



# Radiation

## Key Points at a Glance

- People's exposure to the radiation from uranium mining operations is low.
  - Many protective measures are in place at modern uranium mining operations to limit people's exposure to radiation and minimize risks to people and the environment.
  - This information focuses on radiation and uranium mining. There are many useful sources of information available from experts if people want to learn more about radiation and health in general. These are noted at the end of this fact sheet.
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### What is radiation?

Radiation is a term for mostly invisible energy that can move through the air and some solid materials. It is all around us in various forms and always has been. For example, sunshine is a form of radiation. Other forms of radiation include microwaves, radio, cell phone, and television signals. These types of radiation (often called electromagnetic) are usually not harmful but they can be dangerous at high levels. For example, it is commonly

known that there are negative effects from too much exposure to the sun, including skin cancer.

Other forms of radiation (called ionizing radiation) also exist in the environment and can be harmful at high levels. Sources of this type of radiation include radioactive materials in the ground, in the air and water, and cosmic radiation that comes to earth from outer space. X-rays used in health care are a form of this type of radiation. For all potentially harmful forms

of radiation, it is important to limit the amount to which people or the environment are exposed.

Throughout this fact sheet, “radiation” refers to ionizing radiation such as X-rays or the radiation from radioactive materials such as uranium.

### **Why do we talk about radiation when we talk about uranium mining?**

Radiation is a natural characteristic of uranium. Uranium is a natural element found in all rocks and soils. In many places in the world, including Labrador, it occurs at concentrations that can be mined. Uranium mining involves taking rock containing uranium from the ground, and then removing the uranium from the rock through a process called “milling.”

Uranium taken from rock is concentrated into a powder called “yellowcake” because of its yellow colour. The separation process produces waste water and waste sandy rock particles called “tailings.” Yellowcake is shipped to fuel fabrication plants where it is processed into fuel for nuclear electricity generating stations. Not all the rock taken from the mine contains uranium. The rock that has no uranium is called “waste rock” and is normally stored close to the mine site. When the mine is closed, the waste rock is reclaimed and shaped into a natural contour by adding topsoil and vegetation.

At each step in uranium mining, people and the environment can come into contact

with radiation. These contacts rarely have the potential to be harmful, particularly at the ore grades in the Michelin Project. However, it is important to prevent or limit the amount of radiation people might receive. This is done by limiting the time people are close to the radioactive material and, if necessary, placing barriers between people and the material. These methods have been proven over many years to reduce risks of radiation exposure to the point where people’s health will not be adversely affected.



*Radiation exposure is readily monitored by wearing personal thermoluminescent dosimeter devices (TLD badges). The TLD badges are analyzed and the results recorded by Health Canada.*

### **If it cannot be seen, how can radiation be measured?**

Very sensitive instruments have been developed to measure radiation. The instruments are capable of finding and measuring extremely small levels of radiation. When people are exposed, these measurements can be used to calculate the radiation doses that people receive.

The unit of measurement for radiation dose is called the “sievert.” The sievert is used to measure levels of exposure from all sources of radiation, whether the radiation is from uranium mines and mills, from the ground we stand on, the water and food we drink and eat, or the air we breathe. It is also used to measure medical exposures, such as radiation from X-rays.

When people hear about radiation measures, they may also hear about “millisieverts” as a unit of measure for small amounts of radiation. A millisievert is one-thousandth of a sievert. Everyone in Canada receives an average dose of about 2 - 4 millisieverts per year from the radiation and radioactivity in our environment. This is called natural background radiation.

### **Is there a safe level of radiation to which a person can be exposed?**

Risks to the health of people or the environment can occur at high levels of exposure. However, experts in radiation safety and health have said that there is no scientific evidence of risk at very small levels of exposure of about 50 to 100 millisieverts per year. Workers in mines like the one proposed in the Michelin Project are permitted to receive 20 millisieverts per year - and a 2007 Health Canada report states that Canadian uranium mine and mill workers actually receive less than five millisieverts annually. The general public is permitted to receive just one millisievert per year beyond natural background



*An employee wears protective clothing, safety glasses, and a respirator while cutting cores, in accordance with Aurora's strict health and safety program.*

radiation exposure. Studies of a high-grade uranium mining operation in Saskatchewan show that residents in the nearest town (30 km distant) typically receive less than 0.1 millisievert per year, only a fraction of the allowable limit and much less than natural levels of radiation exposure.

### **What can be done to protect people and the environment from harmful amounts of radiation?**

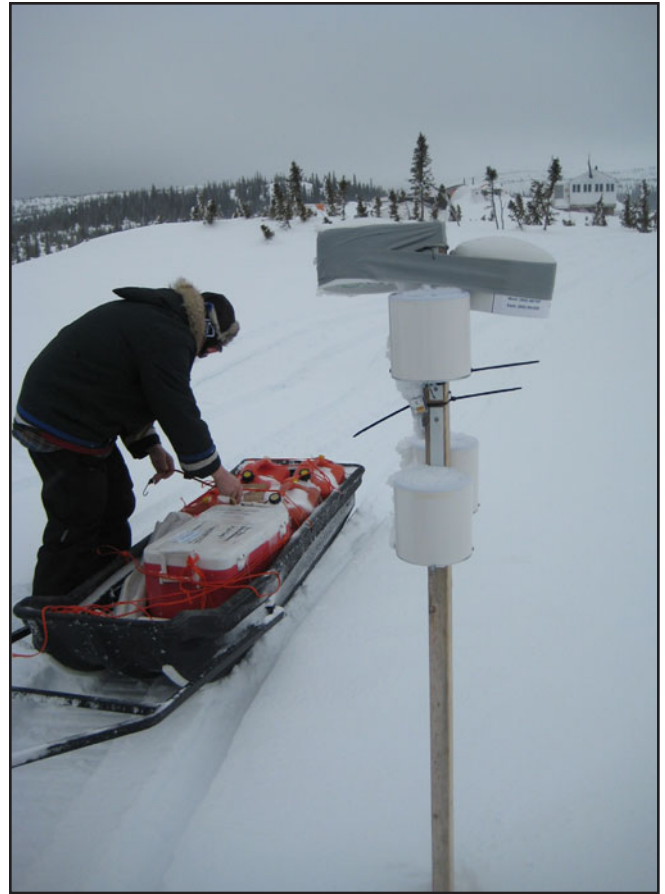
None of the potential radiation exposures at uranium mines, mills and tailings areas are high enough to be immediately harmful. Nevertheless, measures are taken to minimize potential exposure.

These measures, proven over many years, include:

- Making sure people do not encounter harmful amounts of radiation by limiting the amount of time they may be in contact with radioactive materials.
- Making sure sources of radiation are controlled so they do not come into contact with people or the environment.

People and the environment are being well protected from radiation in the exploration phase of the Michelin Project. Measurements of exposure have shown that the exploration workers have not received doses in excess of the natural background levels. This protection will continue during the operation of the proposed Michelin Project and after closure.

To learn more about Aurora, please visit [www.aurora-energy.ca](http://www.aurora-energy.ca)



*Aurora measures radiation levels and air quality around the Michelin Project site year-round.*

## Some Useful Resources

Canadian Nuclear Safety Commission  
[www.cnsccsn.gc.ca](http://www.cnsccsn.gc.ca)

Health Canada  
[www.hc-sc.gc.ca](http://www.hc-sc.gc.ca)

Natural Resources Canada  
[www.nrcan.gc.ca](http://www.nrcan.gc.ca)

Canadian Nuclear Association  
[www.cna.ca](http://www.cna.ca)

Australian Uranium Association  
[www.aurora.org.au](http://www.aurora.org.au)

World Health Organization  
[www.who.int](http://www.who.int)