



Policy note

Coal-ash management by U.S. electric utilities: Overview and recent developments



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ARTICLE INFO

Article history:

Received 6 March 2015

Received in revised form

31 March 2015

Accepted 31 March 2015

Available online 19 April 2015

Keywords:

Coal ash

Coal combustion residuals

Coal-ash management

U.S. environmental protection agency

ABSTRACT

This article briefly presents the historical and potential costs of coal-ash dam failure and disposal site leakage in the U.S. Highlights of the Environmental Protection Agency's 2014 final rule relating to regulation of coal ash as solid waste under Subtitle D of the Resource and Recovery Act, as well as current uncertainties relating to the cost of implementation and compliance by electric utilities, are discussed.

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1. Introduction

Coal ash is a byproduct of the process of generating electricity by coal combustion and is technically called coal combustion residuals. The U.S. Environmental Protection Agency (EPA) considers fly ash, bottom ash, boiler slag, and flue gas desulfurization materials to be coal combustion residuals (U.S. EPA, 2014). An estimated 140 million tons of coal ash were produced in the U.S. in 2008. While 60 million tons were reused by various industries (U.S. EPA, 2010a), the remaining ash is stored in dry form in landfills or in wet form in holding ponds or in abandoned or surface coal mines. Coal ash contains toxins that can be dangerous to public health and the environment and many recent holding pond dam failures and leakages have raised concerns about the safety of current and future coal-ash disposal sites. In a ruling regarding the disposal of coal ash released late in 2014, the EPA chose not to classify the waste as hazardous under subtitle C of the Resource and Recovery Act (RCRA), largely because of the possible effects that such a designation could have on the “beneficial use” of the byproduct. Instead, the EPA decided to classify coal ash as solid waste under subtitle D of RCRA and strengthen rules relating to both new and existing disposal sites. This article briefly presents the historical and potential costs of coal ash dam failure and disposal site leakage, coal ash beneficial use, current accounting treatment of coal ash

related obligations, and the siting, monitoring, and disclosure requirements under the new EPA rules.

2. Potential dangers to human health and the environment

Coal ash contains varying levels of arsenic, lead, mercury, boron, cadmium, chromium and selenium. Chronic exposure to each of these elements can pose dangers to human health. Even low levels of arsenic in drinking water have been associated with birth defects, cardiovascular damage, and urinary cancers. A 2010 EPA report estimated that people living near unlined coal-ash disposal sites have a one in 50 chance of developing cancer from arsenic contamination (US EPA, 2010b). Ingested boron and chromium, as well as cadmium inhalation, can damage vital organs such as the lungs, liver, kidneys and the brain. Lead and mercury are well known neurotoxins that can be particularly dangerous to children, who may be exposed through drinking water or soil contamination. Human exposure to mercury and selenium can occur through consumption of contaminated fish (Gottlieb et al., 2010; Schaeffer et al., 2009).

3. Disposal site leaks and failures

The 1980 Bevill Amendment to the Solid Waste Disposal Act required the EPA to evaluate documented cases of damage to human health or to the environment relating to the disposal of coal combustion wastes. Over a five-year period starting in 2000, the

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EPA evaluated eighty-five potential damage cases, determining that 24 were proven cases of damage.¹ Sixteen of these were related to groundwater and eight were related to surface water. Nine of the proven damages to groundwater were from unlined landfills and unlined surface impoundments, one was due to a liner failure at a surface impoundment, and the remaining six were from unlined sand and gravel pits. Another 43 cases were determined to be potential damages to groundwater or surface water (U.S. EPA, 2007).

A later study conducted by a coalition of environmental law and advocacy groups (Environmental Integrity Project and Earthjustice) identified an additional thirty-one damage cases from coal ash sites in fourteen states. Of these sites, eight were alleged to pollute off-site groundwater and four were alleged to pollute residential drinking water. Another eight sites allegedly leaked into wetlands, creeks, and rivers resulting in measured selenium in fish tissue samples to be several times safe human consumption levels. On-site groundwater at twenty-six sites allegedly showed high levels of toxins including ten with arsenic levels 11 to 100 times higher than the acceptable concentrations specified by federal drinking water standards (Environmental Integrity Project and Earthjustice, 2010).

Although coal ash is stored in 45 states in the U.S., potential exposure from leaching and water contamination from ash sites is greater in some states than others. A 2014 report issued by the Sierra Club focused on the risks associated with facilities in Illinois, Kentucky, Missouri, Montana, North Carolina, New Mexico, and Virginia. The report highlights a finding from a 2010 assessment by the Illinois Environmental Protection Agency that only one-third of the sixty-three coal-ash facilities in the state are lined or monitored. Ten active sites were categorized by the agency as having a “high” or “very high” potential to contaminate drinking water sources. In Kentucky, thirty of the state’s coal-ash dams are not monitored and twenty were not designed by engineers (Sierra Club, 2014). According to the Hoosier Environmental Council, the town of Pines, IN was declared a Superfund site after a landfill used by Northern Indiana Public Service Company to store coal ash leaked and contaminated private wells (Maloney, 2014).

In 2012, Earthjustice reported that the U.S. EPA had updated its data collection on coal-ash ponds and estimated that only 563 of the 1161 known ponds are lined with any type of material.² Unlined coal-ash disposal facilities and subsequent, seemingly inevitable, leakage exposes electric utilities to lawsuits. Earthjustice filed a 2014 lawsuit under the Clean Water Act against Gulf Power, a subsidiary of the Southern Company, claiming that a coal-ash dump at the Scholz Generating Plant in Florida is leaking pollutants, including arsenic and lead, into the Apalachicola River.³

4. Significant cases

Two significant and highly publicized coal-ash containment breaches have occurred in the U.S. in recent years. In late 2008, following a dike failure at an ash pond at the Tennessee Valley Authority (TVA) Kingston Fossil Plant, more than a billion gallons of coal ash spilled into the Emory River and over 300 acres of land in Tennessee. Twenty-three homes were damaged and three were destroyed. It is estimated that TVA will spend \$1.2 billion in cleanup and restoration costs at the site by the end of 2015, including a

buyout of 150 residential properties in the surrounding areas. This structural failure does not appear to be a random event. A 2009 report by the TVA Office of Inspector General found that TVA management had ignored “red flags” relating to the stability of its Kingston ash-storage facilities. The report describes a culture across the organization that ignored the potential hazards of coal-ash disposal and resulted in compliance failures, poor maintenance and training, inadequate communication, and a “failure to follow engineering best practices” (TVA Office of Inspector General (2009) p. 7).

In February of 2014, Duke Energy’s Eden coal-ash disposal site leaked an estimated 39,000 tons of coal ash into the Dan River in North Carolina. The coal-ash sludge traveled nearly seventy miles downstream. According to Duke Energy’s website, the company has spent \$20 million on cleanup to date. However, 94% of the coal-ash waste has settled at the bottom of the river leading to questions relating to the long-term safety of the river for wildlife, fish, and recreational use. In a recently published study, A. Dennis Lemly of Wake Forest University estimated the immediate, short-run damage cost of the spill at \$300million (Lemly, 2015).

The Dan River event prompted the North Carolina legislature to take action and the North Carolina Coal Ash Management Act was enacted in September of 2014. The Act requires Duke Energy to close four ash impoundments and relocate the contents of each to lined facilities no later than August 1, 2019. Additional requirements relate to conversion to dry fly ash or bottom ash handling at active plants and more stringent risk assessment and monitoring by the North Carolina Department of Environment and Natural Resources.

In Duke Energy’s Form 10-K for the year ended 12/31/14, filed with the Securities and Exchange Commission on March 2, 2015, the company booked a \$3.5 billion Asset Retirement Obligation relating to the remediation at the four impoundments and stated that this amount reflected only estimable costs as of that date. The company reports that future additional costs could be significant. The range of estimated costs reported in Duke Energy’s second quarter SEC Form 10-Q was \$2 to \$10 billion. In addition, costs of conversion to dry ash management were estimated at \$425 million to \$650 million.

In February of 2015, federal prosecutors filed criminal charges against Duke Energy for the Dan River spill and the company negotiated a plea agreement with fines estimated at \$100 million (Katz, 2015). According to Duke Energy’s 2014 Form 10-K, five shareholder lawsuits relating to the Dan River spill and coal-ash management were filed against the company and against several current and former officers and directors. These lawsuits were consolidated into one on October 31, 2014 (Duke Energy, 2015).

Several other notable coal-ash spills occurred over the last decade. In 2005, PPL Martins Creek spilled 100 million gallons of coal ash across 10 acres of land and into the Delaware River. PPL was fined \$1.5 million and incurred \$37 million in cleanup costs. Indianapolis Power and Light’s Eagle Valley power plant spilled 60 million gallons of coal ash into the West Fork White River after the same ash pond levee failed in both 2007 and 2008. In October 2011, a retaining bluff at the Wisconsin Energy Corporation’s Oak Creek Power Plant in Milwaukee County collapsed, spilling coal ash into Lake Michigan.

5. Federal regulatory response

In 2009, the EPA began an assessment of the coal-ash sites across the country with the intent of identifying dams that could cause significant destruction similar to that caused by the TVA failure. The agency sent information request letters to electric utilities and corporations that managed surface impoundments.

¹ For the purposes of this EPA analysis, damage to human health is defined as both acute and chronic effects. Damage to the environment is defined as significant impairment of natural resources, degradation of ecosystems and habitats, and effects on wildlife (U.S. EPA., 2007 p. 12).

² A list of the ash ponds and liner status can be found at <http://earthjustice.org/sites/default/files/Coal-Plant-CCW-Disposal-Units-from-ICR.pdf>.

³ <http://earthjustice.org/sites/default/files/files/scholz-complaint.pdf>.

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