Dosimetry for X-ray users

Areas and Equipment - Personal Dosimetry (PD) Requirements

<table>
<thead>
<tr>
<th>Equipment</th>
<th>PD Requirement</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electron Microscopes/Microprobes</td>
<td>No PD required</td>
</tr>
<tr>
<td>Cabinet X-Ray</td>
<td>No PD required</td>
</tr>
<tr>
<td>DEXA - Dual Energy X-Ray Scanner</td>
<td>Body Personal Dosimeter</td>
</tr>
<tr>
<td>Radiographic Diagnostic X-Ray</td>
<td>Body Personal Dosimeter</td>
</tr>
<tr>
<td>XRD - X-Ray Diffraction</td>
<td>Body Personal Dosimeter</td>
</tr>
<tr>
<td>XPS - X-Ray Photoelectron Spectroscopy</td>
<td>No PD required</td>
</tr>
<tr>
<td>Stationary XRF - X-Ray Fluorescence</td>
<td>Body Personal Dosimeter</td>
</tr>
<tr>
<td>Portable/Handheld XRF - X-Ray Fluorescence</td>
<td>Body Personal Dosimeter and/or Extremity Dosimeter</td>
</tr>
</tbody>
</table>

Operating an XED off-site:

Shielding, such as a protective (lead) apron, is required when an X-ray user operates the X-ray tube outside the physical barrier.

When a protective apron is worn, a personal dosimeter must be worn underneath. A second personal dosimeter located at the neck level may be worn. If extremities are likely to be exposed to higher doses, additional monitors should be worn on the extremities.¹

Administration of SFU Personal Dosimetry Program (PDP)

- SFU Radiation Dosimeter Application Form must be completed by X-ray User
- The Radiation Safety Technician (RST) is responsible for the Dosimetry Program.
- Radiation Safety Officer (RSO) for X-ray and Non-Ionizing Radiation is responsible for the oversight and review of the Personal Dosimetry Program involving X-rays, including Incident Investigations and Emergency Response.

X-ray User: General Responsibilities

- Take all reasonable precautions to ensure own personal safety and the safety of fellow workers.

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- Use personal protective equipment and other safety devices provided by the employer.
- Report incidents and exposures to the Equipment Supervisor and RSO.

Special Considerations

- Pregnancy

  A worker can be authorized to use multiple sources of radiation or hold multiple work statuses. For example, she can be both a Nuclear Energy Worker (NEW) for nuclear substance and an X-ray User. Only a single quantity of effective dose can be assigned to an individual at a given point in time, even if the effective dose were accumulated from multiple sources or at various times in the past. Therefore, these guidelines regarding pregnancy (Radiation Dosimetry for SFU X-ray Users) consider both Canadian Nuclear Safety Commission (CNSC) regulations and WorkSafeBC - Occupational Health and Safety (OHS) Regulation. CNSC regulations, in general, concern only nuclear substance use,

  However, WorkSafeBC – OHS Regulation often cites CNSC publications. The worker should also observe policies and guidelines set out by SFU on the use of ionizing radiation/nuclear substance. (SFU Radiation Safety Manual)

  - The Canadian Nuclear Safety Commission (Nuclear Energy Workers - NEW) and WorkSafeBC set special Exposure Limits for Pregnant Workers
  - For the General Public (including X-ray Users who are not declared as NEW), there is no differentiation of Dose Limit between that of pregnant and non-pregnant persons.
  - Every Nuclear Energy Worker who becomes aware that she is pregnant shall immediately inform the RSO in writing.
  - When a worker declares her pregnancy to the RSO, her effective dose of ionizing radiation, for the remainder of the pregnancy, from external and internal sources, must be limited by the employer to the lesser of 4 mSv, or the dose limit specified for pregnant workers under the Nuclear Safety and Control Act (Canada).

- Assurance of Safe X-ray Operation

  - Through Exposure Reports and X-ray Usage Logs, if a record of Safe Operation of over one year were established (with no recorded Exposure or Dose; while the operation of X-ray equipment was frequent and regular), the X-ray User would no longer be required to be monitored through the Personal Dosimetry Program.

- Optional Monitoring

  - Monitoring (Personal and/or Area) can be requested through the Radiation Safety staff.
  - The Radiation Safety staff have the authority to exercise discretion when implementing a Dosimetry Program.

Incident and Emergency Response

- If an incident that has the potential of causing over-exposure (near-miss incident) of a person
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occurred, the Radiation Safety Officer (RSO) must be notified.

• Information to be reported with an incident includes (but not limited to): time, place and nature of the incident.

• An investigation into the circumstances surrounding any complaint, incident or suspected over-exposure will be carried out.

• Personal Dosimeters (and Area Monitor/Survey Meter readings, if any) will be collected to determine committed dose estimates.

Area Monitoring

• Each X-ray facility must have access to an appropriate Radiation Survey Meter compliant to SFU Radiation Safety Policies and Procedures.

Exposure Limits

CNSC Radiation Protection Regulation

<table>
<thead>
<tr>
<th>Item</th>
<th>Person</th>
<th>Period</th>
<th>Effective Dose (mSv)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Nuclear energy worker, including a pregnant nuclear energy worker</td>
<td>(a) One-year dosimetry period</td>
<td>20 * 50</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(b) Five-year dosimetry period</td>
<td>10 0</td>
</tr>
<tr>
<td>2.</td>
<td>Pregnant nuclear energy worker</td>
<td>Balance of the pregnancy</td>
<td>4</td>
</tr>
<tr>
<td>3.</td>
<td>A person who is not a nuclear energy worker</td>
<td>One calendar year</td>
<td>1</td>
</tr>
</tbody>
</table>

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References


