
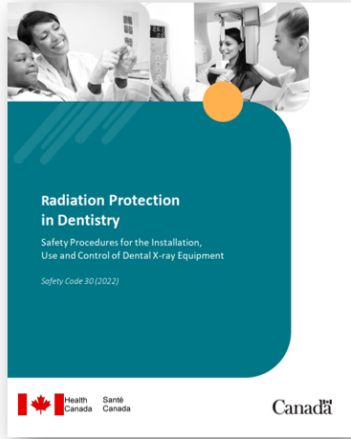


RADIATION PROTECTION, CCMB

E: CCMBMPX-rayCompliance@cancercare.mb.ca

Radiation Protection will be supporting the following in the revised Safety Code 30 – Radiation Protection in Dentistry (2022)

1.0  **Safety Code 30 – Radiation Protection in Dentistry**



Safety Code 30 is a document prepared by Health Canada to provide radiation protection guidance. It sets out principles and best practices to help ensure radiation protection of all individuals who may be exposed to radiation from dental equipment to achieve these principles:

- Minimize patient exposure to x-rays in dental radiography, while ensuring the necessary diagnostic information is obtained.
- To help ensure optional protection of personnel operating dental x-ray equipment.
- To help ensure optimal protection of other personnel and the general public in the areas where dental x-ray equipment is operated.

1.0 Safety Code 30 – Radiation Protection in Dentistry¹

1.1 Safety Code 30 is prepared by Health Canada, and it provides radiation protection guidance for our operations here in Manitoba.

1.2 It sets out principles and best practices to help ensure radiation protection of all individuals who may be exposed to radiation from dental equipment to achieve these principles:

- Minimize patient exposure to X-rays in dental radiography, while ensuring the necessary diagnostic information is obtained.
- To help ensure optional protection of personnel operating dental X-ray equipment and protection of other personnel including the general public where the dental equipment is operated.

2.0 Occupational Radiation Monitoring with Personal Dosimeters in Dental Facilities



In the newest version of Safety Code 30:

As per Safety Code 30, A.2.0.10:

"After review of the first annual radiation dose (in consultation with an expert in radiation protection), along with consideration of any potential variation factors contributing to future radiation dose, if the dose is expected to be below 1 mSv/year, the use of a personal dosimeter can be discontinued."

Group Number:		Date of Report:		Page			
Period	Dosimeter Serial #	Full Name	Medic. Control	Type of Lead	Current Dose	Cumulative Dose (mSv)	Assess
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
20210301		CONTROL		Whole Body	0.00	0.00	
20210301				Hand	0.00	0.00	
20210301				Whole Body	0.00	0.00	
20210301				Hand	0.00	0.00	
20210301				Whole Body	0.00	0.00	
20210301				Hand	0.00	0.00	

2.0 Occupational Radiation Monitoring with Personal Dosimeters in Dental Facilities

2.1 In the newest version of Safety Code 30, it states, "After review of the first annual radiation dose (in consultation with an expert in radiation protection), along with consideration of any potential variation factors contributing to future radiation dose, if the dose is expected to be below 1 mSv/year, the use of a personal dosimeter can be discontinued."

2.2 Years of radiation monitoring have shown that operators of x-ray equipment in dental facilities rarely exceed the public dose limit of 1 mSv/year. Dental facilities in Manitoba will now be able to request, through our department, approval to discontinue the use of personal dosimeters.

2.3 It is not mandatory, however, to discontinue the use of personal dosimeters to monitor occupational doses.

How to Request Discontinuation of Personal Dosimeters:



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Dental facilities may now request to discontinue the use of personal dosimeters (OSL)

- The owner (or appointed person) of the dental x-ray equipment in a facility must email us to request approval to discontinue use of personal dosimeter(s).
- Once we receive the request, we will contact the dental facility and request the submission of the last four consecutive NDS exposure reports to our department.
- If approved by Radiation Protection, it will then be the responsibility of the dental facility (owner and/or appointed designated person) to contact National Dosimetry Services to cancel their account.

2.4 If the owner of the x-ray equipment in a dental facility (or appointed designated person), wishes to discontinue the use of OSL personal dosimeters (National Dosimetry Services, Health Canada) for occupational radiation monitoring, they must contact Radiation Protection, CCMB, for approval. Radiation Protection, CCMB, will then request copies of the last four consecutive exposure reports to ensure doses are below 1mSv/year. Upon review of the NDS reports and the most recent Radiation Protection inspection of the facility, a letter from Radiation Protection, CCMB, will then be issued to the facility indicating if:

- Personal dosimeters (OSL) are **approved** for discontinuation
or
- Personal dosimeters (OSL) are **not approved** for discontinuation

2.5 It will then be the responsibility of the owner or appointed designated person to contact National Dosimetry Services, Health Canada, to cancel their account if Radiation Protection, CCMB, grants approval. [NDS Health Canada](#)

New Dental Facilities and Personal Dosimeters

In the newest version of Safety Code 30

- All new dental facilities **must** ensure personal radiation dosimeters (National Dosimetry Services, Health Canada) are worn by all operators of x-ray equipment and personnel who routinely participate in radiological procedures for the first year of operation to establish a baseline annual dose.
- After the first year, they can **request** discontinuation by contacting Radiation Protection, CCMB, for approval.

National Dosimetry Services

Health Canada

T: 1-800-261-6689

F: 1-800-252-6272

E: hc.nds-snd.sc@canada.ca

W: [NDS](#)



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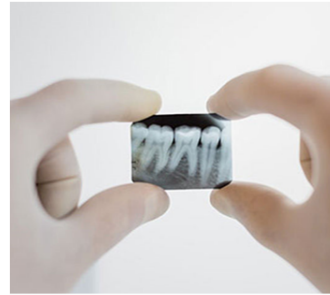
E: CCMBMPX-rayCompliance@cancercare.mb.ca

2.6 Any new dental facility with X-ray equipment, however, must ensure personal dosimeters (National Dosimetry Services, Health Canada) are worn by all operators of X-ray equipment and personnel who routinely participate in radiological procedures for the first year of operation to establish a baseline annual dose. After the first year, if they wish to request the discontinuation of personal dosimeters, they must contact Radiation Protection, CCMB, for approval.

3.0 Film Based Imaging

In the newest version of Safety Code 30:

A.3.2.2.5, "For film-based imaging when the implementation of digital radiography is not practicable, E-speed film or faster **must** be used and D-speed film **must NOT** be used."



➤ Radiation Protection, CCMB, is supporting this recommendation in Manitoba. We will be seeking compliance with this requirement since film below E-speed contributes to greater than necessary patient exposure.

It will be required to use an E-speed film or faster by January 1, 2024.

3.0 Film-Based Imaging

3.1 Safety Code 30, states, "For film-based imaging when the implementation of digital radiography is not practicable, E-speed film or faster must be used, and D-speed film must NOT be used."

3.2 Radiation Protection, CCMB, is supporting this recommendation in Manitoba. We will be seeking compliance with this requirement since film below E-speed contributes to greater than necessary patient exposure. **It will be required to use an E-speed film or faster by January 1, 2024.**

3.3 Film typically used for intraoral exams falls into 3-speed classes:

- D-speed (slowest)
- E and F-speed (fastest)

3.4 The faster the film, the less exposure it needs. Therefore, switching to a faster film complies with the ALARA principle to keep the dose to the patient As Low As Reasonably Achievable.

3.5 Results reported in the literature² illustrate that:

- Switching from E to F speed produced a 20-25% reduction in exposure.
- Switching from D to F-speed film produced a 60% reduction in exposure.
- E and F-speed film offer comparable clinical benefits compared to D-speed.

4.0 Collimation with Intraoral X-ray Units

In the newest version of Safety Code 30:

A.3.2.2.2., "Rectangular collimation of the X-ray beam must be used, except in occlusal protocols, as it significantly reduces the dose to the patient compared to circular collimation. Aftermarket adaptors are available for converting any round-headed collimator to rectangular collimation."



Radiation Protection, CCMB, is supporting this recommendation in Manitoba.

We will be seeking compliance with this requirement since rectangular collimation restricts the size of the X-ray beam, exposing significantly less tissue than round collimation, therefore, decreasing the effective dose to the patient.

4.0 Rectangular Collimation with Intraoral X-ray Units

4.1 Safety Code 30, states, "Rectangular collimation of the X-ray beam must be used, except in occlusal protocols, as it significantly reduces the dose to the patient compared to circular collimation. Aftermarket adaptors are available for converting any round-headed collimator to rectangular collimation." (See 4.3).

4.2 Radiation Protection, CCMB, is supporting this recommendation in Manitoba. We will be seeking compliance with this requirement since rectangular collimation restricts the size of the X-ray beam, exposing significantly less tissue than round collimation, therefore, decreasing the effective dose to the patient (unless it interferes with diagnostic information such as occlusal protocols).

4.3 This recommendation will be inventory-dependent:

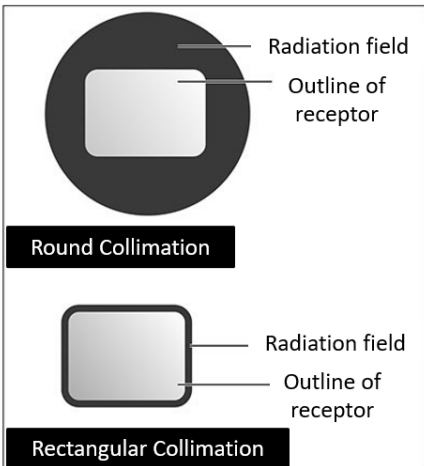
Rectangular collimation is mostly available for new makes/models of intraoral X-ray equipment. However, at present, it seems aftermarket rectangular collimation adaptors are not accessible for certain older X-ray intraoral units.

4.4 Radiation Protection, CCMB, requirements commencing January 1, 2024:

1. All **new** (or nearly new) intraoral X-ray equipment must **work towards** using rectangular collimation (if available). It will be the responsibility of the facility:
 - a) To determine the availability and purchase of the product for each respective intraoral X-ray unit.
 - b) To ensure this recommendation is being **worked towards**, documentation showing progress toward the implementation of rectangular collimation must be made available to Radiation Protection, CCMB (when requested).
2. It will be necessary to use rectangular collimation for all **other intraoral X-ray units** if and when aftermarket adaptors become available. It will be the responsibility of the facility to determine availability.

4.5 Additional Information:

Round Collimation vs Rectangular Collimation for Intraoral X-ray Units




Round Collimation

Radiation field
Outline of receptor

Rectangular Collimation

Radiation field
Outline of receptor

Image receptors are rectangular; therefore, the x-ray beam should be collimated to suit a rectangular shape rather than a circular shape to avoid unnecessary exposure to the patient.



WOW! Large dose reduction is possible through the use of rectangular collimation. It can decrease the radiation burden of the patient to 50% compared to circular collimation.

Scott, J. K. (2014). *National Library of Medicine*. Retrieved from Oblique lateral radiographs and bitewings; estimation of organ doses in head and neck region with Monte Carlo calculations: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4141675/>

- a) Image receptors are rectangular; therefore, the X-ray beam should be collimated to suit a rectangular shape rather than a circular shape to avoid unnecessary exposure to the patient. Large dose reduction is possible using rectangular collimation. It can decrease the radiation burden of the patient to 50% compared to circular collimation.³
- b) Cone Cut Errors:
The benefits of significant dose reduction when using rectangular collimation far outweigh the inconvenience of a less-than-perfect image due to an increase in cone cut errors.⁴ Given the smaller size of the rectangular collimator, alignment may require more precision however, the recommended technique is the same for both cylindrical and rectangular collimation. Reviewing positioning concepts and the use of beam alignment devices and image receptor holders is encouraged.

Please do not hesitate to contact us with any questions or concerns,



CONTACT US

Radiation Protection, CCMB
Room ON2118N, Medical Physics Department
675 McDermot Avenue
Winnipeg, MB R3E 0V9
T: 204-787-4145
F: 204-775-1684
E: CCMBMPX-rayCompliance@cancercare.mb.ca

¹Safety Code 30 – Radiation Protection in Dentistry: <https://www.canada.ca/en/health-canada/services/environmental-workplace-health/reports-publications/radiation/radiation-protection-dentistry-recommended-safety-procedures-use-dental-equipment-safety-code-30.html>

²US Food & Drug Administration: <https://www.fda.gov/radiation-emitting-products/nationwide-evaluation-x-ray-trendsnext/dental-radiography-doses-and-film-speed>

³ Scott, J.K (2014). National Library of Medicine. Retrieved from Oblique lateral radiographs and bitewings; estimation of organ doses in head and neck region with Monte Carlo calculations: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4141675/>

⁴ Ng, L. P. (2011). *NIH*. Retrieved from A comparison between bitewing radiographs taken with rectangular and circular collimators in UK military dental practices: <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC3520300/>