

CHALLENGES IN IMPLEMENTATION OF SAFEGUARDS IN SQP STATES: THE CASE OF CAMEROON

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Abstract. For States with less than specified minimal quantities of nuclear material and no nuclear material in a facility, some of the measures for verifying compliance with the Comprehensive Safeguards Agreements (CSA) are held in abeyance, through a mechanism called the Small Quantities Protocol (SQP). As time passed, and based on lessons learned from challenges that IAEA safeguards faced in the meantime, it became clear that the original text SQP had limitations that posed significant risks with regard to the objectives of the CSA. The main limitations in the original text SQP was that the IAEA was unable to verify that a State met or continued to meet the eligibility criteria for SQP. Adoption of the modified text of the SQP is done a voluntary basis. Nevertheless, there are still many challenges to the implementation of safeguards agreements in SQP countries (whether their SQP is the original text or the modified text). In the case of Cameroon, these challenges, inter alia, are related to the development of the regulatory framework for safeguards implementation, the establishment of an effective SSAC, and communication with national stakeholders, particularly with regard to collecting information required for reporting under the CSA and Additional Protocol (AP). The government of Cameroon has taken some measures to address these challenges – such as the promulgation of a nuclear law, the creation of a working group, a notification system, and a partnership with customs authorities in order to enhance accountability for the import and export of nuclear materials. However, the lack of regulations and sufficient safeguards training of SA staff and other stakeholders, as well as the lack of appropriate equipment for nuclear material accountancy and verification are important challenges that requires more attention. It is proposed that Cameroon work with the African Commission on Nuclear Energy (AFCONE) as an African regional body in order to benefit from the good practices and experience of other SQP States in the region/continent.

I. Introduction

Comprehensive Safeguards Agreements (CSA) are in force in more than 178 States, 94 of which possess little or no nuclear material and only limited nuclear activities. These 94 States have an annex to their CSA called a Small Quantities Protocol (SQP). The purpose of an SQP is to minimize the burden of safeguards activities on both the SQP States and the Agency. The modified SQP ensures that notwithstanding the minimization of safeguards activities, the IAEA's safeguards conclusions for SQP States are soundly based VIII. **Conclusion**

The modified SQP has compensated the weakness of the original SQP, however implementation difficulties remain due to the lack of sufficient training of licensees in reporting to the State Authority, and Implementing safeguards, as well as the lack of appropriate equipment available to the State authority for verification. There are also challenges with the delay of the promulgation of regulations to implement the comprehensive law, and best practices in nuclear material accountancy are not being implemented. In addition, the State authority tends to focus mainly on radiation safety. Many recommendations have been made, but one of the most important is that the State should work more closely in the regional context, through the African Commission on Nuclear Energy (AFCONE), in order to benefit from sharing best practices and experiences with other countries with a similar nuclear profile.

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The authors would like to thank the general management of the National Radiation Protection Authority (NRPA) of Cameroon and the staff involved in the implementation of nuclear safeguards, in particular Samba Ndi Richard and Mangwi Cécile for their assistance in providing information on Cameroon's SSAC. We are grateful to the organizers of this meeting, IMNN - ESARDA, for this great opportunity, and the African Nuclear Energy Commission (AFCONE) for its support.

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: IAEA Service Series 22. It reduces the safeguards implementation effort on both the State and the Agency through suspending some provisions in Part II of the CSA.

Cameroon is an African country. Its geographical location and history have allowed it to develop certain governance and development strategies. A law promulgated by the head of State governs the nuclear field and some agreements are established between the State and the International Atomic Energy Agency. A system for the implementation of these agreements is established. Nuclear and radioactive materials in Cameroon are used for many purposes in medicine especially in Radiotherapy, in industry as in radiography, nuclear gauging and in Research and Teaching.

Through an exchange of letters with the Agency on 15th July 2019, Cameroon adopted the modified SQP after adopting the “original standard text” which entered into force with Cameroon's CSA on 17th December 2004. Cameroon also has an Addition Protocol (AP) in force since 29th September 2016 and periodically submits AP declarations to the IAEA. The initial declaration was submitted on 27 Mars 2017. A system for the accounting and control of nuclear materials has been established through a working group that brings together all the stakeholders. The promulgation of the nuclear act is the major contribution for the implementation of nuclear safeguards but challenges remain in order to respond appropriately to the obligation of nuclear safeguards agreement signed with the Agency.

II. Small Quantities Protocol

There are currently two types of SQPs: SQP based on the “original standard text” which was adopted in 1974 and SQP based on “modified standard text” approved by the board of Governors in 2005.

II.1 Original SQP

The IAEA Board of Government agreed in 1974 the original standard text of SQP. It was entitled “The Standard Text of Safeguards Agreements in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons” - GOV/INF/276 see appendix. This text presented the changes that could be made to the standard text of INFCIRC/153 type safeguards agreements. These modifications took the form of a protocol, usually referred as a “Small Quantities Protocol” (SQP) which could be incorporated into CSAs.

An original SQP State, i.e State whose SQP is based on the original standard text, should meet the following eligibility criteria:

- Little or no nuclear material and;
- No nuclear material in a nuclear facility.

The effect of an SQP was to hold in abeyance the implementation of most of the detailed procedures of comprehensive safeguards agreements (CSAs) as long as the State concerned satisfied those criteria.

The obligation of establishing and maintaining cooperation with the IAEA required the SQP States to establish a point of contact and a channel of communication. The original SQP required the State to notify the IAEA at least 6 months before the introduction of nuclear material into the facility. So an original SQP State is allowed to have an existing nuclear facility but not provide the Agency with design information so long as there was no nuclear material is not introduced into the facility.

Among other limitations, the original text SQP withholds the IAEA ability to conduct verification activities in the field, such as inspections and design information verification. So the Agency could not verify the continued eligibility of the State for SQP status. SQP State does not required to submit an initial report on the types and quantities of nuclear material subject to safeguards. Due to these limitations, the Board of Governors (BoG) of the IAEA approved the modified standard text of the SQP in 2005. Since then, States with original-text SQPs are encouraged to modify (or to rescind) their existing SQPs Yana Feldman, Justin Reed, Margaret Arno, George Anzelon; Prioritizing Safeguards Implementation in Small Quantities Protocol (SQP) States through an exchange of letters. Also, any State with an existing SQP that has a facility, or has decided to construct a facility is called to rescind its SQP and any new State with a SQP statute would be required to follow the modified standard text.

II.2 Modified SQP

The modified SQP adopted in 2005, reduced the number of provisions of the SQP which were held in abeyance and raises the amount of safeguards obligations that a SQP State is required to fulfil, even if it has not yet acquired significant nuclear capabilities. The eligibilities criteria (GOV/INF/276/Mod.1) for a state to be qualify as a SQP's State became:

- Minimal or no nuclear material and;
- No existing or planned nuclear facility.

As with the original SQP, the modified SQP still holds in abeyance many of the State's obligations. Not-held in abeyance is obligation for the modified SQP State to provide an initial report on nuclear material. This report should be sent to the IAEA within 30 days after accepting the modified SQP. After this report the IAEA has the right to conduct inspection. The State should also inform the IAEA as soon as the decision is taken to construct a nuclear facility.

III. Safeguards Implementation in Cameroon

Member State of the IAEA since 13th July 1964, Cameroon ratified the Treaty on the non-Proliferation of Nuclear Weapons (NPT) on 8 January 1969 and concluded a Comprehensive Safeguards Agreement (CSA) with the IAEA on 21 May 1992, which entered into force on 17th December 2004. As Cameroon has minimal nuclear materials and no nuclear facilities its CSA included the original standard text of the Small Quantities Protocol (SQP), INFCIRC/641. This original SQP was amended through an exchange of letters amended its SQP on 15th July 2019 INFCIRC/641/mod.1 to the modified SQP. Since 17th December 2004, Cameroon signed the Additional Protocol (AP), INFCIRC/641 Add.1 which entered into force on 29th September 2016 **Erreur ! Source du renvoi introuvable.** As required on article II of the AP, Cameroon submitted its initial set of AP declarations on 27 March 2017. Since then, Cameroon submits quarterly and annual updates.

Cameroon has only small quantities of nuclear material and these are only in locations outside facilities (LOFs). Mostly depleted uranium used as shielding for radioactive sources. Nuclear materials are found in Non-Destructive testing activities, at radiotherapy centers, and at oil drilling companies. There is no nuclear facility in Cameroon.

III.1 Overview of Legal/Regulatory Framework for safeguards

The initial Act related to nuclear/radioactive materials in Cameroon, is the law N°95/08 on radiation protection dated since 1995. The purpose of this Act is to ensure the

protection of persons, property and the environment against risks that may arise from the use of radioactive substances or from the exercise of an activity involving radiation exposure; it regulates the peaceful applications of radioactive substances and energy for purposes of interest. No nuclear safeguards aspect was included to this act.

IAEA Integrated Regulatory Review Service (IRRS) mission carried out in Cameroon recommended that to the Government should revise the legal and regulatory framework so that all provisions of the international safety standards are addressed in the laws and statutes Report of the regulatory review service (IRRS) mission to the republic of Cameroon Yaoundé, Cameroon 12 to 21 October 2014. Thus on 12th July 2019, government promulgate a new Law N° 2019/012 of 19 July 2019 to establish the general framework for radiological and nuclear safety, nuclear security, civil liability and safeguards enforcement, to replace the law N°95/08 on radiation protection of 1995. Chapter VIII of this law lists five safeguards relevant provisions, from section 66 to section 70

Law N° 2019/012 of 19 July 2019 to lay down the general framework for radiological and nuclear safety, nuclear security, civil liability and safeguards enforcement:

The National Radiation Protection Agency (NRPA) is the competent nuclear and radiological regulatory Authority designated by the government to be responsible of implementation the safeguards. NRPA has obligation to establish and maintain a State System of Accounting and Control of Nuclear Materials (SSAC), and to take into account the provisions of correct and complete reporting, declarations and other information to the international atomic agency (IAEA) to cover the fundamental elements of safeguards infrastructure recommended by IAEA.

III.2 Information collection and reporting

Information about nuclear materials is collected through in-field inspections, authorization system, cooperation with customs and with universities and research centers.

a) In field inspection

As required by Section 67 of Law 2019/012, the authority in charge of regulation and control shall set up, implement a national State's System of Accounting for and Control of nuclear material (SSAC). Thus, an annual inspection planning is drawn up according to the types of inspections and structures involved. Inspections for nuclear material accountancy and control and are planned. The purpose of these inspections is to control and account for the quantities of nuclear materials available. Inspections are carried out in the radiotherapy units using Co-60 and in the non-destructive testing activities using gamma projector. The NRPA inspectors used an established form to check the available information on nuclear material. The service of Control and Inspection (SCI) maintains an inventory of the nuclear materials in the country.

b) System of notification

Import or export and utilization of nuclear and radioactive materials and nuclear related equipment are subject to authorization as instructed by articles 19 and 20 of the national nuclear Law. Before importing or exporting radioactive source, licensees must notify the NRPA and apply for an authorization using an established form. On this form, they must indicate the nature and quantity of the depleted uranium used as shielding in the associated equipment, which contain the radioactive source. Service of Authorizations, Registrations and Licenses (SAEL) process these applications and maintain keep an inventory of radioactive sources. Article 69 of the national nuclear law requires licensees to submit periodic reports to the authority in charge of regulation and control.

c) Working group in charge of implementation of SQP

The National Radiation Protection Agency set up a working group by Decision No. 00238/ANRP/DRC-SATC of 11 September 2020. This working group is in charge of the monitoring and implementation of the Additional Protocol (AP) and the modified Small Quantities Protocol (modSQP) of Nuclear Material. It consists of representatives of:

- Ministry of Mines, Industry and Technological Development (01 member);
- Directorate General of Customs (02 members);
- Institute of Geological and Mining Research/University of Yaoundé I (01 member);
- National Radiation Protection Agency (09 members).

The group meets twice a year. The first meeting of each year is devoted to reviewing the activities and responsibilities of each stakeholders, and the second to the annual updating information. The Collection of information on imports and exports of nuclear material is assigned to the Customs. Members of this working group are designated by their institution as focal points for official communication with the State Authority questions related to safeguards.

A communication mechanism has been established to provide the IAEA with information on export, import, location, use and quantities of Nuclear Material as well as all information relevant to the implementations of safeguards agreements. This mechanism defines procedure for collecting information, verifying it, preparing documents and submitting them to the IAEA through the Point of Contact (PoC). Communication with the IAEA is done via the IAEA's State declaration Portal (SDP).

IV. Challenges faced by Cameroon in implementing SQP

The implementation of CSA in SQP States faces certain difficulties and Cameroon is facing similar challenges as other SQP States. From the regulatory framework to the sending declaration, Cameroon faces several challenges to implements safeguards.

IV.1 National Safeguards Legislation and regulation

Cameroon has had a nuclear act since July 2019. The process of promulgating the Law has been long. This long process is a real challenge. As well as this law contains provision regarding safeguards, the regulations to implement it are not yet promulgated, even though the process has been initiated.

IV.2 Establishment of the SSAC

As indicated in Paragraph 7 of INFCIRC/153 that the State shall establish and maintain a system of accounting for and control of all nuclear material subject to safeguards under the agreement. Cameroon has a nuclear act, an SRA and a working group to implement the SQP and the AP. However, although the SSAC is established, the information system, the knowledge management system and the evaluation of the whole system are not well defined. The members of the group should be given sufficient training and education to develop competency to implement SG in the State.

IV.3 Communication with the stakeholders: establishment and continuity

The SRA should establish effective communications with all entities possessing nuclear material, such as facility operators, universities, research and development institutions, hospitals, and other public and private entities[5,6]. Cooperation between the NRPA and the stakeholder is established through the designated focal point. They are trained by NRPA and have participated to the international training program to represent the State. All related safeguards documents are sent to their private email address and/or personal phone numbers. They don't have institutional email address. The focal point attends all meetings, collects and

submits the necessary information to the working group. A list of addresses of all focal points is available at the NRPA.

Although contact has been established with stakeholders there are some disconnects that break this cooperation:

- There are some staff movements in the different organizations. The focal point is shifted in another department or has completely left the institution and the NRPA is not informed. This will lead to a delay in the transmission of reports, a breakage in information with the structure;
- The continuity and transmission of to the collaborators is not effective and when the focal point left the organization, the new comer sometimes does not have skills about safeguards and the activities done by the working group;
- The Depleted uranium used as shielding is not the first interest of the holder, but rather the radioactive material that is shielded. The person in charge of nuclear material who is generally the safety officer in LoFs, is less interested in depleted uranium and sometimes forgets to submit the information about nuclear material, however he assists inspectors during field activities.

IV.4 Submission of CSA (SQP) reports and/ AP declarations

Cameroon has both the CSA and the AP in force. Deadlines for submission of CSA reports and AP declarations are specified in the agreements. NRPA has to do more to meet the specified deadlines, through official channels.

NRPA make efforts, to identify and locate all the nuclear material in the State. The information is collected on the applications forms for authorization, from the inventory files of radioactive sources, from open sources and from customs, which are at the borders. In order to collect data NRPA has faced many difficulties to get the correct information.

- Sometime the licensee does not know that their equipment contains nuclear material;
- NRPA did not found any documentation on equipment containing depleted uranium that could help to specify the nature and quantity of the nuclear material;
- Publications sent by the universities or information send by customs are sometimes not related to the nuclear fuel cycle activities.

IV.5 Submission of reports for imports/exports of nuclear material

When nuclear material is transferred out of the State, the State should inform the Agency, which terminates safeguards under that State's agreement as provided for in article 12 of INFCIRC/153 (Corrected). The Agency should maintain records indicating each transfer and, where applicable, the re-application of the safeguards to the transferred nuclear material. The State Authority should inform the Agency of any changes through the appropriate reporting mechanisms for Articles 33a. and b of the CSA (with SQP). Information are collected and evaluated as define in the working group before to submit to the IAEA via official channel. This mechanism allows sending the declaration on time but the coordination of this process and verification of collected information still a challenge.

IV.6 Correctness and completeness of the initial inventory report and/or AP declarations

Difficulties encountered by the NRPA in collecting information from licensees include:

- licensees does not know how to report the correct information;
- lack of adequate verification equipment that can detect/verify different types of nuclear materials. NRPA sometimes only has a dose rate meter.

IV.7 State to respond to Agency's requests

Paragraph 3 of the INFCIRC/153(corrected) provide that the Agency and the State shall cooperate to facilitate the implementation of Safeguards. Communication is established through a point of contact. The State should establish a formal point for official communications with the IAEA related to the implementation of safeguards, preferably within the SRA, or in the State's Ministry of Foreign Affairs Safeguards Implementation for States with Small Quantities Protocols, John Kinney.. In the case of Cameroon, the point of contact is within the NRPA, and provides the Agency with all information requested under the CSA (with Mod SQP) and AP.

- The development of a good process of collection and verification of data can improve the response time to the Agency's request;
- Closer cooperation between the ministry of foreign affairs and the SSAC can also facilitate the flow of information between the State and the IAEA

VII. Proposed Solutions

The challenges facing by Cameroon are common to most SQP States. Some of the proposed solutions are:

- Ensuring adequate human, financial and equipment resources for SRA;
- Promulgate regulations in a timely manner;
- develop training documentation for SRA staff, a training manual for operators and licensees, including an SSAC manual;
- Implement a system to retain trained and well qualified SSAC staff;
- Be proactive in taking advantage of IAEA training opportunities;
- establish a national General Ledger for recording all import/export transactions, and establish a clear process for informing the IAEA on time of movements of nuclear material in or out of the country;
- work closely with the IAEA Safeguards Operations Section and country officer responsible for Cameroon;
- take advantage of regional cooperation. the SQP States can work more closely in the regional context e.g. through the African Commission on Nuclear Energy (AFCONE) for African countries., in order to benefit from the sharing of best practices and experience with other countries with a similar nuclear profile.

VIII. Conclusion

The modified SQP has compensated the weakness of the original SQP, however implementation difficulties remain due to the lack of sufficient training of licensees in reporting to the State Authority, and Implementing safeguards, as well as the lack of appropriate equipment available to the State authority for verification. There are also challenges with the delay of the promulgation of regulations to implement the comprehensive law, and best practices in nuclear material accountancy are not being implemented. In addition, the State authority tends to focus mainly on radiation safety. Many recommendations have been made, but one of the most important is that the State should work more closely in the regional context, through the African Commission on Nuclear Energy (AFCONE), in order to benefit from sharing best practices and experiences with other countries with a similar nuclear profile.

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