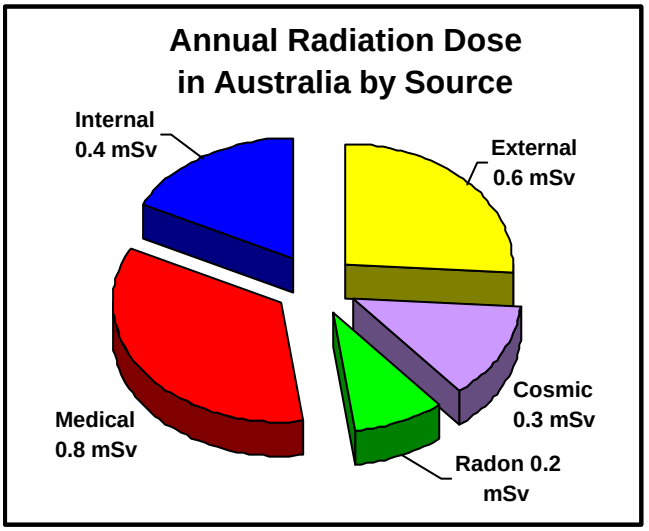
What's Background Radiation?

In Australia, and around the world, everyone and everything is exposed to ionizing radiation every day. This radiation comes from the natural world around us. Humans also can be exposed to radiation in medical procedures. There is no basic difference between natural radiation from the environment and radiation used in medical procedures. The figure below shows the average amount of ionizing radiation (in mSv[#]) received annually by all Australians.



Sources:

Natural background radiation can be divided into two sources, cosmic and terrestrial and the terrestrial radiation sources can be either external or internal.

Cosmic rays are produced when the Earth's upper atmosphere is bombarded by highly energetic particles that come from outer space. This radiation rains down on everyone around the world and contributes 13% on average to total exposure.

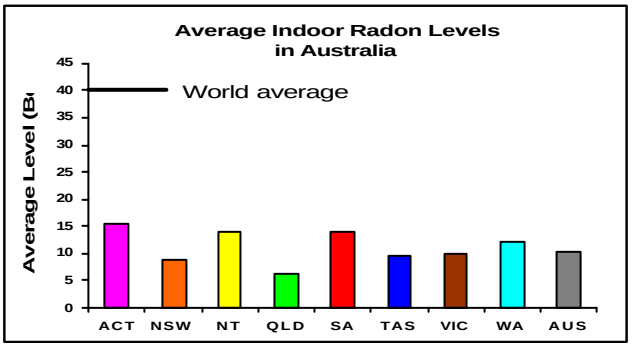
External terrestrial radiation comes from naturally occurring radioactive isotopes with long half-lives* that are still present in the environment. For example natural potassium, found in most soils and living organisms, contains 0.012% of the radioactive isotope Potassium-40 (^{40}K). Two other long-lived isotopes, Uranium-238 (^{238}U) and Thorium-232 (^{232}Th), are also important. These two radioactive isotopes are present at parts per million levels in most soils and rocks and produce a whole series of other radioactive isotopes as they decay, including isotopes of radon, before turning into stable lead.

Internal terrestrial radiation comes from naturally occurring radioactive isotopes inside the body. Since the element potassium is essential to most biological life, most living things have tiny amounts of radioactive ^{40}K in them. They also have tiny amounts of ^{232}Th and ^{238}U which also contribute to their exposure to radiation.

The ^{232}Th and ^{238}U in the earth decay into isotopes of the radioactive noble gas radon. A noble gas, such as radon, does not form chemical bonds, so radon atoms can travel from where they were created in the soil into the atmosphere before they decay. Inhaling the radioactive products resulting from the decay of radon can lead to an increased risk of lung cancer.

Exposure:

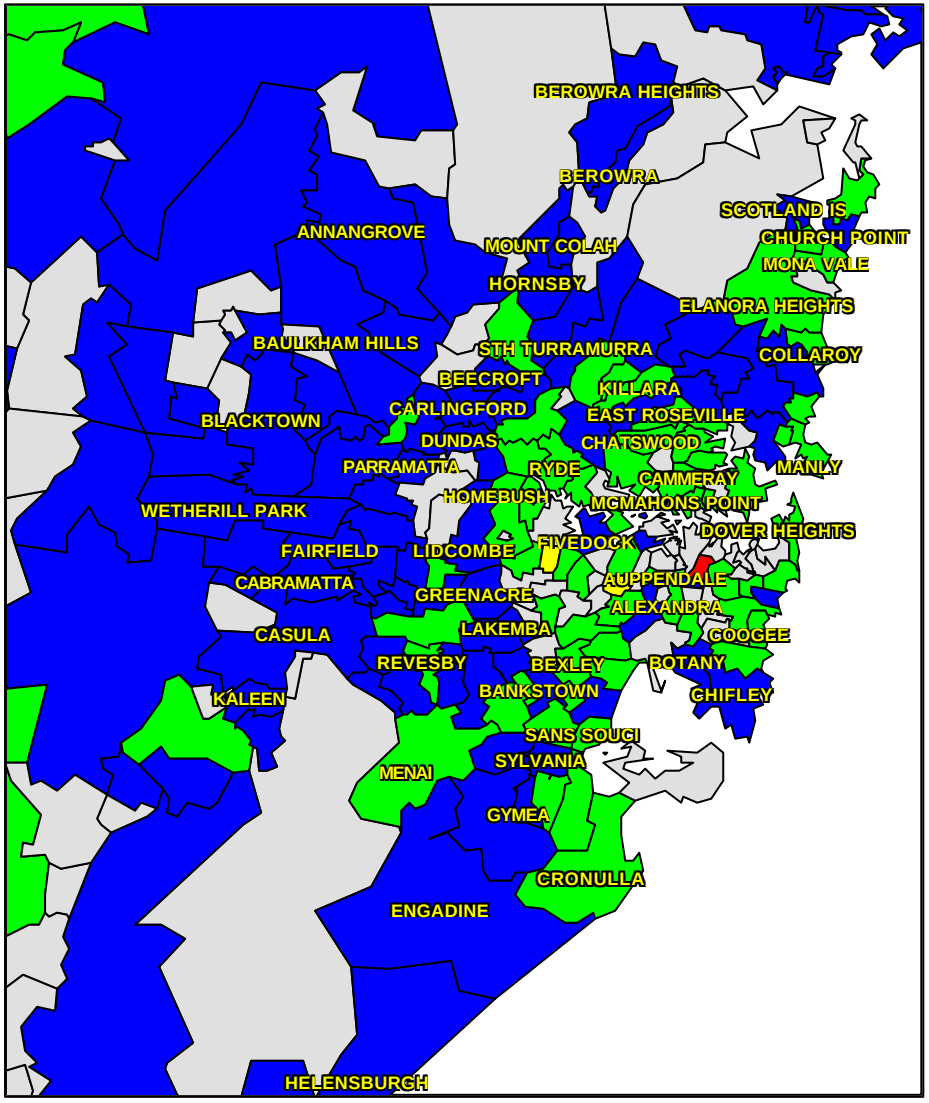
In 1990, scientists from the Australian Radiation Laboratory (now part of the Australian Radiation Protection and Nuclear Safety Agency) conducted a nationwide survey of Australian homes to determine the average annual radiation dose to the Australian population from exposure to natural background radiation. They found that the annual average radiation dose to the Australian population from natural background is relatively low, at 2.3 mSv. The worldwide average radiation dose from natural background is about 3.5 mSv but can be as high as 50-260 mSv. They also measured radon levels in 10,000 homes and found that Australia does not appear to have a problem with elevated radon levels, as is the case in Europe and North America. The average radon level in Australian homes is 10.5 Bq/m^3[@] compared to a world-wide average of 40 Bq/m^3. The indoor radiation survey results for the Sydney area are shown over the page.



[#] mSv is the abbreviation for milliSieverts, a unit of radiation dose.
* half-life is time it takes half of the radioactive material to decay.
[@] Bq/m^3 is a measure of how much radon is in the air

broken down by source.

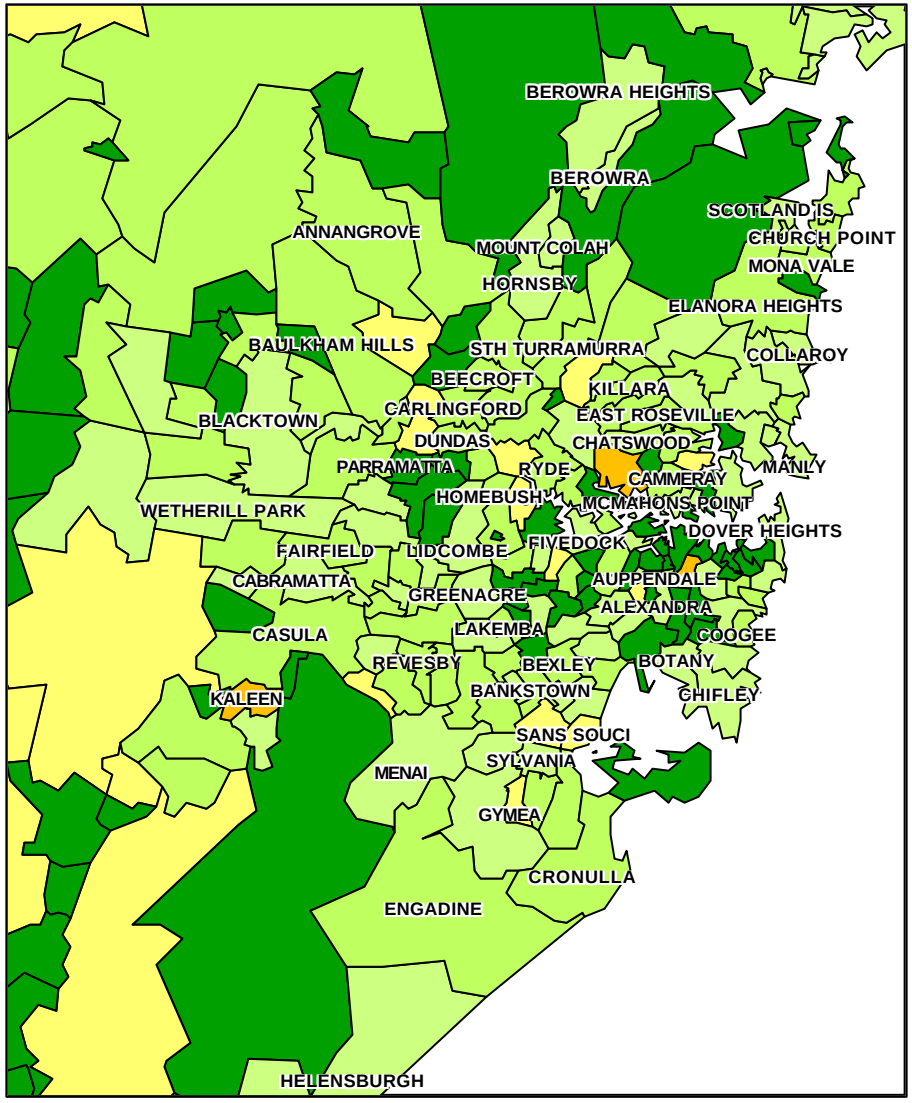
For further information on radiation, see:
http://www.arpansa.gov.au



Average Indoor Radiation Dose
Sydney Area
(By Postcode District)

Average Indoor Radiation Dose
mSv per year

- 2.5 to 5
- 2 to 2.5
- 1.5 to 2
- 1 to 1.5
- 0.5 to 1
- 0 to 0.5
- No Data
- all others



Average Indoor Radon Levels
Sydney Area
(By Postcode District)

Annual Average Indoor Radon
Bq per cubic meter

- 200 to 1,000
- 50 to 200
- 20 to 50
- 10 to 20
- 5 to 10
- 0 to 5
- No Data
- all others