

## PATRAM 2013

### **Revision of the Canadian Nuclear Safety Commission's *Packaging and Transport of Nuclear Substances Regulations***

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#### **Abstract**

The Canadian Nuclear Safety Commission (CNSC) is currently in the process of revising its *Packaging and Transport of Nuclear Substances Regulations* to incorporate the 2012 Edition of the IAEA's *Regulations for the Safe Transport of Radioactive Material*.

In addition, other changes are being considered to address issues that have been identified since the *Packaging and Transport of Nuclear Substances Regulations* were last revised in 2004. These include proposed regulatory provisions relating to: radiation portal monitor alarms triggered by loads being monitored and found to contain a source of radiation which may or may not be subjected to the application of the regulations; the transport of large components; the requirements related to radiation protection programs of carriers; and event reporting.

This paper explains the rationale behind those changes and outlines the work accomplished so far on the development of the revised PTNSR regulations.

#### **Introduction**

In Canada, the responsibility for regulating the transport of nuclear substances is shared between the Canadian Nuclear Safety Commission (CNSC), which looks after nuclear safety including during transport, and Transport Canada, which looks after transport safety of all dangerous goods including radioactive material.

To avoid duplication and overlap of responsibilities, the CNSC and Transport Canada have signed an administrative agreement which specifies the respective roles and responsibilities of each organization in every aspect of radioactive material transport. For example, for matters related to radiation safety the CNSC has the lead role and the regulatory requirements are outlined in the *Packaging and Transport of Nuclear Substances Regulations (PTNSR)*<sup>[1]</sup>. Conversely, in matters where Transport Canada has the lead role, such as for safety marks, documentation and training, the CNSC's PTNSR make reference to Transport Canada's *Transportation of Dangerous Goods Regulations (TDGR)*<sup>[2]</sup>.

Currently, the PTNSR incorporates the requirements of the IAEA's *Regulations for the Safe Transport of Radioactive Material, TS-R-1, 1996 Edition (Revised)*<sup>[3]</sup> (referred to as the *IAEA Regulations*). The PTNSR also include deviations from the *IAEA Regulations* to account for specific Canadian requirements such as the transport of high grade uranium

ore as well as to account for the major changes that were included in the 2003 Amended version of the *IAEA Regulations*.

In 2011, as part of a follow-up to the 2009 International Regulatory Review Service (IRRS) Mission to Canada, a review of the Canadian transport program was requested. The Mission concluded that overall the transport program adequately covered the nuclear activities conducted in Canada and recommended that the PTNSR be revised to refer to the latest Edition of the *IAEA Regulations*.

### **Amendment Process**

Shortly after the IRRS mission in 2011, the CNSC undertook a complete review of its PTNSR, looking at issues that were raised since the update to include the 1996 Edition (Revised) of the *IAEA Regulations* as well as updating the reference to the *IAEA Regulations* to refer to the latest published Edition. In addition, the CNSC decided to investigate the possibility of modifying how the PTNSR were incorporating the requirements of the *IAEA Regulations* in an effort to reduce the work associated with the review and revision of the PTNSR.

As part of the regulations making process, a Discussion Paper<sup>[4]</sup> was prepared and posted on the CNSC Web site in August 2012 for public comments. A total of 134 comments were received during the comment period. Many of the comments were related to the approach proposed for introducing new requirements related to radiation protection and event reporting. The revised PTNSR are currently being drafted and are taking these comments into account. It is expected that the revised PTNSR will be posted for comments in the Canada Gazette Part I in early 2014 and published in the Canada Gazette Part II as new regulations by the end of 2014.

The following sections outline the major changes to the revised PTNSR being proposed and reflect the changes in the approach based on the comments received.

### **Issues Identified since the inclusion of the 1996 Edition (Revised) of the *IAEA Regulations***

#### *1. Unidentified Loads*

Radiation detection equipment, such as radiation portal monitors are being installed around the country at metal recycling facilities, ports of entry, waste transfer stations, landfill sites and other locations. These radiation portal monitors are used to scan all vehicles coming to a site and are able to detect radiation near background levels.

When an alarm is triggered, the load of material is often rejected by the receiving site and may need to be transported elsewhere to be properly characterized and handled. As the nature and quantity of radioactive material causing the alarm is not known, compliance with the applicable transport regulations is difficult since the applicable requirements, if any, cannot be determined without knowing the radioactive content of the load. To

determine this information, it is often necessary to transport the load of material to another location that has suitable instrumentation and facilities to do a proper characterization of the content. The CNSC has allowed such movement to take place on a case-by-case basis by issuing a temporary permission (a form of *administrative forbearance*) in consideration to health, safety and protection of the environment. However, adequate regulatory provisions are needed in the PTNSR to formalize this practice under proper regulatory setting.

From the information collected by the CNSC over the years regarding these events, the majority of the alarms are being caused by medical isotopes or naturally occurring radioactive materials. Items such as discarded smoke detectors and other radiation devices containing a very small amount of nuclear substances were also found to cause alarms. Quite often, once the amount of radioactive material is determined, it is found to be below the regulatory limits defined in the PTNSR and therefore exempt from the application of the regulations.

Given the experience gained in dealing with radiation portal alarms across Canada, it is proposed that the PTNSR include two exemptions for materials that trigger a radiation portal monitor, provided certain conditions are met. The exemptions from the PTNSR are intended only to apply to loads which are not known to be radioactive and which are already in transport.

First, there would be a general exemption from the application of the PTNSR if it can be determined that the material triggering the alarm is one of the following short-lived isotopes: Cr-51, In-111, I-123, I-124, I-131, Ga-67, Tc-99m, Tl-201 and F-18 that are used in medicine. In these cases, the load would be allowed to be moved without notifying the CNSC.

The second exemption proposed will be based on the maximum external dose rate measured for the load of material up to a maximum of 500 $\mu$ Sv/h; no exemption would be provided for cases where the dose rate is above 500  $\mu$ Sv/h. It is recognized that the external dose rates may not fully correlate to the radiological hazard of the unidentified material; nonetheless it provides useful information to evaluate the level of risk in the absence of any other readily available measure.

It is proposed to have three different categories for these exemptions based on the dose rate. If the maximum dose rate is 5  $\mu$ Sv/h or less, movement of the load would be allowed without prior notification to the CNSC, but there would be a requirement to keep a record of the event and to file an annual summary report with the CNSC.

If the maximum dose rate is between 5 $\mu$ Sv/h and 25  $\mu$ Sv/h, then the load would be allowed to be moved provided that the CNSC is notified of the detection. Similarly, if the maximum dose rate is between 25  $\mu$ Sv/h and 500  $\mu$ Sv/h then the CNSC would need to be notified but the movement would not be automatically authorized; it would be based on the information available. Under these circumstances, there would be a requirement for an expert assessment and follow-up reporting. In these situations, timely characterization

of the material would be required, and should the radioactive source turn out to be a licensable quantity an immediate report to the CNSC would be required. Record keeping and reporting of those events will allow tracking of the use of the exemption, including reassessment of the need for the exemption.

## *2. Transport of large components*

From the international aspect, it appears there will be an increased need to transport large radioactive components or objects, such as equipment from decommissioning or refurbishment activities at nuclear facilities. Large nuclear reactor components, such as steam generators, are difficult to package due to their large size. Over the last few years, the industry experience with decommissioning and transport of large components has grown and over one hundred shipments of these types of components, mostly for steam generators, from replacement or dismantlement of nuclear facilities have been conducted under special arrangement around the world.

The draft IAEA document, *TS-G-1.1 Advisory Material for the Safe Transport of Radioactive Material*<sup>[5]</sup>, includes specific guidance for the transport of large components under special arrangement. However, as experience with this type of transport has grown and is becoming more routine, Canada is currently leading an initiative to develop a set of specific regulatory requirements to be proposed for inclusion into a future revision of the *IAEA Regulations*; removing the need for special arrangement.

The revised PTNSR being proposed will include specific requirements applicable to the transport of large components based on the results of the above noted initiative. The inclusion of those requirements would provide clarity on the content of an application related to the transport of such large components. A new type of licence would be created to cover the approval of such shipments.

## *3. Changes to the requirements related to the Radiation Protection Program*

In Canada, most carriers of radioactive material are not licensed by the CNSC. However, they are subject to the PTNSR when transporting radioactive material, which includes the requirement for the carriers to have a radiation protection program. A number of changes are being proposed regarding the radiation protection program requirements in the revised PTNSR. For example, transport companies only handling and carrying excepted packages would be exempted from the requirement to implement a radiation protection program. Also, requirements are being introduced for non-licensees whose workers may receive a yearly dose above 1 mSv, the CNSC regulatory limit for members of the public. Those requirements will cover items such as informing workers, in writing, of their designation as Nuclear Energy Workers and the applicable dose limits prescribed by the *CNSC Radiation Protection Regulations*<sup>[6]</sup>, as well as notification and reporting to the CNSC when a worker exceeds an applicable dose limit prescribed by these same regulations. Additional responsibilities for workers are also being proposed such as acknowledging, in writing, that they have received the information related to the applicable dose limits.

#### 4. Event Reports

Under the current PTNSR, there are a number of events that are required to be reported to the CNSC; however, a gap does exist in certain situations. For example, if a defect in packaging is identified, such as the failure to adequately close a containment boundary when containment is still provided by another containment boundary, this event may not be reported as the current requirement leave it up to the user to determine if the event can be expected to lead to a situation that may affect the health and safety of persons or the environment since containment is still provided. The proposed PTNSR will be revised to prescribe specific reporting requirements for occurrences where packages have defects or do not fully comply with the regulations. Follow-up on incidents similar to the one noted above are important to ensure that appropriate corrective actions are taken. In addition, logging of these events will allow trends to be recorded and allow a more focus use of CNSC resources in this area if needed.

#### **Harmonization with IAEA Regulations**

The PTNSR currently embody a number of variations from the *IAEA regulations* and many will be removed as part of this proposed revision. The main variations that would be kept in the revised PTNSR are related to the limitation on the grade of uranium ore that can be categorized as LSA-I material due to the presence of high-grade ore in Canada.

In addition, all approval types not currently included in the PTNSR will be added for consistency with the *IAEA Regulations*.

These new approvals include:

- Shipment approval,
- Approval for special use vessel,
- Approval of basic radionuclide values,
- Approval of alternative activity limits for instruments and articles, and
- Approval of fissile excepted radioactive material

Shipment approval and approval for special use vessels would be covered under transport licences, while approval of basic radionuclide values, alternative activity limits for instrument and articles and fissile excepted radioactive material would be covered under new types of certificates.

#### **Incorporation of the IAEA Regulations within the PTNS Regulations**

The current PTNSR refer to the 1996 (as amended 2003) Edition of the *IAEA Regulations*, and incorporate the various provisions of this Edition by referring to specific paragraph numbers. For example subsection 15(2) of the PTNSR states that “*Every consignor, other than a consignor of an excepted package, shall act in accordance with paragraphs 550- to 561 of the IAEA Regulations*”.

To ensure Canadian requirements remain aligned with current international regulations, it is proposed that the revised PTNSR will refer to the *IAEA Regulations* as amended from time to time (in legal terms this is called “ambulatory reference”). To minimize the impact on the Canadian industry resulting from future revisions of the *IAEA Regulations*, the revised PTNSR would include a transition period before the coming into force of any new revision of the *IAEA Regulations* to allow time for users to transition to the new edition.

To incorporate the *IAEA Regulations* by way of ambulatory reference, the PTNSR will be completely revised; all specific references to IAEA paragraph numbers will be removed and replaced by searchable terms within the *IAEA Regulations*. This change will allow Canadian requirements to remain current with the most up-to-date Edition of the *IAEA Regulations* as they are revised from time to time.

Furthermore, the CNSC will develop a guidance document to assist users of the regulations, and will specify which version of the *IAEA Regulations* is currently in effect and what are the applicable paragraph numbers corresponding to each section of the PTNSR. This guidance document would be updated every time a future edition of the *IAEA Regulations* is published.

## **Conclusion**

The Canadian Nuclear Safety Commission’s *Packaging and Transport of Nuclear Substances Regulations* (PTNSR) are currently being revised to incorporate the most recent 2012 Edition of the *IAEA Regulations*, as recommended by the 2011 IRRS Mission. It is proposed that the revised PTNSR incorporate new exemptions for unknown loads of radioactive material triggering a radiation portal monitor while in transport, as well as new provisions for the transport of large components based on existing IAEA Guidance and requirements drafted for future inclusion into the *IAEA Regulations*.

In addition, modifications to reporting requirements are being proposed, in order to cover package defects and certain non-compliances associated with transport activities. Modifications to the radiation protection program requirements are also being proposed, to clarify the requirements applicable to carriers (who are not licensed by the CNSC) with regards to radiation dose limits, and reporting requirements.

It is also proposed that the revised PTNSR incorporate the *IAEA Regulations* “as amended from time to time” allowing the PTNSR to remain current with the most up-to-date Edition of the *IAEA Regulations*. The revised PTNSR regulations would include a transition period to allow time for users to transition to the new edition.

It is expected that the revised PTNSR will be posted for public comment in Canada in early 2014 and published as new regulations by the end of 2014.

## References

- [1] Canadian Nuclear Safety Commission (CNSC) Packaging and Transport of Nuclear Substances Regulations, SOR/2000-208, December 2011
- [2] Transport Canada Transportation of Dangerous Goods Regulations, SOR/2012/245 (Amendment 11)
- [3] International Atomic Energy Agency (IAEA) Safety Standards Series, “Regulations for the Safe Transport of Radioactive Material, 1996 Edition (Revised), No. TS-R-1, Vienna, Austria, 2000.
- [4] Canadian nuclear Safety Commission (CNSC) Proposal to Amend the Packaging and Transport of Nuclear Substances Regulations, Discussion Paper DIS-12-06, August 2012
- [5] International Atomic Energy Agency (IAEA) DS 425 Draft 0.5 Advisory Material for the Safe Transport of Radioactive Material, August 2012
- [6] Canadian Nuclear Safety Commission, (CNSC) Radiation Protection Regulation, SOR/2000-203, September 2007