International Physicians
for the Prevention of Nuclear War

1985 NOBEL PEACE PRIZE

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IPPNW calls on NPT Member states to support and act on the principle that nuclear power plants and other nuclear facilities are off-limits as military targets

In the current conflict in Ukraine, an attack on the Zaporizhzhia Nuclear Plant could be catastrophic and cause a nuclear meltdown in up to six reactors and the associated spent nuclear fuel ponds.

An accidental or intentional meltdown of any or all of these facilities brings with it the likelihood that contamination by radioactive elements spread through the air and being deposited in soil in Ukraine and surrounding states could lead to serious short- and long-term effects on human health, on the environment and plants and animals, and on food security.

The International Atomic Energy Agency (IAEA) has continiously warned of the dangers of military actions at the site. But, despite Director General Grossi's recommendations on 30 May at the United Nations Security Council that there should be **no attack from or against** the plant and that it should not be used as storage or a base for heavy weapons – including multiple rocket launchers, artillery systems, munitions, and tanks – his warnings have not been taken seriously enough by either of the main combatants or any of the other interested parties.

In his recent article Prof. Tilman Ruff from the School of Population and Global Health at the University of Melbourne[1] refers to Nobel Peace Prize-winning physicist Joseph Rotblat and his classic 1981 book Nuclear Radiation in Warfare.[2] "The radioactivity released from damaged spent fuel ponds could be even greater than from a meltdown at the reactor itself, he wrote. Rotblat's study makes clear that a military attack on a reactor or spent fuel pond could release more radioactivity – and longer-lasting radioactivity – than even a large (megaton range) nuclear weapon."

Next week, during the NPT PrepCom here in Vienna, IPPNW will present a study undertaken by the the head of the Institute of Safety and Risk Sciences at the University of Vienna, Dr. Nikolaus Müllner. It is based on data from Dr. Müllner's previous project: „flexRISK studies" which was a broad study of the geographical distribution of the health risk to local and regional populations due to severe accidents in each of the nuclear facilities in Europe. FlexRisk is

[1] https://theconversation.com/the-zaporizhzhia-nuclear-power-plant-is-a-dirty-bomb-waiting-to-happen-a-nuclear-expert-explains-209236

[2] https://www.sipri.org/publications/1981/nuclear-radiation-warfare

starting with source terms and accident frequencies, and the large-scale dispersion of radionuclides in the atmosphere were simulated for about 2,800 meteorological situations.

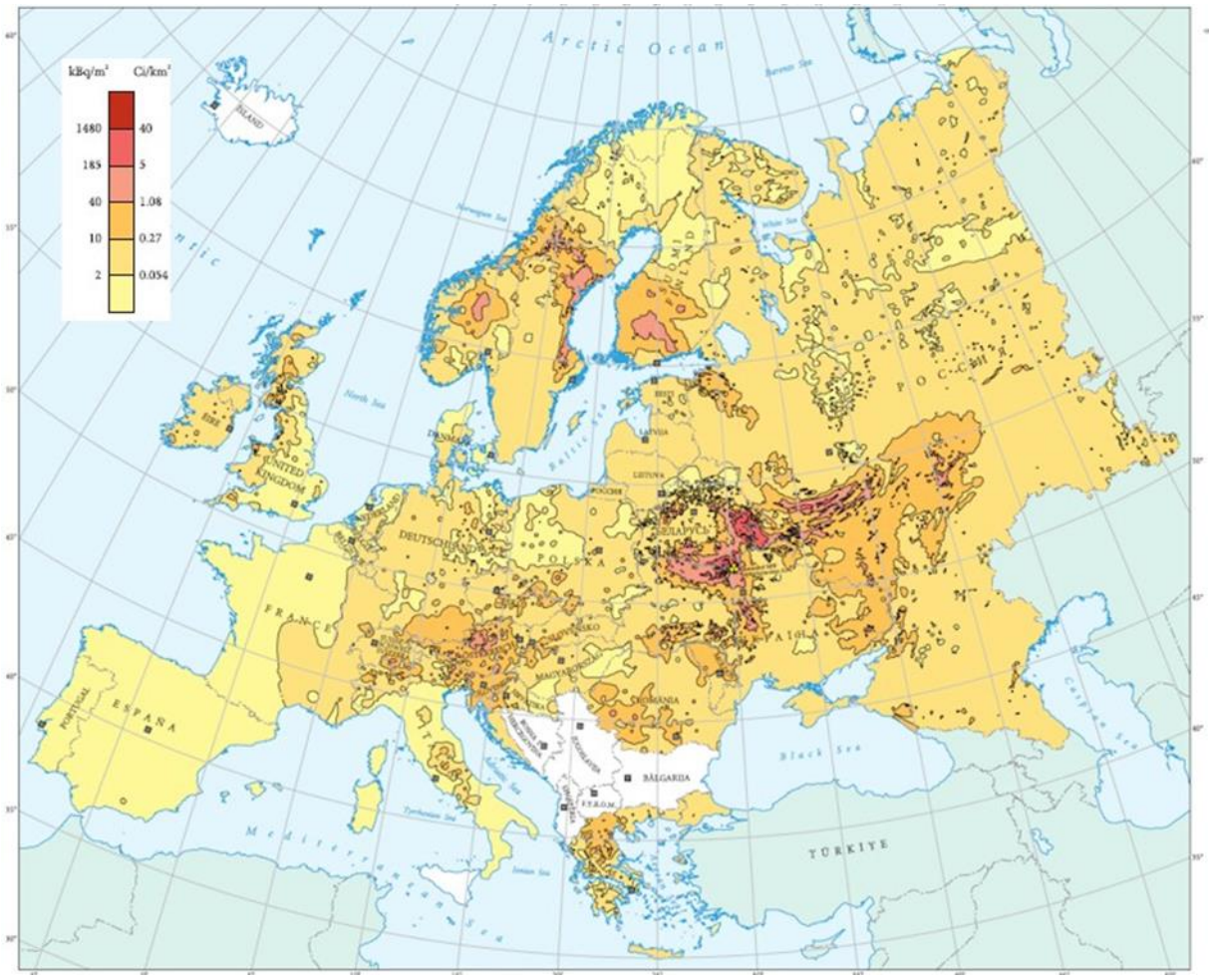
In his new study, Dr. Müllner will show the distribution of the dispersion of possible radiological plumes after a nuclear meltdown in one or more reactors of the Zaporizhzhia Nuclear Power Plant. He will factor in that 5 of the 6 reactors are in cold shutdown, so would have a different composition of radioactive elements released in an accident than if they had all been still in operation.

IPPNW will use this modeling to extrapolate the medical and environmental effects of the radiological contamination, including exclusion and evacuation zones that would be expected and zones where food production would be limited because of the contamination in case of a nuclear meltdown from the reactors or the spent fuel pond.

Because of the many variables involved in a potential nuclear power plant breakdown at Zaporizhzhia, or other facilities in Ukraine and elsewhere in Europe, the spread of radiologial istopes after a nuclear meltdown cannot be precisely predicted, despite efforts like ours to model it. Yet many leading politicians and a few physicists have been publicly minimizing the risks of having a nuclear meltdown and even if it would happen, they downplay the health and environmental consequences.[3]

A comparison with the contamination zones of the nuclear accidents in Chernobyl and Fukushima is helpful in predicting possible outcomes, even though it is not sufficient. Looking at the Chernobyl reactor: the graphite moderated reactor burnt for 11 days and sent nuclear plumes to the Republics of the former Soviet Union and most of the European continent. 36 % of the total radioactive fallout was over Belarus, Russia and Ukraine; about 53 % over the rest of Europe. 11 % was distributed around the rest of the globe.

[3] https://www.politico.eu/article/how-real-is-the-danger-from-ukraines-zaporizhzhia-nuclear-power-plant/



Map of Cesium-137 deposition in Europe through Chernobyl-Fallout. Ressource EUR1673 EN/RU, Izrael et al. 1996[4]

What were the main health consequences of the Chernobyl Accident, according to scientific studies?

Zablotska[5] evaluated the health impacts of the Chernobyl nuclear accident after 30 years.She states that „epidemiological studies reported increased long-term risks of leukemia, cardiovascular and cerebrovascular diseases, and cataracts among cleanup workers and of thyroid cancer and non-malignant diseases in those exposed as children and adolescents“. M. Hatch and E. Cardis[6] point out that „the dose-dependent increase in Papillary Thyroid Cancer (PTC) following childhood I-131 exposure in Ukraine and Belarus has now been shown to persist for decades.“ They also affirm that „studies of clean-up workers/liquidators suggest dose-related increases of thyroid cancer and hematological malignancies in adults. They also report increases in cardiovascular and cerebrovascular disease“.

[4] https://www.umweltanalysen.com/wissen/tschernobyl/
[5] Lydia Zablotska (2016) 30 Years after Chernobyl accident https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4899336/
[6] M. Hatch, E. Cardis (2017) https://pubmed.ncbi.nlm.nih.gov/28929329/

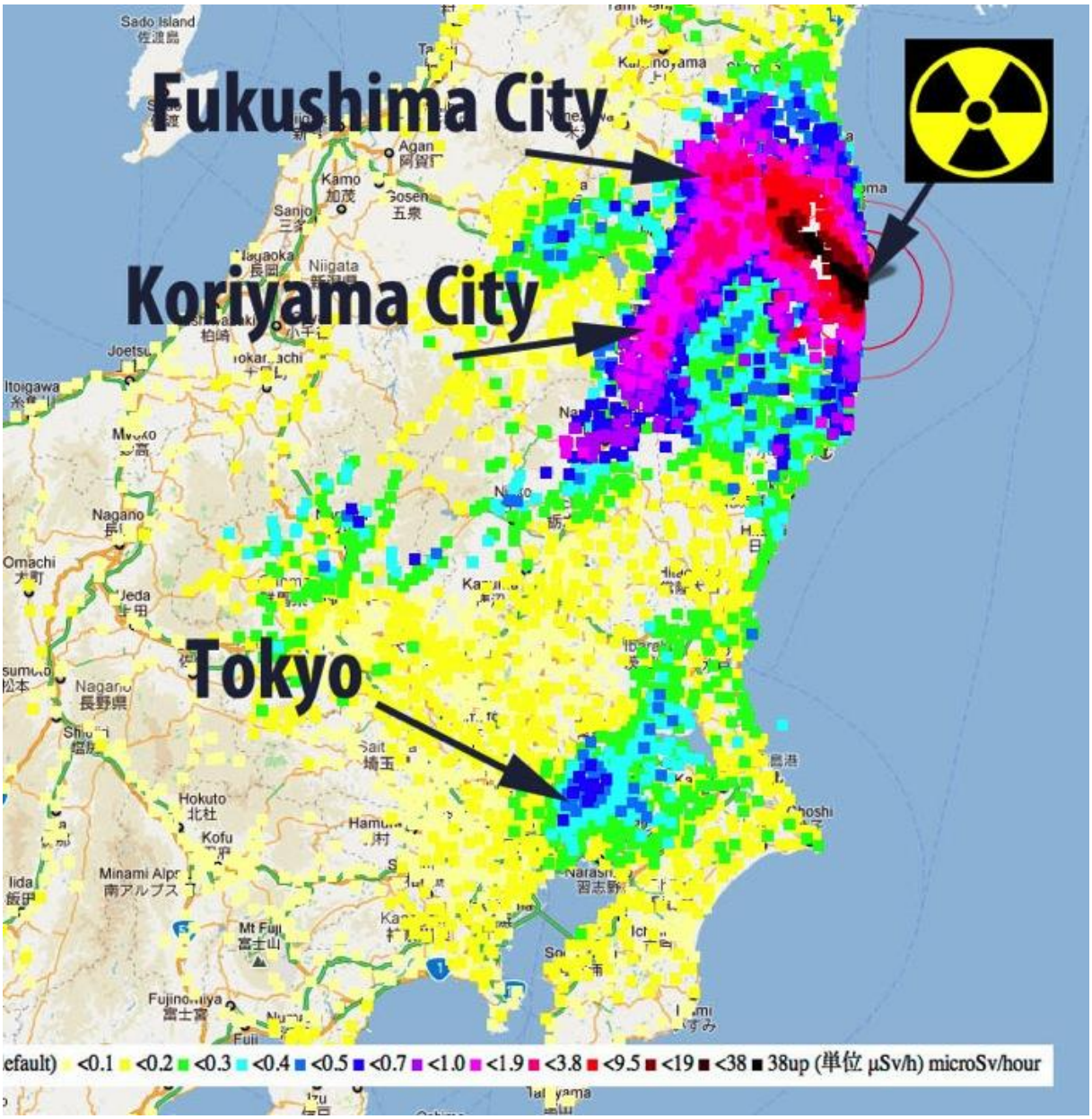
The health impacts of the Chernobyl catastrophe have so far been better researched than the nuclear accident in Fukushima, though in both settings the important opportunity for large long-term population-based studies of health outcomes related to radiation exposure were lost. The results of Chernobyl studies correlate with other medical studies on the health effects of low dose radiation conducted among nuclear workers[7] and on the health effects of uranium mining , another radiological [8]low dose exposures and studies of the influence of residence near nuclear power plants and variations in background radiation on childhood cancer, especially leukemia.

Dr. Edwin Lyman of the Union of Concerned Scientists, an internationally recognized expert on nuclear proliferation as well as nuclear power safety and security writes in his recent post[9]: *„Whenever nuclear reactors operate in unusual conditions that have not been thoroughly analyzed, risks increase.*

Unfortunately, because of the incredible stress that the greatly reduced staff at Zaporizhzhia are under, and the unclear lines of command under Russian occupation, their ability to efficiently execute all the actions necessary to mitigate any accident or sabotage attack is in grave doubt. And if timely operator intervention does not occur, and the fuel assemblies are exposed, then a core melt accident similar to what was experienced in three of the reactors at Fukushima Daiichi is certainly possible".

So let us look at the radiological releases of the Fukushima accident: Explosions of reactors 1, 2 and 3, large atmospheric radioactive releases and leaks into groundwater and the ocean from the damaged reactors and spent fuel pool 4 went on for several weeks. 19% of the nuclear fallout affected the main Japanese island Honshu, 79% went into the Pacific and 2% over the globe. It was entirely a matter of luck that it didn't rain on the night of 14-15 March 2011, when the largest radioactive cloud went over Japan, including the greater Tokyo area with 36 million inhabitants. Prime Minister Naoto Kan stated that Tokyo and Yokohama had been spared major fallout "by a hair's breadth", which could have led to "the collapse of our country". (Naoto Kan interview, Spiegel Online, 9 Oct 2015).

[7] The International Nuclear workers Study (INWORKS), 2017:https://pubmed.ncbi.nlm.nih.gov/27885078/
[8] M. Kreutzer et al (2021) Mortality in underground miners in a former uranium underground mine. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC8182779/
[9] https://blog.ucsusa.org/edwin-lyman/an-attack-on-the-zaporizhzhia-nuclear-plant-could-still-be-catastrophic/



Credit: Prof Timothy Mousseau, University of South Carolina

Because we do not exactly know the possible radioactive releases in the case nuclear meltdown in Zaporizhzhia, IPPNW will examine some scenarios as previously mentioned, using Dr. Müllner's findings, who has done similar studies in his capacity at the Institute of Safety and Risk Sciences at the University of Vienna. We hope to be able to present his findings next week.

For now, I can share as an example of current scientific thinking on this subject, how the German Federal Office for Radiation Protection evaluates the dangers of a possible nuclear meltdown in Zaporizhzhia and its consequences for Germany[10]:

„For Germany, the radiological effects of a release in Ukraine would be limited. In the worst case, i.e. only in the event of a significant release of radioactivity and a weather situation that transports air masses from Ukraine to Germany, maximum levels of radioactivity set for

[10] https://www.bfs.de/SharedDocs/Kurzmeldungen/BfS/DE/2022/0225-ukraine.html

agriculture could be exceeded in this country. In that case, it would become necessary to control feed and food, and possibly also to impose a marketing ban on contaminated products."

What does IPPNW recommend for NPT member states? In simple, clear language, the NPT PrepCom and subsequent meetings of the NPT need to act to exclude an attack on nuclear power plants or other nuclear facilities as a legitimate act of war, without exception. Taking this stand would strengthen the interpretation of existing international humanitarian law, clarifying that a nuclear meltdown resulting from an accident or an intentional act at a nuclear power plant or a massive radioactive release from other nuclear facilities, particularly spent fuel ponds and reprocessing plants, must be avoided under all circumstances. This needs to include a strict prohibition against attacking the electrical supply, water supply and cooling infrastructure necessary for the safe operation of a nuclear power plant.

The indiscriminate harm caused by a nuclear meltdown due to military activities will lead to severe permanent damage to human health, with fatal consequences in some cases, and to the environment. This will affect combatants and non-combatants alike, and must therefore be unambiguously declared illegal under international law.

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