

You Were Wondering...

Our community is changing and we know many of you who are new to Elliot Lake--retirees, cottage owners and others--have questions about the rehabilitated mine sites and tailings management areas. So we talked with people responsible for welcoming new residents to town, who pinpointed some of your most frequently asked questions. If you have other queries, be sure to complete the box below and send it to us by fax or mail.

What are tailings?

When uranium ore (rock containing uranium) is mined, the rock is crushed so the uranium can be removed. The crushed rock remaining after the uranium has been extracted is called "tailings" and it looks like fine sand. In Elliot Lake, 95 percent to 98 percent of the uranium that was in the ore was removed in the milling process. The amount remaining in the tailings is less than 0.005 percent, or the equivalent of half a teaspoon of sand in a 45-gallon drum.

In addition to residual uranium, tailings contain small quantities of other naturally occurring low-level radioactive metallic elements, such as thorium and radium. They also contain natural sulphide minerals--primarily iron sulphide or pyrite--which, when exposed to air and moisture, produce a mild acid. Production of this acid is curtailed by covering the tailings with water, or alternatively, treating the natural precipitation runoff from the tailings with lime to neutralize the acid before the water is released to the environment.

What is radiation?

Radiation is simply energy that can take the form of waves or be carried by energetic particles. Light and heat from the sun are common forms of radiation.

Radiation is also the energy in the form of subatomic particles or waves that is released when an unstable atom breaks down to form a new atom. Radioactivity is the spontaneous decay of atoms that results in the release of radiation. Radioactivity is commonly measured in Becquerels per second (Bq/s). One Becquerel per second is equivalent to one decay per second.

The main result of radiation passing through something is the transfer of energy. Radiation loses energy as it interacts with matter and the matter gains this energy. The amount of energy absorbed by matter is called the "radiation dose." Some types of radiation cause more damage to biological tissues than others because they release energy in a very small area, making it all the more powerful. The biological significance of radiation doses is measured in millisieverts (mSv).

How radioactive are the tailings?

Uranium and other radioactive elements in the tailings release radiation. The concentration of radioactive substances in the tailings is very low. Accordingly, the quantity of radiation that is released is also very low. Radiation received by humans is measured in units called millisieverts (mSv) per year. Here are a few radiation sources and amounts:

- Radiation received by average Canadian from all naturally occurring sources of radiation = 2.4 mSv per year
- Medical diagnosis for the average Canadian (x-rays, radiation treatment) = 0.88 mSv per year
- Canadian Nuclear Safety Commission public limit for radiation exposure above and beyond that from naturally occurring sources of radiation = 1 mSv per year
- Flight across Canada and back = 0.04 mSv
- Increase in radiation exposure (due to higher altitude) from one-month vacation in Banff, Alberta = 0.05 mSv
- 200 hours of walking on mine tailings in the Elliot Lake area = 0.05 mSv

Are the tailings dams safe? Who checks them and how often?

Elliot Lake dams are designed to withstand a maximum rainfall of 16.7 inches in 12 hours—an event that could occur once every 10,000 years. They are also built to remain stable during and after the most powerful earthquakes, which could happen once every 1,000 years. The dams would withstand these two events with tailings intact.

Golder Associates, an engineering firm that builds dams around the world, designed all of the tailings dams and spillways in the Elliot Lake area. Annually, Golder conducts a detailed inspection of all of the dams and issues a report for each site that Rio Algom and Denison submit to the Canadian Nuclear Safety Commission (CNSC). You can view these reports by clicking on links and downloads section of this website).

As well, dam specialists from the CNSC do their own inspections to verify safe performance of the dams. Workers from Denison Environmental Services, who are trained to look for any signs of trouble, visually inspect each dam monthly and after heavy rains or snowmelt.

Is water in the Serpent River Watershed safe?

The Government of Ontario has established water quality guidelines for the protection of plants and animals living in water. These are called the Provincial Water Quality Objectives (PWQO). The Province has also established the Ontario Drinking Water Standards (ODWS) for the protection of human health and the maintenance of aesthetic water quality. Each year, Rio Algom and Denison Mines collect more than 137 water samples from 27 sites in the Serpent River Watershed. These samples are analyzed for 10 key parameters (barium, radium, sulphate, for example) to detect the influence of historic mine operations and the results are compared to the ODWS and PWQO. Lakes upstream of previous mining activity, such as Ten Mine and Dunlop, as well as lakes downstream of previous mining activity, such as Quirke and McCarthy, all consistently meet provincial water quality standards for the 10 key parameters. We report these results to the Canadian Nuclear Safety Commission and share them with residents of the Serpent River Watershed through our annual newsletter and this website.

How are the sites regulated?

The Canadian Nuclear Safety Commission (CNSC), a federal government regulator, is the licenser and regulator of all nuclear facilities in Canada, including uranium mines and mills. The CNSC is responsible for enforcing the Nuclear Safety and Control Act and associated regulations. The Act does not allow uranium mine tailings to be abandoned and requires Rio Algom and Denison Mines to maintain licences. All Rio Algom sites, including the historic mines that operated in the '50s and '60s, are licensed under a Radioactive Waste Facility Operating Licence. Denison Mines sites are currently licensed under a Uranium Mine Decommissioning Licence and Denison will soon submit an application to the CNSC for a Radioactive Waste Facility Operating Licence for its sites.

The Radioactive Waste Facility Operating Licence authorizes us to:

- Operate a nuclear facility comprising uranium mine tailings management areas and surrounding lands
- Possess and manage nuclear substances that are associated with our nuclear facilities.

The licence does not allow us to place additional radioactive substances from other sources in the tailings management areas.

Rio Algom and Denison report monitoring and operating results to the CNSC, both monthly and annually. All environmental monitoring, inspection, construction and operating activities performed in the tailings management areas are reviewed and approved by the CNSC. The CNSC conducts annual inspections of each site as well as regulatory audits of monitoring and dam inspection programs.

How are the sites monitored?

We monitor water quality and environmental conditions in the tailings management areas and in the receiving waters of the Serpent River Watershed very thoroughly. The following are our three comprehensive monitoring programs:

- **Tailings Operational Management Program.** This program ensures that the tailings management areas are properly operated and maintained. It includes routine inspection of dams, spillways, water elevations, roadways and fencing as well as monitoring of surface water and groundwater quality within the tailings management areas. A major focus of the program is monitoring water quality before and after treatment. Our environmental specialists use 10 key parameters that can detect substances related to the mines when they're analyzing water quality. Monitoring frequency ranges from daily to semiannually, depending upon the parameter. Treated water is monitored daily where it's released from a facility.
- **Source Area Monitoring Program.** Under this program, we monitor all surface water releases from tailings management areas. We do this as often as the amount and type of flow demand—anywhere from weekly to quarterly--though we always monitor principal flows weekly. Again, we use the 10 key mine indicator parameters.
- **Serpent River Watershed Monitoring Program.** This program monitors water quality in lakes and streams throughout the watershed. Streams, which have higher flow rates, are sampled more frequently than lakes, which have lower flow rates. Lakes and streams as far downstream of the mines as McCarthy Lake are included in the program as well as lakes and streams upstream of the mines. Our environmental specialists check that water quality continues to meet health-related government standards. They also compare water quality results from downstream lakes with results from upstream lakes using the 10 key parameters to confirm that the influence of historic mining operations on water quality is declining.

Every five years we conduct a wide-ranging study of environmental effects throughout the Serpent River Watershed. We sample and analyze surface water, sediment, benthos (creatures that live in sediment), plants, fish and ducks to determine the health and condition of the watershed. These data are compared with data from lakes and streams that are upstream and are never affected by mining. You'll find results of this monitoring program at the Elliot Lake Public Library, Elliot Lake City Hall, the Township of the North Shore office and at the Serpent River First Nations band office in Cutler.

We'd Like to Hear From You

We'd like your thoughts about our performance in the operation, care and maintenance of our closed mine sites. Please call us or send us a note. We'll respond as quickly as possible.

Cut out this coupon and use it to mail your comments to:

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Elliot Lake Closed Mine Site Operation, Care and Maintenance

Question(s): _____

I'd like to know more about... _____

Your name and address (please print): _____

Telephone: _____ Date: _____
Fax: _____
E-mail: _____

Thank You!