INTERNATIONAL NUCLEAR SERVICES

Challenges and risks associated with the transport of radioactive sources

Bob Officer

International Nuclear Services

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Contents

1. Scope
2. INS who are we and what do we do?
3. UK Transport security regulations – an overview
4. Do the regulations include requirements for transport security plans?
5. Do the regulations include requirements for tracking and monitoring mechanisms?
6. Are transportation security plans and procedures developed and implemented?

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Scope

Ensuring the Resilience and Sustainability of Radioactive Source Security

- Identify and discuss the **criteria and parameters** at the **state level** that promote and demonstrate sustainable security of radioactive sources in transport
- **Specifically the UK's challenges** and risks associated with the transport of radioactive sources

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Department for Business, Energy & Industrial Strategy

UK Government Department:
Sets UK policy

Nuclear Decommissioning Authority

Government Agency:
Responsible for clean-up of the UK's nuclear legacy

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NDA subsidiary:
Delivers specialist nuclear services including transportation

PNTL

INS subsidiary:
Shipper of nuclear cargoes
(68.75% INS | 18.75% Japanese Utilities | 12.5% AREVA)

International Nuclear Services is a wholly-owned subsidiary of the UK Nuclear Decommissioning Authority and has over 40 years experience of irradiated fuel management and nuclear material transportation.

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INS – what do we deliver?

End-to-end transport solutions
4 purpose-built vessels classified by IMO at highest level of INF3
40 year flawless nuclear safety record
+5 million nautical miles covered
+200 shipments completed
18x HLW Shipments to Japan
6x MOX Shipments to Japan
5x Shipments in support of GTRI / M3

World's leading shipper of SNM

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Start with why…

Why is transport necessary?

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Radioactive Source - definition

"radioactive source" means radioactive material that is permanently sealed in a capsule or closely bonded, in a solid form and which is not exempt from regulatory control. It also means any radioactive material released if the radioactive source is leaking or broken, but does not mean material encapsulated for disposal, or nuclear material within the nuclear fuel cycles of research and power reactors."

Code of Conduct on the Safety and Security of Radioactive Sources, IAEA, Vienna (2004)

UK Context- RA Sources- Utility

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Start with why…

Why is security necessary?

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THE Sun
MOST REVEALING SEX SURVEY EVER
TERROR LAWS:
TELL TONY HE'S RIGHT
Sun SAYS
IF YOU BACK THE 90-DAY LAW, CALL 0906 361 2211
The New York Times
10 Bombs Shatter Trains in Madrid, Killing 192
1,400 Are Hurt — Top Suspects Are Basques and Al Qaeda


FREE BREAD RECIPE CARD Pick up from Tesco, WHSmith or McColls
Daily Mail
Bloodbath as bombers launch worst U.S. terror strike since 9/11
MURDERED AT THE MARATHON


SPECIAL LATE EDITION
The Washington Post
Terror Hits Pentagon, World Trade Center
N.Y. Skyscrapers Collapse After Hijacked Planes Hit
'This Is on the Scale of Pearl Harbor'
Nightmare Shatters Manhattan Morning


Once upon a Brooklyn Christmas Eve
DAILY NEWS
TERROR ON FLIGHT 63
HOTFOOT BOMB SCARE
Suspect nabbed trying to light fuse on shoe
Heroic passengers, flight attendants


DAILY Mirror
Sneering Hunt spared chop in May's Cabinet
NEW OUTRAGE IN FRANCE
75 KILLED BY TERRORIST IN A TRUCK


Manchester Evening News
WELCOME TO THE NEW-LOOK M.E.N.
Dwight Yorke opens up to the News
WE NAME MANCHESTER BOMB SUSPECT
Evening News Exclusive by STEVE PANTER


THE Sun 30p
53 DEAD IN LONDON TERROR ATTACKS


Daily Mirror
EUROPE'S BIGGEST DAILY SALE
One dead and 214 injured in blasts
OUTRAGE
The bloody blitz that hit London
Ten held in big swoop at airport
The horror and the devastation
Lunchtime blast rocks a Ministry


THE Sun 70p
TV MAGAZINE
FREE new-look TV MAG
40 killed in gun and bomb terror attacks
Day after US drone blows up Brit Jihadi John
MASSACRE IN PARIS


DAILY NEWS
TIMES SQ. CAR BOMB
Hero cops stop madman in the nick of time
Smoking SUV was packed with gas & gunpowder
SEE PAGES 2-5


The Knoxville News-Sentinel
EXTRA
Oak Ridge Has Over 425 Buildings
ATOMIC SUPER-BOMB, MADE AT OAK RIDGE, STRIKES JAPAN
Two Views of Giant Oak Ridge Production Plant
Story of Secret Officially Told

Threat Spectrum

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International Framework

A Starting point….

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Some architecture…

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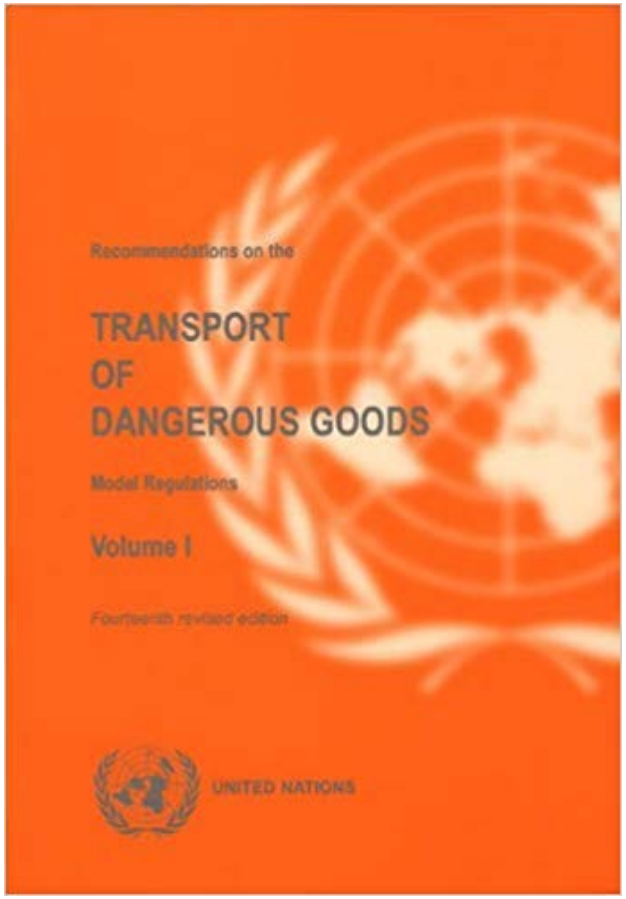
UN Orange Book – 'Model' Regs

- UN Economic Commission for Europe
- Committee of Experts
- Draws up 'non-mandatory' recommendations
- Distinction between DG & HCDG
- Take account of IAEA GP
- Written in the form of 'Model Regulations'…



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Dangerous Goods Classification

- Class 1 – Explosives
- Class 2 – Gases
- Class 3 – Flammable Liquids
- Class 4 – Flammable Solids
- Class 5 – Oxidising Substances and organic peroxides
- Class 6 – Toxic & Infectious substances
- **Class 7 – Radioactive materials**
- Class 8 – Corrosive Substances
- Class 9 – Misc. dangerous goods

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UK Regulatory Framework

UK approach....

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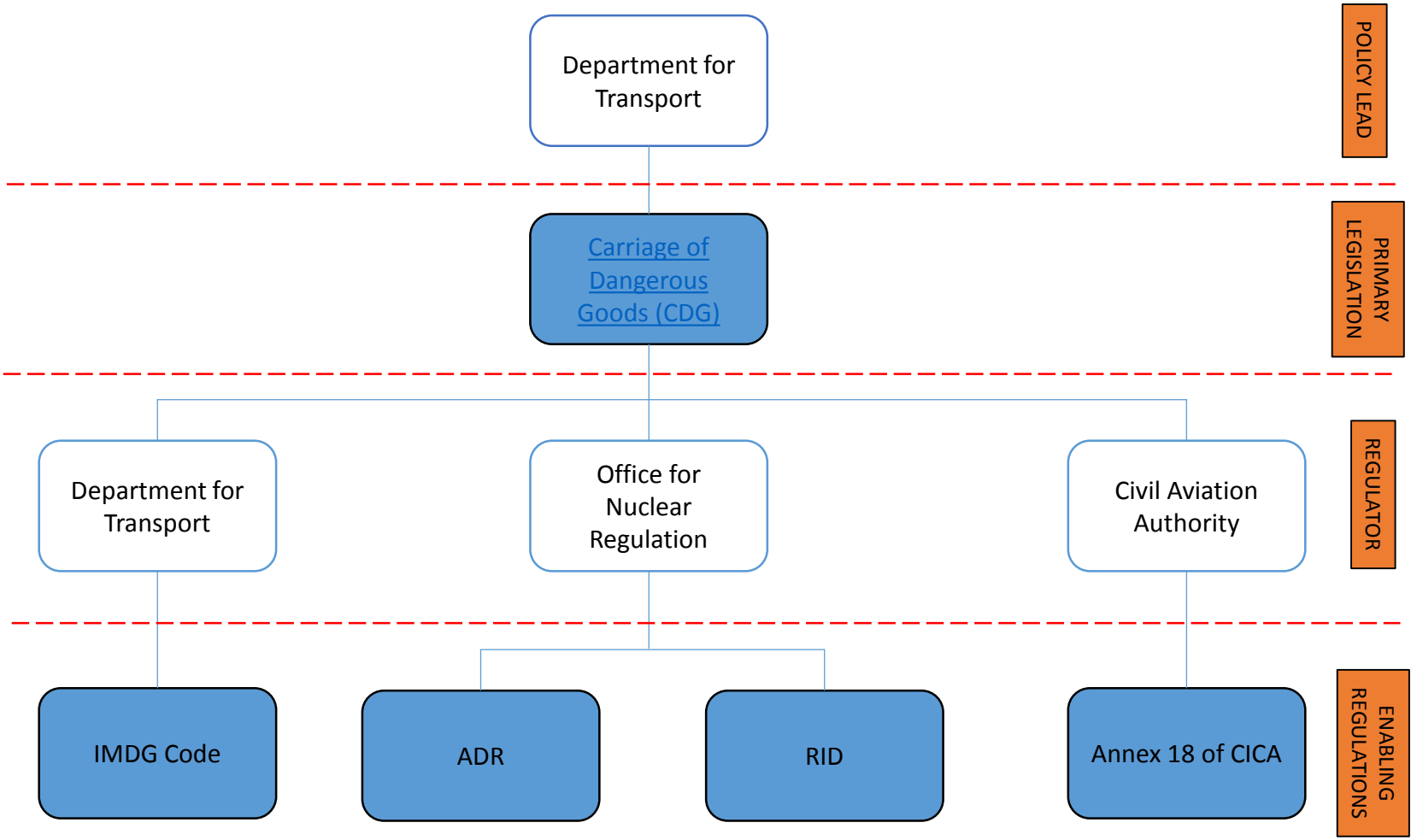
UK Regulatory Map & Links



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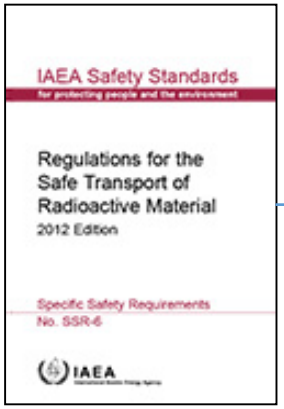
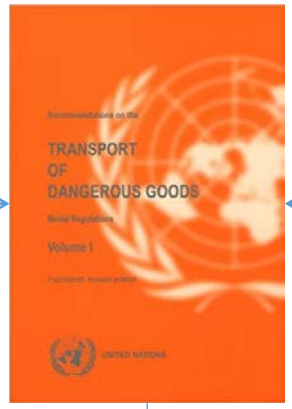
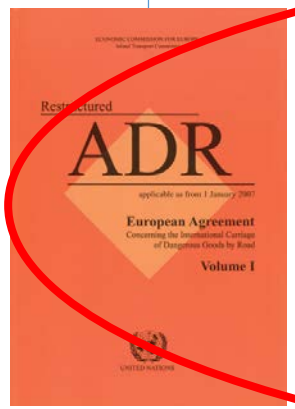
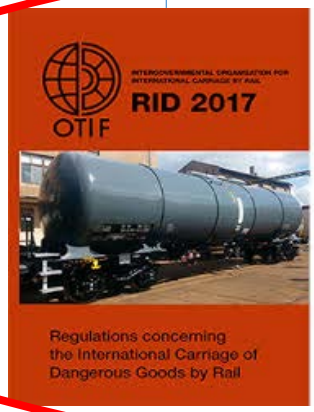
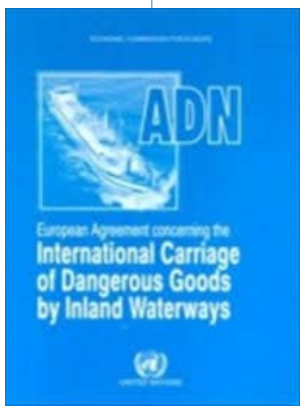
Modal Regulations

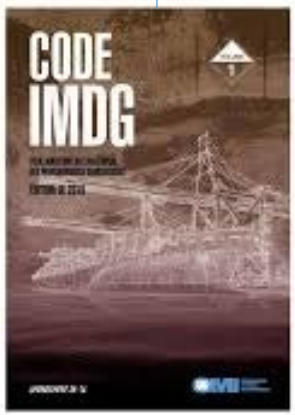


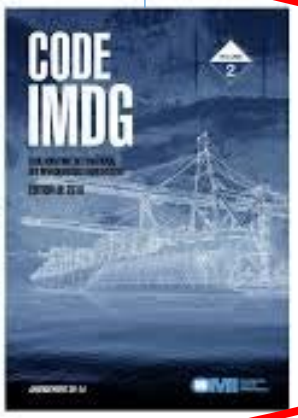


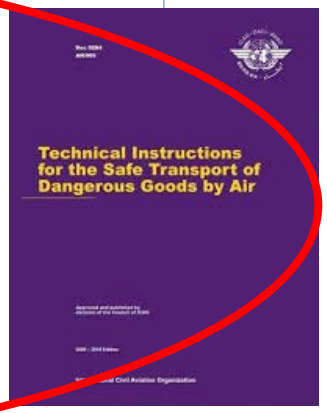












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Source Categorisation

UK approach….

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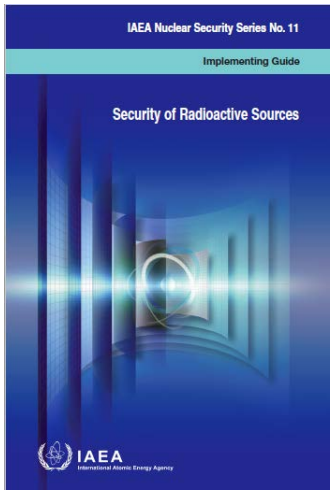
Categorisation – Graded Approach

- ‘The Code’ - 3 Categories D Values
- NSS 11 - 5 Categories recommended based on A/D calculations
- Category 1 most ‘dangerous’-pose a very high risk to human health
- Category 5 least dangerous
- Concomitant security measures required

[NSS 11, Code of Conduct, RS-G-1.9]



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Determine Security Threshold

UK approach….

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RAM Road Moves
Process Map – 'How To'

Supply NM or ORM Inventory

Customer

Refer to European Agreement International Carriage of Dangerous Goods **(CDG)** by Road **(ADR 2017)**

INS RPA/SAR

Determine whether High Consequence Radioactive Material Threshold for **CDG Class 7** Radioactive Material has been Reached?

INS RPA/SAR

Check **ADR** Table 1.10.3.1.3.

YES/NO

INS RPA/SAR

No

Check **ADR** Para 2.2.7.2.2.1 **or** **SSR-6 Table 2** For 3000 times A2 values

YES/NO

INS RPA/SAR

No

Yes

Yes

NSS 9 – Security in the Transport of RM

Excepted

Prudent Measures Section 4.1

No

Basic Measures Section 4.2

Yes

Enhanced Measures Section 4.3

Assess

Additional Measures Section 4.4

Supporting Process

NSS 9- Security Levels

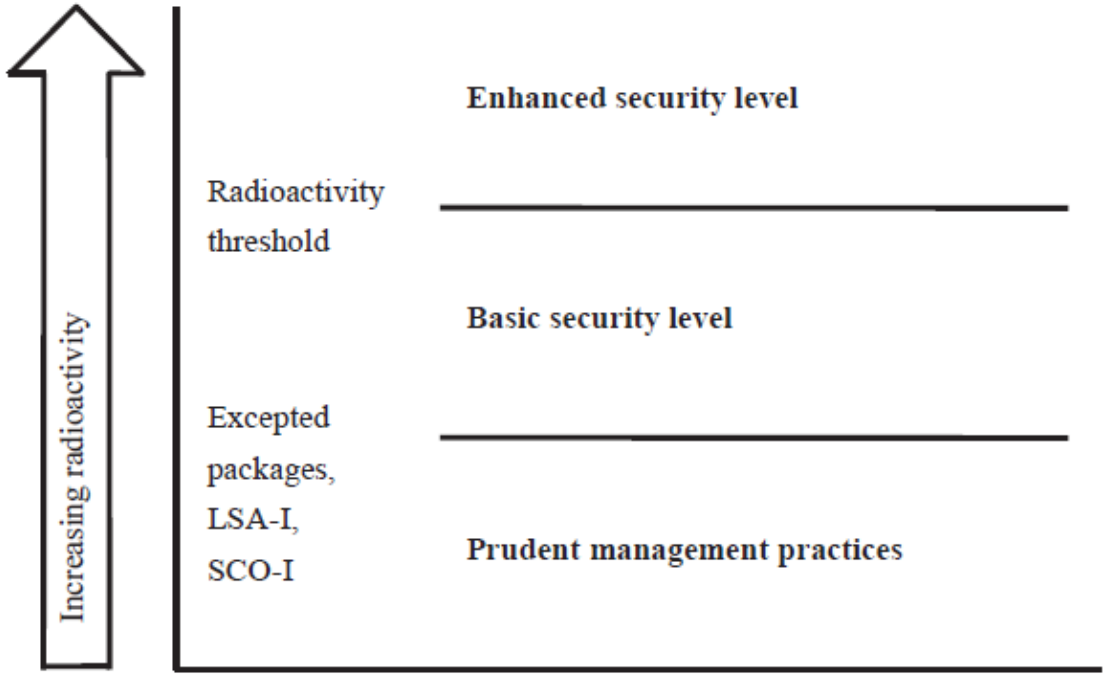


FIG. 1. Incremental transport security levels.

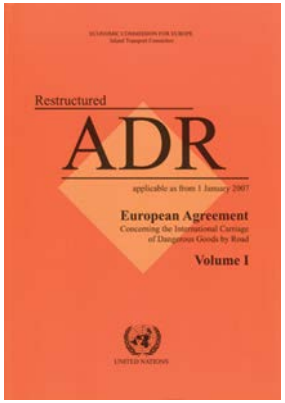
NSS 9 - Security Measures Radiological Material

- Section 4.1 identifies **prudent management practices** for low levels of radioactive material
- Section 4.2 provides guidance for the **basic security level**
- Section 4.3 provides additional guidance for transport of radioactive material **above the threshold level** specified . These are measures based on the Model Regulations and are to be considered by States and operators as representing a minimum set of measures.
- Section 4.4 provides additional guidance that States **may wish to consider applying** to the transport of particularly vulnerable radioactive material or at a time of **increased threat**.

HCDG- definition

"High consequence dangerous goods (HCDG)are those which have the potential for misuse in a terrorist event and which may, as a result, produce serious consequences such as mass casualties, mass destruction or, particularly for Class 7, mass socio-economic disruption"

[ADR 1.10.3.1.1]



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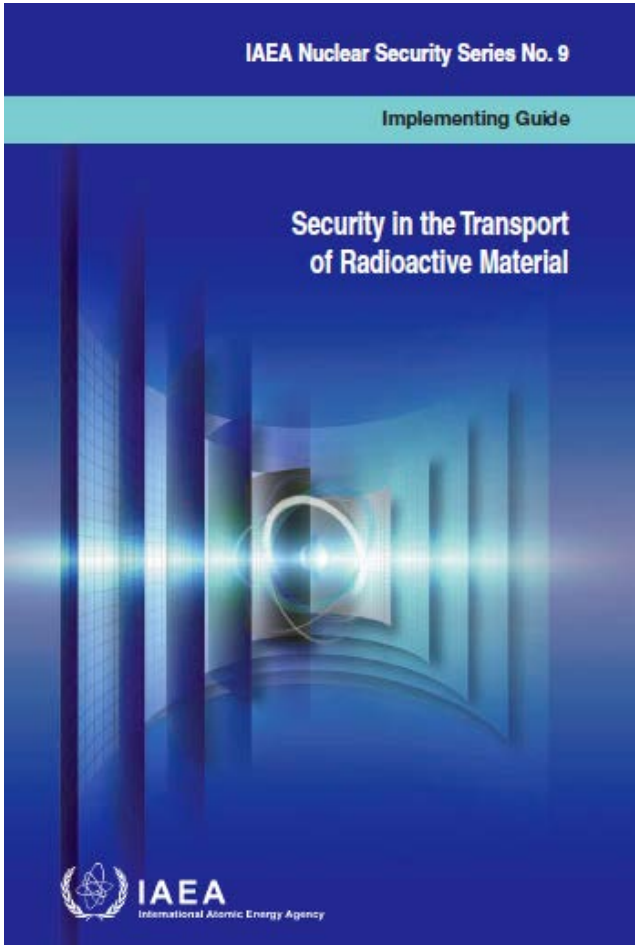
Enhanced Security – Threshold

- For radioactive sources and other forms of radioactive material containing radionuclides covered by the Code of Conduct, 10 D (this includes Category 1 and Category 2 sources) per package; or
- For all other radionuclides, 3000 A2 per package.

[NSS 9]



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Understand Security Objectives

A Modal approach….

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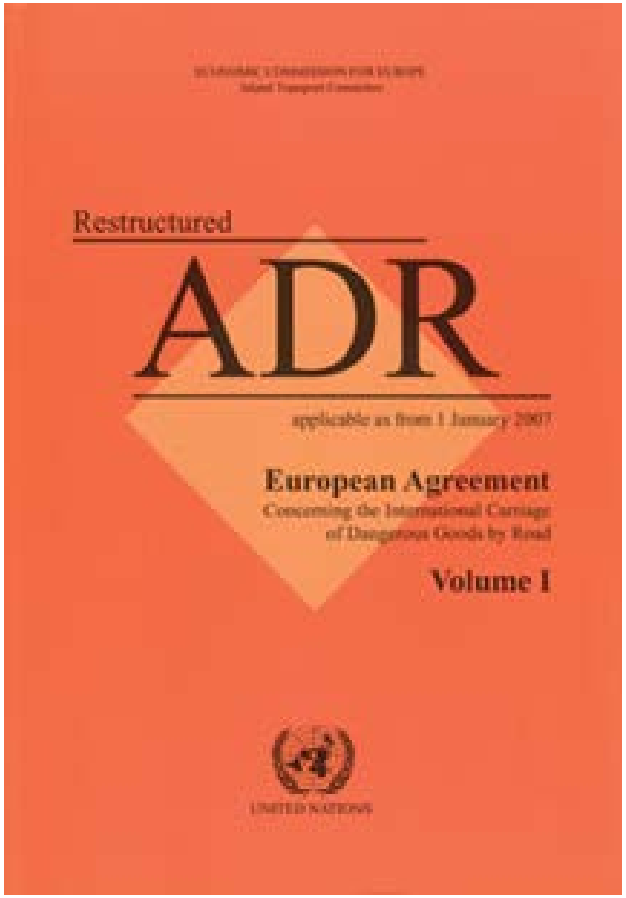
ADR - Road

General Provisions (1.10)

- Company Roles & Responsibilities
- Recruitment checks
- Temporary Storage Arrangements
- Identification
- Security Training



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ADR - Road

Provisions for High Consequence DG's (1.10.3)

- Security Plans
  - Allocation of responsibilities
  - Records
  - Assessment of vulnerabilities
  - Statement of measures (inc. escalation)
  - Incident Procedures
  - Evaluation & testing
  - Protecting information
  - Need to know measures

- Devices, equipment or arrangements to prevent the theft of a vehicle carrying HCDGs

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The Security Plan

Requirements….

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Security Plan

"All operators (consignors, carriers, consignees) and other persons engaged in the transport of radioactive material packages requiring the enhanced security level should develop, adopt, implement, periodically review as necessary and comply with the provisions of a security plan."

[NSS 9]

Security Plan

- Allocation of security responsibilities (accountability)
- Statement of measures
- Procedures
- Contingency & Emergency Plans
- Assurance Plan – how do you measure success?
- Exercising

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Tracking Devices

Defence in depth….

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Tracking Devices

- Technology is always improving…
- Conveyance, Trailer or Package?
- Geofencing
- Who's actually monitoring the device?
- Cyber considerations (spoofing)

Tracking Systems - Learning

- Is it fixed or removable?
- What asset are you interested in…?
- Who is tracking it? Are they trained?
- Redundancy?

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Summary

To conclude….

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Summary – Challenges & Risks

- UK – Regulatory compliance – prescriptive vs outcome focussed – *'too prescriptive/no cost benefit to carriers'*
- Navigating the legal line of sight to/from international Modal regulations – synergised editions of key guidance
- Risk assessing the nature, attractiveness, and hazard presented – theft vs sabotage
- Competence in design, testing and compliance - proportionate mitigatory measures and defence in depth
- Evidence over assertion - internal, peer and external assurance employed – build confidence

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Questions

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