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AUKUS – Understanding the Uranium Connection

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SYNOPSIS

AUKUS brings together Australia, the UK and the US in a pact widely perceived as a response to perceptions of a Chinese threat. Less well known is the fact that Australia's uranium reserves are needed to secure longer-term American strategic advantage globally and to help underpin the trilateral arrangement envisaged in AUKUS.

COMMENTARY

When the Australia, United Kingdom and United States (AUKUS) pact was announced in September 2021, it was apparent that the military partnership was to curb the expansion of China's military power in the Indo-Pacific. Stephen M. Walt, a scholar of international relations, commented, "It doesn't take a genius to figure out that the initiative was taken in response to growing perceptions of a Chinese threat". Since then, discourses on the AUKUS issue have not offered any alternative views.

The AUKUS pact augments the Quadrilateral Security Dialogue (also known as the Quad), a strategic security partnership between Australia, India, Japan and the US. Notably, the AUKUS arrangement brings the UK into the security equation, and it is evident that this trilateral pact is intended to boost US naval power in the Pacific Ocean through the upgrading of Australia's submarine capability.

The current Collins-class submarines of the Royal Australian Navy are diesel powered. In 2016, Australia partnered with France to build Barracuda-class submarines, also diesel-powered, as a replacement for the Collins-class submarines. However, the disadvantage of a diesel-powered submarine is its need to surface more frequently than desirable to vent gases, which compromises its location and is therefore a serious operational handicap.

On the other hand, a nuclear-propelled submarine can remain deep underwater for several months, surfacing only to replenish food for its crew. Operating in the Pacific Ocean, a nuclear submarine will have this critical advantage over its diesel-powered cousin.

Powering Nuclear Submarines

The submarines of the UK and the US are nuclear-propelled and run on uranium, more specifically, highly enriched uranium (HEU) that are weapons-grade. However, both these countries do not mine raw uranium, which reinforces the argument for Australia to be included in the partnership.

Australia has the largest known uranium reserve in the world. According to 2021 data from the World Nuclear Association, Australia ranks fourth in terms of uranium production. The mined uranium is processed into “yellow cake”, chemically termed triuranium octoxide, U_3O_8, which are sold on the open market. The yellow cakes purchased by countries are then shipped to strictly regulated and licensed facilities for the uranium to be processed and enriched up to five per cent level for use as fuels in civilian nuclear power plants.

Under the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), only the five nuclear-weapons states (NWS) – China, France, Russia, UK, and the US – are allowed to possess nuclear weapons. As such, only these states are allowed to enrich uranium to higher than 90 per cent level, which is considered weapons-grade uranium. Besides its use in nuclear warheads, HEU at such levels are used to propel the nuclear submarines of the UK and US navies.

The UK ceased its capability to produce HEU in 1963. Under the US-UK Mutual Defence Agreement of 1958, both countries agreed to the transfer of nuclear submarine technology between them, and to UK reliance on the US for HEU to fuel British nuclear submarines. The UK would purchase uranium oxide from the open market, have it processed, and then shipped to the US for enrichment. After that, the HEU would be flown back to the UK.

The US, in its global effort to promote nuclear non-proliferation, halted its production of HEU in 1992. Since then, it has relied on HEU extracted from nuclear warheads produced during the Cold War to be used as fuel for its navy. As such, the terms in the 1994 US-UK Mutual Defence Agreement were updated – from the requirement to “provide enrichment of HEU” to the requirement to “arrange for HEU” for the UK. The US had stockpiled sufficient HEU for its nuclear submarines, which was expected to last till 2060.

Uranium for Australia’s SSN-AUKUS-Class Submarines

While uranium is readily available, the process of “enrichment to HEU” is not. Therefore, the UK and US submarines running on HEU could face a fuel shortage as the current fuel stockpile is depleting. The UK and the US are also unlikely to switch to lower levels of enriched uranium as this would mean more frequent refuelling of the submarines and hence more operational downtime for the submersibles.

The AUKUS pact, in which Australia, the UK and the US are in partnership to develop the SSN-AUKUS class of submarines, means that HEU will be needed to sustain submarine operations for a long time to come. The eight SSN-AUKUS-class submarines planned for Australia's navy would require an estimated four tonnes of HEU as fuel for the reactor units, which is equivalent to the amount needed for about 160 nuclear warheads.

As a non-NWS, Australia is not allowed by international convention to enrich its uranium to a level above 20 per cent, let alone to the level needed to power its future submarines. Therefore, the reactor units for its proposed submarines, together with the HEU fuels, will come from either the UK or the US. The availability of Australian uranium will provide an assurance that the supply of nuclear fuel will not be disrupted during military operations.

The US navy recently announced its plans to power up its future cruisers and destroyers with nuclear reactors. Currently, only its aircraft carriers and submarines are nuclear propelled. Its petrol-fuelled cruisers and destroyers face operational constraints due to technology limitations and challenges in oil supply logistics.

With the advent of modular reactors, coupled with evolving strategic, economic and environmental factors, the entire US maritime fleet could be propelled by nuclear fuels in the future. It is an eminently sensible move to include Australia, a leading uranium exporter, in the AUKUS arrangement.

Taking Up the Challenge

The SSN-AUKUS-class submarines will be built according to UK design and US technology. They will be built at shipyards in Australia and the UK and are expected to be operational by 2040. Meanwhile, the US intends to supply Australia with up to five of its Virginia-class nuclear-propelled submarines at the beginning of 2030.

Despite reservations in some quarters, there is no doubt that Australia will operate a fleet of nuclear-powered submarines in the future as planned. The imperative is to build up its competence in operating nuclear submarines, a challenge not to be underestimated as Australia has no experience in operating civilian nuclear power plants. The AUKUS partnership would entail the rotation of existing classes of American and British submarines to train the Australian navy in operating nuclear submarines.

Australia is not starting from square one. It currently operates a research reactor, and the country's institutional set-up and culture of safety will add value in its management of the entire nuclear fuel cycle of the submarine.

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