



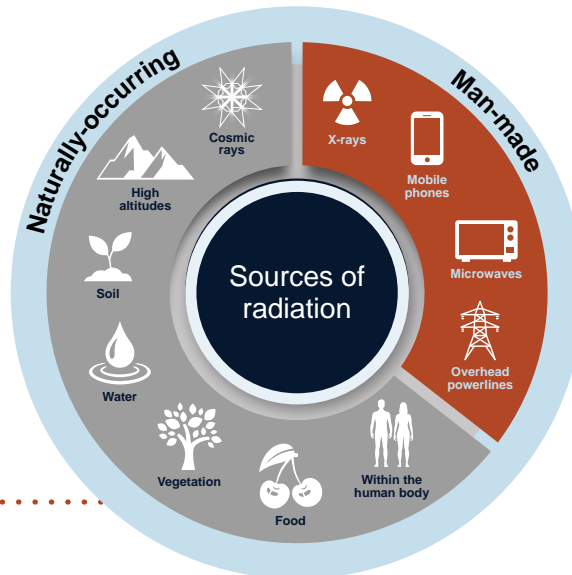
FACT SHEET

NATURALLY OCCURRING RADIATION AND MINERAL SANDS

What is radiation?

Radiation is energy that is emitted or transmitted as waves or particles travelling through space.

Naturally occurring and all around us, radiation can also be man-made and comes in many forms including light, heat, microwaves, and wireless communication.



Understanding radiation exposure

Radiation cannot be fully eliminated from the environment. However, by having a good understanding of radiation and how to control our exposure, we can reduce our risk.

Radiation can seem scary because you cannot see it or feel it (although you can feel sunburn), even though it is all around us – but it is easy to measure with a Geiger counter or scintillometer.

Exposure to radiation is reported as a dose, in units of millisievert (mSv). The average Australian dose from natural sources is 1.7 mSv per year.

Australian Average Radiation Exposure Source and Dose (mSv)

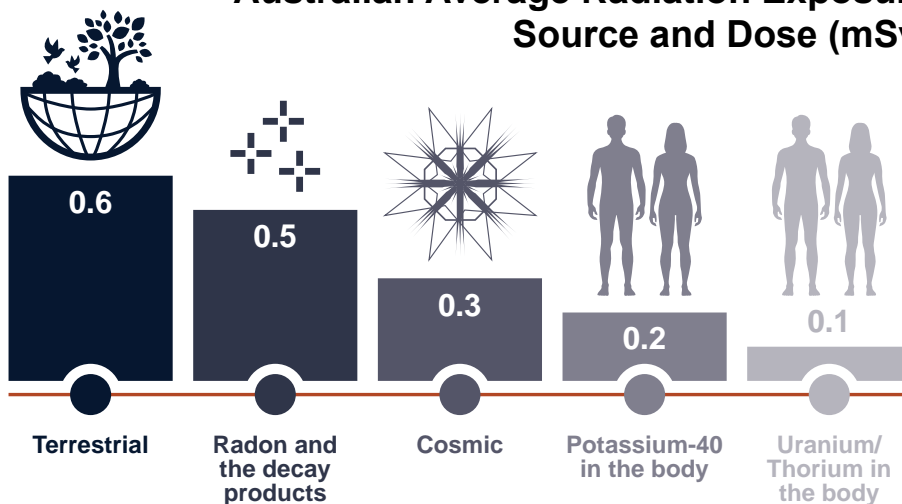


Image source: arpana.gov.au

RADIATION FACTS

Radiation occurs naturally and is all around us in the natural world – in rocks and soil, in the air we breathe, in cosmic rays from the sun, in the food we eat, and in our bodies.

Naturally-occurring, or background radiation, varies in different places – it largely depends on local geology (uranium and thorium content in soils and rocks).

Radiation is well understood – it's easily measured and easily controlled.

Exposure to radiation is reported as a dose, in units of millisievert (mSv). The average Australian dose from natural sources is 1.7 mSv per year. This is about the same amount of radiation received from 75 chest x-rays.

The effects of radiation have been studied for over a century and a reported in scientifically robust publications. The information is continually assessed by the International Commission on Radiological Protection (ICRP) and incorporated into their publications which are used by the International Atomic Energy Agency (IAEA) to produce International Standards and Guidance on radiation protection.

The Australian Radiation Protection and Nuclear Safety Agency (ARPANSA) develops codes, standards, guides and provides advice to support radiation protection and nuclear safety throughout Australia based on ICRP and IAEA documents.

Victoria manages radiation under the *Radiation Act 2005*.

NORM

Naturally Occurring Radioactive Material (NORM) is associated with most, if not all, mineral sands deposits in Australia, including the Goschen Project orebody. NORM is due to the presence of naturally occurring uranium and thorium contained in the grains of orebody sands containing monazite, xenotime, zircon, and some ilmenites.

NORM management at Goschen

Monitoring of background radiation at the Goschen mine site area has been ongoing since 2018. This monitoring will continue throughout the life of the Project. Gamma levels, radon, and radionuclides in dust and groundwater are being measured.

Conservative modelling has shown that the radiation impact of the Goschen Project on humans and the environment is predicted to be well below dose limits, and in line with International Radiation Protection philosophy of doses being “As Low As Reasonable Achievable” (ALARA), and not just below the limit.

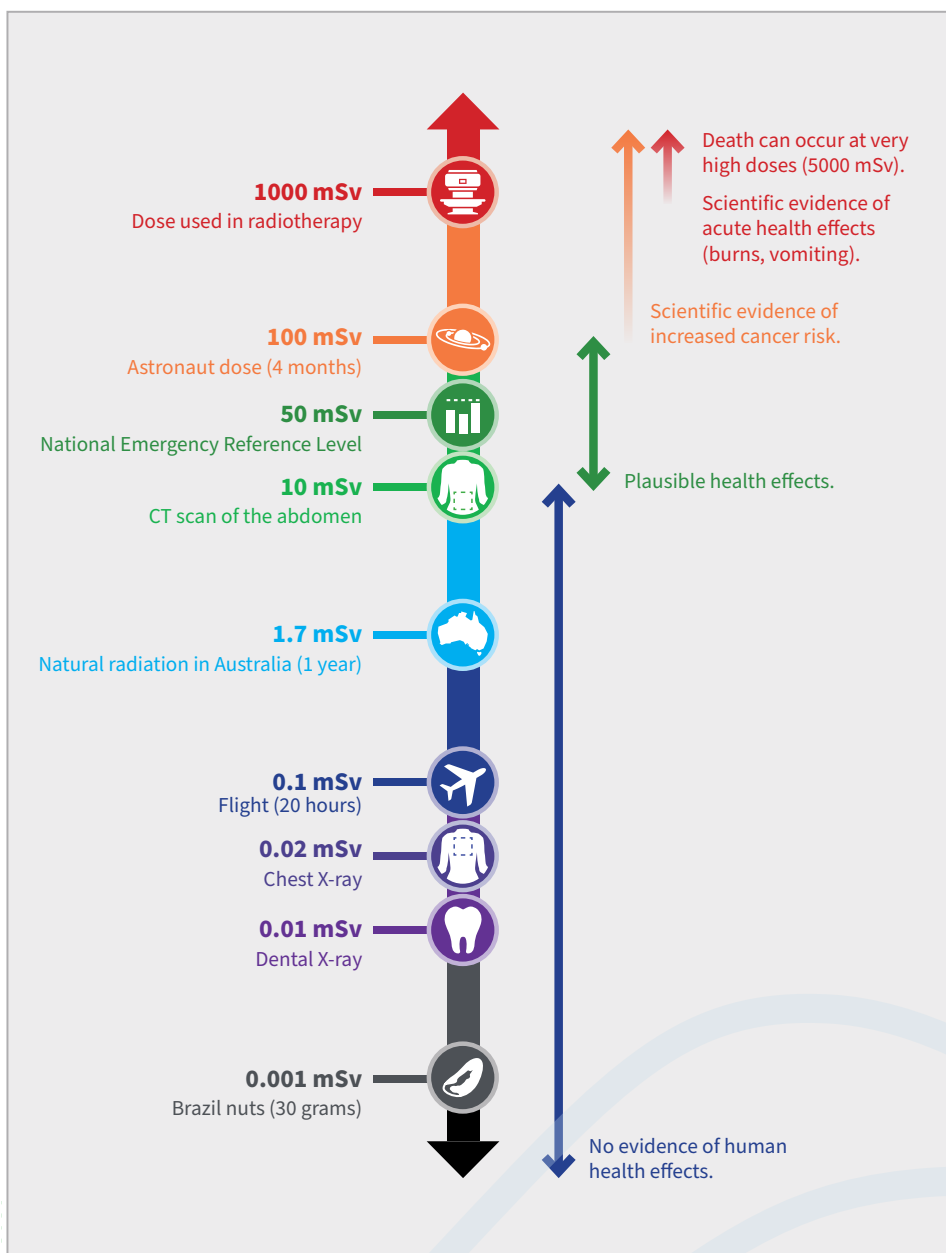
Management of radiation is detailed in the following plans for the Goschen Project and all will require government approval and be monitored by government agencies:

- Radiation Management Plan
- Radiation Environmental Plan
- Radioactive Waste Management Plan
- Transport Management Plan.

Victorian Regulations

Regulation is strict. Victoria manages radiation under the Radiation Act 2005, which is based on the ARPANSA documents, and establishes the legal framework for managing radiation. The Act's purpose is to protect the health and safety of Victorians and the environment from the harmful effects of radiation.

The Radiation Regulations 2017 provide detailed rules and requirements for implementing the Act and including radiation safety, licensing conditions, and disposal procedures.



USEFUL REFERENCES

Australian Radiation Protection and Nuclear Safety Agency (ARPANSA)
arpansa.gov.au

Victorian Department of Health
health.vic.gov.au