Canada's Nuclear Regulator

Proposals to Amend the *Radiation Protection Regulations*

Discussion Paper DIS-13-01

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Preface

Discussion papers play an important role in the selection and development of the regulatory framework and regulatory program of the Canadian Nuclear Safety Commission (CNSC). They are used to solicit early public feedback on CNSC policies or approaches.

The use of discussion papers early in the regulatory process underlines the CNSC's commitment to a transparent consultation process. The CNSC analyzes and considers preliminary feedback when determining the type and nature of requirements and guidance to issue.

Discussion papers are made available for public comment for a specified period of time. At the end of the first comment period, CNSC staff review all public input, which is then posted for feedback on the CNSC Web site for a second round of consultation.

The CNSC considers all feedback received from this consultation process in determining its regulatory approach.

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Executive Summary

Through the *Nuclear Safety and Control Act* and its regulations, the Canadian Nuclear Safety Commission (CNSC) regulates all nuclear activities in Canada in order to protect the health and safety of workers and the public from ionizing radiation.

The *Radiation Protection Regulations* play an important role in achieving this goal by placing limits on radiation doses to workers and members of the public, and by requiring all CNSC licensees to implement radiation protection programs.

Recently, the CNSC recognized the need to review the *Radiation Protection Regulations* in light of various developments since they were introduced in the year 2000

- **Changes to international benchmarks:**
  In 2007, the International Commission on Radiological Protection (ICRP) published a revised set of recommendations for its system of radiological protection. These recommendations were published in ICRP Publication 103 (ICRP 103), which incorporated updates based on more recent scientific information as well as new guidance on controlling radiation exposure. The current *Radiation Protection Regulations* are largely based on earlier ICRP recommendations, ICRP Publication 60 (ICRP 60), and need to be brought in line with ICRP 103.

  In 2006, the International Atomic Energy Agency (IAEA) undertook a review and initiated a revision of the 1996 edition of its *Basic Safety Standards,* in cooperation with other organizations. The IAEA published the revised standards in 2011, incorporating the newer ICRP recommendations and other safety-related improvements. These revised requirements need to be reflected in the *Radiation Protection Regulations*.

- **The March 2011 nuclear event in Fukushima, Japan:**
  The nuclear event in Fukushima prompted the CNSC to examine its regulatory framework and identify how to strengthen it, particularly with respect to nuclear emergencies. The CNSC determined that the *Radiation Protection Regulations* need to more fully describe requirements for addressing radiological hazards during an emergency, and has therefore proposed amendments to sections 15 and 16 of the Regulations.

- **Lessons learned:**
  Since the *Radiation Protection Regulations* came into force in May 2000, the CNSC has gained more than a decade of regulatory experience. This has enabled it to identify opportunities to improve the Regulations by addressing specific gaps and providing additional clarity.

This paper describes the CNSC's proposals to amend existing sections of the *Radiation Protection Regulations,* as well as to add two new sections outlining requirements for radiation detection and measurement instrumentation, and responsibility for radiation protection. These amendments would harmonize the Regulations with updated ICRP and IAEA guidance, where appropriate. They would also clarify requirements and address gaps that were identified post-Fukushima, as well as through lessons learned over time.

The CNSC seeks feedback from licensees, the Canadian public and other stakeholders on these proposed amendments. If implemented, the proposed changes could result in costs to licensees for implementing and complying with new requirements, as well as additional administrative burden. The CNSC therefore

encourages stakeholders to voice their views on these issues. The CNSC will consider all feedback received when determining its regulatory approach.

Proposals to Amend the *Radiation Protection Regulations*

1. Introduction

The Canadian Nuclear Safety Commission (CNSC) regulates the use of nuclear energy and materials in order to protect the health, safety, and security of Canadians and the environment, and to respect Canada's international commitments on the peaceful use of nuclear energy.

The *Radiation Protection Regulations* play an important role in achieving this goal by placing limits on radiation doses to workers and members of the public. These Regulations also require all CNSC licensees to implement radiation protection programs that keep exposure to ionizing radiation below regulatory limits, and as low as reasonably achievable, social and economic factors being taken into account.

It is important to understand that internationally accepted radiation protection standards are developed through an extensive, rigorous review process. Before a recommendation about radiation protection is issued, several expert organizations examine scientific evidence related to radiation exposure, and its associated health impacts and potential risks:

- First, the United Nations Scientific Committee on the Effects of Atomic Radiation (UNSCEAR) assesses and reports levels and effects of exposure to ionizing radiation. Governments and organizations throughout the world rely on UNSCEAR's work as the scientific basis for evaluating radiation risk and for establishing protective measures.
- Second, the International Commission on Radiological Protection (ICRP) develops a recommended system[1] of radiological protection based on current understanding of radiation exposure and its effects, as well as value judgments. These value judgments consider societal expectations, ethics and experience gained in application of the system.
- Lastly, the International Atomic Energy Agency (IAEA) develops nuclear safety standards. Based on these standards, the IAEA promotes the achievement and maintenance of high levels of safety in applications of nuclear energy, as well as the protection of human health and the environment against ionizing radiation.

Background

The CNSC is committed to ensuring its radiation protection requirements are up-to-date, to protect workers, the Canadian public and the environment. In keeping with this commitment, the CNSC undertook a review of the *Radiation Protection Regulations*, in order to ensure continued alignment with evolving international standards and to identify any gaps that may have arisen since the Regulations were introduced.

This review identified areas of the *Radiation Protection Regulations* that could be refined and improved. The CNSC is therefore proposing amendments that would harmonize the Regulations with updated international standards, clarify requirements and address gaps based on lessons learned since the Regulations came into force.

[1] The ICRP recommendations form the fundamental basis of radiation protection worldwide and underlie the International Atomic Energy Agency's *Radiation Protection and Safety of Radiation Sources: International Basic Safety Standards.*

The current *Radiation Protection Regulations*, which were introduced in 2000, are based upon guidance from the ICRP and IAEA. Both of these organizations have updated their guidance since the Regulations were instated; therefore, they need to be brought in line with current recommendations.

The *Radiation Protection Regulations* reflect the ICRP's recommendations made in 1990 (ICRP 60). ICRP recommendations have since been updated to ensure they remain relevant, useful and suitable for worldwide use, and new guidance was published in 2007. Similarly, the IAEA, in cooperation with co-sponsoring organizations, undertook a revision of its 1996 *Basic Safety Standards*, which were republished in 2011 as the *IAEA's General Safety Requirements*, GSR Part 3 (Interim) (hereafter referred to in this document as the IAEA revised BSS). The IAEA revised BSS provide updated requirements designed to be incorporated into future national and regional regulations.

Following the nuclear event that occurred in Japan in March 2011, the CNSC undertook a review of its regulatory framework in order to identify improvements to existing regulations and supporting regulatory documents. It was determined that the CNSC should amend the *Radiation Protection Regulations* to be more consistent with current international guidance and to more fully describe requirements for addressing radiological hazards during the various phases of an emergency. As a result, the CNSC has proposed amendments to sections 15 and 16 of the *Radiation Protection Regulations* in order to align with international benchmarks with respect to dose limits for persons during an emergency. The amendments would also clarify requirements for managing workers exposed to radiation while controlling an emergency.

The CNSC regards this discussion paper as an important tool for communicating with stakeholders, and it is committed to early stakeholder engagement regarding its proposals to amend the *Radiation Protection Regulations*. The CNSC thereby invites feedback on the proposed amendments, and actively encourages input about the potential impact of the proposed amendments – particularly from stakeholders who may incur additional administrative burden[2] or costs[3] to comply with any eventual changes. All comments received will be carefully considered.

2. Proposals to Amend the *Radiation Protection Regulations*

This discussion paper describes the CNSC's proposals to amend certain existing sections of the *Radiation Protection Regulations*. It also presents two proposed new sections that would outline requirements for radiation detection and measurement instrumentation, and responsibility for radiation protection.

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[2] Administrative burden includes planning, collecting, processing and reporting of information, and completing forms and retaining data required by the federal government to comply with a regulation. This includes filling out licence applications and forms, as well as finding and compiling data for audits and becoming familiar with information requirements.

3 Cost includes up-front capital costs as well as ongoing maintenance and training costs that businesses face when complying with a regulation. These include signage or notifications (when in material form, such as a road sign), testing, training staff, purchasing new equipment or software, maintaining equipment and software, renting additional space, purchasing equipment to maintain records (such as secure filing cabinets), etc.

Sections 2 to 4 of this paper outline all proposed changes, which are also summarized in tabular format in Appendices A and B.

2.1 Interpretation and Application

Section 1: Interpretation

Certain definitions provided in subsection 1(1) would be deleted, added or changed as a result of the amendments to the Regulations.

Section 2: Application

When the *Radiation Protection Regulations* first came into force in 2000, the text in sections 2 and 3 was written as follows:

> "2(2) Only section 3 of these Regulations applies to a licensee in respect of a dose of radiation received by or committed to a person
>
> *(a)* in the course of the person's medical examination, diagnosis or treatment, as directed by a medical practitioner who is qualified to examine, diagnose or treat the person under the applicable provincial legislation;
>
> *(b)* while the person is acting as a caregiver, outside a medial facility and not as an occupation, for a patient to whom a nuclear substance has been administered for therapeutic purposes as directed by a medical practitioner who is qualified to give such direction under the applicable provincial legislation; or
>
> *(c)* As a result of a person's voluntary participation in a biomedical research study supervised by a medical practitioner who is qualified to give such supervision under the applicable provincial legislation.
>
> (3) When a nuclear substance is administered to a person for therapeutic purposes, the licensee shall, before the person leaves the place where the substance is administered, inform the person of methods for reducing the exposure of others to radiation from that person."

In 2007, the CNSC initiated certain miscellaneous amendments to its regulations made under the *Nuclear Safety Control Act*, including the deletion of paragraph 2(2)(*b*) from the *Radiation Protection Regulations*. This deletion was a result of a review by the Standing Joint Committee for the Scrutiny of Regulations that had identified issues with the paragraph as drafted and that had determined the paragraph did not align with section 3. In its review, the Committee noted that the Regulations as written (see above) had no link between paragraph 2(2)(*b*) and section 3; consequently, section 3 did not impose any obligations on the licensee with regard to caregivers. As a result, paragraph 2(2)(*b*) was repealed, and licensees were granted an exemption with respect to radiation doses received by non-occupational caregivers. This exemption was granted with the expectation that the wording of section 2 would be revisited when the Regulations were amended.

To improve the clarity and understanding of the applicability of sections 2 and 3, the CNSC is now proposing to revise the overall wording of subsection 2(2) to clearly indicate the scope of the

exemption and to whom it applies. In addition, the direct link between subsection 2(2) and section 3 would be removed. The intent is to state in subsection 2(2) that the licensee is exempt from the dose limits described in sections 13 and 14 of the Regulations in respect of all persons described previously in 2(2)(*a*), (*b*) and (*c*).

Since this is an improvement and clarification of regulatory language, no added administrative burden is anticipated.

2.2 Obligations of Licensees and Nuclear Energy Workers

Section 3: Administration of Nuclear Substance for Medical Purposes

The CNSC is proposing to include a definition of the term "caregiver" in the *Radiation Protection Regulations*. This definition would indicate that a caregiver is a person, outside of a medical facility, who willingly and voluntarily – and not as an occupation – helps in the care, support and comfort of patients who have been administered a nuclear substance for therapeutic purposes.

The CNSC is also proposing to add a subsection to section 3 that would require licensees to inform caregivers that they may incur radiation exposure above the dose limit for any person other than a nuclear energy worker, during their comfort and care of patients.

Currently, the licensee's healthcare professional typically acknowledges, in writing, that a patient is "medically fit" for release after therapeutic treatment. This acknowledgment usually includes an evaluation of the patient's living conditions, including a determination of the need and availability of a caregiver. Patients are also given written recommendations for minimizing radiation exposure to others. In many cases, licensees already inform caregivers that they may incur radiation exposure that exceeds the public dose limit – so adding this requirement to the Regulations is intended to formalize a reasonably common practice. However, making this practice a formal regulatory requirement would ensure that all licensees recognize the need to inform caregivers of the minimal risk they are accepting.

The proposed change would add some administrative burden to licensees, although it is believed this burden would be minor.

Section 4: Radiation Protection Program

Removal of reference to radon progeny
The CNSC proposes to remove the specific reference to radon progeny exposure in paragraph 4(*a*), given other proposed changes to section 13 of the Regulations. The proposed changes to section 13, if adopted, would render the unique treatment of radon progeny, along with the associated concepts of the working level and the working level month, unnecessary. Furthermore, the ICRP is currently revising the models that underlie how radon progeny dose is calculated. It is expected that these models will be replaced by the concept of dose coefficients based on biokinetic and dosimetric models (similar to the treatment of intakes of other radionuclides).

Since the proposal to remove the specific reference to radon progeny exposure in paragraph 4(*a*) is a simplification in wording, it is expected that any resulting administrative burden would be minor.

Dose constraints

The concept of dose constraints was first introduced in ICRP 60 and further elaborated upon in ICRP 103. As defined in ICRP 103, a dose constraint is "a prospective and source-related restriction on the individual dose from a source, which provides a basic level of protection for the most highly exposed individuals from a source, and serves as an upper bound on the dose in optimisation of protection for that source."

Given that ICRP 103 reinforced the principle of optimization and the use of dose constraints, the CNSC undertook a review to determine the appropriateness of amending the *Radiation Protection Regulations* to include requirements for dose constraints.

In its review, the CNSC considered international experience to date in implementing dose constraints. It also considered the current regulatory framework under the *Nuclear Safety and Control Act* and an analysis of the impacts and potential benefits of introducing the concept of dose constraints.

In 2007, the Nuclear Energy Agency conducted a review of international practices. It found that current practice varied widely in the interpretation and use of dose constraints in the management of doses, although the concept of constraints had been included in the revised basic safety standards of both the IAEA and the European Commission. In some countries, dose constraints were proposed and implemented by licensees, whereas in others they were implemented within the regulatory framework. Furthermore, dose constraints for the public and for workers had generally not been interpreted or implemented as the same regulatory instrument.

The CNSC's review of the current *Radiation Protection Regulations* confirmed that they contain a clear requirement to keep doses as low as reasonably achievable (ALARA), with social and economic factors taken into account. The CNSC has also noted that licensees have made significant progress in incorporating the ALARA concept into their radiation protection programs. In addition, the CNSC verifies, on an ongoing basis, that licensees are continually seeking opportunities to incorporate the principle of optimization into their programs and work practices.

The CNSC gave serious consideration to including dose constraints in its proposed amendments to the *Radiation Protection Regulations*. However, it decided that introducing a requirement for dose constraints is unnecessary at this time. This decision was made in light of the current, very clear regulatory expectations for radiation protection programs, as well as significant licensee progress in adopting the optimization principle. Notwithstanding, the CNSC recognized that dose constraints would be a useful tool for licensees in applying the ALARA principle. The CNSC anticipates that future regulatory expectations for demonstrating ALARA will include the requirement to use dose constraints. These expectations would likely take the form of regulatory guidance.

The CNSC is seeking feedback on its decision to forego the introduction of dose constraints to the *Radiation Protection Regulations*. It is anticipated that any future changes to regulatory expectations for demonstrating ALARA could have an impact on licensees. This impact would likely be low for licensees with already-robust ALARA programs, since their programs have internal limits and performance goals for reducing doses to levels that are ALARA. For other licensees, this might be a new concept that would require programmatic changes. Should regulatory expectations change with respect to the use of dose constraints, the CNSC would seek stakeholder feedback at that time.

Section 5: Ascertainment and Recording of Doses

The CNSC is proposing to remove the specific reference to radon progeny exposure in subsections 5(1) and (2). This is in order to align with its proposed revisions to section 4 and to section 13 of the *Radiation Protection Regulations.*

Since the proposal to remove the reference to radon progeny exposure in subsections 5 (1) and (2) is only a simplification in wording, it is expected that any associated administrative burden would be minor.

Section 7: Provision of Information

Provision of information to all workers
Paragraphs 7(1)(*b*), (*c*) and (*d*) of the *Radiation Protection Regulations* require licensees to provide written information to nuclear energy workers (NEWs) about the risks associated with radiation exposure, as well applicable dose limits and individual radiation dose levels, respectively.

This provision applies specifically to NEWs; there is no regulatory requirement for licensees to provide this information to other persons working at CNSC-licensed facilities or performing CNSC-licensed activities. Furthermore, the Regulations do not specify a time period for reporting dose results to workers. The CNSC believes this information is important and relevant to all persons who work at licensed facilities or perform licensed activities, and should therefore be made available to them in a timely manner.

In this respect, the CNSC proposes to replace the term “nuclear energy worker” in section 7 of the Regulations with the term “worker”, using the following existing definition: “a person who performs work that is referred to in a licence”.

If this change is adopted, paragraph 7(1)(*a*) would also be amended to ensure that every worker is informed whether he or she is a NEW and paragraphs 7(1)(*b*), *(c)* and (*d*) would apply to all workers. Similarly, subsection7(3) would need an amendment requiring licensees to obtain written acknowledgment from all of their workers of having been informed of the matters referred to in subsections 7(1) and (2).

With respect to the reporting of doses to workers, the CNSC proposes that workers be informed of their dose results (both effective and equivalent dose) on an annual basis, although more frequent reporting would be encouraged. This proposed amendment would also clarify that licensees must inform each worker, individually and in writing, of their dose levels.

Subsection 5(1) of the Regulations requires all licensees to ascertain and record the magnitude of doses received by and committed to each person. However, in practice, licensees do not consistently record and report doses for workers who are not considered NEWs. The proposed amendment to section 7 would likely improve licensee compliance with subsection 5(1); however, certain licensees may incur administrative burden in order to conduct dose assessments for workers whose doses have not been formally assessed in the past. Likewise, certain licensees may incur additional costs to inform workers of their doses individually and in writing.

Addition of requirement for the provision of information related to emergencies
The *Radiation Protection Regulations* do not specifically require workers to be informed of their duties and responsibilities in the event of an emergency. Since an emergency could certainly

affect all workers, the CNSC proposes to introduce a requirement to subsection 7(1) for all licensees to inform all workers of their duties and responsibilities during an emergency. Under this proposed requirement, licensees would also have to inform all workers of the associated health risks and of how they should protect themselves while conducting their duties during the emergency (including any special restrictions for pregnant workers and those who are breast-feeding).

The CNSC expects this change would require licensees to provide training to workers, commensurate with emergency plans and workers' associated roles. In some cases, workers would simply need to be trained in evacuation procedures, whereas others could also require training related to their specific roles during emergencies. Certain licensees would also need to provide this information to offsite authorities' emergency response personnel, who may be expected to assist during an emergency.

This proposed requirement would likely require some licensees to develop new training material and to administer new or additional training activities. The CNSC expects that most licensees currently provide this information to workers, but nevertheless seeks feedback on the potential additional burden of this proposal.

Addition of the requirement to provide information to female workers with respect to breast-feeding

Section 3.113 of the IAEA revised BSS requires licensees to make special arrangements for female workers, as necessary, to protect breast-fed infants. The *Radiation Protection Regulations* do not currently outline requirements related to breast-feeding female workers. Therefore, the CNSC is proposing a number of changes.

First, the CNSC proposes to expand the requirements in subsection 7(1) of the Regulations to include the provision of information, to each female worker, on the potential risks to breast-fed infants from intakes of radioactive substances by the worker, during both routine operations and emergencies.

Secondly, the CNSC proposes an amendment to subsection 7(2), to ensure that all licensees inform all female workers, in writing, of their rights and obligations as breast-feeding workers under section 11. The CNSC's further proposed changes to section 11 of the Regulations are presented later in this discussion paper.

If implemented, this requirement is expected to have a minor impact, as licensees may need to revise their documentation and training materials in order to provide the additional information to female workers. In some cases, licensees may need to make accommodations for workers to ensure the infant is adequately protected.

Section 8: Requirement to Use Licensed Dosimetry Service

Requirement to use a licensed dosimetry service for equivalent doses

Section 8 of the *Radiation Protection Regulations* requires a licensee to use a licensed dosimetry service (LDS) to measure and monitor radiation doses to nuclear energy workers who are reasonably likely to receive effective doses greater than 5 mSv in a one-year dosimetry period.

However, there are no specific requirements related to the use of an LDS with regard to equivalent dose to the skin, skin of any hand or foot[4], or the lens of the eye.

The CNSC is proposing that a licensee must also use a licensed dosimetry service to measure and monitor radiation to NEWs who have a reasonable probability of receiving an equivalent dose to the skin, or to the skin of any hand or foot, that is greater than 50 mSv in a one-year dosimetry period.

The CNSC believes that implementing this proposal would have a minor impact, since most licensees who would meet the proposed criteria already use licensed dosimetry services to measure and monitor their workers' equivalent doses to the skin of the whole body and the skin of any hand or foot.

Note: Currently, the CNSC is not proposing a requirement with respect to the use of licensed dosimetry services for measuring dose to the lens of the eye.

Section 11: Pregnant Nuclear Energy Workers

As discussed earlier in this paper, the CNSC is proposing to add provisions to section 11 of the *Radiation Protection Regulations*, in respect of women who are breast-feeding. These proposed provisions are further to recommendations in section 3.113 of the IAEA revised BSS. They are also aligned with the CNSC's proposed amendment to section 7 (whereby the CNSC recommended a requirement to provide certain information to workers who are breast-feeding).

To ensure that licensees make reasonable accommodations for female workers for the protection of breast-fed infants, the CNSC is proposing two changes to section 11 of the *Radiation Protection Regulations*:

- the first is to introduce a requirement for a female worker to inform the licensee in writing if she is breast-feeding.
- the second is a requirement for a licensee to adapt the working conditions in respect of exposure to that worker, during both routine operations and emergencies, to ensure the breast-fed infant is afforded the protection required for a member of the public. In other words, the licensee would need to make accommodations to ensure a breast-feeding worker would not receive an intake of a radioactive substance that would result in a dose to her breast-fed infant in excess of 1 mSv per year.[5]

The CNSC surmises that very few breast-feeding women actually work in environments that would require their employers to make this accommodation. Nonetheless, the proposed amendments to section 11 may result in a minor administrative burden, so the CNSC seeks stakeholder feedback on this matter.

If the proposed amendments are adopted, the title of section 11 will need to be modified accordingly.

[4] The current wording in the *Radiation Protection Regulations* is "hands and feet". The CNSC's proposal to clarify this wording is outlined in the discussion on proposed changes to section 14.

[5] As per the effective dose limit for a person who is not a nuclear energy worker, as stated in section 13 of the *Radiation Protection Regulations*.

2.3 Radiation Dose Limits

Section 12: Interpretation

If the proposed amendments to section 13 are adopted (see the following text), certain definitions in section 12 will also be amended.

Section 13: Effective Dose Limits

Effective dose limits
The *Radiation Protection Regulations* currently define effective dose limits for nuclear energy workers, pregnant NEWs, and persons other than NEWs. Section 13 lists mathematical formulas for calculating effective doses; however, the CNSC believes that effective doses could be more clearly defined through written text.

Amendments to subsections 13(2), (3) and (4) are being considered. Via these proposed amendments, the CNSC suggests using written text (as opposed to formulas) to describe how effective doses are to be calculated. The proposed wording would indicate that the effective dose shall be calculated to include both of the following: the sum of relevant doses from external radiation exposures, and the sum of relevant committed doses from intakes in the same period. If the proposed amendment is adopted, section 13 would thereby reflect how doses are measured and/or calculated in practice.

There are further difficulties associated with section 13, as it is currently written. Issues have arisen as a result of the following:

- the use of the annual limit on intake (ALI) to calculate dose, instead of the use of a dose coefficient to calculate the committed effective dose
- the use of the term “E”, which, as currently defined in subsection 12(1), is not recognized in practice

The CNSC proposes to replace the use of ALI with dose coefficients to directly calculate the effective dose of any one component. The dose from an intake would then be combined with doses from other sources (e.g., doses from exposure from external radiation) for comparison against the applicable dose limit. It is expected that this would simplify the calculation of the total effective dose. This proposed approach is consistent with that of the ICRP, and it also reflects how most dose assessments are done in practice.

Similarly, the CNSC proposes to eliminate the term “E”, as defined in subsection 12(1) of the existing Regulations. Since the term “E” includes doses from external sources, as well as some doses from internal sources, it has not always been properly understood. Moreover, the combining formula includes a term for the dose from internal sources of radiation, in addition to the term “E”– which appears to be a double counting of doses.

The unique treatment of radon progeny, as well as the associated concepts of “working level” and “working level month”, is considered unnecessary in the context of the Regulations. Furthermore, the models behind the approach to the calculation of radon progeny dose are currently being revised. It is expected that these models will soon be replaced by the concept of dose

coefficients[6] (similar to the treatment of intakes of other radionuclides). Therefore, it is proposed to remove any direct references to radon and radon progeny, as well as the reference to the related terms "working level" and "working level month".

The removal of direct references to radon and radon progeny, along with the related terms of "working level" and "working level month", is expected to have little to no impact[7]. These terms and their use are generally well understood and are defined in other reference materials, which are readily available. Similarly, the CNSC's other proposed changes to section 13 are not anticipated to cause additional administrative burden – since they are simplifications to the current regulatory language.

Definition of the Five-Year Dosimetry Period

The current definition of the "five-year dosimetry period" found in subsection 1(1) of the *Radiation Protection Regulations* states the following:

> "five-year dosimetry period" means the period of five calendar years beginning on January 1 of the year following the year in which these Regulations come into force, and every period of five calendar year after that period."

The Regulations came into force on May 31, 2000; therefore, the first five-year dosimetry period began on January 1, 2001, and ended on December 31, 2005. The subsequent five-year dosimetry periods commenced on January 1, 2006, and on January 1, 2011, respectively.[8]

As mentioned, the current Regulations were developed based upon the recommendations of ICRP 60. These recommendations formally introduced the principle of optimization, as well as the concept of both an annual period and a five-year dosimetry period to limit workers' occupational exposure. The ICRP judged that its dose limit for workers should be set in such a way and at such a level that the total effective dose received in a full working life would not exceed about 1 Sv (1000 mSv), received somewhat uniformly year by year; and that the application of its radiological protection system should be such that this figure (1 Sv over a working life) would only rarely be approached.

The recommendations in paragraph 166 of ICRP 60 state that:

> "The Commission recommends a limit on effective dose of 20 mSv per year, averaged over 5 years (100 mSv in 5 years), with the further provision that the effective dose should not exceed 50 mSv in any single

[6] The World Health Organization, UNSCEAR and the ICRP have recently concluded from epidemiological studies that the risk of lung cancer appears to be approximately twice the risk estimate used in the existing method for the converting working level month (the current unit of exposure for radon and radon progeny) to mSv. As a result, there was a change to the radon progeny dosimetric model and an increase in the estimated risk; this will also likely result in a new ICRP dose coefficient for radon with a dose-per-unit intake of twice its current value or more.

[7] A new dose coefficient would not be adopted without a technical review and consultation with stakeholders, via a separate regulatory process.

[8] Before the NSCA and the *Radiation Protection Regulations* came into force in the year 2000, the dose limits pursuant to the *Atomic Energy Control Regulations* were based on timeframes of "per quarter of a year" and "per year". The modernization of the regulations under the NSCA and the adoption of a dose limit for a five-year dosimetry period introduced new requirements for both licensees and the CNSC.

> year. The 5 year period would have to be defined by the regulatory agency, e.g. as discrete 5-year calendar periods."

During the development and consultation process that preceded the coming into force of the *Radiation Protection Regulations*, there was significant discussion related to the changes in dose limits and, in particular, the appropriate method of defining the five-year dosimetry period. The decision to adopt a fixed five-year calendar period was consistent with the recommendations of ICRP 60 and the 1996 version of the IAEA BSS, which were in place at the time. In addition, it was determined that the fixed five-year dosimetry period was easier and more practical to administer.

The CNSC has found that licensees have generally accepted the five-year dosimetry period as it is currently defined. Health Canada's National Dose Registry has also accommodated its system to receive and monitor worker dose records in a manner consistent with the dosimetry periods defined in the Regulations.

In ICRP 103 and the IAEA revised BSS, which represent the most up-to-date international benchmarks, the recommended approach for identifying the five-year dosimetry period has not changed. Both the ICRP and the IAEA have allowed for flexibility for national regulatory authorities to adopt an approach most appropriate to their particular circumstances.

The CNSC is seeking stakeholder feedback on whether to maintain the current approach of fixed five-year dosimetry periods (with specific start and end dates as previously stated), or to introduce rolling five-year dosimetry periods[9]. Stakeholders are encouraged to share their views on this matter and to provide information on the potential impacts of such a change.

Section 14: Equivalent Dose Limits

The term "hands and feet"

Item 3 in the table in subsection 14(1) of the current *Radiation Protection Regulations* specifies dose limits for the "hands and feet". The actual intent of this requirement is to limit the dose to the skin of any hand or foot; however, the wording is ambiguous and has sometimes been misinterpreted as "the total dose to all hands and feet". The CNSC therefore proposes to change the wording "hands and feet" to "the skin of each hand and foot".

The proposed terminology also more accurately reflects how equivalent dose to the hands and feet is actually measured[10]:

This amendment is not expected to have any financial impact. Any administrative burden would be minimal because the change is simply a clarification of terminology and regulatory intent.

Equivalent dose limits for the lens of the eye

Radiation exposure to the lens of the eye, above a threshold dose, has been linked to its opacification (or clouding of the lens, which, in its advanced stages, is referred to as a cataract). In order to prevent this effect, dose limits have been defined for the lens of the eye. The current dose limit for the lens of the eye (as defined in the table in subsection 14(1)) is 150 mSv per one-

[9] A change from a fixed to a rolling five-year dosimetry period would require further amendments to other sections of the *Radiation Protection Regulations.* Such potential amendments are not addressed in this document.

[10] ICRP 103 indicates that the operational quantity to be used for measuring dose to the hands and feet is $H_p(0.07)$, which is the personal dose equivalent at a depth that represents sensitive skin cells. (Skin is the most radiosensitive part of the hands and feet).

year dosimetry period for nuclear energy workers (NEW) and 15 mSv per one calendar year for any other person.

On April 21, 2011, the ICRP issued a formal statement indicating that tissue reactions for the lens of the eye have dose thresholds that are, or might be, lower than previously considered. This statement indicated the threshold for absorbed dose was now considered to be 0.5 gray[11]. For occupational exposure in planned situations, the ICRP therefore recommended an equivalent dose limit for the lens of the eye of 20 mSv in a year, averaged over defined five-year periods (i.e., 100 mSv/5 years), with no single year exceeding 50 mSv. The ICRP did not change its recommended dose limit for the lens of the eye for members of the public.

In 2012, the ICRP reinforced its recommendation in relation to the dose limit to the lens of the eye when it released ICRP Publication 118, *ICRP Statement on Tissue Reactions/ Early and Late Effects Of Radiation in Normal Tissue and Organs - Threshold Doses for Tissue Reactions in a Radiation Protection Context*.

The IAEA also incorporated these ICRP recommendations into Schedule III of the revised BSS.

In alignment with the recommendations of the ICRP, the CNSC proposes the following:

- to change the equivalent dose limit for the lens of an eye for a NEW from the current limit of 150 mSv to 50 mSv in a one-year dosimetry period
- to add a new dose limit of 100 mSv in a five-year dosimetry period

No change is being proposed to the equivalent dose limit for the lens of an eye for any person other than a NEW.

Requirements and techniques for measuring dose to the lens of the eye are currently under development internationally. The CNSC is involved in these discussions, and it will ensure that any new information and technology are reflected in its regulatory requirements or recommendations.

As a consequence of the proposed reduction in the lens of an eye dose limit, licensees would be required to conduct assessments for their workers, to determine which work activities may present a risk to the lens of the eye. Based on these assessments, some licensees may need to specifically ascertain the dose to the lens of the eye. It is therefore expected that this change will carry some financial and administrative burden, and preliminary feedback on the extent of this burden is encouraged.

Section 15: Emergencies

Following the March 2011 nuclear event in Fukushima, Japan, the international community initiated various reviews of the safety of nuclear power plants around the world. While major accidents such as this one are extremely rare, it was important for all nuclear facility designers and operators, nuclear regulators, and emergency response organizations to learn every possible lesson. In response to the events at Fukushima, the CNSC issued an order to all Class I nuclear facility licensees to re-examine the safety cases of their nuclear power plants. In April 2011, the CNSC established the CNSC Fukushima Task Force to review licensee responses to this request.

[11] The gray (Gy) is the SI unit of absorbed radiation dose, one joule per kilogram. One Gy is equivalent to 1 Sv, for beta and photon radiation.

In October 2011, the Task Force completed its review and presented its findings and recommendations in the *CNSC Fukushima Task Force Report*. The Task Force made 13 recommendations to enhance the safety of nuclear power plants in Canada with emphasis on:

- the capability of Canadian nuclear power plants to withstand conditions similar to those that triggered the Fukushima nuclear accident
- emergency preparedness and response in Canada
- the effectiveness of the CNSC regulatory framework
- international collaboration

The CNSC subsequently embarked on a series of consultations with the public and stakeholders seeking their input on the Task Force report and the associated *CNSC Action Plan*. The *CNSC Action Plan* is based on the Task Force's findings and recommendations that led to the development of specific actions placed on licensees and the CNSC.

The CNSC Task Force reviewed the CNSC regulatory framework and processes and confirmed that the Canadian regulatory framework is strong and comprehensive. Nevertheless, the Task Force identified further improvements to existing regulations and supporting regulatory documents, including the *Radiation Protection Regulations*. The Task Force's Recommendation 8 states: "The CNSC should amend *the Radiation Protection Regulations* to be more consistent with current international guidance and to describe in greater detail the regulatory requirements needed to address radiological hazards during the various phases of an emergency."

In response to this recommendation, the CNSC undertook a review of ICRP 103, the IAEA revised BSS and the European Commission Council Directive regarding dose limits for workers during an emergency.

Based on international benchmarking, the CNSC is proposing amendments to the *Radiation Protection Regulations* to control and minimize doses to persons in accordance with the severity of an emergency. In addition, the criteria for managing workers who have or may have exceeded a dose limit during an emergency are being clarified. The current wording in section 15 of the Regulations does not provide this level of detail and therefore requires clarification. In addition, the *Radiation Protection Regulations* do not sufficiently describe criteria for workers who receive exposures during an emergency in terms of how these workers will return to work during or following the early response phases of an emergency.

The CNSC is proposing that section 15 deal with all aspects of the emergency including: applicable dose limits, the requirements for and actions to be taken when emergency dose limits are exceeded, and the required process for the transition from emergency-related work to future work activities for persons who have exceeded (a) dose limit(s) during the emergency.

It should be understood that, during both the control of an emergency, and the consequent immediate and urgent remedial work leading up to the transition to recovery, the applicable dose limits for effective and equivalent doses to persons (as proposed below) must be considered discrete and separate from the dose limits defined in sections 13 and 14 of the current *Radiation Protection Regulations*.

In addition, the proposed new text detailed below for section 15 of the Regulations does not address the topic of offsite protective actions that may be taken in the event of a nuclear

emergency in order to protect the public at large.[12] Protection action guidelines, such as Health Canada's guidelines for intervention following a nuclear emergency, and for the restriction of radioactively contaminated food and water following a nuclear emergency, are intended to assist federal and provincial emergency response authorities on choosing appropriate protection actions to protect public health. These guidelines are based, in part, on advice from international organizations such as the IAEA and the ICRP and are found on Health Canada's web site at http://www.hc-sc.gc.ca/ewh-semt/pubs/contaminants/index-eng.php. The CNSC will be developing related guidance to aid stakeholders and the public in understanding what to expect and what actions they may be asked to take during an emergency.

The CNSC is proposing to replace the existing text in section 15 of the Regulations with the following regulatory text in italics:

> *No person shall be subject to a radiation exposure resulting in an effective dose greater than 50 mSv and an equivalent dose to the skin greater than 500 mSv during the control of an emergency and the consequent immediate and urgent remedial work other than for the purposes of accomplishing the following emergency tasks:*
>
> - *Task 1: when voluntarily undertaking actions to prevent severe deterministic effects[13] and actions to prevent the development of catastrophic conditions that could significantly affect people and the environment*
> - *Task 2: when voluntarily undertaking actions to avert a large collective dose*
>
> *During an emergency task, the effective dose and the equivalent dose to the skin shall not exceed the values set out in the table below:*

Task	***Effective dose***	***Equivalent dose to skin***
1	*500 mSv*	*5,000 mSv*
2	*100 mSv*	*1,000 mSv*

> *Females who have declared that they are pregnant shall not be involved in the control of an emergency and the consequent immediate and urgent remedial work.*
>
> *A person who acts voluntarily to save human life may exceed the dose limits prescribed by sections 13, 14, and 15 of these Regulations.*

When an applicable dose limit during an emergency is exceeded

[12] Protective actions include things such as the administration of iodine prophylaxis, sheltering, evacuation and relocation.

[13] A deterministic effect is a health effect of radiation for which, generally, a threshold dose level exists above which the severity of the effect is greater for a higher dose. Such an effect is described as a severe deterministic effect if it is fatal or life – threatening, or results in a permanent injury that reduces quality of life.

When a licensee becomes aware that a dose of radiation received by and committed to a person (or an organ or tissue) may have exceeded an applicable dose limit, the licensee shall:

- *immediately notify the person and the Commission of the dose;*
- *take all reasonable steps to keep the effective dose and equivalent dose received by and committed to the person(s) as low as is reasonably achievable during the control of the emergency and the consequent and immediate remedial work;*
- *conduct an investigation to determine the magnitude of the dose and to establish the cause of the exposure; and*
- *report the results (or the progress) of the investigation to the Commission once the emergency is under control and the consequent immediate and urgent remedial work is complete.*

Return to work of workers who received exposures above the applicable dose limit(s) during an emergency

The licensee shall report to the Commission the measures that will be taken to address the transition of the person(s) from emergency-related work to future work activities, once the control of the emergency and the consequent immediate and urgent remedial work are complete.

The CNSC is seeking stakeholder feedback on the potential administrative burden and cost associated with the proposed enhancements to section 15 of the *Radiation Protection Regulations*.

Section 16: When Dose Limit Exceeded

Section 16 of the *Radiation Protection Regulations* requires a licensee to remove a person from any work that is likely to add to his or her dose when the licensee becomes aware that the person may have exceeded any of the applicable dose limits stated in the following: section 13, "Effective Dose Limits"; section 14, "Equivalent Dose Limits"; and section 15, "Emergencies". In its current wording, this requirement applies to all persons.

Based on regulatory experience to date, this requirement has caused a number of workers who have not been designated as nuclear energy workers to be removed from work as a consequence of exceeding the effective or equivalent dose limit for a person who is not a nuclear energy worker. When workers stop work during the conduct of an investigation (after exceeding the currently stated dose limit), both they and the licensee incur administrative and possible monetary burden – with no real benefit to health or safety.

The CNSC would like to ensure that regulatory requirements are risk-based. Therefore, it is proposing an amendment that would only require a person be removed from work that is likely to add to his or her dose if the person may have or has exceeded any of the dose limits that apply to NEWs or pregnant NEWs, as specified in sections 13 and 14. It is believed that this proposal would reduce the administrative and financial burden currently encountered by some licensees.

In addition, the CNSC proposes to remove the specific reference to section 15. The intention is that section 15 would be a stand-alone section dealing with all aspects of an emergency, including when emergency dose limits are exceeded.

Section 17: Authorization of Return to Work

The CNSC is proposing to remove subsections 17(2) and 17(3) from the *Radiation Protection Regulations*. This would allow for flexibility in the determination of future dose limits with respect to a return-to-work authorization for a person who exceeds a dose limit as specified in section 16 of the Regulations.

As written, subsection 17(2) defines a prorated effective dose limit, and subsection 17(3) defines the equivalent dose limit for the dosimetry period in cases where equivalent dose limits are exceeded. It should be noted that the current calculation method for the prorated effective dose limit in subsection 17(2) is based solely on the time remaining in the dosimetry period; this calculation does not take into account the actual dose received. In the case where an equivalent dose limit is exceeded, a person's equivalent dose limit for the remainder of the dosimetry period is that as prescribed in section 14 of the Regulations.

The CNSC has reviewed its experience to date with respect to the application of section 17. It has concluded that the methods for determining dose limits for the purpose of a return-to-work authorization, as currently prescribed, are overly rigid and do not allow sufficient flexibility to consider individual situations. For example, in certain instances, the determination of an appropriate dose limit may need to consider factors such as the dose received, the presence or absence of a health effect, and the individual's lifetime dose history.

Recent scientific information about the lens of the eye has also brought a greater understanding of how cataracts develop. This new information indicates that the current method of determining equivalent dose limits (after an equivalent dose limit has been exceeded) may be inappropriate, and may not provide adequate protection.

The CNSC anticipates that having added flexibility to consider specific situations will allow it to use a more balanced, risk-based approach when authorizing the return to work of a person who has exceeded a dose limit. Stakeholder feedback on the potential burden associated with this proposed change is encouraged.

2.4 Dosimetry Services

Section 18: Application for Licence to Operate

Section 8 of the *Radiation Protection Regulations* requires licensees to use a licensed dosimetry service (LSD) to measure and monitor radiation doses received by and committed to nuclear energy workers who are reasonably likely to receive effective doses greater than 5 mSv in a one-year dosimetry period.

Section 18 of the Regulations currently sets out the information required for an application for a licence to operate a dosimetry service. The information specified in section 18, as well as in other requirements found in CNSC Regulatory Standard S-106, *Technical and Quality Assurance Requirements for Dosimetry Services, Revision 1*, from the basis for granting a licence to perform licensed dosimetry.

The CNSC is proposing several amendments to section 18. These amendments are related to the information required for an application for a licence to operate a dosimetry service, including the incorporation of certain requirements currently found in S-106, as follows:

- amend paragraph 18(b) to read as follows: "the proposed quality assurance program, including the following elements: management policy; quality assurance program description; review by management; organization and authority; personnel qualifications; procurement; work control; change control; document control; calibration and maintenance; verification; non-conformance; corrective actions; records; and independent audits;"
- amend paragraph 18(c) to read as follows: "the types of dosimetry services proposed to be provided;"
- amend paragraph 18(d) to read as follows: "the precision, accuracy and reliability of the dosimetry services to be provided, including the provisions for independent testing and a demonstration of successful completion of the independent test;"

The proposed changes are not expected to cause any additional burden, since all potential dosimetry service licensees must meet these requirements as they are currently described in S-106.

Section 19: Obligations of Licensees

Obligation to report measured doses to the National Dose Registry
Section 19 of the *Radiation Protection Regulations* specifies that licensees who operate a dosimetry service must file specific information with Health Canada's National Dose Registry (NDR). This information is with respect to each nuclear energy worker for whom the licensed dosimetry service has measured and monitored a dose of radiation, and it includes the following: given names, social insurance number, sex, job category, location, and date of birth, and the doses received by and committed to the worker.

In addition, section 10 of the Regulations requires NEWs to provide specified personal information to the licensee upon request. In order for licensed dosimetry services to comply with the requirement to report to the NDR, it is implied – but not explicitly stated – that their clients (i.e., CNSC licensees) must submit to them to the necessary personal information for each NEW being monitored.

The CNSC is proposing to state explicitly that the licensees whose NEWs are monitored by an LDS must provide the required information to the LDS, for the purpose of reporting doses to the NDR. This would require rewording of section 19, potentially with an addition of a subsection specifying the requirement that every licensee shall provide, to every licensee who operates a dosimetry service, the information currently listed in paragraphs 19(*a*) through (*g*).

This change is expected to provide licensed dosimetry services with the means to require their clients to provide the information specified in the Regulations.

In addition, paragraph 19(*f*) currently lists the "amount of exposure of the worker to radon progeny" as required information that must be filed by the LDS in the NDR, along with the other information previously mentioned. To maintain consistency with the rest of the Regulations, the CNSC proposes to remove this clause, since the dose limits apply to equivalent and effective dose – rendering this clause unnecessary. In practice, workers are informed of their effective dose and all of its relevant contributions from various sources or pathways. Removing this clause will not

change this practice. In particular, the specific reporting requirements set by the NDR will not be impacted by the proposed amendments.

These proposed changes are expected to cause little to no administrative burden for licensees, as they represent clarifications of regulatory expectations.

Failure of an independent test or performance test
The CNSC is proposing to add a new requirement in section 19 that addresses the failure of an independent test or performance test of the LDS. The proposed new requirement would obligate the LDS to notify the CNSC, in writing, immediately following the failure of a test. The LDS would also have to submit a detailed report outlining the causes of the event and corrective actions, within 30 days of the test failure.

This change is not expected to cause any additional administrative burden since all dosimetry service licensees must already meet this requirement as currently described in S-106. The CNSC believes, however, this requirement would be more appropriately stated in the *Radiation Protection Regulations*, since it applies to all dosimetry service licensees.

2.5 Labelling and Signs

Section 20: Labelling of Containers and Devices

Since January 2006, under an exemption granted by the Commission to section 8 of the *Nuclear Substances and Radiation Devices Regulations,* a person may possess, transfer or use an unlimited number of radium luminous devices without a licence, provided that radium is the only nuclear substance in the device and the device is not disassembled or tampered with. The exemption was granted by the Commission following an assessment of the risk associated with the possession of devices containing radium luminous compounds. This assessment concluded that the risks to persons are low, as long as the devices are intact and handled safely.

The manufacture of radium luminous devices in Canada, mainly from the 1930s until the late 1960s, predated the regulatory requirements for labelling devices containing radioactive substances. As a result, radium luminous devices – most of which are now in the public domain – are typically not signed or labelled as containing radioactive materials. In order to align the requirements in the *Radiation Protection Regulations* with the licensing exemption granted in January 2006, the CNSC proposes to add a requirement to subsection 20(2). This amendment would exempt persons who meet the terms of the exemption for radium luminous devices from the requirements in paragraphs 20(1)(*a*) and (*b*).

The proposed exemption is a clarification of regulatory expectations and would not require any action by owners of radium luminous devices. The CNSC therefore does not anticipate any additional administrative burden.

Section 21: Posting of Signs at Boundaries and Points of Access

In 2007, section 21 of the *Radiation Protection Regulations* was amended to remove the word “vehicle” because of issues with the original wording and interpretation. In spite of this amendment, confusion has persisted with the application of section 21’s requirements, as they relate to vehicles.

A vehicle being used to store radioactive material while it is not in transit is considered an enclosure. Therefore, the requirements of section 21 with respect to the posting of signs apply in such a circumstance. The CNSC is considering an amendment to section 21 to clarify the requirements for posting signs on vehicles used for storage and that are not consigned for transport. The intent of the proposed amendment is to clarify the expectations for situations in which a vehicle does not require signage (placards) in accordance with the *Packaging and Transport of Nuclear Substances Regulations*.

Since the proposed revisions are for clarity only, it is expected that no additional administrative burden for licensees would be imposed.

2.6 Records To Be Kept By Licensees

Section 24: Records to be Kept by Licensees

Subsection 5(1) of the *Radiation Protection Regulations* requires that for the purpose of keeping a record of radiation doses, in accordance with section 27 of the *Nuclear Safety and Control Act* (NSCA), every licensee shall ascertain and record the magnitude of exposure to radon progeny[14] of each person referred to in that section as well as the effective dose and equivalent dose received by and committed to that person.

Currently, the *Radiation Protection Regulations* do not identify specific time periods for retaining these types of records. For records for which no retention period is quoted in the NSCA or the *Radiation Protection Regulations*, section 28 of the *General Nuclear Safety and Control Regulations* applies (i.e., until one year after the expiry of the licence that authorized the activity). The CNSC has noted that licensees do not always interpret this requirement correctly: some have questioned if they must keep records for one year after they cease to hold a licence for the activity in question, or if they must keep such records for a one-year period after the licence has, or would have, actually expired.

To ensure that requirements are clear, the CNSC is considering one or both of the following:

- amending section 24 of the *Radiation Protection Regulations* to provide the necessary clarity with respect to expectations for dose records
- amending section 24 of the *Radiation Protection Regulations* to include a specific time period for retaining records of doses generated, in accordance with subsection 5(1)

In determining an appropriate timeframe, the CNSC considered the IAEA revised BSS as a benchmark. The IAEA recommends that occupational exposure records for each worker shall be maintained during and after the worker's working life, at least until the former worker attains or would have attained the age of 75 years, and for not less than 30 years after cessation of the work in which the worker was subject to occupational exposure.

The CNSC is seeking feedback on its two proposals to amend section 24 of the *Radiation Protection Regulations*. It also seeks stakeholder opinions on an appropriate retention period, should a defined time period be specified in the regulations.

[14] The CNSC is proposing to remove the specific reference to radon progeny exposure as outlined in the discussion on proposed changes to section 5.

If section 24 is amended, licensees may incur an administrative burden. The CNSC is therefore requesting feedback to determine the most appropriate approach.

2.7 Transitional Provision

Section 25: Transitional Provision

The current text in section 25 describes the application of the effective dose limits in the transition period that existed from the time the *Radiation Protection Regulations* came into force (January 1, 2000) until the beginning of the first one-year dosimetry period, which began on January 1, 2001. This section was necessary when the Regulations were created, because these particular dose limits and the related concept of fixed dosimetry periods were being applied for the first time (dosimetry periods are further explained in the part of this paper that presents the CNSC's proposed changes to section 13).

If the concept of fixed dosimetry periods remains in the *Radiation Protection Regulations*, section 25 will no longer be required – because the dosimetry periods have been defined and applied since 2000. In this case, section 25 would be removed.

However, if stakeholder feedback on this discussion paper indicates that a "rolling" five-year dosimetry period would be beneficial and such a system is implemented, then section 25 would require amendment. Section 25 would therefore be changed to identify the required transitional provisions as to when to begin the application of rolling dosimetry periods. The outcome of the public comment period will provide the CNSC with the feedback it needs to form a recommendation on this matter.

Section 25 simply provides a description of how and when to implement regulatory requirements; therefore, any change would likely impose only minor administrative burden.

2.8 Schedules 1 and 2

The CNSC is proposing to remove the tables of weighting factors found in Schedules 1 and 2 of the *Radiation Protection Regulations*. The reasoning for this is twofold:

- if changes to the weighting factors occur and are supported by the CNSC, the Regulations would require an amendment
- licensees typically use dose conversion factors (also published by organizations such as the ICRP), as opposed to the weighting factors themselves

It should also be noted that new tissue weighting factors are being incorporated into updated ICRP internal dose coefficients, and will be published in four parts. The publication of these new dose coefficients will mean that some effective dose calculations based on intakes of nuclear substances may change, with doses (based on the same unit intake) increasing in certain cases and decreasing in others. The exact outcomes will not be known until the dose coefficients are published.

In addition, changes to the dose-response function for neutrons have been incorporated in the development of revised energy-dependent dose conversion factors for neutrons (as published in ICRP Publication 116). In most cases, this change will have little impact on the measurement and assessment of neutron dose.

The methods that licensees use to measure and calculate dose are assessed by the CNSC through its licensing and compliance programs. The CNSC also defines its expectations for dosimetry services in S-106. The inclusion of the weighting factors in the *Radiation Protection Regulations* therefore serves little value, and the CNSC expects that removing them would not affect licensees. Nevertheless, it encourages stakeholders to comment on this proposal.

The following information addresses scientific updates to the tissue and radiation weighting factors that are listed in the current Regulations. This discussion has been included for transparency and clarity.

Tissue weighting factors

The concept of effective dose is based, in part, on tissue weighting factors that represent the relative contribution of that organ or tissue to the total injury from uniform irradiation of the whole body. These weighting factors are usually updated when the ICRP publishes its general recommendations, which are based upon the latest scientific evidence. ICRP 103 recommended changes to weighting factors for the breast (increased from 0.05 to 0.12); gonads (decreased from 0.20 to 0.08); and the bladder, esophagus, liver and thyroid (each reduced from 0.05 to 0.04). There was also a slight change to the weighting factor for "remainder tissues".

Table 1 provides the updated tissue weighting factors that are listed in ICRP 103.

Tissue	w_T	$\sum w_T$
Bone-marrow (red), colon, lung, stomach, breast, remainder tissues*	0.12	0.72
Gonads	0.08	0.08
Bladder, esophagus, liver, thyroid	0.04	0.16
Bone surface, brain, salivary glands, skin	0.01	0.04

* Remainder tissues: adrenals, extrathoracic region, gall bladder, heart, kidneys, lymphatic nodes, muscle, oral mucosa, pancreas, prostate, small intestine, spleen, thymus, and uterus/cervix.

Radiation weighting factors

Similar to its guidance on tissue weighting factors, the ICRP also recommends radiation weighting factors that correct for differences in biological effectiveness of the different types of radiation. High-energy gamma rays or x-rays are used as the reference radiation for comparing the biological effectiveness of other types of radiation. For example, alpha particles are generally judged to be 20 times more effective than gamma rays at causing radiological injury, and are therefore assigned a radiation weighting factor (or w_R) of 20.

In its 2007 guidance, the ICRP recommended changes to the weighting factors used for neutrons, pions and protons. Protons and pions are both associated with cosmic rays and high-energy particle accelerators and therefore pose an external radiation risk to some workers. The ICRP recommended decreasing the weighting factor for protons from 5 to 2. It also recommended introducing a radiation factor of 2 to apply specifically to pions (a radiation weighting factor used only for pions had not been previously suggested).

The ICRP previously recommended (ICRP 60) three separate "step functions" or mathematical equations to calculate the w_R for neutrons, based upon their energy. In its latest recommendations (ICRP 103), the ICRP proposed a single formula that describes the entire dose-response function. The most significant practical changes in the newer guidance were the decrease of w_R for low-energy neutrons, and the decrease of w_R at neutron energies above 100 MeV.

3. New Sections Proposed for the *Radiation Protection Regulations*

The CNSC is considering introducing two new sections to the *Radiation Protection Regulations*:

- Radiation Detection and Measurement Instrumentation
- Responsibility for Radiation Protection

3.1 Proposed Section on Radiation Detection and Measurement Instrumentation

Both the *Nuclear Substances and Radiation Devices Regulations* (section 20) and the *Class II Nuclear Facilities and Prescribed Equipment Regulations* (section 18) specify requirements related to radiation survey meters. In addition, paragraph 12(*e*) of the *General Nuclear Safety and Control Regulations* requires that "every person at the site of the licensed activity use the equipment, devices, clothing and procedures in accordance with the Act, the regulations made under the Act and the licence". However, the *Radiation Protection Regulations* do not include any regulatory requirements specifically related to radiation detection and measurement instrumentation.

The CNSC is considering establishing requirements in the *Radiation Protection Regulations* related to the provision and use of radiation monitoring equipment. These requirements would apply to all licensees. Examples of this type of equipment include electronic personal dosimeters, survey meters, contamination meters and area monitors.

Radiation monitoring equipment must be appropriately selected for the types, levels, and energies of the radiation encountered, and it must be capable of performing accurately and reliably in operating field conditions during routine work and emergencies. Instruments must also be tested routinely to verify proper functioning including, where appropriate, for battery power level, high voltage and source response.

Proposed requirements for the *Radiation Protection Regulations* related to use of calibrated equipment will be similar to those in the above-mentioned regulations. The CNSC is proposing that each radiation detection instrument require calibrations done in accordance with an established standard. The calibration standard currently under consideration is the IAEA Safety Report Series, No. 16, *Calibration of Radiation Protection Monitoring Instruments*.

The CNSC is seeking stakeholder feedback on its proposal to add a section to the *Radiation Protection Regulations* on radiation detection and measurement instrumentation. Comments are encouraged, particularly on the proposed section's potential administrative burden.

3.2 Proposed Section on Responsibility for Radiation Protection

The CNSC is considering amending the *Radiation Protection Regulations* to include a requirement for every licensee to appoint a person or position, within the licensee's organization, to be responsible for implementing the radiation protection program. This requirement would allow the person to occupy one of the following positions: radiation safety officer; radiation protection officer; a position certified in accordance with subsection 9(2) of the *Class I Nuclear Facilities Regulations*; or any other position responsible for implementing radiation safety for the licensed activity.

The licensee would be required to identify the qualifications and competencies required for the appointed position. The licensee would also be required to demonstrate to the CNSC that the selected individual meets and maintains the documented qualification and competency

requirements. Furthermore, the CNSC would require written notification of the initial appointment and any change of responsible person, in accordance with section 15 of the *General Nuclear Safety and Control Regulations.*

In general, the licensee would need to demonstrate that the person responsible for the implementation of the radiation protection program:

- has sufficient knowledge, experience and resources to effectively manage the radiation protection program
- has sufficient time to respond to day-to-day situations that may arise, in addition to performing ongoing program oversight
- understands the nature of the licensed activity and applicable regulatory requirements

The CNSC would expect the responsible person to have successfully completed the following training, as a minimum:

- training in the theory and principles of radiation safety, as well as in relevant regulatory requirements
- on-the-job training relevant to the type of licensed activity

The anticipated administrative burden of introducing this requirement is expected to be low to moderate, since the proposal simply formalizes expectations and practices that already exist for many licensees.

4. Carriers of Nuclear Substances

Generally, the CNSC does not license most carriers of nuclear substances. However, the CNSC does need to provide some oversight, in the areas of radiation safety and nuclear security, for these carriers.

When nuclear substances are packaged correctly, their transport is safe and the radiation risks for carriers are typically low. Risks that may occur as a result of a transport accident or when transporting large numbers of packages, can be managed with an appropriate radiation protection program. CNSC Guidance Document GD-314, *Radiation Protection Program Design for the Transport of Nuclear Substances* was published by the CNSC in 2012 to assist carriers in developing their radiation protection programs.

The CNSC recently consulted on a discussion paper regarding the proposal to amend the *Packaging and Transport of Nuclear Substances Regulations* (PTNSR). This discussion paper introduced a proposal to amend the *Radiation Protection Regulations*, in order to make radiation protection requirements for carriers of nuclear substances consistent with those applicable to licensees and their workers.

The PTNSR discussion paper and the stakeholder comments can be found on the CNSC Web site at nuclearsafety.gc.ca/eng/lawsregs/discussionpapers/history/dis-12-06.cfm.

The CNSC considered stakeholder comments about this proposal further to the PTNSR discussion paper, and is currently determining the most appropriate approach.

5. Conclusion

The CNSC is committed to ensuring its radiation protection requirements remain clear, up-to-date and aligned with international standards, with consideration given to the Canadian context. The current *Radiation Protection Regulations* were implemented in 2000. Since then, there have been changes to international benchmarks, along with several lessons learned – necessitating the need to update and refine the Regulations.

The CNSC has therefore proposed several amendments to the *Radiation Protection Regulations*. The proposed changes presented in this paper are intended to clarify or simplify existing regulations, and to update existing requirements in order to align with new or revised international standards. Most countries have already adopted ICRP 60, and are now moving toward incorporating the recommendations of ICRP 103, including references to the IAEA revised BSS. By following suit and incorporating guidance from ICRP 103 and the IAEA revised BSS into the *Radiation Protection Regulations*, the CNSC will ensure its requirements are in line with internationally accepted norms.

6. Public Input

The objective of this discussion paper is to seek feedback on the proposed regulatory amendments outlined in the document. The CNSC will use this input to develop detailed proposals for regulatory amendments for the *Radiation Protection Regulations*. The CNSC will then proceed to pre-publish the regulatory amendments in the *Canada Gazette*, Part I for further stakeholder input.

Following pre-publication, the proposed amendments will be revised as appropriate and presented to the Commission for consideration. Should the Commission make the regulations, they will be presented to Governor in Council, and if approved, published in *Canada Gazette*, Part II.

The CNSC seeks input specific to the proposed regulatory amendments that are outlined in this paper, but also welcomes any additional comments. In terms of feedback on the proposed amendments, the CNSC encourages respondents to give as much detail as possible about the potential impact on business costs and/or the increase in administrative burden on licensees. The CNSC invites all stakeholders to voice their views on these issues.

7. How to Participate

Please submit your comments or feedback in one of the following ways:

- **In writing:**
  Canadian Nuclear Safety Commission
  P.O. Box 1046, Station B
  280 Slater Street
  Ottawa, Ontario K1P 5S9

- **Online:** using the electronic comment form

- **By email:** consultation@cnsc-ccsn.gc.ca

- **By fax:** 613-995-5086

Appendix A: Table of Proposed Amendments

Appendix A presents the CNSC's proposed amendments to the *Radiation Protection Regulations*, with comparisons between current requirements and proposed changes.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
1	Interpretation		Certain definitions in subsection 1(1) would be deleted, added or changed if the amendments proposed in this paper are adopted.	
2	Application		Revision to subsection 2(2) in order to clarify that licensees are exempt from the dose limits with respect to those individuals currently described in paragraphs 2(2)(*a*), (*c*) and for caregivers. Removal of link between sections 2 and 3.	To clarify and add completeness about which exemptions apply and to whom.
3	Administration of Nuclear Substances for Medical Purposes		Addition of a definition of the term "caregiver" to section 1. Addition of a requirement for licensees to inform caregivers that they may incur radiation exposure that exceeds the dose limit for any person other than a nuclear energy worker.	To clearly state who would qualify as a caregiver. To ensure licensees take reasonable measures to ensure that caregivers are aware that they are acting in such a capacity and accept the minimal risk associated with the potential to exceed the dose limit for any person other than a nuclear energy worker.

Section	Title	Current ***Radiation Protection Regulations*** **(SOR/2000-203)**	Proposed amendment	Comments/rationale
4	Radiation Protection Program	Every licensee shall implement a radiation protection program and shall, as part of that program, (*a)* keep the amount of exposure to radon progeny and the effective dose and equivalent dose received by and committed to persons as low as is reasonably achievable, social and economic factors being taken into account…	Every licensee shall implement a radiation protection program and shall, as part of that program, (*a)* keep the effective dose and equivalent dose received by and committed to persons as low as is reasonably achievable, social and economic factors being taken into account…	The unique treatment of radon progeny, along with the underlying concepts of "working level" and "working level month", is considered to be unnecessary in the context of the Regulations. Furthermore, the models behind the approach to the calculation of radon progeny dose are currently being revised by the ICRP. It is expected these models will soon be replaced by the concept of dose coefficients (similar to the treatment of intakes of other radionuclides). Removal of the specific reference to radon progeny exposure would align with the proposed simplification of the formula used to calculate total effective dose (found in section 8) with the proposed changes to sections 5, 13 and 19.

Section	Title	Current ***Radiation Protection Regulations*** **(SOR/2000-203)**	Proposed amendment	Comments/rationale
5	Ascertainment and Recording of Doses	(1) For the purpose of keeping a record of doses of radiation in accordance with section 27 of the Act, every licensee shall ascertain and record the magnitude of exposure to radon progeny of each person referred to in that section, as well as the effective dose and equivalent dose received by and committed to that person. (2) A licensee shall ascertain the magnitude of exposure to radon progeny and the effective dose and equivalent dose…	(1) For the purpose of keeping a record of doses of radiation in accordance with section 27 of the Act, every licensee shall ascertain and record the effective dose and equivalent dose received by and committed to each person referred to in that section. (2) A licensee shall ascertain the effective dose and equivalent dose…	Removal of the specific reference to radon progeny exposure in subsections 5(1) and (2) would align with the proposed revisions for sections 4, 13 and 19.
6	Action Levels	No proposed change		

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
7	Provision of Information	7. (1) Every licensee shall inform each nuclear energy worker, in writing, (*a*) that he or she is a nuclear energy worker;	7. (1) Every licensee shall inform each worker, in writing, (*a*) whether he or she is a nuclear energy worker;	The CNSC proposes replacing the term "nuclear energy worker" with the term "worker" using the existing definition found in the Regulations: "a person who performs work that is referred to in a licence". This change would require an amendment to 7(1)(*a).* As a result, 7(1)(*b*), *(c*), and (*d)* would apply to all workers.
			Addition of a specific requirement to inform all workers of their duties and responsibilities in the event of an emergency.	Introducing this requirement would enhance workers' preparedness and their capacity to respond to emergencies.
		(*d)* of the worker's radiation dose levels	Amendment to specify that workers be individually informed of their dose results (both effective dose and equivalent dose) on an annual basis.	Currently, section 7 does not specify a time period for reporting dose levels to workers. Moreover, the terminology "in writing" has often been misinterpreted, and it will be clarified via the proposed amendment.
			Addition of a requirement to subsection 7(1) to include the provision of information to each female worker on the potential risks for a breast-fed infant from intakes of radioactive substances by the worker. Addition of a requirement to subsection 7(2) to ensure that every licensee informs each female worker, in writing, of their rights and obligations as a breast-feeding worker under section 11.	This proposed addition will align the Regulations with the IAEA revised BSS. Refer to section 11 in this table for further proposed changes related to female workers who are breast-feeding.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
8	Requirement to Use Licensed Dosimetry Service		Addition of a requirement for licensees to use a licensed dosimetry service to measure and monitor the doses of radiation for nuclear energy workers who have a reasonable probability of receiving an equivalent dose to the skin or the skin of any hand or foot of greater than 50 mSv per year.	The current Regulations have no specific requirements related to the use of a licensed dosimetry service with regard to equivalent dose to the skin, and the skin of any hand or foot. The proposed requirement will clarify the CNSC's expectations.
9	Collection of Personal Information	No proposed change		
10	Nuclear Energy Workers	No proposed change		
11	Pregnant Nuclear Energy Workers		Addition of a requirement for a female worker to inform the licensee in writing if she is breast-feeding. Addition of a requirement for a licensee to adapt the working conditions in respect of exposure to the breast-feeding female worker, during both routine operations and emergencies, to ensure the breast-fed infant is protected as required for a member of the public.	To align the Regulations with the IAEA revised BSS and ensure the protection of breast-fed infants.
12	Interpretation		Certain definitions will be amended or removed as a result of the proposed amendments to section 13.	

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
13	Effective Dose Limits		Amend subsections 13(2),(3) and (4) to describe in written text, as opposed to mathematical formulas, how effective doses are to be calculated. The proposed text would indicate that effective dose would be calculated to include both the sum of relevant doses from external radiation exposures and the sum of relevant committed doses from intakes in the same period	To simplify and clarify regulatory requirements, while better reflecting how doses are measured and calculated in practice
			Removal of direct reference to radon and radon progeny as well as the related terms of “working level” and “working level month”.	The unique treatment of radon progeny, along with the underlying concepts of the working level and the working level month, are considered to be unnecessary in the context of the Regulations. Furthermore, the models behind the approach to the calculation of radon progeny dose are currently being revised by the ICRP. It is expected these models will soon be replaced by the concept of dose coefficients (similar to the treatment of intakes of other radionuclides). The removal of specific references to radon and radon progeny, along with the terms “working level” and “working level month”, would align with other similar changes proposed for sections 4, 5, and 19.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
14	Equivalent Dose Limits	"Hands and feet" are referenced in item 3, under column 1 in the table outlined in section 14.	Amendment to the wording "hands and feet" to read "the skin of each hand and foot".	To clarify terminology to more accurately reflect both of the following: the actual measurement of equivalent dose to the hands and feet, and the intent of the dose limit.
		The dose limit in item 1, under column 4 in the table outlined in section 14.	Amendment to the dose limit for the lens of an eye for a nuclear energy worker from the current limit of 150 mSv per one-year dosimetry period to 50 mSv per one-year dosimetry period. Addition of a new dose limit for the lens of an eye for a nuclear energy worker of 100 mSv per five-year dosimetry period.	To align the dose limits for the lens of an eye with the ICRP's latest recommendation, in order to protect workers' health and safety.
15	Emergencies		Replace current text with new text that incorporates relevant clauses from the IAEA revised BSS with respect to dose limits for emergencies. Introduce new requirementsfor when dose limits are exceeded during an emergency and for the associated return-to-work processes for workers. The proposed text for section 15 is described in detail in the discussion paper.	To address the CNSC Task Force recommendation that the *Radiation Protection Regulations* be amended to be more consistent with international guidance and to more fully describe the regulatory requirements needed to address radiological hazards during the phases of an emergency. Section 15 is proposed as a stand-alone section dealing with all aspects of an emergency, including: the applicable dose limits, the requirements for and actions to be taken when emergency dose limits are exceeded, and the required process for the transition from emergency-related work to future work activities for persons who have exceeded a dose limit(s) during the emergency.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
16	When Dose Limit Exceeded		Amendment that would require a person to be removed from work that is likely to add to his or her dose, if the person may have or has exceeded any of the dose limits that apply to nuclear energy workers or pregnant nuclear energy workers, as specified in sections 13 and 14. Removal of the specific reference to section 15.	To ensure that regulatory requirements are risk-based, while reducing administrative and financial burden associated with removing a person from work when he or she has exceeded a dose limit for any person other than a nuclear energy worker. Section 15 is proposed as a stand-alone section dealing with all aspects of the emergency, including the requirements for and actions to be taken when emergency dose limits are exceeded.
17	Authorization of Return to Work		Removal of subsections 17(2) and (3).	To allow for flexibility in the determination of future dose limits for the purposes of authorizing the return to work of a person who exceeds a dose limit, as specified in section 16.
18	Application for Licence to Operate	18(*b*) the proposed quality assurance program	18(*b*) the proposed quality assurance program, including the following elements: management policy; quality assurance program description; review by management; organization and authority; personnel qualifications; procurement; work control; change control; document control; calibration and maintenance; verification; non-conformance; corrective actions; records; and independent audits.	To reflect requirements of S-106, *Technical and Quality Assurance Requirements for Dosimetry Services*, *Revision 1*, that are already being implemented by licensees. The amendment would incorporate requirements that apply to all licensed dosimetry services.
		18(*c*) the types of dosimetry services proposed to be provided, including the types of radiation that will be monitored and their	18(*c*) the types of dosimetry services proposed to be provided;	

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
		respective energy ranges;		
		18(*d*) the precision, accuracy and reliability of the dosimetry services to be provided; and	18(*d*) the precision, accuracy and reliability of the dosimetry services to be provided, including the provisions for independent testing and a demonstration of successful completion of the independent test;	
19	Obligations of Licensees		Addition of a requirement that the licensees whose NEWs are monitored by a licensed dosimetry service must provide the required information to the licensed dosimetry service, for the purpose of reporting doses to the National Dose Registry.	To provide licensed dosimetry services with the means to require clients (i.e., CNSC licensees) who need licensed dosimetry services to provide the information specified in the Regulations (see sections 10 and 19 in this table).
			Addition of a requirement for the licensed dosimetry service to notify the CNSC in writing immediately following the failure of a independent or performance test, and to submit a detailed report, within 30 days of the test failure, outlining the causes of the event and corrective actions.	This requirement already applies to all licensed dosimetry services in Canada and has been stated in S-106, *Technical and Quality Assurance Requirements for Dosimetry Services, Revision 1*. However, it would be more appropriately captured in regulation.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
20	Labelling of Containers and Devices		Addition of a requirement to subsection 20(2) that would exempt persons who meet the terms of the exemption for radium luminous devices from the requirements in paragraphs 20(1)(*a)* and (*b).*	To align requirements in the Regulations with the licensing exemption listed in section 8 of the *Nuclear Substances and Radiation Devices Regulations*, in relation to persons possessing, transferring or using radium luminous devices that contain only radium, and that are not disassembled or tampered with.
21	Posting of Signs at Boundaries and Points of Access		Amendment to clarify the requirements for posting signs on vehicles used for storage and that are not consigned for transport.	To clarify the CNSC's expectations for situations in which a vehicle does not require signage in accordance with the *Packaging and Transport of Nuclear Substances Regulations.*
22	Use of Radiation Warning Symbol	No proposed change		
23	Frivolous Posting of Signs	No proposed change		
24	Records to be Kept by Licensees		Amendment to clarify the retention period required for dose records, and/or to state the specific time period for the retention of records of doses generated in accordance with subsection 5(1).	To promote consistency among licensees and to clarify CNSC expectations with respect to the required retention period for dose records.

Section	Title	Current *Radiation Protection Regulations* (SOR/2000-203)	Proposed amendment	Comments/rationale
25	Transitional Provisions		Amend section 25 in one of the following ways: 1. Remove section 25 entirely. 2. Revise section 25 to provide transitional provisions for the coming into force of the new *Radiation Protection Regulations*, with consideration given to possible changes to the definition of a "five-year dosimetry period".	1. If there is no change to the current definition of the "five-year dosimetry period", the current section 25 will no longer be required. This is because the dosimetry periods have been defined and applied since the Regulations came into force in the year 2000. 2. If a change is made to the definition of the "five-year dosimetry period", section 25 would require an amendment to identify the transitional provisions.
26	Coming into Force	No proposed change		
Schedule 1	Organ or Tissue Weighting Factors		Removal of Schedule 1.	Removing the schedule would avoid the need for further amendments if there are changes to the recommended weighting factors. Furthermore, licensees rarely use the actual weighting factors in dose calculations, so there is no benefit to including the values in the Regulations.
Schedule 2	Radiation Weighting Factors		Removal of Schedule 2.	Removing the schedule would avoid the need for further regulatory amendments if changes are made to the recommended weighting factors. Furthermore, licensees rarely use the actual weighting factors in dose calculations, so there is no benefit to including the values in the Regulations.

Appendix B: Table of Proposed New Sections

Appendix B presents the CNSC's proposals for new sections to the *Radiation Protection Regulations*.

Proposed new section	Comments/rationale
Radiation Detection and Measurement Instrumentation	This proposed new section would include requirements related to the provision and use of radiation detection and monitoring equipment. The CNSC is also considering requirements for each radiation detection and monitoring instrument to be calibrated in accordance with an established international standard, such as IAEA Safety Report Series, No. 16, *Calibration of Radiation Protection Monitoring Instrument*.
Responsibility for Radiation Protection	This proposed new section would introduce a requirement for every licensee to appoint, within its organization, a person or position responsible for the implementation of the radiation protection program. The licensee would be required to identify the qualifications and competencies required for the responsible person, and to demonstrate to the CNSC that the selected individual meets and maintains the minimum competency and qualification requirements. The licensee would also be required to notify the CNSC of the appointment (and any change) of the responsible person.

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