AECOM

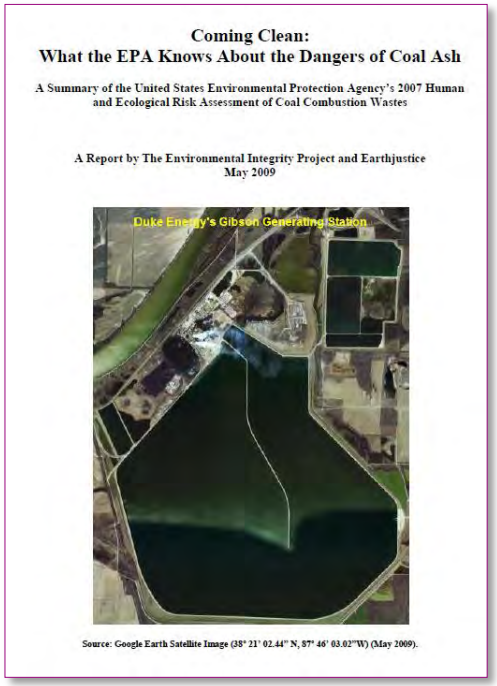
Coal Combustion Products (CCPs)

Questions and Answers about Toxicity and Assessment of Risk

Environment

CCP's in the News

- TVA
- Environmental group publications
- USEPA's proposed rule-making
- LEO website

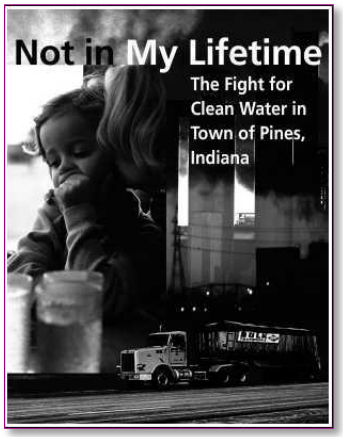

Coming Clean:
What the EPA Knows About the Dangers of Coal Ash

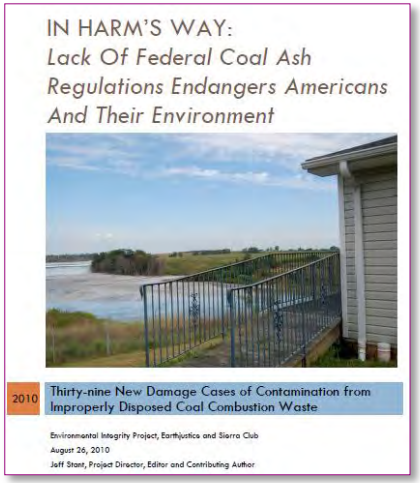
A Summary of the United States Environmental Protection Agency's 2007 Human and Ecological Risk Assessment of Coal Combustion Wastes

A Report by The Environmental Integrity Project and Earthjustice
May 2009

Duke Energy's Gibson Generating Station

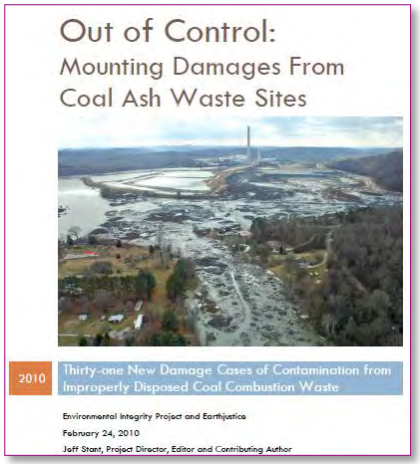
Source: Google Earth Satellite Image (38° 21' 02.44" N, 87° 46' 03.02"W) (May 2009).




IN HARM'S WAY:
Lack Of Federal Coal Ash Regulations Endangers Americans And Their Environment

2010 Thirty-nine New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste

Environmental Integrity Project, Earthjustice and Sierra Club
August 26, 2010
Jeff Stant, Project Director, Editor and Contributing Author


Out of Control:
Mounting Damages From Coal Ash Waste Sites

2010 Thirty-one New Damage Cases of Contamination from Improperly Disposed Coal Combustion Waste

Environmental Integrity Project and Earthjustice
February 24, 2010
Jeff Stant, Project Director, Editor and Contributing Author


Aug. 15, 2010

Coal Ash: 130 Million Tons of Waste

60 Minutes Investigates a Potentially Harmful Waste Byproduct that Inundated a Tenn. Town

Play CBS Video Coal Ash: 130 Million Tons of Waste

(CBS) *This story was originally published on Oct. 4, 2009. It was updated on Aug. 13, 2010.*

We burn so much coal in this country for electricity that every year that process generates 130 million tons of waste. Most of it is coal ash, and it contains some nasty stuff. Environmental scientists tell us that the concentrations of mercury, arsenic, lead and other toxic metals are considerably higher in coal ash than in ordinary soil.

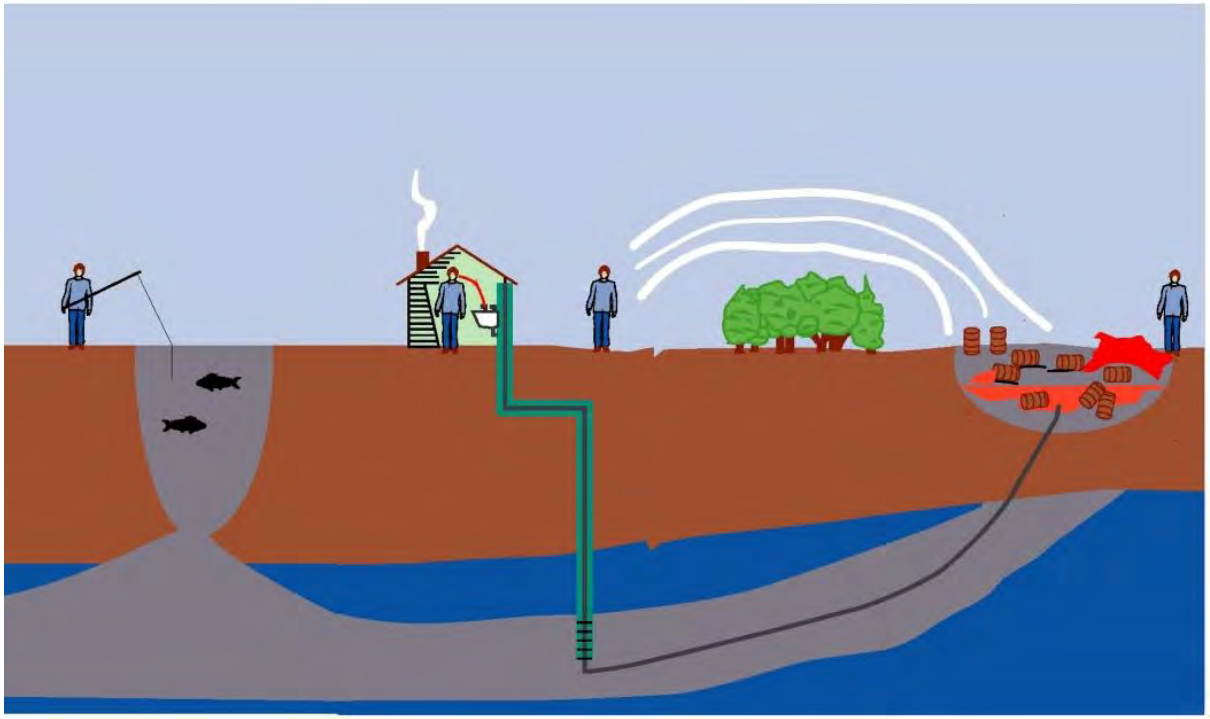
Overview

- Risk Assessment
  - Exposure
  - Toxicity
- What are CCPs?
- Proposed Labadie Landfill
- USEPA's Damage Cases and Risk Assessment

- Lisa JN Bradley, PhD, DABT
- PhD in Toxicology from the Massachusetts Institute of Technology (MIT)
- Diplomate of the American Board of Toxicology
- 20 years of experience as toxicologist and risk assessor

Risk Assessment

- Risk Assessment
  - Hazard Identification
  - Toxicity Assessment
  - Exposure Assessment
  - Risk Characterization



Risk = Exposure x Toxicity

Toxicology

- The study of poisons
- Dose-Response

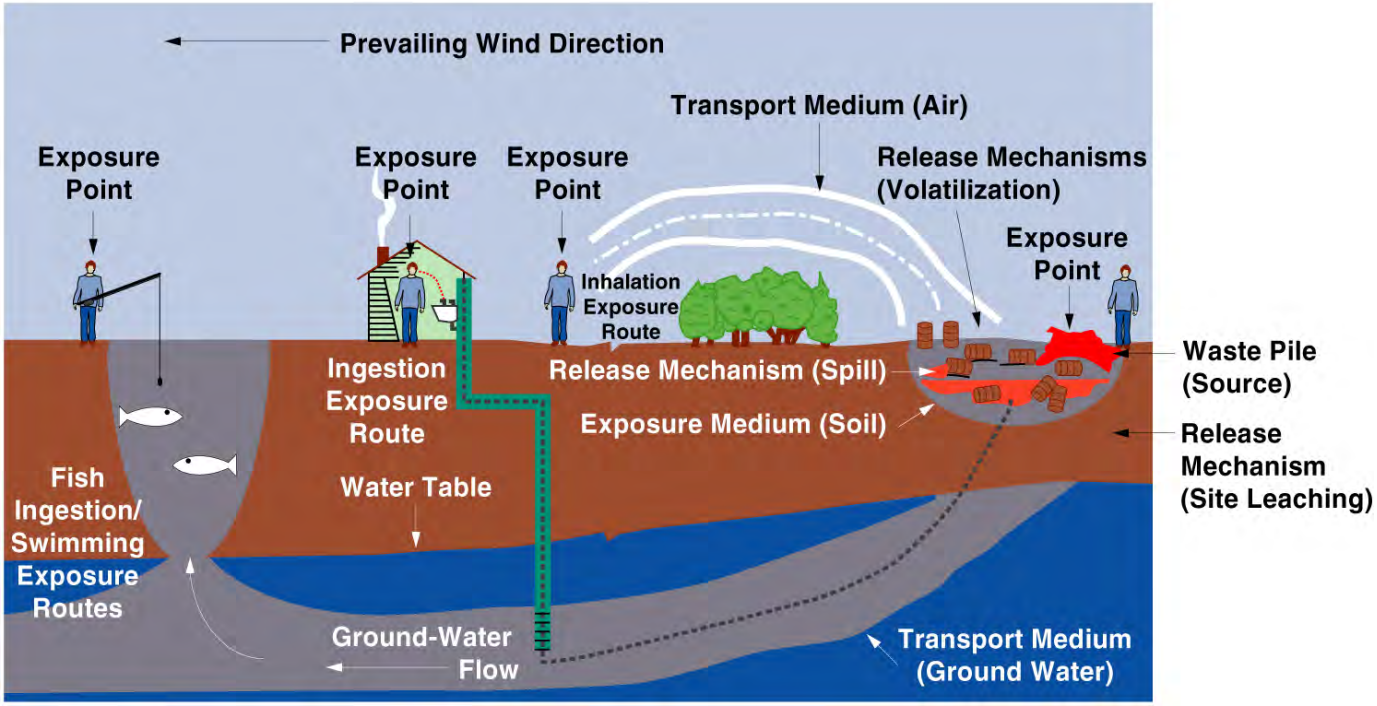
"All substances are poisons; there is none which is not a poison. The right dose differentiates a poison from a remedy."

Paracelsus, 1500s

Exposure

- Routes of exposure –
  - ingestion, inhalation, dermal contact
- How much exposure –
  - how much is ingested, inhaled or contacted

If there is no exposure, there is no risk



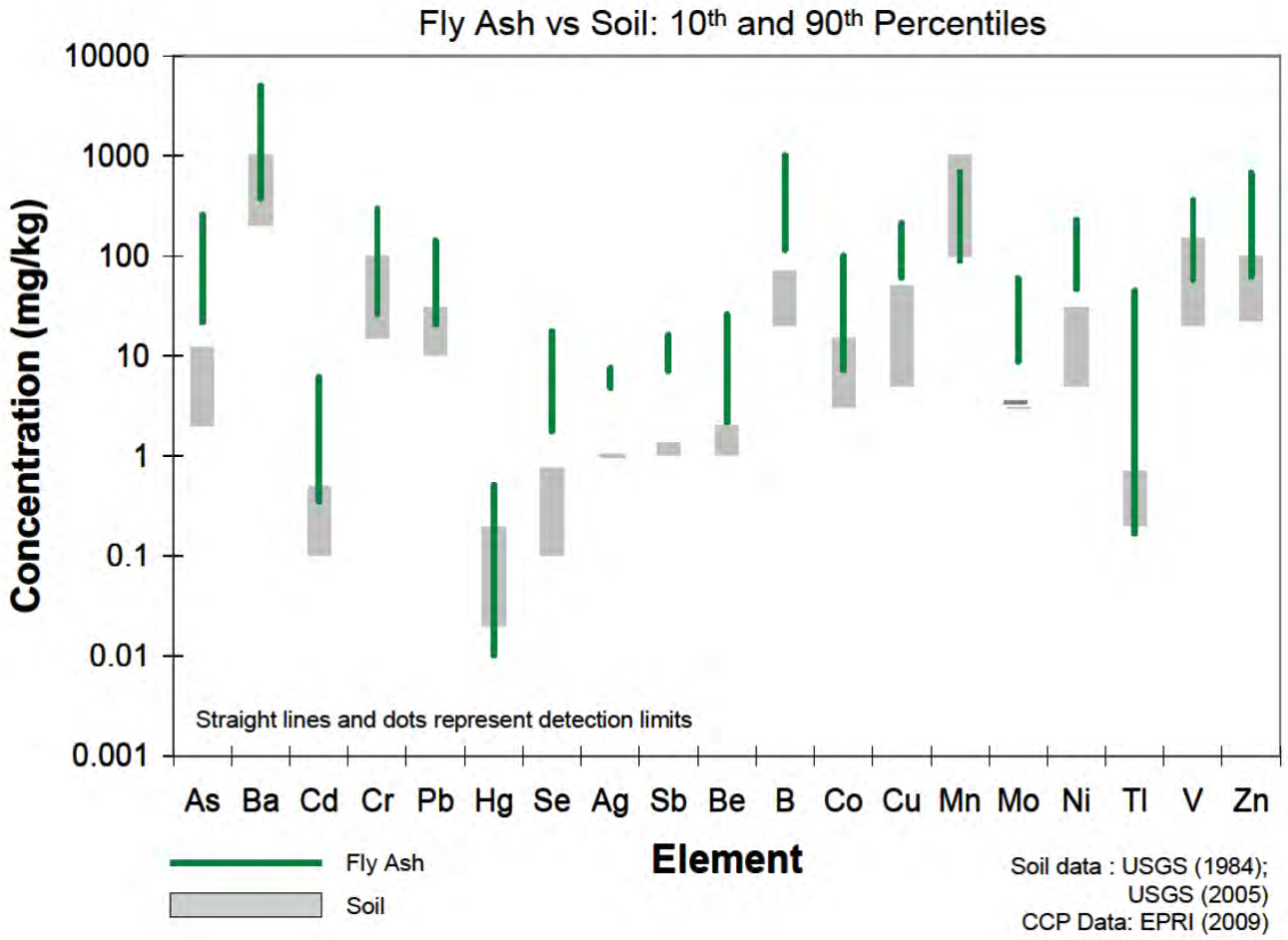
AECOM

What are CCPs?

Bottom Ash

Fly Ash

Coal Ash is Similar to Other Natural Materials

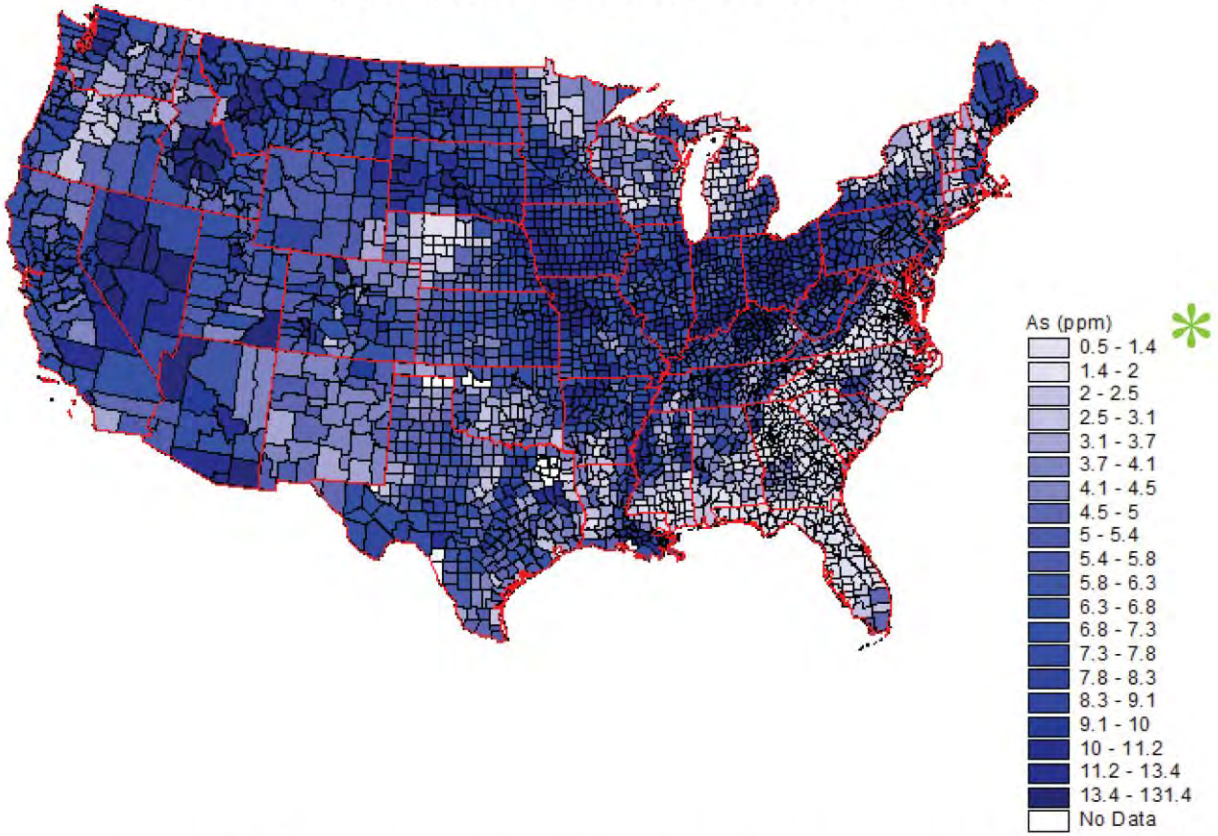


As = Arsenic
Ba = Barium
Cd = Cadmium
Cr = Chromium
Pb = Lead
Hg = Mercury
Se = Selenium
Ag = Silver
Sb = Antimony
Be = Beryllium
B = Boron
Co = Cobalt
Cu = Copper
Mn = Manganese
Mo = Molybdenum
Ni = Nickel
Tl = Thallium
V = Vanadium
Zn = Zinc

Source
EPRI, 2010. Comparison of Coal Combustion Products to Other Common Materials – Chemical Characteristics. Report No. 1020556. Available for download at www.epri.com.

Arsenic is Present in our Natural Environment

Arsenic in Soils and Sediments in the US



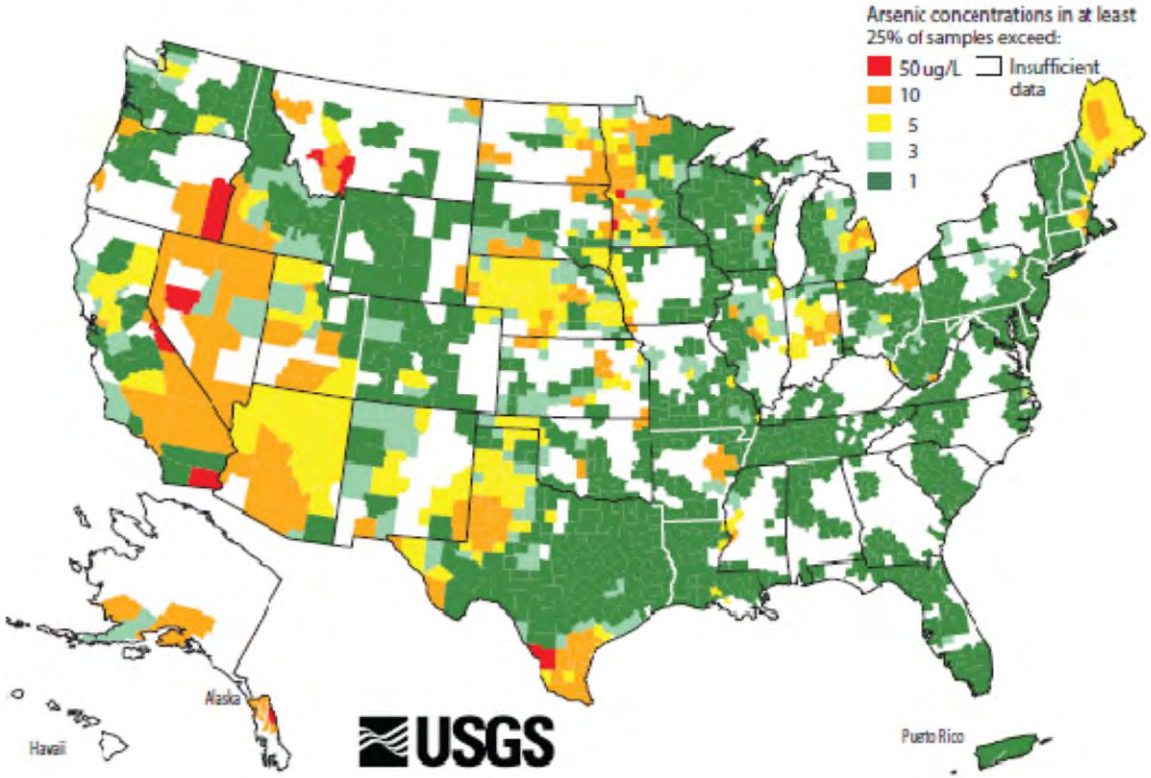
The USEPA regional screening level for arsenic in soil at a 1 in one million risk level is 0.39 ppm;* thus, the arsenic concentrations in the majority of soils in the U.S. are above the 1 in one million risk level.

Sources

- USEPA, 2010. Regional Screening Level Table. May 2010. http://www.epa.gov/region09/superfund/prg/index.html
- Soil. USGS, 2010. The National Geochemcial Survey – Database and Documentation. http://tin.er.usgs.gov/geochem/doc/home.htm

Arsenic is Present in our Natural Environment

Arsenic in Groundwater in the US



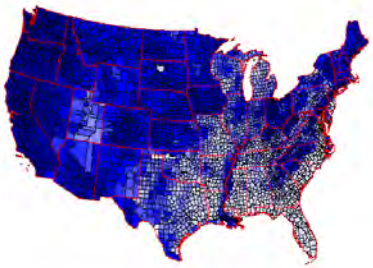
The USEPA regional screening level for arsenic in tapwater at a 1 in one million risk level is 0.045 µg/L.

Sources

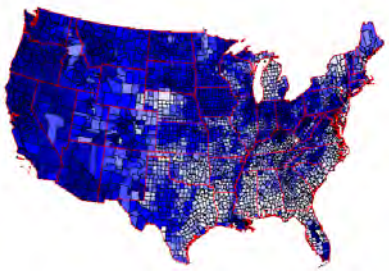
- Groundwater. USGS, 2001. Trace Elements National Synthesis Project. http://water.usgs.gov/nawqa/trace/pubs/geo_v46n11/fig2.html
- USEPA, 2010. Regional Screening Level Table. May 2010. http://www.epa.gov/region09/superfund/prg/index.html

All Metals are Naturally Present in Our Environment

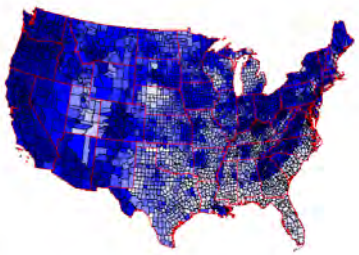
ALUMINUM



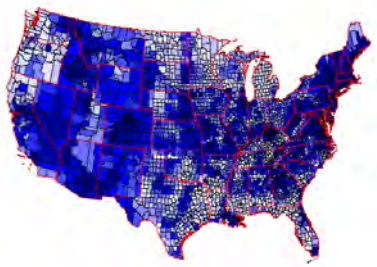
COPPER



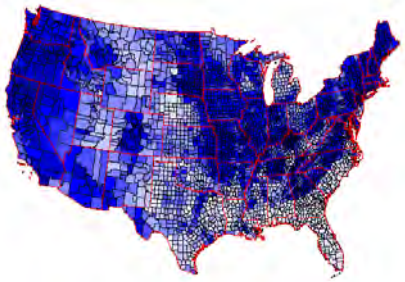
IRON



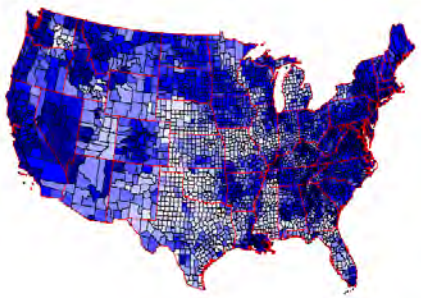
LEAD



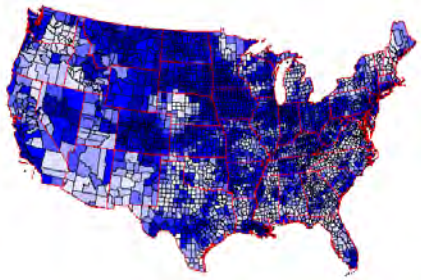
MANGANESE



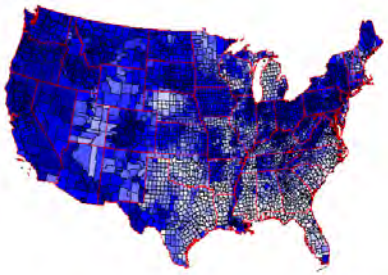
MERCURY



SELENIUM



ZINC

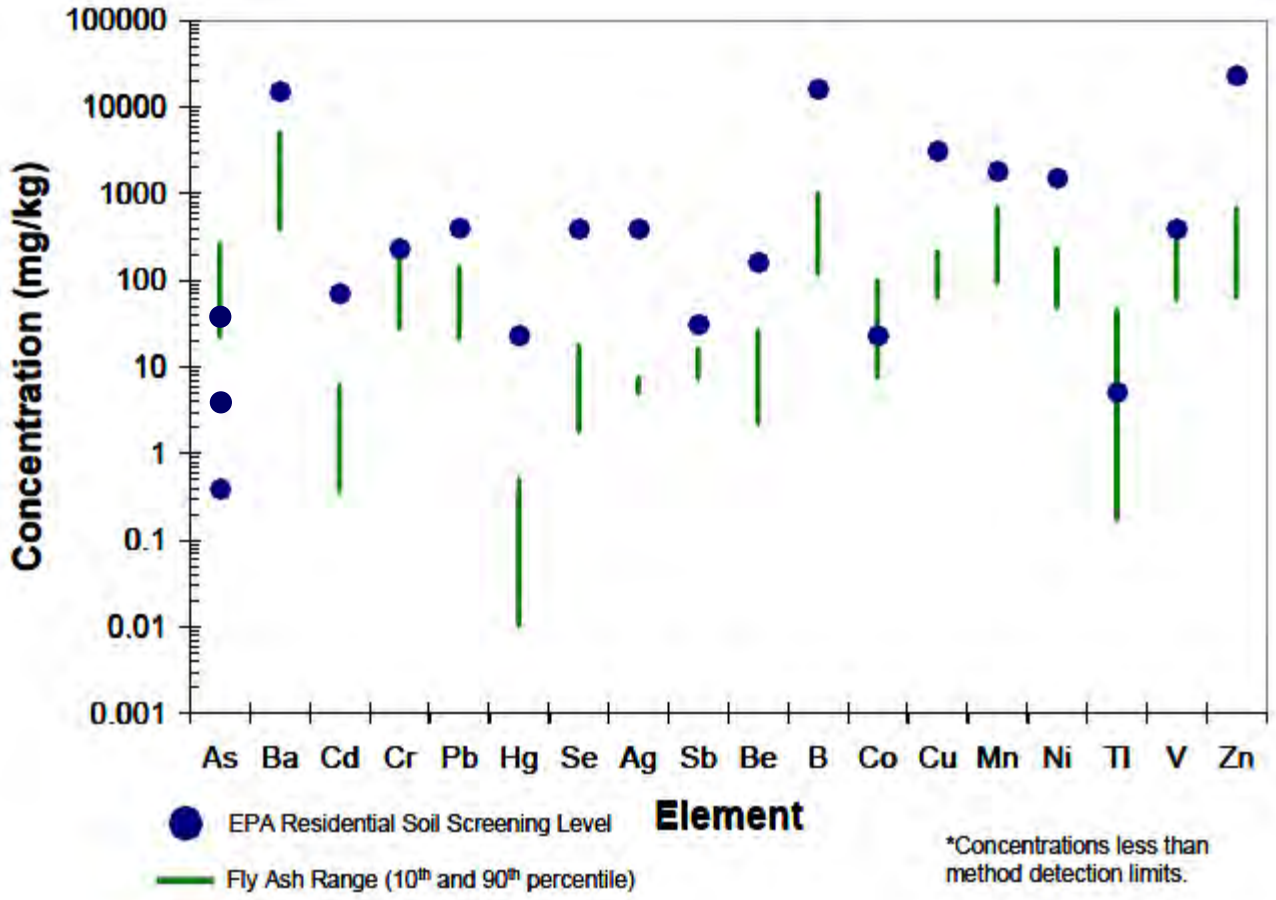


Source

Soil. USGS, 2010. The National Geochemcial Survey – Database and Documentation. http://tin.er.usgs.gov/geochem/doc/home.htm

Coal Ash Levels Similar or Less than Risk-Based Screening Levels

Trace Element Concentration Ranges in Fly Ash Compared to EPA Residential Soil Screening Levels



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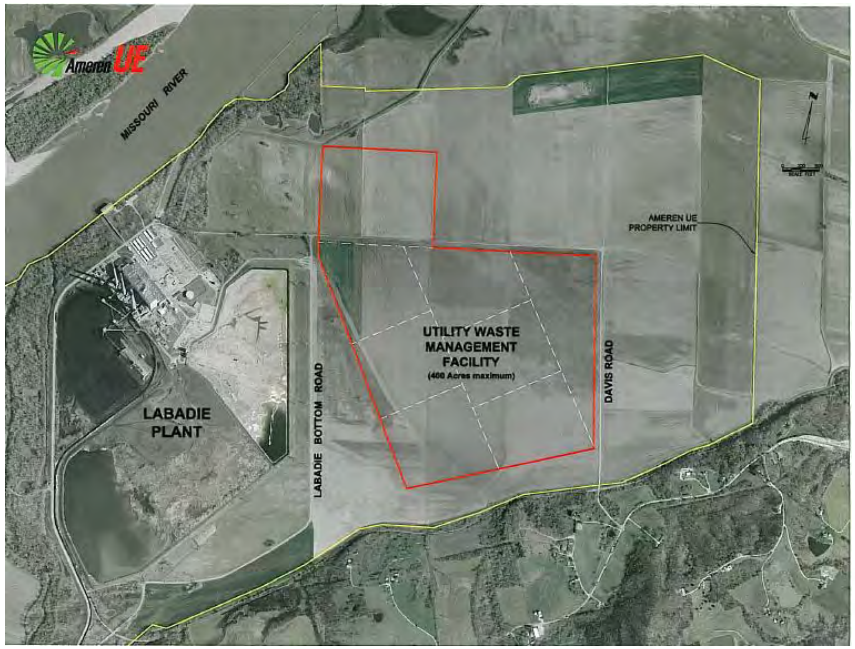
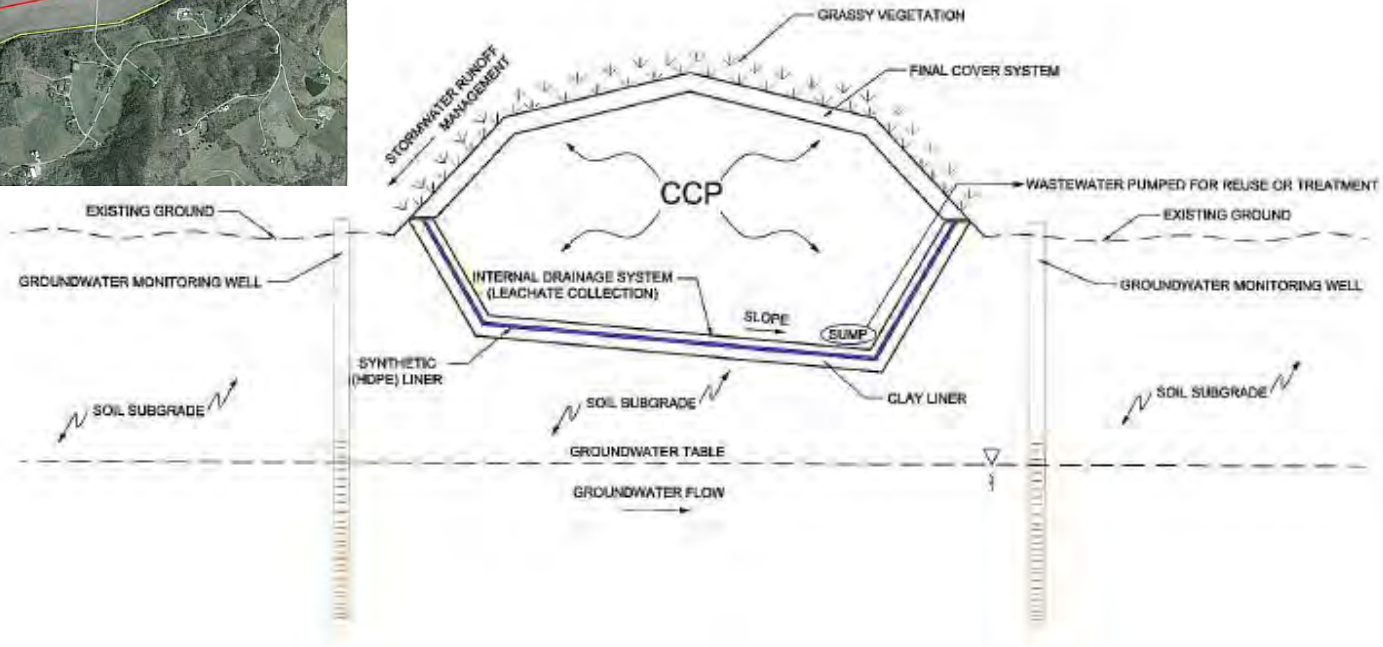
Source
EPRI, 2010. Comparison of Coal Combustion Products to Other Common Materials – Chemical Characteristics. Report No. 1020556. Available for download at www.epri.com.

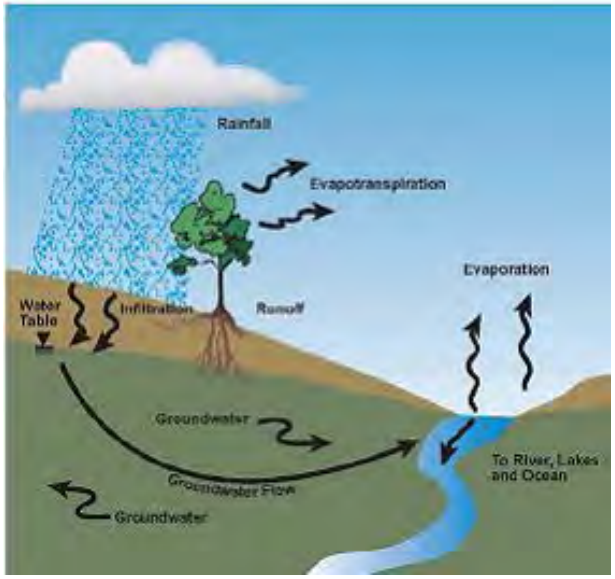
Proposed Labadie Landfill Design





USEPA Risk Assessment and Damage Cases

- USEPA Damage Cases
  - Identified based on whether off-site groundwater had constituent levels in excess of drinking water standards
  - There has been no reported evidence of adverse health effects associated with the damage cases
- USEPA Risk Assessment for CCPs – Groundwater Pathway
  - Lined Landfill groundwater risks below EPA levels of concern



Summary

- Risk is a function of toxicity and exposure
- If there is no exposure, there is no risk
- The constituents present in CCPs are present in our natural environment
- The proposed Labadie landfill design will prevent direct contact exposure and prevent potential impact to groundwater
- EPA's own risk assessment concluded that composite-lined landfills did not pose a risk concern