



Australian Government



---

**Senate Foreign Affairs, Defence and Trade Legislation Committee**

***Australian Naval Nuclear Power Safety Bill 2023 and  
Australian Naval Nuclear Power Safety (Transitional Provisions) Bill 2023***

**Submission by the Australian Nuclear Science and Technology Organisation (ANSTO)**

**1 February 2024**

---

**1.0 Introduction**

The Australian Nuclear Science and Technology Organisation (ANSTO) notes the *Australian Naval Nuclear Power Safety Bill 2023* and the *Australian Naval Nuclear Power Safety (Transitional Provisions) Bill 2023*, both introduced to the House of Representatives and subsequently referred to the Senate Foreign Affairs, Defence and Trade Legislation Committee for inquiry and report on 16 November 2023. ANSTO is pleased to make the following submission on the two Bills in context of this inquiry.

On 14 March 2023, the leaders of Australia, the UK and the US, announced the Optimal Pathway for Australia's acquisition of conventionally-armed, nuclear-powered submarines (NPS) through AUKUS. This pathway includes rotations of UK and US submarines to Australia from 2027, to become "sovereign ready" in order for Australia to operate Virginia Class NPS submarines from the early 2030s, and ultimately the development and build of the new SSN-AUKUS for operation by Australia in the early 2040s.

While Australia has a long-standing and sophisticated civilian nuclear program – largely built around ANSTO and its Lucas Heights campus in Sydney – the NPS program announced under the Optimal Pathway undoubtedly represents a significant increase in the scale of the nuclear industry in Australia.

The Department of Defence has committed to the highest standards of nuclear stewardship in the NPS program. This approach is consistent with ANSTO's own operational experience and history as well as public expectation. It is, therefore, vital that the Australian NPS program is underpinned by a strong and effective regulatory regime on nuclear safety to ensure not only a high level of safety, but also to build and maintain an effective social licence for the program. The NPS regulatory regime also needs to be coherent with the civil nuclear safety regime to facilitate effective and efficient support by the wider Australian nuclear industry.

## **2.0 Background to ANSTO**

ANSTO is Australia's civilian nuclear centre of excellence. It has a mandated role to advise the Australian Government on all nuclear and science technology matters. It, along with its predecessor the Australian Atomic Energy Commission (AAEC), has 70 years' experience in the application of nuclear science and technology, including the operation of research and multi-purpose reactors, nuclear medicine production, uranium and specialist minerals processing, radioactive waste management, and scientific and engineering support for multidisciplinary research and operation and maintenance of our nuclear reactors and facilities.

ANSTO has over 1.5 billion AUD worth of assets under management, centred on Australia's only nuclear reactor, the Open Pool Australian Light-water (OPAL) multi-purpose reactor. Based at ANSTO's main campus at Lucas Heights in southern Sydney, OPAL is a 20 MW(t) reactor that produces nuclear medicines and neutrons for research, and irradiation services including neutron transmutation doped silicon for global industry. OPAL is a key part of Australia's national research infrastructure portfolio along with other ANSTO facilities including the Australian Centre for Neutron Scattering (ACNS), the Centre for Accelerator Science (CAS), and the Australian Synchrotron, this last being located at our Clayton campus in Melbourne. This blend of neutrons, particles, and x-rays uniquely positions ANSTO to enable extensive research programs in Australia and overseas servicing more than 5,000 scientists annually. These facilities also enable research at ANSTO across themes of Human Health, Advanced Manufacturing and support for the Resources sector, Nuclear Fuel Cycle, and the Environment, as well as collaboration with domestic and international partners.

In addition to scientific applications, ANSTO has significant capabilities and experience in supporting the operation of reactors and other nuclear facilities. For example, we have dedicated experts in Nuclear Analysis, Nuclear Stewardship, and Nuclear Materials Development and Characterisation that are drawn on for environmental monitoring, preventative maintenance programs for OPAL, study of Generation IV reactor designs, and the development of a novel waste form, Synroc®. We have sophisticated and robust nuclear safety and security processes that would be expected of a mature nuclear operator. ANSTO routinely manages, treats, and stores solid, liquid, and low and intermediate level wastes.

The extensive engineering experience at ANSTO is continually engaged in the design, construction and commissioning of major nuclear projects and facilities both nationally and internationally. These skills and experience also extend to decommissioning facilities and reactors.

While ANSTO has significant nuclear facilities, much of our capability lies in its 1350 staff. Of this workforce, over 400 have PhDs and a significant majority are directly involved with operation or support of our nuclear facilities. Our staff are highly networked internationally and ANSTO is a member of or provides the leadership of a range of IAEA committees and working groups. ANSTO maintains a Counsellor in Vienna in support of the Australian Permanent Mission to the IAEA.

## **3.0 ANSTO's Support of the NPS Program**

As Australia's centre of excellence in nuclear science and technology, ANSTO has been supporting the Department of Defence in the development of the NPS program since the announcement of the AUKUS partnership in September 2021. This support was initially provided to the Nuclear-Powered Submarine Task Force (NPSTF) and then to the Australian Submarine Agency (ASA) following its creation on 1 July 2023.

This support is managed through a dedicated Nuclear-Powered Submarine Working Group at ANSTO's Lucas Heights campus, made up of experts from multiple disciplines required for the effective operation of a nuclear organisation. Drawing from 70 years of operating experience, the ANSTO Working Group has shared knowledge, experience and expertise across a range of fields including: nuclear science technology, engineering and applications; radioactive waste management; nuclear safety and health physics; nuclear security and safeguards; public communications; and education and workforce development. ANSTO is also increasingly providing services for the program such as radiation safety training and environmental analysis.

In this regard, ASA has been consulting with ANSTO and other Government Departments and Agencies as it develops the Bills currently under consideration by the Committee.

#### **4.0 ANSTO's Interest**

ANSTO's role in the NPS program is advisory and not as an operator. We note that ANSTO will not be the operator of the NPS program and is thus not the intended regulated entity covered by the Bills. However, as a highly regulated civil nuclear operator, ANSTO would expect that the nuclear safety regulatory regime for a NPS program achieves three broad criteria:

- a) Provides a high level of safety, commensurate with international best practice for naval nuclear power and reactor safety more broadly;
- b) Is commensurate and compatible with the existing civil regime overseen by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA); and
- c) Does not unintentionally create barriers for ANSTO's current or possible future support for the NPS program.

#### **4.1 High Level of Safety**

First and foremost, and as the operator of Australia's largest nuclear facility, ANSTO would expect that the risks from a NPS program are appropriately managed to ensure the safety of staff, the public, and the environment. ANSTO wants to ensure that excellence in nuclear stewardship and the proud safety record of the civil nuclear sector in Australia is integrated into the nuclear mindset of the NPS program from its inception.

ANSTO believes the Bills as presented achieve this aim. The *Australian Naval Nuclear Power Safety Bill 2023* covers the concepts and arrangements ANSTO would expect to see in a regulatory framework for nuclear power, drawing from established industry practice and sources such as the International Atomic Energy Agency. Specifically, we note:

- Objectives of the Bills clearly outline a commitment to safety;
- Responsibilities and duties for nuclear safety are clearly identified;
- The regulatory body is independent with strong licensing, inspection, and enforcement powers;
- Regulated activities requiring licenses are clearly defined;
- Expectations for obtaining a licence are clearly expressed, covering the types of information required to demonstrate safety; and
- Punishments for non-compliance are clearly identified and commensurate with severity.

## 4.2 Compatibility with Civil Regime

While ensuring nuclear safety should be the primary consideration for the NPS regulatory framework, ANSTO would expect that the regime to be established would not undermine the civil nuclear industry. This could inadvertently be done in a number of ways including, but not limited to:

- Setting the level of safety at too low a level, undermining public confidence in not just the NPS program but ANSTO's nuclear operations;
- Setting the level of safety at too high a level, ratcheting up expectations for civil nuclear operations that are not commensurate with the different risk profiles; or
- Utilising regulatory assessment and inspection models and processes which are incompatible with those used in the civil sector.

Regarding the first two points, ANSTO believes that the *Australian Naval Nuclear Power Safety Bill 2023* proposes a regulatory framework with safety standards that are commensurate both with the risk proposed by naval nuclear propulsion as well as that in the civil sector. As described above, the Bills include the concepts that ANSTO would expect to see in an effective regulatory regime for nuclear safety, with levels set neither too low, nor too high.

On regulatory models and processes, it is apparent that the Bills have been drafted in close consideration of the *Australian Radiation Protection and Nuclear Safety Act 1998*.

Specifically, the types of regulated activities covered by the Bills are in line with those of the ARPANS Act noting the different applications (i.e. naval nuclear power compared to operation of research reactors for radiopharmaceutical production and scientific applications). Likewise, the information required by the Bill to support a licence application obviously draws heavily from the plans and arrangements required under the ARPANS framework.

This compatibility is further supported by the *Transitional Arrangements Bill 2023* providing a bridge between the ARPANS framework and the *Australian Naval Nuclear Power Safety Bill 2023*, further supporting changes made by the *Defence Legislation Amendment (Naval Nuclear Propulsion) Bill 2023* approved in July 2023. ANSTO would note this approach further ensures nuclear safety by enabling licensing decisions to be made by an experienced regulator while the Australian Naval Nuclear Power Safety Regulator is established.

## 4.3 Enabling of Support

As noted above, ANSTO is supporting implementation of the Optimal Pathway through provision of its experience and advice to ASA. ANSTO sees this support as central to its mandate, consistent with its obligations under its own *Australian Nuclear Science and Technology Organisation Act 1987*, including to provide advice to Government on all matters relating to nuclear science and technology and its application. While most of our support to date has been helping to baseline the Australian nuclear industry and provision of advice on the safe and effective operation of a nuclear organisation, we are seeing an increase for our technical services from ASA.

To date, these services have largely relied on the expertise of our staff and have not involved the application of our licensed facilities or indeed any controlled material under the ARPANS Act. However, we anticipate scenarios whereby requests for support may require utilisation of our facilities in the future.

As described previously, ANSTO operates nationally unique research infrastructure and analytical capabilities. These facilities could be highly beneficial to developing a sovereign understanding of how materials in NPS reactors behave, including in Australian conditions. To gain this understanding, materials may need to be irradiated in OPAL and analysed in hot cells or analysed in ACNS using the neutrons generated by OPAL. ANSTO foresees the possibility of this resulting in ANSTO assisting with “material activities” under the *Australian Naval Nuclear Power Safety Bill 2023*.

If these or similar requests were to eventuate, it would be important that the regulatory basis for ANSTO’s support be clear. As it stands, ANSTO understands that its support would be provided under the existing ARPANSA framework. However, we note that *Australian Naval Nuclear Power Safety Bill 2023* essentially disapplies the ARPANS Act for the purposes of applicable regulated activities which can only occur “in a designated zone or in relation to an Australian submarine”. This is entirely appropriate given the different environment in which reactors dedicated to naval nuclear propulsion operate, including additional security considerations.

Most relevantly for ANSTO, “regulated activities” includes “material activities” which would apply if ANSTO has possession of NPP material or NPP equipment in a “designated zone”. In addition to HMAS Stirling and the Osborne Naval Shipyard, the Bill also indicates a “designated zone” can be prescribed by the regulations. While there is no indication that ANSTO or its facilities would be prescribed as a designated zone by the regulations, we would want to ensure that if our facilities were needed to support the NPS program in the future, the regulatory boundaries between this Bill and the ARPANS Act were clearly established. ANSTO is of the view that this situation can be clarified during the development of the Bill’s associated regulations in due course.

## **5.0 Development of Regulations**

ANSTO notes that in addition to the primary legislation, a key part of an effective regulatory regime is the subordinate regulations. It is often the regulations that provide technical detail on certain aspects of the licensing expectations. For example, it is the *Australian Radiation Protection and Nuclear Safety Regulations 1999* that outline concepts such as dose limits, radioactivity thresholds for different licences, and linkages to standards and codes which can be updated more quickly than legislation.

In this regard, we understand that a dedicated Regulatory Design Team has been established in the Department of Defence to develop the associated regulations. ANSTO has already engaged with this team as it undertakes its important work. It will be important that this group continues to engage Government and industry as it develops the regulations to ensure an effective regime that enables high levels of safety and is consistent with civilian nuclear operations in Australia.

## **6.0 Summary**

ANSTO has reviewed the *Australian Naval Nuclear Power Safety Bill 2023* and the *Australian Naval Nuclear Power Safety (Transitional Provisions) Bill 2023* and, for the reasons set out, holds the opinion that they are a solid foundation for the formulation of a regulatory framework for a NPS program.

The Bills establish arrangements, processes, and powers that draw on, and are consistent with, both the current Australian civil nuclear safety regulatory framework, as well as international best practice. The Bills lay the foundation for ensuring high levels of nuclear safety, commensurate with the risks of naval nuclear propulsion.

Continued engagement by the Department of Defence with organisations like ANSTO as well as wider industry on development of the subordinate regulations and the broader framework will be important to ensure continued effective support of the NPS program. It is conceivable that ANSTO's support will increase in the future to include use of our landmark infrastructure such as the OPAL multi-purpose reactor, and the regulatory frameworks, for both civil and military applications, will need to facilitate this support. ANSTO looks forward to continuing our positive engagement with the Department of Defence in this regard.

ANSTO commends both of the Bills to the Committee.

**Dr Miles Apperley**

**Group Executive – Nuclear Safety, Security and Stewardship**

**ANSTO**