IMPLEMENTATION OF A STRENGTHENED INTERNATIONAL SAFEGUARDS SYSTEM ABACC 15 YEARS

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- Introduction

The purpose of the paper is to explain how the system of a regional safeguard has been operating and developing in the framework of the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials (ABACC), and how the international recommendations of radiological protection must to be taken into account in the safeguards implementation and its impact in the international context.

The ABACC has been a dynamic system, which contributes worldwide in the application of the regional and international safeguards In 2006, the ABACC celebrated its 15th anniversary. The ABACC was created in 1991 in the framework of a Bilateral Agreement for the Exclusively Peaceful use of Nuclear Energy, the ABACC was created in order to apply the aforementioned system called "Common System for Accounting and Control of Nuclear Materials" (SCCC). During this time, the ABACC has grown in its implementation and has become a model in the application of regional safeguards that is recognized internationally.

The ABACC was the pillar to signed an Agreement between Argentina, Brazil, the ABACC and the International Atomic Energy Agency, called "Quadripartite Agreement", committed themselves to accept the application of safeguards to all nuclear materials in all the nuclear activities performed in both countries

The ABACC and the relevant implementing and supplementary agreements, set forth the conditions for the peaceful use of nuclear energy, the exchange of technical staff, the transfer of knowledge and international cooperation in a strong commitment to non-proliferation of nuclear weapons.

1- Implementation of Local Regulations in line with the International Non Proliferation Regime (SCCC).

On the basis of recognizing the sovereign right of every nation to have access to nuclear technology for scientific, technological, economic and social development of their inhabitants, at the end of 1980s, Argentina and Brazil reaffirmed their decision to provide mutual transparency to their nuclear programs. Both countries assume the commitment to use all nuclear materials and nuclear facilities exclusively for peaceful purposes

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It was within this context that they created the Common System for Accounting and Control of Nuclear Materials (SCCC) as a comprehensive bilateral safeguards system and the Brazilian Argentine Agency of Accounting and Control of Nuclear Materials (ABACC) as an independent regional body, in order to manage and apply it.

At the end of 1990s, the states parties and ABACC signed with the IAEA a comprehensive safeguards agreement based on the SCCC and on the INFCIRC/153 model. The application of a total safeguard system began when the Quadripartite Agreement entered in force in March of 1994.

The Quadripartite Agreement is the legal instrument that regulates the relationship between the States Parties, the ABACC and the IAEA. The essential part of the agreement is the Common System for Accounting and Control of Nuclear Materials (SCCC), in which on emphasis is made on the fact that ABACC and the IAEA are partner institutions that must work in a way to apply effective and efficient safeguards to nuclear materials.

2- Cooperation between the Regional System and the IAEA

Several points in the Quadripartite Agreement establish cooperation activities that must be performed with regard to nuclear safeguards. Following these directives, the ABACC and the IAEA have been working together in the development and improvement of safeguard approaches, in modern and secure communication systems, in inspector training and on the resolution of all the implementation problems detected.

The Argentine and the Brazilian authorities asked both agencies to coordinate their task, with the goal of an efficient management of the cost-benefit of safeguard activities. The cooperation within the framework of the Quadripartite Agreement is an on going activity and the success of a regional and an international safeguard system working together, relies on the good coordination between the parties.

3- Coordination between the National and the International Systems

International inspections are carried out in cooperation with the state counterpart, following certain fundamental premises as follow:

- The inspectors should know the radiation protection, safety, and physical protection procedures that have been implemented in the facilities being inspected.
- The inspectors should avoid the undue interference with the nuclear activities in the state.
- ABACC and IAEA inspectors should avoid the duplication of inspection activities in the field.
- The agencies should maintain confidentiality regarding the technological development information.

On the other hand, the state party assumes certain commitments that, in the particular case of Argentina, can be summarized as follow:

- The state should provide the administrative and technical support, in order to assure that either IAEA or ABACC inspectors should meet their inspection goals.

- The State party must provide access conditions that assures doses as low as possible -below the dose limits- and proper support under any potential dangerous or accidental situations.

- Both agencies should be informed in advance about any change in the current regulations or access procedures.

4- Regulation on Radiological Protection versus Safeguards Implementation

The national regulation in line with the international recommendations on radiological protection must be taken into account in the safeguard implementation. At the state level the responsibility is to preserve the fulfillment of international commitments, to update the nuclear material inventories as required and to evaluate the radiological risks and their impact on the safeguards activities and vice versa.

In the following examples we try to show the role played by the National Regulatory Body and the interaction, between the radiation protection national regulations and the safeguard implementation.

- Impact of Safeguard Activities on Radiation Protection Procedures

Following international regulations, each organization is the responsible to apply radiation protection controls to their inspectors. In this regards, each organization provides its own dosimeters and make arrangements for periodic whole body counting measurements to the inspectors, to record the corresponding doses and to detect any potential internal contamination.

In the Argentinean case, on despite of the effectiveness of the radiation protection controls implemented by each organization, an additional national surveillance is applied. Consequently, external radiation and internal contamination control by providing whole body counting, TLD personal dosimeters and excretes assays respectively can be requested, as applicable.

This procedure has been implemented in order to enable the state fulfill the responsibility assumed within the safeguard agreement and to detect, as soon as it is possible, any unexpected exposure or contamination problems that could arise in the Argentinean facilities during safeguards inspections. Even though these criteria reinforced the radiation protection controls, due to the previous coordination required, they represent difficulties on the coordination of the international inspections considering the new modalities that are being implemented.

Normally, for routine inspections the agencies provide the state party at least one week in advance notice concerning the arrival of the inspectors at the facilities and the activities to be carried out. However, a portion of these routine inspections can be performed on short notice or on unannounced basis with no more than 24 hours of advance notification.

Nowadays the short notice modality is becoming more frequently; consequently the regulatory body of Argentina has modified the radiation protection controls in order to avoid any undue interference with the ABACC and the IAEA activities.

In the framework of the responsibility assumed under the Quadripartite Agreement, the application of national regulations on individual monitoring has been reviewed in order to optimize the protection of international safeguard inspectors on duty. In this regard, excretes analysis is required on case by case basis, if applicable; whole body counting have been restricted just to those facilities handling irradiated material and TLD personal dosimeters are provided, as usual, at the beginning of the inspection program. The ARN has the right to require the international inspectors a non- routine measurement in case the results of the air and surfaces monitoring programs show abnormal results.

The immediate consequence of these modifications has been the successful implementation of the short notice random inspection regime in Argentina, during 2008, and an improvement of the cost effectiveness of IAEA and ABACC inspection effort.

- *Impact of Radiation Protection Regulation on Safeguards Activities.*

From the safeguards point of view, the remaining low enriched uranium content in the spent MTR fuel elements, can not be used directly for the production of nuclear weapons due to the low content on the isotope U235 and the irradiated status. Nevertheless, the safeguards criteria requires these spent fuels have to be periodically counted, identified and the irradiated status confirmed, in order to maintain the knowledge on the inventories of these type of nuclear material.

While these fuel elements are stored in the reactor pools, the access for verification purpose is normal and does not require any special arrangement. The situation drastically changes when items are sent to long term storage facilities with difficult access. Identification is not possible any more and the access to counting is highly dependent on the storage conditions.

The nuclear material is normally verified before being transferred to the long-term storage and the continuity of knowledge is maintained applying containment and surveillance measures. In spite of the fact that the results of the containment and surveillance measures were satisfactory, the inventory of nuclear material has to be periodically confirmed. Consequently, provisions should be adopted by the design to verify these items or the introduction of operational restrictions would be required to meet safeguards goals.

In the case of an old wet storage facility in Argentina, the fuel elements are introduced into underground wells filled with water. Up to two fuels elements can be introduced inside each well to meet the maximum capacity. The old design did not foresee the current verification requirements.

From safeguards point of view, the NDA measurements from the top of the well is adequate to confirm the irradiated status but do not allow counting of fuels inside the well.

Under the current conditions, ABACC has developed a methodology where the counting and the confirmation of irradiated status can be done through NDA scanning of the total length of the well. Unfortunately to do this activity is necessary the opening of the well from the top and the introduction of detectors inside it.

According the data recorded during the field test, the dose rate measured on the top of the well filled with two fuel element was higher than 5 mSv/h. The dose rate felt to less than 0.1 mSv/h when only one fuel was stored in the well. In addition, the risk to damage the surface of the fuels is high due to the small diameter and the limited space available.

Taking into account these facts, ARN has considered that remote handling is recommended to introduce detectors inside filled wells due to the high doses involved when maximum capacity is used. Consequently has taken actions on the operator and on the agencies to find an acceptable solution for all the parties involved.

On one side, ARN has requested the operator to store just one fuel per well while remaining capacity is available in order to optimize the doses. These conditions, complemented with surveillance and containment measurements do not require counting of fuels. The irradiated status can be confirmed through NDA measurement from the top of the well with detectors remotely handled. This practice is compatible with the radiation protection regulations and both agencies are able to meet their inspection goals. The problem is the operational restriction imposed.

On the other hand, the regulatory body has requested the ABACC and the IAEA to consider an improvement of the current technology as an alternative for the future, in order to remove the operational restriction in case is needed.

Finally, ARN has suggested the operator to speed up the conclusion of the new storage with an appropriate design to support all the safeguard activities without any impact on the radiation protection regulation.

- *Contribution of Safeguard Data to Nuclear Safety Controls and Environment Protection*

The common system of accounting for and control of nuclear material is a set of accounting procedures that requires the state members the development of accounting database systems. In Argentina, the regulatory body has implemented a central database and has assessed the operators on the implementation of complementary facility databases and record systems in order to fulfill the requirements of the regional safeguards system.

The accounting system implemented at facility level permits monthly updating of the inventories; provides traceable records on the waste materials and gives information on unmeasured losses or accumulated inventories in the case of nuclear material handling. In addition, the quality of the operator measurement system and the true physical values of these quantities can be confirmed at least once a year.

On spite of databases are restricted to nuclear material inventories and beside the use of this information for safeguard purposes, the reliability of these databases represent an important source of data for other regulatory activities like the licensing process and the radiation and physical protection controls. Effectively, through these data, the regulatory body is able to monitor the mass limit restrictions imposed by license, the dates of material transfers, the true inventories of nuclear material at the facilities and their waste discharges.

5- Conclusions

Even though the non proliferation regime contributes to build confidence and transparency between nations and consequently to protect the public and the environment from nuclear disasters, the verification activities have to be implemented under the framework of the universal principle of public, environment and workers protection against radiation effects.

The national regulatory body has the responsibility to require access to nuclear material under adequate radiological conditions. The current legal framework provides the legal tools to require corrective actions from the Operating Organization. On the other hand, the cooperation between the states, the regional system and the IAEA, allows the optimization of the technical capacity and economic and human resources in order to resolve the implementation difficulties and to provide credible assurance on non- diversion of nuclear materials.

The successful application of the SCCC, the atmosphere of mutual confidence and cooperation between the state members, ABACC and the IAEA, show an effective contribution to the nuclear non-proliferation regime in South America. In addition, safeguard data, verification activities and containment - surveillance measures applied with safeguard purposes, introduce additional restrictions to the access, and to any unauthorized use or movement of the nuclear materials. These actions strengthen the protection of the environment and public with an effective control on the inventories of fissile material and irradiated fuel elements.

The on going debate worldwide on the definition of energy policy centered on competitiveness, security of supply and environmental concerns provides an opportunity to consider regional coordinated actions. The Brazilian-Argentine initiative in the nuclear non-proliferation field can be taken as an example for the new challenges, in particular those related with the protection of the health and the environment.