

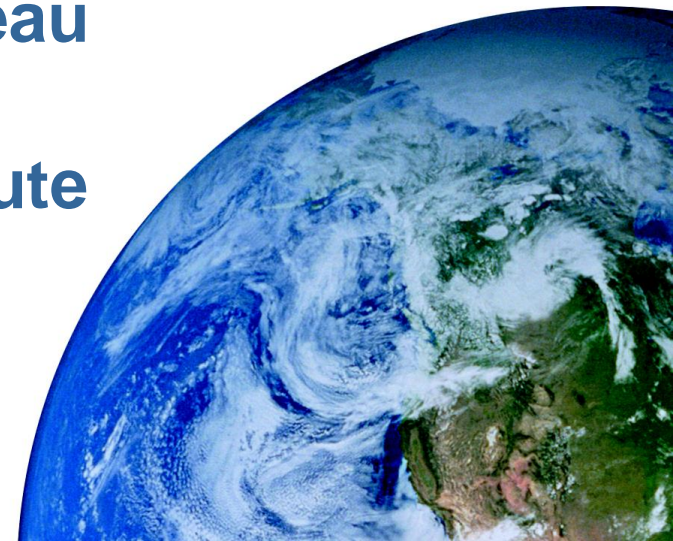
# The Transport of Nuclear Fuel Cycle Materials

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on behalf of Henry-Jacques Neau**

**World Nuclear Transport Institute**

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# Today's Presentation

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- Introduction to WNTI
- Materials of the Fuel Cycle
- Unique Aspects of Transport
- Safety Concept
- Radiation Protection Barriers
- Regulatory Structure
- Future Demand
- Transport Regulations
- Radiation Protection Programmes
- WNTI Initiatives
- Stakeholder Engagement



# The World Nuclear Transport Institute

WNTI

WORLD NUCLEAR TRANSPORT INSTITUTE

- World Nuclear Transport Institute (WNTI)
- Formed 14 years ago and now comprises over 45 member companies covering all aspects of nuclear fuel cycle transport
- Dedicated to present the industry perspective





# The Transport of Nuclear Fuel Cycle Materials

- Mining
- Conversion
- Enrichment
- Fuel Fabrication
- Spent Fuel
- MOX
- Plutonium
- Wastes - LLW
- Waste - ILW,
- Waste - HAW



# What's unique for transport?

## On-site Activities

- Private premises
- Restricted Access
- Controlled environment

## Off-site transports

In the public domain

Freedom of movement

Less controllable environment

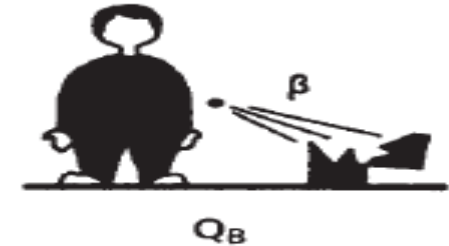


Robust radiation protection systems must be employed to maintain radiological safety under both normal and accident conditions for all radioactive materials.

# Dosimetric Model - The Safety Concept

## Q System

- Photon dose
- Beta dose
- Inhalation dose
- Skin deposition
- Immersion dose



Assigns a hazard  
value 'A value'

# Radiation Protection Safety Philosophy for Transport

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Four key protection mechanisms;

- Physical Barriers
- Operational Barriers
- Training - Knowledge sharing
- Management Systems



# Physical Barriers

- Accurate content classification
- Graded approach
- 'High hazard' contents require 'accident proof' packaging
- Less robust packaging is permitted for 'Low hazard' contents
- Fissile materials must remain safely sub critical under all defined conditions
- Reducing dose through shielding design.



Drop Tower



Fire Test Pit



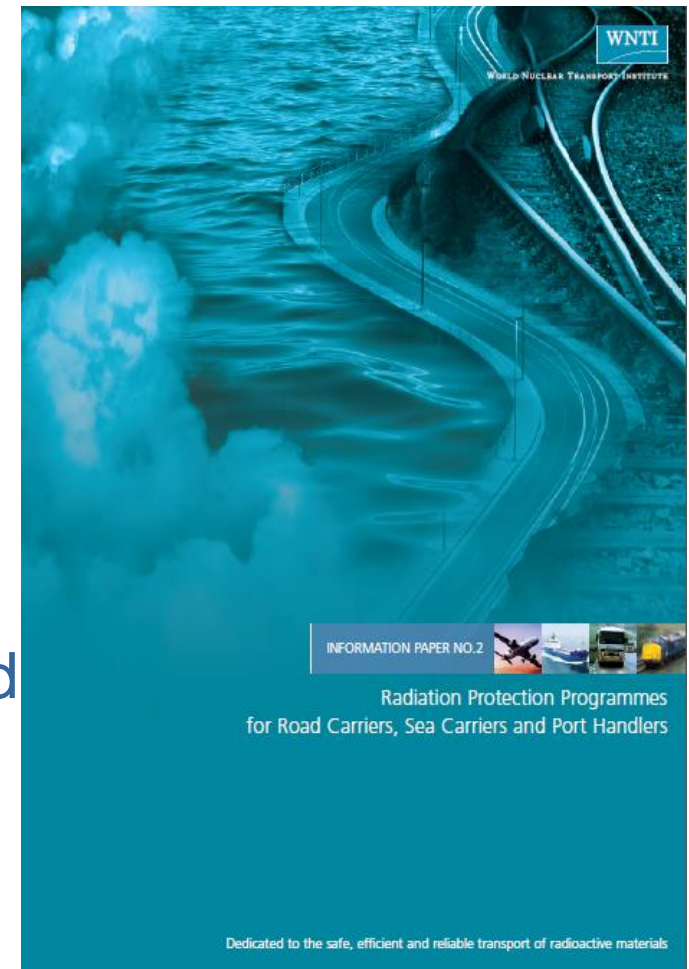
Thermal Environmental Test Room



Water Immersion vessel



- Radiation protection programmes
  - Dose Assessment
  - Segregation
  - Emergency Response
- High levels of cleanliness
- Segregation and stowage
- Heat generation considerations
- Visual warnings, label marking and
- Emergency arrangements

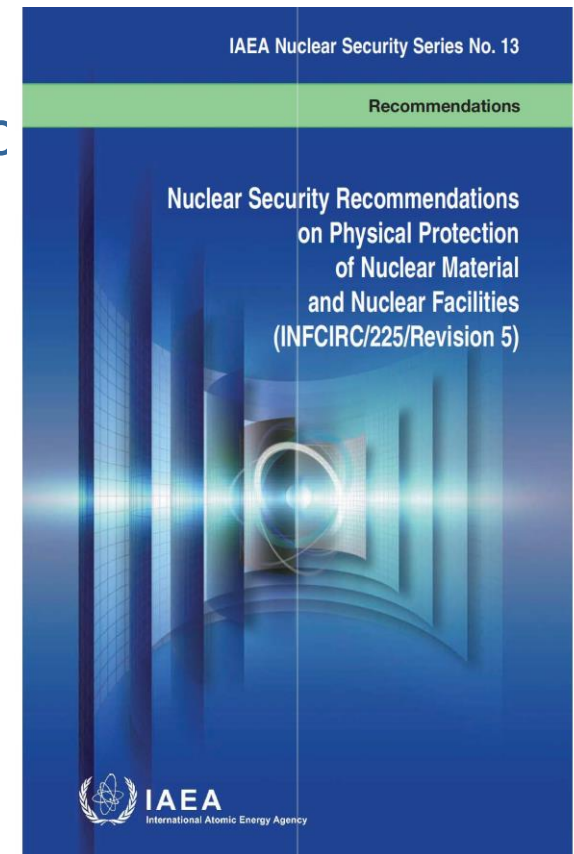


## Training- Knowledge sharing/transfer

- 'General awareness' 'functional specific
- Security Training
- Sustainable and effective
- Ageing staff, new blood

## Management Systems

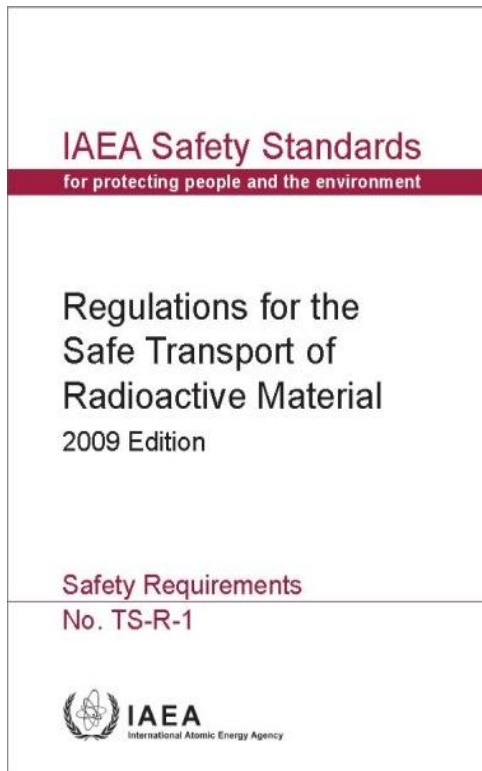
- Comprehensive processes
- Consistent application of regulatory requirements
- Check and review – Learning from experience



# The IAEA Regulatory Structure

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IAEA TS-G-1.1

Advisory Material

IAEA TS-G-1.2

Emergency Response

IAEA TS-G-1.3

Radiation Protection Programmes

IAEA TS-G-1.4

Management Systems

IAEA TS-G-1.5

Compliance Assurance

IAEA TS-G-1.6

Schedules

- Nuclear power is expanding; increasing the demand for fuel cycle services and nuclear transporters
- A reliable and effective transport infrastructure plays a vital role in maintaining high quality, compliant transport in this growing market



- Facilitating compliance through developing best practice guides
- Preparation of information papers to the nuclear fuel cycle supply chains
- Preparation of Radiation Protection Programme templates to assist and encourage carriers





- Delivering transport training to stakeholders in co-operation with the IAEA
- Combating the causes of denials of shipment through the International Steering Committee.
- WNTI are working hard to improve the public acceptability of nuclear fuel cycle materials through
  - Good science, high quality communications
  - Actively listening, being responsive and remaining transparent



- Radiation protection philosophy lies at the heart of the transport regulations
  - The transport of Nuclear Fuel Cycle materials has an impeccable safety record
  - Radiation doses to workers and the public have been well within the regulatory limits, typically less than 1mSv/year
  - WNTI remains proactive in the development of transport safety initiatives, such as 'information papers', and sharing 'good practice' throughout all the parties in the nuclear fuel cycle.
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## Thank you for your attention

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Glasgow Anderston motto in 1824, 'the one flourishes with the help of the others'

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