Annual Report

ABACC

Annual Report 96

ABACC
Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials

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Ministry of External Relations

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National Nuclear Energy Commission
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Pedro Sajaroff
Member of the Board of Directors
National Nuclear Regulatory Body
alternate - Dan Beninson

(*) From November 1996, Minister Pedro Raúl Villagra Delgado, Director-General of International Safety, Nuclear and Space Issues of the Ministry of External Relations, International Trade & Religious Affairs, replaced Minister Enrique de la Torre as the Member in office for Argentina on the ABACC Commision.

Introduction

The activities of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials - ABACC developed satisfactorily throughout 1996, its fifth year in operation. The most important of this year's achievements were improvements in the implementation of coordination mechanisms between the International Atomic Energy Agency (IAEA) and ABACC, reflected in the document agreed between them setting the Guidelines for the Coordination of Routine and Ad-Hoc Inspections.

It is also important to stress among these achievements, with regard to ABACC institutional relationships, the start of negotiations over the signature of cooperation agreements with the IAEA and EURATOM.

On the basis of nuclear material verification activities carried out pursuant to the basic commitment in the Agreement between Argentina and Brazil for the Exclusively Peaceful Use of Nuclear Energy (Bilateral Agreement), following the procedures established in the Common System for Accounting and Control of Nuclear Materials - SCCC, ABACC did not detect any fact that might indicate any diversion of significant quantities of nuclear material for the fabrication of weapons or other explosive nuclear devices.

The Secretary

ABACC Secretariat - 1996

Jorge Antonio Coll
Secretary

Carlos A. Feu Alvim da Silva
Deputy Secretary

Technical Area

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Planning & Evaluation Officer

Marco Antonio Marzo
Planning & Evaluation Officer

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Operations Officer

Olga Mafra Guidicini
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Auxiliary Personnel
Luiz da Costa Gonçalves, Maria Isabel Reyes Gonzalez, Teresinha Curvelo, Maria Dilma, Marcolan Cosetti and Mauro Souza de Jesus.

Representation in Argentina

Camilo Eduardo Paganini

Osvaldo Alberto Cristallini

Institutional Activities

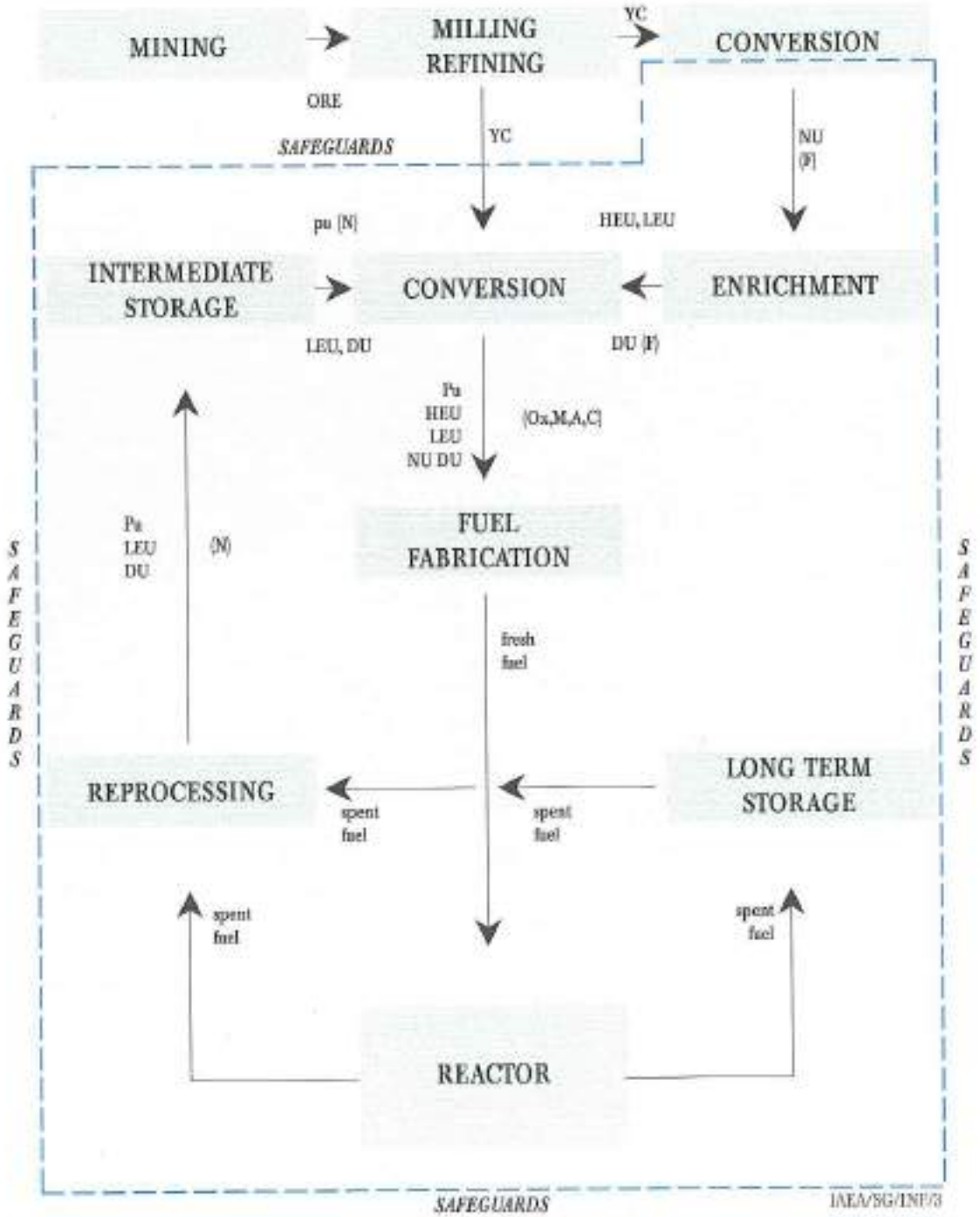
ABACC Commission

Institutional Activities of the Secretariat

Technical Cooperation

Participation in Congresses, Symposia & Seminars

Publications



YC: Yellow Cake
NU: Natural uranium
DU: Depleted uranium
LEU: Low enriched uranium

HEU: High enriched uranium
Pu: Plutonium
Ox: Oxide
N: Nitrate

M: Metal
A: Alloy
F: Hexafluoride
C: Carbide

*Common System for Accounting and Control of Nuclear Materials. Other abbreviations along this report, see page 32.

ABACC Commission

The ABACC Commission held three ordinary meetings and one extraordinary meeting during 1996, all at its head quarters in the City of Rio de Janeiro. At these meetings, the Commission took eight formal decisions, outstanding among them being:

The 1995 Report of the Secretariat was approved and, with the corresponding modifications, was forwarded to the Government of Brazil and the Government of Argentina as the Report of the Commission of ABACC for 1995.

One Argentine inspector and seven Brazilian inspectors were included in the list of ABACC inspectors and six Brazilian inspectors were removed therefrom. The qualification of one Brazilian inspector was altered to Consultant Inspector. The list of ABACC inspectors is given in the Chapter on Administrative Activities.

The resignation of Dr. Jorge Antonio Coll, a senior ABACC officer on the Argentine side, from the position he has held at the Secretariat since 1991 was accepted, and Dr. Elías Palacios was appointed as his replacement.

The Work Plan presented by the Secretariat for 1997 and its corresponding budget of US$ 3,050,000 were approved.

In the course of these meetings, the Commission also took under consideration the partial reports and four-monthly balance sheets submitted by the Secretariat and issued the corresponding guidelines for the activities to be carried thereby in relation to the application of safeguards and the implementation of the Bilateral and Quadripartite Agreements.

Through its minutes, the Commission formally transferred the position of Secretary of ABACC to Dr. Carlos Augusto Feu Alvim da Silva as from 12 December 1996, with Dr. Jorge Antonio Coll becoming the Deputy Secretary. As mentioned above, Dr. Coll will transfer his functions as Deputy Secretary to Dr. Elías Palacios in January 1997.

In November, Minister Enrique de la Torre was replaced as a Full Member of the ABACC Commission by Minister Pedro Raúl Villagra Delgado.

Institutional Activities of the ABACC Secretariat

Bearing in mind the validity of the Quadripartite Agreement as the safeguards agreement foreseen in the Treaty of Tlatelolco, to which Brazil and Argentina are signatories, the ABACC Secretariat forwarded to the Governments of these two countries two half-yearly declarations notifying them of the results of safeguards application activities. These declarations provide basic input for the respective Governments in the preparation of their reports to the Council of the Organization for Prohibition of Nuclear Weapons in Latin America and the Caribbean - OPANAL, in compliance with the provisions of the Treaty of Tlatelolco.

Implementation of Safeguards Agreements:

The Secretariat continued to negotiate the Facility Attachments with the IAEA and the corresponding National Authorities. In 1996, the Secretariat analyzed eight Facility Attachments, corresponding to four documents of Argentine facilities and four of Brazilian facilities. The observations resulting from this analysis were forwarded to the IAEA for consideration at the next negotiating meeting scheduled for early 1997.

In June 1996, a negotiations meeting was held with ABACC, the IAEA and the corresponding National Authorities. The main efforts during these discussions were focused on points common to all the Facility Attachments, on which no agreement has yet been reached.

Relations with the IAEA:

As established in Article 19 of the Protocol of the Quadripartite Agreement, the Liaison Committee consisting of representatives of the four signatories to the Agreement set up to assess and streamline the implementation thereof, held its annual meeting in August. At this meeting, in addition to taking under consideration topics at the operational level put forward by the Liaison Sub-Committee, the Committee also examined its own role and its representation within the context of the Quadripartite Agreement, the situation of the Guidelines for the Coordination of Routine and *Ad-Hoc* Inspections negotiated between the IAEA and ABACC, actions and measures under Part I of Program 93+2 of the IAEA for strengthening safeguards, the progress in negotiations of the Facility Attachments and problems related to termination of safeguards for nuclear

material. One of the outstanding points of this meeting was the decision to raise the level of representation of the Parties on the Committee. This decision should be formalized in early 1997.

In 1996, two planning level coordination meetings were held between ABACC and the IAEA. Provision is made for these meetings in the General Part of the Subsidiary Arrangements to the Quadripartite Agreement, with the purpose of coordinating ABACC/IAEA activities in the implementation of this Agreement. The principal outcome of these meetings was the entry into effect of the Guidelines for the Coordination of Routine and *Ad-Hoc* Inspections which is the initial step towards compliance with one of the basic postulates in the Agreement: to avoid unnecessary duplication of safeguard efforts among both organizations. Another result of these meetings was the decision to start up negotiations leading towards a cooperation agreement between ABACC and the IAEA which would regularize cooperation not linked to the implementation of the Agreement.

The ABACC Secretariat forged ahead with negotiations to define *ad-hoc* procedures for the application of safeguards in sensitive facilities, as the Facility Attachments for these installations are not yet in effect. The *ad-hoc* safeguards procedures for the Isotopic Enrichment Laboratory (LEI) *Laboratório de Enriquecimento Isotópico* in Brazil - one of the topics of the utmost importance in the application of safeguards by ABACC - was covered in various bilateral meetings (ABACC/IAEA) as well as trilateral meetings (ABACC/IAEA/ Brazilian National Authority). The technical details of this activity are described in the Chapter on *Technical Activities*. With regard to *ad-hoc* procedures for the Pilcaniyeu Enrichment Plant in Argentina, even though it had been agreed that they should be revised, it was not necessary to assign high priority to this topic in 1996, as this plant is not in operation at the moment. Notwithstanding, the procedures agreed for Pilcaniyeu in 1992 should be revised in 1997.

With regard to the coordination between ABACC and the IAEA needed to avoid unnecessary duplication of activities as mentioned above, the entry into effect of the guidelines for coordination of Routine and *Ad-Hoc* inspections reflected an important step forward. These guidelines are already being applied partially by inspectors in the field. However, at the moment this document covers instruments and equipment

to be shared, and fails to take the human resources factor into consideration.
The Secretariat will continue to do its utmost to improve coordination for human resources still further, as well as coordination inspection activities and identifying common validated equipment that will lead to reductions in the safeguards efforts of the IAEA and ABACC.

ABACC

ABACC and IAEA inspectors work together on maintenance of the *Fork Detector* equipment

Within this context, in 1996 a tripartite working group (ABACC/IAEA/Argentine National Authority) was set up to analyze the safeguards approach for the Embalse Nuclear Power Plant, whose basic purpose is to review and attempt to trim inspection efforts applied on this facility, while at the same time strengthening safeguards.
This group met twice in 1996, with the second meeting held at the facility itself during the transfer of spent fuel elements to the dry storage silos, in order to observe this process *in situ*. While continuing to analyze the activities required for the transfer of spent fuel to the storage silos and identifying actions which could constitute common inspection activities between ABACC and the IAEA, this group noted a substantial reduction in inspection efforts being applied, as a result of the two meetings held, and rationalization of these activities.

Inspection activities during 1996 carried out in a coordinated manner between ABACC and the IAEA, generally followed the inspections plan forwarded by ABACC to the IAEA the previous year, as stipulated in the Quadripartite Agreement. It is important to note that the meetings held prior to the inspection missions helped ensure that the inspection coordination was satisfactory throughout 1996. In September ABACC forwarded its 1997 Inspection Plan to the IAEA.

ABACC was invited to take part in the activities organized by the IAEA which involved checking the consistency of the

Initial Nuclear Material Declaration in both Brazil and Argentina.

The IAEA entered into consultations with the Member States with regard to the implementation of Part I of Program 93 + 2 for strengthening its safeguards. To this end, an IAEA delegation visited the National Authorities in both Brazil and Argentina as well as the ABACC headquarters in May. During the visit to ABACC, discussions were held over the implications of Program 93+2 and the need to define a role to be played by ABACC in the implementation of this Program. In August, the IAEA held other consultations meetings with the National Authorities to cover implementation of measures under Part I of the Program, particularly with regard to swipe sampling. ABACC also took part in these meetings. Additionally, ABACC was invited to participate as an observer in the meetings organized to prepare the Model Protocol covering the implementation of Part II of the above-mentioned Program. The Deputy Secretary attended these meetings in Vienna during the first two weeks of October.

Finally, in September the Secretariat was represented at the Fortieth General Conference of the IAEA where the ABACC Secretary made a statement.

Coordination with the National Authorities for implementation of the SCCC:

ABACC met twice during 1996 with the National Authorities individually, and also attended two trilateral meetings. These meetings assessed the state of implementation of the SCCC and discussed actions that could prove necessary for fine-tuning this system. The parties agreed that the SCCC is well implemented and operating efficiently. However, it would be appropriate for the General Procedures of the SCCC to be subjected to review in the near future, on the basis of the experience acquired to date.

The above-mentioned meetings were also the appropriate forum for analysis and solution of specific problems identified during the implementation of the system. Matters such as the availability of inspectors, coordination of the inspections plans and inspections in the field, forwarding and processing of accounting data, exemption and termination of safeguards in particular cases among others, are examples of specific activities that often found solutions during the meetings with the National Authorities.

With regard to adapting the Facility Attachments to the SCCC, the fact that it was not possible to agree on the wording of the Facility Attachments, blocked any progress in drafting possible annexes which, supplementing such documents, would constitute the Application Handbook established by the SCCC.

Technical visits to facilities:

In order to expand knowledge of the installations under ABACC safeguards, one of the Operations Officers of the Secretariat visited the CONUAR fuel fabrication plant and the UO_2 conversion plant at Córdoba, Argentina, while another Operations Officer carried out the same type of visits to the enrichment and fuel fabrication facilities in Brazil.

In September, the Deputy Secretary, a Technical Support Officer and an Accounting Officer visited the ultracentrifuge plants in Oak Ridge, USA, to discuss problems involved in the application of safeguards in enrichment facilities.

In order to obtain additional information on the ability of both countries to carry out swipe sampling analyses, the Secretariat officers visited the ENREN environmental analysis laboratories as well as the CNEA mass spectrometry laboratory in Argentina. In Brazil they visited the environmental analysis, mass spectrometry and trace detector laboratories of IPEN, the environmental analysis and mass spectrometry laboratories of CDTN and the environmental analysis laboratory of the IRD.

Advisory Group for Sensitive Facilities:

In 1996, the ABACC Secretariat continued to carry out a variety of activities designed to fine-tune the LEI and Pilcaniyeu *Ad-Hoc* Procedures prior to the meeting of the Advisory Group for Sensitive Facilities scheduled for the first semester in 1997.

Advisory Group for Non-Destructive Analyses (NDA):

The Advisory Group of the Secretariat for NDA met once in 1996. The Brazilian members of the group met first in September to analyze the reports produced by IPEN and the ABACC Secretariat on the calibration of the method for measuring material in *hold up* at the Pilcaniyeu plant.

The whole group met in November to discuss and define the few remaining steps required to complete validation of this method by the ABACC.

Technical Cooperation

With ENREN:

In March, ENREN and ABACC signed a cooperation agreement designed to regulate the cooperation between these two organizations, in order to foster an exchange of safeguards techniques, use of laboratories and equipment, and services of interest to both parties. Two activities projects for joint development were prepared: the first covers remote monitoring and the second complementation and enhancement of the measurement method for hold-up material at enrichment plants.

Still under the aegis of cooperation with ENREN, ABACC took part in upgrading the remote monitoring system for dry storage silos at the Embalse Nuclear Power Plant, as well as radar measurements carried out to prove the integrity thereof.

Both organizations worked jointly to design the inspectors course on records auditing and computerized inspection reports, the operators course for nuclear facilities and the seminar on remote monitoring described under the item on *Training & Qualification of Personnel*.

With CNEN:

Under the aegis of cooperation with CNEN, IPEN completed the report requested by ABACC on the model for calibration of the hold up measurement method for the Pilcaniyeu enrichment plant in Argentina. This study will allow ABACC to complete validation of the above-mentioned method.

ABACC also benefited from CNEN participation in experiments carried out at the CDTN and the Isotopic Enrichment Laboratory (LEI/CTMSP) to detect nuclear material on entry to the laboratory and behind the panels in the LEI cascades hall. These experiences are set out in detail in the chapter on *Technical Activities*.

Additionally, CNEN collaborated with ABACC in organizing courses held in Brazil, described under *Training & Qualification of Personnel.*

With CNEA:

Technical staff from the Bariloche Atomic Center - CAB - *Centro Atómico Bariloche* completed first version of a program commissioned by ABACC for processing remote monitoring data from the Embalse Nuclear Power Plant, which continues to be fine-tuned.

In August the Chairman of the Board of CNEA, Lic. Eduardo Santos, visited the ABACC headquarters.

ABACC Officers during a visit to the National Laboratory at Oak Ridge, USA

DOE/USA

With the DOE:

Its cooperation with the DOE was very important for ABACC during 1996, particularly due to the intensity of the activities carried out and the input of this department, fostering cooperation.

In September the group set up by the Cooperation Agreement between ABACC and the DOE to coordinate this project held its annual meeting in Washington, D.C., USA. On this occasion, all the activities carried out under this cooperation agreement were reviewed and the possibilities of starting four new projects based on environmental monitoring, data processing, transfer of spent fuel to the storage silos and nondestructive measurement systems were studied. The first two projects were approved, and are already in effect.

Cooperation activities with the DOE consisted basically of its participation in the courses organized by ABACC and in running seminars held in Argentina, Brazil and the USA, which are described under the item on *Training & Qualification of Personnel.*

The funding from the Non-Proliferation and Disarmament Fund (NDF) was basically used to acquire surveillance equipment, as

well as underwriting expenses incurred through courses and seminars scheduled under the cooperation activities agreed upon.

With the IAEA:

One of the most important points to be stressed within the sphere of cooperation with the IAEA in 1996, consists of the proposal to draw up a cooperation agreement between the two agencies, which is already under negotiation. This agreement will regulate cooperation between these two agencies in the areas of training, development of safeguards equipment and techniques, inter-comparison of laboratories and analyses results, information treatment and development of safeguards documentation. However, it should be stressed that this agreement is not limited to cooperation in these areas.

At the start of the year, one of the ABACC Technical Support Officers who has joined the Secretariat shortly before, carried out a technical visit to the IAEA installations to obtain information on safeguards methods and techniques under development.

The IAEA invited the Responsible for Institutional Relations of ABACC to take part in a course on State Systems of Accounting for and Control (SSAC) held in Saint Petersburg, Russia, during the second half of June.

In August, a technician from the Statistic Analysis Section of the IAEA Safeguards Department gave a lecture to the ABACC Secretariat staff on swipe sampling taking and analysis thereof. On this occasion, the exchange between these two agencies of the analytical results of inspections was also discussed, as well as quality control for the ABACC analytical laboratory network.

With EURATOM:

The same Technical Support Officer who paid a technical visit to the IAEA at the start of the year completed this trip with a visit to the EURATOM premises at Luxembourg, with the same purpose of gathering information on safeguards methods and techniques under development.

One of the Operations Officers visited the Joint Research Center of the European Economic Community at Ispra, Italy, in order to gather information on training activities carried out by this Center for EURATOM and IAEA inspectors. As a result of this visit, the possibility arose of

firming up a cooperation agreement between ABACC and EURATOM, whose wording is currently being discussed by these two organizations.

Others:

Through the *Commissariat à l'Énergie Atomique*, the French Government offered ABACC a six-month loan with purchase option for surveillance equipment developed thereby. This equipment should initially be installed at the ABACC premises for testing.

Through the Nuclear Material Control Center, the Japanese Government invited the ABACC Secretary to take part in the symposium on "*The Role of National and Regional Safeguards: Past, Present and Future*", to be held in Tokyo in early 1997.

Participation in Congresses, Symposia and Seminars

February

Conference on *Nuclear Non-Proliferation and the Millennium* and a seminar on *Regional Non-Proliferation Initiatives: The Latin American Experience*, held in Washington, D.C., USA.
Paper presented: *ABACC and the Regional Approach for the Application of Safeguards.*

March

Seminar on *Brazil, the Navy and Nuclear Power*, organized by the Brazilian Navy at Aramar, São Paulo, Brazil.

Coordination meeting on the *International Remote Monitoring Project*, held in Vienna, Austria, under the auspices of the U.S. Department of Energy (DOE).

April

Seminar on *IAEA Safeguards: Verifying Compliance with Non-Proliferation Commitments*, organized by the IAEA and OPANAL in Kingston, Jamaica.
Paper presented: *ABACC and the Status of Implementation of the SCCC and INFCIRC/435.*

May

Seminar *Latin American Rapprochement*, sponsored by the Institute for Science and International Safety (ISIS), at the Soreq Nuclear Research Center, Israel.
Paper presented: *ABACC: Designing and Implementing Bilateral Inspections in Brazil and Argentina.*

June

Symposium on Nuclear Radiation for the Development of Latin America, organized by the Latin American Section of the American Nuclear Society (LAS/ANS) at Veracruz, Mexico.

July

37th Annual Conference of the *Institute of Nuclear Materials Management - INMM*, held in Florida, USA.
Paper presented: *ABACC's Inspection System* and *Strengthening Regional Safeguards*, this latter co-authored jointly with technicians of the DOE/USA.
Meeting on the *International Remote Monitoring Project*, under the auspices of the DOE/USA, held in parallel to the INMM conference.

October

Symposium on *Science and Modern Technology* organized jointly by ESARDA and the INMM, at Arona, Italy, and a special meeting on regional systems sponsored by ESARDA.
VI General Nuclear Energy Congress organized by the Brazilian Nuclear Energy Association - ABEN - *Associação Brasileira de Energia Nuclear* (ABEN), in Rio de Janeiro.
Paper presented: *ABACC Inter-comparison Laboratory Program*

November

Symposium on *Competitiveness of Nuclear-based Electric Power over the Next Two Decades*, organized by the Argentina Nuclear Technology Association - AATN - *Asociación Argentina de Tecnología Nuclear* in Buenos Aires, and a round-table on safeguards costs.

Publications

The 1995 Annual Report and two editions of the ABACC News were published.
Preparations began for an ABACC Home Page on the Internet, as well as exhibition panels outlining the purposes and activities of ABACC.

Technical Activities

Nuclear Materials Accounting

Operations

Planning & Evaluation

Technical Support

Training & Qualification of Personnel

Nuclear Material Accounting

In 1996, the ABACC Secretariat received a total of 541 accounting reports from Argentina and Brazil, which were used by the Accounting area to update the ABACC accounting data base.

The Argentine National Authority forwarded 53 MBRs, 50 PILs and 1,357 lines of inventory changes (1,216 originals and 141 modifications). The average delay in forwarding was 76 days for the MBRs, 73 days for the PILs and 13 days for the original lines in the inventory change reports (ICRs). Eight MBRs, 10 PILs and 656 lines of inventory changes were received with no delay.

The Brazilian National Authority forwarded 44 MBRs, 42 PILs and 1,235 lines of inventory changes (1,074 originals and 157 modifications). The average delay was 45 days for the MBRs, 49 for the PILs and 31 days for the original lines (ICRs). Twelve MBRs, 12 PILs and 650 inventory change lines were received with no delay.

In comparison to previous years, a tremendous effort was noted from both National Authorities to improve the punctuality of the reports, particularly with regard to reports forwarded with no delay, although the total number of inventory change lines has increased considerably.

In compliance with the provisions of the Quadripartite Agreement, the ABACC Secretariat reviewed all reports forwarded by the National Authorities prior to forwarding them to the IAEA. The percentage of errors detected by ABACC in lines of inventory was approximately 5%. The percentage of errors detected by the IAEA was around 0.1%.

The Accounting Area cooperated with the Argentine National Authority for the tender for bids and receipt of nuclear material accounting software, which will handle the issue of accounting reports on an electronic basis, commissioned by ENREN to the INVAP company.

The first software module for magnetic data reading was finalized and the first trials were launched, with diskettes forwarded in December by Brazil and Argentina. These first trials were carried out successfully, allowing the diskettes to be read through a computerized process, updating the accounting data base and producing a

diskette containing the corresponding reports which was forwarded to the IAEA on an experimental basis.

At the start of the year, new forms were drawn up for auditing inspection records. The completion and handling of these new forms were covered in inspector courses held in Brazil and Argentina, as mentioned under the item on *Training & Qualification of Personnel*. The new forms are being used routinely during ABACC inspections and are proving appropriate for auditing records.

The list of facilities and LOFs subject to the SCCC and the Quadripartite Agreement was modified through the inclusion of one Brazilian facility and one Argentine LOF, whose DIQs have already been forwarded to the IAEA. The current list of facilities under ABACC safeguards consist of 40 facilities (17 Brazilian and 23 Argentine) and 29 LOFs (14 Brazilian and 15 Argentine).

Inspectors identifying the numbers on fresh fuel

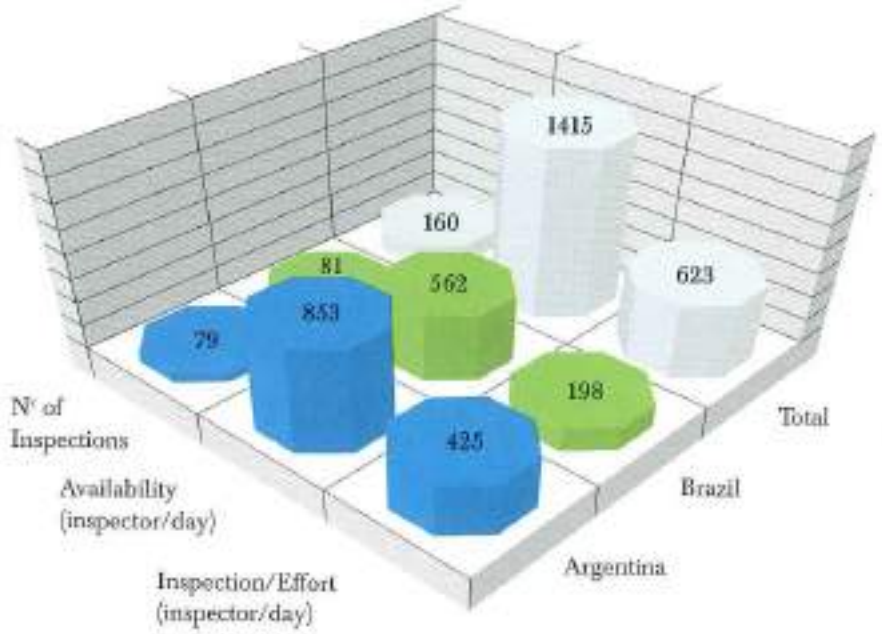
Operations

Inspection activities during 1996 were carried out as follows:

Type of Inspection (*)	Country	Nº of Inspection	Availability (inspector/day)	Inspection/Effort (inspector/day)
Design Information verification	Argentina	1	2	2
	Brazil	7	27	12
	Total	**8**	**29**	**14**
Physical inventory verification	Argentina	39	334	139
	Brazil	35	290	96
	Total	**74**	**624**	**235**
Interim inspections (**)	Argentina	18	244	120
	Brazil	27	191	66
	Total	**45**	**435**	**186**
Verification of spent fuel transfers	Argentina	8	252	154
	Brazil	0	0	0
	Total	**8**	**252**	**154**
Non-announced inspections	Argentina	0	0	0
	Brazil	2	44	16
	Total	**2**	**44**	**16**
Accompanying IAEA inspections	Argentina	13	21	10
	Brazil	10	10	8
	Total	**23**	**31**	**18**
Total inspections	Argentina	79	853	425
	Brazil	81	562	198
	Total	**160**	**1415**	**623**

(*) All inspections are *Ad-Hoc*

(**) Includes Verification of Transfers



The Inspection Handbook drawn up by the ABACC Operations Area is being fine-tuned with suggestions put forward by the inspectors themselves. However, the Handbook does not consist of a single compendium: specific sheets are used for each facility. The ABACC Secretariat decided not to impose rigid procedures that would limit the capacity of the inspectors to take decisions."

The inspection database is already in full operation. Its use by inspectors in preparing inspection reports speeds up this task considerably, as well as the inspections assessment process, by ensuring rapid access to facility data.

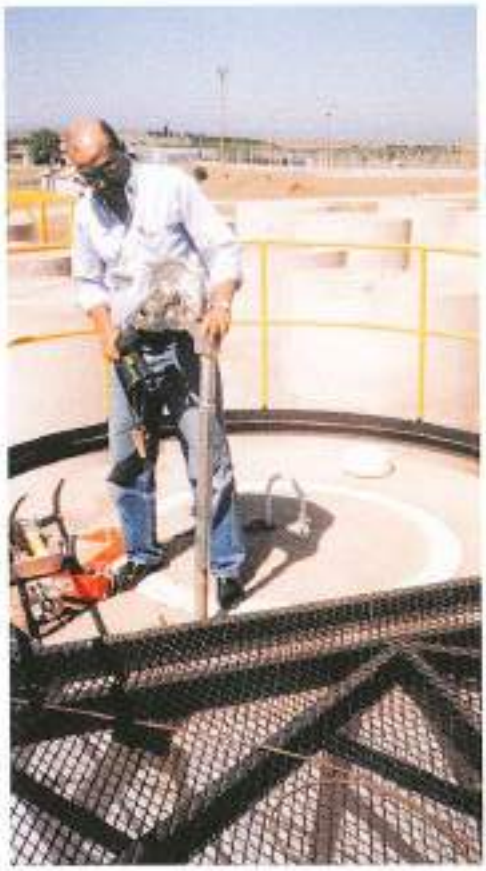
ABACC and IAEA inspectors identifying irradiated fuel

ENRIN

Planning & Evaluation

The routine task of inspection evaluation continued throughout 1996. In the course of the year, 110 *ad-hoc* inspections were carried out and the corresponding notifications forwarded to the National Authorities. Due to the delay in transporting various nuclear material samples collected, the evaluations of 51 inspections have not yet been completed. Nevertheless, the preliminary evaluations were satisfactory. The IAEA forwarded 63 evaluations of inspections carried out thereby, whose results are in line with the results obtained by ABACC.

ABACC inspector obtaining activity profile at storage silo, Embalse Nuclear Power Plant



ENREN

Under the tripartite working group activities program, whose members consist of technicians from ABACC, the IAEA and ENREN, set up to analyze the safeguards approach for the Embalse Nuclear Power Plant, the Planning and Evaluation area is preparing a study to fine-tune verification of spent fuel transfers to the storage silos at this Plant.

A draft safeguards approach was concluded, drawn up on a zone basis for the non-irradiated fuel cycle in Argentina, in order to enhance the efficiency and effectiveness of safeguards covering the material involved. This topic is under analysis by the Argentine National Authority.

The Planning and Evaluation area forged ahead with the consolidation of specific criteria for the application of the SCCC in relevant facilities. The specific approach for the Argentine fuel fabrication plant - CONUAR - and the Angra 1 Nuclear Power Plant in Brazil, is in the final stage of consolidation.

With regard to the safeguards approach for enrichment plants, a set of actions designed to ensure the feasibility of a perimeter control type approach for the LEI was developed jointly with the IAEA, CNEN and the facility Operator. The principal ABACC activities cover experiments on controlling perimeter entries and exists by means of optical surveillance and nondestructive measurements, as well as nondestructive testing to assess the potential for detecting nuclear material build up in the

LEI enrichment centrifuge cascades carried out as described below under the item on *Technical Support*. These actions follow an activities schedule agreed between ABACC, the IAEA and the Brazilian National Authority, and will continue to be taken under consideration during 1997.

The Planning and Evaluation area also took part in activities related to the implementation of the safeguards agreement, as well as coordinating activities with the IAEA and coordination with the National Authorities for the implementation of the SCCC, described under the Chapter on *Institutional Activities* in this report.

Technical Support

In order to fulfill requirements for verification and measurement of nuclear material as well as containment and surveillance, ABACC received the following equipment in 1996:

Verification & Measurement:

3 Monochannel analyzers
4 NaI(Tl) detectors.
2 Spectroscopy amplifiers
2 High-tension power sources for detectors
2 Power sources for amplifiers
1 Spectrum stabilizer
1 Pulser
1 Rate counter
1 Multichannel analyzer and replacement parts

Containment & Surveillance:

5 8mm Video-recorders.
1 VHS Video recorder
2 13" Video monitors
2 Portable Video monitors
2 GEMINI surveillance systems
1 GEMINI system review station
8 VACOSS optical seals
2 Portable programming and reading stations
1 Field kit for handling VACOSS seals

The following equipment is currently in the process of acquisition:

1 Liquid Nitrogen container with accessories
2 Automatic COBRA optical seal readers
Isotopic standards for calibrating spectrometers

With regard to the maintenance, infrastructure and support for inspections, the Technical Support area developed tools and accessories for certain items of equipment, drew up measurement procedures, continued to train inspectors in the use of equipment, calibrated nondestructive measurement equipment as well as maintenance thereof.

The radiological protection of inspectors continued to be controlled through measurement of doses received during inspections. This information is transmitted to the corresponding National Authorities.

During inspections carried out in 1996, 27 samples of nuclear material were collected. The results of the analysis of 18 of these samples have been received; 2 samples are currently being transferred and 7 are being analyzed.

With regard to the Laboratory Inter-Comparison Program, new stages were discussed during a visit by Dr. Irene Spaletto, from the New Brunswick National Laboratory (DOE/USA).
The Inter-Comparison Group responsible for coordinating this program met in December, when the parameters for the second exercise were defined, establishing the bases for preparing working isotopic standards; additionally, the possibility of expanding the ABACC isotopic analysis network was studied.

With regard to advanced containment and surveillance systems, such as remote monitoring, the ABACC Secretariat continued to receive signals from the sensors installed at the Embalse Nuclear Power Plant in Argentina. To handle this, the first prototype of the visualization software was installed, developed by CAB/CNEA for ABACC. Additionally, ABACC was invited to take part in updating the remote monitoring equipment at this Plant, as well as radar measurements to verify the integrity of the silos, carried out under the existing cooperation between ENREN and the DOE.

A provisional surveillance system was set up at the LEI in order to analyze the frequency

and duration of events associated with entry and exit to and from the enrichment centrifuge cascade hall, as well as identification of objects transported at this site. The purpose of this experiment is to determine the technical specifications (response time, storage capacity, etc.) that the definitive surveillance system must have. This activity also covered ongoing testing of the GEMINI surveillance system, acquired by ABACC this year.

With regard to the development of new techniques for verification and nuclear material measurements, in cooperation with the Operator and the Brazilian National Authority, ABACC carried out two series of gamma attenuation measurements at the Brazilian Navy Technological Center in São Paulo, in order to develop a method for detecting nuclear material entering or leaving the LEI enrichment centrifuge cascade hall. Other measurements were carried out in cooperation with the IAEA to assess the possibility of detecting nuclear material using neutrons and gamma radiation.

ABACC

Testing the Gemini surveillance equipment at ABACC facilities

Among the activities for certification of the method of determining nuclear material in hold-up at the Pilcaniyeu Plant in Argentina, the Technical Support area developed a methodology for calculating the calibration parameters, including the effects of the uranium load for the module and enrichment.

Additionally, with the cooperation of the Brazilian National Authority and the Operator of the facility, a series of measurements was carried out in order to establish reference values for the errors expected in determining enrichment through gamma spectrometry, on various types of enrichment cylinders. Within this context, measurements were carried out in Argentina to check the effects of aging on the material. The results obtained will be incorporated into ABACC procedures to be used by the inspectors in assessing the results of the inspection.

Training & Qualification of Personnel

A course on "Nondestructive Analyses of Nuclear Material" was carried out at the IPEN premises in São Paulo, Brazil, in March, attended by nine Argentine inspectors and ten Brazilian inspectors. Two ABACC Officers and two technicians from the DOE acted as instructors, stressing uranium enrichment measurements.

In May, two courses on "Audit Procedures - Code 10 and Computerized Inspection Reports" were also given by ABACC. The first course was held at IPEN, in São Paulo, Brazil, attended by twenty-six Brazilian inspectors. The second course was held at the ENREN/CNEA, premises in Buenos Aires, Argentina, attended by eighteen Argentine inspectors and one inspector from the IAEA as an observer. These two courses covered basic audit procedure concepts, the use of forms for auditing records, and the program developed by the ABACC Secretariat to prepare computerized reports and feed data into the inspection data base.

Instructors and participants in the course on audit procedures held at IPEN

ABACC

Two seminars on "Remote Monitoring" were held in cooperation with the National Authorities of Brazil and Argentina as well as the DOE; the first in May, held in Rio de Janeiro, Brazil, and the second in December, held in Buenos Aires, Argentina.

A seminar was held in December on "Information Treatment" at the ABACC offices, with two DOE technicians acting as instructors. ABACC invited representatives from CNEN, CTMSP, ENREN and CNEA to attend this seminar.

At the request of the Argentine National Authority, the ABACC Accounting area organized a course to train facility Operators in preparing accounting reports, according to the procedures stipulated in the SCCC and the Quadripartite Agreement. This course was held in October in Buenos Aires and Bariloche, in Argentina.

In April, two ABACC Secretariat Officers and one inspector took part in a seminar on environmental monitoring techniques, developed specifically for them by the DOE at the Oak Ridge and Pacific Northwest laboratories, in the USA.

In December, two Secretariat Officers took part in a qualification and training program on the use of the MORE review system for surveillance films, at the IAEA in Vienna, Austria. This system results in an appreciable reduction in time and effort needed for inspectors to compare films manually. On this occasion, the regions of interest were defined for this system, for each of the surveillance cameras at the Embalse, Atucha I and Angra I Nuclear Power Plants.

DOE/USA

ABACC Officers watch a demonstration of the swipe sampling technique

List of Abreviations

AATN:	Argentine Nuclear Technology Association
ABEN:	Brazilian Nuclear Energy Association
IAEA:	International Atomic Energy Agency
CAB:	Bariloche Atomic Center
CDTN:	Nuclear Technology Development Center
CEA:	*Commissariat à l'Énergie Atomique*
CETAMA:	*Comission d'Etablissement des Méthodes D'analyses*
CNE:	Embalse Nuclear Centre
CNEA:	National Atomic Energy Commission
CNEN:	National Nuclear Energy Commission
CONUAR:	Argentine Nuclear Fuel Fabrication Plant
CTMSP:	Technological Center of the Brazilian Navy in São Paulo
DIQ:	Design Information Questionnaire
DOE:	U.S. Department of Energy
ENREN:	National Nuclear Regulatory Body
ICR:	Inventory Change Report
INFCIRC:	Information Circular (IAEA) – (INFCIRC/435: Information Circular which has published the Quadripartite Agreement)
INMM:	Institute of Nuclear Material Management
INVAP:	*Investigación Aplicada S.E. (Argentina)*
IPEN:	Nuclear and Energy Research Institute
IRD:	Dosimetry and Radioprotection Institute
LEI:	Isotopic Enrichment Laboratory
LOF:	Location Outside Facility - any place where nuclear material is used or stored in quantities equal to or less than effective 1 Kg
MBA:	Material Balance Area
MBR:	Material Balance Report
NDF:	Non-Proliferation and Disarmament Fund
OPANAL:	Agency for the Prohibition of Nuclear Weapons in Latin America and the Caribbean
PIL:	Physical Inventory List
SCCC:	Common System for Accounting and Control of Nuclear Materials

Administrative/Financial Activities

Human/Financial Resources

Statement of Accounts

Human/Financial Resources

The administrative activities of the Secretariat, which consist of providing support for the functioning of ABACC and the implementation of inspections for control of nuclear materials progressed satisfactorily.

Outstanding among the principal administrative activities are the following:

- Presentation of the annual balance sheet certified by an outside auditor for the 1995 administration.

- Change in the company controlling the ABACC Secretariat accounting system, allowing it to bring its Asset Inventory Listing up to date and also update the corresponding depreciation thereof.

- Inter-linking the Secretariat computer network, as well as connections to the Internet.

- An inflow of US$ 2,926,392.03 as a contribution by the Argentine and Brazilian Governments to the ABACC budget.

- Receipt of US$ 400,000.00 from the Non-Proliferation and Disarmament Fund (NDF) for investment in staff training and equipment purchases, under the ABACC/DOE Cooperation Agreement.

Following the guidelines of the Commission, the Secretariat administered these funds in a manner that kept its expenses within its approved budget of US$ 3,050,000.00.

The ABACC offices in Buenos Aires, Argentina, moved to new premises made available by CNEA/ENREN, adapted to the requirements arising from inspections carried out in this country. Representation activities showed no problems, and progressed satisfactorily.

ABACC Inspectors

	Argentina	Brazil
Inspectors Consultants	Camilo Eduardo Paganini Eduardo Díaz Eduardo Francisco Santos Osvaldo Alberto Cristallini	Bernardino Coelho Pontes Fernando da Costa Magalhães Laércio Antonio Vinhas Orpet José Marques Peixoto
Inspectors	Alfredo Lucio Biaggio Alicia Jimenez Davila Analía Delia Saavedra Carlos Eduardo Rodriguez Carlos Daniel Llacer Daniel Hector Giustina Eduardo Jesús María Baldocchi Elena Maceiras de Jefimowicz Gustavo Alfredo Bustos Horacio Martín Lee Gonzales Hugo Albani Hugo Eduardo Vicens Jorge Alberto Chagaray Jorge Antonio Coll Jorge Omar Remedi Jorge Oscar Gomez Juan Carlos Cerisoli Juan Marcos Ferro Laura Beatriz Castro de Rossi Leonardo Juan Sobehart Lucia Isabel Valentino de Pereyra Luis Alberto Giordano Luis Alfredo Tomás Rovere Luis Rocchetti Marcelo Rojo María Liliana Mairal Mauricio Guillermo Bachoer Nazario Eduardo Alberto D'Amato Osvaldo Alberto Calzetta Larrieu Roberto Horacio Cesario Rubén Fernando Lavayen Rubén Osvaldo Nicolás Sonia Fernandes Moreno	Bertha Fleh de Araujo Carlos Augusto Feu Alvim da Silva Célia Chrissinani Paschoa Portoghese Claudio Luiz de Oliveira Cleber Lopes de Oliveira Cyro Teiti Enokihara Dulce Maria Daher Eduardo de Braga Melo Florentino M. Palácio Francisco de Assis Brandão Gevaldo Lisboa de Almeida Ivan José Tomazelli Ivan Santos João Batista Borges Joel Alvarenga de Souza José Afonso de Barros Filho José Araujo José Augusto Perrotta José Claudio Pedrosa José Glaucio Motta Garone José Henrique Barbosa Bezerra José Henrique Buchmann José Osmário Vieira Lima José Pontes Moreira José Roberto Tavares de Paiva José da Silva Guimarães Lília Crissiuma Palhares Luiz Antônio de Mello Marco Antonio Saraiva Marzo Maria Clarisse Lobo Iskin Olga Mafra Guidicini Orlando Ferreira Lemos Jr. Pedro Dionísio de Barros Roberto Stasiulevicius Sergio Gavazza Silvio Gonçalves de Almeida Sonia Valéria Gonçalves Vitorio Emilio da Silveira Nunes Walter Pereira

Statement of Account

on 31 December 1996 (values in US$)

1.	**Revenues**	**3,422,137.83**
	Brazilian and Argentine Government Contribution	2,926,392.03
	Other Contributions	400,000.00
	Financial Revenues	95,745.80
2.	**Expenses**	**2,834,011.30**
	Payroll	1,494,068.83
	Travels	666,937.22
	Technical Support	138,880.34
	Temporary Assistance	3,813.23
	Office	152,799.61
	Public Utility	68,846.02
	Vehicles & Transportation	25,773.31
	Contracted Services	153,533.77
	General	36,718.20
	Financial	6,379.13
	Technical Cooperation Agreements	86,261.64
3.	**Depreciations**	**135,515.63**
4.	**Investments during the year**	**217,514.62**
	ABACC-General	80,463.62
	Technical Cooperation Agreements	137,051.00
5.	**Pending Letters of Credit & Advances**	**123,884.66**
6.	**Year-End Balance**	**452,610.90**