

IAEA Nuclear Security Series No. 19

Implementing Guide

# Establishing the Nuclear Security Infrastructure for a Nuclear Power Programme



**IAEA**

International Atomic Energy Agency

## THE IAEA NUCLEAR SECURITY SERIES

Nuclear security issues relating to the prevention and detection of, and response to, theft, sabotage, unauthorized access and illegal transfer or other malicious acts involving nuclear material and other radioactive substances and their associated facilities are addressed in the **IAEA Nuclear Security Series** of publications. These publications are consistent with, and complement, international nuclear security instruments, such as the amended Convention on the Physical Protection of Nuclear Material, the Code of Conduct on the Safety and Security of Radioactive Sources, United Nations Security Council Resolutions 1373 and 1540, and the International Convention for the Suppression of Acts of Nuclear Terrorism.

### CATEGORIES IN THE IAEA NUCLEAR SECURITY SERIES

Publications in the IAEA Nuclear Security Series are issued in the following categories:

- **Nuclear Security Fundamentals** contain objectives, concepts and principles of nuclear security and provide the basis for security recommendations.
- **Recommendations** present best practices that should be adopted by Member States in the application of the Nuclear Security Fundamentals.
- **Implementing Guides** provide further elaboration of the Recommendations in broad areas and suggest measures for their implementation.
- **Technical Guidance** publications include: **Reference Manuals**, with detailed measures and/or guidance on how to apply the Implementing Guides in specific fields or activities; **Training Guides**, covering the syllabus and/or manuals for IAEA training courses in the area of nuclear security; and **Service Guides**, which provide guidance on the conduct and scope of IAEA nuclear security advisory missions.

### DRAFTING AND REVIEW

International experts assist the IAEA Secretariat in drafting these publications. For Nuclear Security Fundamentals, Recommendations and Implementing Guides, open-ended technical meeting(s) are held by the IAEA to provide interested Member States and relevant international organizations with an appropriate opportunity to review the draft text. In addition, to ensure a high level of international review and consensus, the Secretariat submits the draft texts to all Member States for a period of 120 days for formal review. This allows Member States an opportunity to fully express their views before the text is published.

Technical Guidance publications are developed in close consultation with international experts. Technical meetings are not required, but may be conducted, where it is considered necessary, to obtain a broad range of views.

The process for drafting and reviewing publications in the IAEA Nuclear Security Series takes account of confidentiality considerations and recognizes that nuclear security is inseparably linked with general and specific national security concerns. An underlying consideration is that related IAEA safety standards and safeguards activities should be taken into account in the technical content of the publications.

ESTABLISHING THE NUCLEAR  
SECURITY INFRASTRUCTURE FOR A  
NUCLEAR POWER PROGRAMME

The following States are Members of the International Atomic Energy Agency:

AFGHANISTAN	GUATEMALA	PANAMA
ALBANIA	HAITI	PAPUA NEW GUINEA
ALGERIA	HOLY SEE	PARAGUAY
ANGOLA	HONDURAS	PERU
ARGENTINA	HUNGARY	PHILIPPINES
ARMENIA	ICELAND	POLAND
AUSTRALIA	INDIA	PORTUGAL
AUSTRIA	INDONESIA	QATAR
AZERBAIJAN	IRAN, ISLAMIC REPUBLIC OF	REPUBLIC OF MOLDOVA
BAHRAIN	IRAQ	ROMANIA
BANGLADESH	IRELAND	RUSSIAN FEDERATION
BELARUS	ISRAEL	RWANDA
BELGIUM	ITALY	SAUDI ARABIA
BELIZE	JAMAICA	SENEGAL
BENIN	JAPAN	SERBIA
BOLIVIA	JORDAN	SEYCHELLES
BOSNIA AND HERZEGOVINA	KAZAKHSTAN	SIERRA LEONE
BOTSWANA	KENYA	SINGAPORE
BRAZIL	KOREA, REPUBLIC OF	SLOVAKIA
BULGARIA	KUWAIT	SLOVENIA
BURKINA FASO	KYRGYZSTAN	SOUTH AFRICA
BURUNDI	LAO PEOPLE'S DEMOCRATIC REPUBLIC	SPAIN
CAMBODIA	LATVIA	SRI LANKA
CAMEROON	LEBANON	SUDAN
CANADA	LESOTHO	SWAZILAND
CENTRAL AFRICAN REPUBLIC	LIBERIA	SWEDEN
CHAD	LIBYA	SWITZERLAND
CHILE	LIECHTENSTEIN	SYRIAN ARAB REPUBLIC
CHINA	LITHUANIA	TAJIKISTAN
COLOMBIA	LUXEMBOURG	THAILAND
CONGO	MADAGASCAR	THE FORMER YUGOSLAV REPUBLIC OF MACEDONIA
COSTA RICA	MALAWI	TOGO
CÔTE D'IVOIRE	MALAYSIA	TRINIDAD AND TOBAGO
CROATIA	MALI	TUNISIA
CUBA	MALTA	TURKEY
CYPRUS	MARSHALL ISLANDS	UGANDA
CZECH REPUBLIC	MAURITANIA	UKRAINE
DEMOCRATIC REPUBLIC OF THE CONGO	MAURITIUS	UNITED ARAB EMIRATES
DENMARK	MEXICO	UNITED KINGDOM OF GREAT BRITAIN AND NORTHERN IRELAND
DOMINICA	MONACO	UNITED REPUBLIC OF TANZANIA
DOMINICAN REPUBLIC	MONGOLIA	UNITED STATES OF AMERICA
ECUADOR	MONTENEGRO	URUGUAY
EGYPT	MOROCCO	UZBEKISTAN
EL SALVADOR	MOZAMBIQUE	VENEZUELA
ERITREA	MYANMAR	VIETNAM
ESTONIA	NAMIBIA	YEMEN
ETHIOPIA	NEPAL	ZAMBIA
FIJI	NETHERLANDS	ZIMBABWE
FINLAND	NEW ZEALAND	
FRANCE	NICARAGUA	
GABON	NIGER	
GEORGIA	NIGERIA	
GERMANY	NORWAY	
GHANA	OMAN	
GREECE	PAKISTAN	
	PALAU	

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

IAEA NUCLEAR SECURITY SERIES No. 19

ESTABLISHING THE NUCLEAR  
SECURITY INFRASTRUCTURE FOR A  
NUCLEAR POWER PROGRAMME

IMPLEMENTING GUIDE

INTERNATIONAL ATOMIC ENERGY AGENCY  
VIENNA, 2013

## COPYRIGHT NOTICE

All IAEA scientific and technical publications are protected by the terms of the Universal Copyright Convention as adopted in 1952 (Berne) and as revised in 1972 (Paris). The copyright has since been extended by the World Intellectual Property Organization (Geneva) to include electronic and virtual intellectual property. Permission to use whole or parts of texts contained in IAEA publications in printed or electronic form must be obtained and is usually subject to royalty agreements. Proposals for non-commercial reproductions and translations are welcomed and considered on a case-by-case basis. Enquiries should be addressed to the IAEA Publishing Section at:

Marketing and Sales Unit, Publishing Section  
International Atomic Energy Agency  
Vienna International Centre  
PO Box 100  
1400 Vienna, Austria  
fax: +43 1 2600 29302  
tel.: +43 1 2600 22417  
email: [sales.publications@iaea.org](mailto:sales.publications@iaea.org)  
<http://www.iaea.org/books>

© IAEA, 2013

Printed by the IAEA in Austria

March 2013

STI/PUB/1591

### **IAEA Library Cataloguing in Publication Data**

Establishing the nuclear security infrastructure for a nuclear power programme : implementing guide. — Vienna : International Atomic Energy Agency, 2013.

p. ; 24 cm. — (IAEA nuclear security series, ISSN 1816-9317 ; no. 19)

STI/PUB/1591

ISBN 978-92-0-138010-4

Includes bibliographical references.

1. Nuclear facilities — Security measures. 2. Radioactive substances — Law and legislation. I. International Atomic Energy Agency. II. Series.

IAEAL

13-00800

## FOREWORD

A nuclear power programme is a major undertaking requiring careful planning, preparation and investment. Establishing an effective nuclear security infrastructure for a nuclear power programme is an essential element in the success of these activities. A comprehensive approach to nuclear security allows the State to manage all nuclear security issues in a holistic manner.

Through its nuclear security programme, the IAEA supports States in establishing, maintaining and sustaining an effective nuclear security infrastructure. The IAEA has adopted a comprehensive approach to nuclear security. This recognizes that an effective national nuclear security regime builds on: the implementation of relevant international legal instruments; the development of a national nuclear security policy and strategy, and national law and regulations; as well as the development of nuclear security systems and measures in key areas including information security, physical protection and the detection of and response to nuclear security events. Through its nuclear security programme, the IAEA aims to assist States in implementing and sustaining their nuclear security infrastructure in a coherent and integrated manner.

Nuclear security is a State responsibility, and developing and implementing an effective national nuclear security infrastructure is a key requirement for any State wishing to embark on a nuclear power programme. An effective national nuclear security infrastructure is vital to ensure that nuclear and other radioactive material does not fall into the hands of parties who could use the material for criminal or terrorist acts, and to prevent acts of sabotage against facilities and associated activities, including during transport. All States share this interest, whether or not they are implementing a nuclear power programme.

The preparation of this publication in the IAEA Nuclear Security Series has been made possible by the contributions of a large number of experts from IAEA Member States. The IAEA is grateful for their contributions in developing and reviewing this publication.

### EDITORIAL NOTE

*This publication does not address questions of responsibility, legal or otherwise, for acts or omissions on the part of any person.*

*Although great care has been taken to maintain the accuracy of information contained in this publication, neither the IAEA nor its Member States assume any responsibility for consequences which may arise from its use.*

*The use of particular designations of countries or territories does not imply any judgement by the publisher, the IAEA, as to the legal status of such countries or territories, of their authorities and institutions or of the delimitation of their boundaries.*

*The mention of names of specific companies or products (whether or not indicated as registered) does not imply any intention to infringe proprietary rights, nor should it be construed as an endorsement or recommendation on the part of the IAEA.*



# CONTENTS

1.	INTRODUCTION.....	1
	Background (1.1–1.8) .....	1
	Objective (1.9–1.10) .....	3
	Scope (1.11–1.13) .....	4
	Structure (1.14–1.16).....	5
2.	NATIONAL NUCLEAR SECURITY POLICY AND STRATEGY (2.1–2.7).....	6
	Actions for establishing the national policy and strategy .....	8
3.	LEGAL AND REGULATORY FRAMEWORK (3.1–3.12).....	10
	Actions for establishing the legal and regulatory framework for nuclear security .....	14
4.	COMMON NUCLEAR SECURITY MEASURES FOR AN EFFECTIVE NUCLEAR SECURITY INFRASTRUCTURE (4.1) ...	20
	National threat assessment (4.2–4.5).....	20
	Actions for development of the national threat assessment .....	21
	DBT or threat assessment for design of nuclear security measures (4.6–4.9) .....	22
	Actions for development of DBT or threat assessment .....	23
	Management system for nuclear security (4.10–4.14) .....	26
	Actions for general aspects of the management system .....	27
	Protection of sensitive information and associated systems (4.15–4.20) ..	29
	Actions for protection of sensitive information and associated systems .....	30
	Trustworthiness of personnel (4.21–4.22).....	32
	Actions for ensuring the trustworthiness of personnel .....	32
	Human resources for nuclear security (4.23–4.29) .....	33
	Actions for human resource development .....	34
	Promotion of a nuclear security culture (4.30–4.34).....	36
	Actions for the promotion of a nuclear security culture .....	37
	Sustaining the national nuclear security infrastructure (4.35–4.36) ...	38
	Actions for sustaining the national nuclear security infrastructure ..	39

5.	NUCLEAR SECURITY MEASURES FOR NUCLEAR MATERIAL AND NUCLEAR FACILITIES (5.1–5.3) . . . . .	41
	Measures against unauthorized removal of nuclear material and sabotage of nuclear facilities (5.4–5.18). . . . .	42
	Actions for the measures against unauthorized removal of nuclear material and sabotage of nuclear facilities. . . . .	44
	Measures against unauthorized removal and sabotage of nuclear material during transport (5.19–5.25). . . . .	49
	Actions for measures against unauthorized removal and sabotage of nuclear material during transport . . . . .	50
6.	NUCLEAR SECURITY MEASURES FOR RADIOACTIVE MATERIAL AND ASSOCIATED FACILITIES AND ACTIVITIES (6.1–6.4). . . . .	53
	General measures (6.5–6.8). . . . .	53
	Actions for general measures. . . . .	54
	Security of radioactive material in use and storage (6.9–6.12). . . . .	55
	Actions for security of radioactive material in use and storage. . . . .	56
	Security of radioactive material in transport (6.13–6.17) . . . . .	57
	Actions for security of radioactive material in transport. . . . .	58
7.	NUCLEAR SECURITY MEASURES FOR NUCLEAR AND OTHER RADIOACTIVE MATERIAL OUT OF REGULATORY CONTROL (7.1–7.10) . . . . .	61
	Actions for preventive measures . . . . .	63
	Actions for detection measures . . . . .	64
	Actions for response measures . . . . .	66
8.	INTERNATIONAL COOPERATION (8.1–8.6) . . . . .	70
	Actions for international cooperation . . . . .	71
	APPENDIX: SUMMARY OF ACTIONS RELATED TO NUCLEAR SECURITY FOR THE RELEVANT PHASES OF A NUCLEAR POWER PROGRAMME . . . . .	75
	REFERENCES . . . . .	81

# 1. INTRODUCTION

## BACKGROUND

1.1. The IAEA has established a nuclear security programme and instituted a series of publications on nuclear security to provide recommendations and guidance that States may use when establishing their national nuclear security infrastructure and implementing nuclear security systems and measures through that infrastructure.

1.2. This Implementing Guide is designed to assist States in understanding and addressing the key actions to establish an effective national nuclear security infrastructure for a nuclear power programme. It should be read in conjunction with the Nuclear Security Fundamentals [1] and Recommendations [2–4], as well as other IAEA Nuclear Security Series publications, as appropriate.

1.3. A comprehensive approach to nuclear security prepares a States to deal with all nuclear security issues in a holistic manner, including changes in the nature of the threats to be managed by the State. This approach recognizes that an effective nuclear security regime builds on:

- Adoption of all relevant international legal instruments;
- Development of a nuclear security infrastructure, including a legal, regulatory and institutional framework and a national nuclear security strategy;
- Implementation of nuclear security measures for nuclear material and facilities [2];
- Implementation of nuclear security measures for radioactive material, associated facilities and associated activities [3];
- Implementation of nuclear security measures for nuclear and other radioactive material out of regulatory control [4].

1.4. To assist States embarking on a nuclear power programme, the IAEA has published Milestones in the Development of a National Infrastructure for Nuclear Power [5]. This addresses the infrastructure needed for the development of a nuclear power programme. It also provides a framework of phases and milestones in the development of a national nuclear infrastructure [5] (Fig. 1).

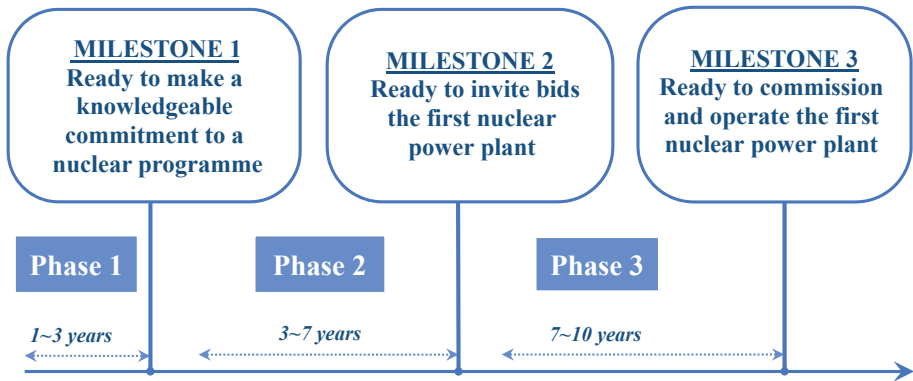


FIG. 1. Phases of infrastructure development for nuclear power.

1.5. The milestones framework allows a Member State to ensure sequentially at each milestone<sup>1</sup> that it has: comprehensively recognized and identified national commitments and obligations associated with the introduction of nuclear power; established and adequately prepared the entire national infrastructure needed to begin construction of a nuclear power plant; and established all of the necessary competencies and capabilities to regulate and operate a nuclear power plant safely, securely, and economically over its lifetime, including decommissioning and management of waste [6].

1.6. To assist States introducing a nuclear power programme, this Implementing Guide adopts the milestones approach [5].<sup>2</sup> The duration of each phase leading to the achievement of each milestone will depend on the resources that a State can commit to each phase and the extent of any existing national nuclear security infrastructure. The time that may be needed to design and implement aspects of the national nuclear security infrastructure does not necessarily coincide with the time taken to implement aspects of the national nuclear safety infrastructure. This publication allows a State

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

<sup>2</sup> This approach recognizes that much of the assistance that the IAEA provides to Member States by way of missions and other specialized services for those embarking on or expanding their nuclear power programme is based on the milestones publication [5], and integration of this approach into the IAEA Nuclear Security Series is an important step in providing a comprehensive service.

to assess from phase to phase and milestone to milestone whether it has effectively designed and implemented its national nuclear security infrastructure.

1.7. As outlined in para. 1.6, this Implementing Guide is structured to cover all aspects of the nuclear security infrastructure for a State, including actions related to nuclear material, other radioactive material and their associated facilities and associated activities as well as nuclear and other radioactive material out of regulatory control. As a consequence, certain parts of this Implementing Guide may not fully correspond with the phases and milestones related to the establishment of a nuclear power programme, although suggestions for the sequence of their implementation, through actions, is made having regard to the phases and milestones. In all cases the nuclear security infrastructure should be established as early as possible. For States that wish to embark on a nuclear power programme, the recommended actions should be fully implemented before the milestones that have been set.

1.8. There are synergies and interfaces between safety, security, and safeguards, including nuclear material accountancy and control, that a State should recognize when establishing its nuclear security infrastructure. In particular, States should actively engage in the international cooperation that strengthens safety, security and safeguards. States should also ensure full cooperation and coordination between competent authorities<sup>3</sup> responsible for these key areas, both nationally and internationally. This issue will not be discussed in detail in this Implementing Guide; however, the relationship between all three is recognized and taken into account throughout the publication. Nuclear security, safety and safeguards should be considered during each phase of the development process of a nuclear power programme. They should be developed as far as possible in a well coordinated manner (for example, for safety see Refs [6, 7]).

## OBJECTIVE

1.9. The objective of this Implementing Guide is to provide guidance on the actions that should be taken by a State to establish an effective national nuclear security infrastructure for a nuclear power programme.

---

<sup>3</sup> A competent authority is a governmental organization or institution that has been designated by a State to carry out one or more nuclear security functions [2]. For example, competent authorities include regulatory bodies, law enforcement, customs and border control, intelligence and security agencies, etc. [3, 4]. Another example is the competent authority for transport.

1.10. States that do not intend to embark on a nuclear power programme, or already have an established nuclear power programme, will find the actions in this Implementing Guide to be useful when assessing and/or establishing the national nuclear security infrastructure for activities related to nuclear and other radioactive material, associated facilities and associated activities, as well as for dealing effectively with nuclear and other radioactive material out of regulatory control<sup>4</sup>.

## SCOPE

1.11. This Implementing Guide is primarily for national legislatures and other entities that will be involved in the establishment of the national nuclear security infrastructure and the implementation of nuclear security systems and measures through that infrastructure.

1.12. This publication covers: development of the national policy and strategy for the national nuclear security infrastructure; development of the legal and regulatory framework for the national nuclear security infrastructure; common nuclear security systems and measures for nuclear security infrastructure; development of a nuclear security infrastructure for nuclear and other radioactive material, associated facilities and associated activities, and systems and measures to address material out of regulatory control; and international cooperation.

1.13. This Implementing Guide is limited to nuclear security. It does not cover the safety and safeguards infrastructure to be developed by a State. These subjects are covered in other IAEA publications [6, 7]. States should take into account the related requirements of non-proliferation (safeguards) and safety in an integrated manner with nuclear security.

---

<sup>4</sup> Regulatory control is any form of institutional control applied to nuclear material or other radioactive material, associated facilities, or associated activities by any competent authority as required by the legislative and regulatory provisions related to safety, security and safeguards. The phrase 'out of regulatory control' is used to describe a situation where nuclear or other radioactive material is present without an appropriate authorization, either because controls have failed for some reason, or they never existed. [4]

## STRUCTURE

1.14. Following this introduction, Sections 2 and 3 provide guidance for the development of a national nuclear security policy and strategy and an associated legal and regulatory framework as fundamental parts of a national nuclear security infrastructure. Section 4 addresses common nuclear security systems and measures to be implemented through an effective nuclear security infrastructure within a State. Section 5 addresses nuclear security systems and measures for nuclear material and nuclear facilities. Section 6 addresses nuclear security systems and measures for other radioactive material, associated facilities, and associated activities. Section 7 addresses nuclear security systems and measures for nuclear and other radioactive material out of regulatory control. Section 8 provides guidance on international cooperation.

1.15. Each section details actions for establishing and sustaining an effective national nuclear security infrastructure. These actions make up a checklist that may be referred to in order to assess a State's progress toward establishing the national nuclear security infrastructure at each stage of development and subsequent implementation of systems and measures. The actions are a set of measurable indicators of a State's progress in establishing its nuclear security infrastructure and refer to 'phases' and the 'infrastructure milestones', where appropriate. The actions are derived from specific IAEA publications and other relevant references are also referred to in the text of each section.

1.16. The Appendix provides a summary of the actions in tabular form indicating phases to be completed leading to the achievement of each milestone.

## 2. NATIONAL NUCLEAR SECURITY POLICY AND STRATEGY

2.1. Nuclear security is a State responsibility and establishing an effective national nuclear security infrastructure is a key prerequisite for any State wishing to embark on a nuclear power programme. An effective national nuclear security infrastructure is vital to ensure that nuclear and other radioactive material does not fall into the hands of those who could use the material for criminal or unauthorized acts, and also to prevent acts of sabotage against associated facilities and associated activities, including during transport. All States share this interest, whether or not they have or are embarking upon a nuclear power programme.

2.2. The importance of nuclear security needs to be recognized and reflected in every State's policy related to the use of nuclear technology. This is particularly important in relation to a planned nuclear power programme.

2.3. The nuclear security policy and strategy developed by a State should:

- Be based upon the State's national security policy;
- Identify the State's international obligations contained in international legal instruments in relation to nuclear security;
- Take into account good practices in nuclear security as set out in relevant guidance documents;
- Identify the elements of a comprehensive nuclear security infrastructure, including appropriate systems and measures for prevention, detection, and response to nuclear security events<sup>5</sup>;
- Identify, and assign responsibilities to, the institutions within the State that will establish, maintain, evaluate, and sustain the nuclear security infrastructure and mechanisms for coordination and cooperation, and implement nuclear security systems and measures through that infrastructure;
- Identify measures to effectively sustain, and to continuously improve and update the nuclear security infrastructure through knowledge management, succession management, and appropriate programmes for capacity building, including training infrastructure;

---

<sup>5</sup> A nuclear security event is an event that has potential or actual implications for nuclear security that must be addressed [3, 4]. In the context of physical protection measures, it is an event that is assessed as having implications for physical protection [2].



- Identify the State’s relationship with key international institutions, such as the IAEA, and with other States, including through multilateral and bilateral arrangements;
- Identify an appropriate process to facilitate the sharing of information and to achieve the goals of combating offences related to nuclear security events including terrorist acts;
- Identify nuclear security measures for response to nuclear security events to ensure the safe and secure recovery of nuclear and other radioactive material out of regulatory control and ensure that such material is placed under regulatory control;
- Identify measures for prosecuting and/or extraditing alleged offenders for offences related to nuclear security events.

2.4. The State should establish a high level coordinating mechanism<sup>6</sup> that brings together representatives of all competent authorities that have responsibilities relating to nuclear security. The roles and responsibilities of the competent authorities should be identified early in the planning stages for the establishment of the State’s national nuclear security infrastructure.

2.5. The State should ensure proper coordination among the competent authorities in relation to the roles and responsibilities of each, and to facilitate information exchange on a secure basis.

2.6. Each competent authority should have the authority and resources to fulfil its responsibilities in relation to nuclear security. Competent authorities responsible for the national nuclear security infrastructure may operate at the national, state and/or local levels.

2.7. The following actions (2-1 to 2-12) for establishing the national policy and strategy for nuclear security have been derived from the IAEA Nuclear Security Recommendations publications [2–4].

---

<sup>6</sup> While the coordinating mechanism is a process, it may be undertaken by a body, and that may be referred to as a coordinating body. An example of a coordinating body is a committee with representatives of all relevant competent authorities. If the State has a federal structure, the coordinating body could be established at the federal and at the state level. [4].

## ACTIONS FOR ESTABLISHING THE NATIONAL POLICY AND STRATEGY

*The national nuclear security policy and strategy as part of the nuclear security infrastructure should be in place by the end of Phase 1 and prior to Milestone 1 and fully implemented during Phase 2 and prior to Milestone 2 and reviewed and updated in Phase 3 and prior to Milestone 3.*

### **Phase 1: Considerations before a decision to launch a nuclear power programme**

**Action 2-1:** The State should undertake a national threat assessment for nuclear security.

**Action 2-2:** The State should assess its national security infrastructure based on the threat assessment, and should prepare recommendations for its national security infrastructure to be strengthened or updated, as appropriate, in areas that affect or are affected by nuclear security.

**Action 2-3:** The State's policy should recognize the need for a strong nuclear security culture to be established and maintained as a key part of an effective national nuclear security infrastructure.

**Action 2-4:** The State should identify the existing competent authorities that have roles and responsibilities to carry out nuclear security functions and should identify the need to establish new competent authorities.

**Action 2-5:** The State should establish a process for developing national nuclear security infrastructure and implementing the necessary systems and measures, and ensure appropriate representation and participation from all of the relevant competent authorities.

**Action 2-6:** The State should establish contact with other States and international organizations to seek assistance, as appropriate, on matters related to its national nuclear security infrastructure.

**Action 2-7:** The State and all competent authorities should have a plan to strengthen cooperation, nationally with counterparts in other competent authorities and internationally with other States, on matters related to nuclear security.

**Action 2-8:** The State should ensure that a high level assessment is undertaken of the requirements related to nuclear security for the design, construction, and operation of a nuclear facility and related activities.

**Action 2-9:** The State should ensure that the national nuclear security strategy specifies the nuclear security infrastructure that is needed. This strategy should identify all of the relevant actions to be taken.

**Action 2-10:** The State should identify the necessary resources, financial and human, that are needed for the implementation of the national policy and strategy.

**Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 2-11:** The State should periodically review and update the national policy and strategy including through an updated national threat assessment.

**Phase 3: Activities to implement the first nuclear power plant**

**Action 2-12:** The State should ensure that the national policy and strategy are reviewed, amended, and adjusted as necessary, including through updated national threat assessments.

### 3. LEGAL AND REGULATORY FRAMEWORK

3.1. Following the development of the State's nuclear security policy and strategy, its implementation relies upon the establishment of an appropriate legal and regulatory framework that is in compliance with the international legal framework for nuclear security.

3.2. Each State should become a party to all relevant international conventions and agreements that relate to nuclear security to demonstrate commitment to the international legal framework. The following international conventions contain obligations that States should meet in establishing their national nuclear security infrastructure, including those related to the transport of nuclear and other radioactive material:

- The Convention on the Physical Protection of Nuclear Material (1979) [8];
- Amendment to the Convention on the Physical Protection of Nuclear Material (2005) (not yet in force<sup>7</sup>) [9];
- International Convention for the Suppression of Terrorist Bombings (1997) [10];
- International Convention on the Suppression of the Financing of Terrorism (1999) [11];
- International Convention for the Suppression of Acts of Nuclear Terrorism (2005) [12];
- Protocol to the IMO Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation (2005) [13];
- Protocol to the IMO Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf (2005) [14];
- Beijing Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation (2010) and the Beijing Protocol to the 1971 Hague Convention on the Suppression of Unlawful Seizure of an Aircraft (2010) [15].

3.3. The United Nations Security Council has adopted the following legally binding resolutions under Chapter VII of the UN Charter that contain provisions which are relevant to nuclear security and, as such, should be implemented within a State as part of establishing a national nuclear security infrastructure:

---

<sup>7</sup> The Amendment to the CPPNM will enter into force on the thirtieth day after the date on which it has been ratified, accepted, or approved by two thirds of the States parties to the CPPNM.

- United Nations Security Council Resolution 1373 (2001) on international cooperation to combat threats to international peace and security caused by terrorist acts [16];
- United Nations Security Council Resolution 1540 (2004) obliging States to refrain from supporting by any means non-State actors from developing, acquiring, manufacturing, possessing, transporting, transferring or using nuclear, chemical or biological weapons and their delivery systems [17].

3.4. The broader international legal framework includes the: Convention on Nuclear Safety (1994) [18]; Treaty on the Non-Proliferation of Nuclear Weapons (1970) [19]; Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management (1997) [20]; Convention on Early Notification of a Nuclear Accident (1986) [21]; and Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986) [22].

3.5. The following are non-binding international legal instruments that relate to nuclear security:

- Code of Conduct on the Safety and Security of Radioactive Sources [23];
- Guidance on the Import and Export of Radioactive Sources [24].

3.6. In addition, the following provide guidance on implementing nuclear security measures that should be considered when establishing a national nuclear security infrastructure:

- IAEA International Law Series No. 4 [25];
- Publications in the IAEA Nuclear Security Series;
- Guidelines for transfers of nuclear related dual use equipment, material, and related technology (INFCIRC 254/Rev 7/Part 2) [26].

3.7. The State's overall legal and regulatory framework should fully reflect all elements that are necessary for an effective national nuclear security infrastructure. Further guidance on these matters can be found in the IAEA's Handbook on Nuclear Law [27] and Handbook on Nuclear Law: Implementing Legislation [28].

3.8. The legal and regulatory framework in the national nuclear security infrastructure may differ from State to State and be dependent on the existing arrangements for regulation of the peaceful uses of nuclear energy. In some States the competent authority with responsibility for assessing the nuclear security infrastructure may be different from the competent authority with

responsibility for authorization or licensing decisions<sup>8</sup>. In this publication all actions that relate to assessment, authorization, or approvals are referred to as being the responsibility of a regulatory authority even in circumstances where States may choose to assign these responsibilities to more than one competent authority<sup>9</sup>; or where the State chooses to assign these responsibilities to the regulatory authority that also assesses nuclear safety and in some cases radiation protection. The assessment and approval of nuclear security for the transport of nuclear and other radioactive material are referred to as being the responsibility of the “competent authority for transport”<sup>10</sup>.

3.9. States should adopt legislative provisions for the criminalization of defined acts<sup>11</sup> consistent with relevant international legal instruments related to nuclear security as well as legislative provisions on prosecution, extradition, and jurisdiction.

3.10. Effective implementation of the necessary nuclear security systems and measures through the national nuclear security infrastructure relies on the appropriate legal and regulatory framework supporting competent authorities that have responsibilities in the following areas, and the interfaces between them:

---

<sup>8</sup> While an authorization is commonly referred to as a licence in some States, the term ‘authorization’ is used throughout this publication.

<sup>9</sup> A regulatory authority is a ‘competent authority’. However, as the actions in this section refer in particular to regulatory actions, the term ‘regulatory authority’ rather than ‘competent authority’ is used.

<sup>10</sup> It is recognized that not all competent authorities for transport assess both safety and security. However, for simplicity only one competent authority for transport is referred to in this publication.

<sup>11</sup> A criminal act is normally covered by criminal or penal law in a State whereas an ‘unauthorized act’ is typically the subject of administrative or civil law. In addition, criminal acts involving nuclear or other radioactive material may constitute offences related to nuclear terrorism, including those set out in the Convention on the Physical Protection of Nuclear Material [8] and its Amendment [9] and the International Convention for the Suppression of Acts of Nuclear Terrorism [12], all of which in some States are the subject of special legislation. Unauthorized acts with nuclear security implications could include both intentional and unintentional unauthorized acts as determined by the State. Examples include: (1) the undertaking of an unauthorized activity involving radioactive material by an authorized person; (2) the unauthorized possession of radioactive material by a person with the intent to commit a criminal or unauthorized act with such material, or to facilitate the commission of such acts; (3) the failure of an authorized person to maintain adequate control of radioactive material; thereby making it accessible to persons intending to commit a criminal or unauthorized act, using such material [4].

- Overall national security;
- Regulation of nuclear security, including physical protection;
- Information security, including that of information in electronic form and computer security (cyber security);
- Nuclear material accountancy and control elements of safeguards obligations;
- Regulation of nuclear safety and radiation protection;
- Intelligence collection and evaluation, including threat assessment;
- Customs;
- Border protection and monitoring, including control of immigration;
- Security arrangements for the transport of nuclear and other radioactive material by land;
- Security arrangements for the transport of nuclear and other radioactive material by air;
- Security arrangements for the transport of nuclear and other radioactive material by sea;
- Law enforcement;
- Prosecution and adjudication of alleged offences;
- Public health and medical surveillance;
- Contingency and response plans and the interface of these plans with emergency response;
- Response forces.

3.11. The State should ensure the appropriate assignment of responsibilities for implementation of the various nuclear security functions to the relevant competent authorities. The assignment of roles and responsibilities is usually done through legislation or administrative arrangements, consistent with national practice.

3.12. The following actions (3-1 to 3-26) for establishing the legal and regulatory framework for nuclear security have been derived from a number of IAEA publications [1–4, 25, 27, 28].

## ACTIONS FOR ESTABLISHING THE LEGAL AND REGULATORY FRAMEWORK FOR NUCLEAR SECURITY

*The legal framework for nuclear security should be defined by the end of Phase 1 and prior to Milestone 1 and be well established and fully implemented at the end of Phase 2 and prior to Milestone 2. The regulatory framework for nuclear security should be in place at the end of Phase 2 and prior to Milestone 2.*

### **Phase 1: Considerations before a decision to launch a nuclear power programme**

**Action 3-1:** The State should identify all relevant international instruments and guidance documents related to nuclear security and plan to take action to become parties to each binding legal instrument.

**Action 3-2:** The State should identify all necessary elements of a domestic legal and regulatory framework for nuclear security arising from the international legal instruments, and plan to implement them through new or amended legislation. In particular, national legislation should:

- Establish and/or identify all of the relevant competent authorities for nuclear security and ensure that appropriate legal authority is given to each;
- Establish effective and independent competent authority(ies) with regulatory responsibilities.

**Action 3-3:** The State should identify the necessary expertise to establish the legal and regulatory framework and request international assistance if necessary and appropriate.

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 3-4:** The State should establish its legislative and regulatory programme to provide for all competent authorities, including regulatory authorities, with a role in the national nuclear security infrastructure to have appropriate legal authority. This may include:

- A system of authorization (such as licences, permits, certifications, approvals), including the authority to issue, amend, revoke, cancel or suspend such authorizations;
- Authority to impose conditions or qualifications on an authorization;



- Authority to conduct inspections and compliance monitoring, including site access, power to require production of documents, examination or interview of personnel, and powers related to seizure and retention of evidence, including notices, warrants or similar processes;
- Provisions related to legal protection of individuals who provide information for the purpose of protecting the integrity of nuclear security (also called protected disclosure or whistleblowing legislation);
- Authority to undertake enforcement action;
- Provisions related to the consequences of breach of or non-compliance with legislative provisions including a system of administrative or civil penalties;
- Provisions related to appeal or review of decisions and actions;
- Provisions related to the imposition of obligations in relation to the protection of sensitive information;
- Provisions related to the exchange of nuclear security related information among competent authorities and with other States and relevant international organizations;
- Provisions that relevant personnel are trustworthy;
- A system for import and export controls for radioactive material, including nuclear material.

**Action 3-5:** The State should include in its legal and regulatory framework the requirement for a national threat assessment, a design basis threat (DBT) for a nuclear power plant and, as appropriate, a DBT or a threat assessment using an alternative threat based approach for other material and facilities.

**Action 3-6:** The State should take steps to ensure that its domestic law establishes criminal offences consistent with its obligations under the relevant international conventions, whether contained in its nuclear security legislation, penal or criminal code or other legislation, as appropriate. Such offences should include:

- Intentional unauthorized acquisition, possession, use, transfer, transport, import, export, disposal or dispersal of nuclear material or other radioactive material;
- A threat or an attempt to commit an offence of unauthorized acquisition, possession, use, transfer, transport, import, export, disposal or dispersal of nuclear material or other radioactive material;
- Sabotage of nuclear or other radioactive material, associated facilities or associated activities;
- Acts that constitute a hoax or a scam with nuclear security implications.

**Action 3-7:** The State should take appropriate legal steps to establish its jurisdiction over any criminal act associated with a nuclear security event: when the offence is committed in the State's territory or on board a ship or aircraft registered in that State; when the alleged offender is a national of the State; or when the alleged offender is present in the State's territory and it does not extradite the alleged offender.

**Action 3-8:** The State should assess its laws related to extradition and take steps to ensure that the laws are consistent with its obligations under relevant international instruments that relate to extradition in the context of a criminal act that has nuclear security implications. It should take steps to amend its laws if the existing laws are not consistent with international obligations imposed by the international legal instruments.

**Action 3-9:** The State should ensure that appropriate penalties<sup>12</sup> are in place for each offence and that the penalties appropriately reflect the gravity of the offences. In determining the penalties for these offences the State should consider the deterrent effect of the penalties that are imposed.

**Action 3-10:** The State should review arrangements and enter into effective mutual legal assistance agreements to ensure that appropriate assistance arrangements are in place between it and other States so that effective prosecution of alleged offences related to nuclear security can occur.

**Action 3-11:** The State should ensure that appropriate arrangements are in place between competent authorities to ensure that all requirements are met to facilitate the successful prosecution of offences and enforcement of civil and administrative penalties.

**Action 3-12:** The State should ensure that its national legislation clearly sets out those unauthorized acts that are not categorized as criminal offences but still call for redress through enforcement measures, including administrative or civil penalties. Such acts may include breaches and non-compliance related to the following in circumstances where the breach was unintentional and there is no other evidence that indicates the commission of an offence:

---

<sup>12</sup> Also referred to as 'sanctions'. The term 'penalty' is used throughout the rest of this publication.

- Receipt, possession, use, transfer disposal or dispersal of nuclear or other radioactive material without necessary authorization;
- Transport of material without required approval;
- Import or export of material without required approval;
- Failure to comply with conditions or other obligations imposed by the authorization or approval to receive, possess, use, transfer, dispose of, transport, import, or export material.

**Action 3-13:** The State should ensure that each competent authority has the appropriate technical, financial, and human resources to carry out its role and responsibilities and the authority to obtain appropriate expertise as needed.

**Action 3-14:** Each competent authority should have in place processes and procedures by which it carries out its role within the nuclear security infrastructure.

**Action 3-15:** The regulatory authority should have all necessary regulations, codes, standards and guidance in place for the review, assessment and approval of actions, and for the issuance of all authorizations required, related to nuclear security systems and measures during the lifetime of the facility. This includes siting, design, construction, commissioning and subsequent operation, waste management, and decommissioning.

**Action 3-16:** The regulatory authority should ensure that its authorization and approvals process requires appropriate consideration of nuclear security systems and measures for the issuance of all authorizations required during the lifetime of the facility, including siting, design, construction, commissioning and subsequent operation, waste management, and decommissioning.

**Action 3-17:** The regulatory authority should ensure that it has a complete regulatory programme in place for authorization, inspection, and verification, as well as an enforcement programme, to carry out its functions as defined in the legal and regulatory framework.

**Action 3-18:** The regulatory authority should ensure that it has a process in place to promulgate its regulatory requirements for nuclear security at appropriate stages.

**Action 3-19:** The regulatory authority should ensure that it has sufficient resources in place to ensure its regulatory requirements are met, through:

- Review and assessment of the nuclear security systems and measures proposed in the application for authorization to ensure that the systems and measures implemented are consistent with the regulatory requirements prior to the issue of an authorization;
- Inspection and oversight programmes for the implementation of nuclear security systems and measures following the issue of the authorization;
- Preparation for operational oversight and inspections related to the implementation of the nuclear security systems and measures approved under the authorization;
- Implementation of an enforcement policy.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 3-20:** The regulatory authority should require an applicant to demonstrate appropriate nuclear security systems and measures in the context of an application for each type of authorization.

**Action 3-21:** The regulatory authority should have in place a process for the review and assessment of nuclear security systems and measures commensurate with the nuclear security concern.

**Action 3-22:** The regulatory authority should have in place a process to determine during its review process that:

- The available information demonstrates that appropriate nuclear security systems and measures have been put in place;
- The information in any application for authorization or an approval is sufficient to confirm and demonstrate the appropriateness of the nuclear security systems and measures;
- The information in any application for authorization or an approval, in particular technical information, has been proved or qualified by experience or testing or both, and will enable the applicant or operator to demonstrate that the required level of nuclear security has been achieved.

**Action 3-23:** The regulatory authority should have inspection and oversight programmes in place for the nuclear security systems and measures to be assured that there is compliance with the regulatory requirements for nuclear security and any licence conditions specified in the authorization or approvals that relate to nuclear security.

**Action 3-24:** The regulatory authority should have an enforcement policy in place for responding to non-compliance with regulatory requirements that relate to nuclear security.

**Action 3-25:** The regulatory authority should have in place a process for reporting all significant non-compliances with regulatory requirements that relate to nuclear security, including loss of regulatory control and other nuclear security events to other relevant competent authorities [4].

**Action 3-26:** The State should have in place a process for regular assessment of the effectiveness of the regulatory framework as part of the process of continuous improvement.

## **4. COMMON NUCLEAR SECURITY MEASURES FOR AN EFFECTIVE NUCLEAR SECURITY INFRASTRUCTURE**

4.1. There are a number of nuclear security measures that are common to the establishment of an effective national nuclear security infrastructure. These common nuclear security measures include development of:

- A national threat assessment.
- A DBT for the design of a nuclear facility for assessment of the threat of unauthorized removal of category I nuclear material or sabotage of nuclear material and nuclear facilities that has potentially high radiological consequences, i.e. for a nuclear power plant.
- A threat assessment based on an alternative threat assessment methodology for the design of nuclear security measures for other nuclear material categories and other nuclear facilities and other radioactive material, associated facilities and associated activities.
- An integrated approach for nuclear security including:
  - Appropriate management and protection of sensitive nuclear security information;
  - Ensuring the trustworthiness of personnel;
  - Human resource development for nuclear security;
  - An effective nuclear security culture;
  - Measures to sustain the national nuclear security infrastructure.

### **NATIONAL THREAT ASSESSMENT**

4.2. The State should undertake a national threat assessment that will support key decisions in relation to the design of its national nuclear security infrastructure and implementation of necessary systems and measures, including for its nuclear power programme. The threats that need to be assessed are threats to nuclear material and other radioactive material, nuclear facilities, associated facilities and associated activities as well as acts involving nuclear or other radioactive material out of regulatory control. The State should ensure that the national authorities responsible for the national threat assessment use a suitable threat analysis methodology.

4.3. A State's nuclear security measures should be based on the State's current evaluation of the threat (the national threat assessment) [2–4].

4.4. The State should keep its national threat assessment under continuous review, and update it periodically and/or as the need arises based on new threat information.

4.5. The following actions (4-1 to 4-5) for undertaking a national threat assessment have been derived from the IAEA Nuclear Security Recommendations [2–4].

## ACTIONS FOR DEVELOPMENT OF THE NATIONAL THREAT ASSESSMENT

*The following actions related to national threat assessment should be initiated by the end of Phase 1 and prior to Milestone 1 and be developed and implemented by the end of Phase 2 and prior to Milestone 2 and reviewed and updated in Phase 3 and prior to Milestone 3.*

### **Phase 1: Considerations before a decision to launch a nuclear power programme is taken**

**Action 4-1:** The State should designate a competent authority (referred to as the ‘responsible competent authority’) to undertake, in cooperation and collaboration with other relevant competent authorities, a national threat assessment as a key part of the design and development of the State’s national nuclear security infrastructure.

**Action 4-2:** The State should ensure that the responsible competent authority has:

- Access to, and experience with, threat analysis methodology, as well as access to relevant information to assess and analyse as part of the national threat assessment;
- The capability, resources and authority to undertake the national threat assessment;
- Access to appropriate information and is authorized to obtain assistance of other competent authorities for the development of the national threat assessment.

## **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-3:** The responsible competent authority should consult widely to help it identify threats to be considered in the national threat assessment and apply a risk informed approach to considering them.

**Action 4-4:** The responsible competent authority should develop the national threat assessment. This should include the full range of threats and cover the maximum threat capabilities affecting:

- Nuclear material and nuclear facilities;
- Radioactive material and associated facilities and activities;
- Other critical infrastructure and social and political institutions that may be adversely affected by criminal or terrorist acts involving the use of nuclear or other radioactive material out of regulatory control.

## **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-5:** The responsible competent authority should ensure regular review of the national threat assessment and any necessary updating of the nuclear security infrastructure.

### **DBT OR THREAT ASSESSMENT FOR DESIGN OF NUCLEAR SECURITY MEASURES**

4.6. The responsible competent authority, using credible information sources, should define the threat and associated capabilities in the form of a DBT or threat assessment. Following the recommendations in paragraphs 3.34–3.40 in Ref. [2], a DBT should be developed for unauthorized removal of category I nuclear material and sabotage of nuclear material and nuclear facilities that have potentially high radiological consequences, such as a nuclear power plant. In relation to other nuclear facilities and other radioactive material, associated facilities and associated activities, the State should decide whether to use a threat assessment or DBT [29].



4.7. The design and implementation of nuclear security systems and measures should be based on the DBT, or the threat assessment, and undertaken by the operator<sup>13</sup>.

4.8. A DBT should include all attributes and characteristics of potential insider and/or external adversaries, who might attempt an act of unauthorized removal or sabotage against which a nuclear security system is designed and evaluated and that an operator, is expected to be able to counter.

4.9. The following actions (4-6 to 4-18) for conducting a DBT or alternative threat based assessment for the design of nuclear security measures have been derived from IAEA Nuclear Security Recommendations [2, 3] and from Ref. [29].

#### ACTIONS FOR DEVELOPMENT OF DBT OR THREAT ASSESSMENT

*The following actions related to DBT or threat assessment for the design of nuclear security measures should be developed by the end of Phase 2 and prior to Milestone 2 and should be reviewed and updated in Phase 3 and prior to Milestone 3.*

#### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision has been taken**

**Action 4-6:** The State should assign a competent authority (referred to as the responsible competent authority) to determine whether a DBT, or an alternative threat based approach resulting in a threat assessment, is required for the nuclear material, nuclear facilities, other radioactive material, associated facilities, and associated activities.

**Action 4-7:** The responsible competent authority should ensure that any threat based approach that is chosen for a threat assessment is appropriate and the decision is fully documented.

---

<sup>13</sup> For the purposes of this publication, the term ‘operator’ includes any person, organization, or government entity licensed or authorized to undertake the operation of a nuclear facility [2], an associated facility [3] or an associated activity such as transport of nuclear or other radioactive material. The term therefore includes shippers/consignors and carriers.

**Action 4-8:** The responsible competent authority for the DBT should:

- Coordinate the process for development of the DBT and document the assumptions and decisions made in relation to the DBT;
- Following the development of the DBT, determine the respective responsibilities of the State and the operator for nuclear security measures.
- Verify whether the existing regulatory framework is adequate for enabling relevant competent authorities to play their role in nuclear security and response to nuclear security events.
- Disseminate the DBT or aspects of it to those responsible for providing nuclear security measures, and to those involved in DBT development and review and its use in the authorization and approval process;
- Promulgate, apply and verify the appropriate security measures to protect the confidentiality and integrity of information provided for and contained in the DBT;
- Determine how often the DBT should be reviewed and updated and define the process for such review and update, including consideration of appropriate trigger points;
- Coordinate with other competent authorities to ensure that the need to update the DBT is confirmed and acted upon;
- Assess whether any review of the DBT has resulted in the need to revise and update the nuclear security systems and measures, and inform the operator accordingly.

**Action 4-9:** If applicable, operators should contribute the following information to assist in the development of the DBT:

- Feedback on the potential impact of the DBT and its potential use as a basis for implementing nuclear security measures;
- Supporting information regarding any concerns about insider threat and any other events that may have nuclear security implications.

**Action 4-10:** Other competent authorities such as national and local police, armed forces, border control and customs authorities should also be consulted in the development process of the DBT. Each competent authority should:

- Develop a list of threats to be considered in the development of the DBT;
- Provide feedback to the State authority developing the DBT on the financial and operational impact of potential decisions and actions that may need to be taken in relation to the DBT under development.

**Action 4-11:** The State should take action to ensure that risk management measures that are beyond the DBT and are the responsibility of the State are appropriately identified and action is taken by the State to manage these measures.

**Action 4-12:** In circumstances where an alternative threat based methodology is foreseen, the responsible competent authority(ies) should:

- Coordinate the process for development of the threat assessment and document the assumptions made, vulnerabilities considered, consequences identified and decisions made in relation to the threat assessment;
- Gain agreement for the threat assessment from other competent authorities and relevant State organizations;
- Verify whether the existing regulatory framework is adequate for enabling relevant State bodies to play their role in nuclear security and response to nuclear security events;
- Disseminate the threat assessment or aspects of it to those responsible for providing nuclear security measures, and to those involved in threat assessment development and review and its use in the authorization and approval process;
- Promulgate, apply and verify the appropriate security measures to protect the confidentiality and integrity of information provided for and contained in the threat assessment;
- Determine how often the threat assessment should be reviewed and updated and define the process for such review and update, including consideration of appropriate trigger points;
- Assess whether any review of the threat assessment has resulted in the need to revise and update the nuclear security systems and measures, and inform the operator accordingly.

**Action 4-13:** For the development of the threat assessment based on alternative methodology, the operators should contribute the following information to assist in the development of the threat assessment:

- Feedback on the potential impact of the threat assessment and its potential use as a basis for implementing nuclear security measures;
- Supporting information regarding any concerns about insider threat and any other incidents that may have nuclear security implications.

**Action 4-14:** Other competent authorities such as national and local police, armed forces, border control, and customs authorities should also be involved

and consulted in the process to develop the threat assessment. Each competent authority should:

- Develop a list of threats to be considered in the development of the threat assessment;
- Provide feedback to the competent authority developing the threat assessment on the financial and operational impact of potential decisions and actions that may need to be taken in relation to the threat assessment under development.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-15:** Based on the DBT, the operator should develop and implement the necessary systems, measures and procedures to protect against the DBT including those relating to security systems, nuclear material control system, contingency plans and transport.

**Action 4-16:** Based on the threat assessment, the operators should develop and implement the necessary systems, measures and procedures to protect against the threat(s) identified by the threat assessment including those relating to security systems, emergency preparedness, and transport.

**Action 4-17:** The State should ensure the review of the DBT for updating the design of nuclear security systems and measures, as appropriate.

**Action 4-18:** The State should ensure the review of the threat assessment for updating the design of nuclear security systems and measures, as appropriate.

## MANAGEMENT SYSTEM FOR NUCLEAR SECURITY

### **General aspects of the management system**

4.10. The management system of each competent authority and operator should establish objectives and policies for nuclear security as part of an integrated management system [30].

4.11. The management system should be consistent with the goals of the organization in relation to nuclear security and should contribute to the achievement of those goals.

4.12. The management system should integrate a number of other key elements, including:

- Protection of the confidentiality and integrity of sensitive information;
- Human resource development;
- Assessment of the trustworthiness of personnel.

4.13. The management system also has a key role to play in the support of a strong nuclear security culture by:

- Ensuring a common understanding of the key aspects of security within the organization;
- Providing the means by which the organization supports individuals and teams in carrying out their tasks successfully, taking into account the interaction between individuals, technology, and the organization;
- Reinforcing a learning and questioning attitude at all levels of the organization;
- Providing the means by which the organization continually seeks to develop and improve its nuclear security culture;
- Reinforcing the safety–security interface.

4.14. The following actions (4-19 to 4-25) for design of an overall management system that encompasses policies and objectives related to nuclear security have been derived from IAEA publications [1–4, 30].

## ACTIONS FOR GENERAL ASPECTS OF THE MANAGEMENT SYSTEM

*The following actions for the general aspects of the management systems should be in place by the end of Phase 2 and prior to Milestone 2 and reviewed and updated in Phase 3 and prior to Milestone 3.*

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-19:** Each organization that has a role in nuclear security should put in place a management system that encompasses policies and objectives that integrate nuclear security within the overall management system.

**Action 4-20:** The documentation of the management system in relation to its coverage of nuclear security should include as appropriate the following:

- The policy statements of the organization in relation to nuclear security;
- A description of the management system for nuclear security;
- A description of the structure of the organization for managing nuclear security;
- Documented delegation of responsibility from the senior management of the operator to the appropriate manager or supervisor with day-to-day responsibility for implementing aspects of nuclear security, including those conditions and qualifications contained in any authorization issued by relevant competent authorities;
- A description of the functional responsibilities, accountabilities, levels of authority, and interactions of those managing, performing and assessing work related to nuclear security;
- A description of the processes and supporting information that explain how the work related to nuclear security is prepared, reviewed, kept up to date, carried out, recorded, assessed, and improved.

**Action 4-21:** The documents that describe the management system should be available for use taking into consideration appropriate security classification of the information contained.

**Action 4-22:** The documentation of the management system should reflect:

- Coordination, within the management system of the operator and between the operator and the competent authorities and other bodies needed to support the operator in meeting its nuclear security obligations;
- The characteristics of the organization and its activities in relation to nuclear security;
- The processes carried out by the organization and their interactions in relation to nuclear security.

**Action 4-23:** Management and staff at all levels should demonstrate their commitment to nuclear security policies and objectives and adequate resources should be allocated to achieve this. Senior managers should act as role models to ensure the promulgation of nuclear security culture, including in particular the need to protect the confidentiality and integrity of sensitive information through the implementation of the management system.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-24:** Each applicant or operator should demonstrate as part of an application for authorization or approval that it has in place an integrated management system that takes account of its responsibilities in relation to nuclear security.

**Action 4-25:** There should be a system for monitoring, assessing, and improving the performance of the integrated management system.

#### PROTECTION OF SENSITIVE INFORMATION AND ASSOCIATED SYSTEMS

4.15. An effective national nuclear security infrastructure needs appropriate identification, classification, protection and management of sensitive information in all forms, covering all of the phases of the lifecycle of information: creation; use; storage; and destruction.

4.16. The system for protecting sensitive information may be based on the overall information classification system that the State has in place for information that has national security implications. An appropriate legal and regulatory framework to afford appropriate protection, including specification of the period for which the information should be protected following its creation, should underpin protection of sensitive information that relates to nuclear security.

4.17. The State should establish a national policy for protecting sensitive information systems, including computer systems, and other means to store, manage, or transmit sensitive information or are critical for the secure operation of the facilities as well as the secure management of nuclear and other radioactive material in use, storage, and during transport [31].

4.18. The competent authorities should take measures to ensure appropriate protection of sensitive information the disclosure of which could compromise nuclear security. The nature of the information to be protected and the level of protection should be specified in the State's policy on sensitive information.

4.19. The regulatory authority should promulgate its requirements on the protection of sensitive information to operators and require operators to ensure that all related parties that hold sensitive information are contractually required to protect sensitive information as defined in the regulatory requirements.

4.20. The following actions (4-26 to 4-33) for protection of sensitive information and sensitive information systems have been derived from IAEA Nuclear Security Series publications [1–4, 31].

## ACTIONS FOR PROTECTION OF SENSITIVE INFORMATION AND ASSOCIATED SYSTEMS

*The following actions for protection of sensitive information should be initiated by the end of Phase 1 and prior to Milestone 1 and be implemented by the end of Phase 2 and prior to Milestone 2. It should be reviewed and maintained throughout the lifetime of the nuclear power programme.*

### **Phase 1: Considerations before a decision to launch a nuclear power programme**

**Action 4-26:** The State should define its national policy on sensitive nuclear security information based on need to know<sup>14</sup>, graded approach, and defence in depth principles. The policy should include:

- Definition of the information to be protected;
- Assignment of clear responsibilities for ensuring protection of sensitive information;
- Classification of the information, including the level to which the information should be protected;
- Measures for handling information including the manner in which it should be stored, transmitted, or destroyed;
- Assignment of responsibilities for each of the competent authorities in relation to information protection;
- Identification of other measures necessary to protect sensitive information, such as protection of electronic data;
- Conditions and arrangements for the sharing of sensitive information and for assisting law enforcement and prosecutorial bodies;
- Detailed procedures, formats and protocols in relation to how information, including information on detection and response systems and measures,

---

<sup>14</sup> A principle under which users, processes, and systems are granted access to only the information, capabilities, and assets which are necessary for the execution of their authorized functions [31].



will be shared with other States, particularly neighbouring States and relevant international organizations;

- Establishment of an offence or offences and penalties in relation to the unauthorized disclosure of sensitive information.

## **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-27:** The State should assign responsibilities to the appropriate competent authorities for the protection of sensitive nuclear security information and the protection of computer systems, networks, and other digital systems that store sensitive information or are critical for the secure operation of the nuclear or other radioactive material facilities (sensitive information systems).

**Action 4-28:** The competent authorities should define appropriate requirements for protecting sensitive nuclear security information and sensitive information systems.

**Action 4-29:** The regulatory authority should promulgate requirements that an operator should demonstrate to the satisfaction of the regulatory authority that it complies with the regulatory requirements related to the protection of sensitive information and sensitive information systems. This should include its contractual arrangements with vendors and contractors.

**Action 4-30:** Each competent authority should establish and implement policy and procedures for the protection of sensitive information and sensitive information systems, including policy and procedure for the appropriate sharing of information with other relevant agencies both nationally and internationally.

**Action 4-31:** Each competent authority should ensure that relevant personnel are trained in procedures for protection of sensitive information and sensitive information systems.

**Action 4-32:** Each operator should implement relevant policies for the protection of sensitive information and sensitive information systems, including procedures for the transmission of information to the regulatory authority and the competent authority for transport in relation to the nuclear security systems and measures of the operator and impose these requirements on vendors and contractors through appropriate arrangements.

**Action 4-33:** Each operator should ensure that relevant personnel are trained in procedures for protection of sensitive information and sensitive information systems, and impose these requirements on vendors and contractors through appropriate arrangements.

## TRUSTWORTHINESS OF PERSONNEL

4.21. Taking into consideration State laws, regulations or policies regarding employment rights and job requirements, a formal process should be used to demonstrate the trustworthiness of personnel involved in nuclear security infrastructure, to the appropriate levels, for their roles. This formal process should serve to assist in reducing the risk of authorized personnel engaging in illegal activities, for example becoming insider threats.

4.22. The following actions (4-34 to 4-36) in relation to the trustworthiness of personnel have been derived from IAEA Nuclear Security Series publications [2-4, 32].

## ACTIONS FOR ENSURING THE TRUSTWORTHINESS OF PERSONNEL

*The following actions for the trustworthiness of personnel should be in place by the end of Phase 2 and prior to Milestone 2 and reviewed and maintained during Phase 3 and prior to Milestone 3.*

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-34:** Competent authorities should establish policies and procedures, consistent with national laws, requiring personnel having specified responsibilities relevant to nuclear and other radioactive material and associated facilities and associated activities, to:

- Be subject to appropriate trustworthiness checks;
- Have as a condition of employment that a positive ‘trustworthiness check’ is obtained and maintained.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-35:** In implementing a trustworthiness policy, the competent authorities should ensure that processes are in place to determine the trustworthiness of persons with authorized access to nuclear and other radioactive material, associated facilities and associated activities, and sensitive information and sensitive information systems.

**Action 4-36:** The competent authorities should adopt measures and procedures to ensure that the trustworthiness of personnel is regularly reviewed and revalidated.

### HUMAN RESOURCES FOR NUCLEAR SECURITY

4.23. Each competent authority and organization with a role in nuclear security should properly address human resources. An assessment of the State's education and training needs in relation to nuclear security should be conducted as part of its initial set of tasks during the establishment of the national policy and strategy that is discussed in detail in Section 2. Cooperation with other States and international organizations should be pursued to provide insights into the competences and human resources necessary for implementing the national nuclear security infrastructure as part of a nuclear power programme.

4.24. The assessment process for education and training needs for nuclear security should include examination of the current capabilities of existing academic facilities and research and development centres as well as technical training institutions to provide training in areas of technical, legal, and policy expertise related to nuclear security that will be required for the authorization, approval, operation and oversight of the national nuclear security infrastructure for the nuclear power programme.

4.25. On the basis of the assessment of the education and training needs for nuclear security, a comprehensive plan for either upgrading existing training institutions or building new training institutions should be developed during the development of the national policy and strategy. Possibilities for collaboration in human resources development for nuclear security, for example with potential vendor States and other States in which nuclear power plants are operated, should be explored at an early stage.

4.26. Experience shows that, before education and training curricula are put in place, it could be useful to use opportunities for education in institutions in other States, to

send nuclear security trainees abroad, and to hire nuclear security specialists from other States to provide academic and practical education and training, so as to start developing human resources from Phase 1 onwards. When hiring general security staff, additional training in nuclear security should be considered.

4.27. Due consideration should be given to securing local resources skilled in nuclear security, since the loss of trained human capital may jeopardize the effectiveness and sustainability of the nuclear security infrastructure. In the light of the experience of developing States, a strategy to attract and retain within the State high quality nuclear security staff should be developed as part of the national policy and strategy developed by the coordinating mechanism.

4.28. Human resource development in nuclear security will vary depending on the extent to which a State develops its indigenous capabilities in nuclear security immediately or relies initially on capabilities supplied by vendor or other States. Indigenous capability in nuclear security should be established and developed in the long term, to ensure the sustainability of the national nuclear security infrastructure and the effectiveness of nuclear security systems and measures put in place by operators. A State should develop its own training and education capability to ensure the long term availability of key human resources in the nuclear security area. Other possible solutions are regional training centres and nuclear security networks to enhance national capacity building and to contribute to sustaining the global nuclear security framework. In addition, States should ensure that they have measures in place for the coordination of training activities among relevant competent authorities including possible cooperation with competent authorities in other States.

4.29. The following actions (4-37 to 4-52) in relation to human resource development have been derived from IAEA Nuclear Security Recommendations [2-4].

## ACTIONS FOR HUMAN RESOURCE DEVELOPMENT

*The following actions for human resource development should be developed during Phase 1 and prior to Milestone 1 and be in place by the end of Phase 2 and prior to Milestone 2 and fully implemented by the end of Phase 3 and prior to Milestone 3.*

## **Phase 1: Considerations before a decision to launch a nuclear power programme**

**Action 4-37:** The State should, in conjunction with the relevant competent authorities, assess the full range of nuclear security related disciplines required for the national nuclear security infrastructure.

**Action 4-38:** The State should assess the availability of those nuclear security related disciplines within the State.

**Action 4-39:** The State should assess the educational capabilities within the State for these nuclear security related disciplines or consider the extent to which it can rely on external sources as a supply of resources for particular disciplines.

**Action 4-40:** The competent authorities should identify specialized training needs for existing nuclear security personnel or other security personnel within the State.

**Action 4-41:** The competent authorities should develop plans to train or hire the human resources necessary for the nuclear security infrastructure of the State.

**Action 4-42:** The competent authorities should consider national training institutions in other States and relevant international organizations that could provide education and training in key areas related to nuclear security.

**Action 4-43:** The competent authorities should consider their strategy for attracting, training and retaining an adequate number of experts to meet the needs of all organizations involved in the nuclear security infrastructure for a prospective nuclear power programme.

**Action 4-44:** The competent authorities should consider establishing competences and a system of qualification and accreditation for nuclear security personnel.

## **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-45:** All competent authorities should actively recruit staff to ensure that there is sufficient capacity in all areas relevant to nuclear security in a timely manner.

**Action 4-46:** All organizations involved in nuclear security should commence the relevant education and training with the appropriate institutions.

**Action 4-47:** Competent authorities should use experts from other States where necessary to augment the nuclear security training programme.

**Action 4-48:** The State should discuss with other State counterparts and international organizations the feasibility of establishing regional training centres for nuclear security personnel.

**Action 4-49:** The State should implement measures for coordination of training activities among relevant competent authorities including possible cooperation with competent authorities in other States.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-50:** The State, in conjunction with competent authorities and the operator, should plan how it will continue to maintain the supply of appropriately trained human resources in nuclear security over the life of the nuclear power programme.

**Action 4-51:** All competent authorities and operators involved in nuclear security should ensure the continued availability of sufficient competent human resources for the efficient and effective implementation of measures necessary for the national nuclear security infrastructure throughout the stages of development of the programme.

**Action 4-52:** All competent authorities and operators should prepare and implement a human resource management programme that should include staffing, qualification, and training and succession management for nuclear security purposes.

## **PROMOTION OF A NUCLEAR SECURITY CULTURE**

4.30. Nuclear security culture has to be effective at three levels. The first is the national nuclear security policy that the State decides to put into practice; the second is each organization that has a role in putting the national security policy into effect; and the third is the management and individuals in each organization that should put nuclear security policies into effect [32].

4.31. Nuclear security culture is the assembly of characteristics, attitudes and behaviour of individuals, organizations, and institutions that serves as a means to support and enhance nuclear security. It is essential that nuclear security culture

is embedded within all organizations involved in nuclear security. When such a culture is successfully embedded, staff at all levels within an organization understand and appreciate the need to maintain a high level of nuclear security.

4.32. The effectiveness of the nuclear security infrastructure is dependent on the actions of individuals as well as the way in which they collectively influence nuclear security. Nuclear security culture plays a key role in ensuring that individuals, organizations and institutions remain vigilant and that sustained measures are taken to counter threats.

4.33. Sound nuclear security culture needs:

- Clear policy and legislation that emphasizes the importance of nuclear security;
- Institutions, including competent authorities and operators, with clear mandates, roles and responsibilities in relation to nuclear security;
- Leaders and managers who model behaviour that emphasizes nuclear security;
- Recruitment and training of personnel that encourage individuals to have the attitudes and behaviours that support nuclear security;
- Strong training programmes and frequent exercises that reinforce the attitudes and behaviours that support nuclear security;
- Sufficient resources to sustain the nuclear security infrastructure, systems and measures;
- Fostering of safety culture and security culture taking into account their commonalities and differences.

4.34. The following actions (4-53 to 4-58) for the support of a sound nuclear security culture are derived from IAEA Nuclear Security Series publications [1-4, 32].

## ACTIONS FOR THE PROMOTION OF A NUCLEAR SECURITY CULTURE

*The following actions for the promotion of a nuclear security culture should be in place by the end of Phase 1 and prior to Milestone 1 and fully implemented during Phase 2 and prior to Milestone 2 and reviewed and maintained during Phase 3 and prior to Milestone 3.*

## **Phase 1: Considerations before a decision to launch a nuclear power programme**

**Action 4-53:** The State's national policy and strategy should recognize that a strong nuclear security culture is essential (see Action 2-1). The State's national nuclear security infrastructure should reflect this and its implementing measures should recognize the importance of a strong nuclear security culture.

## **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-54:** All competent authorities and institutions involved in nuclear security should encourage and promote appropriate behaviour, attitudes and characteristics of a sound nuclear security culture.

**Action 4-55:** The State should strongly promote effective leadership and management of nuclear security within all competent authorities and institutions, including operators, with responsibility for nuclear security.

**Action 4-56:** Competent authorities and institutions, including operators, should strongly promote effective leadership and management of nuclear security within their organizations

**Action 4-57:** Competent authorities and institutions, including operators, should develop tools and methodologies for assessing nuclear security culture within their organizations.

**Action 4-58:** Competent authorities and institutions, including operators, involved in nuclear security should be encouraged to foster a positive nuclear security culture through positive role models (leaders and managers), training, positive reinforcement through recognition of nuclear security culture, sound policies and processes that support nuclear security.

## SUSTAINING THE NATIONAL NUCLEAR SECURITY INFRASTRUCTURE

4.35. Sustaining the national nuclear security infrastructure relies upon:

- Commitment of the necessary resources to ensure that the national nuclear security infrastructure is sustained and effective in the long term;
- Establishment of an effective management system within all competent authorities, entities, and organizations that have responsibility for nuclear security;



- Recognition that credible threats will continue to exist and that nuclear security is important at the institutional, organizational, and individual level;
- Evaluation of threats over time to ensure that nuclear security systems are always consistent with the current evaluation of the threats.

4.36. The following actions (4-59 to 4-61) for sustaining the national nuclear security infrastructure are derived from Recommendations level publications in the IAEA Nuclear Security Series [2–4].

## ACTIONS FOR SUSTAINING THE NATIONAL NUCLEAR SECURITY INFRASTRUCTURE

*The following actions for sustaining nuclear security infrastructure should be in place by the end of Phase 2 and prior to Milestone 2 and be fully implemented during Phase 3 and prior to Milestone 3.*

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 4-59:** The State should establish a sustainability programme to ensure that the nuclear security infrastructure is effective in the long term by committing the necessary resources. This requires assessment and regular review of all components: national policy and strategy, legal and regulatory frameworks, financial support, and investment in human resources.

**Action 4-60:** Competent authorities and operators should establish sustainability programmes for their nuclear security systems and measures. Sustainability programmes should encompass:

- Incorporation of sustainability factors into the design of nuclear security systems and measures;
- Maintenance and continuous improvement of the management system for nuclear security;
- Human resource management, capacity building, and training in relation to nuclear security;
- Equipment updating, maintenance, repair and calibration of nuclear security systems;

- Performance testing and operational monitoring of nuclear security systems;
- Configuration management;
- Ongoing assessment of resource allocation and operational cost analysis to ensure appropriate allocation of resources for the maintenance of nuclear security systems and measures.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 4-61:** Competent authorities and operators should ensure the implementation of their sustainability programmes for the nuclear security systems and measures.

## **5. NUCLEAR SECURITY MEASURES FOR NUCLEAR MATERIAL AND NUCLEAR FACILITIES**

5.1. Nuclear security systems and measures are an essential part of a nuclear power programme and fall within the overall nuclear security infrastructure of the State. The objective of the implementation of nuclear security measures for nuclear material and nuclear facilities is:

- To protect against the unauthorized removal of nuclear material;
- In the event of unauthorized removal of nuclear material, to locate and recover that material;
- To protect nuclear material and nuclear facilities against sabotage;
- In the event of an act or acts of sabotage against nuclear material and nuclear facilities, to mitigate or minimize the radiological consequences of sabotage.

5.2. These objectives may be achieved through the implementation of:

- Measures against unauthorized removal of nuclear material in use and storage and sabotage of nuclear facilities;
- Measures against unauthorized removal and sabotage of nuclear material during transport.

5.3. This section focuses on the nuclear security systems and measures for nuclear material and nuclear facilities. These systems and measures are part of the broader obligation of the State, competent authorities and operators to put in place an appropriate national nuclear security infrastructure for a nuclear power programme. Many of the actions contained in this section are a subset or related to actions set out in Sections 2–4, and 6–8 and should be implemented with due regard to these actions as well. In particular this section applies to the nuclear security systems and measures for the protection of nuclear material against unauthorized removal with the intent to construct a nuclear explosive device, and to the protection against sabotage of nuclear facilities and of nuclear material during transport. Protection against unauthorized removal of nuclear material for potential off-site dispersal is dealt with in Section 6. Measures to locate and recover nuclear material after it has been reported to a competent authority as lost, missing, or stolen are addressed in Section 7.

## MEASURES AGAINST UNAUTHORIZED REMOVAL OF NUCLEAR MATERIAL AND SABOTAGE OF NUCLEAR FACILITIES

5.4. The objective of the State's nuclear security infrastructure can be achieved in relation to nuclear material and nuclear facilities by the application of the principles set out in the Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities [2].

5.5. The nuclear security measures that are put in place should be effective against both unauthorized removal of nuclear material and sabotage. The measures should be based on the more stringent requirements for physical protection: either those against unauthorized removal or those against sabotage. When a facility contains nuclear material and other radioactive material the two sets of protection requirements should be considered and implemented in a manner such that the more stringent requirements for physical protection of the nuclear material are applied.

5.6. The State should ensure that its nuclear security systems and measures are capable of establishing and maintaining the risk of unauthorized removal and sabotage at acceptable levels through risk management. This requires assessing the threat and potential consequences of unauthorized removal or sabotage, and then developing a legal and regulatory framework that ensures that appropriate effective nuclear security measures are put in place [2].

5.7. A graded approach should be used to provide higher levels of protection against nuclear security events that could result in higher consequences. The State should decide what level of risk is acceptable and what level of protection against the threat should be provided. For protection against unauthorized removal, the State should regulate the categorization of nuclear material in order to ensure an appropriate relationship between the nuclear material of concern and the nuclear security measures. For protection against sabotage, the State should establish its threshold(s) of radiological consequences in order to determine appropriate levels of physical protection taking into account existing nuclear safety and radiation protection measures [2].

5.8. The nuclear security systems and measures should also reflect the principle of defence in depth. Defence in depth relies upon the implementation of several layers and methods of protection including hardware (security devices), procedures (administrative controls, including management and organization of guards) and facility design (including layout).

5.9. The State should ensure that the primary responsibility for the implementation of the nuclear security systems and measures for nuclear material and nuclear facilities rests with the holders of the relevant authorizations.

5.10. The applicant or operator should prepare a security plan as part of its application to obtain an authorization. The security plan should be based on the threat assessment or DBT and should include sections dealing with design, evaluation, implementation and maintenance of the nuclear security systems and measures and contingency plans. The competent authority should review the security plan and once approved the plan should then be implemented in accordance with the authorization. The operator should review the security plan regularly to ensure it remains up to date with the current operating conditions and the nuclear security measures. The operator should submit an amendment to the security plan for approval by the competent authority before making significant modifications, including temporary changes, to arrangements detailed in the security plan. For changes involving potential reduction in security, approval should be received prior to making the change.

5.11. For a new nuclear facility the site selection and design of the nuclear facility should take the need for nuclear security measures into account as early as possible and also address the interface between nuclear security systems and/or measures and those for safety and nuclear material accountancy and control to avoid any conflicts and to ensure that all three elements complement each other.

5.12. On-site security personnel, transport security personnel and off-site response forces including military and law enforcement personnel are key to the implementation of an effective nuclear security system. Effective coordination and cooperation between all of these competent authorities and personnel should be established as part of the design and implementation of the nuclear security system.

5.13. The applicant or operator should define measures to respond to nuclear security events (contingency measures). The contingency measures should be included in a contingency plan<sup>15</sup>, which will be a part of a security plan required by the regulatory authority and assessed as part of the authorization process for the nuclear power plant.

---

<sup>15</sup> A contingency plan is a predefined set of actions for response to unauthorized acts indicative of attempted unauthorized removal or sabotage, including threats thereof, designed to effectively counter such acts [2].

5.14. The operator has prime responsibility for the protection of its facility, based on the threat assessment or DBT. The regulatory authority should ensure that the responsibilities of operators and of the other relevant competent authorities, particularly off-site response forces, are clearly defined in the contingency plans.

5.15. Depending on the level of threat, operators may need the support of off-site response forces especially in relation to training, equipment, exercises and actual response to a nuclear security event. To effectively provide for a cooperative and coordinated response, the regulatory authority should ensure that appropriate arrangements are put in place between operator and law enforcement agencies as part of contingency planning.

5.16. The State should ensure that its national response plan and the contingency plan developed by the operator are fully compatible. The State should require evaluations including performance testing to demonstrate this compatibility.

5.17. The State should ensure that the design of the national response plan and the contingency plan be reviewed periodically, including in the light of changes in threats, enhanced understanding of the potential vulnerabilities of a nuclear facility, its systems and structures, and advances in physical protection approaches, systems and technologies, and updated as necessary.

5.18. The following actions (5-1 to 5-30) for measures against unauthorized removal of nuclear material and sabotage of nuclear facilities are derived from IAEA Nuclear Security Recommendations [2].

## ACTIONS FOR THE MEASURES AGAINST UNAUTHORIZED REMOVAL OF NUCLEAR MATERIAL AND SABOTAGE OF NUCLEAR FACILITIES

*The following actions for the measures against unauthorized removal of nuclear material in use and storage and sabotage of nuclear facilities should be developed during Phase 2 and prior to Milestone 2 and fully implemented during Phase 3 and prior to Milestone 3.*

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is made**

**Action 5-1:** The State should define how the graded approach should be applied to the protection against unauthorized removal of nuclear material and sabotage

of nuclear facilities. The State should adopt the categorization system set out in paragraphs 4.5–4.8 in Ref. [2] for the protection of nuclear material from unauthorized removal and the method described in paragraphs 5.4–5.8 in Ref. [2] for protection against sabotage.

**Action 5-2:** The State should define requirements, based on the threat assessment or DBT, for the development of nuclear security measures for nuclear material in use and in storage and for nuclear facilities, depending on the potential consequences of either unauthorized removal or sabotage. The requirements to be taken into account for the protection against unauthorized removal are set out in paragraphs 4.9–4.49 of Ref. [2], for measures to locate and recover missing or stolen nuclear material in paragraphs 4.50–4.63 of Ref. [2] and for protection against sabotage in paragraphs 5.1–5.58 of Ref. [2].

**Action 5-3:** The State should ensure that the nuclear security systems and measures are compatible with nuclear material accountancy and control measures.

**Action 5-4:** The State should specify the roles and responsibilities of all relevant competent authorities, from State to local levels, that will ensure an effective response, in cooperation with operators, to a nuclear security event.

**Action 5-5:** The State should ensure that the regulatory framework in relation to nuclear security systems and measures for nuclear material and nuclear facilities takes into account the recommendations in paragraphs 3.9–3.17 and 3.23–3.30 of Ref. [2].

**Action 5-6:** The State should ensure that the regulatory framework outlines the requirements for the development of nuclear security measures of nuclear facilities at the relevant stages of licensing and that the required measures are implemented by the applicant or operator at each of the following stages:

- Siting;
- Design;
- Construction;
- Commissioning (including bringing nuclear material onto the site);
- Operation;
- Decommissioning.

**Action 5-7:** The State should ensure that the regulatory framework includes in the requirements for licensing the need for a security plan, as part of a licence application, that will detail the applicant/operator’s physical protection system,

including details of the design, implementation, maintenance, and evaluation of the nuclear security systems and measures and contingency plans, including the relationship between the applicant/operator and the relevant response agencies. The security plan should also include provisions for regular exercises.

**Action 5-8:** The State should ensure that the regulatory framework requires the applicant/operator to develop arrangements with off-site response forces in cooperation with the competent authority(ies) responsible for ensuring the effective implementation of the applicant/operator's contingency plan.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 5-9:** The regulatory authority should consider establishing a cooperation programme with vendor States, in particular for sharing of information in relation to the potential consequences of a nuclear security event. In addition the competent authorities should consider establishing cooperation arrangement with the competent authorities of other States with responsibility for authorization and approvals that have experience of oversight of nuclear power plants of the same type as that selected for construction.

**Action 5-10:** The applicant/operator should identify the targets to be protected and design its nuclear security measures to protect targets based upon the threat assessment or DBT. When considering the threats, the applicant/operator should pay due attention to the potential role of insiders.

**Action 5-11:** The applicant/operator should consider establishing a cooperation programme with the vendor and with other organizations operating nuclear power plants and related facilities of the types that are selected for construction, for the purpose of strengthening design of the nuclear security systems and measures.

**Action 5-12:** The applicant/operator should prepare a security plan as part of its application to obtain an authorization to construct a nuclear power plant. The security plan should be based on the threat assessment or the DBT and should include sections dealing with design, evaluation, implementation, performance testing and maintenance of the nuclear security measures, and contingency plans.

**Action 5-13:** The applicant/operator should ensure that its nuclear security measures include procedures and protocols, including trustworthiness checks and programmes for selection and qualifications of staff, to control access of personnel to facilities, critical digital systems and components and sensitive information.



**Action 5-14:** The regulatory authority should assess and approve the security plan, the implementation of which should then be part of the conditions attached to the authorization.

**Action 5-15:** The State should ensure that programmes, plans, and procedures for preparedness for a nuclear security event (contingency plans) are implemented at the national, local, and facility level and having regard to international obligations, including early notification.

**Action 5-16:** The State should ensure that there are appropriate arrangements in place for coordination between the operator's contingency plan, the national response plan and the plans of the relevant competent authorities involved in response.

**Action 5-17:** The State, relevant competent authorities, and the operator should exercise the contingency plan and the response plans, in particular to test the coordination with off-site response forces and to identify potential safety–security interface issues.

**Action 5-18:** The State should ensure that before nuclear fuel first arrives on the site and is loaded into the reactor, all elements of the nuclear security systems and measures are in place and relevant competent authorities and other organizations, including the operator, have developed contingency and emergency arrangements and successfully exercised with local and national organizations to the satisfaction of regulatory authority. Nuclear security measures for fuel in temporary storage prior to loading into a reactor should be consistent with the material category.

**Action 5-19:** The State should ensure that response forces are familiar with the site and the sabotage targets, and with potential on-site prevention or mitigation actions.

**Action 5-20:** The operator should define procedures setting conditions for activation of the contingency plan when initiating the response to a nuclear security event.

**Action 5-21:** The operator should implement its nuclear security measures and evaluate them before receipt of nuclear material and commissioning of the nuclear power plant.

**Action 5-22:** The operator should implement means and procedures for evaluation, including performance testing, and maintenance of the nuclear security systems and measures.

**Action 5-23:** The operator should review the security plan regularly and should submit any amendments to the security plan for approval by the regulatory authority. For modifications to arrangements detailed in the approved security plan, the regulatory authority should verify the operator's compliance with the security plan. For changes that may lead to any reduction in security, regulatory approval should be received prior to implementing any modifications.

**Action 5-24:** The regulatory authority should ensure that the inspection and verification of the nuclear security systems and measures includes testing of the system (including testing of the detection, delay and response systems) and review of the effectiveness of the implementation of the nuclear security systems and measures.

**Action 5-25:** The regulatory authority should require the operator to report any non-compliance with its nuclear security systems and measures including prompt reporting of all events with nuclear security implications.

**Action 5-26:** The competent authority that develops the threat assessment or DBT should continuously review the threats and evaluate the implications of any changes in the threat assessment or DBT. The competent authority should take steps to ensure that any change in the threat assessment or DBT is appropriately reflected in the operator's security plan by requiring a review, and upgrade if necessary, of arrangements.

**Action 5-27:** Recognizing that a revision of the DBT may take time, the regulatory authority should require the operator to implement short-term compensatory measures based on the current threat assessment, if necessary.

**Action 5-28:** If the regulatory authority determines that the nuclear security systems and measures are incapable of providing the required level of protection, the operator should immediately implement compensatory measures to provide adequate protection. The operator should then, within an agreed period, plan and implement corrective actions to be reviewed and approved by the competent authority.

**Action 5-29:** The regulatory authority should ensure that the effectiveness of these compensatory measures against the current assessed threat is evaluated.

**Action 5-30:** The operator should make arrangements to ensure that during emergency conditions and exercises, the effectiveness of the physical protection system is maintained.

## MEASURES AGAINST UNAUTHORIZED REMOVAL AND SABOTAGE OF NUCLEAR MATERIAL DURING TRANSPORT

5.19. Establishing the legal and regulatory framework for nuclear security during transport of nuclear material is addressed in Section 3. Nuclear security measures against unauthorized removal and sabotage of nuclear material during transport should be based on the guidance outlined in paragraphs 5.4–5.10 above.

5.20. The first transport of nuclear material to be conducted as part of the new nuclear power programme will be the transport of fresh nuclear fuel to the nuclear power plant site. Nuclear security requirements for the transport of fresh fuel as well as the transport of irradiated fuel should be established at an early stage. A transport security plan may need to be submitted to the competent authority for transport in relation to each shipment or series of shipments.

5.21. The State's responsibility for nuclear security in relation to nuclear material in transport should be determined either by the borders of its sovereign territory or the flag of registration of the transport vessel or aircraft. A State's nuclear security infrastructure for nuclear material in international transport should extend to the carriage of material on board ships or aircraft registered to that State while in international waters or airspace and until another State acquires jurisdiction.

5.22. The State's nuclear security infrastructure should ensure that nuclear material is always under the jurisdiction and control of the State and that the point at which responsibility for nuclear security is transferred from one State to another State, including in some circumstances through another State to the receiving State and from one shipper/carrier to another, is clearly defined and applied by all concerned. International transport operations should be overseen by one or more government organizations having the relevant authority and competence in transport security and/or the appropriate mode of transport.

5.23. The shipping State should consider, before allowing the international transport, whether the States involved in the transport, including the transit States:

- Are parties to the Convention on the Physical Protection of Nuclear Material [8]; or
- Have concluded with the State a formal agreement which ensure that physical protection arrangements are implemented in accordance with internationally accepted guidelines; or
- Formally declare that their physical protection arrangements are implemented having regard to internationally accepted guidelines; or
- Have issued licences or other authorizing documents which contain appropriate physical protection provisions for the transport of nuclear material consistent with internationally accepted guidelines.

5.24. When international shipments pass through the territory of States other than the shipping State and the receiving State, the shipping State should, in advance, identify and inform the other States involved in such transit in order that the transit States can ensure that the proposed arrangements are in accordance with their national law.<sup>16</sup> Additionally, any sensitive information shared by the States concerned should be protected

5.25. The following actions (5-31 to 5-39) for measures against unauthorized removal and sabotage of nuclear material during transport are derived from IAEA Nuclear Security Recommendations [2].

## ACTIONS FOR MEASURES AGAINST UNAUTHORIZED REMOVAL AND SABOTAGE OF NUCLEAR MATERIAL DURING TRANSPORT

*The following actions for transport security for nuclear material should be developed during Phase 2 and prior to Milestone 2 and fully implemented during Phase 3 and prior to Milestone 3.*

### **Phase 2: Preparatory work for the construction of a nuclear power plant after a policy decision is taken**

**Action 5-31:** The State should define requirements, based on the threat assessment or DBT, for the physical protection of nuclear material during transport, depending on the potential consequences of either unauthorized

---

<sup>16</sup> This publication does not affect the exercise of navigation rights and freedoms by ships and aircraft as provided for in international law.

removal or sabotage [2]. The requirements to be taken into account for the protection against unauthorized removal are set out in paragraphs 6.1–6.43 of Ref. [2], for measures to locate and recover nuclear material missing or stolen during transport in paragraphs 6.44–6.55 of Ref. [2] and for protection against sabotage in paragraphs 6.56–6.73 of Ref. [2].

**Action 5-32:** The competent authority for transport should promulgate its requirements for nuclear security measures for nuclear material during transport to shippers and carriers. In particular, the competent authority should require the use of a threat assessment and/or a DBT as a common basis for the design and implementation of nuclear security measures for nuclear material during transport.

**Action 5-33:** The State should ensure that there is a requirement for the development by a party that enters the State’s territory and may be covered by the State’s jurisdiction of a transport security plan to meet the physical protection requirements during the transport of nuclear material. The plan may cover a series of similar movements.

### **Phase 3: Activities to implement the first nuclear power plant**

**Action 5-34:** The competent authority for transport should ensure that all relevant requirements for the transport of nuclear material are fully implemented by shippers and carriers.

**Action 5-35:** For each shipment, or series of similar shipments, the shipper and/or carrier should submit a transport security plan to the competent authority for transport approval.

**Action 5-36:** The shipper and/or carrier of the nuclear material should ensure that the transport is undertaken in accordance with the approved transport security plan.

**Action 5-37:** The competent authority that develops the threat assessment or DBT should continuously review the threats and evaluate the implications of any changes in the threat assessment or DBT. The competent authority for transport should take steps to ensure that any change in the threat assessment or DBT is appropriately reflected in the shipper’s and/or carrier’s nuclear security measures by requiring a review, and upgrade if necessary, of arrangements. Any review of arrangements that results in a consequent upgrade or amendment should

be submitted to the competent authority for transport for approval prior to its implementation by the shipper or carrier.

**Action 5-38:** Shippers and carriers should develop and implement training programmes for their staff, including any guards they employ in relation to the conveyance. In particular, this should be done prior to the first shipment of nuclear fuel to the nuclear facility.

**Action 5-39:** Shippers and carriers should undertake exercises as part of their security plan and ensure that exercises are coordinated with the appropriate competent authorities. In particular, this should be done prior to the first shipment of nuclear fuel to the nuclear facility.

## **6. NUCLEAR SECURITY MEASURES FOR RADIOACTIVE MATERIAL AND ASSOCIATED FACILITIES AND ACTIVITIES**

6.1. This section focuses on the nuclear security systems and measures for radioactive material, associated facilities and activities. These systems and measures are designed to prevent, detect and respond to nuclear security events and cover radioactive material, as well as associated facilities and associated activities throughout their lifetime.

6.2. In addition to those States that need a nuclear security infrastructure to deal with radioactive material, other than nuclear material, and associated facilities and associated activities, States embarking on or expanding a nuclear power programme need measures for protection against unauthorized removal and sabotage of radioactive material. Establishment of appropriate nuclear security infrastructure and implementation of systems and measures to address radioactive material, associated facilities and associated activities should be addressed at this earliest stage of the nuclear power programme.

6.3. Furthermore, a large inventory of radioactive material will accumulate during the life of the nuclear power plant and will need protection from unauthorized removal and against sabotage. Therefore, a State should have adequate nuclear security measures in place for the radioactive material, its associated facilities and associated activities, including for the transport of radioactive material within the context of its nuclear power programme.

6.4. Many of the actions contained in this section are a subset of, or are related to, actions set out in Sections 2–5, 7 and 8, and should be implemented having regard to those actions.

### **GENERAL MEASURES**

6.5. Implementation of nuclear security systems and measures for radioactive material, associated facilities and associated activities falls within the overall nuclear security infrastructure of any State where radioactive materials are used. The nuclear security measures should be designed to:

- Deter, detect and delay unauthorized access to or unauthorized removal of radioactive material;

- Allow rapid assessment of any nuclear security events to enable initiation of appropriate response and to allow recovery of radioactive materials and mitigation of the event to start as soon as possible;
- Provide for rapid response to any attempted or actual unauthorized access to radioactive material [3].

6.6. Nuclear security measures for radioactive material should be based on a graded approach, taking into account the principles of risk management, including such considerations as the level of threat and the relative attractiveness of the material for unauthorized use. These measures should be based on a risk informed, graded approach that uses the concept of defence in depth to maximize the effectiveness of the measures [3].

6.7. The State should establish an effective system of managing risk to an acceptable level. This relies upon assessing the threat and potential consequences and then developing a regulatory framework and ensuring that appropriate and effective nuclear security measures are put in place.

6.8. The following actions (6-1 to 6-7) for development of nuclear security measures for radioactive material and associated facilities and activities are derived from IAEA publications [3, 23].

## ACTIONS FOR GENERAL MEASURES

*The following actions for nuclear security measures for radioactive material and associated facilities and activities should be developed and implemented whether or not the State has a nuclear power programme. In the case of States wishing to embark on a nuclear power programme, it would be beneficial to the State's overall security programme to have the actions fully in place as early as possible and prior to the introduction of radioactive material for the construction of the first nuclear power plant during Phase 3.*

**Action 6-1:** The competent authority(ies) responsible for threat assessment should undertake a national threat assessment for radioactive material, associated facilities and associated activities in the context of the facilities and activities themselves and of the nuclear power programme. The State should use the outcome of the threat assessment to develop the nuclear security requirements for the operator for radioactive material, associated facilities and associated activities.



**Action 6-2:** The State should ensure that an effective approval process for the import and export of radioactive material includes appropriate consideration of nuclear security measures.

**Action 6-3:** The State should define the requirements to ensure that every operator has appropriate and effective nuclear security measures in place to detect nuclear security events and report any event promptly so that a timely response may be made.

**Action 6-4:** The State should ensure that a categorization system for security measures for radioactive material, compatible with relevant international instruments, is established and implemented by the operator to ensure that appropriate nuclear security measures are applied. The categorization system should allow the identification of radioactive material that has potentially significant consequences if involved in a nuclear security event, including aggregations of radioactive material.

**Action 6-5:** The State should define the requirement for a system of inventory control to be established and implemented by the operator so that the necessary degree of effective control is exercised over the radioactive material at all times, including during all transfers of control.

**Action 6-6:** The State should determine requirements for the security plan for radioactive material and associated facilities and associated activities for the purpose of assessing the security plan submitted by the operator.

**Action 6-7:** The competent authorities should take appropriate measures to sustain the nuclear security measures for radioactive material, associated facilities and associated activities.

## SECURITY OF RADIOACTIVE MATERIAL IN USE AND STORAGE

6.9. The nuclear security system for radioactive material in use and storage should be designed to adequately perform the functions of detection, delay, and response in order to deter and prevent unauthorized removal or loss of control or sabotage. Radioactive material that represents a security concern should be protected to a level commensurate with that concern, using a graded approach.

6.10. The level of protection against sabotage may differ from that against unauthorized removal. Nuclear security systems designed to protect radioactive

material from unauthorized removal generally also provide some degree of protection of the radioactive material and associated facilities against sabotage. If the competent authority with responsibility for authorization and approvals related to nuclear security becomes aware of a specific threat of sabotage against particular radioactive material or particular facilities the competent authority may require additional or more stringent nuclear security measures to increase the level of protection against sabotage [3].

6.11. As outlined in paragraphs 4.16–4.25 of Ref. [3], operators should be required to implement security management measures, addressing access control, trustworthiness of personnel, protection of sensitive information, preparation of a security plan, training and qualification, accounting, inventory, and nuclear security event reporting. The stringency of the required nuclear security management measures should be determined based on the graded approach.

6.12. The following actions (6-8 to 6-13) for security of radioactive material in use and storage are derived from IAEA Nuclear Security Recommendations [3].

## ACTIONS FOR SECURITY OF RADIOACTIVE MATERIAL IN USE AND STORAGE

*The following actions for the security of radioactive material in use and storage should be developed and implemented whether or not the State has a nuclear power programme. In the case of States wishing to embark on a nuclear power programme, the actions should be fully in place as early as possible and prior to the introduction of radioactive material for the construction of the first nuclear power plant during Phase 3.*

**Action 6-8:** The regulatory authority should establish requirements for the protection of radioactive material in use and storage against unauthorized removal and sabotage. The requirements to be taken into account are presented in paragraphs 4.8–4.25 of Ref. [3]. The regulatory authority should promulgate its requirements, including technical requirements that would be required as part of a security plan that describes the nuclear security system that the operator intends to implement.

**Action 6-9:** The operator should define within its security plan the detection measures that it proposes to implement for the detection and assessment of an

attempted or actual intrusion that could be intended to result in the unauthorized removal or sabotage of radioactive material.

**Action 6-10:** Taking into account the graded approach and the principle of defence in depth, the operator should define within its security plan the delay measures that it proposes to implement to prevent access to the radioactive material or the associated facility.

**Action 6-11:** Taking into account the graded approach, the operator should define within its security plan the response measures that it proposes to implement.

**Action 6-12:** The operator's security plan should include cooperative arrangements with competent authorities responsible for locating and recovering radioactive material that is out of regulatory control.

**Action 6-13:** The competent authorities should take appropriate measures to sustain the security of radioactive material in use and storage.

## SECURITY OF RADIOACTIVE MATERIAL IN TRANSPORT

6.13. The objective of nuclear security of radioactive material in transport is to ensure that the nuclear security measures protect radioactive material while in transport against unauthorized removal, sabotage or other acts that could have high radiological consequences and could constitute a nuclear security event.

6.14. The competent authority for transport should ensure that the transport security systems are put in place by consignors include measures designed to:

- Deter, delay and detect unauthorized access to the radioactive material while in transport and during storage in transit;
- Identify the potential threats to any consignment while in transport or during storage incidental to transport, to enable an appropriate response and to allow recovery or mitigation efforts to start as soon as possible;
- Provide rapid response to any attempts towards, or actual unauthorized access to, radioactive material or criminal acts involving radioactive material while in transport or storage incidental to such transport.

6.15. The competent authority for transport should define the thresholds and levels of nuclear security for determining which packages or types of radioactive material need to be protected beyond prudent management practice. Minimizing

the likelihood of unauthorized removal or sabotage of radioactive material during transport should be accomplished by a combination of methods to deter, delay, detect and respond to such acts or attempts of unauthorized removal of radioactive material or sabotage affecting the conveyance or its cargo. These measures should be complemented by other measures to recover stolen material and mitigate the possible consequences, to further reduce the risks. Appropriate nuclear security measures are outlined in Refs [3, 33, 34]. The Regulations for the Safe Transport of Radioactive Material [35] and United Nations Recommendations for the Transport of Dangerous Goods Model Regulations [36] should also be taken into account.

6.16. Security measures should be based on a categorization of radioactive material and structured into security levels for transport (for example, basic and enhanced). Security levels should be defined using a graded approach that is based on an evaluation of the threat to the material and its potential to generate unacceptable consequences. The graded approach for transport security should be based at least on the properties and quantities of radioactive material being shipped [3].

6.17. The following actions (6-14 to 6-23) for security of radioactive material in transport are derived from IAEA publications [3, 33–35] and from UN recommendations [36].

## ACTIONS FOR SECURITY OF RADIOACTIVE MATERIAL IN TRANSPORT

*The following actions for security of radioactive material in transport should be developed and implemented whether or not the State has a nuclear power programme. In case of States wishing to embark on a nuclear power programme, the actions should be fully in place as early as possible and prior to the introduction of radioactive material for the construction of the first nuclear power plant during Phase 3.*

**Action 6-14:** The competent authority for transport should establish the requirements for nuclear security measures against unauthorized removal and sabotage of radioactive material during transport. The requirements to be taken into account are presented in paragraphs 4.26–4.38 of Ref. [3].

**Action 6-15:** The competent authority for transport should ensure that the transport security systems to be put in place by consignors include capabilities designed to:

- Recover any damaged, stolen or lost radioactive material and place it under regulatory control;
- Mitigate the radiological consequences of any unauthorized removal or sabotage and the resulting nuclear security event.

**Action 6-16:** The competent authority for transport should define its requirements for the consignor's transport security plan.

**Action 6-17:** The consignor and/or carrier should develop a transport security plan, consistent with the categorization approach that describes the nuclear security system in place to protect the radioactive material in transport. This may be accomplished through an integrated transport plan for safety and security, taking into account the need to protect sensitive information.

**Action 6-18:** Consistent with the categorization approach, the consignor and/or carrier should submit its transport security plan for radioactive material for approval by the competent authority for transport.

**Action 6-19:** The competent authority for transport should ensure that all relevant security requirements for the transport of radioactive material are fully implemented by the carrier.

**Action 6-20:** The shipper and/or carrier responsible for transporting the radioactive material should ensure that the transport is undertaken in accordance with the transport security plan approved by the competent authority for transport.

**Action 6-21:** If the competent authority for transport determines that the nuclear security measures put in place by the consignor and/or carrier are incapable of providing the required level of protection, the consignor and/or carrier should immediately implement compensatory measures to provide adequate protection, to be approved by the competent authority for transport, or the shipment should not be permitted. The consignor should then, within an agreed period, plan and implement corrective actions that have been reviewed and approved by the competent authority for transport.

**Action 6-22:** Consignors and carriers should develop and implement training programmes for their staff, including any guards they employ in relation to conveyances.

**Action 6-23:** Consignors and carriers should undertake exercises as part of their transport security plan and ensure that exercises are coordinated with the appropriate competent authorities.

## **7. NUCLEAR SECURITY MEASURES FOR NUCLEAR AND OTHER RADIOACTIVE MATERIAL OUT OF REGULATORY CONTROL**

7.1. This section focuses on the measures for nuclear material and other radioactive material out of regulatory control. These systems and measures are part of the obligation of the State, competent authorities and operators to put in place a nuclear security infrastructure that provides the basis for systems and measures to prevent, detect and respond to nuclear security events. The nuclear security infrastructure should cover nuclear material and other radioactive material whether it is under or out of regulatory control, as well as associated facilities and associated activities throughout their lifetime.

7.2. It is particularly important for a State embarking on a nuclear power programme to realize that measures to locate and recover nuclear material or other radioactive material after reporting of it as lost, missing or stolen to a competent authority should be addressed according to the IAEA Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control [4].

7.3. Many of the actions in this section are complementary to actions set out in Sections 2–6 and 8 and should be implemented having regard to those actions.

7.4. Nuclear security for nuclear and other radioactive material out of regulatory control should be based on the development of effective strategies to deter, detect and respond to a criminal act or an unauthorized act with nuclear security implications [4].

7.5. Material out of regulatory control includes material that has been reported as being out of regulatory control to the regulatory authority and other relevant competent authorities (e.g. law enforcement) as well as material that is lost, missing or stolen but has not been reported as such, or has been otherwise discovered.

7.6. The competent authorities should ensure that, in relation to material out of regulatory control, the nuclear security infrastructure enables confirmation whether there is a credible threat, provides the means (through detection) to assess and interdict an attempted act with nuclear security implications and ensures an appropriate response.

7.7. In relation to nuclear and other radioactive material out of regulatory control, the State should put into place a range of preventive measures, including the deterrent effect of publicizing the criminalization of acts and the consequences of commission or attempts to commit such an act [4]. Other preventive measures include protection of sensitive information, checks on trustworthiness of personnel and the promotion of a robust security culture within the operator and all competent authorities.

7.8. The State should develop a national detection strategy and plan for detection of a criminal act or an unauthorized act with nuclear security implications involving nuclear or other radioactive material out of regulatory control. Detection<sup>17</sup> can be achieved by instrument alarm or information alert [37].

7.9. The State should develop a national response<sup>18</sup> strategy and plan for responding to a criminal act or an unauthorized act with nuclear security implications involving nuclear or other radioactive material out of regulatory control. The national response plan for nuclear security (hereafter referred to as the ‘plan’) should detail the response system and measures and the competent authorities responsible for implementing these measures. The plan should be based on the graded approach and should consider the full range of possible nuclear security events and consequences. It should be integrated into the overall response plan of the State, including the nuclear safety emergency response. It should also take account of the preparation, planning, response and recovery methodology set out in relevant IAEA nuclear security guidance including collection and handling of evidence and nuclear forensic examination that may need to be undertaken by specialists within designated competent authorities [38].

7.10. The following actions (7-1 to 7-5) for preventive measures are derived from IAEA Nuclear Security Series publications [4, 38]. The actions (7-6 to 7-14) for detection measures are derived from IAEA Nuclear Security Recommendations [4, 37]. The actions (7-15 to 7-31) for response measures are derived from IAEA publications [4, 37, 39–41].

---

<sup>17</sup> Within the context of this section the term ‘detection’ is used to describe means of attaining awareness of criminal acts or unauthorized acts with nuclear security implications or measurements indicating the unauthorized presence of nuclear material and other radioactive material at an associated facility or associated activity or a strategic location [4]

<sup>18</sup> Within the context of this section the term ‘response’ is used for all the activities by a State that involve assessing and responding to a nuclear security event [4].



## ACTIONS FOR PREVENTIVE MEASURES

*The actions for preventive measures for nuclear and other radioactive material out of regulatory control should be developed and implemented whether or not the State has a nuclear power programme. In case of States wishing to embark on a nuclear power programme, it would be beneficial to the State's overall security programme to have the actions fully in place as early as possible and prior to the use of radioactive material and receipt of the initial fuel for the first NPP during Phase 3.*

**Action 7-1:** The State should implement and support public information programmes that promote public understanding of:

- The general threat environment;
- The importance of public support for actions to deter, detect and report activities that may be relevant to nuclear security including through the provision of information to authorities;
- The potential consequences, including health consequences of exposure to radiation, associated with a criminal or unauthorized act with nuclear security implications;
- The fact that offences related to a breach of nuclear security will result in enforcement action including imposition of criminal penalties that are commensurate with the seriousness of the offences;
- The State's capability and programmes for detecting and responding to a nuclear security event, involving nuclear or other radioactive material out of regulatory control, including nuclear forensic capability;
- The State's programme for responding to a nuclear security event, including provision of public information and recommended actions by the public.

**Action 7-2:** The State should establish policies on the dissemination of information to the media to inform the public of lost, missing or stolen nuclear or other radioactive material. These policies should include recommendations for appropriate actions by competent authorities and authorized persons in relation to information dissemination to the media.

**Action 7-3:** The State should establish an effective first line response and crime scene management capability including national nuclear forensic capability,

**Action 7-4:** The State should establish its nuclear forensics support either within the State or in cooperation with another State's or regional or international

specialized facilities to ensure access to nuclear forensics capability. In particular, the State should consider establishing or participating in a programme that compiles libraries of inventoried/registered nuclear and other radioactive material for nuclear forensic purposes.

**Action 7-5:** The competent authorities should implement policies, management practices and procedures that will sustain the preventive measures including appropriate resources, training and budget allocations.

## ACTIONS FOR DETECTION MEASURES

*The actions for detection measures for nuclear and other radioactive material out of regulatory control should be developed and implemented whether or not the State has a nuclear power programme. In the case of States wishing to embark on a nuclear power programme, the actions should be fully in place as early as possible and prior to the use of radioactive material and receipt of the initial fuel for the first nuclear power plant during Phase 3.*

**Action 7-6:** The national policy and strategy in the nuclear security infrastructure should include the national strategy for detection of a criminal or other unauthorized act with nuclear security implications involving nuclear or other radioactive material out of regulatory control. It should be based on a graded approach and be sustainable by the competent authorities.

**Action 7-7:** The responsible competent authorities should implement the national detection strategy by assessing needs, resources and capabilities and establishing the necessary nuclear security systems and measures that include instrument alarms and information alerts, and appropriate measures to effectively manage the response.

**Action 7-8:** The responsible competent authorities should plan and organize the national nuclear security detection architecture<sup>19</sup> by establishing operational priorities, policies and requirements and an information coordination mechanism.

**Action 7-9:** The responsible competent authorities should design the detection systems and measures using the existing national capabilities, resources and activities, and establishing mechanisms for collection, analysis and sharing of operational information.

**Action 7-10:** The nuclear security detection systems and measures for detection by instruments should be based on a national level deployment plan utilizing a graded approach, available technologies and resources. The plan should include any necessary technical reach-back capabilities for resolution of instrument alarms.

**Action 7-11:** The State should ensure that competent authorities require operators to immediately report non-compliances and notify the appropriate competent authority of lost, missing or stolen nuclear or other radioactive material that was part of the operator's inventory of nuclear or other radioactive material, whether in its possession or during transfer or transport. The competent authority should, upon receipt of such a notification or report, promptly inform other relevant competent authorities and fulfil all relevant reporting obligations. Competent authorities should establish appropriate notification protocols and procedures for the prompt notification of all other relevant competent authorities within and/or outside the State (including, where appropriate, international bodies such as the IAEA).

**Action 7-12:** The State should ensure that the competent authorities responsible for implementing nuclear security measures related to customs and border control as well as strategic locations within a State should be consulted to verify requirements or guidance on measures that should be in place for the transfer and transport of nuclear and other radioactive material to ensure that it remains under regulatory control. Furthermore, these competent authorities should report the

---

<sup>19</sup> Within the context of this publication the term 'nuclear security detection architecture' means the integrated set of nuclear security systems and measures as defined in the IAEA Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control [4] and is based on an appropriate legal and regulatory framework needed to implement the national strategy for the detection nuclear and other radioactive material out of regulatory control.

detection of any nuclear or other radioactive material out of regulatory control to other relevant competent authorities.

**Action 7-13:** The State should as part of its national nuclear security detection architecture instruct health professionals, medical institutions and health authorities to report the occurrence of any suspicious radiation injuries or illnesses to the relevant competent authorities. The relevant competent authority with the responsibility to determine the cause and consequence of the illness or injury should investigate the report.

**Action 7-14:** The competent authorities should implement policies, management practices and procedures that will sustain the nuclear security detection architecture by establishing comprehensive maintenance and calibration programmes and the appropriate allocation of resources for training and exercises.

## ACTIONS FOR RESPONSE MEASURES

*The actions for response measures for nuclear and other radioactive material out of regulatory control should be developed and implemented whether or not the State has a nuclear power programme. In case of States wishing to embark on a nuclear power programme, the actions should be fully in place as early as possible and prior to the use of radioactive material and the receipt of the initial fuel for the first nuclear power plant during Phase 3.*

**Action 7-15:** The State should prepare a national response plan for nuclear security (see paragraph 7.9) and develop the necessary systems and measures to respond to criminal or unauthorized acts with nuclear security implications involving nuclear or other radioactive material out of regulatory control.

**Action 7-16:** The national response plan should define the roles and responsibilities of each competent authority, promote appropriate coordination among the competent authorities and provide for the allocation of appropriate resources to ensure that each competent authority can carry out the assigned tasks for response to a nuclear security event.

**Action 7-17:** The State should ensure that the plan provides for actions following a nuclear security event to include:

- Notification of all relevant competent authorities;

- Notification of all relevant international organizations and potentially affected States;
- Coordination of the competent authorities and command and control units likely to be involved in response, including federal, provincial, and local response organizations;
- Location, identification, and categorization of nuclear and other radioactive material;
- Detention and/or seizure, recovery and control of material or actions to render harmless any threat or associated device;
- Collection, securing and analysis of evidence;
- Isolation, classification, packaging and documentation of any seized or recovered nuclear or other radioactive material for transport, carriage, storage or disposal and placement under proper regulatory control. In relation to transport there should be provision for this transport to occur in accordance with national regulations for the safe and secure transport of any seized or recovered nuclear and other radioactive material;
- Initiation of relevant investigation.

**Action 7-18:** The State should ensure that the plan defines an appropriate command structure with integrated command, control and communications systems to respond effectively to a nuclear security event with a single person or competent authority assigned to direct the response at the scene.

**Action 7-19:** The State should ensure that the plan includes arrangements for informing the media and public as appropriate in a coordinated, clear and consistent manner.

**Action 7-20:** The plan should take into account the possibility of multiple and simultaneous nuclear security events and include such scenarios in its specifications of preparatory exercises and drills.

**Action 7-21:** The plan should include measures in the event that disruption of response systems and measures could delay an effective response.

**Action 7-22:** The plan should take into account the existing national radiation emergency plan, emergency response procedures and be coordinated with the

response to non-radiation emergencies. It should take into account relevant IAEA safety standards.<sup>20</sup>

**Action 7-23:** The plan should promote coordination among response organizations at the international, national and local level to ensure that the radiological consequences for human health and the environment are appropriately dealt with in the nuclear security response, including measures to mitigate the radiological consequences.

**Action 7-24:** The State should empower competent authorities to gather and retain evidence, including through inspection investigation and seizure.

**Action 7-25:** The relevant competent authority should establish basic nuclear forensic capabilities within the State and ensure that arrangements are in place for additional nuclear forensic analysis support from other States or international organizations, if needed.

**Action 7-26:** Competent authorities should ensure that responders (in particular first responders) are aware of the concepts of operation and are suitably qualified and trained, including in radiation protection.

**Action 7-27:** Competent authorities should ensure that responders (in particular first responders) are aware of the basic concepts of crime scene management and radiological evidence collection and preservation.

**Action 7-28:** Competent authorities should ensure that the location of any nuclear security event is managed as a potential crime scene, as appropriate. The relevant competent authority should promote coordination among those involved in recovering control over nuclear or other radioactive material, those concerned with the safety and treating of victims and those concerned with gathering evidence for possible subsequent investigation or prosecution.

**Action 7-29:** The State should ensure that all response plans are consistent with the plan and each competent authority's plan consistent with the plans of other competent authorities.

---

<sup>20</sup> The current relevant IAEA safety standards are: Preparedness and Response for a Nuclear or Radiological Emergency [39]; Arrangements for Preparedness for a Nuclear or Radiological Emergency [40]; and Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency [41].

**Action 7-30:** Competent authorities should establish requirements within the plan to ensure that exercises and drills are undertaken regularly to ensure the effectiveness of response as well as the requirement for the periodic review, revision and incorporation of lessons learned into the plan.

**Action 7-31:** The competent authorities should sustain the response systems and measures. This should include a maintenance programme for response equipment that should include periodic preventive maintenance, testing and calibration and the appropriate allocation of budget and staff.

## 8. INTERNATIONAL COOPERATION

8.1. This section focuses on international cooperation and assistance required for an effective nuclear security infrastructure. Given the global implications of nuclear security events, it is important that each State cooperates and shares appropriate information and experiences from its national nuclear security infrastructure, having regard to issues of confidentiality. Many of the actions contained in this section are a subset of, or are related to actions set out in Sections 2–7 and should be implemented having regard to those actions.

8.2. Effective participation in international activities and networks promotes international cooperation and coordination in relation to nuclear security generally and in specific areas such as physical protection techniques and practices, safety–security interface, prosecution and/or extradition of alleged offenders, sharing of nuclear forensic techniques and sharing of evidence for prosecution of alleged offences in relation to nuclear security.

8.3. States should exchange accurate and verified information on nuclear security events in accordance with international obligations and national legislation, taking into account requirements related to national security and the protection of sensitive nuclear security information. States should ensure that common formats and protocols are developed for this purpose. An example of the development of such common protocols is the IAEA Incident and Trafficking Database (ITDB).

8.4. States should ensure that all relevant international bodies and States with whom they have multilateral or bilateral arrangements in place are advised of their points of contact for exchange of information. The key areas where this cooperation is necessary include:

- Exchange of information on nuclear security techniques and practices.
- Reporting of cases of unauthorized removal or sabotage. In such a case, or a credible threat thereof, the State should provide information as soon as possible to other States that may be affected and to the IAEA and other relevant international organizations.
- In the case of alleged theft of nuclear material, informing other States that may be affected as soon as possible.
- Recovery and return of seized items.
- Rendering of assistance where requested.



- Technical cooperation and assistance including coordination when applying measures to prevent, detect, suppress and investigate alleged offences and institute criminal proceedings.
- Cooperation with respect to alleged criminal offences, including nuclear forensics cooperation and contribution of information from nuclear forensic libraries.

8.5. In addition to their obligations under relevant international legal instruments, States should also consider other key cooperative measures including:

- Participating in and reporting to applicable international and regional databases including the ITDB;
- Exchange of lessons learned following nuclear security events.

8.6. The following actions (8-1 to 8-18) for international cooperation are derived from IAEA Nuclear Security Series publications [1–4].

## ACTIONS FOR INTERNATIONAL COOPERATION

*The actions for international cooperation should be developed and implemented whether or not the State has a nuclear power programme. In the case of States wishing to embark on a nuclear power programme, the actions for international cooperation should be initiated during Phase 2 and prior to Milestone 2, fully implemented during Phase 3 and prior to Milestone 3 and be sustained throughout the life time of the nuclear power programme.*

**Action 8-1:** States should implement appropriate mechanisms for the secure exchange of information on a regional and international level. The mechanisms should be based on bilateral or multilateral arrangements. It is essential that the confidentiality of sensitive information is protected through appropriate arrangements. States and relevant international organizations should develop appropriate formats and protocols for this information exchange.

**Action 8-2:** The State should establish effective cooperative arrangements with other States and with relevant international organizations regarding nuclear security events. The State should designate national point(s) of contact for all matters related to nuclear security.

**Action 8-3:** The State should establish notification systems in relation to alleged criminal or unauthorized acts involving nuclear or other radioactive material among the relevant competent authorities of other States to facilitate mutual assistance in these matters.

**Action 8-4:** The State should establish procedures to ensure that international organizations are notified of the designated point(s) of contact for notification, assistance and cooperation for nuclear security.

**Action 8-5:** The State should ensure that it complies with its obligations to promptly notify relevant international organizations of relevant nuclear security related information.

**Action 8-6:** States should establish effective mechanisms for the mutual legal cooperation and assistance in the context of the prosecution of alleged offences or extradition of alleged offenders, including forensic information. This includes making witnesses available and applying other measures, including those based on relevant treaties for mutual legal assistance between States parties.

**Action 8-7:** States should promote coordination and cooperation by their customs and other border authorities with those of other States, including at points of exit and/or entry. States should establish the capability to coordinate or share detection capabilities and expertise at designated and non-designated points of exit and/or entry.

**Action 8-8:** The State should consider entering into arrangements with other States or relevant regional or international institutions for the purpose of nuclear forensic analysis and support.

**Action 8-9:** A State that has located, seized, recovered or otherwise obtained nuclear or other radioactive material out of regulatory control should safely and securely store the material and then, where appropriate, cooperate with the State in which regulatory control had been lost to arrange for the safe and secure return of the material. Actions taken by States holding the material should be consistent with their national policies, procedures and with applicable bilateral and multilateral arrangements.

**Action 8-10:** Upon detection of nuclear or other radioactive material out of regulatory control at a point of exit or entry, the detecting State should work with the State of origin and other relevant States to return the material to institutional

control<sup>21</sup>. The detecting State should adopt a graded approach for such response that depends on the circumstances of the case and the nature of the material.

**Action 8-11:** The State should participate in international activities and networks for strengthening nuclear security to improve its nuclear security infrastructure, and inter alia to maintain awareness of changes in policy and strategy that may occur in other States and information and guidance from international organizations.

**Action 8-12:** The State should consider enhancing preparedness by conducting or participating in joint exercises and other training activities related to nuclear security, at the bilateral, regional and international levels.

**Action 8-13:** The State should consider, upon request by another State, providing assistance including expertise and equipment, for example for a major public event requiring nuclear security measures. Such assistance should be coordinated with that provided through other bilateral assistance or by regional or international organizations.

**Action 8-14:** The State should consider requesting assistance from other States and international organizations to improve its technical capabilities for detection of and response to a nuclear security event.

**Action 8-15:** The State should consider requesting assistance during nuclear security events, including in circumstances where effectively managing the consequences of the event is beyond the capability of the State.

**Action 8-16:** States parties to relevant bilateral and multilateral instruments should provide and use, where applicable within the framework of national laws, the mutual legal assistance and other provisions in such instruments to cooperate in connection with criminal proceedings related to nuclear security events.

**Action 8-17:** The State should invite an international peer review mission to review the implementation of systems and measures required by the legal and regulatory framework for the national nuclear security infrastructure.

**Action 8-18:** The State should take appropriate measures to sustain international cooperation and assistance.

---

<sup>21</sup> Institutional control in this context includes regulatory control or control by any institution that has a role in the investigation, prosecution, extradition or other proceedings of a State related to the location, seizure or recovery of nuclear or other radioactive material.



## Appendix

### SUMMARY OF ACTIONS RELATED TO NUCLEAR SECURITY FOR THE RELEVANT PHASES OF A NUCLEAR POWER PROGRAMME

Subject	Phase 1		Phase 2		Phase 3	
	Actions	Summary	Actions	Summary	Actions	Summary
<b>National policy and strategy</b>	2-1	Consider threat assessment	2-11	Review and update the implementation of the strategy including through updated threat assessment	2-12	Review and adjust national strategy including through updated threat assessment
	2-2	Assess the status of national security infrastructure				
	2-3	Recognize nuclear security culture as part of national policy development				
	2-4	Identify competent authorities				
	2-5	Ensure appropriate representation of all competent authorities for development of infrastructure				
	2-6	Contact with other States and international organizations				
	2-7	Strengthen cooperation nationally and internationally				
	2-8	High level assessment of requirement for design of nuclear security infrastructure				
	2-9	Develop national nuclear security strategy				
	2-10	Identify required resources (human, financial) for implementation of the policy and strategy				

	Phase 1		Phase 2		Phase 3	
Subject	Actions	Summary	Actions	Summary	Actions	Summary
<b>Legal and regulatory framework</b>	3-1	Identify relevant international legal instruments	3-4 to 3-5	Enact legislation to give appropriate legal authority to all competent authorities, including definition of breaches that are not offences	3-20 to 3-26	Implement and fulfil the responsibilities by the competent authorities and continuous improvement
	3-2	Identify elements of a domestic legal and regulatory framework	3-6 to 3-12	Enact appropriate legislation and arrangements for the prosecution of alleged offences related to nuclear security		
	3-3	Identify expertise for planning and implementing the legal and regulatory framework	3-13 to 3-14	Competent authorities to have in place the processes and procedures.		
			3-15 to 3-19	Regulatory authority to have in place a regulatory programme		
<b>National threat assessment</b>	4-1 to 4-2	Designate a competent authority for threat assessment and ensure its capabilities.	4-3 to 4-4	Develop the national threat assessment	4-5	Update national threat assessment
<b>DBT or threat assessment for design of nuclear security measures</b>			4-6 to 4-7	Identify DBT or alternate threat based methodology for all facilities and materials	4-15 to 4-16	Develop and implement systems and measures by operator/authorized person, shipper and/or carrier
			4-8 to 4-11	Develop DBT and design of systems and measures	4-17 to 4-18	Update DBT or alternate threat assessment
			4-12 to 4-14	Develop alternate threat based methodology for other facilities and material and design of systems and measures		

Subject	Phase 1		Phase 2		Phase 3	
	Actions	Summary	Actions	Summary	Actions	Summary
<b>Management systems for nuclear security: General</b>			4-19 to 4-23	Establish objectives and policies for implementation of integrated management system for nuclear security	4-24 to 4-25	Establish integrated management systems by all involved entities and review and monitor the integrated management systems
<b>Protection of sensitive information</b>	4-26	Define national policy on sensitive information	4-27 to 4-33	Develop and implement the policy and procedures for management of sensitive information including training by competent authorities, operators/auth. persons, shippers and/or carriers		
<b>Trustworthiness of personnel</b>			4-34	Establish policy and procedures for trustworthiness checks	4-35 to 4-36	Implement measures as well as establish processes for review and revalidation of checks
<b>Human resources for nuclear security</b>	4-37 to 4-44	Evaluate the State's human resource needs and the availability of institutions to develop competence domestically and internationally	4-45 to 4-49	Implement a plan of action to recruit and train staff of the competent authority including establishment of regional training centres	4-50 to 4-52	Human resource management during the construction and operation phase
<b>Promotion of nuclear security culture</b>	4-53	Recognize the importance of nuclear security culture in National policy (see action 2.1 above)	4-54 to 4-58	Implement programmes, policies and procedures to promote nuclear security culture within competent authorities and the operator		
<b>Sustaining the national nuclear security infrastructure</b>			4-59 to 4-60	Establish programmes to sustain the nuclear security infrastructure.	4-61	Sustain the nuclear security infrastructure.

	Phase 1		Phase 2		Phase 3	
Subject	Actions	Summary	Actions	Summary	Actions	Summary
<b>Measures against unauthorized removal of nuclear material and sabotage of nuclear facilities</b>			5-1 to 5-8	Define the requirements for the nuclear security measures by promulgation of requirements by the competent authorities for implementation by the applicant/operator	5-9 to 5-30	Implement the nuclear security measures for the purposes of authorization, inspection and enforcement. Implement the nuclear security measures by the operator including contingency and response planning
<b>Measures against unauthorized removal of nuclear material and sabotage during transport</b>			5-31 to 5-33	Define the requirements for the transport of nuclear material by the competent authorities for implementation by the shipper and/or carrier	5-34 to 5-39	Implement the nuclear security requirements for the purposes of approvals of transport of nuclear material. Implement the nuclear security measures by the shipper and or carrier. including contingency and response planning
<b>Nuclear Security measures for radioactive material and associated facilities and activities</b>	6-1 to 6-7	Develop threat assessment and identify the requirements for the security of radioactive material and associated activities and facilities including measures to detect and respond to theft, unauthorized removal or sabotage as well as sustain the infrastructure.				
<b>Security of radioactive material in use and storage</b>	6-8 to 6-13	Develop and implement the requirements for the use and storage of radioactive material through promulgation of requirements by the competent authorities followed up by the implementation and sustainment by the operator/authorized person.				
<b>Security of radioactive material in transport</b>	6-14 to 6-24	Develop and implement the requirements for the transport of radioactive material by promulgation of requirements by the competent authorities followed up by the implementation of the transport security requirements by the shipper and/or carrier.				



	Phase 1		Phase 2		Phase 3	
Subject	Actions	Summary	Actions	Summary	Actions	Summary
<b>Nuclear security measures for nuclear and other radioactive material out of regulatory control: Preventative measures</b>	7-1 to 7-5			Develop and sustain preventive measures		
<b>Nuclear security measures for nuclear and other radioactive material out of regulatory control: Detection measures</b>	7-6 to 7-14			Develop and sustain nuclear security detection measures		
<b>Nuclear security measures for nuclear and other radioactive material out of regulatory control: Response measures</b>	7-15 to 7-31			Develop and sustain nuclear security response measures		
<b>International cooperation</b>	8-1 to 8-18			Establish and sustain international cooperation		



## REFERENCES

- [1] INTERNATIONAL ATOMIC ENERGY AGENCY, Fundamentals of a State's Nuclear Security Regime: Objective and Essential Elements, IAEA Nuclear Security Series No. 20, IAEA, Vienna (2013).
- [2] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities (INFCIRC/225/Revision 5), IAEA Nuclear Security Series No. 13, IAEA, Vienna (2011).
- [3] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Radioactive Material and Associated Facilities, IAEA Nuclear Security Series No. 14, IAEA, Vienna (2011).
- [4] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Recommendations on Nuclear and Other Radioactive Material out of Regulatory Control, IAEA Nuclear Security Series No. 15, IAEA, Vienna (2011).
- [5] INTERNATIONAL ATOMIC ENERGY AGENCY, Milestones in the Development of a National Infrastructure for Nuclear Power, IAEA Nuclear Energy Series No NG-G-3.1, IAEA, Vienna (2007).
- [6] INTERNATIONAL ATOMIC ENERGY AGENCY, Governmental, Legal and Regulatory Framework for Safety, IAEA Safety Standards Series No. GSR Part 1, IAEA, Vienna (2011).
- [7] INTERNATIONAL ATOMIC ENERGY AGENCY, Establishing the Safety Infrastructure for a Nuclear Power Programme, IAEA Safety Standards Series No. SSG-16, IAEA, Vienna (2011).
- [8] Convention on the Physical Protection of Nuclear Material, INFCIRC/274/Rev.1, IAEA, Vienna (1980).
- [9] Amendment to the Convention on the Physical Protection of Nuclear Material GOV/INF/2005/10-GC (49) INF/6, IAEA, Vienna (2005).
- [10] International Convention for the Suppression of Terrorist Bombings, A/52/653, United Nations, New York (1997).
- [11] International Convention on the Suppression of the Financing of Terrorism, United Nations, New York (1999).
- [12] International Convention for the Suppression of Acts of Nuclear Terrorism, United Nations, New York (2005).
- [13] Protocol to the IMO Convention for the Suppression of Unlawful Acts Against the Safety of Maritime Navigation, United Nations, New York (2005).
- [14] Protocol to the IMO Protocol for the Suppression of Unlawful Acts Against the Safety of Fixed Platforms Located on the Continental Shelf, United Nations, New York (2005).
- [15] Beijing Convention on the Suppression of Unlawful Acts Relating to International Civil Aviation (2010) and the Beijing Protocol to the 1971 Hague Convention on the Suppression of Unlawful Seizure of an Aircraft, United Nations, New York (2010).
- [16] United Nations Security Council Resolution 1373, S/RES/1373 (2001), United Nations, New York (2001).
- [17] United Nations Security Council Resolution 1540, United Nations, New York (2004).
- [18] Convention on Nuclear Safety, INFCIRC/449, IAEA, Vienna (1994).
- [19] Treaty on the Non-Proliferation of Nuclear Weapons, INFCIRC/140, IAEA, Vienna (1970).

- [20] Joint Convention on the Safety of Spent Fuel Management and on the Safety of Radioactive Waste Management, INFCIRC/546, IAEA, Vienna (1997).
- [21] Convention on Early Notification of a Nuclear Accident, INFCIRC/335, IAEA, Vienna (1986).
- [22] Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency, INFCIRC/336, IAEA, Vienna (1986).
- [23] INTERNATIONAL ATOMIC ENERGY AGENCY, Code of Conduct on the Safety and Security of Radioactive Sources, IAEA/CODEOC/2004, IAEA, Vienna (2004).
- [24] INTERNATIONAL ATOMIC ENERGY AGENCY, Guidance on the Import and Export of Radioactive Sources, IAEA/CODEOC/IMP-EXP/2005, IAEA, Vienna (2005).
- [25] INTERNATIONAL ATOMIC ENERGY AGENCY, The International Legal Framework for Nuclear Security, IAEA International Law Series No. 4, IAEA, Vienna (2011).
- [26] Communications Received from Certain Member States Regarding Guidelines for Transfers of Nuclear-Related Dual-Use Equipment, Materials, Software and Related Technology, INFCIRC 254/Rev 7/Part 2, IAEA, Vienna (2006).
- [27] STOIBER C., BAER A., PELZER N., TONHAUSER W., Handbook on Nuclear Law, IAEA, Vienna (2003).
- [28] STOIBER C., CHERIF A., TONHAUSER W., DE LOURDES VEZ CARMONA M., Handbook on Nuclear Law: Implementing Legislation, IAEA, Vienna (2010)
- [29] INTERNATIONAL ATOMIC ENERGY AGENCY, Development, Use and Maintenance of the Design Basis Threat, IAEA Nuclear Security Series No. 10, IAEA, Vienna (2009).
- [30] INTERNATIONAL ATOMIC ENERGY AGENCY, The Management Systems for Facilities and Activities, IAEA Safety Standards Series No. GS-R-3, IAEA, Vienna (2006).
- [31] INTERNATIONAL ATOMIC ENERGY AGENCY, Computer Security at Nuclear Facilities, IAEA Nuclear Security Series No. 17, IAEA, Vienna (2012).
- [32] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Culture, IAEA Nuclear Security Series No. 7, IAEA, Vienna (2008).
- [33] INTERNATIONAL ATOMIC ENERGY AGENCY, Security of Radioactive Sources, IAEA Nuclear Security Series No. 11, IAEA, Vienna (2009).
- [34] INTERNATIONAL ATOMIC ENERGY AGENCY, Security in the Transport of Radioactive Sources, IAEA Nuclear Security Series No. 9, IAEA, Vienna (2009).
- [35] INTERNATIONAL ATOMIC ENERGY AGENCY IAEA, Regulations for the Safe Transport of Radioactive Material, IAEA Safety Standards Series No. TS-R-1, IAEA, Vienna (2009).
- [36] UNITED NATIONS, Recommendations on the Transport of Dangerous Goods, 9th revised version (ST/SG/AC.10/1/Rev9), United Nations, New York (1995).
- [37] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Security Systems and Measures for Detection of Nuclear and other Radioactive Material out of Regulatory Control, IAEA Nuclear Security Series No. 21, IAEA, Vienna (2013).
- [38] INTERNATIONAL ATOMIC ENERGY AGENCY, Nuclear Forensics Support, IAEA Nuclear Security Series No. 2, IAEA, Vienna (2006).
- [39] INTERNATIONAL ATOMIC ENERGY AGENCY, Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSR 2, IAEA, Vienna, (2002).

- [40] INTERNATIONAL ATOMIC ENERGY AGENCY, Arrangements for Preparedness for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG 2.1, IAEA, Vienna (2007).
- [41] INTERNATIONAL ATOMIC ENERGY AGENCY, Criteria for Use in Preparedness and Response for a Nuclear or Radiological Emergency, IAEA Safety Standards Series No. GSG 2, IAEA, Vienna (2011).





# IAEA

International Atomic Energy Agency

No. 22

## Where to order IAEA publications

In the following countries IAEA publications may be purchased from the sources listed below, or from major local booksellers. Payment may be made in local currency or with UNESCO coupons.

### AUSTRALIA

DA Information Services, 648 Whitehorse Road, MITCHAM 3132  
Telephone: +61 3 9210 7777 • Fax: +61 3 9210 7788  
Email: [service@dadirect.com.au](mailto:service@dadirect.com.au) • Web site: <http://www.dadirect.com.au>

### BELGIUM

Jean de Lannoy, avenue du Roi 202, B-1190 Brussels  
Telephone: +32 2 538 43 08 • Fax: +32 2 538 08 41  
Email: [jean.de.lannoy@infoboard.be](mailto:jean.de.lannoy@infoboard.be) • Web site: <http://www.jean-de-lannoy.be>

### CANADA

Bernan Associates, 4501 Forbes Blvd, Suite 200, Lanham, MD 20706-4346, USA  
Telephone: 1-800-865-3457 • Fax: 1-800-865-3450  
Email: [customercare@bernan.com](mailto:customercare@bernan.com) • Web site: <http://www.bernan.com>

Renouf Publishing Company Ltd., 1-5369 Canotek Rd., Ottawa, Ontario, K1J 9J3  
Telephone: +613 745 2665 • Fax: +613 745 7660  
Email: [order.dept@renoufbooks.com](mailto:order.dept@renoufbooks.com) • Web site: <http://www.renoufbooks.com>

### CHINA

IAEA Publications in Chinese: China Nuclear Energy Industry Corporation, Translation Section, P.O. Box 2103, Beijing

### CZECH REPUBLIC

Suweco CZ, S.R.O., Klecakova 347, 180 21 Praha 9  
Telephone: +420 26603 5364 • Fax: +420 28482 1646  
Email: [nakup@suweco.cz](mailto:nakup@suweco.cz) • Web site: <http://www.suweco.cz>

### FINLAND

Akateeminen Kirjakauppa, PO BOX 128 (Keskuskatu 1), FIN-00101 Helsinki  
Telephone: +358 9 121 41 • Fax: +358 9 121 4450  
Email: [akatilaus@akateeminen.com](mailto:akatilaus@akateeminen.com) • Web site: <http://www.akateeminen.com>

### FRANCE

Form-Edit, 5, rue Janssen, P.O. Box 25, F-75921 Paris Cedex 19  
Telephone: +33 1 42 01 49 49 • Fax: +33 1 42 01 90 90  
Email: [formedit@formedit.fr](mailto:formedit@formedit.fr) • Web site: <http://www.formedit.fr>

Lavoisier SAS, 145 rue de Provigny, 94236 Cachan Cedex  
Telephone: + 33 1 47 40 67 02 • Fax +33 1 47 40 67 02  
Email: [romuald.verrier@lavoisier.fr](mailto:romuald.verrier@lavoisier.fr) • Web site: <http://www.lavoisier.fr>

### GERMANY

UNO-Verlag, Vertriebs- und Verlags GmbH, Am Hofgarten 10, D-53113 Bonn  
Telephone: + 49 228 94 90 20 • Fax: +49 228 94 90 20 or +49 228 94 90 222  
Email: [bestellung@uno-verlag.de](mailto:bestellung@uno-verlag.de) • Web site: <http://www.uno-verlag.de>

### HUNGARY

Librotrade Ltd., Book Import, P.O. Box 126, H-1656 Budapest  
Telephone: +36 1 257 7777 • Fax: +36 1 257 7472 • Email: [books@librotrade.hu](mailto:books@librotrade.hu)

### INDIA

Allied Publishers Group, 1st Floor, Dubash House, 15, J. N. Heredia Marg, Ballard Estate, Mumbai 400 001,  
Telephone: +91 22 22617926/27 • Fax: +91 22 22617928  
Email: [alliedpl@vsnl.com](mailto:alliedpl@vsnl.com) • Web site: <http://www.alliedpublishers.com>

Bookwell, 2/72, Nirankari Colony, Delhi 110009  
Telephone: +91 11 23268786, +91 11 23257264 • Fax: +91 11 23281315  
Email: [bookwell@vsnl.net](mailto:bookwell@vsnl.net)

### ITALY

Libreria Scientifica Dott. Lucio di Biasio "AEIOU", Via Coronelli 6, I-20146 Milan  
Telephone: +39 02 48 95 45 52 or 48 95 45 62 • Fax: +39 02 48 95 45 48  
Email: [info@libreriaaeiou.eu](mailto:info@libreriaaeiou.eu) • Website: [www.libreriaaeiou.eu](http://www.libreriaaeiou.eu)

## **JAPAN**

Maruzen Company Ltd, 1-9-18, Kaigan, Minato-ku, Tokyo, 105-0022  
Telephone: +81 3 6367 6079 • Fax: +81 3 6367 6207  
Email: journal@maruzen.co.jp • Web site: <http://www.maruzen.co.jp>

## **REPUBLIC OF KOREA**

KINS Inc., Information Business Dept. Samho Bldg. 2nd Floor, 275-1 Yang Jae-dong SeoCho-G, Seoul 137-130  
Telephone: +02 589 1740 • Fax: +02 589 1746 • Web site: <http://www.kins.re.kr>

## **NETHERLANDS**

De Lindeboom Internationale Publicaties B.V., M.A. de Ruyterstraat 20A, NL-7482 BZ Haaksbergen  
Telephone: +31 (0) 53 5740004 • Fax: +31 (0) 53 5729296  
Email: books@delindeboom.com • Web site: <http://www.delindeboom.com>

Martinus Nijhoff International, Koraalrood 50, P.O. Box 1853, 2700 CZ Zoetermeer  
Telephone: +31 793 684 400 • Fax: +31 793 615 698  
Email: info@nijhoff.nl • Web site: <http://www.nijhoff.nl>

Swets and Zeitlinger b.v., P.O. Box 830, 2160 SZ Lisse  
Telephone: +31 252 435 111 • Fax: +31 252 415 888  
Email: infoho@swets.nl • Web site: <http://www.swets.nl>

## **NEW ZEALAND**

DA Information Services, 648 Whitehorse Road, MITCHAM 3132, Australia  
Telephone: +61 3 9210 7777 • Fax: +61 3 9210 7788  
Email: service@dadirect.com.au • Web site: <http://www.dadirect.com.au>

## **SLOVENIA**

Cankarjeva Zalozba d.d., Kopitarjeva 2, SI-1512 Ljubljana  
Telephone: +386 1 432 31 44 • Fax: +386 1 230 14 35  
Email: import.books@cankarjeva-z.si • Web site: <http://www.cankarjeva-z.si/uvoz>

## **SPAIN**

Diaz de Santos, S.A., c/ Juan Bravo, 3A, E-28006 Madrid  
Telephone: +34 91 781 94 80 • Fax: +34 91 575 55 63  
Email: compras@diazdesantos.es, carmela@diazdesantos.es, barcelona@diazdesantos.es, julio@diazdesantos.es  
Web site: <http://www.diazdesantos.es>

## **UNITED KINGDOM**

The Stationery Office Ltd, International Sales Agency, PO Box 29, Norwich, NR3 1 GN  
Telephone (orders): +44 870 600 5552 • (enquiries): +44 207 873 8372 • Fax: +44 207 873 8203  
Email (orders): book.orders@tso.co.uk • (enquiries): book.enquiries@tso.co.uk • Web site: <http://www.tso.co.uk>

### **On-line orders**

DELTA Int. Book Wholesalers Ltd., 39 Alexandra Road, Addlestone, Surrey, KT15 2PQ  
Email: info@profbooks.com • Web site: <http://www.profbooks.com>

### **Books on the Environment**

Earthprint Ltd., P.O. Box 119, Stevenage SG1 4TP  
Telephone: +44 1438748111 • Fax: +44 1438748844  
Email: orders@earthprint.com • Web site: <http://www.earthprint.com>

## **UNITED NATIONS**

Dept. I004, Room DC2-0853, First Avenue at 46th Street, New York, N.Y. 10017, USA  
(UN) Telephone: +800 253-9646 or +212 963-8302 • Fax: +212 963-3489  
Email: publications@un.org • Web site: <http://www.un.org>

## **UNITED STATES OF AMERICA**

Bernan Associates, 4501 Forbes Blvd., Suite 200, Lanham, MD 20706-4346  
Telephone: 1-800-865-3457 • Fax: 1-800-865-3450  
Email: customercare@bernan.com • Web site: <http://www.bernan.com>

Renouf Publishing Company Ltd., 812 Proctor Ave., Ogdensburg, NY, 13669  
Telephone: +888 551 7470 (toll-free) • Fax: +888 568 8546 (toll-free)  
Email: order.dept@renoufbooks.com • Web site: <http://www.renoufbooks.com>

**Orders and requests for information may also be addressed directly to:**

### **Marketing and Sales Unit, International Atomic Energy Agency**

Vienna International Centre, PO Box 100, 1400 Vienna, Austria  
Telephone: +43 1 2600 22529 (or 22530) • Fax: +43 1 2600 29302  
Email: sales.publications@iaea.org • Web site: <http://www.iaea.org/books>







**OBJECTIVE AND ESSENTIAL ELEMENTS OF A STATE'S NUCLEAR SECURITY REGIME****IAEA Nuclear Security Series No. 20**

STI/PUB/1590 (15 pp.; 2013)

ISBN 978-92-0-137810-1

Price: €20.00

**NUCLEAR SECURITY RECOMMENDATIONS ON NUCLEAR AND OTHER RADIOACTIVE MATERIAL OUT OF REGULATORY CONTROL****IAEA Nuclear Security Series No. 15**

STI/PUB/1488 (33 pp.; 2011)

ISBN 978-92-0-112210-0

Price: €23.00

**NUCLEAR SECURITY RECOMMENDATIONS ON RADIOACTIVE MATERIAL AND ASSOCIATED FACILITIES****IAEA Nuclear Security Series No. 14**

STI/PUB/1487 (35 pp.; 2011)

ISBN 978-92-0-112110-3

Price: €22.00

**NUCLEAR SECURITY RECOMMENDATIONS ON PHYSICAL PROTECTION OF NUCLEAR MATERIAL AND NUCLEAR FACILITIES (INFCIRC/225/REVISION 5)****IAEA Nuclear Security Series No. 13**

STI/PUB/1481 (62 pp.; 2011)

ISBN 978-92-0-111110-4

Price: €28.00

**DEVELOPMENT, USE AND MAINTENANCE OF THE DESIGN BASIS THREAT****IAEA Nuclear Security Series No. 10**

STI/PUB/1386 (30 pp.; 2009)

ISBN 978-92-0-102509-8

Price: €18.00

**NUCLEAR SECURITY CULTURE****IAEA Nuclear Security Series No. 7**

STI/PUB/1347 (37 pp.; 2008)

ISBN 978-92-0-107808-7

Price: €30.00

The objective of this publication is to provide guidance on the actions to be taken by a State to establish an effective national nuclear security infrastructure for a nuclear power programme. States that do not intend to embark on such a programme, or already have an established nuclear power programme, will find the actions detailed in this publication useful when assessing and/or establishing the national nuclear security infrastructure for activities related to nuclear and other radioactive material, associated facilities and associated activities, as well as for dealing effectively with nuclear and other radioactive material out of regulatory control.

**INTERNATIONAL ATOMIC ENERGY AGENCY**  
**VIENNA**  
**ISBN 978-92-0-138010-4**  
**ISSN 1816-9317**