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Safeguards Implementation Practices Guide on Establishing and Maintaining State Safeguards Infrastructure

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IAEA Services Series 31

SAFEGUARDS IMPLEMENTATION PRACTICES GUIDE ON ESTABLISHING AND MAINTAINING STATE SAFEGUARDS INFRASTRUCTURE

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The Agency's Statute was approved on 23 October 1956 by the Conference on the Statute of the IAEA held at United Nations Headquarters, New York; it entered into force on 29 July 1957. The Headquarters of the Agency are situated in Vienna. Its principal objective is "to accelerate and enlarge the contribution of atomic energy to peace, health and prosperity throughout the world''.

IAEA SERVICES SERIES No. 31

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INTERNATIONAL ATOMIC ENERGY AGENCY
VIENNA, 2018

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SAFEGUARDS IMPLEMENTATION PRACTICES GUIDE ON ESTABLISHING AND MAINTAINING STATE SAFEGUARDS INFRASTRUCTURE

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FOREWORD

The IAEA implements safeguards pursuant to agreements concluded with States. It is in the interests of both States and the IAEA to cooperate to facilitate the practical implementation of safeguards. Such cooperation is explicitly required under all types of safeguards agreement.

Effective cooperation depends upon States and the IAEA sharing a common understanding of their respective rights and obligations. IAEA Services Series No. 21, Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols, updated in 2016, aims to enhance the understanding of safeguards obligations of both the States and the IAEA and to improve cooperation in safeguards implementation. When building safeguards infrastructure, States can establish different processes and procedures at the national level, and set up different systems as needed, to meet their safeguards obligations. Indeed, a variety of approaches are to be expected, owing to differences in the size and complexity of States' nuclear programmes and their regulatory frameworks, and this is reflected in how the safeguards infrastructure is maintained.

The purpose of the Safeguards Implementation Practices (SIP) Guides is to share the experiences and good practices as well as the lessons learned by States and the IAEA through the many decades of safeguards implementation.

The information contained in the SIP Guides is provided for explanatory purposes only, and its application is not mandatory. The descriptions have no legal status and are not intended to add to, subtract from, amend or derogate from, in any way, the rights and obligations of the IAEA and the States set forth in The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (issued as INFCIRC/153 (Corrected)) and the Model Protocol Additional to the Agreement(s) between State(s) and the IAEA for the Application of Safeguards (issued as INFCIRC/540 (Corrected)). These SIP Guides provide information which States may find useful in implementing their safeguards agreements with the IAEA.

This updated version includes an improved Annex I, containing a comprehensive safeguards regulation model.

The IAEA wishes to acknowledge the many safeguards experts and practitioners from Member States who have contributed to the creation of this SIP Guide. The IAEA appreciates the Member State Support Programmes that participated in Joint Task 1959, Member State Contributions to IAEA Topical Guidance on Safeguards Implementation, which facilitated the participation of external experts in providing input to the SIP Guides. The IAEA officer responsible for this publication was C. Mathews of the Division of Concepts and Planning.

EDITORIAL NOTE

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1. INTRODUCTION

1.1. Purpose, scope and structure

The purpose of Safeguards Implementation Practices (SIP) Guides is to share information about effective safeguards implementation practices for the benefit of all States, particularly with the aim of enhancing their capacity and capabilities in the area of safeguards implementation. States with Small Quantities Protocols are advised to refer to the Safeguards Implementation Guide for States with Small Quantities Protocols (IAEA Services Series 22) found at www.iaea.org/safeguards/resources-for-states/guidance-documents.html.

This SIP Guide addresses activities undertaken by a State to **establish and maintain the infrastructure** needed to implement IAEA safeguards effectively, including a legal and regulatory framework and a State[1] authority responsible for safeguards implementation.

The Guide primarily addresses the activities undertaken by the IAEA and States pursuant to a comprehensive safeguards agreement (CSA) based on INFCIRC/153 (Corr.) and an additional protocol based on INFCIRC/540 (Corr.). However, States that have concluded a voluntary offer safeguards agreement (VOA) and States that have concluded item-specific safeguards agreements based on INFCIRC/66/Rev.2 could also use this Guide to facilitate the implementation of IAEA activities under their safeguards agreements.

SIP Guides belong to a series of guidance prepared by the IAEA with the assistance of experts from Member States which are focused on facilitating safeguards implementation in States with CSAs. The Guides that have been published as well as those that are planned for this series are shown in Figure 1. The SIP Guides further elaborate on the content of the *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols* (IAEA Services Series 21). This SIP Guide addresses the State infrastructure necessary to support effective safeguards implementation, so it touches upon many aspects covered in Services Series 21.

In particular, however, the SIP Guide focuses on establishing the regulatory, institutional and procedural arrangements necessary to facilitate all safeguards activities, including:

- Incorporating safeguards obligations into the national legislative framework;
- Designating and sustaining a State authority responsible for safeguards (SRA);
- Establishing the SSAC;

[1] The IAEA uses the term 'State or regional authority responsible for safeguards implementation' or SRA to distinguish the responsible authority (an organization) from the broader State (or regional) system of accounting for and control of nuclear material (SSAC/RSAC). This SIP Guide focuses on establishing State infrastructure, and thus, the use of the term SRA should be taken to refer primarily to the State authority, and the word "State" is used in relation to either a single State or a group of States which have agreed to establish a regional organization with nuclear material accounting and control responsibilities or other responsibilities relating to the implementation of safeguards.

- Providing information to the IAEA (more detail will be provided in the forthcoming *SIP Guide on Provision of Information*);
- Facilitating IAEA activities in the State (more detail is provided in the *SIP Guide on Facilitating IAEA Verification Activities,* IAEA Services Series 30); and
- Establishing the necessary infrastructure to address other responsibilities such as granting privileges and immunities, provision of protection from third party liability for nuclear damage and issuance of visas.

Several annexes included in this SIP Guide provide case studies and examples of such support and good practices.

Key points are provided in coloured text boxes such as this one.

Implementation practices and examples are contained in ***white text boxes with italicized text.***

The diagram shown in Figure 1 indicates the subjects of each of the four SIP Guides, and their relationship with the higher level Guidance for States Implementing CSAs and APs (IAEA Services Series 21). IAEA Services Series 11 and 15 are also shown, which provide guidance on additional protocol declarations and nuclear material accountancy, respectively. Guidance documents and many other resources can be found at www.iaea.org/safeguards under the 'Resources and Assistance for States' tab.

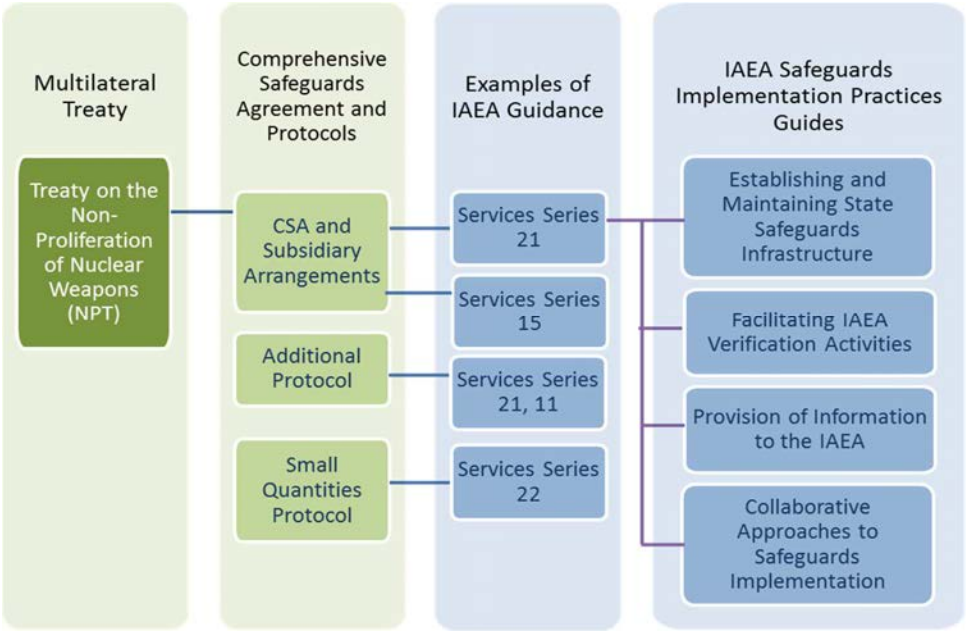

FIG. 1. IAEA safeguards guidance related to comprehensive safeguards agreements.

1.2. The SRA and the SSAC

The IAEA and the State must cooperate to implement safeguards. States with CSAs are

required to establish and maintain a SSAC. The SSAC and the State[2] authority responsible for safeguards implementation, or SRA, are described below.

The **State authority responsible for safeguards implementation** is the authority established at the national level to ensure and facilitate the implementation of safeguards. In addition to its safeguards functions, the SRA (if established within a broader nuclear authority) may have additional responsibilities associated with nuclear safety, security, radiation protection and export/import controls. One of the primary responsibilities of an SRA is to establish (initially) and maintain (continuously) an SSAC.

An **SSAC as a system** is comprised of all of the elements that enable the SRA to carry out its nuclear material accounting and reporting responsibilities. These elements include information systems (computerized or paper-based); nuclear material accounting systems that produce the accounting data at facilities and other locations; various processes, procedures and administrative controls (such as license requirements including import and export; collection and submittal of design information); quality checks; and oversight activities conducted by the SRA to ensure all requirements are satisfactorily met.

It is recommended that all safeguards responsibilities (pursuant to safeguards agreements as well as additional protocols) be assigned to the same State authority. However, sometimes a State may assign some safeguards responsibilities to one State authority (such as nuclear material accounting and reporting) and some to another State authority (such as preparing and submitting AP declarations). This could be based on legal or practical reasons related to the functions or competencies of certain authorities. In such a case, the responsibilities of an SRA are fulfilled by two or more State authorities, and those authorities should coordinate with one another as necessary to ensure effective safeguards implementation.

1.3. Overview of State safeguards infrastructure

Safeguards implementation requires effective infrastructure in the State, including a national legislative and regulatory system that provides for oversight and control of all nuclear material and nuclear-related activities. References from INFCIRC/153 (Corr.) related to establishment and maintenance of State safeguards infrastructure are shown below.

INFCIRC/153 (Corr.) Paragraph 3
"The Agreement should provide that the Agency and the State should cooperate to facilitate the implementation of safeguards provided for therein."

INFCIRC/153 (Corr.) Paragraph 7
"The Agreement should provide that the State shall establish and maintain a system of accounting for and control of all *nuclear material* subject to safeguards under the Agreement, and that such

[2] In the rest of this publication the word 'State' is used in relation to either a single State or, as applicable, a group of States which have agreed to establish a regional organization with nuclear material accounting and control responsibilities or other responsibilities relating to the implementation of safeguards.

safeguards shall be applied in such a manner as to enable the Agency to verify, in ascertaining that there has been no diversion of *nuclear material* from peaceful uses to nuclear weapons or other nuclear explosive devices, findings of the State's system. The Agency's verification shall include, inter alia, independent measurements and observations conducted by the Agency in accordance with the procedures specified in Part II below. The Agency, in its verification, shall take due account of the technical effectiveness of the State's system.

INFCIRC/153 (Corr.) Paragraph 9
The Agreement should provide that the State shall take the necessary steps to ensure that Agency inspectors can effectively discharge their functions under the Agreement. …"

INFCIRC/153 (Corr.) Paragraph 32
The Agreement should provide that the State's system of accounting for and control of all nuclear material subject to safeguards under the Agreement shall be based on a structure of material balance areas, and shall make provision as appropriate and specified in the Subsidiary Arrangements for the establishment of such measures as:

(a) A measurement system for the determination of the quantities of nuclear material received, produced, shipped, lost or otherwise removed from inventory, and the quantities on inventory;
(b) The evaluation of precision and accuracy of measurements and the estimation of measurement uncertainty;
(c) Procedures for identifying, reviewing and evaluating differences in shipper/receiver measurements;
(d) Procedures for taking a physical inventory;
(e) Procedures for the evaluation of accumulations of unmeasured inventory and unmeasured losses;
(f) A system of records and reports showing, for each material balance area, the inventory of nuclear material and the changes in that inventory including receipts into and transfers out of the material balance area;
(g) Provisions to ensure that the accounting procedures and arrangements are being operated correctly; and
(h) Procedures for the provision of reports to the Agency in accordance with paragraphs 59–69.

In order to effectively implement its safeguards obligations, each State needs to establish three fundamental elements of its safeguards infrastructure:

1) Establishment of laws, regulations and a system of accounting for and control of nuclear material at the national/regional level, and designation of an SRA, which ensure that the requirements of the safeguards agreement, additional protocol (if applicable) and subsidiary arrangements are fully met;
2) Provision of timely, correct and complete reports, declarations and other information to the IAEA; and
3) Provision of support and timely access to the IAEA to locations and information necessary to carry out safeguards activities.

This SIP Guide focuses primarily on the first of these three elements. Please refer to the *SIP Guide on Facilitating IAEA Verification Activities (IAEA Services Series 30)* and forthcoming *SIP Guide on Provision of Information* for more information on the other two elements.

2. NUCLEAR LEGISLATION AND REGULATORY FRAMEWORK

For IAEA safeguards to be implemented, a State must first conclude a safeguards agreement with the IAEA. The process by which this is done is described in the Annex to the IAEA publication, *IAEA Safeguards Agreements and Additional Protocols — Verifying Compliance with Nuclear Non-proliferation Undertakings*[3]. After a safeguards agreement has been concluded, it needs to be implemented. Important and fundamental elements needed to support implementation include an adequate legal framework and the designation of the SRA.

IAEA Services Series 21 explains that the State's legal framework for safeguards should address the following aspects:

- The enactment of laws and regulations to **control and oversee** the use of nuclear material and nuclear-related activities in the State, consistent with the State's obligations under its safeguards agreement and additional protocol (if applicable);
- The assignment of responsibilities for safeguards activities and the granting of legal authority to perform them, to one (or more) **independent State authorities**;
- The establishment and maintenance of an **effective SSAC**;
- The creation of an effective **communication mechanism**, including a point of contact, between the IAEA and the State; and
- The implementation of **procedures and practices** necessary to facilitate information gathering, timely reporting and in-field verification.

By concluding safeguards agreements, States accept international obligations that **must be incorporated into national legislation**. This process is explained in the ***Handbook on Nuclear Law***, Section 1.5.9, "Reflecting international conventions or treaties in national legislation" and in more detail in the ***Introduction*** section of the ***Handbook on Nuclear Law – Implementing Legislation***. Readers are encouraged to review this material, found under the Resources for States tab on www.iaea.org/safeguards.

Coordination with all stakeholders is important in this process, including relevant government bodies, industry (including operators of facilities and research institutions) and the public. Technical and legal experts typically work together to prepare the legislation.

The process by which the obligations set out in **international legal instruments are incorporated** into a State's legislative framework varies from State to State.

States that are in the process of developing new nuclear laws need to include safeguards-related provisions consistent with their safeguards agreements and relevant protocols. A State may also wish to include provisions to enable it to implement an additional protocol in the future, if one is not already in force. The nuclear law should cover comprehensively any nuclear material and activities subject to safeguards, including the designation of an SRA and

[3] This document is found at http://www.iaea.org/Publications/Booklets/Safeguards3/safeguards0408.pdf.

its competencies. Such an approach can help avoid time-consuming legal processes often associated with amending an existing law. It would also help to ensure that the legislative framework remains adequate over time, allowing the SRA and other State authorities to address a broad range of safeguards-related issues after entry into force of an additional protocol without having to amend the law. Details on specific regulatory requirements may be included in lower level regulations or guidance once the new law has entered into force.

When a State is considering adopting a new nuclear law, it is helpful to review existing laws, for example related to mining, export and import controls and radiation protection, to determine if they may need to be modified to address obligations under the State's safeguards agreements. If the decision is taken to prepare a new nuclear law, it will also be important to ensure consistency and avoid overlapping with existing laws.

Example: In many States, a nuclear law covering safety, security and safeguards is prepared. This approach is becoming common practice for developing comprehensive nuclear legislation. Specific technical measures regarding the implementation of safeguards, safety and security provisions set out in nuclear law(s) are normally set out or specified in regulations and guidance documents that can be updated or amended as the need arises, without having to modify the laws.

2.1. Legislative hierarchy

Although the structure of national legislation and internal processes to enact it vary among States, a legislative framework generally includes a constitution as the supreme law, underpinned by laws adopted by parliament, decrees adopted by government, regulations and decisions adopted by Ministries, licenses (or permits or other similar documents) and other lower level regulatory or guidance documents issued by State authorities (see Figure 2).

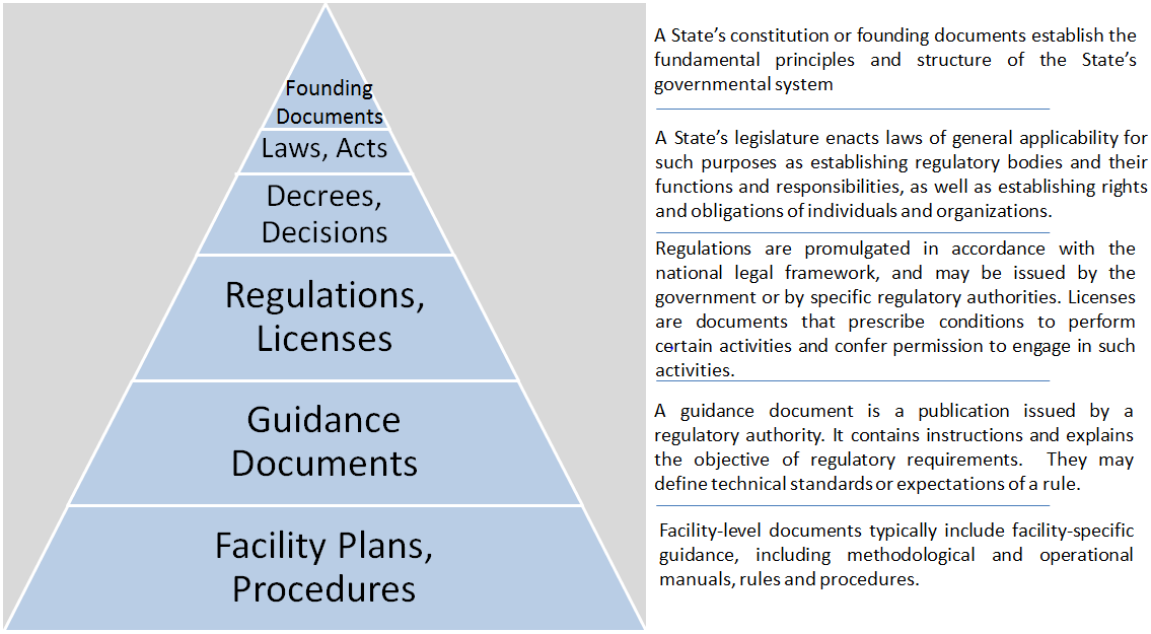

FIG. 2. Example of a legislative and regulatory hierarchy.

It is important to note that guidance documents in this hierarchy may be issued to facilitate the implementation of regulations, licenses or permits. Guidance documents are typically not binding, but contain information to help a licensee understand how to fulfil a regulatory requirement or conditions set out in a license or permit. In some States, however, regulatory guidance documents may contain provisions whose legal force is similar to those set out in regulations, licenses or permits and thus are binding.

2.2. National implementing legislation

The provisions in the national implementing legislation should address all safeguards obligations undertaken by a State pursuant to its safeguards agreement and additional protocol (if applicable). The main elements for States to consider when drafting implementing legislation are described below. Annex 1 contains a model safeguards regulation as an example. More information about implementing legislation is provided in the Handbook on Nuclear Law (2003), and in the Handbook on Nuclear Law — Implementing Legislation (2010), in particular chapters 12 (safeguards) and 13 (export and import controls) in both documents.

A State's legal and regulatory framework must address **all obligations contained in** its safeguards agreement and additional protocol (if applicable).

The main elements of a legislative framework for safeguards are similar to those for other related disciplines such as nuclear safety and security, and radiation protection, including:

- A clear statement of the scope and objectives of the legislation;
- A basic undertaking of the general principle affirming the exclusively peaceful use of nuclear energy in the State;
- Prohibition of activities which are contrary to State undertakings under nuclear non-proliferation and safeguards agreements;
- Clear definitions of key terms (e.g. nuclear material, facilities, LOFs, sites) used in implementing the State's safeguards agreement and additional protocol;
- Designation of an SRA to coordinate and ensure the implementation of safeguards;
- Cooperation among relevant Government agencies in the application of safeguards;
- Provisions regarding authorization or licensing, national inspection and enforcement measures relevant to nuclear material, facilities and other items subject to safeguards;
- Provisions regarding submission of information (e.g. reports and declarations) to the SRA and the IAEA;
- Provisions to facilitate access and support verification activities conducted by the IAEA in the State;
- Establishment and maintenance of an SSAC;
- Requirements for records keeping by those authorized to produce, process or use nuclear material; and
- Arrangements for the submission of amplification or clarification of any information requested by the IAEA.

Some elements such as designation of inspectors, issuance of visas and granting privileges and immunities to IAEA assets and inspectors are normally included in other parts of the national legislation. It is important to note that there cannot be a "one size fits all" approach to drafting nuclear legislation. To be effective, nuclear legislation must fit into a State's existing legal and regulatory structure.[4]

The IAEA offers legislative assistance on nuclear law. States are encouraged to request such assistance when drafting or modifying their legislation (laws or regulations) that are relevant to safeguards. Such assistance may be requested by sending an email to official.mail@iaea.org, with 'Legal Assistance' in the subject line.

2.3. Regulations

As noted above, detailed requirements concerning safeguards implementation are usually established by regulations or set out in licenses or permits. Laws are ordinarily more complicated to amend than regulations. Such regulations may have requirements additional to those contained in the State's safeguards agreement and additional protocol, to meet national objectives associated, for example, with nuclear security or nuclear material management.

Regulations aimed to ensure implementation of safeguards at the national level would typically establish detailed requirements for licensees, incorporating obligations of the safeguards agreement (e.g. submission of reports and declarations, record keeping) into the national regulatory requirements. IAEA Services Series 21 addresses the obligations of States and the IAEA pursuant to CSAs and additional protocols. Topics which are commonly addressed in regulations include, for example:

- Definition of nuclear material subject to accountancy, control and reporting;
- Establishment and implementation of procedures for nuclear material accountancy (including measurement and measurement control, processes for requesting and reporting exemption and termination);
- Taking of physical inventories;
- Submission of specified reports;
- Maintenance of specified records and documentation;
- Early provision of design information;
- Provision of updated design information;
- Provision of information on locations outside facilities (LOFs);
- Notice of intended import or export of nuclear material;
- Provision of information under an additional protocol;
- Prompt reporting of possible loss or theft of nuclear material; interference with or interruption in the operation of installed IAEA safeguards equipment; and detachment or breaking of IAEA seals; and
- Cooperation with IAEA inspectors.

[4] IAEA Handbook on Nuclear Law: Implementing Legislation, p.2.

It is important that the State's regulations **require accountancy and control to continue** to be applied to nuclear material that has been **exempted from safeguards** by the IAEA.

Regulations establish requirements that are not normally included in licenses or permits, such as requirements that apply to entities that are not licensed to handle nuclear material, for example. This could include requirements for the provision of information and access by entities carrying out research and development or manufacturing activities declarable under an additional protocol, which do not involve nuclear material.

Example: In some States, international instruments ratified, accepted or approved in accordance with the State's constitutional procedures become automatically part of the national legislative framework. In such cases, States should consider developing specific regulations consistent with the provisions of their safeguards agreements and additional protocols, establishing an SRA responsible for ensuring national implementation as well as requirements for licensees.

More information on processes to develop, update and issue regulations is found in Section 4.1.

2.4. Authorization process

A process for authorization of activities subject to regulatory control, which may involve the issuance of licenses (or permits or notifications, for example) is an essential tool to compel licensees (or permit holders) to meet established regulatory requirements. Additional conditions can also be specified in licenses which are compulsory for licensees. With respect to safeguards implementation, for example, the SRA should require information from licensees in order to prepare and submit reports and declarations to the IAEA. The regulation should require that the licensee establish a system to collect and prepare such information (e.g. the requirement for establishing a nuclear material accounting system at the facility or LOF level, forms and timeliness for submission of reports and declarations, provisions for submitting design information, etc.), while the license might prescribe details such as the content, format and timing of certain reports or data to be provided to the SRA. The license could also specify details regarding such information as nuclear material accounting data, the format and granularity of design information, and a facility's operational programme.

Some license conditions might be applied to all licensees, while others might be specific to a particular type of facility or to a particular licensee. License conditions will typically address a variety of areas such as radiation protection, nuclear safety, waste management and nuclear material accounting and control. *The Handbook on Nuclear Law* provides guidance on all aspects of licensing, including license conditions. Licensing is discussed in more detail in Section 4.3 and in Annex II.

Requirements that might be elaborated in specific license conditions include:

- Provisions for reporting the inventory of nuclear material and any changes to it (consistent with IAEA report content, format and timing);
- Provisions for submitting special reports;

- Provisions for submitting design information and any changes to it;
- Provision for submitting information relevant to the State's additional protocol, e.g. status of a uranium mine and estimates of annual production, type of research and development activities related to the nuclear fuel cycle, waste containing U-233 or Pu, manufacturing of Additional Protocol Annex II items;
- Granting of access and provision of support for IAEA activities at the licensee location;
- Taking of samples and shipping of samples out of the State;
- Qualification of personnel to carry out particular activities; and
- Provision of support and maintenance for IAEA installed equipment (e.g. continuity of power supply, lighting).

It is very important to ensure that all license applications are supported by detailed documentation from the applicant, to facilitate the regulatory application review process, as applicable, such as:

- Plans for nuclear material accounting and control, reporting and documentation;
- Measurements and measurement quality control;
- Procedures for physical inventory taking;
- Procedures for facilitating IAEA access;
- Qualifications of person responsible for nuclear material accounting and control; and
- Material control measures (custodianship, access controls).

Example: A license issued to facility operators (the requirement does not extend to other licensees) requires the preparation of a Nuclear Material Accounting (NMA) Manual, which describes all the procedures in place at the facility to meet the State's nuclear material accounting and control requirements. The NMA Manual table of contents is provided in Annex IV. It includes a description of how the facility operator fulfils the nuclear safeguards, accountancy, reporting and other obligations under its responsibility that are necessary for the control of its material balance area(s), other corresponding accountancy actions (e.g. international transfers of uranium), or activities defined in the Additional Protocol to the Safeguards Agreement. The manual has to be detailed enough to allow the SRA to assess the sufficiency of the facility's nuclear safeguards system, and the SRA's safeguards-related audits of the facility are performed by confirming that the Manual is being followed.

2.5. Guidance documents

At the lowest level of the hierarchy, the SRA may choose to issue guidance documents to provide further information on how to comply with requirements in various topical areas, such as preparing nuclear material accountancy procedures or conducting physical inventories. The guidance documents provide detailed instructions, and serve to facilitate the effective implementation of the regulations.

Guidance documents can be improved to reflect lessons learned, best practices, and experience gained through implementation as well as any changes to the requirements in

higher level documents. It is a good practice to involve operators and licensees in the development of guidance documents so that they are part of the process and can share their advice and experiences regarding implementation in advance of final issuance.

Annex III describes a situation where an SRA worked with licensees (operators of nuclear power plants) to modify and update guidance in response to a persistent accounting problem that had been identified through national inspections.

3. ESTABLISHING A STATE AUTHORITY RESPONSIBLE FOR SAFEGUARDS IMPLEMENTATION

3.1. Designating an SRA

In establishing the infrastructure needed to implement safeguards, each State will need to designate an SRA, define its specific safeguards responsibilities and grant it the necessary authority and resources to carry them out effectively.

In many States, especially those with nuclear facilities, the SRA is part of an independent nuclear regulatory authority responsible for all aspects of nuclear oversight and control in that State, including radiation protection, nuclear safety and security and safeguards. In some States, particularly those with very little or no nuclear activities, the SRA might be a unit in a Ministry of Science and Technology or Ministry of Environment. In States where most of the nuclear material is used as shielding for high activity radioactive sources used in medical instruments, or used as a contrast stain in a laboratory, the SRA might reside in a Ministry of Health.

It is recommended that the SRA be **independent** from the entities performing activities subject to its regulatory control (e.g. an SRA in a State with a reactor would not be the reactor operator).

It is recommended that the SRA is administratively placed at a high enough level in the government to ensure it can effectively exercise its regulatory independence. In States with nuclear facilities, this level might be the Office of the Prime Minister or the Parliament. Similarly, the safeguards unit in an SRA with multiple regulatory functions will benefit from placement at a high enough level in the organization to ensure that safeguards issues receive the necessary support and attention of senior management.

Example: An SRA has two divisions — one responsible for nuclear safety, and the other responsible for safeguards and nuclear security. The Director of the division for safeguards and nuclear security is authorized to make decisions that pertain to safeguards without seeking the approval of the other Directors. This helps to ensure that safeguards decisions are not unduly influenced by the interests of the other parts of the organization.

There are advantages to having all responsibilities associated with safeguards implementation, including nuclear material accounting and reporting as well as additional protocol activities, in one organization. The personnel with experience implementing a safeguards agreement will have knowledge that is useful in implementing an additional protocol. The SRA could leverage human resources and efficiently address all safeguards aspects when working with licensees. Other benefits of having all safeguards responsibilities reside in one SRA include: improving communication; facilitating coordination; efficient planning, assessing and reporting compliance; and coordinating regulatory decisions. Response time in the case of an unforeseen event or emergency may also be improved.

Many States have established an SRA within a broader nuclear regulatory authority with responsibility for nuclear **safety, security and safeguards, including import and export controls**. Safeguards activities are carried out by a unit within that authority.

A State may consider consolidating responsibilities and competencies that reside in more than one organization into a single nuclear regulatory authority. For example, import and export control plays an important role in safeguards implementation (e.g. controlling and reporting exports of Additional Protocol Annex II items, nuclear material, and uranium ore concentrates). Coordinating and consolidating activities and clarifying roles and responsibilities can be a difficult process. Conflicts will be expected in such a situation, but can be reduced by developing a collaborative working relationship, fostering open and frequent communications and establishing the necessary regulatory roles, responsibilities and arrangements.

Interagency coordination is discussed in Section 3.4. Guidance is also provided in the IAEA's *Milestones in the Development of a Nuclear Power Programme*. Annex V summarizes the *Milestones* process with respect to developing safeguards capabilities, including setting up an SRA. Annex VI includes a case study on how an SRA was initially designated and how its functions and organization evolved with the further development of the State's nuclear programme.

3.2. Independence of an SRA

Section 2.2 of the IAEA *Handbook on Nuclear Law* addresses the need for independence of a nuclear regulatory body. It states, "One of the most important attributes of a regulatory body is its freedom from unwarranted interference in its regulatory functions." Several factors affect the independence of a regulatory body, and deserve careful consideration, including:

- Structure and organization of the SRA, and the appointment and dismissal of its leadership;
- Arrangements for reporting by the SRA, and achieving transparency;
- Means to address disputes concerning regulatory judgements (appeals process);
- Technical capabilities of the SRA and availability of expertise; and
- Sufficiency and reliability of human and financial resources.

Example: An SRA originally belonged to the Ministry of Trade and Energy. Due to its connection with the nuclear industry, the SRA was moved to the Ministry of Environment. This strengthened the SRA's independence from the nuclear industry.

3.3. Organizational structure of an SRA

There are multiple ways to establish and structure an SRA as part of the State's broader administrative and regulatory framework. It is likely that the SRA would have responsibilities in addition to safeguards such as nuclear safety, security and radiation protection. In this case, the unit(s) responsible for implementing safeguards may be placed in a division within the SRA. An example of a possible SRA structure is shown in Figure 3. Annex VIII provides examples of the organizational structure of several existing SRAs, including large and small organizations, with linear and matrix management approaches.

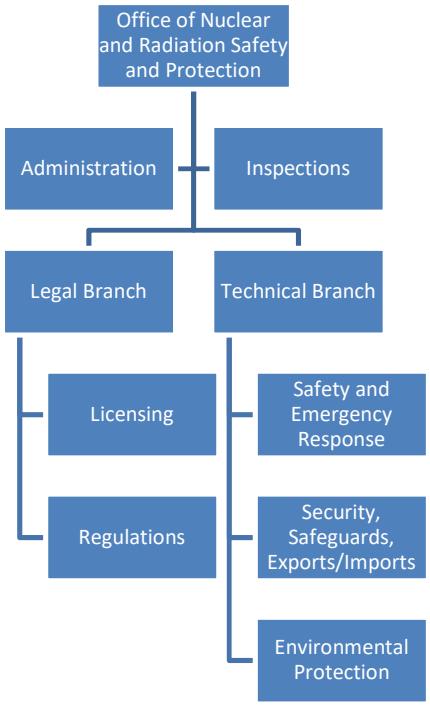

FIG. 3. Example of an organizational structure of an SRA.

The functions and competencies of an SRA provide the basis for defining its organizational structure. An SRA with broad functions and competencies (i.e. responsible for regulating all aspects related to the use of nuclear material and radioactive sources, construction, operation and decommissioning of nuclear facilities, issuing licenses, conducting inspection activities and having enforcement power) may consider a matrix management approach and involve many disciplines such as safety, safeguards, security, transportation and radiation protection. Issues to consider when assigning safeguards responsibilities to an authority (or authorities) include independence, reliable funding, technical capabilities, enforcement capabilities and accountability.

3.4. Interagency coordination

Many safeguards activities need to be coordinated with other disciplines covered by the nuclear regulatory authority (e.g. nuclear safety, radiation protection, nuclear security) and potentially by other organizations, such as the Ministry of Foreign Affairs (for activities related to inspector designation, issuance of visas) and Ministry of Finance (for clearing IAEA equipment through Customs). Coordination among all parties involved in safeguards implementation can be facilitated by a memorandum of understanding or agreement that specifies the roles, responsibilities, obligations and lines of communication. An SRA can play a key role in establishing and maintaining coordination mechanisms. Regular meetings between all parties to review activities and discuss any challenges are beneficial and routinely undertaken in several States. Interagency committees (such as is generically depicted in Figure 4) are often established with responsibility for coordination in a particular area such as nuclear non-proliferation.

Example: A coordinating team was set up to support implementation of a newly ratified additional protocol. This 'additional protocol team' involved representatives from the SRA, the operating organization of the one facility in the State, and the Radiation Safety Authority. This team prepared draft declarations, developed complementary access procedures and conducted outreach. Consideration was then given to broadening the team to include the Ministries of Foreign Affairs, Industry, and Customs.

The extent to which the various government stakeholders need to coordinate with one another will depend on the level and nature of nuclear activities of the State and the way the SRA is organized. If the State has limited nuclear activities, the frequency and scope of such coordination may only need to be limited. However, it is recommended that coordination be pursued to maintain an adequate level of safeguards awareness and communication among government officials outside the SRA.

FIG. 4. Example of participants in a national 'safeguards coordination network'.

There may also be non-governmental organizations which support or are involved in nuclear-related research and development, including mining or exploration of uranium or thorium. Coordination with these organizations is useful for discussing new developments and proposed projects, allowing the SRA to be proactive in identifying areas or upcoming activities that may require safeguards involvement.

Example: An intergovernmental committee that includes various government authorities involved in nuclear non-proliferation – foreign affairs, industry and trade, mines, energy, the nuclear authority – may meet periodically (e.g. quarterly) to review current issues and share information on, for example, activities involving export, new research and development, and other technological advancements, and discuss any actions needed to ensure compliance.

Example: A national committee was established by decision of the Prime Minister, coordinated by the SRA, to make recommendations with respect to rescinding an SQP. The committee reviewed drafted regulations, instructions and regulatory guides to assess adequacy in fully addressing the national safeguards requirements. Intergovernmental protocols between the SRA and relevant governmental institutions and universities were prepared. For example, the protocol between the SRA and the Ministry of Foreign Affairs included provisions regarding communication channels with the IAEA; the protocol with the Customs Office included provisions regarding clearance of IAEA safeguards equipment; the protocol with universities included provisions for declaring activities related to Article 2.a.(i) of the Additional Protocol. The committee provided a report to the Prime Minister describing all outcomes, including comments on draft regulations, instructions and regulatory guides, opinions on rescinding SQP, full application of the CSA, and the intergovernmental protocols.

When an **interagency coordination mechanism** is established, it can be a useful venue for raising the level of awareness and support for safeguards implementation in the State.

3.5. Human resource planning

Developing a qualified nuclear workforce requires investments in recruitment, training and retention. Before launching recruitment and staff development programmes, the SRA may wish to evaluate the frequency and complexity of the safeguards activities it carries out (e.g. the type and number of facilities and locations outside facilities or LOFs) to determine the number and qualifications of staff needed. Table 1 provides examples of SRA's numbers and characteristics of staff participating in safeguards-related activities, based on a survey of five States, some with facilities and some with only LOFs.

TABLE. 1. SAFEGUARDS ACTIVITIES AND ASSOCIATED SRA STAFF (BASED ON A SURVEY OF FIVE STATES).

Category	*Information/question*	*State 1*	*State 2*	*State 3*	*State 4*	*State 5*
Safeguards regulatory footprint	No. facilities/MBAs	4	8	2	N/A	2
	No. LOFs/MBAs	2	1	1	2	1
	No. LOFs/KMPs	38	7	N/A	N/A	N/A
	Number of licensees holding only exempted nuclear material (NM)	~50	None	None	24	None

NM inven-tory	Approx. No. batches in facility/MBAs	320	21,350	137	0	120
	Approx. No. batches in LOF/MBAs	1370	380	73	0	
	Approx. No. exempted NM	650	0	0	0	0
NM inventory reporting	Facilities: Approx. No. ICR lines per year	740	7,000	8	N/A	10
	Facilities: Approx. No. PIL lines per year	320	21,350	211	N/A	120
	Facilities: Approx. No. MBR lines/year	70	115	19	N/A	10
	LOFs: Approx. No. ICR lines per year	400	280	N/A	N/A	N/A
	LOFs: Approx. No. PIL lines per year	1370	380	N/A	N/A	N/A
	LOFs: Approx. No. MBR lines per year	70	80	N/A	N/A	N/A
Additional Protocol reporting	Approx. No. AP lines	213	27	22	20	33
	Approx. No. 2.a.(i)/2.b.(i)	3	5	0	0	0
	Approx. No. 2.a.(iii)	190	11	22	0	0
	Approx. No. 2.a.(iv)	0	1	0	5	0
	Approx. No. 2.a.(ix)	0	4	0	0	0
DIV/Insp./CAs	Inspections: Approx. No. PIVs	3	8	1	0	1
	Inspections: Approx. No. random/interim	2	50	0	0	0
	Approx. No. DIVs	2	8	0	0	1
	Approx. No. CAs	2	2	0	1	0
	Facilities: Approx. No. national inspections	1	6	1	0	0
	LOFs: Approx. No. national inspections	5	9	0	0	0
Other regulatory work	Approximate No. of DIQ modifications prepared/reported each year	2	2	1	2	<1
	Approximate No. of safeguards-related licenses issued/amended per year	~20	~10	N/A	N/A	N/A
Tools	Tools for collecting and compiling nuclear inventory data, and processing ICRs, PILs and MBRs?	Dedicated database + customised excel spreadsheet	Dedicated database	Dedicated database	Under developme nt	Basic spread sheet.

Staffing	Number of operational staff (excluding managers and general administrative support) performing safeguards tasks	2.5	5	3	4	2
	How many of the operational staff are authorised to do domestic inspections?	3	5	3	4	0
	No. of operational staff with tertiary qualifications in related scientific field	Postgraduate: 1; Degree: 1.	Postgraduate: 2; Degree:5	Degree: 4	Postgrad: 1 Degree: 3	2
	No. of operational staff with safeguards experience: >15 years; >10 years; 5-10 years; 2-5 years; <2years	2-5 years: 1 <2 years: 2	>15 years: 1 2-5 years: 1 <2 years: 3	20-30 years: 2 > 5 years: 1	5-10 years: 2 < 2 years: 2	5-10 years: 2
	On average, what percentage of time do staff spend on safeguards activities	~50%	~60%	~60%	~ 25%	~20%
	What other types of activities take up the time of staff members not directly related to safeguards implementation	Policy advice to Government; supporting treaty negotiations; IAEA support projects; APSN and other training activities	Support treaty negotiations; IAEA support programme; training; physical protection; nuclear export licencing	Training, Outreach Seminars to Universities and Industries	Nuclear Security; Workshops, meetings, committees	Safety analysis
	Outside of core safeguards staff how many others available to perform safeguards activities occasionally as required?	6	3	1	3	1
	How often are these other staff used?	1-2/year for IAEA inspections	~ 30% of the inspections	Three times/year	Once a year for workshops	
	How many person-days/yr on training?	10-20	~10-20	10 days/year	~ 40	~5

3.6. SRA staff competencies

SRA staff will need certain competencies (knowledge and skills) to perform the functions described in Section 4. Competencies can reside with the staff members of the SRA, or its

technical support organization (TSO), or contractors/consultants. SRA staff competencies can be grouped into five areas:

- Laws, regulations and licensing;
- National inspections and enforcement;
- Collection and provision of information to the IAEA;
- Facilitating verification activities of the IAEA;
- Cooperation with IAEA.

The IAEA has published a technical document entitled '*Training the staff of the regulatory body for nuclear facilities: a competency framework,*[5] and a workforce planning guide[6] both of which may be useful for developing an approach to assess staffing needs, competencies, skills and abilities relevant to nuclear oversight including safety, security and radiation protection.

As an example, 'National Occupational Standards' were developed to establish a standard set of knowledge, skills and abilities for various occupations, including those associated with nuclear material accountancy and safeguards, some of which are listed below:

- *Configure and manage a nuclear material accounting and safeguards system;*
- *Perform inventory taking and material verification;*
- *Identify and recommend incorporation of nuclear material accountancy and safeguards requirements at the design stage for new nuclear facilities or modifications;*
- *Compilation of nuclear material accountancy and other reports received from licensees;*
- *Enter data onto the nuclear material accountancy and safeguards system and verify data;*
- *Liaise with safeguards inspectorates and other stakeholders;*
- *Confirm that commissioning processes meet nuclear material accountancy and safeguards requirements;*
- *Control nuclear material movements on-site;*
- *Control nuclear material receipts and shipments;*
- *Define and deploy approved nuclear material measurement capability; and*
- *Maintain and review nuclear material measurement quality control.*

Each occupational standard indicates the necessary competencies (knowledge, skills and abilities) required to perform the work.

The SRA's recruitment strategy can address any gaps between the competences needed by the SRA staff to perform their functions and the current competences of the organization's staff.

3.7. Recruitment

Depending on the nuclear infrastructure in a State, different strategies to recruit staff into the SRA may be needed. Staff might be recruited from a technical university in a State or

[5] INTERNATIONAL ATOMIC ENERGY AGENCY, Training the staff of the regulatory body for nuclear facilities: A competency framework, IAEA-TECDOC-1254, Vienna (2001). http://www-ns.iaea.org/downloads/ni/training/rgbd_trg.pdf.

[6] INTERNATIONAL ATOMIC ENERGY AGENCY, Workforce Planning for New Nuclear Power Programmes, IAEA Nuclear Energy Series NG-T-3.10, Vienna (2011). http://www-pub.iaea.org/MTCD/publications/PDF/Pub1477_web.pdf.

research institution, from the domestic nuclear industry or from State authorities such as a radiation protection agency, the Ministry of Health, Ministry of Trade, Industry or Environment. New staff might have training and/or an educational background in scientific or technical disciplines of relevance to nuclear safeguards such as nuclear physics, nuclear engineering, health physics, medicine, radiation protection, chemistry as well as political science, law or international affairs. Subject matter experts might also be recruited from non-nuclear industries such as the chemical, petroleum and manufacturing industries.

When an SRA is intensively developing its capabilities, (e.g. preparing safeguards-related activities in connection with the building of the first nuclear facility in the State) it may consider hiring technical experts from outside the State. These experts might come from the State providing the nuclear facility or might be recent retirees from SRAs of other States. Such experts often possess specialized knowledge and skills that can immediately be applied toward critical functions, such as drafting regulations, establishing a licensing programme, performing domestic inspections or setting up a nuclear material accounting system. Over time, it will be necessary to ensure that the expertise is developed within the permanent staff of the SRA, for continuity and integrity of the organization.

Example: An event such as an 'Atomic Energy Celebration' can be used to draw attention and raise the visibility of opportunities in the field of safeguards. In organizing such an event, letters are sent to universities inviting recent graduates and students in relevant fields such as engineering, chemistry and physics, to attend the event. The letter also explains a programme whereby the new hires can pursue their graduate degree funded by the nuclear regulatory authority, with contractual obligations to remain at the organization for twice the number of years it takes to acquire the degree.

3.8. Technical resources

Technical resources include expertise as well as equipment and specialized laboratories. The field of safeguards involves some quite technical and specific expertise such as statistical analysis, nuclear material accounting, nuclear material measurement, chemical analysis and process analysis. An SRA's technical safeguards capabilities can be augmented through cooperation with the IAEA, with SRAs from other States, within a broader nuclear regulatory authority, or with other organizations in the State.

Technical support organizations (TSOs) which are often established to support the needs of the State's nuclear safety regulator, may also provide assistance in safeguards. TSOs can support routine safeguards activities, such as performing national inspections or facilitating IAEA verification activities in facilities, or offer expertise in situations requiring specific technical expertise (e.g. determination of the type, composition and quantity of nuclear material). In many cases, TSOs perform research and development on methods and techniques that may be needed by the SRA and help respond to current safeguards challenges. For example, a TSO may develop monitoring or measurement instruments that are designed for or adapted to a facility in the State.

The need for technical equipment depends on the scope of the State's nuclear programme, the functions of the SRA and its policies and activities. The maintenance and operation of

technical equipment requires trained staff, procedures and quality programmes and this infrastructure requires sustained funding. Laboratories are sometimes established to support the technical needs of an SRA, particularly when the organization has multiple responsibilities such as safeguards, security and radiation protection. The future maintenance costs should be kept in mind when determining the necessary scope and infrastructure. A laboratory that includes handheld radiation monitors, scales, and possibly a gamma spectrometer, with facilities for training and qualification of personnel, would be beneficial to any State. The investments in these laboratories are often leveraged by serving multiple organizational units in the government, and perhaps also the needs of academia or research.

Example: A project was undertaken to provide for consultation, cooperation and assistance in designing and establishing a Safeguards Laboratory for an SRA in 2013. The laboratory was to be equipped and arranged so that staff and affiliates can perform non-destructive assay (NDA) measurements and some destructive assay (DA) techniques for isotopic measurements in support of national and IAEA safeguards inspections. The collaboration included training in IAEA safeguards instrumentation, methodologies, concepts, practices, techniques and approaches, as well as topics relating to nuclear material control and accountancy, containment and surveillance, and administrative matters.

To determine the capabilities needed in the Laboratory, the SRA evaluated its functions, capabilities, capacities and needs and consulted with others who had experience in designing and using a similar Safeguards Laboratory. A plan was then produced which provided details on the needs to be met by the Safeguards Laboratory, the working-level training to be provided on establishing and sustaining the laboratory, and included a project plan for implementation.

To support national inspections, an SRA may need to develop technical capabilities for nuclear material accountancy data verification using NDA techniques or for validating the measurement program of a licensee (especially important for facilities with nuclear material in bulk form).

Example: A method was developed by a TSO at the request of the SRA to verify the Pu content in very old Pu-Be neutron sources using a neutron assay method. The method development was needed due to a large number of old, unused Pu-Be sources for which original documentation was not available. In addition to the technical equipment for research and verification at the TSO, the SRA also owns and uses its own HM5 and seals to support national inspections.

Example: A TSO supported by two universities gives direct support for the SRA's activities, and proposes and performs research in the field of safeguards. Some of the activities involve development of methods and techniques in the field of safeguards, and the TSO also has a contract with the SRA to participate in planned national inspections in cases when SRA inspectors are unavailable.

It may be beneficial for an SRA to conclude a contract with a nuclear research institute to receive assistance with nuclear material sampling and analysis, or other expertise necessary to supplement the SRA's technical capabilities. An SRA may partner with a university that provides coursework on safeguards or non-proliferation to enable staff to take advantage of those learning opportunities. The SRA could fund that associated university department to conduct relevant research and development to help ensure that the educational infrastructure is sustained.

3.9. Financial resources

It is essential that SRAs are provided with the financial resources necessary to fulfil obligations stipulated by legal instruments. Without a sufficient budget, neither the effectiveness nor the independence of an SRA can be guaranteed. Funding levels depend on the functions and responsibilities of the SRA, the nature, size and complexity of a State's nuclear fuel cycle, and the responsibilities undertaken by the SRA. SRA's budgets are usually provided for in the general budget of the government.

Example: The Parliament and the Government may decide on the assignments and budget of an SRA, but like other authorities, decisions are made independently on allocation of funding to address specific matters. The SRA work is largely financed through fees and tax revenue.

Example: An SRA might be funded by more than one source. A specific sum is provided annually from the State budget to cover the costs of technical support activities assisting the regulatory work of the SRA, the development costs related to the emergency preparedness and response activities and the budget associated with fulfilment of international obligations in the nuclear field. Other funding might be generated through fees from licensees who are obliged to pay the fee to the SRA in the manner and to the extent defined in the relevant regulations.

To assure an adequate budget of an SRA, it may be useful to prepare a risk assessment that addresses potential consequences for safety, security and safeguards that could be caused by activities that would not be properly licensed or controlled by the SRA due to unpredictable or insufficient funding. Reporting on the effective use of resources is important to establish confidence and credibility. Section 4.6 provides additional information on this topic.

4. SRA FUNCTIONS

As mentioned above, the primary functions of an SRA can be grouped into six areas ranging from legal and regulatory oversight to cooperation with the IAEA and with SRAs of other States. Each of these functional areas is discussed with respect to safeguards below.

4.1. Establishing a regulatory framework

The SRA will take a lead role in drafting safeguards regulations or amending existing regulations. It is a good practice to review the regulations of other States with similar practices, regulatory approaches, and safeguards experiences, to consider existing regulatory language and take advantage of lessons learned. States may also request advice of the IAEA when preparing new or modified regulations, and ask that the IAEA reviews the drafts and provides feedback to the SRA.

It is recommended to clearly define the process for establishing and maintaining the regulatory framework. Annex IX provides information about a possible process for developing or amending a regulation in a State. Regulatory development involves drafting, issuing, reviewing (include reviews by external stakeholders including licensees and the public), revising and rescinding regulations. Guidance on this topic is provided in the IAEA

Handbook on Nuclear Law Sections 1.5 and 2.3.

The process will specify the role of the SRA, other State authorities, legal services as well as public consultations. Government approval of regulations is advisable as the implementation of a State's treaty obligations ultimately resides with the government. The number of steps and levels of approval will depend on the structure of the SRA and its interaction with the government.

Example: A proposal, including the justification for a new or revised regulation, is initiated by the SRA and submitted to the government for approval. Once government approval is received, the SRA in consultation with other State authorities and legal advisors will prepare the draft regulation and provide it to the nuclear industry for their comments. An outreach session is arranged with industry as appropriate. The SRA revises the draft regulation as needed and addresses the comments received from industry representatives. An SRA interdepartmental review is undertaken and any final modifications are made as appropriate. The regulation is sent to the legal office for final preparation. The final draft is approved by the SRA and the government and published for public comment. The SRA takes into account public comments, then finalizes and publishes the regulation.

Peer review and advisory service missions (e.g. IAEA SSAC Advisory Service or ISSAS) are organized by the IAEA at the request of a State and are carried out through a bilateral cooperation project, technical cooperation project or other mechanism. These missions are very useful in sharing expert advice on new regulations or planned modifications to regulations as well as other aspects of a State's safeguards infrastructure.

Example: A multidisciplinary inter-governmental committee may be a useful mechanism for discussing a new regulation on the safe use of nuclear energy. A comprehensive nuclear regulation will address many areas and require the involvement of many stakeholders.

When developing or revising laws or regulations, the **advice of the IAEA** can be requested.

A plan for conducting a periodic review of regulations is recommended. A regulations 'steering committee' could fulfill this role. Regulations will need to be reviewed when a new safeguards agreement, approach or procedures are anticipated. Regulations could also be reviewed if repeated or recurring events of non-compliance indicate that a regulation needs to be amended. (See Annex II for a relevant example.)

Example: While preparing to bring an additional protocol into force, laws and regulations will need to be reviewed. In some cases, a law may need to be modified. One example is a law that specified that 'nuclear activities' were subject to regulation. The law was amended to extend the scope of what was defined as a 'nuclear activity' to ensure that activities associated with additional protocol declarations were included. An additional law was also prepared to facilitate the IAEA and the SRA inspectors' access to all locations associated with additional protocol declarations and foresaw the possibility that the IAEA and SRA may request access to any place in the State as needed.

4.2. Establishing and maintaining an SSAC

All States with a CSA are required to establish and maintain an SSAC. Detailed guidance regarding the SSAC's functions can be found in Section 3.2 of IAEA Services Series 21.

INFCIRC/153 Paragraph 7
The Agreement should provide that the State shall establish and maintain a system of accounting for and control of all *nuclear material* subject to safeguards under the Agreement, and that such safeguards shall be applied in such a manner as to enable the Agency to verify, in ascertaining that there has been no diversion of *nuclear material* from peaceful uses to nuclear weapons or other nuclear explosive devices, findings of the State's system. …

Guidance regarding designing and establishing an information management system to support the safeguards work of the SRA is provided in Section 6.

4.3. Licensing (or authorization) of nuclear activities

It is recommended that States establish a system of licensing or authorization that includes conditions related to all aspects of safeguards implementation, such as nuclear material accounting and control, reporting and providing access and support for IAEA activities.

In addition to issuing permits or licences to facility operators, permits or licences may also be required for other persons or entities **possessing or using small quantities** of nuclear material, such as universities, hospitals and industrial radiographers.

Licenses or permits are one of the most important tools a State can use to ensure that nuclear material and related activities are subject to the regulatory control of the State. Annex II provides more detailed information on considerations in setting up a licensing or authorization process. Many States issue licenses that address a wide variety of requirements, including safety, security, radiation protection as well as safeguards.

Example: A license for operations and activities involving nuclear material, called a 'nuclear material management' license, may be issued, addressing all requirements relevant to nuclear material accounting and control and applicable to all facilities as well as to LOF operators. Licenses may also be issued for other activities subject to regulatory control, such as:

- *Siting of a nuclear installation or radioactive waste repository;*
- *Construction of a nuclear installation;*
- *Operation of a nuclear installation;*
- *Restart of a nuclear reactor to criticality following a fuel reload;*
- *Reconstruction or other changes affecting nuclear safety, radiation protection, physical protection and emergency preparedness of a nuclear installation;*
- *Particular stages of decommissioning of a nuclear installation to the extent and in the manner established in a regulation;*
- *Discharge of radionuclides into the environment to the extent and in the manner established in a regulation;*
- *Ionising radiation sources management to the extent and in the manner established in a regulation;*
- *Radioactive waste management to the extent and in the manner established in a regulation;*
- *Import or export of nuclear items or transit of nuclear material and nuclear-related items;*
- *Transport of nuclear material and radioactive substances as laid down in a regulation;*

- *Re-import of radioactive waste originated in the processing of nuclear material exported by the State;*
- *International transport of radioactive waste to the extent and in the manner established in a regulation;*
- *Performance of personal dosimetry and other services significant from the viewpoint of radiation protection to the extent and in the manner established in a regulation; and*
- *Adding of radioactive substances into consumer products during their manufacturing or preparation or import or export of such products.*

The SRA will need to oversee the licensees' compliance with all conditions of the license, including those related to safeguards, as appropriate. When the responsibility for all (or most) nuclear-related regulation lies in one State authority, the oversight of compliance with the license can be carried out by that authority, perhaps achieving some cost savings. This is often the practice in States with small nuclear programmes.

Example: One division in an SRA may be responsible to license the import of a teletherapy unit to a hospital. The unit contains depleted uranium shielding which must be included on the inventory and reported to the IAEA before a request for exemption may be made. The SRA safeguards division would address the license for possession, which prescribes conditions for, e.g., nuclear safeguards and safety.

The contents of a licence application may include, among other things, descriptions of:

- the major characteristics of the location (facility, site, or LOF);
- names and contacts of the owner, operator and of the manager responsible for implementation of safeguards;
- activities planned to be performed at the location;
- accountancy and control system for nuclear material at the location;
- strategic points, which are key measurement points of flow and inventory of nuclear material;
- measurement, calculation and evaluation methods for determining the quantity of nuclear material;
- technical characteristics ensuring the identification of batches of nuclear material;
- the applicant's safeguards organization, name(s) and contact(s) of designated facility and site safeguards officer(s);
- description of duties and responsibilities of facility safeguards officers;
- surveillance and containment measures ensuring control of nuclear material flow;
- the preparation and submission of records and reports to the SRA and IAEA;
- facility support for safeguards inspections and maintenance of IAEA equipment; and
- access procedure of national and IAEA inspectors.

The content may vary depending on the type of application. The content shown above also would typically constitute only part of the whole application, which may include other aspects related to nuclear safety and physical protection, for example.

4.3.1. Steps in a licensing process

A licensing process involves several steps. First, the license application is completed by an applicant according to the regulations, SRA requirements and guidance documents, and is then submitted to the SRA. Then the application is reviewed by the appropriate staff of the SRA to ensure that it is accurate and complete (i.e. the license application is reviewed against the regulatory requirement and guidance documents or another internal procedure/process). If the application is determined to be incomplete it is returned to the applicant with an explanation of what is missing or what needs to be corrected. It may be advantageous at this time for the SRA and the applicant to meet and discuss the application. This iterative process may continue until the application is acceptable to the SRA.

The application is then evaluated by the SRA resulting in a recommended action (approval, rejection, consultation or training, request modification, request clarification). In case the application is incomplete or insufficiently detailed, the SRA may request additional information from the applicant. Prior to reaching its conclusion, the SRA may wish to request a peer review from other related regulatory offices in a State.

If the SRA recommends approval, then the license is issued by the SRA (or by another State authority authorized to issue licenses) for a specific period of time. Depending on the complexity of the requested license, it could be approved by a staff member of the SRA who is designated with this authority or it may require public meetings and consultations and be approved at the highest level within the SRA or even at higher government levels.

At licence renewal, the licensee submits a complete application for SRA approval and the license review process is initiated. When a revision to a license is requested, either by the licensee or the SRA, the licensee must supply additional information to the SRA so that the SRA can determine if the licensee has the resources and capability to conduct the requested activity.

The applicant and the SRA both benefit when the necessary documents, forms, instructions and relevant regulations are readily accessible. These may be posted on the SRA's website, for example, so that the applicants have a good understanding of how to prepare the applications and what the process will involve. Clear communication is important during the licensing process, and outreach to licensees and applicants can prevent misunderstandings or delays during the application process.

When licenses are used to establish safeguards requirements and facilitate SRA inspections, it is necessary to ensure that licenses are issued and **updated periodically**, to bring the requirements up to date with any changes to regulations.

4.3.2. Outreach to licensees and other entities

A key element of outreach is the communication with licensees and other entities regarding the implementation of the safeguards agreement and additional protocol. Communication with licensees is straightforward, since the relationship between the SRA and the licensee

exists once the license application has been submitted. It is important that the relationship does not end with the approval and issuance of the license, but that communication continues through email, periodic audits or inspections, and updates to the license over time.

Communication with entities that are not required to be licensed is more complicated. These entities need to be informed of their responsibilities under an additional protocol, including provision of information and facilitating complementary access. Informative open meetings, publication of information on a website, and provision of explanations of safeguards requirements and concepts in the national language are useful means of communication.

Example: Official letters were distributed informing relevant institutions (such as universities, research institutions, industrial radiography companies, Hospitals, etc.) about new 'Instructions on the conditions and procedures for the collection and provision of information and maintenance of records of activities relating to the application of nuclear safeguards and non-proliferation'. This document contained detailed instructions on safeguards specific requirements which are reflected in the license conditions and was posted on the SRA's website for public comments.

Example: Before ratifying an additional protocol, the relevant organizations in the State, including facilities, LOFs and non-licensees (such as universities performing fuel cycle-related research not involving nuclear material) will need to understand new obligations associated with the additional protocol. An SRA conducts outreach to these organizations to help them prepare declarations and advises them of the new requirements. In this process, if a new regulation is likely to be issued, the SRA can also inform the organizations of the consultative process that would take place during the development of those regulations.

Example: Regulatory conferences may be useful, held in the form of an open forum, to inform licensees of new regulations or changes that are under consideration, where attendees can express their views and share any concerns or recommendations. Outreach brochures may also be helpful for licensees, to explain regulatory requirements in the national language and avoid technical jargon that may not be readily understood.

Example: When preparing for an annual workshop with licensees, an SRA may wish to send a letter in advance to licensees inquiring about topics to be addressed during the workshop. One example was a workshop which focused on the scope, requirements and procedures for requesting nuclear material to be exempted from safeguards.

Example: Facility operators may form a safeguards working group and meet periodically. They could invite the SRA and share experiences, discuss issues and problems, ask questions and make suggestions for improvements. At some occasions, e.g. when the additional protocol was about to be ratified or approved in a State, the IAEA can be invited to present information and provide clarifications in connection with the additional protocol. In some meetings, safeguards officers from facilities in other States were invited to attend and share experiences.

A public website is an excellent place to post all the information required for each type of licence that an SRA may issue. Regulations and license applications are also useful to publish on websites. Anyone wishing to obtain a license or anyone who has to renew a licence will have access to the latest regulatory information and requirements, including how to submit a license application and the licensing process. Many SRAs host websites for licensees and applicants (open to the public) that contain this kind of information.

It is a good practice for an SRA to **include information on its website** such as guidance documents on completing license applications, instructions for completing forms and explanations of requirements in clear and simple language. Industry best practices can also be included on the website.

4.4. National inspections or audits of licensees

SRA inspections are primarily aimed at verifying and ensuring compliance with the laws, regulations and license conditions. They may also provide insight into operator activities, prepare for international inspections and provide high-level assurance that the State's safeguards reports that are submitted to the IAEA are correct and complete. SRA inspections may include a variety of activities over the lifecycle of a facility, including pre-license inspections, regular and targeted (to address a particular issue that has arisen) inspections, and confirmation of the removal of nuclear material from a facility. SRA inspections play an important role in enabling the State to fulfil its national objectives, not simply those that are addressed during IAEA inspections. Only in cases where nuclear material may have gone missing, is the State obliged to report it to the IAEA. An example of an annual programme of SRA safeguards inspections is provided in Annex X.

To ensure that licensed holders of nuclear material are complying with the laws, regulations and licence conditions, including those related to accounting for and controlling nuclear material, the SRA might periodically **audit and inspect** licensees to review their records, check their inventories and ensure they are prepared to facilitate IAEA access and activities.

Audits are often used to assess a new process, procedure or system (such as a measurement procedure or use of a new process), or to support continuous improvement. Audits usually involve review of a particular aspect of a system, and produce recommendations for enhancements or resolutions to identified problems. They often focus on a process as a whole, rather than a particular output. Audits are helpful to avoid mistakes or minor problems during inspections, and can be viewed as a complementary tool. Inspections focus on compliance with regulatory requirements, and review outputs such as reports, records and inventory taking. Both audits and inspections can play a useful role in the SRA's evaluation of licensee performance, and as an internal element of the SRA's quality management system (QMS) for continuous improvement (see Section 7 for more information on QMS).

Example: Audits are performed on the nuclear material accounting systems at facilities. When persistent problems related to receiving accounting data arose, targeted audits could be performed to evaluate all of the facility systems and identify the root causes for the issues. Once the root causes are known, recommendations and additional instructions can be provided to the licensees to resolve the issues.

Because most of the IAEA in-field verification activities are carried out at facilities rather than LOFs, many SRAs make an extra effort to conduct outreach and carry out audits at LOFs. (The *SIP Guide on Facilitating IAEA Verification Activities* has a section for LOFs

which contains more information.) This does not necessarily involve a large investment: the safety or security inspections that are carried out at LOFs, particularly those using high-activity sources, can be expanded to also ensure that accounting and control measures are in place for any associated depleted uranium shielding, or uranium contrast stain used in an electron microscope laboratory at a medical center, for example. The safety or security inspector can simply ask to see the nuclear material accounting records, and perhaps a copy of the most recent report submitted to the SRA. If there is a problem with the records or reports, the matter can be referred by the safety inspector to the safeguards experts at the SRA for follow up. Some SRAs select a small number of LOFs at random in a particular year for a comprehensive inspection, to include safeguards, security and safety.

An SRA may consider conducting safeguards-related audits during its **safety or security inspections** at LOFs. In some States, **SRA staff members are cross-trained** in performing security and safeguards audit or inspection activities.

For States with smaller nuclear programmes, or for a State with a recently established SRA, the SRA may wish to involve a TSO, international expert or other government agencies in the State with relevant expertise, to assist in conducting national audits and inspections.

4.5. Enforcement

The SRA must have jurisdiction over (i.e., the authority to exercise its enforcement rights over) all territory of the State and over all persons, organizations and entities performing activities subject to regulatory control. SRAs need the authority to carry out or recommend measures to address noncompliance by any person, organization or entity, including public or private entities, potential users of nuclear material or others involved in any safeguards-related activities. Such response measures may include warning letters, fines/penalties, suspension or revocation of licenses, removal of material or criminal prosecution, and are appropriately commensurate with the relevant violation. An approach to addressing non-compliance that involves measures that gradually escalate as necessary to address the problems is referred to as a ‘graded approach’.

For example, the first response to a minor violation could be a warning letter. If the non-compliance was not addressed adequately, the letter would be followed by a requirement for compensatory actions to be taken which, if not carried out, would be followed by fines and finally court action including possible sanctions, substantive fines or imprisonment. A serious violation would result, however, in an immediate serious enforcement response, such as a suspension of a license. Certain enforcement measures may be required to be implemented within very short timeframes (e.g., warrants issued in short timeframes can be used to compel short notice access by IAEA inspectors). A graded enforcement strategy is described in more detail in Annex II and a case study is provided in Annex III.

4.6. Accountability and transparency

While it is important that an SRA is independent, it is equally important for an SRA to be transparent and accountable to its stakeholders, including the public. It is recommended that

SRAs strive to maintain public confidence in their activities and findings. This can be done, for example, by regularly issuing annual reports on its activities, publishing IAEA results and findings, issuing reports on nuclear material inventories in the State, and providing amended laws and regulations as required. For the SRA to be credible, it should also be subject to oversight. This could be achieved through external audits by accredited organizations whose findings are published openly.

Example: An SRA with responsibility to ensure that the State's international obligations under the Nuclear Non-Proliferation Treaty (NPT) are met has a Director General who cannot be dismissed by the Government but is fully accountable to the Parliament. The Director General is required to submit an annual report on safeguards implementation in the State to the Parliament.

Example: An SRA that is responsible for all safeguards activities (including those associated with an additional protocol) is set up as a public administration body under the supervision of the Government. One member of the Government is assigned supervisory responsibility over the SRA, independent of his or her other responsibilities. The functions of the SRA are defined in law and include the right to issue licenses. The SRA annually submits its report on the safety of the State's nuclear applications to the Government and Parliament, as required by law.

4.7. Providing information to the IAEA

The IAEA *Nuclear Material Accounting Handbook* and the IAEA *Guidelines and Format for Reporting Declarations Pursuant to Articles 2 and 3 of the Model Protocol Additional to Safeguards Agreements* provide detailed information on this topic, and when published, the *SIP Guide on Provision of Information* will include further details. Information to be submitted to the IAEA by the SRA includes, for example, nuclear material accountancy reports, additional protocol declarations, design information, information on imports and exports, and special reports. The SRA is responsible for submitting State information in a timely manner and for verifying its quality in advance. Trial and mock reporting declaration exercises can provide a learning opportunity for the SRA in preparing to meet safeguards reporting requirements.

An SRA will need an effective mechanism for collecting, storing, handling, and reporting safeguards information. An information management system is essential for facilitating the work of the SRA in meeting these responsibilities. Section 6.0 addresses an SRA's information management system and a detailed case study is provided in Annex XI.

For States that are modifying an SQP or rescinding an SQP, the national register of radioactive sources will contain information useful for locating and reporting nuclear material contained in such sources as well as depleted uranium shielding in containers used for transporting or storing sources, or in medical equipment. The *Safeguards Implementation Guide for States with SQPs* (IAEA Services Series 22) provides additional detailed information on locating and controlling nuclear material in a State.

States are encouraged to use the latest version of the IAEA Protocol Reporter software to prepare and submit declarations. The IAEA provides instructions for downloading software on its *Resources and Assistance for States* webpage (www.iaea.org/safeguards/resources-for-

states/overview.html). The Additional Protocol Declaration Helper tool is also useful and provided on that webpage under the tab 'software and tools'. A State may also request IAEA assistance in preparing its declarations by sending an email to the relevant Country Officer in the Department of Safeguards of the IAEA.

The SRA and facility operators (or designers in the case of facilities planned or under construction) will need to work together in preparing design information and submitting it on time to the IAEA.

Facility operators will need to keep more detailed records than what is submitted in reports to the SRA. Likewise, the SRA keeps more detailed information than what is submitted to the IAEA. Some additional information useful to maintain at the SRA includes a current registry of locations with nuclear material that has been exempted from safeguards; a current registry of licensed nuclear material holders and contact information for each location; operational information from mines and concentration plants that includes, e.g. planned production and anticipated exports.

4.8. Facilitating IAEA verification activities

The *SIP Guide on Facilitating IAEA Verification Activities* (IAEA Services Series 30) provides detailed information on this topic. To support verification activities, procedures will need to be established to support issuance of visas and make arrangements with Customs. To ensure IAEA verification activities are conducted smoothly, the SRA may need to issue regulations and related procedures and review them with facility and LOF operators and other concerned government agencies. Facility operators may also need to prepare and review relevant procedures. Mock inspections and complementary access field trials have been used in many States to prepare both the facility operator and SRA staff for the implementation of IAEA safeguards activities in the field.

4.9. Cooperation with the IAEA and with SRAs of other States

An SRA and the IAEA need to cooperate in the implementation of safeguards. Cooperation is needed in everything from receiving and responding to IAEA correspondence to issuing visas, from arranging logistical support for transporting IAEA equipment to negotiating a facility attachment. Safeguards implementation is most effective when it is carried out in a cooperative, partnership approach between the IAEA, the SRA and facility operators. SRAs often cooperate with one another when there is a perceived mutual benefit in doing so. For example, some regional networks of SRAs (or broader nuclear authorities) have been established to facilitate meetings, information sharing, regional cooperation and networking.

The forthcoming *SIP Guide on Collaborative Approaches to Safeguards Implementation* describes a wide variety of cooperative activities and approaches that have proven mutually beneficial to the IAEA, SRAs and facility operators.

Example: Regional networks can be very useful mechanisms for cooperation and sharing of experiences. For example, States in Africa have established the Forum of Nuclear Regulatory Bodies in Africa (FNRBA) which is a network of nuclear authorities which regularly meet to exchange

information on regulatory experiences and practices. Similarly, States in the Southeast Asian region have established 'ASEANTOM', comprising ASEAN Member States, which meets to enhance knowledge and resources to ensure the safety, security and safeguards of peaceful nuclear applications. The Asia Pacific region also established the Asia Pacific Safeguards Network (APSN) which focuses more closely on safeguards issues.

5. SUSTAINING AN SRA

Once the SRA has been designated and its functions are defined in the legal framework (e.g. safety and security as well as safeguards), the next step is to ensure the SRA has the resources it needs to carry out its work effectively. Specifically, the SRA requires sustained human, technical, and financial resources, as well as a suitable information management system. It is also recommended that the SRA establish its QMS to ensure its performance meets high standards and encourages continuous improvement.

5.1. Retaining Staff

Retaining well-qualified staff members can be a challenge, especially with the funding constraints that often accompany civil service. There are a number of non-financial incentives that could be offered to retain staff members, such as individual career planning based on regular competency assessments, 'development plans' that specify training and professional growth opportunities, support for participation in international conferences and providing benefits such as flexible work hours. Many States establish a workforce development plan that identifies the skill sets that the nuclear program needs in the immediate and long-term, the resources it already has (e.g., training facilities), the steps the State will take to fulfil its workforce needs, and how it plans to fund these activities during the lifecycle of the programme.

Example: A recruitment strategy can help to attract highly qualified candidates, particularly through emphasis of the positive attributes of the career. For example, a theme of 'See the World' could be used, which emphasizes the opportunities present in nuclear regulation to participate in international meetings, conferences, peer reviews or other events. This is an attractive feature of the field to young adventuresome professionals.

Staff development plans (that include training and opportunities for advancement) are an important tool to retain talented staff at the organization. Such plans address training, including structured on-the-job training; mentoring; succession planning; knowledge capture and knowledge transfer.

Tuition reimbursement programmes are useful tools in States where higher education is expensive. These programmes allow staff members to obtain college degrees at reduced or no cost (the cost is borne by the SRA) while working full or part time for the SRA. For the employer, the programmes add new skills and capabilities to the work force. Staff members can be retained contractually, by requiring repayment of the tuition funding if they leave the organization.

5.2. Training and professional development

When developing a safeguards training programme, an SRA may wish to begin with an overall assessment of the national training needs (e.g. for SRA staff as well as for facility operators). Based on the identified needs, the SRA can set priorities for addressing them, by, for example, developing courses, on-the-job training opportunities, attending IAEA training and taking e-learning courses.

Classroom training course(s) could cover particular areas of safeguards (including practical exercises for inspectors, such as non-destructive measurements) designed to build-up and maintain competencies required to carry out the different SRA functions The training programme might also consist of fellowship programmes or on-the-job training for junior staff, technical visits for senior staff and/or a structured plan for attending selected training courses offered by the IAEA. Training may also be offered in the region through other training providers.[7,8]

The development of an effective national training programme in safeguards will benefit from applying a systematic approach to training (SAT). The IAEA's Nuclear Infrastructure Development Section offers e-learning modules explaining the IAEA's Milestones Approach to introducing a nuclear power programme. Within this interactive e-learning series, two modules are devoted to the development of human resources and might be of interest for human resource development managers at SRAs and nuclear facilities.

In particular, the module on Systematic Approach to Training (SAT) provides insight into this internationally recognized tool for ensuring adequate competence of all nuclear personnel. The module on *Human Resource Strategy*[9] focuses on human resources management, which is a crucial element of any nuclear power programme. Another e-learning module focuses on IAEA safeguards. These tools may be very useful for States embarking on a nuclear power programme or expanding their existing programme, as well as in States that are in the process of merging or restructuring their SRA.

IAEA safeguards training courses are offered at the international and regional level on a regular basis. SRA staff members may request to participate in IAEA training courses. National training courses or topical workshops can also be provided upon request of a Member State (subject to budget limitations). IAEA SSAC courses are an excellent opportunity for new SRA staff members as well as staff who are recently assigned to perform new safeguards responsibilities, to learn about all aspects of IAEA safeguards. IAEA courses are hosted by a State in cooperation with the IAEA.

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[7] European Safeguards Research and Development Association (ESARDA) see: https://esarda.jrc.ec.europa.eu/; Integrated Support Centre for Nuclear Non-proliferation and Nuclear Security (ISCN) in Tokai, Japan; International Nuclear Non-proliferation and Security Academy (INSA) in Daejeon, Republic of Korea.

[8] Nuclear Safeguards Education Portal at Texas A&M University see: http://nsspi.tamu.edu/topical-subsections/education/nuclear-safeguards-education-portal-(nsep).

[9] All of the modules can be found at: http://www.iaea.org/NuclearPower/Infrastructure/elearning/index.html.

Safeguards-related training courses are also organized by organizations such as the U.S. International Non-proliferation and Safeguards Engagement Programme (INSEP), the European Safeguards Research and Development Association (ESARDA), EURATOM and the Vienna Centre for Disarmament and Non-proliferation. See also Section 8.2.

Example: In a State with a relatively small nuclear industry, the number of regulatory staff positions with responsibility for national safeguards implementation in the SRA is small. This poses two challenges: (1) maintaining a critical mass of well trained and experienced staff through times when key staff depart; and (2) delivering training for new staff as well as continuous training for existing staff to keep them up-to date with new technologies and developments.

These challenges can be addressed by placing a high priority on training for the few staff members, including: sending new staff to international SSAC training courses; identifying opportunities for staff to do consultancies in the IAEA; finding opportunities for staff to prepare and present on safeguards topics at relevant conferences and workshops; and, providing on-the-job training. Well-structured on-the-job training with specified learning objectives, defined deliverables and evaluation, is a major element of the SRA's training program as it is more economical than in-house training courses for only one or two staff.

Sometimes bilateral cooperation programmes between States include the provision of training and assistance related to safeguards. Reactor vendors also serve as a critical training provider to operator staff, and SRA staff can also benefit from those courses as appropriate.

Example: New staff at an SRA might undertake a preliminary 'organization familiarization period' wherein the new staff member spends time working in all parts of the organization. For example, the staff member that has been hired into safeguards works in radiation protection, waste management, border control, laboratories and licensing departments before settling into the new role in the safeguards office. This helps the staff member to understand the capabilities and missions of the other departments, which can then be leveraged in carrying out their work in safeguards.

Subjects to be addressed in training courses will vary from one SRA to another, depending on the training strategy of the SRA and the kinds of tasks typically undertaken by its staff members. Training documentation will specify the learning objectives met in each course and the types of activities performed by staff members who would benefit from each course.

Example: A training curriculum for SRA staff in a State with a relatively small nuclear programme but with plans for expansion might include the following topics:

Module 1: The international nuclear non-proliferation regime and IAEA safeguards
- *The IAEA Statute, NPT, safeguards agreements and protocols*
- *Safeguards objectives, definition and scope (define key terms, describe nuclear fuel cycle, review main equipment)*
- *IAEA rights and obligations, State's rights and obligations (e.g. under a safeguards agreement, additional protocol, SQP and modified SQP, using Services Series 21)*

Module 2: Establishment of an SRA
- *Basic legal requirements and model regulations*
- *IAEA, SRA and operators rights and obligations*
- *Competences and resource requirements*

- *Practice of safeguards in licensing and enforcement, import and export*
- *Regulatory requirements for facilitating IAEA access*

Module 3: Establishment of an SSAC
- *Nuclear material, nuclear and non-nuclear activities*
- *SSAC requirements*
- *SSAC elements, nuclear material accounting, verification and reporting (types of reports, forms & examples)*
- *Reporting form (Code 10)*
- *Accounting and reporting process*
- *Bulk material measurements and accounting techniques*

Module 4: Additional protocol requirements
- *Article 2 discussion and explanation, including Annexes I and II*
- *Quarterly & annual declarations and updates*
- *Protocol Reporter software*

Example: Mentoring and on-the-job training, job shadowing or job sharing is used in some States to enable the responsibilities of unfilled positions to be met while hiring continues. 'Shadowing Internal Training' for new safeguards staff includes:

- *Internal review of the safeguards history and archive;*
- *Participating in the preparation of official letters for information collection for preparing additional protocol declarations;*
- *Training on preparing declarations using IAEA Protocol Reporter software;*
- *Participation in the Safeguards National Committee and drafting the intergovernmental protocol between SRA and relevant institutions;*
- *Familiarization training in other regulatory functions supporting safeguards functions, such as the Radiation Measurements Labs Division, Radiation Control Division, National Register Section and Border Control Directorate, in order to give new staff a broader view of the regulatory body functions and processes and to take benefit from other Divisions that are related to safeguards.*

Several IAEA Member States have established or are developing national inspector training and qualification programs to train SRA inspectors. Annex X provides details on setting up a State's inspector qualification programme. Section 8.1 of this Guide describes a training programme to help States develop a Domestic Safeguards Inspector Qualification Program (DSIQP). A DSIQP can help a State to systematically develop, monitor, evaluate and retain the knowledge and skill sets relevant to performing effective national safeguards inspections. Existing national safeguards inspector qualification programmes vary greatly in terms of their structure, size and scope. Each approach has advantages and disadvantages, and a State seeking to develop a DSIQP may benefit from considering other States' experiences.

Example: An annual training plan for each staff member is useful for evaluating needs, monitoring implementation and providing feedback for improvements. Depending on needs and funding, the SRA can take advantage of training programmes of international and regional organizations (e.g. IAEA, EURATOM, Asia Pacific Safeguards Network) and incorporate their materials into its training.

The IAEA has a Safeguards Traineeship Programme for young professionals from developing countries, wherein trainees spend 10 months at the IAEA learning about all aspects of the safe and secure use of nuclear energy, as well as in-depth training on safeguards implementation. Training, assistance or advisory service missions can be

requested by writing an email to official.mail@iaea.org with 'safeguards training', 'safeguards assistance' or 'safeguards advisory service' in the subject line (see Section 8).

5.3. Knowledge management and succession planning

Job sharing and mentoring programmes are important training and development techniques but also serve as useful knowledge management methods. The involvement of staff members in development-oriented or documentation-oriented projects can help transfer knowledge and create motivation, such as projects to develop new procedures, document existing processes or implement new equipment, approaches or process improvement initiatives.

For succession planning, managers may develop a plan that identifies a successor (or successors in some cases) to a departing staff member and creates opportunities for them to work together as much as feasible within time and budget limitations. When the expert departs, the staff member is well-positioned to take on the expert's responsibilities. It is important to preserve any materials that were collected or produced during the transition period and make them available to other experts and successors. An electronic reference library is useful for managing and sharing documents in this respect.

Example: In an effort to document the professional experiences of key experts in safeguards and nuclear non-proliferation, interviews were filmed covering topics such as the negotiation of the NPT, development of INFCIRC/153 and the safeguards strengthening efforts of the 1990s that led to the adoption of the Model Additional Protocol. This film series, entitled "Foundations of International Safeguards," has been published and is publically available on DVD and web streaming at http://cgs.pnnl.gov/fois/default.htm.

The IAEA also has established a formal knowledge management programme to capture the institutional memory and key knowledge, skills and experiences of staff members that are preparing to leave the IAEA. This programme is an element of the broader Quality Management System of the Department of Safeguards.

6. INFORMATION MANAGEMENT SYSTEM

An important role of an SRA is the collection, evaluation, processing and submittal to the IAEA of information regarding nuclear material and nuclear-related activities. These activities are usefully supported by the development and maintenance of an effective information management system.

6.1. Objectives of an SRA's information management system

Information management is the collection of basic data from one or more sources with distribution to one or more recipients. Typically, but not necessarily, there is some degree of manipulation of the data before it is presented to the recipient.

Information supporting a State's nuclear program and its SSAC can serve multiple purposes:

- Nuclear material management (e.g. import, export, transportation, storage);

- Meeting obligations of a safeguards agreement and additional protocol;
- Acquisition and disposition of nuclear material;
- Safety;
- Security;
- Efficiency of operations; and
- Organization of resources.

Information management involves stakeholders, including any individual or organization that is actively involved in the process and has interests that may be positively or negatively affected by the process, or may exert influence over the process, its deliverables or other stakeholders.[10] Stakeholders in the context of safeguards might include the SRA; facility and LOF operators; private entities; security and safety authorities; Customs and commerce authorities.

Reliability is essential for an SSAC. The State's ability to defend and justify its results and deliver consistent quality creates confidence and efficiency. Reliability is achieved through quality management and systems engineering practices, including careful process design and effective procedures and documentation.

Example: An SRA information management system can support safeguards information collection, quality control and submission to the IAEA. A system may use a database (such as Oracle) that contains ICRs, PILs and MBRs for all MBAs in the State. Such a system may automatically perform substantial quality control checks, particularly cross-checking movements of nuclear material between MBAs to verify that corresponding ICRs are correct and complete. The system also maintains a database of license holders for nuclear materials management.

In the past, the system exported nuclear material accounting data in Code 10 format to produce an .xml report for submission to the IAEA. It was modified, however, to export data on nuclear material at LOFs to a software programme used by the SRA for reporting, so that it can be submitted to the IAEA directly in electronic form. Data from facility operators that have their own accounting software may helpfully submit their information in a format that is suitable for direct import into the information management system.

The information system can track imports and exports of nuclear material, trigger list items and dual use items. Having this information available in the database simplifies the preparation of the quarterly 2.a.(ix) declarations. As needed, the system can produce a PIL or General Ledger for use during IAEA inspections or national inspections. The software has a user friendly search function that allows querying on, for example, the movement of particular batch of nuclear material, or filters can be applied to the database to look at all aspects of a subset of data.

SSACs can be large and complex involving many parties and a substantial budget, or they may be small with a limited set of activities and individuals involved. An information management system should be created to support the needs of its users.

[10] *A Guide to the Project Management Body of Knowledge (PMBOK® Guide),* Project Management Institute, Fifth Edition.

6.2. Key elements of an information management system

There are key elements to consider when developing an information management system for an SRA. Functional requirements will need to be specified; Annex XI provides a list of considerations to take into account when developing an information management system at an SRA. Commensurate with a complexity of a State's nuclear programme, an SRA may wish consider the following information elements when designing its safeguards information system:

- An accounting and records system of all nuclear material in the State, including exempted material and retained waste, ability to produce reports for IAEA submission, and ability to trace the history of batch data back in time;
- Facility and LOF information, including maps and site information, operational status, contact information and operational programmes;
- Export and import information;
- Inspection planning and preparations for IAEA access;
- Measurement systems and quality control analysis results (performance);
- Equipment installed, including surveillance cameras;
- Action tracking and follow up capability, including license expiration/review dates;
- Annual calendar of due dates for various predictable events, reports, etc.;
- National inspection reports and corrective action tracking;
- Qualifications and training of national inspectors;
- Training; and
- Visas for designated IAEA inspectors.

The SRA's information system will reflect the SRA's activities and information needs, the accounting systems and measurements that produce the data to generate reports, the QMS of the SRA, the procedures to report relevant imports and exports, the tracking of nuclear material movements in the State, and so on. The information system extends beyond data, to include the involved entities and the interactions and communications between them, and the infrastructure in place to facilitate these interactions. In this context, all of the elements of a State's safeguards implementation need to be included in an effective information management system.

Annex XI offers a case study describing a State's development of a new information management tool for the collection, evaluation, formatting, review, approval and submission of additional protocol declarations.

7. QUALITY MANAGEMENT SYSTEM

A QMS serves an essential role in any organization, and is particularly important for an SRA. A QMS ensures that all of the processes involved in carrying out the mission of the organization are documented, and that procedures are established and followed. A QMS also sets standards for performance and encourages continuous improvement, accountability and

clearly defined roles and responsibilities. It is recommended that the QMS extends to all elements of the State's safeguards infrastructure, including State and facility nuclear material accounting systems, inventory taking, records and reports, information collection and submittal, facilitating IAEA access, documentation and other safeguards processes and functions.

Quality management ensures that processes are documented, procedures exist and are followed, standards are met and **performance of the organization** remains at the level expected by its leadership.

A QMS helps an organization to plan and document the implementation of its critical processes used to achieve its objectives. The ISO Standard 17020, *Conformity assessment - Requirements for the operation of various types of bodies performing inspection,*[11] may be a useful standard for an SRA in a State with some nuclear facilities.

Any SRA will benefit from establishing a QMS that addresses the following areas:

- Planning, establishing, implementing and monitoring the attainment of goals and objectives, which are guided by the safeguards agreement and additional protocol requirements);
- Reviewing, evaluating and maintaining the system, including updating underlying assumptions such as risks and operational environment;
- Improvements in effectiveness of the implemented system using performance indicators; and
- Implementation of corrective actions needed to achieve the planned results from the system processes (e.g. methods to determine the effectiveness of operation and control).

7.1 Roles and responsibilities

Responsible officials in the SRA need to define and communicate requirements, responsibilities and authorities to all levels of management and staff, and management will need to fully support and encourage adherence to the QMS. The SRA might first establish, maintain and promote the quality policy and quality objectives of the organization. Then processes cam be documented and implemented to meet customer requirements and enable quality objectives to be achieved. A review of the required resources to achieve the objectives can also be conducted.

Processes are needed to implement the quality system, with documentation and periodic review. Roles and individual assignments are typically described in a 'roles, responsibilities, authorities and assignments (or accountabilities)' matrix, fostering shared understanding.

[11] This and other ISO standards can be purchased from ISO at the following website: http://www.iso.org/iso/home/standards/management-standards/iso_17025.htm.

7.2 Quality policy and communication

A quality policy communicates what the QMS seeks to achieve and fosters understanding among SRA staff as to its purpose and importance. The quality objectives are reviewed and revised by management periodically. SRA quality objectives might focus on continuous improvement of stakeholder satisfaction; continuous improvement of the quality of SRA services and productivity; and compliance of the QMS with the applicable national or international quality standards.

Communication channels and feedback mechanisms need to be put in place. Often an integrated management system is used to provide information to staff members using a secure local area network. This tool can be accessed by all staff and contains all quality controlled documents, templates, publications, presentations, tutorials and procedures in the latest version, in a clearly structured and controlled format.

Example: The IAEA Department of Safeguards manages its policies, procedures and guidelines within its QMS. The approved version of each document is available to staff members in the Department in an on-line document management system. The following information is included for each document, to help ensure documents requiring review and update can be easily identified: document number that follows a defined naming convention; document name; date of the version and version number; date that the next review is due; responsible organization and classification level.

A quality manual provides references to the documented procedures that are to be followed, and describes the inputs, outputs and interactions among key processes. A quality manual contains all relevant information regarding the QMS, including the scope, procedures, forms and instructions.

Example: An SRA's procedure for preparing for and supporting IAEA inspections describes in a step by step manner what to do at the moment an IAEA inspection notification is received, how to support an inspection and how to document and monitor any follow-up actions when the inspection is completed.

7.3 Quality control and corrective action

Quality control and corrective action are important elements of the QMS, ensuring that products (such as nuclear material accounting reports submitted to the IAEA) or services (such as responding to an IAEA notification) that do not meet quality standards are identified and improved. Root cause analysis and corrective action plans help to correct underlying problems, prevent recurrences and improve procedures and instructions.

Example: A procedure may be developed for registering safeguards-related non-conformances. These may not necessarily involve a finding in IAEA terms (discrepancy or anomaly) but rather non-conformance with procedures that are subject to quality control. A series of steps are taken to follow up on the non-conformance, beginning with a letter and timeline for actions. If the deadline for resolution is missed, the issue is elevated until resolution is achieved. A procedure for closing out a non-conformance includes a close out report to document the situation and the resolution.

An SRA will have to consider whether or not to strive for accreditation with international quality standards, such as ISO 9001 or ISO 17025.

Example: A training centre was being established to provide nuclear safety, security and safeguards training under the oversight of an SRA. The SRA considered seeking ISO 9001 accreditation to lend additional credibility to the training centre. However, after evaluating the options and performing a cost-benefit analysis (investments in the accreditation would reduce funds available for the training centre), it was decided to establish a QMS that followed the recommendations of ISO 9001 but without seeking accreditation. The critical aspect from the SRA's point of view was to ensure that the QMS met the needs of the SRA and ensured the effective management of the operation and the successful functioning of the training centre.

7.4 Evaluating an SRA using ISO 9001 quality standard

An SRA may wish to evaluate itself in the context of the recommendations in ISO standard 9001. The tables below summarize the results of a study[12] conducted to describe the features of an SRA that would meet the ISO 9001 standard.[13] These results may be a useful 'checklist' for an initial evaluation of an SRA.

Legal Basis & Organization *This section derives from aspects of clause 1 (Management Responsibility) of ISO 9001.*	• There is clear definition of the relationship between the SRA and the State's national/regional non-proliferation obligations and safeguards agreements. • The SRA is established in national/regional law. • The SRA has legal powers of access, inspection and data provision of equal standing to those of the IAEA. • The SRA is independent of fuel cycle operators. • The SRA can apply sanctions and/or has redress to a higher independent authority (e.g. to ensure that sanctions are enforced). • SRA staff/inspectors are permanently employed (i.e. not seconded) and are independent of the facilities and operator inspected. • SRA funding and budgetary processes are transparent (and subject to independent scrutiny). • The SRA is transparent in terms of providing periodic reports on its activities (which are also subject to independent oversight and review).
Quality System *This section relates directly to clause 2 (Quality System) of ISO 9001, but also has links with clauses 1 (Management*	• The SRA has a documented QMS meeting the requirements of the ISO 9000 series and/or 50-C/SG-Q, and has been operating to these requirements for a minimum of 2–3 years. • Procedures and working instructions cover all stated activities, including inspection, measurement and data analysis.

[12] The contents of Section 7.4 are extracted from that study conducted under a Member State Support Programme to the IAEA Department of Safeguards, published in 2002.

[13] This standard can be purchased from ISO, and found at http://www.iso.org/iso/home/standards/management-standards/iso_9000.htm.

Responsibility), 5 (Document and Data Control), 14 (Corrective and Preventative Action), 16 (Control of Quality Records) and 17 (Internal Quality Audits).	• An internal quality audit/third party audit system has been in operation for minimum of 2–3 years, providing coverage of the whole SRA system.
Personnel *This Section is covered by clause 18 (Training) of ISO 9001), with some links to clauses 5 (Document and Data Control) and 16 (Control of Quality Records).*	• Established system of staff appraisal and development. • Developed role descriptions and training requirements. • Training supported by objective evidence of competence. • Maintenance of staff training records for duration of employment.
Nuclear Material Accountancy *This element is most directly relevant to clause 9 (Process Control) of ISO 9001, but there will also be links to clauses 1 (Management Responsibility), 2 (Quality System), 5 (Document and Data Control), 16 (Control of Quality Records) and, conceivably, 20 (Statistical Techniques).*	• Published State/regional accountancy system policy or standards. • Accountancy procedures and requirements at least equivalent to those needed to satisfy current IAEA requirements. • Established system of data collection. • Established and documented system of error or anomaly identification/correction. • Established and documented systems for the assessment of figures reported for material unaccounted for (MUF) and shipper receiver differences (SRD), and instigation of corrective action. • Technical capability to provide accountancy data to the IAEA by secure electronic means and on a timely basis.
Safeguards Inspection Approaches and Activities *Clause 9 (Process Control) of ISO 9001 covers most of the elements identified for this element of the specification, but clauses 1 (Management Responsibility), 5 (Document and Data Control), and 16 (Control of Quality Records) are also relevant.*	• SRA inspection goals (e.g. quantity, timeliness of detection) that are at least equal to those of the IAEA. • SRA safeguards activities sufficient to meet these goals (e.g. in terms of the frequency and intensity of its verification activities). • SRA inspection records (e.g. log books, working papers, measurement results, sampling details, inspection reports observations) retained by the SRA for at least 5 years.
Inspection Schedule and Planning *This element relates directly to clause 1 (Management Responsibility) of ISO 9001, but clauses 5 (Document and Data Control), and 9 (Process Control) will also be relevant.*	• An overall SRA safeguards inspection regime complementary or comparable to that of the IAEA. • Production and submission of inspection schedules for next 12 months (updated at least quarterly). • Sufficient resources to implement the inspection programme.
Measurement and Equipment Control *This element covers all aspects of sampling, analysis, measurement techniques, measurement equipment accuracy and maintenance along with other issues related to containment and*	

surveillance. Clauses 1 (Management Responsibility,) 5 (Document and Data Control), 9 (Process Control), 11 (Control of Measuring and Test Equipment) and 16 (Control of Quality Records) are each of varying relevance to the activities described in the sub-sections that follow.	
Sampling and analysis of nuclear material	• Sampling procedures equivalent to IAEA. • Samples analysed by an analytical laboratory accredited to an appropriate standard (and/or the IAEA). • Criteria for the acceptance of results equivalent to those used by the IAEA. • Analytical results retained for a minimum of 5 years.
Use and control of Measurement Devices	• SRA use of measurement equipment designed to meet the same standards (e.g. of integrity and security) required for IAEA equipment in similar situations. • An established regime of calibration and measurement quality control for all measuring devices and systems/methods. • Written calibration procedures and instructions for all measurement devices and systems/methods. • Established procedures for checking instrument performance. • Retention of calibration records.
Accuracy and precision of measurement devices	• Operation of SRA instruments and devices to deliver measurement accuracy and precision equivalent to the IAEA.
Use and control of in-field surveillance devices	• SRA use of surveillance equipment designed to meet the same standards (e.g. of integrity and security) as IAEA. • Established procedures for ensuring the security and integrity of SRA surveillance devices. • Evidence of monitoring environmental conditions against those specified for the equipment.
Use and control of seals or other tamper indicating devices (TIDs)	• SRA use of seals/TIDs designed to meet the same standards (e.g. of integrity and security) as IAEA in similar situations. • Established procedures for ensuring the security and integrity of SRA seals/TIDs.
Maintenance of equipment	• Established regime of maintenance for measuring, surveillance and sealing equipment. • Maintenance records retained for a minimum of 3 years.
Data handling and analysis	• Accountancy data forwarded to the IAEA as required. • Accountancy data for facilities available in electronic format. • Scope for timely, suitably authenticated and encrypted electronic transmission of accountancy data for facilities.

8. RESOURCES AND ASSISTANCE AVAILABLE TO STATES ON ESTABLISHING SAFEGUARDS INFRASTRUCTURE

Three areas of assistance related to infrastructure development are addressed in this section: 1) IAEA guidance, advisory service missions, training and review missions; 2) IAEA legal assistance and training; 3) Assistance and training offered by other States. Annex XII includes a paper summarizing the IAEA's assistance offered to States related to safeguards.

8.1 IAEA guidance, training, advisory service missions and review missions

The IAEA produces guidance to assist States in implementing safeguards, and posts all relevant documents, forms and instructions on its *Resources and Assistance for States* webpage found at www.iaea.org/safeguards. Documents are also listed in the Bibliography in this SIP Guide.

A new suite of guidance documents are under development which addresses 'safeguards by design' (SBD) — a process to help facilitate the consideration of safeguards throughout all phases of a nuclear facility project. A dialogue between the IAEA, the SRA and facility vendor/designer/operator can be very useful, from the initial conceptual design through facility construction and into operations, including design modifications and decommissioning. The guidance does not introduce any new requirements but simply suggests that early dialogue can facilitate the cost-effective implementation of safeguards at a new facility. This dialogue is a voluntary initiative to facilitate improved understanding and early consideration of safeguards, providing an opportunity for stakeholders to work together, build understanding and confidence.

Safeguards implementation at a facility is improved when the **designer, vendor, and operator** understand the basics of safeguards, and the **safeguards experts** understand the basics of the facility operations.

Incorporating SBD into the design/build/operation process carries the potential benefits of:

- reducing redundancy and inefficiencies in safeguards activities;
- higher level of confidence in the subsequent safeguards performance because of full transparency;
- improving safeguards implementation by integration of safeguards systems into the plant design;
- facilitating consideration of joint use by the operator and inspectorate of equipment;
- reducing operator burden with less inspection presence and shorter outages;
- reducing the need to retrofit for installation of safeguards equipment;
- increasing flexibility for future safeguards equipment installation; and
- reducing the costs for safeguards implementation.

The documents in this SBD series are provided on the *Resources and Assistance for States* webpage under the subheading 'Additional Documents'. All safeguards guidance documents that have been published are available under the tab 'Guidance Documents'. In addition to guidance, the IAEA offers training for States, including national, regional and international courses. Courses may cover broad topics such as safeguards implementation generally, or may address a specific area such as NDA measurements.

When a State is interested in receiving specific, in-depth and comprehensive safeguards advice, a useful mechanism is requesting an ISSAS mission. The IAEA offers these missions focused on safeguards, and address all aspects that are covered in this SIP Guide. The missions are only offered at the request of the State, and include a pre-mission meeting

(usually a week in length) to prepare and exchange information, followed by the mission a couple of months later (also a week in length). The IAEA produces a report for the State that describes the mission and makes recommendations addressing opportunities for improvement in the State's safeguards implementation.

The IAEA's e-learning modules[14] are also useful for familiarizing new staff members with safeguards topics. In addition to safeguards, these modules cover all aspects of preparing to introduce nuclear power.

8.2 IAEA legal advisory service and training

The IAEA's Office of Legal Affairs offers assistance, advice and training to Member States in nuclear law. Comprehensive training on nuclear law is provided through the Nuclear Law Institute, established by the IAEA in 2011 in order to meet the increasing demand for legislative assistance by Member States. Every year, the Institute offers intensive training for two weeks in Vienna for up to sixty lawyers in all areas of nuclear law and in drafting corresponding national legislation. Additional information can be obtained at http://ola.iaea.org/ola/nli/about.html or by sending an email to Nuclear-Law-Institute.Contact-Point@iaea.org. Legal advisory service missions are also provided through a programme entitled 'integrated regulatory review service' or IRRS[15]. These missions are similar to an ISSAS Mission but focus on the broader nuclear regulatory framework, including safety, security, safeguards, liability and other aspects.

The Nuclear Energy Agency offers the 'International School of Nuclear Law' in cooperation with the University of Montpellier in France. This two-week programme is offered annually, and is designed to provide participants with a comprehensive understanding of the various interrelated legal issues relating to the safe, efficient and secure use of nuclear energy. More information is available at http://www.oecd-nea.org/law/isnl/.

8.3 Assistance and training offered by States

As mentioned in Section 5.2, several organizations around the world offer vocational training and academic courses in the area of safeguards and non-proliferation that are directed to a broad audience ranging from students and diplomats to staff of SRAs and facility operators.

The following provides a **brief overview** of activities in the area of safeguards and non-proliferation training and education. This overview is not exhaustive and inclusion in this SIP Guide does not indicate endorsement by the IAEA; the IAEA has insufficient familiarity with the course material to offer a recommendation.

[14] E-learning modules are found at http://www.iaea.org/NuclearPower/Infrastructure/elearning/index.html.

[15] See IAEA Integrated Regulatory review Service (IRRS) Guidelines for the Preparation and Conduct of IRRS Missions, Vienna 2013.

In Asia and the Pacific region, Japan and the Republic of Korea have established dedicated training centres focusing on nuclear safeguards, non-proliferation, security and safety for experts in and beyond the region. The Integrated Support Centre for Nuclear Non-proliferation and Nuclear Security (ISCN)[16] in Tokai, Japan provides training courses on safeguards and nuclear security. In addition, the ISCN supports emerging nuclear power States in infrastructure development for nuclear non-proliferation and nuclear security. The International Nuclear Non-proliferation and Security Academy (INSA)[17] in Daejeon, Republic of Korea offers educational courses on nuclear security, safeguards, export control and non-proliferation.

The U.S. International Nuclear Safeguards and Engagement Program (INSEP) offers technical training on a variety of topics related to safeguards and infrastructure development. The goal of this training is to strengthen technical capacities in ways that enable partners to meet their international obligations and national objectives. Training covers topics ranging from nuclear material accounting and control, nuclear material measurements, containment and surveillance, non-destructive assay, legal and regulatory development, inspections, workforce planning, reactor operations and information management for safeguards. Training is conducted on site at a partner facility, a regional training centre or at a U.S. location. Training consists of seminars for policy makers, technical training for technical staff, topical workshops, consultations and facility tours. The U.S. is also preparing a series of regional and bilateral training activities aimed at helping countries develop a Domestic Safeguards Inspector Qualification Program (DSIQP).

The Institute for Transuranium Elements of the European Joint Research Centre organises every year in collaboration with European Safeguards Research and Development Association (ESARDA) an academic course on Nuclear Safeguards and Non-Proliferation.[18] This course is recognised by the European Nuclear higher Education Network (ENEN)[19] and is taught by leading experts in the field of safeguards. This academic course teaches students about the general background of safeguards legislation, nuclear fuel cycle elements, verification technologies and safeguards implementation.

The Nuclear Security Science and Policy Institute (NSSPI) at the Texas A&M University in the U.S. collaborates with national laboratories to develop educational programs to train international students as safeguards specialists. Recently, these efforts have included supporting the development of safeguards educational seminars for international university students at Tsinghua University in China and elsewhere. In addition, the NSSPI offers a series of e-learning modules to students with an interest in nuclear safeguards and the

[16] http://www.jaea.go.jp/04/iscn/02_about_en.html.

[17] http://www.kinac.re.kr:8181/eng/busin/busin5.do.

[18] https://esarda.jrc.ec.europa.eu/index.php?option=com_content&view=article&id=56&Itemid=191.

[19] http://www.enen-assoc.org/.

security of nuclear materials. These modules are available on the NSSPI Nuclear Safeguards Education Portal.[20]

The University of Central Lancashire in the United Kingdom offers a postgraduate course on Nuclear Safety, Security and Safeguards (MSc).[21] This course is addressed to employees already working within the sector and is designed to develop an awareness of the planning and regulatory framework related to nuclear safety, security and safeguards projects.

The Vienna Center for Disarmament and Non-Proliferation (VCDNP)[22] is an international non-governmental organization located in Vienna, Austria and operated by the James Martin Center for Nonproliferation Studies at the Monterey Institute of International Studies. The VCDNP arranges conferences, seminars, and other forums to foster result-oriented discussion among international organizations, national governments, non-governmental experts, scholars, and civil society. Each year it holds a week-long intensive course for diplomats on non-proliferation and disarmament.

[20] http://nsspi.tamu.edu/topical-subsections/education/nuclear-safeguards-education-portal-(nsep).

[21] http://www.uclan.ac.uk/courses/msc_nuclear_safety_security_safeguards.php.

[22] http://www.vcdnp.org/about.htm.

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Note: Many of these documents can be found for convenience at www.iaea.org/topics/assistance-for-states.

ABBREVIATIONS

AP	Additional Protocol
AMP	Administrative Monetary Penalty
APRS	Additional Protocol Reporting System
APSN	Asia Pacific Safeguards Network
CA	Complementary Access
CFR	Code of Federal Regulations
CSA	Comprehensive Safeguards Agreement
DA	Destructive Analysis (or Assay)
DDA	Declaration Decision Assistant
DIQ	Design Information Questionnaire
DIV	Design Information Verification
DRA	Declaration Review Assistant
DSIQP	Domestic Safeguards Inspector Qualification Programme
DWA	Declaration Writing Assistant
EEL	Essential Equipment List
EIF	Entry Into Force
EPC	Emergency Preparedness Centre
FA	Facility Attachment
ICR	Inventory Change Report
ID	Identification
INFCIRC	Information Circular
ISSAS	IAEA SSAC Advisory Service
ITQP	Inspector Training and Qualification Programme
KMP	Key Measurement Point
LII	List of Itemized Inventory (or List of Inventory Items)
LOF	Location Outside Facility
LP	Laissez Passer
MBA	Material Balance Area
MBR	Material Balance Report
MC&A	Material Control and Accounting
MFA	Ministry of Foreign Affairs
MUF	Material Unaccounted For
NDA	Non-destructive Analysis (or Assay)

NMA	Nuclear Material Accounting
NNWS	Non-Nuclear-Weapon State (party to the NPT)
NOS	National Occupational Standard
NPT	Treaty on the Non-Proliferation of Nuclear Weapons
NSG	Nuclear Suppliers Group
NWS	Nuclear Weapon State (party to the NPT)
OJT	On the job Training
PIL	Physical Inventory Listing
PMBOK	Project Management Body of Knowledge
QMS	Quality Management System
R&D	Research and Development
R2A2	Roles, Responsibilities, Authorities and Accountabilities
RSAC	Regional System of Accounting for and Control of Nuclear Material
SAT	Systematic Approach to Training
SIP	Safeguards Implementation Practices (i.e. SIP Guides)
SIR	Safeguards Implementation Report
SNRI	Short Notice Random Inspection
SQP	Small Quantities Protocol
SRA	State or Regional Authority (responsible for safeguards implementation)
SRD	Shipper-Receiver Difference
SSAC	State's System of Accounting for and Control of Nuclear Material
TID	Tamper Indicating Device
TSO	Technical Support Organization
VOA	Voluntary Offer Agreement

Annex I
MODEL REGULATION FOR IMPLEMENTING COMPREHENSIVE SAFEGUARDS AGREEMENTS AND ADDITIONAL PROTOCOLS

By virtue of [*relevant article of law that authorizes issuance of the Regulation*] the *[relevant State authority*] issues the [*name of regulation*] as follows:

Chapter 1 – Definitions

Article (1) Definitions

For purposes of this Regulation:

Accounting record means a set of data kept at each facility or location outside facilities (LOF) showing the quantity of each type of nuclear material present, its distribution within the facility or LOF and any changes affecting it.

Additional Protocol means the Protocol Additional to the Agreement between [*State*] and the International Atomic Energy Agency (IAEA) for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (NPT), which entered into force on [*date*].

Batch means a portion of nuclear material handled as a unit for accounting purposes at a key measurement point (KMP) and for which the composition and quantity are defined by a single set of specifications or measurements. The nuclear material may be in bulk form or contained in a number of separate items (e.g. a fuel assembly). Items included in same batch are items containing nuclear material of the same element concentration and enrichment.

Book inventory of an MBA means the algebraic sum of the most recent physical inventory of that MBA and of all inventory changes that have occurred since that physical inventory was taken.

Containment means structural features of a facility, containers or equipment which are used to establish the physical integrity of an area or items (including nuclear safeguards equipment or data) and to maintain the continuity of knowledge of the area or items by preventing undetected access to, or movement of, nuclear or other material, or interference with the items.

De-exemption of nuclear material means reapplication of IAEA safeguards on nuclear material previously exempted from safeguards by the IAEA on account of its use or quantity.

Effective kilogram (ekg) means a special unit used in the safeguarding of nuclear material. The quantity in "effective kilograms" is obtained by taking:

a) for plutonium, its weight in kilograms;
b) for uranium with an enrichment of 0.01 (1%) and above, its weight in kilograms multiplied by the square of its enrichment;
c) for uranium with an enrichment below 0.01 (1%) and above 0.005 (0.5%), its weight in kilograms multiplied by 0.0001;
d) for depleted uranium with an enrichment of 0.005 (0.5%) or below, and for thorium, its weight in kilograms multiplied by 0.00005.

Environmental sampling (ES) means collection of environmental samples (e.g., air, water, vegetation, soil smears) by the IAEA for the purpose of assisting the Agency to draw relevant safeguards conclusions.

Equipment and non-nuclear material means equipment and non-nuclear material specified in Annex II of the Additional Protocol

Exemption of nuclear material from safeguards means a determination by the IAEA upon request by [*State*] that IAEA safeguards will not be applied to particular nuclear material on account of its use or quantity.

Facility means:

(a) a reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant or a separate storage installation; or
(b) any location where nuclear material in amounts greater than one effective kilogram is customarily used.

Inventory change means an increase or decrease, in terms of batches, of nuclear material in an MBA; such a change shall involve one of the following:

(a) increases: import, domestic receipt from other MBAs, nuclear production, accidental gain, retransfer from retained waste and de-exemption of nuclear material;
(b) decreases: export, domestic shipment to other MBAs, nuclear loss, other loss, measured discard, transfer to retained waste, exemption of nuclear material from IAEA safeguards, and termination of IAEA safeguards on nuclear material transferred to non-nuclear use.

Location outside facilities (LOF) means any installation or location, which is not a facility, where nuclear material is customarily used in amounts of one effective kilogram or less.

Key measurement point (KMP) means a location where nuclear material appears in such a form that it may be measured to determine material flow or inventory. KMPs thus include, but are not limited to, the inputs and outputs (including measured discards) and storages in MBAs.

Material balance area (MBA)

means an area in or outside of a facility such that:

(a) the quantity of nuclear material in each transfer into or out of each MBA can be determined; and

(b) the physical inventory of nuclear material in each MBA can be determined when necessary, in accordance with specified procedures, in order that the material balance for IAEA safeguards purposes.

Material unaccounted for (MUF)

means the difference between book inventory and physical inventory.

Monitoring

means a special mode of application of containment or surveillance measures that operate without inspector intervention, i.e. unattended. Safeguards data collected by unattended containment or surveillance, monitoring and measurement systems may be transmitted off-site via secure communication networks (to IAEA Headquarters, a regional office or another IAEA location) for review and evaluation for safeguards purposes.

Nuclear fuel cycle-related research and development (R&D) activities

means those activities which are specifically related to any process or system development aspect of any of the following:

(a) conversion of nuclear material;
(b) enrichment of nuclear material
(c) nuclear fuel fabrication;
(d) reactors;
(e) critical facilities;
(f) reprocessing of nuclear fuel;
(g) processing (not including repacking or conditioning not involving the separation of elements, for storage or disposal) of intermediate of high-level waste containing plutonium, high enriched uranium or uranium-233,

but do not include activities related to theoretical or basic scientific research or to R&D on industrial radioisotope applications, medical, hydrological and agricultural applications, health and environmental effects and improve maintenance.

Nuclear material

means any source or any special fissionable material as defined in Article XX of the IAEA Statute. The term source material shall not be interpreted as applying to ore or ore residue. Any determination by the Board under Article XX of the Statute after the entry into force of the Safeguards Agreement which adds to the materials considered to be source material or special fissionable material shall have effect under the Safeguards Agreement only upon acceptance by [*State*].

Nuclear material accountancy	means procedures for accounting for and control of nuclear material that shall be established and maintained by licensees at the facility and LOF level to enable measurement and verification of flow and physical inventory of nuclear material by the licensee, the SRA and the IAEA.
Operating loss	means the unmeasured loss of nuclear material which occurs as a result of dispersion, evaporation, rounding or as a result of analytical errors or an unauthorized withdrawal or other causes.
Operating records	means a set of operating data kept at each facility or LOF on the operation of the facility or LOF, in connection with the use or handling of nuclear material.
Physical inventory	means the sum of all the measured or derived estimates of batch quantities of nuclear material physically present at a given time within a MBA, obtained in accordance with specified procedures. It is determined by the licensee of a facility or LOF as a result of a physical inventory taking (PIT) and is reported to the IAEA in a physical inventory listing (PIL).
Physical inventory taking (PIT)	means measurement and other activities necessary to determine and record the quantities of nuclear material in the inventory of an MBA.
Physical inventory listing (PIL)	means a report provided by the SRA to the IAEA in connection with a PIT by the licensee of a facility or LOF, listing all batches of nuclear material separately and specifying material identification and batch data for each batch.
Safeguards Agreement	means the Agreement between [*State*] and the IAEA for the Application of Safeguards in Connection with the NPT, which entered into forced on [*date*].
Safeguards equipment	means any item authorized for safeguards activities which is installed or used by the SRA or the IAEA for sampling, measurement or analysis of nuclear material, including containment, surveillance or monitoring devices.
Seal	means a tamper-indicating device used by the SRA or the IAEA to join movable segments of containment in a manner such that access to its contents without opening the seal or breaking of the containment is difficult.

Site	means that area delimited by [*State*] in the relevant design information for a facility, including a closed-down facility, and in the relevant information on a LOF, including a closed-down LOF (this is limited to locations with hot cells or where activities related to conversion, enrichment, fuel fabrication or reprocessing were carried out). It shall also include all installations, collocated with the facility or location, for the provision or use of essential services, including: hot cells for processing irradiated materials not containing nuclear material; installations for the treatment, storage and disposal of waste; and buildings associated with specified items identified under Article 2.a.(iv) of the Additional Protocol.
Source material	means uranium containing the mixture of isotopes occurring in nature; uranium depleted in isotope 235; thorium; any of the foregoing in the form of metal, alloy, chemical compound, or concentrate; any other material containing one or more of the foregoing in such concentration as the Board of Governors shall from time to time determine; and such other material as the Board of Governors shall from time to time determine.
Special fissionable material	means plutonium-239; uranium-233; uranium enriched in the isotopes 235 or 233; any material containing one or more of the foregoing; and such other fissionable material as the SRA shall from time to time determine based on the decision of the IAEA Board of Governors; but the term special fissionable material does not include source material.
SRA	means the State authority responsible for safeguards [*full name*] established by [*law/decree*]
State System of Accounting for and Control of Nuclear Material (SSAC)	means [*State's*] system of accounting for and control of all nuclear material subject to safeguards under the Safeguards Agreement. The SSAC includes the regulatory and control system established within the SRA for the implementation of safeguards pursuant to the Safeguards Agreement and the Additional Protocol.
Subsidiary Arrangements	means the document agreed to between [*State*] and the IAEA containing the technical and administrative procedures specifying in detail how the provisions of the Safeguards Agreement are to be applied, which entered into force on [*date*]. It consists of a General Part (Codes 1-10) and separate Facility and LOF Attachments.
Surveillance	means the collection of information through inspector and/or instrumental observation aimed at detecting movements of nuclear material or other items, and any interference with containment or tampering with IAEA equipment, samples and data.
Tamper-indicating device	means a device used on a container or containment in a manner that will provide an indication of any violation of the integrity of the container contents.

Chapter 2 – Objectives and Scope

Article (2) Objectives

The objectives of this Regulation are to:

1. Provide the basis for meeting [*State's*] international obligations under the Safeguards Agreement and the Additional Protocol.
2. Establish the SSAC to enable the SRA to account for and control all nuclear material in [*State*] and to ensure timely detection of loss, theft, diversion, unauthorized production, or possession of nuclear material.
3. Establish requirements and procedures for:
   (a) accountancy and control of nuclear material,
   (b) submission of design information in respect of facilities and information in respect of LOFs,
   (c) provision of other information as required under the Safeguards Agreement and the Additional Protocol,
   (d) national inspections to enable the SRA to verify the implementation of this Regulation and ensure the implementation of the Safeguards Agreement and the Additional Protocol in [*State*], and
   (e) cooperation with the IAEA in its verification activities in [*State*].

Article (3) Scope

This Regulation shall apply to any person or entity:

1. possessing, producing, handling, or using nuclear material;
2. operating a facility or LOF;
3. exporting or importing nuclear material, or equipment or non-nuclear material;
4. conducting nuclear fuel cycle-related R&D activities, including nuclear fuel cycle-related R&D activities not involving nuclear material; or
5. conducting any other activities required to be reported in [*State's*] declarations under the Additional Protocol, including uranium mining, or concentration of uranium or thorium.

Chapter 3 – Licensing

Article (4) Licence Requirement

Before any person or entity receives, takes possession of, takes responsibility for, exports, imports, or transfers nuclear material, equipment or non-nuclear material, or operates a facility or a LOF, the person or entity shall apply for and obtain a specific licence from the SRA to do so.

Article (5) Licence Application

1. Any person or entity wishing to conduct any of the activities set forth in Article (4) shall submit a completed application to the SRA using the form attached as Annex I to this Regulation [*or as provided in specified regulation on licensing*].
2. The applicant shall provide to the SRA information required in the application form, including as applicable, information on the type, form, and quantity of nuclear material, on the qualifications of personnel with responsibilities for nuclear material accounting and control, and on the system to account for and control the nuclear material at the facility or LOF level.
3. Upon issuance of the licence, the licensee shall be subject to any conditions included in the licence as well as to the requirements of this Regulation.

Article (6) General Licensee Obligations

1. Obtaining Written Authorization

The licensee shall:

(a) Inform the SRA and apply for and receive written authorization from the SRA before beginning any activity or alteration of procedures that may have an impact on nuclear material accountancy and control or the licensee's obligations under this Regulation.

(b) In accordance with Article 13(1) of this Regulation, apply for and receive written authorization from the SRA in advance of any planned consumption or dilution of nuclear material in such a way that it becomes unrecoverable (except in the case of consumption of nuclear material in a nuclear reactor).

(c) In accordance with Article 13(2) of this Regulation, apply for and receive written authorization from the SRA before interfering with any safeguards equipment (except in nuclear safety emergency situations, in which case the licensee shall report the situation immediately to the SRA).

2. Provision of Information to the SRA

The licensee shall:

(a) Submit to the SRA all information, data, reports, and notifications required by this Regulation in writing, in electronic format, within the time period specified in this Regulation or by the SRA.

(b) In urgent situations, employ as necessary other instantaneous means of communication such as telephone provided that the information is subsequently reported to the SRA in writing within the timeline specified in this Regulation or by the SRA.

3. Reporting

The licensee shall:

(a) Provide to the SRA nuclear material accounting reports specified in this Regulation at the times specified, by the means and in a format approved by the SRA using the forms and codes provided in Annex II of this Regulation.

(b) Provide without delay special reports and advance notification to the SRA by the means and in a format approved by the SRA.

(c) Provide to the SRA information identified in Chapter 5 of this Regulation and provide updates at the times specified by the SRA.

(d) Provide amplifications or clarifications of any information or reports provided to the SRA as needed.

4. Records Retention

The licensee shall:

(a) Retain all accounting and operating records, reports and source documents related to the accounting for and control of nuclear material and other items for a period of at least 5 years from the date of their origination or the date on which all nuclear material has been removed from the relevant facility or LOF, whichever is later. These records, reports, and source documents shall be available to the SRA at any time for purpose of evaluation and verification.

(b) All accounting and operating records, any reports and any other communication to the SRA shall be kept in English and [*State's official language(s)*].

Chapter 4 – Nuclear Material Accountancy and Control

Article (7) Nuclear Material Subject to Accountancy and Control

1. The requirements for nuclear material accountancy and control set out in Chapter 4 of this regulation shall not apply to material containing uranium or thorium in mining or ore processing activities, provided that such material has not reached a composition and purity suitable for fuel fabrication or for being isotopically enriched. The reporting requirements set out in Article (19) of this Regulation shall apply to such material.
2. The requirements for nuclear material accountancy and control set out in Chapter 4 of this Regulation shall apply to any nuclear material of a composition and purity suitable for fuel fabrication or for being isotopically enriched when such material leaves the plant or the process stage in which it has been produced, or when such material, or any other nuclear material produced at a later stage in the nuclear fuel cycle, is imported into [*State*].

Article (8) State's System of Accounting for and Control of Nuclear Material

3. The SSAC shall be based on a structure of MBAs established by the SRA in consultation with IAEA to be used for accounting purposes.
4. The strategic points which are KMPs, used to determine the nuclear material flows and inventories in each MBA, shall be as selected by the SRA in consultation with the licensee.
5. The licensee shall ensure the effective implementation of accounting and control measures at facility or LOF level. In this regard, the licensee shall:

(a) Ensure the integrity of and prevent any damage to safeguards equipment installed by the SRA or the IAEA.

(b) Before interfering with any safeguards equipment or removing a seal installed by the SRA or the IAEA, apply for and receive written authorisation from the SRA, except in cases of a safety emergency, which shall be notified within 2 hours by

the licensee to the SRA.

(c) Notify the SRA within 8 hours by telephone or other means of instantaneous communication any finding of a breach or damage of safeguards equipment installed by the SRA or the IAEA and submit a special report to the SRA pursuant to Article 12, including proposed measures to prevent recurrence.

(d) At the request of the SRA, ship to the IAEA headquarters or other location notified by the IAEA samples taken for the IAEA' safeguards use.

Article (9) System of Accounting for and Control of Nuclear Material at Facilities and LOFs

1. The licensee's system of accounting for and control of nuclear material shall include the following elements:

   (a) Designation of an appropriately qualified and experienced person at the facility or LOF level to be responsible for the management of nuclear material accounting and control measures, who shall be available to and cooperate with the SRA at all times.

   (b) Maintenance of the records and reports specified in Articles (10) and (11) of this Regulation in a manner that provides for ease of accessibility for verification by the SRA or any IAEA inspectors.

   (c) Data on the physical location of nuclear material.

   (d) Use and storage of nuclear material only in locations authorized by the SRA.

   (e) Provisions to assure the quality control of the accounting procedures and the manner in which they are implemented.

   (f) A corrective action programme wherein deficiencies and discrepancies are documented, investigated, reported, and resolved.

2. The licensee shall:

   (a) Take physical inventories at regular intervals not to exceed every 12 months to determine the quantities of nuclear material present within each MBA.

   (b) Reconcile any differences between the physical inventory and the book inventory within 15 days after the start of the PIT.

   (c) Adjust the accounting records to reflect the results of the physical inventory of all nuclear material, including changes to nuclear material category, quantities and composition.

   (d) Notify the SRA within 2 hours by telephone or other means of instantaneous communication the discovery of any theft, unauthorized removal, diversion, loss, or misappropriation of any nuclear material which the licensee is authorized to possess, or Annex II equipment or non-nuclear material that is subject to the regulatory control of the SRA, and follow up with a special report pursuant to Article 12.

   (e) In the case of theft, unauthorized removal, diversion, loss or misappropriation of nuclear material, cooperate with the SRA and any other State agencies in any investigation and resolution and, in this regard, make available to them all pertinent information.

(f) Notify and receive written approval from the SRA before introduction or removal of any nuclear material from the facility or LOF.

(g) Facilitate verification by SRA inspectors of the implementation of this Regulation, and allow them access to all nuclear material, facilities and LOFs for verification purposes.

(h) Prior to inspections and visits by SRA or IAEA inspectors, provide to the SRA information on the health and safety procedures and security procedures with which the inspectors shall comply.

Article (10) Records

1. The licensee shall keep accounting records in respect of each MBA as follows:
    (a) All inventory changes, so as to permit a determination of the book inventory at any time;
    (b) All measurement results that are used for determination of the physical inventory;
    (c) All adjustments and corrections that have been made in respect of inventory changes, book inventories and physical inventories;
    (d) For all inventory changes and physical inventories, in respect of each batch of nuclear material:
        i. Material identification;
        ii. Batch data; and
        iii. Source data.
    (e) Accounting for uranium, thorium and plutonium separately in each batch of nuclear material; and
    (f) For each inventory change:
        a. the date of the inventory change;
        b. the originating MBA; and
        c. the receiving MBA or the recipient.
2. The licensee shall keep, as appropriate, in respect of each MBA:
    (a) those operating data which are used to establish changes in the quantities and compositing of nuclear material;
    (b) the data obtained from the calibration of tanks and instruments and from sampling and analyses, the procedures to control the quality of measurements and the derived estimates of random and systematic error;
    (c) a description of the sequence of the actions taken in preparing for, and in taking, a physical inventory, in order to ensure that it is correct and complete; and
    (d) a description of the actions taken in order to ascertain the cause and magnitude of any accidental or unmeasured loss that might occur.

Article (11) Accounting Reports

1. Inventory Change Reports (ICRs)

   The licensee shall complete ICRs reflecting all changes, adjustments, and corrections to the inventory of nuclear material, and submit them to either by using the ICR form in the Annex II.2 of this Regulation or by other means and format approved by the SRA as follows

   (a) Reports of receipts of nuclear material shall be submitted within 5 days of receipt of the nuclear material;

   (b) Reports of shipments of nuclear material shall be submitted no later than the close of business the next working day after the shipment; reports of shipments shall not be released to the public until the shipment is complete;

   (c) Reports of other changes to inventory, e.g. nuclear decay (spontaneous disintegration of a radioactive substance), nuclear loss (consumption of nuclear material because of its transformation into other elements as a result of nuclear reactions), nuclear production (conversion of nuclear material into special fissionable material through irradiation in a nuclear reactor) shall be submitted within 10 days after the start of taking a physical inventory and shall accompany the material balance report as described below.

2. Material Balance Reports (MBRs)

   The licensee shall complete MBRs showing the material balance based on a physical inventory of nuclear material actually present in the MBA, using the codes in the Annex II.4 of this Regulation, and submit them to the SRA either by using the MBR form in the Annex II.3 of this Regulation or by other means and format approved by the SRA as follows:

   (a) The MBR shall be submitted to the SRA within 10 days after the start of taking a physical inventory;

   (b) The MBR shall include the following entries: beginning physical inventory, inventory changes (increases and decreases), ending book inventory, shipper/receiver differences, adjusted ending book inventory, ending inventory, and MUF;

   (c) The Licensee shall explain any amount of MUF different from zero in a concise note accompanying the MBR.

3. Physical Inventory Listing (PIL)

   The licensee shall complete PILs and submit them to the SRA either by using the PIL form in the Annex II.1 or by other means and format approved by the SRA as follows:

   (a) The licensee shall submit the PIL within 10 days after the start of a PIT at a facility;

   (b) The PIL shall be accompanied by the MBR, with exception of the initial PIL, which does not require an MBR; and

   (c) All inventory changes occurring on the PIT date should be reflected in the corresponding PIL and MBR.

Article (12) Special Report

1. The licensee shall submit to the SRA a special report as follows:
    (a) on the loss of nuclear material as described in Article (9)(2)(d) of this Regulation; or
    (b) in the event of breach or damage to safeguards equipment as described in Article (8)(3)(c) of this Regulation.
2. The special report shall be dispatched to the SRA within 14 days following the discovery of such events.

Article (13) Advance Notifications

1. The licensee of a facility or LOF, as appropriate, shall submit an advance notification to the SRA in case of
    (a) planned use, consumption, or measured discard of nuclear material; or
    (b) intended export or import of nuclear material.
2. Such notification shall be submitted by the licensee of a facility at least 60 days before the beginning of the operation and by the licensee of a LOF at least 5 days before the beginning of the operation.
3. The advance notification shall include:
    (a) the name and identification of the licensee;
    (b) the identity, quantity and composition of nuclear material planned to be used, consumed, discarded, or intended to be imported or exported;
    (c) the date of the beginning and of the end of the operation; and
    (d) a brief description of the operation and its purpose.

Article (14) Operating Losses

1. When any operating loss occurs, the licensee shall conduct a PIT to determine the change in the nuclear material inventory.
2. The licensee shall report the results of the PIT to the SRA within 15 days after completion of the PIT.

Article (15) Domestic Transfer of Nuclear Material

1. In the case of domestic transfers of nuclear material, the transferring licensee shall forward to the receiving licensee and to the SRA a report on the inventory change, which shall contain data on the quantity and type of the nuclear material transferred.
2. The receiving licensee shall verify the information provided in the report by the transferring licensee and notify the SRA of the receipt of nuclear material and the inventory change by a corresponding report.
3. In the case of inconsistency between information specified by the transferring and receiving licensees, the licensees shall ask the SRA to carry out a check measurement, the result of which shall be conclusive for accounting purposes.

Article (16) International Transfer of Nuclear Material

1. The licensee shall notify the SRA of any intended transfer out of or into [*State*] of nuclear material in an amount of 1 ekg or more at least 60 days before expected shipment as follows:
    (a) The licensee shall provide the SRA with advance notification of any import of nuclear material at least 30 days before unpacking is scheduled to begin; and
    (b) The licensee shall provide the SRA with advance notification of any export of nuclear material at least 30 days before preparation of the material for packaging and shipment is scheduled to begin.
2. The notification referred to in paragraph 1 shall specify:
    (a) The identification, expected quantity and composition of the nuclear material to be transferred;
    (b) The State for which the nuclear material is destined or originated from;
    (c) The dates on and locations at which the nuclear material is to be prepared for shipment or receipt; and
    (d) The approximate dates of dispatch or receipt and arrival of the nuclear material.

Article (17) Exemptions of Nuclear Material from Safeguards

1. The licensee may apply for exemption from safeguards of nuclear material as follows:
    (a) Special fissionable material, when it is used in gram quantities or less as a sensing component in instruments;
    (b) Nuclear material, when it is used in non-nuclear activities such as the production of alloys or ceramics if such nuclear material is recoverable; and
    (c) Plutonium with an isotopic concentration of plutonium-238 exceeding 80%.
2. The licensee shall not consider any nuclear material to be exempted from safeguards until it receives notification from the SRA of IAEA approval of the request for exemption, following which the transfer to the exempted category should be reported to the SRA using the ICR form in the Annex II.2 of this Regulation or by a means and in a format approved by the SRA.
3. Nuclear material that has been exempted from safeguards by the IAEA shall be:
    (a) stored separately from nuclear material which is not exempted from safeguards;
    (b) included in the book inventory of the facility or LOF indicating that the material is exempted from safeguards;
    (c) listed separately in the list of physical inventory; and
    (d) kept under the regulatory control of the SRA.
4. If exempted nuclear material is to be exported, or processed or stored together with material that is not exempted from safeguards, it shall be first de-exempted, and the licensee shall notify the SRA as of the date of de-exemption using the ICR form in the Annex II.2 of this Regulation or by a means and in a format approved by the SRA.

Chapter 5 – Provision of Information

Article (18) Facilities and LOFs

1. The licensee shall provide the following information to the SRA:
   (a) Design information in respect of each facility, when applying for a construction licence or prior to implementing any change relevant to safeguards:
      i. the identification of the facility, stating its general character, purpose, nominal capacity and geographical location, and the name and address to be used for routine business purposes;
      ii. description of the general arrangement of the facility with reference, to the extent feasible, to the form, location and flow of nuclear material and to the general layout of important items and equipment which use, produce or process nuclear material;
      iii. a description of features of the facility relating to material accountancy, containment and surveillance; and
      iv. a description of the existing and proposed procedures at the facility for nuclear material accountancy and control, with special reference to MBAs, measurements of flow and procedures for PIT.
   (b) Information in respect of each LOF:
      i. a general description of the intended use of the nuclear material, its geographic location, and the user's name and address for routine business purposes;
      ii. the quantity of the nuclear material; and
      iii. the timeframe within which the nuclear material will be used, and the system for accounting for and control of the nuclear material.
   (c) General description of each building on each site, including its use and, if not apparent from that description, its contents. The description shall include a map of the site.
   (d) Information identified on the basis of expected gains in effectiveness or efficiency on operational activities of safeguards relevance.
2. The licensee shall inform the SRA before any modification is made to a facility, LOF or site which may affect information submitted previously as described above.
3. The licensee shall provide updates of the above mentioned information to the SRA by 31 January of each year for the period covering the previous calendar year.
4. Initial information and updates shall be provided using the templates in Annex II.6 of this Regulation or by a means and in a format approved by the SRA.

Article (19) Uranium mines, uranium and thorium concentration plants, source material and exempted material

1. The licensee shall provide the following information to the SRA:
   (a) Information specifying the location, operational status and estimated annual production capacity of uranium mines and concentration plants, and thorium

concentration plants, and the current annual production of each mine and concentration plant;

(b) Information regarding material containing uranium or thorium that has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched, as follows:

i. quantities, chemical composition, use or intended use of such material at each location;

ii. quantities, chemical composition, and destination of each export of such material; and

iii. quantities, chemical composition, and current location and use or intended use of each import of such material.

(c) Information regarding the quantities, uses and locations of nuclear material exempted from safeguards, as set out in Article 17 of this Regulation.

2. Updates of the above mentioned information shall be provided to the SRA by 31 January of each year for the period covering the previous calendar year.

3. Initial information and updates shall be provided using the appropriate form in Annex II.5 of this Regulation or by a means and in a format approved by the SRA.

Article (20) Future plans and processing of waste

1. The licensee or any other person or entity in [*State*] shall inform the SRA before beginning any activities related to the nuclear fuel cycle that are subject to this Regulation.

2. The licensee or any other person or entity in [*State*] shall inform the SRA of the general plans for the succeeding ten-year period relevant to the development of the nuclear fuel cycle, including exploration of uranium or thorium deposits and production of source material, planned nuclear fuel cycle-related R&D activities involving or not involving nuclear material

3. The licensee or any other person or entity in [*State*] shall inform the SRA of the location and further processing of intermediate or high-level waste containing plutonium, high enriched uranium or uranium-233 on which safeguards have terminated upon the determination of the IAEA.

4. Updates of the above mentioned information shall be provided to the SRA by 31 January of each year for the period covering the previous calendar year.

5. Initial information and updates shall be provided using the appropriate form in Annex II.5 of this Regulation or by a means and in a format approved by the SRA.

Article (21) Nuclear Fuel Cycle Related R&D Activities

1. The licensee and any other person or entity conducting nuclear fuel cycle-related R&D activities involving or not involving nuclear material shall:

(a) Provide the SRA with a general description and information specifying the location of the nuclear fuel cycle-related R&D activities; and

(b) Inform the SRA by the 31 January each year of any modification affecting the information previously submitted.

2. Initial information and updates shall be provided using the appropriate form in Annex II.5 of this Regulation or by a means and in a format approved by the SRA.

Article (22) Manufacturing Activities

1. The licensee or any other person or entity engaged in one or more of the manufacturing activities specified in Annex I of the Additional Protocol shall:
    (a) Provide to the SRA a description of the scale of operations for each location where such activities are taking place; and
    (b) Submit to the SRA by 31 January each year updates of the information for the period covering the previous calendar year.
2. Initial information and updates shall be provided using the appropriate form in Annex II.5 of this Regulation or by a means and in a format approved by the SRA.

Article (23) Export and Import of Equipment and Non-Nuclear Material

The licensee or any other person or entity exporting or importing equipment or non-nuclear material specified in Annex II of the Additional Protocol shall provide the SRA with the following information with respect to each export and import within 15 days after the date of the export or import:

(a) Identity;
(b) Quantity;
(c) Location of intended use;
(d) Date or, as appropriate, expected date of export or import.

Chapter 6 – Communications

Article (24) Use of Communication Systems

1. The licensee shall make arrangements with the SRA and other governmental authorities identified by the SRA in order to permit and protect free communications by the IAEA for official purposes between IAEA inspectors in [*State*] and IAEA Headquarters and/or regional offices, including attended and unattended transmission of information generated by IAEA safeguards equipment.
2. The licensee shall make arrangements in consultation with the SRA and other governmental authorities identified by the SRA to enable the IAEA to make use of internationally established systems of direct communications, including satellite systems and other forms of telecommunication, not in use in [*State*].
3. Details of the implementation of these provisions with respect to the attended or unattended transmission of information generated by IAEA safeguards equipment shall be specified in the Subsidiary Arrangements.

Chapter 7 – Inspections

Article (25) Facilitation of Inspections

1. The SRA may conduct inspections of any facility, any LOF, the premises of any licensee and any other locations related to an activity the SRA deems necessary to fulfil its regulatory responsibilities and ensure the implementation of [*State's*] obligations under the Safeguards Agreement and the Additional Protocol.
2. Upon notification by the SRA, the licensee or any other person or entity subject to this Regulation shall allow and assist IAEA inspectors, who may be accompanied by representatives of the SRA to perform verification activities provided for in the Safeguards Agreement, Additional Protocol and/or Subsidiary Arrangements, which may include:
    (a) Examination of nuclear material accounting records and reports
    (b) Examination of other safeguards relevant production and shipping records;
    (c) Verification of the location, identity, quantity and composition of nuclear material;
    (d) Verification and examination of design information;
    (e) Measurements;
    (f) Installation and use of safeguards equipment, including seals;
    (g) Collection of environmental samples; and
    (h) Visual observation.

Chapter 8 – Cooperation

Article (26) Cooperation

All [*State*] agencies and organizations shall cooperate and take the necessary steps in accordance with their statutory responsibilities to facilitate designation of IAEA inspectors for [*State*] and issuance of appropriate multiple entry/exit visas as specified in the Additional Protocol and to grant to the IAEA and its inspectors the privileges and immunities set out in the Agreement on the Privileges and Immunities of the IAEA to ensure that they can discharge their functions in [*State*] under the Safeguards Agreement and the Additional Protocol.

Chapter 9 – Final Provisions

Article (27) Technical Guidelines

The SRA will adopt and publish technical guidelines for the application of this Regulation.

Article (28) Protection of Confidential Information

The licensee and any other person or entity subject to this Regulation shall protect

information and documents acquired or obtained in connection with the implementation of this regulation.

Article (29) Entry into Force

This regulation shall be effective as of the date of its publication.

ANNEXES

I. Licence Application Form for Possession and Use of Nuclear Material

To be added by the State.

II. Forms and Codes Used for Reports to the SRA

1. Form No. 1 – Physical Inventory Listing (PIL)
2. Form No. 2 – Inventory Change Report (ICR)
3. Form No. 3 – Material Balance Report (MBR)
4. Codes Used by the Licensee in Completing Reports to the SRA
5. Forms for Additional Protocol Declarations
6. Templates for submitting information in respect of facilities and LOFs

Annex II
CONSIDERATIONS IN ESTABLISHING A LICENSING PROCESS

To track movements of nuclear material to and from the territory of the State and provide information on such movements to the IAEA in a timely manner, the SRA will need to be involved in the issuance of licenses for imports, exports and shipments of nuclear material.

II-1 Licensing scope for safeguards

Safeguards licensing is initiated at the request of the licensee, upon receiving an application. After the evaluation and approving of the license application, the safeguards license is granted by the SRA in a form of an authority decision. Safeguards licensing procedures aim to verify that the planned safeguards measures to be implemented by the organization that has applied to possess nuclear material are appropriate and comply with the national and international requirements.

Example: As a means of strengthening national control of nuclear material, an SRA introduced a safeguards licencing procedure, requiring the following licenses be applied for and issued by the SRA prior to engaging in that activity:

- *a first safeguards license to possess nuclear material and launch any activity related thereto;*
- *a safeguards modification license to launch any safeguards-relevant modification;*
- *a safeguards transport license to transport nuclear materials not requiring nuclear export-import license according to separate legislation;*
- *a safeguards termination license to terminate safeguards requirements subsequent to termination of nuclear activities.*

Example: Licensees are required to provide design information to the SRA at the following stages:
a) when the decision on construction is made or when the authorization for launching the construction is granted, depending upon which of the foregoing occurs earlier, in case of activity requiring environmental effect analysis when the environmental protection license becomes effective;
b) when the application for installation license is submitted;
c) when the application for construction license is submitted;
d) when the application for commissioning license is submitted;
e) when the application for first safeguards license is submitted;
f) when the application for modification safeguards license is submitted.

Example: Permits may be issued with various scope, the following are examples:

- *Permit to possess nuclear material*
- *Permit to possess associated non-nuclear material (e.g. nuclear grade graphite or heavy water)*
- *Permit to possess nuclear equipment (i.e. specific items for nuclear fuel cycle use)*
- *Permit to possess sensitive nuclear technology*

(And for each of the items listed above, permits are also issued for transport of those items)

- *Authority to communicate information related to sensitive nuclear technology*
- *Permit to establish a nuclear facility*
- *Permit to decommission a nuclear facility*

It is common practice for States to allow nuclear material in certain non-nuclear-use forms to not be subject to regulatory oversight. These forms include, for example, glazes, ceramics and uranium contained in instruments if the material is in an irrecoverable form and used in a non-nuclear purpose. However, the transformation of the uranium (or thorium) into those forms remains under regulatory control. The feed material that is used in a process to produce these forms is subject to reporting of the inventory, followed by submittal of a request for termination or exemption. But the finished non-nuclear-use product for which safeguards has been terminated is not subject to regulatory control. (See the *SIP Guide on Provision of Information to the IAEA* for more information about exemption and termination.)

Nuclear material which has been exempted from safeguards by the IAEA should **remain under regulatory control**, so that requirements can be met for reporting stocks, de-exempting prior to export, and de-exempting prior to co-location with safeguarded material, for example.

II-2. License validity or duration

The license can be issued either with indefinite length but with periodic reviews, which can reduce the administrative burden associated with issuing a new license. After the license is issued, periodic audits or inspections are needed to confirm that the licensee is in compliance with safeguards obligations and keeping proper records. More frequent inspections help the licensees to maintain familiarity and remain up to date on current best practices. For a university with small quantities, the regularity might be once every three years.

II-3. Contents of a license application

Applications will need to contain sufficient information to enable the SRA to evaluate the suitability of the applicant to receive the license. Often the SRA may need to request additional information from an applicant before beginning the license review process.

Example: In one State, the safeguards obligations are stated as license conditions that reference the relevant regulatory documents and directives, and where applicable, the licensee's application and supporting documents or specific licensee safeguards procedures. The safeguards regulations are enforceable under national law so that anyone handling nuclear material is subject to the regulations. For example, a general regulation may require that a license be obtained prior to obtaining or receiving nuclear material. This would apply to all persons/companies who wish to obtain nuclear material.

Anyone who possesses nuclear material without a license is subject to prosecution through the judicial system (although in some cases, rather than prosecute, the SRA may inform the person/company that a license is required and require them to submit a license application, such as for check sources or standards discovered at a university).

Example: The contents of a license application or notification include:

1. *Name, organization identification number and address of the applicant*
2. *Name of responsible person including contact information*

3. *The purpose of the application/notification*
4. *The date the application is completed*
5. *If the nuclear material will be handled at a location other than the organization specified in number 1., the name, organization identification, address and responsible person including contact information shall be stated*
6. *Amount of nuclear material, distributed by areas of use*
7. *Description of chemical form, enrichment, type and other characteristics*
8. *Description of the previous use or origin of the nuclear material*
9. *Description of the intended use*
10. *Description of the planned treatment or disposition after the use (waste plan)*
11. *Description of how the nuclear material is to be stored*

II-4. Determining licensee suitability to receive a license

A license should be issued on condition that the person to whom the license is to be issued has reached the full age (can differ country to country), is competent to perform legal acts, is a person of probity and is professionally competent. Basic suitability considerations might include the ability of the applicant to: (a) appropriately account for the nuclear material inventory; (b) ensure that the relevant staff members have the full authority within the institute/company/facility to carry out accounting activities; (c) have appropriate security, etc.

The applicant must also prove that he has designated a physical person performing systematic surveillance over the fulfilment of radiation protection requirements and requirements on special professional competence or that the applicant possesses such special professional competence himself. The licensee will be obligated to communicate to the SRA without delay any change relating to the performed activities or to himself.

A license application may contain (at least):

- For a natural person his or her name, birth registration number and residential address;
- For a legal person its name and legal form, registered office, registration number in the State's registry of companies. And the name and residential address of the person (or persons) who constitute its statutory body;
- The subject and scope of practice for which the license is requested and the location where the practice will be performed;
- The signature of the applying natural person or the statutory body of the applying legal person;
- An affirmation of the absence of a criminal history for the signatory;
- Certificate of incorporation in the case of legal person entering on a company register;
- A document proving professional competence of a natural person for the performance of the practice being licensed or a document proving professional competence for the performance of the practice being licensed of at least one of the members of the statutory body;
- Specific documentation as required for the particular practice being licensed (such as safeguards). The scope and form of the documentation is developed and approved by the SRA. Additional guidance may explain what is expected to be submitted;

- Documentation indicating that the physical security of the applicant's facility or location has been approved by the relevant regulatory authority. This applies to any location using nuclear materials.

II-5. Issuance of a license

In the proceedings relating to issuance of the license, it is advisable for the SRA to act independently without influence from any other institution or administrative body. The SRA's decision on the issuance of a license will reflect its efforts to verify that the applicant has fulfilled all the conditions established in the nuclear law and in implementing regulations and regulatory documents. From commencement of license proceedings for a particular practice, the SRA will need to take a decision within a reasonable time period.

Hearings held by an SRA to review new regulations, or license amendment decisions, for example, can be open to the public, but some may also require a closed session in whole or in part, because certain protected information may not be discussed in a public forum. The need for public hearings will depend on the types and quantities of nuclear material involved, or the type of facility involved. If a new reactor is being built then public hearings are important, but for issuing a standard license to possess a small quantity of nuclear material, such as at a university or hospital, may more usefully be done expeditiously with no public hearings. For transparency, the SRA may wish to publish transcripts of hearings on its website. The SRA's decision and rationale are often published some period of time (e.g. 6 weeks) after the conclusion of the hearing. Notifications of upcoming public hearings are also useful to post on a website.

The licensing process for major projects such as nuclear power plants, uranium mines or fuel processing facilities, may benefit from including an assessment plan that identifies the scope and depth of the technical assessment needed to evaluate each type of license application. The plan would take historical licensing information into account, such as licensing experience, performance and compliance reports and staff recommendations, and would include a notional timeline for completing the review process.

The effort in the licensing process can be commensurate with the risk that the facility poses; with risk being defined as a combination of the probability that something will go wrong and the consequences should something go wrong. If the license issued covers safety, security and safeguards then the highest risk will probably be driven by safety.

Some States require license applicants to provide a financial guarantee for decommissioning of the site or removal/disposal of the nuclear material, as applicable, prior to issuing them a license. The funding is provided or secured at the time of license application so that the State is not left with the clean-up costs if the licensee defaults on its obligation.

II-6. Compliance with License Conditions

Periodically, the SRA will need to confirm that licensees are observing provisions of the legislation, and that they are adhering to the scope of the issued license and its conditions.

Within the framework of their inspection activities, inspectors will need authorities, for example, to:

- Enter at any time facilities, installations, operational areas, territories and other workplaces of inspected persons where activities related to nuclear energy are being carried out;
- Check compliance with requirements and conditions of nuclear safety, radiation protection, physical protection and emergency preparedness and inspect the nuclear installation conditions, and adherence to limits;
- Take measurements and collect samples as necessary to check compliance;
- Perform a physical inspection of nuclear items or ionising radiation sources, including records;
- Assess the licensee's ability to implement internal procedures with regards to provision of access, support, records and reports for IAEA inspections; and
- Participate in investigations of events that impact nuclear safety, radiation protection, etc.

Example: A law will set out the responsibilities of the SRA in terms of carrying out the supervision required to ensure compliance. Such responsibilities may include:

- *To inspect and control all uses of nuclear energy and for this purpose to have access to any place where such an operation is being carried out;*
- *To carry out measurements required for supervision;*
- *To take and to receive samples and to install equipment necessary for such supervision;*
- *To oblige the applicant to arrange entry to carry out inspections and measurements and to take samples on the premises where, according to the application, the operation would be carried out;*
- *To have access, for the purposes of any supervision of non-proliferation of nuclear weapons as required, to premises where such actions in which nuclear materials or ores have been used;*
- *To carry out measurements therein required for supervision, to collect and receive samples and to install equipment required for said supervision; and*
- *To collect environmental samples and use radiation detection and measurement devices for any supervision required for the non-proliferation of nuclear weapons, pursuant to ensuring that use of nuclear energy is not illegally carried out and that the information given is sound.*

During the inspection, the SRA may conduct a thorough and comprehensive inspection of an operator's overall nuclear material accounting practices, to ensure they conform to the approved procedures. During inspections carried out between October and March, the site declarations of all the sites are checked by the SRA to see if updates to additional protocol site declarations are required. Some of the safeguards inspections can be conducted in conjunction with the SRA's safety or security inspections or some safeguards activities may also be delegated to safety or security inspectors to be performed during their own inspections. Following each SRA inspection, the SRA prepares a safeguards inspection report which includes information about the inspection activities and results and provides it to the IAEA.

It is important that the SRA has, or can invoke, contingency powers to compel locations without a permit or licence **to provide access to SRA inspectors and IAEA inspectors** in the unlikely circumstance that this is required. Some national safeguards laws accommodate this by giving the SRA the right to seek a warrant to gain access.

II-7. Responding to non-compliance

In the event of a licensee violating his obligations as established in the nuclear law (or by other regulations or conditions specified in the license), the SRA will need to be able to restrict or suspend performance of the licensed practice. If the SRA has to take serious action, such as to suspend a license, mechanisms and procedures need to be in place to continue to control the nuclear material during the suspension period, which might require removal of the material to an alternative location.

Enforcement compels compliance and deters future non-compliance. When non-compliance is identified, the significance may be assessed and appropriate enforcement action taken based on a graded approach. If an initial enforcement action does not result in timely compliance, gradually more sever enforcement actions may need to be used.

The powers and responsibility to take enforcement actions are typically specified in legislation. Specific processes are further detailed in the SRA's procedures. It is advised to inform licensees and the public of the enforcement processes by, for example, publishing a document that is sent to all licensees, issuing an information notice or making information available on an external website. Table II-1 describes a graduated series of actions that may be taken in response to non-compliance, notionally in order of lowest to highest severity.

TABLE II-1. GRADUATED SERIES OF ENFORCEMENT ACTIONS

1. Written Notice	A written notice identifies the item of non-compliance and indicates to the licensee or the person subject to enforcement action that a response is requested. The timeframe for taking corrective actions depending on the risk associated with the non-compliance and the complexity of any corrective actions required. Written notices may not, by themselves, carry the force of the law, but under a graduated enforcement plan, failure to act on these may lead to further enforcement action.
2. Request under a Regulation	A request under a regulation or license condition is a letter issued by a high level of management or the highest authority within the SRA, depending on the severity of the infraction, requesting certain information or directing the recipient to take specific action with a response required within a specified time. The licensee or the person subject to enforcement action is legally required to respond to this type of request.
3. Order	An order can be a powerful legal instrument to compel action to ensure compliance with international obligations. Orders are issued when non-compliance is determined to pose unreasonable risk and specify activities required to restore compliance in as short a time period as possible. Examples include restricting the use of certain equipment, restricting certain parts of a licensee's operation, conducting specific tests, etc. The measures are commensurate with the risk posed by the non-compliance. Failure to comply with an order could lead to further regulatory measures, including licensing actions or prosecution.
4. Increased Scrutiny	Increased scrutiny in the form of additional licensee reporting requirements, regular meetings with licensees and/or an increase in inspection frequency and scope may help the licensee focus their efforts on specific areas of non-compliance.
5. Licensing	If the SRA is legislated to issue licenses then for severe or repeat regulatory

Action	infractions, the SRA may on its own motion, renew, suspend in whole or in part, amend, revoke or replace a licence with one which restricts possession or use of the nuclear material. If the SRA resides within a larger regulatory body, the SRA can recommend any of these actions to the group that issues the license.
6. Administrative Monetary Penalties	An administrative monetary penalty (AMP) is a monetary penalty imposed by the SRA without court involvement, for the violation of a regulatory requirement. It is administrative in nature; therefore, no criminal record is associated with it and the burden of proof is less than that for criminal proceedings. Upper limits may be established for individuals and for corporations, and fines are commensurate to the severity of the non-compliance.
7. Prosecution	Prosecution is the laying of charges against a person in accordance with State legislation. Prosecutions are generally only used after considering other enforcement actions and only for non-compliances with significant consequences, such as theft of nuclear material.

II-8. Appeals Process

An appeals process allows a person subject to an enforcement action to request that the decision or action be reconsidered by a higher authority within the SRA or applicable regulatory authority.

Annex III
CASE STUDY ON NUCLEAR MATERIAL ACCOUNTING AND CONTROL VIOLATIONS AND REGULATORY RESPONSE

The following case study is an abbreviated version of a paper published and presented during an international conference held in 2008.[23]

BACKGROUND

In June 2000, during records reconciliation and verification of the spent fuel pool inventory, the licensee for a nuclear power plant identified that two full-length irradiated fuel rods, which had been separated from their parent assemblies and placed in a container for individual rods in the spent fuel pool, were not in the location specified in the nuclear material accounting records. The licensee conducted an extensive investigation, which concluded that the missing fuel rods had very likely been transported to a licensed low-level radioactive waste disposal facility. The State's SRA conducted an inspection that reviewed the results of the licensee's investigation and concurred with the licensee's conclusions regarding the location of the two rods. The licensee was cited for failure to control and account for the two rod segments, and was issued a Severity Level II violation with a monetary penalty.

NUCLEAR MATERIAL CONTROL AND ACCOUNTING REQUIREMENTS

The nuclear material control and accounting (MC&A) requirements that apply to nuclear power reactors are specified in the national regulations. In addition to other more detailed requirements, the three basic MC&A requirements can be summarized as follows:

(a) Establish, maintain, and follow written procedures sufficient to account for all nuclear material possessed under license;
(b) Keep records concerning receipt, inventory (including location and unique identity), acquisition, transfer, and disposal of all nuclear material possessed; and
(c) Perform physical inventories of all nuclear material possessed at least every 12 months.

REGULATORY RESPONSE TO MC&A ISSUES

Temporary Instruction

In response to the issues identified at the plant, the SRA issued a Temporary Instruction (TI) to inspect the MC&A programs at nuclear power reactors. The TI objective was to gather site-specific information concerning MC&A of spent fuel at all power reactors and to assess whether similar problems existed at other sites. These inspections identified problems similar

[23] This annex is based on a paper published in the proceedings of the ANS-INMM 8th International Facility Operator - Safeguards Interface Conference held from 30 March to 4 April 2008 in Portland, Oregon, USA, and has been included with the kind permission of the authors.

to those identified at Millstone Unit 1 at two additional plants. The SRA issued an Information Notice to inform all licensees for operating power reactors, research and test reactors, decommissioned sites storing spent fuel in a pool, and other sites with wet spent fuel storage, of the issues identified regarding accounting and control of nuclear material in spent fuel. Subsequently, another nuclear power plant identified accounting issues and reported them to the SRA.

The SRA issued a Bulletin notifying all licensees about concerns with control and accounting of nuclear material at power reactors and wet spent fuel storage facilities and requested licensees to provide SRA with a description of their physical inventory and accounting processes, confirm the accuracy of their accounting records, visually confirm all nuclear material items in their spent fuel pools, and report the results to the SRA. The SRA staff then reviewed the reports to assess the general condition of licensee MC&A programs and to identify locations for further inspections. Ten locations were selected for inspections, which were carried out, bringing the total number of inspections to 13 (12 at operating reactor sites and one at a decommissioned power reactor site).

A typical inspection involved two inspectors for four days conducting the following activities:

- review of selected MC&A records, including records of receipt, transfer within the spent fuel pool, storage, physical inventory, and shipment off-site of items containing nuclear material;
- review of records of all activities that involved separation of rods or pieces from the "parent" assembly, such as reconstitution (the process of removing damaged rods from an assembly and replacing them) and fuel failure;
- review of written material control procedures, both those currently in use and historical procedures, and other related procedures;
- review of accounting records and comparison with reports from the State system of accounting and control;
- visual verification that the location recorded in the accounting records was correct for a sample of intact assemblies and 100% of "orphan" rods and pieces; and
- review of licensee self-assessments of their MC&A programs and actions taken in response to recommendations.

Enforcement actions were taken at 12 of the 13 sites inspected, with four of the 12 identified for escalated enforcement. Based on the results of the first 13 inspections, a decision was taken to extend inspections to all power reactors, reactors in decommissioning with wet storage, and other facilities with wet storage of irradiated fuel. A total of 22 operating power plants and other sites with wet storage were inspected, and the schedule was expedited to inspect the remaining 51 locations. The SRA had to hire recent retirees with inspection experience and borrow inspectors from the four SRA regional offices to conduct the inspections in accordance with the expedited schedule. The additional inspections identified one location that was subject to escalated enforcement due to a missing small container with irradiated pellets and several in-core detectors missing from the spent fuel pool. The

licensee's investigation concluded that the small container was most likely shipped to a burial site licensed to receive low-level radioactive waste. This location received a Severity Level III violation with a monetary penalty.

In summary, a total of 73 MC&A inspections were conducted at 65 operating power reactor sites, 4 decommissioning reactor sites with fuel remaining in the spent fuel pool, and 4 other sites storing spent or irradiated fuel. There were no findings at 17 of the sites inspected (15 power reactors and 2 wet storage sites). Violations were identified either by the inspectors or self-identified by the licensees at the remaining sites, which was approximately 75% of the sites.

Findings were prevalent in three general areas:

- failure to keep and maintain records;
- failure to establish and follow procedures adequate to control and account for nuclear material; and
- failure to conduct physical inventory of all nuclear material at least every 12 months.

Failure to conduct physical inventory of all nuclear material was a violation at every site with a violation, and problems with record-keeping and physical inventory involved rods, pieces (fragments) of rods, pellets, and instruments, not intact fuel assemblies.

REVISING REGULATORY GUIDANCE

In response to the problems identified with accounting and control of irradiated fuel, the SRA committed to work with power reactor representatives and other stakeholders to revise the regulatory guidance provided in a voluntary consensus national standard ANSI N15.8, *Nuclear Material Control Systems for Nuclear Power Plants*.

A Working Group was convened to establish acceptable guidelines for MC&A systems at power reactors that would address the recently identified problems, while meeting the regulatory requirements. The existing standard, which was issued in 1974, did not address reconstitution or the possibility of damaged fuel and broken rods. Information collected from licensees indicated that over 90% of reactor sites had experienced fuel damage and/or reconstituted irradiated fuel assemblies (that is, they had removed individual rods from assemblies and replaced them with other rods), so it was important that the Standard address these nuclear material items.

In order to emphasize the importance of accounting and accurate records, ANSI N15.8 was renamed "Special Nuclear Material Control and Accounting Systems for Nuclear Power Plants." The revised standard specifically addressed all of the issues identified during the inspections and was issued and referred to in the associated regulation as guidance to be followed in meeting the regulatory requirements for accounting and control of nuclear material.

Annex IV
CASE STUDY ON REGULATORY GUIDANCE: THE 'NUCLEAR MATERIAL MANUAL'

Purpose of the Nuclear Material Manual

The Nuclear Material Manual is one of the operation manuals of the operator, belonging to the quality system. The Manual describes how the operator takes care of the nuclear material accountancy and control and handles the safeguards obligations. The Manual serves as a collection of instructions for the staff for performing the safeguards work at the facility. Furthermore, the Manual is a documentation of the operator's procedures for fulfilling the safeguards requirements. Thus, the Manual needs to be reviewed, assessed and inspected by the regulatory body when evaluating the safeguards system of the operator.

Contents of the Nuclear Material Manual

The contents and the scale of the Manual depend on the type of operation. For a nuclear power plant, the Manual could include:

- Introduction

- Basics of Safeguards
  - – Licensing Procedures
  - – National Safeguards System
  - – International Safeguards

- Safeguards Organisation
  - – Roles
  - – Responsible Persons

- Nuclear Material Accounting and Reporting
  - – General Description of Safeguards System
  - – Definitions and Abbreviations
  - – Description of the MBA and the KMP's
  - – Accountancy Books and Operation Records
  - – Reception of Nuclear Material
  - – Shipments of Nuclear Material
  - – Storing of Nuclear Material
  - – Internal Transfers
  - – Fuel Inspections
  - – Refuelling and Other Outages
  - – Physical Inventory Taking, Inventory Change Reports
  - – Physical Inventory Listing, Material Balance Reports
  - – Annual Report

- Additional Protocol Obligations
- Internal System Audit
- Preparing for Inspections by Authorities

• Regulations and Guides
• References

Composing the Nuclear Material Manual

The operator is responsible for the preparation and updating of the Manual necessary for the control of its material balance area. A process is in place for preparing, updating, evaluating, and accomplishing the Manual as an internally approved document. For example, the nuclear power plants would have a safeguards responsible person draft and update the Manual and an internal review and approval by relevant managers and the plant manager.

Approving the Nuclear Material Manual

The operator's safeguards Manual allows the assessment of the comprehensiveness of the safeguards system under the operator's responsibility. The safeguards Manual shall contain a description and instructions as to how the operator fulfils the safeguards, accounting, reporting and other obligations under its responsibility.

The nuclear facility licensee shall submit the safeguards Manual to the regulatory body for approval no later than three months prior to the commencement of the operation or the commencement of the use of nuclear energy. Other licensees shall submit the safeguards Manual to the regulatory body for approval no later than 30 days prior to the commencement of the use of nuclear energy. Operators other than licensees shall submit the safeguards Manual to the regulatory body for approval within 30 days of the commencement of the use of nuclear energy. Any substantial changes of the Manual shall be submitted to the regulatory body for approval no later than 30 days prior to the intended change, and minor changes shall be reported immediately as soon as they occur.

When reviewing and approving the Manual, the following questions are considered:

- Does the Manual include all the actions that the operator is required to perform for complying with the safeguards requirements?
- Based on the activities described in the Manual, is the operator able to comply with the safeguards requirements?
- Does the Manual provide instructions for performing the activities?

Once the Manual is approved, the regulatory body oversees that the operator follows the Manual.

Annex V
SAFEGUARDS IN THE CONTEXT OF THE IAEA 'MILESTONES PROCESS'

The IAEA Office of Nuclear Energy has published information on developing infrastructure to support a new nuclear power programme. The guidance advocates preparations in nineteen areas and recommends infrastructure needed to achieve each of three milestones. The methodology is described in the *Milestones in the Development of a National Infrastructure for Nuclear Power*[24]. The Milestones provides a framework of phases and milestones in the development of a national nuclear infrastructure. Additional guidance is available on each of the nineteen areas, as well as introductory e-learning training modules.

The decision by a State to embark on a nuclear programme reflects a commitment to use nuclear power in a safe and secure manner for exclusively peaceful purposes. The demonstration of compliance with international legal instruments, internationally accepted nuclear safety standards, security guidelines and safeguards requirements is essential in establishing a responsible nuclear power programme.

Nuclear facilities undergo various stages of planning, design, construction, operation, shutdown and decommissioning. There are defined stages in the context of IAEA safeguards, and activities that need to be carried out in each stage, by the State and by the IAEA, to implement safeguards effectively. According to the *Milestones* document, the development of a nuclear programme can be divided into the following phases; the end of each phase is marked by an infrastructure milestone:

Phase 1: Considerations before a decision to launch a nuclear power programme.	Milestone 1: Ready to make a knowledgeable commitment to a nuclear development programme.
Phase 2: Preparatory work for the construction of a NPP after a policy decision has been taken.	Milestone 2: Ready to invite bids for the first NPP.
Phase 3: Activities to implement the first NPP.	Milestone 3: Ready to commission and operate the first NPP.

The following sections describe these early phases as well as the phases of operation and beyond, and explain the safeguards activities carried out by the IAEA, the State, the SRA and the Operator to facilitate the successful implementation of international safeguards in each of the phases.

Milestone 1: making an informed political decision to introduce a nuclear power programme

[24] *Milestones in the Development of a National Infrastructure for Nuclear Power,* IAEA Nuclear Energy Series NG-G-3.1, IAEA, Vienna (2007).

In Phase 1, it is essential to understand the various obligations and commitments and to prepare a national strategy to fulfil them. With respect to IAEA safeguards, the State needs a clear understanding of and commitment to its nuclear non-proliferation obligations and its safeguards agreement (and additional protocol, where applicable) with the IAEA. In the following discussion, it is assumed the State has concluded an additional protocol on the basis of INFCIRC/540 (Corr.) and has established its SSAC.

To accomplish Phase 1, an informed political decision must be made to proceed with the development of a nuclear power program or further expand an already existing program. This political decision could be either be in the form of a decision in principle by the parliament of the country and/or a governmental or ministerial decision, or any other instrument that can be unambiguously communicated nationally and internationally.

A State with an additional protocol must submit a declaration of its official ten-year plan for nuclear fuel-cycle related development, and annual updates to it. The declaration describes the official plans for nuclear development as approved by the relevant State authorities. The State may wish to discuss with the IAEA the safeguards requirements specific to the type of facility it intends to develop (such as a light water reactor, for example), so that those requirements can be factored into the facility design. Several publications on this good practice have been prepared by the IAEA and posted at www.iaea.org/safeguards.

Milestone 2: ready to invite bids for the first nuclear power plant

The primary objective in Phase 2 is to update or prepare safeguards-specific legislation, regulation, guidance and procedures. The State may also adjust the SRA's organizational and functional responsibilities and enhance its safeguards capabilities. During this phase, the SRA develops the necessary regulations and issues specific guidance documents that explain the requirements to the licensees. The operators develop competences and prepare plans that meet the regulatory requirements. Building a new NPP will require significant imports of nuclear and nuclear dual-use items which may necessitate expansions or modifications to the import-export control regulations and procedures.

Milestone 3: ready to commission and operate the first nuclear power plant

In Phase 3, the vendor and design is chosen. The SRA prepares and submits preliminary design information to the IAEA. The operator, SRA, IAEA and vendor continue safeguards-by-design discussions to incorporate safeguards into the facility design process. During the licensing process, changes to the facility design are sometimes necessary, so updates of the design information will be submitted to the IAEA. The State may define explicit points in the licensing process where update and submission of the design information is compulsory for the operator. Once the commissioning license is issued by the SRA, the schedule for commissioning should be communicated to the IAEA. By the end of Phase 3, all of the necessary safeguards staff of the SRA and the facility operator should be trained and prepared and the required operational readiness achieved. When commissioning is completed and nuclear material has been introduced to the facility, Phase 4, the operation phase begins.

Case Study on stakeholders in a State considering an expansion of its nuclear power programme

The aim of this case study is to review the decision-making process in one State that is considering an expansion of its nuclear energy sector.

All governments need to address their energy security, because stable, affordable and sufficient supply of energy (and in this case study electricity in particular) is a strategic concern of every State. The energy resource strategy is usually shaped by a State's government. It is therefore a political question. In case of this State, a State Energy Policy document was prepared at the ministerial level and approved by the government. This document provided for the possibility of construction of a nuclear power plant, but the ultimate decision whether to initiate the construction of a particular unit would be made by the government on a case-by-case basis.

The responsibility to announce a tender for the construction project and later to announce the winner of the tender (if any), lies with a joint-stock power company that is the investor/operator of the NPP. Because typically the majority owner of its shares is the State, the government will have the final decision on the commitment to construction.

The initial intention to build the new NPP is reported by the State's SRA under the Additional Protocol to the IAEA as part of the Article 2.a(x) declaration regarding official plans for nuclear development.

At the time that the joint-stock company issues the tender, the investor/operator submits to the SRA an application for license for the siting of the nuclear facility. The initial safety report is a fundamental attachment of this application and must provide, inter alia:

- a satisfactory description and evidence of suitability of the selected site based on siting criteria for nuclear facilities;
- a description and preliminary assessment of design conception from the aspect of requirements laid down in an implementing regulation (issued by the SRA) for nuclear safety, radiation protection and emergency preparedness;
- an assessment of quality assurance in the process of selection of the site; and
- the method of quality assurance for the preparatory stage of construction and quality assurance principles for the subsequent stages.

If the tender has a winner and after the government's decision on the construction, there will be a steep increase in the involvement of the SRA as the project will head towards the commissioning stage. Many regulations and norms must be met by the investor/operator from both SRA and IAEA and each particular step must have an appropriate license (e.g., for the initiation of construction of the nuclear facility, particular stages of nuclear facility commissioning, operation of the nuclear facility). The SRA is responsible not only for the construction oversight and regulation but also for the safeguards-related requirements, which include the early provision of preliminary design information and provision of a design information questionnaire.

The SRA will also manage the cooperation with the operator and the IAEA on installation of containment and surveillance equipment, the conduct of design information verification by IAEA inspectors during construction and the negotiation of the Facility Attachment. The facility is then incorporated into the State's and the IAEA's databases with its facility code, and all safeguards provisions must be in place prior to the introduction of nuclear fuel into the facility (at the latest).

In conclusion, three major entities play a key role in the construction of a new nuclear facility: the IAEA, the SRA and the owner/operator. As the decision gains momentum, the focal point of the whole enterprise moves from the political (or strategic) level across the bidding process, where the investor is involved, to the regulatory level where the independent SRA exercises supervision over the licensing and construction process and finally (after commissioning) to the operator, which then cooperates with the IAEA and is regulated by the SRA.

Annex VI
EVOLUTION OF AN SRA: INITIAL DESIGNATION TO TODAY

The objective of this case study is to provide insight into the history and evolution of one State's SRA. Over the years, several institutions involved in radiation and nuclear oversight played a part in the evolution of the SRA.

In the 1980s, a law was enacted on State supervision of nuclear safety of nuclear facilities, which designated an organization to be the State regulator for nuclear safety. This organization had been designated with safeguards responsibilities for the State dating back to the late 1960's. In this State, responsibility for nuclear safety included responsibilities for nuclear security.

The organization belonged to the top level of the State's administration which consists of two types of institutions: 1) ministries which are headed by members of the government, and 2) central administrative institutions which are headed by a politically neutral chairman appointed by the government. In the mid 1990's, this organization (which was at the time responsible for nuclear safety, security and safeguards) also acquired the responsibility for all areas of ionizing radiation protection, leading to its becoming a single State authority responsible for all nuclear areas plus ionizing radiation.

At that time, the organization established an emergency preparedness center (EPC) to provide for crisis management. The EPC established a 24/7 contact point for emergency events, and became electronically interconnected with the nuclear power plants in the State. The EPC also established State-wide radiation monitoring and began conducting exercises focused on emergency preparedness and radiation containment.

Annex VII
EXAMPLES OF SRA ORGANIZATIONAL STRUCTURES

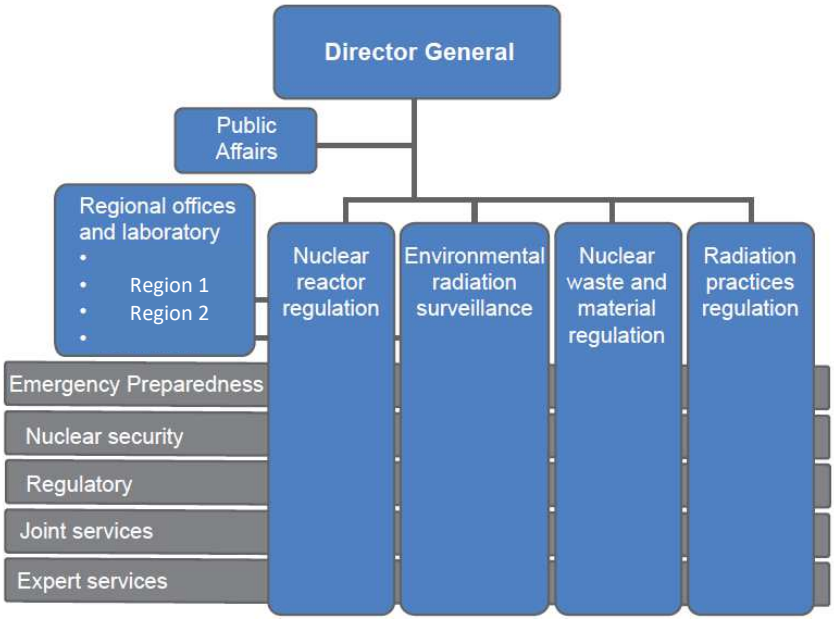

FIG. VII-1. Example organization chart of a matrix SRA.

Example: The Director General of the SRA depicted in Figure 5.1 is appointed by the Government for a fixed term. The responsibility for safeguards lies in the Section for Nuclear Waste and Material Regulation, which coordinates through the other departments, particularly with Nuclear Security. The mission of this SRA is to protect people, society, the environment and future generations from harmful effects of radiation. It is a regulatory body as well as a research centre and advisory/expert organization.

This SRA's Nuclear Material Section contains a Section Head and four inspectors. One inspector is in charge of coordination of safeguards inspections and three inspectors are facility officers, each with responsibilities for a set of facilities (such as one nuclear power plant plus a number of other users of nuclear material).

Because resources are limited, this SRA seeks to use all inspectors' knowledge and expertise in an effective and coordinated way to support the objectives.

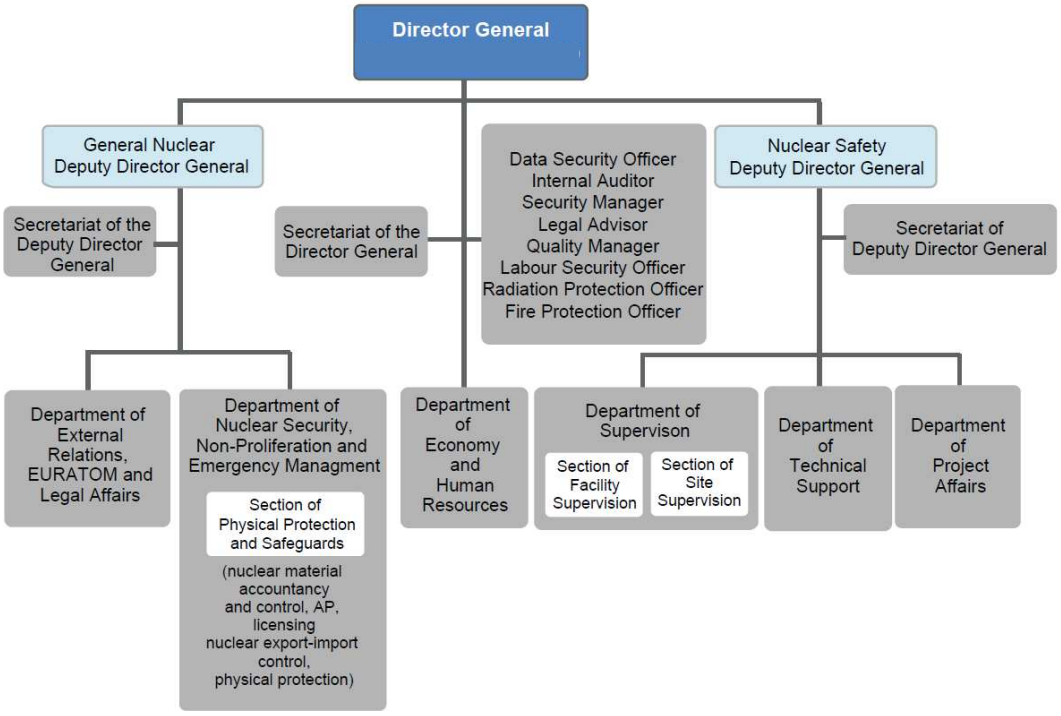

FIG VII-2. Example organization chart for an SRA in a State with nuclear facilities.

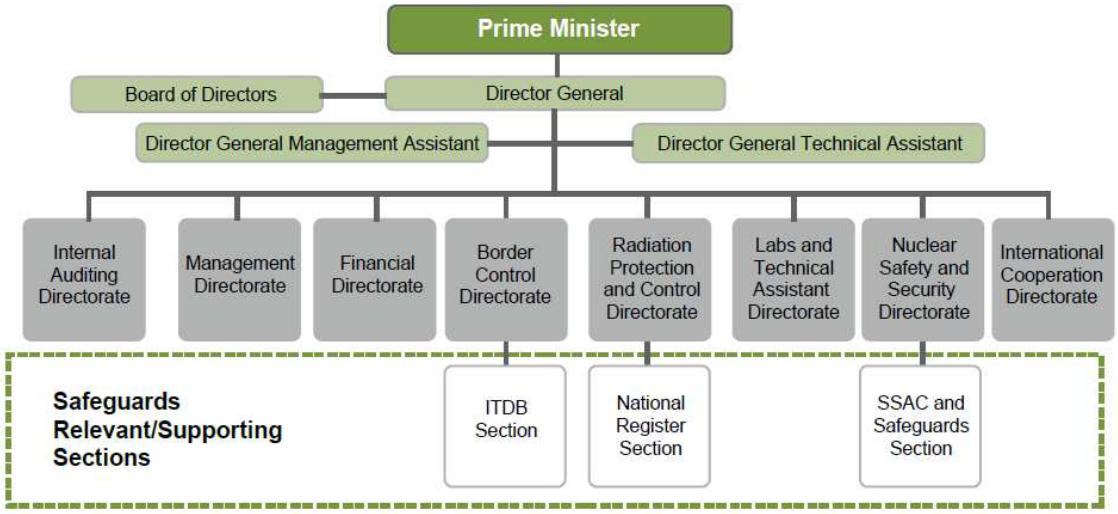

FIG. VII-3. Example organization chart of an SRA in a State with plans for nuclear facilities.

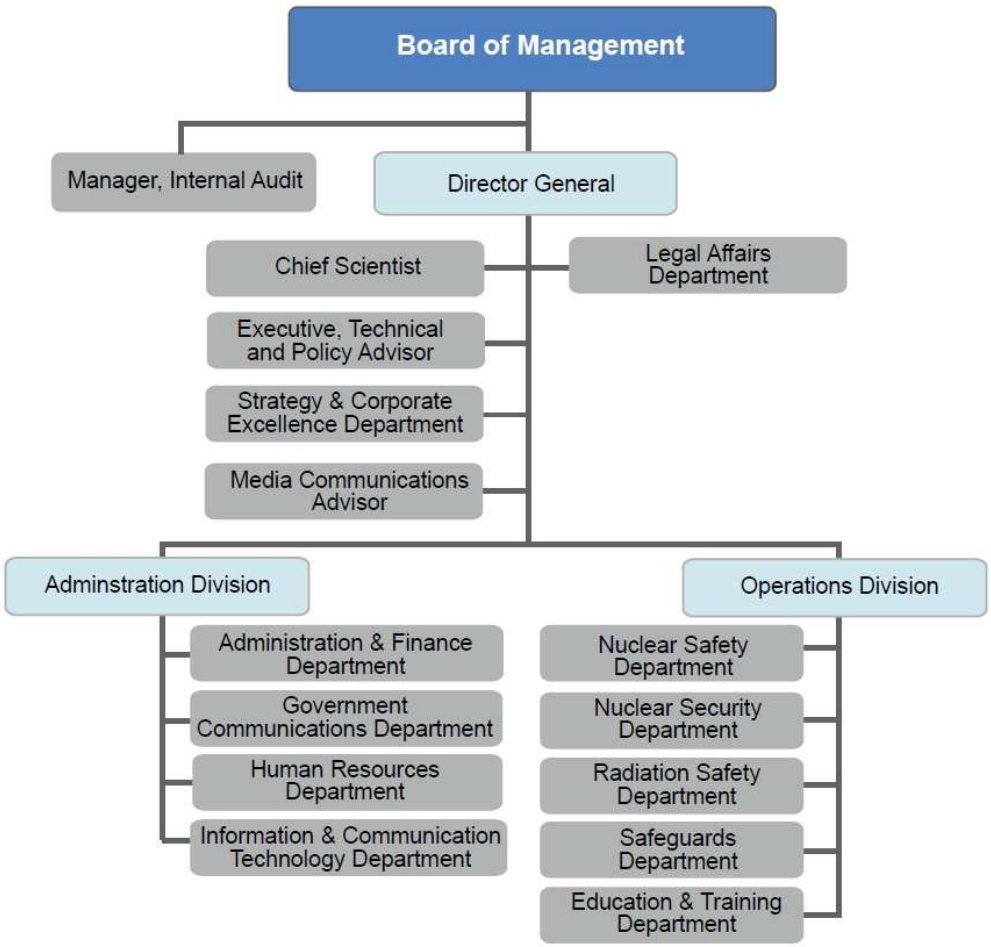

FIG. VII-4. Organization chart of an SRA in a State with plans for nuclear facilities.

Annex VIII
CONSIDERATIONS IN DEVELOPMENT OR AMENDMENT OF A REGULATION

Regulatory documents often convey two types of information: requirements and guidance. When included in the licence, requirements are mandatory and must be met by any licensees wishing to obtain (or retain) a licence or certificate to use nuclear material or to operate a nuclear facility. Guidance, on the other hand, provides direction to licensees and applicants on how to meet requirements. Guidance also provides more information about approaches used by the State to evaluate specific problems or data during the review of licence applications. Licensees are expected to review and consider guidance, and if guidance is not followed, an explanation is needed regarding how the alternate approach meets regulatory requirements.

The regulatory document development process is defined and documented by the SRA, specifying the roles and responsibilities of the various parties for each step in the process. The steps that a State may wish to take are described below:

Step 1. Analyze the issue

A regulatory issue is first analyzed to determine the appropriate regulatory actions needed to address the issue. Existing regulations and related documents will be evaluated to determine if new or revised regulations are needed, if an existing regulatory document could be expanded, or if new guidance is needed. Other regulatory approaches could include amending licences and/or increasing compliance activities. If a new regulatory requirement will be introduced, public consultation may be needed in order to obtain early input. Discussion papers are vehicles for communicating the SRA's proposed actions and solicit stakeholder input, which is taken into account early to streamline development and publishing. Discussion papers are generally used when proposing regulatory oversight in a new area or when exercising authority in a different manner than past practice.

Step 2. Develop a draft of the document for public comment

Once the decision has been made to proceed with a new (or revised) regulatory document, the SRA develops requirements and guidance for the subject in question and produces a draft. It is subjected to a detailed internal review, including a legal review, followed by approval, final editing, formatting and translation (if needed) of the document.

Step 3. Consultation with stakeholders

The consultation process for draft documents has two steps:

- Consultation: The draft document is posted to the SRA's website or mailed out to stakeholders and interested parties. The public, industry, licensees and interested organizations are invited to comment within a defined period.

- Invitation to provide feedback on comments received: All the comments received during the first consultation period are posted on the SRA's website. All the stakeholders have an opportunity to view these comments and provide additional feedback.

The SRA may wish to maintain a 'subscribers list' of relevant and interested stakeholders, which is used to notify individuals or organizations of the release of new or revised regulatory documents and discussion papers for comment, and of the final publication of the regulatory document. The standard timelines for stakeholder consultation are 60 calendar days for initial comments on regulatory documents and 15 days for subsequent consultation, and 120 calendar days for discussion papers.

Step 4. Revise the draft document for approval and publication

The SRA reviews all comments received during the public consultation stage, and determines if any changes are necessary to the document. All the comments are collected in a consultation report, which includes the SRA's response to each comment. The draft documents are then revised as necessary, and prepared for final publication. When extensive revisions are made, the SRA performs a second legal review and approval before publication. If the proposed document includes new requirements that the SRA intends to impose on licensees, the document is presented at a public meeting. If minor changes are made to an existing document, someone designated within the SRA's organization to perform this task may be authorized to approve it.

Step 5. Publish the regulatory document

The final regulatory document and the consultation report are released through the SRA's website for use by stakeholders and licensees, and are often mailed to stakeholders and licensees. A separate notification is often sent to all affected parties to notify them of the website posting.

Annex IX
EXAMPLE OF AN SRA'S ANNUAL SAFEGUARDS INSPECTIONS

This table is an example plan of an SRA's national safeguards inspections in one year, taking into account the operational programmes of license holders. This State's nuclear activities include 4 NPPs in operation, 1 under construction, 2 under design, 1 research reactor, 6 LOFs, a mine, some R&D and a long-term spent fuel repository under construction.

Location	**INSPECTION**	**Month**
Research reactor	Research reactor site verification	February
NPP 1 and 2	Interim inspection + site verification	February
NPP 3 and 4	Interim inspection + site verification	February
LOF A (University)	PIV + site verification	February
LOF B (waste store)	Site verification	February
Repository	Interim inspection + site verification	February
Mine	Inspection to verify safeguards readiness to start operation	Spring
NPP 3 and 4	Pre-PIT (exp. 6.–10.5.), outage starts 12.5.	May
NPP 3	Core Verification (exp. Fri 17.5.)	May
Research Reactor	PIV (exp. June)	June
LOF B	PIV	June
NPP 4	Core Verification (exp. Sat 8.6.)	June
NPP 7 (new)	Construction site verification	June
NPP 3 and 4	Post-PIT (exp. 17.–20.6.), outage ends 13.6.	June
Repository	DIV + Interim inspection	June
NPP 1 and 2	Interim inspection	June
NPP 1 and 2	Pre-PIT (exp. 12.–16.8.), outage starts 18.8.	August
NPP 1	Core Verification (exp. Sat 24.8.)	August
NPP 2	Core Verification (exp. Fri 13.9.)	September
NPP 3 and 4	Post-PIT (exp. 30.9.–4.10.), outage ends 24.9.	October
NPP	Interim inspection	October
Repository	Interim inspection	October
NPP 5 (new)	DIV	December

As a part of the SRA's 'radiation practices regulation' inspections, nuclear materials at small holders are inspected as instructed by Nuclear Materials Section. NDA measuring campaigns are also carried out by the SRA at nuclear power plants. The SRA may also make additional inspections to verify operators' safeguards system functioning (against their approved NMA Manual) or in other situations such as when the integrity of a fuel assembly has been compromised or upon request by the operator. The SRA also participates in inspections, design information verification and complementary access carried out by the IAEA.

Annex X
CONSIDERATIONS IN DESIGNING A NATIONAL INSPECTOR TRAINING AND QUALIFICATION PROGRAMME

The goal of a national Inspector Training and Qualification Programme (ITQP) is to introduce a consistent set of training and qualification requirements for all inspectors (including safety, security or safeguards inspectors) in an organization, including core training, position-specific training and on-the-job training. The programme may also include orientation training on the organization and assessments of an employee's understanding of applicable legislation and regulations. Typically, completion of all the training components of the programme takes between 12 and 24 months. Completion of the programme is dependent on many factors such as previous experience, operational requirements, timelines, and schedules. The information below describes an ITQP in one State and may be a useful framework for other States interested in setting up a similar programme.

Initiation training
A two-day orientation is given to new employees, including training on the legislation.

Core training
The core training includes basic knowledge and skills required by all State inspectors delivered through in-house classroom sessions or online modules followed by an exam. In-house sessions are provided by experienced internal staff or external organizations. Core training covers:

- Radiation Protection course
  Two-day in-class training
- Basic Occupational Health and Safety
  Three modules in a one-day in-class course:
  - Personal Safety Awareness
  - Lifting and Carrying Hazards
  - Personal Protective Equipment

  Six online modules:
  - Workplace Hazardous Materials Information System
  - Ladder Safety
  - Workplace Noise Hazards
  - Confined Spaces Hazards
  - Electrical Hazards
  - Preventing Falls
- Inspection Fundamentals
  Seven modules in a five-day in-class course:
  - Regulatory Framework
  - Introduction to Inspections
  - How to Conduct an Inspection – The Process
  - Legal Overview of Inspections
  - Common Technical Skills for Inspectors
  - Effectiveness Skills for Inspectors
  - Inspection Community (Areas, facilities and activities regulated)
- Interviewing for Information
  One-day in-class training

Position-Specific Training

Position-specific training typically involves external courses specific to the facilities and activities that are inspected by each division (e.g. radiation protection, physical security, safeguards, etc.). Safeguards inspectors are not required to complete position-specific training. However, all safeguards inspectors are expected to take the IAEA's SSAC course at the first available opportunity.

On-the-Job Training

On-the-job training (OJT) is also specific to the facilities and activities that are inspected by each division. An OJT guide and an evaluation guide were developed for conducting safeguards inspections. The OJT guide provides the learning tasks required for conducting each aspect of the inspection and describes: preparing for an inspection, conducting an inspection, documenting an inspection, and follow-up to an inspection. The inspector-in-training observes an experienced inspector during inspections, participates in inspections under the direct supervision of an inspector, performs an inspection under supervision and is evaluated by an experienced inspector or by the Division Director. There are five orientation modules delivered by senior safeguards staff. Module 1 starts with an overview of safeguards in the State, including:

- The NPT, the IAEA Statute and the State's safeguards agreements and arrangements with the IAEA;
- Safeguards procedures for facilities in the State;
- State regulatory requirements and documentation;
- Future directions of safeguards in the State; and
- Basic nuclear material accountancy.

Modules 2 to 5 address safeguards at specific groups of facilities in more detail, including:

- An overview of a facility or site;
- An overview of safeguards at the facility/site;
- A detailed review of the current IAEA safeguards procedures and how they are applied at the facility/site;
- A review of the applicable regulatory requirements and the internal safeguards procedures related to the different types of IAEA activities; and
- Future direction of safeguards at the facility/site.

Other topics relevant to safeguards are also covered in these modules, such as provision and submission of the annual updates to additional protocol declarations, facility operational programmes and DIQs. A list of reference documents is also provided, which safeguards inspectors-in-training review in detail as a self-study. The reference documents include all the documents reviewed in Modules 1 to 5, the IAEA Service Series 21 and related guidance, which help new staff understand the requirement of the CSA and AP. The IAEA *Resources and Assistance for States* website and the reference to relevant links on the SRA's website are also given.

Once safeguards inspectors-in-training have a basic understanding of the SRA's regulatory requirements and the relevant safeguards agreements, they then need to understand how these requirements and agreements are implemented in the facilities. To accomplish this they are assigned, under the guidance of a senior safeguards inspector to:

- observe an experienced inspector during safeguards inspections;
- participate in safeguards inspections under the direct supervision of a safeguards inspector;
- perform inspections under supervision; and
- receive an evaluation by a qualified safeguards inspector.

This process applies to facilitating IAEA inspection, including holding opening and closing meetings as required, and conducting in-field evaluations of a licensee's physical inventory taking and their safeguards programme in general.

Other Individual Training

Based on the evaluation, an inspector may require additional training to better understand and perform their duties and responsibilities as an inspector. Such courses could include writing technical information effectively, negotiation skills, conflict management, etc.

Inspector Designation and Certificate Management

During the training period the inspector-in-training maintains a training and qualifications record. The form includes a list of all the required training courses, including the course provider and dates the courses were taken, as well as a log of OJT training/experience. The OJT training record outlines all the inspections attended, the date of the inspection and the inspection report and is initialled by the coach for that inspection. This training record is evaluated by the inspector-in-training's coach and Director and if it is determined that the inspector-in-training is sufficiently prepared to assume the duties of an inspector, the form is signed.

The Director prepares an inspector designation form which recommends that the inspector-in-training be designated as an inspector and indicates which facilities and activities the inspector is authorized to inspect and perform. The form must be reviewed and approved by management. Upon approval, the inspector-in-training is designated and a certificate is issued. Inspector certificates are valid for a maximum of five years at which time the requirements for a certificate are re-evaluated. If the inspector certificate is still required, a new inspector designation form is completed. The inspector's Director re-assesses previously taken courses and equivalencies to determine if any new or refresher training is required.

Annex XI
CONSIDERATIONS IN SETTING UP AN SRA'S INFORMATION MANAGEMENT SYSTEM

Functions: The functions of the SRA are evaluated to determine the scope of its information system. Will it address only safeguards or also include other responsibilities such as security or safety? Will it include additional protocol activities and information? Data elements may be common to various functions of the SRA, so coordination and information sharing are valued.

Legislative Considerations: One of the key enablers of information flow is the regulatory mechanism requiring data to be exchanged, through laws, regulations or a combination thereof. Authorizations may be necessary to allow collection of the information, provision of data to organizations within the State, and provision of information outside the State, such as to the IAEA or a regional inspectorate.

Data Flow, Timelines, and Schedules: Timeliness of reporting specifies how and when data is gathered and reports prepared. The frequency can vary widely. Establishing processes and their order, and the inputs, outputs, and responsible parties for each, creates a basis to determine the amount of time allocated for completion of each step. A timeline can be developed and schedules put in place. Procedures documenting the inputs, process, and outputs of each step minimize misunderstandings between stakeholders and aid in retaining consistency in the event of staff turnover. These are all elements of the SRA's QMS.

Quality Assurance and Quality Control: The data entered into the information system needs to be correct, complete, formatted properly and submitted on time. Preventive controls might include standards and procedures; good practices; formal documentation; automated quality checks; and adequate training. Designed-in checks and balances and quality control features can identify issues before reports are prepared and submitted. For example, data fields can control the nature of the entry (type of data, number of significant figures, number of characters, etc.) and prevent incorrect entries. These measures are also defined in the SRA's QMS.

Exchanges of Information: Safeguards involves multiple stakeholders so information exchange bears extra consideration due to its inherent complexities. Technical and procedural factors are equally important. Technical decisions might include defining data formats, determining whether to use public or private networks, and selecting data encryption methods. Procedural processes might include establishing timelines, agreeing upon exchange mechanisms, designating recordkeeping and retention policies, and incorporating applicable State security rules.

Risk Management: Evaluating risks at the beginning of the design process supports quality objectives and proactive planning. Risk management consists of two main phases: assessment and resolution. Assessment includes identification of potential risks, evaluation of impact/costs should such an event occur, costs to minimize the likelihood and prioritization

of risks to be prevented. Resolution involves establishing procedures, roles, and responsibilities; communications mechanisms; and a system-wide continuous improvement process. For many SRAs, conducting a formal risk analysis may be a worthwhile exercise.

Technical Reviews: Technical reviews might occur at the point of origination of data, aggregation of data from multiple sources, changes of data ownership, and data interpretation. Reviews may be formal or informal.

Administrative Reviews: Administrative reviews may be necessary before transmitting data outside the organization, e.g. ensuring management approval prior to submittal to the IAEA.

Data Ownership: When data moves through a workflow process involving multiple organizational entities, the system can specify where data changes ownership and for how long backup copies should be retained. A designation of the "official" State copy — either explicitly or incorporated as part of a broader charter - is useful. Special considerations for ownership exist in cases where handwritten or printed submissions from one organization are transcribed or electronically entered into a database by a different organization.

Security: Ensuring the integrity of data and preventing access to it by unauthorized individuals or entities are essential. Cyber security policies typically assess vulnerabilities from two aspects: exposure during transmission and vulnerability while at rest. Preventive measures for transmission may include secure networks, encryption, certified mailing or hand-carrying. At-rest measures include account management, system administration policies, role-based access controls and limiting physical access to the data — including the computing facilities (e.g. server racks on site or off site). Information security requires clear rules and procedures and a system of information classification so that information which requires protection will be protected. Encrypted communication channels will need to be established between the SRA and its data providers and recipients including the IAEA, facility and LOF operators.

Training: Training is closely tied to qualification programmes, industry standards and procedures. For data originators, training and certification may be required on the use of measurement devices or on methods of placing data into the SRA workflow, software, security, data management, data integration, report preparation, review and submission.

Auditing: Developing an auditable system helps to demonstrate that the State is in control of its information collection, quality assurance and reporting mechanisms. Consistent high quality results are needed, and documentation of how values are derived (traceability). The chain of custody for data will also need to be maintained. These are elements of the QMS.

Corrective action: When a problem is identified, whether by the system or by a staff member, procedures should be in place to resolve the problem and implement corrective action as necessary (e.g. send corrections to the IAEA).

Annex XII
OVERVIEW OF IAEA TRAINING AND ASSISTANCE IN SAFEGUARDS

This paper[25] provides an overview of the IAEA's efforts in the area of nuclear safeguards and non-proliferation training and education, including assistance to Member States' initiatives, focusing on the development and delivery of nuclear safeguards training and outreach activities. Further, it discusses the important role of IAEA advisory missions and other mechanisms that significantly contribute to the continuous improvement of the IAEA Member States training in the area of nuclear non-proliferation and safeguards. Finally, it outlines the just recently launched e-learning module on *Introduction to Safeguards* that will complement the existing training programme and is part of an interactive e-learning series explaining the IAEA's Milestones Approach to introducing a nuclear power programme.

XII-1. Introduction

Human resources development is recognized as the cornerstone of capacity building and sustainability of nuclear skills by the International Atomic Energy Agency (IAEA). This includes also the area of nuclear non-proliferation and safeguards. The IAEA Medium-Term Strategy 2012–2017 commits the IAEA to "ensure that States have competent State safeguards authorities" and "to provide States, particularly those introducing nuclear power, with guidance and training on the implementation of their respective agreements." The Long-Term Strategic Plan (2012–2023) of the Department of Safeguards [XII-1] also highlights the need to "develop training material and remote delivery methods to support SRA training with reduced costs and increased accessibility".

Outreach and training play an essential role in ensuring that professionals in Member States are well prepared to carry out functions of the State's system of accounting for and control of nuclear material (SSAC) at both, the State and facility/locations outside facilities (LOFs) level. This is achieved through IAEA seminars, briefings, training, advisory services, activities carried out with the Director General's Office of Coordination (DGOC) as well as through publications.

XII-1. Outreach Activities

Outreach activities aim to increase States understanding and awareness for the importance of having in force a comprehensive legal framework for safeguards, at both the international and national level. These activities are principally addressed to policy-makers, decision makers and States' representatives. Outreach activities are an Agency wide effort involving, inter

[25] This annex provides a copy, with the kind permission of the authors, of a paper prepared for the 2014 IAEA Safeguards Symposium entitled *IAEA support for building-up a highly skilled workforce necessary for an effective State System of Accounting for and Control of Nuclear Material* authored by A. Braunegger-Guelich, V. Cisar, J.-M. Crété and R. Stevens, IAEA, 2014.

alia, the Office of Legal Affairs, the Director General's Office for Coordination, and the Department of Safeguards. It also requires a close cooperation with institutions or education centres delivering seminars in the area of nuclear non-proliferation and safeguards.

XII-2. Training

The *IAEA Member State Training Programme* in the area of nuclear non-proliferation and safeguards is geared to support States in their efforts to build-up a highly skilled workforce necessary for an effective and efficient SSAC. It targets audiences at all levels of responsibility for IAEA safeguards implementation. The training is designed for professionals in governmental organizations, regulatory bodies, utilities, the medical sector, relevant industries and customs. It is provided regularly at the regional and international level and, upon request, at the national level. In the framework of this human resources assistance programme, the IAEA has also established close cooperation with countries, such as the United States or Japan, universities or other institutions for the delivery of outreach activities, training and education in the area of nuclear non-proliferation and safeguards.

Annually, the IAEA conducts approximately 10 training activities in the area of nuclear non-proliferation and safeguards for Member States. Within the last 12 months, more than 270 professionals from more than 60 countries have been trained. The outreach and training efforts are based on the findings and insights resulting from the various IAEA advisory services, such as the IAEA SSAC Advisory Service (ISSAS) or the Integrated Nuclear Infrastructure Review (INIR) mission, and needs identified by the different Safeguards Operations Divisions, the Division of Information Management and official requests from IAEA Member States.

The training courses provided have a modular structure covering a large spectrum of topics:

- The Nuclear Non-Proliferation Regime
- Safeguards Agreements and Protocols
- Accountancy and Control of Nuclear Material
- Containment and Surveillance
- Nuclear Material and Additional Protocol Reporting
- IAEA verification Activities
- Environmental Sampling for Safeguards
- Export Controls
- Nuclear Fuel Cycle
- Safeguards Terminology
- Nuclear Material Measurement Techniques
- National Inspections
- Synergies between Nuclear Safeguards and Nuclear Security

Upon request, the IAEA provides also training courses covering specific topics, such as 'Safeguards by Design'.

The main objective of international and regional courses is to transfer fundamental knowledge and to develop basic skills (e.g. on reporting on design information or nuclear material) in the area of non-proliferation and safeguards. These courses also aim at providing experts from various countries with different professional backgrounds a platform to work

together and to become part of the international safeguards community. National training courses are tailored to meet clearly identified national needs.

XII-3. Delivery of the IAEA Member State training programme

In order to achieve the intended learning objectives and to stick to the real world of safeguards implementation, the safeguards training section uses a variety of interactive teaching methods involving participants as much as possible in the learning process. It goes without saying that developing suitable scenarios and exercises for interactive training requires a thorough preparation and important resources. But, this is the only way to escape from the "death by slides" presentations and to ensure effective training. At the same time, this teaching approach provides trainees the unique opportunity to apply theoretical knowledge in real work scenarios fostering critical thinking and thinking in solutions.

The *IAEA Member State Training Programme* includes instructor-led classroom and brain-storming sessions, exercises such as, simulations, work in groups/pairs, case studies or role-play based teaching. Class room sessions are complemented by well-designed technical visits to nuclear facilities in the host country. This selection of teaching methods allows creating an effective platform whereby States and the IAEA can share lessons learned and concerns in a training environment without any operational pressure. The atmosphere at the courses is open and collegial inviting to discussions and exchange of experience among trainees, host country guest lecturers and IAEA professionals. This provides the ideal frame for developing and strengthening relations among peers from Member States and IAEA experts.

The *Member State Training Programme* is unique due to the fact that the instructors are exclusively IAEA Safeguards training officers and experts from the Department of Safeguards sharing longstanding and updated experience in the implementation of IAEA safeguards and providing optimized guidance in the implementation of safeguards agreements and protocols.

In October 2014, the IAEA has launched a pilot course on SSAC for States introducing nuclear power to create awareness for the increase of safeguards commitments and related activities that are attended by a governmental decision to embark on a nuclear power programme. It focuses on developing knowledge and skills necessary to manage these challenges. 25 participants from ten countries attended the pilot course held 6–17 October 2014 in the Republic of Korea in cooperation with the Korean Institute of Nuclear Non-proliferation and Control (KINAC)[26] and the International Nuclear Non-proliferation and Nuclear Security Academy (INSA)[27]. The related course curriculum is aligned with the IAEA Service Series 21 and 22 [XII-2, XII-3].

XII-4. Evaluation

Evaluation is a key component for continual improvement of safeguards training courses. Course curricula, scope and content of training courses are regularly revised to consider the incorporation of topics set out in newly published IAEA reference documents, of best practices and lessons learned from previous courses as well as to ensure that evolving training needs of Member States are reflected. For this purpose, an evaluation mechanism is in place, including a survey conducted after six month of each course. This survey is carried out with

[26] KINAC https://www.kinac.re.kr/eng.do.
[27] INSA https://www.kinac.re.kr/eng/busin/busin5.do.

the help of a questionnaire sent to trainees and trainees' supervisors to evaluate how the knowledge and skills gained in a particular course is eventually applied in the working environment.

XII-5. Safeguards traineeship programme

In addition to the comprehensive training programme, the IAEA holds a safeguards traineeship programme every second year. This 10-month course for young graduates and junior professionals from developing countries aims at increasing the number of qualified candidates from developing countries suitable to work either as safeguards inspectors at the IAEA or in their SSACs. The traineeship programme typically consists of several phases. The first phase of the training is an induction programme with a focus on the UN system, the IAEA and the functions of its respective departments as well as introduction to radiation protection and dosimetry. The second phase of the programme is a four-week series of lectures and practical exercises conducted at and by the Atominstitut of the Austrian Universities in Vienna[28]. To further enhance the knowledge of the trainees in nuclear technologies and their applications, the trainees participate in a ten-week training project at a nuclear education centre in Europe. The last phase of the traineeship programme consists of 12 weeks practical experience in different divisions of the IAEA. The instructional approach consists of lectures, exercises, demonstrations and technical visits to nuclear facilities (e.g., nuclear power plants, nuclear research institutes, fuel enrichment plant, fuel fabrication plant and waste disposal facilities) in Europe.

XII-6. Material supporting outreach and training

In order to support its outreach and training activities, the IAEA also produces printed and electronic materials. The Agency established a web page[29] providing State and regional authorities with access to guidance. To assist States that have concluded a comprehensive safeguards agreement and protocols in building capacity for complying with their safeguards obligations, the Agency published IAEA Service Series 21 *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols* in March 2012 [XII-2]. This document especially detailed the expected outcomes of an effective SSAC. Additional guidance publications on the following topics are available:

- IAEA Services Series 22, Safeguards Implementation Guide for States with Small Quantities Protocols [XII-3]
- IAEA Service Series 15, Nuclear Material Accounting Handbook [XII-4]
- IAEA Service Series 11, Format for Preparation and Submission of Declarations Pursuant to Articles 2 and 3 of the Model Protocol Additional to Safeguards Agreements [XII-5]

Currently, there are several safeguards implementation practices (SIP) guides under development that will be part of the IAEA Service Series, such as the *SIP Guide on Facilitating IAEA Verification Activities* (IAEA Services Series 30) published in December 2014. The purpose of these Guides is to share the experiences and good practices of States and lessons learned of States and the IAEA over the many decades of safeguards implementation.

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[28] ATI http://www.ati.ac.at/.
[29] http://www.iaea.org/safeguards/resources-for-states/guidance-documents.html.

In addition, the IAEA also produces printed and electronic materials and videos illustrating IAEA infield verification activities and safeguards equipment. IAEA safeguards activities and outreach programmes are publicized through social media, such as Facebook, YouTube, Google+ and Twitter.

XII-7. IAEA advisory services

There are a number of IAEA Advisory Services, provided to States upon their request, which play an important role in identifying training needs in IAEA safeguards implementation in Member States. The findings of these services are, *inter alia*, the basis for the development and provision of tailored and systematic assistance to Member States. IAEA advisory services allow spotting deficiencies at all levels of the SSAC, filling identified gaps with appropriate outreach and training in a systematic way, and enhancing existing best practices. The findings of the following advisory services serve as one of the inputs for the strategic planning of Member State training support.

For instance, the IAEA SSAC Advisory Service (ISSAS) [XII-8] provides States, at their request, with advice and recommendations on the establishment and strengthening of SSACs. An ISSAS mission covers all aspects of safeguards implementation including Additional Protocol reporting, export/import, nuclear material accounting and reporting, legal and regulatory framework, etc. ISSAS missions make recommendations on how any shortcomings identified could be rectified or further cooperation could be implemented, whilst recognizing good practices identified in the course of the mission.

The IAEA's Integrated Nuclear Infrastructure Review (INIR) is coordinated by the Department of Nuclear Energy and is based on the IAEA's *Milestones in the Development of a National Infrastructure for Nuclear Power* [XII-9] which contains a description of 19 infrastructure issues[30] to be considered during the different stages of development of a nuclear power programme.

The IAEA's Integrated Nuclear Infrastructure Review (INIR) missions assist Member States, at their request, in assessing the status of their national infrastructure, including the infrastructure issue 'Safeguards;, for the introduction of a national nuclear power programme. INIR missions also help the IAEA to better understand the needs of Member States, which in turn contributes towards improving the services provided by the IAEA.

XII-8. E-learning programme on safeguards

The IAEA Department of Nuclear Energy has created an interactive e-learning series explaining the above mentioned *Milestones Approach* to introducing a nuclear power programme. This approach is based on three phases and covers the 19 infrastructure issues that need to be addressed, and brings decades of expertise to life. Both newcomers and those expanding their nuclear power programmes may benefit from the e-learning series.

The e-learning module on the infrastructure issue "Safeguards" has just recently being published. The objective of the module is to create awareness for the key issues to be

[30] The 19 infrastructure issues are: National position, Nuclear safety, Management, Funding and financing, Legislative framework, Safeguards, Regulatory framework, Radiation protection, Electrical grid, Human resources development, Stakeholder involvement, Site and supporting facilities, Environmental protection, Emergency planning, Security and physical protection, Nuclear fuel cycle, Radioactive waste, Industrial involvement, Procurement [9];

considered related to safeguards infrastructure by States embarking on new nuclear power programs and the growing level of nuclear activities and quantity and quality of nuclear material in the planning, construction as well as operation phase of the Milestones Approach.

Several important steps need to be considered such as rescinding an SQP, as applicable, strengthening of the SSAC at the State level and scheduling of its development in advance of building a nuclear facility, sending information on the design of the future power plant(s) as early as possible, updating the AP declaration, and so on.

The module is comprised of three parts that cover the following thematic areas:

Introduction
- the nuclear non-proliferation regime;
- IAEA safeguards; and
- the main obligations under the *Treaty on the Non-Proliferation of Nuclear Weapons, Comprehensive Safeguards Agreements* and *Protocols*.

Part 1
- the main elements of a State safeguards infrastructure;
- the importance of the legal framework and regulatory infrastructure in the implementation of safeguards; and
- the key functions of the SSAC.

Part 2
- the importance of considering safeguards in the design and construction of a nuclear power plant;
- the nuclear material flow through a nuclear facility;
- the nuclear material accountancy structure; and
- locations of IAEA safeguards equipment.

The e-learning module is addressed to several audience groups:

- Decision makers, advisers and senior managers in the governmental organizations, subject matter experts, utilities, industries, and regulatory bodies of Member States interested in developing nuclear power;
- Future participants of IAEA events (for example IAEA training courses, workshops, technical meetings, Consultancy meetings, IAEA missions to MS) to ensure/upgrade their knowledge about the Milestones approach;
- Newly recruited IAEA staff-members

The programme is designed to be completed within 2 hours by an average learner and can be stopped at any time since the system records the learner's progress. Subsequently, it can be continued any time.

This e-learning module allows individuals around the world to acquaint themselves with the key elements of non-proliferation and safeguards on their own pace. There is no registration required to take the online Safeguards e-learning module which can be accessed on the IAEA website at: http://www.iaea.org/NuclearPower/Infrastructure/elearning/.

The e-learning module is also an optimal preparation for all participants attending future IAEA training courses.

XII-9. Conclusion

Training and education play an essential role in developing a qualified workforce prepared for the current and future challenges of SSACs. The IAEA provides outreach and training activities to continuously support Member States efforts to build-up sustainable nuclear non-proliferation competencies. In addition, it assists in bilateral outreach activities enhancing competencies in IAEA safeguards implementation and offers programmes to develop safeguards competencies among junior experts.

The report by the IAEA Director General[31] responding to the GC/57/RES/13[32] underlines that "the effectiveness and efficiency of IAEA safeguards depend, to a large extent, on the effectiveness of State and regional systems of accounting for and control of nuclear material" and that "in some States, SSACs have yet to be established, and not all SRAs have the necessary authority, resources or technical capabilities to implement the requirements of safeguards agreements and APs."[33]

This paper sets out that the IAEA has just recently launched a training course that addresses in particular the training needs of SSACs to be established and to put in operation. In addition, it provides some examples how the IAEA contributes to ensure the maintenance of the current skilled and competent personnel at SSACs, and the flow of new recruits for long-term sustainability.

In order to meet the above identified needs in Member States and to meet the Long-Term Strategic Plan (2012–2023) of the Department of Safeguards for the development of training material and remote delivery methods, the IAEA has just recently published an e-learning tool to complement its Member State training programme. The first IAEA e-learning tool on Safeguards aims at enabling all levels of the SSAC to train them any time they want on the key elements of IAEA safeguards implementation.

Through all these efforts, the IAEA addresses also the need for harmonizing the activities of stakeholders providing assistance in the development of nuclear non-proliferation and safeguards competencies. Continuous collaboration and cooperation with a number of stakeholders has shown that harmonization does not require a rigid and formal mechanism. However, it is important that education and training activities are addressed in a consistent and efficient manner, according to requirements set out in safeguards agreements and protocols and IAEA guidance documents, such as Service Series 21 to avoid overlap and contradiction of training content.

Having a nuclear non-proliferation and safeguards community sharing the same understanding, delivering the same message and optimizing the use of available resources is mandatory to put in place the strong leverage required for the effective and efficient implementation of IAEA safeguards as a key component of the nuclear non-proliferation regime.

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[31] GC(58)/16 http://www.iaea.org/About/Policy/GC/GC58/GC58Documents/English/gc58-16_en.pdf.
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