ACAA's Junk Science Report Claims Coal Ash Is Like "Common Dirt"
Report Ignores EPA Risk Screening Levels, Exposure Pathways and Critical Data

A new report from the American Coal Ash Association (ACAA) claims to show that coal ash is not hazardous, but it accomplishes this goal only by severely distorting the science. The ACAA's press release[1] reveals that the ACAA is ignoring important routes of exposure and inventing health-based screening levels to replace the EPA values it doesn't like. A closer look reveals that the ACAA is cherry-picking coal ash data to fit its premise that coal ash is like "common dirt." An intellectually honest report would show that coal ash contains many toxic pollutants at concentrations much greater than applicable health-based screening levels and the levels found in most soils. The ACAA's intentional omissions and obfuscations add up to junk science that minimizes a genuine threat to human health and the environment.

What the ACAA report says:

The ACAA compared contaminant levels in selected coal ashes from five power plants[2] to background soil concentrations in the U.S. and found that "with few exceptions, constituent concentrations in coal ash are below [risk-based] screening levels for residential soils and are similar in concentration to background U.S. soils."

Why the ACAA report is junk science:

The ACAA's conclusions are misleading, irrelevant and erroneous because:

- Only the direct contact/inhalation pathway was evaluated, and critical drinking water and surface water impacts were not taken into account.
- The ACAA selected EPA screening levels that fit its conclusion and ignored other more relevant and stringent EPA screening levels; and
- The source data were cherry-picked to avoid fly ash containing high levels of contaminants, particularly arsenic.

The ACAA used the wrong soil screening levels and ignored groundwater exposure, thereby grossly underestimating risk.

The ACAA claims to be using "the most environmentally conservative approach possible."[3] This is false. The screening levels used by the ACAA only address some routes of exposure from coal ash, namely inhalation, ingestion, and skin contact. Yet the most important health threats from coal ash are incontestably through ingestion of contaminated groundwater that contains deadly contaminants such as arsenic.[4] The ACAA report, however, totally ignores these risks, despite the fact that these risks are easily calculated. In fact, the EPA has soil screening levels for groundwater protection in the same table that the ACAA cited in their report.[5] Because coal ash poses a far greater risk to health by

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[1] The ACAA has not yet made its report available, but it distributed a press release and a Power Point describing the substance and conclusions of the report at a press conference on June 6, 2012. Press release available at http://www.acaausa.org/associations/8003/files/Coal_Ash_Material_Safety_Study_News-_2012-06-06.pdf. Power Point available at http://www.acaausa.org/associations/8003/files/Coal_Ash-_Material_Safety-_Study_Overview_2012-06-06.pdf.

[2] U.S. Geological Survey, Geochemical Database of Feed Coal and Coal Combustion Byproducts (CCPs) from Five Power Plants in the United States (2011). Available at http://pubs.usgs.gov/ds/635/.

[3] *See* http://www.acaa-usa.org/associations/8003/files/Coal_Ash_Material_Safety_Study_News_2012-06-06.pdf at 1.

[4] U.S. Environmental Protection Agency. Human and Ecological Risk Assessment for Coal Combustion Wastes, April 2010.

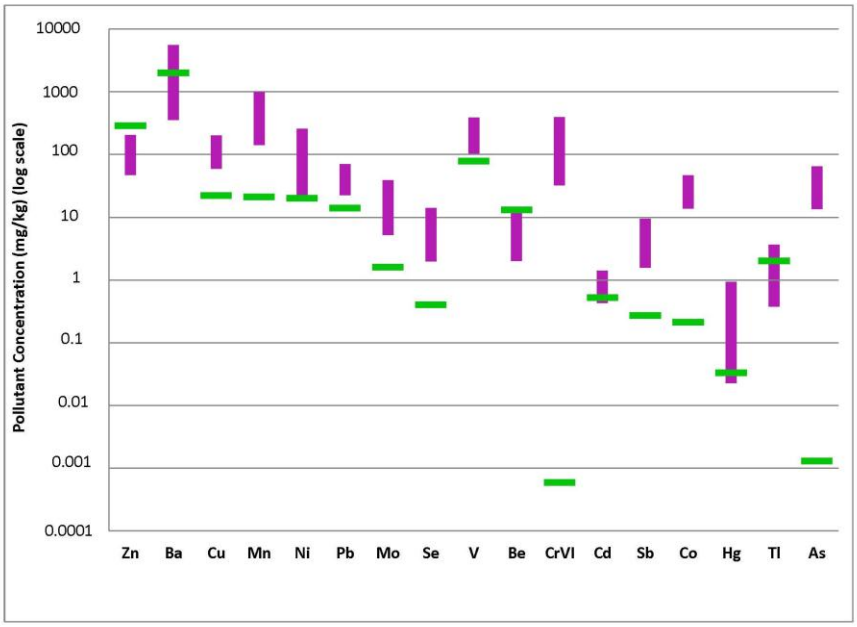
[5] http://www.epa.gov/region9/superfund/prg/

leaching its pollutants to groundwater than from direct contact, the ACAA should have considered these soil screening levels. Their inclusion, however, would have produced vastly different results.

In fact, coal ash dramatically exceeds the soil screening levels.

If the ACAA had examined the risk posed by coal ash to groundwater (drinking water), the ACAA would have had to tell a completely different story. Using the ACAA's own coal ash data, we compared the levels of contaminants in fly ash to groundwater-based soil screening levels for fly ash in Figure 1.[6] It should be noted that our graph, like the ACAA's figures, uses a logarithmic scale, which visually minimizes large differences. As Figure 1 shows, fly ash exceeds the screening levels for most pollutants, frequently by orders of magnitude. Chromium and arsenic are more than 10,000 times higher than the screening levels.

Figure 1: Comparison of 10th and 90th percentile fly ash constituent concentrations (purple bars, from the ACAA presentation of USGS data) to USEPA Soil Screening Levels for groundwater protection (green bars).



The ACAA severely distorted the arsenic and chromium data.

The ACAA report used residential (direct contact) screening levels for all pollutants, but it chose to manipulate this screening level for arsenic and chromium to reduce the appearance of cancer risk from potent carcinogens.

- Arsenic: The EPA residential soil screening level for arsenic is 0.4 mg/kg. The coal ash data presented by the ACAA are 30 to 150 times higher than this screening level. But you wouldn't know this by looking at the ACAA report, because they invented a new arsenic screening level of 40 mg/kg. EPA's screening levels are based on target cancer risks of 1 in 1,000,000. For arsenic, the ACAA decided to change the target cancer risk to 1 in 10,000, and correspondingly

[6] A similar pattern is evident when the levels of contaminants in bottom ash are compared with USEPA Soil Screening Levels for groundwater protection.

loosened the EPA screening level by 100-fold. This is fudging the data in its purest form, and it minimizes a substantial cancer risk. As shown in Figure 1, arsenic in coal ash is 10,000 to 50,000 times higher than the EPA soil screening level for groundwater protection. This is clearly not "safe" by any common-sense definition.

• Chromium*:* Chromium toxicity varies by species, with hexavalent chromium, a carcinogen, being much more toxic than trivalent chromium. The ACAA chose to assume that all chromium in coal ash is the more toxic form— a health-protective assumption that we applaud.[7] However, the ACAA completely ignored the cancer risk of hexavalent chromium by inventing its own screening level. The EPA screening levels for hexavalent chromium are 0.3 mg/kg (residential soil) and 0.0006 mg/kg (groundwater protection), both based on cancer risk. The ACAA derived its own screening level of around 110 mg/kg based on only noncancer health risks.[8] This allowed ACAA to sweep a massive health risk under the rug: if the ACAA had used the proper EPA levels, the coal ash data show chromium concentrations 100 to 1,000 times higher than the residential soil screening level, and 50,000 to 650,000 times higher than the groundwater protection screening level.

The ACAA lowered the appearance of risk by cherry-picking fly ash lower in arsenic from the USGS data sets.

The ACAA derived its figures for the concentration of contaminants in fly ash from a select subset of USGS data for five coal plants, arbitrarily excluding whole categories of fly ash with higher contaminant levels. Most egregiously, the ACAA relied on data from a combination of fly ash and relatively less toxic boiler ash while excluding 57 samples of more pure fly ash from a facility in Alaska. Had the ACAA considered all fly ash sampling at the Alaska site and excluded the dataset where fly ash was mixed with less toxic bottom ash, they would have come up with a mean of 45.9 mg/kg of arsenic, a 90th percentile of 105.0 mg/kg and a maximum of 204 mg/kg compared with the much lower values of a mean of 18.8 mg/kg, a 90th percentile of 29.2 mg/kg, and a maximum of 32.9 mg/kg of arsenic in the dataset selectively chosen by the ACAA. Similarly, the ACAA appears to have ignored 11 samples of fly ash from Indiana, 50 from New Mexico, 15 from Ohio, and 16 from Wyoming. Overall, the narrow dataset considered by the ACAA contained a lower concentration of toxins than did the fly ash in the larger USGS database that the ACAA chose to ignore. The concentration of arsenic in all of the fly ash samples tested by the USGS[9] was 97.9 mg/kg at the 90th percentile and 279.2 at the maximum,[10] compared to a concentration of 58 mg/kg at the 90th percentile and 93.8 at the maximum for sampling considered by the ACAA.

The ACAA has a history of hiding the high arsenic levels in coal ash.

This report is not the first time we've seen false statements regarding the arsenic concentrations in coal ash. Shortly after the massive TVA Kingston spill in December 2008, the ACAA published a

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[7] The EPA has, in fact, determined that the chromium in coal ash leachate is close to 100% hexavalent, because the hexavalent form of chromium is more mobile in water. Chromium in solid coal ash is likely to be 1-20% hexavalent chromium. *See* US EPA, Characterization of Coal Combustion Residues from Electric Utilities—Leaching and Characterization Data, Appendix H (EPA-600/R-09/151, Dec. 2009).

[8] In a footnote, the ACAA states that their screening level was calculated using the EPA IRIS database entry for hexavalent chromium. That entry is outdated and does not include quantitative estimates of cancer risk for ingestion. See US EPA, Integrated Risk Information System, Chromium (VI), last updated 1998, available at http://www.epa.gov/iris/subst/0144.htm.

[9] This calculation omits the mixed fly ash/bottom ash data set from the Alaska plant.

[10] For the sake of conservatism we have not considered as fly ash a category of coal ash alternately referred to by USGS as "air pre heater ash" and as "air pre heater fly ash." Were the concentrations of arsenic in this category of ash included in our analysis, the concentration of arsenic in all fly ash samples would be 102 mg/kg at the 90th percentile and 1360 mg/kg at the maximum.

"fact sheet" entitled "Coal Combustion Products: Not a Hazardous Waste." Dated March 2009, the fact sheet stated that the median level of arsenic in coal ash is 4.6 mg/kg.[11] According to the EPA data source referenced in the fact sheet, this is grossly incorrect. The median level of arsenic in fly ash is 43.4 mg/kg, almost 10 times higher than the figure quoted by the ACAA.[12] Although Earthjustice brought this error to the ACAA's attention in writing in 2009, the erroneous fact sheet remains on the website, uncorrected three years later.[13]

The ACAA also failed to consider the impact of exposure to particulate matter in coal ash.

The ACAA considered the risk of inhalation of toxic metals but ignored the health threat posed by inhalation of particulate matter in coal ash. Exposure to fine particulate matter is associated with a range of adverse health impacts, including increased rates of respiratory illness and asthma, cardiovascular disease, heart attacks, strokes, emergency room visits, and premature death.[14] In 2009, the EPA completed a draft screening assessment to determine the whether the National Ambient Air Quality Standards (NAAQS) could be violated at coal ash disposal sites.[15] EPA found "that there is not only a possibility, but a strong likelihood that dry handing would lead to the NAAQS being exceeded absent fugitive dust controls." Although excessive levels of particulates from coal ash were found to pose potentially significant risks to health, the ACAA's analysis does not address risks from particulate matter.

The ACAA even minimized the threat of the only routes of exposure that it chose to consider.

The ACAA purports to evaluate the risk to "children who live on top of a coal ash pile 24 hours a day."[16] The ACAA describes this "unrealistic" scenario, as if such conditions are completely unthinkable. However, areas exist where coal ash has been widely used as a fill material, such as in the Town of Pines, Indiana, now a federal Superfund site,[17] and in Puerto Rico, where AES is currently using coal ash as fill throughout the island, often without covering the ash.[18] Thus the scenario is not purely hypothetical, especially in states where regulations fail to address reuse and disposal of ash.

The ACAA specifically underestimated the arsenic-related risks of direct contact with coal ash. As we have already mentioned, the ACAA used the wrong residential soil screening level for arsenic and cherry-picked the arsenic data that it wanted to use. Had the ACAA used the right screening level for direct contact (0.4 mg/kg) and the full USGS dataset (with a 90th percentile of 98 mg.kg) that we

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[11] This fact sheet is still on the ACAA-linked website, *See* http://www.coalashfacts.org/CCP%20Fact%20Sheet%202%20-%20Not%20a%20Hazardous%20Waste_FINAL.pdf

[12] National Academy of Sciences. Managing Coal Combustion Residues in Mines (2006) at 45, citing USEPA 1993 Regulatory Determination. NAS Report available at http://www.nap.edu/openbook.php?record_id=11592&page=187. .

[13] Email dated December 16, 2009 from Lisa Evans, Earthjustice to Thomas Adams, President, ACAA.

[14] Kuenzli N, Jerrett M, Mack WJ, Beckerman B, LaBree L, Gilliland F, Thomas D, Hodis HN. "Ambient Air Pollution and Atherosclerosis in Los Angeles," *Environmental Health Perspective* 113 (February 2005):201-6. Miller KA, Siscovick DS, Sheppard L, Shepherd K, Sullivan JH, Anderson GL, Kaufman JD. "Long-term Exposure to Air Pollution and Incidence of Cardiovascular Events in Women," *New England Journal of Medicine* 1:356 (February 2007):447-58; Hoffman B, Moebus S, Mohlenkamp S, Stang A, Lehman N, Dragano D, Schmermund A, Memmesheimer M, Mann K, Erbel R, Jockel K-H. "Residential Exposure to Traffic Is Associated With Coronary Atherosclerosis." *Circulation*, published online July 16, 2007, DOI:10.1161 / CIRCULATIONAHA.107693622. Pope CA, Muhlestein JB, May HT, Renlund DG, Anderson JL, Horne BD. "Ischemic Heart Disease Events Triggered by Short-term Exposure to Fine Particulate Air Pollution," *Circulation* 114 (December 5): 20062443-8; Schwartz J, Slater D, Larson TV, Person WE, Koenig JQ. "Particulate Air Pollution and Hospital Emergency Room Visits for Asthma in Seattle," *American Review of Respiratory Disease* 147 (April 1993):826-31. Jerrett M, Burnett RT, Ma R, Pope CA, Krewski D, Newbold KB, Thurston G, Shi Y, Finkelstein N, Calle EE, Thun MJ. "Spatial Analysis of Air Pollution and Mortality in Los Angeles," *Epidemiology* 16 (November 2005):727-36.
Mustafic et.al, Main Air Pollutants and Myocardial Infarction: A Systematic Review and Meta-analysis, JAMA, Feb 15, 2012. Wellenius, et.al, Ambient Air Pollution and the Risk of Acute Ischemic Stroke, ARCH INTERN MED/VOL 172 (NO.3) Feb 13, 2012.

[15] U.S. Environmental Protection Agency. Inhalation of Fugitive Dust: Screening Assessment of the Risks Posed by Coal Combustion Waste Landfills, (draft), September 2009.

[16] ACAA press release, "Analysis of New Federal Government Data Shows Coal Ash Comparable to Residential Soils," June 7, 2012 at 1, available at http://www.acaausa.org/associations/8003/files/-Coal_Ash_Material_Safety_Study_News_2012-06-06.pdf/

[17] http://www.epa.gov/region5/cleanup/pines/.

[18] Prof. Felix Aponte, University of Puerto Rico in 2010. Location: Parque Gabriela II Housing Development, PR Route 1, intersection Route 180, Lambert Coordinates:x-215974,y-217750, N 17.98361.

describe above, they would have found that arsenic in coal ash is up to 250 times over the screening level.

Child near coal ash that has been used as "fill" at Parque Gabriela II Housing Development, Puerto Rico.

Conclusion

Pressing regulatory and reuse questions surrounding coal ash require the use of sound science. Clearly the threats from coal ash are real, as evidenced by the nearly 200 sites where spills and leaks have released hazardous substances into water and groundwater.[19] For protection of our nation's health and environment, decision makers must rely on accurate characterization of the metals content of coal ash, characterization of its leaching behavior, and attention to damage at current and past coal ash disposal and reuse sites. Junk science like the ACAA report has absolutely no role to play in the important decisions currently facing Congress and EPA.

[19] http://earthjustice.org/features/campaigns/in-harm-s-way-coal-ash-contaminated-sites.