Queensland Government

Radiation Protection Programme

for the

Transport of Radioactive Materials

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Radiation Protection Programme for the Transport of Radioactive Materials

Contents

1. Introduction

The protection and safety of persons during the transport of radioactive materials 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 ARPANSA *Code of practice for the safe transport of radioactive material (2008)* (Transport Code). The Transport Code has been adopted in each State and Territory of Australia.

The Transport Code requires that a radiation protection programme be established for the transport of radioactive materials by the person or organisation undertaking the carriage of radioactive materials (ie. carrier). The programme must contain the systematic arrangements that are in place to ensure adequate consideration of radiation protection measures. This document has been prepared for adoption by carriers of radioactive materials so that they satisfy the Transport Code requirement for developing a radiation protection programme.

This document represents a summary of the key radiation safety elements of the Transport Code that are 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.

Nevertheless, compliance with the Transport Code and this programme is mandatory.

2. Definitions

The following definitions provide clarification of the terms used in this document, and are consistent with the definitions given in the Transport Code.

Carrier - An individual or organisation transporting radioactive materials.

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.

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 radiation level (in units of millisieverts per hour) at 1 metre from the surface of a package multiplied by 100.

3. Legislated Requirements

People involved in the transport of radioactive materials must receive appropriate training on the radiation hazards that may be encountered during the transport of radioactive materials, including the precautions that must be observed to restrict their own exposure and the exposure of other persons who might be affected by their actions.

Additionally, under section 14 of the *Radiation Safety Act 1999*, a licence must be held by persons who wish to transport radioactive substances. All licences authorizing the holder to transport radioactive substances are subject to the condition that the licensee complies with the Transport Code.

(a) Transport by road

Only an individual may hold a licence to transport radioactive substances on roads. If radioactive substances are being transported, there must be a person licensed under the *Radiation Safety Act 1999* in charge of the vehicle. To obtain a licence, a person must successfully complete a training course, approved by the Department of Health, which includes the requirements to transport class 7 (radioactive substances) dangerous goods.

(b) Transport other than by road

A company or individual is permitted to hold a licence authorising the transport of radioactive substances by means other than by road (i.e. air, sea or rail). Corporate licensees must provide appropriate training to staff in relation to the transport of radioactive substances.

This training must address the following:

- a direction to refer to the Transport Code
- details of the responsibilities of the consignor and carrier
- a direction that consignments must be checked before they are accepted for transport
- details of where and when radiation warning placards are to be placed on the vehicle, and other signage requirements
- details of the limitations on the packages which may be transported
- information on how packages must be stored while in transit
- procedures to be followed in the event of an incident

This document may provide a basis for the training programme.

(c) Exemption provisions

Under section 70 of the *Radiation Safety Regulation 2010*, a transport licence is not required if a radioactive substance is transported in accordance with the Transport Code, and if:

1. a radioactive substance is enclosed in an excepted package as defined in the Transport Code; or

2. a sealed radioactive substance, incorporated in a sealed source apparatus, is transported by a person who is licensed to use the apparatus to carry out one of the following radiation practices:
    - borehole logging
    - density-gauging or moisture-gauging, for geo-technical purposes
    - industrial radiography.

Those who are exempt from the requirement to hold a transport licence by virtue of holding a use licence for a prescribed radiation practice are considered to be adequately trained to transport specific radioactive materials under industry specific conditions. They received this training during the radiation safety training required as a pre-requisite to obtaining a licence. In addition to this, these individuals are required to comply with the possession licensee's approved radiation safety and protection plan (i.e. the plan approved by the Chief Executive of the Department of Health).

4. Responsibilities

The responsibility for the transport of radioactive materials is shared by consignors and carriers with each group being responsible for different aspects of compliance with the Transport Code. Specific

responsibilities for consignors and carriers are detailed respectively in sections 2.8 and 2.9 of the Transport Code.

(a) Consignor's responsibilities

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

- packaging and labelling radioactive materials for transport in accordance with the Transport Code; and
- preparing and certifying the transport documentation as required by the Transport Code.

(b) Carrier's responsibilities

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 on the consignment note, consignor's declaration for dangerous goods (if applicable) and the package containing the radioactive materials is consistent (Note: A check list is provided in section 7 of the *Safety Guide for the Safe Transport of Radioactive Material (2008)* which may be used to ensure that all the necessary information is provided);
- identifying labels to ensure appropriate decisions are made about storage, loading and transport;
- the loading, handling, transport and interim storage of packages where appropriate;
- unloading of packages and freight containers; and
- emergency procedures in the event of an incident while loading, transporting, unloading or storage of a package.

The carrier must also adhere to all handling, transport, stowage and unloading instructions detailed in the transport documentation by the consignor. This may contain such information as:

- operational 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 routine instructions; or
- emergency arrangements specific to the consignment.

5. Radiation Monitoring

The Transport Code is designed to ensure that radiation exposures to any person involved in the transport of radioactive material do not exceed those permitted for members of the public. Consequently, provided that this Code and safe practices are being followed, there is no requirement for personal radiation monitoring of carriers.

6. Documentation

The following documentation is required for transport of radioactive material by road or rail:

- a movement order (e.g. waybill, consignment note);
- details of the consignment (including radionuclide, total activity, number of packages);
- a consignment declaration (Note: A consignment declaration is not required for the transport of an excepted package);
- package certification, as required;
- special form certificate, if applicable, for sealed sources;
- competent authority approval, where required; and

- any supplementary information for carriers (e.g. additional handling requirements, emergency arrangements, restrictions on loading).

It is the responsibility of the consignor to ensure that the required documents are provided and correctly completed.

Individuals transporting their own radioactive materials are not required to complete a consignment note or a consignor's declaration for dangerous goods.

7. Types of Packages

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 Type A packages, excepted 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.

8. Categories of Packages

Other than excepted packages, packages and large or small freight containers must be labelled with category I-White, II-Yellow or III-Yellow labels, depending on the content of radioactive material and radiation levels at the surface of the package.

Each category of label represents the potential hazard of the package. A category I-White label means that the radiation levels at the surface of the package is very low, and a category III-Yellow label means that the package has the highest accessible radiation field at the surface of the package and in its near vicinity.

The labels to be used must conform to the requirements in paragraph 542 of the Transport Code. This categorisation of packages is the responsibility of the consignor.

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

9. Labelling and Placarding

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

	Excepted packages	Other packages
Labelling of packages		
Package category	Not applicable	The package category (i.e. I-White, II-Yellow or III-Yellow) must be displayed on

	Excepted packages	Other packages
		the outside of each package or freight container. A package must bear two (2) appropriate labels affixed to opposite sides of the package. A freight container must be labelled on all four (4) sides.
Package type	Not applicable	The type of package must be marked on the outside of the package (eg. type A or B(U) etc).
Identification	The package must be legibly marked on the outside of the packaging with an identification of either the consignee or the consignor.	The package must be legibly marked on the outside of the packaging with an identification of either the consignee or the consignor.
UN Number	The outside of the package must bear the letters 'UN' followed by the United Nations number (refer to Table 8 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. This must comply with Table 8 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.
Placarding of vehicles		
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.
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.

10. Transport Procedures

In general, radiation exposure to personnel is dependent upon the amount of time they spend near the packages containing radioactive materials. All persons should:

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

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

(a) Transport of packages

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 of the package;
- except for the driver and assistants, no person is carried in vehicles carrying packages of radioactive materials bearing category II-Yellow or III-Yellow labels;
- packages of radioactive materials 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 of radioactive materials are securely stowed in the vehicle to prevent movement during transport;
- packages of radioactive materials are not loaded in the same vehicle as goods which could

damage the packaging of the radioactive materials in the event of an accident;

- ensure that the package is placed in the vehicle as far as practicable from the driver to ensure the driver's exposure to radiation is minimised while en route; and
- 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* (Note: Section 3.2 of the *Safety Guide for the Safe Transport of Radioactive Material (2008)* provides minimum separation distances to assist in this regard).

(b) Stowage during transport and storage in transit

The carrier must ensure that:

- packages of radioactive materials 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* (Note: Section 3.2 of the *Safety Guide for the Safe Transport of Radioactive Material (2008)* provides minimum separation distances to assist in this regard);
- 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 separated from occupied areas; and
- packages containing radioactive materials are kept separated from undeveloped photographic films or plates. As a guide this may be achieved by:
    - not transporting photographic film with any category II-Yellow or III-Yellow labelled package; and
    - ensuring at least a 2 metre separation between photographic 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 all the handling, transport, stowage and unloading instructions supplied on the transport documentation or 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 final destination;
- place placards on both sides and the rear of the vehicle (Note: The placards to be used must conform to the model shown in Figure 6 of the Transport Code). Additionally, the United Nations number '2912' must be displayed either on the lower half of the transport placard, or on its own separate label (Note: This label must conform to the model shown in 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 final 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; and
- ensure that, in the event of a small spillage, all of the material is cleaned up and placed back on the truck.

11. Incident Procedures

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:

- provide first aid to injured persons;
- not touch the package;
- 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 Chief Executive or the Radiation Health Unit (Phone: 041 327 9672) of the incident;
- follow any instructions to control the incident given by the consignor, or an officer of Radiation Health;
- not eat, drink or smoke while at the incident site;
- identify persons or equipment that may have been contaminated by radioactive material or exposed to radiation; and
- provide a report to the Chief Executive (c/- the Radiation Health Unit) within 7 days, advising of:
  (a) location of incident
  (b) nature and cause of incident
  (c) actions taken to contain incident
  (d) clean up procedures and environmental concerns
  (e) any person exposed or possibly exposed
  (f) proposals aimed at avoiding a recurrence.

12. Further Information

If you have any questions regarding the transport of radioactive materials, please contact Radiation Health:

Postal Address: PO Box 2368
Fortitude Valley BC Qld 4006

Physical Address: 15 Butterfield Street
Herston Qld 4006

Telephone: (07) 3328 9987
Facsimile: (07) 3328 9622
Email: radiation_health@health.qld.gov.au