The Abdus Salam
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United Nations
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IAEA
International Atomic Energy Agency

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Joint ICTP-IAEA School of Nuclear Energy Management

8 - 26 August 2011

Nuclear Security Regime for Nuclear Material and Nuclear Facilities. Nuclear Security Regime for Radioactive Material and Associated Facilities.

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Nuclear Security Regime for
Nuclear Material and Facilites,
Radioactive Material and Associated Facilites

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Joint ICTP-IAEA School of Nuclear Energy Management
18 August 2011

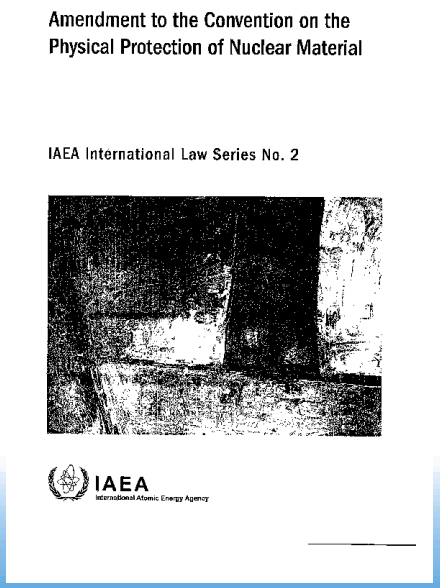
Nuclear Security Concerns

- Theft of nuclear weapon
- Theft of nuclear material to build an improvised nuclear device
- Theft of radioactive material or source for a radiological dispersion device
- Sabotage of a nuclear or radioactive material facility or transport

International Instruments

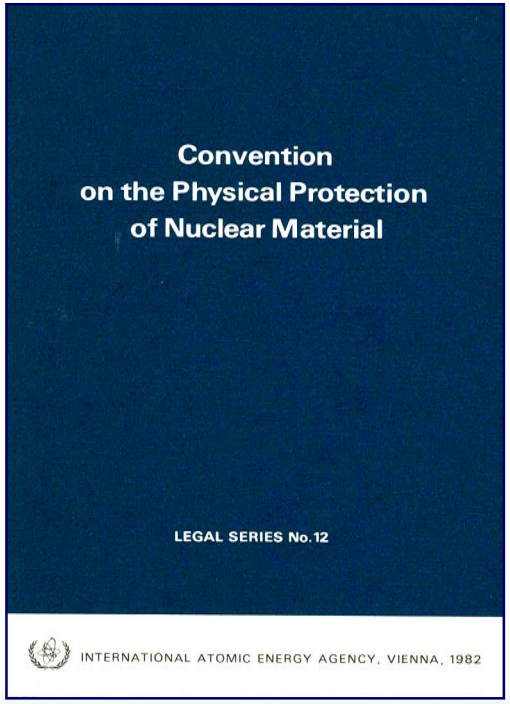
Legally binding:

- **Convention on the Physical Protection of Nuclear Material & Amendment (2005)**
- **Safeguards agreements, Additional Protocols, NWFZ**



Legally non binding:

- **Code of Conduct on the Safety and Security of Radioactive Sources**



IAEA Security related international instruments - binding

- ***Convention on Early Notification of a Nuclear Accident***
- ***Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency (1986)***
- **International Convention for the Suppression of Terrorist Bombings (1997)**

United Nations Security Council Resolutions

- **1373 (2001),*Threats to international peace and security caused by terrorist acts***
- **1540 (2004), *Non-proliferation of weapons of mass destruction***

- **Guidance on the Import and Export of Radioactive Sources (INFCIRC/663)**

Nuclear Security Regime

Essential Elements

1. State Responsibilities
2. Assignment of *Nuclear Security* Responsibilities
3. Legislative and Regulatory Framework and Administrative Measures
4. Import, Export and Trans-Shipment of *Nuclear Material* and *Other Radioactive Material*
5. Criminalization and Combating Offences
6. International Cooperation and Assistance
7. *Target* Identification and Assessment of Potential Consequences
8. Identification and Assessment of *Nuclear Security Threats*
9. Risk-Based *Nuclear Security* Measures and Functions
10. Detection of *Nuclear Security* Events
11. Planning and Preparedness for, and Response to, *Nuclear Security* Events
12. Commitment to Sustaining the *Nuclear Security Regime*

Nuclear Security Regime

Fundamentals Principles

A. Responsibility of the State
B. Responsibilities During International Transport
C. Legislative and Regulatory Framework
D. Competent authority
E. Responsibility of the License Holders
F. Security Culture
G. Threat
H. Graded Approach
I. Defence in Depth
J. Quality Assurance
K. Contingency Plans
L. Confidentiality

Nuclear Security Regime

State Responsibilities

- Establish a nuclear security regime
- Evaluate its national threat and, as appropriate, establish a Design Basis Threat
- Ensure coordination between competent authorities responsible for security, safety and radiation protection
- Establish requirements to ensure appropriate protection of specific or detailed security- related information
- Ensure effective overall cooperation and relevant information sharing between the competent authority and other security-related parts of the Government
- Establish measures to assure the trustworthiness of persons with authorized access to sensitive information
- Promote nuclear security culture

Safety and Security Interfaces

- Both safety and security have the same aim in protecting the public and the environment from harmful effects of radiation
- Safety and Security share a common regulatory approach
- Responsibilities for safety and security may be assigned to a single or different competent authorities
- A consultation and coordination mechanism is required between authorities to ensure efficient protection of radioactive material and to manage regulatory requirements that may be contradictory

Safety and Security Interfaces

- Balancing safety and security should be recognized throughout the nuclear security regime
- Major decisions regarding safety and security enhancements should require the consultation of each discipline on a continuous basis.
- Safety and security issues should be evaluated on mutually supporting and reinforcing terms.
- Security measures should be defined by taking into account those established for safety

Nuclear Safety and Nuclear Security

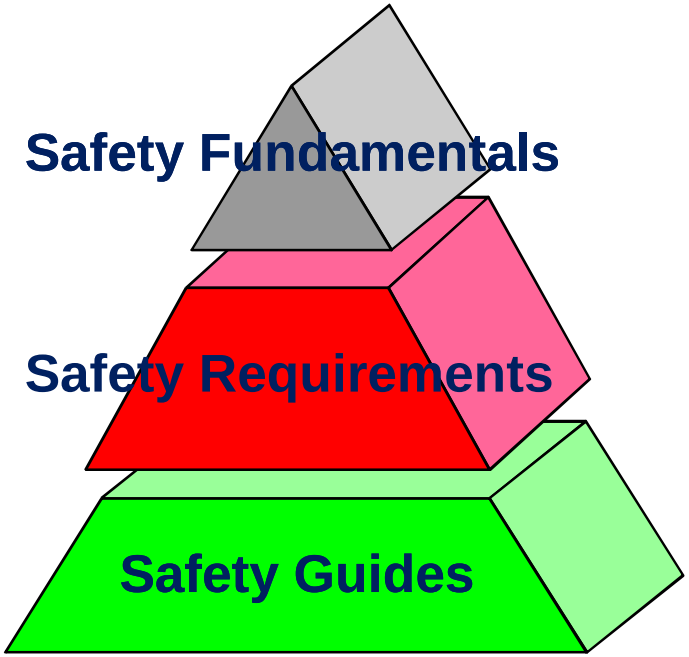
- **The fundamental nuclear safety objective is to protect people and the environment from harmful effects of ionizing radiation (IAEA Safety Fundamentals No. SF-1)**

- **The objective of a State's nuclear security regime is to protect persons, property, society, and the environment from harmful consequences of a nuclear security event (IAEA Fundamentals of a State's nuclear security regime)**

IAEA Safety and Security Standards

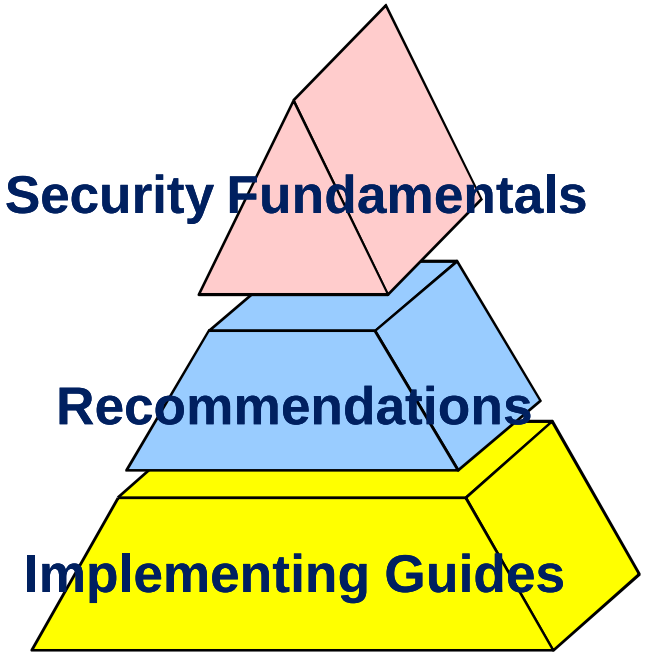
Global reference for high level of nuclear safety and security

NUCLEAR SAFETY STANDARDS



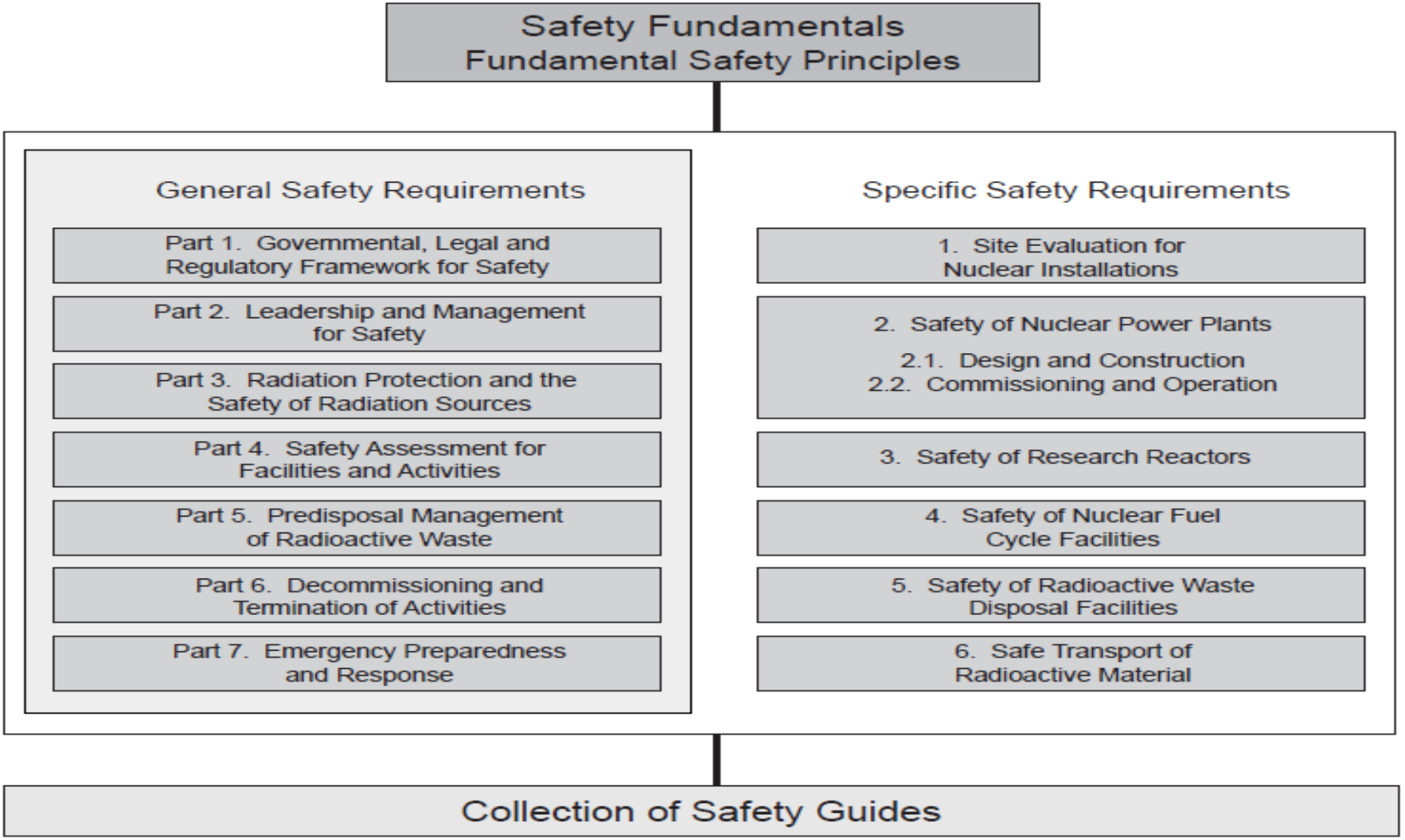
Mature - transparent development process

NUCLEAR SECURITY SERIES

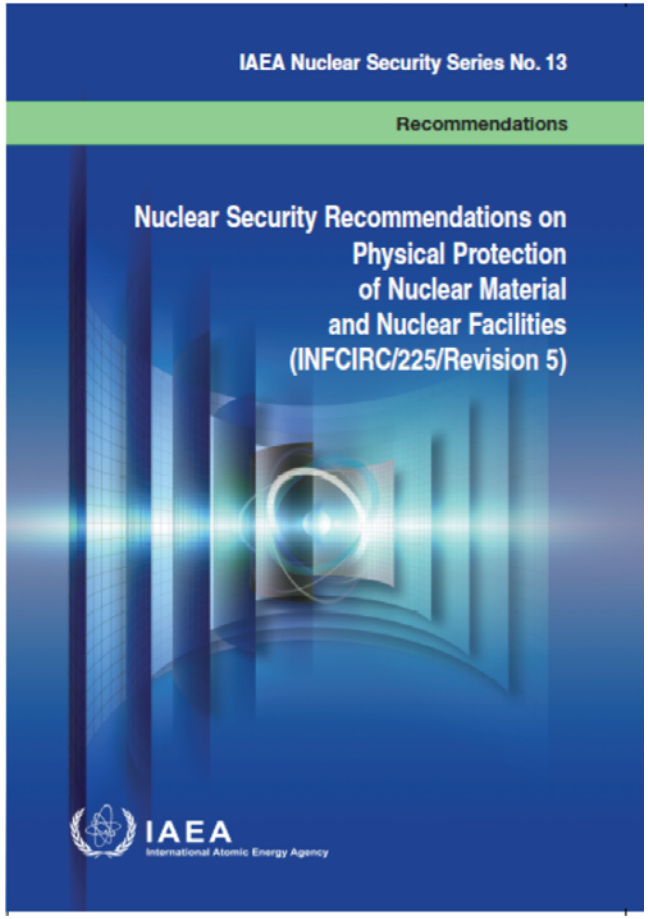


Initial stage of development

IAEA Safety Standards



IAEA Nuclear Security Series



Nuclear Security Series:

- **15 publications so far**
- **15 under development**

http://www-pub.iaea.org/MTCD/publications/
http://www-ns.iaea.org/security/nuclear_security_series.asp?s=5&l=35

Nuclear Security Series

- **Fundamentals (*PRINCIPLES*)**
  - ✓ Objectives and principles
  - ✓ Basis for Nuclear Security Recommendations
  - ✓ Essentials from international instruments
- **Recommendations (*WHAT?*)**
  - ✓ General approaches, actions, concepts and strategies
  - ✓ Applications of Fundamentals
- **Implementing Guides (*HOW?*)**
  - ✓ Broad guides on how Recommendations to be applied
  - ✓ Ways and means for how Recommendations implemented at systems level
- **Technical Guidance**
  - ✓ Reference Manuals, Training Guides, Service Guides

Nuclear Security Series – Published as Technical Guidance

1 Technical and Functional Specifications for Border Monitoring Equipment

2 Nuclear Forensic Support

3 Monitoring for Radioactive Material in International Mail Transported by Public Postal Operators

4 Engineering Safety Aspects of the Protection of Nuclear Power Plants against Sabotage

5 Identification of Radioactive Sources and Devices

6 Combating Illicit Trafficking of Nuclear and other Radioactive Material – Handbook

Nuclear Security Series

published as Implementing Guides in 2008 and 2009

7. Nuclear Security Culture
8. Preventive and protective
9. Measures Against Insider Threats
10. Security in the Transport of Radioactive Material
11. Development, Use and Maintenance of the Design Basis threat
12. Educational Programme in Nuclear Security

Nuclear Security Series – Just published

***Nuclear Security Recommendations*:**

- **Physical Protection NM and N Facilities (to be INFCIRC 225/Rev5 as well), NSS#13**
- **Radioactive Material, NSS#14**
- **Radioactive Material Out of Regulatory Control,NSS#15**

Related Security documents

Just published

- **International Legal Framework for Nuclear Security, IAEA International Law Series No. 4**

NSS publications, expected in 2011-2012

- **Nuclear Security Fundamentals – Essential elements**
- Identification of Vital Areas at Nuclear Facilities
- INPRO Manual on Physical protection
- Computer Security at Nuclear Facilities
- Nuclear Material Accountancy and Control at Facilities
- Nuclear Security at Major public events
- Radioactive Waste Security
- Nuclear Security for New Nuclear Power Plants
- Protecting and confidentiality of nuclear security information
- Protection Against Sabotage
- Physical protection of research reactors
- Procedures for examining legal shipments of radioactive mat.
- Security of fissile/radioactive material in transport
- Risk assessment and State management of nuclear security regime
- Responsibility and Management for Nuclear Security
- Nuclear Security Glossary

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

- **The purpose of the *Nuclear Security Fundamentals (Objective and Essential Elements)* document is to set out the overall objective of a national *nuclear security regime* and to establish the set of Essential Elements of an appropriate and effective national *nuclear security regime***

FUNDAMENTALS - Target Audience

The Nuclear Security Fundaments document is intended for national policy makers, legislative, *competent authorities*, institutions, and individuals involved in the formation, maintenance or enhancement of a national *nuclear security regime*

FUNDAMENTALS - Scope

The Fundamentals document is the top-tier document in the Nuclear Security Series and it is intended to apply to all *nuclear material*, *other radioactive material* and their *associated facilities* and *associated activities*. It provides general recommendations and guidance for the protection of persons, property, society and the environment from criminal and intentional unauthorized acts involving *nuclear material* or *other radioactive material*.

FUNDAMENTALS - Objective

- **The Objective of a State's *nuclear security regime* is to protect persons, property, society, and the environment from harmful consequences of a *nuclear security event.***
- **With the aim of achieving this Objective, States should establish, implement, maintain and sustain an effective and appropriate *nuclear security regime* to prevent, detect, and respond to such *nuclear security events*.**

FUNDAMENTALS - Objective

- **The *nuclear security regime* is part of the State's overall security regime. The *nuclear security regime* covers *nuclear material* and *other radioactive material*, whether it is under or out of *regulatory control*, and *associated facilities* and *associated activities* throughout their lifetimes, and it should reflect the risks of harm to persons, property, society, and the environment.**
- **The following set of twelve Essential Elements of an effective and appropriate *nuclear security regime* should be applied insofar as reasonable and practicable.**

Nuclear Security Regime

Essential Elements

1. State Responsibilities
2. Assignment of *Nuclear Security* Responsibilities
3. Legislative and Regulatory Framework and Administrative Measures
4. Import, Export and Trans-Shipment of *Nuclear Material* and *Other Radioactive Material*
5. Criminalization and Combating Offences
6. International Cooperation and Assistance
7. *Target* Identification and Assessment of Potential Consequences
8. Identification and Assessment of *Nuclear Security Threats*
9. Risk-Based *Nuclear Security* Measures and Functions
10. Detection of *Nuclear Security* Events
11. Planning and Preparedness for, and Response to, *Nuclear Security* Events
12. Commitment to Sustaining the *Nuclear Security Regime*

Nuclear Security Recommendations: Physical Protection Nuclear Material and Nuclear Facilities, NSS#13, INFCIRC/225/Rev 5

- **INFCIRC/225 is not a binding document but…**
  - ✓ **Member States refer in their Regulations, directly to it**
- **The revision 4 of INFCIRC/225 was achieved in 1998. New international Instruments related to security emerged afterwards:**
  - ✓ ***United Nations Security Council Resolution 1373 (2001) and 1540 (2004)***
  - ✓ ***International Convention for the Suppression of Acts of Nuclear Terrorism (UN General Assembly resolution 59/290) (2005)***
  - ✓ ***Amendment to the Convention on Physical Protection of Nuclear Material (CPPNM) (2005)***

Structure of NSS#13-INFCIRC/225/ Rev. 5

1. INTRODUCTION
2. OBJECTIVES OF A STATE'S PHYSICAL PROTECTION REGIME
3. ELEMENTS OF A STATE'S PHYSICAL PROTECTION REGIME FOR NUCLEAR MATERIAL AND NUCLEAR FACILITIES
4. REQUIREMENTS FOR MEASURES AGAINST UNAUTHORIZED REMOVAL OF NUCLEAR MATERIAL IN USE AND STORAGE
5. REQUIREMENTS FOR MEASURES AGAINST SABOTAGE OF NUCLEAR FACILITIES AND NUCLEAR MATERIAL IN USE AND STORAGE
6. REQUIREMENTS FOR MEASURES AGAINST UNAUTHORIZED REMOVAL AND SABOTAGE OF NUCLEAR MATERIAL DURING TRANSPORT

DEFINITIONS

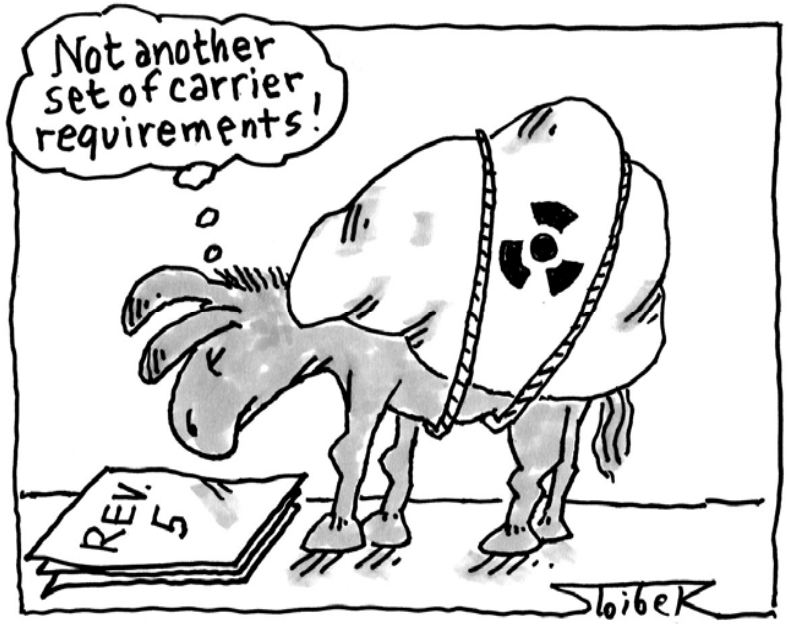
REFERENCES

Improvements of INFCIRC/225/ Rev. 5

- **Clarification of the scope of the document:**
  - ✓ **Three types of risk to be taken into consideration**
    - **risk of unauthorized removal with the intent to construct a nuclear explosive device**
    - **risk of unauthorized removal which could lead to subsequent dispersal**
    - **risk of sabotage**
  - ✓ **Protection requirements against unauthorized removal of nuclear material for potential subsequent off-site dispersal are provided in the Nuclear Security Recommendations on Radioactive Material and Associated Facilities**

Structure of NSS#13-INFCIRC/225/ Rev. 5

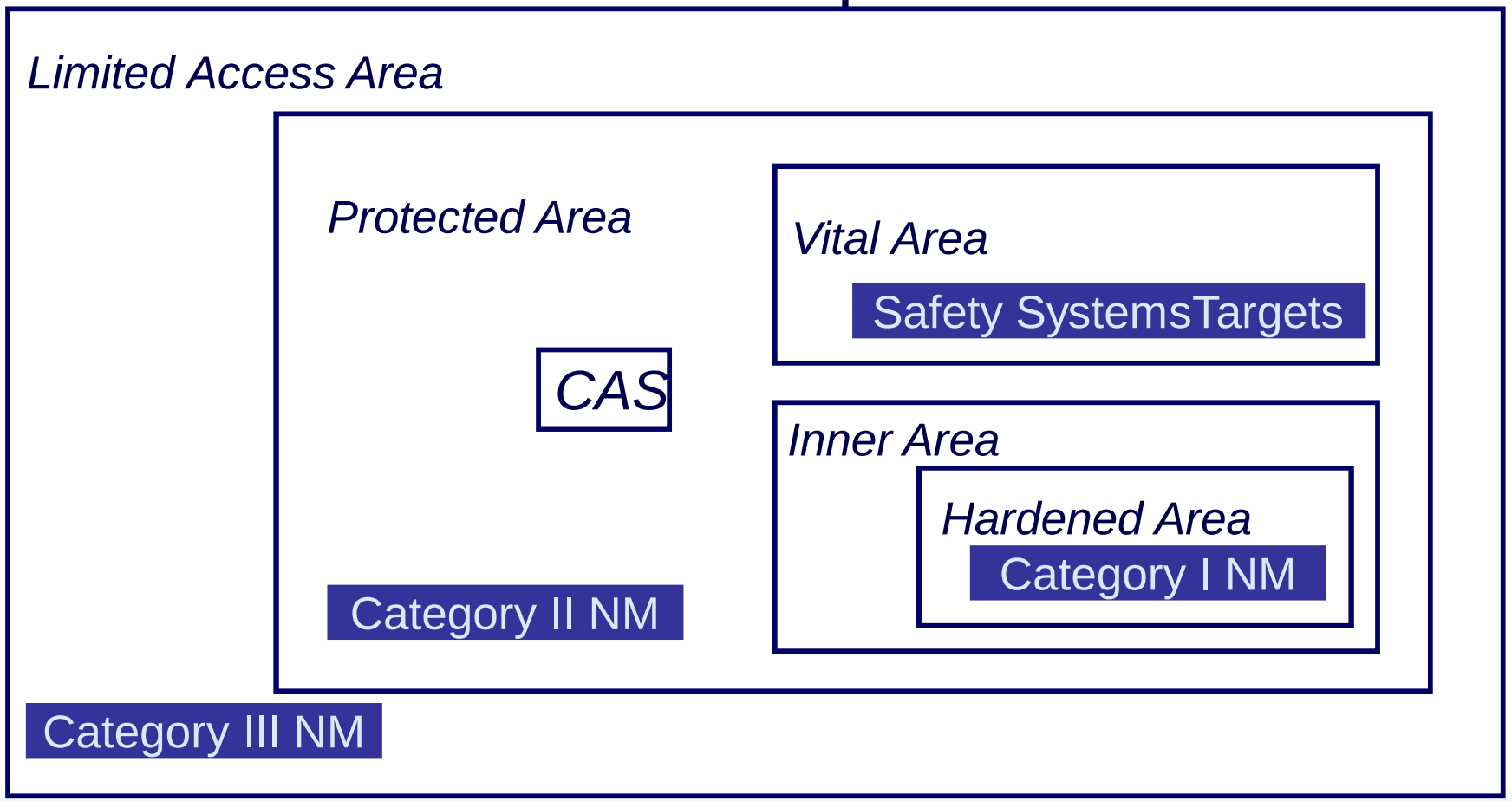
- **Specific Chapter on transport of nuclear material**
  - ✓ **Established with international experts on transport security**
  - ✓ **Consistent with similar section in the Nuclear Security Recommendations on Radioactive Material and Associated Facilities**
  - ✓ **Structured as for nuclear facilities**
  - ✓ **Requirements on physical protection measures against unauthorized removal based on the same table of categorization as for nuclear facilities**



NSS#13-INFCIRC/225/ Rev. 5

➢ Clarification on site areas

✓ **Limited Access Area -new concept: *limited and controlled access***



Improvements of INFCIRC/225/ Rev. 5

- **New requirements on licensing**
  - ✓ **A security plan prepared by operator, based on the threat assessment or the design basis threat**
  - ✓ **A security plan includes sections dealing with design, evaluation, implementation, and maintenance of the physical protection system, and contingency plans**
  - ✓ **License process:**
    - ✓ **Review and approval of the security plan by competent authority**
    - ✓ **Implementation by operator of the approved security plan**
    - ✓ **The security plan should be regularly reviewed**
    - ✓ **The competent authority should verify the operator's compliance with the security plan (inspection)**

Improvements of INFCIRC/225/ Rev. 5

- **New requirements concerning interface with safety:**
  - ✓ **Management of interface with safety to ensure that they do not adversely affect each other and they are mutually supportive**
  - ✓ **Results of safety analysis useful input to design physical protection system against sabotage**
  - ✓ **Physical protection system against sabotage to be designed as an element of an integrated system to prevent the potential consequences of sabotage taking into account safety features**
  - ✓ **Safety related equipment and devices to be protected by controlling access to them and securing them (link to vital areas)**

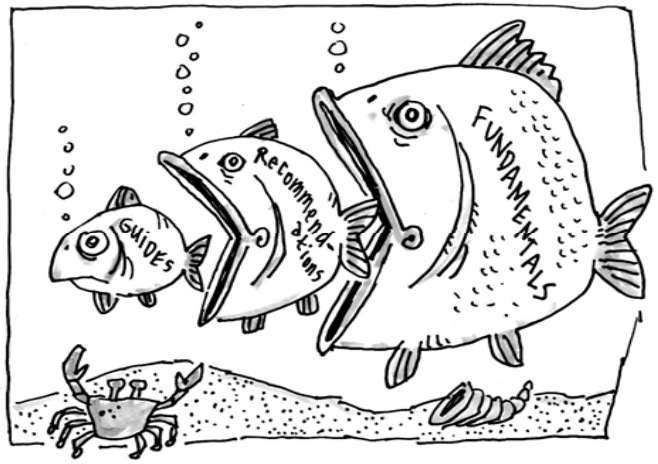
Improvements of INFCIRC/225/ Rev. 5

- **New requirements concerning the response to a malicious act**
  - ✓ **Proposed measures to locate and recover missing or stolen nuclear material**
  - ✓ **Proposed associated measures to mitigate or minimize the radiological consequences of sabotage**
  - ✓ **Establishment of contingency plans by all relevant entities (clear distinction with emergency plans)**
  - ✓ **Reinforce the need to test physical protection system and measures**
  - ✓ **Highlight the need to educate and to train individuals and to organize exercises, especially to test plans**

Improvements of INFCIRC/225/ Rev. 5

- **New requirements concerning the interface with system for nuclear material accountancy and control**
  - ✓ **Management of interface with nuclear material accountancy and control to ensure that they do not adversely affect each other and they are mutually supportive**
  - ✓ **Competent authority should have access to information from system for nuclear material accountancy and control**
  - ✓ **Capability of the system for nuclear material accountancy and control to protect against insiders threats to be used**
  - ✓ **The system for nuclear material accountancy and control could detect in a timely manner any missing or stolen nuclear material and provide information about the potentially missing nuclear material**

Nuclear Security Recommendations for Radioactive Material - NSS #14



- Code of Conduct on the Safety and Security of Radioactive Sources
- Implementing guide "*Security in the Transport of Radioactive Material*" NNS No. 9 (September 2008)
- Implementing guide on "*Security of Radioactive Sources*" NNS no. 11 (May 2009)

Nuclear Security Recommendations for Radioactive Material

Similar to Nuclear Security Recommendations on Physical Protection of Nuclear Material and Nuclear Facilities:

INTRODUCTION

OBJECTIVES OF A STATE'S SECURITY REGIME

ELEMENTS OF A STATE'S SECURITY REGIME FOR RADIOACTIVE MATERIAL AND ASSOCIATED FACILITIES AND ASSOCIATED ACTIVITIES

RECOMMENDATIONS FOR THE SECURITY OF RADIOACTIVE MATERIAL, ASSOCIATED FACILITIES AND ASSOCIATED ACTIVITIES

- **RM in use or storage**
- **RM in transport**

DEFINITIONS

REFERENCES

Nuclear Security Recommendations for Radioactive Material - Scope

- Protection of all types of radioactive material (sealed sources, unsealed radioactive material and radioactive waste, etc.), including that for nuclear material against unauthorized removal for subsequent exposure or dispersal leading to harmful radiological consequences

- Security of radioactive material throughout its lifecycle: manufacture, supply, receipt, possession, storage, use, transfer, import, export, transport (specific section), maintenance, and recycling or disposal

- Security of facilities holding radioactive material and other hazardous material that could have severe non-radiological consequences not addressed

Nuclear Security Recommendations for Radioactive Material

- **Implementation of the 4 Objectives:**
  - ✓ **To establish and maintain the security throughout their entire lifecycle**
  - ✓ **To achieve and maintain a high level of security for each radioactive source that is commensurate with the potential hazard**
  - ✓ **To prevent unauthorized access or damage to, and theft or unauthorized transfer of**
  - ✓ **To response to any malicious act involving a radioactive source under regulatory control**

Nuclear Security Recommendations for Radioactive Material

- **Implementation of 10 of the 12 Essential Elements of the Security Fundamentals (Fundamental Principles included)**
  - ✓ State responsibility
  - ✓ Assignment of nuclear security responsibilities
  - ✓ Legislative and regulatory framework
  - ✓ International cooperation and assistance
  - ✓ Identification and assessment of threats
  - ✓ Risk-based nuclear security systems and measures
  - ✓ Sustaining the nuclear security regime
  - ✓ Planning and preparedness for, and response to, nuclear security events
  - ✓ Import and export of radioactive material
  - ✓ Detection of nuclear security events

Nuclear Security Recommendations for Radioactive Material

Management of Safety and Security Interfaces

Safety and security have the same aim in protecting the persons, society and the environment from harmful effects of radiation

- ⇨ **Legislative and regulatory framework consistent in both safety, radiation protection and security fields**
- ⇨ **Requirements for measures have to take into account those already established for safety or radiation protection purposes**

Nuclear Security Recommendations for Radioactive Material

Establishment of a nuclear security regime

- **Assignment of governmental responsibilities to relevant entities including an independent regulatory body**
- **Prime responsibility on the operator, shipper and/or carrier**
- **Establishment of authorization, inspection and enforcement processes and system of sanctions. As appropriate, these processes could be integrated within one defined for safety or radiation protection**
- **Establishment of a national register of radioactive material over thresholds defined by the State (as a minimum, include category 1 and 2 radioactive sealed sources)**

Nuclear Security Recommendations for Radioactive Material

Risk management approach

- **Assessment of the potential threats, the potential consequences and the likelihood of malicious acts**
- **Decision on what level of risk is acceptable at national level (Definition of a thresholds, e.g. D-value)**
- **Decision on approach to be followed (prescriptive, performance based or a combined approach)**
- **Development of requirements, based on the concept of defence in depth, by using a graded approach applying the principles of risk management including a categorization of radioactive material (e.g. categorization of radioactive sources)**

Nuclear Security Recommendations for Radioactive Material

Recommendations for security of radioactive material in use and storage

- **Security requirements to protect radioactive material from unauthorized removal or loss of control**
  - ✓ **Security system measures designed to adequately perform the security functions of deterrence, detection, delay, and response**
  - ✓ **Security management measures addressed access control, trustworthiness, information protection, preparation of a security plan, training and qualification, accounting, inventory and event reporting**

Nuclear Security Recommendations for Radioactive Material

Recommendations for security of radioactive material in use and storage

- **Specific threat of sabotage against particular radioactive material or particular facilities, implied additional security requirements or more stringent security measures**

- **Operator's accounting required for radioactive sources, particularly in the case of mobile sources**

Nuclear Security Recommendations for Radioactive Material

Recommendations for security of radioactive material in transport

- **Specific Section on transport of nuclear material**
  - ✓ **Established with international experts on transport security**
  - ✓ **Consistent with specific Chapter in the INFCIRC/225/Rev. 5**
- **Security measures based on a categorization of radioactive material and structured into security levels for transport (e.g., basic and enhanced)**
- **Current or potential threat implied additional security measures to protect against sabotage (idem INFCIRC/225/Rev. 5)**

Nuclear Security Recommendations on Nuclear and other Radioactive Material out of Regulatory Control NSS#15

For an effective nuclear security regime for nuclear and other radioactive material out of regulatory control, the State needs:

1. **A comprehensive and complete set of legislative provisions through adoption of criminal and administrative laws for providing relevant administrative and enforcement powers to the various competent authorities within the State**
2. **. Sufficient and sustained resources to the various competent authorities to enable them to carry out their assigned functions**

(see next lecture!)

Conslusions

- Each State is responsible for Nuclear security regime
- Nuclear security is part of State security
- Nuclear security has strong interactions with nuclear safety and safeguards
- Consequences of nuclear security failure might not be limited to one State
- Importance of cooperation inside the States and internationally
- Large body of international legal instruments and IAEA Nuclear Security Series available
- Assistance from IAEA Nuclear Security programme is available

Nuclear Security Recommendations on Nuclear and other Radioactive Material out of Regulatory Control

- The recommendations are not mandatory and do not infringe the sovereign rights of States;
- It provides recommendations to a State for nuclear security of nuclear and other radioactive material out of regulatory control;
- It includes recommendations to State for detection and assessment of alarms/alerts and for a graded response to criminal and unauthorized acts with nuclear security implications.


Thank You!