



**Radiation Protection Programme
for the
Transport of Radioactive Materials**

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Radiation Protection Programme for the Transport of Radioactive Materials

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1. Introduction

The protection and safety of persons from radiation exposure due to the transport of radioactive material must be optimised in order that the magnitude of individual radiation doses, the number of persons exposed, and the likelihood of incurring exposure, are kept as low as reasonably achievable, economic and social factors being taken into account. In addition to this, radiation doses to persons must be below the relevant dose limits.

To achieve these goals, in Queensland, it is a legislated requirement that all packaging, transport and stowage of radioactive materials is conducted as safely as possible and in compliance with the *Code for the Safe Transport of Radioactive Material (2019)* (the Transport Code) published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The Transport Code has been adopted in each State and Territory of Australia.

Under the Transport Code, a radiation protection programme must be established by the person or organisation undertaking the carriage of radioactive materials (the carrier). This document has been prepared for adoption by carriers to satisfy this requirement of the Transport Code.

This document presents a summary of the key radiation safety elements of the Transport Code applicable to the transport of radioactive materials in Queensland and, as such, must not be construed as being a full interpretation of the requirements of the Code.

2. Definitions

Carrier - An individual or organisation transporting the radioactive material.

Consignment - A package, or load of radioactive materials, which is presented by a consignor for transport.

Consignor - An individual or organisation who prepares a consignment of radioactive materials for transport, and who is named as consignor in the transport documents.

Exclusive use - The sole use of a conveyance or of a large freight container by a single consignor where all initial, intermediate and final loading and unloading is carried out in accordance with the directions of the consignor or consignee.

Low specific activity (LSA) material - Radioactive material that by its nature has a limited specific activity, or radioactive material for which limits of estimated average specific activity apply.

Package - This includes the packaging together with its radioactive contents as presented for transport.

Transport Index (TI) - A number assigned to a package, overpack or freight container, or to unpackaged LSA-1 or SCO-1, to assist in providing control over radiation exposure. In general, the TI corresponds to the maximum radiation level (in units of millisieverts per hour) at 1 metre from the surface of a package multiplied by 100.

Surface contaminated object (SCO) - A solid object that is not itself radioactive, but which has radioactive material distributed on its surface.

Vehicle - A road vehicle, railroad car or railway wagon. If a road vehicle carries radioactive material in a trailer, each trailer is considered a separate vehicle.

3. Responsibilities of Consignors and Carriers

The responsibility for the transport of radioactive materials is shared by consignors and carriers with both being responsible for different aspects of compliance with the Transport Code. Specific responsibilities for consignors and carriers are detailed in sections 2.8 and 2.9 of the Transport Code.

(a) The consignor

To ensure that packages containing radioactive material are safe to handle under normal conditions, the consignor is responsible for:

- packaging and labelling radioactive material in accordance with the Transport Code
- preparing and certifying the transport documents as required by the Transport Code.

Transport Documents

The transport documents, prepared by the consignor, must include:

- the details as specified in paragraph 546 of the Transport Code
- any action required to be taken by the carrier, such as -
 - supplementary requirements for loading, stowage, carriage, handling, and unloading
 - restrictions on the mode of transport or conveyance
 - emergency arrangements appropriate to the consignment.

The consignor must also make a dangerous goods declaration (though this is not required for the transport of an excepted package).

The consignor must keep a copy of the transport documents for a minimum period of 3 months.

(b) The carrier

The carrier is responsible for:

- checking that appropriate documentation is provided with the package, and has been completed in accordance with the Transport Code
- verifying that the information in the transport documents, and the labels and markings on the package containing the radioactive material is consistent
- identifying labels to ensure appropriate decisions are made about storage, loading and transport
- the loading and unloading, handling, and transport of packages
- interim storage of packages where appropriate
- emergency procedures in the event of an incident during loading, transport, unloading or storage of a package.

The carrier must adhere to any other instructions detailed in the transport documents prepared by the consignor. The documents may contain information such as:

- instructions for loading, stowage, transport, and unloading and any special stowage provisions for the safe dissipation of heat
- restrictions on the mode of transport and any necessary route instructions
- emergency arrangements specific to the consignment.

4. **Package Types**

There are specifications and limitations on the type of packaging to be used in the transport of radioactive materials. The type of package required depends on the activity and type of the radioactive material to be transported.

The types of packages covered by the Transport Code are:

- Excepted package
- Industrial package Type 1 (Type IP-1)
- Industrial package Type 2 (Type IP-2)
- Industrial package Type 3 (Type IP-3)
- Type A package
- Type B(U) package
- Type B(M) package
- Type C package.

The package type relates to package performance standards, with the Type C package being subject to the most stringent testing. Information on the testing requirements that must be satisfied for the classification of a package is detailed in section VI of the Transport Code.

The majority of radioactive materials in Queensland are transported in excepted packages, Type A packages, and Type B(U) packages. It is the responsibility of the consignor to ensure that the correct type of package is used for the transport of radioactive material.

5. **Package Categories**

Packages (other than excepted packages), overpacks and freight containers must be assigned to either category I-White, II-Yellow, or III-Yellow in accordance with paragraph 529 of the Transport Code and must be labelled accordingly. The categorisation of packages is the responsibility of the consignor.

The category of the package depends on its Transport Index and the radiation dose rate at the surface of the package. The labels to be used must conform to the requirements in paragraph 538 of the Transport Code.

The package category represents the potential radiation hazard of the package. The maximum dose rate at the surface of the package is not more than:

- 0.005 millisieverts per hour for a category I-White package
- 0.5 millisieverts per hour for a category II-Yellow package
- 2 millisieverts per hour for a category III-Yellow package which has a Transport Index less than or equal to 10
- 10 millisieverts per hour for a category III-Yellow package which has a Transport Index more than 10.

Consequently a category I-White label represents the lowest risk, and a category III-Yellow label represents the highest risk.

Category I-White, II-Yellow or III-Yellow labels must include the type and activity of the radionuclide being transported. Category II-Yellow and III-Yellow labels must also include the Transport Index.

6. Labelling, Marking and Placarding

The requirements for labelling and marking of packages and placarding of vehicles are described in the following table.

	Excepted packages	Other packages
<i>Labelling and marking of packages</i>		
Package category	Not applicable	<p>The package category (I-White, II-Yellow or III-Yellow) must be displayed on the outside of each package or freight container.</p> <p>The package must bear two (2) appropriate labels affixed to opposite sides of the package.</p> <p>A freight container must be labelled on all four (4) sides. A large freight container may alternatively be placarded in accordance with the Transport Code.</p>
Package type	Not applicable	The type of package must be marked on the outside of the package (e.g. Type A, B(U), etc.).
Identification	The package must be legibly marked on the outside of the packaging with an identification of either the consignor or the consignee, or both.	The package must be legibly marked on the outside of the packaging with an identification of either the consignor or the consignee, or both.
UN Number	The outside of the package must bear the letters 'UN' followed by the United Nations number (refer to Table 1 of the Transport Code).	The outside of the package must bear the letters 'UN' followed by the United Nations number and the proper shipping name (refer to Table 1 of the Transport Code).
Mass	Each package of gross mass exceeding 50kg must have its permissible gross mass marked on the outside of the packaging.	Each package of gross mass exceeding 50kg must have its permissible gross mass marked on the outside of the packaging.
<i>Placarding of vehicles</i>		
Road vehicles	Not applicable	Road vehicles must display the placard, shown in Figure 6 of the Transport Code, on the outside of the two external lateral walls and on the external rear wall of the vehicle.
Railway vehicles	Not applicable	Railway vehicles must display the placard, shown in Figure 6 of the Transport Code, on each of the two external lateral walls of the carriage.

7. Safe Transport Practices

In general, the radiation exposure to a person depends on the amount of time the person spends near a package containing radioactive materials. Persons should:

- minimise contact time with the package
- not stand or sit near or on the package
- keep as far away as practicable from the package.

Typically, the quantity of radioactive material being transported in Queensland is such that it is unlikely that radiation exposures will exceed those permitted for members of the public, so there is no general requirement for personal radiation monitoring of transporters. However, an assessment of personal radiation dose should be made if the transport of radioactive material becomes a substantial part of a carrier's workload.

The following additional rules must be followed to minimise radiation exposure.

(a) Transport of packages containing radioactive material

The carrier must ensure that:

- Packages stay in good condition and that packaging seals remain intact during loading, transporting, unloading, and storage prior to delivery at the destination.
- Except for the driver and assistants, no person is carried in vehicles carrying packages bearing category II-Yellow or III-Yellow labels.
- Packages bearing category II-Yellow or III-Yellow labels are not carried in compartments occupied by passengers.
- Placards are placed on both sides and the rear of the vehicle when transporting packages of radioactive materials bearing a category label.
- Packages are securely stowed in the vehicle to prevent movement during transport.
- Packages are not loaded in the same vehicle as goods which could damage the packaging of the radioactive materials in the event of an accident.
- Packages are placed in the vehicle as far as practicable from the driver to ensure the driver's exposure to radiation is minimised while en route.
- Packages are segregated from other dangerous goods during transport, in compliance with the *Australian Code for the Transport of Dangerous Goods by Road and Rail*.

(b) Stowage during transport and storage in transit

The carrier must ensure that:

- Packages are not stored near dangerous goods with which common loading or storage is prohibited under the *Australian Code for the Transport of Dangerous Goods by Road and Rail*.
- The number of category II-Yellow and III-Yellow labelled packages in a particular group is limited so that the sum of transport indices is not more than 50. Such groups of packages must be stored at least 6 metres from other groups of such packages. When a consignment is transported under exclusive use, there is no limit on the sum of the transport indexes.
- Packages containing radioactive materials are kept away from occupied areas.
- Packages are kept separated from undeveloped photographic films or plates. As a guide this may be achieved by -
 - not transporting film with any category II-Yellow or III-Yellow labelled package
 - ensuring at least a 2 metre separation between film and an excepted package or a category I-White labelled package.

(c) Transport of unpackaged low specific activity material

Low specific activity (LSA) material is material which, by its nature, has a limited specific activity or for which limits of estimated average specific activity apply. There are three groups of LSA (LSA-I, LSA-II and LSA-III). Only material classed as LSA-I may be transported unpackaged. An example of LSA-I material is uranium and thorium ores.

To safely transport unpackaged material, the carrier must:

- Comply with the handling, transport, stowage and unloading instructions supplied in the transport documents provided by the consignor.
- Only transport the material under exclusive use arrangements.
- Ensure that all loads are fully covered before leaving the loading site – covers are not to be removed until arrival at the destination.
- Place placards conforming to Figure 6 of the Transport Code on both sides and the rear of the vehicle. Additionally, the United Nations number '2912' must be displayed either on the lower half of the transport placard, or on its own separate label. If the label is separate, it must conform to Figure 7 of the Transport Code.
- Regularly check the vehicle to ensure that no radioactive material is spilling or blowing from the vehicle.
- Wash the vehicle and cover after delivery of every load of material to the destination ensuring that no residual material remains in the vehicle or on the cover.
- Ensure that the driver's compartment is kept clean of any radioactive materials.
- Ensure that, in the event of a small spillage, all the material is cleaned up and placed back on the vehicle.

8. Incident Response

If a package containing radioactive material has been damaged and it is suspected that the damage may allow radiation leakage or spillage of the radioactive material, the carrier or other person dealing with the incident must, in addition to any other action required to respond to the incident:

- ensure the package is not touched
- notify the carrier's supervisor or manager and the consignor of the package
- evacuate and control access to the incident area until the arrival of appropriate personnel to control the situation
- immediately notify the Radiation Health Unit (Phone: 0413 279 672) of the incident
- follow any instructions to control the incident given by the consignor, or an officer of the Radiation Health Unit
- identify persons or equipment that may have been contaminated by radioactive material or exposed to radiation
- report in writing to the Radiation Health Unit within 7 days, advising of -
 - the location of incident
 - the nature and cause of incident
 - actions taken to contain incident
 - clean up procedures and environmental concerns
 - any person exposed or possibly exposed
 - proposals to avoid a recurrence.