ANNUAL REPORT 2018

MESSAGE FROM THE SECRETARY

It is with great pleasure that I present the report of the activities of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC) for 2018.

ABACC´s mission is to verify that Argentina and Brazil comply with the basic undertaking established in the Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement).

This mission requires that conclusions on nuclear material verification in all facilities of both countries be independent and based on well-founded technical activities, that is to say with high credibility.

On the basis of the verification and evaluation activities of the 103 inspectors and 55 technical visits carried out to verify the design information of nuclear facilities, ABACC concluded that both countries complied with all the terms of the Bilateral Agreement.

In order to perform the activities efficiently and effectively, it is essential that ABACC maintains the quality of its verification system. In this context, the modernization of surveillance systems of ABACC is to be highlighted. The cutting-edge surveillance systems, which are currently the most modern in the world, were acquired and installed in almost all nuclear installations in the both countries, except for Atucha I Nuclear Power Plant, which is expected to be replaced next year.

In the area of accountancy data management, the Central System of Nuclear Material Accountancy was developed in a modern platform, and the migration of all accounting data from the old to the new platform was completed.

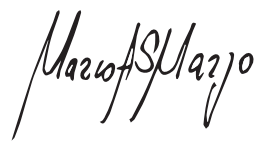
The protection of information supplied by both States on nuclear materials and nuclear facilities is a constant concern for the Secretariat particularly in the current situation in which cybernetic security issues are each time more critical. In this context, the comprehensive policy for information security of ABACC establishes comprehensive organizational guidelines for information protection.

In order to optimize the application of Common System of Accounting and Control of Nuclear Materials (SCCC) the permanent coordination of activities with the national authorities of Argentina and Brazil is of utmost importance. Therefore, I would like to highlight the important increase in the number of technical meetings both bilateral and trilateral, which were essential for the verification activities to be successfully performed.

I would also like to express my appreciation for the high level of cooperation of the national authorities to the Secretariat.

Regarding the coordination of activities with International Atomic Energy Agency (IAEA) for the implementation of the Quadripartite Safeguards Agreement, the scope of which is well defined in the Agreement, it is important to remark the good cooperation in the planning area and the performance of joint inspections. Moreover, the application of common procedures for joint use equipment and the joint audits of the accounting records systems at nuclear facilities made it possible to minimize the duplication of efforts, as provided for in the Agreement.

To conclude, I would like to express my appreciation to the members of the Commission of ABACC for their continuous support to the Secretariat and to all the staff of this Secretariat for the enthusiasm and dedication to comply faithfully with ABACC's mission.

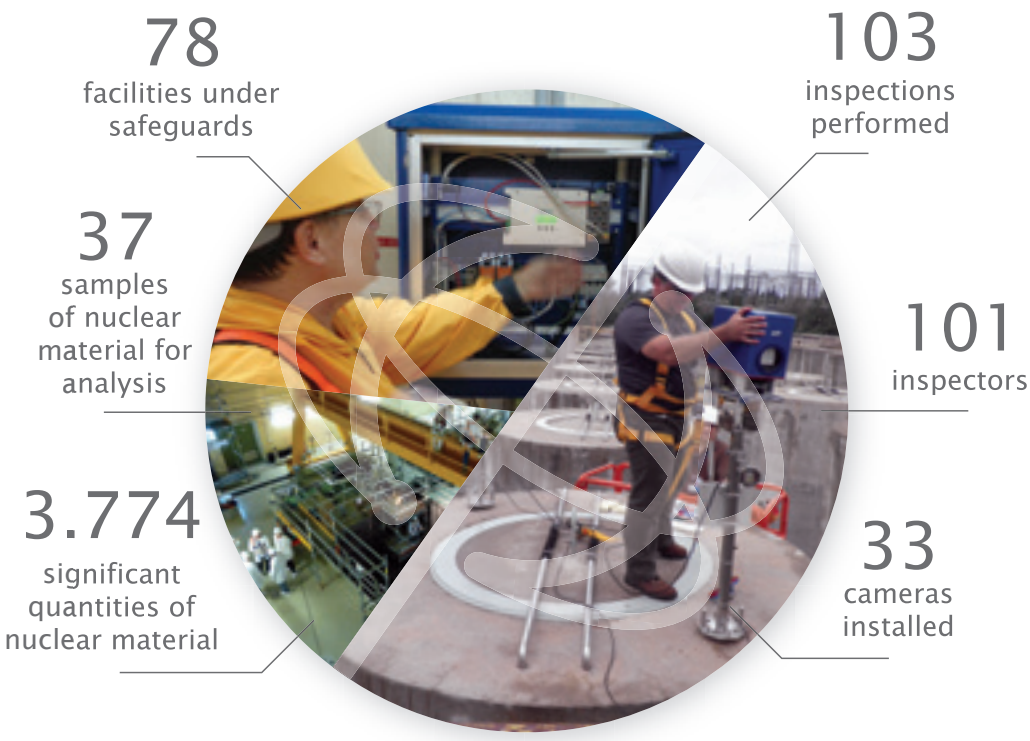


EXECUTIVE SUMMARY

The objective of Argentine-Brazil Agency for Nuclear Materials Accounting and Control (ABACC) is the application of the Common System of Accounting and Control of Nuclear Materials (SCCC), established by the Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Use Exclusively Peaceful Use of Nuclear Energy – Bilateral Agreement. The SCCC is a set of criteria and procedures to verify that nuclear materials in all nuclear activities in the countries are not diverted to the manufacture of nuclear weapons or other explosive nuclear devices.

In 2018, ABACC performed 103 inspections in both countries and 55 technical visits to verify the design information of nuclear facilities.

Focusing on the increasing the efficiency and effectiveness of the implementation of the SCCC, ABACC has prioritized the updating of its measurement equipment, and the containment and surveillance technology and related systems, as well as the introduction of new verification procedures, which reduce the inspection effort without losing effectiveness.



The training of ABACC´s inspectors, is essential to maintain the high level of the SCCC Training courses were performed in the area of nuclear material records auditing, containment and surveillance systems, and inspection procedures for enrichment plants. In addition to these courses, routine training focused on inspection procedures and equipment was carried out prior each inspection.

The daily transmission of the working status (State of Health – SoH) of the discharged spent fuel counter installed in Atucha II Nuclear Power Plant was started at ABACC headquarters, allowing any failure to be promptly detected and corrected.

Finally, the information security policy at ABACC, which states the organizational guidelines for the protection of information assets and for information classification regarding confidentiality is worthy to highlight.

1. ABACC

1.1 History and Mission

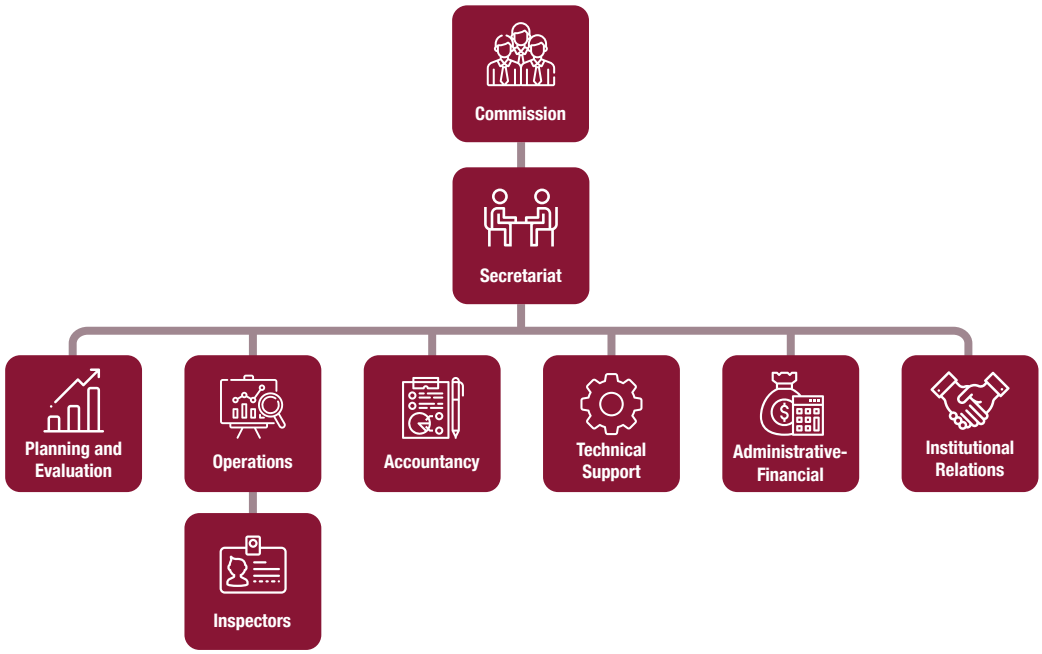
ABACC was created on July 18, 1991, with the signing of the Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement) which entered into force on December 12, 1991, after being approved by the Congresses of both countries.

ABACC´s mission is to verify that Argentina and Brazil comply with the basic undertaking established in the Agreement between the Republic of Argentina and the Federative Republic of Brazil for the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement).

In order to fulfill its mission, ABACC applies a bilateral safeguards system named “Common System For Accounting and Control of Nuclear Materials (SCCC)”, which establishes the verification criteria and procedures to be applied to all nuclear materials in all nuclear activities in Argentina and Brazil, thus guaranteeing the ability to detect possible diversions of these materials for the manufacture of nuclear weapons.

1.2 Organization Chart

ABACC's organizational chart is presented below:



The Commission, the ABACC's policy making organ, is composed by four members, two being designated by each country.

The Secretariat is the ABACC's executive body, is composed by twelve members, being six from Argentina and six from Brazil. The Secretary and Deputy Secretary, which alternate annually in the performance of their duties, are the highest hierarchy ranking officers responsible that SCCC`s verification and control activities are fulfilled efficiently and effectively.

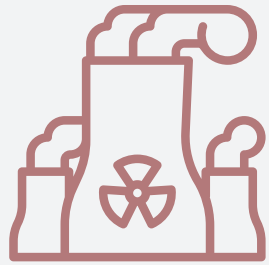
Eight administrative and auxiliary staff support the routine activities, which are necessary for the good functioning of the Secretariat.

In 2018, ABACC counted with 52 Argentinean inspectors and 49 Brazilian inspectors, appointed by ABACC among those proposed by the respective countries. The inspectors of Argentina carry out inspections in Brazilian facilities and the inspectors of Brazil in Argentine facilities. Inspectors are considered ABACC´s Secretariat staff during the safeguards missions for which they are called.

2. ABACC'S VERIFICATION ACTIVITIES

The chart below presents the installations subject to verification by ABACC.

TYPE OF FACILITY	ARGENTINA	BRAZIL	TOTAL
Fuel Conversion and Fabrication	9*	2	11
Uranium Enrichment Plants	2	3	5
Power Reactors	5*	3*	8
Research Reactors / Critical and Sub Critical Units	7*	8*	15
Others (Research & Development Facilities, Storages, etc.)	28	11*	39
TOTAL	**51**	**27**	**78**

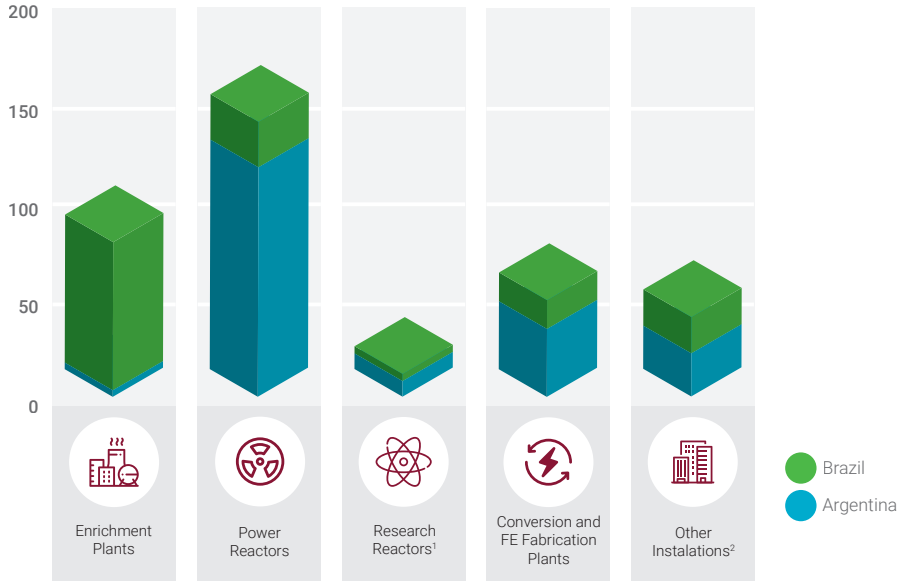


** One reactor/one facility under construction*

In 2018, ABACC performed 103 inspections in nuclear facilities of both countries and 55 visits to verify the design information of nuclear facilities. The inspections effort totalized 970 inspector-days composed by activities in the field and pre and post-inspection activities In comparison with 2017, the inspection effort was reduced in 30%, due to the finalization of the campaign for irradiated fuels transfer campaigns to the dry storage silos at Embalse Nuclear Power Plant and the routine use of the unattended verification system (UMS – Unattended Monitoring System) for the verification of such transfers.

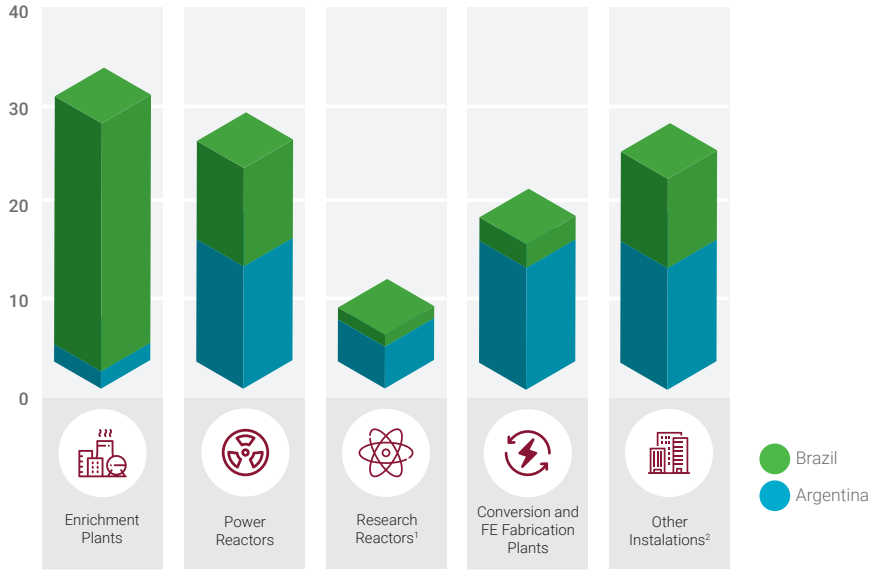
The following figures show the verification effort and the number of inspections performed by type of facility. It is worth noting that uranium enrichment plants are the ones requiring the highest inspection effort in Brazil, while in Argentina most of the effort takes place in the nuclear power plants, particularly on the verification of transfers of irradiated fuel elements to storages.

VERIFICATION EFFORT BY TYPE OF FACILITY (INSPECTORS X DAYS)



[1] *Includes Critical and Subcritical Assemblies*
[2] *Includes Laboratories, Storages, R&D, Production of Radioisotopes, etc.*

NUMBER OF INSPECTIONS BY TYPE OF FACILITY



[1] *Includes Critical and Subcritical Assemblies*
[2] *Includes Laboratories, Storages, R&D, Production of Radioisotopes, etc.*

Fifteen technical missions were carried out for the installation and preventive or corrective maintenance of measurement equipment and containment and surveillance systems. A total of thirteen old cameras were replaced with cutting edge devices (Next Generation Surveillance System – NGSS), which supply higher reliability and better resolution, reducing the risk of failures.

The daily transmission system to ABACC headquarters of the working status (State of Health - SoH) the counter of discharged fuel verifier VIFM (Verifier Integrated Fuel Monitor) installed in the Nuclear Power Plant Atucha II was started. This tool allows the immediate identification of any failure in this equipment, thus avoiding costly re-verifications of nuclear material.

576 accounting reports received from Argentina and Brazil were processed, and 90 accounting audits were carried out in 207 Accounting Records systems of nuclear facilities. At the end of 2018, the total inventory of nuclear material in both countries registered an increase of 3,6% regarding the previous year.

ABACC continued to update its nuclear material accountancy database and associated programs, which allows to improve the control inventories of nuclear material at facilities.

3. COORDINATION OF ACTIVITIES WITH IAEA

According to the provisions set for in the Agreement between the Republic of Argentina and the Federative Republic of Brazil, ABACC and the International Atomic Energy Agency (IAEA) for the Application of Safeguards – Quadripartite Agreement – ABACC coordinates to the maximum its verification activities with those of the IAEA in order to minimize the duplication of efforts. To this purpose, ABACC and IAEA held five technical meetings to discuss specific issues on the implementation of safeguards in facilities of both countries.

It is also worth noting the cooperation between both agencies in the preparation of joint inspection procedures and the use of common use measurement and control equipment for joint use. In 2018, it is important to highlight the establishment, in coordination with IAEA, of the Short Notice Random Inspections (SNRI) for the verification of the fuels initial core at Embalse Nuclear Power Plant reactor, which was refurbished and will start operating at the beginning of 2019. This procedure will be applied until all irradiated fuel elements of the initial core are discharged.

The 17th meeting of the Liaison Sub-Committee (April 19th, in Rio de Janeiro), the 32nd Coordination Meeting (September 21st in Vienna) and the 17th meeting of the Liaison Committee (October 24th, in Rio de Janeiro), as foreseen in the Quadripartite Agreement, were held. These meetings take place annually, in order to evaluate the status of the implementation of safeguards and to improve the verification activities for nuclear material and facilities.

4. COORDINATION OF ACTIVITIES WITH ARGENTINA AND BRAZIL

According to the provisions of set forth in the Bilateral Agreement Argentina and Brazil cooperate with ABACC for the satisfactory accomplishment of its mission.

In 2018, seven technical meetings were held with the national authorities of Brazil and Argentina to discuss specific issues on the implementation of safeguards in both countries, including coordination meetings in the framework of the Quadripartite Agreement.

It is also important to highlight the cooperation of both countries as per supply of design information of the facilities and the necessary activities to facilitate the inspections and the development of safeguards approaches and verification procedures, the technical cooperation for testing new equipment and new technologies, as well as their technical support in the fields of destructive and non-destructive measurements.

5. TECHNICAL COOPERATION

Cooperation with institutions which work in the area of nuclear safeguards is relevant for the exchange of information on safeguards concepts and techniques and for the development of projects of interest to ABACC, contributing to increase the efficiency and effectiveness of its activities.

ABACC holds technical cooperation agreements with institutions in Argentina, Brazil, the European Commission, United States, South Korea, France and the IAEA. In 2018, the following activities are worth to highlight:

5.1 Technical Cooperation with IAEA

ABACC Network Laboratories routinely participate in the IAEA's destructive analysis intercomparison exercises, named Nuclear Material Round Robins (NMRORO). ABACC coordinates the execution of the exercises and supports the participation of specialists of its Network.

In the context of the development of equipment and technologies for common use, ABACC and the IAEA carried out tests of a new technology, based on a 2D- laser system, with potential use as a verification system in the dry storage of irradiated fuels elements of Atucha I Nuclear Power Plant. These tests were performed within the Argentine Support Program to IAEA Safeguards.

In the context of the cooperation with the IAEA, Argentina and Brazil, activities for the implementation of the "ABACC-Cristallini" Method for UF_6 sampling in conversion and enrichment facilities continued. The certification process for the method with the ASTM (American Society of Testing Materials) is in advanced phase. The IAEA is suggesting to perform tests in commercial enrichment facilities of several countries as part of its validation process.

5.2 Technical Cooperation with DoE

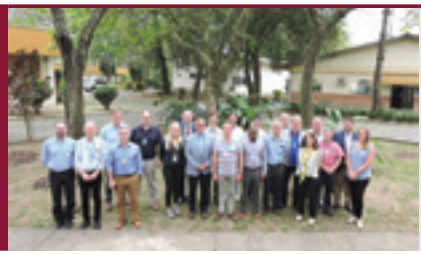
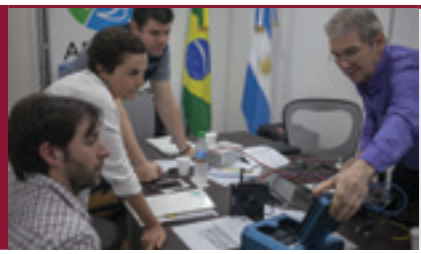
A new project to ensure the quality of the analytical results of ABACC's Network laboratories was started. In this project, the laboratories analyze nuclear material samples sent by "New Brunswick Laboratory" (NBL) of United States.

A program for modernization of the non-destructive measurement system applied at two enrichment facilities in Brazil was established.

ABACC and DoE signed a new cooperation project in the area of quality assurance of analytical laboratories through analytical standards and samples exchange programs

6. TRAINING

Training courses for inspectors contribute to ABACC to maintain a high level of effectiveness of its inspections. The chart below shows the training courses performed in 2018.

ABACC-AIEA Joint Auditing System for Accounting Records (SJAR)		**Date:** 10 - 13/04 **Venue:** Buenos Aires Argentina **Participants:** 10
ABACC-AIEA Joint Auditing System of Accounting Records (SJAR)		**Date:** 21 - 24/05 **Venue:** Rio de Janeiro Brazil **Participants:** 10
Training for ABACC and IAEA Inspectors on Inspection Procedures** Applied to Brazilian Enrichment Facilities		**Date:** 01/05 **Venue:** Rio de Janeiro Resende - Brazil **Participants:** 11*
Training on Containment and Surveillance Systems**		**Date:** 01 - 05/10 **Venue:** Rio de Janeiro Brazil **Participants:** 14
Training on Containment and Surveillance Systems**		**Date:** 16 - 19/10 **Venue:** Ezeiza Argentina **Participants:** 12

** Argentinean and IAEA inspectors*

*** Courses carried out in collaboration with IAEA*

7. INSTITUTIONAL ACTIVITIES

The participation of ABACC in international forums contributes to the dissemination of its activities and the exchange of information and experiences with representatives of other organizations.

Officers of ABACC participated in international events and presented technical papers:

- "Experience on Implementing Remote Transmission of the State of Health (SOH) of Surveillance Systems Applied to Nuclear Reactors in Brazil and Argentina", 59th Annual Meeting of the Institute of Nuclear Materials Management (INMM), July, United States;
- "Nuclear Material Measurements at ABACC - Status Update and Future Steps", 59th Annual Meeting of the Institute of Nuclear Materials Management (INMM), July, United States;
- "Reinforcing Nuclear Safeguards Effectiveness through Collaboration (ABACC/ARN/AIEA)", Symposium on International of Safeguards, organized by IAEA, November, Austria;
- "ABACC – Cooperation and Engagement: Prospects for Raising Regional-International Cooperation to a Higher Level", Symposium on International Safeguards, organized by IAEA, November, Austria;
- "Fast Neutron Collar Tests at Nuclear Fuel Fabrication Plant in Brazil (ABACC/CNEN/IAEA)", Symposium on International Safeguards, organized by IAEA, November, Austria;

ABACC visit to facilities in Argentina

ABACC receives delegation from the Brookhaven National Laboratory

ABACC also participated also in the following events

- Seminar "50 Years of the Treaty on Non-Proliferation of Nuclear Weapons: Impasses and Perspectives", held by Fernando Henrique Cardoso Foundation (FFHC), March 6, Brazil. Participation of the Secretary in the Panel "Autonomy and International Cooperation in the Nuclear Area".
- Meeting of IAEA Board of Governors e, March, Austria.
- Meeting of IAEA Board of Governors, June, Austria.
- Second Preparatory Committee to the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons, April, Switzerland.
- "Regional Training Workshop for Inspectors on Nuclear Safeguards", organized by ARN in collaboration with the DoE, in June, Argentina. In this opportunity, a paper on the SCCC and the coordination of inspection activities between ABACC and the IAEA was presented. In addition, ABACC collaborated in the practical exercises performed in a nuclear facility.

50 Years of the Treaty on Non-Proliferation of Nuclear Weapons: Statements and Perspectives

Preparatory Committee for the 2020 Review Conference of the Parties to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT)

Regional Workshop on Nuclear Safeguards Inspection

- "Workshop on Statistics Applied to Nuclear Safeguards", organized by ARN, in collaboration with DoE, August, Argentina. The Secretary presented the main statistic methods for destructive and non-destructive analysis, ABACC´s measurements results, its main conclusions and recommendations.
- Meeting of IAEA Board of Governors, September, Austria.
- 62nd IAEA General Conference, September, Austria.
- VI Nuclear Energy Week (SEN), held at Federal University of Rio de Janeiro, October, Brazil. ABACC participated in the Panel "Safeguards and Nuclear Non-Proliferation".
- International Workshop of South America in the Nuclear era: Risks, Challenges and Perspectives. The event was organized by University of Santa Maria (UFSM) and the institution "Pugwash Conferences", August, Brazil,
- International Symposium "Renewable and Nuclear Baseload for Reliable and Clean Energy", carried out by Latin American Section (LAS) of the American Nuclear Society (ANS), August, Brazil. The Secretary coordinated the Panel on "Industry Supply for Nuclear Baseload".
- Symposium on International Safeguards, organized by AIEA, November, Austria. ABACC chaired the session on national and regional systems for safeguards as well as moderated a panel on the improvement of gender balance and career opportunities in safeguards. In addition, ABACC presented various technical papers.
- XVL Annual Meeting of the Argentinean Association of Nuclear Technology, December, Argentina. In this opportunity, ABACC give a presentation entitled "Safeguards Regional System of ABACC: Experience and Cooperation".

62nd IAEA General Conference

International Seminar South America in the Nuclear Age

XLV Annual Meeting of the Argentine Association of Nuclear Technology

6th Week of Nuclear Engineering

LIST OF ABBREVIATIONS

ABACC	Agência Brasileiro-Argentina de Contabilidade e Controle de Materiais Nucleares
ABACC	Brazilian- Argentinean Agency for Nuclear Material Accounting and Control
IAEA	Atomic Energy International Agency
ANGRA 2	Nuclear Plant Almirante Álvaro Alberto – Unit 2
ANS	America Nuclear Society
ARN	Nuclear Regulatory Authority
ASTM	American Society for Testing and Materials
ATUCHA I	Nuclear Plant President Juan Domingo Perón
ATUCHA II	Nuclear Plant President Dr. Néstor Carlos Kirchner
CNEN	Nuclear Energy National Commission
COPPE/UFRJ	Institute Alberto Luiz Coimbra Post-Graduation and Engineering Research, from Federal University of Rio de Janeiro
DoE	U.S. Department of Energy
FFHC	Foundation Fernando Henrique Cardoso
I&D	Research and Development Facilities
INMM	Institute of Nuclear Materials Management
LAS	Latin American Section
NBL	New Brunswick Laboratory
NGSS	Next Generation Surveillance System
NMRORO	Nuclear Material Round Robin
SCCC	Common System for Nuclear Materials Accounting and Control
SEN	Nuclear Engineering Week
SJAR	Joint Audit ABACC-AIEA for Accounting Records
SNRI	Short Notice Random Inspection
SoH	State of Health
UF_6	Uranium Hexafluoride
UFSM	Federal University of Santa Maria
UMS	Unattended Monitoring System
VIFM	Verifier Integrated Fuel Monitor