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UNITING AVIATION

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# **Annex 18**

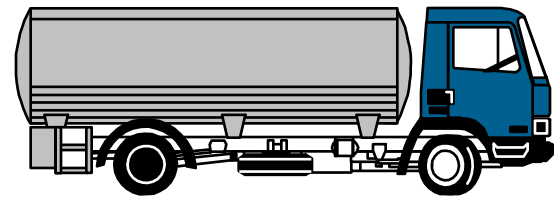
## **The Safe Transport of Dangerous Goods by Air**

Katherine Rooney  
Cargo Safety Section

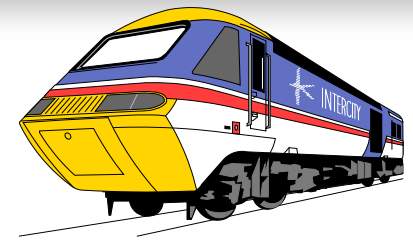


# What are dangerous goods?

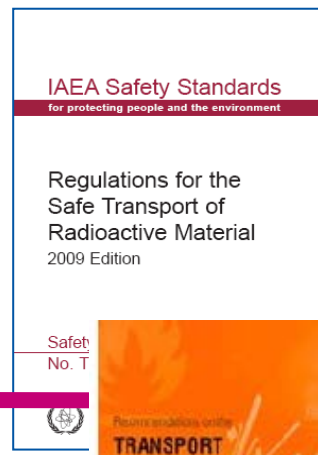
- Articles or substances which are capable of posing a **risk to health, safety, property** or the **environment** and which are classified in the list of dangerous goods



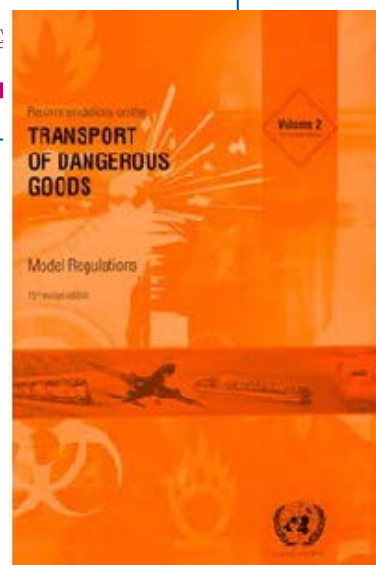
Road



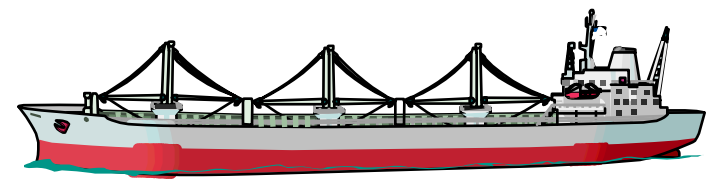
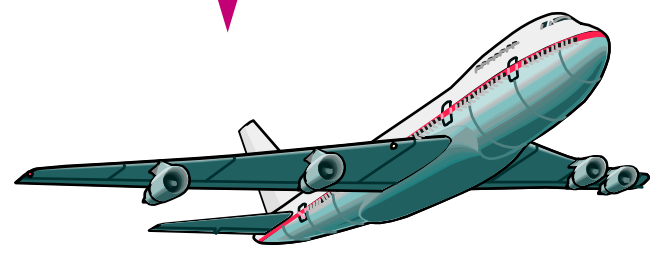
Rail



Air



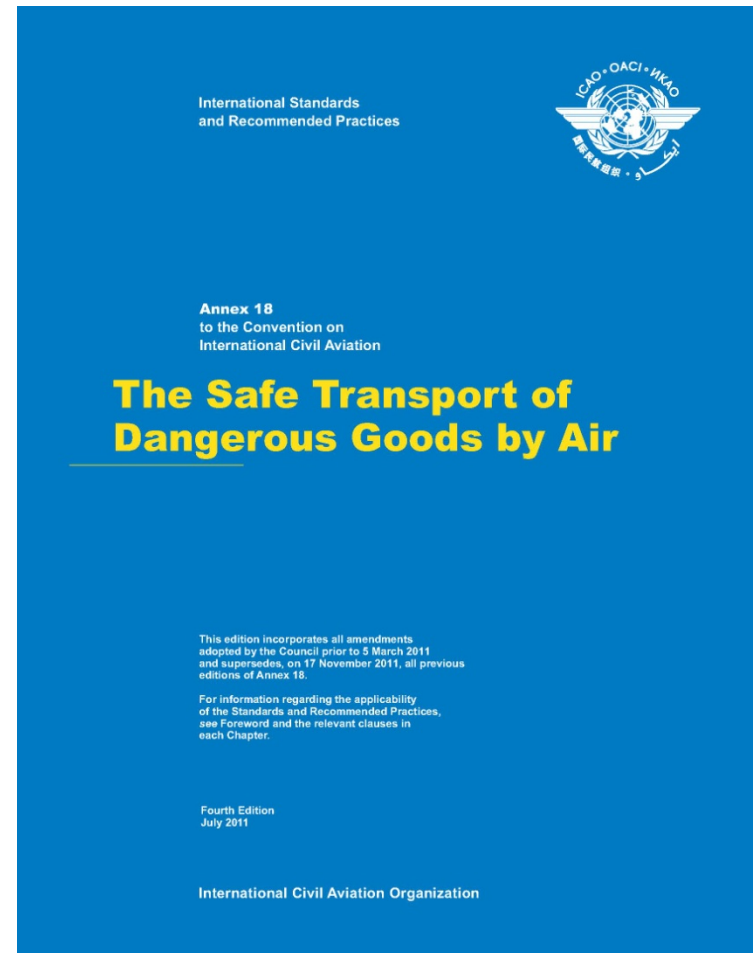
Sea





# Annex 18

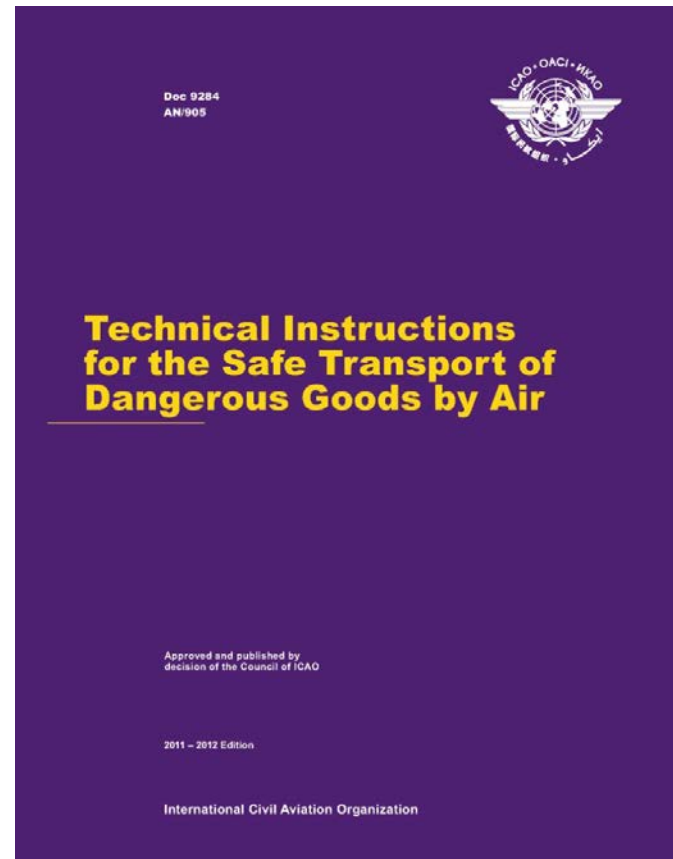
- *The Safe Transport of Dangerous Goods by Air*
- “The Standards and Recommended Practices of this Annex shall be applicable to all international operations of civil aircraft.”





# Technical Instructions

- *Technical Instructions for the Safe Transport of Dangerous Goods by Air* (Doc 9284)
- Issued every two years to reflect UN cycle
- “Each Contracting State shall take the necessary measures to achieve compliance with the detailed provisions contained in the Technical Instructions.” (*Annex 18, 2.2.1*)





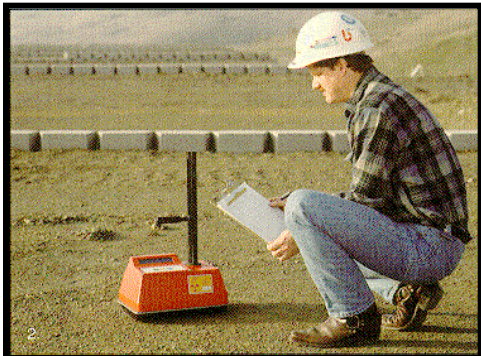
# Hazards.....

- Explosive
- Flammable
- Corrosive
- Toxic
- Radioactive
- Infectious



# Uses of radioactive material

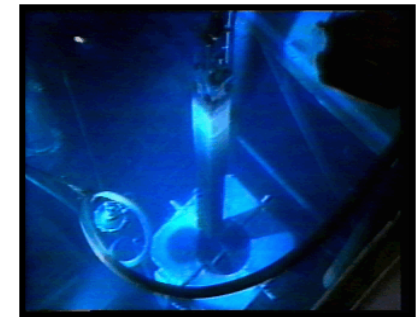
## Industry & Agriculture



## Medicine & Research



## Nuclear Energy



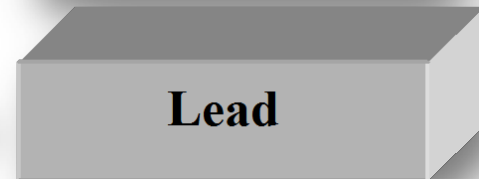
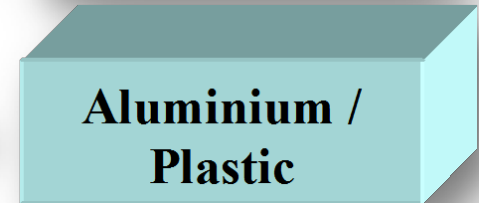
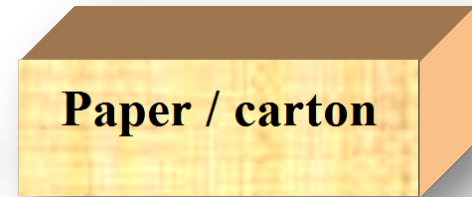


# Safety and radioactive material

- The objective is to protect persons, property and the environment from the effects of radiation during the transport of radioactive material
- This protection is achieved by requiring:
  - a) containment of the radioactive contents
  - b) control of external radiation level
  - c) prevention of criticality
  - d) prevention of damage caused by heat



# Effective barriers



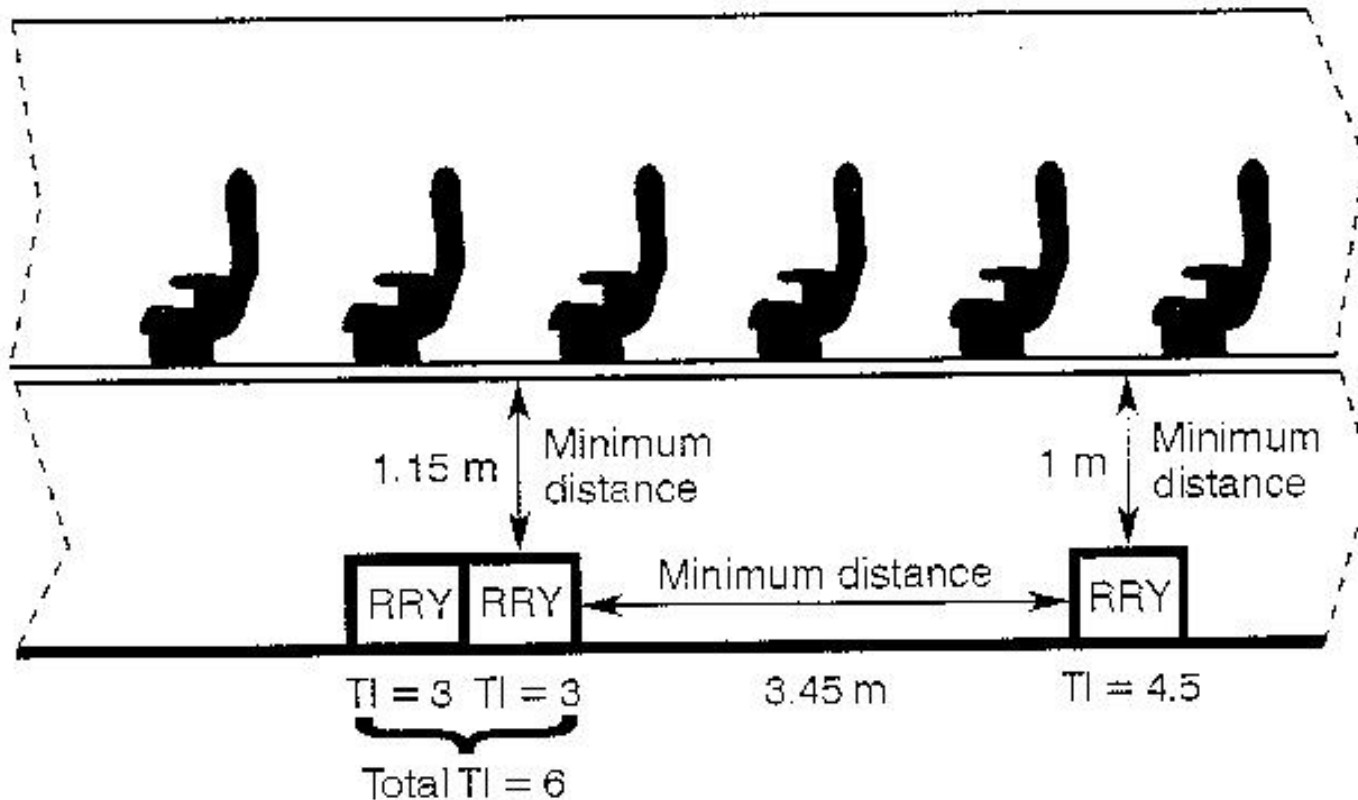


# Type A





# Loading – Separation Distances





# Radiation protection programme

- Nature and extent of measures to be taken must be related to the magnitude and likelihood of radiation exposures
- At least following elements must be included:
  - compliance with the ALARA-principle
  - emergency response procedures
  - training
  - if applicable, individual or work place monitoring records: where it is assessed that the effective dose
    - is likely to be between 1 and 6 mSv/year: a dose assessment program via workplace monitoring or individual monitoring must be conducted; and
    - is likely to exceed 6 mSv/year: individual monitoring must be conducted.



# Exceptions

- a) radioactive material implanted or incorporated into a person or live animal for diagnosis or treatment;
- b) contaminated person;
- c) consumer products
- d) ores



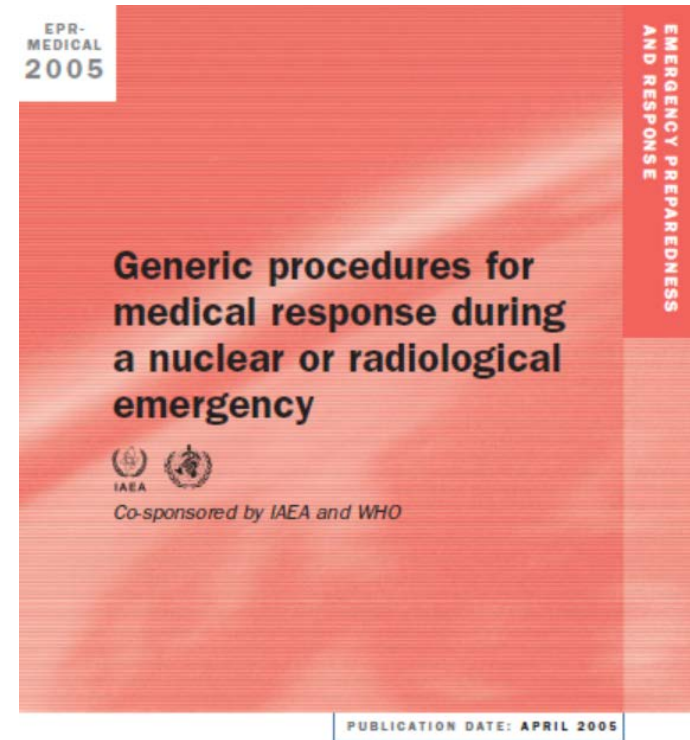
# Denial of shipments

- Many radiopharmaceuticals must be transported by air but sometimes delayed beyond useful life
  - negative perception
  - concern about cost/extent of training
  - lack of awareness about need to use and transport
- IAEA – International Steering Committee
  - To be a negligible problem by 2014.....



## Nuclear or Radiological Emergency

- Generic procedures for medical response during a nuclear or radiological emergency



[www-pub.iaea.org/MTCD/publications/PDF/EPR-Medical-2005\\_web.pdf](http://www-pub.iaea.org/MTCD/publications/PDF/EPR-Medical-2005_web.pdf)





# Infectious substances

- Includes:
  - Infectious substances
  - Patient specimens
  - Cultures
  - Biological products
  - Medical or clinical waste



# Category A

- An infectious substance which is transported in a form that, when exposure to it occurs, is capable of causing permanent disability, life-threatening or fatal disease to humans or animals in otherwise healthy humans or animals



Mycobacterium tuberculosis



# Classification

- Infectious substances assigned to Category A and which cause disease in humans or both in humans and animals must be assigned to UN 2814
  - **UN 2814:** Infectious substances, affecting humans
- Infectious substances assigned to Category A and which cause disease only in animals must be assigned to UN 2900
  - **UN 2900:** Infectious substances, affecting animals only



## Category B

- An infectious substance which does not meet the criteria for inclusion in Category A
- Infectious substances in Category B must be assigned to **UN 3373**
- The proper shipping name of **UN 3373** is **Biological substance – Category B**



# Patient specimens

- Patient specimens for which there is minimal likelihood that pathogens are present are not subject to these Instructions if specimen is transported in a packaging
  - which will prevent any leakage
  - which is marked with the words **“Exempt human specimen”** or **“Exempt animal specimen”**, as appropriate



# Classification of medical/clinical wastes

- Medical or clinical wastes which are reasonably believed to have a low probability of containing infectious substance must also be assigned to:

**UN 3291**

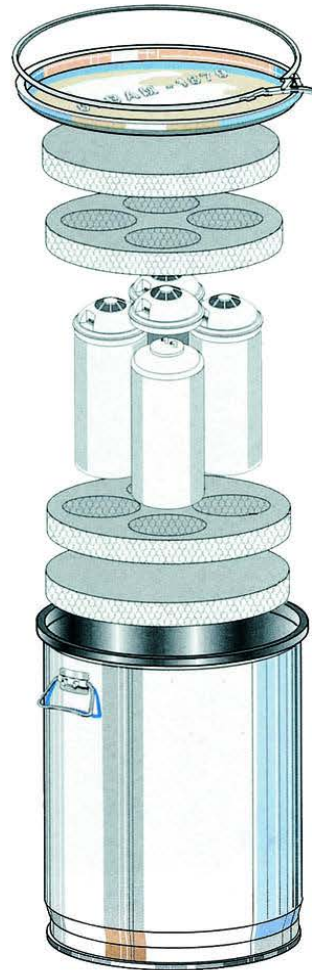
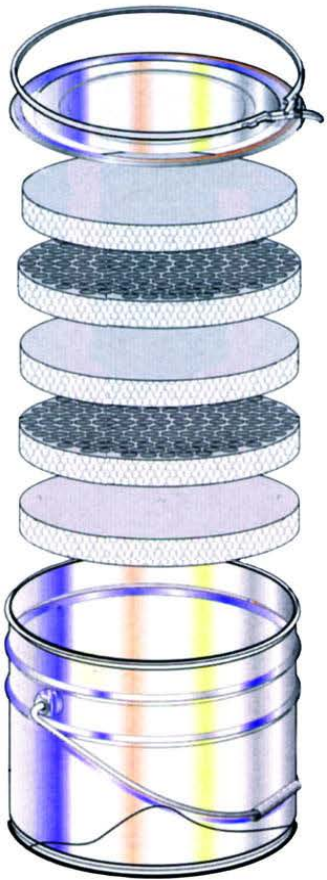
**Clinical Waste, unspecified, n.o.s.**

*(or)*

**(Bio) Medical Waste, n.o.s.**

*(or)*

**Regulated medical waste, n.o.s.**





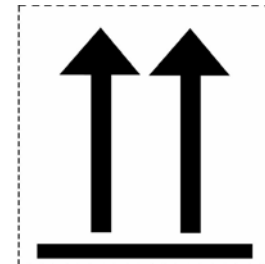
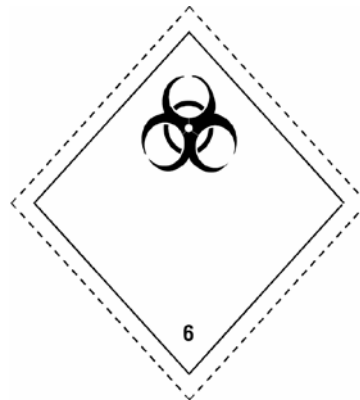
## If refrigerated or frozen....

- Most frequently used refrigerants are ‘Dry Ice’ and ‘Liquid Nitrogen’
- For ‘Dry Ice’, the outer packaging must allow the release of carbon dioxide gas
- For ‘Liquid Nitrogen’, the shippers must use plastic primary receptacles, which can withstand very low temperatures



# Marking and labelling

- Primary Hazard
- Subsidiary Risk Label when required
- Orientation labels on opposite sides on combination packages containing more than 50 mL of liquid in the package
- “Cargo Aircraft Only” label if applicable





## Packagings for Category B

- UN 3373 Biological substance – Category B are similar to these for Category A infectious substances, except that they have not been officially tested and no “Package Specification Markings” are required





# PHEIC and Ebola

- Transport of infectious substances for diagnosis
  - UN 2814 Infectious substance, affecting humans
  - PI 620
  - UN specification packaging
- Transport of infected corpses
  - Only under exemption by the States concerned

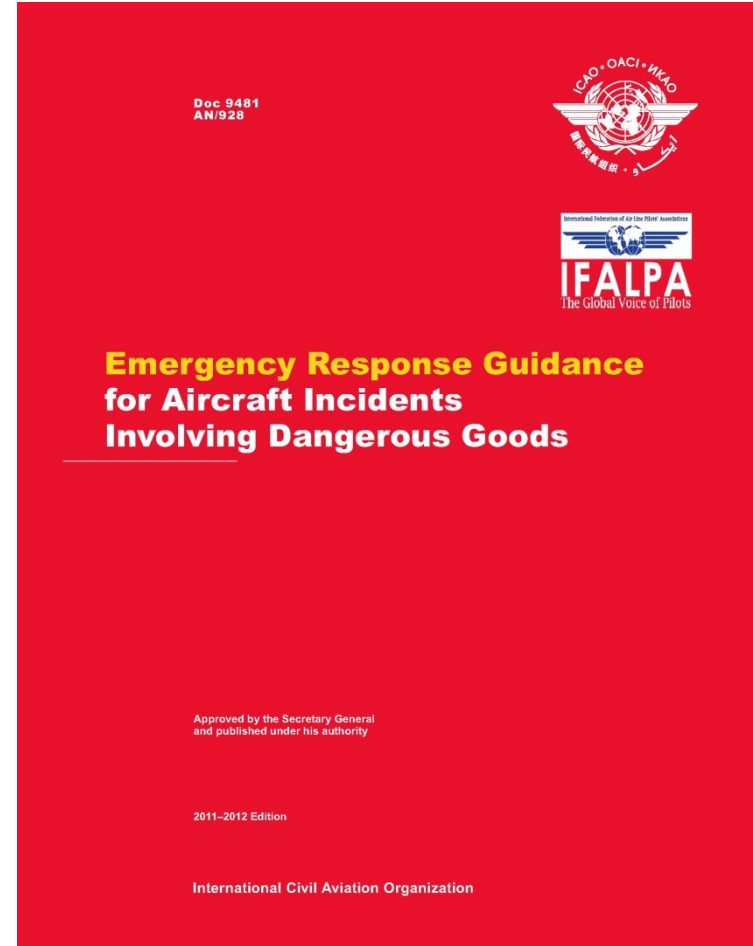


# Problems....

- Availability of packaging
- Cost
- Export/import controls
- Trained personnel
- Potential security issue



- *Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc 9481)*





# Drill Letters

- A ANAESTHETIC
- C CORROSIVE
- E EXPLOSIVE
- F FLAMMABLE
- H HIGHLY IGNITABLE
- i IRRITANT / TEAR PRODUCING
- L OTHER RISK LOW OR NONE
- M MAGNETIC
- N NOXIOUS
- P TOXIC\* (POISON)
- S SPONTANEOUSLY COMBUSTIBLE OR PYROPHORIC
- W IF WET GIVES OFF POISONOUS OR FLAMMABLE GAS
- X OXIDIZER
- Y DEPENDING ON THE TYPE OF INFECTIOUS SUBSTANCE, THE APPROPRIATE NATIONAL AUTHORITY MAY BE REQUIRED TO QUARANTINE INDIVIDUALS, ANIMALS, CARGO AND THE AIRCRAFT



DRILL NO.	RISK TO OCCUPANTS
1	As indicated by the drill letter(s)
2	As indicated by the drill letter(s)
3	Smoke, fumes and heat, and as indicated by the drill letter(s)
4	Smoke, fumes and heat, and as indicated by the drill letter(s)
5	Eye, nose and throat irritation; skin damage on contact
6	Acute toxicity, effects may be delayed
7	Exposure to radiation, and personnel contamination
8	Eye, nose and throat irritation; skin damage on contact
9	As indicated by the drill letter
10	Smoke, fumes and heat, and as indicated by the drill letter
11	Delayed infection to humans or animals



# ‘High consequence’ dangerous goods

- Those with potential for misuse in a terrorist event and which may produce serious consequences
  - Mass casualties
  - Mass destruction
  - Mass socio-economic disruption



## Indicative list

- Explosives
- Toxic gases
- Infectious substances, Category A
- Radioactive material of high activity



# Passenger provisions

- Medical necessities
  - Oxygen or air cylinders for medical use
  - Cylinders for operation of mechanical limbs
  - Medicinal articles (including aerosols)
  - Radioisotopic cardiac pacemakers
  - Mobility aids
  - Portable medical electronic devices
  - Thermometer containing mercury



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#### Latest Updates

10 September 2015  
Addendum/Corrigendum No. 2 to the Technical Instructions (2015/2016 Edition)

[en](#)

26 May 2015  
Addendum No. 1 to the Technical Instructions (2015/2016 Edition)

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20 November 2014  
Corrigendum No. 1 to the Technical Instructions (2015/2016 Edition)

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2 June 2014  
Corrigendum No. 1 to the Emergency Response Guidance for Aircraft Incidents Involving Dangerous Goods (Doc 9481, 2013/2014 Edition)

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31 December 2013  
Corrigendum No. 3 to the Technical Instructions (2013/2014 Edition)

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