

Article

Putting coal ash radiation risks in context

When the U.S. Environmental Protection Agency (EPA) published an October 2023 report concluding that coal ash used as structural fill may pose a health risk due to radium, some groups expressed concern that structural fills posed "dangerous levels of radiation" to people. In fact, based on the science, radiation from coal ash is similar to what we already experience every day.

While it's understandable for people to be concerned about such claims, it is important to look at the underlying science of any public health assessment and what, practically, it means. With that in mind, let's examine the basis of the EPA's report and what it means in the context of potential exposures to radiation from coal ash.

The EPA's analysis

The EPA used available information on the radium content in coal to construct a simulation model for what the exposure may be to someone living in a house constructed on top of coal ash. The EPA concluded that, under typical circumstances where the coal ash would be covered by surface soil, radium would not pose a health risk that is above EPA's trigger for requiring cleanup.

It was only when the EPA assumed that coal ash containing radium was mixed with soil at the ground surface did the agency conclude that risks could be above its levels for indicating when action may be required. The model that the EPA used also predicted that exposures to the naturally occurring levels of radium in soil — exposure to native soils that *don't* contain coal ash — would also exceed the EPA's risk levels.

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In other words, the EPA's model is conservative in that it concludes that even native soil presents radiation risks that exceed the levels that require action — if living on a structural fill were actually unsafe, a home built on everyday soil would be, too.

Putting risk in context

People are exposed to radiation every day, from natural sources such as minerals in the ground, granite countertops, and cosmic radiation to manufactured sources such as medical X-rays. The exposure to radium under the assumption that a house is built on coal ash, even if there is *no* soil cover over the ash, contributes an additional 3.7% to the average annual radiation dose that a person living in the U.S. receives from *all sources* to which they are exposed.

To put that into perspective, the amount of additional exposure to radiation from living on top of coal ash is about the same amount of radiation received from two chest X-rays per year, and about the same amount of radiation received from just three round-trip flights between New York and Los Angeles.

While the presence of radium in coal ash and associated risk could be misinterpreted as a new finding, the composition of coal ash has not changed, and the presence of radium in coal ash has been well researched. As another toxicologist previously explained, because coal ash is derived from coal, it contains naturally occurring elements — including trace amounts of radium. A report prepared by the U.S. Geological Survey (USGS) concludes that radium in most fly ash is within the range that occurs in granitic rocks, phosphate rocks, and shale. The USGS also concluded that the majority of coal and fly ash is not significantly enriched in radioactive elements, or in associated radioactivity, compared to common soils or rocks.

Separately, the EPA has studied the safety of using coal combustion materials in building materials such as concrete. In the EPA's beneficial use evaluations, the agency concluded that the potential exposures to ionizing radiation from coal ash in concrete are comparable to those associated with mined materials. Based on that evaluation, the EPA eliminated radiation as a concern in concrete.

While it's true that the modeled risk for exposure to radiation from coal ash in structural fill may exceed the EPA's risk levels under some extreme circumstances, it's also clear that the radium content of coal ash is similar to the content in naturally occurring rocks and soils, and that the exposures are similar to the radiation exposures that we already encounter every day.