



Three Decades of ABACC: A Regional Safeguards System in the Framework of International Safeguards and Nuclear Cooperation for Peaceful Purposes

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1. Introduction

The creation of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) and the Common System of Accounting and Control of Nuclear Materials (SCCC), a regional safeguards system with unique characteristics in the world, is the result of a process of confidence building and cooperation in the peaceful uses of the nuclear energy between Argentina and Brazil. In July 18, 1991, the Agreement between the Republic of Argentina and Federative Republic of Brazil on the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement) was signed. This Agreement that entered into force in December 1991, after its approval by the parliaments of the two countries, constitutes a founding milestone for ABACC. The Agreement signals the will of both States to make their nuclear programs transparent and their commitment to use nuclear energy exclusively for peaceful purposes. It should be noted that said ratification implies its promulgation under the force of law as established under the Agreement, and that this law imposes mandatory common compliance of both countries. The Bilateral Agreement sets up the SCCC and ABACC's mission to apply it in both countries, that means ABACC has to verify that all nuclear materials in all nuclear activities in Argentina and Brazil are used only for peaceful purposes. In addition to the entry into force of the Bilateral Agreement, the two countries had taken the political decision to incorporate this bilateral arrangement into the international safeguards' regime, in order to share broadly with the international community, the peaceful nature of their nuclear programs and the specific mechanism and the path chosen by them to fulfil this goal. Therefore, on the basis of the Bilateral Agreement, a Quadripartite Safeguards Agreement was signed in December 1991 by the Republic of Argentina, the Federative Republic of Brazil, the ABACC, and the International Atomic Energy Agency (IAEA). The Quadripartite Agreement is a comprehensive

safeguards agreement and entered into force in March 1994 after its ratification by the Congresses of both countries. In May 1994, the two countries brought into force the Treaty of Tlatelolco, which established a nuclear-weapons-free-zone in Latin America and the Caribbean. Argentina and Brazil joined the Non-Proliferation Treaty (NPT) in February 1995 and July 1998, respectively. The Quadripartite Agreement was considered valid by the IAEA for complying with NPT and the Tlatelolco safeguards' obligations. It is important to highlight that both countries have maintained their respective national safeguards authorities (State System of Accounting and Control – SSAC). Moreover, in terms of the Bilateral Agreement, the countries should comply with a robust SSAC including strict requirements to be fulfilled by them and the nuclear operators. Therefore, ABACC is a regional system that verifies the nuclear activities of both countries in order to provide assurances of the exclusively peaceful use of nuclear energy and should not be misinterpreted as a binational safeguards authority.

2. The Common System of Accounting and Control of Nuclear Materials (SCCC)

The SCCC was originally developed in 1990 when both countries had safeguards agreements based on the IAEA model document INFCIRC/66 Rev. 2. Therefore, the first version of SCCC was compatible with the provisions of the Agency's safeguards system. Later on, as both countries decided to sign a comprehensive safeguards agreement with the IAEA, a second and definitive version of the SCCC was prepared in order to be compatible with the IAEA model document INFCIRC/153. The SCCC is composed by two documents. The first one of permanent character is the Annex of the Bilateral Agreement, as a kind of stone clause which provides the basic guidelines for the SCCC. This includes key elements of the system, such as the starting point of safeguards, termination of safeguards and procedures for recording, reporting and measuring nuclear materials. Any modification of this basic guidelines would require to amend the Bilateral Agreement. The second document is named '*General Procedures of the SCCC*' and is approved by the policy-making organ of ABACC, the 'Commission'. It contains detailed procedures to ensure the effective implementation of the SCCC. Therefore, this document is of a more dynamic nature being subject to updates along the time, as required. It is worth noting that this document goes beyond a simple safeguards document, as it encompasses requirements at both facility and State levels, with an extent beyond the requirements established by the IAEA's safeguards system. The General Procedures of the SCCC contain provisions related to operator's records and reports, their measurement systems, nuclear materials transfer notifications, and the purpose and scope of the inspections. The level of accounting and control to be applied for a specific facility is reflected in its Application Manual, which is a technical document that specifies in detail the SCCC measures for that particular facility.

3. ABACC's Safeguards Operation

Considering the basic concepts of nuclear safeguards, i.e. significant quantities on nuclear materials, timely detection of diversion indicators, and reasonable degree of certainty in drawing conclusions, ABACC applies criteria and procedures established in the SCCC. ABACC is entitled to consider each specific case and define a particular set of suitable detailed technical criteria and control measures to verify nuclear materials and facilities, taking into account the characteristics of the nuclear activities in each country. ABACC's safeguards measures include the verification of the continued validity of the information described in the Technical Questionnaires (i.e., design information of the nuclear facilities), independent verification of the inventory and flow of nuclear material, verification of the operator's

accountancy and measurement systems, and the use of containment and surveillance as complementary measures. The level of control for each facility, including the inspection frequency, is established considering the following variables: characteristics of the facility, category of the nuclear material (taking into account the relevance of the isotopic composition), conversion time, inventory, and production time (linked to the facility throughput). In addition, the quality of the measurement system, the application of containment and surveillance, and the material accessibility are factors that could affect the inspection frequency and/or scope. The first evaluation of the results obtained from an inspection is performed by the inspectors themselves. The inspection report has to contain their comments and conclusions about the verification activities, including judgments about the appropriateness of these activities and the safeguards approach, as well as recommendations about resolved or unresolved discrepancies. This is a fundamental stage in the control system and requires the inspector to have technical knowledge and an ability to make judgments. Because the inspectors are not part of the permanent staff of the ABACC, their work has to be very detailed and conclusive to ensure the follow-up of activities performed during the inspection. Inspection activities include, in general, the auditing of the records and comparison with reports; counting and identification of items; weighing and non-destructive assay, according to a sampling plan; verification of the operator's measurement system; taking of sample for subsequent destructive analysis at a qualified laboratory; seals examination, application and replacement; and surveillance service and review. Currently, ABACC has about 50 designated inspectors from each country. A second level of evaluation is performed by ABACC's permanent technical staff and includes the overall evaluation of the inspection report/results. Following these evaluations, the relevant National Safeguards Authority is notified about the conclusions of the verification activities. All discrepancies are followed up immediately, with the urgency being related to the type and quantity of the nuclear material involved and the strategic importance of the facility (or facilities) concerned. Unresolved discrepancies could constitute an anomaly and may trigger follow-up actions. Any anomaly is reported by the Secretariat to ABACC's Commission, its policy making organ, who is responsible to monitor the functioning of the SCCC and to inform the Party concerned of any anomalies which may arise in the implementation of the SCCC and to inform the Parties of the non-compliance by one them of the commitments made under the Bilateral Agreement. The Party in non-compliance shall then be obliged to take the necessary measures to rectify the situation. Since its creation, ABACC has carried out more than 3500 inspections verifying nuclear material inventories and activities declared by Argentina and Brazil. In 2023, ABACC conducted about 167 inspections and visits in the 76 nuclear facilities submitted to the SCCC, corresponding to an effort of 874 inspector-days, made up of in-field activities, travels and pre- and post-inspection activities. Also, 741 non-destructive measurements were performed and 179 items were weighed. A total of 42 samples of nuclear material were collected for further determination of the total element and the ^{235}U enrichment at the ABACC network of qualified laboratories. Furthermore, 55 environmental swipe samples were taken for particle analysis. To control the nuclear material at the two countries' installations, a total of 862 seals have been applied/replaced and 39 surveillance cameras were in used.

4. Coordination of Activities between ABACC and the IAEA

Under Quadripartite Safeguards Agreement - INFCIRC/435, the IAEA also takes responsibility for applying comprehensive safeguards in Argentina and Brazil. The Agreement entered into force in March 4th, 1994. Its basic undertaking is the acceptance, by the State Parties, of safeguards in accordance with the terms of the Agreement, on all nuclear materials in all nuclear activities within their territories, under

their jurisdiction or carried out under their control anywhere, for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other explosive devices. The ABACC undertakes, in applying its safeguards to nuclear material in all nuclear activities within the territories of the States' Parties, to cooperate with the Agency, in accordance with the terms of the Agreement, with a view to ascertaining that such nuclear material is not diverted to nuclear weapons or other devices. The Quadripartite Agreement further states that the IAEA shall apply its safeguards in such a manner as to enable it to verify the findings of the SCCC. The IAEA verification shall include, inter alia, independent measurements and observations conducted in accordance with the procedures specified in the Agreement. The IAEA shall take due account of the technical effectiveness of the SCCC. Moreover, the Agreement states that ABACC and the IAEA shall avoid unnecessary duplication of safeguards activities. The General Part of the Subsidiary Arrangements to the Quadripartite Agreement includes particularities such as the provision for the ABACC to periodically send information on the scope of its inspections, inspection reports, etc. to the Agency. There is an entire protocol dealing with arrangements between the ABACC and the Agency for cooperation in the application of safeguards under the Agreement. In implementing these arrangements, both Agencies shall be guided by the following principles: the need to reach their own independent conclusions and to coordinate, to the extent possible, their activities for the optimum implementations of the Agreement and, in particular, to avoid unnecessary duplication of the ABACC's safeguards. Also, when performing their activities, the ABACC and the IAEA shall work jointly, whenever feasible, according to compatible safeguards criteria of the two organizations. Several levels of coordination between the ABACC and the IAEA are considered in the Quadripartite Agreement and its General Part of the Subsidiary Arrangements. A significant improvement in the cooperation was achieved with the approval of the document *Guidelines for Coordination of Routine and Ad Hoc Inspection Activities between the Agency and ABACC*. The guidelines described in this document provide guidance on the coordination of activities of the two agencies. They are reviewed and amended, as appropriate, in the light of changing circumstances and developments of, inter alia, new safeguards' measures on the part of the IAEA, the ABACC's capabilities, technical effectiveness and functional independence, the need to appropriately apportion the financial burden of shared activities, and changes in the general situation. Significant cooperation was also achieved on the preparation of joint inspection guideline procedures and approaches for specific relevant facilities.

5. Conclusions

The success of the ABACC model in verifying the peaceful use of nuclear energy in two countries with significant nuclear programs over more than thirty years represents a unique opportunity to explore ways and means to enhance cooperation with the IAEA in implementing international safeguards. The steady expansion of the nuclear programs of the two countries under the verification of ABACC, presents new opportunities and challenges to ABACC in leading the process of developing new approaches and procedures and to incorporate new technologies to continue fulfilling its mission in the years to come, both effectively and efficiently. Undoubtedly, the cooperation between Argentina, Brazil, ABACC and the IAEA will continue to be the basis for the success of this regional-international scheme.