

IAEA NUCLEAR SECURITY SERIES NO. \_\_

**FUNDAMENTALS OF A STATE'S *NUCLEAR SECURITY*  
REGIME: OBJECTIVE AND ESSENTIAL ELEMENTS**

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## FOREWORD

[TO BE PROVIDED BY THE SECRETARIAT AT A LATER TIME]

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# 1. INTRODUCTION

## 1.1. Background

Nuclear security focuses on the prevention of, detection of, and response to, criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities, or associated activities*.<sup>1</sup> Other acts determined by the State to have an adverse impact on nuclear security should be dealt with appropriately. Nuclear security, together with nuclear safety and safeguards, is essential for States to enjoy the many benefits of the use of *nuclear material and other radioactive material* in areas including agricultural, industrial, and medical applications, nuclear energy, and many other areas.

The responsibility for nuclear security within a State rests with the State, which has to ensure the security of *nuclear material, other radioactive material, associated facilities, and associated activities* under its jurisdiction. However, the threat of nuclear terrorism has been recognized as a matter of grave concern by all States. States also recognize that the effectiveness of the *nuclear security regime* in one State depends on the effectiveness of the *nuclear security regimes* in other States. There is an increasing need for international co-operation to enhance nuclear security globally.

The evolution of the IAEA's nuclear security activities has occurred within a legal and policy framework that includes the Statute of the IAEA, resolutions of the IAEA Board of Governors and General Conference, resolutions of the UN Security Council and UN General Assembly, as well as the established practices of the IAEA. Various international instruments, adopted under IAEA and other auspices have also contributed to the IAEA's mandate and functions, as well as to the international legal framework, in the nuclear security field. These instruments are described in IAEA International Law Series No. 4, "The International Legal Framework for Nuclear Security."

As part of its efforts in nuclear security the IAEA's Board of Governors has approved a series of Nuclear Security Plans that set out the IAEA programmes for nuclear security. One component of the Nuclear Security Plans has been the development of the Nuclear Security Series of publications. The Nuclear Security Series provides nuclear security fundamentals, recommendations, and implementing and technical guidance for Member States to assist them in implementing new *nuclear security regimes*, or in strengthening existing *nuclear security regimes*. The Nuclear Security Series also serves as guidance for Member States in carrying out their efforts with respect to binding and non-binding international instruments. The Nuclear

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<sup>1</sup> Italicized words in the text represent defined terms. Definitions of the terms are found in Annex I of this document. They are also included in the Nuclear Security Glossary, which sets forth all the defined terms used in the Nuclear Security Series of publications.

Security Series is designed in a tiered approach with the fundamentals-level publication providing the Objective and Essential Elements for the entire *nuclear security regime*, recommendations-level publications outlining what a *nuclear security regime* should do in specific areas of nuclear security, and the implementing and technical guidance publications providing detailed guidance about how to establish specific *nuclear security systems* and *measures*.

This publication, hereinafter referred to as “the *Fundamentals*,” is the primary publication in the Nuclear Security Series. The Objective and the Essential Elements of a *nuclear security regime* set forth in the *Fundamentals* are based on a synthesis of the provisions in the international instruments, the experiences of Member States in their existing *nuclear security regimes*, and the IAEA’s experience in the areas of nuclear security, safety, and safeguards. The *Fundamentals* publication reflects a broad consensus about the Objective and Essential Elements of an appropriate and effective *nuclear security regime*.

## 1.2. Purpose

The purpose of this publication is to provide national policy makers, legislative bodies, *competent authorities*, institutions, and individuals involved in the establishment, implementation, maintenance or sustainability of a State’s *nuclear security regime* with the Objective and Essential Elements of the *nuclear security regime*. The *Fundamentals* sets forth the basis for the Nuclear Security Series of publications. The *Fundamentals* also explains how the binding and non-binding international instruments in nuclear security relate to the Nuclear Security Series of publications.

## 1.3. Scope

The *Fundamentals* applies to *nuclear material*, *other radioactive material*, whether under or out of *regulatory control* and their *associated facilities* and *associated activities* under the jurisdiction of the State.

The Essential Elements provide a basis for the protection of persons, property, society and the environment from criminal or intentional unauthorized acts, and other acts determined by the State to have an adverse impact on nuclear security.

Nuclear security and nuclear safety have in common the aim of protecting persons, property, society and the environment. Security measures and safety measures have to be designed and implemented in an integrated manner to develop synergy between these two areas and also in a way that security measures do not compromise safety and safety measures do not compromise security.

For *nuclear and other radioactive materials* under *regulatory control*, this document pertains only to material used for civil purposes. Member States may decide whether or not to extend the publication's use to other purposes.

## 1.4. Structure

Section 2 presents the Objective of a State's *Nuclear Security Regime*. Section 3 contains the set of Essential Elements of a State's *Nuclear Security Regime*.

## 2. OBJECTIVE OF A STATE'S NUCLEAR SECURITY REGIME

The Objective of a State's *nuclear security regime* is to protect persons, property, society, and the environment from harmful consequences of a *nuclear security event*.

With the aim of achieving this Objective, States should establish, implement, maintain and sustain an effective and appropriate *nuclear security regime* to prevent, detect, and respond to such *nuclear security events*.

The *nuclear security regime* is part of the State's overall security regime. The *nuclear security regime* covers *nuclear material* and *other radioactive material*, whether it is under or out of *regulatory control*, and *associated facilities* and *associated activities* throughout their lifetimes, and it should reflect the risks of harm to persons, property, society, and the environment.

The following set of twelve Essential Elements of an effective and appropriate *nuclear security regime* should be applied insofar as reasonable and practicable.

## 3. ESSENTIAL ELEMENTS OF A STATE'S NUCLEAR SECURITY REGIME

### 3.1. State Responsibility

Responsibility rests with the State for meeting the Objective set forth in section 2 by establishing, implementing, maintaining and sustaining a *nuclear security regime* applicable to *nuclear material*, *other radioactive material*, *associated facilities*, and *associated activities* under a State's jurisdiction.

### 3.2. Identification and Definition of Nuclear Security Responsibilities

Nuclear security responsibilities of *competent authorities* designated by the State as described in Essential Element 3.3, including *regulatory bodies* and those *competent authorities* related to border control and law enforcement, and responsibilities for all *authorized persons* are clearly identified and defined and provisions are identified and defined for appropriate integration and coordination of responsibilities within the *nuclear security regime*, as well as for State's oversight to ensure the continued appropriateness of the nuclear security responsibilities.

### 3.3. Legislative and Regulatory Framework

The legislative and regulatory framework, and associated administrative measures, to govern the *nuclear security regime*:

- i. Establish *competent authorities*, including *regulatory bodies*, with adequate legal authority to fulfil their assigned nuclear security responsibilities;
- ii. Establish the nuclear security responsibilities identified in Essential Element 3.2 of each *competent authority*, including those of the *regulatory bodies* having nuclear security responsibilities, and provide these authorities with adequate and sufficient financial, human and technical resources to fulfil these responsibilities;
- iii. Establish measures to ensure proper coordination and communication among *competent authorities*, and between *competent authorities* and *authorized persons* in fulfilling their nuclear security responsibilities;
- iv. Ensure that *regulatory bodies* have appropriate independence in their nuclear security decision making. Independence includes both functional and financial independence from the entities they regulate and from any other bodies that deal with the promotion or utilization of *nuclear material* or *other radioactive material*;
- v. Provide for the establishment of nuclear security regulations and requirements, and associated procedures for evaluating applications and granting *authorizations* or licenses;
- vi. Provide for the establishment of systems and measures to ensure that *nuclear material* and *other radioactive material* are appropriately accounted for or registered and are effectively controlled and protected;
- vii. Provide for the establishment of regulations and requirements for protecting the confidentiality of *sensitive information* and for protecting *sensitive information assets*;
- viii. Ensure that prime responsibility for the security of *nuclear material*, *other radioactive material*, *associated facilities*, *associated activities*, *sensitive information*, and *sensitive information assets* rests with the *authorized persons*;
- ix. Ensure that there are procedures for the State, or a designated entity, to assume the primary responsibility for security in the absence of *authorized persons*;
- x. Establish law enforcement systems and measures relevant to nuclear security. These systems and measures should include those for the export, import and for border control of *nuclear material* and *other radioactive materials*. This includes security procedures for transport that are consistent with the responsibilities as set forth in Essential Element 3.4 when international transportation is involved;
- xi. Take appropriate and effective steps to prevent, deter, detect, respond to, and otherwise combat illicit trafficking in *nuclear material* and *other radioactive materials*; and
- xii. Establish verification and enforcement measures to ensure compliance with applicable laws, regulations and requirements, including the imposition of appropriate and effective sanctions and criminal or civil penalties.



### **3.4. International Transport of *Nuclear Material* and Other *Radioactive Material***

The responsibility of a State for ensuring that *nuclear material* and *other radioactive material* are adequately protected extends to the international transport thereof, until that responsibility is properly transferred to another State, as appropriate.

### **3.5. Offenses and Penalties Including Criminalization**

A *nuclear security regime* includes measures for:

- i. Defining as offenses or violations under domestic laws or regulations those criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities or associated activities*;
- ii. Appropriately dealing with other acts determined by the State to have an adverse impact on nuclear security;
- iii. Establishing appropriate penalties that are proportionate to the gravity of the harm that could be caused by commission of the offenses or violations;
- iv. Establishing the jurisdiction of the State over such offenses or violations; and
- v. Providing for the prosecution or extradition of alleged offenders.

### **3.6. International Cooperation and Assistance**

A *nuclear security regime* provides for cooperation and assistance between and among States, either directly or through the International Atomic Energy Agency or other international organizations, for:

- i. Making known designated points of contact for notification, assistance and cooperation;
- ii. Providing timely information as appropriate to States affected or likely to be affected or concerned about criminal or intentional unauthorized acts involving or directed at *nuclear material, other radioactive material, associated facilities or associated activities*, or credible threats thereof;
- iii. Providing timely response to requests for assistance on nuclear security-related matters, including requests for the recovery and protection of *nuclear material* and *other radioactive material*; and requests for mutual legal assistance;
- iv. Cooperating and exchanging experiences and information, including on the establishment, implementation, maintenance and sustainability of *nuclear security systems*; and
- v. Ensuring through appropriate arrangements that *sensitive information* or other information exchanged in confidence is adequately and appropriately protected.

### 3.7. Identification and Assessment of *Nuclear Security Threats*

A *nuclear security regime* ensures that:

- i. *Nuclear security threats*, both internal and external to the State, are identified and assessed, including their credibility, regardless of whether the *targets* are within or outside the jurisdiction of the State;
- ii. The State's assessments of *nuclear security threats* are kept up-to-date; and
- iii. The State's assessments are used in implementing the State's *nuclear security regime*.

### 3.8. Identification and Assessment of *Targets* and Potential Consequences

A *nuclear security regime* ensures that:

- i. *Targets* under the State's jurisdiction are identified and assessed to determine if they require protection from *nuclear security threats*;
- ii. The potential consequences should the *targets* be compromised are identified and assessed; and
- iii. An up-to-date assessment of such *targets* is maintained.

### 3.9. Use of Risk-Informed Approaches

A *nuclear security regime* uses risk-informed approaches, including in the allocation of resources for *nuclear security systems* and *measures* and in the conduct of *nuclear security*-related activities, that are based on a *graded approach* and *defense-in-depth*, which takes into account the following:

- i. State's current assessment of the *nuclear security threats*;
- ii. Relative attractiveness of identified *targets* to *nuclear security threats*;
- iii. Characteristics of the *nuclear material*, *other radioactive material*, *associated facilities* and *associated activities*; and
- iv. Potential harmful consequences from criminal or intentional unauthorized acts involving or directed at *nuclear material*, *other radioactive material*, *associated facilities*, *associated activities*, *sensitive information* or
- v. *sensitive information assets*, and other acts determined by the State to have an adverse impact on nuclear security.

### 3.10. Detection of Nuclear Security Events

A *nuclear security regime* ensures that *nuclear security systems and measures* are in place at all appropriate levels to detect and assess *nuclear security events* and to notify the relevant *competent authorities* so that appropriate response actions can be initiated, including:

- i. At *associated facilities*;
- ii. During conduct of *associated activities*;
- iii. At *major public events* or *strategic locations*, including locations of critical infrastructure, as designated by the State;
- iv. In searches for, recoveries of, or discoveries of *nuclear material* or *other radioactive material* that is missing or lost or otherwise out of *regulatory control*; and
- v. Within the State's jurisdiction, including in its territory or on board its ships or aircraft, and at its international borders.

### 3.11. Planning for, Preparedness for, and Response to a Nuclear Security Event

A *nuclear security regime* ensures that throughout the *regime* relevant *competent authorities* and *authorized persons* are prepared to respond, and respond appropriately, at local, national, and international levels to *nuclear security events* by:

- i. Developing arrangements and response plans for ensuring:
  - a. Rapid and effective mobilization of resources in response to a *nuclear security event*;
  - b. Effective coordination and cooperation during response to a *nuclear security event* among all those carrying out response functions (including intelligence, law enforcement, crime scene investigation, and nuclear forensics) and between the security and safety aspects of the response;
  - c. Relevant international emergency assistance and response systems are taken into account; and
  - d. Investigation of any *nuclear security event* and, as appropriate, prosecution of alleged offenders.
- ii. Periodically exercising, testing, and evaluating the plans for effectiveness by relevant *competent authorities* and *authorized persons* with the aim of ensuring timely implementation of comprehensive measures to:
  - a. Mitigate and minimize harmful consequences to persons, property, society, and the environment from *nuclear security events*;
  - b. Locate, recover, and secure *nuclear material* and *other radioactive material* that is out of *regulatory control*;

- c. Feed back into the preparedness process, including into the response plans, the results of exercises and tests of the plans, and of experience.

### 3.12. Sustaining a *Nuclear Security Regime*

A *nuclear security regime* ensures that each organization with nuclear security responsibilities contributes to the sustainability of the *regime* by:

- i. Developing, implementing, and maintaining appropriate and effective integrated management systems including quality management systems;
- ii. Demonstrated leadership in nuclear security matters at the highest levels;
- iii. Developing, implementing and maintaining a robust *nuclear security culture*;
- iv. Allocating sufficient human, financial and technical resources to carry out the organization's nuclear security responsibilities on a continuing basis using a risk-informed approach;
- v. Conducting maintenance and evaluation of the *nuclear security systems*;
- vi. Having in place processes for using best practices and lessons learned from experience;
- vii. Establishing and applying measures to minimize the possibility of *insiders* becoming *nuclear security threats*;
- viii. Identifying and addressing issues and factors that may affect the capacity to provide adequate nuclear security at all times.

## **Annex I Glossary of Terms**

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This Annex contains the definitions of terms used in the document. Users should clearly understand that it is a glossary of terms and not a general dictionary. It should be consulted only to determine the meaning of the defined terms as those terms are used in the document

The definitions of the terms in this Annex *are* arranged alphabetically. Where two defined terms have the same meaning, one entry reads, “See [other defined term entry].” Where the definition of a term is included as a sub-definition of another defined term, the entry will read, “See the definition of [other defined term].”

In some definitions examples have been added in order to assist the reader in understanding the definition. When examples are given they are not intended to be exhaustive, or to limit the definition in any manner.

# Definitions

<b>Associated activity</b>	The possession, production, processing, use, storage, handling, disposal or transport of <i>nuclear material</i> or <i>other radioactive material</i> .
<b>Associated facility</b>	A <i>nuclear facility</i> or <i>radioactive material facility</i> .
<b>Authorization</b>	The granting by a <i>competent authority</i> of written permission for operation of an <i>associated facility</i> or for carrying out an <i>associated activity</i> .
<b>Authorized person</b>	A natural or legal person that has been granted an <i>authorization</i> . An <i>authorized person</i> is often referred to as a "licensee," or "operator."
<b>Competent authority</b>	<p>A governmental organization or institution that has been designated by a State to carry out one or more nuclear security functions.</p> <p>Example: <i>Competent authorities</i> may include <i>regulatory bodies</i>, law enforcement, customs and border control, intelligence and security agencies, health agencies, etc.</p>
<b>Defense-in-depth</b>	The combination of successive layers of systems and measures for the protection of <i>targets</i> from <i>nuclear security threats</i> .

<b>Graded approach</b>	The application of <i>nuclear security measures</i> proportional to the potential consequences of criminal or intentional unauthorized acts involving or directed at <i>nuclear material, other radioactive material, associated facilities</i> or <i>associated activities</i> or other acts determined by the State to have an adverse impact on nuclear security.
<b>Insider</b>	An individual with authorized access to <i>associated facilities</i> or <i>associated activities</i> or to <i>sensitive information</i> or <i>sensitive information assets</i> , who could commit, or facilitate the commission of criminal or intentional unauthorized acts involving or directed at <i>nuclear material, other radioactive material, associated facilities</i> or <i>associated activities</i> or other acts determined by the State to have an adverse impact on nuclear security.
<b>Nuclear facility</b>	A facility (including associated buildings and equipment) in which <i>nuclear material</i> is produced, processed, used, handled, stored or disposed of and for which an <i>authorization</i> or license is required.
<b>Nuclear material</b>	<p><i>Nuclear material</i> is defined to be any material that is either <i>special fissionable material</i> or <i>source material</i> as defined in the IAEA Statute, Article XX.</p> <p>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.</p> <p>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. [IAEA Statute, Article XX]</p> <p>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. [IAEA Statute, Article XX]</p> <p>According to paragraph 112 of INFCIRC/153, "the term source material shall not be interpreted as applying to ore or ore residue."</p>



<b>Nuclear security culture</b>	The assembly of characteristics, attitudes and behaviors of individuals, organization and institutions which serves as a means to support, enhance, and sustain nuclear security.
<b>Nuclear security event</b>	An event that has potential or actual implications for nuclear security that must be addressed.
<b>Nuclear security regime</b>	<p>A regime comprised of:</p> <ul style="list-style-type: none"> <li>• the legislative and regulatory framework and administrative systems and measures governing the nuclear security of <i>nuclear material, other radioactive material, associated facilities, and associated activities</i>,</li> <li>• the institutions and organizations within the State responsible for ensuring the implementation of the legislative and regulatory framework and administrative systems of nuclear security; and</li> <li>• <i>nuclear security systems</i> and <i>nuclear security measures</i> for the prevention of, detection of, and response to, <i>nuclear security events</i>.</li> </ul>
<b>Nuclear security measures</b>	Measures intended to prevent a <i>nuclear security threat</i> from completing criminal or intentional unauthorized acts involving or directed at <i>nuclear material, other radioactive material, associated facilities, or associated activities</i> or to detect or respond to <i>nuclear security events</i> .
<b>Nuclear Security System</b>	An integrated set of <i>nuclear security measures</i> .

<b>Nuclear security threat</b>	A person or group of persons with motivation, intention and capability to commit criminal or intentional unauthorized acts involving or directed at <i>nuclear material, other radioactive material, associated facilities or associated activities</i> or other acts determined by the State to have an adverse impact on nuclear security.
<b>Operator</b>	Any person, organization, or government entity licensed or <i>authorized</i> to undertake the operation of an <i>associated facility</i> .
<b>Other radioactive material</b>	<i>Any radioactive material</i> that is not <i>nuclear material</i> .
<b>Radioactive material</b>	<p><i>Radioactive material</i> is any material designated in national law, regulation, or by a <i>regulatory body</i> as being subject to <i>regulatory control</i> because of its <i>radioactivity</i>.</p> <p>In the absence of such a designation by a State, <i>radioactive material</i> is any material for which protection is required by the IAEA publication “International Basic Safety Standards for Protection against Ionizing Radiation and for the Safety of Radiation Sources,” Safety Series No. 115, current revision which defines radionuclide specific thresholds.</p> <p><i>Radioactive source</i> is a specific use of <i>radioactive material</i> that is defined by how the <i>radioactive material</i> is contained.</p> <p><i>Radioactive material</i> includes sealed and unsealed <i>radioactive material</i> and radioactive waste.</p> <p><i>Radioactivity</i> is the phenomenon whereby atoms undergo spontaneous random disintegration, usually accompanied by the emission of <i>radiation</i>.</p> <p><i>Radiation</i> refers only to ionizing radiation, which is <i>radiation</i> capable of producing ion pairs in biological material(s).</p> <p><i>Radioactive substance</i> and <i>radioactive material</i> have the same meaning. Similarly, the terms <i>other radioactive substance</i> and <i>other radioactive material</i> have the same meaning.</p>
<b>Radioactive material facility</b>	A facility (including associated buildings and equipment) in which <i>other radioactive material</i> is produced, processed, used, handled, stored or disposed of.

<b>Regulatory body</b>	One or more authorities designated by the government of a State as having legal authority for conducting the regulatory process, including issuing <i>authorizations</i> .
<b>Regulatory control</b>	<p>Any form of institutional control applied to <i>nuclear material</i> or <i>other radioactive material</i>, <i>associated facilities</i>, or <i>associated activities</i> by any <i>competent authority</i> as required by the legislative and regulatory provisions related to safety, security, or safeguards.</p> <p>Explanation: The phrase “out of <i>regulatory control</i>” is used to describe a situation where <i>nuclear material</i> or <i>other radioactive material</i> is present in sufficient quantity that it should be under <i>regulatory control</i>, but control is absent, either because controls have failed for some reason, or they never existed.</p>
<b>Sensitive information</b>	Information, in whatever form, including software, the unauthorized disclosure, modification, alteration, destruction, or denial of use of which could compromise nuclear security.
<b>Sensitive information assets</b>	<p>Any equipment or components that are used to store, process, control or transmit <i>sensitive information</i>.</p> <p>Example: <i>Sensitive information assets</i> include control systems, networks, information systems and any other electronic or physical media.</p>
<b>Strategic location</b>	A location of high security interest in the State which is a potential target for terrorist attacks using <i>nuclear</i> or <i>other radioactive material</i> , or a location at which <i>nuclear</i> or <i>other radioactive material</i> that is out of <i>regulatory control</i> is located.

**Target**

*Nuclear material, other radioactive material, associated facilities, associated activities, or other locations or objects of potential exploitation by a nuclear security threat, including major public events, strategic locations, sensitive information, and sensitive information assets..*

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