TESTIMONY OF
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BEFORE THE
SUBCOMMITTEE ON ENERGY AND ENVIRONMENT,
COMMITTEE ON ENERGY AND COMMERCE,
U.S. HOUSE OF REPRESENTATIVES
DECEMBER 10, 2009

Chairman Markey and Members of the Subcommittee, thank you for holding this hearing to examine the threats posed by coal combustion waste -- the voluminous hazardous substance generated by coal-fired power plants. When mismanaged, coal combustion waste damages the health and environment of Americans nationwide by poisoning drinking water, fouling the air, and destroying aquatic ecosystems.

I am Lisa Evans, an attorney for Earthjustice, a national non-profit, public interest law firm founded in 1971 as the Sierra Club Legal Defense Fund. Earthjustice represents, without charge, hundreds of public interest clients in order to reduce water and air pollution, prevent toxic contamination, safeguard public lands, and preserve endangered species. My area of expertise is hazardous and solid waste law. I have worked previously as an Assistant Regional Counsel for the U.S. Environmental Protection Agency (EPA) enforcing federal hazardous waste law and providing oversight of state programs. I appreciate the opportunity to testify this morning.

Federal action on coal ash is imminent. Spurred by the Tennessee Valley Authority (TVA) coal ash disaster, EPA Administrator Lisa Jackson pledged to propose a rule addressing the dangers of coal ash by year's end. My testimony today recognizes the primary goal of this impending rule—the protection of human health. The committee will hear today from witnesses whose own health and the health of their families, neighbors and communities have been seriously harmed by exposure to the toxic constituents in coal ash.

This subcommittee is very appropriately focusing on the threat coal ash poses to our health and drinking water. While the nation awoke last December to the deadly hazard posed by poorly constructed, unregulated coal ash dams, it is clear that coal ash poses an even greater danger to our citizens through the much more subtle movement of its poisons. Communities are harmed when coal ash is disposed without proper safeguards or when ash is carelessly reused. And because no federal regulations require basic safeguards, this exposure occurs again and again, quietly, but with the potential for great harm, everywhere coal is burned.

Any rule addressing the disposal of this toxic waste must ensure that all citizens are protected from such preventable harm. To guarantee this protection, EPA must promulgate federally enforceable regulations under the Resource Conservation and Recovery Act (RCRA). There are four primary reasons to promulgate such federal regulations as soon as possible:

(1) The threat to health and the environment by improper disposal of coal ash is deadly, pervasive, and increasing;

(2) Improperly disposed coal ash has created a dangerous legacy of poisoned water supplies, damaged aquatic resources, and unstable dams that must be recognized and rectified;

(3) The majority of states have failed for decades to regulate coal ash adequately and ensure the safety of their citizens; and

(4) EPA has the clear authority under RCRA to promulgate tailored, federally enforceable standards that will ensure the protection of *every* U.S. community near coal ash disposal sites-- while allowing the legitimate beneficial reuse of coal ash to continue.

1. The threat to health and the environment from improper disposal of coal ash is deadly, pervasive and increasing.

a. <u>Coal combustion waste contains some of the deadliest chemicals known to man.</u>

Coal combustion waste, or coal ash, is largely made up of ash and other unburned materials that remain after coal is burned in a power plant to generate electricity. Burning concentrates the metals naturally found in coal. Toxic elements such as arsenic, cadmium, chromium, lead, mercury, selenium, thallium and numerous other dangerous contaminants are found in much higher concentrations on a per volume basis in ash as compared to coal.[1] In addition, coal ash includes the particles captured by pollution control devices installed to prevent air emissions of particulate matter (soot) and other gaseous pollutants from the smokestack. As power plants employ more and better pollution control devices to capture hazardous air pollutants, the volume and toxicity of coal combustion waste grows. Most importantly, it is not the mere presence of these dangerous toxins in ash that pose the threat—it is their propensity to *leave* the ash when the waste comes into contact with water.

The hazardous substances found in coal ash are poisonous and can cause cancer and damage the nervous systems and other organs, especially in children. (See Figure 1, Table of Human Health Impacts of Coal Ash Pollutants.) One of the most common and mobile pollutants in coal ash is arsenic. Arsenic has been found to cause multiple forms of cancer, including cancer of the liver, kidney, lung, and bladder, and an increased incidence of skin cancer in populations consuming drinking water high in inorganic arsenic.[2] According to an EPA risk assessment, the excess cancer risk for children drinking groundwater contaminated with arsenic from coal ash codisposed with coal

[1] Office of Solid Waste & Emergency Response, U.S. Envtl. Prot. Agency, Report to Congress: Wastes from the Combustion of Fossil Fuels (Mar. 1999).
[2] EPA, Integrated Risk Information System (IRIS), Arsenic (CASRN 7440-38-2). http://cfpub.epa.gov/ncea/iris/index.cfm?fuseaction=iris.showQuickView&substance_nmbr=0278.

refuse in unlined ash ponds is estimated to be as high as 2 in 50.[3]For context, EPA typically considers cancer risk to be unacceptable when environmental exposures result in more than one additional cancer per 100,000 people.[4] Consequently, a lifetime cancer risk of 1 in 50 represents a risk 2000 times EPA‘s regulatory goals.

The EPA risk assessment also states that living near ash ponds and unlined landfills increases the risk of damage to the liver, kidney, lungs and other organs as a result of being exposed to toxic metals like cadmium, cobalt, lead, thallium and other pollutants at concentrations far above levels that are considered safe.[5] Figure 2 presents the elevated risks posed to human health from ponds and landfills as documented in EPA's risk assessment. Further, the EPA study warns that peak pollution from dump sites can occur long after the waste is placed. For example, peak exposures from coal ash ponds are projected to occur approximately 78 to 105 years after the ponds first began operation—thus retired sites still pose very significant threats.[6] Clearly, coal ash, when disposed improperly, poses an extraordinary and highly unacceptable long-term risk to human health.

Further, as new technologies are mandated to filter air pollutants from power plants, cleaning the air we breathe of smog, soot and other harmful pollution, the quantity of dangerous chemicals in the ash increases.[7] Without adequate safeguards, the chemicals that have harmed human health for years as air pollutants- mercury, arsenic, lead and thallium- will now reach us through drinking water supplies. Given the documented tendency of coal ash to leach metals at highly toxic levels, there is clearly the need to ensure that basic safeguards prevent the migration of these chemicals.

Studies completed by EPA's Office of Resource and Development in 2006 and 2008 document the increasing toxicity of coal ash.[8] Testing of numerous ashes and scrubber sludge at plants employing air pollution control devices revealed the resulting solid wastes to be far more dangerous than earlier tests revealed. Using an improved leaching protocol,[9] EPA documented that the coal combustion waste leached *16 to 680*

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[3] U.S. Envtl. Prot. Agency, Human and Ecological Risk Assessment of Coal Combustion Wastes (released as part of a Notice of Data Availability) (Aug. 6, 2007) (draft)
[4] EPA Risk Assessment, supra note 3, at 4-1.
[5] *Id.*
[6] *Id*. at 4-7 to 4-8.
[7] *See*, e.g., Office of Research & Dev., U.S. Envtl. Prot. Agency, Characterization of Coal Combustion Residues from Electric Utilities Using Wet Scrubbers for Multi-Pollutant Control (July 2008) and Office of Research & Dev., U.S. Envtl. Prot. Agency, Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control (Feb. 2006).
[8] *See* Office of Research & Dev., U.S. Envtl. Prot. Agency, Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control (Feb. 2006), Office of Research & Dev., U.S. Envtl. Prot. Agency, Characterization of Coal Combustion Residues from Electric Utilities Using Wet Scrubbers for Multi-Pollutant Control (July 2008) and Susan Thorneloe et al., "Improved Leach Testing for Evaluating Fate of Mercury and Other Metals from Management of Coal Combustion Residues," Proceedings Global Waste Management Symposium: Promoting Technology and Scientific Innovation (Sept. 7–10, 2008).
[9] *See* D.S. Kosson et al, *An Integrated Framework for Evaluating Leaching in Waste management and Utilization of Secondary Materials*, 19 Environmental Engineering Science 159 (2002) *and* F. Sanchez and

times the chromium, arsenic, selenium, boron and thallium than previously documented in EPA and industry data. (See Figure 3.) Thus, unless the solid waste is disposed or reused in a manner that ensures that these toxic chemicals are not released into the environment, our careful efforts to capture the pollutant at the power plant stacks is for naught.

b. <u>The rapidly rising volume of coal ash at hundreds of dump sites threatens public health throughout the U.S.</u>

Exactly 18 months ago I testified before the Subcommittee on Energy and Mineral Resources of the House Natural Resources Committee. At that time, the volume of coal ash generated annually in the United States was 129 million tons-- enough toxic waste to fill the boxcars of a train stretching from Washington, D.C. to Melbourne, Australia.[10]This year, total annual generation has risen to over 136 million tons. In just another five years, EPA estimates that coal-fired electric plants will produce *175 million tons* per year. (See Figure 4.) As the volume of this dangerous waste rapidly climbs, finding a solution to ensure its safe disposal becomes more even more urgent.

The coal ash disaster in Harriman, Tennessee last December vividly demonstrates why federal action is so critical to our health, environment and security. On December 22, 2008, a dam over six-stories high burst at the Tennessee Valley Authority's Kingston Fossil Plant, causing more than 1 billion gallons of coal ash to flow over 300 acres of river, wetlands and residential property in a toxic tsunami 100 times the size of the Exxon Valdez spill. We subsequently learned from EPA that there are 584 coal ash dams, including over 50 "high hazard" dams holding back tens of millions of tons of coal ash that threaten, if they fail, to take the lives of those who live below them.[11] In fact, one of the highest dams east of the Mississippi, 400 stories tall, would threaten the lives of 50,000 people should it fail.[12] The volume of toxic waste currently stored in the nation's coal ash ponds has reached epic proportions—it would flow over Niagara Falls for over three days straight.

The threat of catastrophic failure of any of the nearly 600 coal ash impoundments in 35 states is only one danger posed by unregulated (or under-regulated) coal ash disposal. EPA estimates that hundreds --74% -- of these 584 ponds are unlined, and consequently there is a high probability that hazardous contaminants are leaching out of the coal ash and into the underlying groundwater.[13] Similarly, there are hundreds of

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D.S. Kosson, *Probabilistic Approach for Estimating the Release of Contaminants under Field Management Scenarios,* 25 Waste Management643 (2005).

[10] NRC, *Managing Coal Combustion Residues in Mines* 127 (2006) at 13, *available at* http://www.nap.edu/catalog.php?record_id=11592#toc

[11] *See* EPA, "Coal Ash Survey Results: Responses from Electric Utilities to EPA Information Request Letter at http://www.epa.gov/osw/nonhaz/industrial/special/fossil/surveys/index.htm#surveyresults.

[12] *See* statement by the Pennsylvania Department of Environmental Protection regarding the high hazard dam at the 1300- acre Little Blue Run Surface Impoundment in Beaver County, PA at http://www.pittsburghlive.com/x/pittsburghtrib/news/regional/s_604497.html.

[13] Final Regulatory Determination on Wastes from the Combustion of Fossil Fuels, 65 Fed. Reg. 32214 (Envtl. Prot. Agency, May 22, 2000) at 32216.

landfills without proper safeguards to prevent the migration of contaminants. EPA estimates that 43% of existing coal ash landfills are unlined.[14] Because most of these waste units are not properly monitored, this slow leaching of poisons often goes undetected and unremediated.

2. Improperly disposed coal ash has left a legacy of poisoned communities and severely damaged aquatic resources.

The Subcommittee today will hear from victims of coal ash contamination from three sites in New Mexico, Maryland and Virginia. Unfortunately, these sites are far from unique. The absence of national disposal standards has resulted in serious and widespread damage at coal ash disposal sites throughout the country. In fact, citizens, scientists, state agencies, and EPA have documented such damage for decades. Coal ash mismanagement *routinely* results in the leaching of toxic substances into soil, drinking water, lakes and streams, damage to plant, animal and human communities, and accumulation of toxins in the food chain from both wet ponds and dry landfills.[15]

According to EPA's latest *Damage Case Assessment for Coal Combustion Waste*, the agency recognizes 71 contaminated sites in 23 states where coal ash has polluted groundwater or surface water or caused widespread ecosystem damage.[16] These identified cases of damage are almost equally divided between "wet" and "dry" disposal sites (ponds and landfills). EPA, moreover, admits that this is just the tip of the iceberg. Because most coal ash disposal sites in the U.S. are not adequately monitored, much of the contamination remains undetected.[17] Further, for the last ten years, EPA has readily admitted that it has not actively looked for cases of contamination, but has relied instead on citizens and advocacy groups to call their attention to contaminated sites.[18] EPA has also admitted that if the agency had used its considerable investigative authority under RCRA to systematically attain information directly from electric generating facilities and state regulators, it is likely that the number of damage cases would have increased substantially. EPA stated in its 2000 Final Regulatory Determination on Wastes from the Combustion of Fossil Fuels:

> We acknowledge, moreover, that our inquiry into the existence of damage cases was focused primarily on a subset of states . . . Given the volume of coal combustion wastes generated nationwide (115 million tons) and the

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[14] *Id.*

[15] Adriano, D.C., Page, A.L., Elseewi, A.A., Chang, A.C., Straughan, I.R. (1980).Utilization and disposal of fly ash and other coal residues in terrestrial ecosystems. Journal of Environmental Quality, 9: 333. *See also*, Carlson, C.L., Adriano, D.C. (1993). Environmental impacts of coal combustion residues. Journal of Environmental Quality, 22: 227-247.

[16] U.S. Envtl. Prot. Agency, Coal Combustion Waste Damage Case Assessments (July 9, 2007), *available at* www.regulations.gov (Document ID No. EPA-HQ-RCRA-2006-0796-0015). For reference to four additional damage case, *see* GAO, Coal Combustion Residue: Status of EPA's Efforts to Regulate Disposal, Briefing to Congressional Committees at 24, *available at* http://www.gao.gov/new.items/d1085r.pdf.

[17] 65 Fed. Reg. 32214, May 22, 2000.

[18] U.S. Envtl. Prot. Agency, Coal Combustion Waste Damage Case Assessments (released as part of a Notice of Data Availability) (July 9, 2007) at 2–7.

numbers of facilities that currently lack some basic environmental controls, especially groundwater monitoring, other cases of proven and potential damage are likely to exist.[19]

Yet despite the absence of active federal investigation, the number of documented cases of coal ash contamination has risen precipitously. By EPA's official count, documented cases of "proven" damage to human health and the environment from coal ash have more than doubled since 2000.Since it appears that EPA's assessment of damage cases, however, is current only until 2005, there are many more cases that should be counted. In addition to the 2008 TVA disaster in Kingston, Tennessee, deadly contaminants have leaked from both *wet and dry* coal ash dumps at the following 19 sites, which do not yet appear on EPA's latest list of damage cases:

1. **TVA's Widows Creek Fossil Plant, Stevenson, Alabama,** where approximately 10 million gallons of coal ash and scrubber sludge waste were released from an impoundment on January 9, 2009 into Widows Creek.

2. **PPL Corp.'s Martin's Creek Plant,** Northampton County, Pennsylvania where approximately 100 million gallons of coal combustion waste were released from an impoundment into the Delaware River in 2005.

3. **Gambrills Fly Ash Site, Anne Arundel County, Maryland**, where 3.8 million tons of dry ash were dumped in unlined gravel pits, contaminating drinking water wells with arsenic, lead, cadmium, nickel, radium, and thallium as high as 4 times the drinking water standard.

4. **PPL Montana Power Plant, Colstrip, Montana,** where leaking unlined coal ash ponds contaminated drinking water wells with high levels of metals, boron, and sulfate.

5. **Gibson Generating Station, Gibson County, Indiana,** where coal ash ponds hundreds of acres in size have contaminated adjacent federally managed wetlands with selenium harming aquatic life and federally-threatened bird species and where the power company supplies residents with bottled water because their wells are contaminated with boron and manganese from the leaking impoundments.

6. **Battlefield Golf Course, Chesapeake, Virginia**, where developers used at least 1.5 million tons of dry fly ash to build a golf course over a shallow aquifer. Groundwater wells and private drinking water wells in close proximity to the unlined site reveal elevated levels of lead, arsenic, chromium, and boron.

7. **Faulkner Landfill, Charles County, Maryland** where leaching ash at a dry landfill is contaminating a wetland with selenium and cadmium at levels high enough to kill any animal life, The Smithsonian Institution has called the

[19] 65 Fed. Reg. at 32,216.

affected wetlands, Zekiah Swamp, one of the most ecologically important areas on the East Coast.

8. **Karn and Weadock Landfills, Saginaw, Michigan** where groundwater contamination from two impoundments has resulted in elevated levels of arsenic, boron, and lithium in groundwater flowing into the Saginaw River and Saginaw Bay. Arsenic levels 100 times the federal drinking water standard have been detected in the groundwater. The area where the Saginaw River flows into Saginaw Bay has been designated an Area of Concern (AOC) by the U.S./Canada International Joint Commission. Studies have found that the Karn and Weadock Landfills are major contributors of arsenic contamination to the AOC.[20]

9. **SCE&G Wateree Station, Eastover, South Carolina** where coal ash dumped into an unlined 80-acre impoundment is contaminating groundwater. In 2001, the South Carolina Department of Health and Environmental Control cited the plant for violations of the state groundwater standards. Two wells on the plant property have detected arsenic at levels 18 times the maximum contaminant level, and leaks have been found in the containment wall between the impoundment and the river that have arsenic levels 190 times the federal drinking water standard. Testing by private consultants on an adjacent property found arsenic levels at 5 times the state limit. Fish tissue sampled near the impoundment indicates that the arsenic is being accumulated in the biota of the river. The site is upstream of the Congaree National Park, which is home to the largest contiguous section of floodplain forest in North America.

10. **Reid Gardner Generating Station, Moapa, Nevada** where contamination from unlined ponds entered the local groundwater. Groundwater monitoring at the site found elevated levels of arsenic, selenium, vanadium, boron, sulfate, TDS, and other contaminants as a result of seepage from the ash impoundments.

11. **Progress Energy Asheville Plant, Arden, North Carolina** where unlined ash impoundments, covering a total area of approximately 91 acres, are leaching boron and manganese to groundwater above state standards.

12. **Progress Energy Cape Fear Steam Plant, Moncure, North Carolina** where leaching from unlined ash impoundments covering a total area of 153 acres is resulting in levels of boron, manganese, iron and sulfates above state groundwater standards.

13. **Progress Energy Lee Plant, Goldsboro, North Carolina** where an unlined coal ash impoundment covering 143 acres is leaching arsenic, lead, boron iron and manganese to the groundwater.

[20] Michigan DEQ. 2005. Phase II Final Report, Karn/Weadock Landfills.

14. **Progress Energy Sutton Plant, Wilmington, North Carolina** where coal ash ponds covering a total of 135 acres are leaching levels of arsenic, boron, iron, and manganese levels above state groundwater standards. Arsenic contamination at the site was up to 29 times the federal maximum contaminant level.

15. **Duke Energy Belews Creek Station, Walnut Grove, North Carolina** where voluntary groundwater monitoring of an ash impoundment at the site indicates that the impoundment is currently contaminating groundwater with levels of arsenic, iron, and manganese that exceed state groundwater standards.

16. **Duke Energy Buck Station, Spencer, North Carolina** where voluntary monitoring at three high hazard impoundments has detected levels of boron, iron, and manganese that exceed state groundwater standards.

17. **Duke Energy Dan River Steam Station, Eden, North Carolina** where voluntary monitoring at two high hazard ash impoundments has detected levels of boron, iron, and manganese that exceed state groundwater standards.

18. **Duke Energy Marshall Steam Station, Terrell, North Carolina** where voluntary monitoring at a high hazard coal ash impoundment has detected groundwater contamination from boron and manganese in exceedance of state groundwater standards.

19. **Duke Energy Riverbend Steam Station, Mount Holly, North Carolina** where voluntary monitoring of two high hazard coal ash impoundments has detected levels of boron and manganese in exceedance of state groundwater standards.

Thus, conservatively speaking, the damage case total is at least 91, including the above 19 sites (and the Kingston site). Furthermore, environmental groups identified numerous additional sites in comments submitted to EPA in 2008 in response to the Agency's Notice of Data Availability on the Disposal of Coal Combustion Waste in Landfills and Surface Impoundments.[21] Again, these examples of damages cases are only a small sampling of the contamination currently occurring at wet and dry dump sites throughout the U.S. The above cases were discovered because monitoring data existed for the units. At hundreds of sites across the country, *no* monitoring data exist, and state agencies, local officials, and nearby residents are kept in the dark—at great peril to their safety and economic security.

When tragedy strikes and drinking water is poisoned, the economic vitality of the community is harmed as well as the health of its residents. The effects of water contamination are many: housing prices plummet, sales of homes are difficult or impossible, monthly municipal water bills become a necessity. When coal ash pollutants

[21] 72 Fed. Reg. 49,714 (Aug. 29, 2007).]. *See* Comment from Earthjustice et al., App. C (Feb. 2008), *available at* www.regulations.gov (Document ID No. EPA-HQ-RCRA-2006-0796-0446.3).

enter an aquifer, a resource of great value to the community, its clean well water, is often forever destroyed. Economic and psychological stress plagues communities that must undergo Superfund remediation. Rarely can a community be made whole again.

Lastly, it is essential to note that low-income communities and people of color shoulder a disproportionate share of the deadly health risks from coal ash. The poverty rate of people living within one mile of coal ash disposal sites is twice as high as the national average, and the percentage of non-white populations within one mile is 30 percent higher than the national average. Similarly high poverty rates are found in 118 of the 120 coal-producing counties, where coal ash is increasingly being disposed of in unlined, under-regulated mines, often directly into groundwater. Specifically with regard to coal ash impoundments, the mean annual income of people living within 1 kilometer of such impoundments is $33,455, compared with $44,389 nationally. This means that those living very close to a coal ash pond make only around three-fourths (75.37%) of the national average. (See Figure 5.)

In some states the disparity of impact to those in poverty is even more striking:

- In Arizona, coal ash ponds in are in zip codes that are poorer than the national average and that are in the poorest quarter of zip codes in the state.
- In New Mexico, coal ash ponds are located in zip codes that are among the poorest 2% of zip codes in the country, and among the poorest 8% of zip codes in the state. (See Figure 6.)
- In South Carolina, coal ash ponds are located in zip codes that are poorer than the national average and that average in the 81st percentile for poverty in the nation. In comparison with the rest of South Carolina, zip codes containing ash ponds are in the 68th percentile for poverty.

These trends are also apparent in Kentucky, Louisiana and Tennessee. Such disparities make it critical that federal regulations provide mandatory minimum safety standards at disposal sites to ensure all U.S. communities are protected equally.

3. *The majority of states fail to require basic disposal safeguards for coal ash disposal.*

When one examines state regulations nationwide, the absence of basic waste disposal requirements is shocking. According to a 2005 report prepared for EPA's Office of Solid Waste, there are extensive deficiencies in state regulation of coal ash landfills and ponds in the 34 coal ash generating states surveyed. Among the findings of the2005 report:

(i) 69% of the states do not require groundwater monitoring and leachate collection at all surface impoundments (new and existing). For example, 16 states fail to require *any* groundwater monitoring at all during the operating life of the waste unit, and seven states

(ii) 47% of the states do not require post-closure groundwater monitoring at coal ash surface impoundments.

(iii) Over 50% of the states do not require liners for surface impoundments.

(iv) Over 50% of the states have no requirement for financial assurance for surface impoundments.

(v) 38% of the states do not require groundwater monitoring at all landfills. For example, eleven states only require groundwater monitoring at landfills constructed after a certain date.

(vi) 29% of the states do not require fugitive dust controls at coal ash landfills.

(vii) 17% of the states do not require liners, leachate collection systems or financial assurance for coal ash landfills—even those newly constructed. Of the remaining 83% of states surveyed, 32% of those states only require liners and leachate collection at "new construction." [22]

In addition, the 2005 report verified that states fail to prohibit the most dangerous coal ash disposal practices. The report examined the top 25 coal-consuming states to determine how much coal ash is prohibited from disposal below the water table. Since isolation of ash from water is critical to preventing toxic leachate, it is axiomatic that disposal of ash must occur *above* the water table. Yet the report found that only 16% of the total waste volume being regulated by these 25 states is prohibited from disposal in water when waste is disposed in waste ponds. For landfills, the total waste volume that is prohibited from disposal in water is only 25%. Thus the great majority of coal ash produced in those 25 states is allowed to be disposed *into the water table*.[23] This practice places the nation's drinking water aquifers at great risk.

In addition, a 2006 report published jointly by EPA and the U.S. Department of Energy (DOE)also found significant deficiencies in state regulations.[24] In fact, the report found that a substantial percentage of large ash-producing states lacked one of the most basic mechanisms for regulating waste disposal, namely the authority to *permit* coal ash units. The report concluded that approximately 30% of the net disposable coal ash generated in the U.S. is potentially *totally exempt* from solid waste permitting requirements.[25]This is another wholly unacceptable gap in regulation of coal ash that is likely to have significant negative impact on health and the environment.

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[22] DPRA Incorporated. Estimation of Costs for Regulating Fossil Fuel Combustion Ash Management at Large Electric Utilities under Part 258, prepared for U.S. EPA, Office of Solid Waste, November 30, 2005 at 2-12 – 2-21.

[23] *Id.* at 39.

[24] U.S. Dep't of Energy & U.S. Envtl. Prot. Agency, Coal Combustion Waste Management at Landfills and Surface Impoundments, 1994–2004 (Aug. 2006).

[25] *Id.* at 45-46.

Lastly, even the most recent data submitted to EPA *by the states themselves* indicate that basic safeguards are simply not required by the majority of states.[26] According to a survey by the Association of State and Territorial Solid Waste Management Officials (ASTSWMO), only 33% of the states responding to the survey impose a requirement that coal ash surface impoundments have a liner, only 14% of the states require leachate collection at coal ash ponds, and only 31% of the states require financial assurance for coal ash ponds.[27] It is not clear from the ASTSWMO survey how many states responded, so these percentages may, in fact, overestimate the number of states that have regulatory safeguards. (See Figure 7 for complete results of ASTSWMO survey.)

In view of EPA's risk assessment that finds a significantly elevated threat to human health from both coal ash landfills and ponds, the absence of basic monitoring, lining and isolation requirements at the nation's nearly 600 coal ash ponds and over 300 landfills is very alarming. In fact, the absence of regulations mandating basic safeguards has produced unsafe waste units, even among the most recently constructed landfills and ponds. The 2006DOE/EPA report surveyed 56 permitted landfills and ponds built between 1994 and 2004.Although the report cited the presence of "liners" at nearly all newly permitted units, the types of liners installed at the sites are insufficient to protect human health and drinking water. The report found that, at best, only about half of the landfills and ponds installed composite liners.[28] According to the report, the remaining units were built with clay liners, single liners or no liners.

These types of liners, EPA tells us, are not sufficient to protect human health and the environment. According to EPA's 2007 *Human and Ecological Risk Assessment of Coal Combustion Wastes*, landfills and ponds with clay liners do <u>not</u> provide adequate protection. EPA's *Risk Assessment* states:

> Risks from clay-lined units are lower than those from unlined units, but 90th percentile risks are still well above the risk criteria for arsenic and thallium for landfills and arsenic, boron and molybdenum for surface impoundments.[29]

The *Risk Assessment* further states that only *composite liners*[30] effectively reduce risks from all constituents to below the risk criteria for both landfills and ponds. Thus the 2006 DOE/EPA survey of recently constructed disposal units reveals that the absence of a federal rule requiring composite liners has produced

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[26] *See* Letter from Brian Tormey and Stephen Cobb, Association of State and Territorial Solid Waste Management Officials (ASTSWMO) to Matt Hale, Director, Office of Resource Conservation and Recovery, EPA, dated April 1, 2009.)

[27] Letter from Brian Tormey and Stephen Cobb, Association of State and Territorial Solid Waste Management Officials (ATSTWMO) to Matt Hale, Director, Office of Resource Conservation and Recovery, EPA, dated April 1, 2009.

[28] *Id.* at 33.

[29] US EPA, Hunan and Ecological Risk Assessment at ES-7.

[30] A composite liner is defined as a high-density polyethylene (HDPE) membrane combined with either geosynthetic or natural clays.

a whole new generation of waste units in at least a dozen states that pose serious threats to the communities that host them.

4. *EPA has the clear authority under RCRA to promulgate tailored, federally enforceable standards for the safe disposal of coal ash that will ensure the protection of every U.S. community residing near coal ash disposal sites.*

a. Hazardous waste regulation of coal ash is necessary to ensure protection of health and the environment nationwide.

The way in which EPA chooses to regulate coal ash under RCRA—either as "hazardous" or "non-hazardous" waste--will determine whether the promised regulations offer communities sufficient protection or whether the status quo of patchwork state rules and inadequate standards will remain.

Coal ash fulfills both the statutory definition of hazardous waste under RCRA[31] and the regulatory criteria for a listed hazardous waste.[32] EPA has determined through numerous studies, damage case assessments, and its latest human and ecological risk assessment that coal ash significantly increases the incidence of cancer and other serious diseases in humans and causes death, reproductive failure and other injury to fish, amphibians and wildlife.[33] Furthermore, in recent tests conducted by EPA, using an improved and more accurate leach test, the quantities of dangerous metals, such as arsenic, selenium, and thallium, leaching from coal ash are over 100 times the federal maximum contaminant level, which is the standard at which waste is judged "hazardous" under RCRA.[34]

If EPA regulates coal ash as a hazardous waste under Subtitle C of RCRA, it will provide far greater protection of health and the environment than is available under Subtitle D. Under RCRA Subtitle C, EPA could promulgate a set of regulations specifically tailored to address the threats posed by ash disposal. Under Subtitle C:

(1) All states *must* adopt standards *at least as stringent* as the federal regulations thereby ensuring critical nationwide consistency;

(2) EPA has the power to inspect coal ash disposal facilities;

(3) EPA has the authority to enforce the regulations; and

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[31] RCRA defines a hazardous waste as a solid waste that because of its quantity, concentration, or physical or chemical characteristics may cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitating reversible illness or pose a substantial present or potential hazard to human health or the environment when improperly treated, transported or disposed, or otherwise managed. 42 USC § 6901(5).

[32] See 40 C.F.R. § 261.11(a)(3).

[33] EPA. Human Health and Ecological Risk Assessment of Coal Combustion Wastes (draft) (2007).

[34] Office of Research & Dev., U.S. Envtl. Prot. Agency, Characterization of Mercury-Enriched Coal Combustion Residues from Electric Utilities Using Enhanced Sorbents for Mercury Control (Feb. 2006).

(4) EPA must require solid waste permits and regular inspections of waste units.

Thus under Subtitle C of RCRA, coal ash disposal would ultimately be regulated under far more comprehensive state programs with permitting capabilities and federal inspection and enforcement authority, which would implement consistent minimum standards that protect communities in every state in the U.S.

In contrast, if EPA regulates coal ash as a non-hazardous waste, its authority is severely limited. First, *none* of the essential authority and safeguards listed above would be available under Subtitle D.EPA can issue only "guidelines" under Subtitle D, which EPA has no authority to enforce. Nor can EPA mandate that the states promulgate regulations equivalent to those guidelines. Subtitle D guidelines are enforceable by states and citizens through RCRA's citizen suit provision, but reliance on this very limited enforcement authority does not guarantee effective nationwide compliance.

Since state regulations pertaining to coal ash have been shown to be grossly deficient in many states, it is clear that Subtitle D guidelines cannot solve the national problem. In fact, the states are not required by law to improve their regulations at all, if EPA does not regulate coal ash as a hazardous waste. The states have had decades to regulate coal ash, and they have clearly chosen not to do so. There is no reason to believe that states will remove the loopholes and lax standards, if there is no federal requirement mandating those changes.

Finally, issuance of national guidance may be insufficient to assure proper management of coal ash in all 50 states, since approximately 23 states have a version of "no more stringent" provisions in their laws that prohibit states from promulgating regulations that are more stringent than federal regulations. Such provisions could restrict or preclude those states' agencies from asserting regulatory authority over the use or disposal of coal ash if those standards are set forth in guidance rather than regulations. States with "no more stringent" provisions are typically limited to adoption and imposition of counterpart state rules based only on those standards that have been adopted by regulation at the federal level. Also, some states cannot under state law impose substantive requirements based on "policies." States with "no more stringent" provisions include some of the largest coal ash generating states, such as Kentucky, New Mexico, Alabama, Illinois and Pennsylvania

b. EPA can specifically tailor federal hazardous waste regulations for coal ash disposal.

RCRA contains a statutory provision, applying specifically to several solid wastes, including coal ash, which gives EPA the ability to tailor hazardous waste regulations to the particular characteristics of the waste, such as its high volume.[35] Thus EPA need *not* require that coal ash be disposed in existing hazardous waste landfills, but can mandate that the ash be disposed in engineered landfills that have specific safeguards

[35] RCRA § 3004(x), 42 U.S.C. § 6924(x).

sufficient to safely contain the ash. Hazardous waste regulations are not "one size fits all" under RCRA. Thus fears that coal ash will fill up the nation's existing hazardous waste landfills are unfounded—EPA has the authority to develop less stringent standards for coal ash disposal under Subtitle C that take into account the specific nature of the waste. These regulations will certainly prompt the upgrade of currently operating landfills and spur the construction of new ones. The disposal of most of the nation's coal ash onsite -- on the power plant property-- will likely continue if Subtitle C regulations are promulgated. The difference will be that such disposal will be safe and secure through the use of basic engineering requirements. As an added benefit, such upgrades to existing landfills and the construction of new engineered landfills will aid local economies and provide green jobs.

c. Regulation of coal ash disposal under Subtitle C of RCRA will promote beneficial reuse.

By imposing disposal standards, EPA will encourage coal ash reuse. When cheap dumping is no longer available, power plants will have far greater incentive to recycle their ash. In Wisconsin, for example, more stringent regulation of coal ash has raised state recycling rates significantly. Wisconsin coal ash regulations constitute some of the most comprehensive regulations in the nation. As a result, the recycling rate in Wisconsin for coal ash is 85%, more than double the average recycling rate for all other coal ash-producing states (36%).[36] It stands to reason that if the true cost of disposal were borne by electric utilities, there would be far greater incentive to find beneficial uses for the coal ash.

It is not appropriate, however, to promote reuse of ash at the expense of health and the environment. While certain reuses of coal ash appear to be safe and beneficial, EPA has not been vigilant in requiring characterization of the waste and testing of processes and products to ensure that hazardous substances do not escape from coal ash when reused. As the committee has learned, the placement of 1.5 million tons of ash to build a golf course over a shallow aquifer is not "beneficial" reuse, but unregulated and highly dangerous dumping of toxic waste. EPA must closely examine all reuse claimed to be "beneficial" to determine its long-term safety.

In fact, a recent article, co-authored by an EPA scientist and the former president of the American Coal Ash Association, acknowledges concerns about the safety of some common coal ash reuses, particularly when the reuse involves high temperature processing.[37] According to the authors, the heating of ash greatly increases the likelihood of significant release of mercury. The article also acknowledges that the changing nature of coal combustion waste calls for closer examination of the fate of mercury and other metals that are captured by air pollution control equipment and transferred to the ash and flue gas desulfurization (FGD) sludge. The study notes, in particular, that fly ash used as

[36] U.S. Department of Energy (2004). Coal Combustion Waste Management at Landfill and Surface Impoundments 1994-2004. DOE/PI-004, ANL-EVS/06-4 at page 5.

[37] Senior, Constance L., Susan Thorneloe, Bernine Khan, David Goss. Fate of Mercury Collected From Air Pollution Control Devices, EM, Air and Waste Management Association (July 2009).

a feedstock to cement kilns can result in large mercury emissions, stating "virtually all mercury will be volatilized when [coal ashes] are used as feedstock to cement kilns as the result of high operating temperatures (1450 degrees C)."[38] These concerns, as well as others raised by the use of coal ash as structural fill, minefill, and soil amendment should be investigated and addressed by EPA.

Recommendations

Unsafe disposal of coal ash has resulted in case after case of serious injury to health and the environment. Research conducted by EPA and the National Academies of Science[39] indicate a high and unacceptable risk from coal ash when the waste is disposed without safeguards. It is thus our hope that the Subcommittee will recommend that EPA take the following steps to protect our communities and environment from the clear an significant risks.

1. *Promulgate federally enforceable regulations for coal ash disposal in landfills under Subtitle C of RCRA.*

EPA must designate coal combustion waste as a hazardous waste under Subtitle C of RCRA because federal regulations are needed to address the substantial hazard to human health and the environment when coal combustion waste is improperly stored or disposed. Regulation as a non-hazardous solid waste under Subtitle D of RCRA will not afford sufficient protection from the release of hazardous pollutants from the hundreds of ponds, dumps, piles and mines throughout the United States. Enforceable minimum waste management requirements for dry disposal of coal ash in landfills should include siting restrictions, liners, groundwater monitoring, leachate collection, financial assurance, closure requirements, post-closure care, and corrective action.

2. *EPA should phase-out coal ash surface impoundments (waste ponds) at existing coal-fired plants and prohibit the construction of surface impoundments at new plants.*

EPA should prohibit construction of surface impoundments at all new coal-fired plants and require a phasing-out of surface impoundments at existing plants. Electric utilities have a choice of producing dry or wet waste, and given the evidence of damage to human health and the environment from disposal of slurried (wet) ash in waste ponds, an essential step to improve waste management over the long term is to require utilities to move toward dry disposal of ash. The TVA disaster as well as the dozens of cases of contamination from the leaching of arsenic and other pollutants from ponds across the U.S. is testament to the danger of wet disposal. For existing plants, EPA should establish a reasonable date for termination of all wet ash disposal. As an added benefit, disposing of dry ash in landfills preserves the ash for recycling at a later date.

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[38] *Id.* at 5-6.

[39] Committee on Mine Placement of Coal Combustion Waste, Nat'l Research Council, Managing Coal Combustion Residues in Mines (2006).

3. EPA should prohibit disposal of coal ash in sand and gravel pits.

In view of the clear threat to public health posed by disposal of coal ash in sand and gravel pits, EPA should promulgate an immediate prohibition. Since 2000, EPA has recommended that coal ash disposal in sand and gravel pits be terminated because of the many damage cases resulting from this practice. As the committee heard in testimony by Ms. Gayle Queen, coal ash disposed in an unlined pit poisoned the drinking water of a community in Gambrills, Maryland and sickened its residents. The threat to public health posed by the recent dumping in Gambrills (1999 through 2007) is unconscionable, considering EPA's long experience with cases of water contamination from this disposal practice. EPA has long acknowledged numerous proven damage cases caused by coal ash disposal in sand and gravel pits, including sites that poisoned or threatened public drinking water supplies in Illinois, Massachusetts, Michigan, Ohio, Virginia, and Wisconsin. A prohibition is necessary because this dangerous mode of disposal is still an acceptable practice in numerous states. In fact, Iowa currently has at least four ongoing disposal operations in unlined sand and gravel pits. In view of the propensity of coal ash to leach into aquifers from sand and gravel pits and the likely paths of migration to residential areas and public water supplies, it is necessary to act immediately to avoid further injury.

4. EPA should assess all coal ash reuses to determine their safety and legitimacy.

EPA should encourage the legitimate and safe reuse of coal ash only when such reuse does not pose a threat to health and the environment. Safe beneficial reuse can conserve virgin resources and reduce emission of greenhouse gases. Because unregulated reuse of coal ash can lead to endangerment of human health, the agency should carefully and systematically examine reuse practices, particularly structural fill and minefilling, to determine what standards and guidelines should be imposed to guarantee that these practices do not cause harm. In addition, EPA should examine any reuse of coal ash that involves changes in temperature or pH to ensure that hazardous constituents are not released during the manufacturing, use, or disposal of the recycled product.

Conclusion

In sum, I greatly appreciate the Subcommittee's interest in examining the risk to public health posed by the failure to regulate coal ash and in finding a federal solution to this decades-old problem. Thank you again, Mr. Chairman, for the opportunity to present to you and the Subcommittee information about this critical issue.

Figure 1: Human Health Effects of Coal Ash Pollutants

Aluminum	Lung disease, developmental problems
Antimony	Eye irritation, heart damage, lung problems
Arsenic	Multiple types of cancer, darkening of skin, hand warts
Barium	Gastrointestinal problems, muscle weakness, heart problems
Beryllium	Lung cancer, pneumonia, respiratory problems
Boron	Reproductive problems, gastrointestinal illness
Cadmium	Lung disease, kidney disease, cancer
Chromium	Cancer, ulcers and other stomach problems
Chlorine	Respiratory distress
Cobalt	Lung/heart/liver/kidney problems, dermatitis
Lead	Decreases in IQ, nervous system, developmental and behavioral problems
Manganese	Nervous system, muscle problems, mental problems
Mercury	Cognitive deficits, developmental delays, behavioral problems
Molybdenum	Mineral imbalance, anemia, developmental problems
Nickel	Cancer, lung problems, allergic reactions
Selenium	Birth defects, impaired bone growth in children
Thallium	Birth defects, nervous system/reproductive problems
Vanadium	Birth defects, lung/throat/eye problems
Zinc	Gastrointestinal effects, reproductive problems

Source: ATSDR ToxFAQs, available at www.atsdr.cdc.gov/toxfaq.html

Figure 2:
Risks Posed by Coal Ash Surface Impoundments and Landfills (EPA, Human and Ecological Risk Assessment of Coal Combustion Wastes 2007)

Table A: Surface Impoundments: Highest Health Risks (Groundwater to Drinking Water)			
	90th Percentile HQ or Cancer Risk Value[1 2]		
Chemical	**Unlined Units**	**Clay-Lined Units**	**Potential health Risks**
Conventional CCW			
Arsenic (cancer risk)	1 in 500	1 in 1,111	Nausea; Vomiting; Diarrhea; Cardiovascular Effects; Encephalopathy; Dermal Effects; Peripheral Neuropathy; Skin, Bladder & Lung cancer
Nitrate/nitrite (MCL)	20	10	Methemoglobinemia, infants are particularly vulnerable
Molybdenum	8	5	Fatigue; Headaches; Joint Pains
Boron	7	4	Stomach, Intestines, Kidneys, Liver and Brain Damage; Death; Negative Effects on Male Reproduction
Selenium	2	1	Dizziness; Fatigue; Respiratory Effects; Selenosis (Hair Loss; Nail Brittleness; Neurological Abnormalities)
Lead (MCL)	3	0.7	Learning Disabilities; Kidney, Blood, and Nerve Damage; Children are especially vulnerable to Lead exposure
Codisposed CCW and Coal Refuse			
Arsenic (cancer risk)	1 in 50	1 in 143	Nausea; Vomiting; Diarrhea; Cardiovascular Effects; Encephalopathy; Dermal Effects; Peripheral Neuropathy; Skin, Bladder & Lung cancer
Cadmium	9	3	Diarrhea; Stomach Pains; Severe Vomiting; Bone Fracture; Reproductive Effects; Nerve Damage; Immune System Damage; Psychological Disorders
Cobalt	8	3	Vomiting and Nausea; Vision Problems; Heart Problems; Thyroid Damage
Lead (MCL)	9	1	Learning Disabilities; Kidney, Blood, and Nerve Damage; Children are especially vulnerable to Lead exposure
Molybdenum	3	2	Fatigue; Headaches; Joint Pains

Sources: U.S. Envtl. Prot. Agency (EPA), Human and Ecological Risk Assessment of Coal Combustion Wastes (released as part of a Notice of Data Availability) (Aug. 6, 2007) (draft), Table 4-7, Page 4-14 (does not include data on composite-lined units); and U.S. Department of Health and Human Services, Agency for Toxic Substances & Disease Registry, "Frequently Asked Questions About Contaminants Found at Hazardous Waste Sites" <http://www.atsdr.cdc.gov/toxfaq.html>.

[1] Values are HQs for all chemicals except arsenic; arsenic values are cancer risk.

[2] The Hazard Quotient (HQ) is the ratio of the exposure estimate (dose of contaminants) to a "no adverse effects level" considered to reflect a "safe" environmental concentration or dose.

Figure 2
(Continued)

Table B: Landfills: Highest Health Risks (Groundwater to Drinking Water)			
	90th Percentile HQ or Cancer Risk Value[1 2]		
Chemical	**Unlined Units**	**Clay-Lined Units**	**Potential Health Risks**
Conventional CCW			
Arsenic (cancer risk)	1 in 2,500	1 in 5,000	Nausea; Vomiting; Diarrhea; Cardiovascular Effects; Encephalopathy; Dermal Effects; Peripheral Neuropathy; Skin, Bladder & Lung Cancer
Thallium	3	2	Stomach Pains; Nerve Damage; Joint Pains; Vision Damage; Fatigue; Headaches
Antimony	2	0.8	Eye Irritation; Hair Loss; Lung Damage; Heart and Fertility Problems. Liver and Blood Damage; Skin Irritation
Codisposed CCW and Coal Refuse			
Arsenic (cancer risk)	1 in 2,000	1 in 5,000	Nausea; Vomiting; Diarrhea; Cardiovascular Effects; Encephalopathy; Dermal Effects; Peripheral Neuropathy; Skin, Bladder & Lung cancer
Thallium	2	1	Stomach Pains; Nerve Damage; Joint Pains; Vision Damage; Fatigue; Headaches
Molybdenum	2	0.6	Fatigue; Headaches; Joint Pains

Sources: U.S. Envtl. Prot. Agency (EPA), Human and Ecological Risk Assessment of Coal Combustion Wastes (released as part of a Notice of Data Availability) (Aug. 6, 2007) (draft). Table 4-5, Page 4-12 (does not include data on composite-lined units); and U.S. Department of Health and Human Services, Agency for Toxic Substances & Disease Registry, "Frequently Asked Questions About Contaminants Found at Hazardous Waste Sites" <http://www.atsdr.cdc.gov/toxfaq.html>.

[1] Values are HQs for all chemicals except arsenic; arsenic values are cancer risk.

[2] The Hazard Quotient (HQ) is the ratio of the exposure estimate (dose of contaminants) to a "no adverse effects level" considered to reflect a "safe" environmental concentration or dose.

Figure 3: Increase in Contaminants in Coal Ash from EPA Office of Research and Development Testing
1999-2008

Hazardous Constituent	1999 Report to Congress' Leachate Concentration (ug/l)[1]	2008 ORD Report's Leachate Concentration (ug/l)[2]	Increase in Leachate Concentration (at upper bounds of range) 1999-2008	MCL (ug/L)
Antimony	1.05 - 12.5	<0.3 – 200	16 times	6.0
Arsenic	0.875 - 236	<1.0 – 1,000	Nearly 5 times	10
Boron	103 – 9,630	200-300,000	31 times	n/a
Chromium	0.67 – 5.89	1 – 4,000	680 times	5.0
Selenium	4.83 - 440	5 – 10,000	Nearly 23 times	50
Thallium	1.85 – 15.2	<0.3 – 300	> 19 times	2.0

[1] Office of Solid Waste & Emergency Response, U.S. Envtl. Prot. Agency, Report to Congress: Wastes from the Combustion of Fossil Fuels (Mar. 1999) at 3-19, tbl. 3-9.
[2] Susan Thorneloe et al., "Improved Leach Testing for Evaluating Fate of Mercury and Other Metals from Management of Coal Combustion Residues," Proceedings Global Waste Management Symposium: Promoting Technology and Scientific Innovation (Sept. 7–10, 2008) at 17.

Figure 4: Increases in U.S. Generation of Coal Combustion Waste: Forecast Through 2015

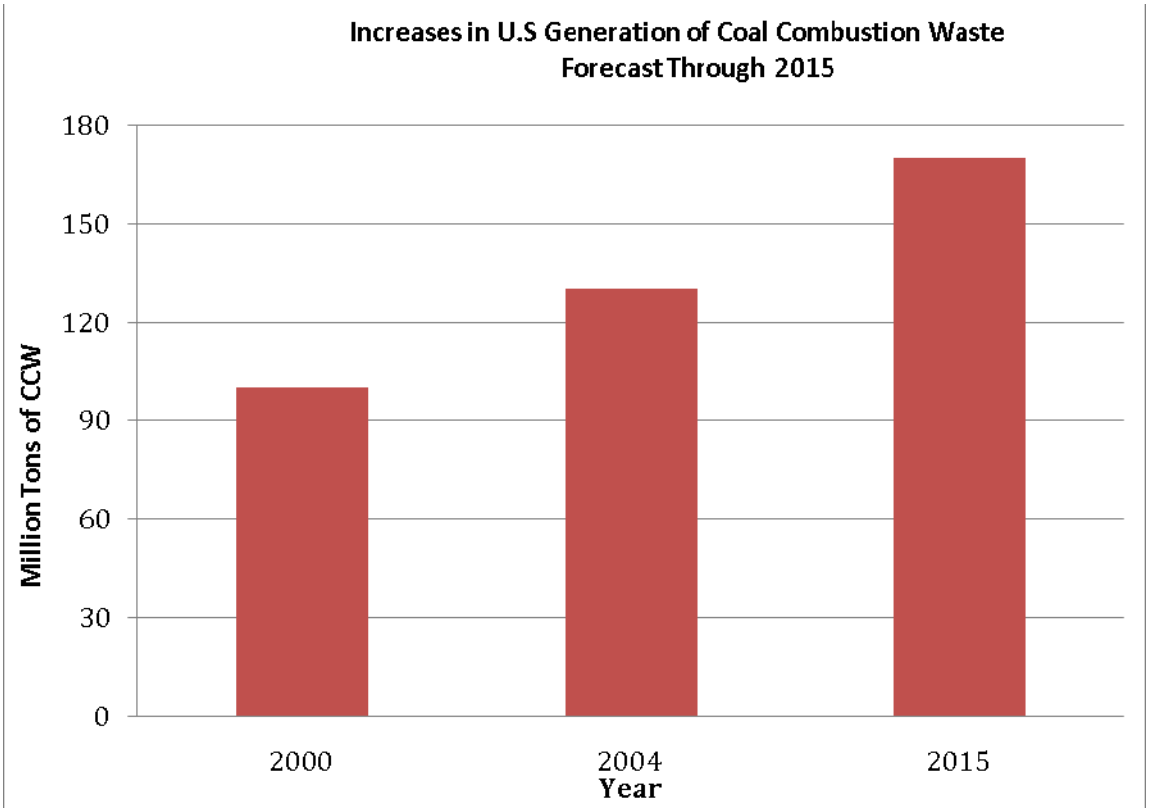

Figure 5: Income Within 1 -5 Kilometers of U.S. Coal Ash Impoundments

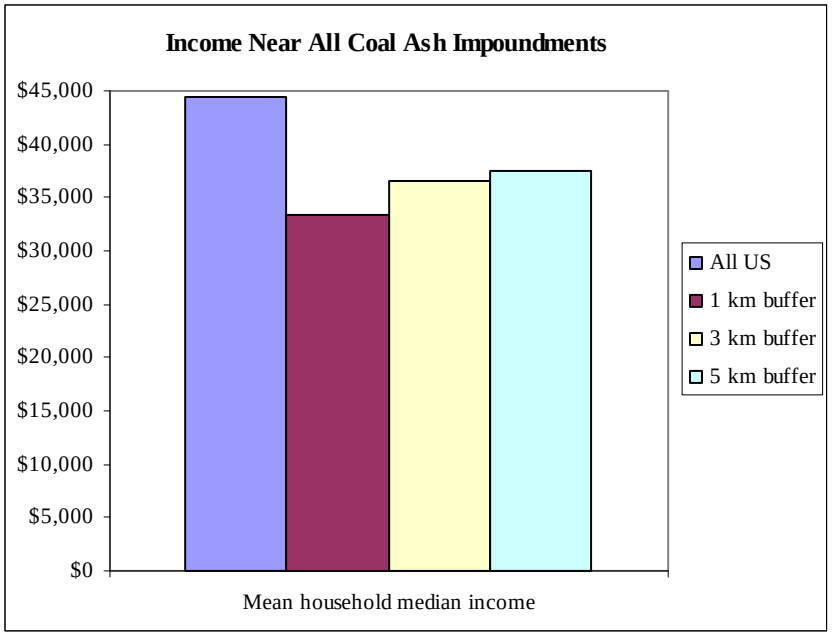

Figure 6: Coal Ash Ponds and Environmental Injustice
Poverty and the Location of Coal Ash Ponds in Arizona and New Mexico

Coal Ash Ponds and Environmental Injustice

Poverty and the Location of Coal Ash Ponds and Landfills in Arizona and New Mexico

EARTHJUSTICE

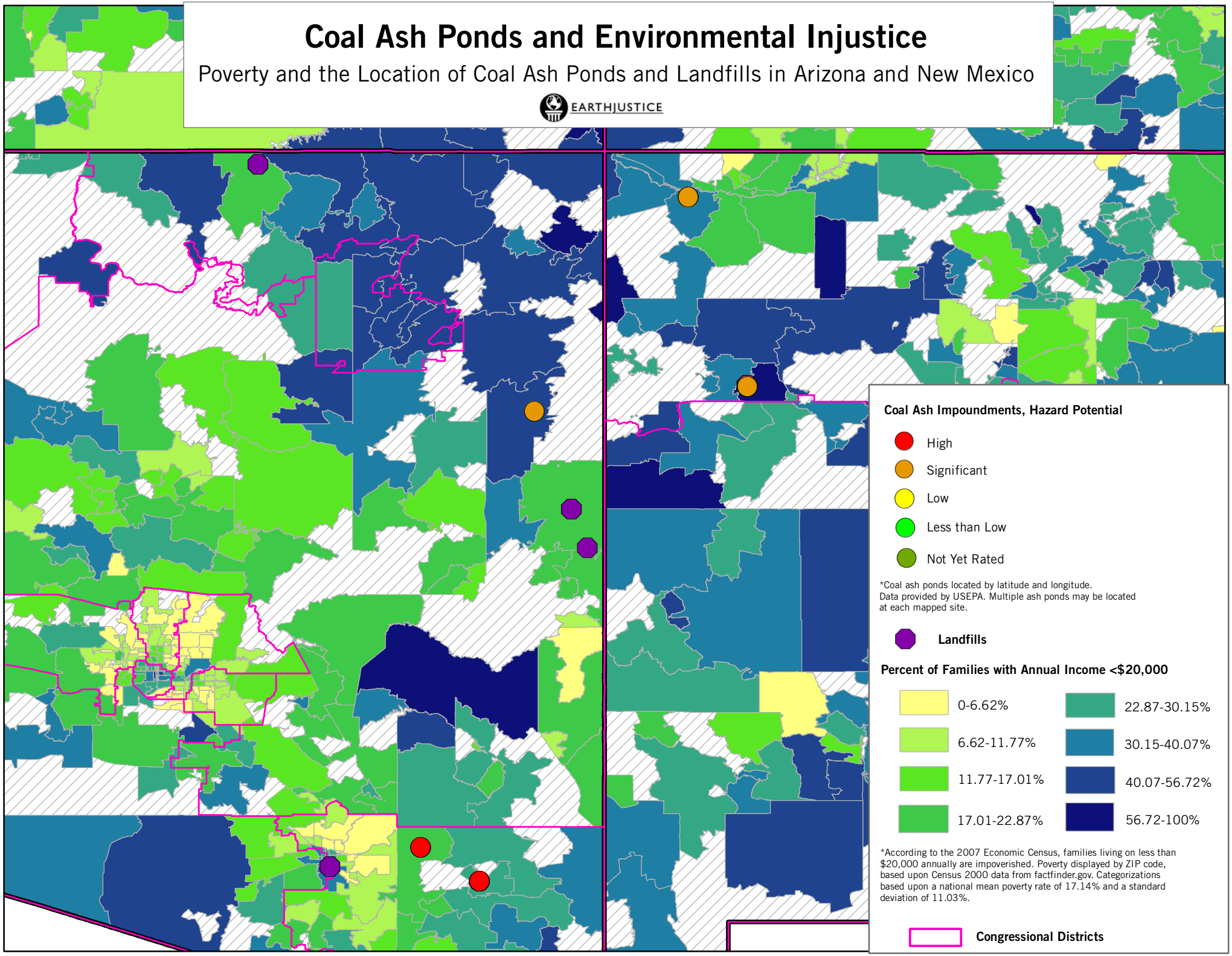

Figure 7: Survey of Association of State and Territorial Solid Waste Management Officials (ASTSWMO), April 1, 2009

Percentage of States with Coal Ash landfills and surface impoundments with specific regulatory requirements

Regulatory Requirement	Landfills	Surface Impoundments
Bottom Liner	64%	33%
GW Monitoring	81%	39%
Leachate Collection	52%	14%
Final Cover System	79%	36%
Post Closure Care	79%	39%
Siting Controls	83%	39%
Corrective Action	86%	39%
Structural Stability	69%	42%
Financial Assurance	69%	31%