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## Zaporizhzhia nuclear plant: The real worst-case scenario

Up-to-date failsafes make a possible meltdown 'extremely difficult to imagine' - but the

# danger posed by missile attacks remains unclear

Joe Pinkstone, SCIENCE CORRESPONDENT

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When Chernobyl melted down in 1986 it led to a radioactive wind, radiation poisoning deaths and an exclusion zone the size of Derbyshire. When Fukushima was devastated by Acts of God in 2011, millions of tons of ocean water was polluted with radiation.

Now, Europe's biggest nuclear reactor, Zaporizhzhia, is in the spotlight, with concerns it could be the next name on this infamous list of nuclear reactor disasters as it remains in the crossfire of Putin's war, reduced to a strategic propaganda pawn.

But exactly what a worst-case scenario for Zaporizhzhia would look like remains unknown, as it was built, and retrofitted, to be as robust as possible, but not with missile strikes in mind, as they were – and are – prohibited by the Geneva Conventions.

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It is designed with myriad failsafes to ensure that the risk of disaster is minimal. For example, it can draw power from other reactors if disconnected from the grid, and there are numerous back-up diesel generators on-site.

Just two of the six reactors at the site are currently online, and they are normally connected by four 750 kilovolt (kV) high-capacity external power lines. Three of these vital arteries have been severed, with the final one intermittently cutting out.

Power is key in order to keep water pumping around Zaporizhzhia as it is used to cool spent fuel that is stored on-site as well as cooling and moderating the reactors themselves.

Chernobyl fell foul of questionable Soviet construction and design choices, poor management and a flawed emergency protocol, all of which will not apply to Zaporizhzhia.

## Exclusive: Inside Chernobyl's reactor four control room



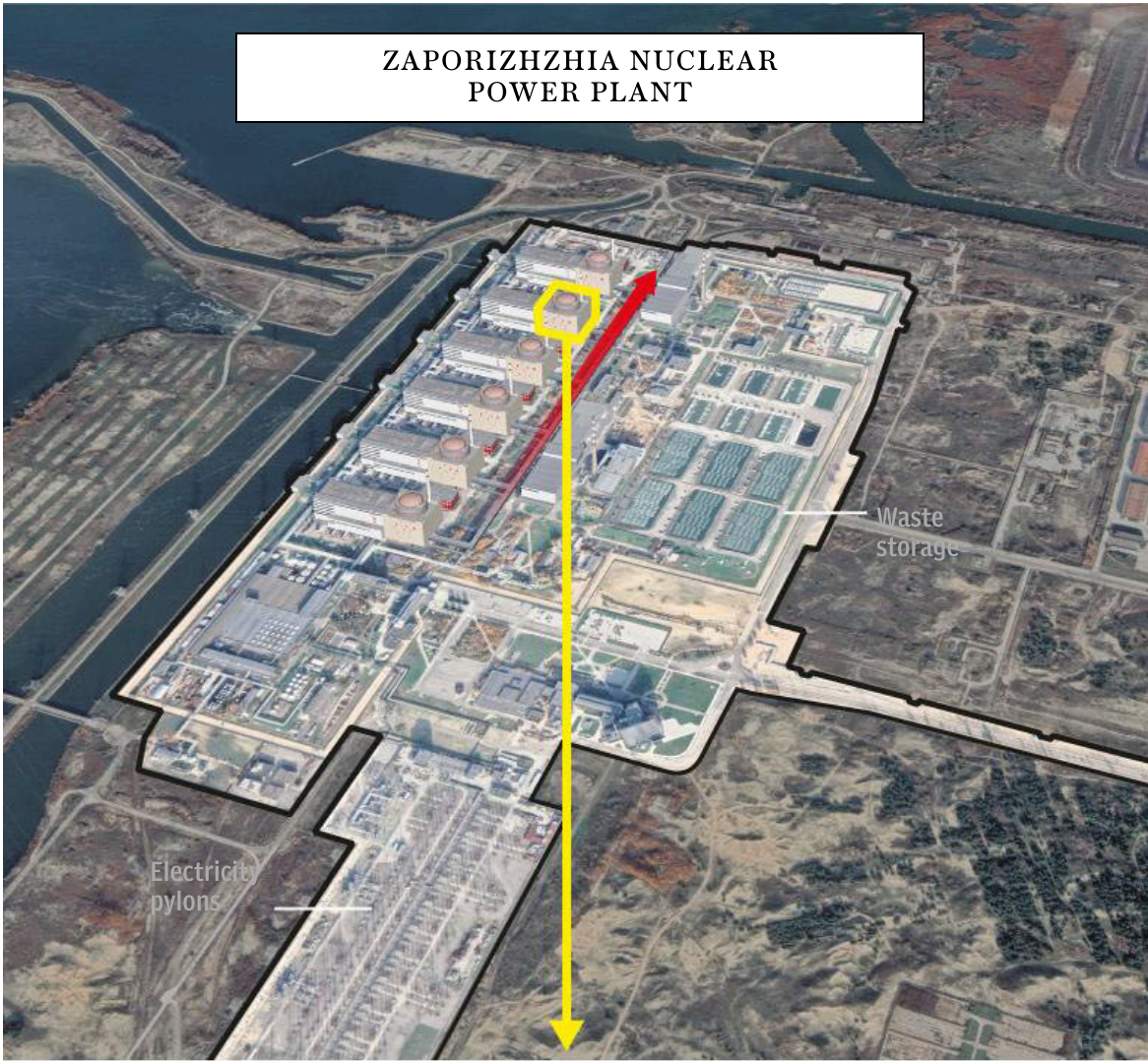
While Fukushima was destroyed by an earthquake and tsunami, Zaporizhzhia has a plane crash-proof two-metre thick concrete containment unit which was added as a result of concern around terrorism in the wake of 9/11. There is also an inner steel shell designed to be able to withstand an explosion. However, nobody knows if it can survive a missile hit.

“The International Atomic Energy Agency has very strict guidelines on what a nuclear power plant has to be able to withstand, and it added aeroplane crashes to the list of things that are planned for,” Amelie Stötzel, a PhD Student at King’s College London studying nuclear security, told The Telegraph.

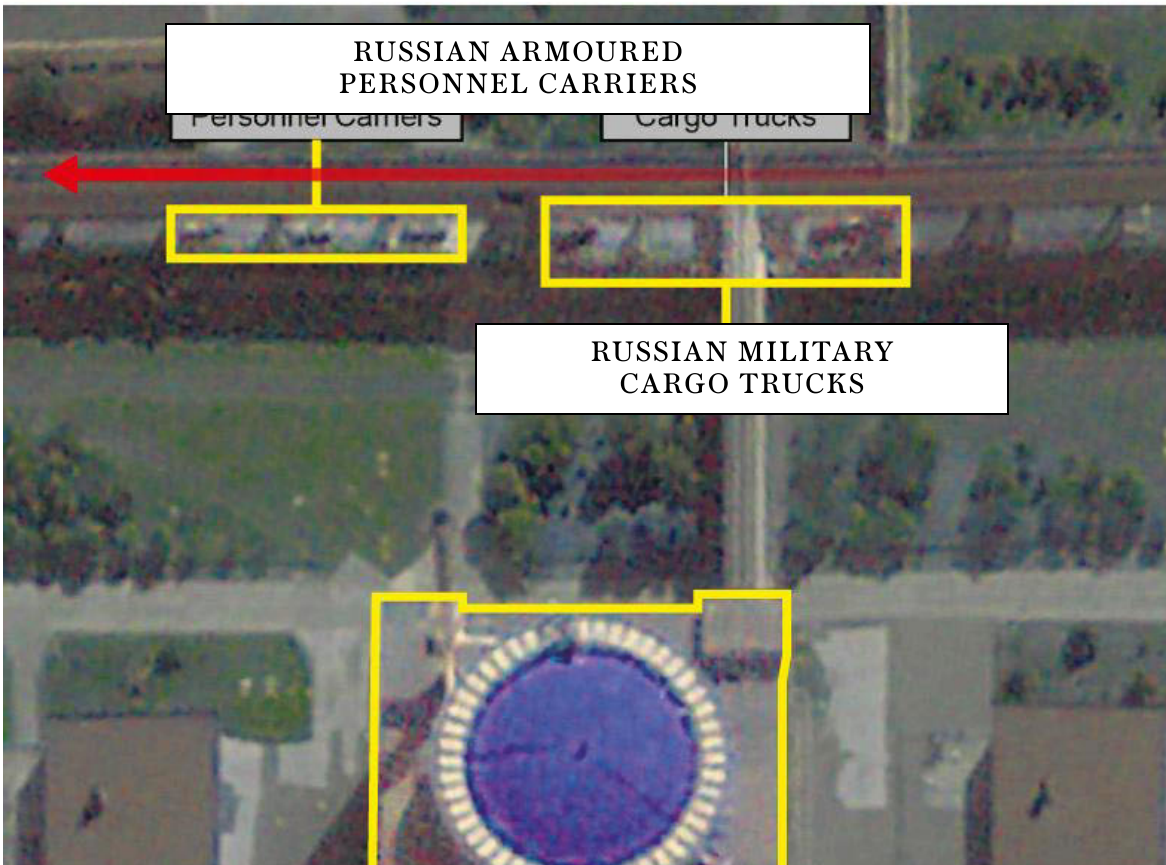
“Interestingly, war missiles were not planned for, so they are not considered in the design.”



ZAPORIZHZHIA NUCLEAR  
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She said that it would make little sense for anybody to damage the power station as it is an expensive and useful asset. But, in a worst-case scenario where all power systems cease to function, it is possible that the spent fuel, or even the reactors, could set ablaze.

“In a worst-case scenario, if we see a proper fire, then the ash that is produced in that fire could be picked up and blown in the direction of the wind,” Ms Stötzel said.

The scale of the incident would depend on which component of the reactor, or which fuel-storing building, is affected.

“In any case, it’s unlikely that this will result in an increase of radiation in Europe. That’s unlikely,” Ms Stötzel added.

“It’s a bit too much of a panic to say that this is Chernobyl number two, we’re all going to die. That’s not likely. I don’t even think that’s possible.”

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Another possibility is the reactor itself explodes. This, however, is extremely unlikely. The design of the reactor means that the more active it is, the harder it is to push it any further.

It would need complete failure of the dual water-cooling mechanism, or for the water to leak out or evaporate.

“Then the fuel will heat up and that will be problematic because it can eventually lead to a meltdown,” Ms Stötzel said.

“In the worst-case scenario we could see an accumulation of hydrogen which might lead to an explosion, but a lot has to go wrong for that to happen.”

A spokesman for the American Nuclear Society told The Telegraph that these are all very unlikely situations, and that even in the “extremely unlikely scenario of a radiological release” there is no threat to the public as the amount of radiation released would be minimal compared to Chernobyl.

“It is extremely difficult to imagine a scenario where widespread radioactivity threatens public health,” they said.

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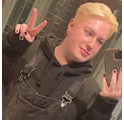


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