



U.S. DEPARTMENT OF
ENERGY

Legacy
Management

Weldon Spring, Missouri, Site Fundamentals of Radiation

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Radiation—It's a Fact of Life

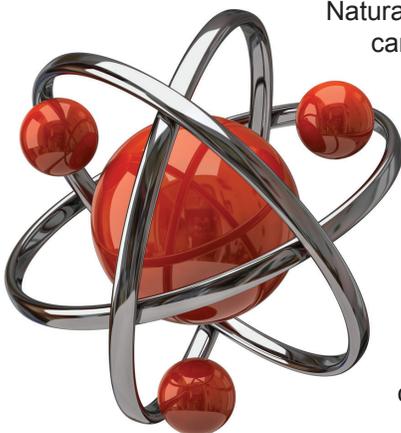
Radiation has been with us since the beginning of time. Everyone who has walked on this planet has been exposed to radiation. Radiation comes from as far away as outer space and as near as the ground that you are standing on, it's even in the food we eat. For the most part, nature is the largest source of exposure.

The radiation we receive from all natural and some man-made sources is called "background radiation." The millirem (mrem) is a unit used for measuring radiation received by a person. The total average background for radiation received by people living in the United States is 620 millirem per year (mrem/yr), of which half is from natural sources and half is from man-made sources.

Some Sources of Natural Background Radiation

- **Cosmic** – Radiation from the sun and stars.
- **Internal** – Radiation from naturally radioactive elements that we eat, drink, and breathe.
- **Terrestrial** – Radiation from naturally radioactive elements in rocks and soil.

We are also exposed to radiation from radon gas, which is a decay product of naturally radioactive components of the Earth's crust.



Natural background radiation can vary greatly. Radiation levels from cosmic rays are greater for people on airplanes and those living on the Colorado Plateau. Because of its higher altitude, the radiation levels in Denver, Colorado, are significantly greater than the national average of naturally occurring

background radiation. However, no greater rate of cancer or other radiation-linked illnesses has been detected in Denver residents.

Man-Made and Other Sources of Radiation

- **Medical** – Radiation from X-rays and radioactive elements for medical use.
- **Building** – Radiation from naturally occurring radioactive elements in the materials we use to build our homes.
- **Consumer** – Radiation from items such as smoke detectors and old lantern mantles.

Background radiation does not include that received from smoking. A person who smokes one pack of cigarettes a day receives 15–20 mrem/yr. This extra radiation is due to the naturally radioactive polonium that sticks to tobacco leaves. Polonium is a decay product of naturally occurring uranium and has always been a part of our environment.

Occupationally Exposed Limits

The legal limit imposed by the federal government in this country for an occupationally exposed worker is 5,000 mrem/yr. The highest average worker radiation dose during the Weldon Spring Site Remedial Action Project (WSSRAP) occurred in 1998 during chemical stabilization and solidification (CSS) plant operations. The average internal and external exposure for that period was about 9 mrem/yr. This exposure is comparable to a chest X-ray or two round trips cross-country on commercial airliners. WSSRAP has had only a few worker radiation doses reported above 100 mrem/yr, the highest of which was an external radiation dose of 170 mrem/yr in 1994 during building demolition.

Hereditary Effects

Some 77,000 children were born to survivors of the atomic bomb explosions in Hiroshima and Nagasaki, Japan. No increased rate of birth defects has been noted in those children or their children or their grandchildren. The fourth

generation is currently being monitored for problems. So far, none have been detected.

There is a greater rate of birth defects in children who are exposed to high amounts of radiation while in the womb. These effects are seen after the mother and her unborn child have been exposed to more than 15,000 mrem of radiation. The reportable dose for WSSRAP in 2000 was 0 mrem/yr.

Weldon Spring, Missouri, Site Today

Recently, a detailed survey was performed at the Weldon Spring, Missouri, Site to determine the radiological conditions of the disposal cell and surrounding areas typically frequented by visitors.

The areas surveyed included:

- Disposal cell stairs
- Disposal cell monument area
- Gravel road surrounding the disposal cell
- Various paths leading to the disposal cell
- Picnic benches outside the Interpretive Center

For comparison, a 5 mrem baseline was determined by averaging the results of various surfaces surveyed at the nearby Francis Howell High School. All of the Weldon Spring, Missouri, Site survey results were equal to or less than the baseline.

Contacts

Documents related to the Weldon Spring Site are available on the DOE Office of Legacy Management website at <http://www.lm.doe.gov/weldon/Sites.aspx>.

For more information about DOE Office of Legacy Management activities at the Weldon Spring Site, contact:

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