

Personal exposure monitoring for ionizing radiation (dosimetry)

OHS information for employers and workers

This bulletin explains Alberta Occupational Health and Safety (OHS) personal exposure limits and monitoring requirements for workers working with ionizing radiation equipment.

KEY INFORMATION

- A dosimeter must be provided to workers who use ionizing radiation equipment or an ionizing radiation source.
- Exposure limits are dependent on a worker's exposure situation and duration of exposure.

Dosimetry is the simplest, most cost-effective method available to monitor radiation exposure to workers working with radiation equipment or an ionizing radiation source. A dosimeter, also called a badge, is a device used to monitor exposure to ionizing radiation. Radiation exposure is measured in millisieverts (mSv).

Employers must provide workers with a personal dosimeter to monitor exposure when workers use or are involved in the use of ionizing radiation equipment or an ionizing radiation source.

The personal dosimeter must be supplied by a dosimetry service provider licensed by the Canadian Nuclear Safety Commission.

Who needs a dosimeter?

Workers who operate radiation equipment and workers who routinely participate in radiological procedures must wear personal dosimeters when using the following equipment:

- diagnostic or therapeutic X-ray equipment used by medical, dental, chiropractic, veterinary or other health professionals
- industrial X-ray equipment
- irradiation X-ray equipment
- particle accelerators

Unless they are likely to receive a radiation dose in excess of one mSv over a 12-month period, workers who operate

the following radiation equipment do not need to wear personal dosimeters:

- analytical X-ray equipment (including portable, hand-held open-beam XRF devices)
- cabinet X-ray equipment
- security X-ray equipment
- baggage-inspection X-ray equipment

An employer must provide every worker who receives or may receive a radiation dose of more than 1 mSv with a personal dosimeter.



Alberta's OHS legislation specifies the following maximum effective dose limits for ionizing radiation.

TABLE 1: EFFECTIVE DOSE LIMITS

Exposure limits for different situations*.

Person	Exposure period	Effective dose limit (mSv)
Worker who uses or is directly involved in the use of ionizing radiation equipment or an ionizing radiation source.	One year	50
	Rolling five calendar years	100
Worker, pregnant, who uses or is directly involved in the use of ionizing radiation equipment or an ionizing radiation source.	Balance of pregnancy after informing employer	4
Worker, student, undergoing a course of instruction involving the use of ionizing radiation equipment.	One year	1
Worker, other	One year	1

*There are additional exposure limits in the OHS Code for eyes and extremities. These additional limits become more relevant when these portions of the body are exposed to a significantly higher amount of radiation than the rest of the body.

Professionals such as physicians, dentists, chiropractors and veterinarians are not required to wear personal dosimeters unless they routinely participate in radiological procedures. However, their professional colleges and associations recommend that they wear personal dosimeters as they move around within a work site containing X-ray sources.

Dosimeter use and maintenance

Wearing a dosimeter

Dosimeters should be worn throughout the workday. This will ensure measurement of any exposure a worker may receive, even if they are not participating directly in a radiological procedure at the time. Note that:

- personal dosimeters must be worn by only one individual, not shared
- for whole body monitoring, dosimeters must be worn on the trunk of the body, either at the waist or chest level
- when protective clothing is worn, e.g. a lead apron, the personal dosimeter must be worn underneath the apron
- if eyes or extremities are likely to be exposed to significantly higher doses due to the radiological workload at the facility, additional dosimeters should be worn at the neck level or on the hands
- in addition to a personal dosimeter, industrial radiographers must use an electronic alarm dosimeter (active dosimeter) that will emit an audible signal when the equivalent dose rate reaches or exceeds 5 mSv per hour (mSv/h) or where the total equivalent dose reaches or exceeds 2 mSv

Whole body dosimeters are exchanged through a service provider quarterly, except for industrial radiographers, who exchange their whole body dosimeters bi-weekly.

Pregnant workers

Scattered radiation is the main source of occupational exposures for pregnant workers. For pregnant workers:

- the most effective method of monitoring exposures to the fetus is to use a personal dosimeter to measure the equivalent dose to the surface of the abdomen
- dosimetry service providers offer pregnancy dosimetry services for workers over their gestation period, where the dosimeters are exchanged on a more frequent basis

Dosimeter storage

Between periods of use, the dosimeters must be stored according to the dosimetry service provider's recommendations.

Dosimeters should be stored in a secure, properly shielded location to avoid registering exposures from the radiation equipment in the facility and from extraneous sources such as direct sunlight or fluorescent lighting.

Dosimeters stay in the facility

Although there is no regulatory guidance for this, most professional colleges and associations have a policy that each personal dosimeter registered within a facility remains at that one facility and is not used or transferred by any means to another facility. Note that:

- if an employer has more than one facility, each facility must register, use and monitor its own dosimeter badges
- staff cannot use the personal dosimeter(s) for multiple facilities
- in the case of an overexposure investigation, the use of the same badge at multiple facilities would make it difficult to determine where the exposure came from

It is recommended that each facility have:

- a control badge to differentiate elevated exposures that may have occurred at the facility from those that may have occurred during shipping of the dosimeter badges
- visitor's badge(s), which can be used by temporary staff, students or visitors; a visitor's badge is not to be worn by more than one person

Record keeping

Employers must submit the badges to a licensed dosimetry service provider, who reads the badges and sends the results back to the employer and to the National Dose Registry (NDR) maintained by Health Canada. Dosimetry records must be kept for at least five years, and:

- workers must be informed of and have access to their dosimetry records
- it is recommended that employers keep dosimetry records for as long as the worker is employed by the employer

Overexposure reporting and investigation

The employer or prime contractor, if there is one, must report a radiation overexposure to OHS as soon as possible after becoming aware of the overexposure.

After reporting the incident, the employer or prime contractor, if there is one, is required to:

- investigate the overexposure incident
- prepare a report regarding the incident including any corrective actions needed to prevent recurrence
- provide a copy of the investigation report to OHS and the work site's health and safety committee, if there is one, or health and safety representative, if there is one, or otherwise make it available to workers
- retain a copy of the report for two years

The National Dose Registry

Health Canada's [National Dose Registry](#) (NDR) maintains a database of occupational exposures to ionizing radiation going back to the 1940s. It contains the dose records of individuals throughout their careers. The main functions of the NDR are to:

- assist in regulatory control by notifying regulatory authorities of overexposures within their jurisdiction
- provide dose histories to individual workers and organizations for work planning and for compensation and litigation cases
- evaluate dose trends and statistics to answer requests from regulators and others
- contribute to health research and to the scientific knowledge on risks from occupational exposure to ionizing radiation

NDR provides the following services to workers and employers:

High exposure notifications – If a worker exceeds a radiation dose limit set by a federal, provincial, or territorial jurisdiction, a high exposure notification is sent to the employer, the appropriate jurisdictional regulatory authority and the Canadian Nuclear Safety Commission.

Personal dose history summary – Workers can request a personal dose history summary from the NDR, showing the details of any radiation exposures they may have received throughout their career.

Employee's dose history summary – Employers and prospective employers can obtain an employee's dose history summary from the NDR upon written consent of the worker. The employer or prospective employer can also obtain personal dosimetry records from workers who are engaged in services with multiple employers to ensure the worker's annual permissible occupational dose limit has not been exceeded prior to undertaking the work at hand.

By using dosimeters and a licensed dosimetry service provider, individuals establish a personal dose history that shows the details of any radiation exposures they may have had over the course of their career. This can provide peace of mind to workers who have worked with sources of radiation.

Collection and use of personal information by the NDR is in accordance with the federal *Privacy Act* and the *Department of Health Act*.

Social insurance numbers are required as unique identifiers, and the NDR is authorized to collect them as per the Directive on Social Insurance Numbers.

If a person chooses not to provide their social insurance number, the dosimetry service provider will not be able to maintain that person's accumulated lifetime exposure record, and the record will not be passed on to the NDR. Note that:

- in this situation, the employer will be responsible for updating the individual's dose record when dose reports are received
- without centralized radiation dose records, there will be no notification of an overexposure sent to the employer

If a person decides they want to have their exposure records updated in the NDR and did not previously provide the required information to the dosimetry service provider, they will be charged a fee. At that time, the NDR will only be able to enter the data if the mandatory information (including social insurance number) is provided, and lifetime dose may be incomplete as past doses will not have been recorded in the NDR.

What if I don't agree with my exposure report?

In some cases, a worker may disagree with their exposure report and request a correction to their dose-related information. This requires federal, provincial, or territorial jurisdiction approval and the worker must complete a [Dose Information Change Request](#). The following must be included with the request:

- an investigation of the event prompting the request
- reasons for requesting the dose information change
- description of the circumstances and time frame involved
- calculations to support the request, when applicable
- other relevant information, as determined by the regulator or a radiation protection specialist, e.g. a brief description of the person's work history and dose history

Upon approval by the appropriate regulatory authority, the Dose Information Change Request is sent to the dosimetry service provider for submission to the NDR.

To learn more read [Guidelines for Making Changes to Dose-Related Information in the National Dose Registry](#).

Contact us

OHS Contact Centre

Anywhere in Alberta

- 1-866-415-8690

Edmonton and surrounding area

- 780-415-8690

Deaf or hearing impaired

- 1-800-232-7215 (Alberta)
- 780-427-9999 (Edmonton)

Notify OHS of health and safety concerns

alberta.ca/file-complaint-online.aspx

Call the OHS Contact Centre if you have concerns that involve immediate danger to a person on a work site.

Report a workplace incident to OHS

alberta.ca/ohs-complaints-incidents.aspx

Website

alberta.ca/ohs

Get copies of the OHS Act, Regulation and Code

Alberta Queen's Printer

qp.gov.ab.ca

OHS

alberta.ca/ohs-act-regulation-code.aspx

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