



# Working safely with zircon sands



# Radioactivity and radiation

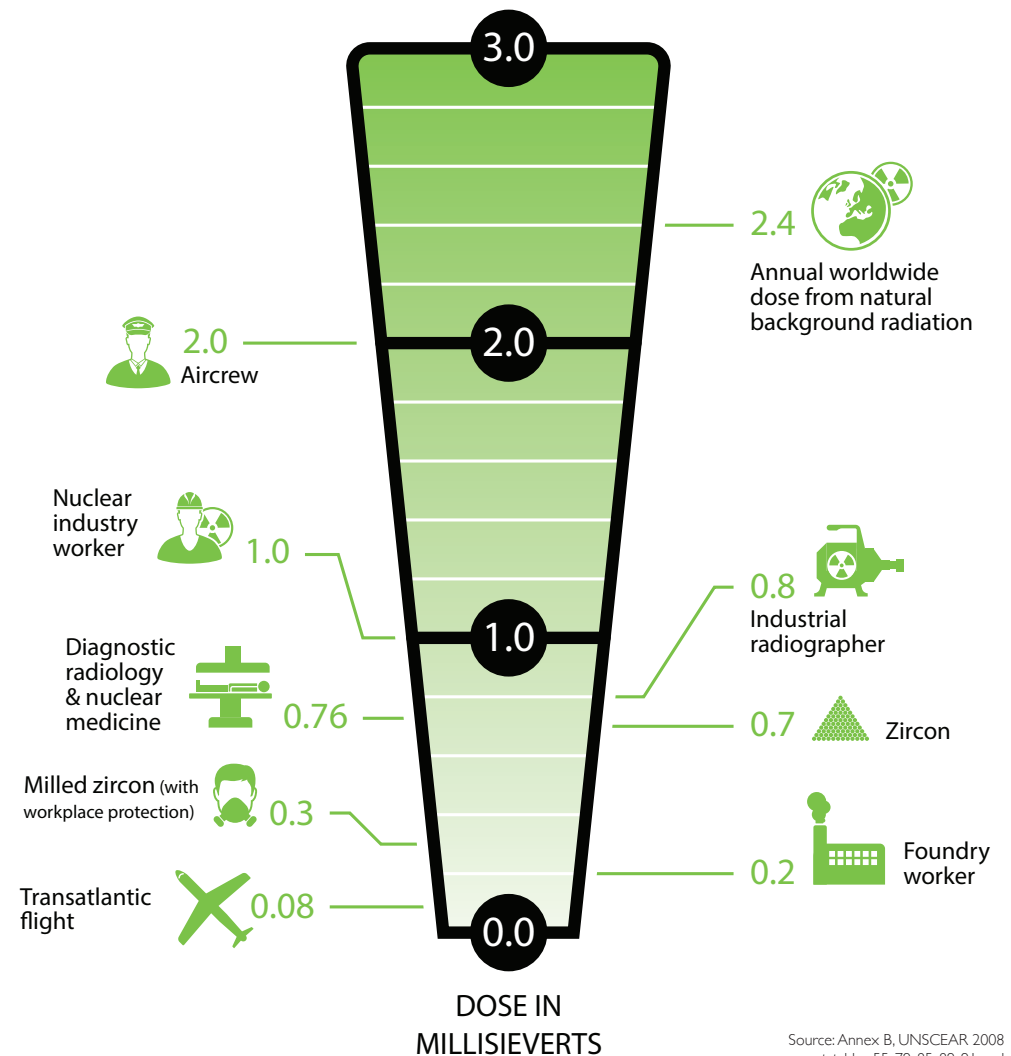
Ionising radiation occurs in our natural environment. We encounter it every day through the food we eat, the water we drink, and the air we breathe. It is also in building materials and items we commonly use.

Like many other rocks and minerals, zircon is a naturally-occurring radioactive material (NORM) that is used in many varied applications including ceramic tiles, sanitary ware, foundry and refractory materials, medical implants, consumer electronics and in the manufacture of jet engine parts.



It is important for operators working in any industry to maintain high standards of safety within their workplace.

**This booklet highlights how to handle zircon safely.**



## Radiation in the workplace

Radiation from zircon is low and is similar to other naturally-occurring sources such as **granite**. Exposure to radiation can either be external or internal and can be lessened by taking appropriate and simple steps to protect workers.

### Potential sources of **external radiation**

Gamma radiation dose rates close to bulk storage areas of zircon are comparatively low, typically 1-2 microsieverts per hour. A microsievert is a measure of radiation dose and is equal to one millionth of a sievert. The radiation dose a person receives depends on the strength of the radiation source, the distance they are from it and the duration of their exposure. Dosimeters are generally used to measure doses of radiation.

### Potential sources of **internal radiation**

While the particle size of zircon sand is too large to be breathed in, dry milling of zircon creates dust which may be inhaled. In the process of separating zircon from other mineral sands, and in the process of its bulk handling, small dust particles may also be generated.

Internal exposure could also be caused by ingestion, but very large quantities would need to be ingested to cause a measurable radiation dose.

## Detection and measurement of radioactivity

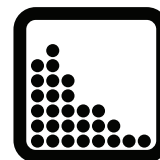
**The detection and measurement of radioactivity within the workplace should be carried out by people with adequate training.**

Test all equipment before use and regularly, typically annually, calibrate it in an approved laboratory.



### **Monitor dose rates in microsieverts per hour -**

Although dose rates from zircon are below those at which specific control procedures are necessary, they should be regularly monitored where bulk quantities of material are involved.



**Measure dust concentrations -** Monitoring dust concentrations is necessary in milling and other operations that produce small particles. Personal dust monitors should be worn to assess the amounts of dust inhaled. Once dust concentrations reach 1-2 milligrams per cubic meter respiratory protection is required.

# Protecting yourself

Dose rates from zircon are low enough for simple procedures to be sufficient to protect against external radiation. These include:

## Storing zircon



Store zircon in a well-ventilated warehouse and/or open ventilation at the start of each shift to allow any build-up of radon to escape.



Keep shipping container doors fully open for approximately one hour before unloading, allowing any radon to escape by natural ventilation



Limit access to zircon storage areas by minimizing general walk-through and managing access only to those workers that need to handle zircon.



Do not store zircon in, or very close to, occupied areas, such as offices.

## Controlling dust

There are limits imposed on the levels of general dust allowed within a working atmosphere. When milled zircon is handled in dry form, it is likely that atmospheric dust levels will need to be controlled. Dust creation is minimised when zircon is wet-milled and special precautions may not be required.



Use dust extraction systems when dry milling zircon, loading material into a processor or bagging a powdered product.



Clean working areas regularly to minimise the build-up of dust in the workplace, particularly floors and horizontal surfaces. If milled powder is spilled or dust is being removed, wash with water or use a vacuum cleaner with an efficient filter. Importantly, do not sweep.



Wear respiratory protective equipment such as dust masks when in the plant. It is generally recommended that maintenance workers and those working in dusty areas, such as product bagging or transferring loose material, wear full face respiratory equipment.



# Further information

Additional information can be found  
on the Zircon Industry Association  
website [www.zircon-association.org](http://www.zircon-association.org)

## IAEA Zircon **Safety Report**



[https://www-pub.iaea.org/books/IAEABooks/7673/  
Radiation-Protection-and-NORM-Residue-Management-  
in-the-Zircon-and-Zirconia-Industries](https://www-pub.iaea.org/books/IAEABooks/7673/Radiation-Protection-and-NORM-Residue-Management-in-the-Zircon-and-Zirconia-Industries)

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