Global Nuclear Security Framework -
Physical Protection of Nuclear Material & Facilities and Illicit Trafficking
(IAEA role and Guidance)

Global Security Evolution
Cold War – Post Cold War – Post 9/11

Main Actors
- Nation-States
- Bipolar
- Superpowers
- Non-States
- Small States
- Global network

Threats
- High density, high intensity
- Lower probability
- Physical overkill
- Low density, low intensity
- Higher probability
- Sociopsychological terror

Motives
- Geopolitical
- Predictable
- Calculable
- Malicious
- Unpredictable
- Incalculable
Threat Picture

• Theft of a nuclear weapon

• Theft of nuclear material to make IND

• Theft of other radioactive material for RDD or RED

• Sabotage of facility or transport

What is the Material of Nuclear Security Concern?

Nuclear material (U, Pu…)
Radioactive sources
Nuclear and radioactive waste
Radioactively contaminated material
Widespread Uses of Nuclear Technologies

- Medicine
- Industry
- Nuclear energy
- Research
- Research reactors
- Storage and disposal

Potential Targets in Figures

- > 25,000 nuclear weapons
- > 3,000 tons civil and military HEU and Pu
- > 480 research reactors (> 100 with HEU)
- > 100 fuel cycle facilities
- > 430 operating nuclear power plants
- > 100,000 Cat I and II radioactive sources
- > 1,000,000 Cat III radioactive sources
Some Bench Marks

- Hiroshima and Nagasaki
- Chernobyl accident
- Fukushima
- Goiania Incident

Illicit Trafficking Database

- Established in 1995
- Facilitates the exchange of authoritative information
- Unique network of Points of Contact (POC) connecting 116 states and several international organizations
- Information collected from official sources supplemented by open-source reports
- States have reported — or otherwise confirmed to the ITDB — 2242 incidents since 1995
What is Nuclear Security?

(1) Prevention, (2) detection of, (3) response to:
- theft
- sabotage
- unauthorized access
- illegal transfer
- other malicious acts
involving:
- nuclear material
- other radioactive substances
- associated facilities
Physical Protection and Safety

- **Safety systems** are designed to respond to accidents or natural hazards

- **Physical protection systems** are designed to respond to deliberate, malicious actions of people

Objectives of a Physical Protection System (PPS)

- **To protect against unauthorized removal** - Protecting against theft and unlawful taking of nuclear material
- **To locate and recover missing nuclear material** - Ensuring the implementation of rapid and comprehensive measures to locate and recover missing or stolen nuclear material.
- **To protect against sabotage** - Protecting nuclear material and nuclear facilities against sabotage.
- **To mitigate or minimize effects of sabotage** - Mitigating or minimizing the radiological consequences of sabotage.
Design and Evaluation Process Outline (DEPO)

Define PPS Requirements → Design PPS → Evaluate PPS → Final PPS Design

Redesign PPS → Design PPS

Design and Evaluation Process Outline (DEPO)

Define PPS requirements

Process of design & evaluation

Facility characterization

Target Identification

Threat definition

Physical Protection System

Detection → Intrusion detection

Alarm Assessment

Access control

Alarm Communication & display

Delay → Barriers

Response forces

Response

ASD

Single Path analysis

Neutralization analysis

Scenario analysis

Insider analysis

Re Design PPS → Final PPS Design
Establishing Platform for National Nuclear Security Regimes

- 2005 Amendment to CPPNM – 57 ratifications
- UNSCR 1540 and 1673, UNSCR 1373
- Code of Conduct on Safety and Security of Radioactive Sources (2003) - 112 States committed
- NPT (1970) 193 Parties, Safeguards 162, Additional protocols 82, NWFZs 5

Establishing Platform for National Nuclear Security Regimes (cont.)

Related international guidance:

- Nuclear Security Fundamentals (GC(45)/INF/14)
- New IAEA Nuclear Security Series including NSS14 and NSS15
Nuclear Security Guidance

Nuclear Security Series:
- 17 publications so far
- Many under development

http://www-pub.iaea.org/MTCD/publications/

Convention on the Physical Protection of Nuclear Material (CPPNM)

- **Protection of Nuclear Material:**
  States obliged to protect NM on their territories and during international transport, at levels specified in CPPNM
  - Annex I: levels of protection by category of nuclear material
  - Annex II: definition of three categories of nuclear material

- **Export and Import:**
  States not to undertake transports/transits unless NM protected at appropriate levels

- **Measures to Prevent, Detect and Punish Offences Relating to Nuclear Material**
  Penalties required under national law
Amendment to CPPNM — Key Issues addressed

- Scope extended to nuclear facilities and material in peaceful domestic use, storage and transport
- Protection against sabotage
- National responsibility for physical protection
- Protection of confidential information
- Expanding punishable acts
- Expanded cooperation between States on rapid measures to locate and recover stolen or smuggled nuclear material, mitigate any radiological consequences of sabotage, and prevent and combat related offences
- Covers Physical Protection Objectives and Fundamental Principles
- Addition of definitions of nuclear facility and sabotage

Nuclear Security Series

Hierarchy of Documents

- 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 applying Recommendations
  - Ways & means of implementing Recommendations at systems level

- Technical Guidance
  - Reference Manuals, Training Guides, Service Guides
INFCIRC/225 — Physical Protection of Nuclear Material and Facilities — Recommendations

**INFCIRC/225:**
- originated as recommendations published in 1972
- is non-binding guidance document for States in establishing national PP systems
- is applied by IAEA in implementing cooperative programmes with Member States
- covers use, storage and transport of nuclear material
- covers both domestic and international PP measures
- has been extended to cover facilities and sabotage
- provides a means for implementing State obligations under CPPNM

**International Nuclear Security Regime**

- Code of Conduct on the Safety and Security of Radioactive Sources
- Categorization of Radioactive sources RS-G-1.9
Physical Protection Objectives and Fundamental Principles

- **Physical Protection Objectives:**
  - Protect against theft
  - Protect against sabotage
  - Locate and recover stolen material
  - Mitigate radiological consequences of sabotage

- **Fundamental Principles:**
  - A: State responsibility
  - B: Responsibilities during transport
  - C: Legislative / regulatory framework
  - D: Competent authority
  - E: Responsibility of license holder
  - F: Security culture
  - G: Consideration of threat
  - H: Graded approach
  - I: Defense in depth
  - J: Quality assurance
  - K: Contingency plans
  - L: Confidentiality

Nuclear Security: IAEA Plans of Activities

- **September 2001**
  - IAEA General Conference requests review of Agency’s activities relevant to preventing nuclear terrorism and proposals for strengthening measures

- **March 2002**
  - Plan of Activities, approved by Board of Governors

- **September 2005:**
  - Nuclear Security Plan 2006-2009, approved by Board of Governors

- **September 2009:**
  - Nuclear Security Plan 2010-2013, approved by Board of Governors
Nuclear Security Plan 2010 - 2013

Objective:
Contribute to global efforts to achieve worldwide, effective security wherever nuclear or other radioactive material is in use, storage and/or transport, and of associated facilities, by supporting States, upon request, in their efforts to establish and maintain effective nuclear security through assistance in capacity building, guidance, human resource development, sustainability and risk reduction.

Nuclear Security Plan 2010 - 2013

• Needs assessment, information collation and analysis
• Contributing to the enhancement of a global nuclear security framework
• Providing nuclear security services
• Risk reduction and security improvement
Prevention Strategies

Two complementary strategies:

- **Eliminate** the material and facilities at risk thereby eliminating the risk
- **Protect** material and facilities at risk thereby reducing the probability of a successful malicious act using stolen material or involving sabotage

Two facets of protection:

- Establishing and maintaining effective inventory, accountancy and controls
- Physical protection

IAEA - Improving Nuclear Security

- Promoting international instruments and implementation
- Developing recommendations and guidelines
- Evaluation and advisory services (input to INSSP)
- Education and training
- Information services — ITDB
- Technical improvements and upgrades
Improving Nuclear Security
Evaluation and Advisory Services — on Request

INSSP - Integrated Nuclear Security Support Plan - covers all needs related to State nuclear security

IPPAS: International Physical Protection Advisory Service — Peer review of State physical protection (50+ missions to 35 countries)

INSServ: International Nuclear Security Service Advisory Mission — Overview of nuclear security activities

ISSAS: SSAC Advisory Service — Overview of effectiveness of State’s State System of Accounting and Control of NM

ITE: International Team of (legal) Experts

IRRS: Integrated Regulatory Review Services

Improving Nuclear Security
Technical Improvements and Upgrades

Facilitating or direct supply under NSF:

Detection and monitoring equipment

- Customs
- Border police
- Police
- CRPs
Goals and Actions for Near Future (1)

**Broader implementation of international nuclear security instruments in States by 2012**
CPPNM Amendment in force by 2012

- >90 CPPNM Amendment Ratifications
- >90 NTC Parties
- >110 CoC States

**How:**
- Awareness through nuclear security services and training (global coverage, regulators, operators, vendors, shipping companies)
- Nuclear Security Summit 2010, and 2012
- Nuclear Security Conference
- Participation in International and Regional
- UN sponsored events

Goals and Actions for Near Future (2)

**Enhancing IAEA guidance and outreach**

**How to achieve:**

- Publication of initial set of Nuclear Security Series: Focus on top level Fundamentals, Recommendations, and Implementing Guides
- Translation of Nuclear Security Series
- Further global human resource development
- Assisting building national legal and regulatory infrastructure based on Gap analysis — INSSP
- Universal implementation of modular nuclear security services
Conclusions

• Nuclear Security — responsibility of States

• Security measures an essential element of threat reduction
• Safeguards, Safety and Security prerequisites for nuclear power and technology sustainability and renaissance
• Universal adherence and full implementation of international nuclear security instruments needed
• Use of IAEA Nuclear Security Series and advisory services recommended
• IAEA ready to support and assist States, upon request, in their efforts to combat nuclear terrorism and in implementation of international obligations