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NPEC Reactors in War:
Legal Aspects and Damage Concepts

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October 27, 2022

What We'll Consider Today

- **Current International Law regarding attacks on Nuclear Reactors and Nuclear Facilities—partly a review of Victor Gilinsky's presentation**
- **Zaporizhzhia current status and potential future issues in current Ukraine situation**
- **The view in 2037—what will probably change**
  - **New Khmelnitsky reactors**
  - **New international agreements**
  - **Iodine tablets**

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Additional Protocol I

vs.

DOD Law of War Manual

AP I

Article 56 of Protocol I reads as follows:

Protection of works and installations containing dangerous forces

1. Works or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, **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.** Other military objectives located at or in the vicinity of these works or installations shall not be made the object of attack if such attack may cause the release of dangerous forces from the works or installations and consequent severe losses among the civilian population.

AP I

Article 56 of Protocol I reads as follows:

2. The special protection against attack provided by paragraph 1 shall cease:
(a) for a dam or a dyke only if it is used for other than its normal function and in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support;
(b) **for a nuclear electrical generating station only if it provides electric power in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support;**

(c) for other military objectives located at or in the vicinity of these works or installations only if they are used in regular, significant and direct support of military operations and if such attack is the only feasible way to terminate such support .

AP I vs DOD Section 5.13.1

Article 56 of AP I provides special rules for works and installations containing dangerous forces. For example, "[w]orks or installations containing dangerous forces, namely dams, dykes and nuclear electrical generating stations, 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." In addition, Article 56 of AP I provides immunity from attack to combatants and military equipment stationed or placed around works and installations containing dangerous forces "for the sole purpose of defending the protected works."

The United States has objected to this article of AP I. In ratifying AP I, other States have taken reservations from this article. Insofar as Article 56 of AP I deviates from the regular application of the principles of distinction and proportionality, the U.S. view has been that it does not reflect customary international law applicable in international and noninternational armed conflicts.

AP I vs DOD Section 5.13.1

- **Why not ratify with reservations like UK and France?**
- **What will the future hold for international agreements post-Ukraine?**
- **Where do Human Rights Law and Nuremberg issues fit in?**

Nuremberg

Comments on Nuremberg from Chief Justice Harlan Stone and Associate Justice William O. Douglas:

Stone- "A highgrade lynching party"

Douglas- tried under an ex post facto law—their guilt did not justify us substituting power for principle

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Nuclear Power in Romania and Poland

Romania

Cernavoda reactors are Canadian CANDU reactors—heavy water, natural uranium. Currently 2 reactors with planned expansion to 4-5.

Poland

No current nuclear power, but plans for future and potential for operating or nearly completed NPP by 2033

What about Iodine Blocking for Thyroid Protection?

Ads · Shop use of potassium iodide tablets

Potassium Iodide Table…
$18.75
Nature's Fu…
Free ship $…

Life Extension Potassium…
$5.25
Life Extension
4.7★★★★★(294)

Iosat Potassium…
$29.95
MediTac Kits

Potassium Iodide Table…
$99.95
Nature's Fu…
Free shipping

IOSAT Potassium…
$159.97
Survival Frog
Free shipping

Potas… Iodat…
$24.9…
Camp…
4.5★★…

Potassium iodide is used **to treat overactive thyroid and to protect the thyroid gland from the effects of radiation from inhaled or swallowed radioactive iodine**. Feb 1, 2022

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Zaporizhzhia Reactors and Nuclear Power in Ukraine

RUSSIA-UKRAINE WAR

Nuclear power in Ukraine

The UN atomic watchdog, IAEA, has warned that damage to the Zaporizhzhia power plant could lead to a nuclear disaster. The Zaporizhzhia Nuclear Power Plant is Europe's largest nuclear facility, captured by Russian forces in March.

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The Importance of Nuclear Energy & Zaporizhzhia to Ukraine

Electricity generated in Ukraine in 2020, by source (in million mWh)

Net capacity of all nuclear power plants in Ukraine (in megawatts)

Sources: U.S. Energy Information Administration, World Nuclear Association

statista

Zaporizhzhia

- **VVER-1000 6 units—current status**
- **Dnieper River Cooling (note cooling towers)**
- **Connection to Ukrainian Power Grid**
- **Emergency Diesels (10 days of fuel?)**
- **IAEA 2-4 onsite—Rosatom onsite**
- **Vulnerabilities??? Control System?**

MAXAR

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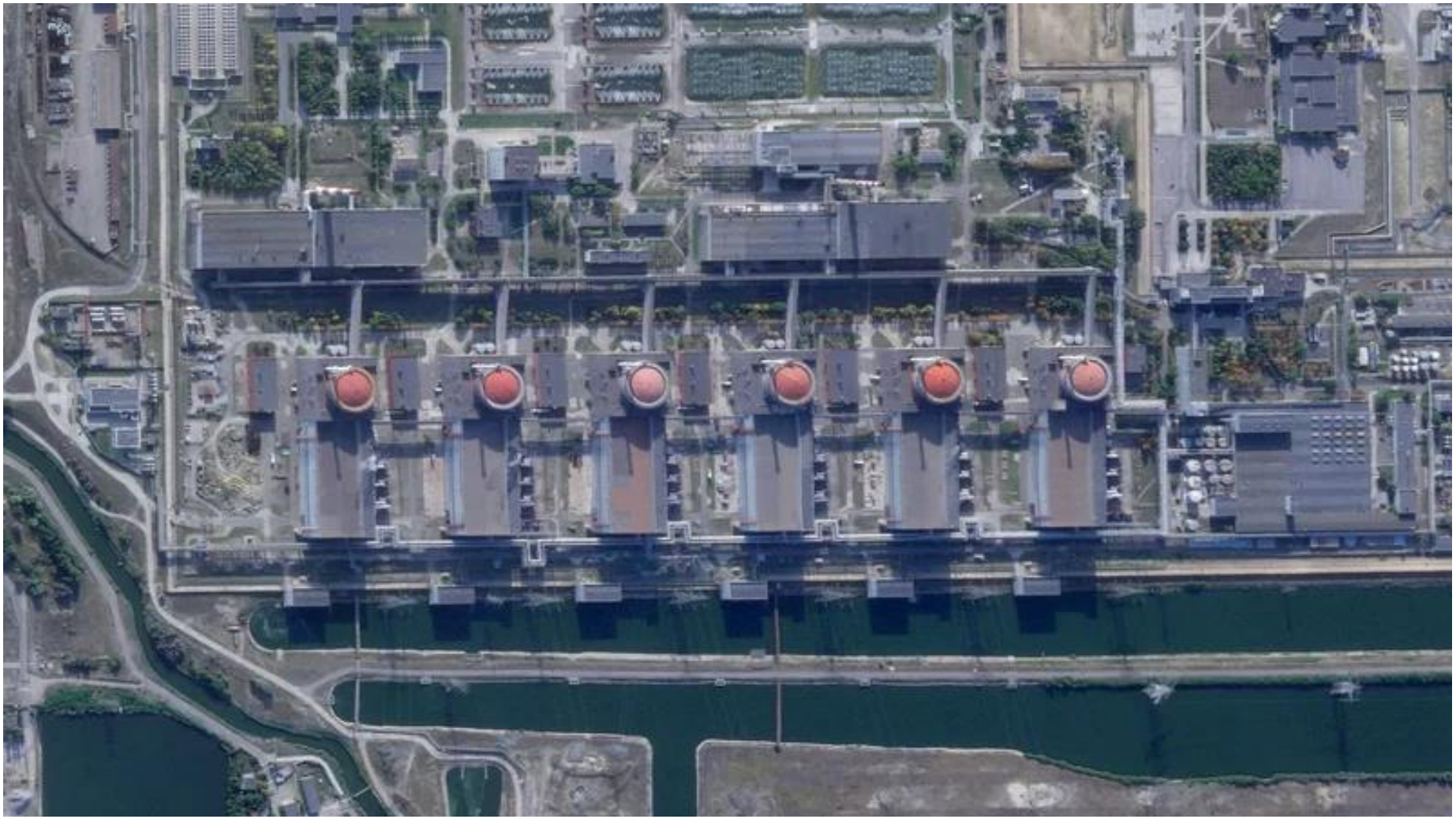

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- **Danger from**
  - **Reactor accident occurring when there is:**
    - **No offsite power**
    - **No diesel generators**
    - **No power from fire trucks, etc.**
  - **Timeline**
  - **Spent fuel pond problems**
- **It's not Chernobyl**

- **How much does a Zaporizhzhia reactor cost?**
- **$30 + billion and 11-15 K workers**

- **IAEA inspectors at Zaporizhzhia**

- **IAEA proposal for demilitarized zone**

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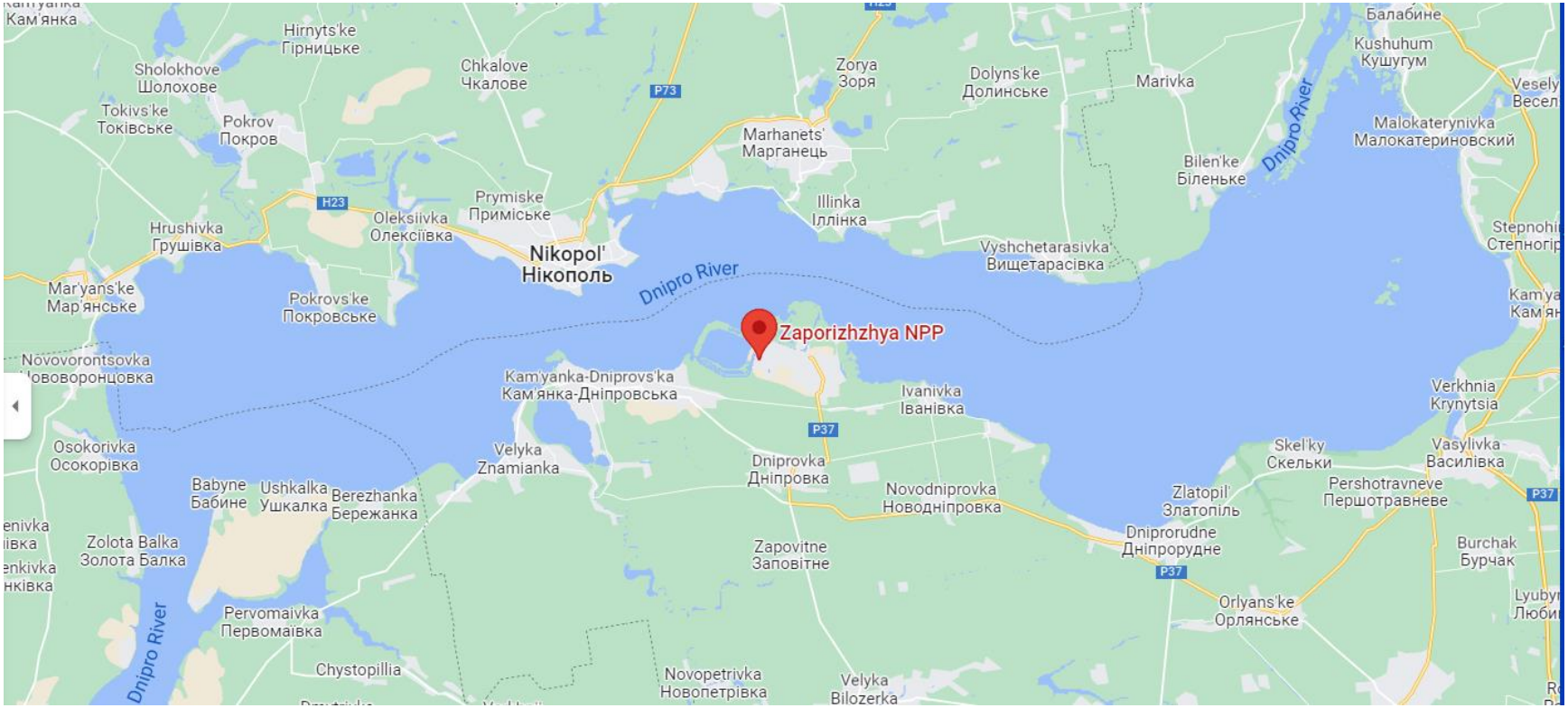

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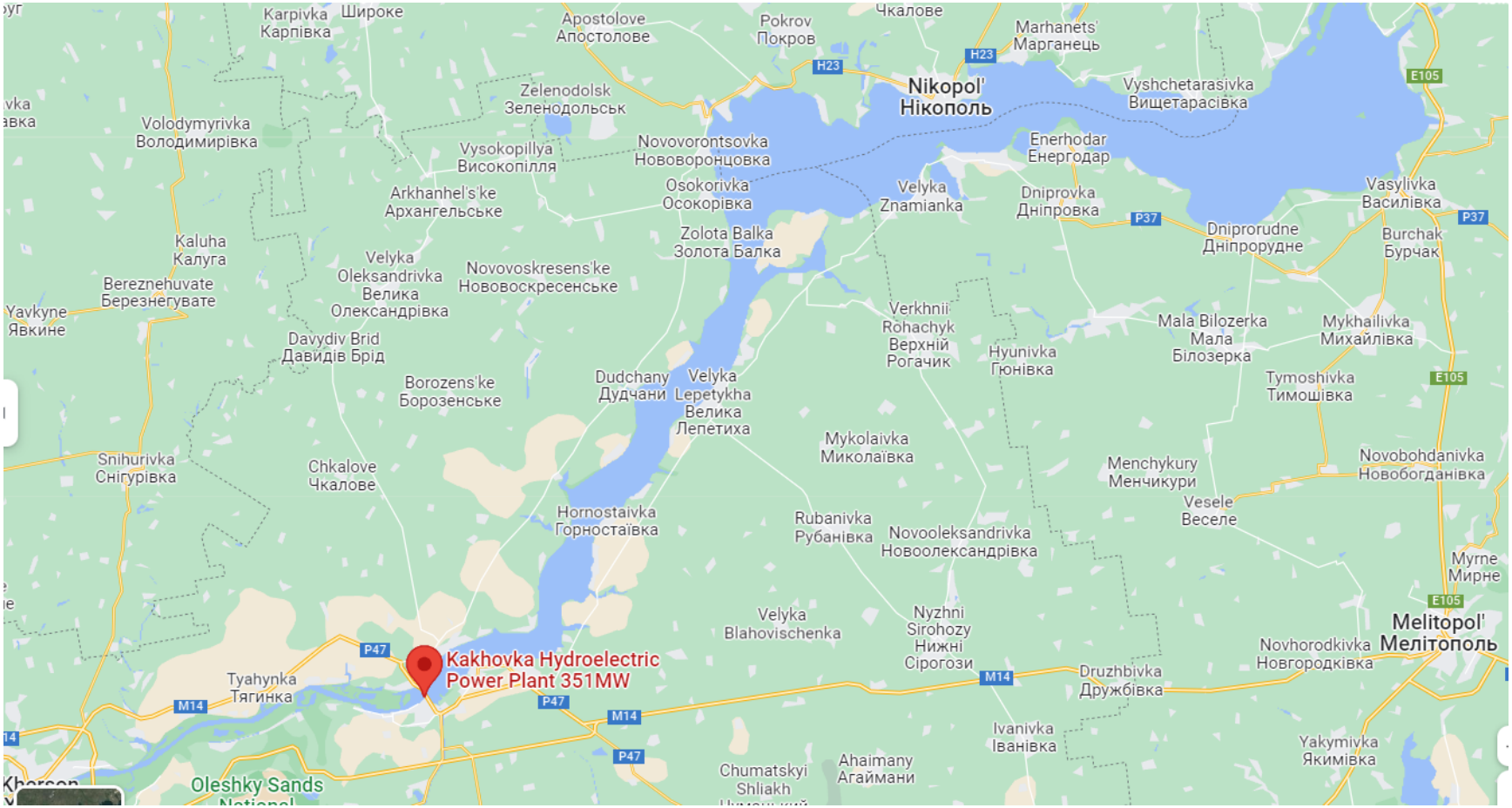

150 m
100 m
50 m
0
Kakhovka
Reservoir

Figure 1. Simulation of contamination spread after a hypothetical core meltdown at Zaporizhzhya 1, using weather information from the third week of March 2021, and simulated contamination levels after a hypothetical core meltdown at Zaporizhzhya 1, using weather information from the fourth week of March 2021.

(Map by Pete McPhail)

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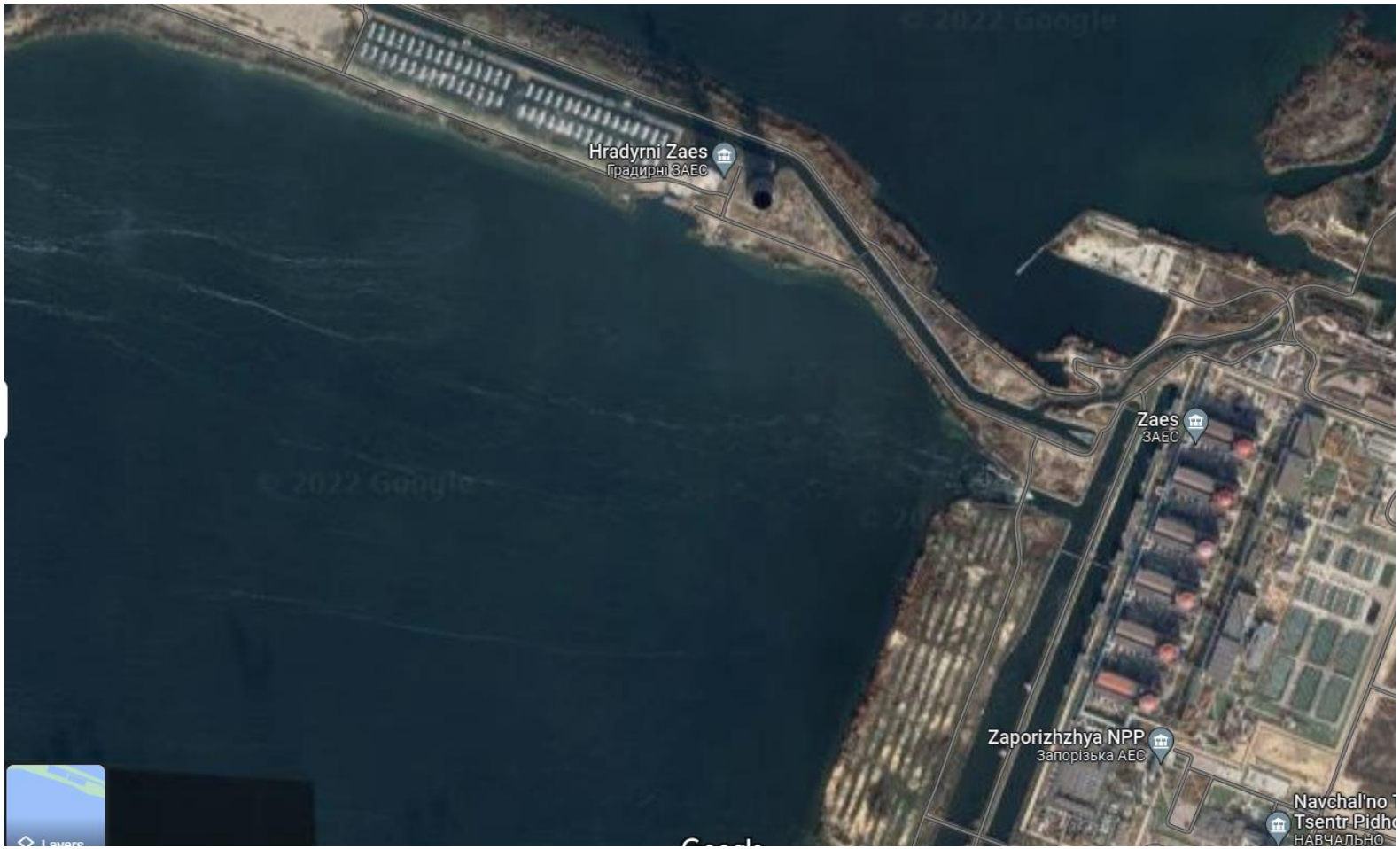
https://www.pravda.com.ua/eng/news/2022/08/18/7363806/


Hradyrni Zaes
Градирні ЗАЕС
Zaes
ЗАЕС
Zaporizhzhya NPP
Запорізька АЕС
Navchal'no
Tsentr Pidho
НАВЧАЛЬНО
Layers

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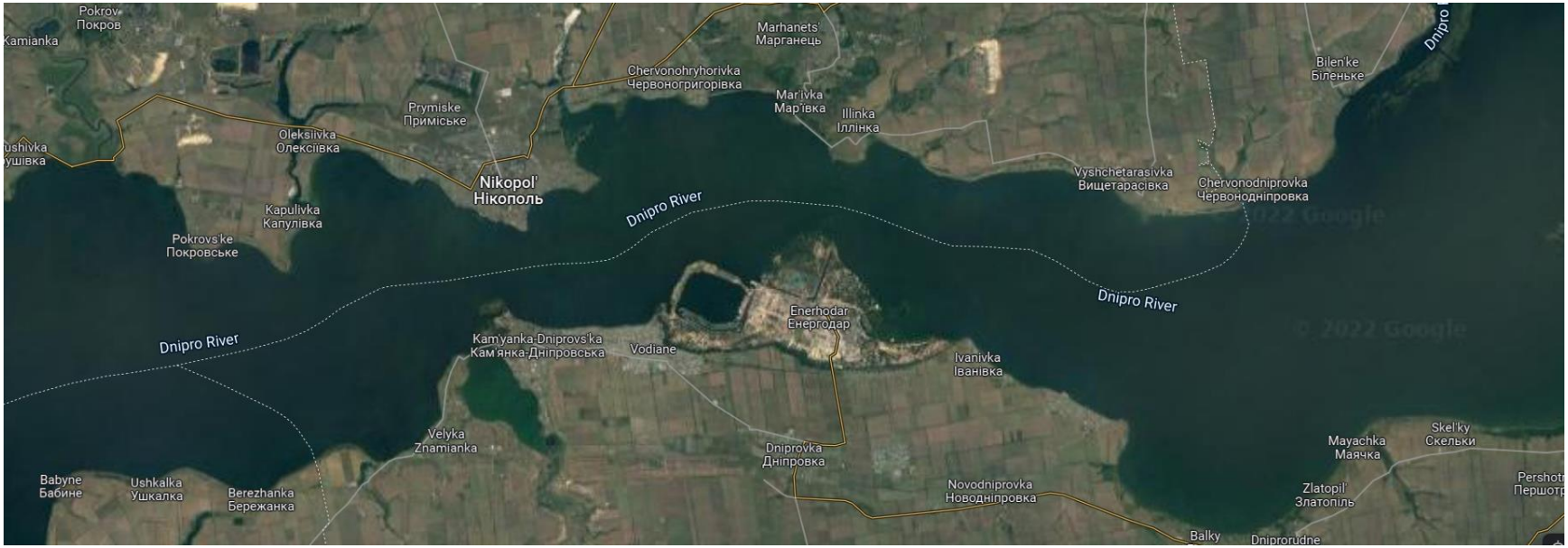

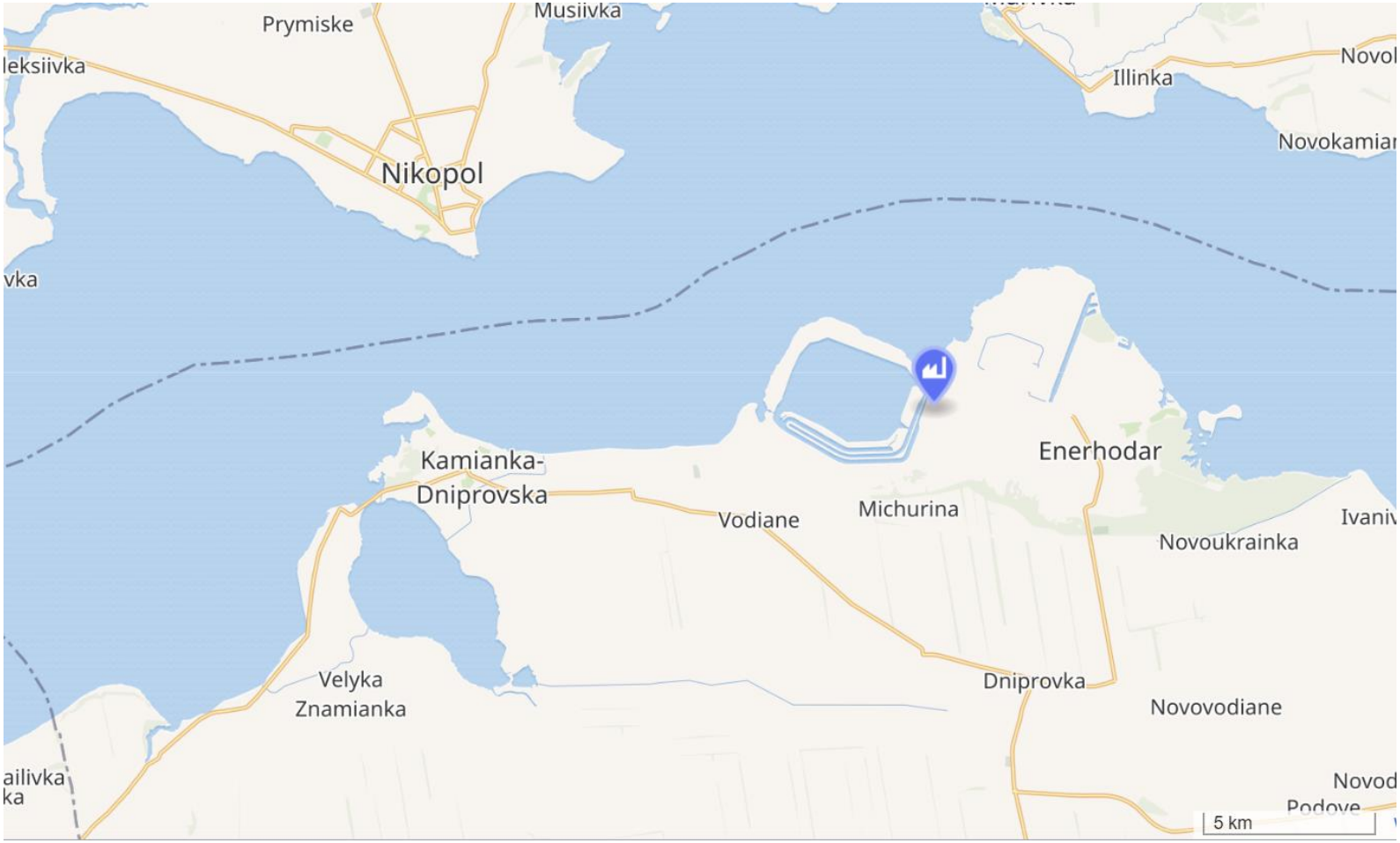
Prymiske
Musiivka
Illinka
Nikopol
Kamianka-
Dniprovska
Vodiane
Michurina
Enerhodar
Novoukrainka
Velyka
Znamianka
Dniprovka
Novovodiane
5 km

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Finally, some thoughts on attacking NPPs and Nuclear Facilities

How to Damage a Nuclear Power Plant

- **What's the goal? Total destruction-Removal from power grid**
- **What's your intel say about operation level of plant(s)?**
- **What about spent fuel storage?**
- **Do you want to spread radiation around or is that self-defeating?**

How to Damage a Nuclear Facility

- **What's the goal? Total destruction or proactive protection against enemy use?**
- **Do you want to spread radiation around or is that self-defeating? Note that the consequences are at the high end probably a lot less than a high-end NPP release after core damage.**

What obligation do you have to minimize damage in any attack?

Additional Reading

B. Ramberg, "The Danger of Nuclear Reactors in War," (2022) Available at https://www.project-syndicate.org/onpoint/ukraine-shows-nuclear-reactors-at-risk-during-war-by-bennett-ramberg-2022-08

B. Ramberg, *Nuclear Power Plants as Weapons for the Enemy: An Unrecognized Military Peril (Studies in International and Strategic Affairs)*,University of California Press ISBN 978-0520049697 (1985) t54

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