The regulation of the transport of radioactive material

**Scope**

This document describes the regulation of the transport of radioactive material in Victoria.

Transport is crucial in all industries to link points of production to points of use.

Sealed radioactive sources are used widely in industrial processes, ranging from inspection to large scale testing and sterilisation of clinical and other sensitive products. Research organisations are also important users of specialised radioactive sources, although often in small quantities.

However, it is the medical use of radioactive materials that is evolving to be possibly the most important use in our society. Most hospitals now use radioactive materials in their diagnostic and therapy work and as a result medical isotopes including radiopharmaceuticals constitute the majority of the radioactive material movements.

The scope of transport is local, national and international. In 2006, it was estimated that there were several million shipments of radioactive material annually worldwide, of which only 2-4% consisted of heavy loads of highly radioactive material, including nuclear fuel.

About half or more of shipments were estimated to carry radioactive material of relatively low activity including relatively short-lived medical isotopes which need to be carried at high speed to ensure that they arrive at the destination in a useful state.

**Victoria’s radiation safety licensing laws**

The Victorian Radiation Act 2005 has the objective of protecting the health and safety of persons and the environment from the harmful effects of radiation.

The Department of Health is the government body which administers this legislation.

The Act seeks to fulfil this objective by establishing a licensing framework to regulate the conduct of radiation practices and the use of radiation sources.

Any person (individual or company) who conducts a radiation practice must hold a management licence (unless exempted from that requirement). Conditions of licence are applied by the department to management licences. The management licence holder must comply with every condition of their licence.

Section 12 of the Radiation Act 2005 creates an offence for a person to conduct a radiation practice unless that person holds a management licence, that is in force, and that allows the conduct of that radiation practice. The maximum penalty for an offence against this section is in excess of $1,099,000.

The definition of what is a radiation practice includes amongst other things ‘transporting radioactive material’.

**International standards for the safe transport of radioactive material**

The International Atomic Energy Agency (IAEA) has developed over the past 40 years what it calls ‘Regulations for the Safe Transport of Radioactive Material’. These regulations are generally adopted by most countries.

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2 Prior to 12 August 2009, the responsible government body was the Department of Human Services
The regulations are intended to ensure that the ‘transport package’ is:

- Appropriate for the radioactive material to be transported;
- Designed according to a quality assured process;
- Properly prepared for transport;
- Properly labelled;
- Properly handled and maintained;
- Accompanied by the appropriate documentation to convey information needed for safe transport and the response to incidents.

Information about the IAEA’s role in the regulation of the transport of radioactive material can be found at http://www-ns.iaea.org/tech-areas/radiation-safety/transport.htm

**What is the Australian safety standard for transport of radioactive material?**

The regulation of these practices in Australia has for many years been based on the previously mentioned international regulations. In Australia, the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) have published the ‘Code of Practice for the Safe Transport of Radioactive Material (2008)’ which incorporates the 2005 edition of the IAEA Regulations. This Code is updated periodically to encompass the latest international regulations.

**Obtaining a copy of Code of Practice for the Safe Transport of Radioactive Material (2008)**

You can download or purchase a copy of the Code from ARPANSA^3^.

**What is the Victorian approach to the regulation of transport of radioactive material?**

Our approach to the regulation of the transport of radioactive material is to:

- Establish a clear distinction between:
  - ‘Contract carriers’ – the organisations which transport radioactive material on behalf of others;
  - ‘Consignors’ – the organisations which possess or sell radioactive material and periodically consign the radioactive material for transport by contract carriers); and
  - ‘Private carriers’ – the organisations which possess or sell radioactive material and, from time to time, as part of their normal operations move that material from place to place;

- Establish a distinction between the types of material that are authorised for transport to allow more targeted communications and monitoring:
  - All management licences which authorise companies to transport radioactive material as a ‘contract carrier’ will, in future, authorise the transport of one or more of the following classes of radioactive material:
    - Radiopharmaceuticals;
    - Radionuclides (that are not radiopharmaceuticals);
    - Sealed sources (that are not security enhanced sealed sources) [as defined by the ‘Code of Practice for the Security of Radioactive Sources (2007)’ published by ARPANSA];


^4^ This is the ‘shipper’ of the material. In most cases it is likely to be the owner of the radioactive material and the person who initiates the transport process.
o Sealed source apparatus (that do not contain security enhanced sealed sources) [as defined by the ‘Code of Practice for the Security of Radioactive Sources (2007)’];

o Low specific activity radioactive material;

o Category 1 security enhanced sealed sources [as defined by the ‘Code of Practice for the Security of Radioactive Sources (2007)’];

o Category 2 security enhanced sealed sources [as defined by the ‘Code of Practice for the Security of Radioactive Sources (2007)’];

o Category 3 security enhanced sealed sources [as defined by the ‘Code of Practice for the Security of Radioactive Sources (2007)’];

• Introduce important new national security requirements for the transport of certain types of sealed radioactive sources:
  – The Council of Australian Governments as part of its review of the handling of hazardous materials has agreed to implement the ‘Code of Practice for the Security of Radioactive Sources (2007)’\(^5\).
  – This Code has been developed on the basis that physical security requirements should be applied in a graduated manner that is related to the risk of the source being stolen and the consequences of malicious use.
  – It categorises sealed radioactive sources into five categories and allocates security requirements commensurate with the risk posed by sources in each category. It applies to both the physical security of the sources when they are in use and to the times when they are in transport.
  – The Code sets out detailed requirements for the transport of Category 1, Category 2 and Category 3 ‘security enhanced sealed sources’. This includes ensuring physical security measures, development of a source transport security plan and a requirement for security background checks of any person who is to have access to the sources. There has been an agreement amongst Australian jurisdictions that the Code should become mandatory from approximately 1 July 2009 (with the exception of several aspects where the compliance date has been delayed such as the requirement for background security checks and external assessment of the required security plans);

• Make compliance with the ‘Code of Practice for the Safe Transport of Radioactive Material (2008)’ mandatory from 1 January 2010;

• Feature ongoing monitoring for compliance involving audits of management licences authorising the transport or the consignment for transport of radioactive material. These audits will focus on the specific practices that have been authorised by the licence e.g. the consignment for transport of sealed sources. Some of the key elements of the audit will be the examination and assessment of the required radiation protection programme and the training of workers;

• Increase the focus on the organisations which possess radioactive material to ensure that consignment and transport is in compliance with the ‘Transport Code’. During 2009/10, all management licences which authorise the possession of radioactive material were varied to confirm the responsibility of those companies who do consign radioactive material to do so in compliance with the ‘Code of Practice for the Safe Transport of Radioactive Material (2008)’. There will also be a requirement for those companies who consign material to a contract carrier to be satisfied that the contract carrier holds the appropriate management licence and so those companies may find that they will be asked by these companies to provide evidence that your licence appropriately authorises the transport.

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What are the prerequisites for a management licence authorising the transport of radioactive material?

Applicants need to demonstrate that they have the systems necessary to enable them to comply with the ‘Code of Practice for the Safe Transport of Radioactive Material (2008)’.

This includes having:

- A radiation protection programme that is related to the magnitude and likelihood of radiation exposures to workers, other persons or the environment;
- Conducted a dose assessment where the dose is expected to be between 1 and 6mSv in a year;
- Dose monitoring where the doses to workers are likely to exceed 6mSv in a year;
- Where any radioactive material will be stored for any period of time on your premises, the details of the construction and shielding of the storage facility or premises that will ensure that no person will receive a higher radiation dose than prescribed in the Radiation Regulations 2007. This includes shielding calculations;
- Emergency procedures;
- Quality assurance systems;
- Training:
  - Of all workers in the transport of radioactive material (in accordance with clause 311 to 314 of the 2008 Code) in radiation safety and protection including the precautions to be observed in order to restrict radiation doses;
  - Commensurate with the risk of exposure in the event of an accident including dangers and how to prevent exposure to the hazards and immediate procedures to be followed.

There are private sector training providers who offer courses for organisations in basic radiation protection and the Transport Code.

Where applicants advise us that they wish to transport security enhanced sources (Category 1, Category 2 and Category 3), an officer from the Department will arrange an interview to discuss the matter further. In such cases the applicant will need to satisfy the Department that they can transport such sources in a safe and secure manner.

In particular, applicants will need to provide information detailing the training that they have provided to staff involved in the transport of radioactive material and a copy of the organisation’s radiation protection programme. The applicant will also need to demonstrate the company can comply with the ‘Code of Practice for the Security of Radioactive Sources (2007)’.
What specific conditions are applied to management licences authorising the transport of radioactive material?

The licence will require compliance with the following conditions:

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<th>Conditions</th>
<th>When would this be applied</th>
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The licence will also require reporting of radiation safety incidents and may also authorise other activities such as the possession of radiation sources and if this is the case there will be other conditions which must be complied with.

What are the main responsibilities of consignors?

The consignor is responsible as a minimum for ensuring that the consignment of radioactive material is properly packaged, labelled, certified and documented. This is the critical part of the transport process.

The certification and documentation includes the supply of documentation to the carrier, sometimes known as a ‘consignor’s declaration’ or the ‘Road/Rail/Marine Consignor’s Declaration for Dangerous Goods – Class 7 Radioactive Material’. ARPANSA publishes information and a downloadable form\(^7\) which can be used for this purpose.

In order to prepare for a shipment, the consignor must first establish the:

- Type of radioactive material;
- Total activity;
- Chemical and physical form
- A\(_1\) level (for special form radioactive material\(^8\))
- A\(_2\) level (for other types of radioactive material).

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\(^6\) Exact wording is subject to change from time to time

\(^7\) Refer http://www.arpansa.gov.au/Publications/codes/rps2.cfm

\(^8\) Certain materials may be approved under the international regulations as ‘special form radioactive material’ if they meet test criteria so as to limit exposures by encapsulation or making the radioactive material indispersible. A common example of this is found in smoke alarms.
These factors define, amongst other things, the required transport packaging standard that must be met.

**Transport packaging standards**

There are three basic requirements for the safe transport of radioactive material:

- The material must be adequately contained to meet defined standards under normal and accident conditions so as to prevent contamination of humans or the environment;
- Humans must be protected from radiation exposure by limiting the radiation dose levels on the outside of the package of radioactive material. These limits are based on very conservative assumptions on the occupancy time and proximity of workers and the public to the packages during transport;
- The heat emitted in the decay of the radioactive material must be dissipated safely. This is generally done via package design and the way in which the package is secured for transport.

The IAEA Regulations provide for a graduated approach where the standards of packaging increase based predominantly on the type of radionuclide and the amount of the radionuclide.

There are four main types of packaging:

- Excepted packages;
- Type A;
- Type B;
- Type C.

In many cases where very small amounts are to be transported, it is usually done in what are called ‘excepted packages’ (so called because they are excepted from all but the most basic requirements).

Excepted packages are typically used for test samples, some medical isotopes etc.

‘Type A’ packages are limited by the quantity of materials and are required to maintain their integrity under normal conditions of transport.

Large quantities of material must be carried in ‘Type B (U)’ or ‘Type B (M)’ packages which are capable of withstanding accident conditions. The actual design of the individual package defines how much material can be transported.

‘Type C’ packages are designed for the transport of larger quantities of material by air.

**Quality assurance requirements**

The IAEA regulations require a number of quality assurance measures which include pre-shipment checks, contamination controls, stowage standards, marking, labelling and placarding.

As an example, each package is required to be labelled with the:

- Consignor and consignee;
- UN number and proper shipping name;
- Permissible gross mass (where the gross mass exceeds 50kg);
- Package type;
- Design number and serial number;
- Radioactive trefoil (which must be fireproof and waterproof).
- Category of the package, either I, II or III according to the radiation dose level both at the surface and at 1m. This is called the transport index or ‘TI’;
- Contents of the package;
- Activity;
- Numerical value of the transport index;
- Criticality safety index (for packages containing fissile material).
Freight containers and vehicles carrying radioactive material must carry placards to indicate the class of material being carried. Where material of a single UN number is being carried, this has to be shown.

**More information?**

If you require clarification about the transport of radioactive material or require more information about this matter please contact the department on 1300 767 469 or email us at radiation.safety@health.vic.gov.au

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