



Regulating the Packaging and Transport of Nuclear Substances in Canada

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Canada is one of the major producers of nuclear substances (radioactive material) in the world and has an excellent safety record for the transport of radioactive material. More than a million packages containing radioactive material are transported safely in Canada each year. The responsibility for ensuring safe transport of nuclear substances is jointly shared between the Canadian Nuclear Safety Commission (CNSC) and Transport Canada.

Transport Canada's *Transportation of Dangerous Goods (TDG) Regulations* deal with the transport of all classes of dangerous goods, while the CNSC's *Packaging and Transport of Nuclear Substances (PTNS) Regulations* are primarily concerned with health, safety and security of the public, and protection of the environment related to the special characteristics of radioactive material. Both the TDG and PTNS Regulations apply to all persons who handle, offer for transport, transport or receive nuclear substances.

Regulating the packaging and transport of nuclear substances

All industrialized countries use the International Atomic Energy Agency (IAEA) TS-R-1, *Regulations for the Safe Transport of Radioactive Material* as the basis to regulate the packaging and transport of radioactive material. Through the PTNS Regulations, the CNSC regulates all aspects of the packaging of radioactive material, including the design, production, use, inspection, maintenance and repair of packages. The CNSC also regulates all phases of transport from the preparation of packages for shipment until unloading at the final destination.

There are exemptions currently in place under the PTNS Regulations, which include persons who have undergone medical treatments, certain consumer products once sold to consumers (e.g. smoke detectors), and radioactive material that is a component of a transport vehicle (such as depleted uranium counterweights used in aircrafts).

Quick facts

- There are approximately 150 transport package certificates issued in Canada, with about 50 certificates added or renewed on a yearly basis.
- Every organization involved in the transport of radioactive material must:
 - have an emergency plan in place
 - maintain a radiation protection program
 - train their workers
 - report to the CNSC any incident involving radioactive materials
 - maintain records for 2 years after the transport takes place.
- Canadian police agencies have considerable training in dealing with nuclear shipments.
- The CNSC will not issue a licence or package certification unless it is convinced that the shipment will be completed safely, without posing risks to the health, safety or security of Canadians or the environment.



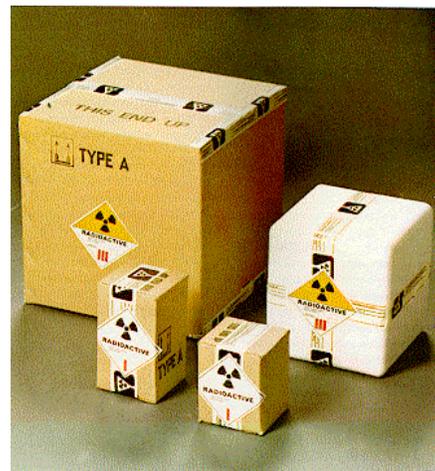
Safety of Transport Package Design

The basic philosophy that has guided the development of the CNSC Regulations is that safety relies heavily on the design of the transport package. Package designs are combined with additional regulatory controls including labeling, placarding, quality assurance and maintenance records, and allow for radioactive material to be carried safely in all modes of transport such as road, rail, air and sea transportation.

All nuclear substances are transported in packages that are selected based on the nature, form and quantity or activity of the substance. There are general design requirements that apply to all package types to ensure that they can be handled safely and easily, secured properly, and are able to withstand routine conditions of transport.

Non-Certified Packages

Packages designed for the transport of low risk levels of radioactive material do not require certification by the CNSC due to their low level of risk. These packages carry quantities that will have little or no impact on the health and safety of Canadians. The responsibility for meeting the regulations rests with the consignor, who must be able to provide written demonstration that the package meets the regulatory performance standards. Substances transported in these types of packages can include surface contaminated objects, portable gauges, returned empty packages, and radioactive medical isotopes.



Examples of non-certified packages

Certified Packages

Packages designed for the transport of high risk levels of radioactive material require certification by the CNSC before they can be used in Canada. Persons must register their use of the package with the CNSC and acknowledge that they have the necessary training to properly prepare it for shipment. These packages are required to undergo stringent testing since improper handling of their contents can give rise to severe consequences. Testing must simulate both normal and hypothetical conditions of transport and can include free-drop testing, puncture testing, thermal testing, and simulated aircraft accidents. These packages are designed to transport material such as Cobalt-60, sources used for industrial radiography, used nuclear fuel, and enriched uranium.



Example of a certified package

Certification Process for Transport Packages

For packages that require certification, CNSC specialists carry out the technical review of the information and test results submitted by the applicant, to ensure that the package design meets all regulatory requirements. The regulations require that a demonstration of compliance be done by conducting actual tests on prototypes or scale test models, by engineering calculations and reasoned arguments using national or international industry standards, or through reference to similar, previously certified designs.

An application for package certification typically contains information on:

- structural design
- thermal and shielding evaluation
- containment of the nuclear substance in the package
- the operation of the package
- the maintenance program
- the quality assurance program followed for the design, the manufacture and maintenance of the package

For packages approved in other countries, a Canadian re-validation is required prior to their use in Canada. This process ensures that the package design meets all of the requirements of the Canadian regulations.

The PTNS Regulations are based on the IAEA Regulations which provide standards for ensuring a high level of safety of people, property and the environment against radiation and other hazards associated with the transport of nuclear substances. The approval requirements are relative to the hazards posed by the nuclear substance being transported. The design requirements for packages requiring CNSC approval ensure that in the event of a severe accident, there is a very low level of probability of significant radioactive release.

Based on the recommendations of CNSC specialists, certificates are issued by the Commission Tribunal or by Designated Officers who have been designated by the Commission Tribunal.

Licensing requirements for the packaging and transport of nuclear substances

Transport activities are generally exempt from licensing by the CNSC, provided the package meets regulatory requirements. However, under the regulations, there are three specific circumstances for which a transport licence is required:

- transits of high risk levels of nuclear substances where there is no Canadian licensee involved in the shipment either at origin or destination
- special arrangement shipments where there are measures in place to ensure the safety of the shipment (e.g. material that is not able to be placed in a regulated package type)
- transport of plutonium and enriched uranium above the quantities specified in the *Nuclear Security Regulations*. In order to transport these shipments, a transportation security plan must be in place and approved by the CNSC. The primary purpose of this plan is to assure that the nuclear material to be transported will receive adequate physical protection against any threats that may arise during its transport

There are approximately 150 transport licences issued every year in Canada. Most of these licences are issued for specific shipments, and are only valid for a limited period of time (three months on average). Transport licences can be issued either by the Commission Tribunal or by Designated Officers who have been designated by the Commission Tribunal.

Preparing Packages for Transport

In preparing a package for shipment, the consignor is responsible for ensuring that the package meets all of the requirements specified in the regulations.

Packages are to be categorized and labeled based on the radiation level at both the surface and at one metre from the package (this is referred to as the Transport Index (TI)). The TI is used to limit the number of packages onboard a transport vehicle and to segregate packages from persons or other goods.

The consignor is also responsible for preparing the transport document, which contains a description of the package being transported, the shipping name of the dangerous good, the United Nations number, the form of the material, the isotope, the maximum activity, the category of package, the transport index and the applicable identification mark for each approval certificate.

Did you know?

A transportation security plan requires:

- a full description of the nuclear material
- a threat assessment to identify any credible threats
- a description of the type of vehicle used to transport
- the proposed security measures in place during transport, such as continuous tracking and type of escort
- the communications arrangement between the carrier and the response force (ex: Canadian police agencies)
- the communication arrangement between the licensee and the response force
- the primary and alternate transportation routes.

The person receiving a shipment of radioactive material is usually a CNSC licensee. In accordance with the PTNS Regulations, that person must verify that the package is not damaged and has not been tampered with.

Emergency preparedness

Under the PTNS and the TDG Regulations, the shipper must have measures in place to respond in the event of an emergency involving the transport of their radioactive material. In addition, the TDG Regulations require the shipper to display a 24-hour emergency telephone number on the shipping document that accompanies a shipment of dangerous goods. The purpose of these requirements is to ensure that appropriate technical assistance is immediately available to initial emergency responders.

The PTNS Regulations require that all incidents be immediately reported to the CNSC. Once notified of a transport incident involving radioactive material, CNSC transport staff will follow up to provide appropriate technical information and advice to responders on site. CNSC staff can be deployed immediately, if needed, to assist in managing the incident.

Compliance with CNSC Regulations

CNSC inspectors do regular compliance verifications to ensure that licensees and carriers comply with the PTNS Regulations. They verify proof of training for transport workers, review transport documents and inspect packages to ensure they are prepared for transport in accordance with regulations. If a licensee or carrier is found to be non-compliant with these regulations, the CNSC uses a graded enforcement approach for the implementation of corrective measures. The CNSC remains committed to ensuring the health, safety and security of the environment and the Canadian public.

Did you know?

- Current regulations don't allow the public disclosure of security information on the location, routes and timing of shipments, nor any security arrangements or procedures specific to the transport of certain types of packages. This type of information is considered prescribed, and is limited to persons who have a legitimate need to know, such as police response forces.

For more information:

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Canadian Nuclear Safety Commission