Transportation of Nuclear Substances: Receiving (Class 7)

Refresher Training
Refresher Training Instructions

The following Class 7 Receiving Refresher training, also referred to as TDG training, is intended for nuclear substance workers who have previously attended the full day Radiation Safety training workshop.

This module is not intended to substitute for the full training session.

TDG refresher training is required every three years to maintain a valid status that allows you to receive packages containing nuclear substances.

TDG refresher training will be documented by reviewing this power point and submitting the associated quiz to the Environmental Health & Safety Office.
Course Outline

This refresher course will review the following topics:

• Nuclear Substance Regulators
• Responsibilities
• Basic Radiation Safety Principles
• Package Types
• Shipping & Receiving Requirements
• Steps to Safely Receive a Package Containing Nuclear Substances
• Measuring Contamination
• Additional Requirements
Nuclear Substance Regulators
Canadian Nuclear Safety Commission

The **Canadian Nuclear Safety Commission** (CNSC) is the governing body for nuclear substances in Canada. The **Nuclear Safety and Control Act** provides the CNSC with the authority to regulate the production and use of nuclear energy and materials to protect the environment, health, and safety of Canadians. The CNSC ensures that Canada is contributing to the international commitment of peacefully using nuclear energy.

The CNSC is responsible for communicating regulations and requirements to licensees, inspecting licensees for compliance, and intervening in the event of non-compliance.
Responsibilities
Principal Investigators

It is the responsibility of the Principal Investigator to ensure that all workers in their research group who will be handling nuclear substances are registered with the Radiation Safety Officer (RSO) and have completed required Radiation Safety Training.

This would include not only full time staff but also summer students, honors students, visiting scientists, etc.

Only individuals directly working with radioisotopes are required to complete and maintain Radiation Safety Training.
Radiation Safety Committee

The **Radiation Safety Committee** (RSC) acts as a resource body for Dalhousie University and is comprised of individuals from various departments across the different campuses. The committee helps develop policies and procedures for the safe use of nuclear substances and advises personnel on radiation safety requirements relating to research. The following positions are included as members of the committee:

- Chair
- RSO
- Applicant Authority
- Radiation Safety Technician
- Principle Investigators
- Building Managers
- Lab Managers
Basic Radiation Safety Principles
ALARA

The basic radiation safety principle is **ALARA**. ALARA stands for **A**s **L**ow **A**s **R**easonably **A**chievable. This is in place to minimize exposure.

ALARA is achieved by:

- **Time**
  *Minimize the time spend in the presence of radioactive materials*

- **Distance**
  *Maintain as much distance as feasibly possible (i.e. arms length)*

- **Shielding**
  *Use appropriate shielding to block radiation dose*
Package Types
Class 7 Package Types

Type A Package
There are three categories:

- Category I – White
- Category II – Yellow
- Category III – Yellow
Class 7 Type A Package Categories

**Category I – White**
The radiation level at the package surface is less than or equal to 5µSv/h and the transport index is 0.

**Category II – Yellow**
The radiation level does not exceed 500 µSv/h at any location on the external surface of the package and the transport index does not exceed 1.

**Category III – Yellow**
The radiation level does not exceed 2 mSv/h at any location on the external surface of the package and the transport index does not exceed 10.
Class 7 Package Types

**Excepted Package**

There is no external labeling required on the exterior of the package.

The safety mark “RADIOACITVE” must be visible upon opening the package.

The radiation level at any point on the external surface of the package must not exceed 5µSv/h
Transport Index (TI)

The transport index is the maximum radiation level in microsieverts ($\mu$Sv) per hour at one metre from the external surface of the package, divided by 10.

1 $\mu$Sv/h at 1 metre equals a TI = 0.1
Shipping & Receiving Requirements
Shipping Requirements

Shippers are required to provide the following for each Class 7 package:
• Correct Label, including
  • Radiation Warning Symbol
  • Shipping Address
• Packing Documents
• Approved Shipping Container
• Isotope & Activity Limits
• Correct TDG Package Type
  • UN & Excepted or Type A pkg

You must verify these requirements before signing and accepting a package.
Receiving Requirements

Receivers are required to follow the regulations for all Class 7 shipments under Section 40.(1) – “Packaging and Transport of Nuclear Substances Regulations”.

No person, other than the consignor or the consignee of the package, shall open the package unless:

• Measures are taken to prevent persons from receiving doses higher than the radiation dose limits prescribed by the Radiation Protection Regulations

• The package is opened in the presence of an expert in radiation protection (someone authorized and trained to open the package)
Receiving Requirements

For additional information on receiving procedures or if you require clarification during the receiving procedure please refer to the CNSC poster “Guidelines for Handling Packages Containing Nuclear Substances”.

In every lab that receives shipments this poster should be posted in the area where nuclear substance packages are received.
Receiving Requirements

Procedures must be in place to ensure that all nuclear substance packages are:

- Delivered to the laboratory without delay
- Stored securely (locked up) until checked for contamination
- Received (opened) only by authorized personnel
- Properly secured and stored after receiving
Steps to Safely Receive a Package Containing Nuclear Substances
Before Signing for a Shipment

1. **Check the name or address on the package.**
   - If it is not correct, do not accept the package.
   - Once accepted the package becomes the responsibility of the signee (YOU), and ultimately Dalhousie.
   - Dalhousie has a defined list of isotopes and quantities we are permitted to have. Accepting a package that you are not expecting or are uncertain of the contents could incur an Order from the CNSC.

2. **Check the package for leaks or damage.**
   - If it is damaged or leaking do NOT sign or accept the package.

The RSO must be notified in any of these situations.
Upon Signing for a Shipment

1. Once signed for, transport the package directly to the laboratory.
   • Packages should be handled with care, preferably by cart or dolly to the lab.
2. Once in the lab, place in a secure location.
3. If you notice damage after the courier has left:
   • Do not touch the package
   • Wash your hands if you have already handled it
   • Keep your distance
   • Contact the RSO immediately
Receiving Shipments in the Lab

If a department receiver accepts the package for you then once you are in the lab you must:

- Check for damage
- The package should be visually inspected for damage or leakage by a certified worker, upon arrival in the lab, if delivered by a courier or receiving staff
- If the package looks damaged, tampered with, or is leaking, STOP all receiving and implement emergency procedures
- Notify the RSO
Prior to Opening the Package

1. Wear the appropriate Personal Protective Equipment (PPE) for working with nuclear substances. PPE required for receiving will include:
   • Buttoned Lab Coat
   • Gloves
   • Close-toed shoes
   • Long pants PPE that may be required include:
     • Dosimetry (TLD) badge
     • Ring badge (worn under the glove)
     • Safety Glasses
Prior to Opening the Package

2. Place the shipment in a designated radiation area that is appropriate for opening the package safely, such as:
   - A fume hood is the best option, especially if the material is volatile
   - With appropriate shielding between you and the package

3. Prepare in advance materials to conduct your wipe test, including:
   - Appropriate number of counting vials, pre-numbered to avoid “mix-ups”
     - The minimum number of wipe tests required is 6
   - Filter paper
   - Q-tips
   - Tongs
   - Alcohol or water
Prior to Opening the Package

4. Verify Package Dose Rate (If possible/applicable)

• If a survey meter (Ludlum 44-38) is available, monitor the dose rate at the surface and at one meter around the package, record on the receipt inventory sheet

• Contamination meters (Ludlum 44-9/Pancake) cannot be used to monitor dose rates
5. **Verify the Contents**

- There should be a packing slip and MSDS/information sheet directly inside the top of the package.
- Verify the nuclear substance, quantity and other details with the information on the packing slip with the purchase order.
Checking the Package for Contamination

6. Perform Wipe Test

Wipe Test #1
• Wipe the exterior surfaces of the box

Wipe test #2
• Wipe the container packing material
Checking the Package for Contamination

6. Perform Wipe Test

Wipe Test #3
- Wipe the exterior surfaces of the pig

Wipe test #4
- Wipe the exterior surfaces of the primary container (vial)

Note: If the material received is “highly” radioactive use tongs to handle the vial
Checking the Package for Contamination

6. Perform Wipe Test

Wipe test #5
• Wipe the interior surfaces of the pig

Wipe test #6
• Clean control wipe, commonly known as a background wipe.
• Monitor your hands (if feasible for the isotope) and remove gloves used to open the package before continuing on to next step.
Proper Glove Removal

With both hands gloved, peel one glove off from top to bottom and hold it in the gloved hand. With the exposed hand, peel the second glove off from the inside, tucking the first glove inside the second.
Proper Glove Removal

Dispose of the gloves promptly. Never touch the outside of the glove with bare skin.

Wash your hands as soon as possible.
Transporting Samples for Counting

If you must transport your samples to another location for counting ensure that you do not leave the laboratory wearing gloves.

Remember to take the service elevator or stairs.
Measuring Contamination
Measuring Contamination

Ensure that your liquid scintillation or gamma counter are on the appropriate settings to count your wipes.

Depending on your isotope there are different contamination limits. Most of the isotopes at Dalhousie are Class B and C.

*If in doubt use Class B contamination criteria.*

<table>
<thead>
<tr>
<th>Class</th>
<th>Control Area Limit</th>
<th>Public Area/Decommissioning Limit</th>
<th>Dalhousie Limit</th>
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<tbody>
<tr>
<td>A</td>
<td>3 Bq/cm²</td>
<td>0.3 Bq/cm²</td>
<td>0.3 Bq/cm²</td>
</tr>
<tr>
<td>B</td>
<td>30 Bq/cm²</td>
<td>3 Bq/cm²</td>
<td>3 Bq/cm²</td>
</tr>
<tr>
<td>C</td>
<td>300 Bq/cm²</td>
<td>30 Bq/cm²</td>
<td>30 Bq/cm²</td>
</tr>
</tbody>
</table>
Scintillation Vials

Used vials containing the wipe test samples must be placed in an appropriate storage container to await waste disposal through the Hazardous Waste Disposal Program.

These do not go in with RAD waste.
Packing Materials Free of Contamination

If your wipe tests on the packing materials are negative you may dispose of these material. But **FIRST** you must deface or remove any reference to “radioactive” material.

Stickers should be removed and ripped up so that the trefoil and word “Radioactive” are not distinguishable.

Stamps and other non-removal signs should be blacked out with permanent marker.
Additional Requirements
The current Dalhousie requirement is that you keep a log of shipment receipt for all nuclear substance package receipt.

Each lab must also keep an accurate inventory of the quantity of nuclear substance material contained within the lab. This must be entered into the EHS Assistant online database. This can be found at www.dal.ca/safety.

In addition to the EHS Assistant database a lab may keep a paper copy but this is not required.
Emergency and Reportable Events

Notify the RSO if any of the following receiving requirements are not met:

- Incorrect address or delivery (if the package was already received)
- Incorrect labels or transport index
- Radiation levels in excess of labeling or >2mSv/hr at surface
- Package damage, leaking or evidence of tampering
- Wipe test reading above licence criteria 3Bq/cm² for most isotopes
- Lost shipments
- A duplicate order arrives after you have received your product
- The shipper tape appears to have been replaced with different tape on a Class 7 Package
The Quiz

In order to receive a TDG Class 7 certificate you must complete the TDG refresher quiz, found on the DAL EHS website.

Completed quizzes are to be submitted via email to jrobertson@dal.ca, or through interdepartmental mail to the Environmental Health & Safety Office at 1435 Seymour St. Halifax, NS.

If you have any questions regarding this refresher presentation or the accompanying quiz, please contact the RSO.