

Radiation



Naturally-occurring radiation

Mineral sand projects like Donald produce materials with naturally occurring radioactive material (NORM) - trace amounts of thorium and uranium common in the Earth's crust. We all receive daily radiation from rock, soil, sun, space, food, water, air travel, and medicine.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) reports Australians average 1.5 millisieverts (mSv) of background radiation yearly, while the worldwide average is 1 to 10 mSv. Donald Project NORM radiation will be a fraction of regulatory limits – and a negligible risk to the public.

NORM and the Donald Project

The ore extracted at the Donald Project site will contain NORM. However, any public exposure to radiation is considered negligible and will be well below the prescribed levels set by the *Radiation Regulations 2017 (Victoria)*.

Radiation levels will be subject to onsite measurement and appropriate management measures. These will ensure exposure to our workforce and members of the public are always minimal and well below the prescribed levels.

Mineral sands not uranium

We will mine mineral sands, not uranium. All soils naturally contain trace uranium. By weight the material we mine will be about 21 parts per million (0.0021%) uranium and 81 parts per million (0.0081%) thorium. These levels are about an order of magnitude (10×) below the prescribed extraction limits in *Victoria's Nuclear Activities (Prohibitions) Act 1983* of:

- Uranium: 0.02% by weight
- Thorium: 0.05% by weight

The World Nuclear Association has more information about NORM in different industries and products, including building and agriculture:

[Naturally-Occurring Radioactive Materials \(NORM\)](#)

NORM exposure

Natural background radiation includes exposure to NORM.

Public and worker exposures are measured as dose above natural background (from the natural environment). The effective dose is the amount of radiation expected to be absorbed by a person. The effective dose will vary depending on how and where the person is exposed to the radiation and the nature of the exposure, such as inhalation or ingestion.

In understanding the effective dose and the risk of radiation exposure, it is important to consider:

- A person's cumulative exposure to all radiation sources, and the;
- Natural background exposures expected for that person.

Radiation regulation in Australia

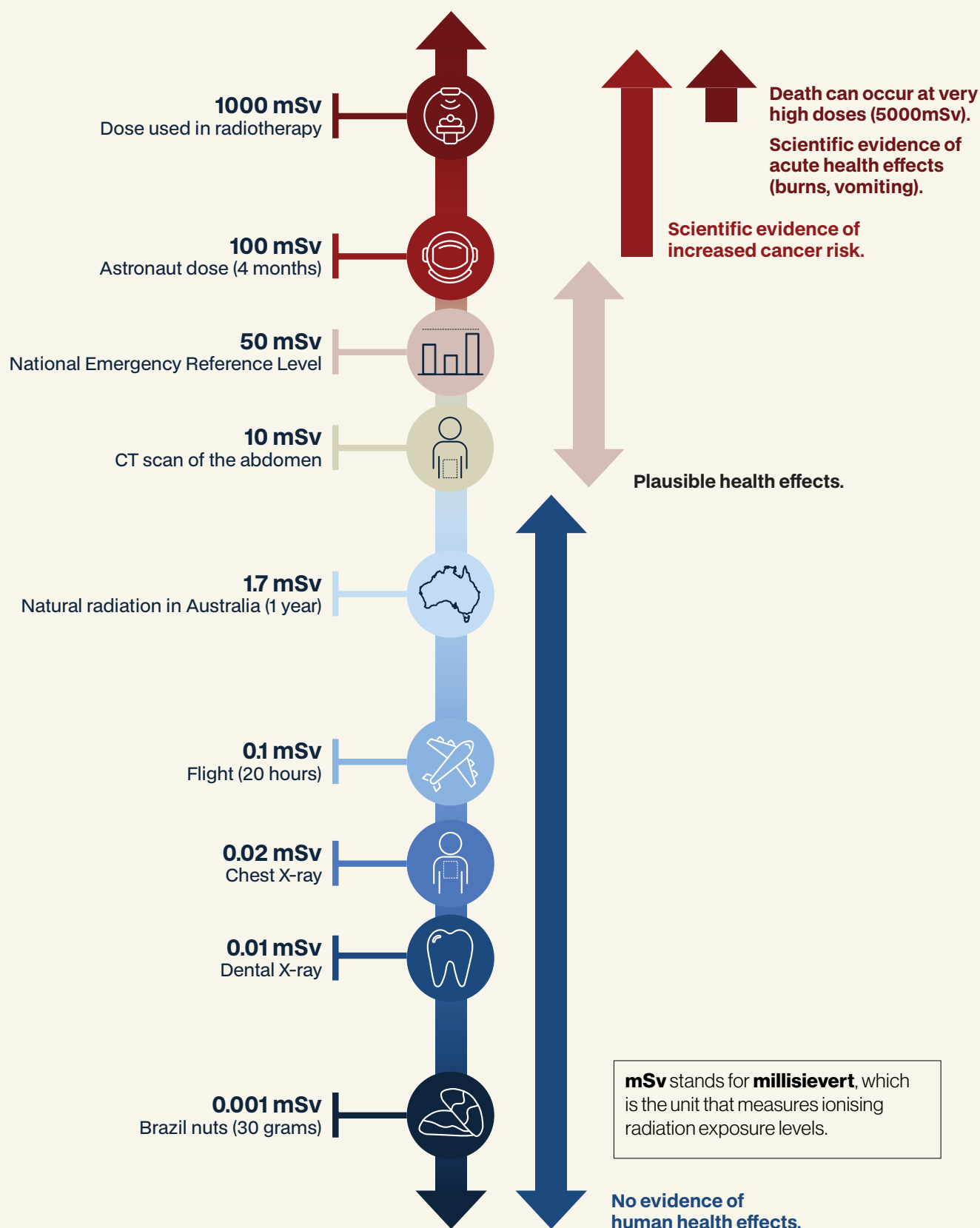
Radiation is comprehensively regulated in Victoria, as in other jurisdictions, to ensure the safety of the public and workers.

The Department of Health is responsible for regulating radiation under the *Radiation Act 2005 (Victoria)* and the *Radiation Regulations 2017 (Victoria)*. ARPANSA is the primary authority on radiation protection and promotes national uniformity in radiation management procedures.

The Donald Project will adhere to all necessary regulations and ensure best practice operating procedures in relation to all environmental and health and safety standards, including radiation. The company will continue to work with regulators, government, and relevant organisations to meet high operating standards and environmental outcomes.

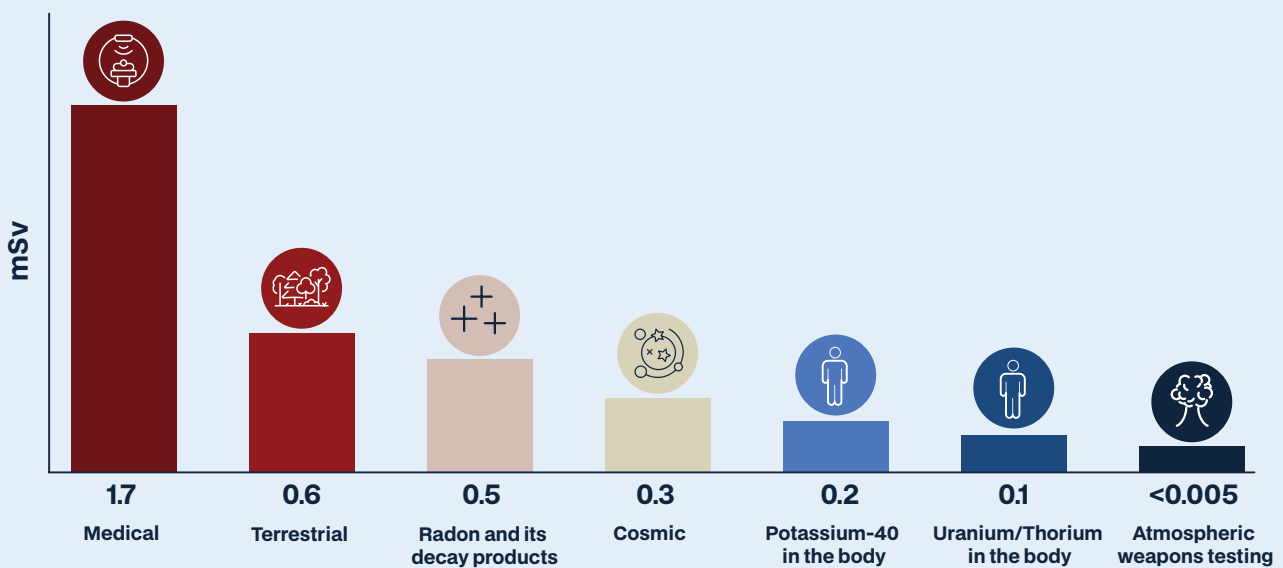


Human exposure to ionising radiation



Source: https://www.arpana.gov.au/sites/default/files/2021_ionising_radiation_and_health.pdf

Radiation types



Radiation monitoring and management

Managing naturally-occurring radiation is common practice in mining, and an established part of rare earth and mineral sands mining.

We will follow strict operating regulations and best practice procedures in relation to environmental and health and safety standards, including radiation. DMS holds a Radiation Management Licence (30066740), under the *Radiation Act 2005 (Victoria)*.

To secure the licence, we had to show we will:

- Reduce exposure levels from naturally-occurring radiation to as low as reasonably practical below the prescribed levels.
- Continuously monitor radiation levels so they remain within prescribed and safe limits.

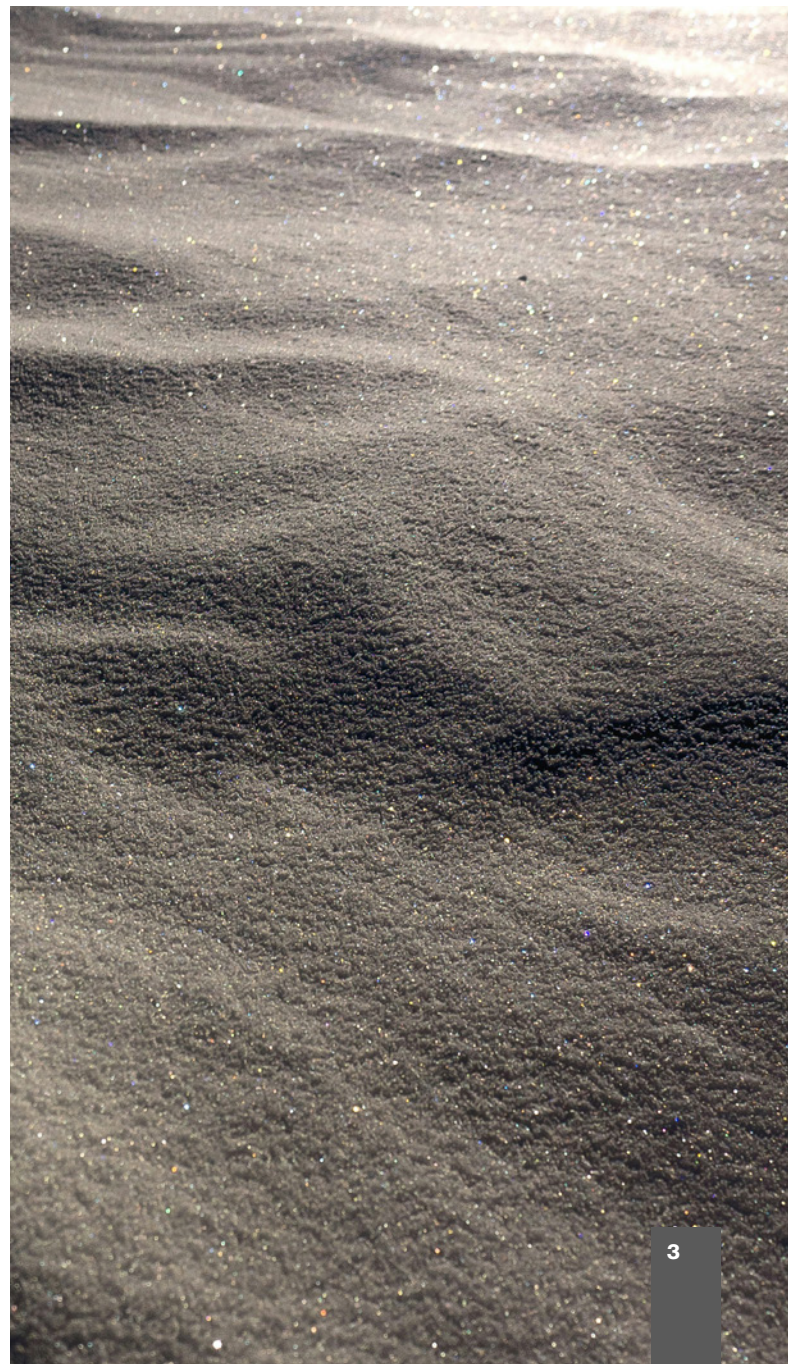
We are already monitoring environmental radiation at the site. The results will establish baseline radiation levels.

We will monitor and compare levels throughout the mine life against these baseline levels.

The minerals we will mine are naturally heavier than regular sand. This means they are less likely to become airborne dust. But we will also implement dust controls to further limit doses from naturally-occurring radiation.

We will do this by:

- Using the 'moving pit' mining technique. We divide the site into blocks, mining a set of blocks at a time, and refilling and revegetating the previously mined blocks. This technique limits open areas and dust spread.
- Pumping ore and tailings, and transporting them in wet slurry form. Certified companies will transport ore in sealed containers, in accordance with ARPANSA's Code for the Safe Transport of Radioactive Material.



Farming and the environment

Implementing the Donald Project's Radiation Management Plan will mean there is a negligible effect on the public, animals, and plants in the area during mining or mine closure.

Doses to humans are significantly below member of public dose limits.

The Donald Project team will continue to engage farmers, surrounding communities, and key local stakeholders to share information and better understand local views. Please contact us if you have any questions.

Useful references

- The Department of Health
<https://www.health.vic.gov.au/public-health/radiation>
- Australian Radiation Protection and Nuclear Safety Agency
<https://www.arpsa.gov.au>

About the Donald Project

The Donald Rare Earth and Mineral Sands Project is near Minyip and Donald, 300 km north-west of Melbourne.

Discovered in the 1980s, the site is a world-class source of minerals essential for everyday industries. These include critical minerals like zirconium and titanium, along with rare earth elements such as neodymium and praseodymium.

Donald Project Pty Ltd, trading as Donald Mineral Sands (DMS), is the joint venture between Astron Limited and Energy Fuels Inc developing the project.

Through responsible resource development, DMS will create long-term regional benefits including economic growth, jobs, and infrastructure improvements.

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