

Mineral sands mining and radiation

Mineral sands are naturally occurring deposits rich in ilmenite, rutile, zircon, and leucoxene typically found in areas that were once ancient inland seas.

Today, these minerals play a key role in a range of technologies critical to Australia's future, including renewable energy, advanced manufacturing, and medical applications.

Multiple mineral sands projects across Victoria are currently undergoing exploration and assessment and aim to become operational mines in the coming years.

Radiation and mineral sands mining

Like many things on earth, some mineral sands contain small quantities of naturally occurring radioactive materials (NORM). When extracted and processed, these materials can become more concentrated.

Although mineral sands contain only a very small quantity of NORM, in Victoria the extraction of this material is carefully managed to ensure public and environmental safety.

What is radiation?

Radiation is a form of energy that travels as waves or particles. It occurs naturally and has been a part of the Earth's environment since its formation.

Whether you realise it or not, everyone is exposed daily to low levels of radiation everyday.

Sources of natural background radiation include:

Natural background radiation



Your body



Cosmic rays



Soil



Rocks



Water



Plants



Food

There are also a number of common artificial sources of radiation, including:

- X-rays and some medical procedures
- Smoke detectors
- Microwave ovens
- Air travel

Radiation exposure levels

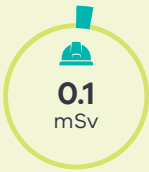
Radiation levels are measured in millisieverts (mSv). Australians are typically exposed to around 1.5 mSv of background radiation each year, which is considered low.

Under legislation, occupational exposure to radiation should be limited to 20 mSv per year (and not exceed more than 50 mSv).

Did you know, number of common occupations such as pilots, veterinarians and medical imaging technologists are exposed to more annual radiation than someone working at a minerals sands mine.

Below you can see how minerals sands mining compares to other common occupations.

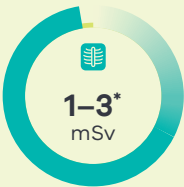
Average annual dose per occupation (estimated dose)



Operator in mineral sands mine



Veterinarian



Medical imaging technologist



Airline pilot

**depending on role*

How radiation is managed

Regardless of the low level of risk, the mining and processing of mineral sands in Victoria are subject to strict regulatory controls designed to minimise exposure and protect community and environmental health.

As part of a strict series of assessment processes, companies must propose how they will deal with environmental issues, such as dust and radiation, under a detailed plan known as an Environmental Effects Statement (EES).

If the EES is accepted, the company must produce a work plan that shows how work will be undertaken safely and any risks managed. This includes managing risks to workers, community and the environment.

Without demonstrating this, **applications will not be approved.**

While details for how companies will approach the mitigation of issues are specific to each project and location, an outline of common considerations is provided below.

- **Monitoring and assessment;** Ensuring radiation safety begins with a continuous and comprehensive monitoring program. This involves regular measurement of dust, atmospheric gases, water, soil, and materials used or produced on site.
- **Engineering controls;** to prevent the release or spread of naturally occurring radioactive materials, a range of solutions can be implemented. These might include:
 - Fully enclosed processing systems to minimise the escape of dust and waste.
 - Dust suppression techniques reduce airborne particles. This commonly includes regularly applying water to work areas and stockpiles.
 - Waste residue and tailings containing NORM being stored and handled in secure facilities.

Regulation of radiation in Victoria

In Victoria, radiation use and safety is governed by the **Victorian Department of Health**, who is responsible for administering the Radiation Act 2005 and Radiation Regulations 2017, ensuring the safe management of radioactive materials and licensing of regulated activities.

All companies undertaking mineral sands mining must obtain a Radiation Management Licence from the Department of Health. This requires applicants to demonstrate how risks to workers, the community, and the environment will be mitigated. It forms part of the work plan required by Resources Victoria.

A number of other government bodies have a role in ensuring mining projects are undertaken in a safe manner. These include:

- **Resources Victoria** regulates the states mining industry, providing strategic direction and oversight of mining and resources activities.
- **WorkSafe Victoria** enforces workplace health and safety regulations related to radiation exposure at mine sites.
- **Environment Protection Authority (EPA)** regulates pollution and waste, and it has independent authority to make regulatory decisions under the Environment Protection Act 2017. Under this legislation, EPA enforces the General Environmental Duty (GED), which applies to anyone doing any activity (e.g. mining) that creates a risk to human health and the environment from waste or pollution. The EPA may require action if a site is causing on or off-site pollution.
- **Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)** provides the Australian Government and communities with expertise and guidance in relation to the measurement and management of radiation.
- **Local Government** is responsible for implementing the Victorian Planning Provisions in their local government area.

Find out more

Visit resources.vic.gov.au/critical-minerals to find out more about mineral sands mining, project updates and answers to frequently asked questions.



For questions regarding how radiation and other issues will be addressed at a specific project, you can contact the mining applicant or visit their website which will generally provide information on the risk mitigation approaches being proposed or undertaken.

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