive material out of regulatory control, as well as with the requirements for and the conduct of a nuclear forensics examination.

D. Nuclear Security Interfaces

106. During the reporting period, the Agency continued to draft a new joint Safety Guide and Implementing Guide on managing the interfaces between nuclear and radiation safety and nuclear security.

107. In April 2023, the Agency's Advisory Group on Nuclear Security and the International Nuclear Safety Advisory Group together published a joint report entitled *A Systems View of Nuclear Security and Nuclear Safety: Identifying Interfaces and Building Synergies*.

108. Progress continued towards the publication of *Safety and Security Interfaces in the Regulatory Infrastructure for the Oversight of Nuclear Power Plants* (Technical Reports Series No. 1003).

109. The Agency held one Regional School on Drafting Regulations for Radiation Safety and Security of Radioactive Material in Vienna in July 2023 for Member States in the Caribbean. The school was intended to mentor training teams of participating countries in drafting regulations considering both radiation safety and security of radioactive material.

110. The Agency held a Regional Training Course on the Authorization and Inspection of Radiation Safety and Nuclear Security for Medical Practices in Lusaka in June 2023, and a Regional Training Course on the Authorization and Inspection of Radiation Safety and Nuclear Security for Industrial Practices in Rabat in September 2023, in order to train regulatory staff of the respective regions to perform the core regulatory functions of authorization, including review, assessment, inspection and enforcement, considering both radiation safety and nuclear security aspects.

111. The Agency held three Training Courses on the Security of Radioactive Material in Use and Storage, in Bogotá in October 2023 for Latin American States, in Dakar in October 2023 for French-speaking African States and in Nairobi in November 2023 for English-speaking African States, in order to enhance the participants' understanding of key Agency guidance on the security of radioactive material and associated facilities in use and storage.

112. The Agency is advancing the development of the Technical Safety Review (TSR) guidelines on safety, security and safeguards with the objective of providing a consolidated basis for TSR services. The guidelines aim to streamline, harmonize, and formalize the process of conducting TSRs. These review guidelines can also be used to support the review of safety–security–safeguards interfaces.

113. The Agency organized an Interregional Workshop on Safety, Security and Safeguards by Design in Small Modular Reactors in Idaho Falls, United States of America, in September 2023. Discussions held during the workshop confirmed that several SMR designers are currently addressing safety–security–safeguards measures in the early stages of design and that there is valuable practice to build upon.

114. Within the framework of the RIDP, the Agency held a Regional Workshop on Safety and Nuclear Security Culture Values and Approaches in Saint Lucia in November 2023 for countries in the Caribbean region, in order to raise awareness of the importance of nuclear safety and nuclear security cultures.

E. Nuclear Security Fund

Figure A-12: In 2023, the Agency held two multilateral donor coordination meetings. (Photo: IAEA)

115. In 2023, the Agency held two multilateral donor coordination meetings. The Agency also held bilateral donor coordination meetings with 21 donors: Armenia, Australia, Austria, Belgium, Canada, China, Denmark, the European Union, France, India, Japan, Norway, Pakistan, the Republic of Korea, the Russian Federation, Saudi Arabia, Spain, Sweden, Switzerland, the United Kingdom, and the United States of America.

116. The Agency developed 208 individual reports and sent them to donors in accordance with donor requirements.

117. For greater visibility and accountability, the Agency developed donor-specific NSF dashboards and piloted their individual sharing with 6 NSF donor States.

F. Technical Support and Assistance to Ukraine

118. At the United Nations Security Council on 30 May 2023, the IAEA Director General set out five concrete principles to help ensure nuclear safety and security at ZNPP in order to prevent a nuclear accident and ensure the integrity of the plant.

119. In 2023 the Agency continued providing technical support and assistance to Ukraine in terms of the delivery of nuclear safety- and security-related equipment. Twenty-six deliveries of donated and

procured nuclear safety- and security-related equipment to different organizations in Ukraine were organized, bringing the total number of deliveries to 33. In addition to these deliveries, the Agency supported three deliveries of spare parts for emergency diesel generators for South Ukraine NPP through a partnership agreement.

115. Eighty nuclear safety and security missions (rotations) were implemented to the five nuclear sites in Ukraine where Agency has a continuous staff presence (10 to ZNPP, 17 to Khmelnytskyy, Rivne and South Ukraine NPPs and 19 to the Chornobyl NPP site).

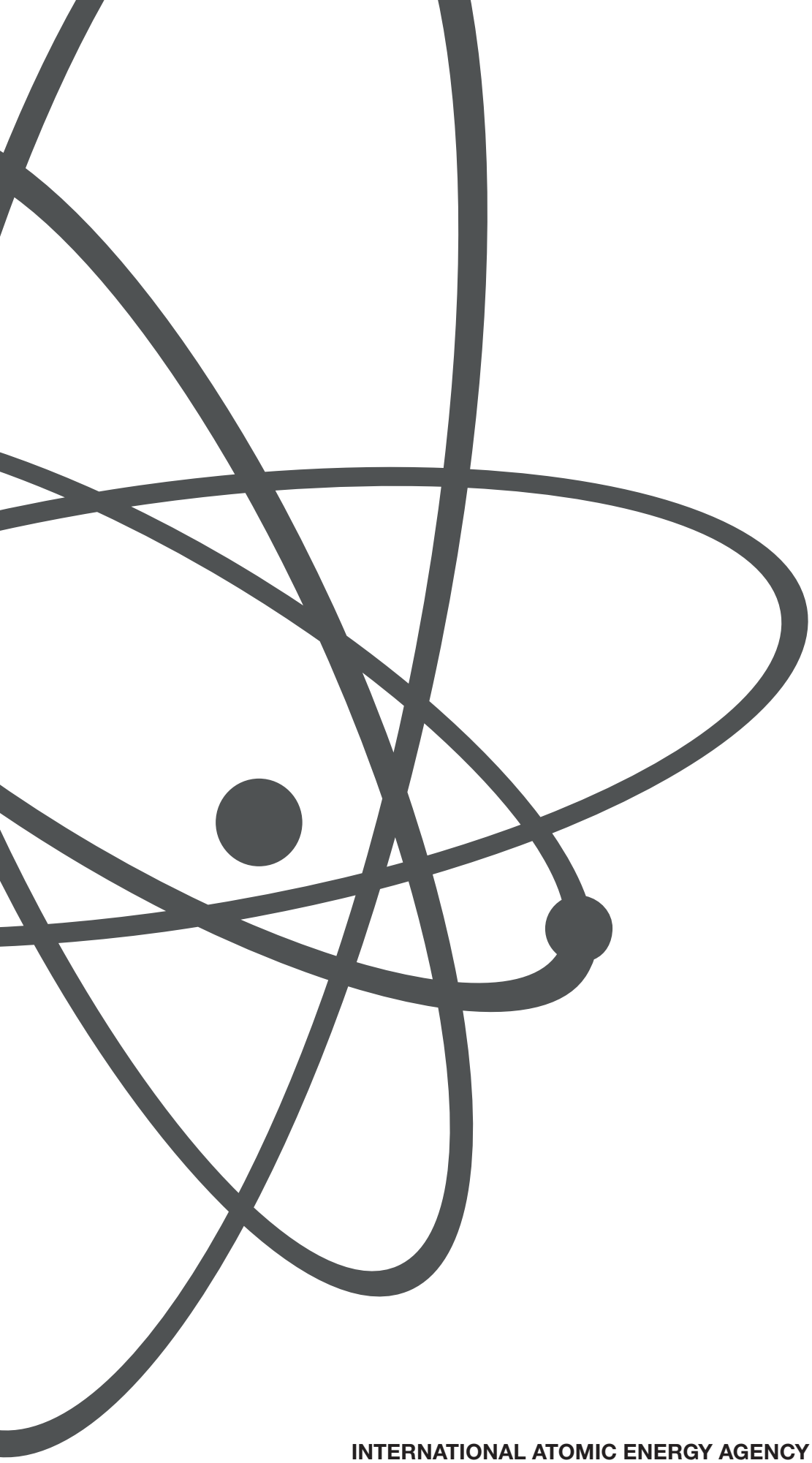
116. The Agency implemented six additional missions to Ukraine, including the Director General visit on the occasion of inauguration of the continued presence of Agency staff in nuclear sites in Ukraine in January 2023, the second and third visits of the Director General to Zaporizhzhya in March and June 2023, medical assistance and coordination missions in June and November 2023, and an IAEA Support and Assistance Mission on the Safety and Security of Radioactive Sources in July 2023.

117. The Agency held regular coordination meetings with the State Nuclear Regulatory Inspectorate of Ukraine to coordinate the provision of technical support and assistance within the comprehensive assistance programme and to exchange on the nuclear safety and security situation at the ZNPP. In addition, national coordination meetings were held in May and July 2023 with different entities in Ukraine to discuss the situation in general and priority needs in the areas of nuclear safety and security and medical assistance.

118. The Agency held regular coordination meetings with the European Commission, as well as with a number of Member States and organizations such as the European Bank for Reconstruction and Development, to ensure effective coordination in the provision of assistance and to secure the necessary funding. Moreover, the Agency participated in two meetings on the information sharing initiative pertaining to assistance to Ukraine, in Oslo in April 2023 and in Krakow, Poland, in October 2023.

119. The Agency continued to review challenges in the application of its safety standards and nuclear security guidance during an armed conflict. The Agency initiated the preparation of a TECDOC that will analyse the issues and challenges faced at nuclear facilities in terms of the practical application of such standards and guidance during an armed conflict, using the knowledge and experience collected in Ukraine since February 2022, and how these issues and challenges might be addressed, if possible, by all interested parties, including the Agency.

120. The Agency continued sharing information with Member States, international organizations and the public on the nuclear safety and security situation in Ukraine. The Agency issued a public report entitled ‘Nuclear Safety, Security and Safeguards in Ukraine, February 2022–February 2023’, marking one year since the beginning of the armed conflict in Ukraine. The Director General provided detailed reports on the situation in Ukraine to the Agency’s Board of Governors in March, June, September and November 2023, which were made available to the public, and also provided a detailed report on the situation in Ukraine to the 67th regular session of the Agency’s General Conference (GC(67)/10). The Agency continued providing regular updates on the situation in Ukraine on its website with over 60 updates published throughout the year.



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