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Brazil's naval nuclear propulsion programme and the safeguards regime under the Treaty on the Non-Proliferation of Nuclear Weapons

Working paper submitted by Brazil

1. In May 2022, Brazil submitted to the secretariat of the International Atomic Energy Agency (IAEA) its initial proposal for special procedures to be applied to the nuclear material used in naval nuclear propulsion, pursuant to article 13 of the Quadripartite Agreement (the Agreement between Argentina, Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the International Atomic Energy Agency for the Implementation of Safeguards (see INFCIRC/435), of 13 December 1991), which is the legal framework for the application of IAEA safeguards in Brazil.
2. The submission marked the start of consultations between Brazil and IAEA focused on concluding an arrangement for the application of such special procedures. It strengthens the partnership between Brazil and IAEA, which is already characterized by many joint initiatives. On 6 June, the IAEA Director General, Rafael Grossi, praised Brazil's "transparent approach and decision to work closely with the Agency on this important project".
3. As a responsible international actor with irreproachable non-proliferation credentials, Brazil is committed to ensuring that its nuclear-powered submarine programme is fully compatible with its relevant undertakings under the international nuclear non-proliferation regime and IAEA safeguards.
4. Naval nuclear propulsion is not prohibited under the Treaty on the Non-Proliferation of Nuclear Weapons and is consistent with Brazil's non-proliferation obligations as a non-nuclear-weapon State under that instrument, as well as with its undertakings under the Treaty for the Prohibition of Nuclear Weapons in Latin America and the Caribbean (Treaty of Tlatelolco), by which a nuclear-weapon-free zone in Latin America and the Caribbean was established.
5. Under the Quadripartite Agreement, all nuclear material in Brazil is not only under IAEA comprehensive safeguards, but also under those of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials, therefore ensuring the highest level of transparency and technical standards.



6. Similarly to bilateral comprehensive IAEA safeguards agreements based on INFCIRC/153 (Corrected), the Quadripartite Agreement envisages the possibility of using nuclear material in certain non-proscribed military activities, including nuclear propulsion. In this case, as specifically indicated in its article 13, special procedures regarding the application of safeguards to nuclear material will apply while the nuclear material is used for nuclear propulsion in submarines and prototypes.

7. A long-standing objective pursued by Brazil for many decades, the development of nuclear propulsion is a fully indigenous and autonomous project. The submarine, its nuclear reactor and fuel are being designed, developed, built and assembled in Brazil. It will be a nuclear-powered, conventionally armed vessel. Its reactor will use low-enriched uranium.

8. In pursuing the legitimate goal of naval nuclear propulsion, Brazil is committed to transparency and open engagement with IAEA, ensuring the Agency's ability to fulfil its statutory non-proliferation mandate, as well as to keeping States members of IAEA informed about relevant developments.

Rationale for the nuclear propulsion programme

9. Brazil is both a continental and a maritime country. It exercises rights of jurisdiction over economic resources in an area of approximately 4.5 million km² off its extensive coastline up to the outer limits of its continental shelf, defined in accordance with the United Nations Convention on the Law of the Sea. This is an area of vital economic and strategic importance to Brazil, as it contains significant oil and gas reserves, among other mineral as well as living resources. Close to 85 per cent of Brazil's oil extraction and 75 per cent of its gas extraction are carried out in this maritime area, while 95 per cent of the country's foreign trade passes through sea routes. It is therefore essential for Brazil to effectively exercise surveillance, control and defence of its jurisdictional waters.

10. A nuclear-powered submarine capability will contribute to the defence and preservation of Brazilian national interests in the maritime domain, particularly in the South Atlantic, thereby enabling the protection of resources and trade routes and the maintenance of free navigation. The programme will also contribute to promoting Brazil's defence industrial base and potential spin-offs for civilian applications of associated advanced technologies. Achieving autonomy in these areas is an indispensable part of Brazil's efforts towards sustainable development for future generations.

Naval propulsion programme and Brazil's international non-proliferation obligations

11. In line with a constitutional norm that determines the use of nuclear energy exclusively for peaceful purposes, Brazil is a party to numerous international non-proliferation treaties: the Treaty on the Non-Proliferation of Nuclear Weapons; the Treaty of Tlatelolco, under which Latin America and the Caribbean was established as a nuclear-weapon-free zone; and the above-mentioned Quadripartite Agreement, whereby comprehensive multilateral and bilateral safeguards are applied to all nuclear material in its territory. Brazil is also an active member of the Nuclear Suppliers Group, a key export control arrangement.

12. Article 13 of the Quadripartite Agreement envisages special procedures to be applied in case nuclear material that is required to be safeguarded is used "for nuclear propulsion or in the operation of any vehicle, including submarines and prototypes", thus allowing the Agency to fulfil its verification mandate under the Agreement.

13. The Brazilian nuclear-powered, conventionally armed submarine programme does not pose a proliferation risk. Brazil's nuclear non-proliferation track record is impeccable. All nuclear facilities of the Brazilian Navy are subject to safeguards under the Quadripartite Agreement and will remain so.

14. The Brazilian Navy has a long-standing partnership with IAEA for the implementation of safeguards in its nuclear-related facilities, which are the only military facilities in the world subject to IAEA safeguards.

15. Both the Director General of IAEA and the Deputy Director General and Head of the Department of Safeguards have, since 2021, visited the facilities associated with the nuclear-powered submarine programme. Continued visits by IAEA safeguards inspection teams will assist in mapping out the details of the special procedures applicable to the nuclear material to be used in naval nuclear propulsion.

16. Every year, the safeguards conclusion reached by IAEA regarding nuclear material in Brazil has been that the secretariat found no indication of the diversion of declared nuclear material from peaceful nuclear activities, as reiterated in the latest safeguards implementation report (2021).

17. In addition, and in accordance with their specific commitments, Brazil and Argentina submit all their nuclear materials in all nuclear activities to a common system of accounting and control of nuclear materials, which is administered and implemented by the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials.

Special procedures for nuclear material to be used in naval propulsion

18. The special procedures will be a customized set of practices and verification measures that will ensure that IAEA retains its ability to draw a safeguards conclusion for Brazil.

19. The application of special procedures to the nuclear material employed in nuclear-propelled submarines will not affect the ability of IAEA to reach its safeguards conclusions.

20. The consultation process under way between Brazil and IAEA will ensure that such special procedures will be sufficient to enable the Agency to draw the relevant safeguards conclusion on the non-diversion of nuclear material, while protecting sensitive technological and operational parameters related to the nuclear-powered submarine.

Role of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials

21. The Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy, of 1991, by which the Common System of Accounting and Control of Nuclear Materials and the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials were established, emphasizes that nuclear naval propulsion is, for both parties, a peaceful use of nuclear energy. Article IV of the annex to the Agreement deals with the procedures applied in this case for the duration of nuclear propulsion activities.

22. The role of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials in the implementation of special procedures will include keeping records of the total quantity and composition of nuclear material used in nuclear naval propulsion.

Naval propulsion and the additional protocol

23. Signing and ratifying an additional protocol is a voluntary, sovereign decision of each States member of IAEA.

24. The decision by a State party to the Quadripartite Agreement to exercise its discretion to use nuclear material for nuclear propulsion is not contingent upon that State party having signed an additional protocol, nor does it entail an obligation to do so.

25. Nuclear activities in Brazil are currently subject to the highest standards of transparency as regards their exclusively peaceful purposes. Brazil and Argentina are subject to a unique nuclear safeguards regime, based on two layers of inspections, one carried out by IAEA, and the other by a bilateral agency (the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials), creating cross-inspections by its two member States. Combined, these two layers complement each other to create one of the most robust verification frameworks in existence. Brazil and Argentina are among the countries that receive the highest number of safeguards inspections in their respective territories.

26. Having celebrated its thirtieth anniversary in 2021, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials has been recognized by the General Assembly, through its resolution [76/52](#), as a reference of best practice in nuclear safeguards and non-proliferation verification.

Spent fuel

27. Brazil does not currently have capacities in the field of reprocessing, nor are there plans to develop them. Spent fuel assemblies from the nuclear reactor of the Brazilian nuclear-powered, conventionally armed submarine will be stored in a spent fuel pool before being transferred to long-term dry storage facilities, whereupon they will be returned to the standard comprehensive safeguards regime.

Safety and security issues

28. Brazil has recently established a stand-alone national authority for nuclear security as part of a process to consolidate a new legal framework in terms of regulation, standardization, licensing, control and inspection of nuclear material and installations.

29. The Authority is being created through the separation of the regulatory arm of the National Nuclear Energy Commission, which will henceforth focus on nuclear research and development. The Authority is responsible for establishing norms and regulations in radioprotection and for regulating, licensing and inspecting the production and use of nuclear power in Brazil. Among other tasks, it will define rules on nuclear safety, radiation protection and physical security of nuclear activities and facilities.

30. The particular nature of the naval nuclear propulsion programme and the need to adapt national legislation to the peculiarities of the nuclear-propulsion submarine have required additional efforts in terms of licensing installations and projects associated with the programme. Based on their experience and knowledge about nuclear plants and other on-shore installations, Brazilian regulators are adjusting the licensing procedures required for mobile platforms, such as nuclear submarines.

31. The Naval Agency for Nuclear Safety and Quality is the regulatory body of the Brazilian Navy responsible for licensing and inspecting ships with on-board nuclear plants and overseeing the transport of their nuclear fuels. While nuclear installations operated by the Navy on land will continue to be licensed and supervised by the National Authority for Nuclear Security, including the prototype on land of the

nuclear reactor to propel the submarine, the on-board nuclear plants will be licensed by the Naval Agency.

32. The nuclear reactor on the submarine will therefore undergo a double licensing process: its prototype, by the National Authority for Nuclear Security, and the on-board plant, by the Naval Agency for Nuclear Safety and Quality. This double licensing makes the Brazilian case unique. In other countries with naval propulsion capabilities, the licensing of both land-based prototypes and submarines is carried out exclusively by the respective military regulatory bodies.

33. Brazil is also a party to the Convention on the Physical Protection of Nuclear Material and its 2005 Amendment, as well as to all other nuclear governance conventions, and actively contributes to continuing efforts to strengthen nuclear security.
