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Nuclear Safety, Security and Safeguards in Ukraine

Report by the Director General

Summary

- The Board of Governors, in its resolutions GOV/2022/17, GOV/2022/58, GOV/2022/71 and GOV/2024/18, respectively, requested the Director General to continue to closely monitor the situation regarding nuclear safety, security and safeguards in Ukraine and regularly report formally to the Board on these matters. This report provides a summary of the situation in Ukraine regarding nuclear safety, security and safeguards. It covers the period from 31 August to 12 November 2024 and is based on information made available to the Agency, and verified by the Agency, during this period. This report covers the progress made by the Agency in responding to Ukraine's requests to provide technical support and assistance in re-establishing, as appropriate, a sound nuclear safety and security regime at its nuclear facilities and in activities involving radioactive sources.
- This report also summarizes relevant aspects of the implementation of safeguards in Ukraine under the Agreement Between Ukraine and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol Additional thereto under the current circumstances.

Recommended Action

- It is recommended that the Board of Governors take note of this report.

Nuclear Safety, Security and Safeguards in Ukraine

Report by the Director General

A. Introduction

1. At the Board of Governors meeting in September 2024, the Director General provided the Board of Governors with a detailed report entitled *Nuclear Safety, Security and Safeguards in Ukraine* (document GOV/2024/45), covering the period from 25 May to 30 August 2024.

2. On 12 October 2022, the United Nations (UN) General Assembly adopted resolution A/RES/ES-11/4, declaring that, inter alia, the "attempted illegal annexation" of four regions of Ukraine on 4 October 2022 had no validity under international law.[1] The Agency complies with this resolution.

3. On 17 November 2022, the Board of Governors adopted resolution GOV/2022/71[2], on the safety, security and safeguards implications of the situation in Ukraine, in which it "[e]xpresse[d] grave concern that the Russian Federation ha[d] not heeded the calls of the Board to immediately cease all actions against and at nuclear facilities in Ukraine" and "request[ed] that the Russian Federation do so immediately". In addition, it "[d]eplore[d] and d[id] not recognize, consistent with resolution A/RES/ES-11/4 adopted by the UN General Assembly on 12 October 2022, the Russian Federation's attempts to take ownership of Ukraine's Zaporizhzhya Nuclear Power Plant [(ZNPP)] and its attempted illegal annexation of the Ukrainian territory on which the plant is located".[3]

4. On 28 September 2023, the General Conference, at its 67th regular session, adopted resolution GC(67)/RES/16[4] on nuclear safety, security and safeguards in Ukraine, in which it "fully support[ed] the continued and reinforced physical presence of the IAEA Support and Assistance Mission to Zaporizhzhya (ISAMZ), given the ongoing risks to nuclear safety, security, and safeguards implementation at the ZNPP" and "[c]all[ed] for the urgent withdrawal of all unauthorized military and other unauthorized personnel from Ukraine's ZNPP and for the plant to be immediately returned to the full control of the competent Ukrainian authorities consistent with the existing licence issued by the State Nuclear Regulatory Inspectorate of Ukraine (SNRIU) to ensure its safe and secure operation and in order for the Agency to conduct safe, efficient, and effective safeguards implementation, in accordance with Ukraine's comprehensive safeguards agreement and additional protocol". In addition,

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[1] United Nations General Assembly resolution A/RES/ES-11/4, adopted on 12 October 2022: https://documents-dds-ny.un.org/doc/UNDOC/GEN/N22/630/66/PDF/N2263066.pdf?OpenElement, para. 3.

[2] IAEA Board of Governors resolution GOV/2022/71, adopted on 17 November 2022, para. 1.

[3] IAEA Board of Governors resolution GOV/2022/71, adopted on 17 November 2022, para. 2.

[4] IAEA General Conference resolution GC(67)/RES/16, adopted on 28 September 2023, paras 1 and 2.

it "[f]ully support[ed] the Agency's continued provision, upon request, of technical support and assistance to Ukraine to help ensure the safe and secure operation of nuclear facilities and activities involving radioactive sources, including the continued physical presence of IAEA technical experts at the Chornobyl, Rivne, Khmelnytskyy, and South Ukraine Nuclear Power Plants" and "[e]ncourage[d] Member States to offer political, financial, and in-kind support to the IAEA comprehensive programme of technical support and assistance to Ukraine, including through the provision of necessary nuclear safety and security equipment as requested by Ukraine".[5]

5. On 7 March 2024, the Board of Governors adopted resolution GOV/2024/18[6] on the nuclear safety, security and safeguards in Ukraine, in which it "[r]eiterate[d] its grave concern that the Russian Federation ha[d] not heeded the previous calls of the Board of Governors and General Conference contained in their respective resolutions to withdraw its military and other personnel from the ZNPP" and, inter alia, "call[ed] for the urgent withdrawal of all unauthorized personnel from Ukraine's ZNPP".

6. On 11 July 2024, the UN General Assembly adopted resolution A/RES/78/316[7] on the safety and security of nuclear facilities of Ukraine, including the ZNPP, in which it "[w]elcome[d] and encourage[d] the continued efforts of the Director General of the [Agency] to address the risks to nuclear safety and security, as well as to safeguards implementation at the [ZNPP]" and "[c]alle[d] upon all parties to the armed conflict to implement fully the 'seven indispensable pillars for ensuring nuclear safety and security during an armed conflict' and the five concrete principles of the Director General of the [Agency] to help to ensure nuclear safety and security at the [ZNPP]". Furthermore, it "[c]alled upon [UN] Member States to continue to support the efforts of the Director General of the [Agency] to uphold nuclear safety, security and safeguards implementation at all nuclear facilities in Ukraine".

7. From 2 to 5 September 2024, the Director General led his tenth high-level mission to Ukraine. During this mission, the Director General, accompanied by other senior Agency officials, held talks with the Ukrainian President Volodymyr Zelenskyy and other high-ranking officials in Kyiv and agreed for the Agency to expand its assistance to Ukraine by taking a more proactive stance to help ensure stability of critical energy infrastructure so that nuclear safety is not impacted. This agreement followed a number of missile attacks that had either directly caused the disconnection of several nuclear power reactors or led to dangerous instability of the national grid as reported in document GOV/2024/45. The Director General crossed the frontline for the fifth time since the start of the armed conflict to visit the ZNPP and assess developments at the plant, where the nuclear safety and security situation remains precarious.

> "***The safety of operating nuclear power plants is dependent on a stable and reliable connection to the electricity grid. As a result of the war, the situation is becoming increasingly vulnerable and potentially even dangerous in this regard. I agreed with President Zelenskyy that the IAEA will widen its determined activities to help prevent a nuclear accident during the conflict and look closer at this important aspect of nuclear safety and security.***"
>
> Director General Rafael Mariano Grossi, 3 September 2024

8. Furthermore, the Director General agreed with President Zelenskyy that the Agency would provide technical support and nuclear safety advice for Ukraine's plans to purchase equipment from the

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[5] IAEA General Conference resolution GC(67)/RES/16, adopted on 28 September 2023, paras 3 and 4.

[6] IAEA Board of Governors resolution GOV/2024/18, adopted on 7 March 2024, 2022, paras 2 and 3.

[7] United Nations General Assembly resolution A/RES/78/316, adopted on 11 July 2024: A/RES/78/316 (undocs.org), paras 6, 9 and 11.

interrupted Bulgarian project in Belene for the Khmelnytskyy nuclear power plant (KhNPP). The support from the Agency will consist of assessments against the Agency safety standards and, as appropriate, Nuclear Security Series guidance to assist Ukraine in determining what areas need further investigation.

Director General Rafael Mariano Grossi during the meeting with Ukrainian officials on the first day of his official visit to Kyiv, 3 September 2024.

9. On 4 September 2024, the Agency issued a report[8] to mark two years since the establishment by the Director General of the continued presence of Agency staff at the ZNPP, highlighting the challenges and achievements of the Agency's activities to protect the ZNPP and prevent a nuclear accident. The report also provides information about the continued presence of Agency staff at Ukraine's other nuclear sites, and details of the Agency's comprehensive programme of assistance to Ukraine.

10. On 6 September 2024, the Director General travelled on to Kaliningrad, Russian Federation, for further high-level talks and met with the Director General of the State Atomic Energy Corporation "Rosatom", Alexey Likhachev, to discuss the persistent risks to nuclear safety and security at the ZNPP.

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[8] *Two years of IAEA continued presence at the Zaporizhzhya nuclear power plant: the IAEA's unwavering support for nuclear safety, security and safeguards in Ukraine* is available here: two-years-of-iaea-continued-presence-at-the-zaporizhzhaya-nuclear-power-plant.pdf.

Director General Rafael Mariano Grossi, and other Agency officials, during the meeting with officials of the Russian Federation in Kaliningrad, 6 September 2024. (Photo: ROSATOM)

11. On 20 September 2024, the General Conference, at its 68th regular session, adopted resolution GC(68)/RES/15[9] on nuclear safety, security and safeguards in Ukraine, in which it "[w]elcom[ed] with appreciation the continued efforts of the Director General and IAEA Secretariat to address nuclear safety and security risks in Ukraine" and "[c]all[ed] upon the Russian Federation, until it return[ed] Ukraine's ZNPP to the full control of the competent Ukrainian authorities, to provide ISAMZ with unrestricted and timely access to and from all relevant locations at and around the ZNPP and open information sharing in order to allow the [Agency] to fully report on the nuclear safety and security situation at the site and to undertake vital safeguards activities". In addition, it "[f]ully support[ed] the Agency's continued provision, upon request, of technical support and assistance to Ukraine to help ensure the safe and secure operation of nuclear facilities and activities involving radioactive sources, including the continued physical presence of IAEA technical experts at the Chornobyl, Rivne, Khmelnytskyy, and South Ukraine Nuclear Power Plants" and "[e]ncourage[d] Member States to continue to offer political, financial, and in-kind support to the IAEA comprehensive programme of technical support and assistance to Ukraine, including through the provision of necessary nuclear safety and security equipment as requested by Ukraine".[10]

12. On 23 September 2024, ahead of the 2024 UN General Assembly, the Director General spoke at the Summit of the Future about the Agency's mission to foster peace and development around the world, including by assisting Ukraine in ensuring nuclear safety and security during a large-scale conflict.

13. On 1 October 2024, the Director General travelled to Minsk, Belarus, where he met President Alexander Lukashenko. At this meeting, President Lukashenko confirmed to the Director General that no action originating from Belarus would compromise the nuclear safety or security at the Chornobyl nuclear power plant (ChNPP).

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[9] IAEA General Conference resolution GC(68)/RES/15, adopted on 20 September 2024, paras 3 and 4.

[10] IAEA General Conference resolution GC(68)/RES/15, adopted on 20 September 2024, paras 5 and 6.

Director General Rafael Mariano Grossi meeting President Alexander Lukashenko in Minsk, 1 October 2024. (Photo: www.president.gov.by)

14. During the reporting period[11], from 31 August to 12 November 2024, the Agency maintained the continued presence of its staff at the five nuclear sites in Ukraine without any interruption and remained committed to providing any support it could to help ensure the safe and secure operation of nuclear facilities and activities involving radioactive sources in Ukraine. This includes undertaking impartial assessments of the situation pertaining to nuclear safety and security; providing relevant information updates to the public and the international community; and delivering on the comprehensive programme of technical support and assistance to Ukraine by providing nuclear safety- and security-related equipment and technical expertise and advice, including assistance for ensuring medical support and care for Ukrainian operating staff, for ensuring radiation safety and nuclear security of radioactive sources, and for mitigating the consequences associated with the destruction of the Kakhovka dam.

15. Agency staff present at the five nuclear sites in Ukraine continued to monitor and assess the situation against the seven indispensable pillars for ensuring nuclear safety and security during an armed conflict ('Seven Pillars') first outlined by the Director General at the meeting of the Board of Governors held on 2 March 2022 and described in document GOV/2022/52[12]. In addition, ISAMZ continued to monitor and report on observance of the five concrete principles for protecting the ZNPP ('Five Principles') established by the Director General at the meeting of the United Nations Security Council (UNSC) on 30 May 2023 and described in document GOV/2023/30[13].

16. The Agency still assesses the overall situation with respect to nuclear safety and security at the ZNPP to be precarious, with six of the Seven Pillars compromised either fully or partially during the reporting period. The ZNPP continued to face challenges related to the number of available off-site power lines with frequent disconnections of the limited lines available. Military activities including explosions, drone attacks and gunfire in the vicinity of the ZNPP, as well as the presence of Russian

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[11] Following the reporting period referred to in GOV/2024/45.

[12] Report by the Director General to the Board of Governors, document GOV/2022/52, issued on 9 September 2022, para. 8.

[13] Report by the Director General to the Board of Governors, document GOV/2023/30, issued on 31 May 2023, para. 23.

armed troops and military equipment on site, continued to be reported by ISAMZ. While ISAMZ did not find any indications that the Five Principles were not being observed during the reporting period, activities affecting, for example, the off-site power supply or, potentially, the staff of the ZNPP continue to put the Five Principles and the overall nuclear safety and security of the plant at great risk.ISAMZ continued to face some restrictions in obtaining timely and appropriate access to all areas of relevance to nuclear safety and security and in having open discussions with all relevant staff at the ZNPP. This limits the Agency's ability to make its assessment and report impartially and objectively on the nuclear safety and security situation at the site, and to fully assess whether all Five Principles are being observed at all times.

17. The military activities on the territory of Ukraine resulted in frequent reports of drones observed flying in close proximity to the operating nuclear power plants (NPPs), frequent air raid alarms at these sites, and impacts on the energy infrastructure, resulting in an increased risk to the safe and secure operation of the plants.

18. This report has been produced in response to resolution GOV/2022/17[14], in which the Board of Governors requested the Director General and the Secretariat to "continue to closely monitor the situation [in Ukraine], with a special focus on the safety and security of Ukraine's nuclear facilities and report to the Board on these elements, as required"; to resolution GOV/2022/58[15], in which the Board of Governors requested the Director General to "continue to closely monitor the situation and report formally to the Board on these matters as long as required"; to resolution GOV/2022/71[16], in which the Board of Governors requested the Director General to "continue to closely monitor the situation [in Ukraine] and regularly report formally to the Board on these matters as long as required"; and to resolution GOV/2024/18[17], in which the Board of Governors requested the Director General to "continue to report comprehensively on the observance of the five concrete principles to help ensure nuclear safety and security at ZNPP as well as the Director General's 'seven indispensable pillars for ensuring nuclear safety and security'; and that he continue to closely monitor the situation and continue to report formally to the Board on these matters for as long as required."

19. This report provides a summary of the situation in Ukraine regarding nuclear safety, security and safeguards from 31 August to 12 November 2024. It also covers progress made by the Agency in providing technical support and assistance in nuclear safety and security to Ukraine. Finally, this report summarizes relevant aspects of the implementation under the current circumstances of safeguards in Ukraine under the Agreement Between Ukraine and the International Atomic Energy Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons and the Protocol Additional thereto.

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[14] IAEA Board of Governors resolution GOV/2022/17, adopted on 3 March 2022, para. 4.

[15] IAEA Board of Governors resolution GOV/2022/58, adopted on 15 September 2022, para. 7.

[16] IAEA Board of Governors resolution GOV/2022/71, adopted on 17 November 2022, para. 8.

[17] IAEA Board of Governors resolution GOV/2024/18, adopted on 7 March 2024, para. 6.

B. Nuclear Safety and Security in Ukraine

B.1. Agency Missions to Ukraine

B.1.1. IAEA Support and Assistance Missions to the Zaporizhzhya, Rivne, South Ukraine and Khmelnytskyy NPPs, and to the Chornobyl NPP Site

20. During the reporting period, the Agency maintained the continued presence of its staff, comprising up to 13 staff members in total across the 5 nuclear sites in Ukraine, through the uninterrupted deployment of IAEA Support and Assistance Missions to the ZNPP (ISAMZ), the KhNPP (ISAMIK), the Rivne NPP (RNPP) (ISAMIR), the South Ukraine NPP (SUNPP) (ISAMISU), and the ChNPP site (ISAMICH). The purpose of the continued presence of Agency staff at all nuclear sites in Ukraine is to help decrease the risk of a nuclear accident.

21. The Agency continued its rigorous preparations and logistics for the safe and secure deployment of missions to Ukraine. The rotations of Agency staff at the KhNPP, the RNPP, the SUNPP, and the ChNPP site as well as at the ZNPP during the reporting period were conducted as planned.

22. As part of these rigorous preparations, a comprehensive programme focused on the psychological welfare of Agency staff travelling on missions to Ukraine has been implemented, and a total of ten pre-deployment workshops aimed at fostering resilience and improving teamwork and communication skills had been delivered by end of the reporting period. Additionally, Agency staff undertaking missions at the ZNPP benefit from specialized support provided before, during and after the missions with the aim of enhancing team cohesion and optimizing operational performance, in light of the challenging conditions in which staff members must perform their duties.

23. The activities performed by Agency staff at each site include the conduct of technical meetings with plant management, field observations of key plant areas, and discussions with technical counterparts to broaden the understanding of the nuclear safety and security situation at the sites.

ISAMIR holding a meeting with counterparts at the RNPP training centre. (Photo: RNPP)

24. As of 12 November 2024, a total of 155 missions comprising 157 Agency staff members had been deployed as part of the continued presence at all 5 nuclear sites in Ukraine, totalling over 330 person-months in Ukraine. Some of the 157 Agency staff members participated in several rotations. Agency staff at all nuclear sites in Ukraine continued to experience frequent air raid alarms, some of which required them to take shelter.

25. The main findings and observations from the IAEA Support and Assistance Missions are reflected in Section B.2.

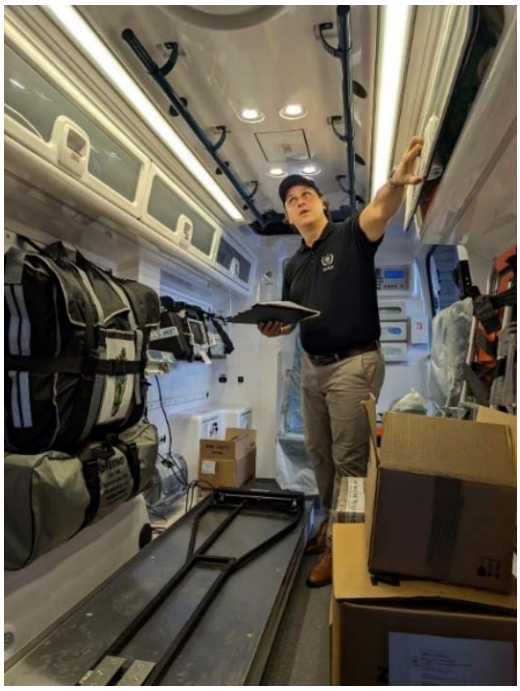
B.1.2. The Director General's Fifth Visit to the Zaporizhzhya NPP

26. On 4 September 2024, the Director General made his fifth visit to the ZNPP since the start of the armed conflict to discuss and assess recent developments in relation to the fragile nuclear safety and security situation at the plant. During his visit, the Director General visited the cooling tower that suffered a major fire in August 2024 and, after ascending to a height of approximately 15 metres inside the massive concrete structure, observed damage to the interior walls as well as debris and blackened surfaces. He also visited a pumping station of one of the six reactor units and was able to assess the availability of cooling water in the ZNPP cooling pond. Lastly, the Director General toured a storage facility located in one of the ZNPP's special buildings containing fresh nuclear fuel.

Director General Rafael Mariano Grossi at the damaged cooling tower at Ukraine's ZNPP, 4 September 2024.

B.1.3. Medical and Procurement Mission

27. From 11 to 13 September 2024, the Agency's senior medical and procurement officers conducted a mission in Ukraine. The aim of the mission was to assess the conformity with the purchase order of the two ambulances and the medical equipment inside the ambulances procured for the ChNPP and Varash Hospital under the medical assistance programme for the operating personnel of NPPs. Agency staff confirmed the conformity and readiness for operational use of the ambulances and the associated medical equipment.



Agency staff assessing the conformity of one of the ambulances during the mission to Ukraine.

28. The mission also included a visit to the National Research Centre for Radiation Medicine in Kyiv where Agency representatives reviewed the ongoing progress under the programme. This was followed by meetings with representatives from the National Nuclear Energy Generating Company "Energoatom", the World Health Organization and the United Nations Development Programme to discuss the epidemiological situation in Ukraine, medical evacuation logistics, and further opportunities for cooperation. The team also held discussions with the World Food Programme at their Kyiv office focusing on field procurement expertise and potential collaboration in future.

B.1.4. Nuclear Safety and Security Missions to Electrical Substations

29. Following the agreement reached on 3 September 2024 between the Director General and President Zelenskyy for the Agency to expand its assistance to Ukraine by taking a more proactive stance to help ensure stability of critical energy infrastructure so that it does not impact nuclear safety, the Agency conducted its first visit to the Kyivska electrical substation on 12 September 2024, followed by an additional mission to visit six other electrical substations, conducted from 20 to 27 October 2024.

30. The purpose of the visits was to:

- Collect initial information on the electrical substations, focusing on the impact on the safe operation of the nuclear facilities they serve;
- Document the damage to the substations caused by military activity;
- Observe the substations' security measures against related threats; and
- Identify any additional actions that could be taken or technical assistance that could be provided by the Agency to strengthen the safety of operation of NPPs in Ukraine.

Agency staff during their visit to the Kyivska substation, 12 September 2024. (Photo: SNRIU)

31. During the visits to the electrical substations, Agency staff observed and documented extensive damage to the equipment of all substations and confirmed that the capabilities of the electrical grid to provide a reliable off-site power supply to Ukrainian NPPs were significantly reduced due to the loss of the grid's internal capacity and of redundancy for power transmission, and damage to equipment. Agency staff confirmed that repairs and additional protective measures were being implemented to further mitigate the negative impact of this damage on the provision of a reliable off-site power supply to Ukrainian NPPs. Agency staff also confirmed that the damage to the electrical grid resulting from the military activity on 26 August 2024 and subsequent harsh transients had significantly impacted the operations of several reactors, resulting in equipment damage and malfunctions leading to reactor scrams.

32. In addition, Agency staff discussed with experts from Energoatom, the challenges to nuclear safety that the NPPs would face following a collapse of the electrical grid. Following stabilization of the NPPs utilizing the on-site emergency power supply, the timely restoration of the electrical grid would depend on the availability of independent sources of off-site power, critical substations and power lines forming the backbone of the grid. An electrical grid of sufficient capacity to provide stable off-site power to the NPPs is essential to nuclear safety, minimizing the occurrence of reactor power transients.

Agency staff during the Dniprovska 750 kV substation visit on 24 October 2024. (Photo: UKRENERGO)

B.1.5. IAEA Support and Assistance Mission on the Safety and Security of Radioactive Sources

33. From 2 to 8 November 2024, the second IAEA Support and Assistance Mission on the Safety and Security of Radioactive Sources (ISAMRAD) was conducted in Ukraine to initiate the implementation of the first phase of the ISAMRAD programme.

34. The mission focused on aspects related to the development of operational plans for the recovery, consolidation and transfer of vulnerable high activity radioactive sources and disused sources, in order to mitigate immediate safety and security concerns. The mission also supported the preparation of plans for the installation, upgrading, or repair of physical protection systems (PPSs) and safety monitoring and measuring equipment at potentially vulnerable locations storing or using high activity radioactive sources. During the mission, the ISAMRAD team visited several facilities in Kyiv that store and use radioactive sources. For all sites, discussions with management and staff occurred in relation to the nuclear safety and security situation at these facilities. Updates were provided by Ukrainian officials as a follow up to the ISAMRAD fact-finding mission and regarding delivery of nuclear safety and security-related equipment by the Agency to identified organizations to enhance safety and security of radioactive sources.

35. Key findings from the mission are further detailed in Section B.3.2.

B.2. Overview of the Situation at Nuclear Facilities in Ukraine

36. The Agency continued to monitor and assess the nuclear safety and security situation at Ukraine's nuclear facilities and activities involving radioactive sources against the Seven Pillars. In addition, the Agency continued to monitor and assess observance of the Five Principles aimed at ensuring the integrity and the nuclear safety and security of the ZNPP. The Agency continued to report regularly on its observations and findings.

The Seven Pillars outlined for the first time by the Director General at the meeting of the Board of Governors held on 2 March 2022.

The Five Principles established by the Director General during his address to the UNSC on 30 May 2023.

37. An overview of the current nuclear safety and security situation at Ukraine's nuclear facilities and activities involving radioactive sources against the Seven Pillars, as well as an overview of the observations made at the ZNPP against the Five Principles, are presented below. A chronology of events in Ukraine during the reporting period is provided in the Annex.

B.2.1. Zaporizhzhya NPP

38. The Agency's assessment is that the overall situation with respect to nuclear safety and security at the ZNPP continues to be precarious, with six of the Seven Pillars compromised either fully or partially during the reporting period. Despite some improvements in information sharing from the ZNPP, ISAMZ continued to face limitations in the provision of timely and appropriate access to all areas and information related to nuclear safety and security that might have implications for the Agency's assessment of the overall situation.

39. Throughout the reporting period, all units remained in cold shutdown, except for a few days when Unit 1 was in the shutdown for maintenance state. The Agency's understanding is that no reactor is to be restarted as long as the nuclear safety and security situation at the ZNPP remains in jeopardy due to the conflict.

40. During the reporting period, the heating season for the city of Enerhodar commenced and the ZNPP commenced operating some of the 9 mobile diesel boilers at the site to provide heating for the ZNPP and the city. The four diesel steam generators (DSGs) were operated for 15 days in October 2024 to provide the steam required by the ZNPP to process liquid radioactive waste.

41. During the reporting period, the ZNPP reported to ISAMZ events that had occurred outside the ZNPP site perimeter, notably:

- On 7 September 2024, an alleged drone attack on the transport workshop used by the ZNPP and located approximately four kilometres from the ZNPP site perimeter. ISAMZ visited the location of the alleged attack two days later and observed a hole in one roof as well as two trucks that sustained minor damage, but ISAMZ was not able to comprehensively conclude that the damage was linked to the alleged drone attack.

- On 20 September 2024, an alleged attack on the Zaria electrical substation located approximately 300 metres from the ZNPP site perimeter. The ZNPP informed ISAMZ that the substation supplies power to the ZNPP's non-essential electricity consumers, such as the grid water pumping station, the external warehouse, the diesel fuel farm, the ZNPP sewage system and other non-safety related systems. ISAMZ visited the substation the following day, confirmed that it was inoperable, and observed some impact on one of the substation's two transformers, as well as the remains of batteries and pieces of metal that appeared to be remnants of a drone.
- On 29 September 2024, an alleged attack on the Raduga electrical substation located almost four kilometres from the ZNPP site perimeter. The ZNPP informed ISAMZ that the Raduga substation supplies electricity to the industrial area, including the ZNPP's non-essential power consumers such as the transportation workshop, the external warehouses and the topography facility. ISAMZ visited the substation the following day and confirmed that it was severely damaged and inoperable.
- On 21 October 2024, an alleged attack on the Vodozabor electrical substation in Enerhodar. The ZNPP informed ISAMZ that the Vodozabor substation was inoperable and impacted the availability of electricity and water being supplied to Enerhodar.
- On 22 October 2024, alleged attacks on two petrol stations in Enerhodar. Reportedly, these alleged attacks resulted in fires.

ISAMZ visiting the Raduga substation on 30 September 2024 (left) and the transformer fire observed during the visit. (Photos: ZNPP)

Physical integrity

42. During the reporting period, ISAMZ did not observe any impact on the physical integrity of the six reactor units or the on-site storage facilities housing spent fuel, fresh fuel and radioactive waste. However, ISAMZ continued to report military activity in the vicinity of the plant, such as frequent explosions and gunfire that could potentially affect the nuclear safety and security of the site. Some military activities triggered air raid alarms at the site, which resulted in ISAMZ's planned walkdowns being postponed or interrupted.

43. ISAMZ was informed of an alleged drone attack at approximately 14:00 local time on 25 September 2024, about 100 metres from the ZNPP site perimeter. No casualties or damage were reported. ISAMZ visited the location of the alleged drone attack the next day and observed a small crater and remnants of what appeared to have been parts of a drone, located under the cables of the 330 kV

line connecting the Zaporizhzhya thermal power plant (ZTPP) 330 kV open switchyard to the autotransformer in the ZNPP 750 kV open switchyard.

Nuclear safety and security systems and equipment

44. During the reporting period, ISAMZ was able to routinely visit the reactor halls and other key locations within the reactor containment area, the safety systems rooms, the main control rooms (MCRs), the electrical rooms, the instrumentation and control rooms and parts of the turbine halls of all six units. ISAMZ also visited the dry spent fuel storage facility and the storage facilities for fresh fuel at the site. Moreover, ISAMZ visited the cooling pond, the discharge channel isolation gate, the essential service water (ESW) sprinkler ponds, including the drilled wells, and the emergency diesel generators (EDGs). ISAMZ did not report any new major issues affecting the overall nuclear safety and security of the plant based on the observations made during these visits.

45. However, ISAMZ observed several issues within operational limits that were assessed to not represent a safety concern, as follows:

- On 6 September 2024, a visible water leak coming from one of the ESW pumps following a scheduled test of an EDG of Unit 6. The ZNPP subsequently informed ISAMZ that the pump's packing seal had been tightened, which fixed the leak.
- On 10 September 2024, one of the main feedwater pumps and the three second-stage pumps in the turbine hall of Unit 2 being covered in plastic due to a leaking overhead water pipe that had been under repair. During a subsequent visit on 8 November 2024, ISAMZ observed that the repair works had been completed, and that there were no signs of water leakage. ISAMZ also observed that the plastic cover remained on one of the main feedwater pumps.
- On 16 September 2024, traces of a borated water leak coming from the spent fuel pool wall and a temporary collection system for borated water during a walkdown of the containment of Unit 2. The ZNPP explained to ISAMZ that the leak had been fixed, and that the collection system remained in place as a precaution in case it recurs.
- On 25 September 2024, failure of a motor operated valve due to a faulty electrical connection during the restart of the ESW pumps of safety train I of Unit 5. The connection was immediately repaired by the electrical department.
- On 28 October 2024, ISAMZ was informed that a small primary coolant leak was detected at one of the impulse pipes within the reactor coolant pump support system at Unit 1. ZNPP decided to move the status of Unit 1 from cold shutdown to shutdown for maintenance in order to perform repair of the impacted impulse pipe. Pressure in the primary circuit was decreased to atmospheric pressure and the leaking line was welded. ISAMZ observed maintenance works on the radiography checks of the new weld. Following the satisfactory evaluation of the radiographic test results, Unit 1 was returned to cold shutdown state on 2 November 2024.

46. ISAMZ continued to be prevented from visiting the western part of the turbine halls on all levels of all units throughout the reporting period, without justification being provided on a sound nuclear safety or security basis. Therefore, ISAMZ continued to be unable to independently confirm whether there were any issues or materials present in these parts of the turbine halls that could potentially affect the nuclear safety or security of the plant. ISAMZ continued to report a military presence in these areas.

47. ISAMZ continued to gather information and independently monitor and observe maintenance activities based on the maintenance plans for 2024. ISAMZ reported the following:

- Safety train II of Unit 1 was put into maintenance from 2 to 17 October 2024 to repair a failure on a gate valve on one of the ESW redundancies supplying water to the safety train heat exchanger for cooling the spent fuel pool.
- Scheduled maintenance activities on Unit 2 commenced on 10 September 2024. Maintenance on safety system train I of Unit 2 commenced on 10 September 2024 and was completed on 1 November 2024.
- Safety train I of Unit 3 was put into maintenance between 19 and 21 October 2024 for corrective maintenance on the regulator of a water valve.
- Safety train III of Unit 4 was put into maintenance between 28 October and 1 November 2024, and safety train II of Unit 4 was in maintenance between 4 and 8 November 2024.
- Maintenance was completed on safety train I of Unit 5. However, during the test and prior to putting the safety train back into standby mode, a malfunction of the EDG's automatic regulation and control system and its local monitoring display occurred. The ZNPP later reported that the cause of the failure was related to a software error that had been reset after rebooting. Safety system train I of Unit 5 returned to standby mode on 1 October 2024, following completion of a successful test.
- Safety train III of Unit 5 was put into maintenance between 4 and 8 November 2024.
- Welding had been performed to repair a tube in one of the steam generators of Unit 5 that had caused a leak of borated water into the secondary circuit in November 2023. ISAMZ was not given any information about when this work had been performed.
- Scheduled maintenance activities on Unit 6 continued throughout the reporting period. Maintenance on safety train I was completed on 10 September 2024. ISAMZ was informed that some maintenance activities on safety train III were yet to be completed.

48. ISAMZ continued to monitor the situation regarding the availability of cooling water by gathering information and visiting the ZNPP's cooling water facilities. ISAMZ reported that:

- The 11 groundwater wells continued to provide approximately 250 cubic metres of cooling water per hour to the 12 ESW sprinkler ponds;
- The height of water in the ESW sprinkler ponds, which currently serve as the ultimate heat sink for the plant, remained sufficient to provide cooling to all six units and safety systems in the shutdown state;
- Water continued to be pumped into the ZTPP discharge channel from both the ZTPP inlet channel and from water on the reservoir side of the isolation gate of the discharge channel. During the reporting period, the height of the water in the ZTPP discharge channel fluctuated between 16.35 metres and 16.64 metres;
- Water from the ZTPP discharge channel and unused water from the 11 groundwater wells continued to be pumped into the ZNPP cooling pond, reportedly at a maximum flow rate of 270 cubic metres per hour;
- The circulation pumps at Unit 4 continued to operate one at a time, despite the height of the cooling pond dropping by 38 centimetres to 14.15 metres by the end of the reporting period;

– The ZNPP commenced excavation works near the ZNPP cooling towers discharge channel. ISAMZ was informed that the intention is to redistribute water into the discharge channel and also into the ZNPP inlet channel to ensure that the water level of the inlet channel remains higher than that of the cooling pond. If successful, this would avoid the stagnation of cooling pond water through continued circulation. ISAMZ was informed that these works are intended to be completed by the end of the year.

49. During the reporting period, ISAMZ frequently observed the testing of the EDGs and the respective safety system trains from locations such as the MCRs, the emergency control room, and the local EDG rooms. On 6 September 2024, after observing the scheduled test on safety system train II of Unit 6, ISAMZ observed oil leaking from the gasket of the EDG and reported it to the ZNPP. Subsequently, the ZNPP informed ISAMZ that no oil had been observed prior to the conduct of the test, and that due to the observed presence of oil after the test, the gasket would be replaced after completion of the maintenance on safety train I of Unit 6.

50. Following the observations made on 6 September 2024, ISAMZ requested additional information from the ZNPP regarding the maintenance of the EDGs. The ZNPP informed ISAMZ that it has 5 categories of maintenance to ensure the reliability of the EDGs: category 1 maintenance (monthly visual inspections) were performed on all EDGs in 2024, category 2 maintenance (annual maintenance) was performed on some EDGs in 2024, and higher categories of advanced maintenance were performed less frequently. ISAMZ was provided with the maintenance schedule for the EDGs for the period from 2025 to 2036, with all EDGs scheduled to undergo both category 1 and category 2 maintenance in 2025, and more advanced maintenance planned in the coming years. ISAMZ noted that the frequency for the highest maintenance category had changed from every 10 years before the conflict to every 16 years, reportedly based on manufacturer requirements and following approval by the Federal Environmental, Industrial and Nuclear Supervision Service (Rostechnadzor).[18]

51. During the reporting period, ISAMZ observed that some of the six mobile diesel generators, which were installed following the post-Fukushima stress tests, were not in their designated locations. The ZNPP confirmed that some of the generators were being used to provide power at other locations, such as the Zaria electrical substation. The ZNPP also stated that the mobile diesel generators could be brought promptly back to the ZNPP for use in case needed.

Operating staff

52. During the reporting period, the average total number of staff at the ZNPP was just over 2200 on working days, and over 430 on weekends and designated holidays. On 2 October 2024, the number of staff at the ZNPP was approximately 5000, with around 7 to 10 newly recruited staff joining each week to take up various positions. ISAMZ was subsequently informed that the ZNPP currently has approximately 700 applications for recruitment and that the goal is to have approximately 6000 staff in total. Furthermore, ISAMZ was informed that the total number of staff should remain stable until the end of the year, as account is taken of staff leaving the ZNPP for various reasons. ISAMZ confirmed its observance of the stable number of staff during its regular visits and walkdowns. However, for the Agency to be able to fully assess the staffing situation at the ZNPP, including in relation to qualifications and training, and reach a conclusion regarding its potential implications for nuclear safety and security, timely and precise information as well as open discussions with all relevant staff continue to be needed.

53. ISAMZ visited all six MCRs on several occasions during the reporting period. ISAMZ observed that each unit consisted of three authorized personnel per MCR on average, in line with the number reported in document GOV/2024/30. During a visit to all six MCRs on 2 October 2024, ISAMZ was

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[18] See para. 2 above.

provided with details of the additional personnel being trained in each unit for positions such as senior reactor operator, turbine shift supervisor, and reactor and turbine department field operator.

54. ISAMZ was informed by the ZNPP of alleged attacks on residential housing in the city of Enerhodar on 20 and 25 September 2024. While damage was reported to have been sustained, no casualties were reported.

> "***Any targeting of employees of nuclear power plants would constitute a blatant violation of this pillar, which is fundamental for overall nuclear safety and security. In addition, any statements indicating further retaliatory measures potentially affecting staff of the ZNPP would be unacceptable and contrary to the safety pillars established by the IAEA***."
>
> Director General Rafael Mariano Grossi, 7 October 2024

55. Moreover, the Agency has been informed by both the Russian Federation and Ukraine of the assassination of an individual in the city where most ZNPP staff live. The person reportedly died in a car bomb explosion in Enerhodar on 4 October 2024. The Russian Federation informed the Agency that the individual was one of the key staff members responsible for ensuring nuclear security at the ZNPP, whereas Ukraine reported that the individual was no longer a ZNPP staff member.

56. On these occasions, the Director General condemned any attacks on ZNPP staff as they would compromise the third pillar for ensuring nuclear safety and security during an armed conflict, which states that operating staff must be able to fulfil their safety and security duties and have the capacity to make decisions free of undue pressure.

Off-site power supply

57. The status of the off-site power supply to the ZNPP remained vulnerable throughout the reporting period. The ZNPP off-site power supply continued to rely on only two of ten off-site power lines — the 750 kV Dniprovska line and the 330 kV Ferosplavna 1 back-up line. While there was no total loss of off-site power during the reporting period, the ZNPP was disconnected from the 330 kV Ferosplavna 1 line on 2 September, and 1 and 21 October 2024. The line was reconnected on 5 September, and 2 and 22 October 2024, respectively.

58. ISAMZ continued to monitor the maintenance activities on electrical components located on site and in the 750 kV open switchyard, which provide off-site power to all six units. ISAMZ reported the following developments during the reporting period:

- On 16 September 2024, the main transformer of Unit 6, together with the house load transformers and respective equipment in the 750 kV open switchyard, were put under maintenance. The main transformer was put back into operation on 24 October 2024.
- On 2 September 2024, the second overhead bus in the 750 kV open switchyard was put under maintenance. During a walkdown of the 750 kV open switchyard on 3 September 2024, ISAMZ observed the ongoing maintenance activities on the five breakers connecting the second overhead bus and on the voltage transformer. On 13 September 2024, ISAMZ observed the reconnection of the 750 kV second overhead bus from the electrical control room.

59. During the maintenance activities, the ZNPP made a temporary modification to the electrical power configuration in order to ensure an uninterrupted power supply to all units while minimizing the risk of a start of the EDGs in case of a loss of connection between the ZTPP 330 kV open switchyard and the back-up transformers.

Logistical supply chain

60. During the reporting period, the supply chain to the ZNPP continued to be provided by the Russian Federation. ISAMZ continued to access relevant locations at the ZNPP to assess the status and availability of spare parts, including visits to the mechanical and electrical warehouses, and to hold discussions with the ZNPP staff. However, the ZNPP informed ISAMZ that it was not possible to visit the central warehouse or the diesel fuel farm, reportedly due to safety concerns.

61. Based on these activities, ISAMZ reported that the maintenance of compressors, air driers blocks and valves on safety train III of Unit 6 had not been completed, as some necessary materials remained under procurement. The ZNPP stated that these activities would be completed before the end of 2024.

62. On 2 October 2024, the ZNPP informed ISAMZ that one of the 3 large diesel fuel tanks located in the off-site diesel fuel storage facility was undergoing maintenance, and that maintenance was planned to be performed on the other tanks one at a time. The ZNPP also stated that the site had approximately 2500 cubic metres of diesel fuel stored in the diesel fuel storage facility and in the individual EDG fuel tanks. The ZNPP added that, considering the cold shutdown state of the 6 units, an estimated 1000 cubic metres of diesel fuel consumption was sufficient to provide power to the site for 10 days. The ZNPP therefore considers the 2500 cubic metres of diesel fuel to be sufficient to operate the EDGs for over 20 days under current reactor conditions.

63. While these observations continued to indicate that the supply chain appeared to be in place to meet the needs of the ZNPP, some delays in maintenance due to procurement were noted. Moreover, the inaccessibility of the central warehouse and diesel fuel farm — reportedly due to safety concerns — affected the ability of ISAMZ to make a more comprehensive assessment on the availability of spare parts and status of the supply chain. ISAMZ will continue to monitor the situation so that it can independently confirm that all necessary and compatible spare parts are available or could to be supplied to the ZNPP as needed.

On-site and off-site radiation monitoring systems and emergency preparedness and response

64. During the reporting period, there was no change to the status of on-site and off-site radiation monitoring stations reported in GOV/2024/45. All on-site radiation monitoring stations were operational, and all but four of the off-site radiation monitoring stations continued reporting monitoring data. The ZNPP informed ISAMZ that while one off-site radiation monitoring station located on the bank of Kakhovka reservoir remained operational, it had been affected by frequent power cuts because it is supplied by the Enerhodar power grid.

65. The online transmission of data from the ZNPP's radiation monitoring systems to the SNRIU continued to be interrupted and was not restored during the reporting period. Data from the on-site and off-site radiation monitoring stations continued to be provided to ISAMZ manually several times a week and were uploaded to and displayed on the Agency's International Radiation Monitoring Information System (IRMIS). ISAMZ conducted independent radiation monitoring within the ZNPP perimeter. However, the backpack radiation monitoring systems used by ISAMZ were unable to establish a connection with the global positioning systems within the ZNPP perimeter, so it was not possible for the results to be uploaded to IRMIS. Consequently, ISAMZ initiated the practice of conducting gamma dose rate measurements at a series of fixed points on a regular basis. All radiation levels reported to and collected by ISAMZ were normal throughout the reporting period.

Radiation monitoring data from the monitoring stations in the 20 km radius around the ZNPP. Radiation levels are normal.

66. On 17 September 2024, the ZNPP conducted an emergency exercise based on a scenario featuring a loss of coolant accident in the Unit 1 reactor caused by a fictitious large earthquake, followed by a loss of all off-site power and the failure of all three of the unit's EDGs. A secondary aspect of the exercise scenario simulated a fire in the ZNPP's training centre and injuries to two staff members, which required an evacuation of the training centre and a fire brigade and ambulance response.

67. ISAMZ observed the exercise from the temporary emergency centre, located in Unit 2, and from the ZNPP training centre. ISAMZ observed that the Unit 1 full scope simulator was utilized for the exercise control room actions. Outside the training centre, ISAMZ observed the response to the fire scenario. Subsequently, ISAMZ was able to watch the exercise debriefing, during which ZNPP personnel provided feedback from the exercise.

68. ISAMZ reported that the ZNPP had noted reliability of the communication equipment as well as an appropriate response by participating staff. The ZNPP had also identified opportunities for improvement, including in communications between participants in the exercise regarding plant data on the accident, and the reporting of personnel contamination monitoring.[19]

69. The ZNPP informed ISAMZ that the new ZNPP emergency plan was going through the final review and approval process. ISAMZ held discussions with the ZNPP regarding the new plan and were informed of the following:

- The new plan was prepared in accordance with Rostechnadzor's published guidelines for emergency plans;
- The planning basis, which takes account of a loss of coolant accident considered in the safety analysis report, has not changed compared to the plan in place prior to the conflict;

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[19] See para. 2 above.

- Possible industrial incidents and external natural hazards were also considered in the development of the new plan;
- The new plan contains minor changes, mostly related to the ZNPP's interaction with external organizations such as Crisis Centre of the Rosatomenergo Concern, Russian chemical, biological, radioactive and nuclear (CBRN) forces, and the medical and fire and rescue services of Enerhodar and the surrounding areas; and
- The new plan might need to be revised once the emergency plan for the municipality of Enerhodar is prepared, to ensure that the plans are harmonized.[20]

Communications

70. Official communication between the ZNPP and the SNRIU has not been restored. The ZNPP remains in contact with the Ukrainian electricity grid operator on matters related to the off-site power supply.

71. ISAMZ reported that Internet connections remained functional even during reported power outages in the nearby city of Enerhodar. ISAMZ was able to connect to the local mobile telephone network as needed, providing a separate means of communication with the Agency's Headquarters.

72. However, ISAMZ reported that communications utilizing satellite phones and equipment with global positioning systems (i.e. backpack radiation monitoring system) were not functional at the ZNPP.

Five concrete principles for protecting the ZNPP

73. During the reporting period, the Agency continued to monitor observance of the Five Principles at the ZNPP. ISAMZ conducted regular walkdowns within the ZNPP site and other areas such as the ZNPP cooling pond and the 750 kV open switchyard. However, ISAMZ was not permitted to access several areas — including the western part of the turbine halls of all six units, the ZNPP cooling pond isolation gate, the inside of cooling tower number 2 and the ZTPP 330 kV open switchyard — throughout the entire reporting period. The access restrictions imposed on ISAMZ by the ZNPP continue to limit the Agency's ability to fully assess whether all Five Principles are being observed at all times.

74. Based on its observations and with these limitations, ISAMZ did not find any indications that the Five Principles were not being observed during the reporting period. However, ISAMZ observed that some principles were put at risk during the reporting period. Although ISAMZ did not report or could not confirm any attacks from or against the plant targeting the reactors, spent fuel storage, or other critical infrastructure or personnel, it continued to report that it regularly heard explosions and gunfire in proximity to the ZNPP site perimeter and that military activities involving drones were reported by the ZNPP at various distances from the site perimeter.

75. ISAMZ followed up on a reported drone attack on a substation approximately 300 metres away from the ZNPP site perimeter on 21 September 2024. ISAMZ visited the affected substation and observed the impact on one of the substation's two transformers. Moreover, after alleged shelling on the Raduga substation in the city of Enerhodar on 29 September 2024, ISAMZ observed damage to a power line connecting the ZNPP and the ZTPP 150 kV open switchyard.

76. ISAMZ did not observe any heavy weapons during walkdowns of the areas to which it had access. However, for the Agency to fully confirm the absence of heavy weapons at the ZNPP, timely and appropriate access to all areas important for nuclear safety and security is needed.

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[20] See para. 2 above.

77. ISAMZ continued to report the presence of armed troops (which the Russian Federation claims are members of the Russian National Guard and some CBRN specialists) and military equipment such as armoured personnel carriers, military logistics-type vehicles, and weapon-mounted armoured vehicles. ISAMZ reported that armed troops prevented its access to the western parts of the turbine halls.

78. During the reporting period, the ZNPP did not suffer a total loss of off-site power. However, the 330 kV Ferosplavna 1 back-up line was disconnected on three occasions[21] as a result of military activity outside the ZNPP site perimeter, demonstrating that the third concrete principle continues to be at risk.

> "***The off-site power situation remains a deep source of concern. This week's loss of the 330kV power line shows that the situation is not improving in this regard — on the contrary.***"
>
> Director General Rafael Mariano Grossi, 3 October 2024

79. The ZNPP stated that key infrastructure at the site was protected by Russian troops and that additional physical protection measures had been put in place, as reported in documents GOV/2022/66 and GOV/2023/10. However, it is not possible for the Agency to fully confirm that all structures, systems and components essential for the safe and secure operation of the ZNPP are protected against attacks or acts of sabotage, due to limitations on and inconsistencies in access and information.

B.2.2. Khmelnytskyy, Rivne and South Ukraine NPPs

80. During the reporting period, the KhNPP, the RNPP and the SUNPP continued to be the only operating NPPs in Ukraine producing electricity for the Ukrainian network. All reactors (nine in total) at these sites remained in operation during the reporting period, except during scheduled outages for maintenance and refuelling. On 4 September 2024, one unit at the RNPP that had been shut down following electrical grid fluctuations caused by military activities affecting energy infrastructure was reconnected to the grid and reached nominal power three days later on 7 September 2024. As a result of the grid fluctuations experienced at the SUNPP, one unit at the SUNPP was shut down between 20 and 25 September 2024 to repair an electrical motor of one of the reactor coolant pumps. At the SUNPP, Unit 1 was disconnected from the grid for approximately four hours on 22 October 2024.

81. At the KhNPP, the refuelling outage of Unit 1 was completed on 1 October 2024, while on 9 October 2024, the refuelling outage of Unit 2 was completed at the RNPP.

82. Throughout the reporting period, frequent air raid alarms were reported by the Agency staff present at these NPPs, some of which required them to take shelter.

Physical integrity

No physical damage was caused to the KhNPP, the RNPP or the SUNPP as a result of military activities during the reporting period. Activities at all three NPPs to protect critical structures, systems and components, and vital structures through additional mitigatory measures, were reported to have continued.

Nuclear safety and security systems and equipment

83. All nuclear safety and security systems at the KhNPP, the RNPP and the SUNPP continued to operate as designed and to be fully functional. The plants' operating staff conducted regular operational

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[21] See para. 57 above.

testing and preventive maintenance of the safety systems, some of which was witnessed by the Agency staff present on site.

84. On 22 October, Unit 1 at the SUNPP was disconnected from the grid at 18:05 local time due to the actuation of the safety systems. The reactor was not shut down, and Unit 1 was reconnected to the grid at 22:11 local time. An investigation of the root cause of the actuation was initiated by the SUNPP.

85. No additional challenges to the safe operation of the KhNPP, the RNPP and the SUNPP were reported.

ISAMISU conducting a walkdown of a turbine hall with counterparts at the SUNPP. (Photo: SUNPP)

Operating staff

86. All three NPPs reported that they had a sufficient number of qualified operating staff to ensure safe and secure plant operation. ISAMIK, ISAMIR and ISAMISU did not report any change in staffing levels during the reporting period. However, the operating staff at these NPPs continued to be exposed to increased stress due to the armed conflict, including as a result of frequent air raid alarms.

Off-site power supply

87. All three operating NPPs benefit from a robust design that provides for several independent connections with the outside grid. Agency staff regularly monitored the status of the off-site power and reported that, during the reporting period, several off-site power lines were temporarily disconnected for planned maintenance.

88. Additionally, off-site power lines at all NPPs experienced periods of disconnection, as follows:

- At the KhNPP, one of the two 750 kV off-site power lines was taken out of operation between 24 September and 1 October 2024 at the request of the grid operator. The reconnection of the power line coincided with the return to operation of Unit 1 following the completion of the planned outage.

- At the RNPP, following the military activities affecting energy infrastructure in August 2024, the fourth and final 330 kV off-site power line was reconnected on 2 September 2024, meaning all four such lines were again available. The two 750 kV off-site power lines were reconnected on 4 and 10 September 2024, respectively. On 23 September 2024, one 110 kV off-site power line was disconnected for a few hours at the request of the grid operator.
- At the beginning of the reporting period, the two 750 kV off-site power lines at the SUNPP were unavailable following the military activities in August 2024 affecting energy infrastructure. They were reconnected on 23 and 24 September 2024, respectively.

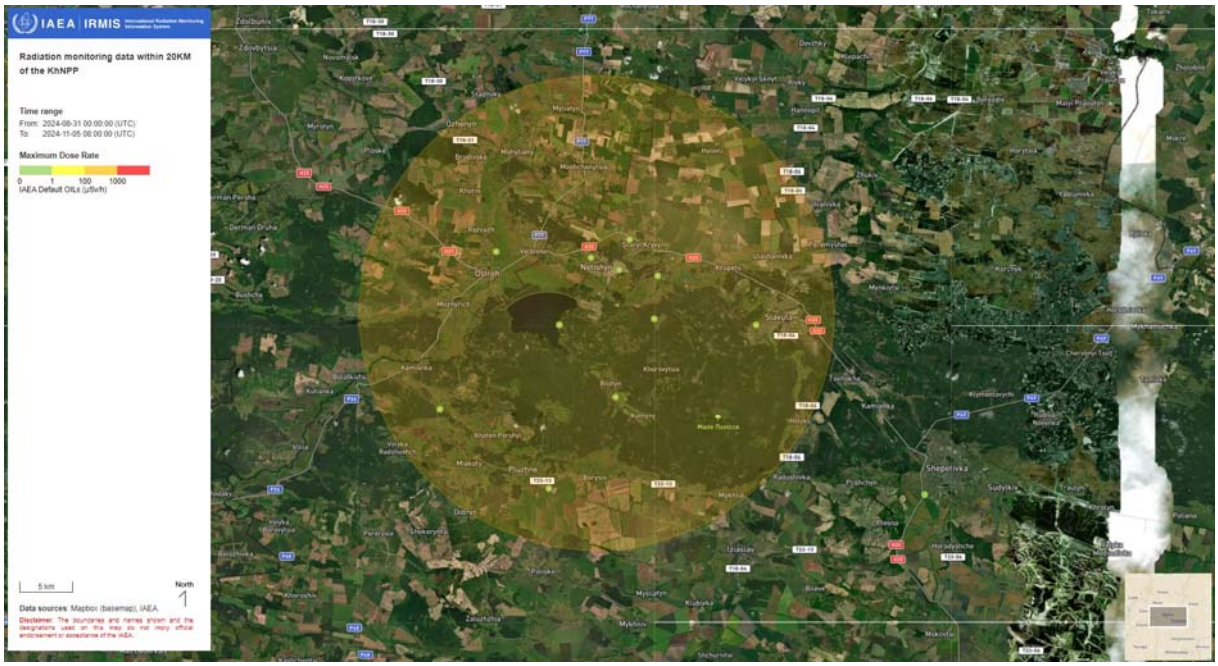
Logistical supply chain

89. No new challenges to the logistical supply chains for the KhNPP, the RNPP and the SUNPP were identified during the reporting period.

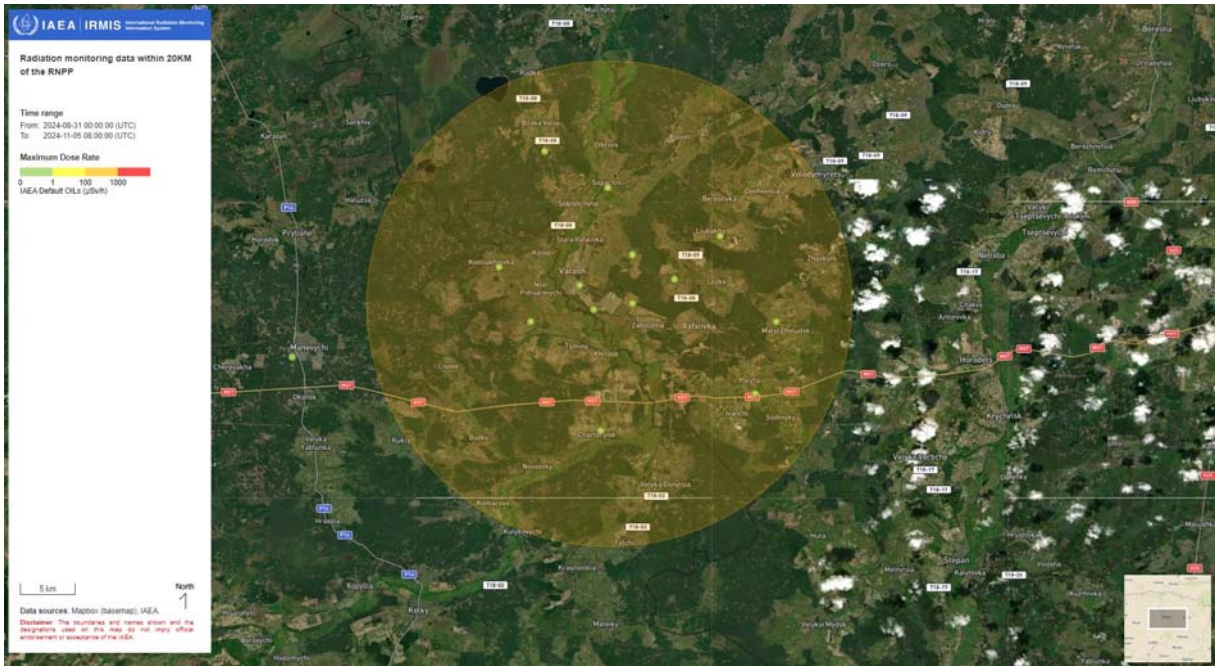
On-site and off-site radiation monitoring systems and emergency preparedness and response

90. During the reporting period, ISAMIK held meetings on radiation protection and monitoring and observed an on-site emergency drill. ISAMIK and ISAMISU held meetings with the respective fire safety departments, while all Agency teams visited their respective on-site emergency response centres.

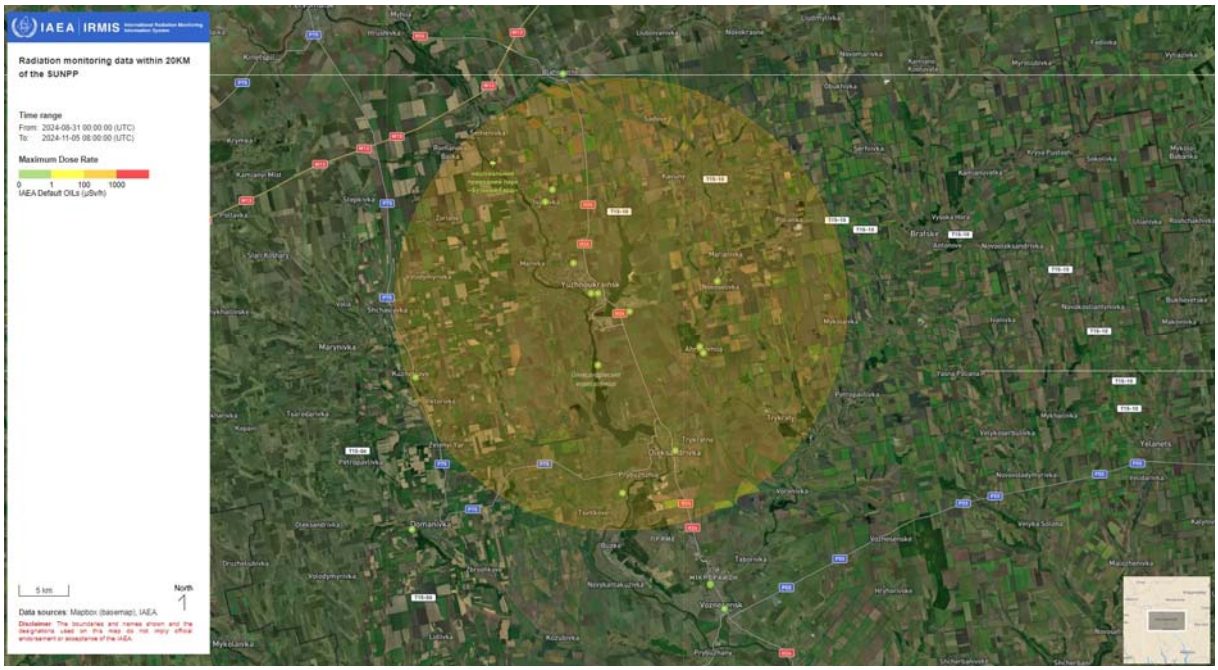
91. All off-site radiation monitoring stations were reported to be operational throughout the reporting period, with the measurements transmitted to and displayed on IRMIS.



Radiation monitoring data from the monitoring stations in the 20 km radius around the KhNPP. Radiation levels are normal.



Radiation monitoring data from the monitoring stations in the 20 km radius around the RNPP. Radiation levels are normal.



Radiation monitoring data from the monitoring stations in the 20 km radius around the SUNPP. Radiation levels are normal.

Communications

92. All means of communication remained available during the reporting period.

93. Agency staff reported that inspectors from the SNRIU continued to be present at all three NPPs.

B.2.3. Chornobyl NPP Site and Other Facilities

94. The nuclear safety and security situation at the ChNPP site did not show any significant deviation from the situation previously reported in documents GOV/2022/52, GOV/2022/66, GOV/2023/10, GOV/2023/30, GOV/2023/44, GOV/2023/59, GOV/2024/9, GOV/2024/30 or GOV/2024/45 with regard to the assessment of the nuclear safety and security situation against the Seven Pillars.

Physical integrity

95. ISAMICH reported that no events occurred during the reporting period that affected the integrity of the facilities on site.

Nuclear safety and security systems and equipment

96. ISAMICH reported that there were no situations in which nuclear safety and security systems were not functional. However, ISAMICH was informed by the ChNPP that some of the nuclear safety and security systems require maintenance and funding to replace older equipment with more modern versions.

Operating staff

97. As highlighted in more detail in documents GOV/2023/59, GOV/2024/9 and GOV/2024/30, ISAMICH confirmed that living conditions for staff remained a challenge, although the situation still allowed for the safe and secure operation of the site.

Off-site power supply

98. The 110 kV back-up power lines remained connected for the majority of the reporting period. Following the military activities that affected the sole 750 kV off-site power line and one of the 330 kV off-site power lines towards the end of the previous reporting period, the off-site supply returned to normal configuration on 6 September 2024.

99. On 9 September 2024, one of the 330 kV off-site power lines at the site was disconnected for about 40 minutes due to a technical issue that was quickly resolved.

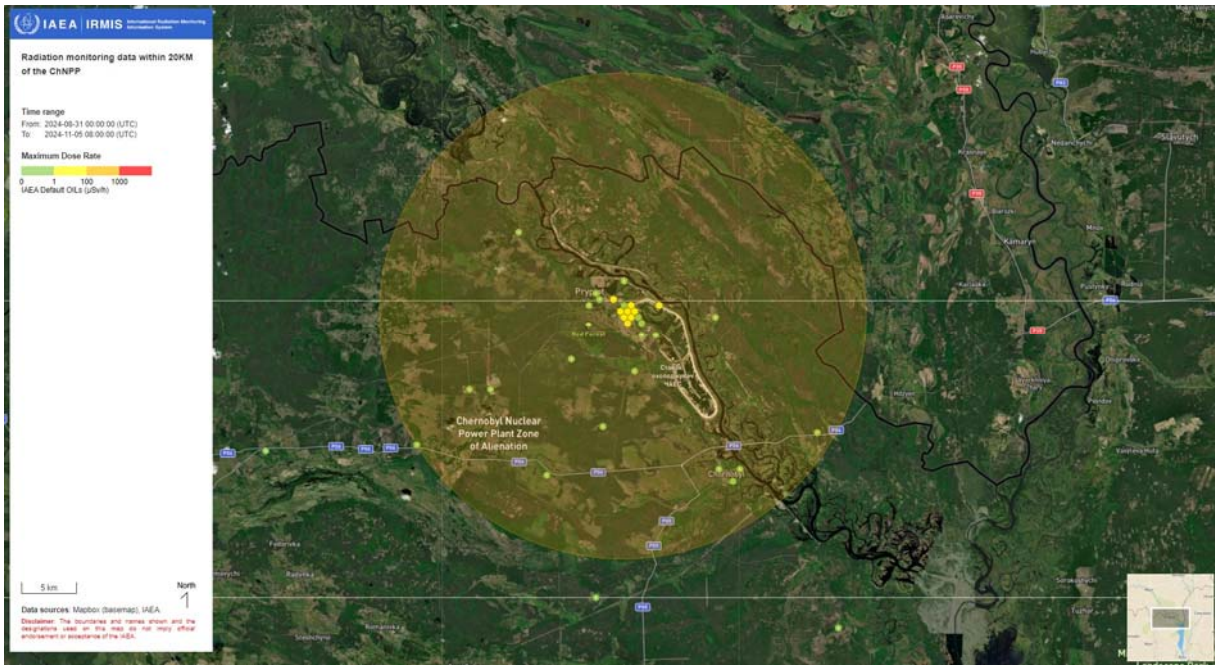
100. Between 17 and 19 October 2024, one of the five 110 kV off-site power lines at the site was disconnected for planned maintenance.

Logistical supply chain

101. Challenges in the supply chain and in transportation to and from the site remain, as the infrastructure in the region has been impacted by the armed conflict.

On-site and off-site radiation monitoring systems and emergency preparedness and response

102. During the reporting period, the ISAMICH teams visited emergency shelter #1 and confirmed it to be fully operational. Off-site and on-site radiation monitoring systems were also reported to be fully operational. Radiation levels and dose rates are continuously monitored and are reported to be normal.



Radiation monitoring data from the monitoring stations in the 20 km radius around the ChNPP. Radiation levels are normal.

103. A limited scope emergency exercise with a blackout scenario was conducted successfully at the ChNPP site on 12 September 2024.

Communications

104. The ChNPP maintained the availability of all necessary means of communication with stakeholders without interruption.

Other facilities

105. SNRIU informed the Agency that the subcritical Neutron Source installation located in the Kharkov Institute of Physics and Technology was shelled on 14 September 2024 but was not damaged. This nuclear research facility, located in north-eastern Ukraine, had already been heavily damaged during the first year of the conflict, without any indication of radiological release or diversion of declared nuclear material.

106. Between 08:28 and 10:37 local time on 7 November 2024, the Centralized Spent Fuel Storage Facility, located within the Chornobyl Exclusion Zone, lost all off-site power. During this time, the facility was powered by emergency diesel generator.

B.3. IAEA Technical Support and Assistance for Nuclear Safety and Security

107. The Agency continued to make progress in the delivery of its comprehensive programme of assistance to Ukraine. In addition to the in-person technical support and assistance provided through on-site expert missions — including the continued presence of Agency staff at the five nuclear sites in Ukraine, further information on which is provided in Section B.1. — the programme consists of the delivery of nuclear safety- and security-related equipment; a medical assistance programme for operating staff at the NPPs; and assistance in managing the environmental, social and economic impact of the flooding following the destruction of the Kakhovka dam. It also encompasses remote assistance and the deployment of rapid assistance should the need arise.

108. The Agency and its Ukrainian counterparts have continued to cooperate closely in order to better understand and address the priority needs of Ukraine as efficiently as possible as the situation evolves. This effort needs to continue, with strong coordination and cooperation at the national level, taking into account that the needs are great and the available resources are limited.

109. The Agency has also continued to work closely with a number of Member States and international organizations to ensure coordination in the provision of technical support and assistance to Ukraine, and to secure the funding necessary to enable the delivery of the assistance needed.

110. By 12 November 2024, 26 Member States[22] and 1 international organization[23] had offered extrabudgetary cash contributions to support Agency efforts in providing technical support and assistance to Ukraine in nuclear safety, security and safeguards, including for sustaining the continued presence of Agency staff at the 5 nuclear sites in Ukraine.

111. An overview of the latest developments regarding the different components of the comprehensive programme for assistance to Ukraine is presented below.

B.3.1. Delivery of Nuclear Safety- and Security-related Equipment

Requests for assistance in terms of nuclear safety- and security-related equipment

112. During the reporting period, no additional request was received for nuclear safety- and security-related equipment to be provided under the statutory functions of the Agency and the operational arrangements[24] under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention). The total number of requests for assistance remained unchanged compared to those reported in document GOV/2024/45 (11 in total).

Offers of assistance

113. By 12 November 2024, 13 Member States[25] had offered assistance in the form of in-kind contributions of nuclear safety- and security-related equipment for supporting Ukraine. No new offers of in-kind contributions of equipment were received during the reporting period.

Delivery of nuclear safety- and security-related equipment

114. The Agency continued to deliver equipment to various organizations in Ukraine. During the reporting period, the Agency organized a total of 8 deliveries of nuclear safety- and security-related equipment, bringing the total number of such deliveries to 67, including deliveries to meet the needs of the energy sector in Ukraine.

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[22] Australia, Austria, Belgium, Canada, China, Czechia, Denmark, Finland, France, Germany, Ireland, Italy, Japan, the Republic of Korea, Malta, the Kingdom of the Netherlands, New Zealand, Norway, Poland, Saudi Arabia, Slovakia, Spain, Sweden, Switzerland, the United Kingdom (UK) and the United States of America (USA).

[23] The European Commission representing the European Union.

[24] The operational arrangements include the IAEA Response and Assistance Network (RANET) and the Operations Manual for Incident and Emergency Communication (EPR-IEComm 2019) available at: International operational arrangements | IAEA.

[25] Australia, Canada, France, Germany, Greece, Hungary, Israel, Japan, Romania, Spain, Sweden, Switzerland and the USA.

Thermal vision cameras during their testing at the RNPP.Cameras were delivered on 17 September 2024 and procured using extrabudgetary funding from the United Kingdom. (Photo: RNPP)

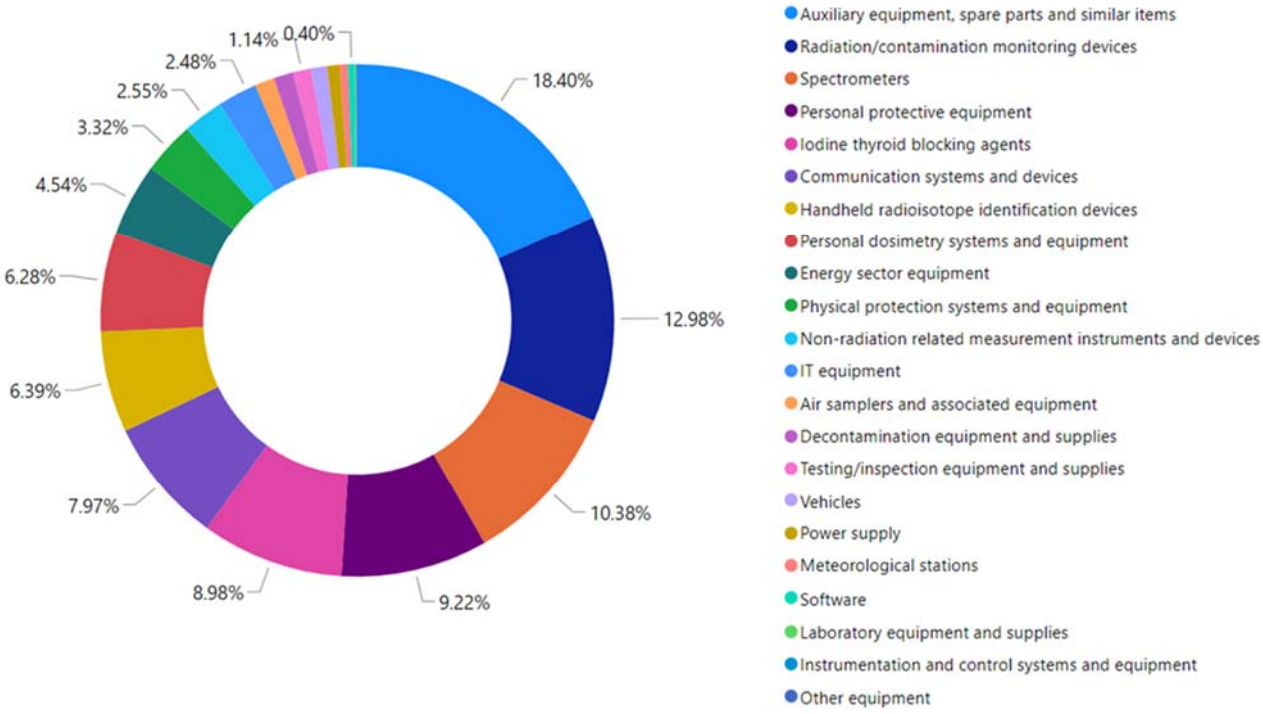
Local vertical wind profiler successfully installed at the KhNPP on 5 November 2024. The equipment was procured using extrabudgetary funding from the European Union. (Photo: KhNPP)

115. These eight deliveries comprised equipment procured by the Agency under extrabudgetary contributions provided by Australia, Canada, France, Japan, New Zealand, the Republic of Korea, Switzerland and the UK. As a result of these deliveries, the Joint Stock Company "Chernihiv Oblenergo", the Public Health Centres of the Ministry of Health of Ukraine, the RNPP, the SUNPP, the Ukrainian Hydrometeorological Centre and the hydrometeorological organizations of the State Emergency Service of Ukraine and the Eastern Mining and Processing Enterprise "VostGOK" and the State Enterprise "USIE Izotop" received equipment such as spectrometers, radiation monitoring devices, physical protection systems and equipment, personal protective equipment, power supply systems and spare parts.

116. During the reporting period, the Agency successfully coordinated the delivery of the frames of static test benches from the RNPP to the original supplier in Germany for repair. The repair is expected

to be completed next year and the static test benches returned to the site. The equipment is used to stress test components, including hydraulic shock absorbers. This project is fully funded by Norway.

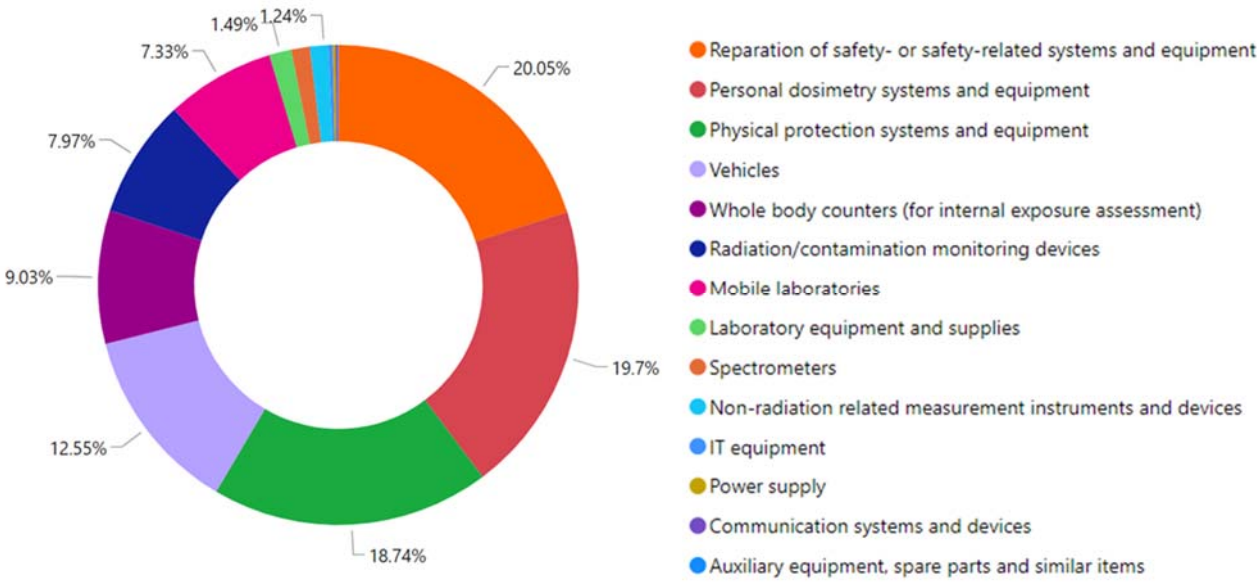
117. Following these deliveries, the value of the nuclear safety- and security-related equipment delivered to Ukraine since the start of the armed conflict amounts to €11.81 million.



Overview of the monetary value of items as a percentage of the total monetary value of the nuclear safety- and security-related equipment worth €11.81 million delivered to 17 different organizations in Ukraine since the start of the armed conflict.

118. During the reporting period, the Agency continued liaising with Canada to finalize arrangements for the third and final shipment of donated equipment.

119. More nuclear safety- and security-related equipment procured by the Agency is expected to be transported to 15 different organizations in Ukraine in the coming months. The total cost of these expected deliveries exceeds €4.04 million. Additional nuclear safety- and security-related equipment is in various stages of procurement and exceeds €5.4 million, with many more items and pieces of priority equipment in the preparation and funding allocation stage.



Overview of the monetary value of items as a percentage of the total monetary value of the nuclear safety- and security-related equipment procured (in transit or pending readiness) for delivery to Ukraine.

B.3.2. ISAMRAD

120. During the reporting period, the Agency and the SNRIU signed the ISAMRAD Phase One Assistance Action Plan (AAP) on 14 October 2024.

121. In coordination with the SNRIU, the Agency conducted the second ISAMRAD in Ukraine from 2 to 8 November 2024 to initiate the implementation of Phase One of the ISAMRAD programme.

122. ISAMRAD Phase One specifically focuses on aspects related to the development of operational plans for the recovery, consolidation and transfer of vulnerable high activity radioactive sources and disused sources to mitigate immediate safety and security concerns and the development of plans for the installation, upgrading, and repair of PPSs and safety monitoring and measuring equipment at potentially vulnerable locations storing or using high activity radioactive sources.

123. The ISAMRAD team observed that the SNRIU already possessed a plan to recover vulnerable radioactive sources in areas of military activity on Ukrainian territory. It is recognized, however, that the implementation of this plan faces several logistical, technical and security challenges. The SNRIU expressed the need for Agency support to organizations with relevant responsibilities within this strategic plan to ensure optimal coordination and delivery of the necessary equipment to support activities for recovering these radioactive sources and for their safe and secure management.

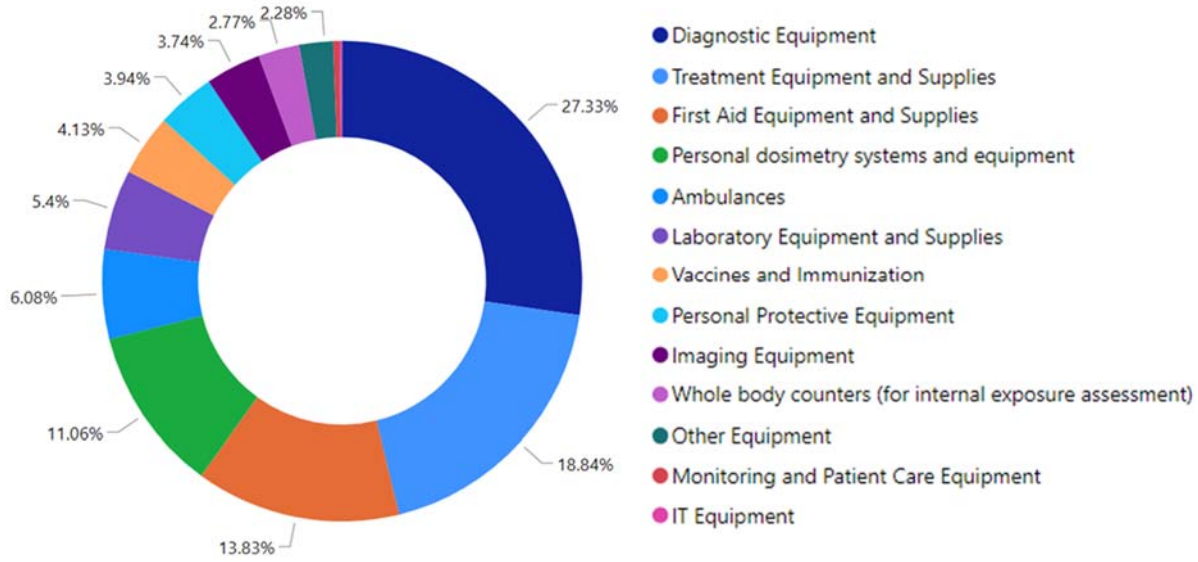
124. The Agency is currently defining the details of support to these organizations to facilitate assistance that could be provided within ISAMRAD, based on the findings and estimated costs associated with the delivery of such assistance.

ISAMRAD team viewing a high security transport vehicle for radioactive material.

B.3.3. Medical Assistance for Operating Staff at NPPs

125. The Agency continued to deliver on this component of the assistance programme to beneficiaries in Ukraine. Progress was made in procuring and delivering priority medical equipment and supplies, with the aim of helping to enhance the healthcare services available for operating personnel at the ChNPP site, the KhNPP, the RNPP and the SUNPP. In this regard, the Agency visited the warehouse of the main supplier for this programme where the team performed conformity checks of procured goods and observed the conditions that provide for proper handling and preservation of goods prior to shipment.

Agency staff during the visit of the main supplier's warehouse for the medical programme.



Overview of the monetary value of items as a percentage of the total monetary value of medical equipment and supplies, including radiation protection and monitoring equipment, in transit or under procurement for all nine beneficiary organizations of the medical assistance programme, in the amount of approximately €3.32 million.

126. During the reporting period, the Agency organized a total of 7 deliveries of equipment, bringing the total number of such deliveries to 9.

127. The deliveries comprised equipment procured by the Agency under extrabudgetary contributions provided by Norway, Japan and the USA. As a result of these deliveries, Energoatom, the SNRIU, South Ukraine, Netishyn, Slavutych and Varash hospitals, as well as the ChNPP, the KhNPP, the RNPP and the SUNPP received the following equipment and supplies:

- 550 beds and mattresses for the ChNPP, intended to replace the foldable beds that have been in use for the past two years, thereby significantly improving the living conditions of the ChNPP staff.
- 2000 rabies vaccines to Slavutych, Varash, Netishyn and South Ukraine hospitals, intended to strengthen the hospitals' capacity to provide life-saving treatment, and to protect the staff of nearby NPPs and communities from the deadly virus, which poses a nationwide threat.
- 13,000 antigen combo rapid test kits to the operating NPPs, the Chornobyl site, the SNRIU and Energoatom. The antigen test kits play a critical role in the NPPs' response to the recent surge in COVID-19 and other respiratory infections, enabling the early identification and isolation of infectious cases and thus preventing widespread sick leave among the operating personnel.

Rabies vaccines delivered to Varash hospital. The delivery was supported with funding from Norway and the USA. (Photo: Varash Hospital)

- Medical equipment and supplies were provided for the medical unit at the ChNPP and for the Slavutych and South Ukraine hospitals, comprising items such as pulse oximeters, dry heat and steam sterilizers, first aid kits, electrocardiographs, biochemical analysers, a gynaecological chair, syringe pumps and similar equipment to enhance diagnostic and treatment capabilities.

New bed with a mattress delivered to the ChNPP (left). A total of 550 beds and mattresses (right) were delivered in September 2024, with support from Norway. (Photo: ChNPP)

128. During the reporting period, the Agency continued to implement the next round of mental health support for the staff and managers of Ukrainian NPPs, as well as for the psychologists and mental health teams supporting them. These tailored virtual training sessions, which involved over 40 participants, were conducted by three local psychologists from the Social and Psychological Centre in Slavutych. The trainings focused on critical topics such as post-traumatic stress disorder, psychological recovery, stress resilience, and the prevention of professional burnout.

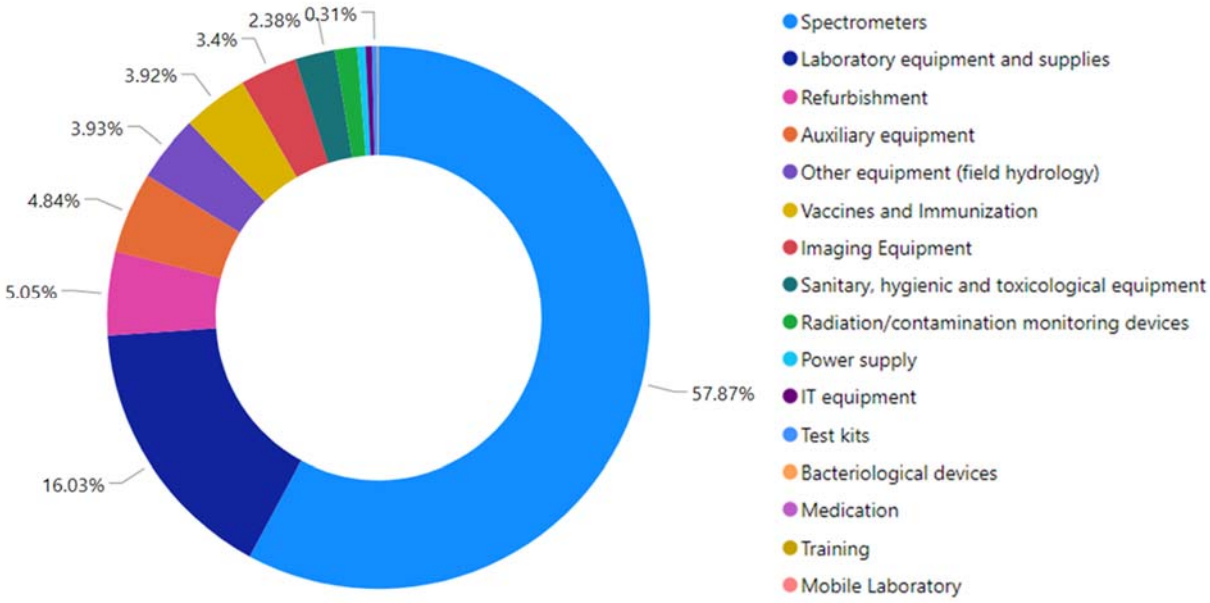
129. Building on these virtual sessions, a three-day in-person workshop with over 30 participants started in Truskavets, Ukraine on 11 November 2024. Through practical exercises, collaborative discussions, and interactive sessions, mental health professionals not only enhanced their professional skills but also strengthened connections within the Ukrainian NPPs' mental health community. This workshop underscores the IAEA's commitment to strengthening the psychological resilience and wellbeing of Ukraine's nuclear personnel, essential for maintaining nuclear safety and security. The delivery of the workshop was supported with funding from Japan.

Director General Rafael Mariano Grossi delivering a video message at the opening of the workshop in Truskavets, Ukraine on 11 November 2024.

B.3.4. ISAMKO

130. No new request for assistance was received under this component of the assistance programme during the reporting period. The total number of requests remains 2, comprising an estimated €2.8 million of nuclear or isotopic technique-based equipment and associated supplies to address the areas of human and animal health, food safety and soil and water management for a total of 22 beneficiaries, including the Ministry of Health of Ukraine and its Regional Centres for Disease Control and Prevention in areas affected by the destruction of the Kakhovka dam and its healthcare institutions in Kherson; the Ukrainian Geological Survey under the Ministry of Energy and its regional laboratories; the State Service of Ukraine on Food Safety and Consumer Protection and its regional laboratories; the Ukrainian Hydrometeorological Institute of the State Emergency Service of Ukraine; and the State Scientific Research Institute of Laboratory Diagnostics and Veterinary and Sanitary Expertise in Kyiv.

131. Progress was made during the reporting period on the procurement of priority items worth €1.55 million, amounting to over 65% of the requested needs.



Overview of the monetary value of items as a percentage of the total monetary value of equipment and supplies requested for all 22 beneficiary organizations of ISAMKO, in the amount of approximately €2.8 million.

132. The Agency also conducted a series of coordination meetings with the ISAMKO focal point and other potential beneficiaries regarding assistance in the area of non-destructive testing, with the aim of identifying the assistance needed and appropriate beneficiaries.

B.3.5. Remote Assistance

133. The Agency agreed training activities on the topics of leadership and management for nuclear safety and security, including safety and security culture and cybersecurity, to be delivered to all Ukrainian NPPs throughout 2024 and 2025 through remote webinars and on-site training, taking advantage of the continued presence of Agency staff at the sites.

134. On 17, 23 and 24 October 2024, the Agency implemented the first virtual trainings for the ChNPP, the RNPP and the SUNPP sites on the topics of human performance and management observation and coaching. The trainings were intended to raise awareness of and train relevant staff in the basic principles of a human performance programme and possible methods for reducing human error, and to present the

management observation and coaching programme for excellence. A total of 60 participants took part in the human performance programme training, while 59 participants took part in the management observation and coaching training.

Staff of the RNPP attending the remote Agency training on human performance and management observation and coaching. (Photo: RNPP)

B.3.6. Deploying Rapid Assistance

135. No nuclear or radiological emergency involving nuclear facilities or activities involving radioactive sources was declared during the reporting period, and no deployment of rapid assistance was requested.

C. Implementation of Safeguards in Ukraine

C.1. Background

136. Ukraine acceded to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT) as a non-nuclear-weapon State in December 1994. Ukraine subsequently brought into force a comprehensive safeguards agreement (CSA) with the Agency in connection with the NPT in January 1998 and an additional protocol (AP) thereto in January 2006.

137. The Agency implements safeguards at 35 nuclear facilities and more than a dozen locations outside facilities (LOFs) in Ukraine. The safeguards implementation effort is concentrated at 4 NPP sites, which

host 15 operational power reactors, and at the ChNPP site, which hosts 3 shut down reactors, the reactor damaged in the 1986 nuclear accident, and 2 spent fuel processing and storage facilities.

138. On 25 February 2022, Ukraine submitted to the Agency a special report under Article 68 of its CSA informing the Agency that "as a result of the temporarily occupied territory of Chernobyl region, Ukraine has lost control over nuclear material" subject to safeguards on the ChNPP site. Ukraine submitted two additional special reports to the Agency, dated 4 March and 5 July 2022, regarding Ukraine's loss of control over nuclear material at all facilities on the Zaporizhzhya site and at three LOFs in south-eastern parts of Ukraine, respectively.

139. Despite the very challenging circumstances, the Agency has continued to implement safeguards in Ukraine, to verify the declared nuclear material at declared facilities and LOFs and/or design information at such facilities.

C.2. Recent Developments

140. Since the Director General's previous report, the Agency has continued to rely on remotely transmitted data from its cameras, seals and unattended monitors to maintain continuity of knowledge over declared inventories of nuclear material. All data collected by these systems were transmitted successfully to the Agency's Headquarters during the reporting period. The Agency has maintained its continuous acquisition and analyses of open source information, and its analyses of satellite imagery covering nuclear installations in Ukraine. This has proved to be essential for the Agency in the preparation of its in-field verification activities, in particular at the Zaporizhzhya site. The Agency has been acquiring and analysing satellite imagery and continuously monitoring all available open source information to track developments and to assess the operational status of the plants, including the detection of possible damage caused by shelling at the site.

141. With the establishment of a continuous presence of Agency staff at the KhNPP, the RNPP, the SUNPP and the ZNPP, as well as at the ChNPP site, safeguards activities have been integrated with the various IAEA Support and Assistance Missions to the extent possible. Designated safeguards inspectors typically comprise part of the technical experts continuously present in Ukraine. For efficiency reasons, Agency inspectors are scheduled so as to be present whenever safeguards activities are planned — for example, to conduct physical inventory verifications or spent fuel transfer verifications — and otherwise provide technical support to the ongoing safety and security missions. Independent safeguards missions are planned, as needed, for activities that cannot be covered in the course of IAEA Support and Assistance Missions, including the installation or servicing of safeguards equipment and the conduct of complementary access.

142. During the reporting period, the Agency successfully conducted physical inventory verifications at a number of facilities and LOFs in Ukraine. Complementary accesses were also carried out in Ukraine. The Agency verified spent fuel that was transferred from the KhNPP to the centralized storage facility at the ChNPP. In addition, the Agency verified the transfer of spent fuel from the spent fuel storage at the ChNPP to dry storage at Chornobyl. The Agency also verified inter-unit transfers of spent fuel at one NPP. The participation of Agency inspectors as part of the various IAEA Support and Assistance Missions has continued to enable the implementation of interim verifications of declared nuclear material inventories. Finally, Agency technical experts continued to travel to NPPs and to the ChNPP site to install, service and maintain the Agency safeguards systems that monitor the loading and transfer of spent fuel from NPPs and the spent fuel pond at the Chornobyl site to dry storage at Chornobyl.

D. Summary

143. The situation at the ZNPP continues to be precarious, with six of the Seven Pillars being compromised fully or partially. The plant kept all units in cold shutdown throughout the reporting period.

144. The ZNPP continued to face challenges related to the number of available off-site power lines and their disconnection following military activities affecting the energy infrastructure in Ukraine. Military activities including explosions, drone attacks and gunfire in the vicinity of the ZNPP, as well as the presence of Russian armed troops and military equipment on site, continued to be reported by ISAMZ. While ISAMZ did not find any indications that the Five Principles were not being observed during the reporting period, activities affecting, for example, the off-site power supply or, potentially, the staff of the ZNPP continue to put the Five Principles and the overall nuclear safety and security of the plant at great risk.

145. ISAMZ continued to face some restrictions in obtaining timely and appropriate access to all areas of relevance to nuclear safety and security and in having open discussions with all relevant staff at the ZNPP. This limits the Agency's ability to make its assessment and report impartially and objectively on the nuclear safety and security situation at the site, and to fully assess whether all Five Principles are being observed at all times.

146. The Agency continued to request timely and appropriate access to all areas of the ZNPP of significance for nuclear safety and security and to strongly encourage the ZNPP to ensure that open information sharing take place regularly to enable the Agency to make its independent, impartial and objective assessment of the nuclear safety and security situation at the site.

147. During the reporting period, the KhNPP, the RNPP and the SUNPP continued to operate safely and securely despite the challenging circumstances imposed by the armed conflict. The military activities on the territory of Ukraine resulted in frequent reports of drones observed flying in close proximity to the NPPs, frequent air raid alarms at the sites, and impacts on energy infrastructure, resulting in instability of the electrical grid, increasing the risk to the safe and secure operation of the plants.

148. The Agency continued providing technical support and assistance to Ukraine related to nuclear safety and security and to make progress on the delivery of various components of the comprehensive programme of assistance to Ukraine. Moreover, the Director General announced the expansion of the assistance programme to Ukraine to help ensure the stability of critical energy infrastructure for the safe operation of the NPPs, resulting in the first visits to seven electrical substations being completed during the reporting period.

149. During the reporting period, 15 deliveries of procured nuclear safety- and security-related equipment and medical equipment and supplies to various organizations in Ukraine were organized, bringing the total number of deliveries to 76. In total, over €12.08 million worth of equipment has been delivered to 20 organizations in Ukraine since the start of the armed conflict.

150. The Agency maintained a continuous presence at all nuclear sites without interruption, and all rotations were conducted in a timely manner and as planned. Maintaining the continued presence of Agency staff at all 5 nuclear sites in Ukraine continues to be a major undertaking for the Agency, requiring significant resources. As of 12 November 2024, a total of 155 missions comprising 157 Agency staff members had been deployed as part of the continued presence at all 5 nuclear sites in

Ukraine, totalling over 330 person-months in Ukraine. Some of the 157 Agency staff members participated in several rotations.

151. The Agency continued with delivery of additional mental health training sessions for NPP staff and managers and their mental health teams to assist them in building skills to manage the impact of the stressful and traumatic experience of the armed conflict.

152. The Director General is grateful to 30 Member States and the European Union for the extrabudgetary contributions provided to the Agency for assisting Ukraine in the area of nuclear safety, security and safeguards, and would welcome any further support.

153. The continued commitment of Member States and their close cooperation with the Agency are essential for ensuring nuclear safety and security in Ukraine under all circumstances and for providing assistance efficiently while ensuring the timely delivery of the Agency's programmatic activities.

154. The Agency has continued to undertake a vital verification role to reach independent conclusions that nuclear material under safeguards remains in peaceful activities and that safeguarded facilities are not used for the undeclared production or processing of nuclear material. The Agency continues to implement safeguards in Ukraine, including in-field verification activities, in accordance with Ukraine's CSA and AP. Based on the evaluation of all safeguards-relevant information available to the Agency to date, the Agency has not found any indication that would give rise to a proliferation concern.

Annex: Chronology of Events from 31 August to 12 November 2024

Events at the Zaporizhzhya Nuclear Power Plant

- On 2 September, the 330 kV Ferosplavna 1 back-up power line was disconnected in the evening, leaving the ZNPP reliant on a single 750 kV line. Shortly after the disconnection occurred, ISAMZ observed dark smoke in an area close to where the power line was disconnected, about three kilometres away, but it was not immediately clear if these events were linked. The ZNPP said it believed the disconnection was caused by military activities. The line was reconnected on 5 September.
- On 9 September, ISAMZ visited a transport workshop four kilometres from the ZNPP site perimeter following an alleged drone attack on 7 September. They observed a hole in one roof, and two trucks that had sustained minor damage.
- On 10 September, ISAMZ performed a walkdown of the turbine halls of Units 1 and 2 and were unable to access the western part of the hall.
- On 16 September, ISAMZ performed a walkdown of the turbine halls of Units 3 and 4 and were unable to access the western part of the hall.
- On 17 September, ISAMZ observed an emergency exercise conducted by the ZNPP, which simulated a loss of coolant accident in the Unit 1 reactor caused by a fictitious large earthquake, followed by a loss of all off-site power and the failure of all three of the unit's EDGs. A secondary aspect of the exercise scenario simulated a fire in the ZNPP's training centre and injuries to two staff members, which required evacuation of the training centre and a fire brigade and ambulance response.

- On 18 September, ISAMZ was informed by the ZNPP that two power lines supplying the nearby city of Enerhodar had been damaged by unspecified military activities the previous day, prompting the use of diesel generators to operate the pumping station for tap water — including for the ZNPP — as well as other facilities in the city. The lines were reconnected later that week. The event had no impact on nuclear safety and security at the ZNPP.
- On 19 September, the ZNPP informed ISAMZ of the five categories of maintenance it is implementing to ensure the reliability of the EDGs, and the frequency of maintenance.
- On 20 September, drone attacks occurred on civilian buildings, a petrol station, and the Luch and Zaria electrical substations — as reported to the Agency by Rosatom on 25 September. Damage to a transformer at the Zaria substation was reported.[26]
- On 21 September, ISAMZ was informed by the ZNPP of the drone strike that had allegedly occurred the previous day on Zaria substation approximately 300 metres away from the ZNPP site perimeter. This substation provides electricity to non-safety related facilities at the ZNPP, including a grid water pumping station, a water management plant, and external warehouses. ISAMZ visited the affected site that day and observed some impact on one of the substation's two transformers. The remains of batteries and pieces of metal that appeared to be remnants of a drone were also observed in the area.
- On 25 September, ISAMZ was informed by the ZNPP that it was not allowed to conduct its planned walkdown of the external warehouses and diesel fuel storage facility due to the risk from military activities.
- On 25 September, Rosatom reported to the Agency that drones attacked a residential building in Enerhodar, with damage sustained to two floors. There were no casualties.[27]
- On 25 September, a drone crashed 60 m outside of the ZNPP, which led to a fire of dry grass — as reported to the Agency by Rosatom on 26 September. There were no casualties or damage.[28]
- On 29 September, Rosatom reported to the Agency that the Raduga electrical substation in the city of Enerhodar had been damaged due to shelling.[29]
- On 30 September, ISAMZ visited the Raduga electrical substation in the city of Enerhodar after being informed of an alleged artillery strike on 29 September. ISAMZ confirmed that one of the two transformers at the substation was destroyed by shelling and that the other transformer had been unavailable since June 2024 due to damage to one of its power lines. The substation had been used to provide back-up power to the city of Enerhodar and to the industrial area near the ZNPP. The alleged shelling on 29 September also damaged another power line nearby that connects the plant to the 150 kV open switchyard of the ZTPP.

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[26] See para. 2 above.

[27] See para. 2 above.

[28] See para. 2 above.

[29] See para. 2 above.

- On 1 October, ISAMZ was informed that the 330 kV Ferosplavna 1 back-up power line had been disconnected in the morning, leaving the ZNPP reliant on a single 750 kV line. The reason for the disconnection was unknown. On 2 October, the line was reconnected.
- On 5 October, ISAMZ was informed that the ZNPP had restored its connection to a 150 kV power line that was reportedly damaged by shelling late September 2024.
- On 7 October, ISAMZ performed a walkdown of the turbine halls of Units 5 and 6 and was unable to access the western part of the hall.
- On 21 October, the 330 kV Ferosplavna 1 back-up power line was disconnected, leaving the ZNPP reliant on a single 750 kV line. On 22 October, the line was reconnected. The reason for the disconnection was not known.
- On 29 October, ISAMZ was informed that one of the impulse lines, part of the reactor coolant pump support systems, of Unit 1 was leaking and required repair. Unit 1 was placed into cold shutdown for maintenance to perform repairs, and was returned to cold shutdown state on 2 November 2024 following the completion of repairs.

Events at the Khmelnytskyy, Rivne and South Ukraine Nuclear Power Plants

- On 4 September, ISAMIK heard drones and gunfire in the early hours and was told to take shelter. The KhNPP and the SNRIU reported to the Agency that drones had flown within a few kilometres of the plant.
- On 5 September, ISAMISU heard drones and gunfire and was told to take shelter. The plant and the SNRIU said drones had flown close to the plant. ISAMISU did not observe any issues with respect to nuclear safety or security at the site following this event.
- On 10 September, ISAMIR was informed that a 750 kV line disconnected since the attacks in late August had been reconnected.
- On 12 September, ISAMISU heard drones and gunfire and was told to take shelter. The plant and the SNRIU said drones had flown close to the plant. The team did not observe any issues with respect to nuclear safety or security at the site following this event.
- On 12 September, the SNRIU reported to the Agency that drones had been observed flying in the area surrounding the KhNPP early that morning.
- On 18 September, ISAMISU was informed that several drones were flying at a distance of 6 kilometres from the plant. No damage to the plant or casualties were reported. Later that evening, the team decided to take shelter in their hotel upon hearing drones and gunfire.
- On 20 September, the Agency was informed by the SNRIU that, on the evening of 18 September early in the morning of 19 September, 22 drones had flown through the area of the SUNPP. One of them had flown directly over the plant, while the others had been observed approximately 1.5 kilometres from the plant.
- On 22 September, ISAMIK reported hearing anti-aircraft fire and a large explosion during an air raid alarm. In connection with this matter, the SNRIU reported to the Agency that a drone had been detected flying 3.4 kilometres away from the KhNPP.
- On 25 September, following the completion of repairs on the electrical motor of one of the main cooling pumps at Unit 2 of the SUNPP, which had been damaged as a result of military attacks on the electrical grid outside the plant on 26 August, the unit returned to operation.

- On 25 September, the Agency was informed by the SNRIU that 15 drones had been detected in the monitoring zone of the SUNPP overnight from 19 to 20 September. One drone was intercepted 8 kilometres from the plant. There was no damage to the plant itself.
- On 26 September, ISAMIK was requested to take shelter at the site multiple times due to consecutive air raid alarms.
- On 26 September, the Agency was informed by the SNRIU that, on the nights of 20 and 21 September, two and eight drones, respectively, had flown through the monitoring area of the SUNPP.
- On 1 October, Unit 1 of KhNPP was reconnected to the grid after completion of a refuelling outage that had started in July 2024.
- On 2 October, the Agency was informed by the SNRIU that on the nights of 27 and 29 September, 23 drones had flown through the area of SUNPP, including 1 over the plant.
- On 4 October, the Agency was informed by the SNRIU that five drones had flown near SUNPP early on 1 October, including one above the site.
- On 7 October, ISAMIK was told to take shelter at the plant as a result of an air raid alert. The Agency was subsequently informed by the SNRIU that a drone had been flying near the site during the morning.
- On 9 October, Unit 2 at the RNPP was reconnected to the grid following a planned outage that started in late August 2024.
- On 11 October, the Agency was informed by the SNRIU that, on 6 October, two drones had flown through the area of SUNPP.
- On 15 October, the Agency was informed by the SNRIU that, on 10 October, three drones were recorded within the monitoring zone of the SUNPP.
- On 17 October, the Agency was informed by the SNRIU that, in the evening of 14 October, five UAV flights were recorded within the monitoring zone of the SUNPP.
- On 18 October, the Agency was informed by the SNRIU that, earlier that morning, two drones were recorded near KhNPP and that, on 16 October, six drones were recorded near SUNPP.
- On 21 October, the Agency was informed by the SNRIU that, early that morning, three drones were recorded within the KhNPP monitoring zone.
- On 22 October, Unit 1 of the SUNPP was disconnected from the grid for about four hours due to a spurious signal to the unit’s protection systems, without the reactor safety systems being activated.
- On 28 October, the Agency was informed by the SNRIU that 12 drones had been flying near the KhNPP site that morning, the closest being 400 metres away. ISAMIK reported that it was told to take shelter at their hotel for several hours on the same day after hearing military activity.
- On 29 October, the Agency was informed by the SNRIU that drones had been reported near the SUNPP site on three occasions over the past week.

- On 7 November, the Agency was informed by the SNRIU that 2 and 13 drones had been flying in the area surrounding the SUNPP on the mornings of 3 and 6 November 2024 respectively.

Events at the Chornobyl Nuclear Power Plant Site

- On 9 September, ISAMICH was informed that one of the 330 kV off-site power lines had been disconnected for about 40 minutes due to a technical issue that was quickly resolved.

Events at Other Facilities

- On 14 September, the subcritical Neutron Source installation, located in the Kharkiv Institute of Physics and Technology (KIPT), was shelled, but did not suffer damage.
- On 7 November, the Centralized Spent Fuel Storage Facility, located within the Chornobyl Exclusion Zone, experienced a total loss of off-site power event from 08:28 to 10:37 local time, during which time the facility received power from its emergency diesel generator.
- No other events were reported affecting other facilities and activities in Ukraine.