PROCEDURE V8 JUN 2025

INTERNAL TRANSPORTATION OF RADIOACTIVE COMPOUNDS

INTRODUCTION

This procedure is applicable to employees of the institutions that take part in the complex license Randwyck, who are involved in transportation of radioactive substances. Transportation of radioactive substances within the terrain borders of the complex license is characterised as internal transportation. The condition that apply for this form of transportation are formalised in this procedure.

The following aspects are outside of the scope of this procedure:

Transportation of radioactive substances

- within a radiological area;
- between adjacent radiological rooms within an area or department;
- outside the terrain border of the complex license;
- over public roads.

The supervising Radiation Protection Officer (RPO; Dutch: 'Toezichthoudend Medewerker Stralingsbescherming' or TMS) sees to it that the requirements in this procedure are met.

In the written internal permit (Dutch: 'schriftelijke interne toestemming' or SIT), department-specific local permit (Dutch: 'lokale interne toestemming' or LIT) and/or written internal approval for biomedical studies (Dutch: 'schriftelijke interne goedkeuring' or SIG) regarding procedures with radioactive compounds involving human and/or animal test subjects, as issued to the researcher or responsible recipient of the department it involves, additional requirements may be formulated.

Attachments to this procedure:

- Attachment A: Transport form Dispersible Radioactive Substances
- Attachment B: Transport form Closed sources
- Attachment C: Transport form Radioactive waste

GENERAL CONDITIONS

1. The RPO/TMS of the department that is the starting point of the internal transportation is responsible for:
   - supervising the correct execution of the transportation;
   - supervising the correct packaging of the radioactive compound
   - administration of transportation documents;
   - instructing the transporter;
   - drawing up a risk analysis, in which the exposure of employees as a consequence of the transport is evaluated, as well as any foreseeable unintentional events.
2. The transporter has been informed of the requirements that are obligatory for the transportation, as well as any additional specific instructions and demands from the department in question, and abides to these rules.
3. Only employees who are qualified and competent to autonomously work with radioactive sources is allowed to carry out the transport of radioactive substances; this means they have successfully participated in a course in radiation protection; at least at the level TMS-VRS D or based on instruction and only after explicit approval by the Radiation Protection Officer. The transport of radioactive waste is, under certain conditions, exempted from this requirement; the transport of radioactive substances in the original transportation packaging from the Maastricht University department of logistics to the Radionuclide Laboratories is also, under certain conditions, exempted from this requirement.
4. For each transport, a transport document (see addendum), needs to be drawn up in duplicate. One of these filled out forms stays with the sender, and the second accompanies the transporter. The RPO/TMS of the

respective departments must administer these documents into their departmental nuclear energy files. If sender and receiver are the same RPO/TMS, one transport document may be sufficient.

5. Packaging of the radioactive compound must meet the following criteria:
   - it must be lockable;
   - the packaging material is physically and chemically resistant to its contents;
   - the outside of the packaging must hold the text 'radioactive substances' and/or the symbol for radioactivity in a way that is clearly visible. This indication may be hand-written (with a non-removable marker), printed or in the form of a sticker;
   - the packaging is not contaminated with radioactive substances.

   Generally, packaging of accredited suppliers meets the requirements for transportation over public roads, and is therefore suitable for internal transport.
6. Internal transportation of radioactive biological materials from patients or test subjects is exempted from the requirement to use a transportation form, as is the internal transportation of mildly radioactive samples for bacteriological analysis or sterility tests by the department of Clinical Pharmacology and Toxicology. The transportation itself has to be performed under the same conditions as normal transportation of radioactive substances (lockable packaging, physically and chemically resistant, symbol for radioactivity, the text 'radioactive substances' and non-contaminated packaging).
7. When transporting biological materials from patients or test subjects treated with radiotherapeuticals, a transportation form is always obligatory. Transportation is only allowed after explicit approval by the RPO.

BEFORE THE INTERNAL TRANSPORTATION TAKES PLACE

1. Preceding the transportation and if applicable, the RPO/TMS makes sure that the receiving party is granted a SIT that allows them to receive and use the radioactive substance that is about to be transported;
2. The transporter must inform the RPO/TMS of the receiving department, the receiver, about transportation plans well before it takes place.
3. The transporter consults the RPO/TMS on necessary means, radiation measurement devices and/or any other possible additional measures (of organisational nature) that are needed for a safe transportation of radioactive substances. In the case of radioactive sources in dispersible form, this implies materials needed to clean up possible radioactive contamination.
4. Radioactive substances must be transported in a (rolling) means of transport, which meets the following requirements:
   - adequate and suitable shielding is foreseen in order to reduce the exposure of the transporter as much as possible; this in compliance with the risk-analysis based advice of the RPO/TMS;
   - under normal circumstances, during transportation of radioactive sources in dispersible form, there will be no leakage of radioactive substances, or measures have been taken to prevent leakages from occurring;
5. The transportation must take place via the route that ensures the smallest risk at exposure of third parties, or the smallest risk at causing contamination. Places where people are present, should be avoided as much as possible.
6. When transporting radioactive waste, the RPO/TMS is responsible for judging if additional shielding of the waste is necessary to protect the transporter.

DURING THE TRANSPORTATION

1. During transportation, a completed transportation form (*see addendum*) must be present. In the case of internal transportation directly following receipt of an accredited supplier, the transportation form used for transportation over public roads may be used in lieu of the transportation form. This document needs to hold the name of the receiving party.
2. It is not allowed to open the package during transportation.
3. The transportation must be carried out without interruptions.
4. The means of transport may under no circumstances be left unattended.
5. In case of incidents or calamities during the transportation, the RPO/TMS or the on-call Radiation Protection Expert (RPE; Dutch: 'Stralingsbeschermingsdeskundige' or SBD) from the Radiation Protection Unit (Dutch:

'Stralingsbeschermingseenheid') must be notified immediately. The latter can be reached by calling the internal alarm number. This number can be found in the section Contact information.

AFTER THE INTERNAL TRANSPORTATION

1. At arrival, the radioactive compound is either transferred to a radiological area for use, or stored in a dedicated storage facility.
2. A copy of the transport form is handed over to the RPO/TMS of the receiving department, who will register the transport and the radioactive material received in their nuclear energy law files. If sender and receiver are the same RPO/TMS, one copy of the transport form may be sufficient.
3. After the transportation of radioactive substances in dispersible form, the means of transport is checked for contamination. Contaminations must be removed, unless physical decay is to be preferred (and possible) out of ALARA perspective. This decision can only be made after consulting with the RPO/TMS.

ROUTES OF TRANSPORT

The most suitable route for the transportation is determined in advance, in consultation with the RPO/TMS. It is to be preferred that this route is the shortest possible, at the same time avoiding places where many people group together.

CONTACT INFORMATION

In case of a calamity and/or incident, the RPO/TMS must be informed immediately. In case the RPO/TMS cannot be reached, call the internal alarm number and mention, next to location and number where the caller can be reached, that it concerns an incident involving radioactive substances. This will result in calling the on duty RPE of the Radiation Protection Unit.

Numbers to call in case of reporting an incident or calamity:

- in MUMC+ and Maastro: **1000**
- in UM: **1333**
- General security number: **043-3875566**

LIST OF ABBREVIATIONS

Dutch		English	
ALARA	As low as reasonably achievable	ALARA	As low as reasonably achievable
BV2	Beeldvorming 2	BV2	Nuclear Medicine
CDL	Centraal Diagnostisch Laboratorium	CDL	Central Diagnostic Laboratorium
DEC	Dierexperimentencommissie	DEC	Animal ethics committee
LIT	Lokale interne toestemming	LIT	Local internal permit
MUMC+	Maastricht Universitair Medisch Centrum +	MUMC+	Maastricht University Medical Center +
RNL	Radionuclidenlaboratoria	RNL	Radionuclides Laboratories
SBD	Stralingsbeschermingsdeskundige	RPE	Radiation Protection Expert
SIG	Schriftelijke interne goedkeuring	SIG	Written internal approval
SIT	Schriftelijke interne toestemming	SIT	Written internal permit
TMS	Toezichthoudend medewerker stralingsbescherming	RPO	Radiation Protection Officer
TMS-VRS D	Toezichthoudend medewerker stralingsbescherming – verspreidbare radioactieve stoffen niveau D	-	Radiation Protection Officer – dispersible radioactive substances at level D
UM	Universiteit Maastricht	-	Maastricht University
VEA1	Verpleegeenheid A1	-	Nursing unit A1

REFERENCES

- Complex license Randwyck including changes

Revision table	
Version 2 – April 2019	
Version 3 – September 2019	Appendix B added (transportation of sealed sources).
Version4 – August 2020	New format.
Version 5 – June 2022	Appendix C added.
Version 6 – July 2023	Changes in Appendix C. Colours added to Appendix A, B and C.
Version 7 – April 2024	General conditions 6 and 7 added.
Version 8 – June 2025	General conditions 6 expanded with samples for bacteriological analysis and sterility tests.

APPENDIX A: INTERNAL TRANSPORTATION DOCUMENT

DISPERSIBLE RADIOACTIVE SUBSTANCES

In case of emergency, contact: 1000 (MUMC+ / Maastro) | 1333 (UM) | 043-3875566

General:	
Date:	
Responsible investigator:	☐ N.A.
Transporter:	
Nr. Internal permit RNL (LIT) and/or DEC-protocol:	☐ N.A.
Data radioactive compound: ***(if applicable: add label of dose calibrator)***	
Nuclide:	
Chemical compound:	
Calibration date and time:	
Activity at calibration date and time:	
Transportation data DEPARTURE:	
Institute / department:	
Time:	
Product registered at department of departure (IBC or Isores): yes / no	
Transportation data ARRIVAL:	
Institute / department	
Conditions on departure:	
• receiving RPO/TMS is informed about the transportation; • delivery is within the limits of the SIT/LIT; • packaging is in good condition and is adequatly labeled; • packaging is free of radioactive contamination; • only internal transportation is allowed.	
Signature of responsible investigator/transporter:	
All conditions as stated above have been met, (Signature of responsible investigator/transporter)	

Original for RPO/TMS of receiving institution/department. Copy for RPO/TMS of institution/department of departure, for administrative use.

APPENDIX B: INTERNAL TRANSPORTATION DOCUMENT

SEALED SOURCES

In case of emergency, contact: **1000 (MUMC+ / Maastro) | 1333 (UM) | 043-3875566**

General:
Date of transportation:
Transporter:
Owner of the sealed source (department):
Data sealed source:
Nuclide:
Date of calibration:
Activity at calibration date:
Identification number of sealed source:
Transportation data:
Institute / department of departure:
Institute / department of arrival:
Conditions on departure:
• receiving RPO/TMS is informed of transportation; • sealed source is identifiable; • sealed source is transported in durable packaging; • sealed source is free of radioactive contamination (leakage test); • only internal transportation is allowed.
Signature of responsible investigator/transporter:
All conditions as stated above have been met,   (Signature of responsible investigator/transporter)

Original for RPO/TMS of receiving institution/department. Copy for RPO/TMS of institution/department of departure, for administrative use.

APPENDIX C: INTERNAL TRANSPORTATION DOCUMENT

RADIOACTIVE WASTE

Barcode label RNL:

In case of emergency, contact: 1000 (MUMC+ / Maastro) | 1333 (UM) | 043-3875566

SENDER		
Form filled out by:		
Origin radioactive waste: ☐ VEA1 | ☐ BV2 | ☐ CDL | ☐ RNL | ☐ Other:		
Receiving department: ☐ RNL | ☐ Other:		
Identification number waste container/jerrycan:		
Radionuclide(s):	Activity: [MBq]	At date:
Dose rate at surface: [µSv·h^{-1}]		
Properties: ☐ Solid | ☐ Liquid | ☐ Gas | ☐ Special waste		
Liquid class: ☐ Flammable | ☐ Toxic | ☐ Corrosive | ☐ N.A.		
Liquid waste categories ☐ Cat 1 (inorg. acids) ☐ Cat 4 (org. halogens)	☐ Cat 2 (inorg. bases) ☐ Cat 5 (special waste)	☐ Cat 3 (org. non-halogens) ☐ N.A.
Remarks:		

To be filled out by the employee radioactive waste management			
Gewicht: [kg]			
☐ Naaldcontainer klein ☐ Naaldcontainer groot	☐ Wiva vat 30 L ☐ Wiva vat 50 L	☐ Jerrycan 5 L ☐ Jerrycan 10 L	☐ Wasgoed

Conditions on departure:

- sending RPO/TMS is informed about the transportation;
- receiving RPO/TMS is informed about the transportation;
- packaging is in good condition, is adequately labelled and has a unique identification number;
- packaging is free of radioactive contamination;
- the dose rate is adequately low, if necessary with additional shielding;
- only internal transportation of radioactive waste is allowed.

Original for RPO/TMS of receiving institution/department. Copy for RPO/TMS of institution/department of departure, for administrative use.