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Safeguards Implementation Guide for States with Small Quantities Protocols

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SAFEGUARDS IMPLEMENTATION GUIDE FOR STATES WITH SMALL QUANTITIES PROTOCOLS

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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''.

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FOREWORD

The International Atomic Energy Agency (IAEA) works to enhance the contribution of nuclear energy for peace and prosperity around the world, while helping to ensure that nuclear material is not diverted to nuclear weapons or other nuclear explosive devices. In implementing safeguards, the IAEA plays an instrumental independent verification role, providing credible assurances that States' safeguards commitments are being respected.

Most of the world's non-nuclear-weapon States (NNWSs) have concluded comprehensive safeguards agreements (CSAs) with the IAEA, pursuant to the Treaty on the Non-Proliferation of Nuclear Weapons (NPT). The IAEA and States are required to cooperate in the implementation of such agreements. Effective cooperation demonstrates a State's commitment to the peaceful use of nuclear energy and furthers the State's national interests by reducing the risk of unauthorized use of nuclear material.

About 90 NNWSs party to the NPT have very limited quantities of nuclear material and have concluded protocols to their CSAs which hold in abeyance many procedures in Part II of a CSA. These protocols are referred to as 'small quantities protocols' or 'SQPs' and remain in effect as long as the State meets certain eligibility criteria. The purpose of an SQP is to reduce the burden of safeguards implementation for States with little or no nuclear activities, while retaining the integrity of the safeguards system.

States with SQPs have very important obligations they must fulfil under their CSAs. In 1997, as part of the IAEA's efforts to strengthen its safeguards system, the Model Additional Protocol to the Agreement(s) between State(s) and the International Atomic Energy Agency for the Application of Safeguards was developed to provide the IAEA with broader access to information and locations, thus significantly increasing the IAEA's ability to provide assurance of the absence of undeclared nuclear material and activities in States. Many States with SQPs have also concluded additional protocols to their CSAs.

This publication is aimed at States with SQPs, and addresses obligations under CSAs, SQPs and additional protocols. It is primarily intended for State or regional authorities responsible for safeguards implementation (SRAs). Recognizing that SRAs often have responsibilities in areas other than safeguards, such as nuclear safety and security, the book highlights some possibilities for synergies among these disciplines.

The IAEA wishes to acknowledge the many individuals who contributed to the creation of this publication. The IAEA officer responsible for this publication was C. Mathews of the Division of Concepts and Planning.

CONTENTS

1. PURPOSE AND SCOPE

This *Safeguards Implementation Guide for States with Small Quantities Protocols* (hereafter referred to as the Guide) has been prepared for States with minimal or no nuclear activities that have concluded a small quantities protocol (SQP) to their respective comprehensive safeguards agreements (CSAs) with the International Atomic Energy Agency (IAEA). IAEA document INFCIRC/153 (Corrected), *The Structure and Content of Agreements between the Agency and States Required in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons* (hereafter referred to as INFCIRC/153 (Corr.)) [1] provides the basis for these CSAs.

This Guide also addresses obligations of States that have concluded an additional protocol based on IAEA document INFCIRC/540 (Corrected), *The Model Protocol Additional to the Agreement(s) between States and the IAEA for the Application of Safeguards* (hereafter referred to as INFCIRC/540) [2].

The Guide expands on the *Guidance for States Implementing Comprehensive Safeguards Agreements and Additional Protocols* of March 2012 (IAEA Service Series 21, hereafter referred to as SS21) [3].

Terms defined in INFCIRC/153 (Corr.) and INFCIRC/540 (Corr.) are *italicized* when first used and included in the section titled 'Definitions'. Key points are made in text boxes such as the sentence below.

> The purpose of this Guide is to provide detailed explanations and examples aimed at enhancing the understanding of States with SQPs regarding their safeguards obligations.

Safeguards activities discussed in this Guide include:

- identifying all *nuclear material* and nuclear-related activities in the State;
- controlling the use of nuclear material;
- preparing and submitting information to the IAEA;
- responding to IAEA correspondence and requests; and
- facilitating access for IAEA inspectors in the State.

The Guide provides background information on the IAEA safeguards system, describes the national infrastructure and activities necessary to establish and maintain effective control over nuclear material and describes the activities carried out in SQP States to implement CSAs and additional protocols. A glossary of terms and a list of references are followed by several appendices.

Appendix 1 describes the common uses of nuclear material in medical, industrial and research applications, with information about nuclear material used in those applications.

Appendix 2 explains how to prepare an initial report on nuclear material and updates to it as the inventory of nuclear material may change over time.

Appendix 3 describes how to report imports and exports of nuclear material (and any material containing uranium or thorium).

Appendix 4 describes events that may occur in an SQP State, and explains the safeguards activities associated with each event and the forms used to report these events to the IAEA.

Appendix 5 provides an example of an IAEA Technical Cooperation project proposal, which may be used in considering whether such a project might be of interest to an SQP State that wishes to further develop its regulatory capability.

The texts of the original SQP and modified SQP are provided in Annex A and B, respectively.

The descriptions in this Guide 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 States set forth in CSAs, SQPs and additional protocols. This Guide provides information that States may find useful in the exercise of their rights and the discharge of their obligations under these instruments.

2. IMPORTANCE OF ESTABLISHING AND MAINTAINING EFFECTIVE STATE CONTROL

Effective control of nuclear material[1] and activities in a State is essential to protect its citizens, neighbouring countries and the region from the effects of accidents, malicious acts, illicit trafficking and the proliferation of nuclear weapons.

The safe use of technology involving nuclear material, such as medical diagnostic equipment, cancer treatment, industrial applications and research and development activities, requires that the State effectively protect, regulate and control it. The quality of life of a State's citizens can be improved through the use of nuclear material in these kinds of applications. Effective regulatory control builds confidence within the international community and demonstrates a strong commitment to the responsible use of this potentially hazardous material.

The establishment of an independent and competent State (or regional[2]) authority with responsibility for safeguards (SRA) is fundamental to the effective control of nuclear material, facilities and nuclear-related activities and must be given high priority.

An SRA is needed in order for the State to establish and maintain its system of accounting for and control of nuclear material (SSAC), which is an obligation each State accepts when it concludes a CSA.

Experience has shown that safety, security and safeguards are best served by a complete separation of the regulatory functions from the organizations that promote nuclear activities or use nuclear material (operators/licensees). As stated in the Handbook on Nuclear Law

[1] Control of all ionizing and non-ionizing radiation, including radioactive sources, is also essential for the protection of people and the environment. IAEA Safety Standards Series and Nuclear Security Series provide guidance on the safe and secure use of nuclear and other radioactive material, and are found at www.iaea.org/MTCD/Publications.

[2] The term SRA applies to all States with a CSA. Currently there are no States with an SQP for which a regional authority, such as EURATOM, is involved in safeguards implementation.

Implementing Legislation [4], "*A fundamental requisite for an effective regulatory body is that it possesses an adequate measure of independence or functional separation from entities having interests or responsibilities that could unduly influence regulatory decision making. Such entities include not only the regulated industry and medical users of radioactive material and technology, but also other governmental bodies charged with the development or promotion of the technology, as well as political bodies and non-governmental bodies.*" Independence of the government authority helps to ensure that regulatory decisions can be made and enforcement actions can be undertaken without interference from other organizations.

This Guide is directed at SRAs in SQP States, and is intended to enhance their understanding by providing clear guidance, instruction and examples regarding safeguards implementation in these States.

3. THE IAEA SAFEGUARDS SYSTEM

An overview of the IAEA safeguards system as it is currently implemented, and the historical events that influenced its evolution, are described in the IAEA publication, *The IAEA Safeguards System,* which can be found at the following link:
http://www.iaea.org/Safeguards/documents/safeg_system.pdf.

States conclude safeguards agreements with the IAEA in order to fulfil their non-proliferation commitments. Each non-nuclear-weapon State party to the *Treaty on the Non-Proliferation of Nuclear Weapons* (NPT) [5] is required to conclude a CSA with the IAEA. A model agreement based on INFCIRC/153 (Corr.) is published as GOV/INF/276, Annex A.

Each paragraph in INFCIRC/153 (Corr.) corresponds to an article in a State's CSA. However, CSAs for SQP States do not include paragraph 24 in INFCIRC/153 (Corr.) that provides for the suspension of the application of safeguards under safeguards agreements concluded with the IAEA prior to the entry into force of a CSA. Therefore, each Article in the CSAs concluded by SQP States from Article 23 onwards are one number less than the corresponding paragraph in INFCIRC/153 (Corr.) For example, Article 33 of a CSA concluded by an SQP State corresponds to paragraph 34 of INFCIRC/153 (Corr.)

3.1 Obligations of States under CSAs

Under a CSA, the State undertakes to accept IAEA safeguards in accordance with the terms of the safeguards agreement, on all source or special fissionable material in all peaceful nuclear activities within the territory of the State, under its jurisdiction or carried out under its control anywhere. For its part, the IAEA has the corresponding right and obligation to ensure that such safeguards are applied on all source or special fissionable material for the exclusive purpose of verifying that such material is not diverted to nuclear weapons or other nuclear explosive devices.

3.2 Small quantities protocols

The purpose of an SQP is to minimize the burden of safeguards activities on States with little or no nuclear activities, while ensuring that the IAEA's safeguards conclusions for SQP States are soundly based. Under an SQP based on the original text of 1974 (GOV/INF/276/Annex B) [6][3], the implementation of most of the procedures in Part II of a CSA is held in abeyance[4] for as long as specified criteria are met. Procedures that are not held in abeyance include, for example, those relating to the reporting of exports and imports of nuclear material and any material containing uranium or thorium which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched.

A State's SQP based on the original text remains operational until such time as the quantities of nuclear material within the territory of the State or under its jurisdiction anywhere exceed the limits stated, for the type of material in question, in paragraph 37 of INFCIRC/153 (Corr.), or the State has nuclear material in a *facility* (as defined in the agreement).

The original SQP text contains a number of weaknesses, such as the inability of the IAEA to perform verification activities in order to confirm that the State meets the eligibility criteria, and the fact that the State is not required to provide the IAEA with an initial report on all nuclear material which is subject to safeguards.

In 2005, the Board of Governors recognized that the SQP in its original form constituted a weakness in the IAEA safeguards system and that there should be modifications to the eligibility criteria and in the substantive requirements of such protocols. Accordingly, the Board decided to make an SQP unavailable to a State with an existing or planned facility, and reduced the procedures in Part II of a CSA that are held in abeyance. The modified SQP (ModSQP) is published in GOV/INF/276/Mod.1 and Corr.1 [7][5].

A State's ModSQP remains operational until such time as the quantities of nuclear material within the territory of the State or under its jurisdiction anywhere exceed the limits stated in paragraph 37 of INFCIRC/153 (Corr.) or the State has taken a decision to construct, or to authorize construction of, a *facility*.

Of particular importance is the fact that States with a ModSQP are required to submit to the IAEA an initial report on all nuclear material and to notify the IAEA as soon as a decision has been taken to construct, or to authorize construction of, a facility.

Nuclear material in SQP States is used at locations called '*locations outside facilities*' (LOFs) which are defined in the Model Additional Protocol as "any installation or location which is not a facility, where nuclear material is customarily used in amounts of one *effective kilogram* or less." A facility is defined in a CSA as "a reactor, a critical facility, a conversion plant, a fabrication plant, a reprocessing plant, an isotope separation plant or a separate storage installation; or any location where nuclear material in amounts greater than one effective kilogram is customarily used." In States with ModSQPs, the IAEA may carry out ad hoc and special inspections; ad hoc inspections would be carried out in the State to verify the information in the initial report. Ad hoc inspections are also carried out to verify changes to

[3] The text is provided in Annex A to this Guide for convenience.

[4] Or suspended.

[5] The text is provided in Annex B to this Guide for convenience.

information in the initial report, and to identify and verify nuclear material before its transfer out of, or upon transfer into, the State.

Following the 2005 Board of Governors decision, the IAEA initiated an exchange of letters with each State with an SQP to give effect to the modified text or to rescind its SQP if it no longer qualified for eligibility under the new criteria. The Board also called on SQP States to conclude the exchanges of letters with the IAEA as soon as possible and requested the Secretariat to help SQP States to establish and maintain their State systems of accounting for and control of nuclear material, as required by the CSA.

Each SQP State that has not yet exchanged letters with the IAEA to adopt the modified text is encouraged to do so. The process for exchanging letters, and suggested model texts of the letters, can be found at:
http://www.iaea.org/Publications/Booklets/Safeguards3/safeguards0806.pdf

When a State no longer meets the eligibility criteria, the SQP becomes non-operational. This is discussed in more detail in Section 13.

In addition to other criteria, to remain eligible to have an SQP (whether based on the original or modified text), a State's nuclear material inventory may not exceed the quantities specified in paragraph 37 of INFCIRC/153 (Corr.) (see Figure 1). As a State prepares its initial report on nuclear material (see Section 6), the State can determine its inventory of each of the four specified categories of nuclear material (bulleted below).

Nuclear material in the State may not exceed:

- 1 kilogram in total of *special fissionable material* which may consist of one or more of the following:
  (i) plutonium;
  (ii) uranium with an *enrichment* of 0.2 (20%) and above, taken account of by multiplying its weight by its enrichment; and
  (iii) uranium with an enrichment below 0.2 (20%) and above that of natural uranium, taken account of by multiplying its weight by five times the square of its enrichment;
- 10 metric tons in total of natural uranium and depleted uranium with an enrichment above 0.005 (0.5%);
- 20 metric tons of depleted uranium with an enrichment of 0.005 (0.5%) or below; and
- 20 metric tons of thorium;

Or such greater amounts as may be specified by the Board of Governors for uniform application.

FIG. 1. SQP quantities limits specified in paragraph 37 of INFCIRC/153 (Corr.).

3.3 Obligations of States with SQPs

States with an SQP (whether based on the original or modified text) have important obligations that they must fulfil. The obligations under Part I of a CSA are applicable to all SQP States, such as the obligation not to divert nuclear material subject to safeguards to nuclear weapons or other explosive devices, the obligation to cooperate with the IAEA to facilitate the implementation of safeguards, and the obligation to establish and maintain an SSAC. All SQP States must also report to the IAEA at least annually all exports and imports of any material containing uranium or thorium which has not reached the stage of the nuclear fuel cycle described in paragraph 34 of INFCIRC/153 (Corr.), (so-called ‘pre-34(c) material’) unless the material is exported or imported for specifically non-nuclear purposes, and all exports and imports of nuclear material of a composition and purity suitable for fuel fabrication or for being isotopically enriched (so-called ‘34(c) material’) regardless of the intended purpose.

To enable the timely conclusion of Subsidiary Arrangements (discussed in Section 4.2), each State with an SQP must notify the IAEA in advance of its having nuclear material in quantities that exceed the specified limits. States with an original SQP are required to notify the IAEA at least six months before nuclear material is to be introduced into a facility.

States with a ModSQP must provide such notification as soon as the decision to construct or to authorize construction of a facility is taken, whichever occurs first. As mentioned above, a State with a ModSQP must also submit an initial report of its nuclear material inventory and be prepared to facilitate IAEA inspectors’ access in the State to conduct verification activities pursuant to the CSA. More detailed information about these obligations (summarized in Table 1) is provided in subsequent sections.

Table 1. Summary of obligations under original and ModSQPs

CSA (relevant paragraphs of INFCIRC/153 (Corr.))	Original SQP	ModSQP
SSAC (7)	Establish and maintain an SSAC	Establish and maintain an SSAC
Conclude Subsidiary Arrangements (39)	Conclude Subsidiary Arrangements	Conclude Subsidiary Arrangements
Timing for bringing into force Subsidiary Arrangements (40)	*Held in abeyance*	*Held in abeyance*
Initial report on nuclear material (62)	*Held in abeyance*	Submit initial report within 30 days of the last day of the month in which the ModSQP has entered into force
Provision of information on nuclear material customarily used outside facilities (49)	*Held in abeyance*	Provide up-to-date information on nuclear material customarily used outside facilities on a timely basis (IAEA requests at least annually)
Reports on imports and exports of any material containing U or Th unless imported or exported specifically for non-nuclear purpose (34(a) and 34(b))	Report exports and imports at least annually (more frequently is preferred)	Report exports and imports at least annually (more frequently is preferred)
Reports on imports and exports of 34(c) nuclear material (91, 95-96)	Report exports and imports at least annually (more frequently is preferred)	Report exports and imports at least annually (more frequently is preferred)
Provision of design information (42)	Provide design information *at least* 180 days before nuclear material is introduced into the facility	Provide early notification to the IAEA of a decision to construct, or to authorize construction of, a facility
Inspections (71, 73-77)	*Held in abeyance*	Facilitate ad hoc and special inspections

3.4 Additional protocols

An SQP State may also conclude a protocol additional to its CSA, based on the Model Protocol Additional to the Agreement(s) between State(s) and the IAEA for the Application of Safeguards (INFCIRC/540 (Corr.)). The obligations and activities undertaken pursuant to an additional protocol do not differ based on whether a State has an original or a ModSQP. An additional protocol equips the IAEA with additional tools and access to information and locations in the State, which strengthen the IAEA's ability to verify the peaceful use of *all* nuclear material in a State with a CSA.

This Guide describes the activities carried out by States with original SQPs, ModSQPs, and activities associated with an additional protocol.

Figure 2 is a simplified diagram showing a nuclear fuel cycle, and how an additional protocol expands the IAEA's knowledge and access to all elements of the nuclear fuel cycle in a State.

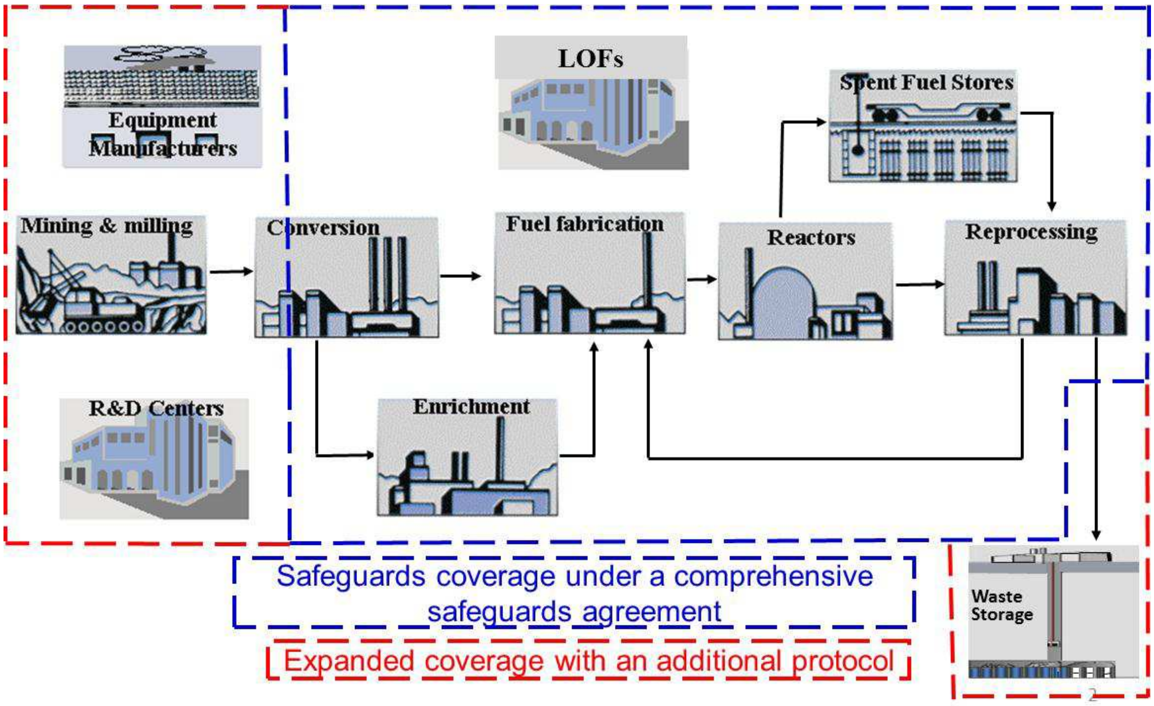

FIG. 2. Simplified diagram of coverage of nuclear activities under a CSA and an additional protocol.

A simple nuclear fuel cycle begins with the mining of uranium (covered in more detail in Section 9), then conversion of uranium ore to a form suitable for use in a reactor, and ends with long-term storage of waste. More information on the nuclear fuel cycle is provided at http://www.iaea.org/Publications/Booklets/NuclearFuelCycle/nfc0811.pdf.

As shown in Figure 2, a CSA plus an additional protocol covers the entire nuclear fuel cycle and its supporting elements. This includes uranium mining, nuclear waste storage and all locations where nuclear material is present, as well as *nuclear fuel cycle-related research and development activities* that do not involve nuclear material, and manufacturing of nuclear fuel cycle equipment.

Nuclear material in SQP States is typically used for non-nuclear purposes such as shielding, or as a component in an industrial process.

4. STATE INFRASTRUCTURE TO IMPLEMENT SAFEGUARDS

SQP States need to ensure that their legal and regulatory frameworks are adequate. They are required to establish and maintain an effective SSAC for the purpose of implementing safeguards. SQP States also need to provide information to the IAEA in a timely manner, facilitate access for IAEA inspectors as necessary, respond to IAEA communications and carry out administrative responsibilities such as designation of inspectors and issuance of travel visas. Each of these areas is summarized in the following sections. Additional information on these subjects can be found in SS21.

4.1 Establishing a regulatory framework

A State's ability to control nuclear material on its territory depends on its legislative and regulatory system, which should provide for oversight and control of all nuclear material and activities. Detailed guidance on nuclear law and implementing legislation is provided on the *Assistance for States* webpage (the link is provided in the section titled 'Other Documents'). Documents offer information on topics such as the legal framework, establishing a State or regional authority responsible for safeguards, licensing or authorizing uses of nuclear material, safeguards, export and import controls, inspection, enforcement and penalties.

> With the increased use of technology involving nuclear material (particularly depleted uranium) in medical facilities and industrial processes, **all States are likely to have some nuclear material on their territory.**

Consistent with each State's legal framework, the safeguards infrastructure should address, among other things, three fundamental areas to enable it to implement its safeguards obligations:

1) Establish laws, regulations and an SSAC which ensures that the requirements of the safeguards agreement and the additional protocol (if applicable) are fully met;
2) provide timely, correct and complete reports and declarations to the IAEA and respond to IAEA requests; and
3) provide support and timely access to the IAEA to locations and information necessary to perform safeguards activities.

In addressing these areas, States should make efforts to ensure that the relevant entities (e.g. Ministries, Missions or Embassies, operators) cooperate with the IAEA and respond to IAEA requests for information and assistance in safeguards implementation.

Paragraph 7 of INFCIRC/153 (Corr.) requires the State to establish and maintain an SSAC. An organization (entity, official or governmental body) must be authorized by law (or decree or order) to implement the safeguards obligations of the State. The State may wish to designate the organization responsible for safety, security and radiation protection to also address its safeguards responsibilities.

It is recommended (but not required) that the same entity also be responsible for activities required under an additional protocol.

The designated entity (or entities) is referred to as the **State or regional[6] authority with responsibility for safeguards implementation (SRA).** This name does not imply that the SRA is *only* responsible for safeguards — it may have other responsibilities.

> The SRA is the authority designated by law to exercise safeguards oversight and control over nuclear material and activities on the territory of the State, and to cooperate with the IAEA on safeguards implementation matters. The SRA is part of the SSAC. In addition to safeguards, the SRA may also have responsibilities associated with nuclear safety, security, radiation protection and/or export/import controls.

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[6] An example of a regional authority is the European Commission, which has primary responsibility under the Euratom Treaty for safeguards implementation in the European Union.

4.2 Establishing and maintaining communications with the IAEA

SQP States need to establish a point of contact and a channel of communications with the IAEA on safeguards matters. The State should establish a formal point of contact for official communications with the IAEA related to the implementation of safeguards, preferably within the SRA, or in the State's Ministry of Foreign Affairs. Examples of communication channels include email, fax and diplomatic pouch. The General Part of Subsidiary Arrangements to a CSA contains details regarding the communications channels between the State and the IAEA and other procedures for implementing the provisions of a CSA, and is normally concluded through an exchange of letters between the SRA and the IAEA.

SQP States are strongly encouraged to conclude **Subsidiary Arrangements** with the IAEA with a view to establishing the main point of contact for communications with the IAEA, use standardized formats for reporting, and specify timing for submitting reports, as applicable.

The SRA may need to establish a mechanism for submitting information securely to the IAEA, using encrypted email for example.

4.3 Providing information to the IAEA

States are required to provide information to the IAEA on the export, import, location, use and quantities of nuclear material, as well as information regarding nuclear fuel cycle-related activities and plans. In order to provide correct, complete and timely information, States must establish a sustainable mechanism with which to collect that information over time. The SRA could use a licence or a permit as a tool to authorize and control the import, possession or use of nuclear material, uranium or thorium mining and concentration activities, as well as to establish reporting requirements for licensees.

Under an additional protocol, States must provide information regarding the manufacturing, export and import of equipment and non-nuclear material that are especially designed and prepared for use in the nuclear fuel cycle. Controlling these kinds of activities requires cooperation between the SRA and other State authorities. For example, controlling and monitoring exports and imports of items specified in Annex II of an additional protocol may require coordination with a Ministry of Trade and Industry or a Ministry of Commerce. Preparing declarations on the location and scale of operations involving activities specified in Annex 1 of an additional protocol may require coordination with a Ministry of Science and Technology or a Ministry of Industry.

4.4 Facilitating access for the IAEA

The IAEA may perform verification activities (e.g. inspections, complementary access) in a State with a ModSQP and/or an additional protocol. Each SRA should have specific procedures in place to ensure that the IAEA can perform its verification activities in the State without delay. The IAEA may visit locations where nuclear material is present, as described in the initial report, and may carry out complementary access on the *site* of each such location, and at other locations identified in the State's additional protocol declarations, such as mines, manufacturing locations or places where nuclear fuel cycle-related R&D is taking place. The IAEA will give advance notice to the SRA before conducting such verification activities, and the IAEA and the State will discuss the logistics and arrangements in advance.

4.5 Carrying out administrative responsibilities

Each State needs to take measures to enable the IAEA to carry out its work in the State in a safe, secure and efficient manner. Such measures include responding to IAEA correspondence, facilitating the shipment of equipment or samples, and granting privileges and immunities to the IAEA and its staff to discharge their functions. The State's Mission to the IAEA or its Embassy in Vienna, Geneva or New York may be helpful to the SRA in addressing these issues.

5. ESTABLISHING AND MAINTAINING A STATE OR REGIONAL AUTHORITY RESPONSIBLE FOR SAFEGUARDS

Reliable accounting for and control of nuclear material serves not only to meet international nuclear non-proliferation obligations, but also to provide important contributions to national security and radiation safety. The actual design and implementation of a State's safeguards infrastructure will vary from State to State depending on the uses of nuclear material and the level of nuclear activities to be controlled.

5.1 Organization responsible for safeguards implementation

States commonly establish a governmental authority responsible for nuclear and radiation safety, in accordance with international standards. For States with limited nuclear activities, this organization would be suitable to be designated as the SRA. An illustrative organization structure is shown in Figure 3.

Although the diagram indicates a number of units with different functions and responsibilities, one person could have responsibilities in more than one unit. An SQP State might have only two people who have the primary responsibility to carry out safeguards activities, and those individuals may have other responsibilities in addition to safeguards. It is important to have more than one person qualified to carry out safeguards activities, so that the primary individual can delegate responsibilities when he or she is away of the office.

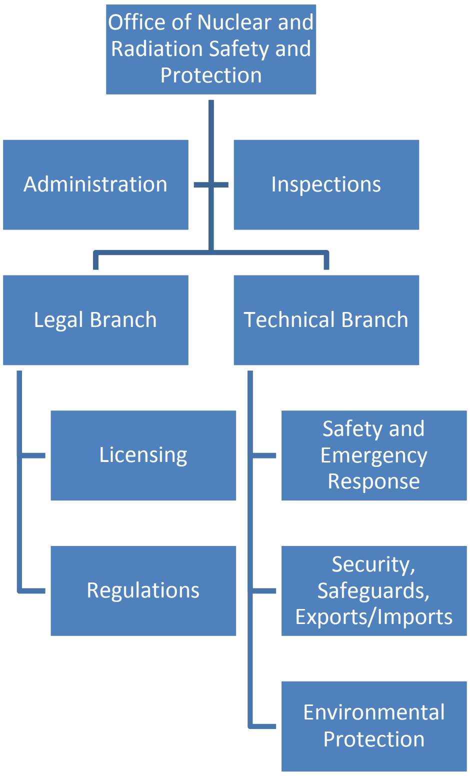

FIG. 3. Example of an organizational structure of an SRA.

The State must provide the SRA with sufficient authority through its laws and regulations, and provide adequate financial, technical and human resources to carry out its responsibilities. Consistent with the State's legal framework, the laws need to authorize the SRA, among other things, to:

- prepare technical regulations for safeguards implementation;
- ensure the technical effectiveness of the SSAC;
- establish reporting requirements;
- review applications for licence (or permit or authorization) and participate in approval process and licence issuance for activities under its purview;
- conduct inspections and audit activities of licensees under its purview;
- take actions to enforce the implementation of its regulatory decisions and apply penalties as appropriate; and
- facilitate IAEA activities under a CSA/SQP and/or an additional protocol.

It is important for the SRA to be independent from other Government authorities responsible for promoting the exploitation of uranium resources and developing nuclear-related capabilities in the State. The SRA's staff members should also be independent from the licensees or operators that they oversee or regulate.

Many activities involving the use of nuclear material are related to the shielding of radioactive sources. Therefore, some safeguards activities such as establishing and verifying the inventory of nuclear material and supervising nuclear material control procedures, might be discharged by staff members responsible for radiation protection or security.

5.2 Developing human resources

The effectiveness of the SRA depends heavily on the skills and abilities of its staff members. The activities carried out by these individuals span a wide range — from technical analysis to regulatory development to policy-making to conducting inspections — requiring different educational backgrounds and training curricula. Staff members need to be able to explain technical issues to administrators and diplomats, and also communicate effectively with licensees and IAEA inspectors. It is challenging to retain a well-trained workforce. Strategies to acquire and keep qualified employees engaged must be part of the organization's staff development and human resource planning.

The number of staff required to carry out safeguards activities will vary from State to State, and is dependent on factors such as the State's legal framework, licensing/authorization approach, number and complexity of LOFs, scope of the regulatory body, and experience. An SRA in a State with a limited number of LOFs and very few exports or imports may need only two staff members to address safeguards activities among other duties. A State with active uranium mining and concentration, several LOFs, and frequent uranium exports may need more than five staff members who share responsibilities for safeguards activities.

Several opportunities exist for training and developing staff in safeguards. The IAEA has a traineeship programme for young professionals wherein trainees spend 10 months at the IAEA learning about all aspects of the safe and secure uses of nuclear energy, as well as in-depth training on safeguards implementation. SSAC training courses organized by the IAEA are very helpful for new employees with safeguards responsibilities.

The IAEA has published a technical document entitled 'Training the staff of the regulatory body for nuclear facilities: a competency framework' [8] and a workforce planning guide [9] both of which may be useful for developing an approach to assess staffing needs, competencies, skills and abilities relevant to safeguards as well as the other important regulatory functions such as safety, security and radiation protection.

5.3 Licensing or authorizing the possession and use of nuclear material

One effective method of ensuring that the SRA is able to control the nuclear material inventory in the State, and receive advance notification of any planned domestic transfers, exports or imports, is to require that **all nuclear activities***,* in particular those involving nuclear material, be subject to authorization[7]. Authorization might be granted through a licence, permit, notification, certificate or other document.

Requiring a licence (or permit) for **all nuclear-related activities, in particular those involving nuclear material[8],** helps to ensure that the SRA has the information and the authority to effectively control the use, possession, export, import and domestic transfers of nuclear material.

[7] A permit or certificate could be issued instead of a licence. The name of the document may vary, but the purpose is the same — to ensure that the SRA authorizes activities that may involve the use of the nuclear material, and that the SRA is empowered to verify and enforce compliance with the requirements of the licence, permit or certificate.

[8] Licensing of radioactive materials is also recommended, and further guidance can be found in the IAEA Safety Standards series at www.iaea.org.

The licence application and licence conditions (or other authorization mechanism) can be designed in such a way, for example, to provide the SRA with:

- all of the necessary information for reporting to the IAEA;
- the right to validate information submitted by the licensee (SRA right of inspection);
- the right to evaluate the safe, secure and environmentally responsible use of nuclear material over time; and
- the right to require the licensee to give advance notification to the SRA regarding the planned construction of a new nuclear facility or other nuclear fuel cycle-related activities.

The licence should require the licensee to submit to the SRA information regarding the use, location, transfer, ownership and accounting and control procedures concerning nuclear material. A licence to possess/use nuclear or radioactive material could include requirements for safety, security, safeguards and environmental protection. It is not necessary to issue a separate licence for each area.

> If a Co-60 teletherapy unit contains nuclear material (depleted uranium) for shielding, the licence for use may contain a requirement for the licensee to establish an inventory for the depleted uranium, designate a person responsible for accounting and controlling the nuclear material, and reporting the inventory and any changes to the SRA. These requirements would be in addition to those related to the safe and secure use and disposal of a radioactive source.

5.4 Confirming compliance with licence (or permit) requirements

The SRA should confirm that licensees are prepared and qualified to use nuclear material in a safe and secure manner, in accordance with the provisions of the licence. The licence should require the licensee to report information to the SRA, e.g. any receipt and shipment of nuclear material to another location in the State, any significant changes to the location, and any possible loss or theft of nuclear material.

> To ensure that licensed holders of nuclear material are complying with their licence conditions, including those related to accounting for and controlling nuclear material, the SRA should periodically audit/inspect LOFs, mines and concentration plants, to review their records, check their inventories and ensure they are prepared to facilitate IAEA access.

Audit activities are necessary for controlling the use of nuclear material and will help to identify errors and correct them. Audits also provide an opportunity for constructive communication between the SRA and the licensee. In order to ensure that licensees are complying with the regulatory requirements and providing correct and complete information, the SRA should:

- update licence conditions to be consistent with national and international law, as necessary;
- examine the licence (or permit) applications and determine if the applicant will be capable to perform the required tracking, control and reporting functions, and meet all requirements to be further stipulated in the licence;

- conduct periodic inspections of licensees to verify that the licensee is:
    - following approved procedures and effectively accounting for and controlling nuclear material in its possession,
    - submitting complete and correct reports to the SRA,
    - meeting the requirements established by the SRA,
    - not having unreported nuclear material and not carrying out prohibited activities;
- collect and analyze information and coordinate with other governmental bodies to identify all nuclear material in the State which is subject to safeguards, and identify nuclear fuel cycle-related activities which should be declared pursuant to the State's additional protocol; and
- define quality control requirements for licensees.

If an SRA finds a situation of non-compliance with its regulatory requirements, it should undertake enforcement actions as authorized by the State legislation. Such actions might include levying a fine, suspending the licence and/or operations at the LOF, or making arrests in cases of serious violations. Violations related to safeguards might include failure to report information to the SRA, providing false or misleading information, obstructing access of the SRA or IAEA inspectors, or refusing to make documentation available for audit or inspection.

5.5 Enhancing the capabilities of the SRA

The SRA may wish to request assistance from the IAEA to enhance its nuclear regulatory and safeguards capabilities, by requesting training, equipment and participation in regional workshops or other activities related to nuclear control and security. As a first step, the SRA should establish communications with the safeguards Country Officer at the IAEA for the State. The Country Officer is the individual primarily responsible for interactions with the State on safeguards matters, and may assist the SRA upon request. The SRA can request contact information for the State's Country Officer by sending an email to official.mail@iaea.org.

> The IAEA offers several kinds of assistance, including technical assistance, advisory service missions, training courses and software tools.

Member States of the IAEA can request technical assistance, following a structured process. Appendix 7 provides an example of a project proposal that could be submitted to the IAEA's Department of Technical Cooperation (TC), and describes the process for submitting such a proposal.

States may request advisory service missions in many areas including safeguards, legal framework, safety and security. IAEA SSAC Advisory Service (ISSAS) missions provide assistance in strengthening the SSAC and the implementation of safeguards. Legislative assistance can be requested addressing the legal aspects of nuclear control. International Nuclear Security Advisory Service (INSServ) missions review both overall and specific needs of States to provide protection against illicit trafficking and to control and secure radioactive sources as well as nuclear material.

The Regulatory Authority Information System (RAIS) is a software application developed by the IAEA to assist States in managing their regulatory activities in accordance with IAEA safety standards. It promotes a consistent approach to regulatory control of radiation sources which offering the flexibility to meet specific needs of States' legislative, institutional and regulatory frameworks. It may be useful for regulatory control of nuclear material in the State as well as radioactive sources. RAIS is described at the following IAEA webpage: http://www-ns.iaea.org/tech-areas/regulatory-infrastructure/rais.asp?s=3&l=92. Copies of the software can be requested by writing an email message to radiation.sources@iaea.org.

A State may wish to participate in a regional training course on IAEA safeguards, or request a training course specifically addressing its training needs (although these are exceptional due to costs). Requests for assistance or training should be sent to the Country Officer, or to official.mail@iaea.org. Guidance documents, forms, templates and many other publications and resources are available on the *Assistance for States* web page at http://www.iaea.org/Safeguards.

6. NUCLEAR MATERIAL REPORTING

Appendix 1 describes common uses of nuclear material in industrial, medical and research applications. This section explains reporting obligations associated with nuclear material. States are required to submit reports regarding imports and exports as well as nuclear material inventories (inventory information is required only from States with a ModSQP). States with an additional protocol are also required, among other things, to submit information regarding nuclear material.

6.1 What is nuclear material subject to safeguards

To locate nuclear material in the State and report it to the IAEA, it is necessary first to understand the definition of nuclear material under a CSA and additional protocol. **Only three chemical elements are included in the definition of nuclear material — uranium, plutonium and thorium**[9]. Elements like cobalt and caesium that have radioactive isotopes and are important to control[10], are not included in the definition of nuclear material. Figure 4 shows the elemental information for each of the three elements which are defined as nuclear material.

FIG. 4. Elemental information on uranium, plutonium and thorium (Images courtesy of © 2012 periodictable.com).

[9] The definition of nuclear material may change if so determined by the Board of Governors, but any determination by the Board under Article XX of the Statute after the entry into force of a State's safeguards agreement which adds to the materials considered to be source material or special fissionable material shall have effect under the agreement only upon acceptance of the State.

[10] For guidance regarding control and registry of radioactive sources, please see IAEA/CODEOC/2004, *Code of Conduct on the Safety and Security of Radioactive Sources* and other documents in this series, as well as the nuclear safety standards, all of which can be found at www.iaea.org.

Nuclear material as defined in Article XX of the IAEA Statute [10]. The term source material does not apply to ore or ore residue. The definitions of *special fissionable material* and *source material* are provided below.

"The term ***'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 Board of Governors shall from time to time determine; but the term 'special fissionable material' does not include source material."

"The term ***'source material'*** means uranium containing the mixture of isotopes occurring in nature (e.g. 99.3% uranium-238, 0.7% uranium-235); uranium depleted in the 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 other such material as the Board of Governors shall from time to time determine."

States with a ModSQP are required to submit to the IAEA an initial report on nuclear material inventory, as described in Section 6.2. This report is due to the IAEA within 30 days after the end of the month in which the State brings into force the ModSQP.

6.2 Initial report on nuclear material

All nuclear material which meets the conditions of **paragraph 34(c)** of INFCIRC/153 (Corr.) must be included in the initial report on nuclear material (also called the initial report). This paragraph provides that, "*When any nuclear material of a composition and purity suitable for fuel fabrication or for being isotopically enriched leaves the plant or the process stage in which it has been produced, or when such nuclear material, or any other nuclear material produced at a later stage in the nuclear fuel cycle, is imported into the State, the nuclear material shall become subject to the other safeguards procedures specified in the Agreement.*"

This Guide refers to nuclear material which must be included in the initial report as '34(c)' nuclear material (referring to paragraph 34(c) of INFCIRC/153 Corr.). Any material containing uranium or thorium that has not reached the stage described in paragraph 34(c) of INFCIRC/153 (Corr.) is referred to in this Guide as 'pre-34(c)' material. These are not intended as legal terms, but are used for the purpose of this Guide. Depleted uranium, plutonium and enriched uranium are 34(c) nuclear material, regardless of form, purity, use or quantity. Ore and ore deposits are not 34(c) nuclear material.

The SRA should make all reasonable efforts to identify and locate all nuclear material in the State. Nuclear material in SQP States is often used in medical, industrial, academic and research applications.

The IAEA has developed a reporting form which should be used to prepare and submit the initial report. Use of this form by SQP States helps to ensure that the information is reported in a simple, straightforward and organized way. It also follows the format of the *physical inventory* listing (PIL) report which facilitates the analysis of the information at the IAEA.

Appendix 2 contains a blank initial report form, instructions for filling out the form, hypothetical scenarios of situations that might be found in an SQP State in medical, industrial and research locations, and completed reports based on the scenarios.

One of the most common uses of 34(c) material in SQP States is the use of depleted uranium as radiation shielding in containers or instruments that contain high-activity radioactive sources. Therefore, the SRA could use its **radioactive source registry** to begin identifying locations which use high-activity sources (such as Co-60) as they may also have depleted uranium shielding.

Equipment that is imported and that contains depleted uranium should be accompanied by certification or documentation that specifies the quantity, composition, form and number of items that contain nuclear material, such as collimators or source removal/replacement machines. Containers with depleted uranium shielding should also be labelled with the quantity of depleted uranium indicated either on the label or on the documentation that accompanied the container. The shipper’s address and contact information should also be indicated on the document or certificate, and the SRA can contact the shipper for additional information regarding the nuclear material as necessary.

Appendix 1 provides information about common applications of nuclear material in each sector and a list of various equipment models in medical and industrial applications and the quantity of depleted uranium shielding in each instrument, based on manufacturer specifications. This information is provided to help the SRA to locate, control and report all nuclear material in the State.

6.3 Submitting the initial report

The initial report is to be prepared by the SRA on the basis of information received from licensees/operators. To the extent possible, the SRA should ensure the quality of the information by evaluating its correctness and completeness before submitting it to the IAEA. The initial report may be submitted to the IAEA via diplomatic pouch, encrypted email, fax or registered mail by post. Refer to Appendix 2 for detailed instructions on filling in the initial report, as well as several examples of reports that have been completed using hypothetical scenarios.

6.4 Updating information on nuclear material inventory and LOFs

After the initial report on nuclear material is submitted, the IAEA establishes a *book inventory* for the State. Over time, nuclear material in the State might be exported or imported, or transferred from one location to another, or used up or discarded as waste from a manufacturing process, or discovered. Each of these events causes a change (an increase or a decrease or a change in location) in the inventory of nuclear material in the State. The State should inform the IAEA of changes to the inventory so that the IAEA’s information accurately reflects the situation in the State. The SRA should provide updated information at least annually; however, if no changes have occurred, no updates to the report on nuclear material need to be submitted under the safeguards agreement[11].

[11] There are requirements for providing updates to information pursuant to an additional protocol, even if the update declares “no change”. This is addressed in Section 8.

SQP States provide updated information in two different kinds of nuclear material reports, as described below.

1) Updated information on the **nuclear material inventory** is submitted using the same form as was used for the initial report. This form (report on nuclear material) is used to report changes to the inventory at LOFs, and also to provide information about any new nuclear material identified in the State.
2) An annual report (or more frequent, as preferred) on **exports and imports** of nuclear material is to be provided to the IAEA. This is discussed in Section 6.6.

The IAEA may send a 'book inventory letter' to the State, informing the State about what the IAEA has in its records as the State's inventory of nuclear material. If the SRA notices an inaccuracy in the IAEA's book inventory, it should respond to the IAEA and provide information to correct the inaccuracy. The IAEA will then respond with the corrected book inventory letter.

It is common for nuclear material to be discovered after a State has submitted its initial report. The discovery should be reported to the IAEA in an updated report. The discovery of material may occur at an existing LOF, in which case a line will be added to the initial report, and the comment could be, for example, 'item discovered during laboratory clean out'.

If nuclear material is discovered at a location not previously reported, then a new form should be submitted describing the location (as was done for the initial report on nuclear material) and a comment should be provided that the nuclear material at the previously unreported location was discovered.

Appendix 2 includes a hypothetical scenario at a LOF where nuclear material was received, introduced into a process, and exported, over the course of a year. Instructions and a completed form are provided to show how each change to the inventory is reported to the IAEA.

6.5 Requesting exemption from safeguards (only for States with a modified SQP)

States with a ModSQP have the right to request that nuclear material that was previously reported to the IAEA in an initial report or subsequent reports be exempted from safeguards, pursuant to paragraphs 36 and 37 of INFCIRC/153 (Corr.).

Exemption may be requested for nuclear material that is either a small quantity (less than one effective kilogram), or that is used for a non-nuclear purpose (such as a counterweight in a crane, or shielding in a container).

If a State with a ModSQP wishes to request exemption, it should send a letter to the IAEA requesting exemption based on either paragraph 36(b) (use) or 37 (quantity) for a specific quantity of nuclear material, referencing the report on nuclear material, and the specific items for which exemption is requested. The IAEA will consider the request and inform the State as to whether it granted or did not grant the exemption. If the exemption is granted, the State must continue to control the material and monitor its use and location. If the exempted material is to be processed or stored together with non-exempted material, or if it is to be exported outside of the State, the SRA must arrange for the re-application of safeguards to that material. In such cases, the SRA must send a letter to the IAEA requesting de-exemption of the relevant items.

Reporting is not normally required for exempted nuclear material that is temporarily transferred out of a State if it is in transit and does not change ownership (such as depleted uranium in shielding in a shipping container). A letter clarifying reporting requirements related to exports of exempted material was sent to States in July 2000 [11]. Pursuant to Article 2.a.(vii)(a) of an additional protocol, the State must provide to the IAEA information regarding the quantities, uses and locations of nuclear material exempted from safeguards pursuant to paragraph 37 of INFCIRC/153 (Corr.). This is discussed in Section 8.

6.6 Providing information regarding exports and imports of pre-34(c) material and 34(c) nuclear material

All SQP States (with the original or modified text) have reporting obligations associated with imports and exports of 34(c) nuclear material, and imports and exports of any material containing uranium or thorium that has not reached the stage described in Paragraph 34(c) of INFCIRC/153 (Corr.) (pre-34(c) material). The reporting requirements for pre-34(c) material depend on whether the import or export is for 'specifically non-nuclear purpose'.

Nuclear purpose refers to those applications of nuclear material (thorium, uranium and plutonium) that use the nuclear characteristics of the material, such as uranium in fuel for a research reactor. Use of nuclear material in radioactive sources is considered a nuclear purpose.

Non-nuclear purpose refers to those applications of nuclear material that use non-nuclear characteristics such as its chemical and physical properties (chemical reactivity, density, mass, mechanical strength). Nuclear material in a non-nuclear purpose includes depleted uranium used as shielding, thorium in lantern mantles or smoke detectors, uranium in ceramics, and thorium contained as an alloying element in a magnesium-thorium alloy aircraft component.

Under a CSA, all SQP States must report:

- All exports and imports of 34(c) nuclear material regardless of the end purpose;
- All exports of pre-34(c) material directly or indirectly to a NNWS, unless exported specifically for non-nuclear purposes; and
- All imports of pre-34(c) material, unless imported specifically for non-nuclear purposes.

The IAEA has designed a form to be used for reporting exports and imports of nuclear material. Using this form ensures that the IAEA receives all the necessary information to allow it to accurately match exports with imports. An SQP State should submit a consolidated report once a year on exports and imports or pre-34(c) material and 34(c) nuclear material that occurred during that year. However, the IAEA prefers that SQP States report exports and imports more frequently (e.g. within 30 days after the transfer occurred) so that the IAEA can match the export of the shipping State with the import of the receiving State. These reporting obligations are summarized in Table 2.

The form for reporting exports and imports, instructions for its use and completed forms using a hypothetical scenario are provided in Appendix 3.

TABLE 2. SUMMARY OF REPORTING OBLIGATIONS RELATED TO EXPORTS AND IMPORTS UNDER A CSA

	Pre-34(c) material	34(c) nuclear material
Exports	All exports to any NNWS, unless exported specifically for non-nuclear purposes	All exports to any State
Imports	All imports from any State, unless imported specifically for non-nuclear purposes	All imports from any State
How Often	Annual (or more frequent) report of exports/imports under a CSA (form provided in Appendix 3)	Annual (or more frequent) report of exports/imports under a CSA (form provided in Appendix 3)

Under a CSA, SQP States are not obligated to report exports of pre-34(c) material to nuclear-weapon States party to the NPT (NWS)[12]. However, the IAEA prefers and appreciates such reporting to facilitate the matching of imports and exports. SQP States are requested to report such exports and imports using the form in Appendix 3.

Under an additional protocol, exports and imports of pre-34(c) source material for specifically 'non-nuclear purposes' must be declared to the IAEA under Article 2.a.(vi). Exports are to be declared under Article 2.a.(vi)(b) when quantities exceed ten metric tons of uranium and twenty metric tons of thorium (either in one shipment or in successive shipments to the same State over the course of a calendar year). Imports are to be declared under Article 2.a.(vi)(c) when one import exceeds ten metric tons of uranium or twenty metric tons of thorium, or if a series of imports over one calendar year exceed those limits. If a State has nothing to declare under Article 2.a.(vi) of the additional protocol, a declaration must be submitted stating, 'nothing to declare'.

When an SQP State carries out uranium mining, it may have frequent exports of uranium ore or uranium ore concentrate. The next chapter discusses safeguards activities associated with mining and the concentration of uranium[13], and suggests some methods to help ensure that complete and correct information is provided by the mining operator to the SRA with sufficient time for the SRA to validate, format and send it to the IAEA.

6.7 Design information

All SQP States are required to notify the IAEA regarding the design of nuclear facilities. States with an original SQP must provide design information at least 180 days before introducing nuclear material into a facility. States with a ModSQP must notify the IAEA when a decision is made to construct or to authorize construction of a nuclear facility, and must provide early design information regarding the planned facility. Design information is

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[12] unless the SQP State participates in the voluntary reporting scheme (described in SS21 Section 3.1, pages 10-11)

[13] All safeguards activities described for uranium also apply to thorium if a State is extracting and concentrating thorium for use or export.

submitted using a 'Design Information Questionnaire' (DIQ)[14]. When a State with a ModSQP notifies the IAEA of its decision to construct or authorize construction, the SQP becomes non-operational. This process is described in more detail in Section 13.

Early design information about a planned facility may at first be very general information such as its purpose and characteristics. For example, if the State plans to acquire a research reactor, the early design information could read, '1–5 MW(th) research reactor, low enriched uranium fuel, pool type, to be built at the State University to support a nuclear engineering programme and to conduct research. Vendor and detailed specifications are currently unknown, but bids have been requested.' As more details become known, the DIQ is updated to reflect the additional information. Design information about a facility that is already under construction will be very detailed.

7. SAFEGUARDS ACTIVITIES ASSOCIATED WITH URANIUM MINES AND URANIUM OR THORIUM CONCENTRATION PLANTS

Several SQP States have significant uranium deposits and are extracting uranium in ore, milling the ore, concentrating the uranium and exporting the product, called uranium ore concentrate or UOC.

7.1 Overview of uranium mining and milling

Methods of uranium extraction from ore include open pit (shown in Figure 7), underground and in-situ leaching. The waste material from mines may also be further processed to extract additional uranium, which is called 'tails reworking'. Uranium can also be extracted as a by-product of mining other materials.

FIG. 7. Example of an open pit mine
(IAEA Image 0410135; Photographer Peter Waggit).

Any method which is used to extract uranium should be included for the purpose of declaring uranium production to the IAEA pursuant to an additional protocol (discussed below). These include:

[14] A DIQ template can be found at the IAEA's *Resources for States* webpage.

- by-product extraction of uranium from other types of minerals, including phosphate, gold and copper ores;
- extraction from tails from other mines or mills, such as tantalum, monazite or copper;
- uranium extraction from a water treatment plant.

Extraction of uranium from a water treatment plant may produce a few tonnes of uranium concentrate per year, while large concentration plants may produce 10,000 tonnes per year. The purity of the concentrate can also vary significantly, from 45% uranium to over 85% uranium.

Two primary methods are used to extract uranium from ore: acid and alkaline leach. Figure 8 shows one example of the steps taken to produce uranium ore concentrate from uranium ore using an acid leach process.

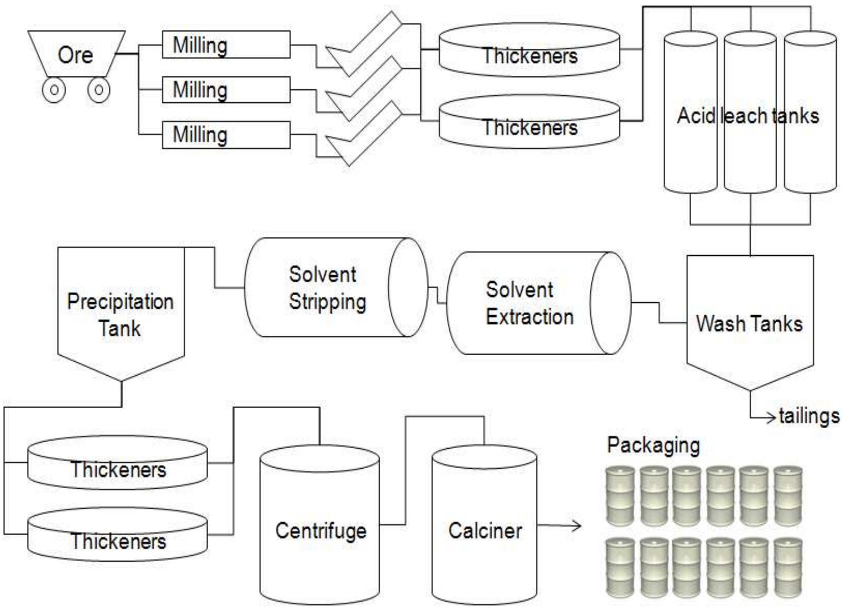


FIG. 8. Example of an acid leach concentration process.

7.2 Safeguards activities associated with uranium mining and uranium or thorium concentration

The reporting obligations under a CSA and an additional protocol which pertain to exports and imports were described in Section 6.6. There are a few other safeguards activities related to uranium and thorium mining and concentration. Pursuant to Article 2.a.(v) of an additional protocol, SQP States are required to declare information regarding the estimated production capacity and annual throughput of uranium mines and uranium and thorium concentration plants. Additionally, the current annual production in the State as a whole must be declared. Upon request from the IAEA, the State must also provide information on the current annual production of an individual mine or concentration plant. The IAEA may request to conduct a complementary access at a uranium mine or concentration plant, so the SRA needs to ensure that the operator is prepared to facilitate IAEA inspectors' access, as necessary.

Article 2.a.(vi)(a) of the additional protocol also requires the declaration of quantities, chemical composition, location and use or intended use of source material (which includes uranium or thorium ore concentrate) which has not reached the composition and purity suitable for fuel fabrication or for being isotopically enriched, for each location at which the material is present in quantities exceeding ten metric tons of uranium and/or twenty metric tons of thorium, and for locations with quantities more than one metric ton if the aggregate for the State as a whole exceeds those amounts. This material must be reported whether it is in nuclear or non-nuclear use (but not yet in a non-nuclear end-use form).

The due dates for submission of additional protocol declarations are provided on the *Assistance for States* webpage.

7.3 Determining whether uranium or thorium ore concentrate is 34(c) nuclear material

If the concentration operations in an SQP State produce uranium or thorium ore concentrate which is "of a composition and purity suitable for fuel fabrication or for being isotopically enriched" the product is 34(c) nuclear material. If the State's inventory of 34(c) nuclear material exceeds the limits stated in paragraph 37 of INFCIRC/153 (Corr.) then the SQP becomes non-operational, as described in Section 13. The State may determine that UOC or thorium concentrate produced in the State is suitable for fuel fabrication or isotopic enrichment, in which case the State should notify the IAEA. Determination of suitability for use in fuel fabrication or enrichment should involve cooperation and communication between the SRA and the IAEA.

7.4 Collecting and reporting information related to mining and concentration

The SRA must establish a mechanism to obtain the information it needs for reporting to the IAEA. Mineral resources are typically owned by the State and exploration and mining are subject to notification or licensing. Uranium mines and concentration plants may be licensed and controlled by the same Government entity responsible for other mines, such as gold, copper or rare earths. The SRA would need to establish a coordination mechanism for participating in the licensing process for new uranium mines or mines with uranium or thorium by-products in order to ensure that the safeguards requirements are addressed in the licence conditions. The export control regulations should also require that the SRA be notified prior to exporting uranium and thorium-bearing material.

As a minimum requirement, the SRA should maintain records regarding the production capacities and annual production of uranium mines and uranium and thorium concentration plants, stocks of the products and the relevant export and import information.

> To meet the State's reporting obligations, operators of uranium mines and uranium or thorium concentration plants should submit reports to the SRA in a timely manner to allow the SRA to validate the operator's information, and then submit the information to the IAEA on time and in the correct format.

8. ADDITIONAL PROTOCOL DECLARATIONS

In addition to the additional protocol declarations described earlier regarding uranium mines, uranium or thorium concentration plants and exports and imports, States with an additional protocol need to prepare and submit declarations regarding other activities and plans. Most SQP States will not have lengthy additional protocol declarations, but every effort should be made to ensure that the declarations are complete and correct. This Guide offers information on aspects of declarations that are most relevant to SQP States and does not address all obligations pursuant to an additional protocol. Complete guidance is provided in IAEA Services Series 11, *Guidelines on the Preparation and Submission of Declarations Pursuant to Articles 2 and 3 of the Model Protocol Additional to Safeguards Agreements* [12], and is not repeated here.

8.1 Coherence of declarations and reports

The information provided in CSA reports and additional protocol declarations complement each other, as was shown in Figure 2. SQP States with an additional protocol need to prepare and submit the additional protocol declarations as well as the reports required under a CSA. Each declaration or report should be prepared using the correct form/format. This helps the IAEA to record the information in the appropriate IAEA database.

> The initial report on nuclear material under a CSA and the initial declarations under an additional protocol should be submitted separately. However, the information contained in them should be complementary and consistent.

The IAEA will evaluate the consistency of the information in reports submitted under a CSA and declarations submitted under an additional protocol, and will request clarification from the State if the information appears to be inconsistent or incomplete. To avoid repeated requests for clarification, it is helpful if the SRA checks that the reports and declarations are correct, complete and consistent with one another prior to submitting them. Examples are provided below of common situations requiring a consistency check.

8.2 Ten-year nuclear development plans

The declaration on a State's ten-year nuclear development plans made under Article 2.a.(x) of the additional protocol should inform the IAEA about all official nuclear development plans, including exploration of uranium deposits, the schedule for preparing and operating a new uranium or thorium mine, extraction of uranium or thorium as by-products from any other kind of mine or process, and any plans to acquire a nuclear facility.

With respect to exploration, mining and extraction, the following factors should be considered when preparing the declaration:

- Article 2.a.(x) declarations provide information on possible developments over a ten year period to assist with long term planning and are assessed in relation to other activities in the State.
- There may be a large number of exploration projects in a country.
- Mining-related activities may commence ahead of a decision on mine development.
- Once a feasibility study commences, the likelihood of a deposit being mined increases.
- The time to develop a mine once a decision to proceed is made can be as short as 12 months but is usually less than three years.

It is suggested, therefore, that declarations of uranium or thorium exploration and mining activities be made as follows.

- If there is any uranium or thorium exploration in a State at a stage following the issuance of an exploration licence, but prior to feasibility studies (this could include among other things: prospecting, remote sensing work, sampling, gravity surveys, exploration drilling and resource drilling), the State should include an entry to the effect that ‘uranium (or thorium) exploration activities are being conducted at the following locations (insert a list of the projects or the regions where projects are located) which, if successful, could lead to uranium (or thorium) mining in the future’. Only one entry would be made regardless of the number of such projects in the State.

- Following the commencement of a feasibility study (including: pre-feasibility, metallurgical testing, bankable feasibility, environmental assessments, mining licence application, design work and construction), an individual entry for the project should be included in the Article 2.a.(x) declaration.
- If a project is cancelled, it should be stated in the Article 2.a.(x) declaration.
- Once a uranium or thorium mine becomes operational, it should be declared under Article 2.a.(v) and an entry in the Article 2.a.(x) declaration should note that the mine is now operational and all future declarations regarding the mine will be made under Article 2.a.(v). Once reporting under Article 2.a.(v) has begun, the mine should no longer be reported under Article 2.a.(x).

With regard to nuclear development plans involving construction of a nuclear facility, the 2.a.(x) declaration should indicate the type of facility (e.g. pool-type research reactor), the time frame (e.g. operational in 12 years) and the intended purpose of the facility (e.g. a university plans to acquire a research reactor for conducting physics experiments and producing medical isotopes). Official plans to develop nuclear fuel-cycle related research and development should also be declared under Article 2.a.(x), such as plans to acquire a sub-critical assembly for physics research, or to develop a nuclear physics graduate programme.

8.3 Site declarations pursuant to Article 2.a.(iii) of an additional protocol

Article 2.a.(iii) of an additional protocol requires that the State declare information about all ‘sites’ (defined in Article 18.b of the additional protocol) in the State. Such site declarations should be provided for every LOF in the State. Therefore, every LOF that is described in a State’s initial report on nuclear material should also be included in the State’s Article 2.a.(iii) declarations. However, no site declaration needs to be provided in respect of a LOF which only contains nuclear material exempted from safeguards. The SS21 and the Guidelines [12] provide detailed information about preparing site declarations, which means providing a general description of each building on each site.

For LOFs such as a hospital or an oil exploration company, the site boundary could be the room(s) in which the nuclear material is stored and used. The entire hospital or building does not need to be included. A building description includes the use and general contents of the building, the approximate size (area of the floor and number of floors) and a map or diagram of the site showing where each building is located. For all LOFs, whether operating or shut down, the State should provide an associated site declaration. If a State with an original SQP has a shut-down facility, it must submit a site declaration for that facility.

To facilitate the provision of a map or diagram of the site, the SRA may wish to include a requirement in the nuclear material use licence that the operator must provide a diagram of the site to the SRA, including all associated buildings and a description of their purpose and their floor plans. An example is shown in Figure 9.

FIG. 9. Example of a site map using artificial information.

8.4 Annexes I and II of an additional protocol

Declarations are required (annually) regarding manufacturing of certain types of nuclear fuel cycle-related equipment and technology as described in Annex I of an additional protocol. Declarations are also required (quarterly) regarding exports of nuclear fuel cycle equipment and non-nuclear material as described in Annex II of an additional protocol.

Most SQP States do not carry out activities in these areas. However, it is recommended that the SRA develop and maintain awareness of activities in the State that may need to be declared, through coordination with a relevant ministry, such as science and technology, to identify licensed entities that might carry out such activities. Some activities and items listed in Annex I and II of INFCIRC/540 (Corr.) may be relevant in SQP States with advanced industrial capabilities. These include the manufacture of nuclear grade graphite, heavy water or deuterium and the construction of hot cells, all of which could be used in non-nuclear applications, such as medical isotope production, magnetic resonance research, and organic chemistry processes. It is important for the SRA to ensure that companies engaged in these kinds of activities do not export equipment without the knowledge of the State.

SRAs should also communicate with the Government authority responsible for controlling exports and imports, and for licensing relevant industrial activities, to request notification about licence applications for activities that would need to be reported to the IAEA, such as exports and imports of pre-34(c) material, 34(c) nuclear material and items listed in Annex II of an additional protocol.

8.5 Conducting outreach on additional protocol reporting

An SRA in a State with an additional protocol should reach out to organizations carrying out activities that may need to be declared under an additional protocol, including nuclear fuel cycle-related research and development not involving nuclear material, manufacturing of certain types of equipment, and export or import of certain equipment and non-nuclear material. This outreach can be challenging because of the broad possibilities that exist in a State for such activities, and because those activities may not require a licence, unlike the use of nuclear material, which should require a licence (or permit). Also, such activities may be funded or supported by an organization within or outside of the State, and may involve people who are unaware that such activities may have a regulatory aspect.

The SRA may find it helpful to discuss outreach first with other relevant offices of the government, which may have communication mechanisms in place that could be useful to the SRA. Industry groups, professional societies or business networks may also provide useful mechanisms for communication.

8.6 Software tools to help prepare and submit additional protocol declarations

The IAEA offers software to assist States in preparing additional protocol declarations. The software is called *Protocol Reporter*. The software and detailed instructions regarding downloading and installing it, and using it to prepare additional protocol declarations, are provided on the *Assistance for States* webpage. If issues with the software are encountered during installation or use, please request assistance by sending an email to official.mail@iaea.org. In addition to tools developed by the IAEA, a number of Member States also provide assistance to help States in implementing their safeguards agreements and additional protocols. For example, a software tool called *Additional Protocol Declaration Helper* is available to States to help them in identifying activities which should be included in an additional protocol declaration.

Protocol Reporter and ***Additional Protocol Declaration Helper*** software can be accessed at the *Assistance for States* webpage, where instructions on their use can also be found.

9. RESPONDING TO IAEA COMMUNICATIONS

IAEA communications are sent via formal communications channels. Sometimes the letters are sent to the State's Mission to the IAEA or Embassy in Vienna, Geneva or New York, and sometimes the formal communications channel is with the State's Foreign Ministry in its capital with a copy sent to a Mission or Embassy. The SRA should be familiar with the State's particular formal communication channel.

Working level communications are sent to the SRA point of contact. At the request of the SRA point of contact, copies of formal communications can be sent to the SRA, which is a good practice to avoid delays associated with multiple transmittals of information.

One of the most important responsibilities of the SRA is to respond in a timely manner to IAEA communications.

The two tables below provide examples of safeguards-related communications sent by the IAEA to States.

Table 3 contains communications which typically require a response from the State and Table 4 contains communications which typically convey information to the State and do not require a response.

TABLE 3. IAEA COMMUNICATIONS THAT TYPICALLY REQUIRE A RESPONSE FROM THE STATE

Issue	Purpose	Response and Timing
Inspector designation	Request a State to accept designation of Agency inspectors for that State	States without an AP must respond to the IAEA within 30 days, accepting the designation (or rejecting it in 90 days or less, although this should be an infrequent response) States with an AP are assumed to accept a designation unless the IAEA is notified in 90 days or less regarding a rejection
Request for visa	Request a multiple entry/exit/transit visa for designated inspectors (*this letter normally goes to the State's Mission or Embassy in Vienna; a letter goes to the Foreign Ministry of the State if the visa is not received on time*)	Issue multiple entry/exit visas valid for at least one year, "as soon as possible" (CSA) or "within 30 days of request" (additional protocol)
Reminder letter	Remind a State of an obligation which has not been met, such as overdue initial inventory report or additional protocol declaration	Acknowledge receipt of the letter as soon as possible, and respond with information about the obligation (e.g. when it will be submitted), or submit the report or declaration in question
Request	Request a State to undertake an action, such as correcting an error in a report, facilitating the receipt of IAEA equipment, or nominating a person to participate in a training course.	Respond to the letter as soon as possible and take action to fulfil the request
Request for amplification or clarification (CSA)	Request amplification or clarification about the content of a State's report	Respond to the request in a timely manner, providing the additional information (States with Subsidiary Arrangements must respond within the time period defined therein)
Import/export notifications	Notify a State regarding any exports or imports which were not reported by the other	Inform the IAEA of any errors or omissions in the report of exports or imports as soon as possible

Issue	Purpose	Response and Timing
	party	
(Semi-annual) book inventory (CSA)	Notify a State of the book inventory on record at the IAEA for nuclear material in the State	Respond as soon as possible if the IAEA's book inventory does not match the book inventory maintained by the SRA; inform the IAEA of specific differences
Notification of an inspection (CSA)	Notify a State of an inspection, providing the inspectors' names, and the location where the inspection will be carried out, and the date and time	Acknowledge receipt of the letter (by email and/or fax) and take action to facilitate the inspection (notify the LOF operator, arrange logistics as necessary)
2.c. letter (additional protocol)	Request amplification or clarification about content of an additional protocol declaration	Respond in a timely manner, providing the additional information
4.d. letter (additional protocol)	Provide the State with an opportunity to clarify and facilitate resolution of a question or inconsistency identified by the IAEA	Respond in a timely manner with information to facilitate resolution of the question or inconsistency
Complementary access letter (additional protocol) 4.b.(i) (24 hour notice) 4.b.(ii) (2 hour notice)	Notify the State regarding complementary access at a location and specify the reasons for the access and the activities to be carried out.	Acknowledge receipt, notify the relevant contact points in the State, and facilitate the access (respond in time to assure the access is not delayed)

TABLE 4. IAEA COMMUNICATIONS THAT TYPICALLY DO NOT REQUIRE A RESPONSE FROM THE STATE

Issue	Purpose	No response is typically required
90(a) statement (CSA)	Notify a State about the *results* of an inspection (one letter is sent for each location inspected)	Notification only
90(b) statement (CSA)	Notify the State about the *conclusion* the Agency has drawn from its verification activities in the State	Notification only
10.a. letter (additional protocol)	Inform the State about the *activities* carried out during complementary access	Notification only
10.b. letter (additional protocol)	Inform the State about the *results* of activities in respect to a question or inconsistency the IAEA has brought to the attention of the State	Notification only
10.c. letter (additional protocol)	Inform the State about the *conclusions* the IAEA has drawn from its activities under an additional protocol (annually)	Notification only

All SQP States are encouraged and welcomed to communicate with the IAEA at any time regarding any matter related to safeguards. Effective safeguards implementation requires communication and cooperation between the IAEA and the State. If the email address of the appropriate IAEA Country Officer is not known, emails can be sent to official.mail@iaea.org and the message will be forwarded to the appropriate staff member or section.

10. FACILITATING IAEA ACCESS IN THE STATE

The IAEA may request access to a location in a State with a ModSQP or additional protocol to perform inspections, either ad hoc or special, or complementary access.

The SRA is responsible for coordinating with other Governmental bodies and with relevant operators and other organizations, as needed, to facilitate the IAEA's access and to ensure that inspectors can carry out all verification activities to meet the objectives of the inspection or access.

10.1 Supporting IAEA access for verification activities

Each time the IAEA visits a State, the SRA needs to ensure that technical and administrative activities are carried out as necessary to facilitate the IAEA's visit. States that have received equipment through the IAEA's Technical Cooperation (TC) programme may have developed procedures to facilitate the visits of staff from TC to confirm the use of equipment provided by TC.

Such equipment is often used in applications that require safety gear such as hard hats or safety glasses, and the movement through the building might need to be controlled to avoid unsafe areas. A similar approach can be taken to develop procedures to facilitate IAEA access for verification activities.

To ensure that the IAEA inspectors can effectively discharge their functions, the SRA should address the following areas:

- Respond to IAEA requests for designation of inspectors;
- Respond to IAEA requests regarding issuance of multiple entry/exit/transit visas;
- Acknowledge receipt of an IAEA notification of inspection or complementary access;
- Depending on the notification:
    - facilitate any IAEA requests regarding import of IAEA equipment;
    - work with the appropriate operator or other organization to arrange access for IAEA inspectors; and
    - arrange any requested or necessary technical or logistical support for carrying out the IAEA verification activities.

10.2 Technical support for IAEA access

When performing inspections or complementary access, IAEA inspectors carry out a variety of activities, such as confirming the presence of nuclear material, measuring quantities of nuclear material and examining records and reports. At a LOF, for example, inspectors may request to check the operator's supporting documentation showing the import of a piece of equipment containing depleted uranium which is included on the State's inventory. The inspector will confirm that the equipment is at the hospital and that the amount of depleted uranium is consistent with the amount reported by the State. Equipment such as teletherapy units are used to treat patients and will not always be immediately accessible. All operators should have procedures in place to respond in a timely manner to an IAEA request to physically see nuclear material in its inventory.

When an inspector is carrying out an inspection at a LOF in a State with an additional protocol, the inspector may request access with 2 hour notice to any location on the site of the LOF. The LOF operator should support the request by providing the inspector with a briefing on the activities carried out at the site, provide a site map and floor plans for each building, and be available to answer questions the inspector may have.

During complementary access, inspectors might carry out *location-specific environmental sampling* (wiping a cotton cloth over various surfaces), and examine safeguards-relevant production and shipping records, among other things. For each swipe sample taken by the IAEA, an archive will be provided to the SRA. Archive swipes should be stored at the SRA's office for a period of at least one to two years, as they are used in case an issue arises with the analytical results or for independent measurement by the State. They can be stored in a file cabinet or other office storage location; they do not require a special container.

FIG. 10. Environmental swipe sample collection kit.

Another example that may be applicable to SQP States is the examination of records relevant to quantities, origin and disposition of material at mines and concentration plants. The SRA should communicate with mine operators and LOF licensees and other organizations as necessary to ensure that they can make shipping, production and laboratory records available to inspectors, provide briefings and floor plans, and generally support activities carried out during ad hoc inspections and complementary access.

10.3 Administrative support for IAEA access

The SRA may need to coordinate with other authorities (immigration office, ministry of internal affairs, national security agencies) to ensure that the appropriate immigration legislation and procedures are in place to support provision of multiple entry/exit/transit travel visas to inspectors in a timely manner. Coordination is also sometimes necessary to facilitate the inspectors bringing IAEA equipment into the State, and to ensure that the equipment clears customs and is exempted from taxes or duties. IAEA equipment is typically sealed, and must be protected from tampering or removal of the seal by security or customs officials. The IAEA's inspectors and its equipment must be granted privileges and immunities from such searches and seizures.

A simple arrangement preferred by the IAEA — and accepted by many States — is not to require a visa for the holder of a United Nations 'Laissez Passer'. All IAEA inspectors hold Laissez Passers. This simplifies matters for both the State and the IAEA. The State should inform the IAEA if holders of a Laissez Passer require a visa or not.

If the State requires IAEA inspectors to obtain a visa, the SRA may need to involve the relevant State authorities when responding to IAEA requests for designation. Visa requests are submitted by the IAEA to the Vienna-based Embassy (Mission or Consulate) of the State, as appropriate, or to a New York-based Mission to the United Nations, as an alternative. Therefore, the relevant procedures should be established at the appropriate Mission or Embassy, and the SRA should be familiar with those procedures and protocols. It is helpful for the SRA to inform the IAEA which designated Mission or Embassy is responsible to issue visas for IAEA inspectors.

A CSA requires that visas be provided *as quickly as possible, where required,* for each inspector designated for the State. However, if an additional protocol is in force, the State must provide a multiple-entry/exit visa valid for at least one year to each designated inspector within one month after receiving a request from the IAEA.

11. LOSS OR SEIZURE OF NUCLEAR MATERIAL

If nuclear material is seized or lost in a State, it must be reported to the IAEA by the SRA immediately (within 72 hours or less) in a 'special report'. Seized nuclear material must be added to the inventory of the State immediately. A special report may be provided in the form of a letter.

The IAEA has established and maintains an *Incident and Trafficking Database* (ITDB) to track seizures of nuclear or other radioactive material. The IAEA encourages all States to participate in the ITDB. As a matter of good practice, States are encouraged to reference the 'special report' when submitting information to the ITDB so the IAEA knows that the events are connected. The SRA should ensure that border security and customs officials are aware to contact the SRA in case material is seized which contains uranium, plutonium or thorium. The SRA should also recommend procedures for storage, security, safety and notification, for the protection of citizens as well as the security of the seized material.

Communication between the IAEA and States participating in the ITDB is maintained through a network of national points of contact. The ITDB receives information from States on incidents ranging from illegal possession, attempted sale and smuggling, to unauthorized disposal of material and discovery of lost radioactive sources. The ITDB's scope covers all types of nuclear material as defined by the *Statute* of the IAEA (i.e. uranium, plutonium and thorium), naturally occurring and artificially produced radioisotopes and radioactively contaminated material such as scrap metal. States are also encouraged to report incidents involving scams or hoaxes where material is purported to be nuclear or otherwise radioactive.

States wishing to join the ITDB programme should contact the IAEA Office of Nuclear Security. See http://www.iaea.org/newscenter/focus/nuclearsecurity/ for more information.

12. SAFEGUARDS-RELATED ACTIVITIES OF OPERATORS OR LICENSEES

The SRA should communicate with licensees (any holder of a licence to possess or use nuclear material) regarding their safeguards responsibilities. The SRA contact information should be provided to every operator or other licensee. A website could be used to share information about safeguards obligations, or a brochure sent to all licensees (or permit holders). The SRA may meet with the persons or organizations, or request their attendance at a training workshop or meeting on safeguards. The communication approach may be designed to meet the needs of the licensees and the SRA.

12.1 Tracking the nuclear material inventory

Any licensee (or permit holder) should be required to report nuclear material inventory changes to the SRA so that those changes can then be reported to the IAEA, as applicable.

Inventory changes which involve the receipt, shipment, transfer or use of nuclear material should be in conformance with the licence specifications. For example, a licensee may be permitted to hold no more than a specified amount of nuclear material, and may be permitted to use a specified amount of nuclear material in its process throughout a year. Consumption of material above that limit would require prior approval by the SRA because it would be outside of the license specifications.

An export or import of equipment containing nuclear material should require advance notification to the SRA. The SRA should make it clear in the licence what actions require notification, permission in advance or a new license application. The SRA should periodically inspect the licensees to ensure that they remain in compliance with the licence. Certain events should also be required to be immediately reported to the SRA, such as the accidental loss of nuclear material.

12.2 Reporting LOF changes to the SRA

Changes can occur at a LOF which should be reported to the IAEA. These changes should be communicated in advance to the SRA so it can report to the change to the IAEA in a timely manner. For example, if the organization operating a LOF will change, the licence should be re-evaluated by the SRA and issued to the new organization. The SRA would then report the change to the IAEA by updating the relevant part of the State's report on nuclear material.

If a LOF is to change its physical location, this would also require advance notification to the SRA and updated information would have to be provided to the IAEA. If a LOF adds a new building or extends the size of a laboratory, this would be declared to the IAEA by the SRA in an updated site declaration for that LOF, pursuant to an additional protocol. The LOF operators should be aware that changes should be communicated to the SRA in a timely manner.

If a LOF is *closed down* but has not been *decommissioned*, the SRA must continue submitting the associated site declaration. The SRA may discontinue submitting site declarations only after the IAEA has confirmed the decommissioned status of the LOF.

12.3 Maintaining documentation

LOF operators should maintain records regarding the nuclear material they possess, such as shipping records, logs of movements of nuclear material and results of inventory taking of nuclear material. The documentation must be accessible for review by the SRA and by IAEA inspectors. The level and detail of the documentation will vary depending on the amount and characteristics of the nuclear material and its use.

12.4 Facilitating IAEA inspectors' access

IAEA inspectors may visit a LOF to carry out inspections or, if the State has an additional protocol, complementary access. The operator should have procedures in place defining how to prepare for an inspection or complementary access, and how to support the inspectors upon their arrival. The SRA may wish to test the procedures by working with the LOF operator to carry out a mock (simulated) inspection. The SRA may carry out the same kinds of activities that the IAEA inspectors would carry out to help the LOF operator work out any issues with their procedures in advance of the IAEA inspectors' arrival.

13. NON-OPERATIONAL SMALL QUANTITIES PROTOCOLS

Once a State ceases to meet the criteria for eligibility contained within its SQP, its SQP automatically becomes non-operational. As a consequence, the safeguards procedures in Part II of the State's CSA that were previously held in abeyance cease to be held in abeyance. The IAEA will inform the State that the State's SQP became non-operational and request the State to rescind the SQP. The rescission can be concluded by an exchange of letters between the IAEA and the State. The State may send a letter to the IAEA rescinding its SQP, and the IAEA will respond to the State acknowledging that the SQP has been rescinded. However, the SQP becomes non-operational even if rescission is not agreed to.

A State may rescind its SQP at any time. The full implementation of a CSA facilitates a cooperative relationship with the IAEA and supports effective State regulatory control.

Any State with an SQP may rescind its SQP at any time by sending a letter to the IAEA.

13.1 Situations that result in an SQP becoming non-operational

As mentioned above, an SQP becomes non-operational when a State no longer meets the eligibility criteria. Criteria are specified regarding facilities and nuclear material quantities.

An **original SQP** remains operational as long as the State has nuclear material in quantities not exceeding the limits stated in paragraph 37 of INFCIRC/153 (Corr.) and has no nuclear material in a facility.

A **ModSQP** remains operational as long as the State has nuclear material in quantities not exceeding the limits stated in paragraph 37 of INFCIRC/153 (Corr.), and has not taken a decision to construct or to authorize construction of a facility.

A State may acquire nuclear capabilities gradually. The State may purchase a subcritical assembly for a university research/academic programme. A subcritical assembly is not a facility as defined in INFCIRC/153 (Corr.), and thus does not cause an SQP to become non-operational. After using the sub-critical assembly for some time, the State may wish to further develop its capabilities by acquiring a critical assembly or a research reactor. These are facilities as defined by INFCIRC/153 (Corr.).

When a State with an original SQP acquires a facility, it is obligated to notify the IAEA at least 180 days before introducing nuclear material into the facility. When nuclear material is introduced into the facility, the SQP becomes non-operational.

When a State with a ModSQP notifies the IAEA of its decision to construct or authorize construction of a facility, its SQP becomes non-operational. The State is required to provide early design information to the IAEA regarding its planned facility.

The quantities of nuclear material in the State may increase in three primary ways. First, the State may import nuclear material in one import or in a series of imports. The original SQP and the ModSQP both require that the State notify the IAEA in advance of importing nuclear material in quantities greater than or equal to one effective kilogram (in one import or in a series of imports over a year or less). Upon receiving that notification, the IAEA would then notify the State that the SQP will become non-operational when the import(s) occurs.

Second, the State may produce nuclear material by concentrating (and possibly purifying) uranium ore extracted from mines or other processes in the State or by concentrating thorium extracted from ore or other processes. If that nuclear material remains in the State, the inventory of nuclear material may increase such that it exceeds the specified limits.

Third, as technologies change, material which may not have been considered suitable for fuel fabrication or isotopic enrichment may, in the future, become suitable and, therefore, become 34(c) nuclear material. When the IAEA determines that nuclear material produced in an SQP State has become suitable for fuel fabrication or for being isotopically enriched, and that the quantity of nuclear material in the State exceeds one effective kilogram, then the IAEA will notify the State that the SQP has become non-operational.

13.2 Implementation of all measures in Part II of a CSA

When a State's SQP becomes non-operational, the State is advised to seek IAEA training in safeguards implementation, to review relevant guidance such as IAEA Services Series 21 and 15 (provided on the *Assistance for States* webpage) and to consult frequently with the State's IAEA country officer.

The State may also wish to request legislative assistance from the IAEA to review the relevant laws, orders and regulations, and identify necessary modifications and other opportunities to strengthen the regulatory framework. Finally, an IAEA SSAC Advisory Service mission (ISSAS mission) would help to identify opportunities for the State to improve its safeguards implementation capabilities. Section 6.5 provides more information about resources to support SRAs.

14. ASSESSING PERFORMANCE ON SAFEGUARDS IMPLEMENTATION

States may wish to periodically assess their own performance in safeguards implementation, and identify areas where technical assistance may be helpful or training might be requested. The IAEA has prepared a self-assessment tool for States which is part of SS21. States are encouraged to use that tool to evaluate their performance and, if the need for improvement is identified, to request assistance of the IAEA. The SS21 can be downloaded from the Assistance for States webpage.

APPENDIX 1. COMMON USES OF NUCLEAR MATERIAL IN MEDICAL, INDUSTRIAL AND RESEARCH APPLICATIONS

Medical uses of nuclear material

Typical applications of nuclear material in medical uses are shown below. Plutonium and thorium are not typically used in medical applications.

Material	Quantity Range	Application	Equipment
depleted uranium (metal)	10–600 kg	radiation shielding	teletherapy machines
uranium compounds (depleted or natural uranium in compounds such as powders, liquids)	10–100 g	chemical agents, dyes	electron microscopy laboratory

A very common use of nuclear material in the medical sector is depleted uranium shielding for radiation treatment instruments such as teletherapy, brachytherapy and scanner units. These instruments are often found in hospitals and cancer treatment centres. Electron microscope laboratories also commonly have dyes (also called contrast stains) containing small quantities of uranium in solutions. The weight of uranium (not the weight of the solution) is to be reported to the IAEA. The calculation is shown in Appendix 2 where instructions for filling in the initial report are provided.

Industrial uses of nuclear material

There are many industrial uses of nuclear material. Uranium and thorium are used as additives to industrial material such as filaments, electrodes, semiconductors and ceramics. Depleted uranium is occasionally used as a counterweight for forklifts and cranes, and thorium is sometimes used in airplane engines.

Uranium in solutions or powders is used as a chemical agent or additive in various industrial processes, such as toner, contrast stain, hydrocarbon chemistry and enamel production. Sources that contain plutonium are sometimes used for their emission of alpha radiation in neutron radiography and well logging. The more common uses in industrial applications are shown below.

Material	Quantity Range	Application	Equipment
thorium dioxide alloys	10–100 kg	additive	welding electrodes, filaments, metal
thorium dioxide alloys	100 kg	catalyst	oil refinery
uranium dioxide	10–100 kg	additive	ceramics, pottery, semiconductors
uranium compounds	10–100 kg	agents	various applications
depleted uranium	10–300 kg	shielding	gamma radiography device, radioactive source container
depleted uranium	100–500 kg	counterweight	vibration damping, aircraft, forklift, ship ballast
plutonium dioxide	1 mg–100 g	source of alpha radiation	neutron radiography, well logging, moisture meter

Other radioactive sources are used in some industries, e.g. exploring for oil and gas deposits, manufacturing ceramics, making filaments for light bulbs, and irradiating food to reduce bacteria. Shielding is, once again, a primary use of nuclear material in these industrial applications.

Research and academia

Research institutions (such as a national laboratory or university) may possess nuclear material used as shielding, or contained in sources or reference standards (shown in Figure A1-1), or in small quantities used for experiments in physics, material science, engineering or other disciplines. Typical uses of nuclear material in academic institutions and laboratories include research in physics, material science, biology and chemistry, involving thorium, uranium and plutonium, as indicated below. Some high activity sources used in these laboratories may be stored in or shielded with depleted uranium. Common uses are shown in the table below.

Universities or academies of science with physics departments, material science research or a large experimental laboratory in a chemistry department, for example, may possess small quantities of nuclear material. It is a good practice to inquire about the possible use of nuclear material from all academic and research institutions because the uses are quite varied and relatively common.

FIG. A1-1. Examples of nuclear material reference standards.

Material	Quantity Range	Application	Equipment
thorium, natural uranium, depleted uranium	1–1000 g	samples and standards (nuclear use)	metallurgy, research in catalysis, physics and uranium semiconductors
depleted uranium	10–100 kg	radiation shielding	radioactive source container
enriched uranium	1–100 g	fission chamber, standards (nuclear use)	research in neutron detection, spectroscopy, physics
plutonium dioxide	1 mg–100 g	source of alpha (Pu) or neutron (Pu-Be) radiation	neutron radiography, physics research, neutron source for sub-critical assembly

EQUIPMENT CONTAINING NUCLEAR MATERIAL WITH ESTIMATED MASS BASED ON MANUFACTURER SPECIFICATIONS

The first source of information regarding mass of nuclear material in a piece of equipment is the documentation that accompanied its receipt at the location, such as manufacturer's specifications, user manual, any tag or label, or by contacting the manufacturer directly. The information contained in the two tables (industrial applications, followed by medical applications) is extracted from the IAEA's International Catalogue of Sealed Radioactive Sources, found at http://icsrs.iaea.org/srssearch.aspx. This database can be searched to find the information which is contained in these tables or to find information about instruments in the future. Access to the database may be requested by emailing source-catalogue@iaea.org.

1. Industrial Applications

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
1	Gauge	None (tool insertion)	U-235, U-238	19	PIPE RECOVERY SYSTEMS, Inc.
2	Gauge	None (tool insertion)	U-235, U-238	25	PIPE RECOVERY SYSTEMS, Inc.
0666AY	Container		H-3	20	MAYAK (Industrial Association 'Mayak')
100	Radiography	GPL	Ir-192	9	CUMBERLAND RESEARCH Corp.
1001	Gauge	VD(HP)	Co-60	Unknown (assume 12)	GAMMA INDUSTRIES
1001	Gauge	CKC.P1	Co-60	Unknown (assume 12)	GAMMA INDUSTRIES
1006A	Radiography	VD-HP	Co-60	272	GAMMA INDUSTRIES
1006B	Radiography	VD-HP	Co-60	272	GAMMA INDUSTRIES
1006C	Radiography	92301-1	Co-60, Ir-192	227	TECHNICAL OPERATIONS
1006D	Radiography	93302	Co-60	254	TECHNICAL OPERATIONS
109 SERIES	Irradiator	7810	Co-60	227	J.L. SHEPHERD & ASSOCIATES
120	Radiography	120 SOURCE	Ir-192	12	CUMBERLAND RESEARCH Corp.
190000	Radiography			16	PICKER Corp.
20V	Radiography			14	GULF NUCLEAR, Inc.
20VS	Radiography			14	GULF NUCLEAR, Inc.
2-15SA	Radiography	A-13-A	Ir-192	38	GAMMA INDUSTRIES
35	Radiography	S-16	Ir-192	8	GAMMA INDUSTRIES
40V	Radiography			15	GULF NUCLEAR, Inc.
424	Radiography	702	Ir-192	18	RTS TECHNOLOGY, Inc.

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
4493-97	Gauge	CDC.PE3	Cs-137	46	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
496	Radiography	A424-1	Ir-192	44	TECHNICAL OPERATIONS
496	Radiography	A424-5	Co-60	44	TECHNICAL OPERATIONS
50	Radiography	1	Ir-192	20	INDUSTRIAL NUCLEAR
500-SU	Radiography			18	TECHNICAL OPERATIONS
5094 - 5098	Analyzer	57157C	Cs-137	Unknown	TEXAS NUCLEAR Corp.
520 Series	Radiography	899XX-Series	Ir-192	12	TECHNICAL OPERATIONS
525	Radiography	A424-5	Co-60	50	TECHNICAL OPERATIONS
525	Radiography	A424-1	Ir-192	50	TECHNICAL OPERATIONS
532	Radiography	A424-1	Ir-192	Unknown	TECHNICAL OPERATIONS
533	Radiography	A424-1	Ir-192	Unknown	TECHNICAL OPERATIONS
533	Radiography	705	Yb-169	Unknown	TECHNICAL OPERATIONS
576	Radiography	A453-1	Co-60	182	TECHNICAL OPERATIONS
578	Radiography	A424-8	Co-60	159	TECHNICAL OPERATIONS
581	Radiography	A58101-8	Ir-192	13	TECHNICAL OPERATIONS
5SA	Radiography	S-16	Ir-192	58	GAMMA INDUSTRIES
616	Radiography	A58101-8	Ir-192	13	TECHNICAL OPERATIONS
655	Radiography	A424-11	Co-60	127	TECHNICAL OPERATIONS
655E	Radiography	A424-11	Co-60	127	TECHNICAL OPERATIONS
660	Radiography	702	Ir-192	15	AEA TECHNOLOGY - QSA
660 SERIES	Radiography			17	AEA TECHNOLOGY - QSA
660A	Radiography	702	Ir-192	15	AMERSHAM Corp.
660AE	Radiography	91810	Yb-169	15	AMERSHAM Corp.
660B	Radiography	702	Ir-192	15	AMERSHAM Corp.
660BE	Radiography	702	Ir-192	15	AMERSHAM Corp.
660E	Radiography	702	Ir-192	15	AMERSHAM Corp.
670	Radiography	A424-10	Co-60	61	TECHNICAL OPERATIONS
670E	Radiography	A424-10	Co-60	61	TECHNICAL OPERATIONS
672	Radiography	A424-12	Co-60	182	TECHNICAL OPERATIONS

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
672E	Radiography	A424-12	Co-60	182	TECHNICAL OPERATIONS
683	Radiography			13	TECHNICAL OPERATIONS
699	Radiography	A424-1	Ir-192	14	AMERSHAM Corp. (MASSACHUSETTS)
750	Radiography	A424-20	Ir-192	18	AMERSHAM Corp. (MASSACHUSETTS)
770	Radiography	A424-2	Co-60	Approx 200	TECHNICAL OPERATIONS
771	Radiography	A424-3	Co-60	Approx 200	TECHNICAL OPERATIONS
771	Radiography	A453-1	Ir-192	Approx 200	TECHNICAL OPERATIONS
796	Radiography	A424-9	Ir-192	10	TECHNICAL OPERATIONS
807	Gauge	4P6T	Cs-137	55	MEASUREMENTS, Inc.
807	Gauge	GT-GHP	Co-60	55	MEASUREMENTS, Inc.
820	Radiography	A424-9	Ir-192	Unknown	TECHNICAL OPERATIONS
850	Radiography	91003	Ir-192	22	TECHNICAL OPERATIONS
855	Radiography	866	Ir-192	57	AMERSHAM Corp. (MASSACHUSETTS)
858	Radiography	A424-14	Co-60	149	AMERSHAM Corp. (MASSACHUSETTS)
861L	Gauge	CKC.P1	Co-60	29	AMERSHAM Corp. (MASSACHUSETTS)
861U	Gauge	CKC.P1	Co-60	29	AMERSHAM Corp. (MASSACHUSETTS)
865	Radiography	86520	Ir-192	18	TECHNICAL OPERATIONS
880 Series	Radiography	A424-25W	Co-60, Ir-192, Se-75, Yb-169	Unknown (assume 8)	AEA TECHNOLOGY - QSA
900	Radiography	90003	Ir-192	13	TECHNICAL OPERATIONS
910	Radiography	90003	Ir-192	8	AMERSHAM Corp. (MASSACHUSETTS)
920	Radiography			14	TECHNICAL OPERATIONS
928	Gauge	87551	Co-60	Unknown	AMERSHAM Corp. (MASSACHUSETTS)
928	Gauge	87551	Ir-192	Unknown	AMERSHAM Corp. (MASSACHUSETTS)
959M	Radiography	X540/1	Se-75	11	AEA TECHNOLOGY - QSA
C-1	Radiography	SEVERAL	Ir-192	16 or 17	SOURCE PRODUCTION & EQUIPMENT Co.
C-10	Radiography	S-16	Ir-192	17	GAMMA INDUSTRIES
C-8	Radiography			154	GAMMA INDUSTRIES

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
CDV-794 MODEL NO. 2	Calibration			Unknown	TECHNICAL OPERATIONS
CENTURY S	Radiography	S-16	Ir-192	17	GAMMA INDUSTRIES
CENTURY S.A. UNIVERSAL	Radiography	S-16	Ir-192	12	GAMMA INDUSTRIES
CENTURY SA	Radiography	S-16	Ir-192	17	GAMMA INDUSTRIES
CRAWLER CONTROL POT	Radiography	VD	Cs-137	8	C.S. PRODUCTS (TESTING EQUIPMENT)
CS 0316	Radiography	87556	Ir-192	7	C.S. PRODUCTS (TESTING EQUIPMENT)
CS0316 GAMMAHEAD		CS0316	Ir-192	7	MEDDINGS Radiographics Ltd
D80161(F/220)-U	Container		Ir-192	Unknown (~ 40)	MAYAK (Industrial Association 'Mayak')
DUSB	Gauge			4.5 kg per foot	GULF NUCLEAR, Inc.
GAMMA CENTURY	Radiography	S-16	Ir-192	17	GAMMA INDUSTRIES
Gammabeam X-200	Irradiator	C-146	Co-60	up to 105 kg	MDS NORDION, Inc.
GAMMAMAT S301	Radiography		Ir-192	15	CIS-US, Inc.
GAMMAMAT SE TYPE A	Radiography			3	MDS NORDION, Inc.
GAMMAMAT SE TYPE B (U)	Radiography		Se-75	3	MDS NORDION, Inc.
GAMMARID-169/15	Radiography		Yb-169	3	
GAMMARID-192/120	Radiography		Ir-192	12	
GAMMARID-192/40	Radiography		Ir-192	9	
GAMMATRON 10 SA	Radiography	S-16	Ir-192	55	GAMMA INDUSTRIES
GAMMATRON 100	Radiography	A-5-A	Co-60	159	GAMMA INDUSTRIES
GAMMATRON 2	Radiography	S-16	Ir-192	46	GAMMA INDUSTRIES
GAMMATRON 200	Radiography	A-5-A	Co-60	159	GAMMA INDUSTRIES
GAMMATRON 20-A	Radiography	S-16	Ir-192	90	GAMMA INDUSTRIES
GAMMATRON 50-A	Radiography	A-7-A	Co-60	91	GAMMA INDUSTRIES
GAMMATRON 5A	Radiography	S-16	Ir-192	59	GAMMA INDUSTRIES
GAMMATRON 5S	Radiography	S-16	Ir-192	59	GAMMA INDUSTRIES
GH-ll	Gauge	VD(HP)	Cs-137	12	TIECOR, Inc.
INTEC CONTROL	Radiography	VD(HP)	Co-60	16	GAMMA INDUSTRIES

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
IR-50	Radiography	1	Ir-192	15	INDUSTRIAL NUCLEAR
IRIS-2	Gauge	87551	Ir-192	96	INTERNATIONAL DIGITAL MODELING
IRIS-2	Gauge	87551	Co-60	96	INTERNATIONAL DIGITAL MODELING
LS-106	Gauge			Unknown	ABB PROCESS AUTOMATION, Inc.
M-205	Gauge	CDC.PE3	Cs-137	55 mm thick DU lining	FAG KUGELFISCHER GEORG SCHAFER
Master Minder Model 2	Radiography	VD(HP)	Cs-137	8	GAMMA INDUSTRIES
MK I	Radiography	C-164	Ir-192	Unknown	NORAM TESTING TECHNOLOGY, Ltd.
MK.6 Nautilus	Radiography		Ir-192	17	C.S. PRODUCTS (TESTING EQUIPMENT)
Model A (DRAWING #T79580)	Radiography			2	SANDIA NATIONAL LAB
Model A (DRAWING #T79580)	Radiography			2	SANDIA NATIONAL LAB
Model B (Drawing #P0009614)	Radiography			2	SANDIA NATIONAL LAB
MODEL I	Radiography	G-37	Co-60	159	SOURCE PRODUCTION & EQUIPMENT Co.
MRC-794	Calibration			Unknown (~250 to 350 kg)	EON Corp.
MX-IC-100	Radiography	9	Ir-192	14	MAGNAFLUX Corp.
P192 SERIES	Radiography	P192-100-1U	Ir-192	Unknown	RADIONICS, Inc.
PAN X-I	Radiography	SRC-3	Ir-192	9.5	NORAM TESTING TECHNOLOGY, Ltd.
PAN X-II	Radiography	SRC-3	Ir-192	9.5	NORAM TESTING TECHNOLOGY, Ltd.
PIPELINER MODEL 1	Radiography	PTL-1	Ir-192	11	GAMMA INDUSTRIES
PIPELINER MODEL 201	Radiography	PL-2	Ir-192	12	GAMMA INDUSTRIES
PIPELINER MODEL 300	Gauge	VD(HP)	Cs-137	12	GAMMA INDUSTRIES
PIPELINER MODEL 300A	Gauge	VD(HP)	Cs-137	12	GAMMA INDUSTRIES
RAD-LAB MODEL 1018	Radiography	GC5-3	Ir-192	13	ATOMERGIE CHEMICALS Corp.
RAD-LAB MODEL 1019	Radiography	GC5-2	Co-60	13	ATOMERGIE CHEMICALS Corp.
RCC-10	Radiography	VD	Cs-137	7	NORAM TESTING TECHNOLOGY, Ltd.

Model (in alphabetical order)	Industrial Application	Example Sources	Shielded Radionuclides	Approx. mass of U or DU (kg)	Manufacturers
SE-1	Radiography			22	NORAM TESTING TECHNOLOGY, Ltd.
SENTINEL 660	Radiography			17	AEA TECHNOLOGY - QSA
SINCOMATIC B	Radiography			Unknown (~ 13)	SARNIA INSPECTION Co. (SINCO)
SINCOMATIC C	Radiography			Unknown (~ 13)	SINCO
SINCOMATIC CRAWLER IC-12-20	Radiography	S-16	Ir-192	13	SINCO
SINCOMATIC CRAWLER IC-20-48	Radiography	C-169M	Ir-192	13	SINCO
SPEC 150	Radiography	G-60	Ir-192	17	SOURCE PRODUCTION & EQUIPMENT Co.
SPEC 2-T	Radiography	G-1	Ir-192	16	SOURCE PRODUCTION & EQUIPMENT Co.
SPEC-300	Radiography	G-70	Co-60	Unknown	SOURCE PRODUCTION & EQUIPMENT Co.
SPEC-CHECK MODEL 1	Radiography	G-23	Ir-192	10	SOURCE PRODUCTION & EQUIPMENT Co.
SPEC-CHECK MODEL II	Radiography	G-36	Ir-192	10	SOURCE PRODUCTION & EQUIPMENT Co.
TCN822 mini collimator	Radiography			1	AEA TECHNOLOGY – QSA
TCNL719	Radiography			6	AEA TECHNOLOGY – QSA
TELETRON SU 100	Radiography			Unknown (assume 8)	NUCLEAR GmbH
TELL-TALE POT (TT155)	Radiography	CDC.805	Cs-137	0.7	C.S. PRODUCTS (TESTING EQUIPMENT)
TEN660 Amertest 660	Radiography			17	AEA TECHNOLOGY – QSA
TENB660	Radiography			17	AEA TECHNOLOGY
TITAN	Radiography	C-990	Ir-192	13.5	MDS NORDION, Inc.
UKTIB-0.3/0090-U-GS	Container	Undefined	Pm-147,Pu-239	90	MAYAK (Industrial Association 'Mayak')
UKTIB-0.5/0050-U-GS	Container	Undefined	Pm-147,Pu-239	50	MAYAK
UKTIB-10000/0185-U	Container	Undefined	Cs-137, Ir-192	185	MAYAK
UKTIB-90-U	Container	Undefined	Ir-192, Sr-90	750	MAYAK
ZA/CNS 1004/B(U)-85	Container	Trans-portation	Ir-192	Unknown	NECSA - ISOTOPE CENTRE

2. Medical Applications

Model (in alphabetical order)	Medical Application	Example Sources	Shielded Radionuclides	Approximate Mass of U or DU (kg)	Manufacturer
6183 series A-G (only with 590A head)	Teletherapy	P3800A	Co-60	23	PICKER Corp.
6202 (only with 590A head)	Teletherapy	P3800A	Co-60	23	PICKER Corp.
6204 and 6204A (only with 590A head)	Teletherapy	P3800A	Co-60	23	PICKER Corp.
6223 and 6223A	Teletherapy	P3802A	Co-60	16	PICKER Corp.
C/9 (DU & Tungsten in shutter wheel)	Teletherapy	AMS-3801	Co-60	Unknown (assume 12)	ADVANCED MEDICAL SYSTEMS, Inc.
C-3000 series (with 590A head)	Teletherapy	P3800A	Co-60	23	PICKER Corp.
C8M/80	Teletherapy	P3802A	Co-60	16	PICKER Corp.
DU-100	Radiography	SAR	Ir-192	Unknown (~12)	SARNIA INSPECTION Co. (SINCO)
ELDORADO 6	Teletherapy	C-146	Co-60	16	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
ELDORADO 76	Teletherapy	C-151	Co-60	Unknown (~12)	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
ELDORADO 78	Teletherapy	C-146	Co-60	137 (for model G9-140 or G22-140)	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
ELDORADO 8	Teletherapy	C-146	Co-60	41	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
ELDORADO A	Teletherapy	C-146	Co-60	Unknown (~12)	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
ELDORADO G	Teletherapy	C-146	Co-60	12 or 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
ELDORADO SUPER G	Teletherapy	C-146	Co-60	32	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
Elite 100	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
GAMMA MED II	Brachytherapy	CIL BV	Ir-192	18	ISOTOPEN TECHNIK DR. SAUERWEIN, GmbH
GAMMAMED 12i (all sources)	Brachytherapy	724	Ir-192	12	ISOTOPEN TECHNIK DR. SAUERWEIN, GmbH
GAMMAMED 12it (all sources)	Brachytherapy	724	Ir-192	12	
GAMMATRON 3	Teletherapy	C-146	Co-60	20	SIEMENS MEDICAL

Model (in alphabetical order)	Medical Application	Example Sources	Shielded Radionuclides	Approximate Mass of U or DU (kg)	Manufacturer
					OF AMERICA, Inc.
GAMMATRON-S Series	Teletherapy	C-146	Co-60	162.5	SIEMENS MEDICAL OF AMERICA, Inc.
IBL 137	Irradiator	CSC-212-A	Cs-137	95	COMPAGNIE ORIS INDUSTRIE S.A. (CEA-ORIS-LAPIB)
IR-100	Radiography	33	Ir-192	15	INDUSTRIAL NUCLEAR Co .
MCD/AC system	Scanner	HEG-137	Cs-137	11	ADAC Laboratories
PHILIPS ROTATIONAL UNIT	Teletherapy	MD4030	Co-60	24	NORTH AMERICAN PHILIPS Co., Inc.
SINCO-RAY DU-100 B	Radiography		Ir-192	Unknown (~12)	SARNIA INSPECTION Co. (SINCO)
T1000	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
T1000	Teletherapy	C-151	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
T1000E	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
T1000E	Teletherapy	C-151	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON 1000	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON 1000	Teletherapy	C-151	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON 1000E	Teletherapy	C-151	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON 1000E	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON 60	Teletherapy	C-151	Co-60	16	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON 60	Teletherapy	C-146	Co-60	16	ATOMIC ENERGY OF CANADA, Ltd. (AECL)

Model (in alphabetical order)	Medical Application	Example Sources	Shielded Radionuclides	Approximate Mass of U or DU (kg)	Manufacturer
THERATRON 765	Teletherapy	C-146	Co-60	Head: 92.2. Primary Definer: 8.0. Collimator Trimmer Bars: 7.3. Optional Collimator Blocks: 5.5. Source Drawer: 12.0.	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON 80	Teletherapy	C-146	Co-60	41	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON 80	Teletherapy	C-151	Co-60	41	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON B	Teletherapy	C-151	Co-60	DU insert - 12; Solid DU drawer - 29	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON B	Teletherapy	C-146	Co-60	DU insert - 12; Solid DU drawer - 29	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON BII	Teletherapy	C-151	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON BII	Teletherapy	C-146	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON ELITE 100	Teletherapy	C-146	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON ELITE 100	Teletherapy	C-151	Co-60	105	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON F	Teletherapy	C-146	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON F	Teletherapy	C-151	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON JUNIOR C	Teletherapy	C-146	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON JUNIOR C	Teletherapy	C-151	Co-60	DU insert - 12; Solid DU drawer - 29	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
THERATRON JUNIOR C-II	Teletherapy	C-146	Co-60	DU insert - 12; Solid DU drawer - 29	MDS NORDION, Inc. (BEST THERATRONICS Ltd.)
THERATRON JUNIOR C-II	Teletherapy	C-151	Co-60	DU insert - 12; Solid DU	MDS NORDION, Inc. (BEST

Model (in alphabetical order)	Medical Application	Example Sources	Shielded Radionuclides	Approximate Mass of U or DU (kg)	Manufacturer
				drawer - 29	THERATRONICS Ltd.)
THERATRON PHOENIX	Teletherapy	C-146	Co-60	Head: 92.2. Primary Definer: 8.0. Collimator Trimmer Bars: 7.3. Optional Collimator Blocks: 5.5. Source Drawer: 12.0.	ATOMIC ENERGY OF CANADA, Ltd. (AECL)
V-3000	Teletherapy	P3800A	Co-60	23	PICKER Corp.
V-3000	Teletherapy	P3801A	Co-60	23	PICKER Corp.
V-3000	Teletherapy	P3802A	Co-60	23	PICKER Corp.
XK-5105/33-140	Teletherapy		Co-60	135	PHILIPS MEDICAL SYSTEMS, Inc.
XK-5105/33-150	Teletherapy	C-146	Co-60	135	PHILIPS MEDICAL SYSTEMS, Inc.
Y-0	Radiography	PTL-1	Ir-192	Unknown (assume 12)	BENDIX

APPENDIX 2. HOW TO PREPARE AN INITIAL REPORT ON NUCLEAR MATERIAL: BLANK FORM, INSTRUCTIONS, SCENARIOS, AND COMPLETED FORMS

The initial report on nuclear material has two parts. The first part shown below provides information on the SRA and the second part on the following page provides information on the inventory of nuclear material. The report (parts 1 and 2) can be downloaded as a .pdf file from the ‘Assistance for States’ webpage in the Safeguards section of the IAEA website (www.iaea.org). However, the IAEA prefers that an electronic version of the report be filled in and submitted by secure email, or printed and submitted by mail. The electronic version of the report can be requested by writing an email to official.mail@iaea.org.

IAEA
International Atomic Energy Agency
Department of Safeguards

Report on Nuclear Material
INITIAL REPORT

State:	
Regulatory Authority:	
Visiting (physical) address:	
Mailing address:	
Responsible official:	
Contact information:	
Reporting data (below):	
No nuclear material:	☐

Check the box above, if the regulatory authority has confirmed that there is no nuclear material in the State, or fill out the second page of the report separately for each location where nuclear material is held.

Date

Signature

Part 1 of the Initial Report on Nuclear Material

REPORT ON NUCLEAR MATERIAL

Part 2

Name of location:	Visiting address:	
Geographical location:	Mailing address:	
Owner/Operator:		Page of pages
Accountancy and control procedures:		Date:

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA				ENRICHED URANIUM	
			TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	URANIUM ENRICHMENT % U-233 or U-235 (6)	ISOTOPE TYPE (7)
1								
2								
3								
…								
…								
…								
…								
…								

Explanations:

(1) General description of the use of the material (for example: depleted uranium for radiation shielding; small samples used for calibration in a physics laboratory) If possible, include serial numbers or other identifying information.

(2) Number of individual items. If the material is in bulk form or number is not meaningful, leave blank.

(3) The physical (solid/gas/liquid/sealed source) and chemical (element/compound) forms of the material.

(4) Element codes are: D (Depleted Uranium) or N (Natural Uranium) or E (Enriched Uranium) or P (Plutonium) or T (Thorium).

(5) Weight should be provided to the highest level of precision available, and at least to the nearest gram for E or P or to the nearest kg for D, N or T.

(6) Enrichment should be provided for enriched uranium only, as % of U-233 and U235 combined in the total weight of uranium.

(7) Isotope types are: U-235 or U-233 or both (U-235 + U-233). Leave blank if unknown.

Part 2 of the Initial Report on Nuclear Material

INSTRUCTIONS FOR COMPLETING AN INITIAL REPORT ON NUCLEAR MATERIAL

The form for an initial report (and subsequent reports on nuclear material) has two parts: Part 1 is a single page containing contact information about the State/regional Safeguards Authority (SRA); it can also be used as a cover page for the initial report. Part 2 is used to submit information regarding the location, the characteristics of the nuclear material, and the approach used to keep track of the nuclear material at that location.

Part 1 of report on nuclear material

All States are required to establish and maintain an SSAC, and the SRA is an important part of the SSAC, and is responsible to ensure it functions adequately. The SRA can be a regulatory body, a branch or section of the government, or a regional entity. The organizational name of the SRA and the visiting address (a physical address with a street name and building number) and a mailing address (this can be the same as the physical address, or can be a post office box) should be provided in the first three lines of Part 1. If the physical and mailing addresses are the same, the mailing address may be left blank.

It is also expected that there is a single person, a responsible official, who serves as the main point of contact for the IAEA for any further communications regarding safeguards implementation. Therefore it is desirable that in addition to the address of the SRA, contact information for the responsible official be provided to the IAEA, to facilitate working-level communications (by telephone and e-mail).

The reporting date is the date when the initial report is dispatched to the IAEA. This date should be — at the latest — the last day of the month following the calendar month in which the ModSQP entered into force. However, the report should reflect the inventory of nuclear material in the State as of the last day of the calendar month in which the ModSQP entered into force.

At the lower left corner of the Part 1 form there is a check-box labelled 'no nuclear material.' If the SRA has established and verified that no 34(c) nuclear material was identified in the State, then this box should be checked, and the initial report would consist of this single page of the Part 1 form. It should be signed by the responsible official and sent to the IAEA.

However, if there is 34(c) nuclear material in the State, then Part 2 of the initial report should be filled in separately for each location where the material exists. In that case, the initial report will consist of the cover page (Part 1) plus as many Part 2 pages as there are locations where nuclear material is held in the State. The Part 2 form of the model initial report provides places to submit all of the information required under the CSA.

Part 2 of the report

The *name of the location* should be a unique name that unambiguously identifies the institution (hospital, factory, university etc.) or the part of it (department, site, branch) where the nuclear material is located and used.

The *visiting address* (a street address) and *mailing address* (may be a post office box) are provided next. Again, it is essential to provide the street address of the location for inspection planning purposes. It should be specific enough for an inspector to find the physical location of the nuclear material. The IAEA generally does not communicate directly with owners of nuclear material, but only with the SRA. It is useful, therefore, if the SRA provides specific information on the form to describe the geographical location such as longitude and latitude coordinates, or confirms that the street address can be located correctly using 'Google Maps'©. This helps the IAEA to estimate the time and logistics needed to conduct an inspection.

The *owner or operator* (user) of the nuclear material at the location (institution) might be a person or a legal entity (organization, company) that exercises the ownership and control rights over the location and the nuclear material. A commercial company (owner) might have several factories (locations) at different geographical locations where nuclear material is present and used. For example, an oil mining company might have several drilling sites across the country where plutonium-beryllium sources are used, or a university may have several branches in different towns, each possessing a small uranium reference standard. States should have established a regulatory requirement to apply for and receive a licence to possess nuclear material prior to taking possession of it. The licences should contain the information needed for the initial report; however, the SRA must validate that the information is correct before submitting it to the IAEA. This can be done by contacting the licensees and/or visiting the locations.

Under *accountancy and control procedures*, a brief description of legal and local requirements, rules relating to physical inventory taking, accountancy and security measures should be given. The hypothetical scenarios and associated reports provided later in this Appendix offer additional explanation on the type and detail of information requested.

Finally, at the right hand side of the upper half of the Part 2 form, there are two more fields PAGE NO. and (NUMBER) OF PAGES. *Page number* is number for each page in the initial report. The total number of Part 2 pages is entered in the 'OF PAGES' field.

The lower half of the Part 2 form is the actual inventory list, stipulated by Article 62 of the CSA. If there is more than one nuclear material item held at a particular location, each item should be listed line by line.

The first column is a simple sequential ENTRY NUMBER, or line numbering, starting with 1, which will be used (together with the page number that identifies the location) for the unique identification and reference to the actual items in the State's nuclear material inventory.

The second column is GENERAL DESCRIPTION AND USE OF THE MATERIAL. This is expected to be a short free text explanation of the purpose and the intended or current use of the nuclear material. In addition to that, any explanatory information that might be relevant but does not fit the other fields could be entered into this field. Typical examples of material descriptions and uses are:

- depleted uranium for radiation shielding
- sealed neutron source for physics experiments
- small samples, standards of nuclear material for research
- uranium-oxide powder for material research
- thorium-oxide for welding rods
- uranyl acetate for electron microscopy.

The third column is NUMBER OF ITEMS. As mentioned above, the general concept is that individual items are reported in individual lines. However, in the particular case when the inventory has several identical or similar items, listing them line by line and repeating the same information in the rest of the columns would not provide very much new information. In this case, similar items might be grouped and reported in one line, indicating in this column the actual number of individual items, which make up the total amount reported in the line.

Identical or similar items mean that, if listed in separate lines, all the fields except the *weight of element* will have the same or very much similar information. The concept of grouping similar items will be dealt with in the reporting examples provided later in this Appendix.

The fourth column is TYPE OF MATERIAL. It should be used to describe the physical and chemical properties of the nuclear material item, providing as much detail as is known. Typical information to be entered in this column would be:

- physical form: solid, liquid (gaseous); metal, powder, crystalline, solution
- chemical form: element, compound; chemical composition, liquid solvent
- sealed radioactive source (a special but frequent *type of material*).

The fifth column is ELEMENT CODE, a single letter indicating which of the three types of nuclear material (thorium, uranium, plutonium) the item contains. In the case of uranium, the element code also indicates the enrichment: different codes are used for depleted, natural and enriched uranium. The codes to be used are as follows:

- T: thorium
- P: plutonium
- N: natural uranium
- D: depleted uranium (uranium with a ^{235}U content less than that of natural uranium)
- E: enriched uranium (uranium with a ^{235}U content larger than that of natural uranium).

The sixth column is WEIGHT OF ELEMENT, the total weight of nuclear material contained in the item, or in all items together if the number of items is larger than one. For thorium, depleted uranium and natural uranium, the amount should be given with a precision of kilogram, for plutonium and enriched uranium, with a precision of gram. However, higher precision can be provided. In the case of a pure element (uranium, thorium, plutonium), the weight of element is obviously the weight of the item itself. However, in the case of compounds (e.g. uranium dioxide, uranyl nitrate) and solutions (liquid solution of compounds), the weight of the element is the actual weight of the pure element contained in the compound or solution. This is calculated as shown below.

Calculating the mass of uranium, thorium or plutonium in a compound/solution

To calculate the weight of uranium in a solution, the following approach is used. Taking uranyl nitrate as an example, this compound contains uranium, oxygen and nitrogen: $UO_2(NO_3)_2$. So for each atom of uranium, there are 8 oxygen atoms and 2 nitrogen atoms. Uranium has an atomic mass of 238, oxygen has an atomic mass of 16, and nitrogen, 14.

Figure A2-1 shows the calculation to determine the percentage of uranium in a compound of uranyl nitrate, uranium dioxide, yellowcake as U_3O_8 and thorium dioxide. For pure uranyl nitrate, the percentage of uranium in the compound is 60%. If the weight of uranyl nitrate is 5g, then the weight of uranium which would be reported to the IAEA would be 5 multiplied by 60% or 5 x 0.6, which is 3g.

COMPOUND	COMPOSITION	ATOMIC MASS	% U/Th IN COMPOUND
Uranyl nitrate	$UO_2(NO_3)_2$	238+(8*16) +(2*14) = 394	238/394 = 60%
Uranium dioxide	UO_2	238 + (2*16) = 270	238/270 = 88%
U_3O_8	U_3O_8	3*238 + 8*16 = 842	714/842 = 85%
thorium dioxide	ThO_2	232+(2*16)=264	232/264 = 88%

* means to multiply

FIG. A2-1. Calculation of uranium mass in a compound.

The seventh column UNIT is for indicating the weight measurement unit in which the WEIGHT OF ELEMENT is reported. It is normally ***g*** for plutonium and enriched uranium and ***kg*** for all other element codes (but can be ***g*** for all).

The last two columns, URANIUM ENRICHMENT and ISOTOPE TYPE should be filled only for enriched uranium (element code ***E***) and only when the actual enrichment is known. Enrichment should be given in percentage (%) of the fissile isotope in the total element weight. The fissile isotope might be ^{235}U or ^{233}U (in most of the cases it is ^{235}U). If known, the fissile isotope should be indicated in the last column (235 or 233), if not known, this field should be left empty. Enriched uranium should be reported with an element code of ***E*** even if no specific data for enrichment and isotope type are known, and the corresponding fields are left blank.

Using the Electronic 'Report on Nuclear Material' Form

The IAEA has prepared an electronic form that can be requested by sending an email to official.mail@iaea.org. The form has instructions and guides the user through the process of entering information. States are strongly encouraged to use this form to avoid mistakes and ensure information is submitted in the correct format. Examples of the input screens are shown below.

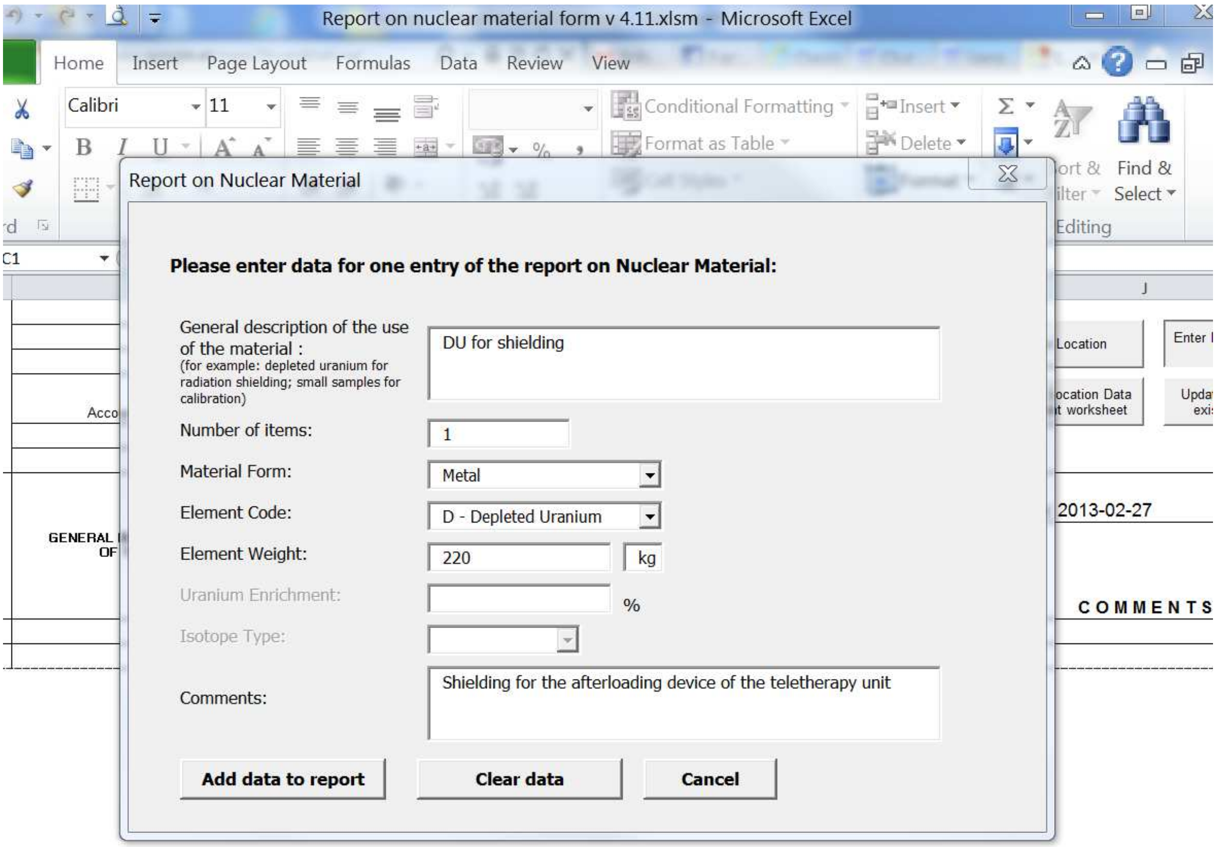


FIG. A2-1. Data entry screen example.

EXAMPLE SCENARIOS FOR INITIAL REPORT PREPARATION

Medical example

The *Hospital* is located in *Small Town*, *250 km North-West* of the capital, at 1 Main Street, Small Town, 40001. This hospital is operated and supervised by the *Ministry of Health*. It has a *Cancer Treatment Centre*, which has a teletherapy machine and an electron microscope laboratory. The high activity radioactive sources of the teletherapy machine are subject to regulatory licensing and are registered in RAIS, but the non-radioactive auxiliary equipment is not (which includes the depleted uranium shielding in the instrument and the source container). Therefore, the hospital does not account for the depleted uranium specifically. However, all medical equipment is inventoried each year. The inventory items are uniquely labelled and the records are kept by the hospital administration in a computer database. The following nuclear material items are located at this hospital:

- One teletherapy machine, with a depleted uranium primary shielding with a mass of about 250 kg (inventory identification number: TT-201).
- Three collimators containing depleted uranium, with 8, 6 and 3 kg respectively (inventory identification numbers: TT-202/1, TT-202/2, TT-202/3).
- One after-loading device for replacing the radioactive source of the teletherapy machine (inventory identification number: AL-001), containing a 12 kg uranium radiation shield.

- Uranyl acetate contrast stain in the electron microscope laboratory. Part of it is in crystalline powder form as purchased, containing about 20 g of uranium. The other part is already in liquid solution, containing about 10 g of uranium.

To complete the initial report for this location, the general characteristics of the location are provided in *Part 2*. The street address is provided as the *visiting address* and, since no separate mailing address exists, the mailing address is left blank.

The nuclear material inventory is then listed, with an item on each line. There are a total of seven items. Five of these have unique item identification numbers; two do not. Depleted uranium shielding is always metal, so unless it is a kind of alloy, the entire mass of the shielding will equal the mass of depleted uranium. The mass of uranium that is in other forms such as a powder or liquid will have to be calculated as a fraction of the total mass of the liquid or powder. The element code for depleted uranium is ***D***, and the type of material is *solid, metal*.

The uranium chemicals are made of either natural or depleted uranium. If uncertain, assume that uranyl acetate in electron microscope laboratories contains natural uranium, which has the element code of ***N***. There are two forms — liquid and powder — so two items can be listed. Although the mass of natural uranium is normally reported to the nearest kilogram, the mass of this uranyl acetate should be reported in grams, to avoid reporting a zero quantity when there actually is some mass of this material at this location. As mentioned above, in the case of chemical compounds (e.g. liquids, powders, alloys) the *Weight of Element* field must reflect only the mass of the uranium in the compound and not the total mass of the chemical compound. The mass of uranium can be calculated from the chemical composition and might be significantly less — especially in the case of liquid solutions — than the total weight of the chemical. Since none of the inventory items are enriched uranium, the *Uranium Enrichment* and *Isotope Type* fields are left blank.

Completed Report for the Hospital

REPORT ON NUCLEAR MATERIAL Part 2

Name of location:	*Municipal Hospital Cancer Treatment Center*	Visiting address:	*1 Main Street 5, Small Town, 40001*
Geographical location:	*250 kms North-West of Capital City*	Mailing address:	
Owner/Operator:	*Ministry of Health*	Page No. *1*	of pages *5*
Accountancy and control procedures:	*All equipment is subject to annual inventory taking, records kept in computer database, no specific nuclear material accountancy, inventory items uniquely labelled.*	Date: 2008-May-13	

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA: TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	Only for ENRICHED URANIUM: URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)
1	shielding of teletherapy machine (TT-201)	1	solid, metal	D	250	kg		
2	collimator for teletherapy machine (TT-202/1)	1	solid, metal	D	8	kg		
3	collimator for teletherapy machine (TT-202/2)	1	solid, metal	D	6	kg		
4	collimator for teletherapy machine (TT-202/3)	1	solid, metal	D	3	kg		
5	shielding of after loading device (AL-001)	1	solid, metal	D	12	kg		
6	uranyl acetate for electron microscopy		powder	N	20	g		
7	uranyl acetate for electron microscopy		liquid solution	N	10	g		
…								

Industrial example 1

The Golden Oil Company of the Republic of Small Quantities operates several exploration sites in the northern part of the country. The headquarters of these operations are located in the Northern Village, at the crossing of two major roads North 5 (N5) and West 2 (W2). One of the sites is called the Northern Oil Drilling Site, located at the geographical coordinates E 23˚16'33" / S 38˚27'22". The nearest city is Northern Village, where Golden Oil Company rents a post office box, No. 2. The post code is SQ-98.

The company has several high activity radioactive sources, which are used at the various exploration sites. The company has strict control procedures for the sources. All equipment and sources are subject to quarterly physical inventory taking. The inventory is recorded in a computerized database. The use, location, and movement of any equipment or source are recorded in the database on a daily basis.

The inventory of Golden Oil Company's nuclear material is shown below.

- Three identical radioactive source transport containers (used when moving the containers within the State) with 45 kg depleted uranium shielding in each container.
- Various well logging equipment items containing altogether five plutonium-beryllium neutron sources with a total of 128.2 g plutonium. Three of the sources each have 40 grams of plutonium — one has 8 g, and one has 0.2 g.
- Two identical gamma radiography devices. Each has a source container with 16 kg depleted uranium shielding and two depleted uranium collimators of 8 kg each.

The Northern Drilling Site is in a rural area and mail is not sent to the exploration site. However, the IAEA needs to know the physical location of the actual site, so the longitude and latitude coordinates should be used as the location, and the visiting address should be the headquarters of the company, at the intersection of the two highways. The mailing address should be provided as the P.O. Box in the city of Northern Village.

When the characteristics (description, use, material type, element, weight) of several items in the inventory are the same, they should be reported on one line. However, when the individual characteristics of some items are significantly different from others, they should be reported separately. The nuclear material inventory in this example has several similar items, which can be grouped and reported together. The three transport containers should be grouped in one line with the total mass of depleted uranium of 135 kg.

The depleted uranium parts of the radiography equipment which are the same are grouped on a line — source containers on one line and collimators on the next line. The three plutonium-beryllium sources with the same mass can be grouped together with a total mass of 120 g; plutonium has the element code P. The other two sources should be reported on the next two lines. Based on the requirements for this material category, the mass of plutonium on each line should be rounded to the nearest gram. In the case of the 0.2 g source, however, rounding to the nearest gram would result in a declared mass of 0. Instead, the 0.2 g should be reported.

Completed Report for the Industry Example 1

REPORT ON NUCLEAR MATERIAL			Part 2
Name of location: Northern Oil Drilling Site	Visiting address: Northern Village, Crossing of Roads N5 and W2		
Geographical location: E 23°16'33" / S 38°27'22"	Mailing address: Northern Village, P.O.Box 2, Postal Code SQ-98		
Owner/Operator: National Oil Company			Page No. 2 of pages 5
Accountancy and control procedures: Quarterly physical inventory taking of all radioactive material and related equipment; computerised inventory database, location and use of equipment recorded on a daily basis.			Date: 2008-May-13

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA: TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	Only for ENRICHED URANIUM: URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)
1	*shielding of radiactive source transport container*	*3*	*solid, metal*	*D*	*135*	*kg*		
2	*Pu-Be neurton sources for well logging*	*3*	*sealed source*	*P*	*120*	*g*		
3	*Pu-Be neurton sources for well logging*	*1*	*sealed source*	*P*	*8*	*g*		
4	*Pu-Be neurton sources for well logging (0.2 g)*	*1*	*sealed source*	*P*	*0*	*g*		
5	*shielding of 2 gamma radiography device source containers*	*2*	*solid, metal*	*D*	*32*	*kg*		
6	*2 collimators for each of 2 gamma radiography devices*	*4*	*solid, metal*	*D*	*32*	*kg*		
…								

Industrial example 2

The second industry example involves the use of bulk feed material in industry as additives to produce non-nuclear final products. The Light-bulb & Ceramics Factory manufactures light bulbs and produces industrial ceramics. The factory is owned and operated by the Industrial Products Joint Venture. It is located in the West District of the Capital City, at 11 Industry Way, 5 km west of the city centre near a port. The mailing address is: Central Post Office, Mail box 5, Capital City, 3535.

The factory uses uranium dioxide as an additive to the ceramics produced. The annual consumption is 120 kg. The current stock is 250 kg. The manufacturing of light bulbs involves the fabrication of thoriated tungsten filaments. For this, the factory uses approximately 75 kg of thorium dioxide each year. Currently there is 120 kg thorium dioxide in stock.

For logistical and economic reasons, the factory purchases both uranium dioxide and thorium dioxide in quantities sufficient to cover their needs for several years. The feed material is recorded in their inventory accounting records upon receipt. There is no subsequent inventory taking, but monthly production records are kept and filed in hard copy, and contain transaction information which can be used to calculate the current stocks.

To report the nuclear material holdings at these locations in the initial report, it is necessary to calculate the mass of uranium and thorium as a fraction of the total mass of uranium dioxide and thorium dioxide.

The element weight for uranium (88% of 250 kg = 220 kg) and thorium (88% of 120 kg = 106 kg) are provided. The input data did not explicitly indicate the enrichment of the uranium; we can assume that the uranium dioxide is natural uranium (element code = N).

If known, the approximate annual consumption of the material should be provided in the *General Description* field. This helps the IAEA to estimate the expected amount of nuclear material at the location in the subsequent years.

Completed report for the Industry second example

REPORT ON NUCLEAR MATERIAL			Part 2
Name of location: Light-bulb and Ceramics Factory	Visiting address: Capital City, West District, 11 Industry Way		
Geographical location: 5 kms West of city center near a port	Mailing address: Central Post Office, Mail box 5, post code 3535		
Owner/Operator: Industrial Products Joint Venture			Page No. 3 of pages 5
Accountancy and control procedures: Source material recorded in books upon receipt; no subsequent inventory taking; stocks can be calculated; monthly production data available in hard copy.			Date: 2008-May-13

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	Only for ENRICHED URANIUM URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)
1	*uranium dioxide used in production of ceramics, typical annual consumption is ~106 kg U*		*powder*	*N*	*220*	*kg*		
2	*thorium dioxide for tungsten filaments of light bulbs, annual consumption is ~66 kg Th*		*powder*	*T*	*106*	*kg*		
…								

Research/academia 1

The example below is an academy of science research laboratory that conducts physics experiments.

The Physics Research Centre of the National Academy of Sciences is located in Major Town at a larger research site consisting of several buildings. The main office is at Avenue of Research 23, post code 4545. The mailing address is SQ-5432, P. O. Box 1, Major Town, 4545. Major Town is located 50 km east of the capital along Main Road 2. Book inventories of all equipment and material are kept in the main office and are reviewed and updated annually. There is no regular physical inventory taking procedure for equipment or material.

As expected at a physics research site, the inventory includes a wide variety of nuclear material in small quantities:

- 3 plutonium-beryllium neutron sources containing approximately 300 mg, 450 mg and 1 g plutonium respectively. There are no written certificates for the sources, the plutonium amounts are estimated from the neutron yield.
- 5 unused fission chambers, left from discontinued research projects. According to their certificates, they are identical and contain 1 g uranium each with an enrichment of 98% U-235.
- 3 pieces of uranium metal foil of unknown origin, approximately 1 g each. They are thought to be enriched uranium standards used in earlier experiments, but no detailed information is available.

- 1.5 kg uranium-oxide powder used in material research.
- 2 radioactive source containers, containing 19 and 32 kg depleted uranium shielding.

The three plutonium-beryllium sources are reported on separate lines, and the 0.3 g and 0.45 g amounts are indicated in the description. Reporting the 1.5 kg uranium-oxide powder requires the same calculation as done previously, resulting in the declared mass of uranium being 88% of the total mass of the compound.

The 5 fission chambers are identical, so they are reported as a combined amount on one line. The 3 uranium metal foil standards most probably have different enrichments. If the LOF or SRA has access to a non-destructive measurement instrument such as a sodium iodide detector, the enrichment could be determined. Otherwise, if there is no data available for their actual enrichment, they can also be grouped because reporting them in separate lines would provide no more information. However, even if the enrichment field is left blank, they should still be reported with an element code ***E*** for *enriched*.

Finally, the depleted uranium shielding of the two radioactive source containers is reported on one line but their separate masses are indicated in the description.

Completed report for Research/Academia first example

REPORT ON NUCLEAR MATERIAL			Part 2
Name of location: *Physics Research Centre*	Visiting address: *Avenue of Research 23, 4545 Major Town*		
Geographical location: *50 kms East of Capital along Main Road*	Mailing address: *SQ-5432, P.O.Box 1 post code 4545*		
Owner/Operator: *National Academy of Sciences*		Page No. *5*	of pages *5*
Accountancy and control procedures: *Book inventories are reviewed and updated annually; no routine physical inventory taking.*		Date: 2008-May-13	

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA: TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	Only for ENRICHED URANIUM: URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)
1	*Pu-Be neutron source used in physics experiments*	*1*	*sealed source*	*P*	*1*	*g*		
2	*Pu-Be neutron source used in physics experiments (300 mg)*	*1*	*sealed source*	*P*	*0*	*g*		
3	*Pu-Be neutron source used in physics experiments (450 mg)*	*1*	*sealed source*	*P*	*0*	*g*		
4	*unused fission chambers left from earlier research project*	*5*	*solid*	*E*	*5*	*g*	*98*	*U-235*
5	*unused uranium standards left from earlier research project (enrichment unknown)*	*3*	*metal foil*	*E*	*3*	*g*		
6	*uranium dioxide powder for material research*		*powder*	*N*	*1.3*	*kg*		
7	*shieldings of radioactive source container*	*1*	*metal*	*D*	*19*	*kg*		
8	*shieldings of radioactive source container*	*1*	*metal*	*D*	*32*	*kg*		
…								

Research/academia 2

The Science University of the State is located in Capital City. Two departments of the university — the Department of Biology and the Department of Physics — hold small amounts of nuclear material used for scientific experiments. Both departments belong to the Faculty of Natural Sciences and share the same building, the Science Tower on the University

Campus in the city centre. The street address is 25 Central Avenue, postal code 6765. The mailing address is SQ-1234, P. O. Box 5, Capital City, postal code 6700. All radioactive and other hazardous material is subject to annual physical inventory taking. This includes all nuclear material of any form and quantity. The resulting inventories are recorded in a computer database.

The inventory of the Department of Biology contains:

- uranyl nitrate solution, containing 50 g uranium. The material was left over from biological experiments discontinued more than a decade ago. There is no information available on the origin and properties of this material.
- uranyl acetate liquid solution, containing 250 g uranium. This material is currently used in the electron microscope laboratory as a contrast stain. The shipping documents of the last purchase indicate that the material is produced from depleted uranium.

The Department of Physics holds the following nuclear material items:

- 1 plutonium-beryllium neutron source containing 300 mg plutonium, used in physics experiments.
- 3 pieces of uranium metal foil used as standards for gamma spectroscopy. The foils weigh 1 g each and their enrichments are 1%, 5%, and 20% ^{235}U respectively.

Since the Department of Biology and the Department of Physics share the same building and have the same visiting address, their inventories can be reported on one report sheet as a single location. The Faculty of Natural Sciences should be used as the unique name for the location because it encompasses both departments. The rest of the information in the header part of the form is filled in similarly to previous examples.

The inventory list begins with the bulk material at the Department of Biology. The mass of uranium in the solution is given. If the mass were unknown, the mass of the total solution could be given, with a comment. Quantities of natural and depleted uranium are typically rounded to the nearest kg but in this case, to avoid reporting a 0 kg quantity, the mass should be reported in grams. There is no information given regarding the enrichment of the uranium in this solution. The SRA would need to contact the university to clarify this information. In this example, we assume it to be natural uranium and state the assumption in the general description. As with oxide compounds, the element weights reported for solutions must be the weight of the uranium element contained in the solution. It can be calculated from the concentration and mass of the total solution and the chemical composition of the uranium compound in question.

The plutonium-beryllium source is reported with 0 g, since 300 mg rounded to the nearest gram is zero. However, since it is known, the actual weight in mg should be provided in the general description field. The three enriched uranium samples cannot be grouped into one line due to their different enrichments. They are each reported separately.

Completed report for Research/Academia – second example

REPORT ON NUCLEAR MATERIAL				Part 2
Name of location: *Faculty of Natural Sciences*	Visiting address: *Capital City, University Campus, Science Tower*			
Geographical location: *Central Avenue 25, Capital City, 6765*	Mailing address: *SQ-1234, P.O.Box 5, 6700*			
Owner/Operator: *Science University of the State*			Page No. *5*	of pages *5*
Accountancy and control procedures: *Annual physical inventory taking, inventories are recorded in computerised database.*			Date: 2008-May-13	

ENTRY No.	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	ACCOUNTANCY DATA TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg/g)	Only for ENRICHED URANIUM URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)
1	*uranyl nitrate left from discontinued biological experiments (enrichment unknown, assume natural)*		*liquid solution*	*N*	*50*	*g*		
2	*uranyl acetate used in the electron microscopy laboratory*		*liquid solution*	*D*	*250*	*g*		
3	*Pu-Be neutron source used in physics experiments (nominal Pu weight: 300 mg)*	*1*	*sealed source*	*P*	*0*	*g*		
4	*standard for spectroscopy*	*1*	*metal foil*	*E*	*1*	*g*	*1*	*U-235*
5	*standard for spectroscopy*	*1*	*metal foil*	*E*	*1*	*g*	*5*	*U-235*
6	*standard for spectroscopy*	*1*	*metal foil*	*E*	*1*	*g*	*20*	*U-235*
…								

Scenario for reporting changes to the inventory

Using the university as an example, over the course of a year, the following events might occur:

- Uranyl nitrate solution containing 50 g of uranium was diluted and discarded.
- About 70 g of uranyl acetate solution was consumed.
- One uranium metal foil (1 g, 20%) was disposed of by Radioactive Waste Management Company under contract to the university.
- Two plutonium-beryllium sources (8 g + 0.2 g) were received at the university from a well-logging company inside the State.

If the IAEA's electronic form is used for submitting changes to information previously provided in a Report on Nuclear Material, then the instructions for updating information on nuclear material provided in the file should be followed. The following instructions are not applicable.

However, ***if the electronic form is not used, and a standard excel worksheet is used***, the following instructions should be followed.

To reflect changes in the updated inventory report, the appropriate line will be modified in the report to indicate the change. The IAEA prefers the State to use a *"track changes"* approach when submitting updates so that it is clear what is being modified.

For the first event, the entire item on line 1 is deleted. This can be shown by changing the font of the text in the first row to be crossed out. This is done by highlighting the row, then selecting *edit*, *font*, *strikethrough*. The row should also be shaded gray to indicate that it has changed. This is done by highlighting the cells, then right clicking to bring up the menu, then select *format cells*, then select *fill* and choose a grey color). A comment can be included in the cell just to the right of the form on that row, with ‘uranyl nitrate solution was diluted and discarded.’

For the second event, there is no need to cross out the line but just to highlight the cell that has changed. In this case, the cell with the number 250 should be shaded grey and the number in the cell changed from 250 to 180 (because 250 g – 70 g = 180g). The comment could be, ‘uranyl acetate solution containing 70g of uranium was used up in experiments.’

For the third event, the same procedure as above for the first event will be done to cross out the text in the row with the standard that has 20% enrichment and 1 gram and highlighting it grey. The comment could be, ‘uranium foil disposed as waste’. The other two rows with the other enrichment foils will not change.

Finally, two new lines can be added to the report to show the new plutonium-beryllium sources, with the mass of each on its respective line. The description of the source with 0.2 g mass should indicate that the mass is 0.2 g. The element code is P. The comment could say, ‘sources received from Golden Oil Company.’

Completed report to reflect Inventory Changes

REPORT ON NUCLEAR MATERIAL Part 2

Name of location:	*Faculty of Natural Sciences*	Visiting address:	*Capital City, University Campus, Science Tower*
Geographical location:	*Central Avenue 25, Capital City, 6765*	Mailing address:	*SQ-1234, P.O.Box 5, 6700*
Owner/Operator:	*Science University of the State*	Page No. *4*	of pages *6*
Accountancy and control procedures:	*Annual physical inventory taking, inventories are recorded in computerised database.*	Date:	2008-Dec-31

	GENERAL DESCRIPTION AND USE OF THE MATERIAL (1)	NUMBER OF ITEMS (2)	TYPE OF MATERIAL (3)	ELEMENT CODE (4)	WEIGHT OF ELEMENT (5)	UNIT (kg or g)	URANIUM ENRICHMENT (% of U-233 or U-235)	ISOTOPE TYPE (6)	Comments
			ACCOUNTANCY DATA				Only for ENRICHED URANIUM		
1	~~*uranyl nitrate left from discontinued biological experiments (enrichment unknown, assume natural)*~~		~~*liquid solution*~~		~~*50*~~	~~*g*~~			discarded in radwaste
2	*uranyl acetate used in the electron microscopy laboratory*		*liquid solution*	*D*	*180*	*g*			70 g consumed in process
3	*Pu-Be neutron source used in physics experiments (nominal Pu weight: 300 mg)*	*1*	*sealed source*	*P*	*0*	*g*			
4	*standard for spectroscopy*	*1*	*metal foil*	*E*	*1*	*g*	*1*	*U-235*	
5	*standard for spectroscopy*	*1*	*metal foil*	*E*	*1*	*g*	*5*	*U-235*	
6	~~*standard for spectroscopy*~~	~~*1*~~	~~*metal foil*~~	~~*E*~~	~~*1*~~	~~*g*~~	~~*20*~~	~~*U-235*~~	discarded in radwaste
7	*Pu-Be neurton source used in physics experiments*	*1*	*sealed source*	*P*	*8*	*g*			received from industry
8	*Pu-Be neurton source used in physics experiments (0.2 g)*	*1*	*sealed source*	*P*	*0*	*g*			received from industry
…									

APPENDIX 3. HOW TO REPORT EXPORTS AND IMPORTS: BLANK FORM, INSTRUCTIONS, SCENARIO AND COMPLETED FORM

Main Page for an Export:

Pre-34(c) Material Exported from [country]

Period: From [from date] to [to date]

Shipping date	Country of final destination	Intermediate Destination	Estimated date of Arrival	Chemical composition	Category code (Element)	Quantity of Contained Element (Kg)	Identification including batch/lot reference (shipping container numbers as attachment if possible)
Comments:					Signature:		Date:

A separate line should be used for each shipment (one date, one destination) and preferably each batch/lot.
Use as many copies of this page as necessary.

Shipping Container Attachment Page 2 for Exports:

Pre-34(c) Material Exported from [country]

Shipping Container attachment

Period: From [from date] to [to date]

Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available

Main Page for an Import:

Material Imported into [country]

Period: From [from date] to [to date]

Receipt date	Country of origin	Intermediate transit State	Date of shipment from origin	Chemical composition	Category code (Element)	Quantity of Contained Element (Kg)	Identification including batch/lot reference (shipping container numbers as attachment if possible)
Comments:					Signature:		Date:

A separate line to be used for each shipment (one date, one destination) and preferably each batch/lot.
Use as many copies of this page as necessary.

The Lot Header Page 2 for an Import contains the same information as the Lot Header Page 2 for an Export.

These forms and the instructions for completing them can be downloaded from the *Assistance for States* webpage.

States with SQPs may wish to use these forms for reporting imports and exports of **both pre-34(c) material as well as 34(c) nuclear material**. Annual reporting of imports and exports is required, but the IAEA prefers that reports are submitted within 30 days of the import or export.

INSTRUCTIONS FOR COMPLETING EXPORT AND IMPORT REPORT FORMS

MAIN PAGE - EXPORT:

Shipping date

- Use DD-MM-YYYY format
- Provide the date the material leaves the exporting state (or a range of dates as appropriate to include all reported exports)

Country of final destination

- The State next taking safeguards responsibility
- This should be the delivery destination on the consignment notice/bills of lading
- For uranium ore concentrate (UOC) usually the State where the converter is located

Intermediate destination(s)

- Transit State(s)
- These are States en route that are not the delivery State
- There may be several

Estimated date of arrival

- Best estimate of arrival date

Chemical composition

- This should be the actual composition of the material (eg U_3O_8, UO_4, Ammonium di-uranium or ADU)

Category code (element)

- For UOC this is ***N*** for natural uranium (other codes include T for thorium, E for enriched uranium, D for depleted uranium, P for plutonium)

Quantity of contained element (kg)

- This is the calculated content of uranium
- If weight is U_3O_8 equivalent, the element weight of uranium should be 84.8% of the total weight. For UO_2, the element weight of uranium is 88% of the total weight.

Identification including batch/lot reference for UOC (shipping container numbers on attachment if possible)

- Identify the lots in the shipment (e.g. Lots 203-227)

MAIN PAGE - IMPORT:

Receipt date

- Use DD-MM-YYYY format
- Provide the date the material arrives in the importing State (or a range of dates as appropriate to include all reported imports)

Country of origin

- The State that exported the material

- This should be the originating destination on the consignment notice/bills of lading

Intermediate transit State(s)

- Transit State(s)
- These are States en route that are not the delivery State
- There may be several

Date of shipment from origin

- This is the date the shipment was sent, as recorded on the shipping documentation

Chemical composition

- This should be the actual composition of the material (eg U_3O_8, UO_4, Ammonium di-uranium or ADU)

Category code (element)

- For UOC this is ***N*** for natural uranium (other codes include T for thorium, E for enriched uranium, D for depleted uranium, P for plutonium)

Quantity of contained element (kg)

- This is the calculated content of uranium
- If weight is U_3O_8 equivalent, the element weight of uranium should be 84.8% of the total weight. For UO_2, the element weight of uranium is 88% of the total weight.

Identification including batch/lot reference for UOC (shipping container numbers on attachment if possible)

- Identify the lots in the shipment (e.g. Lots 203-227)

SHIPPING CONTAINER ATTACHMENT (PAGE 2):

The information provided on the *Lot Page* links the batch/lot reported on the main page to the shipping container number for each lot. This is helpful to the IAEA because the container numbers are common to both the shipper and the receiver, while the lot numbers may not be. The IAEA uses the container numbers to match the imports reported by the receiving State with the exports reported by the shipping State.

FREQUENCY:

The export/import reports must be submitted annually but the IAEA prefers more frequent reporting. The SRA may submit them at the same frequency as the shippers submit them. This reduces the size of reports for States with frequent exports and helps the IAEA to match exports and imports reported by shipping and receiving States in a timely manner.

EXAMPLE SCENARIO FOR REPORTING AN EXPORT FROM THE NORTHWEST MINING COMPANY

The Northwest Mining Company has shipped two batches of uranium ore concentrate (UOC) to State B over the past 3 months. The report submitted by the Northwest Mining Company to State A's SRA provides the following information.

In March, the concentration plant shipped 2 batches of UOC to State B. The first batch transited through State C. Both batches produced U_3O_8. The weight of each full container was reported by the plant as well as the net weight of each container when it is empty. The container numbers for each batch were provided by the Company, as shown below, together with information on the contents.

Batch Number	Container Number	Net weight (kg)	Gross weight (kg)	Ship Date	Destination	Transit States
1	346891	4.80	389.25	10-03-2012	State B	State C
1	259634	4.80	390.30	10-03-2012	State B	State C
1	289715	4.80	391.02	10-03-2012	State B	State C
1	316397	4.80	389.92	10-03-2012	State B	State C
2	203957	4.80	395.89	20-03-2012	State B	-
2	234099	4.80	396.01	20-03-2012	State B	-
2	232309	4.80	397.58	20-03-2012	State B	-
2	230498	4.80	396.45	20-03-2012	State B	-
2	193657	4.80	397.05	20-03-2012	State B	-
2	234098	4.80	398.01	20-03-2012	State B	-

To determine the element weight of uranium in each container, first we determine the weight of UOC, which is the gross weight minus the container's net weight. Recalling that the percent of element uranium in U_3O_8 is 84.8%, we calculate the element weight by multiplying the weight of UOC by 0.848.

For the first container in Batch 1, the calculation is 389.25 kg – 4.80 kg = 384.45 kg. Multiplying 384.45 kg of UOC by 84.8% to determine the weight of uranium gives us 326.01 kg of uranium. The category code for natural uranium is N. The completed export form to be submitted to the IAEA is shown below.

Page 1 of the form:

Pre-34(c) Material Exported from State A

Period: From January to March 2012

Shipping date (dd-mm-yyyy)	Country of final destination	Intermediate Destination	Estimated date of Arrival	Chemical composition	Category code (Element)	Quantity of Contained Element (Kg)	Identification including batch/lot reference (shipping container numbers as attachment if possible)
10-03-2012	State B	State C	15-03-2012	U3O8	N	1307.01	Batch 1 (4 containers on page 2)
20-03-2012	State B	NA	24-03-2012	U3O8	N	1994.66	Batch 2 (6 containers on page 2)
Comments:					Signature:		Date:

A separate line should be used for each shipment (one date, one destination) and preferably each batch/lot.
Use as many copies of this page as necessary.

Page 2 of the form:

Pre-34(c) Material Exported from State A

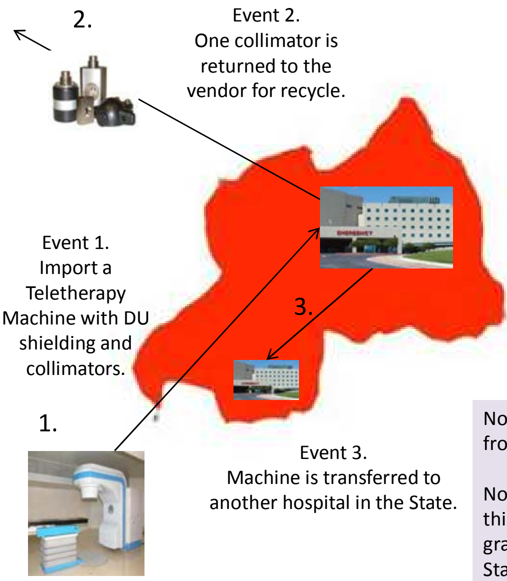
Shipping Container attachment

Period: From January to March 2012

Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available	Batch/Lot number	Shipping Container number if available
1	346891						
1	259634						
1	289715						
1	316397						
2	203957						
2	234099						
2	232309						
2	230498						
2	193657						
2	234098						

APPENDIX 4. EXAMPLES OF COMMON EVENTS IN SQP STATES AND THE ASSOCIATED SAFEGUARDS ACTIVITIES

Teletherapy Equipment with Depleted Uranium Shielding of a Co-60 Source

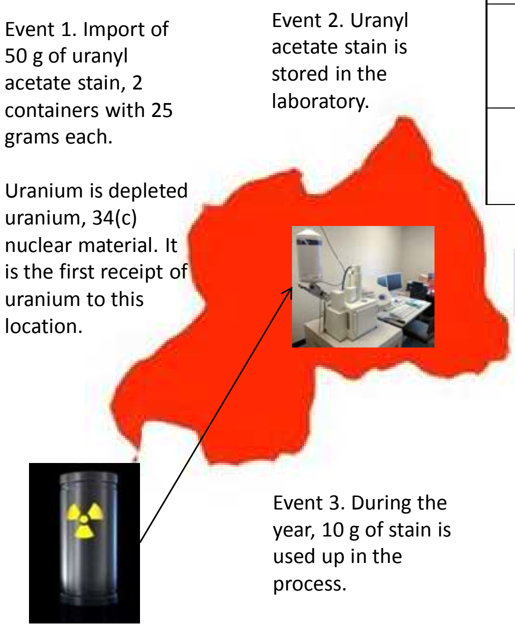


Event	INFCIRC/153 Activity	INFCIRC/153 Form	INFCIRC/540 Activity	INFCIRC/540 Declaration
1	Report imports and exports (annually, or within 30 days, as preferred)	Report of Imports and Exports		
1	Report the inventory change for this LOF (prefer at least annually)	Report on Nuclear Material	Submit the site declaration of this LOF	2.a(iii) Declaration
2	Same reports as for Event 1 - export and inventory change			
3	Report the inventory change for both LOFs (prefer at least annually)	Report on Nuclear Material	Submit the site decl-aration of the 2nd hospital	2.a(iii) Declaration

Note 1: Reports of Import/Export of DU in Event 1 and Event 2 are required from States with original or modified SQPs.

Note 2: Exemption from safeguards may be requested under ModSQP for this material (INFCIRC/153 para. 36(b)). If exemption is requested and granted, the transfer in Event 3 would not be reported to the IAEA, and the State must de-exempt prior to exporting the collimator in Event 2.

Electron microscope laboratory using uranyl acetate contrast stain



Event	INFCIRC/153 Activity	INFCIRC/153 Form	INFCIRC/540 Activity	INFCIRC/540 Declaration
1	Report imports and exports annually (or within 30 days, as preferred)	Report of Imports and Exports		
2	Report the inventory of uranium at this LOF (prefer at least annually)	Report on Nuclear Material	Submit a site declaration for this new LOF	2.a(iii) Declaration
3	Report the change to inventory at this LOF (prefer at least annually)	Report on Nuclear Material		

Note: For nuclear material that will be consumed in a process, exemption should not be requested.

University discovers uranium reference standards and non-destructive testing device

Event 1. While refurbishing a lab, a university finds 2 foil standards and a testing device. Staff suspect uranium may be present and contacts the SRA. The SRA requests photos and documentation to be sent.

Event 2. SRA reviews photos and documentation provided by the university. Information is inconclusive. SRA consults the photos in Appendix 5 and the table in Appendix 6 and identifies the non-destructive testing device as containing 2.5 kg of DU shielding.

Event 3. SRA requests assistance from Ministry of Customs to identify the foil standards. Using a non-destructive measurement device, they identify the foils as 3.5% and 5% enriched uranium, each weighing 1 gram.

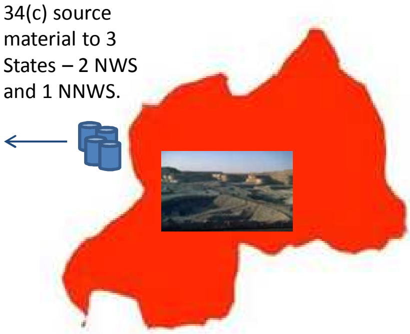
	INFCIRC/153		INFCIRC/540	
Event	Activity	Form	Activity	Declaration
Event 1 - Discovery	No action until material is characterized			
Event 2 – Inventory, Site Declaration	Report the change to inventory of DU at this LOF	Report on Nuclear Material	Submit a site declaration for this LOF	2.a(iii) Declaration
Event 3 - Inventory	Report the change to inventory of enriched uranium at this LOF	Report on Nuclear Material		

Note: Many border guards and customs officials have instruments to characterize radioactive material. The SRA should establish a mechanism for cooperation with those agencies or obtain its own such instrument, e.g. IdentiFinder™. If nuclear material (or suspected nuclear material) is discovered at a border, the IAEA should be notified immediately (within 72 hours or less).

Exports of uranium ore concentrate (UOC)

Event 1. During the 1st quarter of a calendar year, a concentration plant exports UOC that is pre-34(c) source material to 3 States – 2 NWS and 1 NNWS.

Event 2. At the end of the quarter, the plant submits reports to the SRA on each batch of UOC exported to each State. The exports are not specifically for non-nuclear purpose.



Event 3. SRA checks the plant's reports for consistency with licence specifications and prepares reports for submission to the IAEA. The SRA audits the plants' records to validate accuracy of reports and to collect information for AP declarations under 2.a(v) for prior calendar year (due by 15 May).

	INFCIRC/153		INFCIRC/540	
Event	Activity	Form	Activity	Declaration
1	Each export should be subject to State authorization or licensing.			
2	Report the exports to the IAEA. Exports to NNWS must be reported; exports to NWS must be reported if the State participates in the voluntary reporting scheme, and are requested if the State does not participate.	Report on Exports and Imports		
3	Check the plant's records to validate the reports submitted on the exports and to collect information for AP declaration.	Report on Nuclear Material	Declare annual production capacity, location and operational status of the concentration plant	Submit by 15 May for the prior calendar year

Note: UOC produced at a concentration plant may be of a purity and composition suitable for fuel fabrication or for being isotopically enriched, and thus is 34(c) nuclear material. The SRA, concentration plant operator and the IAEA should cooperate in making such a determination.

APPENDIX 5. ESTABLISHING A TECHNICAL COOPERATION PROJECT FOR REGULATORY CAPABILITY DEVELOPMENT

Member States of the IAEA may wish to participate in the IAEA's Programme of Technical Cooperation in order to receive training and assistance in the area of regulatory capability development. TC projects may be national (proposed by one State and carried out in that State), regional (proposed by one or more States, and carried out involving multiple States in a region) or interregional (involving more than one region). States that are not members of the IAEA may participate in interregional projects.

States participating in TC projects appoint a national liaison officer (NLO) who is an individual responsible to act as the main point of contact for the State for all TC matters. If an SRA plans to propose a project to develop regulatory capability, a first step is to identify the State's NLO and coordinate the submission with that individual. If the NLO is not known, the SRA may inquire with the IAEA by writing an email to official.mail@iaea.org, or to the State safeguards country officer.

Information about the process and deadlines for submitting new proposals to TC can be found at the website at http://tc.iaea.org/tcweb/participation/default.asp. The TC programme follows a two year cycle, so effective planning and the timely submittal of documents are essential for successful implementation of a project.

An example project proposal package for a national or regional project to develop regulatory capability is provided in this appendix. The activities and estimates of cost provided in the example are simply illustrative; each project proposal should contain estimates derived from activity-based costing or other internationally accepted cost estimation methods.

The State's NLO can assist the SRA in preparing a project proposal suitable for the needs of that State and region.

EXAMPLE PROJECT TO SUPPORT REGULATORY CAPABILITY DEVELOPMENT IN SAFEGUARDS IMPLEMENTATION

(The information contained in this example project is fictitious. The content provides an example of how a project is constructed, the level of detail appropriate in a project proposal, and the structure of the project planning tables.)

Concept Number: XXXXX
Title: Strengthening Nuclear Regulatory Authority Capabilities for Licensing, Nuclear Material Accounting and Control and Reporting in States with Limited Quantities of Nuclear Material
Original Language Title:
Project Number: XXX
Project Type: National (or regional)
Submitted By: Member State
Field of Activity: 09 - Legal, governmental and emergency preparedness and response infrastructures
Project duration (Total number of years): 2
P**roject duration (Start date):** 2012-01-01
Objective: To contribute to safe, secure and peaceful use of nuclear material in XXXXXXX by strengthening the regulatory authority capabilities for the effective control of and reporting on nuclear material and nuclear activities.
Problem statement: XXXXXXX currently possesses and inventory of nuclear material, primarily depleted uranium used in medical and industrial applications, and is undertaking uranium exploration and considering actively mining uranium. In anticipation of expanded nuclear activities and international nuclear trade, XXXXX needs to expand its capabilities for control and regulation of nuclear activities, and reporting on nuclear material and nuclear activities. Presently the nuclear regulator only monitors exports and imports of nuclear material and is coordinating with the ministry of energy regarding potential uranium mining activities. Therefore, new responsibilities related to the nuclear expansion and also to licensing, control and inspections during the operation of mines and export of uranium products, constitute a challenging task to the regulatory authority. To perform its mandate, the regulatory authority requires training, assistance with regulatory development, licensing, conduct of national inspections/monitoring, outreach to relevant industries, and assistance in establishing the necessary communications and information management infrastructure. It is also important in this regard to develop analysis capabilities, including the ability to characterize seized radioactive material using an instrument such as IdentiFinder^{TM}, as well as computer codes used for safety analyses, radiation protection, and information collection and reporting of nuclear material and related activities.
Linkages with the Country Programme Framework and/or national development plans: Regulatory capability development is included in the Country Programme Framework of XXXXXXX, signed on XX XX XXXX.
Past and present country efforts to address the need: XXXXXX has been actively involved in regional networks established to support effective nuclear regulation. However, assistance at a national level focused on this aspect of nuclear regulation and control has not been requested or provided in the past by other States or by the IAEA.
Past and present support to the country by the IAEA in the same Field of Activity: Participation in various activities covered by regional TC projects that are peripherally related to nuclear control, such as radiation safety, environmental management, and use of nuclear techniques in medicine, has occurred. However, no assistance has been provided by the IAEA in this specific field.
Role of nuclear technology: N/A
Role of the IAEA: The IAEA is expected to share with the XXXXXX regulatory authority staff its experience in identification of specific activities needed to fulfil the project objectives. Moreover, we count on the IAEA support for our specialists' scientific visits and fellowships organized abroad as well as for national workshops and training held in XXXXX on various subjects necessary for the establishment of regulatory infrastructure related to nuclear control, reporting and licensing, consistent with IAEA guidance and international good practices. Finally, we also expect that the IAEA will be able to facilitate access to specialized software used for nuclear regulatory activities, such as Protocol Reporter, RAIS, and provide for the procurement of equipment needed to establish communication and information management infrastructure, such as computer workstations, encrypted transmission of reports, and local area networks.
National counterpart institutions/stakeholders: Main counterpart institution: National Nuclear Regulatory Authority. Responsible person: XXX XXXX. Stakeholders: The project will focus primarily on the development of the technical staff and management of the regulatory authority, who are responsible directly for nuclear material control, reporting and licensing.

End users: Regulatory authority, decision makers responsible for the future direction of XXXXXX nuclear development, people living in the vicinity of, and working in uranium mines.
Partnership: There are no additional donors identified at this stage. There is a possibility to cooperate with experienced regulatory authorities from other countries; they can contribute by providing training and expert services and model or example regulations or licence requirements and procedures (for instance regional networks of nuclear regulators).
Physical infrastructure and human resources: Currently the staff of the regulatory authority relevant sections amounts to 12 employees. It is expected to be increased by 4 persons during the Programme implementation.
Environmental considerations: N/A
Gender considerations: End-users of the project will be both men and women, involved in the regulatory work carried out by the XXXXX regulatory body.
Safety regulatory infrastructure: N/A
Risk management: To be well prepared for the fulfilment of regulatory responsibilities related to the control and reporting of nuclear material and nuclear activities, the regulatory authority needs to train and slightly increase its professional staff. It requires additional financial resources subject to the positive decision of the Government in that regard. Due to financial limitations such a decision may be postponed which might prolong the project implementation. Until the decision in question is undertaken, in the framework of the project the present staff members will be trained.
Strategy: - the professional staff of the regulatory authority will be trained; new regulations will be created defining specific requirements for licences for uranium mines, and for reporting on nuclear material used in medical and industrial sectors. Staff will be trained in outreach to nuclear material users in areas including reporting, control, safety, security and radiation protection. Cooperation with other more experienced regulatory authorities of countries in the region will be strengthened; - a mechanism for sharing good practices will be established.
Implementation arrangements: Regular meetings with other stakeholders in the government involved in nuclear regulation will be organized to exchange views, discuss difficulties and propose solutions. Inside the regulatory authority, representatives of departments involved in related areas such as safety, security, environmental protection, export control and radiation protection will also meet regularly to discuss current developments and outreach to nuclear material users.
Monitoring and progress reporting: During regular meetings of various regulatory body department representatives, the information concerning new opportunities for training for the regulatory staff members will be exchanged and also up-to-date status of currently implemented training will be presented.
Project Budget: EURO 65 000 (IAEA). Trainings or workshops may be funded by other countries; these are anticipated to occur in addition to those anticipated in this plan.

CORE FINANCING										
Year	**Human Resource Components** (Euros)						**Procurement Components** (Euros)			**Total** (Euros)
	Experts	Meetings/ Workshop	Fellow-ships	Scientific Visits	Training Courses	**Sub-Total**	Equipment	Sub-Contracts	**Sub-Total**	
2012	10 000	5 000	5 000	0	5 000	**25 000**	10 000	0	**10 000**	**35 000**
2013	10 000	0	10 000	0	5 000	**25 000**	5 000	0	**5 000**	**30 000**
Blank										

FOOTNOTE-a/ FINANCING										
Year	**Human Resource Components (Euros)**						**Procurement Components (Euros)**			**Total (Euros)**
	Experts	Meetings/ Workshop	Fellow-ships	Scientific Visits	Training Courses	**Sub-Total**	Equipment	Sub-Contracts	**Sub-Total**	
2013	0	0	0	0	0	**50 000**	0	0	**15 000**	**65 000**
First Year Approved : 2012										

Logical Framework Matrix

	Design Element	**Indicator**	**Means of Verification**	**Assumptions**
Outcome	Increased performance and capacity of the XXXX regulatory authority in its duties related to nuclear material accounting and control, licensing and reporting.	Regulatory framework and capabilities are in place to enable the regulatory authority to carry out its responsibilities for nuclear material licensing, accounting and control and reporting.	Issuance of licences to nuclear material users, expanded regulatory framework, provision of regulations and relevant procedures to IAEA for review.	Government commitment to the effective regulation of the use of nuclear material.
Output	1 Enhanced regulatory framework for nuclear control and reporting.	Established regulatory infrastructure, e.g. management system, regulatory approach, plan for regulations, guidance and procedures.	Relevant mission report.	Additional financial resources for increasing the professional staff of the regulatory authority are provided by the Government or through licensee fee collection.
	2 HR development plan associated with the regulatory functions for nuclear material control is adopted.	Draft HR plan in place in the regulatory authority.	Regulatory authority documentation.	HR development plan is implemented.
	3 Trained staff in areas related to nuclear material accounting and control and reporting.	Training completed.	Training reports.	Trained staff retained and engaged in relevant regulatory activities.

Activity	1.1 Establishment of the regulatory authority information system (RAIS) and requirements for licensee reporting.	RAIS installed and training on its use completed. Procedures developed for licensee reporting.	Regulatory authority documentation.	Use of RAIS implemented by regulatory authority and reporting submitted by licensees.
	1.2 Expansion of regulatory basis for nuclear material and nuclear activity reporting. Development of nuclear material tracking system	Regulatory framework reflects expanded approach.	Regulatory policy documents and draft regulations, guidance and procedures as available.	Regulatory approach adopted.
	2.1 Drafting the HR development plan associated with the regulatory functions.	Draft HR development plan in place.	Regulatory authority documentation.	HR development plan is aligned with activities necessary for nuclear material control and reporting.
	3.1 Staff training in specific regulatory areas related to nuclear material control and reporting.	Staff trained.	Training reports.	Trained staff implements the expanded regulatory approach.
Input	1.1.1 Expert reviews the existing procedures for reporting and the status of the regulatory authority and information management.	Expert meeting completed.	IAEA documentation.	Expert available.
	1.2.1 Workshop on nuclear material reporting and control and the State's nuclear material tracking system.	Workshop completed.	IAEA documentation.	Appropriate staff attend workshop and implement improved tracking and reporting.
	1.2.3 Equipment for information management and communication.	Equipment procured and installed.	IAEA documentation.	Equipment is used for its intended applications by appropriate staff.
	2.1.1 Expert reviews HR needs with regulatory body and recommends actions.	Expert meeting completed.	Report.	Expert available; access to necessary information and people at national authority.
	2.1.2 Expert follows up	Expert meeting	Report.	Expert available;

	on implementation of recommendations.	completed.		access to necessary information and staff.
	3.1.1 SQP States preparatory meeting.	Preparatory meeting held.	Meeting report.	Self-assessment updated and conclusions followed in preparation of the assistance mission.
	3.1.2 Mission.	Mission completed.	IAEA documentation.	Experts available.
	3.1.3 National training course on nuclear control, licensing and reporting.	Training course held.	IAEA documentation.	Availability of trainees.
	3.1.4 National workshop on assessment of licence applications, inspections, and outreach.	Workshop held.	IAEA documentation.	Availability of participants.

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Unless a link is provided, the above documents can be downloaded from the Assistance for States webpage at http://www.iaea.org/Safeguards.

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DEFINITIONS

Several terms are defined in INFCIRC/153 (Corr.) and INFCIRC/540 and are provided below for convenience. The IAEA Safeguards Glossary[15] provides definitions of other safeguards terms; only those defined in INFCIRC/153 (Corr.) and INFCIRC/540 (Corr.) are included here.

Term	Reference Definition
Batch	A portion of *nuclear material* handled as a unit for accounting purposes at a *key measurement point* 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.
Book Inventory of a Material Balance Area	The algebraic sum of the most recent *physical inventory* of that *material balance area* and of all *inventory changes* that have occurred since *that physical inventory was* taken.
Closed Down Facility or Location Outside Facilities (AP)	An installation or location where operations have been stopped and the *nuclear material* removed but which has not been decommissioned.
Decommissioned Facility or Decommissioned Location Outside Facilities (AP)	An installation or location at which residual structures and equipment essential for its use have been removed or rendered inoperable so that it is not used to store and can no longer be used to handle, process or utilize *nuclear material*.
Effective Kilogram	A special unit used in safeguarding *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; and (d) For depleted uranium with an *enrichment* of 0.005 (0.595) or below, and for thorium, its weight in kilograms multiplied by 0.00005.
Enrichment	The ratio of the combined weight of the isotopes uranium-233 and uranium -235 to that of the total uranium in question.
Facility	(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.
High Enriched Uranium (AP)	Uranium containing 20 percent or more of the isotope uranium-235
Inventory Change	An increase or decrease, in terms of *batches* of *nuclear material* in a *material balance area;* such a change shall involve one of the following: (a) Increases: (i) Import; (ii) Domestic receipt: receipts from other *material balance areas,* receipts from a non-safeguarded (non-peaceful) activity or receipts at the starting point of safeguards; (iii) Nuclear production: production of special fissionable material in a reactor; and (iv) De-exemption: reapplication of safeguards *on nuclear material* previously exempted therefrom on account of Its use or quantity. (b) Decreases:

15 IAEA Safeguards Glossary (2001 Edition), International Nuclear Verification Series 3, Vienna (2003). This document has no legal status and is not intended to serve as a basis for adjudicating on problems of definition such as might arise during the negotiation or in the interpretation of safeguards agreements or additional protocols.

	(i) Export; (ii) Domestic shipment: shipments to other *material balance areas* or shipments for a non-safeguarded (non-peaceful) activity; (iii) Nuclear loss: loss of *nuclear material* due to its transformation into other element(s) or isotope(s) as a result of nuclear reactions; (iv) Measured discard: *nuclear material* which has been measured, or estimated on the basis of measurements, and disposed of in such a way that it is not suitable for further nuclear use; (v) Retained waste: *nuclear material* generated from processing or from an operational accident, which is deemed to be unrecoverable for the time being but which is stored; (vi) Exemption: exemption of *nuclear material* from safeguards on account of its use or quantity; and (vii) Other loss: for example, accidental loss (that is, irretrievable and inadvertent loss of *nuclear material* as the result of an operational accident) or theft.
Location Outside Facilities (AP)	Any installation or location, which is not a *facility*, where *nuclear material* is customarily used in amounts of one effective kilogram or less.
Location-Specific Environmental Sampling (AP)	The collection of environmental samples (e.g., air, water, vegetation, soil, smears) at, and in the immediate vicinity of, a location specified by the Agency for the purpose of assisting the Agency to draw conclusions about the absence of undeclared *nuclear material* or nuclear activities at the specified location.
Material Balance Area	An area in or outside of a *facility* such that: (a) The quantity of *nuclear material* in each transfer into or out of each "material balance area" can be determined; and (b) The *physical inventory* of *nuclear material* in each "material balance area" can be determined when necessary, in accordance with specified procedures, in order that the material balance for Agency safeguards purposes can be established.
Nuclear Fuel Cycle-Related Research and Development Activities (AP)	Those activities which are specifically related to any process or system development aspect of any of the following: - conversion of *nuclear material*, - enrichment of *nuclear material*, - nuclear fuel fabrication, - reactors, - critical facilities, - reprocessing of nuclear fuel, - processing (not including repackaging or conditioning not involving the separation of elements, for storage or disposal) of intermediate or 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 research and development on industrial radioisotope applications, medical, hydrological and agricultural applications, health and environmental effects and improved maintenance.
Nuclear Material	Any source or any special fissionable material as defined in Article XX of the 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 this Agreement which adds to the materials considered to be source material or special fissionable material shall have effect under this Agreement only upon acceptance by the State. **Article XX of Statute** 1. The term "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 Board of Governors shall from time to time determine; but the term "special fissionable material" does not include source material. 2. The term "uranium enriched in the isotopes 235 or 233" means uranium containing the isotopes 235 or 233 or both in an amount such that the abundance ratio of the sum of these isotopes to the isotope 238 is greater than the ratio of the isotope 235 to the isotope 238 occurring in nature.

	3. The term "source material" means uranium containing the mixture of isotopes occurring in nature; uranium depleted in the 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.
Physical Inventory	The sum of all the measured or derived estimates of *batch* quantities of *nuclear material* on hand at a given time within a *material balance area,* obtained in accordance with specified procedures.
Site (AP)	That area delimited by [the State] in the relevant design information for a *facility*, including a *closed-down facility*, and in the relevant information on a *location outside facilities* where *nuclear material* is customarily used, including a *closed-down location outside facilities* where *nuclear material* was customarily used (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, co-located 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 activities identified by [the State] under Article 2.a.(iv) above. (Article 2.a.(iv) requires “A description of the scale of operations for each location engaged in the activities specified in Annex I to this Protocol.”)

ABBREVIATIONS

CSA	Comprehensive safeguards agreement
DIQ	Design information questionnaire
DIV	Design information verification
IAEA	International Atomic Energy Agency
INFCIRC	IAEA information circular
INIR	Integrated Nuclear Infrastructure Review
INSServ	International Nuclear Security Advisory Service
ISSAS	IAEA SSAC Advisory Service
ITDB	Incident and trafficking database
LOF	Location outside facilities (see definition)
ModSQP	Modified SQP (as shown in Annex II)
NLO	National Liaison Officer (for IAEA Technical Cooperation Programme)
NNWS	Non-nuclear-weapon State (party to the NPT)
NPT	Treaty on the non-proliferation of nuclear weapons
NWS	Nuclear-weapon State (party to the NPT)
PIL	Physical inventory listing
RAIS	Regulatory Authority Information System
SQP	Small quantities protocol
SRA	State or regional authority responsible for safeguards implementation
SSAC	State system of accounting for and control of nuclear material
TC	IAEA Programme of Technical Cooperation
UOC	Uranium ore concentrate

ANNEX I: ORIGINAL TEXT OF A SMALL QUANTITIES PROTOCOL

GOV/INF/276
Annex B

ANNEX B

STANDARD TEXT OF A PROTOCOL TO AN AGREEMENT

PROTOCOL

.... (hereinafter referred to as "...................")
and the International Atomic Energy Agency (hereinafter referred to as "the Agency") have agreed as follows:

I. (1) Until such time as .... has, in peaceful nuclear activities within its territory or under its jurisdiction or control anywhere,

(a) Nuclear material in quantities exceeding the limits stated, for the type of material in question, in Article 36 of the Agreement between .... and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (hereinafter referred to as "the Agreement"), or

(b) Nuclear material in a facility as defined in the Definitions,

the implementation of the provisions in Part II of the Agreement shall be held in abeyance, with the exception of Articles 32, 33, 38, 41 and 90.

(2) The information to be reported pursuant to paragraphs (a) and (b) of Article 33 of the Agreement may be consolidated and submitted in an annual report; similarly, an annual report shall be submitted, if applicable, with respect to the import and export of nuclear material described in paragraph (c) of Article 33.

(3) In order to enable the timely conclusion of the Subsidiary Arrangements provided for in Article 38 of the Agreement, ... shall notify the Agency sufficiently in advance of its having nuclear material in peaceful nuclear activities within its territory or under its jurisdiction or control anywhere in quantities that exceed the limits or six months before nuclear material is to be introduced into a facility, as referred to in section 1 hereof, whichever occurs first.

II. This Protocol shall be signed by the representatives of .... and the Agency and shall enter into force on the same date as the Agreement.

DONE in .... on the .... day of .... 197..
....

ANNEX II: MODIFIED TEXT OF A SMALL QUANTITIES PROTOCOL

GOV/INF/276/Rev.1

ANNEX B

STANDARD TEXT OF A PROTOCOL TO AN AGREEMENT CONCLUDED ON THE BASIS OF GOV/INF/276, ANNEX A

The .... (hereinafter referred to as "................") and the International Atomic Energy Agency (hereinafter referred to as "the Agency") have agreed as follows:

I. (1) Until such time as ....

(a) has, in peaceful nuclear activities within its territory or under its jurisdiction or control anywhere, nuclear material in quantities exceeding the limits stated, for the type of material in question, in Article 36 of the Agreement between .... and the Agency for the Application of Safeguards in Connection with the Treaty on the Non-Proliferation of Nuclear Weapons (hereinafter referred to as "the Agreement"), or

(b) has taken the decision to construct or authorize construction of a facility, as defined in the definitions,

the implementation of the provisions of Part II of the Agreement shall be held in abeyance, with the exception of Articles 32–38, 40, 48, 49, 59, 61, 67, 68, 70, 72–76, 82, 84–90, 94 and 95.

(2) The information to be reported pursuant to paragraphs (a) and (b) of Article 33 of the Agreement may be consolidated and submitted in an annual report; similarly, an annual report shall be submitted, if applicable, with respect to the import and export of nuclear material described in paragraph (c) of Article 33.

(3) In order to enable the timely conclusion of the Subsidiary Arrangements provided for in Article 38 of the Agreement, ... shall:

(a) notify the Agency sufficiently in advance of its having nuclear material in peaceful nuclear activities within its territory or under its jurisdiction or control anywhere in quantities that exceed the limits, as referred to in section (1) hereof, or

(b) notify the Agency as soon as decision to construct or to authorize construction of a facility has been taken,

whichever occurs first.

II. This Protocol shall be signed by the representatives of .... and the Agency and shall enter into force on the same date as the Agreement.

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