

GUIDELINES FOR TRANSPORT OF RADIOACTIVE SUBSTANCES

1. INTRODUCTION

Transportation of radioactive substances within Australia is governed by various State Government legislation and by the Commonwealth's *Code of Practice for the Safe Transport of Radioactive Substances (1990)*. In Victoria the regulatory requirements are embodied in the Code and cover such matters as packaging, labelling, transportation and documentation requirements for all consignments.

Packaging and labelling requirements depend on the radioisotope being transported and the radioactivity involved. Packages containing isotopes with activities less than those shown in Table 1 (called "excepted" packages) are exempt from the provisions in the Code other than the general requirements, which apply to all packages.

For transport of radioisotopes of activities greater than those shown in Table 1, specialist advice on transport requirements must be obtained from the Occupational Health and Safety Section beforehand.

2. GENERAL REQUIREMENTS

2.1 Packaging

- a) The total radioactivity must be less than that given in Table 1 of these Guidelines
- b) The smallest overall external dimension of the package must not be less than 10 cm
- c) The package must not have a gross weight in excess of 10 kg
- d) The outside of every package must be sealed, and not be readily breakable
- e) The outer layer of packaging must be so designed as to avoid, as far as practicable, the collection and retention of water
- f) The external surfaces of packaging must, as far as practicable, be so designed and finished that they may be easily decontaminated
- g) Packages containing a liquid volume less than 50 cm³ should contain sufficient absorbent material to absorb twice the volume of the liquid contents. The absorbent material must be placed so as to contact any leaking liquid.
- h) Packages containing a liquid volume greater than 50 cm³ should either contain absorbent material outlined above, or be provided with a containment system designed to retain the liquid in the event of the primary component leaking
- i) The design of the containment system should take into account (where applicable) the radiolytic decomposition of liquids and other vulnerable materials and the generation of gas by chemical reaction and radiolysis.
- j) Any features added to the package at the time of transport which are not part of the package must not reduce the safety of the package

2.2 External Package Dose Rate

The external dose rate for excepted packages must not exceed 5 microsieverts per hour at any point on the external surface of the package.

The external dose rate will depend on the activity of the radioisotopes present, the type of radiation emitted, the energy of the radiation and the manner in which the isotope is packaged (i.e. the presence of shielding and dimensions of the packaging). The Occupational Health and Safety Section can measure the dose rate using appropriate radiation monitors and can provide advice on shielding and packaging.

In general, beta radiation can be completely shielded by several millimetres of perspex, or an equivalent thickness of other material. However, the shielding may give rise to secondary, or Bremsstrahlung radiation, which will contribute to the external dose rate.

2.3 Labelling

A radiation-warning symbol is not required on the outside of excepted packages. However, a radioactive warning label must be affixed to the inside of the package, such that a warning of the presence of radioactive material is visible on opening the package and including details of the isotope and activity of the contents.

The contact details must be prominently displayed on the outside of the package and include the following details:

| | |
|--------------------------|---|
| Contents: | Isotope and activity |
| Consignor: | Name and address of consigning department |
| Contact details: | The name and telephone number of the person responsible for preparing the consignment |
| Emergency number: | The University's after hours emergency telephone number |

2.4 Transport

When transporting packages containing radioactive material, the following must be observed:

- Keep the contact time with the package short
- Keep yourself and other people as far away from the package as possible, and store the package well away from occupied areas
- Secure the package so that it will not move during transportation
- Do not place the package in the cabin with the driver

2.5 Leakage and contamination testing

All consignments containing radioactive material must be checked for breakage or leakage and contamination on receipt. If any contamination is detected, the Department Radiation Supervisor and the Occupational Health and Safety Section must be informed.

Non-fixed external contamination must not exceed 10^{-4} microcuries per square centimetre for beta and gamma emitters or 10^{-5} microcuries per square centimetre for alpha emitters.

3. IN CASE OF ACCIDENT:

- i. Stay away from the package and DON'T touch it
- ii. Isolate the package – keep people away, and stay upwind and at least 3 metres away
- iii. Contact the Department Radiation Supervisor or the Occupational Health and Safety Section
- iv. Don't eat, smoke or drink at the accident site or leave until you have been checked for possible contamination

4. REFERENCES

Victorian Health (Radiation Safety) Regulations 1994
 Commonwealth of Australia's Code of Practice for the Safe Transport of
 Radioactive Substances (1990).

Table 1 – Package limits

| Radioisotope | Package limits | | | | |
|---------------|-----------------------|---------------------|---------|-----------------------|---------------------|
| | Solid Special form | Solid Other form | Liquids | Gases Special form | Gases Other form |
| Hydrogen 3 | 40 GBq | 40 GBq | 4 GBq | 40 GBq | 40 GBq |
| Carbon 14 | 40 GBq | 2 GBq | 200 MBq | 40 GBq | 2 GBq |
| Phosphorus 32 | 300 MBq | 300 MBq | 30 MBq | 300 MBq | 300 MBq |
| Phosphorus 33 | 40 GBq | 900 MBq | 90 MBq | 40 GBq | 900 MBq |
| Sulphur 35 | 40 GBq | 2 GBq | 200 MBq | 40 GBq | 2 GBq |
| Calcium 45 | 40 GBq | 900 MBq | 90 MBq | 40 GBq | 900 MBq |
| Cadmium 109 | 40 GBq | 1 GBq | 100 MBq | 40 GBq | 1 GBq |
| Iodine 125 | 20 GBq | 2 GBq | 200 MBq | 20 GBq | 2 GBq |

Note: (1) *Special form* radioactive material is either an indispersible solid radioactive material or a sealed capsule containing radioactive material.
 (2) 37 gigabecquerel (GBq) = 1 curie (Ci)