

SESLHD PROCEDURE COVER SHEET



Health
South Eastern Sydney
Local Health District

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AUTHOR	Brent Rogers, SESLHD Radiation Safety Officer Erin McKay, RSO St George Hospital
POSITION RESPONSIBLE FOR THE DOCUMENT	District Radiation Safety Officer SESLHD-RadiationSafetyOfficer@health.nsw.gov.au
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SUMMARY	Procedure for transporting radioactive substances

COMPLIANCE WITH THIS DOCUMENT IS MANDATORY

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1. POLICY STATEMENT

The South Eastern Sydney Local Health District (SESLHD) is committed, through a risk management approach, to protecting employees, contractors, students, volunteers, patients, members of the public and the environment from unnecessary exposure to radiation arising from systems and processes which use radiation apparatus and radioactive substances, whilst maintaining optimum diagnostic and therapeutic quality, therapeutic efficacy and patient care.

This document provides the procedure for the safe transport of radioactive substances.

2. BACKGROUND

There is sometimes a need to transport radioactive materials between hospitals, academic institutions, and other medical establishments in such a way that no aspect of worker or public safety is compromised.

The transport of radioactive substances within NSW is governed by the *Radiation Control Regulation 2013* (NSW). The Regulation specifies that the transport must conform to the detailed requirements contained in the Code of Practice for the Safe Transport of Radioactive Material, published by the Australian Radiation Protection and Nuclear Safety Agency (ARPANSA). The current version (2019) is Radiation Protection Series C-2 Revision 1 (RPS C-2), which is based on the IAEA Regulations for the Safe Transport of Radioactive Material (1996, revised 2014).

This document will assist by providing specific safety instructions for consignors, carriers and recipients; and providing information on minimising any radiation consequences in the event of a transport accident.

3. RESPONSIBILITIES

3.1 Responsible Person

- is the legal entity which has overall management responsibility for radiation matters in the jurisdiction under which the centre operates (Clause 3.1 of the Code)
- may delegate radiation protection duties to a Radiation Safety Officer (RSO)
- For SESLHD the responsible person is the Chief Executive; whilst some tasks may be delegated to the nuclear medicine specialist or to the RSO, or medical physicist the ultimate responsibility lies with the Responsible Person.

3.2 Radiation Safety Officer (RSO)

- will have sufficient professional and/or technical training to oversee and provide advice on radiation safety within the centre
- should ensure that the Responsible Person is kept informed of the radiation safety status of the centre.

3.3 The Consignor

- under the supervision of the Radiation Safety Officer, the person initiating the transport of radioactive material (the consignor) is required to comply with the current

ARPANSA Code of Practice for the Safe Transport of Radioactive Material C-2, Rev 2 and any existing national and State legislation.

4. PROCEDURE

4.1 Delivery and receipt of radioactive substances to the facility

4.1.1 Delivery

- The consignor is responsible for ensuring that the consignment of radioactive materials is properly packaged, labelled, certified and documented to ensure safe carriage and prompt delivery. To achieve this, the consignor should be familiar with the relevant requirements of RPS C-2
- Along with the goods, the consignor is required to supply information, sometimes known as a “consignor’s declaration”, outlining details of the consignment, such as:
 - the name(s) and activity of the radionuclides
 - the type of packaging
 - the hazard category of the package
 - the transport index (TI).
- The TI is the maximum radiation level at 1 metre from any external surface of the package in mSv/h × 100 and rounded up to the first decimal place. A value of 0.05 or less may however be considered as zero. The TI is used to provide control over radiation exposure during transport.
- The consignor’s declaration also needs to contain a signed statement to certify that the consignment conforms to applicable regulations.
- Although the supplier is normally responsible for the packaging and transport of a radioactive source the Responsible Person should ensure that the supplier is aware of its responsibilities in transporting a radioactive source and immediately report to the relevant regulatory authority any breach of the transport regulations.
- Special procedures relating to dispatch of therapeutic sealed sources can be found in ARPANSA Radiation Protection Series No. 14.3 Safety Guide for Radiation Protection in Radiotherapy (2008)

4.1.2 Receipt

- Complete records of the radionuclide, activity, chemical form, supplier, supplier’s batch number and purchase date need to be kept.
- On arrival, if a package containing radioactive material is suspected of being damaged, the package should be:
 - monitored for leakage with a wipe test; and
 - checked with a survey meter for unexpectedly high external radiation levels.
 - Using this monitoring, ensure that the package is compliant with 4.3.3 below.
- If a package does not meet the requirements of 4.3.3., is damaged or suspected of being damaged, contact the RSO and the supplier should be contacted immediately.
- All records need to be kept for at least two years.
- For any consignments that include Security Enhanced Sources, the requirements of [SESLHDPR/149 - Radiation Safety - Security of Radioactive Sources](#) must be included.

4.2 Procedures for the transport of radioactive substances within the facility

- When a radioactive source is transported within premises, it should be placed in a suitably shielded container and transported in a way that minimises exposure to radiation and is secured to prevent tampering or theft.
- All movements of a source within the premises should be supervised, including to and from the radioactive source safe or store.

4.3 Procedures for the transport of radioactive substances between facilities

- The Procedure to be followed depends upon the classification of the radioactive material when packaged.
- ARPANSA RPS C-2 (Rev.1) 2. specifies a classification of Excepted packages. Packages in this classification are exempt from many of the stringent requirements which otherwise are required to be followed (See 4.3.1 below).
- If a package does not meet the excepted packages classification, then it is usually transported as Type A. For the Type A category, the package has to satisfy various performance tests such as drop and penetration tests to demonstrate an ability to withstand the normal conditions of transport. The advice of the institution's RSO, or the relevant regulatory authority, should be obtained if a Type A package (or rarely, a higher category Type B package) has to be transported.

4.3.1 Excepted packages

Excepted packages are required to meet the following criteria:

- the activity does not exceed the limits listed for Excepted Packages set out in ARPANSA RPS C-2 (Rev 1).;
- the radiation level at any point on the external surface is not greater than 5 $\mu\text{Sv/h}$;
- the removable radioactive contamination on any external surface averaged over any area of 300 cm^2 of any part of the surface does not exceed 4 Bq/cm^2 . If this value is exceeded, the package needs to be checked for damage and repackaged;
- the package will retain its radioactive contents under routine conditions of transport;
- the package bears the marking '**RADIOACTIVE**' on an internal surface in such a manner that a warning of the presence of radioactive material is visible on opening the package;
- the transport document with each consignment gives the United Nations Number '**2910**'; and
 - all items are described as '**RADIOACTIVE MATERIAL, EXCEPTED PACKAGE**' and include the proper shipping name of the substance or article being transported i.e: '**LIMITED QUANTITY OF MATERIAL**'.

If the package does not satisfy criteria for an excepted package it may require a Type A (or B) classification.

Note: A summary of Activity Limits for Excepted Packages for common unsealed sources can be found in Table 11 in ARPANSA Radiation Protection Series No. 14.2 Safety Guide for Radiation Protection in Nuclear Medicine (2008)

4.3.2 Type A packages

Type A packages fit the following criteria:

Transport of Radioactive Substances

SESLHDPR/534

- The activity does not exceed the limits listed for Type A Packages as set out in ARPANSA C-2 (Rev 1)
- The removable radioactive contamination on any external surface averaged over any area of 300 cm² of any part of the surface does not exceed 4 Bq/cm². If this value is exceeded, the package needs to be checked for damage and repackaged.

Note: A summary of Activity Limits for Type A Packages for common unsealed sources can be found in Table 12 in ARPANSA RPS 14.1

4.3.3 Category Labels

Excepted and Type A packages have category labels attached to at least two opposite external surfaces. The label to be used depends on the radiation dose rate at the surface and the transport index. The transport index is the maximum radiation dose rate at any point 1 metre from the surface of the package in µSv/h, divided by 10 and then rounded up to one decimal place.

Transport index	Maximum radiation level at any point on external surface	Category
0 ^a	Not more than 5 µSv/h	I-WHITE
More than 0 but not more than 1	More than 5 µSv/h but not more than 500 µSv/h	II-YELLOW
More than 1 but not more than 10	More than 500 µSv/h but not more than 2000 µSv/h	III-YELLOW
More than 10	More than 2 mSv/hr but not more than 10 mSv/hr	III-Yellow ^b

^a If the measured transport index is not greater than 0.05, the value quoted may be zero.

^b Shall also be transported under *exclusive use* except for freight containers

Note: Both the transport index and the surface radiation level conditions are taken into account in determining the appropriate category. Where the transport index satisfies the condition for one category but the surface radiation level satisfies the condition for a different category, the package will be assigned to the higher category.

Type A Package Limits

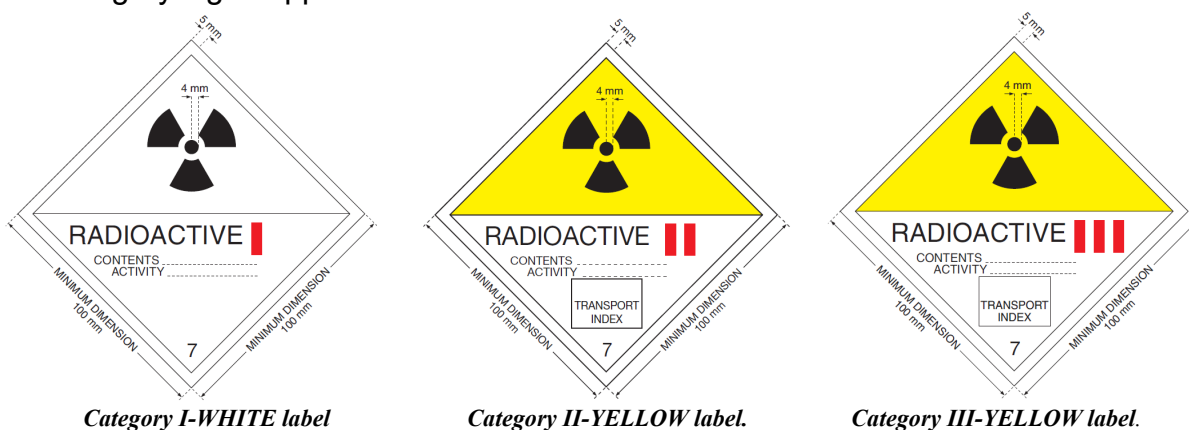
Transport of Radioactive Substances **SESLHDPR/534**

	GBq		GBq
Bromine-82	400	Phosphorus-33	1 000
Carbon-14	3 000	Samarium-153	600
Chromium-51	30 000	Selenium-75	3 000
Cobalt-57	10 000	Sodium-22	500
Cobalt-58	1 000	Sodium-24	200
Fluorine-18	600	Strontium-89	600
Gallium-67	3 000	Strontium-90	300
Indium-111	3 000	Sulphur-35	3 000
Iodine-123	3 000	Technetium-99m	4 000
Iodine-125	3 000	Thallium-201	4 000
Iodine-131	700	Tritium (³ H)	40 000
Iron-59	900	Xenon-133	10 000
Molybdenum-99	600	Yttrium-90	300
Phosphorus-32	500		

Note: Contact the RSO for radionuclides not listed above, for non-standard packages, and for activities greater than can be transported in Type A packages.

The category labels will need to indicate the radionuclide, its activity in becquerels and for category II and III, the transport index must be included.

The category signs appear as follows:



4.3.4 Segregation from other dangerous goods

Under the Australian Dangerous Goods Code, radioactive materials are not to be carried on the same vehicle as some other dangerous goods, as specified in ARPANSA Radiation Protection Series No. C-2 - Code for the Safe Transport of Radioactive Material (2019 Edition).

4.3.5 Documentation

The **consignor** needs to complete the following documents prior to commencement of the transport of the radioactive material:

- a consignor’s declaration (an example form is given on the ARPANSA website at [Consignor's Declaration For Dangerous Goods \(March 2017\) \(arpansa.gov.au\)](http://arpansa.gov.au). A minimum of two copies is required. One is for the driver and one, enclosed in a stout envelope, is to be firmly fixed to the outside of the package for inspection in transit. Where more than one driver is involved, it may be necessary for each driver to receive a copy of the consignor’s declaration; and
- information for drivers – a document which provides:
 - any supplementary operational requirements for loading, transport, storage (away from persons, dangerous goods, etc.)
 - emergency arrangements specific for the package.

4.3.6 Instructions to the person organising transport

The person organising the transport should comply with the following:

- taxis, motorcycles, or public transport are not to be used to transport radioactive material
- the institution’s transport vehicle may be used to transport the package provided the driver has been instructed in how to handle and secure the package in the vehicle and in the actions to be taken in case of an accident or an emergency. Written instructions should be provided
- when the delivery is urgent, private cars may be used (insurance provisions may apply). A person who is conversant with the hazards involved and with handling emergency situations, and preferably authorised to use the radioactive material being transported, will either drive the vehicle transporting the material, or will accompany the driver
- the package needs to be addressed and delivered to a specific authorised person. It should not be addressed generally to a ‘Department’, nor delivered to a specified ‘area’ or to the ‘front desk’. It should be transferred to the custody of an authorised person or left at a secured location.

4.3.7 Packaging procedure

- Place the vial or other source in a shielded (lead etc) container with sufficient absorbent material to absorb twice the volume of the liquid contents. Label the container ‘**RADIOACTIVE**’ and give the name and activity of the compound, and the date. Close the container with a tight fitting lid, and tape.

Further details for packaging radiopharmaceuticals in liquid form can be found in Annex I of ARPANSA Radiation Protection Series No. 14.2 Safety Guide for Radiation Protection in Nuclear Medicine (2008)

- Place this sealed container inside an outer transport box with cushioning material to prevent movement within the box and seal the transport box.
- Measure and record the surface dose rate. Check that there is no contamination on the outer surface.
- Determine whether the package is classified as an excepted package, or Type A.
- Fill out a ‘consignor’s declaration’ and attach to the package.

- Label the package with:
 - the name and address of addressee
 - the sender's name and address
 - appropriate category label
- Give the package and the transport kit (detailing transport instructions) to the driver.

4.3.8 Further Details

A Radioactive Material Transport Kit which includes instructions for the driver and information on procedure to be taken in the event of an accident can be found in Annex I of ARPANSA Radiation Protection Series No. 14.2 Safety Guide for Radiation Protection in Nuclear Medicine (2008)

5. DOCUMENTATION

- [Consignors Declaration for Dangerous Goods](#)

6. AUDIT

The following records should be available for audit:

- Records of consignment and receipt kept for two years.

7. REFERENCES

- [1] *Radiation Control Regulation 2013* (NSW)
- [2] ARPANSA Radiation Protection Series No. C-2 (Rev 1) - Code of Practice for the Safe Transport of Radioactive Material (2019 Edition).
- [3] ARPANSA Radiation Protection Series No. 14.2 Safety Guide for Radiation Protection in Nuclear Medicine (2008)
- [4] ARPANSA Radiation Protection Series No. 14.3 Safety Guide for Radiation Protection in Radiotherapy (2008)
- [5] ARPANSA Radiation Protection Series No. C-5 Code for Radiation Protection in Medical Exposure

8. VERSION AND APPROVAL HISTORY

Date	Version	Version and approval notes
July 2010	Draft	Area Radiation Safety Officer in conjunction with the Area Radiation Safety Committee
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February 2011	0	Approved by Combined Clinical Council
December 2015	1	Periodic review
October 2016	1	Update endorsed by Executive Sponsor
March 2020	2	Update endorsed by Executive Sponsor
14 July 2023	2.1	Minor review: updates endorsed by Executive Sponsor.