

RADIATION IN PERSPECTIVE

The CLS 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.

Dosimeters

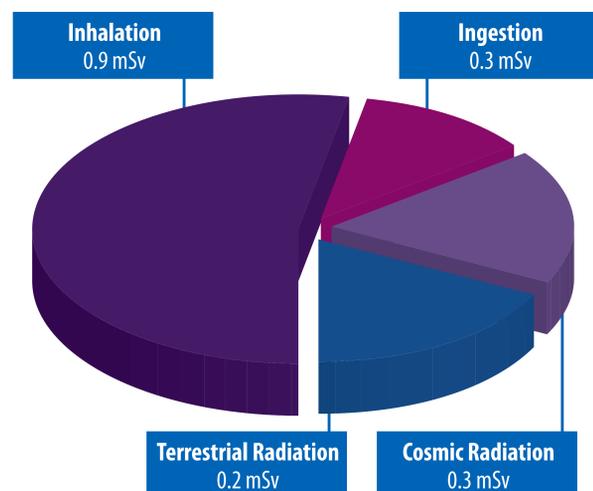
A dosimeter is a device that is worn to measure radiation exposure. OSL (Optically Stimulated Luminescence) Luxel+ Dosimeters are used at the CLS.

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.



Contribution of Sources of Exposure (averaged over the population of Saskatchewan)



Source: <http://nuclearsafety.gc.ca/eng/resources/radiation/introduction-to-radiation/types-and-sources-of-radiation.cfm>

Radiation Exposure in Daily Life

(micro sievert - μSv)

7500

6900 μSv /tomography

Chest X-Ray computer tomography (one time)



3000

2400 μSv /year

Natural Radiation per person/year (World average)



390

Space

290

Food



480

Earth

1260

Radon (In air)



1000

1000 μSv /year

Regular public space (except medical area)



100

600 μSv /radiograph

Abdominal X-Ray for health checkup (one time)



100

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)



Sv (sievert) =

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

10

30 μSv /year

Canadian Light Source



Canadian Light Source

Centre canadien de rayonnement synchrotron

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