1.0 Purpose

To ensure that all shipments of Sealed Source radioactive material are received and transported from the University in compliance with appropriate regulations and in a manner to minimize exposures to personnel and the environment.

2.0 Policy

All shipments of Sealed Source radioactive materials to and from The University of Manitoba shall be handled as detailed in this procedure to ensure compliance with the appropriate regulations and in a manner to ensure exposures to personnel and the environment ALARA.

3.0 Definitions

Consignor The shipper of the shipment

Consignee The recipient of the shipment

Devices Containing Sealed Sources Devices containing integrated sealed sources that are not normally removable. Examples are moisture density gauges, electron capture chromatographs, and X-ray fluorescence equipment.

EHSO: The University of Manitoba Environmental Health and Safety Office [added April 17, 2012]

Excepted package: Package can contain up to certain limited amount of radioactivity, specified by IAEA regulation. “Excepted” packages present a very low radiological risk and are not required to meet the same design and documentation requirements as other types of packages for radioactive materials transport.

IAEA: International Atomic Energy Agency [added April 17, 2012]

TDG: Transportation of Dangerous Goods [added April 17, 2012]
Sealed Source Radioactive Material (Sealed Sources)  Sealed sources are radioactive materials that are encapsulated or encased in such a way that they are extremely unlikely to be absorbed into the body and therefore present only an external radiation hazard. An example would be small calibration sources and Mossbauer spectroscopy sources.

Sealed Sources Requiring Leak Tests  Except for gaseous sources or sources of tritium, all sealed sources over 50 MBq and all devices containing sealed sources over 50 MBq must be leak tested.

Transportation of Dangerous Goods (TDG) Certification:  TDG certification of personnel is mandatory for anyone receiving or transporting radioactive materials (Dangerous goods Class 7). The certification automatically expires after 3 years and must be renewed.

Type A package:  Package can contain up to $10^4$ times the maximum amount of radioactivity permitted in an excepted package with 4Bq/cm² limit for surface contamination. These and other parameters are specified by IAEA regulation. Packages are specially designed to withstand typical accident conditions; prototypes have successfully passed prescribed tests to demonstrate physical integrity.

IDENTIFYING TYPE A RADIOACTIVE PACKAGES

**Category I – White**

Does not exceed 5 μSv/hr at any location on the external surface of the package.

**Category II-Yellow**

Does not exceed 500 μSv/hr at any location on the external surface of the package and the transport index does not exceed 1.

**Category III-Yellow**

Does not exceed 2 mSv/hr at any location
on the external surface and the transport index does not exceed 10.

The transport index for a package is the maximum radiation dose rate in microsieverts per hour at one metre from the external surface of the package, divided by 10.

**Accidental release:** Is defined as the accidental release of radioactive material resulting in following levels of radiation levels:

a) Greater than 2 mSv/hour on the external surface of a package
b) Greater than 0.1 mSv/hour at a distance of 1m from the package

### 4.0 Responsibilities

Personnel in each of the following roles have certain defined responsibilities. Each must participate in an appropriate radiation safety program in accordance with relevant Canadian Nuclear Safety Commission (CNSC) and Transport of Dangerous Goods (TDG) Regulations, which will include optimization of occupational and public radiation dose, management control of work practice, worker training and certification, and appropriate record keeping. Each has a legal duty to report lost, stolen damaged and leaking shipments of radioactive material when such events occur.

#### 4.1 Permit Holder responsibilities:

a) Ensure that all Sealed Source radioactive materials or Devices Containing Sealed Sources are received and transported by University personnel in accordance with this procedure. TDG training is provided by EHSO. Anyone who will consign or transport radioactive material including Moisture Density Gauges shall be have valid Transportation of Dangerous Goods Certification.

b) Ensure that all transporters receivers are trained as outlined in this procedure.

#### 4.2 Consigner (shipper) responsibilities - In the instance of transporting a nuclear gauge, often the Consignor (shipper), Consignee and Carrier roles pertain to the same person.

a) Act in accordance with CNSC and TDG regulations
b) Ensure that the intended recipient has CNSC licence authorizing the possession of the radioactive material being transported.
c) Advise the consignee that the radioactive material will be transported.

d) Ensure that the packaging material meets the CNSC requirements.

e) Fulfill any packing requirements.

f) Ensure that all package closures are correctly closed.

g) Ensure that any non-fixed radioactivity on the exterior surface of the package is

less than 4 Bq/cm² when averaged over any area of 300 cm² of any part of the

surface.

h) Correctly apply all necessary safety marks to the package.

i) Supply the carrier with necessary shipping documentation.

j) Provide a telephone number at which the shipper could be reached for information

regarding damaged or defective packages.

k) Retain a copy of shipping document for two years.

4.3 Carrier Responsibilities

a) Only accept radioactive consignments properly packaged with appropriate

documentation.

b) Radioactive materials are never loaded into a compartment reserved for

passengers.

c) Transport the material in accordance with the consignor’s instructions.

d) Transport the shipment in a safe and secure manner.

e) Properly display and comply with all required package safety marks.

f) Display “radioactive” vehicle placards when appropriate.

g) Ensure that all relevant shipping documents accompany the consignment.

h) Copies of shipping documents are passed to succeeding carriers or to consignee

taking delivery of the shipment.

i) If a consignment cannot be delivered to the consignee, notify the consignor,

consignee and the CNSC and place the consignment in a secure location until

it can be delivered to the consignor or consignee.

j) Retain a copy of the shipping document for two years.

4.4 Consignee (recipient) Responsibilities

a) Take appropriate reporting action when the radioactive package is discovered

to be lost or stolen during transit.

b) Upon receipt, first examine the transport documents and package labelling.

c) Before opening and while opening the package, visually examine it for

evidence of tampering, damage and/or leaking of contents.
5.0 Procedures

5.1 Transportation of Moisture Density Gauges – Excepted Packages

For Radioactive Materials: The person who prepares the shipping document (and signs it), transports (driver or some one in the vehicle) or unpacks the gauge after transport must be certified in Transportation of Dangerous Goods. Training is available from the Environmental Health & Safety Office.

If the package is excepted – this requirement does not apply. Excepted packages must be below certain activities and with doses on the surface of the packaging below 0.5μSv/hr. Check with EHSO on the excepted limits for your gauge.

Before transporting the device ensure the following conditions are met:

1. **On The Gauge:**
   a) A radioactive warning TDG label that is readily visible upon opening the storage box. (approved RSCtte, April 23, 2007)
   b) The name, address (Department and University of Manitoba) and phone number of the Permit Holder.
   c) Information on the radioisotope present, the activity and the date of activity.

2. **Inside The Transport Case:**
   a) Emergency procedures for Portable Gauges - CNSC (Supervisor’s contact information must be filled in!). (Replaced AECB)
   b) Add: “University of Manitoba Radiation Safety Officer, 204-789-3613
      i. After hours Emergency – 204 474-9341”
   c) A copy of the Internal Radioisotope Permit.

3. **On The Outside Of The Transport Case:**

   d) Take appropriate radiation safety measures (see below) when a radioactive package that has been delivered shows evidence of tampering, damage or loss of containment.
   e) Effective November 30, 2012 – retain a copy of the shipment document for eight years (was: two years) (Approved by RPCtte November 8, 2012).
Radiation Safety Manual

Title: Receiving/Transporting – Sealed Source

Number: RSP-513

| Issued by: | Environmental Health and Safety |
| Approved by: | Radiation Protection Committee |
| Date Issued: | April 22, 2005 |
| Date Approved: | May 5, 2005 |
| Date Last Revised: | October 10, 2012 |
| Date Approved: | November 8, 2012 |

a) UN 2911 label (approved RSCttee, April 23, 2007)
b) Permit holder contact information (approved RSCttee, April 23, 2007) and a 24 hours emergency contact information
c) NO LABELS that indicate Radiation or Radioactive Material.

4. In The Shipping Vehicle:

a) A completed shipping document – Must indicate proper shipping name: Radioactive Material, excepted package, instrument. UN2911
b) A reference to the Special Form Certificate.

5. Other Requirements:

a) Transport gauges as far from the passengers as possible, preferably outside the passenger compartment. Excepted gauges may be transported in the passenger compartment of a van.

b) Store gauges at least 2 meters from humans.

c) Keep the gauge secure at all times – either locked or attended by a person on the University of Manitoba Internal Radioisotope Permit.

d) The gauge must be in the care and custody and only used by a person on the University of Manitoba Internal Radioisotope Permit.

5.2. Preparing radioactive packages of sealed sources for shipment (other than Moisture Density Gauges) [Section 5.2 added Nov 15, 2011]

*Only a TDG certified personnel can prepare for shipment and/or ship Type A packages. This section will apply for Excepted packages only.*

5.2.1. Shipping Documents for Excepted Packages
1. Electronic Waybills should bear only the appropriate 6-character alphanumeric \textit{United Nations (UN) code} (below), or

2. Paper shipping documents should bear the appropriate UN code number, as well as text bearing the words \textit{"Radioactive Material – Excepted Package"}.

\begin{center}
\begin{tabular}{ll}
\textbf{UN 2908} & \textbf{Empty Packaging} \\
\textbf{UN 2909} & \textbf{Articles manufactured from depleted uranium, natural thorium or natural uranium} \\
\textbf{UN 2910} & \textbf{Limited Quantity of Material} \\
\textbf{UN 2911} & \textbf{Articles or Instruments} \\
\textbf{UN 2912} & \textbf{Low Specific Activity} \\
\textbf{UN 2913} & \textbf{Surface contaminated Objects}
\end{tabular}
\end{center}

3. No other special documentation is required.

\begin{itemize}
\item Note: The majority of “Excepted Packages” shipped from the University will fit into the UN 2910 category.
\item Note 2: If the dose rate is too high to be shipped as ‘excepted’, you must be certified to ship (not just receive) Class 7. The package limits are 10 times the number in table 1).
\end{itemize}
Table 1. Radioactivity Limits for Excepted Packages

<table>
<thead>
<tr>
<th>Radionuclides</th>
<th>IAEA ST-1 Revised (2005)</th>
<th>CNSC Amended PTNSR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Activity Limit (GBq)</td>
<td>Excepted Package – SOLID not Special Form</td>
</tr>
<tr>
<td>Americium-241</td>
<td>0.001</td>
<td></td>
</tr>
<tr>
<td>Calcium-45</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Carbon-14</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Cesium-137</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Chromium-51</td>
<td>30</td>
<td></td>
</tr>
<tr>
<td>Cobalt-57</td>
<td>10</td>
<td></td>
</tr>
<tr>
<td>Fluorine-18</td>
<td>0.6</td>
<td></td>
</tr>
<tr>
<td>Germanium-68</td>
<td>0.05</td>
<td></td>
</tr>
<tr>
<td>Hydrogen-3 (Tritium)</td>
<td>40</td>
<td></td>
</tr>
<tr>
<td>Iodine-125</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Iodine-131</td>
<td>0.7</td>
<td></td>
</tr>
<tr>
<td>Phosphorus-32</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Phosphorus-33</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>Sodium-22</td>
<td>0.5</td>
<td></td>
</tr>
<tr>
<td>Sulphur-35</td>
<td>3</td>
<td></td>
</tr>
<tr>
<td>Technetium-99m</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>
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Example of Shipping Document

**Consignor:** (shipper’s name and address)  
**Consignee:** (recipient’s name and address)

**Carrier:**  
Shipping document#: (any number helping to track the shipment)

<table>
<thead>
<tr>
<th>Number of packages</th>
<th>Description of Articles</th>
<th>Weight or Volume of Package</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RADIOACTIVE MATERIAL - Excepted Package, limited quantity of material, UN 2910</td>
<td>kg</td>
</tr>
</tbody>
</table>

*Preferable, but not required:*

Isotope, activity in GBq, physical form

Special Handling: No special handling required.

24 hour Emergency Response Telephone Numbers: (204) 474 9341

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

**Name:**  
**Signature:**  
**Phone #**  
**Date:**
6.0 Documentation Requirements

A copy of the shipping documents, the Type A Packaging documentation (if applicable), the Special Form certificate (if applicable) and a log indicating the transportation and return of the gauge or source must be kept in the Radiation Safety Records binder in the room where the devices/source are (were) stored. Records for the last eight years shall be kept in this binder. [underlined added April 17, 2012]

7.0 Accidents and Emergencies

Accidents and emergencies with the Gauge shall be handled in accordance with AECB CNSC INFO-0483rev/42 (Copies available from EHSO, for reference see RSP-014). [underlined added April 17, 2012]

ALL accidental releases or incidents with shipping radioactive materials shall be reported to the Radiation Safety Officer immediately. [underlined added April 17, 2012]