Coal Ash: The Truth About Toxicity

The United States has relied on coal-powered generation for nearly a century. Today, it's just part of the way Duke Energy meets customers' demand for electricity. The Environmental Protection Agency has evaluated coal ash extensively and has repeatedly determined that it is not a hazardous waste.

- Everything can be toxic at high levels. Risk depends on whether you're actually exposed and at what amount.
- Regulations and electric utilities' practices to monitor groundwater, maintain safe ash basins and manage ash in lined landfills significantly reduce the potential for public exposure to ash or elements in ash.
- Ash contains low levels of trace elements. Even if you do come into contact with ash, studies have shown you'd have to ingest large amounts to have the potential for experiencing adverse effects.

Duke Energy is committed to managing ash responsibly. We support an environmentally sound, cost-effective and fact-based solution.

The Facts

FACT: More than 90 percent of the mineral components of fly ash consist of oxides of four common elements that make up soil and rocks: silicon, iron, aluminum and calcium.

FACT: Less than 1 percent of ash consists of trace elements that can pose health risks in high quantities. Many of these elements are also found in foods and beverages we consume every day, such as flour, juices and chicken. **Apple juice** contains 0.008 ppm or 8 ppb arsenic.

FACT: For the past 25 years, Duke Energy's coal plants in the Carolinas have been required to perform regular toxicity tests of water discharged from ash basins. In these tests developed by EPA, sensitive aquatic animals are exposed to samples of that water prepared to simulate worst-case drought conditions in the receiving lake or river.

More than 1,000 tests have been completed, and greater than 99 percent of the tests indicate the absence of toxicity. Many facilities have never failed a test.

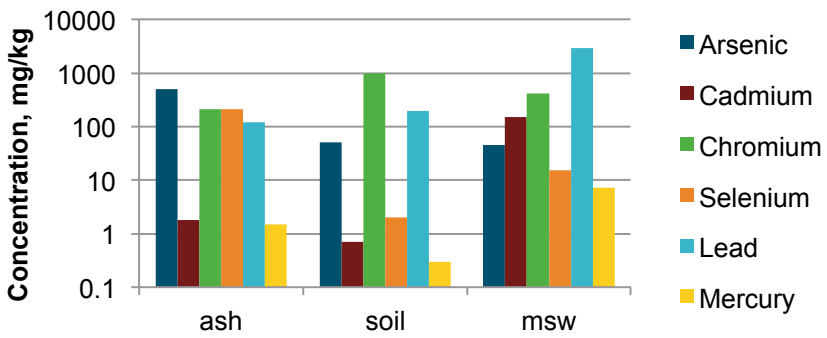
FACT: Most minerals in fly ash are below EPA's residential soil screening levels. Screening levels are amounts in soil that a child and adult could be exposed to daily without adverse effect. Arsenic is the exception; however, its risk is based on daily direct ingestion exposure, which is extremely unlikely.

Total average daily arsenic exposure from food
0.05 – 0.058 mg/day

Range of incidental arsenic ingestion if child exposed daily to fly ash rather than soil
0.0044 – 0.052 mg/day

Did you know? Many of the same substances in ash are also found in soil and municipal solid waste.

Maximum Concentrations



FACT: The trace elements in ash are measured in very small units. A part per million is equivalent to four drops of water in a 55-gallon barrel. A part per billion is equivalent to one pinch of salt in 10 tons of potato chips.

msw – municipal solid waste
ppm – parts per million
ppb – parts per billion

Sources: EPRI, EPA, Lisa Bradley, Ph.D., ATSDR Toxicological Profile, Coal Ash in Context

References

Introduction

During this time, the EPA has extensively evaluated coal ash and has repeatedly determined that coal ash is not a hazardous waste.

- EPRI, 2009. Coal Ash: Characteristics, Management and Environmental Issues.

Risk depends on exposure and the level of toxicity. If there's no exposure, there's no risk.

- Bradley, Lisa, 2012. Health Hazards and Risk Issues: Sorting Fact from Fear Presentation. Slide 6.

Even if you do come into contact with ash, studies have shown you'd have to ingest large amounts to have the potential for experiencing adverse effects.

- Bradley, Lisa and Ward, John, 2011. Coal Ash in Context: Separating Science from Sound Bites as Regulatory and News Media Debates Continue. Ash at Work.

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- EPRI, 2012. Coal Ash Toxicity Technical Brief

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- EPRI, 2012. Coal Ash Toxicity Technical Brief

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- "Coal Ash Material Safety: A Health Risk-Based Evaluation of USGS Coal Ash Data from Five US Power Plants." LJN Bradley. Ash at Work, Issue 1, 2012. Available at www.acaa-usa.org.
- http://www.epa.gov/ttn/atw/hlthef/arsenic.html

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- ATSDR Toxicological Profile for Arsenic. 2007. Available for download at http://www.atsdr.cdc.gov/toxprofiles/index.asp

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- http://www.nesc.wvu.edu/ndwc/articles/OT/FA04/Q&A.pdf

Chart comparison of coal ash, soil and municipal solid waste

- Characterization of Coal Combustion Residues from Electric Utilities – Leaching and Characterization Data, EPA-600/R-09/151 December 2009.
- Lindsay, W. L. 1979. Chemical equilibria in soils. John Wiley, as cited in Ground Water Issue, Behavior of Metals in Soils EPA/540/S-92/018.
- A Study of the Metal Content of Municipal Solid Waste, Chemical Science and Technology Laboratory, NIST (prepared for US DOE), 1998.