

## Nonproliferation Implications of AUKUS

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Much of the criticism of the AUKUS submarine deal has had little to do with nonproliferation. Although China's heated rhetoric often focused on nonproliferation – claiming the deal could lead to the collapse of the NPT – Beijing was mainly perturbed by being AUKUS' geostrategic target. The French were upset by being unceremoniously booted out of their own lucrative submarine sale to Australia. Some in Southeast Asia, including Indonesia, were worried that AUKUS could be a harbinger of instability and arms racing in their neighborhood. And AUKUS was seen by several countries, including South Korea (which had been turned down by the United States in its bid to pursue nuclear-powered submarines) as an example of double standards in which Anglo-Saxon allies are regarded as more trustworthy and treated more favorably than others.

Moreover, criticism of AUKUS on nonproliferation grounds is almost never based on a concern that it will lead to the acquisition of nuclear weapons by Australia, whose impeccable nonproliferation record, strong support for the NPT and IAEA, and declared lack of intention or interest in pursuing enrichment or other fuel cycle facilities place it above suspicion.

### *Concern about creating a damaging precedent*

Instead, the principal nonproliferation-based concern is that Australia's acquisition of nuclear-powered submarines will create a damaging precedent that would enable other NNWSs to use naval nuclear propulsion as a cover to acquire nuclear weapons. For example:

- A NNWS could use a declared intention to acquire nuclear-powered submarines as a justification for developing an indigenous uranium enrichment program and later – whether or not plans for naval propulsion ever materialized – would have the option to boost enrichment to weapons-grade, break out of its safeguards and NPT commitments, and build nuclear weapons; or
- A NNWS could invoke paragraph 14 of its Comprehensive Safeguards Agreement with the IAEA, withdraw enriched uranium (whether produced indigenously or imported) from safeguards for a permitted non-explosive military use like naval propulsion, and exploit any deficiencies in paragraph 14 oversight arrangements with the IAEA to divert nuclear material illicitly to a nuclear weapons program.

Some critics of AUKUS are concerned that, by conveying the impression that nuclear-powered submarines have major advantages over conventionally powered boats and are a prestigious indicator of advanced military capability, the deal will generate a greater worldwide desire for naval nuclear propulsion than would otherwise exist. This increased perceived value of nuclear propulsion could give countries with nuclear weapons aspirations a more plausible and defensible justification for pursuing nuclear-powered submarines. And countries with no current aspirations to join the nuclear club could embark on nuclear propulsion programs for naval warfare or prestige reasons, giving them an option, should they later become interested in having a nuclear weapons capability, to use those programs to pursue such a capability.

Critics also argue that Australia's likely fueling of its submarine reactors with highly enriched uranium (HEU) will undercut efforts to make fueling with low enriched uranium (LEU) the global naval propulsion standard, increase the likelihood of future HEU-fueled propulsion programs, and therefore greatly elevate the proliferation and nuclear security risks of any intentional or accidental diversion of nuclear material from such programs.

*Few countries are seeking nuclear-powered subs, at least so far*

These risks are serious and must be addressed. But the scale of the potential problem is not as great as is sometimes assumed. For one thing, not many countries are likely to seek naval nuclear propulsion. Naval reactor programs are expensive, technically challenging, and require a sustained national commitment. Few countries have the capacity to mount such programs indigenously. And few countries have seen a military need for nuclear-powered submarines, especially with advances in non-nuclear propulsion technologies.

The number of countries interested in naval nuclear propulsion, at least so far, is rather small. Of course, there is Brazil, which has had an indigenous program for decades and is now discussing paragraph 14 arrangements with the IAEA. And there is Iran, which notified the IAEA of its interest in naval propulsion years before AUKUS existed and is using its supposed interest in nuclear-powered submarines to justify higher enrichment levels that bring Tehran closer to a threshold nuclear weapons capability.

Which other countries might seek nuclear-powered submarines? Canada once had a program but long ago abandoned it. Japan has studied the idea but now seems content with its fleet of highly capable diesel boats and remains wary of nuclear propulsion as a result of its unfortunate experience with its nuclear-powered merchant vessel *Mutsu* some 30 years ago.

Among other NNWSs, South Korea has the strongest interest in nuclear-powered submarines, with a reactor development program pre-dating AUKUS. Its request for support for nuclear-powered submarines was rebuffed by the Trump administration, but Seoul is likely to continue seeking a U.S. green light, especially if the ruling party candidate wins the March presidential election. It is uncertain how the Biden administration would respond to such an appeal, but the U.S.-ROK alliance relationship gives Washington considerable leverage to ensure that, should South Korea acquire nuclear-powered submarines, it will do so in a way that minimizes proliferation risks.

Of course, there is no telling how many NNWSs may seek nuclear-powered submarines in the future. But beyond the small handful of countries that have already declared their interest, there currently appear to be few, if any, serious candidates on the horizon.

*At least in the AUKUS case, HEU fueling may be a plus*

It is also far from clear that AUKUS will give rise to increased interest in HEU fuels for naval reactors. Notwithstanding the apparent determination of the United States (and U.K.) to continue relying on weapons-grade HEU to fuel naval reactors – and Russian and Indian reliance on HEU fuels below weapons-grade – the recent trend has been toward LEU fueling, with France, China, and Brazil all committed to LEU fuels.

Moreover, as many experts have pointed out, if pursued in the way AUKUS is likely to be pursued – with lifetime HEU reactor cores that do not need refueling, that will not be accessible without cutting into the submarine hulls, and that therefore provide little if any opportunity for undetected diversion – HEU fueling can be a net nonproliferation plus.

Still, even if the potential nonproliferation fallout from AUKUS is not as great as some critics fear, it is essential for the international community – and first and foremost for the United States, the United Kingdom, and Australia – to do everything they can to minimize the risks inherent in naval nuclear propulsion. And that means not only carrying out the AUKUS project itself in a way that enables the IAEA to provide highly credible assurances that no nuclear material has been diverted; it also means treating AUKUS as an opportunity to promote norms, best practices, and even agreed guidelines or rules that could be applied to future cases if and when additional countries pursue naval nuclear propulsion.

#### *Setting a high bar with the AUKUS-IAEA arrangement*

The three AUKUS partners have pledged “to implement the strongest possible nonproliferation standards to maintain the strength and integrity of the nuclear nonproliferation regime.” For its part, Australia committed “to adhering to the highest standards for safeguards, transparency, verification, and accountancy measures.” Over the 18-month period they set for developing the details of the submarine project, they will have to make good on these pledges.

The AUKUS parties have held very preliminary discussions with the IAEA. But before the basic elements of the project are agreed, it won’t be possible to work out verification arrangements with the Agency. Still, even in the absence of formal trilateral agreement on those basic elements, it seems that certain assumptions are already being made about the project – including that a sealed, HEU-fueled reactor will be transferred to Australia by either the United States or United Kingdom; that the reactor will be integrated into a submarine constructed mainly by Australia in such a way that Australians will not have access to the reactor compartment; that the reactor will not require re-fueling for the life of the boat; and that the reactor, fuel and seals intact, will be re-transferred to its country of origin when the submarine has been retired from service.

Another key assumption is that a detailed transparency and verification arrangement will need to be worked out with the IAEA. This was not a foregone conclusion given the argument sometimes made, but now apparently rejected, that the transfer of unsafeguarded nuclear material from a nuclear weapons state to a non-explosive military use in a NNWS could be carried out without any IAEA oversight.

The assumed “black box” approach, if eventually adopted, would greatly facilitate the IAEA’s ability to provide assurances that no diversion of nuclear material has occurred. But given the precedential importance of the AUKUS deal, the trilateral partners need to go the extra mile in accepting specific arrangements that bolster the credibility of those assurances and set a very high bar for any future nuclear-powered submarine cases. That will require adhering to certain principles:

- In designing the many technical and procedural elements of the submarine project, every effort should be made to build in features that facilitate the IAEA's oversight role. Of course, verification cannot drive the design process. Other considerations will play a critical role, including cost, reliance on existing submarine or reactor models, and the need to protect sensitive technology. But taking account of verifiability considerations at an early stage can avoid design decisions that inadvertently and unnecessarily foreclose options for strengthening the credibility of oversight arrangements with the IAEA.
- The three partners should be prepared to provide the IAEA the maximum level of transparency and access consistent with the need to avoid compromising genuinely sensitive information. For example, they should be creative in developing shrouding and other managed access and measurement techniques that could enable IAEA inspectors, while observing fuel loading and unloading operations, to obtain the information they need without revealing sensitive information about the specific design of fuel assemblies and reactors.
- The goal of the AUKUS-IAEA arrangement should be to come as close as possible to normal IAEA accountancy and verification methods, while recognizing that some deviations from those methods will probably be needed to protect sensitive information. Where non-disclosure or non-access cannot be avoided, every effort should be made to compensate through other means, including enhanced transparency and access in less sensitive areas. Depending on how close the AUKUS arrangement comes to normal IAEA safeguards, the parties and IAEA could consider whether it would trigger the requirement for a paragraph 14 agreement (providing for the temporary withdrawal of nuclear material from safeguards) or could be pursued in a more traditional type of IAEA safeguards agreement.
- The trilateral partners need to consider how parties to future nuclear-powered submarine deals might apply the precedents contained in the AUKUS-IAEA oversight arrangements. If, for example, the partners would strongly object to certain arrangements in a possible future deal between Russia and Iran, they should be careful to avoid such arrangements in their own deal.
- The AUKUS partners should seek approval by the IAEA Board of Governors (BOG) for the oversight arrangement they conclude with the IAEA Secretariat. It is not firmly established whether BOG approval would be required, and there are no precedents to go by. Moreover, a BOG debate on the AUKUS arrangement could provide an opportunity for China and perhaps also Russia to make mischief for reasons unrelated to the merits of the arrangement. Nonetheless, if achievable (and BOG decisions do not require a consensus), Board approval could set an important precedent for future cases (e.g., Brazil) in which the United States and others might want the leverage of Board approval to persuade states seeking nuclear-powered submarines to accept more rigorous nonproliferation requirements (e.g., adherence to the Additional Protocol).
- Australia could do its part to promote international support for an AUKUS-IAEA arrangement and to create higher expectations for countries seeking nuclear-powered submarines in the future by further strengthening its already impressive nonproliferation credentials. For example, it could unilaterally commit not to develop new fuel cycle capabilities, forswear activities related to the development of nuclear explosive devices,

permit the IAEA to implement promising new safeguards methods (e.g., wide-area environmental sampling), and provide more frequent and detailed reports to the BOG.

*Promoting regime-wide norms and standards for nuclear propulsion*

In addition to concluding a rigorous oversight arrangement with the IAEA that gives the Agency the information and access it needs to provide credible assurances on non-diversion in implementing the Australia deal and that establishes positive precedents that could be applicable to future agreements, the trilateral partners should work with other countries to promote objective (i.e., non-country-specific) norms, guidelines, and perhaps requirements that might govern future naval propulsion projects.

Experts have suggested that, to minimize nonproliferation risks, any NNWS pursuing naval nuclear propulsion should have to meet certain standards, such as:

- It would have to adhere to the Additional Protocol and receive the IAEA’s “broader conclusion” that its nuclear program is exclusively peaceful.
- Its naval reactors would have to be fueled with LEU.
- It would have to have a positive record of compliance with its nonproliferation obligations.
- It would have to forgo domestic enrichment and rely on foreign supplies of enriched fuel, preferably as finished fuel assemblies or in a black-boxed, fueled and sealed reactor.
- It could not invoke paragraph 14 and withdraw nuclear material from safeguards until its naval reactor development program had reached a certain stage.

Clearly, some of these standards would have broader international support than others. For example, as desirable as a requirement to forgo domestic enrichment might be, there is no chance of gaining an international consensus. The trilateral partners should explore what the traffic will bear and what forums and instruments could be used to put in place practices and policies that would reduce the potential nonproliferation downsides of naval propulsion.

Among the questions the partners might consider: Could the IAEA BOG adopt a list of requirements for BOG approval of a paragraph 14 agreement? Could the IAEA Secretariat draft a “model agreement” for implementing paragraph 14? Instead of mandatory requirements, could the BOG agree on factors that would be “taken into account” in its consideration of paragraph 14 or other negotiated oversight arrangements? What about the role of the Nuclear Suppliers Group in adopting new guidelines applicable to supplier-state cooperation with NNWSs in naval propulsion projects? Or if NSG consensus is not attainable, what about less formal coordination among an ad hoc group of nuclear suppliers?

Gaining broad international support for meaningful criteria or requirements for future nuclear-powered submarine projects will not be easy. But the adoption of such non-country-specific guidance is hardly the only tool for minimizing the nonproliferation risks of the NPT’s naval propulsion “loophole.” The potential risks are already being addressed by a wide range of existing nonproliferation policies and tools, including diplomatic efforts to encourage Brazil and other holdouts to adhere to the Additional Protocol, negotiations to restore the JCPOA or otherwise roll back Iran’s enrichment program, possible future discussions between the United States and South Korea on how best to counter North Korean missile-carrying submarines, NSG

restrictive guidelines on the transfer of fuel cycle equipment and technology, and continuing efforts to upgrade the IAEA's overall safeguards system.

So, regime-wide standards should be actively promoted. But when such standards are unable to gain the necessary international consensus, the United States and like-minded countries should use the leverage and tools at their disposal, individually and collectively, to address the nuclear propulsion problem in a more targeted, case-by-case way, such as by using available incentives and disincentives to persuade individual countries contemplating the acquisition of nuclear submarines, including allies, to avoid or at least reduce the nonproliferation downsides – whether that means forgoing indigenous enrichment programs, designing the submarine program in a way that minimizes those downsides, adopting the strongest possible safeguards arrangements with the IAEA, or abandoning the idea of nuclear-powered submarines altogether.

*An opportunity to mitigate risks, whatever they may turn out to be*

The AUKUS deal has had the salutary effect of focusing international attention on a problem that was anticipated long ago but whose solution had been indefinitely deferred – the need to prevent non-nuclear weapon states from using naval propulsion programs as a cover for pursuing nuclear weapons. Although AUKUS has raised alarm bells in the nonproliferation community (and Brazil's advancing program and Iran's use of naval propulsion as a pretext for boosting enrichment levels have contributed to this concern), it is not clear how serious or widespread this problem is likely to become. Still, whatever the risks, AUKUS presents an opportunity to mitigate those risks – by setting a strong example in the AUKUS-IAEA oversight arrangement, by providing the impetus for international exploration of effective regime-wide standards for naval propulsion projects, and by prompting the United States and others to give the nuclear propulsion issue a higher priority in their nonproliferation diplomacy with key countries.