The Canadian Light Source requires a licence from the Canadian Nuclear Safety Commission (CNSC) to operate the synchrotron because radiation-producing devices, such as electron beam accelerators and radioactive materials, are used. The Health, Safety and Environment Department is responsible for keeping radiation doses to individuals as low as reasonably achievable.

Radiation is energy transferred through space and matter. In daily life, we encounter radiation from a variety of sources. Some of these exposures are of our choosing, such as nuclear medicine procedures and occupational exposure, and some are not, such as terrestrial and solar radiation. Radiation does pose a risk but it is smaller than many risks people are accustomed to.

**Saskatchewan Background Radiation**

As we carry out our normal daily activities, we are exposed to small amounts of radiation from the environment known as natural background radiation. According to the CNSC, these are the major sources of public exposure to natural background radiation.

- Cosmic rays - high-energy subatomic particles originating mostly from nearby stars. Cosmic rays interacting with the Earth create the Northern Lights.
- Terrestrial radiation - naturally occurring radioisotopes found in the soil.
- Inhalation - radon gas from the earth’s crust, which is present in the air we breathe.
- Ingestion - natural radiation from the food we eat and water we drink. Potassium-40 is the main contributor.

**Contribution of Sources of Exposure**

<table>
<thead>
<tr>
<th>Source of Exposure</th>
<th>Contribution</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ingestion</td>
<td>0.3 mSv</td>
</tr>
<tr>
<td>Terrestrial Radiation</td>
<td>0.2 mSv</td>
</tr>
<tr>
<td>Cosmic Radiation</td>
<td>0.3 mSv</td>
</tr>
</tbody>
</table>

**Dosimeters**

A dosimeter is a device that is worn on an individual for measuring the dose of radiation received by that person. OSL (Optically Stimulated Luminescence) Luxel+ Dosimeters are used at the CLS.

Dosimeters have small inorganic crystals that, when exposed to certain frequencies of laser light, emit a quantity of light proportional to the energy deposited in the crystal. This is used to obtain dose information.

Luxels absorb energy from ionizing radiation. Dosimeters used at CLS respond to beta, gamma, X-ray and neutrons.

**Radiation Exposure in Daily Life**

(micro sievert - μSv)

- 1000 μSv/year
  - Regular public space (except medical area)
- 600 μSv/radiograph
  - Abdominal X-Ray for health checkup (one time)
- 200 μSv/roundtrip
  - Tokyo - New York round trip (radiation varies depending on flight altitude)
- 50 μSv/radiograph
  - Chest X-Ray for health checkup (one time)
- 50 μSv/year
  - Nuclear Power Plant area (Light Water Reactor) (estimated value)
- 30 μSv/year
  - Canadian Light Source
- 1000 μSv/year
  - Natural Radiation per person/year (World average)
- 7500 μSv/tomography
  - Chest X-Ray computer tomography (one time)
- 6900 μSv/tomography
  - Nuclear Power Plant area (Light Water Reactor) (estimated value)

**Sv (sievert) =**

A measure of dose designed to reflect the amount of radiation harm to a particular tissue or organ.

Source: Ministry of Education, Culture, Sports, Science and Technology of Japan