

# Briefing note

## Radioactive Substances Regulation

### Understanding radiation

Radioactive materials, discharged into the environment from various sources, give off radiation. We look at what radiation is, how people are affected and how we measure this.

#### What is radiation?

Radiation is energy or fast moving particles. Radiation can be natural or man-made, although more than 99 per cent of the typical radiation exposure of most people comes from natural sources and medical examinations such as X-rays.

#### Sources of radiation

**Man-made:** The largest source of man-made exposure to radiation is medical X-rays, particularly from examinations of the chest and lower back. Some diseases are treated using man-made radiation. Most people, however, tend to think of man-made radiation as being from nuclear power stations and other nuclear sites. It is true that there are some low levels of man-made radiation that come from nuclear sites. In the UK some radioactivity from the Chernobyl accident can also still be found. However, medical sources and natural radiation are the largest source of exposure to radiation.

**Natural:** The largest source of natural radiation exposure is from inhaling radon gas, which is found everywhere in the UK, the highest levels being in parts of South West England. Radon gas comes from uranium that occurs naturally in all rocks and soils. The wind disperses radon in the open air but it can build up in houses, offices or schools where ventilation is low, for example in basements. Radon exposure varies across the country, but most homes have low levels.

Other sources include cosmic radiation from outer space. The atmosphere absorbs some of the



cosmic radiation before it reaches the Earth's surface. The higher up people are, the more exposure they receive from cosmic radiation. That's why aircraft crew are most exposed to this type of radiation.

We are also exposed to natural radiation from certain rock types and naturally radioactive material in our food and drink. For example, potassium emits low levels of radiation and gets into our bodies through the food we eat. It is an essential component of our diet. Because of this our bodies also emit radiation from the radioactive potassium that is present naturally in bones and soft tissue.

#### What is dose?

Exposure to radiation can damage tissues in the body and increase the risk of cancer. The more radiation a person is exposed to the greater the risk of damage and cancer.

Potential harm done to a person through exposure to radiation is measured by the radiation 'dose'. This is measured in milliSieverts (mSv) and takes into account the harm done to any part of the body exposed to radiation.



**Dose from natural radiation:** The average radiation dose to individuals in the UK from natural sources is 2.2mSv per year (mSv/y). This can range from 1.6 mSv/y in some parts of the country to nearly 8 mSv/y in parts of Cornwall where radon gas levels are highest. The Health Protection Agency ([www.hpa.org.uk](http://www.hpa.org.uk)) monitors doses from natural radiation across the UK.

**Dose from man-made radiation:** Medical exposure such as X-ray examinations add, on average, 0.4mSv/y to the UK population.

The average exposure to all sources of radiation in the UK including from medical exposure is 2.6 mSv/y. Exposure to radiation at work and fallout from historic nuclear weapons testing contributes about 0.4 per cent of the total dose.

Radiation doses to people living or working near nuclear sites range from less than 0.001 mSv/y for most people up to 0.2 mSv/y for a few groups near nuclear sites. The dose to the average person from nuclear sites is less than one per cent of the average radiation dose. The legal dose limit for members of the public from man-made radiation in the UK is 1 mSv/y.

### Assessing radiation and doses

Radiation doses are calculated from measurements of levels of radioactivity and radiation in the environment or, where these are not available, from predictions. Doses are calculated in the same way for natural radioactivity and from man-made radiation sources. The Health Protection Agency assesses and reports on the UK public's dose from radiation from time to time.

Some industrial processes, such as at nuclear sites or in hospitals, need to dispose of low levels of radioactive waste to the environment. The Environment Agency regulates these disposals in England and Wales. We ensure strict controls are in place to prevent or minimise public radiation exposures and make sure they are below the legal dose limit.

Together with the Scottish Environment Protection Agency and the Food Standards Agency, we carry out an assessment of radiation doses to the public each year. We calculate doses from radioactivity taken into the body and from radiation emitted from radioactivity in the environment. We use measurements of radioactivity in food and the environment. We publish our findings in our annual Radioactivity in Food and the Environment (RIFE) report.

All of the annual reports have confirmed that radioactivity in food and the environment remains low and the public's exposure to radiation around nuclear sites is below the legal dose limit.

### About this briefing

This briefing is part of a series that highlights our work in the area of regulating radioactive substances.

You can find these briefings by typing 'rsr' in the keyword search on our publications catalogue (<http://publications.environment-agency.gov.uk>).

### Links to other organisations

**The Health Protection Agency** has a key role. Its Centre for Radiation, Chemical and Environmental Hazards (CRCE) carries out work on ionising and non-ionising radiations. It undertakes research to advance knowledge about protection from the risks of these radiations; provides laboratory and technical services; runs training courses; provides expert information and has a significant advisory role in the UK. It publishes many reports on radiation, including reviews to the UK population radiation exposure on its website [www.hpa.org.uk](http://www.hpa.org.uk)

The **Food Standards Agency** has a role in protecting the foodchain from contaminants including radioactivity. We work closely with them to ensure that disposals of radioactive waste will not compromise health via the foodchain. [www.food.gov.uk](http://www.food.gov.uk)