



## Radionuclides in Air

Some radioactive materials - most of which are naturally-occurring elements - are actually air pollutants. All of them, as a whole, are a relatively small proportion of the many elements and chemicals that are considered air pollution. Radon is the most significant of these elements, but most radon exposure stems from the indoor environment. Improving technology continues to minimize man-made radioactive air pollutants and monitor air quality.

Under EPA's Clean Air Act, significant air pollutants include ozone, particulate matter, nitrogen dioxide, sulfur dioxide and lead. An additional 189 air pollutants are considered toxic in small amounts, including cadmium, benzene and radionuclides.

Air pollution affects everyone to some extent, but it is particularly harmful to the following groups:

- Residents of major metropolitan areas, especially those areas with large industrial facilities;
- Children, who tend to be more active outdoors and whose lungs are still developing
- Individuals suffering from respiratory illnesses, like asthma; and
- The elderly, especially sufferers from heart or lung disease.

### Terrestrial Radiation (Radon)

The majority of our total radiation exposure stems from naturally-occurring radioactive materials, including uranium, thorium, and radon. The most significant of these is radon — a colorless, tasteless, and odorless gas that comes from the decay of radium found in nearly all soils. Levels of radon vary throughout the country.

From the ground, radon migrates into homes and other buildings through cracks and holes in foundations or walls. Accumulated radon, trapped inside the buildings, may become a health hazard if the building is not properly ventilated. Radon in the air decays into radioactive polonium, which, if inhaled, can damage lung cells and can even lead to lung cancer.

In a January 2005 news release, the U.S. Surgeon General Richard H. Carmona noted that radon is the second leading cause of lung cancer in the United States, with more than 20,000 Americans dying each year from radon-related lung cancer. Only smoking causes more lung cancer deaths, and smokers exposed to radon are at an even higher risk than nonsmokers. Dr. Carmona also noted that “radon can be detected with a simple test and fixed through well-established venting techniques.”

### Cosmic Radiation

Another 8% of our radiation exposure comes from outer space, originating from our galaxy, other galaxies, and even our own sun. People in higher elevations, such as those who live in the mountains or fly on airplanes, experience higher doses of cosmic radiation. The atmosphere shields us from cosmic radiation. The more air that is between us and outer space, the more shielding we have. While radon is absorbed through breathing, cosmic particles are absorbed through the skin.

### Industrial Emissions

Nuclear power plants, mining facilities, and research facilities are man-made contributors to radioactive air pollutants. These industrial facilities account for less than 0.1% of the average American's total radiation exposure, much less than that from medical x-rays and various consumer products.

Health and the environment become a concern when radionuclides are released into the air as a result of facility accidents, nuclear weapons testing or acts of terrorism. Air monitors are used to track changes in radiation levels and assess the spread of contamination in the case of a radiation accident or incident.

## Who is protecting you

### U.S. Environmental Protection Agency (EPA)

Under EPA's Clean Air Act, EPA's Office of Air and Radiation (OAR) develops national programs, technical policies, and regulations for controlling air pollution and radiation exposure. Within OAR, the Office of Radiation and Indoor Air (ORIA) maintains responsibility to protect the public from the risks of radiation. Additionally, EPA's RadNet program monitors the air throughout the country for changes in radiation levels and assesses the spread of contamination in the case of a radiation accident or incident.

### U.S. Department of Energy (DOE)

The DOE's Department of Environmental Management issues regulations related to spills, releases, and clean-up of radiation in the air from DOE facilities. DOE has requirements that limit how much radiation may be released from its facilities, and it ensures that all facility operators comply with these internal agency standards.

### U.S. Nuclear Regulatory Agency (NRC) and Agreement States

The primary mission of the NRC is to protect public health and the environment from the effects of radiation from nuclear reactors, materials, and waste facilities. Thirty-three states have signed formal agreements with the NRC, providing these states regulatory responsibility over small quantities of special nuclear material, special nuclear material sources and their byproducts. These states are known as NRC Agreement States.

### State Environmental Protection Divisions/Agencies

Individual states have the authority to also establish standards for radiation protection, and many have adopted such standards. The state agencies also are empowered to enforce compliance with these standards in order to ensure public health and the environment are protected from industrial and governmental uses of radioactive materials.

## What can you do to protect yourself

- **Test Your Home for Radon** - Testing is the only way to know if you and your family are at risk from radon. If you do not wish to hire a professional, using a low-cost, "do-it-yourself" radon test kit only takes a few minutes of your time. You should test your home for radon every two years, and retest any time you move, make structural changes to your home, or occupy a previously unused level of a building. Radon in the air is measured in units known as "picocuries per liter," or "pCi/L." Sometimes test results are expressed in Working Levels (WL) rather than pCi/L. If you have a radon level of 4 pCi/L (0.16 WL) or more, take steps to remedy the problem as soon as possible. If you find radon concentrations above 4 pCi/L, you can reduce them through methods that can be as simple as sealing cracks in floors and walls or as complex as installing systems that use pipes and fans to draw radon out of the home or building.
- **Be Informed** - Cosmic radiation is a natural part of the background radiation, and there is little that can or needs to be done to protect yourself from it. Emissions of radioactive materials from routine operations of nuclear power plants should not require any protective actions on your part. However, in the event of an accident or a significant unplanned release, you may be instructed to evacuate or shelter-in-place. During such an event you should listen to the radio or television for information and instructions from your local emergency management directors and/or your elected officials.

## Resources

You can explore this radiation source further through the resources at the following URL:

<http://www.epa.gov/radtown/air.html#resources>

We provide these resources on-line rather than here so we can keep the links up-to-date.