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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 13 November 2024 to 27 February 2025 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 November 2024, the Director General provided the Board of Governors with a detailed report entitled *Nuclear Safety, Security and Safeguards in Ukraine* (document GOV/2024/63), covering the period from 31 August to 12 November 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/2022/71², 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/16⁴ 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,

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, Khmelnytsky, 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/2024/18⁶ 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 military and other unauthorized personnel from Ukraine’s ZNPP”.

6. On 11 July 2024, the UN General Assembly adopted resolution A/RES/78/316⁷ 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. On 20 September 2024, the General Conference, at its 68th regular session, adopted resolution GC(68)/RES/15⁸ 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, Khmelnytsky, 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”.⁹

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, 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.

⁸ IAEA General Conference resolution GC(68)/RES/15, adopted on 20 September 2024, paras 3 and 4.

⁹ IAEA General Conference resolution GC(68)/RES/15, adopted on 20 September 2024, paras 5 and 6.

8. On 12 December 2024, a meeting of the Board of Governors was convened at the request of Ukraine, as a Member of the Board of Governors, to address the implications of unstable energy infrastructure critical to safety and security of nuclear power plants (NPPs). On this occasion, the Board of Governors adopted resolution GOV/2024/73¹⁰, in which it “[e]mphasize[d] that attacks targeting Ukraine’s energy infrastructure critical for the off-site power supply of nuclear power plants represent a direct threat to nuclear safety and security, as outlined in the fourth ‘indispensable pillar for nuclear safety and security in an armed conflict’” and “[c]alle[d] on the [Agency] to continue to assess the risks and extent of damage to energy infrastructure in Ukraine including substations identified as essential for maintaining nuclear safety and security”. It also “[e]ncourage[d] all Member States to continue to provide political, financial, technical, and in-kind support to strengthen the [Agency’s] technical assistance and monitoring activities in Ukraine”.



Director General Rafael Mariano Grossi addressing the delegates and Member State representatives at the 1749th Board of Governors meeting held at the Agency’s Headquarters in Vienna, Austria on 12 December 2024.

9. During the reporting period¹¹, from 13 November 2024 to 27 February 2025, 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 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.

¹⁰ IAEA Board of Governors resolution GOV/2024/73, adopted on 12 December 2024, paras 1, 2 and 3.

¹¹ Following the reporting period referred to in GOV/2024/63.

10. 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/2022/52¹². 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/2023/30¹³.

11. On 10 December 2024, for the first time since the start of the armed conflict, a drone hit and severely damaged an Agency vehicle during the planned rotation of the incoming and outgoing ISAMZ teams. The incident occurred within Ukrainian controlled territory approximately 8 kilometres from the frontline. The vehicle, occupied by two Agency staff members, was the first in the convoy moving towards the frontline to meet the outgoing ISAMZ team. It was hit from behind and sustained damage to the rear section, but the two Agency staff members were unharmed. Despite the incident, the convoy continued its journey and the rotation was safely completed. The Director General condemned the attack and called for maximum restraint.

"This week's attack was a stark reminder of the potential dangers our staff are facing as they carry out their important nuclear safety and security work in an active war zone. They deserve all our sincere gratitude for helping to keep the Zaporizhzhya NPP safe."

Director General Rafael
Mariano Grossi, 12 December
2024



Damage sustained by an Agency armoured vehicle following the incident on 10 December 2024.

12. 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

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.

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 armed troops and military equipment on site, continued to be reported by ISAMZ, with no significant change compared to the previous reporting period. While ISAMZ did not find any indications that the Five Principles were not being observed during the reporting period, such activities continue to put the Five Principles and the overall nuclear safety and security of the plant at great risk.

13. 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.

14. The military activities on the territory of Ukraine resulted in frequent reports of drones observed flying in close proximity to the operating NPPs and frequent air raid alarms at these sites. On 14 February 2025, a drone hit the New Safe Confinement (NSC) that houses the remains of Unit 4 of Chernobyl NPP (ChNPP), which was severely damaged in the 1986 accident. The incident caused damage and a fire at the site, but no casualties. Although on-site and off-site radiation levels remained normal, the incident again underscored the persistent risks to nuclear safety and security arising from the armed conflict.

“It is especially concerning as it comes at a time when we are also seeing an increase in military activity in the area around Zaporizhzhya NPP. The Agency remains committed to doing everything we can to help prevent a nuclear accident. Judging by recent events, nuclear safety remains very much under threat.”

Director General Rafael Mariano Grossi,
15 February 2025

15. Moreover, additional attacks on the critical energy infrastructure were observed to have occurred during the reporting period, resulting in an increased risk to the safe and secure operation of the plants. In order to assess the impact on critical energy infrastructure, the Agency deployed, in December 2024, an additional mission to a number of substations critical for nuclear safety, in line with the agreement between the Director General and President Zelenskyy of 3 September 2024.

16. On 4 February 2025, the Director General led his 11th mission to Ukraine as part of the Agency's ongoing efforts to help stabilize the nuclear safety and security situation and prevent a nuclear accident. On this occasion, the Director General met President Zelenskyy and senior Government officials in Kyiv before visiting one of the substations, which Ukraine's NPPs are dependent upon for off-site power to cool their reactors, for other essential nuclear safety and security functions, and for transmission of the electricity generated. During his visit, the Director General observed the degradation of the infrastructure at the site of the Kyivska substation as well as the work conducted to help “preserve the stability of the grid”.



Director General Rafael Mariano Grossi with Ukraine's Minister of Energy, Herman Halushchenko, at the Kyivska substation on 4 February 2025.

17. On 6 February 2025, the Director General and senior Agency officials travelled to Moscow, where they met with State Atomic Energy Corporation "Rosatom" Director General, Alexey Likhachev, and other officials of the Russian Federation. On this occasion, discussions focused primarily on matters pertaining to the nuclear safety and security situation at the ZNPP and the regular rotations of Agency staff at the site.



Director General Rafael Mariano Grossi and senior Agency officials at the meeting with Russian officials in Moscow on 6 February 2025. (Photo: ROSATOM)

18. This report has been produced in response to resolution GOV/2022/17¹⁴, 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/2022/58¹⁵, 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/2022/71¹⁶, 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”; to resolution GOV/2024/18¹⁷, 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”; and to resolution GOV/2024/73¹⁸, in which the Board of Governors requested the Director General to “continue providing regular updates to the [Board] on the nuclear safety, security and safeguards situation in Ukraine, including the status of critical energy infrastructure essential for nuclear safety and security, and to propose additional measures immediately if risks arise to prevent a nuclear accident.”

19. This report provides a summary of the situation in Ukraine regarding nuclear safety, security and safeguards from 13 November 2024 to 27 February 2025. 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.

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 Khmelnytsky NPPs, and to the Chornobyl NPP Site

20. During the reporting period, the Agency maintained the continued presence of its staff, comprising 12 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

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.

¹⁸ IAEA Board of Governors resolution GOV/2024/73, adopted on 12 December 2024, para. 4.

(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. Agency staff at all five nuclear sites continued to meet with key management and operational personnel to exchange information, and continued to discuss the nuclear safety and security situation and observe key areas important for nuclear safety and security at the sites.

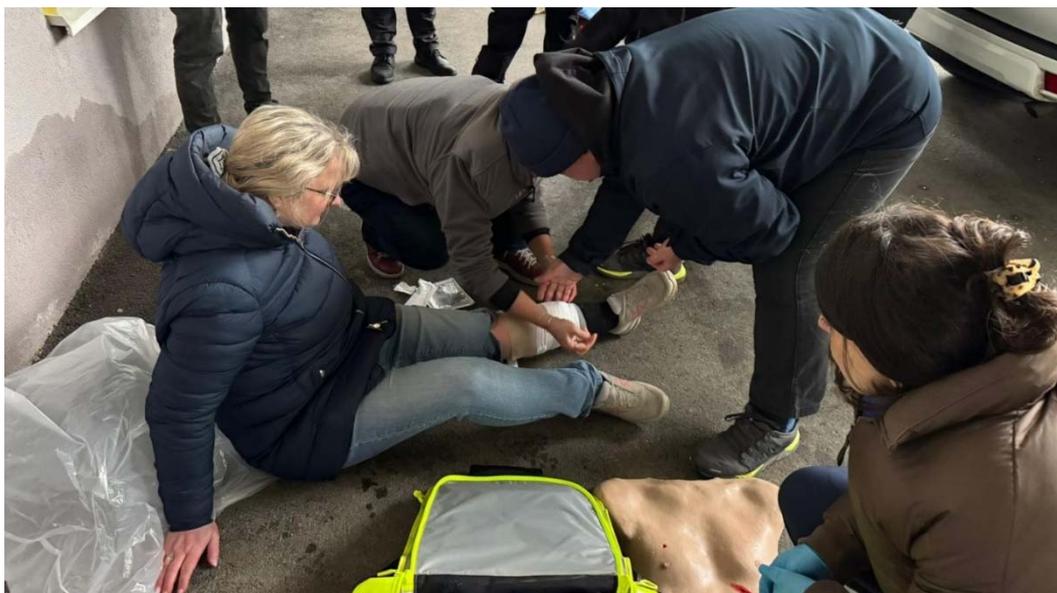
22. The rotations of Agency staff at the KhNPP, the RNPP, the SUNPP, and the ChNPP site during the reporting period were conducted as planned. However, on 10 December 2024 an Agency armoured vehicle was hit by a drone during the planned rotation of the ISAMZ teams. The rear section of the vehicle was damaged, but the two Agency staff members inside were unharmed. Although the rotation of the ISAMZ teams continued and was safely completed on that occasion, the subsequent rotation was delayed significantly due to intense military activity in the region jeopardizing the safety of Agency staff on the ground. The Agency engaged in intensive consultations with both sides to guarantee the safety of the ISAMZ teams and to identify suitable arrangements to ensure safe rotations. Notwithstanding, by the end of the reporting period, the rotation of ISAMZ teams had not taken place, raising concerns about maintaining the indispensable mission to help ensure nuclear safety and security at the ZNPP.

“I deeply regret today’s cancellation of the carefully prepared and agreed rotation of our staff, who are carrying out vital work in very challenging circumstances to help prevent a nuclear accident during the military conflict. It is completely unacceptable that the safety of our staff is jeopardized in this way.”

Director General Rafael Mariano
Grossi, 12 February 2025

23. The Agency continued implementing rigorous preparations and logistics for the safe and secure deployment of missions to Ukraine. As part of these preparations, the Agency:

- Assessed the arrangements in place and undertook additional measures to further enhance the safety and security of staff in the field; and
- Continued to deliver pre-deployment workshops aimed at fostering resilience and improving teamwork and communication skills among Agency staff travelling in Ukraine, and to make available additional tailored support to Agency staff undertaking missions at the ZNPP.



First aid training provided to Agency staff supporting the rotations of the ISAMZ teams.

24. As of 27 February 2025, a total of 178 missions comprising 158 Agency staff members had been deployed as part of the continued presence at all 5 nuclear sites in Ukraine, totalling over 381 person-months in Ukraine. Half of the 158 Agency staff members participated in two or more missions, while some participated in over 10 missions. 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. Nuclear Safety and Security Missions to Electrical Substations

26. The need for NPPs to have a reliable and stable power supply so that safety can be maintained has been addressed in several of the Agency's safety standards. Moreover, the need for nuclear security systems and measures to be in place at strategic locations, including locations of critical infrastructure, has been addressed in the Agency's nuclear security guidance.

27. Principle 8 of the Fundamental Safety Principles (IAEA Safety Standards Series No. SF-1) states that “[a]ll practical efforts must be made to prevent [...] nuclear or radiation accidents” and that “measures have to be taken to prevent the occurrence of failures or abnormal conditions that could lead to [...] a loss of control”; a loss of, or disruption to, off-site power would constitute a failure or abnormal condition in this context.

“The Agency’s safety standards stress that it is of paramount importance to ensure the availability of a stable off-site power supply system. In addition, the Fundamental Safety Principles state that all efforts must be made to prevent nuclear accidents. A reliable transmission system is a significant contributor to defence in depth for nuclear safety.”

Director General Rafael Mariano Grossi, 18 December 2024

28. The issue is addressed more specifically in several other publications in the IAEA Safety Standards Series. Requirement 28 of the Specific Safety Requirements publication *Safety of Nuclear Power Plants: Design* (IAEA Safety Standards Series No. SSR-2/1) stipulates that the design “shall establish a set of operational limits and conditions for safe operation of the nuclear power plant”. Such operational limits and conditions are further detailed in the Specific Safety Guide publication *Operational Limits and Conditions and Operating Procedures for Nuclear Power Plants* (IAEA Safety Standards Series No. SSG-70) and include requirements for the availability and operability of the electrical power sources in all operational states. Requirement 41 of the Specific Safety Requirements publication *Safety of Nuclear Power Plants: Design* (IAEA Safety Standards Series No. SSR-2/1) stipulates that “[t]he functionality of items important to safety at the nuclear power plant shall not be compromised by disturbances in the electrical power grid [...]”.

29. Moreover, the Specific Safety Guide publication *Design of Electrical Power Systems for Nuclear Power Plants* (IAEA Safety Standards Series No. SSG-34) stipulates that “[h]igh reliability of the grid is essential for a safe and reliable electrical power supply to a nuclear power plant” and that “[t]he means for safe shutdown of a nuclear power plant in transients and accidents, as well as normal shutdown, are more flexible and more reliable if off-site power is available”. It therefore recommends that “[t]he power supply should [...] have adequate capacity and capability”.

30. Essential Element 10 of the Nuclear Security Fundamentals publication *Objective and Essential Elements of a State’s Nuclear Security Regime* (IAEA Nuclear Security Series No. 20) states that “[a] nuclear security regime ensures that nuclear security systems and nuclear security measures are in place at all appropriate organizational levels to detect and assess nuclear security events [...]”, including at ‘strategic locations’, such as locations of critical infrastructure. Parts of the energy infrastructure that are essential for the safe operations of NPPs may be designated such locations by a State on the basis of

the national nuclear security threat assessment, further guidance on which is available in *National Nuclear Security Threat Assessment, Design Basis Threats and Representative Threat Statements* (IAEA Nuclear Security Series No. 10-G (Rev.1)).

31. These Agency publications form the basis for the expansion and relevance of the Agency's assistance to Ukraine intended to help in ensuring stability of the critical energy infrastructure so that it does not compromise nuclear safety, as agreed by the Director General and President Zelenskyy on 3 September 2024 and reported in document GOV/2024/63.

32. The safe operation of NPPs in Ukraine, like that of any NPP, is heavily dependent on a stable and reliable connection to the electricity grid. The availability of off-site power is a significant contributor to defence in depth for a plant, and frequent and sustained losses of external power supply significantly increase the risk of core damage. Events that disrupt this connection introduce transients that would generally require shutdown of a plant and the actuation of safety systems powered by back-up emergency power supplies in order to maintain safe conditions and prevent the escalation of such events, placing significant demands on supplies (such as diesel fuel) and additional demands on operators. If such scenarios are not mitigated in a timely manner, situations could arise that might lead to events that adversely impact nuclear safety. At the NPPs in Ukraine, the current frequency and duration of losses of off-site power likely exceed those assumed in the original safety cases for the plants, causing a degradation of defence in depth and challenges to the plants' safety.

33. In September and October 2024, the Agency conducted its first visits to seven electrical substations identified as critical for the nuclear safety of Ukrainian NPPs, as reported in document GOV/2024/63.¹⁹ Following further attacks on the electrical substations in Ukraine on 15, 21 and 28 November as well as on 13 December 2024, the Agency conducted a further nuclear safety and security mission to the electrical substations from 16 to 23 December 2024. This mission included visits to five substations already visited by the Agency during the missions conducted in September and October 2024, and to two additional substations critical for nuclear safety of NPPs.

34. The purpose of the mission was to:

- Document the damage to the substations caused by military activity since the previous missions;
- Assess the impact of the damage on the safe operation of the nuclear facilities served by the substations;
- 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 further strengthen the safe operation of NPPs in Ukraine.

35. During the mission, the Agency documented the damage and gathered essential evidence highlighting the vulnerabilities of the electricity grid that have resulted from attacks on Ukraine's energy infrastructure. The mission confirmed that the capabilities of the electricity grid to provide a reliable off-site power supply to Ukrainian NPPs were further reduced due to the functional damage to some of the equipment contained within the substations visited, which was sustained following the attacks in November and December 2024.

¹⁹ Report by the Director General to the Board of Governors, document GOV/2024/63, issued on 13 November 2024, paras 29–32.



Agency staff visiting one of the critical substations in Ukraine to assess the damage and its impact on nuclear safety of NPPs in December 2024. (Photo: NEK UKRENERGO)

36. The damage observed by the Agency demonstrated the vulnerability of the external power supply to the three operating NPPs (the SUNPP, the KhNPP and the RNPP) as well as to the ZNPP and the ChNPP site. This applies to the two voltage levels — 750 kV and 330 kV — at which all five nuclear sites receive and/or generate electricity. Some of the substations visited are no longer capable of converting electricity from one voltage level to the other, while others have been functionally eliminated from the grid. This significantly limits the options for providing back-up power supply to the NPPs in case of emergencies.

37. Agency staff confirmed that, despite ongoing repairs and the implementation of additional protective measures to further mitigate the negative impact of the damage to electrical substation equipment, the ability of the electricity grid in Ukraine to provide a reliable off-site power supply to Ukrainian NPPs has been significantly degraded. In the event of a potential electricity grid transient, there would be an increased likelihood of the total collapse of the electrical grid with a complete loss of off-site power at the NPPs, potentially for an extended period.

38. During the mission, Agency staff met with representatives from Ukraine's grid operator, the NPPs and the SNRIU. Drawing on the findings of the missions conducted, the Agency is engaged in further work to identify what targeted technical assistance it could provide to mitigate any adverse impact and to help prevent a nuclear accident.

B.1.3. Medical and Technical Coordination Mission

39. An Agency team comprising staff from the Department of Nuclear Safety and Security and the Vienna International Centre (VIC) Medical Service conducted a coordination and medical assistance mission to the ChNPP site from 18 to 21 November 2024. The purpose of the mission was twofold: to discuss with the staff and management of the ChNPP site their experience of the continued presence of Agency staff deployed at the site and possible further improvements to enhance utilization of the technical support that Agency staff can provide during such missions; and to hand over two fully

equipped ambulances to the ChNPP site's medical unit and to Varash Hospital (near the RNPP) procured as part of the medical assistance provided for NPP operating personnel in Ukraine. Agency staff also met representatives of the SNRIU.

40. During the mission, the current activities of Agency staff present at the ChNPP site were discussed, as well as possible ways to broaden their nuclear safety- and security- related activities at the site. All parties agreed that the continued presence missions at the ChNPP site are well established and are conducted without any major difficulties, and noted further improvements that could be made to the conduct of site activities that would further contribute to a more systematic and comprehensive assessment of the situation at the sites against the Seven Pillars, based on the lessons learned since the continued presence was established. These improvements include the implementation of a systematic approach for Agency staff conducting walkdowns and assessments, as well as harmonization of the scope of their activities. A similar approach was adopted during 2024 across the three operating NPPs in Ukraine, where Agency staff are present.

B.1.4. The Director General's visit to Ukraine

41. On 4 February 2025, the Director General led his 11th mission to Ukraine since the start of the armed conflict to discuss and assess recent developments related to the fragile nuclear safety and security situation in Ukraine.

42. During the mission, the Director General met with President Zelenskyy, the Minister of Foreign Affairs of Ukraine, Andrii Sybiha, and the Minister of Energy of Ukraine, Herman Halushchenko, as well as other senior Government officials, in Kyiv. On this occasion, he discussed the nuclear safety and security situation in Ukraine and the Agency's ongoing efforts to help prevent a nuclear accident, focusing on the importance the Agency attaches to the possible implications for nuclear safety of the attacks on critical energy infrastructure. The Director General also discussed the progress made under Ukraine's plan to purchase equipment from the interrupted Belene NPP project in Bulgaria for use in the new reactor units being constructed at the KhNPP site, and reiterated the Agency's readiness to provide technical support and nuclear safety advice in relation to the plan.

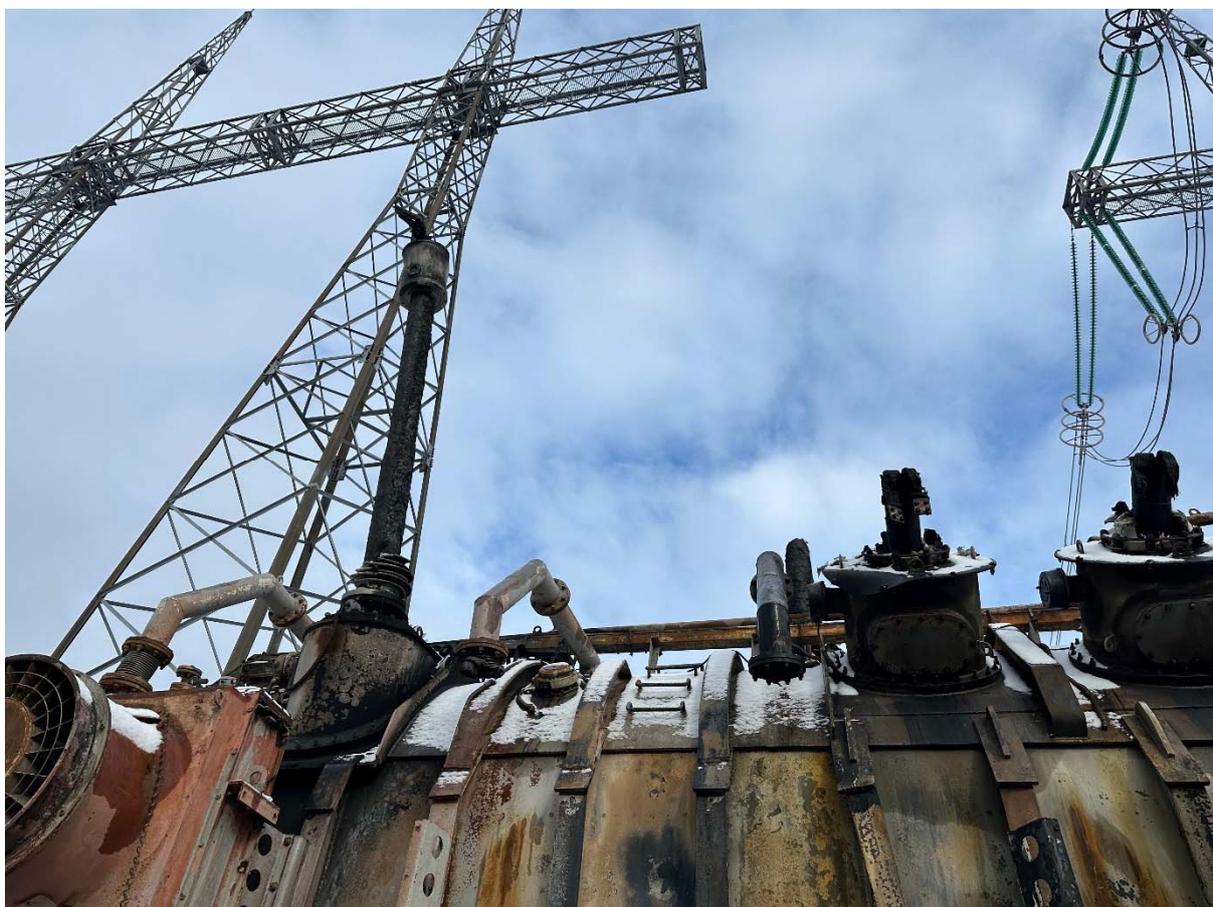


Director General Rafael Mariano Grossi with President Zelenskyy during a press conference on 4 February 2025. (Photo: www.president.gov.ua)

43. The Director General also visited the Kyivska substation to observe and assess its status and the damage sustained. He stressed that such damage, if it continued to occur, could compromise the nuclear safety of an NPP and eventually lead to a nuclear accident.

“The situation is quite dire. We should not, I think, hide the fact. And as you can see behind us, this infrastructure has been degraded.”

Director General Rafael Mariano Grossi, 4 February 2025



Ukraine’s Kyivska substation during the Director General’s 11th mission to Ukraine on 4 February 2025.

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

44. 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 nuclear safety and security of the ZNPP. The Agency continued to report regularly on its observations and findings.

“For almost three years now, we have been doing everything we can to help prevent a nuclear accident at the ZNPP and elsewhere in Ukraine. An accident has not occurred, but the situation is not improving. It is still precarious. I remain seriously concerned about nuclear safety and security in Ukraine, including at the Zaporizhzhya site. Our work is far from over.”

Director General Rafael Mariano Grossi, 23 January 2025



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.

45. 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

46. The Agency's assessment is that the overall situation at the ZNPP with respect to nuclear safety and security has not changed significantly since the previous reporting period. The nuclear safety and security situation 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.

47. Throughout the reporting period all units remained in cold shutdown and the ZNPP informed ISAMZ that there were no plans to place any reactor unit in hot shutdown. 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.

48. During the reporting period, the ZNPP operated some of the 9 mobile diesel boilers at the site to provide heating for the plant and the city. The diesel steam generators (DSGs) were operated for 19 days in December 2024 and for 14 days in January 2025 to provide the steam required by the ZNPP for water treatment, including the processing of liquid radioactive waste.

Physical integrity

49. 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.

50. ISAMZ was informed of an alleged drone attack on the ZNPP training centre, located outside of the site perimeter, on 5 January 2025. No damage or casualties were reported. Although ISAMZ was unable to visit the training centre to confirm the attack, the ISAMZ team reported that it had heard two loud explosions and machine gun fire during the day.

Nuclear safety and security systems and equipment

51. 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 supplementary control rooms, 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 major issues affecting the overall nuclear safety and security of the plant based on the observations made during these visits.

52. 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.

53. ISAMZ continued to gather information and independently monitor and observe maintenance activities based on the maintenance plans for 2024 and 2025. ISAMZ reported the following:

- Safety train II of Unit 1 was placed under maintenance on 3 February 2025. The maintenance activities were ongoing at the end of the reporting period.
- Safety train III of Unit 2 was under maintenance from 2 to 28 December 2024, which included cleaning the heat exchangers and some valves and electrical equipment.
- Safety train III of Unit 3 was under unplanned preventative maintenance from 25 to 29 November 2024 to service a water control valve. The ZNPP informed ISAMZ that maintenance work on the control valve was initiated due to the failure of another control valve in October 2024.
- Safety train I of Unit 4 was under maintenance from 13 January to 19 February 2025 to perform maintenance on heat exchangers, valves, a pump and electrical equipment.
- Safety train II of Unit 5 was under maintenance from 11 to 22 November 2024 to perform maintenance on some pumps and fittings, and cleaning and servicing of parts of the EDG.
- Safety train II of Unit 6 was under maintenance from 11 November to 27 December 2024 to perform servicing and cleaning of the heat exchangers; servicing of pumps, fittings and electrical equipment; and inspection and cleaning of part of the EDG.
- The two EDGs that provide emergency on-site power for the site were placed under maintenance — one from 12 to 28 December 2024 and the other from 13 to 24 January 2025 — to service the oil cooling systems, fuel oil systems, lubricating oil system and cooling system. ISAMZ performed a walkdown of the common EDGs on 23 December 2024 and 21 January 2025 to observe the maintenance activities. It noted the presence of drums of lubricating oil and was informed that these preventative maintenance activities were scheduled to be performed every four years.

54. The ZNPP provided ISAMZ with the high-level maintenance plan for 2025, which includes periods of planned maintenance for all six reactor units.

55. ISAMZ continued to monitor the situation regarding the availability of cooling water by gathering information and visiting the ZNPP's cooling water facilities. The team visited the ZNPP cooling pond and the Zaporizhzhya thermal power plant (ZTPP) discharge channel on 15 November 2024, but on a subsequent visit on 14 January 2025 ISAMZ was not permitted to visit the ZTPP discharge channel, reportedly due to security reasons. ISAMZ reported that:

- The 11 groundwater wells continued to provide approximately 250 cubic metres of cooling water per hour to the 12 essential service water (ESW) sprinkler ponds;
- The height of the 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 cold 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 16.36 metres and 16.60 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;
- ISAMZ was informed that the Unit 4 circulation pump had been turned off on 18 December 2024, and that no circulation pumps were in operation. The ZNPP told ISAMZ that the pump had been turned off to help maintain the height of the water in the cooling pond, and that there was no need to maintain a pump in operation because there were no plans to place any reactor unit into hot shutdown. Furthermore, the ZNPP stated that sufficient water was provided to the ESW sprinkler ponds by the 11 groundwater wells, and that the water in the cooling pond could also be used, if required, by operating the service water and fire pumps;
- The height of the cooling pond was relatively stable during the reporting period due to the combination of colder ambient temperatures and the turning off of the Unit 4 circulation pump. At the end of the reporting period, the height of the cooling pond was 14.12 metres, a decrease of 3 centimetres from the 14.15 metres reported in document GOV/2024/63.

56. During the reporting period, ISAMZ frequently observed testing of the EDGs and the respective safety system trains from locations such as the MCRs, the supplementary control room and the local EDG rooms. Although ISAMZ did not observe any issues related to nuclear safety and security, on two separate occasions the team was prevented from accessing the ESW pumps located in the EDG buildings. The ZNPP subsequently stated that this was due to a miscommunication on its part.

57. During the reporting period, ISAMZ continued to observe that some of the six mobile diesel generators (MDGs), which were installed following the post-Fukushima stress tests, were not in their designated locations. On 6 December 2024, ISAMZ observed three new MDGs located next to Units 2, 3 and 5. In subsequent discussions with the ZNPP, ISAMZ was informed that three MDGs had been procured by the site in accordance with regulations of the Russian Federation²⁰ stipulating the delivery of a voltage of 6 kV. The ZNPP also explained that three additional MDGs would be purchased during 2025, and that one new MDG would then be connected to each reactor unit where they could be manually activated in case of an emergency situation in which no on-site or off-site power was available (station blackout).

58. No new significant nuclear safety and security related issues were observed by ISAMZ during the reporting period. However, the current solution for supplying cooling water through the groundwater remains an interim solution for providing cooling to the reactors in their cold shutdown state and for spent fuel, and the observations made by ISAMZ indicate that the maintenance being conducted is not yet at the comprehensive level that would normally be expected.

Operating staff

59. During the reporting period, the average total number of staff at the ZNPP was just over 2130 on working days, and over 340 on weekends and designated holidays.

60. On 30 January 2025, ISAMZ was informed that the number of staff at the ZNPP was approximately 5000, that recruitment was ongoing and that the goal was to have between 6500 and 7000 staff in total. The ZNPP informed ISAMZ that there was a sufficient number of staff to perform all functions at the ZNPP with the reactors in the cold shutdown state, and that all operators requiring

²⁰ See para. 2 above.

authorizations had received them from the Federal Environmental, Industrial and Nuclear Supervision Service (Rostekhnadzor).²¹ ISAMZ reported that it observed a stable number of staff during its regular visits and walkdowns and that on some occasions it was able to converse with staff about their qualifications and experience. 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.

61. ISAMZ visited all six MCRs on several occasions during the reporting period. It observed that each unit consisted of at least three authorized personnel per MCR on average, in line with the number reported in document GOV/2024/30.

62. Throughout the reporting period, ISAMZ collected the following information and observations related to the staffing situation at the ZNPP:

- Staff working at the ZNPP, all of whom have contracts with the Russian operating organization, include personnel who were employed at the site prior to the start of the armed conflict, as well as staff from NPPs in the Russian Federation who have been permanently or temporarily deployed to the ZNPP;
- Various departments at the ZNPP informed ISAMZ that new staff had been recruited during 2024 and that additional recruitment was still required, including in the maintenance department;
- Contractors are used to supplement the ZNPP maintenance workforce to perform maintenance activities;
- There were 135 staff working in the Waterworks Department;
- There were 1200 positions in the Electrical Department, although reportedly not all of these had been filled and additional staff were being recruited; and
- The off-site and on-site radiation monitoring laboratories had 19 and 18 staff respectively.

Off-site power supply

63. 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, both lines were disconnected on multiple occasions during the reporting period, as detailed below:

- The 750 kV Dniprovska main power line was disconnected from 16 to 17 November 2024; from 21 to 23 November 2024; on 29 January 2025 (when it was disconnected and reconnected on the same day); and from 29 January to 1 February 2025.
- The 330 kV Ferosplavna 1 back-up line was disconnected from 20 to 22 December 2024; from 24 to 25 December 2025 due to unplanned maintenance activities; on 12 January 2025 for maintenance; and on 11 February 2025 due to military activities.

²¹ See para. 2 above.

64. On 20 November 2024 and 23 January 2025, ISAMZ visited the 750kV open switchyard and confirmed that the switchyard was connected only to the Dniprovskaya line.

65. ISAMZ continued to monitor the maintenance activities on electrical components located on site and in the 750 kV and 330 kV open switchyards that provide off-site power to all six units, although it did not have access to the 330 kV switchyard. ISAMZ reported the following developments during the reporting period:

- The ZNPP reported that all 2024 planned maintenance had been completed prior to 19 November 2024 and that the maintenance plan for 2025 had been prepared.
- The voltage stabilizer (referred to by the ZNPP as a “shunt reactor”) of the Dniprovskaya 750 kV line, located in the 750 kV open switchyard, was disconnected on 23 November 2024 to perform maintenance on the ‘A’ phase of the equipment. The ZNPP informed ISAMZ that the phase was damaged internally, not as a result of military activities, and would need to be replaced with a spare phase stored in the 750 kV open switchyard.
- ISAMZ confirmed that the voltage stabilizer was returned to operation on 31 December 2024, after several previous unsuccessful attempts.
- On 9 December 2024, the ZNPP informed ISAMZ that the back-up power transformer pair (RTSN-3,4) was in standby mode and that planned maintenance would commence during December. On 6 January 2025, ISAMZ was informed that the maintenance had been completed on 31 December 2024.
- The disconnection of the 330 kV Ferosplavna 1 back-up line from 24 to 25 December 2024 was due to a faulty gasket in a circuit breaker in the ZTTP 330 kV open switchyard, which was replaced by the maintenance staff at the ZTPP open switchyard. The ZNPP informed ISAMZ that the fault was not related to the frequent disconnection and reconnection of the power line.
- While the 330 kV Ferosplavna 1 back-up line was repaired following the disconnection on 11 February 2025, its reconnection was delayed due to ongoing military activities near the 330 kV open switchyard preventing the back-up power from being connected to the ZNPP autotransformer. However, the Agency was informed that the 330 kV Ferosplavna 1 back-up line would be available to provide off-site power to the ZNPP in case of disconnection of the 750 kV Dniprovskaya main power line.

Logistical supply chain

66. 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 — where permitted — 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, ISAMZ has been denied permission to visit the central warehouse or the diesel fuel farm²² since 31 July 2024, reportedly due to safety concerns.

67. ISAMZ visited the electrical and thermomechanical warehouses located within the ZNPP perimeter on 26 November and 27 December 2024, and noted the following:

- The electrical warehouse was full, and the thermomechanical warehouse was approximately 40% full, which ISAMZ noted was consistent with previous visits to the warehouse.

²² Report by the Director General to the Board of Governors, document GOV/2024/63, issued on 13 November 2024, para. 60.

- The thermomechanical warehouse stored both new items and items that had been used and dismantled, such as the electric motors and pistons from the EDGs. Of the new items in the thermomechanical warehouse, most of them had labels dated prior to February 2022, with a small number dated after that time. The labels indicated that most of the equipment had come from Ukraine and western countries, while some items had originated from suppliers in the Russian Federation.
- On the first visit to the electrical warehouse, ISAMZ observed many cardboard boxes stored in the corridor, 38 new electrical motors of different sizes — each with tags with dates in 2021 and 2024 — and portable electric 5 kW heaters, lamps and cabling. A variety of switches, fuses, batteries and other small electrical devices were also observed in one part of the electrical warehouse.
- On the second visit to the electrical warehouse, ISAMZ again observed many cardboard boxes in the warehouse which, according to the ZNPP, contained special uniforms for electrical workers.
- New electrical cabinets made in the Russian Federation were noted, and ISAMZ was informed that approximately 100 cabinets are being replaced.

68. Given that ISAMZ was unable to visit the external warehouse and diesel fuel farm, a meeting was conducted within the site perimeter on 21 November 2024 to discuss the status of the diesel fuel farm. ISAMZ was informed that all corrective maintenance for 2024 had been completed and that additional corrective maintenance activities were scheduled to commence in spring 2025. The large diesel fuel storage tank damaged by military activities in 2022 had been repaired and was fully operable at its nominal capacity, and a total of approximately 2000 cubic metres of diesel fuel was stored in the three large tanks.

69. The observations made by ISAMZ continued to indicate that the supply chain appeared to be in place. However, while items originating from the Russian Federation were observed by ISAMZ, a significant number of the items observed in the electrical and mechanical warehouse predated the start of the armed conflict. The inaccessibility of the central warehouse and the diesel fuel farm — which was reportedly due to safety concerns — affected the ability of ISAMZ to conduct a more comprehensive assessment of the availability of spare parts and the 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 be supplied to the ZNPP as needed.

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

70. During the reporting period, there was no change to the status of on-site and off-site radiation monitoring stations reported in document GOV/2024/63. All on-site radiation monitoring stations were operational, and all but four of the off-site radiation monitoring stations continued reporting monitoring data.

71. 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 often 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 continued 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.*

72. The ZNPP informed ISAMZ that the new on-site emergency plan had been reviewed by relevant off-site organizations of the Russian Federation, that the comments received had been addressed, and that the updated version had been sent for further review.²³

73. The temporary on-site emergency response centre, which was established in 2022 when the original centre became unavailable, continues to be available to host an emergency response, if required. During a visit to the temporary on-site centre, ISAMZ noted that the ventilation system produced a high level of noise, making it difficult to communicate verbally. The ZNPP informed ISAMZ that the ventilation system could be turned off and on again if necessary.

74. ISAMZ reported that the emergency exercise planned for December 2024, as reported in GOV/2024/63, had not been conducted and that the next large-scale ZNPP emergency exercise was being scheduled for the second half of 2025.

75. The ZNPP informed ISAMZ that the fire station located in the neighbouring industrial zone had not yet been restored to operation after having been damaged in 2022, and that the fire brigade from Enerhodar was prepared to respond, reportedly within 6 to 7 minutes. Furthermore, ISAMZ was informed that a 20-person brigade and two fire trucks belonging to the Russian Federation were based at the ZNPP site, and that there are plans to have two additional trucks and personnel on site.

Communications

76. 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.

²³ See para. 2 above.

77. 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.

78. ISAMZ reported that communications utilizing satellite phones and equipment with global positioning systems (i.e. the backpack radiation monitoring system) continued to experience communication issues at the ZNPP.

Five concrete principles for protecting the ZNPP

79. 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. 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 ZTPP 330 kV open switchyard, and the off-site central warehouse and diesel fuel farm — 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.

80. Notwithstanding 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.

81. ISAMZ was informed of an alleged drone attack on the ZNPP training centre located outside of the site perimeter on 5 January 2025. No damage or casualties were reported. ISAMZ was further informed that a drone had been destroyed by gunfire within the industrial zone, approximately 400 metres from the site boundary. While ISAMZ was not able to visit the training centre to confirm the attack, the team reported hearing two loud explosions and machine gun fire during the day.

82. 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.

83. ISAMZ continued to report the presence of armed troops (which the Russian Federation claims are members of the Russian National Guard and chemical, biological, radioactive and nuclear (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.

84. During the reporting period, the ZNPP did not suffer a total loss of off-site power. However, the 750 kV Dniprovskaya main power line and the 330 kV Ferosplavna 1 back-up line were disconnected on a number of occasions,²⁴ as a result of military activity outside the ZNPP site perimeter, demonstrating that the third concrete principle continues to be at risk.

²⁴ See para. 63 above.

85. 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,²⁵ 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. Khmelnytsky, Rivne and South Ukraine NPPs

86. 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 for a period of maintenance at one reactor unit. All reactor units were required to reduce power at times, at the request of the grid operator, due to military activities affecting energy infrastructure, while others experienced disconnections, as described below.

87. On 21 November 2024, one unit at the SUNPP was temporarily disconnected from the electricity grid, and the reactor units at the KhNPP and the RNPP temporarily operated at reduced power following military activities. On 28 November 2024, all units at the KhNPP, the RNPP and the SUNPP reduced power, and one unit at the RNPP was disconnected from the electrical grid following electricity grid fluctuations caused by military activities affecting energy infrastructure. The affected unit at the RNPP was reconnected to the grid the next day. On 13 December 2024, one unit at the RNPP was disconnected from the grid and another unit reduced power due to military activities; both units returned to nominal power on 17 December 2024. On 25 December 2024, seven of the nine operating reactor units at Ukraine's NPPs were required to temporarily reduce power due to military activities. On 15 January 2025, one reactor unit at the RNPP was required to operate at reduced power for several hours as a precautionary measure due to military activities. On 29 January 2025, one reactor unit at the SUNPP temporarily operated at reduced power after one off-site power line was disconnected. On 1 February 2025, all nine operating reactor units temporarily operated at reduced power due to military activities. On 11 February 2025, one reactor unit at each of the KhNPP, RNPP and SUNPP were required to temporarily reduce power due to military activities.

88. In addition, one reactor unit at the RNPP was shut down and disconnected from the electricity grid from 3 to 7 December 2024 in order to perform maintenance on the main feedwater pipe.

89. 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

90. During the reporting period, no physical damage was caused to the KhNPP, the RNPP or the SUNPP as a result of military activities. Efforts at all three NPPs to protect critical structures, systems

“A stable electricity grid that provides secure off-site power is essential to ensure nuclear safety at Ukraine’s operating nuclear power plants, which are vital for producing the electricity the country needs, especially during the cold winter months. The operators have demonstrated significant resilience during and after this latest period of grid instability so that these plants can maintain nuclear safety and generate electricity following last week’s output cuts.”

Director General Rafael Mariano Grossi, 5 December 2024

²⁵ See para. 2 above.

and components, and vital structures through additional mitigatory measures, were reported to have continued.

Nuclear safety and security systems and equipment

91. During the reporting period, all nuclear safety and security systems at the KhNPP, the RNPP and the SUNPP continued to be fully functional and to operate as designed, except during periods when components were unavailable due to maintenance. The plants' operating staff conducted regular operational testing and preventive maintenance of the safety systems, some of which were observed by the Agency staff present on site.



*ISAMIR conducting a walkdown of the turbine hall of Unit 2 of the RNPP on 3 February 2025.
(Photo: RNPP)*

Operating staff

92. 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

93. The ISAMIK, ISAMIR and ISAMISU teams based at the three operating NPPs reported that repeated military attacks on Ukraine's energy infrastructure, including substations, had resulted in each site being disconnected from some off-site power lines during the reporting period. The disconnections and military activities also caused some reactor units to operate at reduced power for periods of time.

94. On 17 November 2024, military activities affecting Ukraine's energy infrastructure affected the off-site power lines from one 750 kV and three 330 kV substations, resulting in disconnections that impacted all three operating NPPs, as follows:

- At the KhNPP, two off-site power lines were disconnected, causing one reactor unit to operate at reduced power. Both lines were subsequently reconnected, and the reactor unit returned to nominal full power on 20 November 2024.
- At the RNPP, two power lines were disconnected, causing three reactor units to operate at reduced power. Both lines were reconnected on 19 November 2024.
- At the SUNPP, two 750 kV lines were disconnected — one was reconnected the next day and the other was reconnected on 24 December 2024.

95. On 28 November 2024, two off-site power lines were disconnected from the KhNPP and three were disconnected from the RNPP. One of these off-site power lines remained disconnected from the RNPP until 30 December 2024.

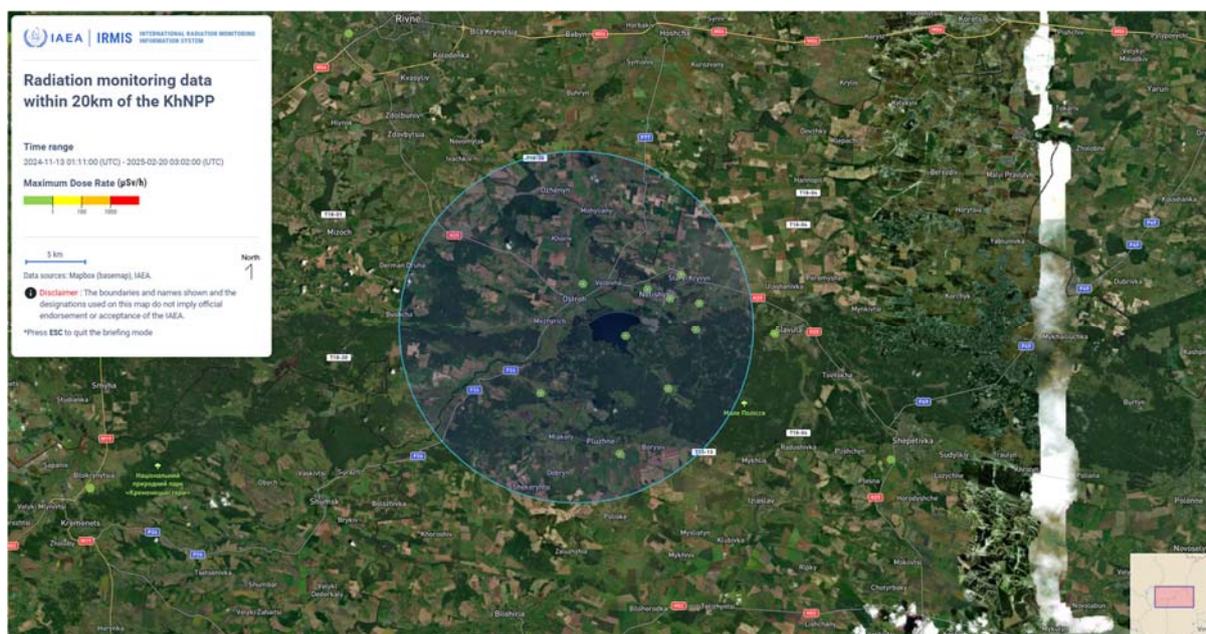
96. On 29 January 2025, one off-site power line was disconnected from the SUNPP. It was reconnected on 8 February 2025.

Logistical supply chain

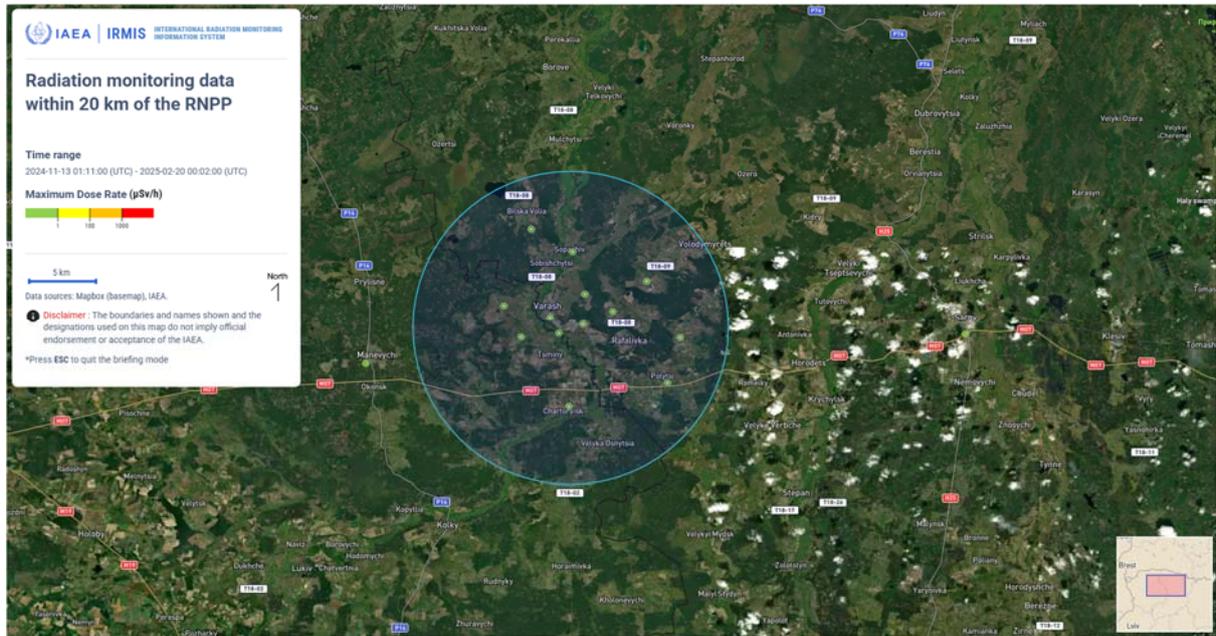
97. During the reporting period, no new challenges to the logistical supply chains for the KhNPP, the RNPP and the SUNPP were identified.

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

98. All off-site radiation monitoring stations were reported to be operational at the KhNPP, the RNPP, and the SUNPP 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.*



ISAMIK visiting the on-site firefighting service at the KhNPP on 20 January 2025. (Photo: KhNPP)

Communications

99. All means of communication remained fully available during the reporting period and Agency staff reported that inspectors from the SNRIU continued to be present at all three NPPs.

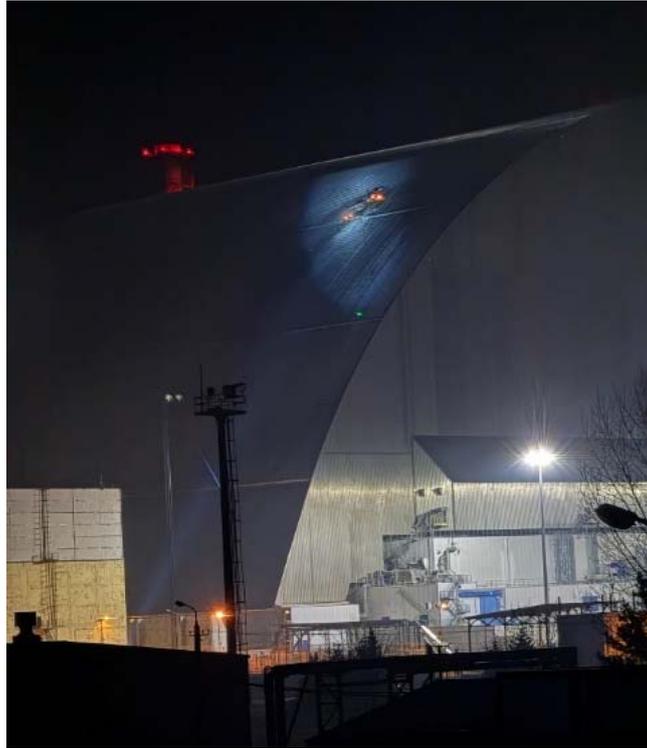
B.2.3. Chernobyl NPP Site and Other Facilities

100. 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, GOV/2024/45 and GOV/2024/63 with regard to the assessment of the nuclear safety and security situation against the Seven Pillars, with the exception of the pillar on physical integrity.

101. ISAMICH regularly reported air raid alarms. On 15 January 2025, it was informed that drones had been observed flying over the exclusion zone for the previous two months, and that at least two drones had flown close to the industrial area of the site on 14 January 2025.

Physical integrity

102. On 14 February 2025, ISAMICH reported hearing an aerial vehicle flying near the site, immediately followed by a very loud explosion at the site. ISAMICH observed the location of impact to be the upper part of the NSC of Unit 4 of the ChNPP, which had fire and smoke coming out of it. Shortly afterwards, the SNRIU reported to the Agency a drone attack on the NSC resulting in fire and damage to the NSC arch, with no casualties.



Fire observed on the NSC shortly after the structure was hit by a drone on 14 February 2025.

103. Following the incident, ISAMICH observed emergency response vehicles and personnel responding to the scene, with the initial efforts focused on extinguishing the fire and monitoring radiation levels, followed by preliminary assessment of the damage. Efforts to extinguish small fires, which resulted in fire alarms and smoke coming from different parts of the NSC structure, continued in the days after the incident. Radiation monitoring, close monitoring of possible new fires, and actions to further assess the damage continued in the days after the incident and are expected to continue beyond the end of the reporting period.



Response personnel scale the NSC on 14 February 2025 as part of efforts to prevent fires spreading within the outer and inner cladding.

104. ISAMICH was granted unrestricted access to the NSC and the location of impact on several occasions during the reporting period. It observed the damage and performed radiation measurements. Moreover, ISAMICH regularly exchanged information with staff and management on the findings of its assessment and the actions taken. Although further assessment is needed, ISAMICH was able to report the following based on its activities so far:

- The height of the location of impact was 87 metres above ground, and damage had occurred to both the outer and inner cladding as well as to the main crane system;
- The damage had resulted in a hole approximately six meters in diameter, affecting systems and structures in that area;
- Part of the insulation material in between the outer and inner cladding contained flammable materials, which facilitated the spread of fire and made it difficult to fully extinguish, such that thermal imaging was required to monitor any further spread. In addition, over 150 holes were cut in the outer cladding to extinguish smouldering materials;
- Freezing of the residual water injected into the space between the outer and inner cladding to extinguish the fire led to concerns about the additional weight potentially exceeding the loading capacity of the NSC;



*ISAMICH observing the damage inside the NSC
on 15 February 2025.*

- Radiation monitoring continued to be performed in the course of the incident response;
- The blast from the explosion broke the windows of one EDG structure and of the interim spent fuel storage facility;
- Remnants of drone components were observed at ground level outside the NSC;
- Seismic qualification of the NSC did not appear to have been compromised but further evaluation is necessary;
- There was damage to the sealing membranes of the NSC between the ground concrete support structure (wall) and the arch contour in several areas, as well as to some NSC structures.

105. The incident did not result in a release of radioactive material into the environment and on-site and off-site radiation levels remained normal. However, the incident compromised the first of the Seven Pillars, which states that “[t]he physical integrity of facilities — whether it is the reactors, fuel ponds, or radioactive waste stores — must be maintained”, demonstrating the fragile nuclear safety and security situation in Ukraine. Moreover, the incident could lead to degradation of the controlled environmental conditions (such as pressure and humidity) that the NSC is intended to provide, with a potential adverse impact on nuclear safety in the longer term.



Personnel inspecting damage to the membrane between the arch contour and the concrete support structure of the NSC on 20 February 2025.

106. On 27 February 2025, Agency staff travelled to Kyiv where they were invited to observe components that had been reportedly recovered from the site of the incident. Based on the information shared with the Agency team, and the team's observation of the components, it is highly likely that these components originated from a Shahed-type uncrewed aerial vehicle (UAV), or a variant thereof. However, the Agency team did not engage in any further assessment of the UAV or its provenance.

Nuclear safety and security systems and equipment

107. During the reporting period, all nuclear safety and security systems were available and functional. However, ISAMICH continues to be 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.



ISAMICH visiting the facility in which materials are monitored for radioactive contamination at the ChNPP on 14 January 2025. (Photo: ChNPP)

Operating staff

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

Off-site power supply

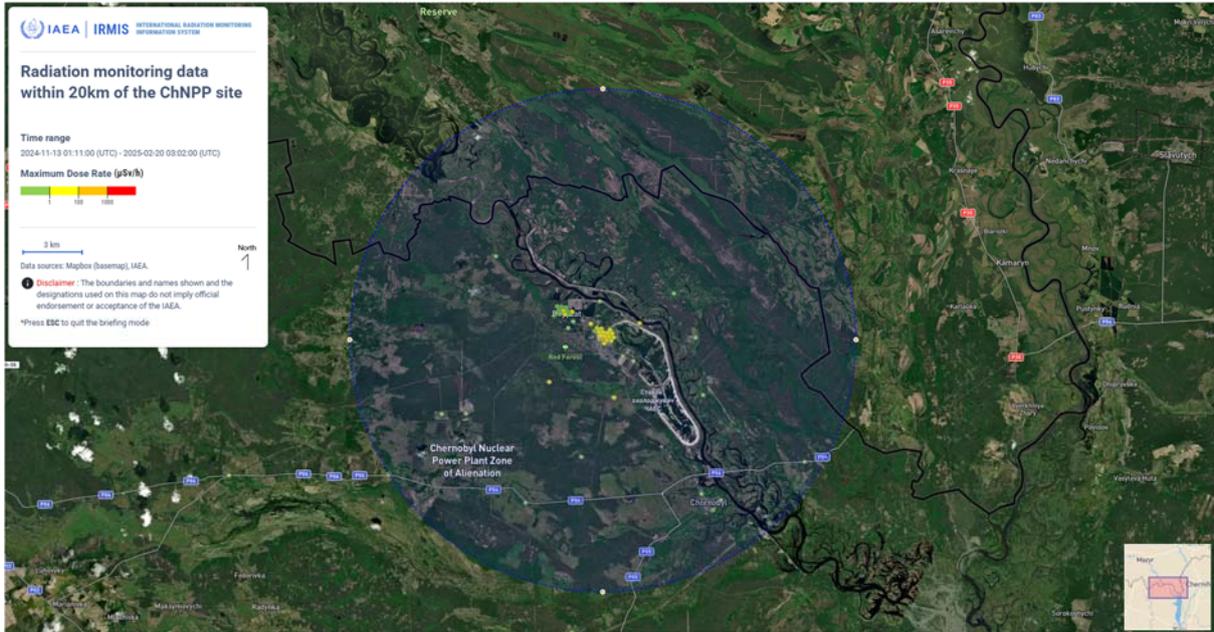
109. During the reporting period, all normally available off-site power lines remained connected.

Logistical supply chain

110. 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

111. During the reporting period, off-site and on-site radiation monitoring systems were 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.



ISAMICH performs radiation monitoring at the ChNPP site on 7 February 2025. (Photo: ChNPP)

Communications

112. During the reporting period, all necessary means of communication with stakeholders remained available without interruption.

Other facilities

113. On 27 December 2024, the SNRIU informed the Agency that the subcritical Neutron Source facility at the Kharkov Institute of Physics and Technology (KIPT) had lost all off-site power on the morning of 25 December 2024, as a result of military activities. The facility, which has been shut down since the start of the armed conflict, received power from its EDG until off-site power was restored approximately five hours later.

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

114. 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.

115. The Agency and its Ukrainian counterparts 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.

116. The Agency 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.

117. By 27 February 2025, 26 Member States²⁶ and 1 international organization²⁷ 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.

118. 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

119. During the reporting period, three additional requests were received for nuclear safety- and security-related equipment to be provided under the statutory functions of the Agency and the operational arrangements²⁸ under the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (Assistance Convention). The total number of requests for nuclear safety- and security-related equipment since the start of the armed conflict increased to 14.

²⁶ 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).

²⁷ The European Commission representing the European Union.

²⁸ 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](#).

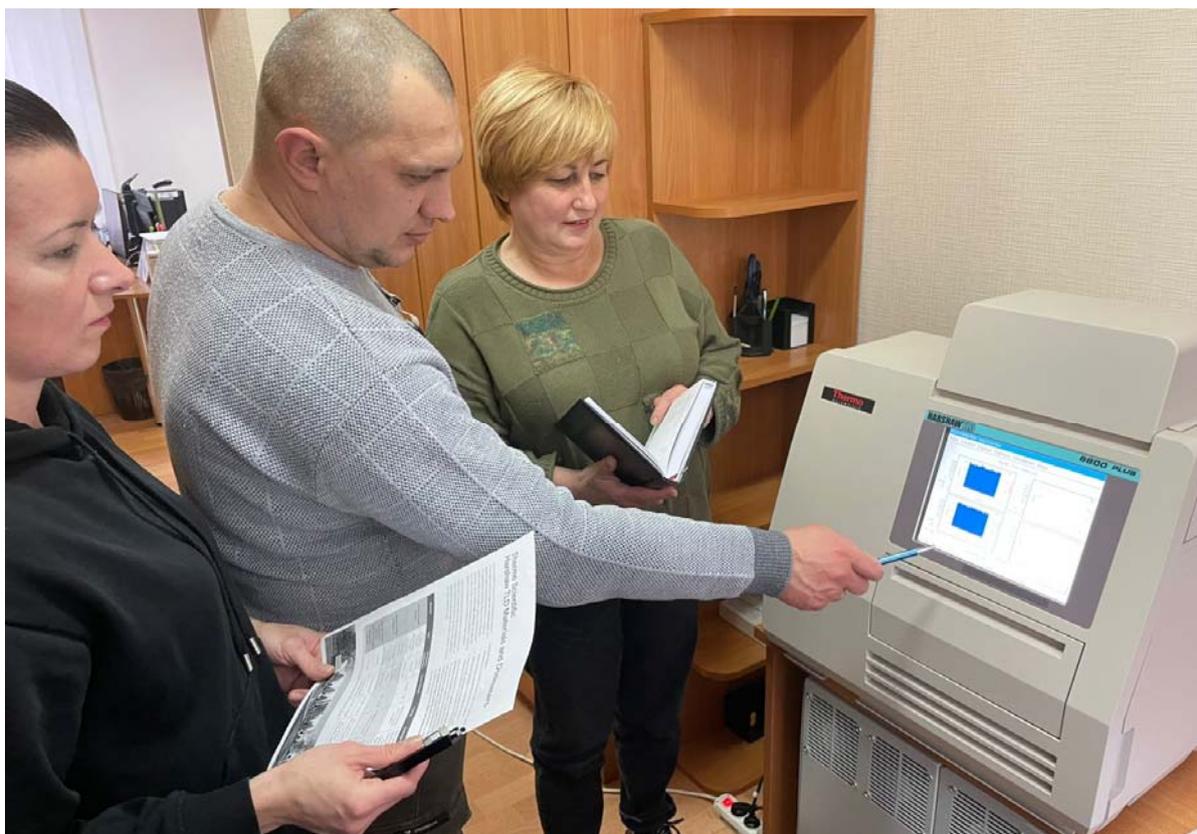
Offers of assistance

120. By 27 February 2025, 13 Member States²⁹ 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

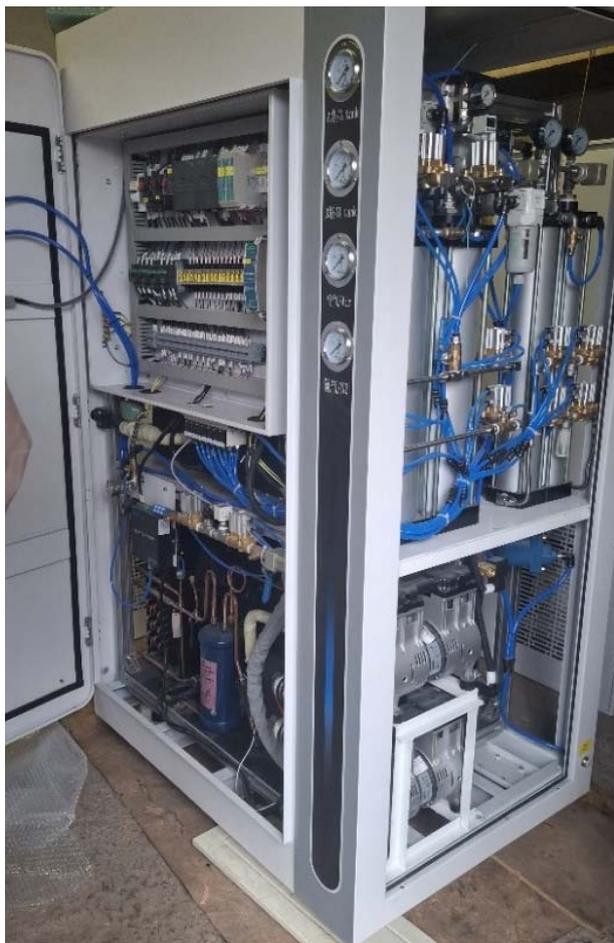
121. The Agency continued to deliver equipment to various organizations in Ukraine. During the reporting period, the Agency organized a total of 11 deliveries of nuclear safety- and security-related equipment, bringing the total number of such deliveries to 78, including deliveries to meet the needs of the energy sector in Ukraine.

122. These 11 deliveries comprised equipment procured by the Agency under extrabudgetary contributions provided by Belgium, Denmark, Ireland, Japan, Norway, Switzerland and the UK. As a result of these deliveries, the Centralized Spent Fuel Storage Facility of the National Nuclear Energy Generating Company “Energoatom”, the Affiliate State Enterprise “Emergency Technical Centre” of Energoatom, the ChNPP, the Ukrainian Hydrometeorological Centre and the hydrometeorological organizations of the State Emergency Service of Ukraine, the RNPP, and the Eastern Mining and Processing Enterprise “VostGOK” received equipment such as communication systems and devices, information technology (IT) equipment, laboratory equipment and supplies, personal dosimetry systems and equipment, physical protection systems and equipment, and power supply.



An individual dosimetry system delivered to Energoatom on 2 January 2025. (Photo: Energoatom)

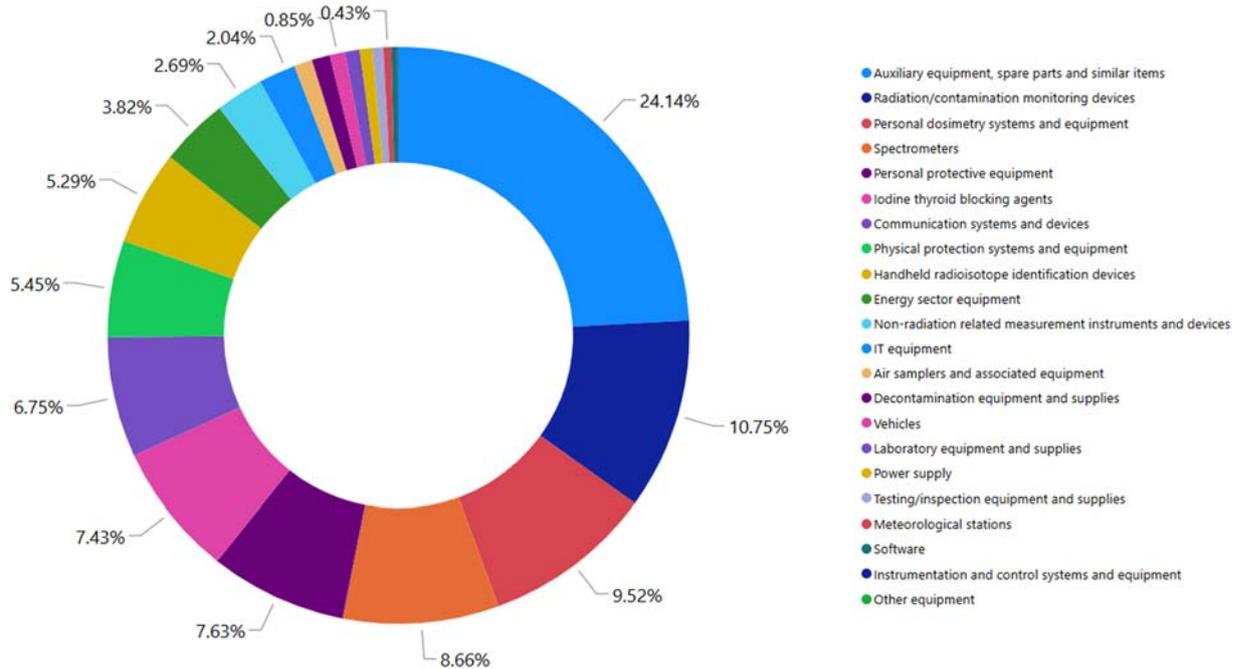
²⁹ Australia, Canada, France, Germany, Greece, Hungary, Israel, Japan, Romania, Spain, Sweden, Switzerland and the USA.



Liquid nitrogen generator (left) (Photo: SESU) and dosimeters in use (right) (Photo: Energoatom) delivered to the Ukrainian Hydrometeorological Centre and the hydrometeorological organizations of the State Emergency Service of Ukraine in December 2024, and to the Centralized Spent Fuel Storage Facility of Energoatom in November 2024.

123. During the reporting period, in the framework of the agreement between the Agency, Energoatom, and the French Ministry for the Economy, Finance and Industrial and Digital Sovereignty, spare parts for maintenance of the EDGs were delivered to the SUNPP.

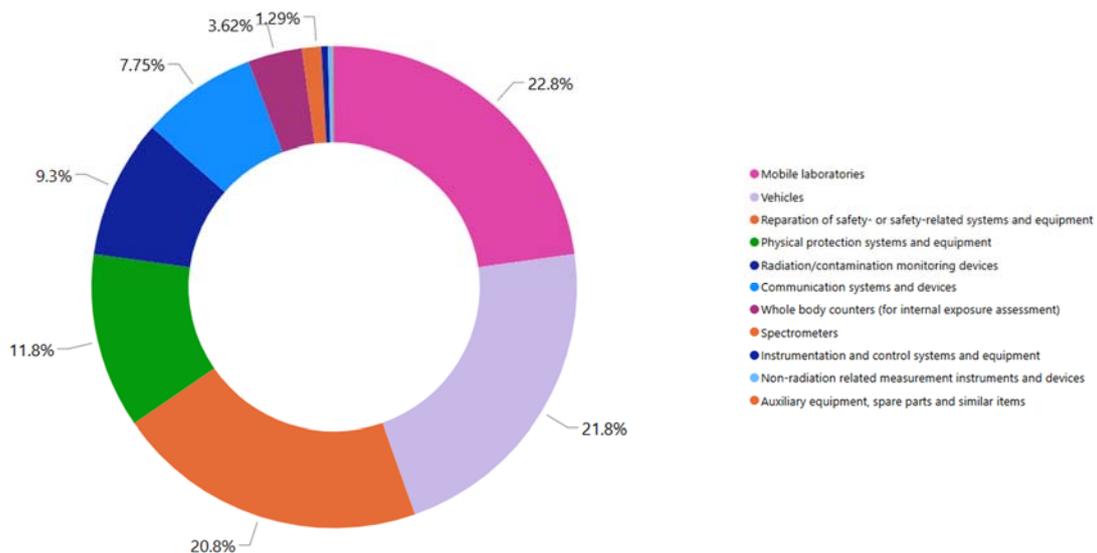
124. Following these deliveries, the value of the nuclear safety- and security-related equipment delivered to Ukraine since the start of the armed conflict amounts to €14.3 million.



Overview of the monetary value of items as a percentage of the total monetary value of the nuclear safety- and security-related equipment worth €14.3 million delivered to 18 different organizations in Ukraine since the start of the armed conflict.

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

126. More nuclear safety- and security-related equipment procured by the Agency is expected to be transported to ten different organizations in Ukraine in the coming months. The total cost of these expected deliveries exceeds €3.9 million. Additional nuclear safety- and security-related equipment is in various stages of procurement and exceeds €4.3 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

127. Following the second IAEA Support and Assistance Mission on the Safety and Security of Radioactive Sources (ISAMRAD) conducted in Ukraine from 2 to 8 November 2024 to initiate the implementation of Phase One of the ISAMRAD programme as reported on in document GOV/2024/63, the Agency is currently defining the details of the assistance that could be provided within this programme.

128. ISAMRAD Phase One specifically focuses on aspects related to the development of operational plans for the recovery, consolidation and transfer of vulnerable Category 1 to 3 radioactive sources and disused radioactive sources needed to mitigate immediate safety and security concerns, and the development of plans for the installation, upgrading and repair of physical protection systems and safety monitoring and measuring equipment at vulnerable civilian locations storing or using Category 1 to 3 radioactive sources.

129. For the recovery, consolidation and transfer of vulnerable Category 1 to 3 radioactive sources in areas affected by the conflict, the Agency is working closely with the SNRIU to provide support to address logistical, technical and security challenges. In this regard, the Agency is reviewing information regarding vulnerable Category 1 and 2 radioactive sources in the areas affected by the conflict, with a view to identifying next steps and determining whether there is a need for an additional mission to assist Ukraine in ensuring that these sources are safe and secure.

B.3.3. Medical Assistance for Operating Staff at NPPs

130. During the reporting period, on 5 December 2024 and 15 January 2025, two additional requests for assistance under the medical assistance programme were received from Ukraine, encompassing equipment and items such as ambulances and power supply systems.

131. The Agency continued to deliver medical equipment and supplies to Ukraine. During the reporting period, the Agency organized a total of 21 deliveries, bringing the total number of such deliveries to 30.

132. The deliveries included equipment and supplies procured by the Agency under extrabudgetary contributions provided by Austria, Czechia, Denmark, Italy, Japan, Norway and the USA. As a result of these deliveries, the National Research Centre for Radiation Medicine, as well as South Ukraine, Netishyn, Slavutych and Varash hospitals and the ChNPP, the KhNPP, the RNPP and the SUNPP received equipment and supplies such as individual dosimetry systems, ambulances, mobile X-ray systems, IT equipment, ultrasound devices, biochemical blood and urine analysers, electrocardiography machines, patient monitors and personal protective equipment.

133. On 19 November 2024, the Agency organized a ceremony for the handover of two fully equipped ambulances to the ChNPP site's medical unit and to Varash hospital near the RNPP. These vehicles, funded by donations from Norway, are intended to enhance emergency response capabilities by enabling the safe transportation of staff at the ChNPP and the RNPP who need hospital treatment.

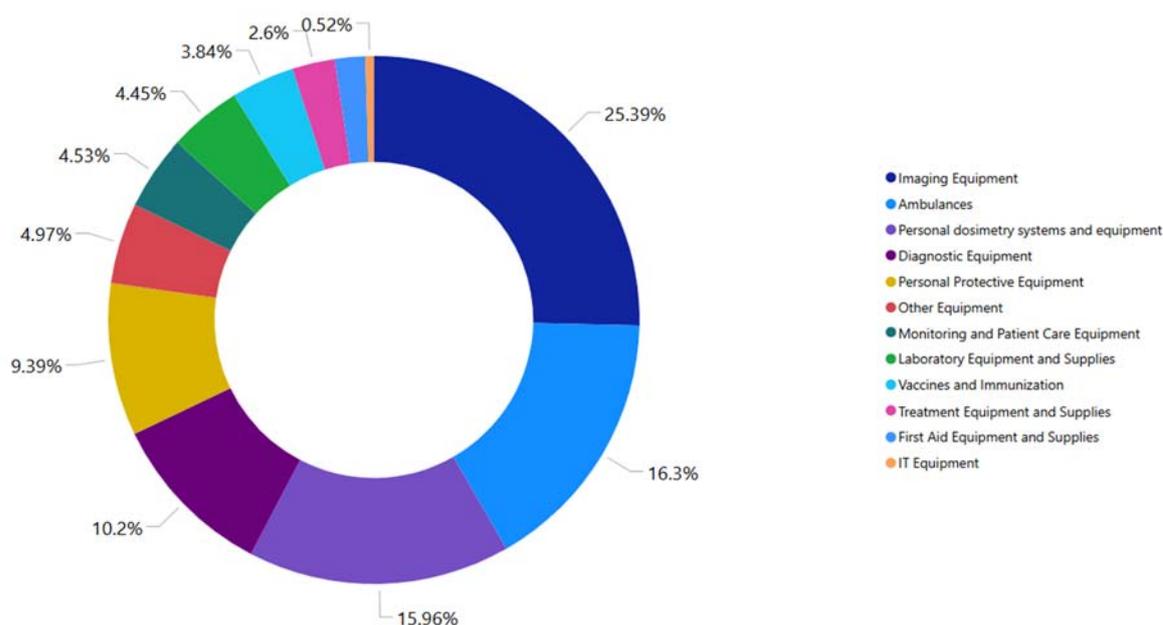


The two fully equipped ambulances parked in front of the ChNPP site during the handover ceremony.

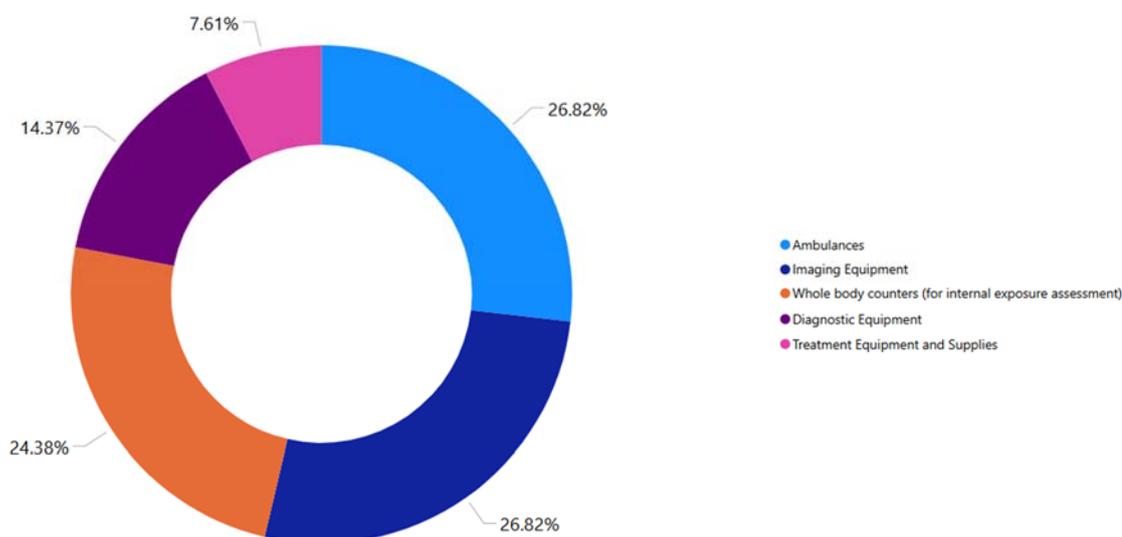


Trauma simulation kit in use at the RNPP. The kits were delivered on 17 December to the RNPP under the medical assistance programme. (Photo: RNPP)

134. Following these deliveries, the value of medical equipment and supplies delivered to Ukraine since the start of the armed conflict amounts to €1.4 million. Additional medical equipment and supplies with a value of 2.8 million are in the process of procurement or pending delivery to Ukraine.



Overview of the monetary value of items as a percentage of the total monetary value of medical equipment and supplies worth €1.4 million delivered to 11 beneficiary organizations of the medical assistance programme.



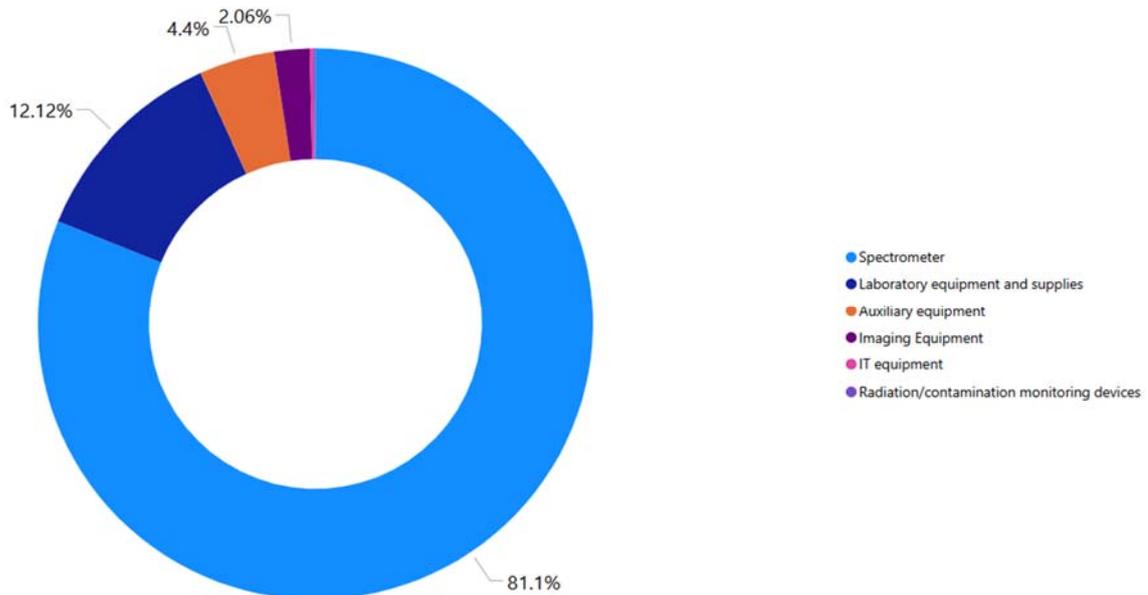
Overview of the monetary value of items as a percentage of the total monetary value of medical equipment and supplies, including radiation protection and monitoring equipment, in transit or under procurement for 11 beneficiary organizations of the medical assistance programme, in the amount of approximately €2.8 million.

B.3.4. ISAMKO

135. On 14 January 2025, the Agency received an additional request for assistance under the IAEA Support and Assistance Mission to the Kherson Oblast (ISAMKO) programme, bringing the total

number of requests to three, comprising of nuclear or isotopic technique-based equipment and similar equipment and supplies. In addition, training activities have been requested to build Ukraine’s capacity in the area of isotope hydrology, and the support needed and potential beneficiaries within the area of non-destructive testing have been further clarified.

136. The Agency is procuring assessed priority equipment and supplies worth €2.9 million, amounting to over 70% of the requested needs for the beneficiaries of the programme: 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. The first deliveries under the ISAMKO programme are expected in the coming weeks.



Overview of the monetary value of items as a percentage of the total monetary value of equipment and supplies in procurement within ISAMKO programme, in the amount of approximately €2.9 million.

B.3.5. Remote Assistance

137. 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.

138. After conducting the first virtual trainings in October 2024 on human performance and management observation and coaching, the first face-to-face training for the SUNPP was conducted on 13 November 2024, with remote support from the Agency’s Headquarters. The topic was leadership in the nuclear industry. The training covered IAEA guidelines on leadership and management for safety, highlighted the unique aspects of nuclear leadership, explained the differences between leadership and

management and the roles of managers and leaders, and presented methods for self-assessment of leadership skills.

B.3.6. Deploying Rapid Assistance

139. 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

140. 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.

141. 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.

142. 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.

143. 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

144. 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.

145. 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.

146. During the reporting period, the Agency successfully conducted physical inventory verifications at a number of facilities and LOFs in Ukraine. The Agency verified spent fuel that was transferred from the RNPP 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 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 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

147. During the reporting period, no significant changes to the nuclear safety and security situation at the ZNPP were observed. 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 and the Agency's understanding is that this will continue as long as the plant's safety and security remains in jeopardy due to the armed conflict.

148. 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, such activities continue to put the Five Principles and the overall nuclear safety and security of the plant at great risk.

149. 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.

150. 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.

151. During the reporting period, the KhNPP, the RNPP and the SUNPP continued to face challenges arising from the continued military activities on the territory of Ukraine. Specifically, 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 electricity grid continued to be reported, leading to an increased risk for the safe and secure operation of the plants.

152. On 14 February 2025, a drone hit the NSC of Unit 4 of the ChNPP causing damage and a fire. Although the incident did not result in a release of radioactive material into the environment, it compromised the integrity of the NSC, which houses the remains of the reactor damaged in the 1986 accident. The incident demonstrates once again the fragility of the nuclear safety and security situation in Ukraine.

153. 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.

154. During the reporting period, 31 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 108. In total, over €15.6 million worth of equipment has been delivered to 23 organizations in Ukraine since the start of the armed conflict.

155. The Agency maintained a continuous presence at all nuclear sites without interruption. The rotations at the ChNPP site, the KhNPP, the RNPP and the SUNPP were completed as planned during the reporting period, while the rotations at the ZNPP did not take place after 10 December 2024 due to ongoing military activities that put the safety of Agency staff at risk.

156. 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 27 February 2025, a total of 178 missions comprising 158 Agency staff members had been deployed as part of the continued presence at all 5 nuclear sites in Ukraine, totalling over 381 person-months in Ukraine.

157. 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. The unmet funding need to support continued programme delivery until the end of June 2026 has been estimated at over €22 million.

158. 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.

159. 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 13 November 2024 to 27 February 2025

Events at the Zaporizhzhya Nuclear Power Plant

- On 13 November, ISAMZ was unable to visit the off-site central warehouse and diesel fuel storage, with the ZNPP citing security concerns.
- From 16 to 17 November 2024, the 750 kV Dniprovsk power line was disconnected.
- On 21 November 2024, ISAMZ continued to be denied access to the external spare parts warehouse and diesel fuel storage facility. However, the team was informed that the diesel fuel storage tank damaged more than two years ago had been repaired.
- From 21 to 23 November 2024, the 750 kV Dniprovsk power line was disconnected.
- On 29 November 2024, ISAMZ visited Unit 1 to observe the repairs conducted the previous month on a leaking impulse line. The team was informed that gamma radiography had been performed on approximately 30 other locations in Unit 1 and had identified one further weld that had degraded without any leak. Both welds were repaired and re-tested.
- From 30 November to 1 December 2024, the 330 kV Ferosplavna 1 line was disconnected.
- On 2 December 2024, ISAMZ was informed by the ZNPP that the voltage stabilizer for the ZNPP's 750 kV power line was being repaired after it was automatically disconnected by the activation of a protection mechanism.
- On 10 December 2024, a drone hit and severely damaged an official Agency vehicle during the rotation of ISAMZ teams.
- From 12 to 30 December 2024, 3 of the 4 DSGs operated to treat roughly 800 cubic metres of liquid waste.
- On 18 December 2024, ISAMZ was informed by the ZNPP that Unit 4's circulation pump, which maintains the movement and cleanliness of water in the ZNPP cooling pond, had been switched off to minimize loss of the water in the cooling pond.
- On 18 December 2024, the ZNPP cancelled ISAMZ's planned visit to the ZNPP 750 kV open switchyard, citing security reasons.
- From 20 to 22 December 2024, the 330 kV Ferosplavna 1 line was disconnected.
- From 24 to 25 December 2024, the 330 kV Ferosplavna 1 line was disconnected by the ZTPP 330 kV open switchyard for maintenance.
- On 5 January 2025, ISAMZ reported hearing loud blasts near the ZNPP, coinciding with reports of a drone attack on the plant's training centre.
- On 12 January 2025, the 330 kV Ferosplavna 1 line was disconnected for several hours for maintenance.

- On 24 January 2025, ISAMZ conducted a walkdown of the reactor containment building of Unit 5 and observed condensate water on the walls, floor and bridge platform, as well as water dripping from the polar crane and corrosion on some pipes.
- On 29 January 2025, the 750 kV Dniprovskya line was disconnected and reconnected on the same day. It was disconnected again later on 29 January 2025 and was reconnected on 1 February 2025.
- On 11 February 2025, the 330 kV Ferosplavna 1 line was disconnected.
- On 24 February 2025, ISAMZ reported hearing several rounds of gunfire at the ZNPP.

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

- On 17 November 2024, electricity production at six of the nine units at the KhNPP, the RNPP and the SUNPP was reduced as a precautionary measure following widespread military activities across the country that reportedly targeted Ukraine's energy infrastructure. Furthermore, the main power lines connecting four of the substations to the NPPs were disconnected. Agency staff present at the NPPs heard air defence activities and sought shelter during the air raid alarms, and the team at the KhNPP heard a loud explosion.
- On 21 November 2024, the SUNPP was disconnected from its two 750 kV power lines following military activities. One reactor unit was temporarily disconnected from the electricity grid and gradually returned to full power after being reconnected. One of the 750 kV power lines was reconnected on 22 November 2024 and the second power line was reconnected one month later.
- On 21 November 2024, reactor power at the KhNPP and the RNPP was temporarily reduced as a precautionary measure due to air raid alarms.
- On 28 November 2024, all units at the KhNPP, the RNPP and the SUNPP reduced their electricity generation and one unit at the RNPP disconnected from the grid that morning following attacks on Ukraine's energy infrastructure. The KhNPP site also lost connection to two of its power lines, and the RNPP was disconnected from three of its power lines. Staff at the KhNPP and the SUNPP were forced to seek shelter.
- On 3 and 4 December 2024, ISAMISU was informed that a total of 17 drones had been detected approximately 3 kilometres from the site.
- On 3 and 6 December 2024, ISAMIK was required to shelter.
- On 8 December 2024, the KhNPP reduced power at one unit, at the request of the grid operator.
- On 13 December 2024, five of Ukraine's nine operating nuclear power reactors reduced their electricity output, and one unit was temporarily disconnected from the grid early in the morning, following attacks on Ukraine's energy infrastructure. One of the deployed teams was forced to shelter, and ISAMISU was informed that military objects had been observed flying approximately 300 metres from the site. Additionally, the SNRIU informed the Agency that cruise missiles had been observed 3.7 kilometres from the KhNPP.
- On 16 December 2024, ISAMIK was required to shelter in the morning due to the presence of drones in the area, the closest of which was 900 metres away.
- On 19 December 2024, two reactor units at the SUNPP reduced power temporarily in the morning, before returning to nominal full power later that day.

- On 25 December 2024, a major attack on Ukraine's energy infrastructure caused seven reactor units at the country's three operational NPPs to reduce their operating power for several hours.
- On 15 January 2025, one reactor unit at the RNPP was required to temporarily reduce power for several hours, as a precautionary measure due to military activities.
- On 29 January 2025, one reactor unit at the SUNPP was required to temporarily reduce power following the disconnection of the 750kV Dniprovaska line. The line was reconnected to the SUNPP on 8 February 2025.

Events at the Chernobyl Nuclear Power Plant Site

- On 15 January 2025, ISAMICH was informed that drones had been observed flying over the exclusion zone for the previous two months and that at least two drones had flown close to the industrial area of the site on 14 January 2025. ISAMICH also reported hearing gunfire in the vicinity.
- On 14 February 2025, ISAMICH heard the sound of an aerial vehicle flying near the site, immediately followed by a very loud explosion at the site. ISAMICH observed the location of impact, as well as fire and smoke coming from the upper part of the NSC. The fire, which spread through the outer and inner cladding of the NSC structure, continued for several days.
- On 14 February 2025, ISAMICH visited the external areas of the NSC and observed damage to the exterior, smoke emanating from the structure, and remnants of a drone. The team also performed radiation monitoring and confirmed that there was no increase in radiation levels compared to the measurements regularly performed by ISAMICH.
- On 15 February 2025, ISAMICH conducted a detailed walkdown of the NSC and observed the damage caused by the incident.

Events at Other Facilities

- On 27 December 2024, the SNRIU informed the Agency that the subcritical Neutron Source facility at the KIPT had lost off-site power for approximately five hours on the morning of 25 December, as a result of military activities.
- No other events were reported affecting other nuclear or radiological facilities and activities in Ukraine.