NUCLEAR POWERED SUBMARINES

SAFETY BRIEF JAN 2023

Naval nuclear reactors - like all nuclear reactors - pose potentially serious risks for people and the environment. But unlike other reactors, most information about naval reactors is kept classified, and it can be difficult to say how safe they are, and in what way they are safe. For communities in current and potential port sites, there are key questions to be answered.

Wherever there is **nuclear fission**, there is a potential for harm to people and the environment.

A core meltdown is the most serious accident in a nuclear submarine. Following an accident involving meltdown, dangers to people and the environment include:

- direct gamma radiation from the vessel;
- gamma radiation from a drifting cloud or plume of radioactivity and from material deposited on the ground;
- release of fission products to seawater;
- inhalation of airborne fission products, in particular radioactive iodine;
- ingestion of fission products from contaminated food or water;
- ingestion of fission products indirectly, particularly radioactive iodine in milk from cows grazing on contaminated pastures.

Key questions: What is the plan for distribution of stable iodine to communities and port workers? Will communities be educated to respond to accidents? Will communities be consulted on accident response plans?

Serious naval nuclear accidents are very infrequent, but communities must always be prepared for them. Nearby health and emergency services must have the training and capability to respond to a **worst-case scenario**. Medical interventions may not, however, mitigate all harms.

Key questions: What is the existing radiation emergency capability in current and proposed nuclear sub port sites? How will any gaps in training and capability be addressed, and funded? Will local health and medical services be consulted?

Because most of the detailed information about how nuclear subs and naval reactors are designed is kept classified, risk assessments are 'best guesses' based on what can be known about existing ships and systems, and by making comparisons with safety systems in commercial reactors.

For example, an ARPANSA (the civil nuclear safety authority) report notes that there is uncertainty around what kind of emergency core cooling system naval nuclear reactors have.

The way an emergency cooling system works is important to **understanding the risks** of naval nuclear reactors to people and the environment - but this information is classified.

There is also precedent for **withholding information** about nuclear ship safety from the public. The UK Defence Nuclear Safety Regulator (DNSR) stopped allowing the public to access reports about nuclear sub safety issues in 2017.

Prior to 2017, the public was able to learn that there were numerous regulatory and nuclear safety breaches, and that the Regulator itself was understaffed and unable to properly function.

Legal appeals to gain access to safety reports issued after 2017 have been rejected on national security grounds. A judge ruled that the potential for hostile adversaries to gain information about nuclear subs **outweighed public interest** in safety issues.

Key questions: How will communities be properly informed about the risks of naval nuclear reactors? How will safety issues be monitored and communicated? Will an independent regulator play a role? How will the public interest in safety issues be protected?

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The 2020 Nuclear Powered Warship Reference Accident Review report for ARPANSA models accident scenarios based on **visits** of nuclear subs to Australian ports.

The review notes that **visiting** ships pose less risk than a commercial reactor, but **does not model** the comparative risks of ships or reactors undergoing maintenance and sustainment at an Australian base.

Key questions: When will accident scenarios for nuclear subs at base be modelled and made public? How can accident scenarios account for variables that are still not decided, like ship and reactor design?

In Australian ports currently approved to accept visits from nuclear powered ships, responsibility for safety and emergency management is spread across a number of military and civil authorities at national, state and local levels; each port, city, and state must have a plan.

When MAPW analysed Australian port safety plans in 2021, we found **wide variation** in the quality and availability of emergency management plans.

We found that some plans were inaccessible, outdated, or based on superseded medical information. This suggests poor coordination and oversight, which may increase safety risks to the public.

Key questions: How can the public verify the quality of emergency management plans and systems? How can authorities demonstrate their capacity to respond to radiation emergencies, and other accident scenarios?

The International Atomic Energy Agency (IAEA) provides some data on nuclear submarine accidents. The data may be incomplete due to military secrecy.

Between 1963-2001, there have been five confirmed accidents related to nuclear powered military vessels that have resulted in a loss of radioactive material and release of radionuclides to the sea. Six nuclear powered subs have been sunk entirely since 1963. Nuclear weapons have also been lost at sea as a result of accidents.

Other confirmed accidents involved non-nuclear explosions, and incidents like fires, collisions, flooding, and running aground.

No accident data since 2015 is publicly available.

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MAPW is a national network of health professionals from every field. We work for global health by promoting peace and preventing war through the abolition of nuclear weapons, action on the arms trade, and more.

MAPW opposes Australia's acquisition of nuclear powered submarines. Nuclear subs pose unacceptable risks to people and the environment and threaten key nuclear-free and non-proliferation agreements. Learn about us at **mapw.org.au**

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