

CONSIDERATIONS ON THE ROLE OF RSAC AND SSAC ON INTEGRATED SAFEGUARDS

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ABSTRACT

Integration of Regional and State Systems of Accountancy and Control into the international safeguard's system is one of the recognized tools to increase the safeguards effectiveness and efficiency. Suggestions on potential actions for increasing integration of Regional or State Systems into the international safeguard's system are presented. The activities performed by RSAC/SSAC Systems that could be used by the IAEA without losing confidence and independence are analyzed. The concept of safeguards credibility of RSAC/SSAC Systems, the use of quality assurance and auditing techniques as features of enhanced cooperation and the benefits of using RSAC/SSAC system are discussed.

INTRODUCTION

The integration of Regional or State Systems for Accountancy and Control (RSAC and SSAC) into the international safeguards is not completely new in nuclear verification. The INFCIRC/153 and others comprehensive agreements stated that IAEA should make full use of RSAC/SSAC. Nevertheless, until now the IAEA safeguards system practically does not take advantage of the existing RSAC or SSAC and, even more, almost no mechanisms for considering their activities is foreseen in the current IAEA Safeguards Criteria. With the new measures of the Additional Protocol the development of the concept of integrated safeguards system is gaining momentum and the reconsideration of the relationship between the IAEA and RSAC/SSAC becomes more important.

This paper describes activities that can be performed by a RSAC or a SSAC in the framework of an increased integration into the international safeguards system. In particular, the paper discusses aspects of the evaluation of RSAC/SSAC, the application of quality assurance techniques by the IAEA and how the safeguards activities of the RSAC or SSAC can be used in an integrated system.

THE ROLE OF RSAC AND SSAC

The integration of a RSAC or SSAC safeguard's system into the IAEA international system must be logically based on the existence and maintenance, by the States or the State, of a credible safeguard's system of accounting for and control of nuclear material. Such a RSAC or SSAC safeguards system should embrace at least the following main areas:

- Information on nuclear facilities, nuclear material inventories and inventory changes;
- Accountancy system;
- Technical capacity and legal authority to verify the information provided by the Operators or States, including to the extent necessary the construction, operation and decommissioning of nuclear facilities
- Appropriate access to declared nuclear facilities and nuclear materials.

The activities developed under the on going co-operation are mostly based in provision of information by SSAC.

The IAEA evaluation of the credibility of any RSAC or SSAC must be first based on objective elements. Among the list of objective elements to be considered we have: the legal basis of the RSAC or SSAC; its structure and independence; the number and quality of the personnel involved, and the correlation between personnel/budget with the nuclear activities controlled. In principle, it seems that the IAEA can easily generate an evaluation program based in objective elements and, in fact, a questionnaire was circulated to RSAC and SSACs, for submission in recently years, that seems to be aimed at to carry out this kind of objective evaluation.

A second step in the evaluation of a RSAC or SSAC system for considering its possible degree of integration into the international safeguards' regime would include less objective elements. Of relevant importance into these less objective elements are how much confidence would provide an IAEA quality assurance system on its credibility, and how much confidence can the IAEA get from the application of the measures foreseen in the Additional Protocol. In principle, it seems that for a multinational system (i. e. a RSAC) it would be easier to evaluate these less objective elements. A Regional System arose as results of the political commitment of more than one country to non-proliferation and, therefore, is less subjected to political changes in a given country.

Regarding the integration of a RSAC or SSAC in the international safeguards system the following points should be noted:

- In the present IAEA Safeguards Criteria it is not foreseen an integration between the international safeguards scheme and regional or state ones.
- These Criteria were developed and are intended for a uniform application worldwide, while as results of the consideration given above some differentiation could appear among States as results of differences in the quality or credibility of RSAC or SSAC.
- The Criteria are being applied in a mechanistic basis and does not allow for modifications aimed at covering particular fuel cycles in a more efficient way.
- The Criteria are in fact a set of well defined safeguards activities aimed at fulfil safeguards objectives not described in the document and, therefore, it is usually not easy to correlate the safeguards activities prescribed with the diversion scenarios covered by these activities.

Note: These limitations of the structure of the Criteria are reflected, inter alia, in the present difficulties for the harmonic incorporation of new technologies such us remote monitoring or environmental sampling.

In the context indicated, the current integration of a RSAC or SSAC into the international safeguards system is mainly limited to a few areas, like common use of safeguards' equipment and

the reduced cost saving on verification measurements associated to this. The international community is asking to rethink the whole international system as to allow a more rational integration of safeguards activities after the entry into force of the Additional Protocol and, for doing that, several aspects must to be reconsidered.

What is probably more important is that some basic documents should be prepared and made available for the appropriate reconsideration of the international system, in particular:

- a) A complete description of the safeguards objectives that are intended to be covered by the current IAEA Safeguards Criteria. Such a description would allow to consider alternative safeguards activities for covering these objectives and facilitate the proper introduction of new safeguards tools, either because of new techniques (e.g. remote monitoring, environmental sampling) or because use is made of RSAC or SSAC resources.
- b) A scheme of the rules and criteria to be used for evaluating the objective elements of an RSAC or SSAC. This will allow both the IAEA to consider the eventual “delegation” of some verification activities and the RSAC or SSAC to consider improvements of its system for a better inclusion into the integrated scheme.
- c) A summary description of the basic rules that would be used to consider the less quantitative elements that shall be considered for evaluating the credibility and effectiveness of RSAC and SSAC. This will allow the States and the RSAC or SSAC to understand logical differences in the application of the integrated system to similar facilities as well as to promote changes aimed at increasing credibility and effectiveness of the local system.
- d) A summary description of the basic scheme of the quality assurance program to be used by the IAEA to confirm, on a continuous basis, that the RSAC or SSAC maintains its initial level of credibility and effectiveness. And, to the extent necessary, the use that will be made of the measures foreseen in the Additional Protocol to this end. This will allow the States and the RSAC/SSAC to be prepared for an extensive integration. It should be noted that an increase integration would imply, inter alia, the presence of IAEA inspectors at the RSAC or SSAC headquarters for long periods of time or the suddenly incorporation of an IAEA Inspector to an ongoing RSAC/SSAC inspection at a given facility.
- e) A tentative schedule of how the current IAEA safeguards activities will be modified as the Additional Protocol entries into force, its measurements are implemented and the RSAC/SSAC evaluation is being satisfactorily completed. This will allow the international community to have a tentative picture of the transition between the present safeguards and a fully implemented integrated system.

INTEGRATED SAFEGUARDS

Integrated safeguards have been defined as the optimum combination of all safeguards measures available to the IAEA, which achieves the necessary effectiveness and the maximum efficiency, within the available resources, to fulfil the IAEA obligations. With this general definition it is not a surprise that different persons expressed dissimilar ideas on how to integrate safeguards. In fact, these differences reflect basic assumptions not always explicitly indicated. In this paper, in dealing with an integrated safeguards system the following assumptions are made:

1. - The IAEA will have an appropriate procedure to evaluate the objective elements of a RSAC or SSAC in order to assess its initial effectiveness.
2. - The use of the less objective elements described above in conjunction with the application of the Additional Protocol will allow the IAEA to confirm the continuous credibility of the RSAC or SSAC.
3. - The application of an appropriate quality assurance program will allow the IAEA to confirm the continuous effectiveness of such a system.
4. - The RSAC or SSAC will accept the IAEA auditing activities and both the system and the State or States that support it will be prone to introduce improvements to increase the effectiveness and credibility of such system.

If assumptions 1 to 3 are valid and the RSAC or SSAC is willing to fulfill the 4 assumption, then an increasingly integrated system can be considered. In considering such a system, a gradual implementation must be planned, inter alia, to consider the transition period that would start when the Additional Protocol enters into force.

Considering the time frame, in a short time after the entry into force of the Additional Protocol the Agency should be able to implement all activities necessary to satisfy assumptions 1 to 3 and to reach an agreement with the RSAC or SSAC on the initial scheme of auditing activities. After this period, for instance of one year, the increasing integration of the RSAC or SSAC would start.

A possible schedule of gradual integration is described below (feedback and adjustments should happen after each step).

- Subjected to the appropriate Quality Assurance (QA), fully “delegate” on the RSAC or SSAC the control of LOFs and small facilities like critical assemblies or small research reactors;
- Subjected to the appropriate QA, fully “delegate” on the RSAC or SSAC the interim inspections to the facilities that produces or process indirect use material (like conversion and fuel fabrication plants and related storage);
- Subjected to the appropriate QA and credibility acceptance, “delegate” some activities in facilities for enrichment or reprocessing as well as all direct use material.

When considering the activities to be delegated the IAEA should take advantage of new technologies and bear in mind that significant improvements may be achieved in the following areas:

- **Accounting System** - Nowadays with the easy and secure communications by electronic media it seems possible a near real time transmission of accounting data between the RSAC/SSAC and the IAEA. The provision and pre-checking of accounting records for IAEA examination would reduce the inspection effort.
- **Nuclear Material Verification** – As stated above, in given conditions most of the inspection activities may be carried out by the RSAC or SSAC System (enrichment and reprocessing would deserve special consideration). The Agency inspectors may, in an unannounced basis, joint the RSAC/SSAC inspectors or eventually carry out a fully independent inspection, but these IAEA

inspection activities shall be aimed at to confirm the effectiveness of the RSAC/SSAC system rather than to verify the nuclear material.

- **Containment and Surveillance Activities** - With the development of remote monitoring, if the IAEA and the SSAC/RSAC have arrangements on the application of these new tools, the system will allow the IAEA to reach safeguards conclusion without visiting the facilities. In defined conditions the servicing of the RM and C/S systems may be performed by SSAC/RSAC. The right coordination of the application of these technologies envisaged important savings and should be of particular importance in dealing with enrichment and reprocessing plants and power reactors.
- **Joint Use of Equipment** – The common use of safeguards equipment is a main advantage to avoid unnecessary duplication of safeguards activities. In addition to save manpower, the safeguards organizations together can procure common equipment, evaluate the equipment performance, and share the inspector's training.
- **Using Selective Criteria for Safeguards Implementation** – Verification of indirect use material could be done randomly, using the RSAC/SSAC verification as the steady process, the IAEA concentrating its efforts in the verification of direct use material and enrichment and reprocessing facilities.

QUALITY ASSURANCE AND AUDICTING TECHNIQUES FOR RSAC AND SSAC: PERFORMANCE EVALUATION

The integration of a RSAC or SSAC safeguard's system into the IAEA international system, as proposed in this paper is strongly dependent of QA. The IAEA should have confidence on the verification and information from a State or Regional System when utilizing their data and conclusions. For this purpose, the IAEA should establish requirements that the RRSA/SSAC have to accomplish and implement a QA program.

This is presently a very useful mechanism for an organization to certificate the design, process and final product of suppliers. It is not uncommon for one customer to assess different suppliers, having these suppliers different levels of technical and process production. As result of this assessment, the customer can guarantee the service or product received. The same relationship may be established between the IAEA, as a customer, and the RSAC/SSAC as suppliers.

This type of a system has a successful record of implementation, and in fact it was originated in the nuclear and space areas, where the customers have to guarantee standardization and quality from a large variety of services, data, equipment, etc. The same concept applies when dealing with accountancy where in the financial area it has been proved to be feasible. Assessment Systems like the ISO having been successfully implemented worldwide and are became more and more used in several fields.

The assessment of safeguards systems should be composed of the usual major phases:

- Quality System Documentation Review, which will determine whether the RSAC/SSAC quality system (through its Manual) meets the IAEA requirements;

- On-site Audit, which will determine the degree and effectiveness of the implementation of the quality system at RSAC/SSAC;
- Analysis and Report, which will be used to determine the conformance of the RSAC/SSAC with the proposed quality system that meets the IAEA requirements.

The IAEA requirements may change, depending upon the experience, technical expertise, organization and implementation of the RSAC/SSAC.

For the safeguards assessment system, the IAEA could act as the accredited body performing the accreditation of the State or Regional System and permanent auditing inspection of these systems. The assessment system should enclose a Second Party Assessment Methodology, an auditing process methodology and an evaluation process for RSAC/SSAC and performing measures to qualify the technical level, the experience and the credibility of the RSAC/SSAC system being evaluated, should be available and discussed and analyzed. The concept of credibility is discussed below.

Many national and international organizations have a large experience in quality assurance systems, and many accredited bodies may help to implement the quality system in the RSAC/SSAC. In the same way, the IAEA should improve the capability to:

- support the RSAC/SSAC System to satisfy the guidelines and requirements specified by the IAEA;
- analyze and audit the quality system in use;
- have trained inspector staff to perform auditing in the field

The application of proper quality assurance techniques on the SSAC/RSAC systems will allow the IAEA to draw independent conclusions.

RSAC AND SSAC CREDIBILITY ASSURANCE

The assessment of the structure and quality of the RSAC or SSAC System shall be complemented by the evaluation of its reliability and credibility in the context of international safeguards. This means that, beyond any assessment or checking methodology, the RSAC/SSAC should be evaluated considering factors that give confidence to work in a partnership basis. Trying to give grading or subjective evaluation for Safeguards Systems credibility is a cumbersome task. There is no specific rule to proceed in this evaluation. Many factors are important on the process of building credibility and reliability. Nevertheless, they are related to the following characteristics:

- Technical capability of the organization operating the safeguards system;
- Organization's experience in applying safeguards;
- Independence of the organization managing the safeguards system;
- “De facto” political enforcement of the Safeguard System implemented.

Technical capability of the SSAC/RSAC System acts as a fundamental system characteristic to be analyzed. The higher technical capability the organization has the easier will be its acceptance. Points to be examined are the technical qualification of the staff, inspectorate background and experience, controlling and management systems implemented, equipment available and technical

support. Experience in applying safeguards usually will be a function of the system size and time of functioning.

Independence of the organization in managing the safeguards system resembles the capacity of the SSAC/RSAC System to manage the safeguards not directly driven by political issues by the State(s). On a scale that resembles the independence level of the RSAC/SSAC System, the following sequence in ascending independence grade can be envisaged:

- SSAC in states where the majority of nuclear activities are State manage;
- SSAC in states where the majority of nuclear activities are Private Company manage;
- RSAC with partnership of few countries;
- RSAC with partnership of many countries.

“De facto” political enforcement of the Safeguard System means the power and importance of the decisions from the organization managing the safeguards system, through the State(s) forum, with other international organizations.

Using the ideas stated above would support to make a frame on the evaluation of the credibility assurance of RSAC/SSAC on the integrated safeguards.

FINAL CONSIDERATIONS

With the new measures of the Additional Protocol the concept of integrated system becomes more essential. The integration of a RSAC or SSAC safeguard's system into the IAEA international system is a relevant part of this concept. The IAEA evaluation of the credibility of any RSAC or SSAC should be based firstly on objective elements. The inclusion of less objective elements for this evaluation should also be considered. All these elements should be documented and available for consideration by the concerned organizations and the international community.

Gradual implementation of the integration of a RSAC or SSAC system into the international system after the entry into force of the Additional Protocol seems to be a reasonable approach.

Application of Quality Assurance Program seems to be an appropriate tool to be used by the IAEA to assess the RSAC or SSAC system.

REFERENCES

- [1] IAEA: Model Protocol Additional to the Agreement(s) Between States and the International Atomic Energy Agency for the Application of Safeguards. INFCIRC/540, September 1997.
- [2] IAEA: Treaty on the Non-Proliferation of Nuclear Weapons, INFCIRC/140, April 1970.
- [3] IAEA: “ The Agreement between the Republic of Argentina, the Federative Republic of Brazil, the Brazilian-Argentine Agency for Accounting and Control of Nuclear Materials and the International Atomic Energy Agency for the Application of Safeguards”, INFCIRC/435, IAEA, Vienna, March 1994.

- [4] IAEA: Experts Group Meeting on Integrated Safeguards Working Paper – SAR-28, Vienna, September.1998.
- [5] IAEA: REPORT – Consultants Meeting on Integrated Safeguards – SAR-29, Vienna, December.1998.
- [6] Andrew, Graham. “Safeguards – Changes and Challenges”, INMM Vienna Chapter, Vienna, November.1997.