



Coal Risk Update

JULY, 2013

Dump Now, Pay Later:

Coal Ash Disposal Risk for the U.S. Electric Power Sector

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Dump Now, Pay Later:

Coal Ash Disposal Risk for the U.S. Electric Power Sector

Executive Summary

The Health and Environmental Impacts of Coal Ash Ponds and Landfills

The U.S. coal-fired power plant fleet produces over 130 million tons of coal ash each year. At many coal plants, this ash is buried in on-site landfills or mixed with wastewater and stored in containment ponds as a wet slurry. Over 2,000 of these ponds and landfills are located at power plants around the country. Coal ash frequently contains significant concentrations of heavy metals and other toxic chemicals that cause cancer, respiratory problems, and neurological damage to humans who inhale windborne ash or ingest ash-contaminated groundwater.

Since 2002, multiple holding dams at coal ash ponds have ruptured without warning, resulting in catastrophic ash spills. These have included a 2008 rupture at a Tennessee Valley Authority ash pond that covered over 300 acres with an estimated billion gallons of toxic coal ash slurry. In addition to posing hazard risks from potential dam failures, many of these ponds lack a synthetic bottom lining to prevent toxic contaminants from leaching into groundwater or nearby rivers and lakes.

Ash Pond Failure and Contamination Risks for Electric Power Producers

Several investor-owned electric power producers face growing regulatory and litigation risks related to coal ash disposal. Although coal ash is not currently regulated on the federal level, forthcoming EPA regulations will likely require power producers to close coal ash ponds that lack a bottom lining. These closure costs will range from under \$1 million to potentially over \$100 million per pond, and in combination with ash-handling retrofits that will be required at some power plants, are likely to accelerate the closure of smaller coal-fired units. Contamination from ponds and landfills has also prompted several environmental groups and more recently, a major plaintiff firm to file lawsuits on behalf of residents near contamination sites.

This report assesses EPA coal ash pond data and finds that the following electric power producers are most exposed to ash pond failure risk and groundwater contamination risk based on their ownership of high-risk ponds:

U.S. electric power producers with the most coal ash ponds with significant or high hazard ratings	U.S. electric power producers with the most coal ash ponds that lack bottom linings
1. Duke Energy (24)	1. Duke Energy (45)
2. Tennessee Valley Authority (19)	2. Southern Company (45)
3. American Electric Power (18)	3. American Electric Power (36)
4. PPL Corporation (12)	4. Tennessee Valley Authority (28)
5. Southern Company (10)	5. AES Corporation (22)

Implications for Investors

Unlined coal ash ponds and landfills can leach contamination into groundwater for decades, leaving investors in publicly traded electric power producers exposed to major litigation risks. And forthcoming EPA coal ash disposal regulations are likely to force power plant operators to incur substantial compliance costs and potentially shutter several coal-fired power plants.

To date, electric power producers assessed in this report have disclosed very little information about either their coal ash pond and landfill ownership or their plans for managing potential pond and landfill closures in the future. If these companies fail to clean up coal ash ponds and landfills, investors will ultimately bear the costs of future legal battles and cleanup projects. At the same time, communities impacted by coal ash ponds and landfills will continue to needlessly suffer serious health impacts unless investors demand that companies manage coal ash responsibly.

Background

Coal ash (also known as coal combustion residuals or coal combustion byproducts) is the solid waste that is produced when coal is burned. Coal-fired power plants generate both fly ash, the fine particles filtered from smokestacks, and bottom ash, the larger particles that fall to the bottom of coal furnaces. Power plants and other industrial users of coal generate an estimated 130 million tons of coal ash each year, making it the second largest industrial waste stream in the United States.¹

In spite of the immense quantity of ash produced by coal combustion, federal law does not yet regulate the handling or disposal of coal ash, although the U.S. Environmental Protection Agency (EPA) is likely to issue new coal ash regulations by 2014.² State-level regulations governing coal ash are inconsistent and many states do not regulate or monitor ash disposal at all. A portion of the coal ash waste stream is recycled into components of concrete and other building materials, but the remainder is disposed of in landfills or mixed with power plant wastewater for storage as slurry in a holding pond. According to the EPA, there are over 2,000 coal ash holding ponds and landfills in the U.S.³

These coal ash ponds are frequently located next to power plants and use either concrete walls or soil dams to hold in ash slurry. Depending on the type and concentration of coal ash in each pond, stored ash slurry can have the consistency of a thin liquid or a dense, chalky paste. Ponds at older power plants have often been dug directly into topsoil, although some newer ponds have been built with either semi-permeable clay bottom linings or plastic composite linings to stop coal ash from leaching into groundwater. Smaller ponds cover less than an acre, while the largest ponds can stretch over nearly a thousand acres and store billions of gallons of coal ash slurry behind dams of up to 400 feet in height (for example, see the partial view of First Energy's Little Blue Run ash pond in figure 1). Power plants also store coal ash at power plant sites in dry landfills, many of which have been built without either composite or clay bottom linings.

**According to the EPA, there are over 2,000
coal ash holding ponds and landfills in the U.S.**

FIGURE 1: FirstEnergy's 967-acre Little Blue Run coal ash pond, one of the largest in the country. Under the terms of a successful lawsuit, it will have to be closed in 2016.



Impoundment Failure Risk at Coal Ash Ponds

At older or poorly maintained coal ash ponds, impoundment dams can fail, resulting in potentially disastrous consequences. Since 2002, seven coal ash pond dams have failed in the U.S., dumping toxic coal ash slurry onto backyards and into waterways.⁵ The largest of these dam failures occurred in December 2008 when an impoundment dam ruptured at a 40-acre Tennessee Valley Authority (TVA) coal ash pond in Kingston, Tennessee, releasing over a billion gallons of coal ash slurry (see figure 2). The spill covered 300 acres in toxic slurry and contaminated both the Emory and Clinch rivers.⁶ TVA was left with an estimated \$1.2 billion in cleanup costs and faced lawsuits filed by over 500 nearby residents impacted by the spill.⁷

The Kingston disaster was a wake-up call for the EPA, which responded by evaluating the stability and condition of coal ash ponds throughout the US. To date, the EPA has released assessment data for 676 ash ponds and landfills, which represent less than half of the total coal ash storage units in the country. But even this incomplete data is troubling. 129 ponds received a significant or high hazard rating from the EPA.⁸ According to the EPA's classification system, the failure of a dam with a significant hazard rating can cause environmental damage or economic loss, while the failure of a dam with a high hazard rating "will probably cause loss of human life."⁹ (TVA's Kingston ponds received a significant rating.) Of additional concern, 42 of these significant-hazard and high-hazard dams were originally built without engineering oversight and 46 of them are not currently monitored for structural integrity by a professional engineer.¹⁰

TVA was left with an estimated \$1.2 billion in cleanup costs and faced lawsuits filed by over 500 nearby residents impacted by the spill.

FIGURE 2: Aerial view of coal ash spilled from ponds at TVA's Kingston Fossil Plant in December 2008



Coal ash ponds at older power plants were often constructed with earthen dams back in the 1960s or 1970s and have deteriorated considerably over the decades. More than 230 of the ponds and landfills surveyed by the EPA were determined to be in fair or poor structural condition.¹² The EPA assigned a fair condition rating to ponds with minor deficiencies and a poor rating to ponds that lacked design documentation or had major safety deficiencies that required remedial action.¹³ Of the ponds that had fair or poor condition ratings, 35 also had significant or high hazard ratings.

Structural stability risks at some coal ash ponds are compounded by vulnerability to natural disasters such as hurricanes, earthquakes, and flooding. Several of the oldest ash ponds in the U.S. are located in the southeastern part of the country, which faces frequent hurricanes. Some of these ponds are also located in active seismic zones or have been built next to rivers, leaving them vulnerable to flooding and compounding potential environmental damage if coal ash slurry from a breached or flood-inundated pond were to reach a river.¹⁴

Ash Pond Failure Risk Exposure at Electric Power Producers

Exposure to ash pond failure risk is highly concentrated among a small number of electric power producers. Table 1 ranks the ten corporations (eight investor owned companies, one federally owned company, and one cooperative) with the most exposure to pond failure risk. The ranking uses hazard and condition data released by the EPA on the 676 coal ash disposal ponds and landfills the agency assessed through 2011.¹⁵ The second column from the right lists the number of landfills and ponds owned by each company that received significant or high hazard ratings from the EPA, and the right-hand column indicates the subset of significant- and high-hazard ponds owned by each company that were also found to have structural deficiencies.

TABLE 1: Top Ten Owners of Significant or High Hazard-Rated Coal Ash Ponds¹⁶

Rank	Company (Ticker)	Total Significant or High Hazard-Rated Ash Ponds	...That Also Received Fair or Poor Condition Ratings
1	Duke Energy (DUK)	24	10
2	Tennessee Valley Authority (Govt.)	19	0
3	American Electric Power (AEP)	18	9
4	PPL Corporation (PPL)	12	2
5	Southern Company (SO)	10	2
6	NV Energy (NVE)	8	8
7	FirstEnergy (FE)	7	1
8	Arizona Electric Power Coop (Coop.)	7	0
9	Pinnacle West Capital (PNW)	4	0
10	Xcel Energy (XEL)	3	0

Unsurprisingly, ownership of high-hazard ponds is highly correlated with the size of a company's coal-fired power generation fleet. The three largest publicly-traded U.S. electric power producers by generation capacity, Duke Energy, the Southern Company, and American Electric Power each had over 20,000 megawatts of coal-fired generating capacity in 2012 and also owned ten or more significant- or high-hazard ponds. NV Energy was an exception to this pattern with only 1,073 megawatts of coal-fired capacity but eight significant- or high-hazard ponds, all of which received fair or poor condition ratings.

The EPA's assessment reports also noted whether ponds and landfills received periodic inspections by professional engineers to assess their condition and structural integrity. Nearly all ponds with significant and high hazard ratings were found to have been inspected on a regular basis. However, Duke Energy had 18 significant- and high-hazard ponds that did not receive inspections by engineers, and NV Energy and PPL Corporation both had eight ponds that were not inspected.

Although inspections alone do not guarantee a pond's safety, they do demonstrate that, at a minimum, the pond's owner has management systems in place to track and monitor potential structural stability problems. Companies can best address the risk of coal ash pond failure by moving coal ash from older and less stable ponds into permanent, lined landfills away from rivers, lakes, and drinking water sources. The EPA is considering issuing regulations governing coal ash impoundment stability, which are likely to be finalized by 2014.¹⁷ These pending regulations create additional risks for owners of significant- and high-hazard ponds that lack procedures for monitoring and addressing pond failure risks.

Regardless of the outcome of the EPA's rulemaking process, improved transparency about the location, size, and structural condition of ponds will help investors assess pond failure risk at specific companies and differentiate between companies that are managing pond structural stability effectively and those that are not. For example, Duke Energy has yet to demonstrate that it has taken steps to mitigate stability risks at its ponds and landfills. But in contrast to most of its industry peers, it has taken a first step towards greater transparency by disclosing and explaining the structural condition of some ponds in its sustainability reporting.¹⁸

Risks to Health from Ash Ponds and Landfills

In addition to posing risks related to potential impoundment failures, ash ponds and landfills can leach, leak, and spill toxic contaminants into groundwater and nearby bodies of water with severe consequences for public health and the environment. Dramatic structural failures are not the only source of surface contamination. Smaller spills occur when impoundment dikes and dams leak less significant amounts or when impoundments overflow in heavy rains or floods. Discharges of coal ash, both accidental and deliberate, also occur at coal ash ponds. Moreover, coal ash is also dangerous when inhaled. Ash can blow from landfills, from the drying edges of wet impoundments, and from trucks when coal ash is transported and dumped, further extending its threat to health.

As the previous section noted, coal ash ponds and landfills were frequently built decades ago without a composite lining on the bottom. Some of these ponds and landfills have semi-permeable clay liners, but many lack any barrier between stored coal ash and underlying soil, which has allowed plumes of contaminants to leach into groundwater. Furthermore, even the best liners can leak and break, especially as they reach the end of their effective lifetimes. Thus, assuring that wet impoundments will never leak or leach is virtually impossible.

Residents living next to an unlined wet ash pond that contains coal ash commingled with other coal wastes, and who get their drinking water from a well, have as much as a 1 in 50 chance of getting cancer from drinking water contaminated by arsenic, one of the most common and most dangerous toxins in coal ash.

Coal ash frequently contains significant concentrations of toxic heavy metals and other chemicals, including mercury, lead, chromium, arsenic, selenium, cadmium, thallium, and boron, among others. When coal ash encounters water, its toxic elements dissolve out of the ash and diffuse through the body of water. This leaching may continue to release toxic substances into the environment, endangering human health and wildlife over the course of decades.¹⁹ In fact, leaching can expose people to dangerous toxicants at levels that can be hundreds to thousands of times greater than federal drinking water standards.²⁰

The health consequences of storing coal ash in surface impoundments are severe. Human exposure to chemicals in coal ash through ingestion, inhalation, or dermal (skin) contact may cause stomach, lung or urinary tract cancers; lung damage; cardiovascular impairment; nervous system damage; developmental defects; impaired vision; paralysis; and even death.²¹ According to the EPA, residents living next to an unlined wet ash pond that contains coal ash commingled with other coal wastes, and who get their drinking water from a well, have as much as a 1 in 50 chance of getting cancer from drinking water contaminated by arsenic, one of the most common and most dangerous toxins in coal ash.²²

In 2010 and 2011, The Environmental Integrity Project and Earthjustice documented contamination that exceeded legal limits at 89 coal ash disposal sites.²³ Through 2012, the EPA had documented nearly 100 additional “proven and potential” damage cases where ponds or landfills had contaminated groundwater and nearby surface water bodies, raising the total number of coal ash contamination sites above 180.²⁴ In addition to identifying these sites, environmental groups have raised concerns about contamination at other coal ash ponds and landfills. For example, coal ash ponds at Duke Energy’s Riverbend coal plant have leached contaminants such as iron and manganese into Mountain Island Lake, which serves as a municipal water source for over 800,000 residents of Charlotte, North Carolina (see figure 3).²⁵

FIGURE 3: Satellite View of Duke Energy’s Riverbend Coal Ash Ponds and the City of Charlotte’s Municipal Water Intake Station



SOURCE: Catawba Riverkeeper²⁶

Regulatory Risks from Coal Ash Contamination

Currently, coal ash is not regulated on the federal level, although the EPA is in the process of finalizing coal ash regulations, which are anticipated in late 2013 or early 2014. The agency is considering two regulatory options. The first option (Subtitle C) is more stringent and would reclassify coal ash and other coal combustion residuals as a “special waste” subject to strict regulations on transport, storage, and disposal that would be enforced at the federal level. Subtitle C would also phase out the use of all existing coal ash ponds and require groundwater monitoring at coal ash landfills. The second option (Subtitle D) would regulate coal ash as a non-hazardous solid waste subject to less-stringent handling and disposal criteria and would be enforced either by states or through third-party citizen lawsuits. Under Subtitle D, lined coal ash ponds would be allowed to operate, while unlined ponds would be required to close. Subtitle D would also require groundwater monitoring at coal ash landfills.²⁷ A third option (Subtitle D Prime) would allow existing unlined ash ponds to continue to operate.²⁸

If the EPA finalizes these rules by 2014, electric power producers with coal ash ponds and landfills will face significant compliance costs as the rules phase in through 2019. Actual costs will vary based on the characteristics of each pond, landfill, and power plant, but are likely to include some of the following:

- Closure costs of \$100,000-\$200,000 per acre to fit landfills with a composite cap. (The cost of capping ponds would be higher due to the additional cost of de-watering ash slurry.)²⁹
- Stranded asset costs of up to \$1 million per acre from accelerated pond and landfill closure (depending on the unused capacity of each pond to be closed).³⁰
- Capital costs of \$10-30 million per plant for fly ash conversion if a plant is required to convert from wet to dry handling of fly ash.³¹
- Capital costs of \$20-40 million per boiler unit for bottom ash conversion if a plant is required to convert from wet to dry handling of bottom ash.³²
- Capital costs of \$80 million per plant (or \$120 million if a plant disposes of flue-gas desulfurization wastes in its wastewater) for additional wastewater treatment capacity if a plant is required to phase out the use of ash ponds for wastewater disposal.³³
- Additional operating costs of \$37.50 per ton of ash produced if offsite landfill disposal that meets Subtitle C’s “special waste” standards is required. Per-ton costs for offsite disposal under Subtitle D would be significantly less.³⁴

The average size of coal ash ponds in the EPA’s hazard survey was 50 acres, so for a an average pond with half of its storage capacity unused, the cost of capping would be \$5-10 million (likely higher due to dewatering costs), in addition to stranded asset costs of \$500,000 per acre, or \$25 million. These costs would be in addition to any ash collection and wastewater disposal upgrades that might be needed at plants that use the pond for ash and wastewater disposal.

Although this \$35 million cost to close a typical coal ash pond is substantial, the cost of fully remediating environmental contamination at coal ash ponds and landfills will likely be significantly higher than these estimates suggest. Even if they are closed with a composite cap, landfills and ponds that do not have a composite bottom lining will continue to leach contaminants into groundwater. According to EPA models, groundwater contamination levels at unlined and clay-lined coal ash ponds will continue to increase for over dozens or even hundreds of years, even after capping and closure. Unlined landfills will also continue to leach significant levels of contamination into groundwater for hundreds of years.³⁵ Therefore, for companies with unlined ponds and landfills, fully addressing environmental contamination will likely require removing coal ash and reburial in landfills lined with a durable, composite bottom lining.

The cost of coal ash removal and reburial is much higher than capping landfills or ponds in place. For example, an alternatives analysis for the closure of two ash ponds at Santee Cooper's Grainger Plant estimated that capping the ponds, which had a combined surface area of 82 acres would cost \$60 million, while removal and off-site disposal of the 1.32 million tons of coal ash in the ponds would cost \$101 million.³⁶ And at Ameren's Venice Plant, capping two ash ponds with a combined area of 58 acres was estimated to have a life cycle cost of \$12.4 million, compared to \$215.8 million for removal and off-site disposal of the 2.95 million tons of coal ash in the ponds.³⁷ Both analyses assumed that removed ash would be moved to a municipal landfill, so disposal in a hazardous waste or "special waste" landfill that meets Subtitle C standards under consideration by the EPA would further increase the cost of coal ash removal at these or similar sites.

The pond and landfill closure decisions companies make in response to the forthcoming EPA coal ash regulations will have significant implications for investors. Electric power producers will face a choice between removing ash from unlined landfills and ponds, or capping unlined ponds and landfills in place, which would minimize up-front costs. But even if the latter cap-and-close option meets the letter of new EPA regulations, it could fail to stop ongoing contamination and leave an electric power producer exposed to potential coal ash litigation for decades.

Overall, the EPA's forthcoming coal ash regulations will leave electric power producers with significant capital, operating, and stranded asset costs at power plants that have unlined ash ponds (and at power plants with lined ponds as well if the EPA chooses to implement Subtitle C). According to analysis by the EOP Group, coal-fired units with less than 230 megawatts of generating capacity may no longer be economically viable if they are required to phase out wet storage of coal ash. Therefore, in conjunction with other regulatory developments such as pending EPA regulation of greenhouse gas emissions under Section 111(d) of the Clean Air Act, the EPA's coal ash regulations will likely accelerate the pace of coal plant retirements.

But even if the latter cap-and-close option meets the letter of new EPA regulations, it could fail to stop ongoing contamination and leave an electric power producer exposed to potential coal ash litigation for decades.

Litigation Risks from Coal Ash Contamination

Groundwater contamination from unlined coal ash ponds leaves power producers that own ash disposal sites exposed to litigation risks from potential violations of the Clean Water Act and other water quality regulations. With the support of environmental organizations such as Earthjustice, the Sierra Club, and the Riverkeeper Foundation, groups of residents living near coal ash ponds and landfills have reached settlements that have forced companies to clean up several ash ponds and landfills. For example:

- In 2008, PPL Corporation agreed to a \$25 million settlement with 57 residents of Colstrip, Montana over groundwater contamination from an ash pond.³⁸
- In 2009, Constellation Energy reached a \$54 million settlement over contamination from coal ash dumped at a gravel quarry in Gambrills, Maryland.³⁹
- In 2012, after 200 residents threatened to file a lawsuit against FirstEnergy over contamination from its Little Blue Run ash pond, Pennsylvania's Department of Environmental Protection sued the company and reached a settlement that required the company to close the pond by 2016.⁴⁰
- In 2012, the Riverkeeper Foundation and SCANA Corporation reached a settlement that required the company to remove all coal ash from ponds at its plant in Eastover, South Carolina.⁴¹

To date, most coal ash lawsuits have been filed with assistance from environmental advocacy groups. But there are signs that major plaintiff firms may have begun to take an interest in coal ash litigation. In February 2013, residents living near the Southern Company's Plant Scherer in Monroe County, Georgia filed 13 lawsuits against the company, alleging that it engaged in racketeering, battery, fraud, and negligence by failing to put a lining on its 750-acre coal ash pond. Plaintiffs in the lawsuit are represented by Napoli Bern Ripka Shkolnik LLP, a New York-based plaintiff litigation firm that won an \$850 million settlement for World Trade Center recovery workers sickened after the September 11th attacks.⁴²

Several power producers that own coal ash ponds and landfills have further increased their coal ash liability risk by disposing ash off-site in unsafe and unlined locations that have harmed nearby communities. For example, Dominion Resources, which disposed of coal ash as fill for a golf course in Chesapeake, Maryland, faces ongoing litigation over alleged groundwater contamination near the golf course.⁴³ In addition, AES Corporation allegedly used a contractor to ship coal ash waste from an AES coal plant in Puerto Rico to the Dominican Republic. The contractor allegedly dumped the waste near residential neighborhoods where it reportedly caused birth defects, respiratory problems, and severe skin irritation.⁴⁴ According to Earthjustice, AES continues to sell coal ash to building contractors in Puerto Rico. This ash has been used as residential construction fill and has allegedly exposed entire neighborhoods to contamination, prompting Earthjustice to file a lawsuit against the company.⁴⁵ These examples show that unless ash is disposed in lined landfills, it can pose ongoing health risks.

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Coal Ash Contamination Risk Exposure for Investors

Using data obtained from the EPA by Earthjustice on over 1000 coal ash ponds and landfills, we ranked U.S. electric power producers based on their ownership of unlined coal ash ponds (see table 2).⁴⁶ The EPA also assessed coal ash landfills at power plant sites, although we did not assess landfill ownership in this ranking. (Complete ash pond and landfill ownership data can be found in the appendix).

TABLE 2: Top 20 Owners of Unlined Coal Ash Ponds⁴⁷

Rank	Company (Ticker)	Unlined Ponds	Lined Ponds	Total Ponds
1	Duke Energy (DUK)	45	26	71
2	Southern Company (SO)	45	13	58
3	American Electric Power (AEP)	36	25	61
4	Tennessee Valley Authority (Govt.)	28	5	33
5	AES Corporation (AES)	22	10	32
6	Berkshire Hathaway (BRK.A/BRK.B)	19	17	36
7	Ameren (AEE)	18	8	26
8	PPL Corporation (PPL)	16	11	27
9	Alliant Energy (LNT)	15	0	15
10	Edison International (EIX)	12	28	40
11	FirstEnergy (FE)	12	17	29
12	Dynegy (DYN)	12	9	21
13	Reliant Energy (REI)	11	27	38
14	NiSource (NI)	11	7	18
15	Xcel Energy (XEL)	10	10	20
16	Dominion Resources (D)	8	17	25
17	Santee Cooper (Govt.)	8	3	11
18	Big Rivers Electric Corp. (Coop.)	8	0	8
19	Pinnacle West Capital (PNW)	7	3	10
20	NRG Energy (NRG)	3	14	17

As with the risk of ash pond and landfill failure, exposure to ash pond contamination risk is highest among the largest coal-intensive electric power producers. Duke Energy and the Southern Company both own over 40 unlined ponds, leaving them vulnerable to lawsuits and EPA rulemaking-related compliance costs. However, while Berkshire Hathaway's MidAmerican Energy subsidiary is not a top power producer by generating capacity, it ranks sixth on the list due to a disproportionately high number of unlined ponds and landfills. Ameren (ranked 7th) and Dynegy (ranked 12th) are also likely to face near-term costs to remediate several unlined ash ponds in Illinois. Unlike its counterparts in most other states, the Illinois EPA has begun to proactively enforce water quality laws at coal ash disposal sites, prompting Ameren to propose a \$120 million ash cleanup plan covering several sites in April 2013.⁴⁸

Companies not ranked towards the top of table 2 may also face significant risks from coal ash contamination. In its survey data, the EPA did not report whether it counted only ponds with composite linings as "lined" or whether it also included ponds with less effective clay linings in this category. In addition, composite linings can also leak depending on their age and condition. And if the EPA chooses to regulate coal ash under Subtitle C, power producers would be required to close both lined and unlined ponds. Therefore, lined ponds and landfills also expose power producers to ongoing risks (the appendix lists the top 40 owners of lined and unlined ponds and landfills).

Companies can best mitigate risk related to contamination from unlined ash ponds and landfills by moving ash to lined dry landfills for permanent disposal, as SCANA agreed to do in its settlement with the Riverkeeper Foundation. Additional disclosure from companies regarding coal ash disposal would also help investors minimize their exposure to related risks. Xcel Energy has taken a step in this direction by providing plant-by-plant reporting on its ash management practices.⁴⁹ Investors would also benefit from detailed pond-by-pond and landfill-by-landfill data on the size of disposal sites, whether they are lined, and what systems are in place to monitor and remediate potential contamination. Finally, most electric power producers do not report anticipated pond and landfill closure costs separately from other asset retirement obligations in their financial reporting. Were companies to break out these costs separately and disclose their assumptions about which landfill closure options were used to estimate future retirement expenses, investors would be better able to quantify each company's ash cleanup liabilities.

Unlike its counterparts in most other states, the Illinois EPA has begun to proactively enforce water quality laws at coal ash disposal sites, prompting Ameren to propose a \$120 million ash cleanup plan covering several sites in April 2013

Conclusion: Risk Trends and Implications for Investors

For decades, U.S. coal-fired power plants have disposed of coal ash on the cheap in unlined ponds and landfills. But the long-deferred bill for coal ash disposal is coming due. Impending EPA regulation, Clean Water Act enforcement lawsuits, and toxic torts filed by plaintiff firms have ramped up coal ash-related risks for coal-intensive electric power producers. And with hundreds of older coal plants in line for retirement, the question of what to do with their coal ash ponds and landfills has become even more pressing for coal plant operators and their investors. Meanwhile, aging impoundments and landfills have occasionally collapsed, burying communities and ecosystems under toxic sludge and leaving lenders and investors on the hook for cleanups, which in the case of the Kingston disaster, cost TVA over a billion dollars.

Investors with electric power sector holdings have several options for mitigating their exposure to coal ash disposal risks:

- **Analysis of existing company disclosures.** Investors can assess the asset retirement obligations reported by electric power producers as well as disclosures about pond and landfill closure cost assessments (as Ameren has reported for some sites) and current ash disposal practices (as Xcel reports).
- **Qualitative assessment of company environmental management practices.** Patterns of contamination-related lawsuits and regulatory enforcement actions against a company can indicate a failure to manage coal ash risks effectively, while disclosure about coal ash risks and management practices provides evidence that a company is taking these risks seriously.
- **Requests for additional risk reporting and disclosure of plans for closing ponds and landfills.** Nearly all companies mentioned in this report do not disclose pond stability assessment reports, pond and landfill closure plans, or cost estimates for these potential closures, even though this information can provide investors with insights into key risks related to coal ash.
- **Shareholder engagement with and divestiture from companies that do not manage coal ash risks effectively.** For companies that fail to transparently and proactively address coal ash risks, investors can file shareholder resolutions or sell their holdings if engagement fails to improve company behavior.

In addition to financial risks, companies highlighted in this report face emerging reputational risks related to coal ash. Power producers that are seen—fairly or unfairly—to be poisoning their customers' water supply are likely to have difficulty maintaining a positive image with ratepayers, legislators, and regulators. And with human lives at stake, companies have a moral obligation to dispose of coal ash safely, even if effective solutions involve costs over the short-term. At a minimum, investors should not tolerate reckless actions such as AES Corporation's shipping of coal ash to the Dominican Republic or its sale of coal ash to third parties that allegedly disposed of it in residential neighborhoods.

Electric power producers already possess most of the information investors need to assess and mitigate their exposure to coal ash risks. Through persistent engagement with companies, investors can encourage improved disclosure and hold companies accountable for managing these risks effectively. And in the event that these companies prove unwilling or unable to act responsibly, this report's rankings and findings can serve as a starting point for engaging with and if necessary, selling holdings in companies that fail to clean up coal ash ponds and landfills.

Electric power producers already possess most of the information investors need to assess and mitigate their exposure to coal ash risks.

Top 40 Owners of Coal Ash Ponds and Landfills⁵⁰

	Company (Ticker)	Ponds			Landfills			Total
		Unlined Ponds	Lined Ponds	Total Ponds	Unlined Landfills	Lined Landfills	Total Landfills	Total Ponds + Landfills
1	Duke Energy (DUK)	45	26	71	2	10	12	83
2	American Electric Power (AEP)	36	25	61	1	11	12	73
3	Southern Company (SO)	45	13	58	2	8	10	68
4	Berkshire Hathaway (BRK.A/BRK.B)	19	17	36	7	2	9	45
5	Reliant Energy (REI)	11	27	38	1	6	7	45
6	Edison International (EIX)	12	28	40	1	1	2	42
7	FirstEnergy (FE)	12	17	29	4	6	10	39
8	AES Corporation (AES)	22	10	32	0	5	5	37
9	Tennessee Valley Authority (Govt.)	28	5	33	1	1	2	35
10	Dominion Resources (D)	8	17	25	1	6	7	32
11	PPL Corporation (PPL)	16	11	27	3	2	5	32
12	Ameren Corp (AEE)	18	8	26	0	3	3	29
13	Xcel Energy (XEL)	10	10	20	5	4	9	29
14	Energy Future Holdings (Private)	2	16	18	4	5	9	27
15	NRG Energy (NRG)	3	14	17	0	7	7	24
16	Dynegy (DYN)	12	9	21	0	1	1	22
17	Unisource Energy (UNS)	0	20	20	1	0	1	21
18	NiSource Inc (NI)	11	7	18	0	1	1	19
19	Alliant Energy (LNT)	15	0	15	1	2	3	18
20	PNM Resources (PNM)	0	17	17	0	1	1	18

	Company (Ticker)	Ponds			Landfills			Total
		Unlined Ponds	Lined Ponds	Total Ponds	Unlined Landfills	Lined Landfills	Total Landfills	Total Ponds + Landfills
21	Great Plains Energy (GXP)	0	12	12	0	4	4	16
22	DTE Energy (DTE)	3	10	13	1	1	2	15
23	Basin Electric Power (Coop.)	3	5	8	2	3	5	13
24	Pinnacle West Capital Corp (PNW)	7	3	10	2	1	3	13
25	Santee Cooper (Govt.)	8	3	11	1	0	1	12
26	Teco Energy (TE)	0	11	11	1	0	1	12
27	Allele Inc (ALE)	0	6	6	0	5	5	11
28	NV Energy Inc. (NVE)	0	8	8	2	0	2	10
29	Arizona Electric Power (Coop.)	0	9	9	0	0	0	9
30	Big Rivers Electric Corp. (Coop.)	8	0	8	1	0	1	9
31	JEA (Govt.)	3	3	6	2	1	3	9
32	SCANA Corporation (SCG)	2	2	4	2	3	5	9
33	City of Springfield (Govt.)	1	4	5	1	2	3	8
34	Cleco Corporation (CNL)	0	7	7	0	1	1	8
35	Entergy (ETR)	2	2	4	0	4	4	8
36	Integrus Energy Group (TEG)	1	6	7	0	1	1	8
37	Omaha Public Power Dist. (Govt.)	3	2	5	2	1	3	8
38	So. Miss. Elec. Pwr. Assoc. (Coop.)	0	5	5	0	3	3	8
39	Westar Energy (WR)	5	0	5	3	0	3	8
40	City of Colorado Springs (Govt.)	0	6	6	1	0	1	7

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