BRATISLAVA LAW REVIEW

PUBLISHED BY
THE FACULTY OF LAW,
COMENIUS UNIVERSITY
BRATISLAVA

ISSN (print): 2585-7088
ISSN (electronic): 2644-6359

PLAYING WITH FIRE AT THE ZAPORIZHZHIA NUCLEAR POWER PLANT AND THE CHALLENGES FOR INTERNATIONAL NUCLEAR LAW IN CENTRAL EUROPE / Marianna Novotná, Jakub Handrlica

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This paper was written under the umbrella of the projects APVV-20-0171 *Concurrence of delicts and quasi-delicts in non-contractual relations and their overlap with contract and property law* (Law Faculty, University of Trnava) and *Cooperatio Laws* (Law Faculty, Charles University in Prague).

Abstract: *Since the start of the military aggression of the Russian Federation against Ukraine in February 2022, the Zaporizhzhia Nuclear Power Station has been at the centre of heavy combat. The Zaporizhzhia Nuclear Power Station, which is both the largest nuclear power plant in Europe and the tenth largest nuclear power plant in the world, has been targeted by various weapons, including rocket-propelled grenades and drones. The fact is that a potential nuclear accident in this installation may have tremendous transboundary impacts on the whole region of Central Europe. In this respect, the question arises of whether international law provides an appropriate reaction to these realities. Having outlined this question, one must bear in mind that since March 2022, the Ukrainian executive has lost effective control over the nuclear power plant, which has been controlled since then – in strict contradiction with the rules of international law - by the Russian Federation since then. This article analyses the potential applicability of three international agreements - the Convention on Early Notification of a Nuclear Accident, the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency and the Vienna Convention on Civil Liability for Nuclear Damage - and will respond to a potential accident in this nuclear power plant. This article is written from the perspective of the states of Central Europe, whose territories are most likely to be affected by a nuclear incident that occurred at the Zaporizhzhia Nuclear Power Station.*

Key words: *Nuclear Accident; Armed Conflict; Early Notification of a Nuclear Accident; Assistance in a Case of a Nuclear Accident; Nuclear Liability; International Nuclear Law*

Suggested citation:
Novotná, M., Handrlica, J. (2024). Playing with Fire at the Zaporizhzhia Nuclear Power Plant and the Challenges for International Nuclear Law in Central Europe. *Bratislava Law Review*, 8(2), 57-74. https://doi.org/10.46282/blr.2024.8.2.880

Submitted: 16 June 2024
Accepted: 23 September 2024
Published: 31 December 2024

1. INTRODUCTION

The Zaporizhzhia Nuclear Power Plant[1] in southeastern Ukraine is the largest nuclear power plant in Europe and among the ten largest in the world. The Zaporizhzhia

[1] Ukrainian: *Запорізька атомна електростанція*, romanised: *Zaporiz'ka atomna elektrostantsiia*.

Nuclear Power Plant is situated near the city of Enerhodar, on the southern shore of the Kakhovka Reservoir on the Dnieper River. It is composed of six nuclear reactors of Soviet design, each generating 950 MWe for a total power output of 5,700 MWe. The first five were successively brought online between 1985 and 1989, and the sixth was added in 1995. In 2020, the plant generated nearly half of Ukraine's electricity derived from nuclear power and more than a fifth of the total electricity generated in the country (Wendland, 2022).

Since the commencement of the aggression of the Russian Federation against the sovereign territory of Ukraine in February 2022, the safety situation of the Zaporizhzhia Nuclear Power Plant has been the focus of the international community of States.[2] For the very first time in history, a nuclear power plant has become a military objective in the front line of a war (Zurita, 2024). After the Russian invasion of Ukraine began, the *Energoatom*[3] shut down Units 5 and 6 to reduce risk, keeping Units 1 to 4 in operation to produce electricity for the concerned region. During the military conflict, the Zaporizhzhia Nuclear Power Plant became several times the target of military attacks from both sides of the conflict. In March 2022, heavy fights between Ukrainian and Russian military forces ended with the military occupation of the Zaporizhzhia Nuclear Power Plant by the forces of the Russian Federation. In September 2022, a delegation of officials from the International Atomic Energy Agency (**IAEA**) visited the nuclear power plant. Subsequently, a report was published by the IAEA documenting damage and potential threats to plant security caused by external shelling and the presence of occupying troops in the plant.[4] This report has stated that:

> "The situation in Ukraine is unprecedented. It is the first time an armed conflict has occurred amid the facilities of a large, established nuclear power program. A nuclear accident can have a serious impact within a country and beyond its borders, and the international community is relying

[2] See United Nations, Briefing Security Council, International Atomic Energy Agency Director Outlines Five Principles to Prevent Nuclear Accident at Zaporizhzhia Power Plant in Ukraine, 9334th meeting (PM), SC/15300, 30 May 2023. At this meeting, the IAEA presented five indispensable principles to prevent any nuclear accident at the Zaporizhzhia Nuclear Power Plant, which are as follows: (i) no attack of any kind from or against the plant, targeting in particular the reactors, spent fuel storage, other critical infrastructure or personnel; (ii) no use of the plant as storage nor as a base for heavy weapons or military personnel that could be used for an attack; (iii) no placement of off-site power — which must be available and secure at all times — at risk; (iv) the protection of all structures, systems and components essential to the plant's safe and secure operation from attacks or acts of sabotage; and (v) no action which undermines these principles. In this respect, the representative of Switzerland at the 9334th meeting reiterated his call on the Russian Federation to withdraw its troops from Ukrainian territory and condemned any attack against civilian infrastructure. At the same time, the representative of Switzerland stressed that the Russian Federation and Ukraine must fully implement these five principles and commit to protecting the Zaporizhzhia Nuclear Power Plant. The representative of France at the 9334th meeting urged the Russian Federation to return full control of all nuclear facilities to Ukraine and cease all threats on their personnel, she said the nuclear plant must not be used as a military base. Also, the representative of France stressed that the five principles presented by the IAEA are there to protect the whole international community. Finally, the representative of Ukraine at the 9334th meeting argued that the Russian Federation's actions — its mining of the plant's perimeter and shelling of its site and adjacent areas — have led to the violation of its physical integrity, serious damage to the station and a direct threat to the life and health of its operating personnel. In this respect, he added that "the threat of dangerous accident as a result of these irresponsible and criminal actions hangs over us."

[3] State Enterprise National Nuclear Energy Generating Company "Energoatom", commonly known as just *Energoatom*, is an Ukrainian State enterprise, operating all four nuclear power plants in Ukraine (Zaporizhzhia Nuclear Power Plant, Rivne Nuclear Power Plant, South Ukraine Nuclear Power Plant and Khmelnytskyi Nuclear Power Plant). It is the largest power producer in Ukraine.

[4] See IAEA, Nuclear Safety, Security and Safeguards in Ukraine IAEA, Nuclear Safety, Security and Safeguards in Ukraine, Report by the Director General, GOV/2022/52, 9 September 2022.

> on the Agency to perform a rigorous assessment of the situation and to keep it informed with accurate and timely information (...)."[5]

The fact is that despite this warning, military operations haven't ceased around the Zaporizhzhia Nuclear Power Plant. On 30 September 2022, the Russian Federation declared unilateral annexation of four Ukrainian regions (oblasts) – Donetsk, Cherson, Luhansk and Zaporizhzhia. At the same time, the operation of the Zaporizhzhia Nuclear Power Plant was taken over by Rosatom, Russia's state nuclear power company. The destruction of the nearby Kakhovka Dam in June 2023 was reported to have no immediate risk to the plant. In April 2024, the IAEA reported that the Zaporizhzhia Nuclear Power Plant was attacked by drones, apparently targeting surveillance and communication equipment. Russian troops tried to shoot down the drones without success (Roecker, 2023).

A potential nuclear incident in the largest nuclear power plant in Europe will most probably cause a profound impact not only in Ukraine but also beyond its borders (Tsagkaris, Matiashova and Isayeva, 2022). The potential risks of a nuclear accident, which may occur in the Zaporizhzhia Nuclear Power Plant, have been recently addressed by authors dealing with international relations, non-proliferation of nuclear weapons and disarmament (Alkiş, 2023; Bennet, 2023; Davis, 2023; Kurando, 2023; Wendland, 2023). At the same time, the situation in Ukraine has attracted considerable attention from scholars of international public law, international humanitarian law and international energy law (Burke, 2022; Boron, Gouin and Sauvourel, 2023; Smith, 2022; Smith, 2023, Morgandi and Betin, 2022). The fact is, however, that the authors have addressed so far mainly the issues of prohibition of military attacks on nuclear installations (Lamm, 2007; Mais, 2023) and challenges of the current situation for the existing global framework (Duliba, 2023; Hood and Cormier, 2024; Semenko, Remez, Nazarenko et al., 2024; Vasileva, 2023).

The fact is that while most of the so far existing literature on the potential impacts of a nuclear accident in the Zaporizhzhia Nuclear Power Plant has addressed prospective consequences from a global viewpoint, the main harmful implications of such an accident will occur in the region of Central Europe. Having said this, one may refer to the simulation as developed by the Ukrainian Hydrometeorological Institute of the State Emergency Service of Ukraine and the National Academy of Sciences of Ukraine. This simulation was published in the *Ukrainska Pravda* on 18 August 2022 and indicates that a potential nuclear accident in the Zaporizhzhia Nuclear Power Plant will have impacts both for Kyiv and for the regions of Ukraine currently under the military occupation by the Russian Federation (Roshchina, 2022). Furthermore, radioactivity as the product of such a nuclear accident may reach the territory of several states of Central Europe, particularly Poland, the Czech Republic, Slovakia, Hungary, Romania, and the Republic of Moldova.

In this respect, this article aims to address the gap existing in the legal scholarship of Central Europe on the potential impacts of a nuclear accident in the Zaporizhzhia Nuclear Power Plant. This article will address the issue from neither the Ukrainian viewpoint nor the viewpoint of the global community. This article aims to address the question of how the existing instruments of international nuclear law can provide a suitable reaction to a nuclear accident, which will correspond to the interest of the States of Central Europe to protect the health and life of their citizens and their environment.

[5] *Ibid.*, p. 11.

DOI: 10.46282/blr.2024.8.2.880

This article aims to address the potential impacts of a nuclear accident in the Zaporizhzhia Nuclear Power Plant from the viewpoint of Central Europe. In this respect, the authors seek to address the applicability of three regimes of international nuclear law, which will be crucial in the case of a nuclear accident in Central Europe. Having said this, one must bear in mind that the Russian occupation of the nuclear power plant represents an act without any historical parallels to the past, a kind of *black swan* (Handrlica, 2021b). Consequently, it is crystal clear that the existing instruments do not provide any provisions that would explicitly react to the newly emerged situation. This represents a considerable challenge, which the legal scholarship must address. In this respect, the topic will be analysed as follows:

Firstly (chapter II.), attention will be paid to the applicability of the Convention on Early Notification of a Nuclear Accident to the potential nuclear accident which may occur in the Zaporizhzhia Nuclear Power Plant. Secondly (chapter III.), the authors will analyse the applicability of the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency to the same potential incident. By reviewing the prospective applicability of both these instruments of international nuclear law, one must bear in mind that while Ukraine represents one of the Contracting Parties to both these Conventions, it has lost any effective control over the concerned territory since March 2022. This fact makes the current situation even more challenging. Lastly (chapter IV.), this article will also address the capability of the Vienna Convention on Civil Liability for Nuclear Damage to address the issues of liability and compensation for damage that may potentially occur in the aftermath of a nuclear accident in the Zaporizhzhia Nuclear Power Plant.

2. THE CONVENTION ON EARLY NOTIFICATION OF A NUCLEAR ACCIDENT

2.1 Scope of the Convention

The regime for early notification of a nuclear accident in the territory of Ukraine will be in Central Europe, governed by the Convention on Early Notification of a Nuclear Accident (from now on, "**the Convention on Early Notification**").[6] The regime, as established by the Convention on Early Notification, recently covers the whole territory of Central Europe. Both Ukraine and the neighbouring States, such as Poland, the Czech Republic, Slovakia, Hungary, Romania and the Republic of Moldova, are Contracting Parties to the Convention on Early Notification.[7] At the same time, the Russian Federation is participating in this international regime of early notification of a nuclear accident as well.

The scope of the application of the Convention on Early Notification is rather broadly designed (Moser, 1989). The international regime for early notification of a nuclear accident will be applicable if the following three preconditions are fulfilled:

a) nuclear accident will be involving facilities or activities of a Contracting Party, which are explicitly referred to;[8]
b) release of radioactive material occurs or is likely to occur;[9]

[6] The Convention on Early Notification of a Nuclear Accident (adopted 26 September 1986, entered into force 27 October 1985), INFCIRC/335.
[7] The Convention itself refers about the „State Parties".
[8] The Convention on Early Notification provides in its Article 1.2 that following facilities and activities are covered: (a) any nuclear reactor wherever located; (b) any nuclear fuel cycle facility; (c) any radioactive waste management facility; (d) the transport and storage of nuclear fuels or radioactive wastes; (e) the manufacture, use, storage, disposal and transport of radioisotopes for agricultural, industrial, medical and related scientific and research purposes; and (f) the use of radioisotopes for power generation in space objects.
[9] See Convention on Early Notification, Article 1.

c) which has resulted or may result in an international transboundary release that could be of radiological safety significance for another State.[10]

In this respect, it is essential to note that the scope of application of the Convention on Early Notification does not distinguish between nuclear accidents occurring in peaceful operations and those arising because of an armed conflict (McBrayer, 1987). A nuclear accident that may arise because of a military attack on a nuclear installation will undeniably fall under the regime as established by the Convention on Early Notification.

Consequently, the applicability of the Convention on Early Notification to a nuclear accident at the Zaporizhzhia Nuclear Power Plant will be triggered in the case of a transboundary release with a radiological safety significance for at least one other country will be given.

2.2 International Regime for Early Notification of a Nuclear Accident

The Convention on Early Notification aims to establish an international regime for early notification of a nuclear accident. At the same time, it is presumed that this regime will be further developed through bilateral and regional agreements, as adopted by the respective Contracting Parties.[11] Therefore, some scholars rank the Convention on Early Notification as the "incentive" convention, which primarily aims to trigger further development of international nuclear law in the respective area of governance (De Wright, 2007).

The international regime of early notification of a nuclear accident, as established by the Convention, has been built upon the obligation of the Contracting Party to provide for a notification to those States which may be affected by an international transboundary release. The Contracting Party is being obliged[12] to:

a) notify, directly or through the IAEA, those States which are or may be physically affected by the nuclear accident, its nature, the time of its occurrence and its exact location where appropriate; and
b) promptly provide the states referred to in subparagraph (a), directly or through the IAEA, with information that is relevant to minimising the radiological consequences in those states.

The practical exchange of information under the international regime, as established by the Convention on Early Notification, is to be realised *via* the competent authorities of the Contracting Parties. In this respect, the Convention provides[13] that each Contracting Party shall make known to the IAEA and to other Contracting Parties its competent authorities and point of contact responsible for issuing and receiving the notification on the transboundary release. The IAEA maintains an up-to-date list of all competent authorities.[14]

At the same time, the Convention on Early Notification provides[15] for certain obligations of the IAEA in the notification regime. The IAEA shall immediately inform both Contracting Parties to the Convention and other States that are or may be physically

[10] *Ibid*.
[11] See Convention on Early Notification, Article 9 ("in furtherance of their mutual interests, States Parties may consider, where deemed appropriate, the conclusion of bilateral or multilateral arrangements relating to the subject matter of this Convention").
[12] *Ibid*., Article 2.
[13] *Ibid*., Article 7.1.
[14] *Ibid*., Article 7.3.
[15] *Ibid*., Article 4.

DOI: 10.46282/blr.2024.8.2.880

affected by the transboundary release of a notification received pursuant to the Convention. Also, the IAEA shall promptly provide any Contracting Party, any Member State or relevant international organisation, upon request, with any information received under the international regime discussed here.

Lastly, the Convention on Early Notification also calls[16] for voluntary notification of any other nuclear accidents than those specified above, with a view to minimising the radiological consequences. This call hasn't been adopted as an obligation but merely as an incentive for the Contracting Parties to strengthen their cooperation through an intensive exchange of information in this field.

2.3 Applicability to a Potential Accident at the Zaporizhzhia Nuclear Power Plant

The applicability of the Convention on Early Notification to a potential accident at the Zaporizhzhia Nuclear Power Plant implies several questions. The fact is that the Convention does not contain any explicit provision reflecting the situation when another Contracting Party is militarily occupying a nuclear installation to this Convention. Under such a situation, the question arises: which State is being obliged to fulfil the notification obligation under the Convention?[17]

The fact is that the Convention provides[18] that it shall apply in the event of any accident involving facilities or activities of a Contracting Party or of *persons or legal entities under its jurisdiction or control* (highlighted by the authors). In this respect, the Convention on Early Notification provides for an exhausting list of information, which is to be supplied to the affected State or States[19] and which reads as follows:

a) the time, exact location where appropriate, and the nature of the nuclear accident,
b) the facility or activity involved,
c) the assumed or established cause and the foreseeable development of the nuclear accident relevant to the transboundary release of the radioactive materials,
d) the general characteristics of the radioactive release, including, as far as is practicable and appropriate, the nature, probable physical and chemical form and the quantity, composition and effective height of the radioactive release,
e) information on current and forecast meteorological and hydrological conditions necessary for predicting the transboundary release of the radioactive materials,
f) the results of environmental monitoring relevant to the transboundary release of the radioactive materials,
g) the off-site protective measures taken or planned,
h) the predicted behaviour over time of the radioactive release.

Consequently, the Convention on Early Notification clearly presumes that the Contracting Party possessing jurisdiction over the legal entity operating the nuclear installation will notify transboundary release. The reason for this regulation is crystal clear. The Convention presumes that the Contracting Party has complete control over its territory and, therefore, can obtain information about any nuclear accidents that may have transboundary impacts (Stuckey, 1988).

[16] *Ibid*., Article 3.
[17] *Ibid*., Article 2.
[18] *Ibid*., Article 1.
[19] *Ibid*., Article 5.1.

Having said this, however, the Convention also refers to a situation when a Contracting Party merely controls a person or a legal entity operating the respective nuclear installation. Consequently, one may argue that the international regime of early notification clearly links the notification obligations primarily to those states that execute factual control over the respective installation or activity. The ratio behind this concept is that the State that is in factual control will most efficiently gather information on potential transboundary release and notify them abroad.

Having said this, it is undeniable that the Zaporizhzhia Nuclear Power Plant belongs to the Ukrainian jurisdiction. The unilateral annexation of Donetsk, Cherson, Luhansk and Zaporizhzhia, which the Russian Federation announced on 30 September 2022, has been considered an act contrary to the principles of international public law (Ali, 2023). At the same time, imposing the notification obligation under the Convention on Early Notification primary to Ukraine would not be appropriate, as Ukraine does not possess any effective control over the installation. Therefore, one may argue that it will be the Russian Federation, as the Contracting Party possessing the actual control over the respective installation, which will be obliged to provide for notification of any transboundary release in the first place.

The fact is that the outlined way of interpretation has much broader implications. It is also relevant for interpreting the obligations arising from bilateral agreements that have been adopted to further specify the Convention on Early Notification. The bilateral regime, as established between Slovakia and Ukraine, may serve as an example.[20] Pursuant to this regime, Ukraine would be obliged to notify the competent authorities of Slovakia of any nuclear accident occurring in its territory.[21] Consequently, under a peaceful situation, this obligation would clearly concern any nuclear accident occurring at the Zaporizhzhia Nuclear Power Plant as well. However, applying the above-outlined interpretation to this obligation, one may argue that Ukraine cannot be required to deliver information about nuclear accidents occurring in a territory that is beyond its control. In this respect, the notification obligation of the Contracting Party to the Convention on Early Notification, which is in factual control of the nuclear installation, will replace the obligation arising from the bilateral agreement.

3. THE CONVENTION ON ASSISTANCE IN THE CASE OF A NUCLEAR ACCIDENT OR RADIOLOGICAL EMERGENCY

3.1 Scope of the Convention

Together with the Convention on Early Notification, the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (from now on "**the Assistance Convention**") represents another major convention, adopted right in the aftermath of the nuclear accident at the Chornobyl Nuclear Power Plant in 1986. The Assistance Convention differentiates between nuclear accidents originating from peaceful operations and those caused by an armed conflict. Also, in the same fashion as the Convention on Early Notification, the Assistance Convention is very broadly designed. It applies[22] to any case of a nuclear accident or a radiological emergency. In this respect,

[20] See Agreement between the Government of the Slovak Republic and the Government of Ukraine on Early Notification of a Nuclear Accident, on Information Exchange and Co-Operation in the Field of Nuclear Safety and Radiological Protection (adopted 24 September 1998, entered into force 1 March 1999), published in Collection of Laws of the Slovak Republic, under 323/1999 Coll.
[21] *Ibid*., Article 2.1.
[22] See Assistance Convention, Article 2.1.

one must stress that both Ukraine and the Russian Federation are Contracting Parties to the Assistance Convention. At the same time, all states in Central Europe participate in the international regime, as established by the Assistance Convention. Having said this, one must bear in mind that similar to the Convention on Early Notification, the Assistance Convention has also been designed as an "incentive" instrument of international nuclear law (De Wright, 2007). It urges[23] its Contracting Parties to enter into bilateral and regional agreements to strengthen the global regime of assistance further.

Consequently, the assistance regime, as established by the Assistance Convention, will also undeniably apply to a nuclear accident potentially occurring at the Zaporizhzhia Nuclear Power Plant. At the same time, the existing bilateral agreements that have been adopted to develop the Assistance Convention further will also apply to the concerned Contracting Parties.

3.2 International Regime on Assistance in the Case of a Nuclear Accident

The Assistance Convention provides[24] for the right of any Contracting Party affected by a nuclear accident or a radiological emergency to address other Contracting Party, or Parties, or the IAEA directly for assistance. A Contracting Party requesting assistance[25] shall specify the scope and type of assistance required and, where practicable, provide such information as may be necessary for other Contracting Parties[26] to determine the extent to which it is able to meet the request. The Assistance Convention itself does not provide for any obligation to provide for any specific assistance. It merely provides[27] that each Contracting Party to which a request for assistance is directed shall promptly decide and notify the requesting Contracting Party whether it is able to render the assistance requested, as well as the scope and terms of the aid that might be rendered. In this respect, the Assistance Convention also provides that Contracting Parties shall, within the limits of their capabilities, identify and notify the Agency experts, equipment and materials which could be made available for the provision of assistance to other Contracting parties in the event of a nuclear accident or radiological emergency as well as the terms, primarily financial, under which such aid could be provided.[28]

3.3 Applicability to a Potential Accident at the Zaporizhzhia Nuclear Power Plant

The Assistance Convention has established an international regime that aims to facilitate the provision of assistance to the Contracting Party that will be affected by a nuclear accident or by a radiological emergency. With respect to a potential nuclear accident at the Zaporizhzhia Nuclear Power Plant, it is necessary to clarify which State will be entitled to require assistance under the Assistance Convention (Cook, 2022). Having posed this question, it must be stressed in the first place that the Assistance Convention does not qualify for assistance; only those states that have provided for a notification under the Convention on Early Notification do. Further, the Assistance Convention specifies[29] that a Contracting Party is entitled to require assistance in the event of a nuclear accident or radiological emergency *whether or not such accident or emergency originates within its territory, jurisdiction or control*. Consequently, the right to

[23] *Ibid*., Article 1.2.
[24] *Ibid*., Article 2.1.
[25] The Assistance Convention uses the term „requesting State".
[26] The Assistance Convention uses the term „assisting Party".
[27] See Assistance Convention, Article 2.3.
[28] *Ibid*., Article 2.4.
[29] *Ibid*.

require assistance from other Contracting Parties to the Convention, from the IAEA, or from different international organisations is being defined very broadly. In principle, the Convention does not require that the nuclear accident occur in the territory under the control of the Contracting Party, needing assistance.

Consequently, in the case of a nuclear accident at the Zaporizhzhia Nuclear Power Plant, Ukraine will be entitled to require assistance from other Contracting Parties to the Assistance Convention. The reason behind this is crystal clear: it will be the territory under the control of Ukraine which will be affected by the transboundary release in the first place. Therefore, even if Ukraine is not in a position to notify other states of the accident under the Convention on Early Notification, one must argue for its right to require assistance under the Assistance Convention.

In this respect, the Assistance Convention provides for basic principles governing any assistance provided by other Contracting Parties. These principles, applicable also in a potential case of a nuclear accident at the Zaporizhzhia Nuclear Power Plant, are as follows:

a) the overall direction, control, coordination and supervision of the assistance shall be the responsibility of Ukraine within its territory,[30]
b) Ukraine shall provide, to the extent of its capabilities, local facilities and services for the proper and effective administration of the assistance,[31]
c) Ukraine shall also ensure the protection of personnel, equipment and materials brought into its territory by or on behalf of the assisting State for such purpose,[32]
d) Ukraine shall afford to personnel of the assisting State and personnel acting on its behalf the necessary privileges, immunities and facilities for the performance of their assistance functions,[33]
e) without prejudice to the privileges and immunities, all beneficiaries enjoying privileges and immunities (see above sub d) will have a duty to respect the laws and regulations of Ukraine. They shall also have the duty not to interfere in Ukraine's domestic affairs.[34]

The principle of overall direction, control, and supervision of assistance by the Contracting Party in its territory may imply severe problems with respect to the current situation in Ukraine. In particular, the question may arise of to what extent Ukraine will be able to execute this principle in those territories that have been annexed by the Russian Federation—contrary to the principles of international public law—. In this respect, the Assistance Convention provides[35] for a regime of dispute settlement between the Contracting Parties, which will need to be activated.

4. THE VIENNA CONVENTION ON CIVIL LIABILITY FOR NUCLEAR DAMAGE

4.1 Scope of the Convention

The regime for liability and compensation of damage occurring as a consequence of a nuclear accident in the territory of Ukraine will be governed in Central Europe by the Vienna Convention on Civil Liability for Nuclear Damage (from now on, "the

[30] *Ibid*., Article 3.a.
[31] *Ibid*., Article 3.b.
[32] *Ibid*.
[33] *Ibid*., Article 8.1.
[34] *Ibid*., Article 8.7.
[35] *Ibid*., Article 13.

DOI: 10.46282/blr.2024.8.2.880

Vienna Convention").[36] This Convention aims to establish a regime of liability and compensation in case of transboundary damage. The Vienna Convention will be applicable to damage that occurs as a consequence of the radioactive properties or a combination of radioactive properties with toxic, explosive, *or other hazardous properties of nuclear fuel or radioactive products or waste*.[37] Consequently, any nuclear accident occurring in the Zaporizhzhia Nuclear Power Plant and causing damage beyond the territory of Ukraine will be governed by this Convention – under the precondition that the State where the damage occurred is also participating in the regime of the Vienna Convention.

Having said this, one has to note that while several States of Central Europe (Poland, Romania) currently belong to the international regime, as established by the Revised Vienna Convention on Civil Liability for Nuclear Damage, Ukraine belongs together with Slovakia, the Czech Republic and Hungary to the international regime, as established by the Vienna Convention (Handrlica, 2021a). Both of these existing international regimes of nuclear liability have been interconnected (Handrlica and Novotná, 2018; IAEA, 2017). In practical terms, this means that in the case of a nuclear accident in the Zaporizhzhia Nuclear Power Plant, both the victims from the territories of the Contracting Parties to the Vienna Convention and the victims from the territories of the Contracting Parties to the Revised Vienna Convention on Civil Liability for Nuclear Damage will be entitled to compensation.

Having said this, one must also note that the Russian Federation is one of the Contracting Parties to the Vienna Convention.

4.2 Regime of International Liability for Nuclear Damage

In contrast to the international regimes established by the Convention on Early Notification and the Assistance Convention, which were outlined above, the Vienna Convention establishes a global regime of civil liability rather than a regime of international responsibility of the States (Novotná and Trojčáková, 2020). In this respect, the Vienna Convention links the liability for nuclear damage to the operator of the nuclear installation, which means the entity of civil law.[38]

In the legal framework of the Vienna Convention, the operator is *the person designated or recognised as the operator of a nuclear installation by the State*.[39] The operator of a nuclear installation is exclusively liable for nuclear damage which occur in his installation.[40] The Convention provides that the operator has a right of recourse only if this is expressly provided for by a contract in writing or – in the case a nuclear incident results from an act or omission done with intent to cause damage – against the individual who has acted or omitted to act with such purpose.[41] No other person than the operator[42] may be held liable, and the operator cannot be held liable under different legal provisions.

[36] The Vienna Convention on Civil Liability for Nuclear Damage (adopted 21 May 1963, entered into force 12 November 1972), INFCIRC/500.
[37] See Vienna Convention, Article I.1.k.i.
[38] In this respect, it is important to note, that also the Installation State, or its constituent sub-division, can be also considered as operator under the Vienna Convention (see Vienna Convention, Article VII.2).
[39] *Ibid*., Article I.1.c.
[40] *Ibid*., Article II.5.
[41] *Ibid*., Article X.
[42] This is in particular the issue of the constructor, the subject delivering the nuclear technologies or nuclear fuel. Although being participating in the nuclear industry, these persons do not bear any liability in the framework of the Convention.

In relation to this, the Vienna Convention provides for minimal liability relief. The operator will be exonerated from liability only if he proves that the nuclear incident was directly due to armed conflict, hostilities, civil war, insurrection, or a grave natural disaster or that it resulted wholly or partly either from the gross negligence of the victim or from an act or omission of the victim with intent to cause harm.[43] Further, strict preconditions concerning potential liability relief are provided.[44]

In general, loss of life, any personal injury or any loss of, or damage to, a property which arises out of or results from the *radioactive properties or a combination of radioactive properties with toxic, explosive or other hazardous properties of nuclear fuel or radioactive products or waste in, or of nuclear material coming from, originating in, or sent to a nuclear installation* are to be covered by the liability framework, created by the Vienna Convention.[45]

As a quid pro quo for the stringent conditions of the operator's liability, each Contracting Party[46] may limit the operator's liability by the corresponding national legislation. However, the Vienna Convention provides for a minimum possible liability limit: the Installation State may limit the liability of the operator to not less than US $ 5 million for any one nuclear incident. The US $ referred to in this Convention is a unit of account equivalent to the value of the United States dollar in terms of gold on 29 April 1963, that is to say, US $ 35 per one troy ounce of fine gold.[47] Consequently, the Vienna Convention provides for a "floating" limit of operator's liability when fixing the minimal limit to the price of one troy ounce of fine gold. This constitutes a particular challenge for national legislation, which must avoid providing for a minimal limit that may become too low due to the diversions of the price of gold. Consequently, the limitation of the operator's liability is to be considered as a right of the Contracting Party, which is guaranteed under international law. It is a matter of fact that, from the very early beginning, the Contracting Parties to the Vienna Convention have been allowed to introduce an unlimited liability. The provisions of the Convention do not contain any obligatory maximum limit of liability. Therefore, the limitation of the operator's liability is a right of an Installation State rather than an obligation. In this respect, it must be mentioned that the national legislation of Ukraine[48] has limited the liability of the operator to the equivalent of 150 million Special Drawing Rights in the currency of Ukraine for each nuclear incident (Hamankov, 2000).

Furthermore, the Vienna Convention requires the operator to maintain mandatory insurance or to provide other financial securities covering its liability for nuclear damage in such amounts, of such types and in such terms as the Contracting Party specifies. This renvoi to national legislation makes the amounts to be insured by the operator dependent on the Installation State rather than on a binding provision of the Vienna Convention. However, the Convention requires the Contracting Party to *ensure the payment of any claims which have been established against the operator by providing the necessary funds to the extent that the yield of insurance or other financial security is inadequate to satisfy such claims, but not in excess of the limit, if any, established in national legislation*.[49] Having

[43] Vienna Convention, Article IV.2.
[44] Pursuant to the Article X, the operator shall have a right of recourse only if this is expressly provided for by a contract in writing; or if the nuclear incident results from an act or omission done with intent to cause damage, against the individual who has acted or omitted to act with such intent.
[45] Vienna Convention, Article I.1.k.
[46] The Convention uses the term „Installation State" to refer about Contracting Parties.
[47] Vienna Convention, Article V.1 and 3.
[48] See Act of Ukraine "On Civil Liability for Nuclear Damage and its Financial Security", Article 6.1.
[49] Vienna Convention, Article VII.1.

DOI: 10.46282/blr.2024.8.2.880

said this, it is important to stress that the national legislation of Ukraine provides that the operator may secure his liability for nuclear damage either by means of insurance or by another type of financial security.[50]

Finally, the operator's liability under the Vienna Convention is also limited in time. In view of the fact that physical injury from radioactive contamination may not manifest itself for some time after the nuclear incident, the adoption of too short a period of limitation would clearly be inequitable. Consequently, the Vienna Convention provides that rights of compensation will be extinguished if an action is not brought within ten years from the date of the nuclear incident.

At the same time, the Vienna Convention provides that the courts of the Contracting Party where the nuclear incident occurred will have exclusive jurisdiction over all actions brought for damage caused by a nuclear incident occurring in their territory.[51] Consequently, in the scenario of a nuclear incident at the Zaporozhzhia Nuclear Power Plant, the application of the Vienna Convention would imply the competence of Ukrainian courts to decide on the compensation for damage arising.

4.3 Applicability to a Potential Accident at the Zaporizhzhia Nuclear Power Plant

The applicability of the Vienna Convention to a potential accident at the Zaporizhzhia Nuclear Power Plant ranks among the most sensitive questions of the current situation in Ukraine (Morgandi and Betin, 2022; Sancin, 2023). The fact is that a nuclear incident in this installation will inevitably imply transboundary damage that will occur in the territory of other Contracting Parties to either the Vienna Convention or the Revised Vienna Convention. Consequently, the question arises whether the regime of the Vienna Convention will also be applicable to the current situation under which the Zaporizhzhia Nuclear Power Plant is under military occupation, and the nuclear accident will most probably result in an army attack.

One must bear in mind that the Vienna Convention was originally not drafted to apply to situations like those arising in Ukraine recently. Consequently, the provisions of the Vienna Convention do not provide for any explicit answer to the question arising. At the same time, due to the magnitude of the potential harm, the clarification of the applicability of the Vienna Convention is essential. Having said this, we must stress that two main issues are crucial for clarifying the applicable regime. Firstly, the issue of operator liable under the Vienna Convention must be clarified. Secondly, the consequences of the liberation, as provided by the Vienna Convention, must be evaluated.

4.3.1 Operator Liable for Nuclear Damage

The Vienna Convention channels the liability for nuclear damage to the operator of the concerned nuclear installation.[52] In this respect, the liability regime established by the Vienna Convention is interconnected with the national public law regulating nuclear safety, with the license issued by the competent authority to operate the installation. Consequently, Energoatom, as the operator holding the license under Ukrainian legislation (Hamankov, 2000), will be exclusively liable for nuclear damage in a peaceful situation. The fact is, however, that the *Energoatom* has not been able to control the

[50] See Act of Ukraine "On Civil Liability for Nuclear Damage and its Financial Security", Article 7.2. Also, the Article provides (*in fine*) that "the Cabinet of Ministers of Ukraine may grant the operator of a nuclear installation a State guarantee of financial security for civil liability for nuclear damage."
[51] Vienna Convention, Article XI.1.
[52] *Ibid.*, Article II.5.

operation of the concerned nuclear installation since March 2022. In this respect, the question arises of how to reconcile the international regime, as established by the Vienna Convention, with the current situation in Ukraine.

Having said this, one must bear in mind that the Vienna Convention aims to channel liability for nuclear damage to that entity which is in *factual* control of the nuclear installation (Kissich, 2004). Therefore, the Vienna Convention provides that the operator is *the person designated or recognised as the operator of a nuclear installation by the State.*[53] If referring to a person designated, the Vienna Convention refers to a person holding the license pursuant to the national legislation of the Contracting Party. The fact is, however, that the Vienna Convention also aimed to govern those cases when nuclear installations are being operated in the territory of the Contracting Party without a duly issued license. For these reasons, the Vienna Convention has defined the person liable for damage as the person designated or *recognised as the operator of a nuclear installation by the State* (highlighted by the authors). The reason behind this definition was that the fathers of the Conventions felt the necessity to cover also those situations where nuclear installations are being operated illegally. Thus, the liability regime of the Vienna Convention clearly stands upon channelling liability for nuclear damage to that person who is factually in control of the nuclear power plant (Kissich, 2004).

The text of the Vienna Convention does not contain any explicit provision addressing the military occupation of a nuclear power plant by another Contracting Party to this Convention. Consequently, the application of the Vienna Convention to the current situation in Ukraine is a matter of interpretation. Within this context, it is crucial to determine, *among other things,* to what extent the regulatory authority and the nuclear power plant's staff continue to be able to safely and securely regulate and operate the Ukrainian nuclear facilities without being obstructed in any manner or placed under *undue pressures* that would jeopardise the exercise of de facto control (Horbach and Brown, 2024). In this respect, one may argue that the concept of liability channelling to the person who is de facto in charge of nuclear installation implies liability of the *Rosatom* for any nuclear damage occurring with respect to a nuclear accident at the Zaporizhzhia Nuclear Power Plant. In this respect, identifying Russia's state nuclear power company as the *person recognised as the operator of a nuclear installation* only serves the purpose of identifying the person liable for nuclear damage. Thus, this interpretation does not intend to provide any legitimation for the military occupation of the Zaporizhzhia Nuclear Power Plant by the forces of the Russian Federation.

The application of the Vienna Convention to the potential nuclear accident occurring at the Zaporizhzhia Nuclear Power Plant has several consequences. Russia's state nuclear power company Rosatom, which has been in effective control of the Zaporizhzhia Nuclear Power Plant, will be exclusively liable for any nuclear damage arising because of a nuclear incident during this nuclear installation. Due to the fact that Rosatom is operating the Zaporizhzhia Nuclear Power Plant in the territory which belongs to Ukraine, it will be subject to the jurisdiction of Ukrainian courts and Ukrainian nuclear liability legislation for a case of judicial proceedings.

4.3.2 The Scope of Operator's Liability under an Armed Conflict

Having said this, the scope of the operator's liability under the Vienna Convention must be clarified. As explained in detail above, neither the Convention on Early Notification nor the Assistance Convention excludes cases of nuclear accidents due to

[53] See Vienna Convention, Article I.1.c.

DOI: 10.46282/blr.2024.8.2.880

their origin in an armed conflict. On the contrary, the Vienna Convention provides[54] that *no liability under this Convention shall attach to an operator for nuclear damage caused by a nuclear incident directly due to an act of armed conflict, hostilities, civil war or insurrection*. The reason behind this dismissal is the conception of the Vienna Convention, which is very different in substance to the international regimes (Gioia, 2012; Handrlica and Novotná, 2018), as established by the Convention on Early Notification and by the Assistance Convention. While both mentioned instruments are based upon obligations of the States, the Vienna Convention stands upon the civil liability of the operator. Thus, the reason for the exoneration is to liberate the operator in those cases which cannot be avoided by the operator by any means (Demougin, Nieto-Cerezo and Wenzelburger, 2024; Handrlica and Sancin, 2021). In this respect, it is essential to mention that under modern international humanitarian law, the term *armed conflict* includes both international and non-international armed conflicts. Consequently, the concept of an act of *civil war* or *insurrection* may be deemed to be equivalent to the modern concept of an act of (non-international) *armed conflict* (IAEA, 2017).

As Tibisay Morgandi and Batuhan Betin stressed in their contribution at the *EJIL Talk!* (Morgandi and Betin, 2022), the wording *directly due to an act of armed conflict, hostilities, civil war or insurrection* suggests that there must be a causal link between the act of armed conflict (or hostilities) and the nuclear accident. Thus, the exoneration from the operator's liability will clearly cover accidents that will be directly caused by acts of violence on or near a nuclear power plant, such as an artillery strike (Morgandi and Betin, 2022). However, the question arises whether the exoneration will also cover accidents caused by other acts, for example, if Russian forces will interfere with the safe monitoring of the nuclear power plants or will be simply negligent in this regard. In this respect, Nathalie L. J. T. Horbach and Omer F. Brown have very recently argued that the war-like exoneration was intended to cover only such exceptional circumstances under which "*law and order might break down*" (Horbach and Brown, 2024). Furthermore, they argued that from the *travaux préparatoires* of the Vienna Convention, it can be discerned that the exoneration of liability of the operator applies only in *exceptional* situations in which a war-like act directly causes nuclear damage, e.g. in situations that are entirely beyond human control and thus will become the responsibility of the nation as a whole. This would include bombing or other military attacks directed against nuclear power plants within international conflict that are beyond the control of the operator and state. It would not include situations in which operational control of the nuclear power plant has been compromised through military occupation, but the safe and secure operation is not otherwise jeopardised (Horbach and Brown, 2024).

At this point, it can be concluded that the operator's liability would be exonerated when an artillery strike directly causes a nuclear incident. On the other hand, exoneration will not apply if a nuclear incident is caused by Russian forces interfering with the safe monitoring of nuclear power plants.

In either case, the question of dismissal must be determined before the competent Ukrainian court.

5. CONCLUSIONS

The unprovoked military aggression of the Russian Federation against the territory of Ukraine has implied a myriad of new challenges for both society and law. Among others, for the very first time in history, a nuclear power plant has become a

[54] *Ibid.*, Article IV.3.a.

military objective in the front line of a war. In the States of Central Europe, which will most likely be affected by a nuclear accident at the Zaporizhzhia Nuclear Power Plant, the current situation implies a need to clarify whether the instruments of international nuclear law provide for an adequate reaction.

This article aimed to analyse the applicability of international conventions adopted in the field of early notification, assistance in the case of a nuclear accident and nuclear liability and compensation for a potential nuclear accident at the Zaporizhzhia Nuclear Power Plant. In this respect, the authors argue that while the existing instruments of international nuclear law do not provide for any explicit provisions governing the current situation, they are, in principle, able to address potential challenges arising nowadays in Central Europe. Having said this, it must be stressed that this presumes, in principle, that all Contracting Parties to the analysed instruments of international nuclear law will fully fulfil their obligations.

Having said this, the authors must stress at this place that the only and ultimate mitigation of any nuclear accident at the Zaporizhzhia Nuclear Power Plant lies in the immediate end of the occupation of this nuclear installation by the military forces of the Russian Federation.

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