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Charting the Course: Australia's Nuclear Submarines and the International Nuclear Safeguards and Non-Proliferation Regime

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Key points

- Australia's nuclear submarine acquisition under the AUKUS partnership is lawful and represents an opportunity to establish new norms in international nuclear governance, particularly in managing naval nuclear fuel under the non-proliferation regime.
- The AUKUS initiative does not exploit a loophole in the international safeguards system but rather adheres to its established rules, with nuclear naval propulsion being a permissible, though largely unregulated, area of nuclear activity.
- Australia's commitment to nuclear non-proliferation remains strong, with the country engaging transparently with the International Atomic Energy Agency (IAEA) and ensuring that its nuclear activities, even for naval propulsion, will remain under appropriate safeguards.
- Nuclear stewardship is central to Australia's approach, with significant investments in regulatory frameworks, nuclear knowledge, and best practices for the safe and responsible operation of nuclear-powered submarines.
- Australia's acquisition of SSNs is setting a normative precedent as the first instance of a non-nuclear-weapon state using provisions under the safeguards regime to manage nuclear materials for non-explosive military purposes.

Introduction

The announcement[1] on 15 September 2021 of the decision to form the Australia–United Kingdom–United States Partnership (*'AUKUS'*)[2], including the transfer of naval nuclear- propulsion technology and weapons-grade uranium from the US and UK for Australia to acquire a nuclear-powered attack submarine (*'SSN'*) capability[3], has reignited concerns about a so-called 'loophole' in the international nuclear non-proliferation regime relating to nuclear naval fuel.[4] This paper responds to claims that the AUKUS SSN initiative undermines international nuclear governance.[5] It begins by elaborating on AUKUS and the progress towards the realisation of an Australian SSN capability. It then turns to the international legal framework on nuclear controls and the positioning of nuclear naval propulsion within this framework. The paper concludes by demonstrating that the AUKUS SSN initiative not only complies with international law but also presents an opportunity to establish precedent and shape future practices in this emergent area of nuclear activity.

AUKUS represents the first time the US is sharing its nuclear submarine technology with a foreign country since the establishment of the US-UK partnership in the 1950s on the use of nuclear energy for mutual defence.

The AUKUS Agreement

AUKUS is an 'enhanced trilateral security partnership'[6] aimed at deepening diplomatic, security, and defence cooperation between Australia, the US, and the UK in the Indo-Pacific region.[7] AUKUS builds upon and expands Australia's existing security and defence relationships with the US and the UK, including under the 1951 ANZUS Treaty[8], the 1990 UK-Australia Treaty for Defence and Security Cooperation[9], and the Five Eyes intelligence-sharing partnership.[10] AUKUS represents the first time the US is sharing its nuclear submarine technology with a foreign country since the establishment of the US-UK partnership in the 1950s on the use of nuclear energy for mutual defence.[11] It is hailed by the three governments as offering 'a positive contribution to peace and stability in the Indo-Pacific region by enhancing deterrence'.[12]

'Pillar 1' of AUKUS is to support the acquisition by the Royal Australian Navy (RAN) of a sovereign, conventionally armed, SSN fleet to increase the interoperability of the AUKUS partners' naval forces in the Indo-Pacific region.[13] Since the initial announcement, the Australian Government has been engaged in trilateral discussions to scope 'the optimal pathway' for Australia to acquire an SSN capability as soon as the 2030s[14], while simultaneously advancing the development of the necessary domestic infrastructure, regulation, guidelines, and procedures to develop and sustain this capability. This includes addressing key questions related to relevant science and technology, industrial bases, workforce development, safety and radiological protection, and supply chains.[15] The establishment of the Australian Submarine Agency (ASA) and the Australian Naval Nuclear Power Safety Regulator (ANPSSR) are well underway, with legislation before the Australian Parliament to formalise these agencies' safety and security regulatory and licencing duties related to the nuclear-powered fleet.[16] The graduation of three groups of RAN Officers from the US Navy's nuclear power training program also represents a significant step forward in Australia's SSN endeavour.

Pursuant to its sovereign naval shipbuilding enterprise[17], Australia intends to construct the SSN on its own soil.[18] Australia will not be involved in the research, design, manufacture, testing, maintenance, or ultimate disposition of the naval nuclear propulsion materials.[19] Instead, it will apply the unprecedented approach of importing nuclear reactors – fuelled by uranium at weapons-grade levels of enrichment – for installation directly into its submarines once constructed.[20] These will be 'complete, welded power units'

designed to ensure that 'removal of any nuclear material would be extremely difficult and would render the power unit, and the submarine, inoperable'.[21]

Although the AUKUS announcement does not mention the People's Republic of China by name, the move is broadly interpreted as a joint response to China's strategic posturing in the region.[22] Certainly, Chinese naval modernization since the 1990s has created a formidable naval force (including six SSNs) and associated weapons arsenal that is contributing to the country's growing assertiveness in the region.[23] The Chinese government claims that '[t]he AUKUS nuclear submarine cooperation is a sheer act of nuclear proliferation and represents a serious non-proliferation challenge confronting the international community today'.

The Nature and Content of Nuclear Safeguards and Non-Proliferation

Many aspects of both civilian and military uses of nuclear energy draw on the same basic technology, materials, infrastructure, and know-how.

For as long as the technology has existed, the dual nature of nuclear energy – that it can be harnessed for both peaceful and non-peaceful purposes – has prompted consternation within the international community of how best to control its uses for the benefit of mankind. Many aspects of both civilian and military uses of nuclear energy draw on the same basic technology, materials, infrastructure, and know-how.[24] The potential linkage between civil nuclear energy and nuclear weapons presents unique risks of diversion from peaceful to non peaceful uses not only of fissile material, but also of diversion of knowledge and expertise in nuclear science and technology more generally. This reality has profoundly shaped the development of international norms, rules, institutions, and procedures on nuclear materials, as well as nuclear research, development, and exploitation.

Atoms for Peace

The constitution in 1956 of the International Atomic Energy Agency (*'IAEA'*) was a momentous step forward in the development of international nuclear regulation and control. Earlier post-war diplomatic efforts had failed to realise US plans to proscribe nuclear arms development and to centralise ownership and management of fissionable material under a new, dedicated intergovernmental agency.[25] Meanwhile, five states had acquired nuclear capabilities, ending the American atomic monopoly. Against this background, the US – at that time the sole state in possession of nuclear naval propulsion technology – shifted its domestic policy from secrecy and denial to a desire to engage in mutually advantageous exchanges relevant to its nuclear defence and naval propulsion projects, including via the US UK Mutual Defence Agreement.[26] The final wording of the IAEA's statutory objective[27] represented a careful compromise of peace and security interests: the Agency would act as a clearinghouse for the international distribution of special fissionable materials[28] to serve the peaceful pursuits of mankind; the production of power using atomic fuel would be permitted; and no country could use the IAEA to further activities of a military character.[29]

An important but often overlooked feature of the international safeguard system created pursuant to the IAEA Statute (*'the Agency Safeguards System'*) is that it is concerned solely with materials voluntarily declared for safeguard by the IAEA Member States.[30] This provision was included to ensure that the Agency (or, more specifically, the individual IAEA Member States) would not have control over any country's program of peaceful uses of the atom.[31] IAEA Member States 'remain free to transfer fissionable materials to another state without securing the consent of the Agency'.[32]

Towards Transparency

The 1970 *Treaty on the Non-Proliferation of Nuclear Weapons*[33] (*'NPT'*) dramatically augmented the role and importance of IAEA nuclear safeguards by assigning the IAEA responsibility for the independent verification of the nuclear non-proliferation commitments of the non-nuclear-weapon states (*'NNWS'*) party to the treaty.[34] This system of verification (the *'NPT Safeguards System'*) differs in two important respects from the Agency Safeguards System. First, NPT safeguards are concerned with '*all* source or special fissionable material in *all* peaceful nuclear activities within the territory of the NNWS, under its jurisdiction, or carried out under its control anywhere'.[35] Second, pursuant to the NPT, the NNWSs commit to conclude a Comprehensive Safeguards Agreement (*'CSA'*) with the IAEA that establishes a sophisticated system of national accounting for and control of nuclear material (*'SSACs'*).[36] SSACs contribute to the measurement and reporting of quantities of nuclear material received, produced, shipped, or removed from inventories[37], taking into consideration the consumption, movement, and loss of nuclear materials as they circulate through the peaceful nuclear cycle'.[38] This accounting and control mechanism is fundamental to IAEA substantiation of the completeness and quality of material balance measurements[39] and forms the basis of the IAEA's independent verification that a state's nuclear activities are being used exclusively for peaceful purposes.[40] The introduction of the NPT Safeguards System, while not replacing the Agency Safeguards System, thus significantly enhanced IAEA safeguards to be an institutionalised form of 'nuclear transparency'.[41]

> International nuclear governance [has] an interest in deterring the proliferation of nuclear weapons and other nuclear explosive devices, [but] neither proscribes the development nor the use of other forms of non-peaceful nuclear science and technology.

IAEA Safeguards and Nuclear Propulsion: A Legal Loophole?

Against this background, it is possible to respond to claims that AUKUS undermines international nuclear governance on two main grounds.[42] First, while both the Agency Safeguards System and the NPT Safeguards System have an interest in deterring the proliferation of nuclear weapons and other nuclear explosive devices, neither proscribes the development nor the use of other forms of non-peaceful nuclear science and technology. This decision reflects inter alia the interest of several states at the time of drafting to protect sensitive and classified military information[43] including, notably, submarine nuclear fuel designs, production technology, operational data, and naval fuel stocks.[44] As one expert summarises, '[I]t is thus both possible and legally permissible for a state to maintain unobligated and uncontrolled nuclear activities parallel to those under obligation without in any way violating their undertakings and commitments'.[45] Nuclear naval propulsion is one such activity. There is no loophole, only a purposeful omission of controls and obligations in these spheres of operation.

Second, the scope of the omission of controls and obligations relating to nuclear naval propulsion is extremely limited. That is, even in the event that a state should request and receive permission from the IAEA for the withdrawal from safeguards of nuclear materials for use in naval propulsion,[46] such permission (if granted) is necessarily very strict in its application 'to ensure the material spends as little time as possible outside safeguards'.[47] For example: any exclusions would apply solely while the material is in use in naval submarines; all processes outside the actual use of the relevant nuclear material in a submarine would be required to be under safeguards; and full safeguards would apply for other activities in this process which are not intrinsically military, such as storage, transportation, and disposal.[48] Moreover, IAEA agreement would also be required on precisely when nuclear material in the naval reactors must be brought back under safeguards.[49] At that point, consistent with a CSA, standard processes of nuclear accounting and control would detect any unauthorised removal of nuclear material.[50]

It must also be acknowledged that a nuclearised navy does not in itself provide a state the means to develop the fissile material necessary for a nuclear weapon. As John Carlson, the former Director General of the Australian Safeguards and Non-Proliferation Office, has explained,

> [N]uclear power reactors have no proliferation capability in themselves. While all uranium-fuelled reactors produce plutonium, this remains inaccessible in spent fuel unless the state has a facility for plutonium separation. Proliferation risk is presented primarily by the processes at the 'front end' and the 'back end' of the nuclear fuel cycle uranium enrichment and reprocessing.[51]

A state seeking to use a naval reactor program to acquire fissile material for the purpose of its illicit diversion to a weapons program would have the option only to access and extract the spent fuel at the back end of its life cycle. It would still face the challenge of developing and applying the highly technical means to reprocess that material for its conversion into an (undeclared) nuclear weapons program.[52]

A nuclearised navy does not in itself provide a state the means to develop the fissile material necessary for a nuclear weapon.

Charting the Course

Depending on timing, the acquisition by Australia of SSNs may not be the first time a non-nuclear-armed state obtains and applies nuclear propulsion technology.[53] It is, however, the first instance in which an NNWS is exercising the facility under the international nuclear safeguards regime to request the removal of nuclear materials from IAEA safeguards, and has entered negotiations with the IAEA on an arrangement for Special Procedures to this end. In this regard, the AUKUS SSN process is setting an important normative precedent.

In announcing the AUKUS, the partners declared,

> Australia has no plans to acquire nuclear weapons and this proposal will remain consistent with Australia's longstanding commitment to nuclear non-proliferation. All three nations are deeply committed to upholding leadership on global non-proliferation.[54]

Australia, the US, and the UK have since repeatedly declared their commitment 'to ensuring the highest standards of safeguards'[55] in pursuing the acquisition by Australia of an SSN capability. The governments have stated individually and collectively that 'as they develop the details of this trilateral cooperation, they would do so with "the critical objective of maintaining the strength of both the nuclear non-proliferation regime and Australia's exemplary non-proliferation credentials"'.[56] Furthermore, they have confirmed that any SSN capability of Australia will operate in conformity with Australia's international safeguards agreements and consistent with Australia's international legal commitments on nuclear safeguards and non-proliferation.[57] On the question of nuclear weaponry, the partners have also affirmed that Australia will not pursue associated uranium enrichment or reprocessing capabilities, nor will it undertake any nuclear fuel fabrication.[58]

Such claims are being supported by action. The IAEA is being actively engaged on the issue pursuant to its mandate. Several technical consultative meetings have been held with the IAEA's Director General, with further meetings scheduled, to ensure Australia is open and transparent in its approach and well placed to be 'a responsible and reliable steward of this sensitive technology'.[59] Australia is currently engaged with the IAEA on 'the development of suitable verification measures to enable the Agency to confirm the non-diversion of nuclear material from nuclear-powered submarines'.[60] Australia and its partners have also responded to IAEA Member States' queries and concerns about the initiative directly via the IAEA Board of

Governors' standing agenda item on the matter at its quarterly meetings.[61] Moreover, details of the design of the technology-sharing arrangement reveal close attention to details to manage the nuclear proliferation risks.[62]

Domestically, Australia is making significant changes to ensure it will possess the sovereign knowledge, regulatory framework, and best-practice capability to operate and maintain an SSN fleet safely and responsibly. As the Vice-Chancellor of The Australian National University recently declared,

> The task goes beyond training the crews of future submarines. [Australia] can't just acquire nuclear technology without being able to provide best-practice nuclear stewardship. The challenge includes building the nuclear knowledge across all elements of the enterprise including corporate, nuclear physics, engineering, legal, policy, security and human resources across government and industry.[63]

Correctly understood, the AUKUS SSN initiative represents an important opportunity to shape future practice in a complex and emerging area of nuclear governance.

It is evident that this notion of 'nuclear stewardship' is central to Australian naval nuclear policy, planning, and pronouncements. It reflects the Australian government's comprehension of the responsibility it shoulders, being defined as 'the responsible planning, operation, application, management, and leadership of nuclear facilities and technologies to ensure that the highest levels of safety, security, safeguards, and sustainability are achieved to maximise utilisation, benefit, and assurance for the people of Australia'.[64] Moreover, it acknowledges Australia's commitment, as enshrined in the organisational goal of the Australian Safeguards and Non Proliferation Office (ASNO), to ensure its nuclear naval functions and operations – both technical and regulatory – are geared 'to enhance Australian and international security through activities which strengthen the effectiveness of regimes against the proliferation of weapons of mass destruction'.[65]

Conclusion

Thirty years ago, nuclear expert Dr Lawrence Scheinman declared that '[nuclear] safeguards were never designed to prevent proliferation. Consequently, to judge them according to this criterion is to raise the wrong question and to foster the wrong expectations'.[66] Safeguards, he underscored, are simply 'a technical means of verifying that states comply with their legal undertakings'.[67]

Suggestions that AUKUS manipulates a 'loophole' in the non-proliferation regime, and so creates a dangerous model for other NNWS seeking a pathway to weapons-grade fissile material, fundamentally misunderstand the rules and legislative history of nuclear safeguards and the non-proliferation framework. Correctly understood, the AUKUS SSN initiative represents an important opportunity to shape future practice in a complex and emerging area of nuclear governance: the acquisition, possession, and use of non-peaceful but non-explosive nuclear technology by a non-nuclear-armed state. It seems that Australia, the US, and the UK appreciate this circumstance and are pursuing the task with the utmost levels of transparency, accountability, and responsibility.

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2 For the purposes of this paper, this term where appropriate includes reference to AUKUS' facilitating treaty, *Agreement between the Government of Australia, the Government of the United Kingdom of Great Britain and Northern Ireland, and the Government of the United States of America for the exchange of naval nuclear propulsion information*, signed 22 November 2021 (entered into force 8 February 2022).

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