Guidance for the Transport of Radioactive Material by Road

The transport of radioactive material between different premises, for example between different campuses or between the University and another research institute is subject to many complex legal requirements.

This guidance relates specifically to transport by road, which is subject to the Carriage of Dangerous Goods Regulations. This guidance also supplements the University's general arrangements for radiation protection established in accordance with the Ionising Radiations Regulations 1999.

In addition to requirements concerning the actual transportation the consignor of the material also has significant responsibilities unless the courier undertakes all packaging and documentation. The following guidance is therefore relevant to anyone consigning radioactive materials whether they are to be transported by a specialist courier or by themselves.

Movement, i.e. that within a campus or premises is not subject to these Road Transport Regulations although there are requirements under the Ionising Radiations Regulations 1999 that do apply (packaging, labelling, security).

It should be remembered that the controls on acquisition and disposal of radioactive materials under the Environmental Permitting Regulations licences issued by the Environment Agency also apply. It must be established at the outset that the recipient is licensed to hold and dispose of the isotope in the quantities concerned. The stock transferred must be recorded in the stock record of the donor.

It is a requirement of the Radioactive Material (Road Transport) Regulations that the Department for Transport and the Police must be informed in the event of a notifiable event such as loss, escape, theft of a radioactive source, or a radiological emergency i.e. a situation where urgent action is required to protect workers and/or the public. Other regulations also require notifications to the EA and HSE under certain circumstances. The Safety Office is responsible for making such notifications on behalf of the University and must be informed as soon as possible.

Preferred Routes of Transport

The transport of radioactive materials by road by a member of the University is a course of action that needs to be considered carefully and in effect it should be a choice of last resort. The preferred course of action to transfer radioactive material is through one of the courier services outlined in Appendix 1. These can be used for local or national delivery and have the necessary expertise, training and experience.

For local speedy transfer of small radioactive samples between QMC and the City hospital an ambulance service is available. Any one wishing to use this service will need to contact Malcolm Frier (QMC Medical Physics; internal ext. 44885) for more

details. There are no similar arrangements between other University sites, e.g. between QMC and Sutton Bonington.

Note that neither the Post Office nor Securicor accept radioactive packages.

Permitted Method of Transport

The radioactive material can only be transported by hire vehicle or your own car provided the insurance cover permits it - see section on insurance below.

It is illegal to take any radioactive materials on any form of public transport (including bus, train, taxi, aeroplane, boat).

Justification for own transportation of radioactive materials.
Relevant criteria for justifying the personal transport of radioactive samples are as follows:

- It contains a very short-lived isotope with a half-life measured in hours.
- It is a cell culture or a prepared compound that cannot survive for long at ambient temperatures.
- It is a special product urgently required for a trial or other genuine reason at another site.

Should it be decided that the material must be personally transported then there a number of criteria or limitations that must be complied with.

Activity Limits for Transport

There are considerable and complex regulatory requirements governing the transport of larger amounts of radioactive material. Consequently, unless specifically approved by the Safety Office, own transportation is restricted to those packages that meet the criteria specified for the lowest risk category under the Regulations, i.e. an "***Excepted Package***". [Safety Office approval for transport of higher categories is subject to detailed protocols and allocated responsibilities being in place to enable the more exacting requirements to be complied with.]

To be an **excepted package** the surface dose rate anywhere on the package must not exceed 5μSv/hr. Additionally, the activity being transported must not exceed limits defined in the Regulations.

For a list of limits for common isotopes see Appendix 2 below. If material in excess of these limits is to be transported, or if the material is uranium or fissile, or not in appendix 2 contact the Safety Office for advice.

The package must also comply with specific design criteria concerned with containment, physical protection and labelling. Appendix 3 (below) describes the packaging design criteria that must be applied for consigning and/or transporting any excepted package.

The package must be transported by a person who is aware of all the hazards, including the radioactive hazards that the material being transported possesses. This usually means the person involved in the production of, or use of the material.

Documentation Required

An excepted package requires a basic consignment note accompanying it during transport. Appendix 4 shows the type of consignment note required. The vehicle is not required to display any radiation warning placards providing the material meets the criteria for an **excepted package**. A fire extinguisher is **not** required providing no more than ten excepted packages are carried together at any one time. The excepted packages **must** always be locked away in the boot out of site. They must be securely restrained within the boot to prevent significant movement that might cause damage to the package or leakage from the primary container.

There is a requirement to keep records relating to contamination monitoring of consignments for 2 years. This should be achieved by combining a log of shipments with the contamination measurements and keeping a copy of the consignment note with this. An Excel form is available for this purpose, please contact the Safety Office, bb-safety-office@exmail.nottingham.ac.uk.

Quality Assurance

The regulations require quality assurance arrangements to ensure that the requirements of the regulations are met. These cover the design, manufacture, testing, documentation, carriage, use, maintenance and inspection of the packaging.

The Radiation Protection Supervisor, or other competent person(s) specified in the Local Rules for the area, must check each package to be consigned as an excepted package prior to it being sealed for conformity with the packaging specification described in Appendix 3. This is to be formally confirmed by Radiation Protection Supervisor or nominated person signing the label/consignment note contained in Appendix 4. A copy of this must be sent to the Safety Office for the purposes of auditing and compiling records for transport of radioactive materials.

Duties of the Driver

The driver of the vehicle, whilst transporting is required to:

- Exercise reasonable care to ensure that none of the material is lost, escapes, or stolen from the vehicle or from any package,
- Not, without reasonable cause, leave the vehicle unattended in a public place,
- Keep on the vehicle the transport documents relating to the package, and
- Ensure that the material is delivered to a person authorised to receive and secure it at the delivery address. A signed record of the delivery must be obtained from the recipient.

In the event of an incident, (i.e. loss, escape or theft of the material; or vehicle suffered serious damage following a collision, or involved in a fire) the driver is

required to notify the police and the consignor immediately. The consignor will be the University, or the establishment that produced the material if bringing it to the University from elsewhere. In any case, the driver should notify his/her line manager and the Safety Office immediately (Trent Security out of hours – 0115 951 3013).

Insurance cover

If you are using your own vehicle you must have at least basic business use cover. Insurers may vary in their willingness to include this type of risk hence it is essential that this be confirmed with them before undertaking the journey (note that there is a distinction between "irradiated nuclear fuel" and other radioactive materials). If you are involved in an accident whilst carrying radioactive material without having established that this activity is covered this could void any subsequent insurance claim you might make.

If you are using a car hired by or leased to the University, or a vehicle owned by the University, you must check with Procurement that the transportation will be covered by the University insurance policy.

Appendix 1

Courier services for Excepted Packages

Updated 29 November 2012.

Va Va Voom Active Ltd

Radioactive transport specialists for UK and Ireland ADR and non-ADR.

- Operations manager Barry Cosh (07875 567166),
- Email: vvvactive@hotmail.com,
- Tel: 01555 840 671 ,
- Fax: 0800 066 4012.

They have taken over Bacup Transport's business (who it is thought took over Strand before them). They have depots in Lanarkshire, Bolton and Meriden.

DSB Active

Offer a next day 09.00/12.00 UK wide delivery service for UN2910/UN2915/UN3332. They have EA permitted storage in transit facilities at Didcot/Berkswell/Bolton. DSB Active is part of DSB Deliveries.

Address:
DSB Active, Berryfield House, Berkswell Road, Meriden CV7 7LB

Contact: Simon Bishop

- Email: simon@dsb.co.uk
- Tel: 01676521126 Office
- Fax: 01676 523845
- Mobile:07702 113629 (Preferred)

Alternate for customer enquiries:
Ranjit Bans

- Email: ranjdsbacs@gmail.com
- Tel: 07541 204935

Appendix 2

Activity Limits for Exemption from the Regulations and for Transport as an Excepted Package – Isotopes in Common University Usage

Permission

Before transporting any amount of stock to another site it must be confirmed that the site receiving the stock is authorised to hold the isotope and the amount being sent to it. Consult the Site/Departmental RPS first.

Exemption

The Regulations specify a threshold activity beneath they do not apply. For a shipment to be exempt either the activity concentration must be less than that specified in column 2 of the table below, or the total activity in the consignment does not exceed the value specified in column 3.

Excepted Packages

Excepted packages are the most basic category of package specified by these Regulations and may be used for the lowest risk material. This term should not be confused with "exempt" and merely indicates that this category is excepted from some of the more stringent requirements. The bulk of university transport requirements will be covered by excepted packages.

It should be noted that the Regulations do not differentiate between radioactive sources and radioactive waste when it comes to excepted package quantities. As long as the waste fulfils the requirements for excepted packages it can be transported as such. [Note - consignment of radioactive waste for disposal by the authorised contractor is covered by specific arrangements and is therefore not included in this guidance.]

Activity Limits for Excepted Packages

As long as the packaging and documentation requirements are met in full, radioactive material in liquid or solid form with an activity not exceeding that given in columns 4 and 5 of the table below, and a surface dose rate not exceeding 5μSv/h, may be transported as an excepted package. There are different limits, usually higher, for special solid form radioactive materials, radioactive materials within instruments, and gases - consult the Safety Office for further advice.

When either of these criteria are exceeded then the material must be transported in a Type A package or an industrial package as appropriate. Contact the Safety Office for advice. Further information on the requirements for these more exacting package categories can be found in the AURPO Guidance Note 6 "Transport of Radioactive Materials by Road".

Table of Activity Limits for Exemption and for Transport as an Excepted Package.

	Exemption Limit		Limit for Excepted Packages	
ISOTOPE	**Activity Concentration**	**Limit for Consignment**	**ORDINARY SOLID FORM**	**LIQUID**
H-3	1 MBq/g	1 GBq	40GBq	4GBq
C-14	10 kBq/g	10 MBq	3GBq	300MBq
Na-22	10 Bq/g	1 MBq	500MBq	50MBq
Na-24	10 Bq/g	100 kBq	200MBq	20MBq
P-32	1 kBq/g	100 kBq	500MBq	50MBq
P-33	100 kBq/g	100 MBq	1GBq	100MBq
S-35	100 kBq/g	100 MBq	3GBq	300MBq
Cl-36	10 kBq/g	1 MBq	600MBq	60MBq
Ca-45	10 kBq/g	10 MBq	1GBq	100MBq
Cr-51	1 kBq/g	10 MBq	30GBq	3GBq
Fe-55	10 kBq/g	1 MBq	40GBq	4GBq
Fe-59	10 Bq/g	1 MBq	900MBq	90MBq
Co-57	100 Bq/g	1 MBq	10GBq	1GBq
Co-60	10 Bq/g	100 kBq	400MBq	40MBq
Tc-99m	100 Bq/g	10 MBq	4GBq	400MBq
In-111	100 Bq/g	1 MBq	3GBq	300MBq
I-125	1 kBq/g	1 MBq	3GBq	300MBq
I-131	100 Bq/g	1 MBq	700MBq	70MBq
Cs-137	10 Bq/g	10 kBq	600MBq	60MBq
Sm-153	100 Bq/g	1 MBq	600MBq	60MBq

N.B. The Safety Office must be consulted in respect of proposals to transport fissile material or all forms of thorium or uranium.

Appendix 3

Packaging Criteria for Excepted Packages.

When consigning radioactive material for transport as an excepted package, the packaging must comply with the following criteria.

a) When necessary, shielding should be provided to ensure that the dose rate at the surface of the excepted package does not exceed 5μSv/h.

For instruments or manufactured articles containing an excepted quantity of radioactive material the above dose rate limit does not apply, but the dose rate 10cm from any external point of any unpackaged instrument or article should not exceed 0.1mSv/h

b) Non-fixed contamination of the external surface of the excepted package shall not exceed:-

i. 4 Bq/cm^2 for beta, gamma and low toxicity alpha emitters, e.g. natural uranium and thorium;

ii. 0.4Bq/cm^2 for all other alpha emitters.

c) The package shall bear 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.

d) The package shall be so designed in relation to its mass, volume and shape that it can be easily and safely handled and retain its contents under conditions likely to be encountered in routine transport, eg taking into account acceleration, vibration and braking. The volume of absorbent material should be always at least twice that of a liquid sample (see figure 1 below).

e) As far as practicable, the packaging shall be so designed and finished that the external surfaces are free from protruding features and can be easily decontaminated.

f) As far as practicable, the outer layer of the package shall be so designed as to prevent the collection and retention of water.

g) Any features added to the package at the time of transport which are not part of the package shall not reduce its safety.

h) The materials of the packaging and any components or structures shall be physically and chemically compatible with each other and with the radioactive contents. If applicable account shall be taken of their behaviour under irradiation.

i) In addition to the radioactive properties, any other dangerous properties of the contents of the package, such as explosive, flammable, pyrophoric, toxic and corrosive, shall be taken into account in the packing.

j) If the gross weight of the package exceeds 50kg then the maximum weight shall be clearly marked on the package.

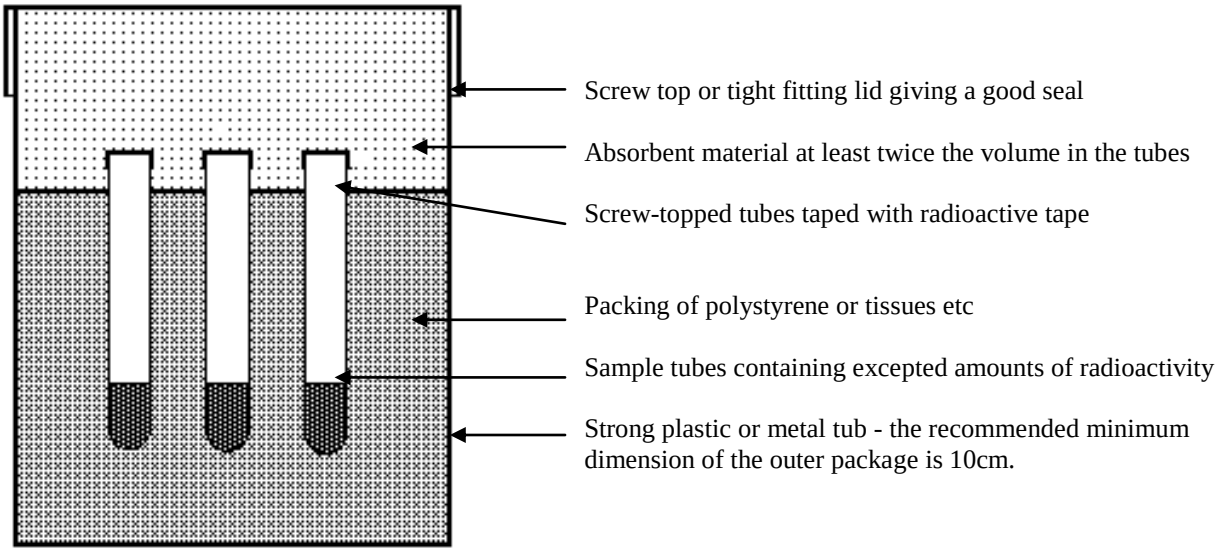
NB Additional labelling requirements might be required by the relevant Transport Regulations for Dangerous Goods, i.e. The Chemicals (Hazard Information and Packaging for Supply) Regulations.

Meeting the Packaging Requirements

Primary Container - The active material must be contained in an appropriate container to prevent spills and provide primary radiation shielding. An empty isotope stockpot that can be sealed in a similar manner to its original supply will be suitable. If this is not available then any sealable, preferably plastic, container will do. If glass containers are to be transported they should be stoppered and sealed within plastic bags. This is the primary container. Please note that the transport of pressurised samples is not permitted, if this cannot be avoided then contact the Safety Office on extension 13401 for advice

Outer Container - The screw top cans now used by Amersham are ideal for re-use, as are some of the moulded polystyrene blocks used by other manufacturers. NB if they are being sent to another establishment, then the original suppliers name should be obliterated. As an alternative, polythene/polypropylene bottles or jars with screw fittings or other tight-fitting lids might prove useful. An example of a suitable excepted package design is given in Figure 1 below.

FIG 1 Example of Excepted Package



Note that NO radioactive labels should be affixed to the outside of the outer container.

The outer container must be labelled with the UN Number, the identification of the consignor or recipient, or both, and its weight if greater than 50 kg.

Appendix 4

Excepted Packages - consignment documentation and labelling

All items and materials transported as excepted packages shall be described in the transport documents with the appropriate UN number and shipping name in accordance with the following four categories:-

- UN 2910 *Radioactive Material, Excepted Package - Limited Quantity of Material*
- UN 2908 *Radioactive Material, Excepted Package - Empty Packaging*
- UN 2909 *Radioactive Material, Excepted Package - articles manufactured from natural or depleted uranium or natural thorium*
- UN 2911 *Radioactive Material, Excepted Package - instruments and articles*

There should also be details of the consignor and consignee, the date of shipment and a signed declaration by the consignor (facsimile signature allowed).

In order to fully comply with the requirements of the transport regulations and the Ionising Radiation Regulations 1999, the following additional information should accompany an excepted package:

- a reference to the applicable transport regulations
- emergency contact details of consignor
- a description of the radioactive substance, e.g. the radionuclide, its activity on a specified date and its chemical and physical form;
- any additional information which would be required to enable the person opening it to do so safely.

The above will more than meet the requirements of the regulations and, as the UN number and either the consignee or consignor details must be displayed on the outside of the package, it is recommended that a label is made up as in figure 2 above for attachment to the outside of the package. Any additional information that might be required can be included in an accompanying letter or technical note that should be found immediately on opening the package.

There is no specific requirement for a record to be kept of shipments of excepted packages but there is a requirement to keep records for 2 years relating to measurements of contamination of consignments. Therefore in order to meet this requirement it would be prudent to make a log of shipments combined with contamination measurements. All that should be needed is a statement that contamination is less than the permitted level. This will also be satisfactory for a record of other shipments.

Figure 2: Transport Label and Consignment Note for Excepted Packages.

The Carriage of Dangerous Goods Regulations 2009
Consignment Note

UN 2910

RADIOACTIVE MATERIAL - EXCEPTED PACKAGE
- LIMITED QUANTITY OF MATERIAL

Date ……. Physical form ……

Isotope ……. Chemical form ……..

Activity ……

Dispatched by: University of Nottingham,

School of ……

Postcode …….

Contact: …….. Tel: ……

Deliver to ……..

……..

I hereby declare that the contents of this consignment are fully and accurately described above by the proper shipping name, and are classified, packed and labelled, and are in all respects in a proper condition for transport by road according to the applicable international and national governmental regulations.

Signed for the Consignor ……..…..
(Radiation Protection Supervisor)