



Natural Radiation in Wastes From Coal-Fired Power Plants

Fly ash, bottom ash and boiler slag from coal-fired power plants contain small amounts of naturally occurring radioactive material.

- Naturally radioactive materials that were in coal before processing mostly end up in fly ash, bottom ash and boiler slag.
- About 80 to 90 percent of fly ash, bottom ash and boiler slag is non-radioactive minerals, typically silicon, aluminum, iron and calcium.

About Natural Radiation in Wastes From Coal-Fired Power Plants

In 2012, approximately 37 percent of the United States' electricity was created by burning coal. Like all rocks, coal contains small amounts of radioactive material that are found naturally in the environment.

When coal burns, most of the radioactive material does not burn and ends up in three types of wastes:

- **Fly ash** is carried by hot gases and trapped by stack filters. It is the largest of the coal combustion wastes (about half) by weight.
- **Bottom ash** is too large or heavy to be carried by gases and settles to the bottom of the boiler. Just over ten percent of coal combustion waste is bottom ash.
- **Boiler slag** is formed when ash melts under the intense heat of combustion and collects at the bottom of the boiler and in exhaust stack filters. It makes up about two percent of coal combustion waste.

Generally, these wastes are only slightly more radioactive than the average soil in the U.S.

While 99 percent of fly ash is captured by filters, small amounts can escape into the air. Government regulations require power plants to limit the amount of fly ash that escapes into the environment and to dispose of collected ash properly.

A survey by the American Coal Ash Association showed that about 45 percent of all fly ash, bottom ash and boiler slag was reused. Its use depended on the characteristics of the waste. Just over 60 percent of collected fly ash was used in concrete and blended cement. Almost 70 percent of bottom ash was used for concrete, blended cement and to fill structures or embankments. About 80 percent of boiler slag was used as blasting



Different colors of coal ash.
Source: American Coal Ash Association



Bottom ash
Source: American Coal Ash Association



Boiler slag
Source: American Coal Ash Association

grit or roofing granules. Fly ash, bottom ash and boiler slag can also be used to fill structures or embankments, in snow and ice control, as waste stabilization/solidification, or as aggregate.

Rules and Guidance

U.S. ENVIRONMENTAL PROTECTION AGENCY (EPA)

EPA develops standards for coal-fired power plants under the Clean Air Actⁱ, Clean Water Actⁱⁱ, Safe Drinking Water Actⁱⁱⁱ, Resource Conservation and Recovery Act^{iv} and the Comprehensive Environmental Response, Compensation, and Liability Act^v. EPA has primary responsibility for setting federal radiation standards for exposure to naturally-occurring radioactive materials.

THE STATES

Each state has one or more programs to address radiation protection, including naturally occurring radioactive materials. Most states control public exposure to radioactive materials through programs implementing federal environmental laws such as the Clean Air Act and the Clean Water Act.

U.S. DEPARTMENT OF ENERGY (DOE)

DOE provides grants for research and studies on coal-fired plants and on clean coal technologies.

What you can do

The amount of natural radiation in wastes from coal-fired power plants is so small that no precautions need to be taken.

There are other harmful emissions from power plants and industrial sources that are regulated. You can learn more about EPA's air pollution standards by visiting the *Plain English Guide to the Clean Air Act*^{vi}.

If you are concerned about air quality from any type of emission, you can track the Air Quality Index for your area at the government's AirNow website^{vii}.

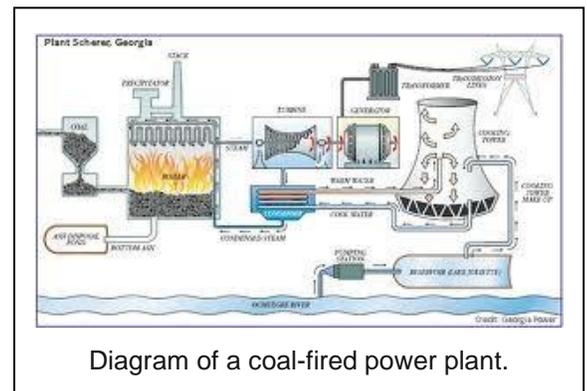


Diagram of a coal-fired power plant.

Where to learn more

You can learn more about natural radiation in wastes from coal-fired power plants by visiting the resources available on the following webpage: <http://www3.epa.gov/radtown/coal-fired-power-plants.html#learn-more>.

ⁱ <http://www.epa.gov/air/caa/peg/>

ⁱⁱ <http://www2.epa.gov/laws-regulations/summary-clean-water-act>

ⁱⁱⁱ <http://water.epa.gov/lawsregs/rulesregs/sdwa/>

^{iv} <http://www2.epa.gov/laws-regulations/summary-resource-conservation-and-recovery-act>

^v <http://www.epa.gov/superfund/policy/cercla.htm>

^{vi} <http://www.epa.gov/air/caa/peg/>

^{vii} <http://www.airnow.gov/>