



Zaporizhzhia nuclear plant, Ukraine.¹

RUSSIAN ATTACK ON ZAPORIZHZIA NUCLEAR PLANT

Timeline of events 4 March 2022 – 28 February 2023

Implications for nuclear safety, sanctions against ROSATOM

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¹ Image from 2015, google earth,
<https://www.google.com/maps/@47.5086509,34.5930892,3a,75y,292.46h,83.59t/data=!3m6!1e1!3m4!1s5A7YsTHS1bpRgqZiiXnZ3A!2e0!7!13312!8!6656>

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Introduction

The Russian military attacks on the Zaporizhzhia nuclear power plant (ZNPP) in Ukraine, their seizure and ongoing occupation have created unprecedented risks of a large-scale nuclear disaster potentially at a scale beyond the Chernobyl or Fukushima disasters. It highlights that no nuclear power plant in the world is designed to withstand war-type attacks and it shows how the safety of a nuclear plant depends on a complex and fragile set of services and infrastructure, such as the electricity grid, access to water, logistic supply lines, the working conditions of the workers or the unhindered access by national nuclear authorities.

On March 2nd 2022, two days before the occupation by the Russian army and Russian state nuclear corporation ROSATOM of the ZNPP, Greenpeace published its first [briefing](#) explaining these risks followed by a second [report](#) on the South Ukraine reactors and our daily updated [interactive map](#). Since then, our warnings about the risks to the safety of the nuclear plants have been confirmed by the impact of the Russian war against Ukraine, by the Ukrainian nuclear authorities and even the pro-nuclear [IAEA](#).

In this briefing, we call for immediate action to significantly increase the safety in and around the EU nuclear power plants under a new “stress test”. We also offer a chronology of the key incidents that endangered the ZNPP, the people of Ukraine and the wider European population.

Russian ‘war nuclear stress tests’

Greenpeace Central and Eastern Europe (CEE) joins the calls of the [European Environmental Bureau](#) and [Nuclear Transparency Watch](#) on the European Commission European Nuclear Regulators Group, and national nuclear regulators to initiate “War nuclear stress tests”, comparable to the EU post-Fukushima nuclear stress tests from the last decade. Lessons should be drawn from the illegal and violent occupation of Zaporizhzhia nuclear power plant and threats to other nuclear installations during Russia’s invasive war in Ukraine, and be used in a nuclear stress test of all European nuclear power stations. Attacks and illegal seizure and occupation as we see in nuclear installations in Ukraine or other armed attacks are possible in any nuclear power station on every continent. With planned remaining lifetimes up to 60 years and beyond, acts of war towards nuclear installations can never be excluded, security in times of war can never be fully guaranteed.

Sanctions on the Russian nuclear sector

Greenpeace CEE also joins calls from among others the Government of Ukraine, the [European Parliament](#) and others for sanctions on the Russian nuclear sector, and especially the nuclear giant Rosatom, which has played a considerable role in increasing the risks around ZNPP.



IAEA inspection of Zaporizhzhia nuclear plant, 1 September 2022, Photo Credit: Fredrik Dahl / [IAEA](#)

One year of occupation of the Zaporizhzhia nuclear power plant

On 4 March 2022, Russian troops occupied the Zaporizhzhia nuclear power plant (ZNPP) in the South of Ukraine. This largest nuclear power plant in Europe saw since that moment ongoing threats to its safety. [A day after Russian forces broke into the town of Enerhodar](#), which hosts most of the employees of the ZNPP, military attacks started on the nuclear power station itself. Since that time, the power station has faced numerous actions that increased the risks of a severe nuclear accident with release of substantial amounts of radioactive substances. This briefing contains a timeline of nuclear risk moments during the first year of occupation of ZNPP and looks into issues that were raised over the year concerning nuclear safety, relevant for other nuclear power stations all over the world. It furthermore looks into the role of the Russian nuclear company Rosatom in all this. The briefing is based on the day-by-day monitoring carried out by Greenpeace and the almost 150 updates on the situation from the International Atomic Energy Agency (IAEA).

Lessons learned

- **Unrestricted independent oversight by the Ukrainian nuclear regulatory authority SRNIU** is vital for keeping nuclear safety risks under control. For that, ZNPP should be and remain under Ukrainian ownership. The Russian invasion and following interference by the Russian nuclear giant Rosatom and nuclear regulator Rostekhnadzor introduced

an unacceptable level of unclarity for regulatory oversight and staff, leading to higher risks.

- The Russian nuclear giant **Rosatom** cannot be trusted in cooperation and issues of nuclear safety and risk and should be completely and globally sanctioned;
- The **IAEA** suffers from its nuclear promotion mandate, membership from every nuclear nation in the world, including aggressor states and the continued presence of former Russian nuclear industry staff up to the highest level of the IAEA's management. Its operation is thereby severely compromised;
- In spite of introducing some level of transparency, independent observers were brought in too late, at a too low level, with a too limited mandate, among others by not being able to fully expose cause and effect relations in case of safety violations. This is directly related to the status of the IAEA, because of its lock-in with the nuclear aggressor state Russia.

[West European Nuclear Regulators Association \(WENRA\)](#) "No nuclear power plant has ever been designed to consider potential war-induced damage in its safety demonstration."

Acts of war are a real existing threat to nuclear safety at every nuclear power station. Given the involved risks, nuclear power stations should be phased out as soon as practicable.

Examples of vulnerabilities that surfaced during one year of Russian occupation of ZNPP

- **Communication lines** (telephone, data, internet, mobile) are highly vulnerable to malevolent attack;
- **Power lines and switching stations** are highly vulnerable to malevolent attack;
- **Cooling and water channels and pipelines** essential for access to the ultimate heat sink are vulnerable to outside attack or inside sabotage;
- The **dependency on one large ultimate heat-sink** in the form of a reservoir increases the vulnerability of a nuclear power station in case of dam breach or sabotaging dam operation, including emptying the reservoir for military strategic purposes as was executed by the Russian army at the Kakhovka;
- **Open dry-storage of radioactive waste** is vulnerable to outside attacks;
- Nuclear power station sites can easily be used to **store military equipment and ammunition**, increasing their vulnerability in case of attacks – military blackmail (counting on the other party not to attack a nuclear power station) can easily backfire due to misunderstandings or intent;
- Stockpiles of **essential spare parts** are not large enough to survive long-time occupation by enemy forces. This increases the vulnerability of nuclear power stations for military or terrorist abuse;
- **Essential staff can be put under pressure and taken hostage** in many ways by terrorists, occupying military forces or enforced enemy management. This includes harassment, kidnapping, murder, undermining the shift-pattern, lack of sufficient resting places, lack

of food and water, hostage taking of family members and others. This severely increases the chance and impact of human failure;

- **Lack of independent verification of events can spread false information**, undermining the safety situation of a nuclear power station;
- **Lack of sufficient, and/or damage to independently operating observation and monitoring equipment** undermines independent oversight when access to the site for regulatory authorities is blocked;
- **Multiple grid-connections are not sufficient**. Even ZNPP's four 750 kV external grid lines, backed up by seven 330 kV and three 150 kV lines appear not to be enough to secure off-site power at all times during this military conflict. Dependency on emergency diesel generators during military conflict remains highly risky (theft of diesel, operability of generators, maintenance of generators);
- The need for **concentration of switching stations** towards external power increases the vulnerability of power provision of nuclear power stations, which need long term power access under all circumstances to secure cooling and operation;
- **Important buildings and installations** (incl. nitrogen-oxygen stations, fire brigade stations and others) are **never sufficiently protected against shelling**.

TIMELINE OF HIGHEST RISK SITUATIONS AT THE ZAPORIZHZHIA NUCLEAR POWER PLANT

Russian occupation of ZNPP

- **4 March 2022** – [Shelling of the ZNPP premises](#); hit of training building near to one of the plant's reactors as well as damage to a laboratory; two people injured; unit 1 was already shut down for maintenance; units 2 and 3 underwent a controlled shut-down; unit 4 operating at 60%; units 5 and 6 held in lower power mode in reserve. [Reactor compartment building unit 1 damaged](#). Two shells hit the dry spent fuel storage facility. Personnel was forced to work more than 24 hours.
- **5 March 2022** – [One telephone communication line lost, one still functioning](#), as well as mobile phone communication. Unit 2 increasing capacity, unit 3 disconnected in low power mode, 4 operating at full capacity, 5 and 6 shut-down.
- **6 March 2022** – Against pillar 3 of the IAEA 7 pillars of safe operation^[1], [actions of management require prior approval by Russian commander](#). Some mobile networks and internet were switched off impairing communication of staff with the nuclear regulator and operator. This contravenes pillar 7.^[2] [Three staff shifts reinstalled](#). [750 kV line to Zaporizhzhia switching station damaged](#) near Vasylivka, Zaporizhzhia region.
- **7 March 2022** – delivery of spare parts and medicines [has become impossible](#).
- **8 March 2022** – [Limited access](#) to food, water and medicines.
- **9 March 2022** – [Loss of remote safeguards system data transmission](#) to the IAEA. Local storage of data continues, uncertainty about storage capacity and operational status of monitors. Two of five high voltage power lines were damaged, one on stand-by. Emergency repair of unit 6 transformer after cooling leak since 4 March.

- **10 March 2022** – [No access for specialized personnel](#) for planned repairs and maintenance activities to unit 1.
- **11 March 2022** – [Detection and disposal of unexploded munition](#) in the damaged training center and other places after the events of 4 March. Presence of foreign forces affects work morale and causing pressure.

Russian attempts to take over control

- **12 March 2022** – [Ukraine informed the IAEA](#) that Russia planned to take full and permanent control of ZNPP under the management of Rosatom. Russia denies. 400 Russian soldiers are present full time on site. Russian experts have arrived at the site to assess the radiation situation and provide consultative assistance. Russian occupying forces bring in additional diesel for diesel generators. Contravention of pillar 3.^[3] Two 750 kV lines disconnected (Zaporizhzhia and South-Donbas). [No independent regulatory oversight](#) directly at the ZNPP site.
- **13 March 2022** – [11 representatives of Rosatom present at ZNPP](#). The regulator tells the IAEA it can no longer provide independent on-site regulatory oversight, partially because its working premises at ZNPP had been damaged on 4 March. It remains in constant contact with the site.
- **14 March 2022** – [Detonation of unexploded munition](#) by Russian forces at the ZNPP site.
- **16 March 2022** – [ZNPP loses connection to another high voltage line](#). Two remain operating. Decrease of output of units 1 and 2 to 500 MWe, later increased to 600 MWe.
- **19 March 2022** – [Disconnected power line repaired](#) and reconnected.
- **26 March 2022** – [Transformer at unit 6 repaired](#). Unit 6 kept in reserve.
- **20 April 2022** – Representatives of the Russian Federation strictly forbid to carry out photo and video recording on the territory of ZNPP, there are [threats](#) (including the use of weapons) against persons who intend to do so.
- **28 April 2022** – [Overflight of Kalibr](#) type cruise missile over ZNPP.
- **29 April 2022** – A group of 8 [people from Rosenergoatom arrived at ZNPP](#) demanding daily reports from plant management about “confidential issues” on the functioning of the NPP, including administration, management, maintenance, repair activities, security and access control, management of nuclear fuel, spent fuel and radioactive wastes. Personnel working under “unbelievable pressure”. IAEA announces visit to the ZNPP at the earliest possible opportunity.
- **12 June 2022** – [Remote transmission of safeguards data](#) from ZNPP to the IAEA restored after a technical interruption of almost two weeks (30 May). IAEA stresses need for verification mission to ZNPP.
- **24 June 2022** – IAEA draws attention to [untenable conditions facing staff](#) at ZNPP.
- **29 June 2022** – Remote connection to safeguards [surveillance system ZNPP again lost](#) on 25 June due to a disruption of the facility’s communication system.
- **3 July 2022** – Alleged attempt by Russian forces to [drain cooling ponds](#). [Refusing diver beaten to death](#).

- **4 July 2022** – Remote transmission of [safeguards data ZNPP restored](#) after week-long disruption on 1 July.
- **5 July 2022** – [Shortage of supplies](#) (valves, consumables), ammunition located at the station, [more than 50 Russian military equipment located at the station](#). [Anti-personnel mines along the shores of the reservoir](#), "Smerch" and "Grad" surface-to-air missiles, tanks and armored personnel carriers on the territory of the nuclear power plant.
- **7 July 2022** – [Employee of ZNPP kidnapped](#) by Russian forces. [Another kidnap](#) at 17 July 2022. [Two more](#) on 18 July 2022.
- **9 July 2022** – MLRS (Grad) [missiles launched](#) from Enerhodar. From this day on, [daily shelling](#) of the right bank of the Dnpr by ZNPP based launchers from sites around Enerhodar.
- **12 July 2022** – [Ukrainian attack](#) on Russian troops in Enerhodar. Use of drones. Kamikaze drone hits tent camp and equipment next to dry storage spent fuel.
- **18 July 2022** – [Event at ZNPP among Russian troops](#). Nine hospitalized. Panic. Held two shifts of personnel longer than supposed to. [Russian military entered closed zones](#) without keeping safety procedures.
- **21 July 2022** – 14 units of [heavy military equipment](#), ammunition, weapons and explosive placed in the engine room of unit 1 of ZNPP.
- **25 July 2022** – [Around 1000 ZNPP workers](#) (10% of the workforce) have left occupied Enerhodar. [Around 100 ZNPP workers](#) were abducted by Russian forces.
- **30 July 2022** – Internet and mobile communications in Enerhodar disappeared. [Russian troops opening fire in the direction of the ZNPP from Enerhodar](#). This type of fire continues in the following days.



Inside control room of one of the Zaporizhzhia nuclear reactors, 1 September 2022, Photo Credit: Fredrik Dahl / [IAEA](#)

Russian shelling interferes with daily operations

- **5 August 2022** – [Russian shelling of ZNPP](#), hitting 330 kV line at ZNPP. [Further shelling](#) hits [nitrogen-oxygen station and combined auxiliary building](#). [Rosatom representatives hurriedly left](#) the premises before the attacks happened. Two power lines remained operational. [One unit disconnected from the grid](#) as its emergency protection system was triggered. [Two units remained operating](#). Breach of pillars 1, 2, 3, 4 and 6. Emergency diesel generators went into operation.
- **6 August 2022** – [Shelling of ZNPP wounds 1 employee](#). One direct hit near the dry spent fuel site (containing 174 cases with 24 assemblies each). [Three radiation detectors around the spent fuel site damaged](#). Fire at the water intake station of Enerhodar. Later in the day, [more shelling](#), fire at ZNPP leading to a short circuit at a substation near unit 5.
- **8 August 2022** – [ZNPP is connected with only one operating line](#) to the Ukrainian grid.
- **9 August 2022** – [False reports](#) about potential mining of ZNPP by Russian troops. [Ukraine nuclear regulator SNRIU](#) has only very limited and fragmentary communications with ZNPP.
- **11 August 2022** – [330 kV power line](#) to Zaporizhzhia coal power station (ZTPP) restored. [Further shelling of ZNPP site](#) near fire department. One shift-change could not take place. [Power line to ZTPP restored](#). [West European Nuclear Regulators Association \(WENRA\)](#) position paper: *“No nuclear power plant has ever been designed to consider potential war-induced damage in its safety demonstration. WENRA therefore reiterates its previous position: it is imperative to exercise the utmost restraint and vigilance to prevent any direct or indirect impact of military operations on nuclear installation safety.”*
- **13 August 2022** – 750 kV open [switchgear damaged](#).
- **14 August 2022** – [Shelling of Enerhodar](#), several civilians injured.
- **19 August 2022** – [Russian film crew filming at ZNPP](#). Staged shelling attacks on bus station and discharge channel. New workers not allowed to ZNPP premises. [Nuclear regulator SRNIU instructs](#) ZNPP to bring units 1 and 2 in cold shut-down.
- **21 August 2022** – [Shelling damaged ZNPP](#) infrastructure including laboratory and chemical facilities.
- **22 August 2022** – Ukrainian authorities deliver [25.000 potassium iodide tablets](#) to Enerhodar. [Shelling damaged the reserve station transformer](#) at the ZTPP and ZNPP-ZTPP connection line. Line restored within 4 hours. Multiple injured, one killed. Fire on the road to the ZNPP.
- **24 August 2022** – [two employees of the ZNPP detained](#) by Russian troops on accusation of cooperation with the UA armed forces.
- **25 August 2022** – [Shelling damages 330 kV switch yard](#) and [severs two operational 750 kV lines](#). One 330 kV back-up line delivers power. [Two reactors disconnected from grid](#) and emergency protection system triggered. All six units disconnected from grid after

power line was restored. Overpass from unit 2 for handling radioactive waste and decontamination, water mains and desalinated water pipes damaged, as well as communication line with radiation control sensors and the ZNPP telephone line.

- **26 August 2022** – [Units 5 and 6](#) are [brought back to the grid](#).
- **28 August 2022** – [Russia blocked the adoption of a joint declaration](#) of the UN conference on Non-Proliferation Treaty that cites “grave concern” over military activities around Ukraine’s nuclear power plant, in particular Zaporizhzhia.
- **29 August 2022** – [IAEA Support and Assistance Mission](#) (ISAMZ) sets out to ZNPP. Reports of [26 arrests by Russian authorities](#) since they took over on March 4, cases of torture and restricting Ukrainian workers from monitoring the condition of ZNPP.
- **1 September 2022** – [Shelling of ZNPP](#) in the morning, unit 5 switched off. The 330 kV back-up line was damaged and unit 2 suffered a black-out, starting its emergency diesel generators. Unit 6 continued to operate. [Unit 5 was reconnected to the grid](#) on 2 September 2022.

[IAEA ISAMZ arrives at ZNPP](#) and leaves at the end of the day. Six IAEA representatives remain behind until 3 September.

- **3 September 2022** – [ZNPP loses connection to the last operating 750 kV line](#) and falls back to the 330 kV back-up connection. [Unit 5 disconnected from the grid](#), unit 6 remains operational providing power to the back-up 330 kV line and on-site power.
- **5 September 2022** – The [back-up power line is also lost due to a fire](#). ZNPP is powered by unit 6. Two IAEA representatives remain on-site, four leave.
- **7 September 2022** – [Renewed shelling](#) damaged back-up power lines of ZNPP and the site’s switchyard is damaged. [Unit 6 provides on-site power](#). [IAEA SG Grossi calls at the UN Security Council](#) for a safety and security protection zone around ZNPP. Black-out at Enerhodar.
- **8 September 2022** – Ukrainian authorities call on inhabitants of Enerhodar to [evacuate](#) due to military operations.
- **11 September 2022** – [Unit 6 taken from the grid to cold shut-down](#). One 330 kV back-up power line restored. There are 20 back-up diesel generators available with diesel stocks for 10 days. [Later on the day](#) a second back-up power line (750/330 kV) was restored.
- **13 September 2022** – [A third 150 kV back-up power line](#) to the ZTTP was restored and the ZTTP switchyard was repaired, enabling power for Enerhodar.
- **17 September 2022** – A [main 750 kV line \(to Dniprovsk\) has been restored](#). All six units of ZNPP in cold shut-down. Additional diesel supplies.
- **19 September 2022** – [The switch-yard at the ZTTP is down](#), cutting off all back-up power lines. ZNPP remains connected to the Dniprovsk 750 kV line. The Pivdenniukrainsk or South Ukraine NPP (SUNPP) was shelled.
- **21 September 2022** – [Shelling damaged cables](#) providing power to unit 6 that had to switch to diesel emergency power. Also the site of the ZTTP was shelled.
- **27 September 2022** – [Situation of staff deteriorating](#). ZNPP personnel does not want to cooperate with Russian invaders and is trying to leave the occupied territories. Russian occupiers refuse Enerhodar residents to leave the territory and city. Russian military putting pressure on people to vote in the “referendum” on annexation by Russia. Threats

of mobilization as form of coercion. [Renewed shelling of switchyards](#) and explosions among others near cooling channel. These probably were caused by [animals setting off landmines](#). Such landmine explosions continued in the next week, causing local damage.

- **1 October 2022** – [General Director of ZNPP](#) Ihor Murashov was detained by Russian forces. He was released on **4 October** and moved to Zaporizhzhia city. He [stepped down from his position](#), which was taken over by Energoatom CEO Petro Kotin.
- **6 October 2022** – [Rosatom established the Operating Company of ZNPP](#) in Moscow. Russian president Putin signs decree taking over Russian control over ZNPP. Ukrainian authorities dismiss this and Ukrainian staff *de facto* maintains control.
- **7 October 2022** – [Shelling damaged a 150 kV power line](#) to reactor unit 6, triggering the need for use of five emergency diesel generators for one and a half hour.

Full off-site black-outs due to Russian shelling of Ukraine energy infrastructure

- **8 October 2022** – [Full station off-site black-out](#) due to shelling. First, the switching station at ZTTP connecting to back-up lines was damaged. Then the last remaining 750 kV line was lost shortly after midnight and ZNPP had to switch fully to diesel emergency power (16 available generators, six after stabilization). It is assumed there is sufficient diesel for 10 days.
- **9 October 2022** – Connection to the 750 kV Dniprovskia [line is restored](#).
- **11 October 2022** – [Deputy head ZNPP](#) Valery Martynyuk kidnapped by Russian forces. [Shelling](#). ZNPP employees are offered to sign [contracts for working with Rosatom](#).
- **12 October 2022** – [Full station black-out](#) after damage of a substation of the Dniprovskia 750 kV line just before 09:00. ZNPP is fully dependent on emergency diesel generators. Around 14:00, the [750 kV was reinstalled](#).
- **14 October 2022** – Three 330 kV back-up power lines restored. ZNPP received additional fuel supplies for the diesel generators. [Staff under “unacceptable pressure”](#).
- **17 October 2022** – [ZNPP lost connection to the 750 kV power line](#) to Dniprovskia because of shelling of a substation. Emergency diesels started, then external power from back-up connection.
- **18 October 2022** – Connection to 750 kV line restored. ZNPP deputy director Martynyuk released. [Two other ZNPP staff arrested by Russians](#).
- **21 October 2022** – [Russian forces mine the aggregates and dam of the Kakhovka hydropower plant](#). The dam secures the water level at the Kakhovka reservoir, the ultimate heat sink for the ZNPP.
- **29 October 2022** – From around 6700 ZNPP employees, around [100 have signed contracts with Rosatom](#). [4300 fled to UA held territory](#). Before 24 February 2022, there were around 11000 people employed at ZNPP.
- **31 October 2022** – ZNPP unit 4 lost power from the 750 kV line due to a [landmine explosion outside the fence](#). Now powered by 150 kV back-up line. Earlier, several 330 kV back-up connections were lost due to shelling of the switching station at the ZTTP.

Unit 5 in hot shut-down to produce steam for the plant's operation. One employee released. IAEA calls for release of the other employee.

- **1 November 2022** – There is an estimated [28 Bln UAH \(760 Mln EUR\) damage](#) to the ZNPP.
- **3 November 2022** – [Full off-site black-out after shelling](#) on Ukraine controlled territory around 50 to 60 km from the plant. Diesel generators had fuel for 15 days. Units 5 and 6 brought to cold shut-down.
- **5 November 2022** – [Off-site power restored again](#) – both the 750 kV line to Dniprovka and on 330 kV back-up line. Units 5 and 6 are in hot shut-down, also providing Enerhodar with heat.
- **8 November 2022** – Energoatom starts on the request of the nuclear regulator SRNIU planning on measures in case [water levels in the Kakhovka Reservoir](#) would irreversibly fall.
- **16 November 2022** – IAEA concerned about [personnel "faced with conflicting instructions on how to run the plant"](#), because of interventions by Rosatom staff. [The Khmelnytsky NPP \(KhNPP\) lost all off-site power](#) for 9 hours, the Rivne NPP (RNPP) lost one 750 kV line temporarily. ZNPP maintained its connections.
- **20 November 2022** – Around [12 severe explosions at and around ZNPP](#) site, some near reactors. [Damage to some buildings](#), systems and equipment, but non critical to nuclear safety and security. This includes a radioactive waste and storage building, cooling pond sprinkler systems and a bridge between a reactor and its auxiliary buildings.
- **23 November 2022** – ZNPP again in full off-site black-out after instabilities in the grid due to [severe attacks on Ukraine's energy infrastructure](#). All 20 emergency diesels started, stabilizing to the use of eight with 12 in stand-by. The units in hot shut-down were brought into cold shut-down. Also grid connection to SUNPP, KhNPP and RNPP was lost. Automatic radiation monitoring systems of the Ministry of Health were temporarily down. Those of the Ukrainian Hydrometeorological Center were still functioning.
- **24 November 2022** – [Access to the Dniprovka 750 kV line](#) and back-up 330 kV lines was re-established. Two units returned to hot shut-down.
- **30 November 2022** – Rosatom stated that the former chief engineer of ZNPP Yuri Chernichuk has become the [new director of the Rosatom subsidiary Operating Organization of the ZNPP](#). Energoatom acting General Director of the ZNPP Dmytro Verbytskyi and chief engineer Ihor Murashov, who are not on the site, [called on employees not to cooperate](#) with the occupiers.
- **2 December 2022** – Rosatom informed it would prepare another 330 kV line as back-up to the ZTTP switchyard. IAEA's General Secretary Grossi reiterated that [the IAEA regards ZNPP as a Ukrainian facility](#) and expressed concern about conflicting decision making processes.
- **9 December 2022** – [Intensified repression against ZNPP workers](#). Russian military broke into the premises of the ZNPP social programme department, beat up the department head and his deputy in the presence of female employees and abducted them. They also abducted a shift chief.

- **23 December 2022** – [IAEA held talks with Rosatom chief Alexey Likhachev](#) on the issue of a proposed protected demilitarized zone around ZNPP. The Russian nuclear regulator Rostekhnadzor announced it would establish a permanent representation at ZNPP.
- **30 December 2022** – The [last functioning 330 kV back-up line](#) at ZNPP (to Ferosplavna 1) was disconnected due to shelling of Ukraine occupied territory. Also shelling around the ZNPP site. [The line was only restored](#) on 7 January 2023.
- **6 January 2023** – The IAEA ISAMZ team expresses concern about the [exhaustion and stress amongst ZNPP operational staff](#).
- **20 January 2023** – The [radiation monitoring sites of the Ministry of Health](#) in Enerhodar and Kamianska Dniprovksa (near Enerhodar) stopped functioning. There is now no direct public radiation monitoring any longer in the vicinity of the ZNPP.
- **27 January 2023** – The Russian occupiers have [stopped the operation of the full-scale simulator](#) of ZNPP, necessary to upkeep skills for staff.

The threat of loss of ultimate heat sink: the Kakhovka Reservoir



Sentinel satellite image of Zaporizhzhia nuclear plant, showing cooling pond and sandbanks exposed by more than 2 meter drop in water level of Kakhovka reservoir – [Sentinel](#).

- **8 October 2022** - sluice gate [opened](#) by Russian military at Kakhovka reservoir hydro-dam. Water level [declines](#) from 16.44m on 8 October to 14.03m on 2 February 2023.
- **3 February 2023** – Concerns about [reductions in water level of the Kakhovka Reservoir](#) due to opening of sluices in the Kakhovska dam by Russian occupiers.
- **6 February 2023** – Rosatom brought [staff from the Russian Kalinin NPP to ZNPP](#).
- **10 February 2023** – [Planned rotation IAEA ISAMZ mission is postponed](#) due to disagreements about safety of rotation route;
- **12 February 2023** – Ukrainian nuclear regulator SRNIU has [withdrawn permission for power production](#) for all ZNPP reactors.

- **28 February 2023** – [Artillery fire \(20 detonations\) and loss of back-up power](#). The ISAMZ team has not been rotated for three weeks.

[1] Pillar 3: “The operating staff must be able to fulfil their safety and security duties and have the capacity to make decisions free of undue pressure”.

[2] Pillar 7: “There must be reliable communications with the regulator and others.”

[3] Pillar 3: “The operating staff must be able to fulfil their safety and security duties and have the capacity to make decisions free of undue pressure;”