
Refresher Course RC-4
P. Lardiez Holgado
Nuclear Security Head
Spanish Nuclear Safety Council
Security of radioactive sources

Measures to prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources
Security Culture

Means characteristics and attitudes in organizations and of individuals which establish that security issues receive the attention warranted by their significance.
Main Believes

- Credible threat exists;
- Nuclear security is important.
Radioactive source

A *radioactive source* means:

- radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form
- includes any radioactive material released if the radioactive source is leaking or broken
- does not include material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors.
**Uses of radioactive sources (I)**

<table>
<thead>
<tr>
<th>Uses (I)</th>
<th>Description</th>
<th>Isotope</th>
<th>Activity Range (Bq)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Irradiators</td>
<td>Used to sterilize food, cosmetics, medical products and supplies, and for other specialized applications such as research applications or for blood irradiation.</td>
<td>cobalt-60</td>
<td>56 to 560,000</td>
</tr>
<tr>
<td></td>
<td></td>
<td>caesium-137</td>
<td>37 to 190,000</td>
</tr>
<tr>
<td>Teletherapy</td>
<td>Used for cancer therapy and are commonly found in medical institutions, such as hospitals or clinics.</td>
<td>cobalt-60</td>
<td>37 to 560</td>
</tr>
<tr>
<td></td>
<td></td>
<td>caesium-137</td>
<td>19 to 56</td>
</tr>
<tr>
<td>Fixed multi-beam teletherapy</td>
<td>Used to focus gamma radiation from an array of over 200 sources on brain lesions (gamma knife). These are commonly found in hospitals or clinics.</td>
<td>cobalt-60</td>
<td>150 to 370</td>
</tr>
</tbody>
</table>
# Uses of radioactive sources (II)

<table>
<thead>
<tr>
<th><strong>Industrial radiography</strong></th>
<th>Used to test the integrity of various materials, as well as for testing welds in pipes and tanks in the petrochemical industry.</th>
<th><strong>Cobalt-60</strong></th>
<th>0.41 to 7.4</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td><strong>Iridium-192</strong></td>
<td>0.19 to 7.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Selenium-75</strong></td>
<td>3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Ytterbium-169</strong></td>
<td>0.093 to 0.37</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Thulium-170</strong></td>
<td>0.74 to 7.4</td>
</tr>
<tr>
<td><strong>High/medium dose rate brachytherapy</strong></td>
<td>Used for cancer therapy and are commonly found in medical institutions, such as hospitals or clinics.</td>
<td><strong>Cobalt-60</strong></td>
<td>0.19 to 0.74</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Caesium-137</strong></td>
<td>0.11 to 0.3</td>
</tr>
<tr>
<td></td>
<td></td>
<td><strong>Iridium-192</strong></td>
<td>0.11 to 0.44</td>
</tr>
</tbody>
</table>
## Uses of radioactive sources (III)

<table>
<thead>
<tr>
<th><strong>Fixed industrial gauges</strong></th>
<th><strong>Uses</strong></th>
<th><strong>Radioactive Isotopes</strong></th>
<th><strong>Concentration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used for process control; for measurement of flow, volume, density, or material presence; and may be placed in locations unsuitable for continuous human presence</td>
<td>californium-252</td>
<td>0.0014</td>
</tr>
<tr>
<td></td>
<td></td>
<td>caesium-137</td>
<td>0.00011 to 1.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>cobalt-60</td>
<td>0.0037 to 0.37</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th><strong>Well logging gauges</strong></th>
<th><strong>Uses</strong></th>
<th><strong>Radioactive Isotopes</strong></th>
<th><strong>Concentration</strong></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Used in areas where exploration for minerals is occurring, such as coal, oil, natural gas</td>
<td>americium-241/beryllium</td>
<td>0.019 to 0.85</td>
</tr>
<tr>
<td></td>
<td></td>
<td>caesium-137</td>
<td>0.037 to 0.074</td>
</tr>
<tr>
<td></td>
<td></td>
<td>californium-252</td>
<td>0.001 to 0.0041</td>
</tr>
</tbody>
</table>
Dangerous source

- Radioactive source “that could, if not under control, give rise to exposure sufficient to cause severe deterministic effects”
- “Severe deterministic effects”
  - “fatal or life threatening or results in a permanent injury that decreases the quality of life”
IAEA Sources Categorization

- simple and logical method for ranking radioactive sources in terms of their potential to cause harm to human health, and for grouping sources and the practices in which they are used into discrete categories.
IAEA Sources Categorization

- Developing or refining national regulatory infrastructures;
- Developing national strategies for improving control over radioactive sources;
- Optimizing decisions about the priorities for regulation within resource constraints;
- Optimizing security measures for radioactive sources, including measures directed against their possible malicious misuse;
- Emergency planning and response.

IAEA Safety Standards
for protecting people and the environment

Categorization of Radioactive Sources

Safety Guide
No. RS-G-1.9

International Atomic Energy Agency
## Categories of radioactive sources

<table>
<thead>
<tr>
<th>Category</th>
<th>Exposure to individual source</th>
<th>Exposure due to source dispersion</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>By Air Risk Area</td>
</tr>
<tr>
<td>1</td>
<td>Extremely dangerous to the person</td>
<td>Ø ≈ 1km</td>
</tr>
<tr>
<td>2</td>
<td>Very dangerous to the person</td>
<td>Ø ≈ Hm</td>
</tr>
<tr>
<td>3</td>
<td>Dangerous to the person</td>
<td>Ø ≈ m</td>
</tr>
<tr>
<td>4</td>
<td>Unlikely to be dangerous to the person</td>
<td>Risk area Ø ≈ m</td>
</tr>
<tr>
<td>5</td>
<td>Most unlikely to be dangerous to the person</td>
<td>No risk</td>
</tr>
</tbody>
</table>
Based on the potential for sources to cause harm to human health

Determined in the first by the “Activity Ratio,” A/D, where:

A = the activity of a source material in a given practice

D = the value which will yield pre-defined (deterministic) dose consequences
## Summary Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Activity Ratio (A/D)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A/D 1000</td>
</tr>
<tr>
<td>2</td>
<td>1000 &gt; A/D 10</td>
</tr>
<tr>
<td>3</td>
<td>10 &gt; A/D ≥ 1</td>
</tr>
<tr>
<td>4</td>
<td>1 &gt; A/D 0.01</td>
</tr>
<tr>
<td>5</td>
<td>0.01 &gt; A/D ≥ Exempt/D</td>
</tr>
</tbody>
</table>
• A/D ratios are calculated for radionuclides in a variety of practices

• The assignment of radionuclides to categories is further refined based on other factors, such as:
  • physical and chemical form
  • source shielding
  • circumstances of source use
  • accident case histories
### Summary Table

<table>
<thead>
<tr>
<th>Category</th>
<th>Source and practice</th>
<th>Activity Ratio</th>
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</thead>
<tbody>
<tr>
<td>1</td>
<td>Radioisotope thermoelectric generators (RTGs)</td>
<td>A/D 1000</td>
</tr>
<tr>
<td></td>
<td>Irradiators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Teletherapy sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Fixed, multi-beam teletherapy (gamma knife) sources</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Industrial gamma radiography sources</td>
<td>1000 &gt; A/D 10</td>
</tr>
<tr>
<td></td>
<td>High/medium dose rate brachytherapy sources</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Fixed industrial gauges that incorporate high activity sources</td>
<td>10 &gt; A/D ≥ 1</td>
</tr>
<tr>
<td></td>
<td>Well logging gauges</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>Low dose rate brachytherapy sources (except eye plaques and permanent implants)</td>
<td>1 &gt; A/D 0.01</td>
</tr>
<tr>
<td></td>
<td>Industrial gauges that do not incorporate high activity sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bone densitometers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Static eliminators</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Low dose rate brachytherapy eye plaques and permanent implant sources</td>
<td>0.01 &gt; A/D ≥ Exempt/D</td>
</tr>
<tr>
<td></td>
<td>X ray fluorescence (XRF) devices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Electron capture devices</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Mossbauer spectrometry sources</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Positron emission tomography (PET) check sources</td>
<td></td>
</tr>
</tbody>
</table>
Aggregate Sources

- Multiple sources in close proximity in a single storage or use location
- If sources with a single radionuclide are aggregated, sum the total activity, $A$, and divide by $D$ to calculate the $A/D$ Ratio
- If sources with several radionuclides are aggregated, use the following formula:

$$\text{Aggregate } \frac{A}{D} = \sum_n \frac{\sum_i A_{i,n}}{D_n}$$

Where:

- $A_{i,n} = \text{Activity of Each Individual Source, } i, \text{ of Radionuclide, } n$
- $D_n = \text{D Value for Each Radionuclide, } n$
Code of Conduct on Safety and Security of Radioactive Sources

- approved by the Board of Governors of the International Atomic Energy Agency (IAEA) on 8 September 2003.
- It replaces the version published by the IAEA in March 2001
Code of Conduct

Scope

- Category 1, 2 and 3 radioactive sources
- Nuclear Material Excluded
  - Except radioactive sources including Pu-239
- State may wish establish regulatory control over radioactive sources within categories 4 and 5
Code of Conduct on Safety and Security of Radioactive Sources

• Not legal binding document

• On 19 September 2003, the General Conference, urged each State to write to the Director General stating:
  • it fully supports and endorses the IAEA’s efforts to enhance the safety and security of radioactive sources; and
  • it is working towards following the guidance contained in the revised Code.
Code of Conduct Status

- More than 80 States have stated their political commitment with the Code
- Presently status could be checked at http://www.iaea.org/Publications/Documents/Treaties/codeconduct_status.pdf
Objectives

- achieve and maintain a high level of safety and security of radioactive sources;
- prevent unauthorized access or damage to, and loss, theft or unauthorized transfer of, radioactive sources, so as to reduce the likelihood of accidental harmful exposure to such sources or the malicious use of such sources to cause harm to individuals, society or the environment; and
- mitigate or minimize the radiological consequences of any accident or malicious act involving a radioactive source.
Code of Conduct
Achievement of the Objectives

• objectives should be achieved through the establishment of
  • an adequate system of regulatory control, applicable from the stage of initial production to final disposal, and
  • a system for the restoration of such control if it has been lost.
General Principles

- Safe and secure management of radioactive sources.
- Effective national legislative and regulatory system
- Appropriate facilities and services
- Training
- National Register of radioactive sources
- Early notification of significant incidents
- Prevention of orphan sources risks
- Recycling of used sources
- Responsibilities of the licensees
- Threat and vulnerability assessments
- Protection of confidentiality of sensible information
Legislation and regulation

- Governmental responsibilities
- Effective control
- Protection against exposure to ionizing radiation
- Specify the requirements for the safety and security
Regulatory Body

- Independence, Power, and Authority
- Resources
- Performance
Import / Export Principles

- Radioactive sources in Categories 1 and 2
- Transfers are undertaken in a manner consistent with the provisions of the Code
- Prior notification
- Import authorization
- Export authorization

- Exceptional Circumstances
- Re-entry of disused sources
- Transit or transshipment through the territory of a State
Security responsibilities distribution, State (I)

- **State**
  - prescribes and assigns *governmental responsibilities* to relevant bodies including an independent regulatory body to assure the security of radioactive sources;
  - establishes *security requirements* for radioactive sources and includes a *system of evaluation and licensing* or other procedures to grant authorizations;
Security responsibilities distribution, State (II)

- **State**
  - places the *prime responsibility* for the security of radioactive sources on the persons being granted the relevant authorizations;
  - provides for *measures to reduce the likelihood of the attempt* of malicious acts;
Security responsibilities distribution, State (III)

- State
  - establishes **punishable offences** covering malicious acts involving radioactive sources;
  - **mitigates or minimizes** the consequences of malicious acts involving radioactive sources.
Security responsibilities distribution, Licensees (I)

- have the **prime responsibility** for implementing and maintaining security measures for their authorized radioactive sources in accordance with national requirements.

- should ensure that their personnel and their contractors are **suitably trained** and meet the requirements for trustworthiness set by the regulatory body.
Security responsibilities distribution, Licensees (I)

- should ensure that the presence of sources is verified at the prescribed intervals, and that any discrepancies are promptly investigated and reported to the regulatory body. Processes should be in place to ensure that, where practicable, all Category 1 and 2 sources for which they are authorized are identifiable and traceable.

- should promote a security culture, and establish a management system commensurate with the levels of security, to ensure that:
Loss of control of radioactive sources

Safety

Inadvertent loss
Or damage

Source
Misplaced
Forgotten

Accident

Loss of control
over the source

Intentional

Radiological
Sabotage

Malicious Motive
Terrorism
Intention to harm

Unauthorized
Movement

Theft
Illegal Purchase
Legal Purchases

Illegal sale
Avoid cost
Extortion

Security

Damage
Illicit acts involving nuclear or radioactive materials

**Innocent Aims**
- Inadvertent movement
  - Loss
  - Abandon
  - Accident

**Criminal Aims**
- Radiological sabotage
  - Radioactive facilities
  - Transportation
- Terrorist attack
  - Radiological Dispersion Devices (RDD)
  - Radiological Exposure Device (RED)
- Illicit trafficking
  - Radioactive material theft
  - Radioactive material smuggling
  - Radioactive material illegal purchase...
Prevention of Malevolent Acts

- Physical protection of radioactive sources
- Recovery of orphan sources and strengthening of control over vulnerable sources
- Prevention of Illicit Trafficking
- Emergency preparedness and respond to minimize or mitigate consequences of malevolent acts.
Physical protection of radioactive sources – Basic Concepts

- Target
- Threat
- Required level of security
• Attractiveness of the sources
• Consequences of the loss of control
Physical protection of radioactive sources – Basic Concepts - Threat

- National threat assessment
- Attributes and characteristics of adversaries who could attempt malevolent acts
- Motivation, intentions and capabilities
- National Community of Intelligence with other agencies and departments
Physical protection of radioactive sources – Basic Concepts - Threat

- Design Basis Threat
  - Regulatory tool
  - Design of physical protection systems
  - Evaluation and upgrade of existing physical protection systems
  - Requirements on the performance of physical protection system
Required security level
Graded approach

- the highest consequence sources should receive the greatest degree of security
  - the current evaluation of the threat,
  - the relative attractiveness of a radioactive source,
  - the nature of the radioactive source and
  - potential consequences associated with the unauthorized removal of and sabotage against
Security functions (I)

- **Deterrence**
  - an adversary is dissuaded from undertaking the attempt.

- **Detection**
  - the discovery of an attempted or actual intrusion which could have the objective of theft or sabotage of a radioactive source.

- **Delay**
  - impedes an adversary’s attempt to gain unauthorized access or to remove or sabotage a radioactive source.
Security functions (II)

- **Response**
  - the actions undertaken following detection to prevent an adversary from succeeding or to mitigate potentially severe consequences.

- **Security management**
  - the development of procedures, policies, records, and plans for the security of radioactive sources
Security functions (II)

- **Response**
  - the actions undertaken following detection to prevent an adversary from succeeding or to mitigate potentially severe consequences.

- **Security management**
  - the development of procedures, policies, records, and plans for the security of radioactive sources
Design and evaluation principles

- Deterrence
- Detection before delay
- Detection requires assessment
- Delay greater than assessment plus response time
- Balanced protection
- Defence in depth
The Principle of Timely Detection

Deter Actions
Begin Action

Adversary Task Time

Delay

PPS Time Required

Detected

Alarm Assessed

Respond

Adversary Interrupted

Defeat Adversary

First Alarm

Time

Task Complete

Mitigate Results
Regulatory approach to establish security requirements

- Establish graded security levels with corresponding goals and objectives for each security level.
- Determine the security level applicable to a given source.
- Select and implement a regulatory approach.
graded security levels with associated goals and objectives

- **Security level A**
  - Prevent unauthorized removal of a source.

- **Security level B**
  - Minimize the likelihood of unauthorized removal of a source.

- **Security level C**
  - Reduce the likelihood of unauthorized removal of a source.
Nuclear Security Branch, October 2008

graded security levels with associated goals and objectives - Detect

<table>
<thead>
<tr>
<th>Security Functions</th>
<th>Security Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Security Level A</td>
</tr>
<tr>
<td>Detect</td>
<td>Provide immediate detection of any unauthorized access to the secured area / source location</td>
</tr>
<tr>
<td></td>
<td>Provide immediate detection of any attempted unauthorized removal of the source (e.g. an insider)</td>
</tr>
<tr>
<td></td>
<td>Provide immediate assessment of detection</td>
</tr>
<tr>
<td></td>
<td>Provide a means to detect loss through verification</td>
</tr>
</tbody>
</table>
graded security levels with associated goals and objectives Delay and Response

<table>
<thead>
<tr>
<th>Security Functions</th>
<th>Security Objectives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Security Level A</td>
</tr>
<tr>
<td></td>
<td>Goal: Prevent</td>
</tr>
<tr>
<td></td>
<td>unauthorized removal</td>
</tr>
<tr>
<td>Delay</td>
<td>Provide delay after detection sufficient for response personnel to interrupt the unauthorized removal</td>
</tr>
<tr>
<td>Response</td>
<td>Respond to assessed alarm in time and with sufficient resources to interrupt and prevent the unauthorized removal</td>
</tr>
</tbody>
</table>
graded security levels with associated goals and objectives Security Management

| Security Functions | Security Level A
Goal: Prevent unauthorized removal | Security Level B
Goal: Minimize likelihood of unauthorized removal | Security Level C
Goal: Reduce likelihood of unauthorized removal |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Delay</td>
<td>Provide delay after detection sufficient for response personnel to interrupt the unauthorized removal</td>
<td>Provide delay to minimize the likelihood of unauthorized removal</td>
<td>Impede the unauthorized removal</td>
</tr>
<tr>
<td>Response</td>
<td>Respond to assessed alarm in time and with sufficient resources to interrupt and prevent the unauthorized removal</td>
<td>Provide immediate initiation of response</td>
<td>Implement appropriate action in the event of unauthorized removal of a source</td>
</tr>
</tbody>
</table>
Nuclear Security Branch, October 2008

graded security levels with associated goals and objectives Security Management

<table>
<thead>
<tr>
<th>Security Functions</th>
<th>Security Objectives</th>
</tr>
</thead>
</table>
| **Security Level A**  
 Goal: Prevent unauthorized removal | **Security Level B**  
 Goal: Minimize likelihood of unauthorized removal | **Security Level C**  
 Goal: Reduce likelihood of unauthorized removal |
| Provide access controls to source location that effectively restrict access to authorized persons only | Provide access controls to source location that effectively restrict access to authorized persons only | Provide access controls to source location that effectively restrict access to authorized persons only |
| Ensure trustworthiness for individuals involved in the management of sources | Ensure trustworthiness for individuals involved in the management of sources | Ensure trustworthiness for individuals involved in the management of sources |
| Identify and protect sensitive information | Identify and protect sensitive information | Identify and protect sensitive information |
| Provide a security plan | Provide a security plan | Provide a security statement |
| Ensure a capability to manage security events covered by security contingency plans | Ensure a capability to manage security events covered by security contingency plans | Ensure a capability to manage security events covered by security contingency plans |
| Establish security event reporting system | Establish security event reporting system | Establish security event reporting system |
## Security levels & Categories of Sources

<table>
<thead>
<tr>
<th>Security Level</th>
<th>Source and practices</th>
<th>Category</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Radioisotope thermoelectric generators (RTGs)</td>
<td>1</td>
</tr>
<tr>
<td></td>
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<td>Teletherapy sources</td>
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<td>High/medium dose rate brachytherapy sources</td>
<td></td>
</tr>
<tr>
<td>C</td>
<td>Fixed industrial gauges that incorporate high activity sources</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td>Well logging gauges</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Apply measures as described in the Basic Safety Standards [5]</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low dose rate brachytherapy (except eye plaques and permanent implants)</td>
<td>4</td>
</tr>
<tr>
<td></td>
<td>Industrial gauges that do not incorporate high activity sources (Typically portable)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bone densitometers</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Static eliminators</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Low dose rate brachytherapy eye plaques and permanent implant sources</td>
<td>5</td>
</tr>
<tr>
<td></td>
<td>X ray fluorescence (XRF) devices</td>
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</table>
Select and implement a regulatory approach.

- Prescriptive approach
- Performance-based approach
- Combined approach
Prescriptive approach

- appropriate combination of threat and potential consequences is low
- simplicity in implementation for both regulatory body and operators
- ease of inspection and auditing.

- relative lack of flexibility to address actual circumstances
- an operator can be in compliance with prescribed measures, and yet not meet the aim of the security system
Performance-based approach

- An effective security system can be composed of many combinations of security measures, that
- Each operator’s circumstances can be unique.
- Requires both the operator and the regulatory body to have relatively high levels of security expertise.
Combined approach

- Flexibility.
Thank you very much for your attention.
Key Principles on Security State (I)

• that the radioactive sources within its territory, or under its jurisdiction or control, are **securely protected** during their useful lives and at the end of their useful lives; and

• the **promotion ... of security culture** with respect to radioactive sources”.

• **prime responsibility for ..., the security of radioactive sources** on the **licensees**;

• **measures to reduce the likelihood of malicious acts, including sabotage**, 

• **Mitigate or minimize the radiological consequences of** accidents or **malicious acts** involving radioactive sources;”
**Key Principles on Security - State (II)**

- **appropriate facilities and services** for *intervention in the event of a malicious act* involving a radioactive source;
- establish a **national register** of radioactive sources. Categories 1 and 2. *information contained should be appropriately protected*.
- **promote awareness** of the safety and *security hazards* associated with orphan sources
- **emphasize** to licensees *their responsibilities for (...) security of radioactive sources*.
- **define its domestic threat**, and assess its *vulnerability with respect to this threat*
Key Principles on Security - Legislation and regulation

- prescribe and assign governmental responsibilities to assure (...) and security of radioactive sources;
- specify the requirements for the safety and security of radioactive sources and of the devices in which sources are incorporated.
- requirements for security measures to deter, detect and delay the unauthorized access to, or the theft, loss or unauthorized use or removal of radioactive sources during all stages of management”
- requirements relating to the verification of the safety and security of radioactive sources, through security assessments, monitoring and verification of compliance, and the maintenance of appropriate records;
Key Principles on Security
- Regulatory Body (I)

- promotes the establishment of a safety culture and of a security culture among all individuals and in all bodies involved in the management of radioactive sources.

- establishes systems for ensuring that, where practicable, radioactive sources are identifiable and traceable, or where this is not practicable, ensures that in place; alternative processes for identifying and tracing those sources are

- ensures that inventory controls are conducted on a regular basis by persons with authorizations;
Key Principles on Security - Regulatory Body (II)

- requires the **prompt reporting** by authorized persons of loss of **control over**, and of incidents in connection with, **radioactive sources**

- provides guidance on appropriate levels of **information, instruction and training on** the safety and **security of radioactive sources to licensees**
Key Principles on Security - Regulatory Body (II)

- requires the **prompt reporting** by authorized persons of loss **of control over**, and of incidents in connection with, **radioactive sources**

- provides guidance on appropriate levels of **information, instruction and training on** the safety and **security of radioactive sources to licensees**
Key Principles on Security
- Regulatory Body (III)

- establish regulations and issue guidance relating to (...) security of radioactive sources;

- require those who intend to manage radioactive sources to seek an authorization, and to submit: (...) and (ii) a security plan or assessment as appropriate;

- obtain any relevant and necessary information from a person with an authorization, in particular if that is warranted by revised safety or security assessments;
Key Principles on Security - Regulatory Body (IV)

- attach clear and unambiguous conditions to the authorizations issued by it, including conditions relating to:
  - minimum performance criteria and maintenance requirements for equipment and systems used to ensure the safety and security of radioactive sources;
  - measures to determine, as appropriate, the trustworthiness of individuals involved in the management of radioactive sources; and
  - the confidentiality of information relating to the security of sources;