Peaceful atom in enemy hands

Consequences of the takeover by Russian occupiers of the Zaporizhzhia and Chernobyl nuclear power plants in Ukraine from 24 February to December 20, 2022

Occupied Zaporizhzhia nuclear power plant (Photo: Telegram/Energoatom)

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INTRODUCTION

As part of the Russian army's full-scale invasion of Ukrainian territory, in addition to bombing residential areas and civil infrastructure, Russian troops encroached on international security and resorted to nuclear terrorism. On 24 February, occupant troops took control of the Chernobyl nuclear power plant (hereinafter referred to as the ChNPP) and on 4 March, — the Zaporizhzhia NPP, during the seizure of which its industrial site was shelled by Russian armed forces with small arms and artillery systems of various calibres, causing damage to systems and elements of NPP power units and infrastructure buildings.

The Russians have turned the occupied nuclear power plants into military facilities, deploying personnel and heavy weaponry. Whereas the occupiers were in control of the Chernobyl NPP for five weeks, after which they were forced to abandon it as part of their retreat from the Kyiv oblast, they are still in control of the Zaporizhzhia plant, terrorizing personnel, shelling its territory and posing direct risks to nuclear safety.

Active hostilities in the area of the Zaporizhzhia NPP (hereinafter referred to as ZNPP), presence of Russian military on the nuclear plant site and their unpredictable actions can lead to a number of catastrophic consequences. In particular, it may lead to the inability of the personnel to perform their direct functions of controlling the power units, prevent the application of additional technical means implemented at ZNPP power units taking into account the experience of the Fukushima nuclear accident, and prevent the units of the State Emergency Service of Ukraine from extinguishing fires and responding to other possible accidents. Moreover, the actions of the Russian military may result in the inability to protect the personnel and population of the temporarily occupied territory in the area of the ZNPP under conditions of a nuclear/radiation accident and the like.

The Regulations concerning the Laws and Customs of War on Land, annexed to The Hague Convention IV of 1907[1], and Protocol Additional to the Geneva Conventions of 12 August 1949 (Protocol I)[2] prohibit the use of weapons, projectiles, substances, and methods of warfare likely to cause superfluous injury or undue suffering. International law imposes restrictions on the use of permitted weapons and methods of warfare — it is prohibited to attack or bomb unprotected cities, towns, residential buildings, or buildings, provided that the buildings and cities are not used for military purposes.

In accordance with Article 54 of Protocol I (Protection of objects indispensable to the survival of the civilian population), it is prohibited to attack, destroy, remove or render useless objects indispensable to the survival of the civilian population. Article 56 of Protocol I establishes that works or installations containing dangerous forces shall not be made the object of attack, even where these objects are military objectives, if such attack may cause the release of dangerous forces and consequent severe losses among the civilian population.

Experts from the National Nuclear Energy Generating Company Energoatom have carried out a preliminary analysis of the consequences of the occupation of the Zaporizhzhia NPP and other separate subdivisions of the company located in Enerhodar, the destruction and damage to the plant's buildings and facilities. According to its results, the value of assets that were destroyed and damaged as of 1 November 2022 is UAH 28,184 million, including fixed assets — UAH 27,804 million[3]. The final amount of losses and damages caused to the Zaporizhzhia NPP by Russia will be determined after the de-occupation of the plant and a full inspection and inventory of all assets. Energoatom plans to take all measures to recover damages and hold the Russian Federation and its state atomic energy corporation, Rosatom, accountable.

Despite physical and psychological pressure, the operational staff at the Zaporizhzhia nuclear power plant continue to work and monitor the safety of the power units and make every effort to ensure their safe operation. Communication with the employees of the plant is constantly maintained, information on the parameters and operating modes of the power units is updated and published daily through remote control and radiation monitoring systems with data transfer to the IAEA's IRMIS system.

1 https://zakon.rada.gov.ua/laws/show/995_222#Text

2 https://zakon.rada.gov.ua/laws/show/995_199#Text

3 https://t.me/energoatom_ua/10475

This publication, prepared by the Luhansk Regional Human Rights centre "Alternative," presents the consequences of the seizure of Ukraine's two nuclear power plants, Zaporizhzhia and Chernobyl, during the Russo-Ukrainian War from 24 February to December 20, 2022.

The information was obtained from open sources, including national media, social media, statements by officials and public eyewitness accounts.

KEY OBSERVATIONS

At the beginning of 2022, more than 50% of Ukraine's electricity was generated by nuclear power plants, among which 43% of generation came from the Zaporizhzhia NPP, which was occupied by the Russian army on 4 March. **This was the first time in world history that one country had taken control of another country's nuclear facility.** The international community was totally unprepared for such a scenario.

Since the beginning of August 2022, the Zaporizhzhia NPP has been the target of constant attacks by the Russian army. Not only is the plant itself under threat of shelling, but also the power lines that feed it. Disabling the power unit and shutting down the reactor is a procedure that is routinely done on every reactor every year. However, a routine shutdown lasts at least a week under constant expert supervision, and experts believe[4] that an abrupt power outage at the ZNPP could lead to a Fukushima disaster scenario.

Continuous, uninterrupted access to the source of electrical power is critical. Of course, the plant has diesel generators, but this cannot be a long-term solution. If the NPP switches to diesel generators, there will no longer be a contingency plan; 90 minutes without thermoregulation could cause a huge problem. Moreover, under occupation, it is virtually impossible to verify the operability of backup generators, which must be in working order and have enough fuel to power pumps and other systems.

4 https://theins.info/news/254254

According to Olha Kosharna, a former member of the Board of the State Nuclear Regulatory Inspectorate, Energoatom made calculations to assess the consequences of a reactor core meltdown accident if external power and water supply to the primary circuit were lost:

> *"On 27 July 2022 it was calculated that depending on wind direction, humidity, rainfall, and temperature, in 6–7 hours the radioactive cloud would go to Romania/Crimea/Bulgaria, and in 23 hours it would reach Turkey, but the highest rainfall would occur in the Krasnodar Krai. We operate with data, according to which at a distance of 350 km from Enerhodar, 100 thousand becquerels per 1 m² will fall together with precipitation, while the norm is 400 per 1 m². One hundred thousand becquerels per square meter is the exclusion zone. So, Russia will suffer even if there is a north wind, and the west wind will carry all radioactive particles to Russia."*

The constant physical and psychological pressure of the Russian occupiers on the NPP workers also creates direct safety risks. When personnel are dealing with a complex facility and very structured processes, employees must remain calm.

On 4 August 2022, a meeting of the Board of the State Nuclear Regulatory Inspectorate of Ukraine was held, which was devoted to the safety situation at the Zaporizhzhia NPP[5]. The Board concluded that the deployment of a military arsenal at the ZNPP site could lead (as a result of its direct use or detonation) to damage to systems and elements important for the safety of ZNPP nuclear installations. Consequently, depending on the operating condition of the nuclear installation and the nature of the damage, in the worst case, severe damage to the nuclear fuel can occur within a few hours, followed by radiation contamination of the environment and radiation exposure of personnel and the public.

Taking this into account, the Board decided to acknowledge the actions of the Russian military on the ZNPP site and the placement of military equipment with ammunition, weapons, and explosives directly next to the nuclear installations as an **act of nuclear terrorism.**

5 https://t.me/znppatom/1025

On 23 November 2022, during another massive missile attack by the Russian army on Ukrainian territory, the emergency protection at the Rivne, South Ukraine and Khmelnytskyi nuclear power plants was triggered as a result of frequency reduction in the energy system due to damage to the energy infrastructure. All power units of these plants were automatically disconnected from the power grid. The temporarily occupied Zaporizhzhia NPP went into full blackout mode, with all diesel generators running. **Thus, for the first time in the 40-year history of the Ukrainian nuclear energy industry, all nuclear power units were shut down.**

Of course, such a situation is envisaged by the operating regulations of nuclear power plants, which are equipped with reliable safety systems and personnel with the necessary level of skills and knowledge to respond promptly. However, despite this, there is always a real danger of nuclear and radiation catastrophe from Russian cruise and ballistic missiles being fired all over Ukraine, and a huge risk of nuclear plants being hit.

Energoatom's specialists have done everything possible to restore operation of the nuclear power plant as soon as possible. On 24 November, the Zaporizhzhia NPP received power for its own needs from the Ukrainian energy system. All diesel generators were shut down and put on standby. Power units at Rivne, South Ukraine and Khmelnytskyi NPPs have been connected to the power grid and supplies of electricity to Ukrainian citizens and the country's economy have been restored.

As of 20 December, all six power units of the occupied ZNPP were shut down due to constant Russian shelling. Russian occupiers are blocking the launch of power units. The plant continues to constantly consume about 100 MW for its own needs from the energy system of Ukraine.

According to Energoatom, the only way to prevent the global nuclear threat is to withdraw the Russian military from the Zaporizhzhia NPP (the largest nuclear facility in Europe), the entire adjacent territory and return the station to the status of a peaceful civilian facility, which it was before the Russian invasion.

ZAPORIZHZHIA NUCLEAR POWER PLANT[6]

The Zaporizhzhia nuclear power plant is located on the bank of the Kakhovka reservoir in Zaporizhzhia oblast, near the city of Enerhodar. It is Europe's largest and the world's third-largest nuclear power plant in terms of total capacity, consisting of six nuclear power units of 1 million kW each. The plant generates about 40 billion kWh of electricity annually, a fifth of Ukraine's total annual electricity production and half of that from Ukrainian nuclear power plants.

6 Materials used in this chapter:
https://bit.ly/3WOvSIC
https://bit.ly/3hJQy5Y
https://t.me/energoatom_ua
https://t.me/znppatom
https://t.me/DIUkraine
https://www.bbc.com/russian/news-63106095
https://on.wsj.com/3OTt0H0
https://t.me/orlovdmytroEn/611
https://youtu.be/zvlW8sndvoo
https://bbc.in/3C4YmWL
https://bit.ly/3C4b5Jj
https://bit.ly/3VkVA6o
https://on.wsj.com/3hMf7iq
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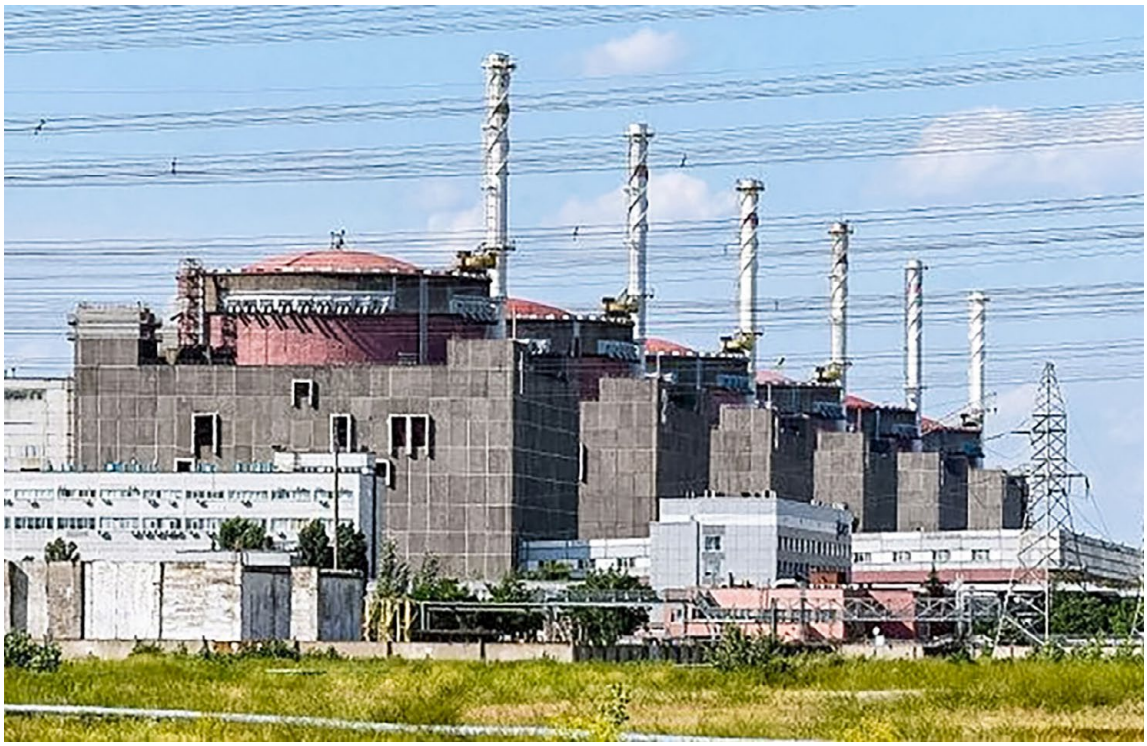
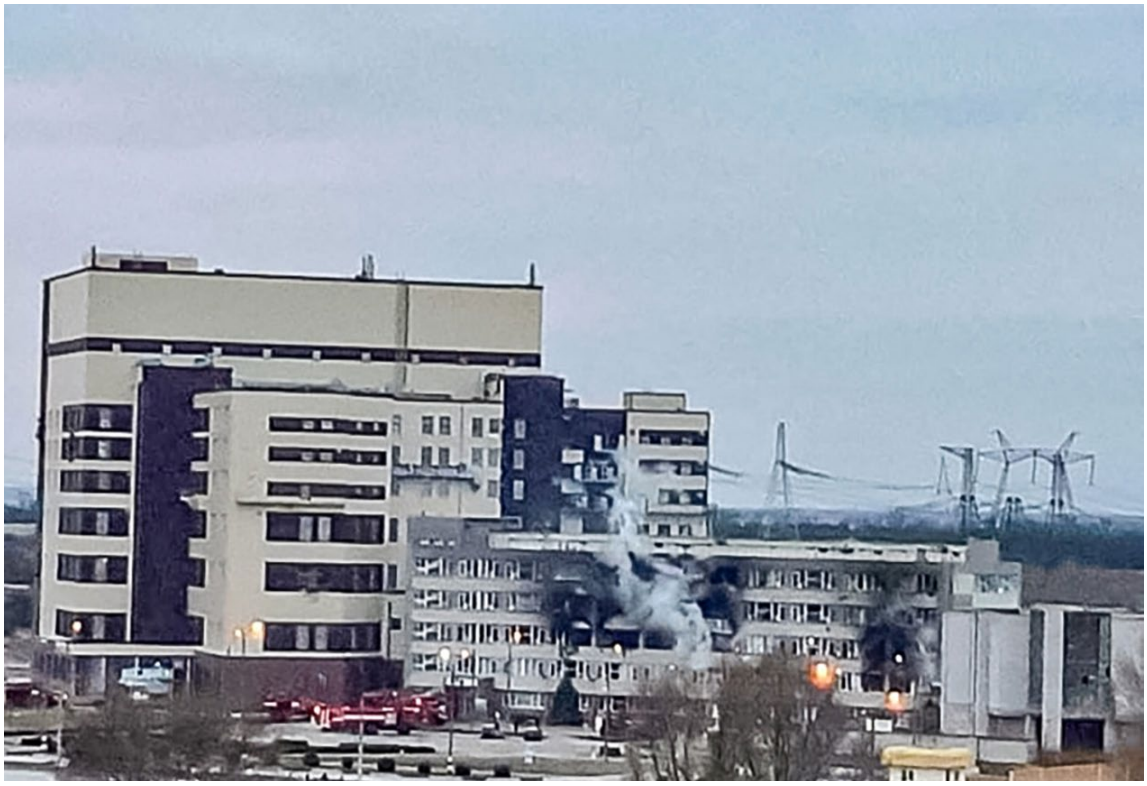
Based on its performance in 2000, the Zaporizhzhia NPP was recognized as one of the world's three best nuclear power plants, fully compliant with IAEA requirements.



Occupation of a nuclear power plant

On 4 March 2022, at the time the plant was taken over by the Russian occupiers, three units (units 2, 3, 4) were in operation, unit 1 was undergoing scheduled repairs, and units 5, 6 were on standby.

On the evening of March 3, the Russian military broke through the checkpoint at the entrance to Enerhodar and the Zaporizhzhia NPP with about 100 units of heavy equipment, stormed into the city and started shelling the nuclear power plant. A hit was recorded in a power unit, and building A of the training complex was completely smashed. Due to the high risks of damage to the nuclear units, power units 2 and 3 were put into a safe cold state; power unit 4, which was at maximum distance from the shelling zone, remained in operation. The pipelines in Enerhodar were damaged in several places, leaving the city without heating.



At 1 a.m. on March 4, 2022, at the control panel of the third power unit of the Zaporizhzhia NPP, a working shift of personnel used a loudspeaker and a public address system that could be heard throughout the plant, trying to "reach out" to the invaders*: "Stop shooting at the nuclear hazardous facility! You are endangering the security of the entire world! The work of the vital elements of the Zaporizhzhia plant may be disrupted. It will be impossible to restore it with our efforts."*

The ZNPP administration building and the passing station were under fire until 4.30 a.m., when the invaders came under control. At 9 a.m. on 4 March, physically and mentally exhausted plant personnel were allowed to work.

The shelling of the Zaporizhzhia NPP on the night of 3-4 March is the first time in history that an operating nuclear power plant has been attacked by troops in defiance of all norms of international law on countering nuclear terrorism. The greatest danger comes from the nuclear material stored in the plant's six nuclear reactors and pre-reactor spent fuel pools. In addition, about 150 containers of spent nuclear fuel are located at the plant site.

42 countries and the European Union have condemned the attack by Russian troops on the Zaporizhzhia nuclear power plant and called on Russia to withdraw its troops immediately. Their joint statement was released on the website of the Delegation of the European Union to the International Organisations in Vienna.

Operation of the Zaporizhzhia NPP under the occupation

From the first day of the seizure of Enerhodar, a satellite town of the Zaporizhzhia nuclear power plant, the number of military, particularly police and OMON riot police on the streets increased significantly, whose main task was to suppress protests and peaceful assemblies. The occupiers removed Ukrainian flags from all administrative buildings. Information and psychological pressure on the city's residents was intensified and mass propaganda was carried out in order to persuade Enerhodar's population to take their side. Due to the actual blockade of the city, there were problems with fuel, interruptions in the supply of food and medicine.

Leading engineer on operation of nuclear power plant equipment of the Chief Technologist Service Andrii Shevchyk cooperated with the occupiers and announced the creation of a "public council of self-organization" under his leadership.

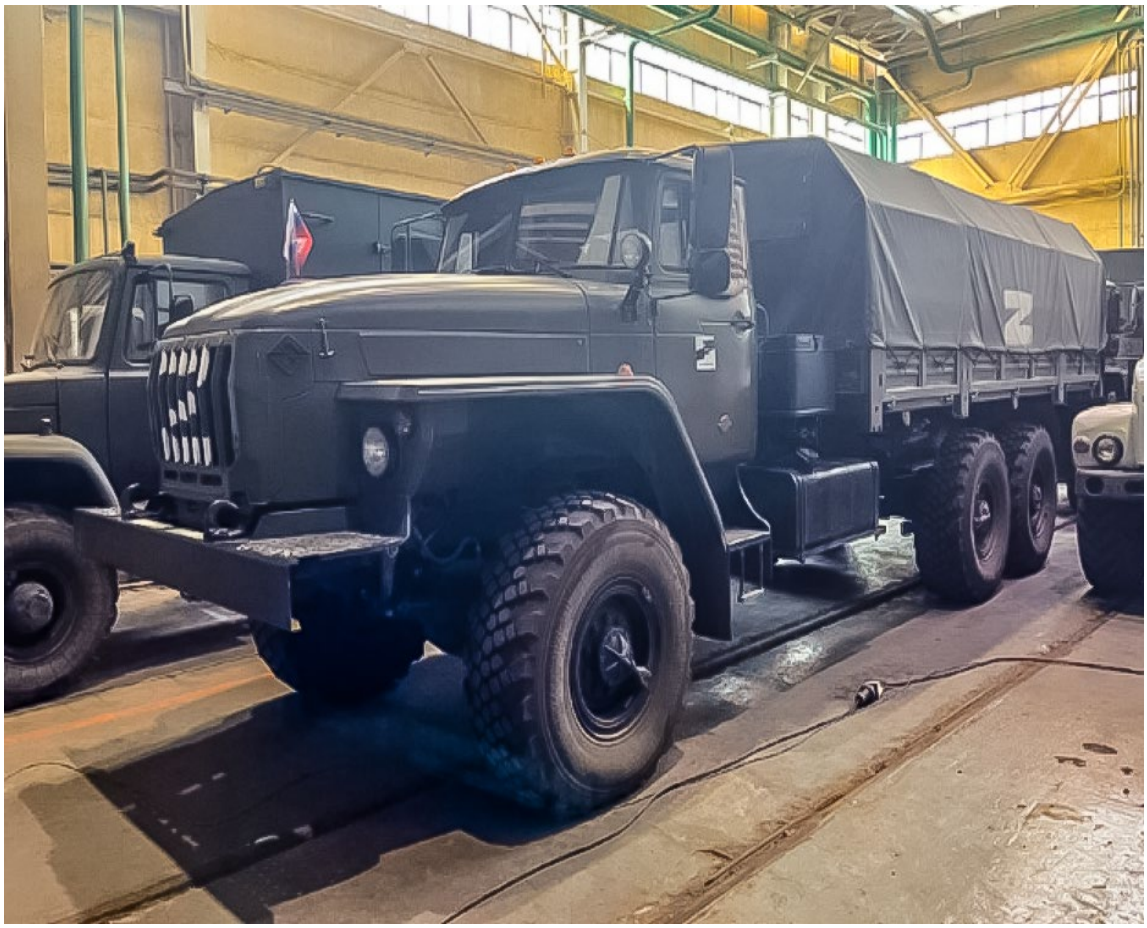
In the first months of the occupation, all six ZNPP power units were serviced by Ukrainian personnel, work shifts had the possibility of rotation. Formally, the occupiers did not interfere in the work of the NPP, but they forced the personnel to coordinate all technical decisions with their command. All employees of the plant were thoroughly checked by armed invaders upon arrival.

Since August 2022, the Zaporizhzhia NPP has been the target of constant shelling by the Russian army. Artillery "strikes" near the industrial site of the nuclear power plant and hits to high-voltage communication lines of the Zaporizhzhia nuclear power plant with the Ukrainian energy system have been recorded. The employees of the station had to work in dangerous conditions, under constant physical and psychological pressure.

On September 1, a delegation of the International Atomic Energy Agency (hereinafter referred to as the IAEA) arrived at the plant to assess the situation and the physical damage to the facilities, determine the operability of the main and back-up security and safety systems, and assess the working conditions for personnel. Having visited the plant, the inspectors concluded that the safety situation at the ZNPP is unprecedented. Shelling of the plant threatens its physical integrity, the breach of which could lead to the risk of a "nuclear incident," the consequences of which would be felt both inside and outside Ukraine.

On 6 September, the IAEA's report on radiation safety in Ukraine was released, which included information on the mission's visit to the Zaporizhzhia nuclear power plant. Mission members confirmed that the Russian Federation had stationed "military personnel, vehicles, and equipment in various locations of the Zaporizhzhia

NPP, in particular several military heavyweights located on the ground floor of turbine halls in power units 1 and 2." The delegation recorded the presence of a Rosatom expert group, which in the IAEA's view could lead to "interference in the normal operation of the operational management and create a potential tension in the context of the decision-making process." The report also mentions that the presence of Russians at ZNPP has had a negative impact on Ukrainian plant personnel, who are under "extremely stressful conditions."



In its recommendations, the IAEA called for the immediate cessation of all shelling of the plant to prevent further damage, for the removal of "all vehicles that could interfere with safety systems and equipment" from the ZNPP site, and for the creation of adequate working conditions for personnel. A separate recommendation concerns the "immediate establishment of a nuclear protection zone" around the Zaporizhzhia NPP, in which the IAEA is ready to assist.

IAEA Director General Rafael Grossi has said that the agency plans to ensure permanent representation of its experts at the Russian-occupied Zaporizhzhia NPP.

On 5 October, given the results of a pseudo-referendum on the annexation of the occupied Ukrainian territories to Russia, according to which 93.11 percent of voters in Zaporizhzhia oblast "voted" for the accession, **the Russian president signed a decree on the transfer of the Zaporizhzhia NPP to Russian ownership.** The decree said that the joint-stock company "Operating Organization of the Zaporizhzhia NPP" would now operate the plant "using its own resources or by engaging other organizations." The seal of the company, which certified the right to sign documents, was stolen.

Subsequently, representatives of the Russian state atomic energy corporation Rosatom began arriving at the Zaporizhzhia NPP and began persuading, and sometimes forcing, plant personnel to reissue employment agreements and take jobs at the newly created fake "Zaporizhzhia NPP" with a legal address in Moscow. According to BBC News, Ukrainian personnel at the Zaporizhzhia NPP have been threatened that they could be forced to fight on the Russian side if they do not sign documents to go to work for Rosatom. One of the newspaper's sources said that the Russians want to keep Ukrainian personnel at the plant because it could take up to 8–10 years to train new employees.

The acting general director of the Zaporizhzhia nuclear power plant, Petro Kotin, has asked plant employees not to accept the occupiers' offers, not to sign any statements or contracts and to stay within the confines of Ukrainian law. The occupiers resorted to pressure and manipulation, claiming that a thousand workers at the plant had already signed contracts. In reality, of the 6,700 employees who remained to work at the Russian-occupied ZNPP, only about a hundred have signed contracts with Rosatom. And the vast majority of those who did so "agreed" under pressure from the invaders. Another 4,300 ZNPP workers left for Ukraine-controlled territory. Among those who agreed to work for the Russians were also volunteers, in particular, from the plant's management. For example, the plant's chief engineer, Yurii Chernychuk, agreed to cooperate with the occupiers in December and became the "new head" of the Zaporizhzhia nuclear power plant.

Military presence of Russian occupiers on the territory of the plant

Since the start of the occupation of Enerhodar, the Russians have been using the Zaporizhzhia NPP as a military base. Another shift of occupiers has been stationed in the industrial zone of ZNPP, with the command staff scattered around the city and living in the flats of the locals who left. In the engine rooms at power units 1, 2 and 3 the Russians have placed their military arsenal — tanks, trucks, weapons, ammunition, making it difficult to access the three power units with special equipment in case of fire. The roof of power unit 5 is equipped with devices for electronic warfare against aerial reconnaissance means.

The storage of weapons and explosives directly in the engine rooms of the power units of Europe's largest nuclear power plant violates all norms and requirements for nuclear and radiation safety of nuclear power plants.

The Russians do not conceal their plans and openly blackmail the whole world by claiming that Zaporizhzhia NPP is mined, and they are ready to blow it up. According to Energoatom, the Head of the Nuclear, Biological and Chemica l Protection Troops of the Russian Armed Forces, Major General Valery Vasilyev, commander of the ZNPP garrison, speaking to his soldiers, assured that "it will be either Russian territory or scorched desert."

> *"As you know, we have mined all important facilities at the Zaporizhzhia nuclear power plant. And we are not hiding this from the enemy. We have warned them. The enemy knows that the plant will be either Russian or no one's. We are ready for the consequences of this step. And you, the warriors-liberators, must understand that we have no other way. And if the toughest order comes, we must carry it out with honour!"* said Vasilyev.

In mid-October, the Russian occupiers began bringing beds, mattresses, boilers and other domestic "tools" to the engine rooms of units 1 and 2, probably to set up winter barracks at ZNPP and increase their presence at the plant.

In December, several Grad multiple-launch rocket systems were brought into the territory of the seized nuclear power plant. The systems were placed near power unit 6, close to the territory of the plant's dry storage facility for spent nuclear fuel. The most probable provocation being prepared is Grad shelling of the opposite bank

of the Dnipro River, in particular the towns of Nikopol and Marhanets, directly from the nuclear power plant site, under the "cover" of the power units and the spent nuclear fuel storage facility.

On several occasions, Minister of Energy Herman Halushchenko has stated that the very first and most necessary condition for nuclear safety is the complete withdrawal of Russian troops from seized nuclear power facilities.

Russian shelling

Zaporizhzhia NPP has been regularly shelled by Russian forces since early August 2022. On 5 August, artillery strikes were recorded near the ZNPP industrial site. The enemy hit the 330 kV high-voltage communication line of the ZNPP – Zaporizhzhia TPP autotransformer. As a result, it was damaged, emergency protection was actuated at one of the power units, diesel generators were switched on. Currently, this unit is unloaded and disconnected from the power grid. The nitrogen-oxygen station and the joint auxiliary building were damaged due to repeated evening shelling. Ukrainian ZNPP personnel were in place, carrying out all nuclear and radiation safety measures and dealing with the consequences of the damage.

Under the procedural supervision of the Zaporizhzhia Regional Prosecutor's Office, a pre-trial investigation has been launched into a criminal case involving violations of the laws and customs of war (article 438, part 1, of the Criminal Code of Ukraine).

The next day, Russian occupiers hit the ZNPP site, directly next to the plant's dry spent nuclear fuel storage facility. Three radiation monitoring sensors around the ZNPP site were damaged due to enemy missile attacks. About 800 square meters of windows surface were damaged due to numerous small fragments from the explosions in various NPP buildings. As a result of the explosions, one ZNPP employee received a shrapnel wound. In five days, five "strikes" were registered in the area of the ZNPP command post, next to the welding area and the radiation sources storage facility. As a result of the plant shelling, it was not possible to rotate the personnel in time, because for the safety of the employees, the buses with the next shift personnel were turned back to Enerhodar.

On 25 August, fires at the Zaporizhzhia TPP ash dumps, located next to Zaporizhzhia NPP, caused the last (fourth) communication line between Zaporizhzhia

NPP and the Ukrainian power system to be disconnected twice. Three other communication lines were damaged earlier by Russian shelling. As a result, two operating power units of the plant were disconnected from the grid. Thus, **the actions of the invaders caused the ZNPP to be completely disconnected from the power grid for the first time in the plant's history.** Part of the rehabilitation work was completed overnight, and two of the shut-down units were connected to the power grid.

In September 2022, another attack on Zaporizhzhia NPP damaged the equipment connecting ZNPP unit 6 to the outdoor switchgear. The block transformer and in-house unit transformers disconnected. The loss of power caused emergency actuation of two diesel generators of safety systems to support operation of the fuel cooldown pumps.

In mid-October, rocket fire by Russian troops damaged the Dniprovska substation in Dnipropetrovsk oblast, causing an emergency disconnection of the 750 kV ZNPP–Dniprovsk line. Zaporizhzhia NPP was completely de-energized. The diesel generators were switched on automatically. Energoatom prepared and sent another batch of diesel fuel to ZNPP. Subsequently, Ukrainian specialists managed to find a technical solution to restore the communication line, and the plant's own needs for power supply were once again provided from the Ukrainian energy system.

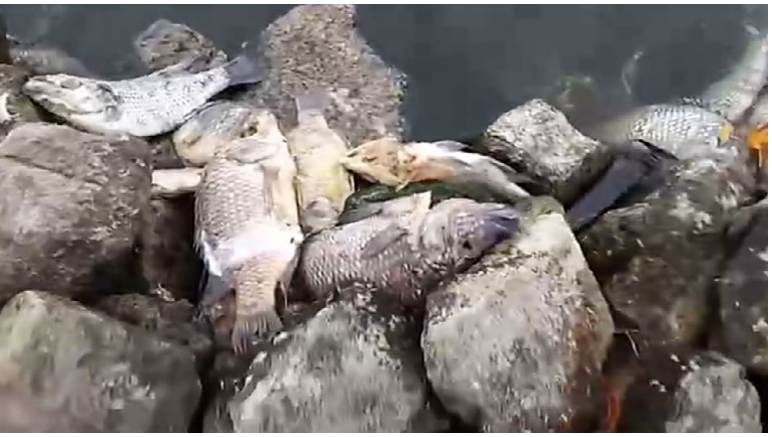
On 2 November, Russian shelling damaged the last two high-voltage communication lines between Zaporizhzhia NPP and the Ukrainian power system, causing the plant to go into total blackout mode. All 20 diesel generators were switched on. Subsequently, the power supply scheme for ZNPP own needs was optimized, and 9 diesel generators were left in operation. Power units 5 and 6 were switched to a cold state.

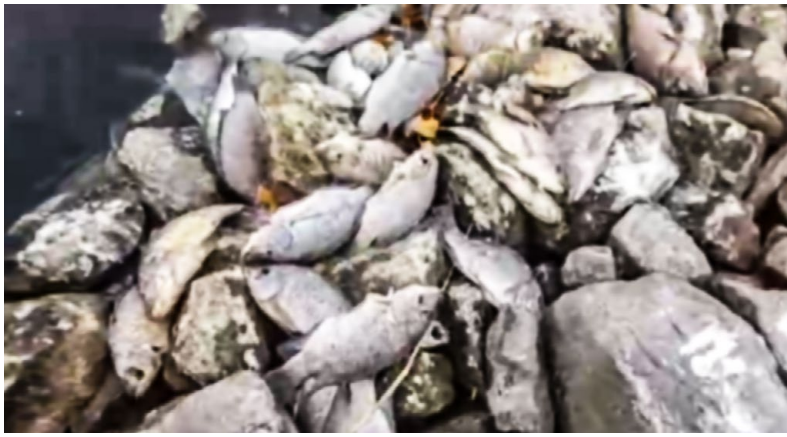
The Energoatom made a decision and the State Nuclear Regulatory Inspectorate of Ukraine granted permission to bring power units 5 and 6 to the minimum controlled power level to generate steam, which is critically necessary in winter to ensure the safety of power units, personnel, population, and the environment.

The occupiers tried in every possible way to prevent Ukrainian personnel of the plant from starting up the power units. Rosatom's "director" of the plant, Oleh Romanenko, blocked the preparation of the power units to bring them to minimum power level. In addition, on November 20, the Russians shelled and damaged the very equipment whose destruction made it impossible for any further action to start up the ZNPP power units. During another attack, at least 12 "strikes" to the Zaporizhzhia NPP site were recorded. As a result, the communication trestle with special units, chemical desalinated water storage tanks, steam generator blowdown system, auxiliary systems of one of the two station diesel engines and other equipment of

the station infrastructure were damaged. Three hits were also recorded near the Raiduha substation.

Due to the shutdown of Zaporizhzhya NPP power units, warm water does not enter the cooling pond of the ZNPP, so the temperature of the reservoir has dropped to 13 degrees above zero, which led to a mass fish die-off in the pond. It is currently stocked with two species of fish – warm water tilapia and Asian catfish, which were introduced about 25 years ago to ensure environmental cleanliness. The fish perform a sanitary function by destroying green algae and keeping the cooling tubes of the turbine condenser clean.



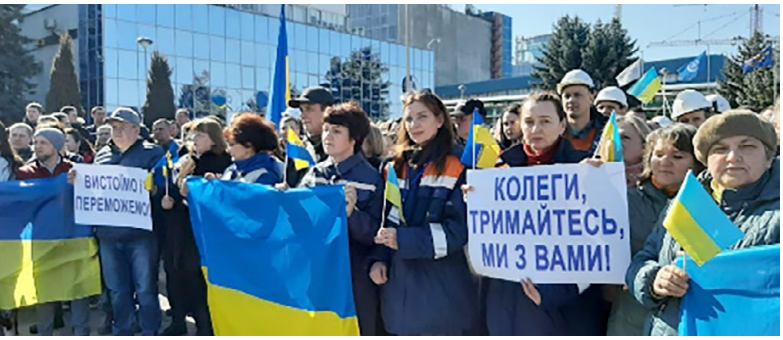


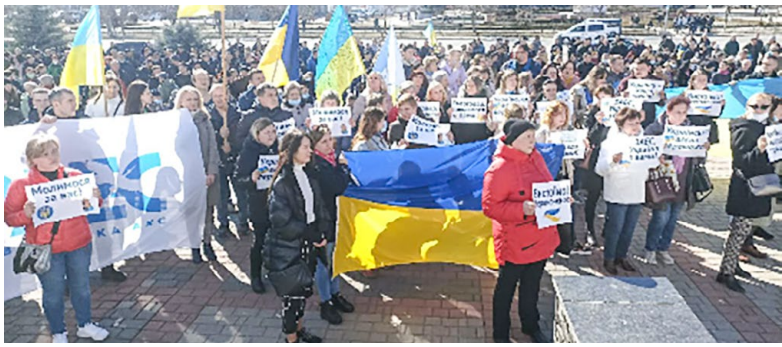
As of 17 December, all six power units of the occupied Zaporizhzhia NPP have been shut down. Their switching on is blocked by the occupiers. The plant continues to constantly consume about 100 MW for its own needs from the energy system of Ukraine.

Terror of station staff

Under occupation, ZNPP personnel continues to ensure nuclear safety of Ukraine and the whole Europe, being under constant pressure of the Russian military, risking becoming a victim of Russian torture.

On 21 March, employees of all nuclear power plants in Ukraine (South Ukraine, Rivne, Khmelnytskyi) held actions of solidarity and support for the residents of Enerhodar and employees of Zaporizhzhia NPP, who are under occupation and suffer from insane pressure and terror.

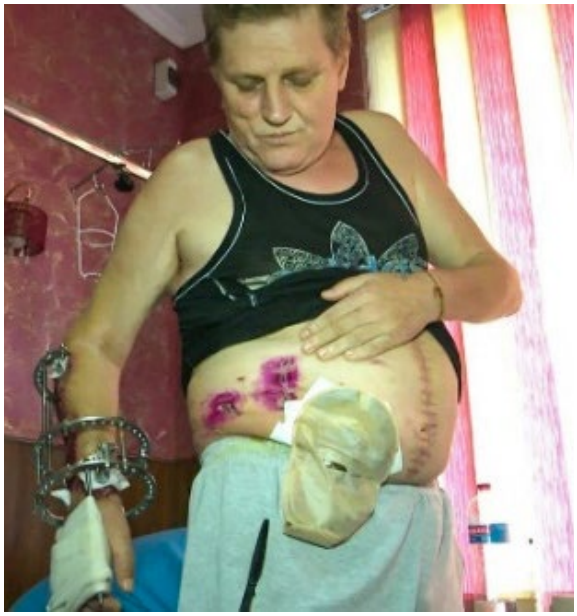




More than 500-armed Russian soldiers have been among the 11,000 personnel since the seizure of the plant. They looked for Ukrainian spies among the NPP workers, patrolled the plant, rebuked workers who spoke Ukrainian rather than Russian, and checked their mobile phones for loyalty to the Ukrainian authorities. The kidnapping of employees, followed by interrogations, was a common practice. According to the mayor of Enerhodar, Dmytro Orlov, hostages were tortured with electric shocks, beaten, and held for weeks and sometimes months. They demanded to confess to "illegal activities" (hiding weapons, participation in the city's self-defence) and give the names of their "accomplices."

The plant's Director General, Ihor Murashov, and other nuclear workers who were freed from captivity said that a Russian FSB unit set up underground prisons next to the plant, where they beat detained workers with rifle butts and sticks, shot them in the legs and elbows, deprived them of food, and attached electrodes to their ears and fingers. According to Energoatom, more than 200 employees were detained and dozens are still missing.

On May 23, 2022, Russian servicemen broke into the house of Serhii Shvets, an employee of the energy repair unit of the Zaporizhzhia NPP, a former ATO participant, and shot him with automatic weapons. The man was hospitalized in Enerhodar city hospital with numerous bullet wounds. Later, Shvets managed to leave for the unoccupied territory of Ukraine.



In June, a Russian checkpoint stopped Volodymyr Zhaivoronok, a 49-year-old station contractual worker, in whose phone soldiers found photos of a Russian foot patrol and a list of cars stolen from civilians, which they considered evidence of subversive activities. He was taken to the police station and thrown into one of three basement cells filled with station workers. Zhaivoronok said that during his 53 days in captivity, FSB officers repeatedly beat him with rifle butts. During an interview with The Wall Street Journal journalists, he demonstrated the missing fingernail that had been torn out by interrogators. The wounds on his wrists were bandaged.

According to former captured workers, most detainees were released in a few weeks if they agreed to record a video with propaganda messages, which was later broadcast by Russian TV channels, or their families could afford to bribe the FSB.

A station technician who spent more than 70 days in prison described his cell as a windowless underground room with a single guarded entrance, which "smelt of faeces and chlorine antiseptic." The cell contained wooden crates and planks on which to sleep. According to him, guards undressed him and threatened to rape him, after which they threatened to rape his wife. As he said, his face was too disfigured from the torture to record a propaganda video. Prison guards took a bribe for his release, but he was unable to leave Enerhodar.

In early July, Enerhodar mayor Dmytro Orlov reported the death of a diver from the Zaporizhzhia NPP's hydraulic unit, Andrii Honcharuk. On 29 June, the occupiers brutally beat an experienced and professional employee of the nuclear power plant for refusing to take part in a provocation they had organized. The Russian military accused the workers of storing weapons on plant premises and tortured them into "confessing" that back in March they had dropped weapons: explosives or shells

into the concrete bowls of the cooling pools. Under this pretext, the occupiers insisted on draining the cooling pools to check its bowls and stopping the pumps that supply water to the safety systems of the power units. Energoatom said that if this happened, the safety systems of Europe's largest nuclear power plant would be left without cooling, which is a serious violation and could threaten nuclear safety. Subsequently, the Russians could place explosives, unexploded shells and other weapons in the concrete bowls and then accuse ZNPP employees or its defenders of this and make it a formal reason to invite IAEA representatives to the plant to present these "facts."

After Andrii Honcharuk refused to dive into the NPP sprinkling basin, he was severely beaten. The man was taken in a coma to hospital where, without regaining consciousness, he died of his many injuries.

On 17 July, Ihor Kvashnin, Head of Environmental Protection Service of the Zaporizhzhia NPP, was kidnapped. The next day, the Russian military took Serhii Pykhtin, Deputy Head of Decontamination and Radioactive Waste Management Department, and Olena Riabtseva, Master of the Decontamination Department, to an unknown location.

Employees of the seized Zaporizhzhia NPP told BBC journalists via SMS that they are actual hostages of the Russians. According to them, the occupiers have turned off the Internet, allowed them to use only Russian SIM cards and turned the training building into a barracks. The workers are fed in one single canteen, as the occupiers have set up their bases in others. It is forbidden to go there because there are observation points on the roofs. The Russian military moves freely around the station with weapons, and the personnel are forced to work virtually at gunpoint. Respondents confirmed that the Russians are using the station as a military base and spoke of the daily threat of abduction, as well as their fears of "radioactive contamination of surrounding areas" and nuclear catastrophe.

Working under difficult physical and psychological conditions, the desperate employees of the plant published an appeal to the world community in August, following another shelling, in which they stressed that in five months many legal norms, principles, and safety regulations for the handling of peaceful atom had been violated, and the plant itself had become, in fact, the target of continuous military attacks. The plant workers called on the international community to stand with them for the right to live and work, raise and educate children in a peaceful city, in a peaceful country, on a peaceful planet.

The new Russian-appointed "mayor" of the city, Oleksandr Volha, regularly urged plant managers to accept the inevitability of working for the occupiers and claimed that Russia was here forever. **On 1 October, it became known that Ihor Murashov, Director General of the Zaporizhzhia NPP, had been kidnapped.**

He was detained by a Russian patrol on his way to Enerhodar, blindfolded and taken in an unknown direction. The IAEA appealed to the Russian authorities to provide clarification on the detention of Zaporizhzhia NPP Director General. Two days later, Ihor Murashov was released.

On 10 October, Russian occupiers abducted Deputy Director General for Human Resources of Zaporizhzhia Nuclear Power Plant Valerii Martyniuk. A week later, the Russian occupiers detained and took away to an unknown destination Oleh Kostiukov, Head of the ZNPP IT Service, and Oleh Osheka, Assistant to the ZNPP Director General.

On December 8, the Russian military broke into the premises of ZNPP Social Program Department and, in the presence of other workers, severely beat the Head of Department Oleksii Trubenkovv and his deputy Yurii Androsov. After a brutal beating, the invaders removed them from the premises and took to an undisclosed location.

According to Energoatom, by doing so, the occupiers are trying to gain loyalty from the pro-Ukrainian power plant personnel and increase the number of transfers of employees to the fake JSC "Operating Organization of the Zaporizhzhia Nuclear Power Plant," which is managed by Rosatom.

Nevertheless, the operational personnel of Zaporizhzhia NPP continues to work and monitor the safety of power units and makes every effort to ensure their safe operation.

CHERNOBYL NUCLEAR POWER PLANT[7]

The Chernobyl nuclear power plant is a shutdown nuclear power plant in Ukraine, located near the city of Prypiat in the Kyiv oblast. On April 26, 1986, during design tests, an accident occurred that completely destroyed the fourth reactor of the plant and caused significant contamination of the surrounding area with radioactive substances. As a result of this catastrophe, the population of Prypiat, Chornobyl and all other settlements within a radius of 30 km around the station was completely evacuated, and the accident itself became one of the largest man-made disasters in the history of mankind. Almost all workers who were on the territory of the station at that time died due to radiation exposure.

On 15 December 2000, a period of decommissioning of shut-down power units began for the Chernobyl NPP team. To carry out this task, by governmental decision, the Chernobyl NPP was deduced from Energoatom and transformed into a state specialized enterprise (hereinafter referred to as SSE). On the basis of ChNPP repair service, Atomremontservice enterprise was established within Energoatom,

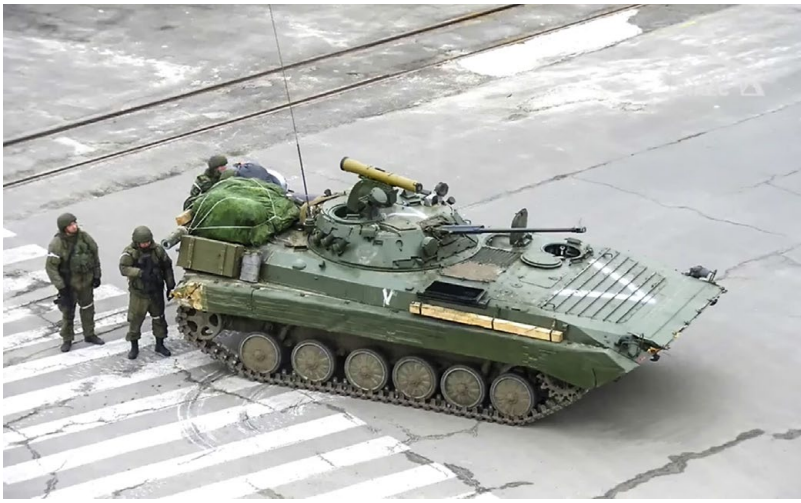
7 Materials used in this chapter:
https://bit.ly/3ybqFBg
https://bit.ly/3jrsogJ
https://www.facebook.com/ChornobylNPP
https://www.facebook.com/dazv.gov.ua
https://youtu.be/mqE8cDib3n8
https://youtu.be/snPYoevNBMY
https://t.me/energoatom_ua
https://bit.ly/3FIMUAY

which today employs 730 workers, more than three hundred of whom are former employees of the Chernobyl NPP. The emergency training centre of Energoatom, established on the basis of the emergency actions control centre of the Chernobyl NPP, is also staffed mainly by former Chernobyl employees.

The Chernobyl NPP is located 18 km northwest of the city of Chornobyl, 16 km south of the border with Belarus and about 110 km north of Kyiv.

Seizure of the Chernobyl nuclear power plant by Russian occupiers

On the evening of 24 February 2022, during the large-scale Russian invasion of Ukraine, it was reported that the Russian regular army had taken over the Chernobyl nuclear power plant. All Chernobyl NPP facilities located in the exclusion zone, namely spent fuel storage facilities (ISF-1 and ISF-2), the New Safe Confinement of the Shelter Structure and units 1, 2, 3, have been transferred under the control of the Russian Armed Forces. About 500 Russian soldiers, 50 units of heavy equipment were on the territory of the NPP.



The State Nuclear Regulatory Inspectorate of Ukraine informed the International Atomic Energy Agency about the loss of control over nuclear and radiation facilities in the Chornobyl exclusion zone as a result of the military attack. The latest data obtained from the automatic radiation monitoring system showed a sevenfold excess of the absorbed dose rate on the sensor near radioactive waste storage facilities, which indicated incorrect use of security systems by the occupiers and lack of necessary expertise to protect nuclear facilities.

In the first weeks of the war, the surrounding settlements were occupied and cut off from communication, aid, electricity, and food. People lived under constant shelling, and the occupiers exerted enormous psychological and physical pressure on the population.

On 9 March, hostilities resulted in the power station ceasing to receive the external power required for the safe storage of spent fuel. Emergency diesel power generators turned on. Valentyn Heiko, the plant's shift supervisor, told the occupiers that because they had taken over the plant, they had to provide the NPP with diesel fuel to keep the generators running continuously. For four days, the Russians supplied fuel to the plant—an average of 25 tonnes a day. However, then they were confronted with the fact that there would be no more deliveries, as the fuel was needed at the front and the plant management had only one option — to connect to the Belarusian power grid.

Understanding that the devices used to monitor spent nuclear fuel and radioactive waste, and the systems that provide cooling and heat removal, must always be in working order, plant management took this difficult decision. At the same time, the NPP employees put forward the condition that electricity should also be supplied to the satellite town of Slavutych, where many NPP employees and their families live. Thus, the power supply to the Chernobyl NPP was restored.

Since the seizure of the station, about 300 people have been on its territory:

- ChNPP personnel
- Servicemen (National Guard of Ukraine)
- Fire department personnel (State Emergency Service)
- Medical staff of the health care unit (Slavutych City Hospital)
- 4 “stalkers” of the exclusion zone who asked for shelter.

Attempts by the Ukrainian authorities to negotiate with the occupiers to create a humanitarian corridor and evacuate the power plant workers so that a new shift could take their place failed. In addition, there were problems with the route by which the old shift was to be evacuated and the new shift brought in, because the road and railway bridges had been blown up.

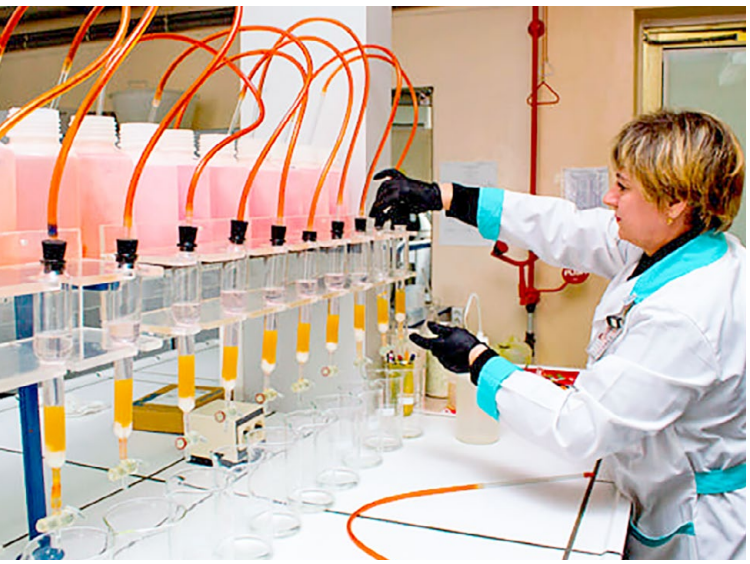
As of 20 March, Chernobyl NPP personnel had worked 50 shifts; in fact, people had been at their workplaces for more than 600 hours. They worked out duty schedules and arranged sleeping quarters in their offices, as special restrooms at the plant were not provided. Any movement of personnel had to be coordinated with the Russians, who set up specific routes for the workers to move around exclusively. Under the conditions of the constant work, the Chernobyl workers demonstrated a high level of solidarity and a responsible attitude to the performance of their official duties.

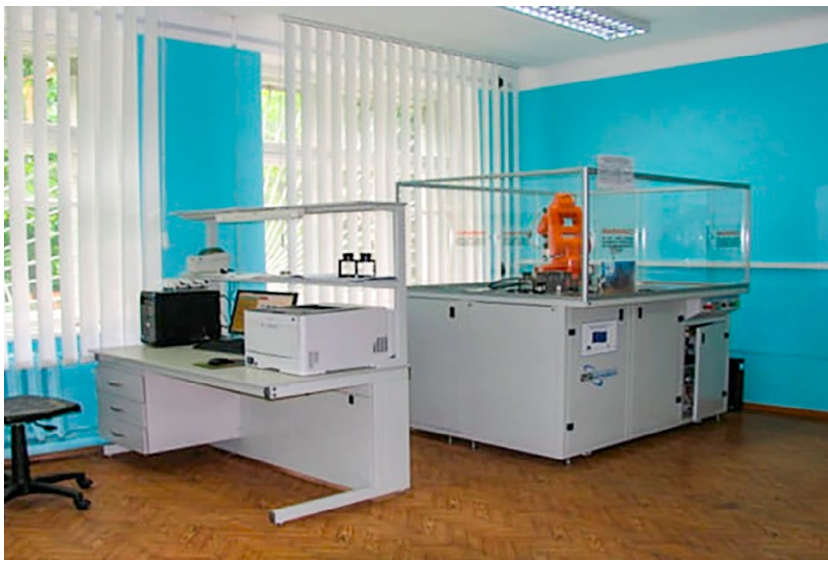
On that day, a partial rotation of the NPP personnel and the evacuation of those who were in the territory of the occupied plant was carried out via the territory of Belarus, by boat. It was possible to evacuate 106 people. To replace the evacuated personnel of the Chernobyl NPP, 46 volunteer workers of the plant went to carry out their duties and to ensure the operation of the plant.

Consequences of the occupation of the Chernobyl nuclear power plant

Since mid-March, Russians have begun removing machinery, including specialized machinery, valuables, equipment from offices and facilities, as well as movable assets such as cars and heavy forestry equipment, which have recently been renewed and purchased. The removal took place via Belarus, and there was a photographic evidence of a SSE Pivnichna Pushcha vehicle near Gomel in a convoy of Russian equipment.

The Russian occupiers looted and destroyed the state-of-the-art Central Analytical Laboratory in Chornobyl, worth €6 million, which was a unique complex with strong analytical capabilities that could provide services at any stage of radioactive waste management, from conditioning to disposal, as well as at the research and technology development stage.





According to The Washington Post, the Russians removed property worth more than $135 million from the Chernobyl NPP laboratories. It includes 698 computers, 344 cars, 1500 radiation dosimeters and special software.

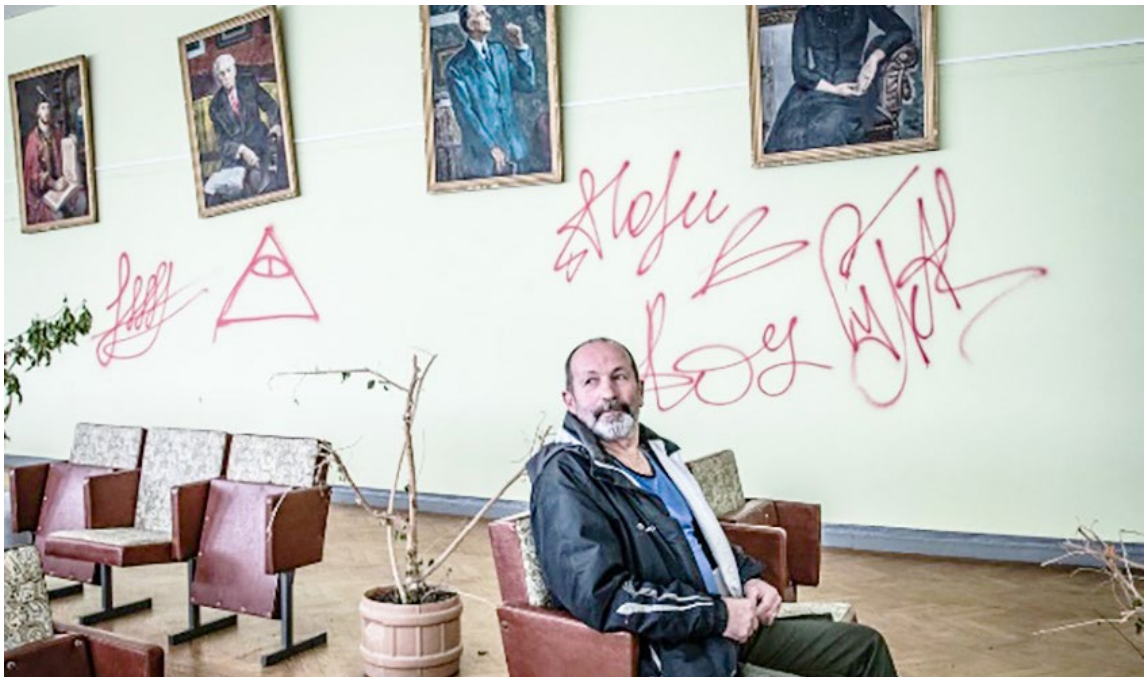
On March 31, Russian occupation troops began to withdraw from the territory of the ChNPP. Before leaving, they robbed the administrative building of the station and the hotel in the city of Chornobyl. In addition to computer equipment and station property, household appliances and small kitchen utensils were stolen. The next day, access routes to the industrial site were taken under control of the plant personnel.

On April 2, 2022, the flag of Ukraine was raised over the Chernobyl NPP, and the Ukrainian anthem was played. The flag-raising ceremony was attended by the

operational personnel of the plant, who, under the difficult conditions of occupation, always ensured nuclear and radiation safety of the Chernobyl NPP facilities.

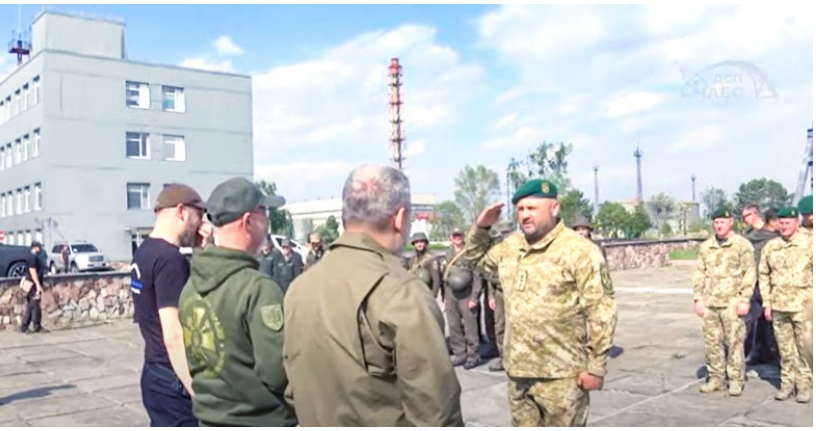
Soon, the Chernobyl NPP was taken under the protection of the National Guard of Ukraine. The main tasks of the National Guard at the site were protection and defence of nuclear facilities and physical protection of nuclear materials. Heads of the State Agency of Ukraine on Exclusion Zone Management also arrived at the station to assess the situation.

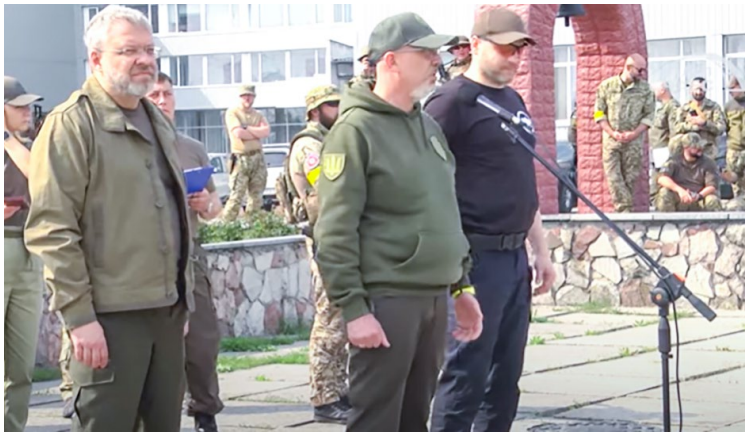
Almost every office space in the buildings of the enterprises was significantly damaged, broken and completely stolen. Both work property and personal belongings of employees at their workplaces were stolen; conference rooms were spray-painted. Russian troops completely looted and destroyed the automated system for monitoring the radiation state of the exclusion zone.



The main tasks at the time were to organize accessible logistics, deliver humanitarian aid, establish communication, and rotate personnel. Subsequently, a plan was initiated to restore all enterprise functions, both environmental monitoring and hazardous waste management. Continued work was carried out with international institutions to obtain appropriate assistance. On 26 April, Rafael Grossi, IAEA Director General, visited the Chernobyl nuclear power plant. He led the Agency's mission to prevent nuclear accidents during the war in Ukraine. IAEA specialists have brought equipment and set themselves the goal of carrying out radiological investigations at the Chernobyl nuclear power plant, which has been under Russian occupation for five weeks.

On 12 May, Ukrainian Minister of Defence Oleksii Reznikov, Minister of Internal Affairs Denys Monastyrskyy and Minister of Energy Herman Halushchenko visited the Chernobyl NPP site. As part of the visit, the ministers officially awarded servicemen of the Ukrainian Armed Forces, the NGU, border guards and employees of enterprises in the exclusion zone.





In the Red Forest, adjacent to the Chernobyl nuclear power plant, which took the largest share of radioactive dust emissions during the 1986 reactor explosion, the occupiers decided to build defensive positions. Danger signs placed everywhere did not stop them. In the forest, Russians dug trenches, lived in the forest, burned fire, breathed combustion products.

After the exclusion zone was liberated, experts recorded abnormally high radiation levels in the Red Forest.The Energoatom informs that all occupiers, who were based and dug in the Red Forest for almost 30 days, will have radiation sickness of varying severity.